GEOPHYSICAL, GEOCHEMICAL and DRILLING REPORT

on the

EXPO GROUP A

Owned by: UTAH MINES LTD. and HEINZ VEERMAN and WILLIAM G. BOTEL

Located: 7 Kilometers northeast of Holberg, B.C.

and

EXPO GROUPS B, C and D

Owned by: UTAH MINES LTD.

Located: 5 Kilometers north to 20 kilometers east of Holberg, B.C.

NANAIMO MINING DIVISION

50° N 127° W

NTS 92 L/12

H.R. Muntanion
Project Geologist
Utah Mines Ltd., Vancouver

K.E. Witherley
Consulting Geologist
Utah Mines Ltd., Toronto

October, 1982
Vancouver, B.C.

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INTRODUCTION

Geophysical and geochemical surveys and diamond drilling were carried out from May 23 to August 25 on Expo Groups A, B, C and D. This activity was concentrated in the Red Dog claim and Hushamu Lake areas on the following claims: Red Dog No's 1 to 12, 14, Red Dog Fraction, T2 Fraction, Expo No's 1, 10 Fraction, 21, 41 Fraction, 51, 190, 192, 217, 221, 222, 237 to 239, 241 to 243, 245, 260 to 262, 281, 282 and Don Fractions 2, 4, 6, (Plate 1).

The above Expo claims, owned by Utah Mines Ltd. and the Red Dog claims owned by Heinz Veerman and William G. Botel are part of a large west-northwest trending claim block occupying an area of approximately 24 by 11 km. The groups affected by this report consist of 309 units.

During the 1982 field season the following work was performed:

a) 16.9 line km. of induced polarization geophysics to complete the coverage in the Red Dog area over a porphyry copper target and to test for deep-seated disseminated sulphides within and adjacent to the Hushamu porphyry Cu-Mo deposit;
b) 3.6 line km. of geochemical sampling, including 131 soil and 20 rock chip samples, to test the potential for Cu, Mo and Au in an area of strongly-quartz veined and silicified Bonanza fragmental volcanics;
c) 17.5 km. of linecutting
d) 1,145 m. of diamond drilling in ten holes to test a Cu-Mo quartz-magnetite breccia zone on the Red Dog claims and to further define the Hushamu porphyry Cu-Mo deposit
e) and the construction of a 16 by 30 ft. core storage facility.

All field work was performed or caused to be performed by Utah Mines Ltd. Personnel employed by the company to carry out and supervise the work were: geologists H. Muntanion, J.B. Richards; consulting geophysicist K. Witherley; warehouseman J. Howe; technician D. Stonecipher and assistants C. Robinson, B. Laird, A. McNutt and D. Barnett.

Accomodation for Utah personnel and the drill crew was found at the Trails End Motel in Holberg and meals were provided by Glenora's Kitchen. Statements of qualifications and costs, together with contractors' invoices, are included in this report in Appendices A and B, respectively.

Location and Access

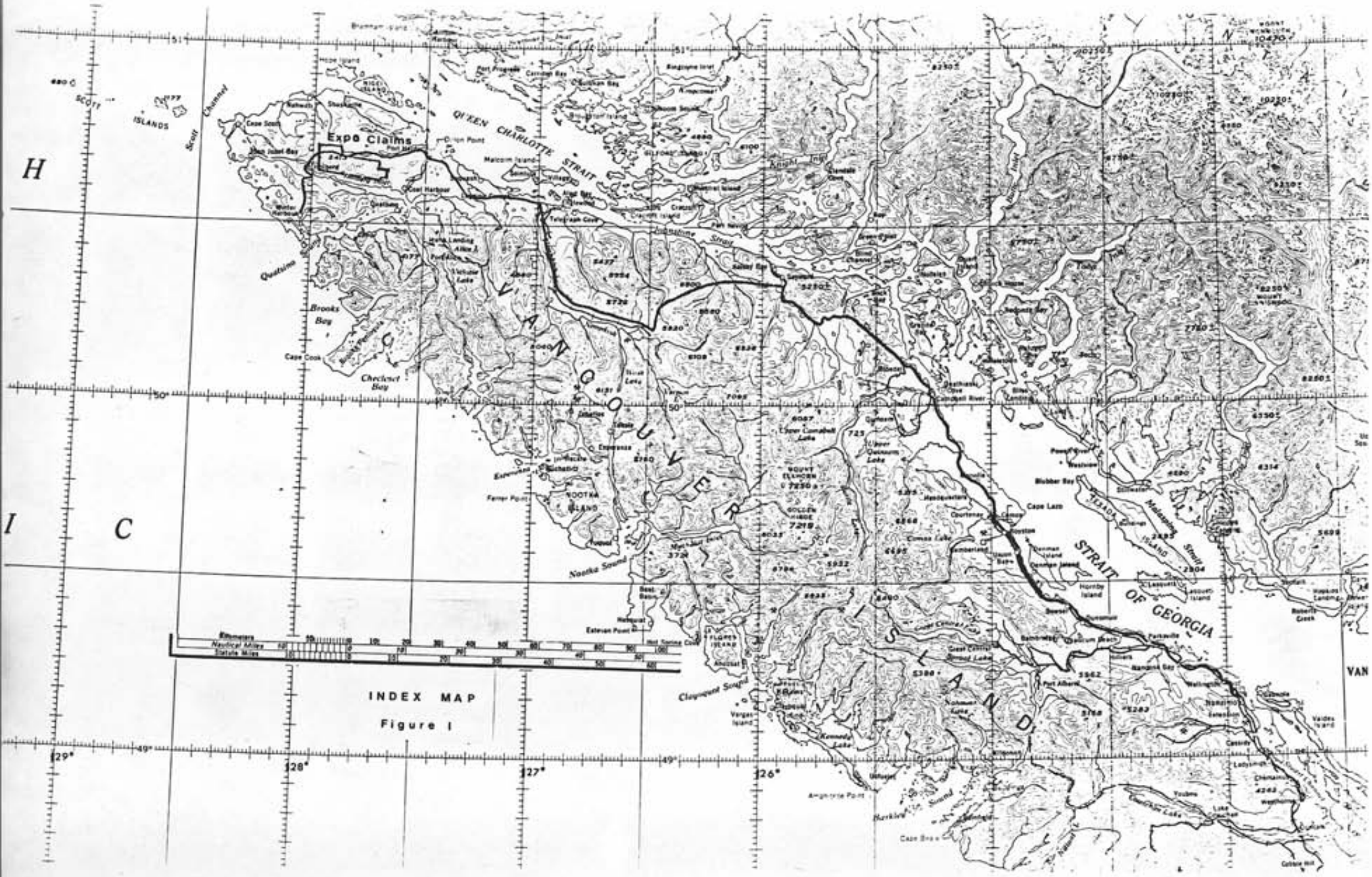
The area of interest is located north of Holberg Inlet about 24 to 34 km. west and southwest of Port Hardy on Vancouver Island (Figure 1). It extends from about 2 km. east of Wanokana Creek to about 8.5 km. north of the town of Holberg (Plate 1).

The work area is accessible by the Port Hardy-Holberg road and a network of logging roads constructed by Western Forest Products. Road NE 62 services the Red Dog claim vicinity and NE Main and a drill access road provides access to the Hushamu Lake area.

Daily flights originating from Vancouver service Port Hardy. A helicopter charter service is available at the Port Hardy airport.

Physiography

Within the area of work elevations range from about 240m to 700m. The topography is rugged and slopes are generally steep and deeply incised with stream valleys. Both the Red Dog claim and the Hushamu areas lie within the Western Forest Products timber licences.


Expo Claims
QUEEN CHARLOTTE STRAIT
VANCOUVER ISLAND
STRAIT OF GEORGIA
Scott Channel
SCOTT ISLANDS
Brooks Bay
Checleset Bay
Nootka Sound
Clayoquot Sound
Kilometers
Nautical Miles
Statute Miles
INDEX MAP
Figure 1
129°
128°
127°
126°
51°
50°
49°

The Red Dog claim area is dominated by a northeast trending hill which rises 350m above the Goodspeed River valley to the south.

North of the logging road NE 62 and west of the south-flowing tributary, which joins the Goodspeed River on the Red Dog 12 claim, the area has been logged off and is littered with slash. Secondary growth is heavy, particularly on the south facing slopes. Gulleys and several landslides have developed on some of the steeper slopes. A few small swamps occur in the river valley.

Within the Hushamu Lake valley area the bordering hills have a relief of almost 400m. The valley is covered with mature stands of hemlock, spruce, cedar and balsam, becoming somewhat stunted 500m above sea level.

At Holberg the average annual precipitation is about 400 cm. At sea level snow rarely remains for more than a few days at a time but depths increase rapidly with an increase in altitude. At elevations of 600m the cummulative annual snowfall is about 240 cm. The period from mid June to early September is normally relatively dry. Mean daily temperatures range from a few degrees above zero centigrade in January to about 14 degrees centigrade in July.

History

The first report on the geology of Northern Vancouver Island was published by the Geological Survey of Canada in 1887. Since then, both the Geological Survey of Canada and the British Columbia Department of Mines have sponsored field parties in the region at various times. In 1962, the Department of Mines released data from an airborne magnetometer survey of Northern Vancouver Island which

generated an interest in a search for iron deposits. During 1963 and 1964 copper exploration programs consisting mainly of stream sediment sampling were conducted by numerous companies. No significant discoveries were made, however, and by 1965 very little interest was being shown in the region.

Utah's initial effort in the area was the staking of a few claims in the Wanokana River and Hep Creek areas in 1961 and 1962. Additional claims were staked in the latter area in 1965 and 1966, following ground surveys and limited drilling. In 1967 Utah staked the Expo claim block (661 claims) following the discovery of the Island Copper deposit. Internal to the Expo ground, the Red Dog claims were staked in the same year by Westcoast Mining Co.

Between 1967 and 1969 the claim block was covered with detailed soil sampling and geologically mapped on a scale of 1 inch to 1,000 feet. Between 1970 and 1973 areas of primary interest, totalling 70.4 sq.km., were mapped on a scale of 1 inch = 200 feet and covered by magnetometer surveys on lines spaced 400 ft. (120m) to 500 ft. (150m) apart. The bulk of this area was also covered by induced polarization surveys. A small amount of EM and seismic geophysical work was also done.

Between 1966 and 1977 a total of 146 holes were diamond drilled, most of which tested Cu-Mo zones in the Hushamu and Hep Creek valley.

The Red Dog Cu-Mo claims were geologically mapped on a scale of 1 inch to 400 ft., soil sampled and covered by magnetometer and EM surveys. From 1968 to 1970 24 holes were diamond drilled. From 1972 to 1977 the property was optioned by City Services Ltd., and remapped. An additional six holes were also drilled.

In 1980 a relatively small portion of the claim group was allowed to lapse. In the spring of 1982 Utah Mines Ltd. staked the Wanokana 1 to 3 and Pemberton 1 to 6 blocks in the Youghpan and Wanokana River areas and the Expo 900 claim adjoining the northwestern end of the block. Competitors also staked some claims in the former region.

Claim Status

The Expo and Red Dog blocks of claims currently consist of 672 and 26 units, respectively. Apart from the Wanokana 1 to 3 and Pemberton 4 to 6 claim blocks which are valid until April 1983 and Expo 274, valid until October 1983, claim expiry dates range from 1984 to 1997.

In May 1982, Utah Mines Ltd. entered into an option agreement with H. Veerman and W.G. Botel for the Red Dog claims.

Geological Setting

The Expo/Red Dog claim block is underlain by volcanic and sedimentary rocks of the Vancouver Group, which consists of Karmutsen basic volcanic rocks of Triassic age overlain successively by Quatsino limestone, of Triassic age, Parson's Bay sediments of Upper Triassic age and Bonanza volcanics of Upper Triassic-Lower Jurassic age. The above rocks are intruded by several isolated stocks which are part of a belt of intrusive stocks extending from Rupert Inlet northwesterly to the mouth of the Stranby River. In proximity to the northwesterly trend of acid intrusive stocks are zones of silicified ($\pm$ pyrophyllite) breccia bodies, apparently crosscutting Bonanza rocks.

Dominant fault and shear trends in Bonanza rocks are northwest and northeast, with subordiante east-west and north-south trends. Most major faults have a northwest trend.

Pyrite is the most widespread and abundant sulphide mineral. Sulphides, including chalcopyrite, occur as disseminations and in veinlets in the Bonanza volcanics. The sulphide content increases towards the silicified breccia volcanic contact. Copper porphyry occurences are known at Hushamu, Red Dog and Hep. At Hep a Cu zone of insignificant dimensions is localized in a fault zone. At Red Dog Cu-Mo mineralization has been found in a quartz-magnetite zone and in small erratic zones, grading up to 0.3% Cu, at the contacts of felsic dikes and andesite. The dimensions of the zones of mineralization at Red Dog are undetermined but appear to have a limited extent.

FIELD WORK

The field work carried out by Utah Mines Ltd. on the Expo and Red Dog claim blocks consisted of induced polarization and geochemical surveys and diamond drilling. For control, Sky Hookers Logging Ltd. were employed to construct picket lines over the survey areas by compass and chain method, correcting for slope where necessary. Existing lines on the Expo claims were extended across the Red Dog claims. A total of 10.5 line kilometres were cut and pickets placed at 100 feet (30.5m) intervals along north-south lines 2042 E, 2047 E, 2052 E, 2072 E, 2077 E, 2082 E, 2087 E and 2092 E (Plate 2). A total of 5.5 km of line had been cut on these claims earlier in the year by Utah crews.

In the Hushamu area north-south line 2330 E was refurbished and picketed at 100 feet intervals from 2392 N to 2506 N (3.5km). An east-west line was constructed at 2440 N for 3.5 km from 2284 E to 2400 E and picketed at 100 feet intervals (Plates 3 to 6).

Induced Polarization Survey

A total of 10.2 line km (33,400 ft) of I.P. survey were conducted by Pheonix Geophysics Ltd. between July 7 and 28 on Expo Claim No's: 10 Fraction, 21, 41 Fraction, 51, T2 Fraction and Red Dog claims 1 to 12, 14 and Red Dog Fraction in the Red Dog area and 6.7 km (22,000 ft) on Expo claims No.'s 190, 192, 221, 222, 237, 239, 241 to 243, 245, 260 to 262, 281, 282 and Don Fractions 2, 4 and 6 in the Hushamu areas (Plates 2 to 6).

Soil Geochemistry

Detailed soil sampling was conducted by Utah personnel within a 0.33 sq. km. area on Expo claim No.'s 237, 239, 242, 245, 261 and Don

Fractions 4 and 6. Twenty rock chip samples were also collected within and peripheral to the grid. A total of 131 soil samples were taken at 100 feet intervals along lines with separations of 200 and 250 feet north and south, respectively, of east-west line 2440 N (Plates 19 and 20). Lines and stations were flagged using compass and hip chain. Existing lines which were still visible were used.

Drilling

From June 1 to July 1 diamond drilling was performed by D.W. Coates Enterprises Ltd. Six holes totalling 664.5 m (2180 feet) were drilled on Red Dog Hill on Expo claim No. 1 and Red Dog claim No.'s 5 and 7 (Plate 2). In addition four holes totalling 480.5 m (1577 feet) were drilled on Expo claim No.'s 217, 237 and 238 in the Hushamu Lake valley (Plates 4 and 5). Expo claim No. 237 a 16 by 30 feet core shack was constructed by Utah personnel (Plate 5).

All drill sites are accessible by road. On the Red Dog area 1,000 m of road work were required to re-open logging road NE 62H and to upgrade a tractor road. A 120 m link was constructed to join logging road NE 62B (Plate 2). In the Hushamu area a 120 m corduroy-surfaced spur was constructed to drill site EC-136 (Plate 4). At site EC-137 and 137A the existing road was widened. The road work was contracted to Port Hardy Bulldozing Ltd. Professional falling, performed by Sky Hookers Logging Ltd., was required at two drill sites.

INDUCED POLARIZATION SURVEY

Field Procedures

IP surveys were conducted over the porphyry Cu-Mo targets in the Red Dog and Hushamu areas. At Red Dog a dipole - dipole array, with a dipole of 200 feet, acquiring separations of n = 1 through n = 4, was used along parallel lines. At Hushamu, where deeper penetration was desired, a dipole of 500 feet, acquiring separations of n = 1 through n = 6, was used along two lines perpendiculer to each other.

The surveys were performed using a Phoenix IPV-2 receiver and a Phoenix IPT-1 transmitter, powered by a 3 h.p. motor generator at Red Dog and an 8 h.p. unit at Hushamu. The IPV-2 is a phase measuring-type receiver, capable of measuring two potential dipoles simultaneously. For a given transmitted waveform, in this case a 1 Hz squarewave, the IPV-2 measures the phase lag in milliradians of the received potential signal with respect to the transmitted signal. This phase lag is an expression of the earth's local chargeability and is comparable to chargeability units such as mili-seconds in the time domain or percent frequency effect in the frequency domain (potential measurements at more than one frequency are needed to determine a PFE response). In order to measure the phase lag to a fine precision, syncronized crystal clocks are used in both the IPV-f2 and the IPT-1. These clocks are checked at least twice a day to ensure that the drift between the two devices is within survey precision limits.

Discussion

The IP survey over the Red Dog grid revealed three main anomalous zones, designated anomalies A, B, and C shown on Plate 2. The pseudosections for the surveyed lines are designated Plates 7 to 17 for lines 2042E to 2092E inclusive.

Anomaly A: This anomaly appears as a narrow, dyke-like feature on lines 2042E and 2047E. On L2042E, a coincident resistivity low, chargeability high is noted. While the resistivity source appears to be at depth, the chargeability source appears to extend to bedrock surface. On L2047E, the resistivity anomaly is essentially absent while the chargeability response is reduced in amplitude and appears to be deeper than on L2042E. This anomaly is considered to be open to the west. No outcrops occur in this area.

Anomaly B: This is the major anomaly located on the grid, extending from L2052E to L2087E. The anomaly ($>$ 50 mrad) is roughly circular in shape, centered at approximately 2064E, 2584N, with a radius of about 800 feet. The anomaly forks between L2067E and L2072E with the forks continuing eastward to L2077E. On all the lines over the anomaly, a fairly intense but narrow resistivity low ($<$ 150 ohm) is associated with a very broad area of anomalous chargeability. The most intense and coherent part of the chargeability anomaly is found on lines L2052E and L2057E. Moving eastward, the amplitude of the anomaly diminishes and the anomaly pattern breaks up into a number of discreet lows, not all of which show a coincident low in resistivity.

On the south end of L2057E the top of the chargeability anomaly between station 2575N to 2579N appears to be in the order of 125 feet below the surface. The corresponding high-over-low resistivity section suggests thicker glacial till may be the cause of this affect.

On L2072E the anomaly divides into two towards the east, with the southerly trending fork the more substantial of the two. On L2077E, the anomaly represented by the southern fork is considered open to the south, while the northern fork is largely a relatively shallow feature and thought to be depth restricted. By L2082E, almost all sign of the chargeability anomaly has disappeared, although the narrow resistivity low is still apparent under station 2578N.

The anomally is underlain by Bonanza volcanics intruded by an east-west trending dike-like body of hyrothermally altered quartz-feldspar porphyry. To the west (2050 to 2062E) the dike is apparently capped by a quartz-magnetite breccia. Over the southern half of the anomaly exposure is sparse although there are indications of strong silicification and clay alteration. Sulphide contents are variable but generally in the 2-5 % range.

Anomaly C

This anomaly is located on the east end of the grid at the south end of L2087E and L2092E, an area covered by overburden. On L2087E, a deep seated (approximately 200 feet) chargeability source is interpreted under station 2581N.

An adjacent but shallower resistivity low is noted under station 2579N. On L2092E, station 2581N, the depth of the anamaly is interpreted as being shallower, however, the adjacent resistivity low is absent and a very small low is noted directly over the chargeability anomaly. This anomaly is considered to be open to the east and to the south on L2087E.

The location of the two surveyed lines, L2330E and L2440N in the Hushamu area are shown on Plates 3 to 6. The pseudosection plots are submitted as Plates 18 and 19.

L2330E

The pseudosection shows a considerable level of anomalous activity in both the resistivity and chargeability parameters. While the resistivity anomalies are fairly discreet, particularly the lows (250 ohm), the chargeability anomalies (>50 mrad) are quite spread out across the line. Three areas of intense resistivity low are indicated, one under station 2423N, one under station 2450N and the other under station 2464N. The first two anomalies appear to be most intense at depth where no geological information is available while the anomaly under station 2464N, within the Hushamu porphyry Cu-Mo zone, looks to be relatively shallow. Although anomalous chargeability values are noted at various depths across almost the entire line, two of the most intense zones have a direct association with the resistivity lows under stations 2423N and station 2450N. A chargeability anomaly is also associated with a resistivity anomaly at station 2464N, at the contact of a silicified-pyrophyllitized breccia with andesite, but is just south of the resistivity feature. A zone of resistivity high is situated in the central part of the line, underlain by the above breccia unit, and is associated with chargeability values of a moderately anomalous to non-anomalous level.

L2440N

The pseudosection shows a considerable level of anomalous activity in both resistivity and chargeability. Three areas of resistivity low are identified: under stations 2313E, 2335E and 2355E. The anomalies under stations 2313E and 2355E appear to extend from surface to bedrock, while the anomaly under 2335E appears to be at a moderate depth below surface. The area in the vicinity of 2313E appears to be underlain by argillized andesite with 2-10% disseminated pyrite. Stations 2335 and 2355E are within the breccia unit with about 5% pyrite being visible near the latter location which is at the contact zone with andesite.

The most intense zone of anomalous chargeability is between stations 2327E to 2350E, underlain by the breccia unit, with the response appearing to go from surface to depth. Unlike the previous line, the most intense chargeability anomalies do not show a close spatial relationship with the resistivity lows.

GEOCHEMICAL SURVEY

A small area was selected for geochemical study to test the potential for Cu, Mo and Au in an area of strongly quartz veined and silicified breccia. For the soils, As and Hg results were also obtained to ascertain the practicability of these elements as pathfinders for Au in this environment. The grid is situated on the top and the southern slope of a hill south of the Hushamu valley. The hilltop is relatively flat to undulating and the slope has a grade of 15° to 35°.

Sampling Procedure

About 200 gm. of B horizon sample material was collected with a mattock and put in water-resistant Kraft bags. Depths of 15 to 30 cm. were required on the relatively flat terrain and 20 to 40 cm. on the slope to obtain this material. At a few locations the A horizon was not penetrated and no sample was taken. The soil, generally light brown in color, varies from clay to silt, is frequently grainy and rarely contaminated by organics.

Rock sample, collected in a plastic bag, was collected by chipping exposures with a rock hammer along lengths varying from about 4 to 10 m.

Analytical Procedure

Samples were submitted to Chemex Labs in North Vancouver. The soil samples were dried at 80°C and sieved through an ASTM 80 mesh screen (0.18 mm). About one-third of the samples were subjected to pulverization (to - 100 mesh) and homogenization in a ring grinder.

Rock samples were crushed and pulverized in a ring grinder to - 100 mesh (0.15mm). The soils were analyzed by atomic absorption for Mo, As, Au most for Hg and some for Cu. Rock samples were analyzed for Cu, Mo, Au and some for As.

Molybdenum and copper were analyzed using a Techtron A.A.5 atomic absorption unit resulting in detection limits of 1 ppm. One gm portions of sample are weighed into a calibrated test tube. The sample is digested using hot 70% $HClO_4$ and concentrated HNO_3 . The sample volume is adjusted to 25 mls using demineralized water. Solutions are homogenized and allowed to settle before analysis.

For the determination of Au a 5 gm sample is ashed at 800°C for one hour, digested with aqua regia (twice to dryness) taken up in 25% HCl^-. The Au is then extracted as the bromide complex into MIBK and analyzed by atomic absorption, achieving a detection limit of 10 ppb.

Arsenic is determined using flameless atomic absorption to a detection limit of 1 ppm. A 1.0 gram sample is digested with a mixture of perchloric and nitric acid to strong fumes of perchloric acid. The digested solution is diluted to volume and mixed. An aliquot of the digest is acidified, reduced with Kl and mixed. A portion of the reduced solution is converted to arsine with $NaBH_4$ and the arsenic content determined using flameless atomic absorption.

Mercury is determined by digesting the sample with nitric acid plus a small amount of hydrochloric acid. Following digestion the resulting solution is transferred to a reaction flask connected to a closed system absorption cell. Stannous sulfate is rapidly added to reduce mercury to its elemental state. The mercury is then flushed out of the reaction vessel into the absorption cell where it is measured by cold vapour atomic absorption methods with a Jarrell Ash Multi-Versatility Spectrophotometer. The absorbance of samples is compared with the absorbance of freshly - prepared mercury standard solutions carried through the same procedure. The detection limit of this method is 5 ppb.

Discussion of Results

Values of the soil and rock geochemical results are presented on Plates 20 and 21.

Soil results are generally of a relatively low order of magnitude and the few obviously anomalous values have a somewhat erratic distribution. Au results appear to be the most interesting ranging up to 150 ppb. Two areas on the southern hillside are considered to be anomalous. Values of 40 to 130 ppb. are scattered in the southwestern quadrant of the grid. This area is underlain by a strongly siliceous breccia unit and the contact zone with altered andesite. At the southeastern corner of the grid, within the altered andesite unit, an open-ended Au anomaly is represented by values of 80 and 150 ppb. The highest Au value recorded in a rock sample is 60 ppb, located just northwest of the grid.

A wedge-shaped low to moderate Mo anomaly, extending from 2434 to 2439N on line 2328E and pinching out to the east, is characterized by values in the 20 to 30 ppm range with peaks of 55 and 124 ppm. This area is underlain by strongly quartz-veined siliceous volcanic breccia. The anomaly is supported by four rock results in excess of 100 ppm. The two samples in the southeast corner with Au highs also yield Mo highs.

Copper results from the first dispatch of samples were low (mostly$\angle$50 ppm) and it was decided to discontinue Cu analyses. The highest results were recorded along line 2328E between 2420 and 2435N, ranging from 16 to 71 ppm Cu.

Arsenic values range up to 39 and 103 ppm. Values above 20 ppm may be anomalous for this area and are concentrated along line 2328E between 2428 and 2438N showing some coincidence with both Au and Mo highs. A few other scattered As highs occur.

Mercury values range from 20 to 100 ppb. Anomalous patterns are not developed and this element does not show an obvious correlation with the other metals.

A multi-element anomalous dispersion is manifested on line 2328E between 2428 to 2438N. It occurs on a steep slope (25-40^{o}) possibly resulting in downward transport of an anomalous source which may be much more restricted in size. The sample of 2328E, 2435N has enhanced levels in all metals analysed. The significance of these values should probably be reduced due to the presence of organics in the sample which tend to scavange most metals.

DIAMOND DRILLING

Drilling was restricted to: a) Red Dog Hill to test Cu-Mo porphyry mineralization hosted in a quartz-magnetite breccia unit b) the Hushamu Lake valley to further delimit the Hushamu porphyry Cu-Mo deposit

Drilling was performed by D.W. Coates Enterprises Ltd. using a skid-mounted Super "38" drill unit equipped to drill NQ core size. The drill was operated by two 2-man crews each working a ten hour shift seven days per week. During the latter part of June the B.C. Forestry Department restricted hours of industrial operations due to a high fire hazard.

Below is a summary of the holes drilled. Locations are plotted on Plates 2 to 4.

Hole Number	Located on Claim	Approx. Elev.	Angle	Azimuth	Total Depth
EC-131	Red Dog 7	503m	-51°	357°	189m (620ft)
EC-132	Red Dog 7	503m	-50°	181°	53.5m (176ft)
EC-132A	Red Dog 7	503m	-71°	181°	155m (509ft)
EC-133	Red Dog 5	384m	-45°	180°	152m (500ft)
EC-134	Expo 1	363m	-45°	179°	62m (203ft)
EC-135	Expo 1	363m	-90°		52m (172ft)
EC-136	Expo 217	302m	-90°		151.5m (497ft)
EC-137	Expo 237	329m	-90°		27.5m (90ft)
EC-137A	Expo 237	329m	-90°		136m (447ft)
EC-138	Expo 238	305m	-90°		165m (542.5ft)

Drilling generally encountered moderate to good ground conditions, with average core recovery in the 90-95% range. Two holes, EC-132 and EC-137, were abandoned prior to target depth due to bad ground conditions and other subsequent problems.

Core was logged by a Utah geologist, then split in half. Half the core was sent for analyses to Chemex Labs Ltd. in North Vancouver via Pacific Coach Lines. The remainder was placed in storage in the core storage facility constructed on Expo claim No. 237.

Drilling data accpompanying the report consists of complete diamond drill logs for holes EC-131 to 138 in Appendix D. A copy of the drilling contract is given in Appendix C. The drill logs submitted in Appendix D were done by H. Muntanion whose signature is given below to cover all log sheets.

H. Muntanion, B.Sc.
Project Geologist

CONCLUSIONS

The IP survey over the Red Dog area outlined three anomalous zones of chargeability. A large area of response is related to abnormal sulphide contents associated with an alteration zone. The strongest part of the anomaly is situated in the vicinity of current drill holes in which sulphide contents of 5 to 10% are common. The two remaining anomalies are small but open-ended and their source is unknown since geological data over these areas does not exist.

The IP survey at Hushamu generated what are considered to be moderate strength anomalous readings over a broad area. Vertical intensities do not vary a great deal.

The soil and rock geochemical survey outlined overlapping anomalous Au and Mo zones. The anomalous area appears to be related to strongly quartz-veined siliceous breccia.

Additional drilling appears to be warranted to further define the Red Dog and Hushamu Co-Mo porphyry zones. The IP data appears to be useful, particularly at Red Dog in locating future drill hole positions.

REFERENCES

DAWSON, G.M. 1886	Geology of Rupert Inlet, Annual Report, Geological Survey of Canada.
MULLER, J.E. 1971	Chemistry and Petrology of Some Mezozoic Volcanic Rocks of Vancouver Island, British Columbia, G.S.C. Paper 71-1B, p.5
NORTHCOTE, K.E. 1970	Geology, Exploration, and Mining in British Columbia, B.C. Department of Mines and Petroleum Resources pp. 267-269.
J.E. MULLER K.E. NORTHCOTE D. CARLISLE 1973	Geology and Mineral Deposits of Alert Bay-Cape Scott Map Area (92L-1021) Vancouver Island, British Columbia.

In addition, the following assessment reports provided reference data:

ASCENCIOS, A.	Geological and Geophysical Report Expo-Hep Claims, 1972.
ASCENCIOS, A.	Geological and Geophysical Report Expo-Hep Claims, 1973
BOWEN, B.	Geological, Geophysical and Drilling Report, Expo-Hep Claims, 1974.
BOWEN, B.	Drilling Report, Expo-Hep Claims, 1974.
BOWEN, B.	Drilling Report on the Expo Groups 1 to 3, 1976.
BOWEN, B.	Drilling Report on the Expo Groups 2, 4, 5, 6, 7 and 8, 1977.

APPENDIX A

STATEMENT OF QUALIFICATIONS

Field work for the report was done by H. Muntanion. K.E. Witherley was responsible for the geophysical section of this report. Qualifications are outlined below:

H. Muntanion, Project Geologist for Utah Mines Ltd, Vancouver, B.C.

Completed B.Sc. in 1970 at the University of Manitoba; employed by: Canadian Nickel Co. in the summers of 1969 and 1971 as a student and field geologist, respectively; Amax, Vancouver, B.C. during the summer of 1970 as a geological assistant in the Yukon; The Manitoba Mines Branch during the 1972 field season as a field geologist; Hudson Bay Oil and Gas Ltd., Toronto, Ontario during May to December, 1973 as a temporary geologist; Mindeco Ltd., Lusaka, Zambia from May 1974 to May 1977 as a geologist; Canadian International Development Agency, Ottawa, Ontario from August, 1977 to December, 1979 as geologist in Malaysia; Utah Mines Ltd. from April, 1980 to present under the supervision of A.J. Schmidt, P. Eng.

K. Witherly, Geophysicist for Utah Mines Ltd., Toronto, Ontario

Completed B.Sc., (Geophysics) at the University of British Columbia in 1971; employed by Utah Mines Ltd., and Tri-Con Exploration Surveys during 1969 and 1970 summer field seasons respectively as a geophysicist's assistant; employed by Utah Mines Ltd. from 1971 to 1975 in Vancouver, from 1975 to 1978 in Reno, Nevada and from 1978 to present in Toronto.

APPENDIX B

STATEMENT OF COSTS AND INVOICES

Linecutting

4.02 mi @	1,325.00/mi	$5,326.50
2.56 mi @	1,100.00/mi	2,816.00
1.81 mi @	1,505.00/mi	2,724.05
104 hrs @	20.16/hr	2,096.64

Salaries:

J.R. Richards	Sr. Geologist	1 day @ 175.00/day	175.00
H. R. Muntanion	Proj. Geologist	6 days @ 119.23/day	715.38
C. Robinson	Assistant	12 days @ 48.05/day	576.60

Accomodation

19 man days @ 39.50/man day	750.50
Total	$15,180.67

Induced Polarization Survey

Survey Cost (Invoices 3179, 3218, 3223)	$15,932.29
Helicopter (Invoice 29845)	353.53

Salaries (preparatory, supervision):

J.R. Richards	Sr. Geologist	2 days @ 175.00/day	350.00
H.R. Muntanion	Proj. Geologist	3 days @ 119.23/day	357.69
C. Robinson	Assistant	3 days @ 48.05/day	144.15

Accomodation:

8 man days @ 39.50/men day	316.00
Total	$17,453.66

Geochemical Survey

Analytical costs:

Soils (Determinations 131 Mo, As, Au; 93 Hg; 38 Cu)	$1,437.88
Rocks (20 Cu, Mo, Au)	160.00

Salaries:

J.B. Richards	Sr. Geologist	1 day	175.00
H.R. Muntanion	Proj. Geologist	7 days @ 119.23/day	834.61
C. Robinson	Assistant	9 days @ 48.05/day	432.45

Accomodation:

17 man days @ 39.50/men day	671.50
Total	$3,711.44

Diamond Drilling

Drill Site Preparation:	Road work (Invoice 8559 and 033-1350-2135)		$9,721.28
	Falling		600.00
Diamond Drilling:	(Invoices 2265, 2271, 2345)		110,554.21
Bulldozer Rental:	(Invoice 8580)		6,474.75
Drill Mobilization:	(Invoice 8571)		1,463.41
	Rental of skidder		471.50
Assays:	Analyses 316 Cu, 202 Mo, 149 Ag, 261 Au		5,451.61
	Sample shipment		239.00

Salaries:

J.B. Richards	Sr. Geologist	8 days @ $175.00/day	1,400.00
H.R. Muntanion	Proj. Geologist	52 days @ 119.23/day	6,199.96
C. Robinson	Assistant	49 days @ 48.05/day	2,354.45
J. Howe	Warehouseman	2 days @ 76.90/day	153.80

Accomodation: (including 4-man drill crew) 231 man days @ 39.50/man day	9,124.50
Total	$154,208.47

Core Storage Facility Construction

Materials:			$5,096.73
Salaries:			
J. Howe	Warehouseman	18 days @ 76.90/day	1,384.20
D. Stonecipher	Technician	15 days @ 76.90/day	1,153.50
G. Robinson	Assistant	7 days @ 48.05/day	336.35
A. McNutt	Assistant	4 days @ 55.19/day	220.76
D. Barnett	Assistant	4 days @ 48.05/day	192.20
B. Laird	Assistant	4 days @ 62.50/day	250.00

Accomodation 52 man days @ 39.50/man/day	2,054.00
Total	$10,687.74

Miscellaneous Costs

Gasoline			$912.39
Vehicle and Tire Repairs			278.41
Vehicle Rental			231.81
Airfares: 8 airfares @ 82.10 each			656.80
Field Supplies			450.58
Map Reproduction			135.00
Telephone			897.43
Report Preparation:			
H.R. Muntanion	Proj. Geologist	7 days @ 119.23/day	834.61
J.B. Richards	Sr. Geologist	2 days @ $175.00/day	350.00
K.E. Witherly	Cons. Geophys.	3 days @ 250.00/day	750.00
R. Gopal	Draftsman	2 days @ 100.00/day	200.00
V. del Valle	Secretary	1 day @ 100.00/day	100.00
Computor		8 hrs. @ 50.00/hr.	400.00
		Total	$6,197.03

July 21/82

SKY HOOKERS LOGGING LTD
Box 387
PORT HARDY BC
V0N2P0

REQUEST PAYMENT:- RE RED DOG
HOLBERG BC.

"1P GRADE - 4.02 miles @ 1325./mile
$5,326.50

WALKING GRADE - 2.56 miles @ 1100/mile
$2,816.00

as / Work Schedule I

Line 2082E has been changed to $4000 not 3600.

TOTAL $8,142.50

Harry Montanna
July 28, 1982

OK /APJ.

Best Res, Jr.

Tilden
Rent-a-car Service

P.O. Box 1800
Port Hardy, B.C.
V0N 2P0
(604) 949-7273

Affiliates:
National Car Rental
Europcar

RECEIVED
SEP 21 1982
UTAH MINES L.D.
EXPLORATION DEPT.

Sept 14/82

SKY HOOKERS LOGGING LTD.
BOX 387
PORT HARDY BC V0N 2P0

REQUEST PAYMENT
RE McINTOSH -

19 - 2440
36 - 2440
34 2330
33 - 2330

954 ÷ 5280 = 1.81 miles

1.81 miles @ 1505.00 = $2724.05

[signature]

OK/AD/.
EXPO

Aug 3/82.

Sky Hookers Logging
Box 387
Port Hardy BC
V0N 2P0

Extention on MacDonald (Intosh)
64 hrs @ 20.16/hr = $1,290.24 - TOTAL

Backline Reed Dog Area.
40 hrs @ 20.16/hr = $806.40 - TOTAL

Postkleepen
[signature]

OK /A.D.S.
Ex10 - $1290.24 ✓
Red Dog - 806.40 ✓

Aug 24/82

Stig Hoekes Logging Ltd
Box 387
Port Hardy BC V0N 2P0

6 Bales of Flagging Tape.

40 rolls @ 2.05 = 82.00
20 rolls @ 2.25 = 45.00

127.00

Tax 7.62

$154.62

20 rolls was used from Stig Hoekes's Logging Stock

OK/AJ.
EXPO

PHOENIX Geophysics Limited

200 YORKLAND BLVD., WILLOWDALE, ONTARIO, CANADA M2J 1R5

TELEPHONE (416) 493-6350
Telex: 06-986856
Cable: PHEXCO TORONTO

I N V O I C E

DATE: July 21, 1982
INVOICE: 3179

Utah Mines LImited,
Island Copper Mine,
P.O. Box 370,
Port Hardy, B.C.
VON 2PO

Attention: Mr. Gordon Clarke

REFERENCE: Geophysical Survey - Contract PV-1207, IP and Resistivity Survey, Red Dog Property, Holberg, B.C.

CREW: J. Marsh, R. LaPlante, M. Sagmeister, B. Odland

PERIOD: July 7/82 to July 10/82

3½	Operating days	@ $870.00	$3,045.00
½	Bad Weather day	@ $585.00	292.50
			$3,337.50

PHOENIX GEOPHYSICS LIMITED

UTAH MINES LTD.
REC. RPT. O.K.
PRICE EXT.
REC'D JUL 2 ' 1982
I.C. APPROVED
ACCT'G APP'D

RECEIVED
JUL 30 1982
UTAH MINES LTD.
VANCOUVER, B.C.

PHOENIX Geophysics Limited

200 YORKLAND BLVD., WILLOWDALE, ONTARIO, CANADA M2J 1R5

TELEPHONE (416) 493-6350
Telex: 06-986856
Cable: PHEXCO TORONTO

I N V O I C E

DATE: August 6, 1982
INVOICE: 3218

Utah Mines Limited,
Island Copper Mine,
P.O. Box 370,
Port Hardy, B.C.
V0N 2P0

Attention: Mr. Gordon Clarke

REFERENCE: Geophysical Survey - Contract PV-1207
IP and Resistivity Survey, Red Dog Property, Holberg, B.C.

CREW: J. Marsh, R. LaPlante, M.Sagmeister, B. Odland

PERIOD: July 11, 1982 to July 17, 1982

4	Operating days	@ $870.00/day	$3,480.00
2	Bad Weather days	@ $585.00/day	1,170.00
1	Day Off	N.C.	N.C.
	Vehicle Rental		665.53
	Fuel		162.21
			$5,477.74

OK /127.

PHOENIX GEOPHYSICS LIMITED

UTAH MINES LTD. -- EXPLORATION DEPT.					
DISTRIBUTION					
Location	Major	Minor	Act.	Exp.	Amount
00	A405	044 0	0	0	5477 74
00		0	0	0	
00		0	0	0	
00		0	0	0	
00		0	0	0	
Date Received		Invoice Amount			5477 74
Ext. & Prices		Discount			
Approved by		Amount Payable			
		Check No.			

UTAH MINES LTD.
REC. RPT. O.K.
PRICE EXT.
REC'D AUG 11 1982
G.C. APPROVED
ACCTG APPRVD

PHOENIX Geophysics Limited

200 YORKLAND BLVD WILLOWDALE ONTARIO CANADA M2J 1R5

TELEPHONE (416) 493-6350
Telex: 06 986856
Cable: PHEXCO TORONTO

INVOICE

DATE: August 6, 1982
INVOICE: 3223

Utah Mines Limited,
Island Copper Mine,
P.O. Box 370,
Port Hardy, B.C.
V0N 2P0

Attention: Mr. Gordon Clarke

REFERENCE: Geophysical Survey Contract PV-1207, IP & Resistivity
Expo Property, Holberg, B.C.

CREW: J. Marsh, R. LaPlante, M. Sagmeister, B. Odland

PERIOD: JUly 18, 1982 to JUly 28, 1982

5½	Operating days	@ $870.00/day	$4,785.00
1	Bad Weather day	@ $585.00/day	585.00
1½	Standby days	@ $585.00/day	877.50
3	Days Off	@ N.C.	N.C.
	Vehicle		610.07
	Fuel		213.73
	Freight		45.75
			$7,117.05

UTAH MINES LTD. -- EXPLORATION DEPT.

DISTRIBUTION

Loc	Mine	Mkt	Adv.	Exp.	Amount
			0	0	PHOENIX GEOPHYSICS LIMITED
	A097	044	0	0	7,117.05
					7,117.05

UTAH MINES LTD
REC'D AUG 11 1982

VANCOUVER ISLAND HELICOPTERS LTD.

No. 1 - 9600 CANORA ROAD, SIDNEY, B.C. V8L 4R1 TELEPHONE 656-3987

87/12

DATE July 29, 1982

In Account With

Utah Mines Ltd. - Exploration Dept.

1600 - 1050 W. Pender Street

Vancouver, B.C. V6E 3S7

Expl
E.14 4g

REFERENCE Invoice #29845

FLYING SERVICE FOR MONTH OF July 20 19 82

AS PER ATTACHED FLIGHT INVOICES.

HELICOPTER TYPE Bell 206B REG. No. C.F. VIF

BASE OF OPERATION Port Hardy

BALANCE FORWARD		
.7 HOURS @ $ 450.00 PER HR.	$	
.7 HOURS V.I.H. FUEL @ $ 51.25 PER HR.		
____ HOURS @ $ ____ PER HR.		
____ HOURS V.I.H. FUEL @ $ ____ PER HR.		
MINIMUM CHARGES (IF APPLICABLE)		
CREW EXPENSES		
ADDITIONAL CHARGES Airport Fees		2.65
TOTAL CHARGES	$	353.53

ISLAND BUSINESS FORMS

TERMS: 30 DAYS NET

Interest at 2% per month (24 per cent per annum) charged on overdue accounts.

This company complies with the CODE OF ETHICS of the Helicopter Association of America.

PORT HARDY BULLDOZING LTD.

Box 166 Port Hardy, B.C. V0N 2P0 Telephone 949-6548

May 31, 1982

Utah Mines Ltd.,
Suite 1600-1050 W. Pender St.,
Vancouver, B.C.,
V6E 3S7

Attn: Harry Muntanion

To Build & Grade Spur Roads For Drill

225 Excavator @ $90.00 per hour	
33 hours	$2970.00
D6 Tractor @ $75.00 per hour	
23½ hours	1762.50
Lowbed @ $66.25 per hour	
18½ hours	1225.63
966 Loader @ $75.00 per hour	
4 hours	300.00
Labourer @ $26.00 per hour	
8 hours	208.00
Travel Time @ $53.10 per hour	
19 hours	1008.90
Culvert Pipe	500.00
TOTAL	$7975.03

This reduced figure as per union agreement. double time for travel

CREDIT TERMS

ACCOUNTS PAYABLE IN FULL
20th FOLLOWING MONTH
2% service charge on
overdue accounts

INVOICE # 8559

Harry Muntanion
Utah Mines Ltd.

Western Forest Products Limited

Holberg Forest Operation
Holberg, B.C. V0N 1Z0
(604) 288-3362

Invoice No.
033-1350-2135UTM

May 10, 1982

Utah Mines Limited
Exploration Department
1600 - 1050 West Pender Street
Vancouver, B.C.

Re: Roadwork (using two graders each day)

April 28:	10 hours	
May 1:	17½ hours	
	27½ hours @ $63.50/hr	$1746.25

TERMS: Payable Upon Receipt

Please Remit To:

Western Forest Products Limited
Holberg Forest Operation
Holberg, B.C.
VON 1ZO

Harry Montanaro

July 30/82

Sky Hookers Logging Ltd
Box 387
Port Hardy BC V0N 2P0

RECEIVED
AUG 16 1982
UTAH MINES LTD.
EXPLORATION DEPT.

Re Expo Project

Preparation for Drill Site K
— Total Price $450.00 ✓

Preparation for Drill Site A
— Total Price $150.00 ✓

UTAH MINES LTD. -- EXPLORATION DEPT.					
DISTRIBUTION					
Location	Major	Minor	Act.	Exp.	Amount
00	A497	0410	0	0	600.00
00		0	0	0	
00		0	0	0	
00		0	0	0	
00		0	0	0	
Date Received		Invoice Amount			600.00
Ext. & Prices		Discount			
Approved by		Amount Payable			
		Check No.			

[signature] Bookkeeper

$600.00 — EXPO

OK/[illegible]

D.W. COATES
ENTERPRISES LTD.
DIAMOND DRILLING CONTRACTORS

2560 A Simpson Road, Richmond, B.C. V6X 2P9
Phone: (604) 273-0985
Telex No.: 04357618

RECEIVED
6/22/82 JUN 25 1982
UTAH MINES LTD.
EXPLORATION DEPT.

Utah Mines Ltd.
1600 - 1050 West Pender Street
Vancouver, B.C.
V6E 3S7

INVOICE NO.: 2265
JOB NO.: 474
DATE: June 22, 1982

RE: Holberg, B.C. Drilling
PERIOD: June 1 - 15, 1982

ok / [illegible]
[illegible]

DRILLING DETAIL	$33,643.75
MOVING BETWEEN HOLES	1,665.00
WATER SUPPLY	540.50
MOBILIZATION	5,076.00
REAMING CASING AND HOLE STABILIZING	4,862.83
DRILLING WITH MUD	7,785.10
STANDBY	116.00
TRAVEL TIME	903.25
MATERIAL LEFT IN HOLES	1,515.77
	$56,108.20

UTAH MINES LTD. -- EXPLORATION DEPT.

DISTRIBUTION

Location	Major	Minor	Act.	Exp.	Amount
00	A405	0400	0	0	33,643.75
00	A405	0410	0	0	22,464.45
00		0	0	0	
00		0	0	0	
00		0	0	0	

* 32.25/ft.

Date Received		Invoice Amount	56,108.20
Ext. & Prices		Discount	
Approved by		Amount Payable	
		Check No.	

Big Enough to Do the Job; Small Enough to Care How

D.W. COATES
ENTERPRISES LTD.
DIAMOND DRILLING CONTRACTORS

2560 A Simpson Road, Richmond, B.C. V6X 2P9
Phone: (604) 273-0985
Telex No.: 04357618

RECEIVED
JUL 09 1982
UT... ..D.
EXPLORATION DEPT.

Utah Mines Ltd.
1600 - 1050 West Pender Street
Vancouver, B.C.
V6E 3S7

INVOICE NO.: 2271
JOB NO.: 474
DATE: July 8, 1982

7/14/82

Holberg, B.C. Drilling

PERIOD: June 16 - 30, 1982

DRILLING DETAIL	37,460.5 ~~39,214.50~~
MOVING BETWEEN HOLES	3,972.25 ~~3,990.25~~ 3925.25
WATER SUPPLY	399.50
DEMOBILIZATION	4712.5 ~~4,690.00~~
REAMING CASING AND HOLE STABILIZING	292.9 1,171.22
DRILLING WITH MUD	2335.59 ~~4,109.65~~
STANDBY	1,249.00
TRAVEL TIME	1056.50 ~~1,176.25~~
MATERIAL LEFT IN HOLES	1843.62 ~~1,972.54~~
FUEL	157.50
OTHER CHARGES	312.35
	$ 58,522.76
	58,504.76.

Invoice 2265
Paid $56,108.20
should be $52,779.43
$3,328.77

2016'
$29.03/ft.

$53719.31
-$3328.77
$50390.54

Pay This amount ⇒ $50390.54

...ary
...d Day $6288.50
...xpo $44102.04

D.W. COATES
ENTERPRISES LTD.
DIAMOND DRILLING CONTRACTORS

2560 A Simpson Road, Richmond, B.C. V6X 2P9
Phone: (604) 273-0985
Telex No.: 04357618

Utah Mines Ltd.
1600 - 1050 West Pender Street
Vancouver, B.C.
V6E 3S7

INVOICE NO.: 2345
JOB NO.: 474
DATE: Sept. 16, 1982

RE: Credits as per Agreement Between J. Forsythe and B. Richards

PERIOD:

DRILLING WITH MUD	(2,692.78)
REAMING CASING AND HOLE STABILIZING	(342.33)
MATERIAL LEFT IN HOLES	(236.36)
WATER SUPPLY	(47.00)
MOBILIZATION	(232.00)
TRAVEL TIME	(505.00)
	($ 4,055.47)

Inter-Office Credit

Pay balance of $4076.75 on Invoice # 2271

PORT HARDY BULLDOZING LTD.
Box 166 Port Hardy, B.C. V0N 2P0 Telephone 949-6548

June 30, 1982

Utah Mines Ltd.,
Suite 1600-1050 West Pender St.,
Vancouver, B.C.,
V6E 3S7

Rental of Case 850B Bulldozer

As per agreement dated June 1, 1982

For the period of June 1 - 30/82 $3500.00

Operating Hours @ $45.00 per hour

Start - 1502 hours
Finish - 1557.8 hours
55.8 hours 2511.00

To move 850B Case to N.E.62
As per slip # 6

To move machine back to Port Hardy

Lowbed @ $66.25 per hour

June 1 - 3 hours
July 2 - 4 hours
7 hours 463.75

TOTAL $6474.75

INVOICE # 8580

PORT HARDY BULLDOZING LTD.
Box 166 Port Hardy, B.C. V0N 2P0 Telephone 949-6548

Exp
F.U 4yr

June 30, 1982

Utah Mines Ltd.,
Suite 1600-1050 W.Pender St.,
Vancouver, B.C.,
V6E 3S7

To Move Drill and Cat From N.E. 62

Lowbed @ $66.25 per hour	
June 20 - 8 hours	$530.00
Operators Overtime @ $22.45 per hour	
June 20 - 8 hours	179.60
Hi-Boy @ $66.25 per hour	
June 20 - 7 hours	463.75
Operators Overtime @ $22.45 per hour	
June 20 - 7 hours	157.15
52 feet of 3/4" cable	132.91
TOTAL	$1463.41

INVOICE # 8571

STATEMENT

RECEIVED

JUL 05 1982

UTAH MINES LTD.
EXPLORATION DEPT.

EXPO PROJECT

DATE JULY 7 19 82

UTAH MINES LTD
IN ACC. D. MORRIS
P.O. BOX 165 HOLBERG BC

DATE	DETAILS	DEBIT	CREDIT	BALANCE
	SKIDER RENTAL			
	TO REMOVE SWAMPED			
	CAT			
	5hr + 45 MIN TRAVEL TO			
	AND BACK			
	AT $82.00 PER hour			
	[redacted]			
			OK	471.50
	OK.			
	Harry Mountain			
	June 26, 1982			

REDIFORM - 8M101

Invoice

kirkland and amos ltd.

1422 CROWN STREET, NORTH VANCOUVER, B.C. V7J 1G5 PHONE: 985-6929

Expo 3/30/82

INVOICE NO.	JOB NO.	YOUR ORDER NO.	SALES TAX NO.	S.S. TAX NO.	TERMS
82007	Store	Verbal	Extra	Extra	Net.30days.

SOLD TO

Utah Mines Ltd,
#1600.
1050, West Pender Street,
Vancouver,
B.C.

DATE

26th.March,1982

DESCRIPTION	AMOUNT
To supply 264. only ½" steel rods cut to size as per your instructions, as per our quote 15th.March,1982. 0.80.ct.all at;	$2440,20.
SALES TAX	219.62.
S.S. TAX	159.59.
TOTAL	$2819.41.

CORE STORAGE

EXPO

SHOP IN CANADA FIRST

BUY CANADIAN

Thank You

SEAFORD BUILDING SUPPLIES LTD.

1422 MAIN STREET,
NORTH VANCOUVER, B.C. V7J 1C8
COMPLETE BUILDING SUPPLY CENTRE

PHONE 987-9301

SOLD TO
UTAH MINES LTD
EXPLORATION DEPT
1600 1050 W PENDER
VANCOUVER B C
V6E 3G7

SHIP TO

DATE Apr. 1 PHONE

CUSTFORD NO	JOB NO	CALL	SHIPPED	CASH	CHGE	C O D	S S TAX NO	FEDERAL TAX NO
9748		O		O	O	O		

CODE	QUANTITY	SHIPPED	DESCRIPTION	UNIT FEET	PRICE	AMOUNT
6	1	1	Vise #1010		49	49
34	4	4	nuts & Bolts. 3/4.	4	61	244
	10	10	LAG SCREWS (4/24/82) 3/4.	10	20	200
9	2	2 3/4	Bulbs 3/4.		5.49	10 98
5	1	2 3/4	gallon Instant Paint			11 49
			Nails			7 80
					SUBTTL	39.60
					DSCTTL	28.11
					CH DIS 3960	2.81
					SUBTTL SUB TOTAL	39.60
					TAX	2.38
					SS TAX	.00
					CARTAGE	***41.98
					TOTAL	

E & O E

FILLED BY [signature] CHECKED BY [signature] DELIVERY DATE

TERMS NET
2% PER MONTH (24% PER ANNUM)
SERVICE CHARGE ON OVERDUE CHARGE

No goods will be accepted for credit unless returned with our permission. Claims for shortage on this delivery must be presented within 2 days. 10% handling charge on all goods returned at invoice price charged. Sellers liability restricted to the replacement of the materials only.

CUSTOMER'S SIGNATURE Jeanie Howe

87627

CUSTOMER'S COPY

CORE STORAGE

Confirmation Only

DISTRIBUTION: (FOR INTERNAL USE ONLY)

75% Expo
15% Hatsoff
10% B.C. Gen'l.

FEDERAL SALES TAX
CHARGE ☐ EXEMPT ☐

IMPORTANT

(1) LEASE INVOICE FOUR COPIES IMMEDIATELY GOODS ARE SHIPPED.
(2) DO NOT SUBSTITUTE WITHOUT OUR CONSENT.

Jeremy Howe

PURCHASING AGENT

SEAFORD BUILDING SUPPLIES LTD.

142 MAIN STREET,
NORTH VANCOUVER, B.C. V7J 1C8
COMPLETE BUILDING SUPPLY CENTRE
PHONE 987-9301

RECEIVED MAY - 4 1982

SUBTTL 1372.11
SUBTTL 1372.11
TAX 82.33
.00
CHARGE *1454.44

SOLD TO:
UTAH MINES LTD
EXPLORATION DEPT
1600 1050 W PENDER
VANCOUVER B C
V6E 3C7

UTAH MINES LTD.
EXPLORATION DEPT.

SHIP TO: Johnson Terminals
Shed 8

DATE Apr 19.

PHONE

CUST ORD NO	JOB NO	CALL	SHIPPED	CASH	CHGE	COD	SS TAX NO	FEDERAL TAX NO
19871								

CODE	QUANTITY	SHIPPED	DESCRIPTION	UNIT FEET	PRICE	AMOUNT
0	1/16		2x4 Timber	800	22	176 00
0	9/14		2x4 Comlin	84	22	18 48
0	4/12		2x4 Comlin	48	20	9 60
0	64/10		2x4 Comlin	640	20	128 00
0	50/8		2x4 Comlin	50	159 EA	79 50
0	40/8		2x8 Comlin	320	42	134 40
0	2/14		2x10 Comlin	28	92	25 76
10	16		5/8 4x8 DD Sheath	16	1259	201 44
10	30		3/8 4x8 DD Sheath	30	799	239 70
10	20		1/2 4x8 D Sheath	20	1079	215 80
	7		90# Roofing Black	7	2049	143 43
			Del. Tues. ASAP AM.		SUB TOTAL	1372 11

FILLED BY | CHECKED BY | DELIVERY DATE

TERMS NET
2% PER MONTH (24% PER ANNUM) SERVICE CHARGE ON OVERDUE ACCOUNTS

CUSTOMER'S SIGNATURE Jeremy Howe

SS TAX	82 33
CARTAGE	N/A
TOTAL	1454 44

E & O E

87912

CUSTOMER'S COPY

No goods will be accepted for credit unless returned with our permission. Claims for shortage on this delivery must be presented within 2 days. 10% handling charge on all goods returned at invoice price charged. Sellers liability restricted to the replacement of the materials only.

CORE STORAGE

DISTRIBUTION: (FOR INTERNAL USE ONLY)

EXPO.

FEDERAL SALES TAX
CHARGE ☐ EXEMPT ☐

IMPORTANT
PLEASE INVOICE FOUR COPIES IMMEDIATELY GOODS ARE SHIPPED.
DO NOT SUBSTITUTE WITHOUT OUR CONSENT.

Jeremy Howe
PURCHASING AGENT

PLYWOODS
SHINGLES
CEMENT
INSULATION
ALUMINUM WINDOWS

STATEMENT

LUMBER
HARDWARE
ACOUSTIC CEILING TILES
FLOOR COVERINGS
PIERSON WINDOWS

Port Hardy Building Supply Ltd.

Box 132
Tel.: 949 - 6453 PORT HARDY, B.C. MAY 27 1982 19

IN ACCOUNT WITH

Utah Mines Ltd - Exploration Div.
1600 - 1050 W.Pender St.
Vancouver, B.C.

RECEIVED
JUN 01 1982
UTAH MINES LTD.
EXPLORATION DEPT.

TERMS: ACCOUNTS PAYABLE 10TH 2% PER MONTH INTEREST CHARGED ON OVERDUE ACCOUNTS.

	AMOUNT FORWARDED					
8/5/82	57927	745 63				
19/5/82	57947	35 27			780	90

EXPO

DUE TO THE HIGH BANK INTEREST RATES, WE ARE UNABLE TO EXTEND CREDIT BEYOND 30 DAYS.

CORE STORAGE

Port Hardy Building Supply Ltd.
PORT HARDY, B.C.

APPENDIX C

DIAMOND DRILLING CONTRACT

AGREEMENT

THIS AGREEMENT, entered into this 27 day of April, 1982 by and between

Utah Mines Ltd.

, a corporation, hereinafter referred to as "Owner" and

D.W. Coates Enterprises Ltd.

hereinafter referred to as "Contractor",

WITNESSETH:

WHEREAS, Owner desires to have Contractor carry out a work program on certain lands controlled by Owner and located in British Columbia, specifically the Expo Project near Holberg, B.C.

; and

WHEREAS, Contractor is desirous of performing such work program for Owner and is fully equipped and capable to perform such work;

NOW THEREFORE, in consideration of the covenants and conditions hereinafter set forth, Owner and Contractor mutually agree as follows:

1. WORK TO BE PERFORMED: Contractor agrees to perform fully and completely all work requested by Owner to be done by Contractor on the above mentioned lands, such performance by Contractor to be in strict conformance with the terms and provisions of this agreement and specifically in conformance with those provisions set forth on Schedule I attached hereto and by this reference incorporated herein.

All work to be performed by Contractor hereunder shall be done at such times, such locations and in such manner as requested by Owner, subject, however, to the specific provisions set forth in Schedule I hereto.

It is understood that Owner may employ other contractors to perform work upon the subject property and Contractor shall conduct its operations so as to best cooperate with such other contractors, if so requested by Owner.

2. WORKMEN AND EQUIPMENT: Contractor agrees to furnish and maintain in first class operating condition the equipment, and supplies specified in Schedule I hereto, or necessary to perform the work as set forth in said Schedule I hereto, and all labor, including superintendence, and all other things whatsoever required or convenient to properly perform the work specified in this agreement and within the time herein required. Owner may require Contractor to discharge from the performance of this contract any employee deemed to be in any way objectionable by Owner. No equipment furnished by Contractor hereunder for use in the performance of this agreement shall, without the prior consent by Owner, be removed from the site of the work until such time as the performance of this contract shall be completed by Contractor.

3. COMMENCEMENT AND PROGRESS OF WORK: Unless otherwise specified in Schedule I herein, Contractor shall, within 7 days after being notified by Owner to start work, commence work in the field at such locations as Owner may designate and shall thereafter continue diligently in the performance of the work at such rate of progress and at such locations as may be required by Owner and shall fully complete said work to the satisfaction of Owner.

4. NO REPRESENTATIONS TO CONTRACTOR: It is understood that Contractor has satisfied itself as to the nature and location of the work, the character of the soil, rock, or other materials to be encountered, the character, kind and quantity of equipment needed for the prosecution of the work, and the conditions under which the work is to be performed and Owner has made no representations to Contractor concerning the conditions to be

encountered in the performance of the work. No verbal agreement or statement shall affect or modify any of the terms or provisions of this contract and no change, amendment, or modification of the terms or conditions of this contract shall be valid unless reduced to writing and signed by Owner and Contractor.

5. LIENS AND CLAIMS: Contractor shall discharge at once all liens, claims, stop notices, or attachments which may be filed or levied in connection with the work done by Contractor under this agreement and shall pay all taxes levied upon Contractor, its employees, equipment, property, or operations and Contractor shall hold Owner, Owner's property, and the lands upon which the work called for in this contract is being performed harmless therefrom. Contractor shall pay promptly and in full the claims of all persons, firms, or corporations performing labor upon or furnishing equipment, materials, supplies, or power used in the performance of or contributing to the work described in this agreement.

Upon completion of work under this agreement, Contractor, if required by Owner, shall deliver to the Owner a complete release of all claims for taxes, liens, claims, stop notices, or attachments arising out of this agreement or receipts in full in lieu thereof and if required in either case, an affidavit that, to Contractor's knowledge, such releases or receipts include all labor and material for which a lien, claim, stop notice, or attachment could be filed.

6. LIABILITY FOR INJURIES AND PROPERTY DAMAGE: Contractor shall save harmless Owner, Owner's property, and the lands upon which the work called for in this agreement is being performed from all liability for injury to or death of persons and for damage to property in any way arising out of Contractor's performance under this agreement.

7. PATENT RIGHTS: Contractor shall save harmless Owner, Owner's property, and the lands upon which the work called for in this agreement is being performed from any claim, damage, or expense arising out of any action or proceeding for the infringement or alleged infringement of any patent arising out of Contractor's performance under this agreement.

8. PAYMENT: In consideration of the covenants of the Contractor herein set forth and the full and prompt performance of this agreement by Contractor, Owner agrees to pay to Contractor and Contractor agrees to receive and accept as full compensation for Contractor's performance of this agreement, and also for any loss or damage to Contractor arising out of this agreement or from action of the elements or from unforeseen difficulties or obstructions which may be encountered in the performance of the contract, and for all risks of every description to Contractor in connection with the work, those sums set forth in Schedule II attached hereto and by this reference incorporated herein.

9. TERM OF CONTRACT: Unless the provision of Schedule I shall specify a different length of time during which Contractor shall be bound to perform under the terms of this agreement, Contractor shall be obligated to perform for Owner under the provisions of this contract upon the lands hereinabove described, all work requested by Owner to be performed by Contractor during a period of 6 months from and after the date of this agreement, provided, however, that Owner may, at any time after the completion of the minimum amount of work guaranteed to Contractor under the provisions set forth in Schedule I, terminate this agreement by giving notice of such termination to Contractor.

10. INSURANCE: Contractor shall obtain and carry during the period of this agreement at Contractor's sole cost the following insurance coverage:

Insurance Coverage	Minimum Limits	
Comprehensive Liability Bodily Injury and Property Damage Liability including Contractual Liability and Completed Operations	Each Occurrence Aggregate	$500,000.00 $500,000.00
Automobile Liability (Including Owned and Non-owned automobiles) Bodily Injury and Property Damage Liability	Each Occurrence	$500,000.00
Workers' Compensation and Employer's Liability	Statutory Each Accident	$100,000.00

No work under this contract shall be started until certificates of insurance conforming with the above minimum requirements are obtained and submitted to the Owner. Insurance companies must be satisfactory to Owner, and policies must provide that ten (10) days' written notice be given to Owner prior to cancellation or annulment.

11. COMPLIANCE WITH THE LAW: Contractor and its employees shall at all times observe and comply with all statutes, ordinances, and regulations of any nation, state, province, municipality or other governmental authority or agency having jurisdiction over the place where the work hereunder is being carried on.

12. PERMITS: Contractor shall obtain all permits and licenses necessary for the performance of this contract and shall give all necessary notices and pay all fees required by governmental agencies or by other authorities in connection with the performance of this contract.

13. SUPERINTENDENT: The Contractor shall have a competent superintendent, satisfactory to Owner, on the work at all times with authority to act for Contractor. The superintendent shall not be changed except with the consent of Owner unless the superintendent ceases to be in the employ of the Contractor.

14. CONTRACTOR NOT AGENT OF OWNER: In the execution of the work to be performed hereunder, Contractor shall operate as an independent contractor and not as an agent or employee of Owner. Contractor shall hold Owner harmless from any liability which may arise by reason of any action or representation of Contractor, its agents, or employees.

15. NOTICE AND PLACE OF PAYMENT: All notices to be given to Owner by Contractor hereunder shall be delivered to Owner's office at #1600-1050 West Pender Street, Vancouver, B.C. V6E 3S7. Any notice to be given by Owner to Contractor hereunder may be given by delivering such notice personally to Contractor's superintendent at the job site, or at Owner's option, such notice may be given by depositing said notice in any post office in an envelope, postage prepaid, and addressed to Contractor at 2560 A Simpson Road, Richmond, B.C. V6X 2P9. Such notice to Contractor shall be deemed to have been given either upon its delivery to Contractor's superintendent or by deposit in said post office as the case may be.

16. ASSIGNMENT: Contractor will not, without the previous written consent of Owner, assign this agreement nor subcontract any part or portion of work to be performed hereunder to any other party.

17. PROTECTION OF INFORMATION: No information whatsoever regarding the conduct, records, or results of any work performed by Contractor under this agreement shall be given or discussed by Contractor or any of Contractor's agents or employees in any manner to or with any party other than the Owner without the prior written consent of Owner.

18. SUCCESSORS: This agreement and each and every provision hereof shall insure to the benefit of and be binding upon the parties hereto and their successors and assigns.

IN WITNESS WHEREOF, the parties hereto have executed this agreement as of the date hereinabove set forth.

OWNER

By _____
EXPLORATION MANAGER

CONTRACTOR

By _____
D.W. Coates
President

SCHEDULE I

WORK PROVISION

1. The Contractor will provide equipment, supplies and crews to operate one Longyear Super 38 drilling rig, equipped for tractor or helicopter moves, two ten hour shifts per day, including, but not limited to all necessary drilling machinery, bits, associated tools, and oils, repair parts, casing, rods, corebarrels, equipment required for pumping water, personnel and all necessary labour and supervision. Contractor shall at the commencement of work hereunder, transport all such equipment, supplies and crews to a discharge point, as near as practical to the lands upon which the drilling programme is to begin.

2. Holes will be drilled NQ wireline. In all instances, reasonable care shall be exercised to obtain the recovery of as high a percentage of core as the formation being drilled will reasonably permit. All such core shall be properly identified in correct order and placed in core boxes provided by Contractor. Contractor shall furnish a daily record sheet with holes drilled and footage noted. Said record is to be signed by the driller and will be used in computing payment for work done.

3. The location, depth and angle of each hole to be drilled by Contractor shall be specified by the Owner. Holes shall have a maximum depth of one thousand five hundred (1500) feet. The Owner guarantees four thousand (4000) feet of NQ drilling under this agreement.

5. Should cavities or loose and caving materials, or other adverse conditions be encountered, so that in the opinion of the Owner and Contractor, further drilling in a hole is not practical, the hole may be abandoned, and the Contractor shall be paid at the rates specified in Schedule II attached hereto for the footage actually drilled, provided however, that the Contractor shall

not be paid when said adverse conditions are direct result of negligence on the part of the Contractor. The Contractor at the request of Owner, will replace any driller not achieving satisfactory core recovery.

6. The Owner shall provide, at its own expense all rights of way that may be required to enable Contractor to move to and from, and to operate on the drill sites specified by the Owner. The Contractor shall be permitted to fall and cut such timber as may be required in the course of the work hereunder upon the property controlled by Owner, provided however, that the Contractor shall comply with all terms of Owner's permits allowing such timber cutting. Owner shall save the Contractor harmless from any assessments for stumpage.

7. During the course of the work, the Contractor shall, at all times, keep the Owner's premises free from accumulation of waste materials, rubbish and garbage, and upon completion of the work shall remove all tools, scaffoldings, surplus materials and rubbish, and leave the premises in a clean condition. The Contractor shall observe and comply with all applicable Federal and Provincial laws, regulations and orders relating to prevention of forest fires and sanitation in the bush.

8. This agreement and any disputes arising hereunder shall be interpreted and determined in accordance with the laws of the Province of British Columbia.

SCHEDULE II

PAYMENT SCHEDULE

The Owner shall pay the Contractor, in Canadian funds, for work completed according to the following schedule:

1. Schedule of Rates - Coring: NQ

			Inclinations -45 to -90
From		To	Price/Foot
0'	-	500' in depth	$19.40
500'	-	1000' in depth	$20.55
1000'	-	1500' in depth	$22.40

The schedule of rates includes a $3.00 per foot diamond allowance for core bits, shells and casing shoes. Due to the potential for encountering extremely hard and broken quart-magnetite breccias, all diamonds consumed in excess of $3.00 per foot shall be charged to the Owner. Diamond bits "burned" due to operator neglect shall not be included in the diamond cost. All other labour costs and other operating expenses shall be for the Contractor's account, except when reimbursed to Contractor by Owner as hereinafter provided.

2. Overburden: Triconing and Setting Casing:

From		To	Price/Foot
0'	-	50' in depth	$19.50
50'	-	100' in depth	$20.50
100' plus	-		Field Cost

It is understood that all holes are to be left cased unless the Owner specifically orders casing to be removed. The Contractor shall employ used HQ rod as casing when it is available and charge the Owner at its depreciated value.

3. Moving Between Holes - Setting Up - Tearing Down:

All time spent tearing down, moving the drill and equipment between sites, and setting up shall be charged to the

Owner, on a field cost basis for all labour, plus standby rates for the drill equipment.

The Owner shall supply a suitable tractor or helicopter as required to aid in moving between sites at no cost to the Contractor.

4. Water Supply:

The laying, maintaining and removing of the waterlines and supply pump shall be performed on a field cost basis.

5. Mobilization - Demobilization:

The Contractor shall move his men, drill, equipment and supplies from his base to truck unload point and return from truck load point to his base for the lump sum of $7,500.00.

The movement of men, drill, equipment and supplies from truck unload point to first hole site and return from last hole site to truck load point, including unloading and loading, shall be performed on a field cost basis.

The Owner shall supply a suitable tractor or if necessary a helicopter to aid in mobbing and demobbing and for continuing supplies as the job progresses, at no cost to the Contractor.

6. Drill Sites:

The Owner shall prepare the access roads, and level suitable drill sites and pumping stations at no cost to the Contractor.

7. Reaming Casing and Cementing:

If ever necessary to help prevent cave-ins and maintain circulation, reaming casing and cementing shall be performed on a field cost basis.

8. Mud and Additives:

The mud and additives required to help penetrate the overburden and/or aid in core recovery if ever necessary, shall be supplied at cost on job site, plus twelve percent.

Time spent mixing mud and/or stabilizing the hole if ever necessary shall be charged on a field cost basis.

9. Core Boxes:

The Schedule of rates includes the supply of NQ core boxes complete with a lid for each.

10. Fuel:

The schedule of rates includes the fuel required for operation of the drill and equipment.

11. Board and Lodging:

The Company would supply free room and board to the Contractor's personnel in the Owners camp.

12. Tests:

If requested by the Owners the Contractor shall take acid tests at the rate of three feet drilled at the depth the test is taken. Other surveys shall be performed at the field cost rate.

13. Travelling Time:

The schedule includes the first one-half hour spend travelling from the lodging site to job site and return per man per shift. Should the time be greater than one-half hour per man per shift, the "over" would be charged on a field cost basis.

14. Operating Field Costs:

When functions as noted above are performed on a field cost basis, the following schedule shall apply:

Labour——————————————$23.50 per man hour

38 Drill with Tower——————————$23.00 per hour

Pump——————————————$ 2.50 per hour, per pump

Mud Mixer (when applicable)————$ 1.50 per hour

4 x 4 Truck (when applicable)————$10.00 per hour

Materials Consumed——————————At cost on job site + 12%

15. Standby Rate:

Waiting for instructions from the engineer, waiting for cement to set, or other delays beyond the Contractor's control:

Labour (max. 8 hrs/man/shift)----------$20.00 per man hour

Drill & Equipment (max. 8 hrs/day)----------$18.00 per hour

16. Billing and Payment:

Contractor shall submit all invoices to the Owner at Utah Mines Limited. Payment shall be made to the Contractor in accordance with Paragraph 8 of this agreement form. The prices set forth in this Schedule II shall include all applicable taxes and insurance. Owner shall pay Contractor within thirty days from delivery of invoices.

7/11/79

REED STENHOUSE
LIMITED
INTERNATIONAL INSURANCE BROKERS
P.O. BOX 10028, PACIFIC CENTRE, VANCOUVER, CANADA V7Y 1B4
Telephone (604) 688-4442 Telex 04-51381

To: Utah Mines Ltd.
Exploration Dept.
Suite 1600-1050 W. Pender St.
Vancouver, B.C. V6E 3S7

Certificate of Insurance

Dated: April 28, 1982

This is to Certify that *Insurance as described hereunder has been arranged on behalf of the Assured named herein and that such Insurance, at the date hereof, is in full force and effect.*

Assured: D.W. COATES ENTERPRISES LTD. A/O COATES DRILLING INC.

Term: 12 Months

Effective: March 1, 1982

Payee: Assured or Order

Expires: March 1, 1983

POLICY NUMBER	COMPANY	SUM INSURED
2L 30083	The Canadian Indemnity Company	As Below

Interest Insured: COMPREHENSIVE GENERAL LIAIBILITY AND NON-OWNED AUTOMOBILE LIABILITY INSURANCE

Comprehensive General Liability	$5,000,000.00
Non-Owned Automobile Liability	$5,000,000.00
Fire Suppression	$100,000.00

Sum Insured or Limits of Liability: As Shown Above

Conditions: As agreed with and as per Policy No. 2L 30083 issued by The Canadian Indemnity Company.

The Insurance described above is subject to the limitations, exclusions and conditions contained in the policies.

SL/tb
c.c. D.W. Coates Enterprises (R. Simpson)
c.c. Canadian Indemnity Co. (M. Chutter)

REED STENHOUSE LIMITED

F 32 H 382-4M

HOLE NO. EC-131, PROJECT: RED DOG PAGE NO: 1 OF 11

COLLAR ELEV: / GROUND ELEV.: 1650' DATE STARTED: June 2, 1982 REF. TO CLAIM CORNER: Red Dog 7

COORDINATES: 2586+90' N. 2057+80' E. DATE FINISHED: June 6, 1982 SCALE: 1"=100' (1:120)

INCLINATION: -51° BEARING: 357° TOTAL DEPTH: 620' LOGGED BY: H. Muntanion

COMMENTS: Hem-lim stain on fracts. 10-25 is str. Hem continues to

AVE CORE REC'Y / HOLE 95.6%

GEOLOGICAL BRANCH ASSESSMENT REPORT

Part of 2

10,982

DESCRIPTIVE GEOLOGY

SECTION	ALTERATION: Silica	Mag	Clay-ser	Chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y CAMP INT
0									Stick up 0-10' Overburden						
10	wk-Mod.	wk-Mod.	wk-Mod. (clay)	wk	1 (1-2/ft)			10.5' 8" zone of qtz-mag-py bx of fsp porph. Str sulph. Some cpy. Fracts w hem coating. Some filled w soft wht material crb? + zeol? 1" gouge contact attitude?	10'-24' Fsp Por. Dk grey rk speckled w yellow-grn (sauss-ser). 20-25% wk alt anhed-subhed Fsp planes in dk gry-grn matrix consisting of 10-15% sauss-epid after fsp (subhed), 5% fine chl planes, ≥5% mag w tr chl (ser?) assoc (aggregate replacing mafics). Remainder is silica w wk clay (±ser?) Only v-fine sulph tr. wk to cpy.	<1/2	10', 15, 17.5	94, 100		10'-20 36451	88
20											20, 24	66		20-24 36452	66
	Mod-str		Str.			Py-cpy (rare to bn)			24- 157.3' Qtz-Mag (Py) Bx prob. of Ands tuff (lap tuff?) Grn gry. Locally mottled appearance. Wht-dk grn patches. Sections of grn matrix (mafic) matrix w qtz frags + the reverse. 24-30 Matrix of qtz, chl, clay (ser) mag, sulph w corroded virtually pure qtz frags. Containing rare tr. py. Also qtz occurs along fracts	5 to 8	24, 29.5	100		24-30 36453	99
30	V. str				v. str (2-4/ft)			Pale grn miner prob mix of chl, ser.			29.5, 36	94	WL 7	30-40 36454	92
	Str.	Str.-v. str	mostly ser	mod.							36	89			
40								Irreg py strgrs. up to 1/2 in wide "3" gouge zone	Below 30' qtz flooding is v. str + makes up about ≥75% of rk. Here irreg shaped patches + vlts of mafic aggregate make up remainder of rk (mag, chl-ser, sulph + intergrown qtz). Mag also dissm. Mag, part replaced by hem appears to replace sulphs.	15	44.5		NQ	40-50 36455	95
	extreme-v. str	v. wk	wk					str hem. Vugs occur where sulphs + soft mins have been leached		5 to 8	46	100, 100			
50	wk	wk	wk-mod	wk-mod				gouge zone 4"? 1mm cpy vlt. Here pods, strgrs py.	Sulphs occur w mafic patches + on fracts. Cpy seems to occur mostly as v. fine dissm in qtz. 44.5-47 Extr silic 90-95%. No mag remains 47-58' Large proportion of mafics and sulphs	8 to 12	51.5, 54.5	100, 100		50-60 36456	100
60											60				

HOLE NO. EC-131 | PROJECT: RED DOG | PAGE NO: 2 OF 11

COLLAR ELEV: | GROUND ELEV.: | DATE STARTED: | REF. TO CLAIM CORNER:

COORDINATES: N. E. | DATE FINISHED: | SCALE: 1:100'

INCLINATION: | BEARING: | TOTAL DEPTH: | LOGGED BY: H Muntanion

COMMENTS: * 445-157.3' mag-rich + mafic sects are short + rk gen > 80% qtz. Qtz flooding dominates.
* sulph + cpy content below 60' seems very variable

AVE CORE REC'Y / HOLE

DESCRIPTIVE GEOLOGY

Qtz-Mag-Py Bx (here Py more common than Mag)

Alteration: Silica – extreme (60–~92), v. str (~92–120); mag – v. str (60–72), v. wk dk patches str mag (72–~93), v. wk (to 120); Clay-ser – wk-mod (60–70), mod-str (70–~93), mod, wk (~93–120); Chl – wk-v. wk (60–70), mod (~93–120). Fracturing: v. str. Mineral: Py-cpy; Tr. bn.

Sketch notes:

- mag pods, strgrs part hematt.
- 6-12" goug zone Attitude?
- 1'-2' fract zone, about 25° to C/A
- 3" gouge zone. Clay (+ser?) on fracts. Rounded qtz frags obvious.
- Hem still occurs in mag rich patches.
- Patches, irreg vlts py. Here up to 20% py.
- Fract zone Attitude unknown. Str Hem, sulph. Fract to py.

Below 50' h/1-2 mm fract fills of qtz-ser. (± clay) - sulph are apparent. In more mafic mag-rich sections vein nature of qtz is apparent.

In silic portion v. finely dissm sulphs. Sulphs also along h/l fracts. Also v fine chl (ser?)-sulph aggregates. Wk dissm mag, part alt to hem. High proportion of sulph in siliceous component is cpy.

@ 95' Bx text imparted by dk grn mafic patches, irreg shape composed of sauss. chl, ser (+ clay?), py, mag (+ hem). These are believed to be andis remnants.

Sulphs largely on fracts. V fine sulphs in matrix may be cpy?

* Py + mag substitute for one another.

Section	% Sulphides	Drilling Interval	% Core Recovered	Core Size	Sample Interval	Sample No.	% Rec'y Samp. Int.
60–70.5	4 to 8	60–70.5	95	N.Q. WL	60–70	36457	95
70.5–80	8 to 12	70.5–80	74		70–80	36458	75
80–85	4 to 6	80–85	100		80–90	36459	98
85–89.5		85–89.5	96				
89.5–95	6 to 8	89.5–95	100		90–100	36460	100
95–105	8 to 12	95–105	100		100–110	36461	100
105–114		105–114	100		110–120	36462	100
114–117		114–117	127				
117–120	15%	117–120	92				

HOLE NO. EC-131 | PROJECT: RED DOG | PAGE NO: 3 OF 11

COLLAR ELEV: | GROUND ELEV.: | DATE STARTED: | REF. TO CLAIM CORNER:

COORDINATES: N. E. | DATE FINISHED: | SCALE: 1"=100' (1:120)

INCLINATION: | BEARING: | TOTAL DEPTH: | LOGGED BY: H Montanari

COMMENTS: Below Fsp. Por (157.3') + fault zone in FW Au values drop dramatically + Cu drops considerably.

AVE CORE REC'Y / HOLE

DESCRIPTIVE GEOLOGY

SECTION | ALTERATION: Silica, mag, clay-ser, Chl | FRACTURING | MINERAL | GEOLOGY | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y. SAMP. INT.

120

narrow qtz v/ts common on fracts. Very narrow.

1-2" fract. Clay-ser (zeol?) developed on most fracts ± str sulphs as above

6" Fault zone

3" " "

well developed bx text

1' Fract zone Hem str on fract surfaces leading. Vugs.

Large hem patches after mag. Fract ± sulphs. Attitude?

2" gouge

½" fault gouge

½" irreg Py ± cpy fract vn.

170-182.5 Fault zone str sulph + cpy noted. Considerable hem.

Qtz-Mag-Py Bx. (cont'd) -as above.

122-136' Str devel of Py-rich patches ± sauss, chl, ser, clay. Very irreg up to 2".

Sulphs on fracts + extremely fine dissm in qtz. Cpy mostly as fine dissm + on ½ fracts.

157.3-167' Fsp Por. (RED DOG POR FINGER?)

Appears to be different porph unit than 10-24'.

Is med-H.gry. About 20% subhedral lath-shaped phenos ave 2-4mm. Most have corroded outlines due to alt. These are grndms to str sauss(ser?) alt. Matrix lt color composed of fine clay-alt fsp grains, qtz, clay-ser. 2-3% py, some wk alt to Hem. Mod density of ½ fracts

167-256.5 Qtz-Mag-Py Bx

167-170' Bx text obvious Subang-wqtz frags in blk matrix of hem(±mag), chl, py. Most of Fe ox is hem here. Prob ≥0.5 Cu here.

SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y. SAMP. INT.
15 to 20	122	92		120	
		63		364163	69
	131			130	
		100		364164	96
8 to 12	135				
		100		140	
	145		N Q W.L.	364165	100
15 to 20		100		364166	
8	155			157.3	95
2 to 3		83		364167	74
	164				
10 to 15	167	60		170	
		69		364168	85
3 to 5	175				
		100		180	

HOLE NO.: EC-131
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 4 OF 11
REF. TO CLAIM CORNER:
SCALE: 1" = 100' (1:120)
LOGGED BY: H Muntanion

SECTION	ALTERATION: Silica	ALTERATION: mag (+hem)	ALTERATION: clay-ser	ALTERATION: Chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS	DESCRIPTIVE GEOLOGY	SULPHIDES %	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y CAMP INT
180	str	str	wk	mod-str	v str	py-cpy		Hem on fracts	Qtz - Mag. Py Bx (con'D)	3 to 5	180.6	100		180	
								H/l fracts w sulphs clay-ser alt	Below fault zone bx. text resumes. Rk prob. 70% qtz Dk grn-blk patches w mag - largely alt to hem, chl. Mag+hem prob 10-15% of rk.		185	94		36469	95
190								str py in fracts	As above seems to be inverse relationship between mag(+hem) and py but not necessarily cpy.	5 to 8	195	94		190	
200								1/4" qtz vlts w dissm cpy, py	Cpy still mostly as v. fine dissm mostly in qtz.			100		36470	96
	v str							qtz vlt str w chl-lim. qtz vlt	214'-220 More intense qtz flooding. Bx text no longer evident. This has absorbed mafics resulting in v. fine mag, hem speckles in qtz	3 to 5	205	96	NQ3	200	
210								qtz vlt			214			36471	98
	V. str-extreme	mod	wk					1/4" mag-hem vlt		8	219	96		210	
220	str-V. str											98		36472	96
	V. str-extreme	str		mod-str						3 to 4	228.5			220	
230									* Below 233' Qtz veining conspicuous w mag strgrs @ core. Vns contain v fine cpy dissm. Also py. These cut by fracts coated w sulph			100		36473	98
240	str-v str	v str						shear to py coating	* 238-250 is about 15% mag. Little alt to hem.		238	99		230 / 36474 / 240	100

HOLE NO.: EC-131

COLLAR ELEV.:

GROUND ELEV.:

COORDINATES: N. E.

INCLINATION:

BEARING:

PROJECT: RED DOG

DATE STARTED:

DATE FINISHED:

TOTAL DEPTH:

REF. TO CLAIM CORNER:

SCALE: 1" = 100' (1:120)

LOGGED BY: H Muntanion

COMMENTS: @ 273' crb vlts 1st noted. Sulph tarnished + often difficult to differentiate between py, cpy

AVE CORE REC'Y / HOLE

SECTION	ALTERATION: silica	ALTERATION: red (+hem)	ALTERATION: clay-ser	ALTERATION: chl	FRACTURING	MINERAL	GEOLOGY
240–250	str-v.str	v.str	wk-mod	mod-str	v.str	py-cpy	
250–300		str	mod		str (more healed)		

Geology column annotations:

- ← patche, stgrs py
- ← large qtz bx frags.
- narrow gouge
- ← vugs
- ← 1" calc lens
- 1mm calc vlt.
- } Qtz stckwk w v fine dissm sulph
- narrow gouge
- } sulph on fract faces
- good bx w ave. qtz frags (1/2")
- ← Hem. after mag
- ← qtz floodin

DESCRIPTIVE GEOLOGY

Qtz-Mag-Py Bx (cont)

256.5–257 Fsp por.

Identical to 10-24'

Some core missing from this unit?

257–265.4' Qtz-Mag-Py Bx

Same as above Str Mag.

Sections of finer fragmental rk ≈15-20% mag. Same comp as above. Here may be str alt tuff or lap tuff

265.4–266' Q.F Por? (or Tuff?)

-seems to be intrus contact. Lt grn gry. Subrnd qtz + dk grn 2-4mm grains. Dk grn may be alt fsp (sauss, ser) but these also contain v. fine mag. Silicified. Dissm py, cpy is wk V

266–364' Qtz-Mag-Py Bx.

Same as 257–265.4' Text is finer w mostly 4-8mm qtz + mafic aggregate frags. Qtz veining increasingly more obvious, locally destroying the text. Mag content gen 5-10%

% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% RECY SAMP INT
10 to 15	245	99		36475	99
3 to 4	250	98			
1 to 2	255 / 256.5	87		36476	97
	260	100			
	265		WL	36477	100
	270	100			
5	275		NQ	36478	99
	280	99			
6 to 8	285			36479	99
	290	98			
	295			36480	99
1 to 2	300	99			

HOLE NO.: EC-131
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1"=100' (1:120)
LOGGED BY: H. Montenion

SECTION	ALTERATION: silica	mag	ser-clay	chl	FRACTURING	MINERAL	COMMENTS	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
300–310	v.str			mod	str		Irreg crb strgrs on fract. py on fract.	Qtz-Mag-Py Bx (con't) -same as above. Variable text. Fine-grained (relic lap tuff) bx, section of mottled rk w alternate qtz + mafic (mag-rich) patches. Short section of qtz flooding.	8	305	99		300–310 36481	99
310–320	str-v.str	mod-str	wk-mod	mod-str	(mostly healed)	py-cpy	mag in fracts (h/l - stckwk)		8 to 12	315	100		310–320 36482	98
320–330			mod (-str)	k-mod			½ patches of mag	* 322-342 finer fragmental rk. Appears to be Relic lap tuff text? (May be relic por?) 3-4mm qtz frags. Qtz vlts. 5-10% mw-hem. Mod-str clay-ser alt.	2	325	95	NQ WL	320–330 36483	98
330–340			wk-mod				v.str fract w sulph. Qtz vlts common		8 / 1 to 2	335	100		330–340 36484	94
340–350							calc on h/l fracts. py on fract surface. Cut by h/l fract.			345	88		340–350 36485	94
350–360					v.str-extreme		fract w py. some gouge. mag on h/l fract w qtz selvage. str cpy in vlts. V. Str fract mostly h/l w some crb coating	* 355-357 below (narrow fault) Silic is massive w ≥15% dissem mag. Well dissem cpy.	5 to 6	355	99 / 94		350–360 36486	97

HOLE NO.: EC-131

COLLAR ELEV.: GROUND ELEV.:

COORDINATES: N. E.

INCLINATION: BEARING:

PROJECT: RED DOG

DATE STARTED:

DATE FINISHED:

TOTAL DEPTH:

PAGE NO.: 7 OF 11

REF. TO CLAIM CORNER:

SCALE: 1" = 100' (1:120)

LOGGED BY: H. Muntenian

COMMENTS: * Below 390' Calc strgrs (in fracts) more abundant. Also small pods Appear to be w latest stage of fracturing.

AVE CORE REC'Y / HOLE

SECTION | ALTERATION (silica, md, ser-clay, chl) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP. INT.

Section depths: 360, 370, 380, 390, 400, 410, 420

Alteration: silica: v str–extreme, wk, v str; md: mod–str, v str; ser-clay: str, v. wk–wk; chl: mod

Fracturing: v. str

Mineral: py-cpy; (trace) + Mo + bn

Geology notes:
- 2mm mag vlt.
- Calc strgrs + small pods
- Sulph strgs
- Gouge. Attitude?
- Bhr/fault w str chl.
- 3mm mag vlt.
- Attitude?
- qtz vlt cuts mag.
- Chl. on fracts
- Well developed bx w chloritic matrix Qtz frags.
- str crb veining. Attitude?
- 2' zone of milled? bx. Qtz frags variable size-fine to 2". Subang-Subrnd in matrix of V str py, chl, mag-hem aggregate
- Milled? bx. Same as 405-407'

Qtz-Mag-Py Bx (con't).

364' – 367? Fsp-mag por.

Below fault Dk grn color. Dioritic comp? 15% phenos of plag (subhed-anhed) completely alt to clay, ser (sauss?) Finer relic mafic phenos now consist of mag-chl (10%) Matrix altered to clay-ser. No sulph except on fracts. Sheared @ lower contact

367–379? Qtz-Mag-Py Bx
379.5–394.5

For about 1' below contact v silic w v. fine dissm mag (part alt to hem) + About 2-3% dissm sulph here ~3–4% Cu. Below contact only short sections w obvious fragments. Rk is shattered. Calc veining more common. Mag tends to be v fine in qtz, imparting dk grey color. Also few mag vlts. Also chl-mag-py patches. Sulph as fract vlts (v. irreg) & fine dissm. Chl also developed in fracts. Higher cpy:py ratio. Mag content varies from 5–30% (mostly ≥ 15%) Rk hard + less weathered

394.5–395? Fsp Por.
+379–379.5? Identical to 10-24.' Here 2% dissm py

395–514' Qtz-Mag-Py Bx

Same as above. Short sects of milled? bx. v silic component laced w N/I sulph vlts.

% Sulphides	Drilling Interval	% Core Recovered	Core Size	Sample Interval	% Rec'y Samp. Int.
5 to 6		94		360–371: 36487	86
L1	364	80			
2 to 3	372	67		371–380: 36488	80
	375	85			
	379	99	NQ WL	380–390: 36489	99
	388.5	97			
	394.5	95		390–400: 36490	96
6 to 8	405	100		400–410: 36491	98
3 to 4	415	100		410–: 36492	100

HOLE NO.: EC-131
COLLAR ELEV.: GROUND ELEV.:
COORDINATES: N. E.
INCLINATION: BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 8 OF 11
REF. TO CLAIM CORNER:
SCALE: 1"=100' (1:120
LOGGED BY: H. Montanion

ALTERATION: silica | mag | ser-clay | chl | FRACTURING | MINERAL | GEOLOGY

COMMENTS: Crb vns weaker below 440'

AVE CORE REC'Y / HOLE

DESCRIPTIVE GEOLOGY

SECTION	silica	mag	ser-clay	chl	FRACTURING	MINERAL	Notes
420–440	v. str	v. str	wk-v. wk	mod	v. str	Py-cpy	calc v/lt. Qtz v/lt offset by Fracts w sulph coatings @ 30° to C/A. Str qtz veining - stckwk type. Mag vns become conspicuous. Always selvaged by qtz. Crb veining becomes wkr.
440–480	v str - extreme			mod-str	(mostly healed)		More qtz flooding. H/l mag v/lts. mag v/d (2mm) changes to sulph abruptly. Bx text w irreg. subrnd qtz frags Mafic very mag-rich matrix. fract w chl, sulph

Qtz-Mag-Py Bx (cont)

Below about 430' appears to be increase in qtz veining. Stckwk. type. Some have core of v narrow mag (or fract). Most steep angle to C/A. Cut by later sulph strgrs (or fracts) gen 15-30° to C/A. Qtz vns often vague boundaries + flood rk. for very short sections.
Mag 15-20%. (+hem). As v/lts + v fine crowded dissm in silica. Sulph intimately intergrown.
V short sects = developed bx text. (qtz frags).

% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
8%	420–425	100	NQ W.L.	420–430: 36493	100
	425–430	100			
3 to 4	430–435	100		430–440: 36494	99
	435–440	99			
5 to 8	440–445	99		440–450: 36495	99
	445–450	100			
4 to 6	450–455	100		450–460: 36496	100
	455–460	100			
	460–465	100		460–470: 36497	99
	465–470	98			
	470–475	98		470–480: 36498	99
	475–480	100			

HOLE NO.: EC-131
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1" = 100'
LOGGED BY: H. Muntanion

SECTION	ALTERATION: silica	mag	ser-clay	chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS	DESCRIPTIVE GEOLOGY	SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
480–495	v. str	str	v. wk - wk	mod-str	v. str (healed)			1mm str ū calc @ 50° to c/a. Selvage qtz, sulph. fragmental text	Qtz-Mag-Py Bx (con't) — some short sections of relic lap tuff? text. * Sulph dominantly fract controlled	4 to 6	485	100		36499	99
490–495											490	99			
495–505			md					3" wide mass sulph ū silica. Nearly all py. Qtz cut py			495	100		36500	99
505–510			wk							2 to 3	505		NQ UL	36501	100
510–515								shear	514–525? Ands tuff?	8	510	100			
515–521	mod	str						1" in gouge.	Below fault @ 518.3' to 519' V. str alt (ser clay, py) Q.F.P.? Not certain. May be extr alt tuff, same as above. Str alt due to faulting. Max mag in fault zone. 514-518, 519-21. about 52% mag hem. Str sulph. Considerable cpy. Variable frag size.	3 to 4; 6 to 8	515; 521	100		36502	100
521–531	v. str		wk					clay-crb on fract; 3mm cpy-py vlt; str b/l calc		2		100		36503	100
531–540	v. str (silica)							Milled bx. Qtz vein of variable thickness often ū mag core	525 - 581.9' Qtz-Mag Py Bx — similar to above. Swirled appearance 10-15% mag + hem. Str silic veining + flooding. * 533.5-536 Milled bx 2% sulph. 0.1% Cu Str Mag + clay-ser alt.		531	100		36504	100

HOLE NO.: EC-131 | PROJECT: RED DOG | PAGE NO.: 10 OF 11

COLLAR ELEV.: | GROUND ELEV.: | DATE STARTED: | REF. TO CLAIM CORNER:

COORDINATES: N. E. | DATE FINISHED: | SCALE: 1" = 100' (1:120)

INCLINATION: | BEARING: | TOTAL DEPTH: | LOGGED BY: H. Muntanion

SECTION | ALTERATION (silica, mag, ser-clay, chl) | FRACTURING | MINERAL | GEOLOGY | COMMENTS: | AVE CORE REC'Y / HOLE | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP INT

DESCRIPTIVE GEOLOGY

Section: 540 – 600

Alteration: silica v.str (540–550), v.str (550–577), v.str-carb (577–582), wk?-mod (582–593), mod-str (593–597), wk-mod (597–600); mag v.str (540–545), wk (545–555); ser-clay wk (540–544), str (544–548), wk; mod (clay) (582–590), mod (590–600); chl mod.

Fracturing: v.str

Mineral: py-cpy; py; py; py

Comments (geology column):

← Milled bx

shr.

2 in qtz vn w v.str py. wk cpy

calc vlt. Open fractu voids.

"swirled" appearance

Crb h/l stngrs.

shr w str chl on plane + hem.

shr planes w chl, some diss py

1" fault gouge - clay.

str crb vlts.

narrow fault gouge - clay

fault gouge - clay. 8"? About 20° to C/A

gouge

Attitude? V.str clay

2" shr zone. Attitude 40° to C/A

calc criss-cross vlts.

Descriptive geology:

Qtz - Mag - Py Bx (con't).

* Well developed milled text. from 540-549.5! Qtz frags subrnd to subang in qtz-mag-chl-sulphd matrix. In strongest bx sect (1.5') str cpy (.5-.6 % Cu). Some clay-ser? alt.

577'-581.9'

* Spotted text. Same comp as above. Mafic aggregates etc. Hornfelsic? Zone of assimilation

581.9 - 620' FSP- (Hbl.?) Por (REDDOG POR)

includes assimilated volc from 592-594.' w upper shr contact. Str sulph + > 0.5% Cu

Por is lt to med gry.

Consists of 25% Fsp (plag) phenos (wht) 3-4 mm + gen anhed. Have hazy outlines due to alt. St clay + crb alt. Mafic phenos 5-8%, prob orig. hbl completely alt'd to chl, minor crb, epid, mag + intergrown py

% Sulphides	Drilling interval	% Core recovered	Core size	Sample interval	% Rec'y samp int
5 to 8	542.5	100		540	
		100		36505	100
2 to 3	550.5			550	
3 to 4	555	96		36506	98
4 to 6		100		560	
	565			36507	100
		100	NQ W.L.	570	
	575			36508	98
		96		581.9'	
2	585			36509	98
		100		590	
6-8	591				
2		99		36510	99
	600			600	

HOLE NO.: EC-131 | PROJECT: RED DOG | PAGE NO.: 11 OF 11

COLLAR ELEV.: | GROUND ELEV.: | DATE STARTED: | REF. TO CLAIM CORNER:

COORDINATES: N. E. | DATE FINISHED: | SCALE: 1"=100' (1:120)

INCLINATION: | BEARING: | TOTAL DEPTH: 620' | LOGGED BY: H Montanion

SECTION	ALTERATION: silica	ALTERATION: clay	ALTERATION: chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS: / DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y. SAMP. INT.
600							AVE CORE REC'Y / HOLE		600			600	
	wk? - mod	mod	mod.				½" gouge 50° to c/A mod ctb (calc) veining shrs. ± chl, crb. 15" fault mud-clay completely ground-up 10" fault Str crb. FSP (HBL?) Por (RED DOG P&R) (cont) @ contact there are shapeless masses but below are subhed, lath-shaped. Matrix qtz-fsp + alt products. 2% dissn py Rare rnd qtz phenos. crb vns common ⇒ Crb also as alt + on fracts.	1 to 2	605	100		365111	97
610										94	w c	365112	
									613.5		N &		93
620										92		620	
							END OF HOLE 620'		620				

HOLE NO.: EC-132
COLLAR ELEV.: 15
GROUND ELEV.: 1650'
COORDINATES: 2586+90' N. 2057+80' E.
INCLINATION: -50°
BEARING: 181°

PROJECT: RED DOG
DATE STARTED: June 7, 1982
DATE FINISHED: June 9, 1982
TOTAL DEPTH: 176'

PAGE NO.: 1 OF 3
REF. TO CLAIM CORNER: Red Dog 7
SCALE: 1" = 100' (1:120
LOGGED BY: H. Montanion

COMMENTS: Rk very broken + weathered from 10-60'. Unconsolidated? @ this level the bx appears more alt than same level in EC-131. Considerable v fine cct, covel bn. in Bx from 32'-176'.

AVE CORE REC'Y / HOLE: 62.9%

SECTION	Alteration: silica	mag	clay-ser	chl	FRACTURING	MINERAL	COMMENTS	DESCRIPTIVE GEOLOGY	SULPHIDES %	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
0–10								0–10' overburden and extremely weathered rock.					0	
10–30	wk-mod?	wk	wk-mod (clay)	wk	str.	Py	1/1 fracts ≈ hem stain. Some zeol? on fracts. Rk is very broken + str. weathered. ↓	10' – 30.5' Fsp Por (same unit agin EC-131). Med gry rk ≈ grn tinge. 20-25% wht subhed wk clay (+ser?) alt fsp planes 2-4mm. Speckled ≈ yellow-grn epid-sauss replacing finer fsp. 5-10% fine chl-mag. About ≤ 2% finely dissem mag. 1% fine py. Remainder matrix qtz-fsp (v fine) + alt products.	1?	15, 25	56, 55		10, 36513, 20, 36514	55, 57
30–50	mod-str	str	str	mod	v str	Py-cpy-bn-cct-cv	2.5' fault zone. Crushed rk, prob por. Lim weathored. Attitude? ← dissem bn, covel, cct. very fine. qtz vlts, locally stickwks	30.5' – 176' Qtz-Mag-Py Bx. Same unit as EC-131. Near contact (30.5 – 50') Med-grn-gry rk, gen massive locally ≈ sects containing pure qtz frags ≈ rare to py. Matrix of qtz, chl, clay (ser?) + mag sulph. Mag sulph content variable + appear to substitute for one another - inversely proportional. Sulph as v. fine dissem + 1/1 fracts Cpy str in silica, particularly. Supergene Cu mostly on cpy margins + extr. fine dissem.	2, 10%, 2	35, 41	58, 100, 76	N.Q. W.L.	30, 36515, 40, 36516	79, 78
50–60	v str		v str				gouge. qtz bx frags. gouge zone, about 1'. Fault 2-3'?? Poor recovery.	Below 50' Mottled rk. (Bx) Patches of mafic aggregate (mag chl (+ clay, ser), sulph, bn) + qtz patches. Cpy gen strongest in qtz as v. fine dissem. V str fract. Original rk prob Ands lap. tuff. (see descriptn EC-131). Poss. por.? V str. alt.	6-8, 1 to 3	50, 55	74, 28		50, 36517, 60	51

HOLE NO.: EC-132
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 2 OF 3
REF. TO CLAIM CORNER:
SCALE: 1" = 100 (1:120)
LOGGED BY: H. Montanian

COMMENTS: Rk extremely broken (mostly pebble-size) from 105'–142', 150'–176'

AVE CORE REC'Y / HOLE

DESCRIPTIVE GEOLOGY

Columns: SECTION | ALTERATION (silica, mag, clay-ser, chl) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP INT

Section	Silica	Mag	Clay-ser	Chl	Fracturing	Mineral
60'–70'	v. str	str	str	mod		py-cpy-cct (cov)
70'–80'	v. str extreme	wk	v. wk	wk		
80'–90'	mod–str	str	v. str – str	wk – mod	v. str – extreme	Tr Mo
90'–100'	extreme	wk	wk	wk		
100'–110'			str			
110'–120'	v. str	str		mod		

Fault-gouge-str. weathered. Some lim stain

*1/2" qtz vns ū some dissm cpy. Shallow angle to c/a cuts steep angle vn.

72–79' fault zone. Rk mostly crushed.

Rk broken ↓

← qtz vns ū str cpy + some cct.

Up to 3/4" qtz vns

gouge zone. Fault.

Qtz vns up to 2"

gouge zone. Fault

v. str dissm + h/l fract cpy

Fract

gouge – Fault

Fract zone. Only rk chips here

Fault. Possibly overburden + boulders?

Qtz- mag-py bx (cont).

60–70' short sections ū virtually no sulph but 20% mag (some alt to hem) Sulph content very variabl. Locally 15%.

72–80' Mostly silica (flooded ū v. fine dissm cpy + supergene mins.

*92–99. str qtz veining + flooding ū increase in cpy carried mainly by vns

* 99–110' Qtz – py – (sericite/clay) rk. minor Mag + cpy.

% Sulphides	Drilling Interval	% Core Recovered	Core Size	Sample Interval	Sample No.	% Rec'y Samp Int
2	61	28		60–70	36518	67
	65	75				
	72	61				
3 to 4	80	38		70–80	36519	43
	85	92		80–90	36520	91
8	93	91	NQ WL			
	100	100		90–100	36521	97
	105	68		100–110	36522	49
	110	30				
2	115	56		110–120	36523	62
		67				

HOLE NO.: EC-132
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 3 OF 3
REF. TO CLAIM CORNER:
SCALE: 1" = 100' (1:120)
LOGGED BY: H. Muntanion

COMMENTS: From 114' – END Mostly rk chips c̄ intermittent "muddy" sections which may be overburden. (Fault near surface?)

AVE CORE REC'Y / HOLE

DESCRIPTIVE GEOLOGY

SECTION	ALTERATION: silica	mag	clay-ser.	chl.	FRACTURING	MINERAL	GEOLOGY	DESCRIPTIVE GEOLOGY (notes)	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% RECY. SAMP INT
120	v. str.	str.	wk / str	mod	v. str.	Py-cpy-cct		Fault? Overburden, boulders? some mag vlts; l/l fracts c̄ sulph.; ½" qtz vn c̄ v. fine dissem cpy.; laced c̄ mag-hem vlts	Qtz-mag-py bx (con't). Below about 110' may be drilling along interface of overburden and bedrock.	4.5 / 1 to 2	121, 125	67, 90, 84		120; 36524	85
130								small chips, some mud. overburden + boulders. Prob. Fault gouge.		4 to 5	130, 135	30, 47	N.Q. W.L.	130; 36525	39
140								appears to be some overburden		1 to 2	140.5, 143	100, 55		140; 36526	65
150	"str-extreme"							some overburden? material here. Gouge.	Tri-coned 155-175'. Rubble + overburden. Drill 175-176'. Still unconsolidated material		148.5, 156	46		150	
160									END HOLE 176'		Tri-coned	0	Tri-coned	36527	17
170											170, 176	25	N.Q. WL		
180															

HOLE NO.: EC-132A
COLLAR ELEV.: ± '
GROUND ELEV.: 1650'
COORDINATES: 2586+90' N. 2057+80 E.
INCLINATION: -71°
BEARING: 181°

PROJECT: RED DOG
DATE STARTED: June 9, 1982
DATE FINISHED: June 12, 1982
TOTAL DEPTH: 509'

REF. TO CLAIM CORNER: Red Dog 7
SCALE: 1" = 100' (1:120)
LOGGED BY: H. Montanion

AVE CORE REC'Y / HOLE: 93.2%

SECTION	ALTERATION: silica	mod	clay-ser	chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y. SAMP. INT.
0–50									0-50' Overburden and unconsolidated rock.						
50–60	v. str	str	wk (str in fault)	str	v. str	py-sph-gal		Fract. 8" zone w str lim stain. Cataclastic text here. 52-56' fract zone. ← Str ser clay in fault zone. Fract w sulph-lim stain. Gouge. Fault 59.5-63.5'	50-509' Qtz-mag-py bx. Same unit as in EC-131. Grn-gry. Where extr. silic buff-gry color. v str alt ands in qtz matrix. Qtz veining conspicuous, particularly 50-57.' Below 67'	3%	50 – 56	82 / 98	NQWL	50 – 60 #36528	84

HOLE NO.: EC-132 A
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:
PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:
PAGE NO.: 2 OF 9
REF. TO CLAIM CORNER:
SCALE: 1" = 100' (1:120)
LOGGED BY: H Muntanion

SECTION	ALTERATION: silica	mag	clay ser	chl	FRACTURING	MINERAL	COMMENTS	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
60–70	v.str	str	mod.	mod	v.str	py-cpy (+cct)	Fault ū sections of ground-up rk. @ 60' includes some soil. Lim in fract (after sulph). narrow fault gouge. 2" gouge. cavity ū lim-hem. coating. section ū qtz flooding	Qtz-mag-py bx (cont) sections of qtz flooding. As in EC-131, 132 qtz carries v.fine dissm cpy. Ands remnants now consist of chl (+clay ser?), mag (+hem) + sulph. Short sections ū well developed fragmental (bx) text.	3 to 4	635, 685	88, 100		60–70: 36529	95
70–80	wk		str.				About 2' fault ū gouge. 20% c/a str clay.	@ 65' + 80' appears to be remnant tuff to lap. tuff text ū tightly packed qtz fragments. (see also description EC-131 for other details).		76	92		70–80: 36530	91
80–90	v.str intense	str		mod.			6" fracture - some gouge. 1" clay pod.	Sulphs as fine dissm + as vlts on fracts.	8%	82	90		80–90: 36531	93
90–100	v.str	str				(bn)	small clay patches. (ext alt tuff frag?)	Hem occurs as alt of mag.	2 to 4	91, 96	94, 100	NQ. WL	90–100: 36532	88
100–110	v.str, v.str-intense	wk-m					103-106' Fault. Str gouge ū clay			106	72		100–110: 36533	71
110–120		str			v.str, intense		109.5-114.5 Fracture zone V. broken rk. 6" gouge. 3mm mag vlt			112, 120	70, 100		110–120: 36534	94

HOLE NO.: EC-132A
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 3 OF 9
REF. TO CLAIM CORNER:
SCALE: 1" = 10'
LOGGED BY: H Montanion

COMMENTS: @ about 130' qtz vns more conspicuous. Become more prominent w stkdipas edges @ 180'

AVE CORE REC'Y / HOLE:

Columns: SECTION | ALTERATION (silica, mag, clay-ser, chl) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | SULPHIDES % | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP. INT.

Alteration notes: silica v str (120–127), extr. (127–133), extr-v str (133–142); mag str; clay-ser mod-str in mafic component (clay sea); chl mod-str, prob sm wk v fine grid hem, str, wk; fracturing v str, extreme. Mineral: Py-cpy.

DESCRIPTIVE GEOLOGY

- 120–: 1" gouge Fract zone.
- Fracts w chl-clay.
- v. Siliceous
- 8" gouge. Fault
- Fract w shall(and/to) c/A offsets qtz vn w steep angle to c/A
- 1" gouge
- criss-cross 3mm qtz vlts
- narrow fault-zone gouge
- Shr w str sulph
- qtz vns up to 2". V fine dissem grey, py Most 25° to CA
- ½" massive py (50%)
- 168-177? Fault Ground-up rk str chl + some clay alt. Mag.
- qtz vn on fract w str ser, clay

Qtz-Mag-Py Bx (con't)

Ext mag-rich (>15K) sects gen only wk py + cpy Gen <1% sulph.

*134-135 F.g. Bx (cataclastic): well preserved relict text w tightly packed subang. qtz frags (fine-med) Identical comp to Bx v. str mag (10%-15%)

Appears to be mod-str ser (+ clay) alt in mafic component

Sulphides %	Drilling interval	% Core recovered	Core size	Sample interval	% Rec'y samp. int.
2 to 4	120–125	100		120–130: 36535	94
	125–130	88			
	130–134	100		130–140: 36536	100
	134–139	100			
1 to 2	139–146	96	W.L.	140–150: 36537	98
	146–151	100			
4 to 6	151–156	100	N.Q.	150–160: 36538	100
	156–161.5	100			
	161.5–166	100		160–170: 36539	80
	166–177	51		170–180: 36540	63
	177–180	92			

HOLE NO.: EC-132A
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 4 OF 9
REF. TO CLAIM CORNER:
SCALE: 1"=100' (1:120)
LOGGED BY: H. Muntanion

COMMENTS: Below 180' hem is rarer!
Some [crb] on h/l fracts
180-240' silic flooding appears less intense than @ EC-131.

AVE CORE REC'Y / HOLE

SECTION	ALTERATION: silica	mag	ser-clay	chl	FRACTURING	MINERAL	GEOLOGY	DESCRIPTIVE GEOLOGY (notes)	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP INT.
180	str	str	mod (ser)	str	v. str	py-cpy		Qtz vns on fracts. Some w mag centres. Vns @ steep angle to C/A offset by those @ shallow angle to C/A	Qtz-Mag-Py Bx (cont) Below fault @ about 180' section of dk grn rk cut by discreet qtz vns (about 4-8/ft), majority v. steep to C/A but another set almost parallel. Some have mag core. Also mag vlts conspicuous. As above v. fine blebs cpy, py in qtz vns. In mafic component which makes up 70% of rk is about 10-15% mag + amounts of chl + apple grn alt prod (ser?).	4 to 6	183	92		180	
190								narrow fault @ 15° to C/A 195'		2 to 4	190.5	91		36541	91
	ext.		str adj to fract	wk				criss-cross h/l mag vlts in silic section (short)			196	93		190	
200								Adj to fract 1" selvage ser, py. 2' fault 2' w v. str silic + ser alt w py stngrs (bleached)	. Adj to faults mafic component bleached - alt to ser (+clay?), py	very erratic	204.5	100		36542	96
210	str (as vns)			str				Qtz vns up to 3" wide & some silic flooding			211.5	100		200	
									* 5% mag			100	N.Q. W.L.	36543	100
220	ext.	str		wk				1" gouge 60° to C/A; 3" gouge. Below extr silic + bleaching of mafic component to ser, py	* Notable hem after mag + some py		219.5	94		210	
			chl-ser (+ py)					calc vlt cross-cut qtz.			226.5			36544	100
230	str											100		220	
	(as vns)							swlph (qtz+ser) on fract (1/2")			236			36545	96
240								3-4" fault gouge.		8%		93		230	
														36546	97
														240	

HOLE NO.: EC-132A
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1" = 100' (1:120')
LOGGED BY: H. Muntenion

COMMENTS: The mafic component gen finer-grained than [illegible]. Str hem in this section

AVE CORE REC'Y / HOLE

SECTION	ALTERATION: silica	mag	ser-clay	chl	FRACTURING	MINERAL	GEOLOGY	DESCRIPTIVE GEOLOGY (notes)	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
240–260	v.str-extr.	wk	str.-v.str		Extreme			Gouge @ 50° to c/A. gouge @ 35° to c/A. 6" gouge @ 35 to c/A. narrow gouge. Criss-cross py/cpy vlts h/l–1/2". Also criss-cross calc h/l vlts	* Qtz-Mag-Py Bx (cont). 240 – 259' Str fract zone. Blended rk, except for short sections. Gouge planes. V.str ser (+clay?) alt. Also str pyrgte. Str sulph vnlts. including some cpy strgrs. Short sections on fault zone. 15-20% sulph.	5 to 10	243.5, 249, 256	93, 89, 89		36547 (240–250), 36548 (250–260)	90, 94
260–280	str-v.str	str			v.str			h/l-2mm qtz vlts. Irreg. Criss-cross bx text. Cataclastic. fault gouge 1/2" 20° to c/A. h/l to 1/2 qtz vlts. 1" py on fract. Str ser, qk alt	* 261-267' Dk grn-blk section. Str dll alt. Mod. ser alt (after dll?) Str mag. h/l criss-cross qtz vlts. (v.str). Contains str cpy. (≈5% Cu) Mag part alt to hem. 276-277.5' * Relict lap tuff text? Mafic intrus?? V str alt. Str mag (12 K)	4 to 5	266, 276	100, 101	W.L. N.Q.	36549 (260–270), 36550 (270–280)	100, 99
280–300	v.str-extreme; str	wk	v.str; str	v.wk; str	extreme	(Tr. bn) (Tr. Mo)		1" gouge, 5" gouge. Str hem. criss-cross h/l calc vlts. Py as v.str dissm'n on fract. hp to 1/4" calc vlts. 1" gouge. 1/2" gouge. Str calc vlts. 3" py. ser... zone (on fract).		15; 2 to 3	286, 296	98, 100, 100		36551 (280–290), 36552 (290–300)	99, 100

HOLE NO.: EC-132A
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 6 OF 9
REF. TO CLAIM CORNER:
SCALE: 1" = 10' (1:120)
LOGGED BY: H. Muntanion

COMMENTS: Still notable hem in mafic portions

AVE CORE REC'Y / HOLE

SECTION	ALTERATION: silica	mag	ser-clay	chl	FRACTURING	MINERAL	GEOLOGY	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
300	extr-v str	wk	wk	str	v. str	py-cpy		← str ser-clay in fract zones. Also crb. 8" gouge. / gouge (2") / chl-crb fract	Qtz-Mag-Py Bx (cont) / Rk, partic silic sects appear crackled.	5 to 10	304	100		300	
	str		(str on fracts)											36553	100
310								str crb v/t on fracts	* 314-334' Qtz-Py rk. ē some patchs of mafic (+hem) Py occurs as grains cone in patches + fract-controlled strgrs (patches replacing mafics). Assoc ē patches of py is clay-ser. V. str h/l fractsē crb. About 10% py -4-.5% Cu	short sects ≤ 2% to str mag	310, 314	100		310	
	v-extr	wk		wk	(mostly healed)							100		36554	100
320								narrow gouge / gouge / Ground-up rk. Fract or fault zone. Missing core. Thickness of fault unknown. Attitude?	* 323-330' Zone ē intermittent sections of rk ē fine mottled or "speckled" appearance (same comp as bx). Small patches of qtz + mafic hem stained patches in silic matrix ē alt product clay-ser. Mafic component ē chl. 3% py, .25% Cu. May be intrusive - str alt. ??		320.5, 326	93		320	
			mod-str											36555	68
330								crackled text filled mostly by calc, sulph			330, 333	30 / 73		330	
	v. str	in relic mafic patches						narrow gouge	Alternating sections are qtz-py ē str ser (+clay?) in fracts + acly 10% py. Str clay.	3 to 4		98	N.Q. W.L.	36556	91
340			mod-str			(tr bn)		patches of sulph / narrow cataclastic bx / 1" patch of sulph ē str cpy	* Below 340' some narrow relic (gen. ≤1") tuff bedding conspicuous. Fine-aph. only visible in siliceous sections		340.5, 346	100		340	
														36557	99
350	v str-extrm	mod-str		wk	extreme			cataclastic bx. Fracts mostly filled by calc + sulph / 2" gouge. Adj. v. str silic, ser? & clay? alt.	* 357-364' Qtz-Py rk ē clay-ser alt adj to fracts. Prob bleached Bx (some relic chl). Py, ser-clay. wk. chl represent original mafics	6 to 8	356	98 / 98		350	
360		str												36558	98

HOLE NO.: EC-13ZA
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1" = 100' (1:120)
LOGGED BY: H. Montanon

ALTERATION (silica, mag, ser.-clay, chl) | FRACTURING | MINERAL | GEOLOGY | COMMENTS: | AVE CORE REC'Y / HOLE

SECTION: 360 – 420

Alteration / fracturing / mineral column notes: v.str – str – ext – v.str – str (silica); str – wk – (str hem (& mafic sect) wk) – v.str – mod-str (mag); str – mod – (in mafic sed. compt) mod (ser.-clay); mod (mafic component) (chl); mostly h/l (fracturing); str – v.str (mineral); py-cpy

DESCRIPTIVE GEOLOGY

← narrow gouge
← 8" gouge
crb.
narrow gouge
shr ω * clay alt
Locally crackling filled ω calc.
← fract ω str hem stain
← narrow fract ω py, cpy, chl
gouge 2? attitude?
str – qtz, sulph
8" sect ω well developed bx text. Subrnd–subang qtz frags in mafic matrix (tectonic breccia?)
gouge
Here tuff lamil visible in silic flooded zone.
Chl-graph common on fracts
← v.str cpy – fairly coarse
1' sect of bleached rk adj to fract silic, clay alt. Str sulph.

<u>Qtz-Mag-Py Bx (cont)</u>

Intermittent sections of qtz flooding (qtz-py rk) + mafic (chl, mag (+hem) sulph + some seri-clay alt).

* 367' – 374', 382' – 391'. Mostly qtz-py rk as described @ 357-364'. Some v.str cpy. 0.6% Cu over short sects (≤1 ft.)

* 404' – Again, Relic tuff lamillae (Gen. ≤1") conspicuous in silic. sections (made up of qtz-sulph). Alternating Mafic, mag-hem-rich, sections, cut by qtz vns.

SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
6 to 8	366	98	N.Q. W.L.	36559 (360–370)	98
8 to 12	376	98		36560 (370–380)	99
6 to 8	389	100		36561 (380–390)	94
3 to 4	395.5	90		36562 (390–400)	95
6 to 8	405.5	100		36563 (400–410)	98
3 to 4	416	95		36564 (410–420)	97
6 to 8		99			

HOLE NO.: EC-132 A
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1"=100'
LOGGED BY: H. Muntanion

COMMENTS:

AVE CORE REC'Y / HOLE

SECTION | ALTERATION (silica, mag, ser-clay, chl) | FRACTURING | MINERAL | GEOLOGY

Alteration (420–480): silica: v str-extr; str-v.str; v str-extr; str-v.str; extr. mag: str; wk; chl; str; str-v.str; str; mod; mod. v.wk. ser-clay: mod-str; wk-mod.; str; wk; mod-str. chl.

Fracturing: v.str

Mineral: py-mag

DESCRIPTIVE GEOLOGY

- crb
- 1/2" sulph on fract
- clay-py pods (assoc w fract)
- open-fracturing (4"?)
- 6" str ser?-sauss? [illegible]
- silic zone 'crackled'-filled w calc (h/l)
- fract w vugs
- Bx text
- 4" crackle bx zone. Adj to 2" wide py-filled fract zone.
- 6'? gouge zone w some cataclastic bx text
- calc vlts (mostly h/l) in fracts.
- 1" gouge w v. str ser-clay alt
- chl, py fract

Qtz-Mag-Py Bx. (con't)

Mafic component largely v. fine grained dk grn-brn, consists of v.f.g hem, mag, sulph, chl.

* 463-469 Str mottled patches of mafic material (as described on top of page) in v. silic rk.

% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED
6 to 10	420–426	99
	426–434	96
3 to 5	434–443	92
8 to 10	443–452	84
	452–456	33
3 to 5	456–459	83
2 to 3	459–466	96
	466–476	100
6	476–	100

CORE SIZE: NQ, W.L.

SAMPLE INTERVAL	SAMPLE	% REC'Y SAMP. INT.
420–430	36565	98
430–440	36566	94
440–450	36567	86
450–460	36568	65
460–470	36569	98
470–480	36570	100

HOLE NO.: EC-132A
COLLAR ELEV.: GROUND ELEV.:
COORDINATES: N. E.
INCLINATION: BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 9 OF 9
REF. TO CLAIM CORNER:
SCALE: 1"=100' (1:120")
LOGGED BY: H. Muntanion

SECTION	ALTERATION: silica	mag	ser-clay	chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
480–509	v str (480–482); extreme (to ~502); v str (502–509)	wk (to ~502); mod-str (502–509)	v str	v wk	v str			calc fract fills narrow str. / Gouge 65° to C/A / gouge. Attitude? / some cpy strgrs (w calc) / Str w str py / cataclastic bx / gouge Attitude?	Qtz-mag-py Bx — * 482.5 – 494' Fract zone w several gouge zones. Consists of blended v. str alt rk (Qtz-py (crb) rk). Large py patches. Py, clay-ser, str crb assemblages replace mafic component of Bx unit. Thou str alt rk continues in F.Z. to 506'. * 506' Pass out of v. silic section	3 to 4; 10 to 15	480–486; 486–494; 494–500; 500–509	100; 100; 98; 98	NQ WL	480–490 36571; 490–500 36572; 500–509 36573	100; 99; 98

*END OF HOLE @ 509'

HOLE NO.: EC-133
COLLAR ELEV.:
GROUND ELEV.: 1260'
COORDINATES: 2593+70' N. 2053+60' E.
INCLINATION: -45°
BEARING: 180°

PROJECT: RED DOG
DATE STARTED: June 14, 1982
DATE FINISHED: June 16, 1982
TOTAL DEPTH: 500'

REL. TO CLAIM CORNER: Red Dog 5
SCALE: 1" = 100' (1:120)
LOGGED BY: H. Muntanion

ALTERATION: silic | mag | clay-ser | chl. — FRACTURING — MINERAL — GEOLOGY

COMMENTS:

AVE CORE REC'Y / HOLE: 90.9

SECTION | DESCRIPTIVE GEOLOGY | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP. INT.

Section scale: 0, 10, 20, 30, 40, 50, 60

DESCRIPTIVE GEOLOGY

0-37' Overburden

37-40' mostly bedrock ?

40'-58'? Monz or Grdr

Crowded Fsp Subpor. Red Dog Po?

Lt. colored rk c̄ pink hue in matrix. Small grn patches (chloritic). Consists of 40-50% tightly packed wht anhed-subhed. fsp phenos, 2-3mm. Mod clay-ser (±sauss) alt. Interstit. irreg. clots of chl-mag (15%) alt from mafic phenos. Matrix has pink stain due to fine hem. + consists of part alt fsp, about 10% qtz. Mag content 2%-3%. Tr epid. Wk tr py. Xenoliths of f.g. intermed rk (Andes?)

Alteration (30-40'): ← (mostly clay)

Alteration (40-60'): clay-ser: mod (40-50'), extreme clay (50-60'); chl.: str.; silic: wk sil (bottom)

Fracturing: wk (40-50'); extreme? (50-60')

Mineral: completely weathered (50-60')

very badly broken + weathered

Comments: Some hem stain in matrix + on h/l fracts

Hem, lim. stain

50.5'-93' prob. fault zone

contact? Attitude?

% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
<0.1	40-45	40	N.Q. WL	40-50 (36574)	49
	45-55	57		50-60 (36575)	70
	55-60	83			

HOLE NO.: EC-133
COLLAR ELEV.: GROUND ELEV.:
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INCLINATION: BEARING:

PROJECT: RED DOG
DATE STARTED:
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TOTAL DEPTH:

PAGE NO.: 2 OF 9
REF. TO CLAIM CORNER:
SCALE: 1" = 100' (1:120)
LOGGED BY: H. Muntanion

COMMENTS: Hem-lim stain not obvious below 120'.

AVE CORE REC'Y / HOLE

DESCRIPTIVE GEOLOGY

SECTION	ALTERATION (silic / mag / clay or chl)	FRACTURING	MINERAL	Notes	Descriptive Geology	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
60–88	silic: wk-mod; chl: wk?	v. str-extreme		Broken, crumbled, weathered rock ↓ Limonite stain along fract planes. ? Vague contact area	58-88' : Dac? + Ands? Dike. V. fine internal? volc. Prob dike. Has 32 1 mm chl-mag clots (alt of pyroxene?) Some part alt wht fsp planes. Matrix appears silic. No sulph. This section v. str broken + weathered. Appear to be some short section of qtz-mag rk. (83-85')	<1/2 ; 1% to 2% ; 1/2	62, 73, 83	83, 30, 47	NQ WL	60–70: 36576; 70–80: 36577; 80–90: 36578	41, 42, 53
88–118	silic: v. str-extreme, ?; mag: str-extr, mod, extreme		Py (cpy-cct) (covel moly)	102-117' Fault zone. Str broken rk. Str weathered from 103-110'. Also fract-controlled chl, py, mag. qtz vn ū fine dissem py, cpy, covel, cct. Fract controlled	88-118.2' : Qtz-mag (py) rk. Bx? Alt of por? Ands? Locally appears to have bx text, very str fract. Prob same bx unit as EC 131, 132, 132A but appears more bleached. About 6% mag. Contains irreg wht patches or frags ū soft alt product (prob clay (ser?)) ū dissem mag + sulph. Also along fract. Mag largely occurs as pod-like masses. gen assoc ū chl, sulph + as stringers on fracts. * @ 103' vague relic fsp planes.		93, 103, 113, 117	55, 66, 76, 80, 100		90–100: 36579; 100–110: 36580; 110–118.2: 36581	63, 73, 81

Depth scale: 60, 70, 80, 90, 100, 110, 120

HOLE NO.: EC-133
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:
PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1" = 100' (1:120)
LOGGED BY: H Muntanion

COMMENTS:
—— zeolite vns.

AVE CORE REC'Y / HOLE

SECTION	ALTERATION: silica	mag	ser-clay	chl	FRACTURING	MINERAL	GEOLOGY
120–142		Mod crb alt.	wk	mod-str	mod-str		
142–180	v.str / str	v str	str (ser)	wk- mod. / wk- / wk-mod	mod. / str / wk- / (random h/l) / mod-ife		

DESCRIPTIVE GEOLOGY

← zeol fractfills Mostly h/l–3mm
Adj. to these rk is pink-stained.
← 1/2" zeol vn. Epid alt. adj.
← some h/l criss-cross qtz vlts.
← late-stage 1/2" shr 5 finely dssm mag, silica, chl, prob some ser. Cuts zeol vlts 50° to C/A.
Near contact epid in intrus. rk.
← 3" gouge Attitude?
← 2" qtz-ser zone @ 70° to C/A (on fract?)
← fragmental text obvious here rnded qtz frags (up to 1/2") in mafic matrix
← str chl on fracts. 3" gouge.
Dissm. + strgrs cpy. Cpy also w mafic patches.

118.2 – 143.2 Por
Part of Red Dog Por unit.
Med gry-grn rk. Vaguely Por text. Hazy outlines of phenos due to part alt. Some pink-stained fsp phenos (prob. due to hem). Fsp phenos wk-mod. ser, sauss? alt. 15% corroded mafic phenos now consist of chl-mag. Also dssm. mag. About 5% mag. Part alt fsp, wk qtz matrix. Also crb. Mod-str zeol (laumontite?) vning (h/l - 1/2"). About 1% py (dissm).
Some scatt. f.g. xenoliths. Now assimilated.
Epid assoc w zeolite vlts, gen periph.

143.2 – 329.4' Qtz-Mag-Ser? Bx
- here sulph are only accessory.
Mottled gry (qtz) + dk grn-blk (mafic mag-rich) component. Vague bx text. Locally obvious fragmental text.
Similar to unit in EC 131, 132, 132A original rk obliterated. Pale grn matrix. Prob considerable ser alt. Patches are relatively small 1/4–1/2".
Locally granular appearance (coarse) + gives impression of original intrusive.
Cut by wht zeol v/ts wk distrib, gen. 1-3 mm.
* orig rk now consists of qtz-ser? + some chl. About 10% mag

% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	SAMPLE NO.	% RECY. SAMP. INT.
1%	125	100		(118.2)–130	36582	99
	130	98				
	135	98		130–142.2	36583	98
2%	145	93	W L	142.2–150	36584	95
	149.5	96	N.Q.	150–160	36585	95
	158.5	94		160–170	36586	91
4 to 5	165	88				
2	175	91		170–180	36587	90

HOLE NO.: EC-133
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 4 OF 9
REF. TO CLAIM CORNER:
SCALE: 1" = 100' (1120)
LOGGED BY: H. Montanion

COMMENTS: In bx some cpy grains up to 5 mm. Epid vlts (fract fills) offset by those ō crb.

AVE CORE REC'Y / HOLE

Columns: SECTION | ALTERATION (silica, mag, ser-clay, chl) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP. INT.

Section: 180 – 240

Alteration / fracturing / mineral notes: str; str; str; mod; str; v. str; mod str; v str-ex str; (str-mod in non-silic patches) ... ; wk; mod (healed); v. str; str-mod; wk-mod; mod; mod-str; py-cpy; moly; ex str; str

Left-hand notes (by depth):

- ← narrow ser-rich strs. Some ō diss mag. About 10° to C/A offset by crb-rich fract @ 75° to C/A
- calc vlt
- zeol on fract.
- criss-cross crb h/l vlts. bx text
- Fracts ō crb. mostly h/l
- bx text
- coarse cpy
- sm ~~py~~ cpy pod.
- str calc vlts + pods
- 8 mm cpy patch
- Epid h/l vlts random
- ← h/l mag vlts ō cpy
- epid vlt ~~40~~° to C/A offset by calc fract @ 20° to C/A
- ½ qtz vlt cut by h/l epid fracts
- mag vlts
- Bx text. Subrnd Vague. In mod ser alt matrix (also some chl ō assoc calc. Calc str in h/l fracts.
- 1" gouge @ 50° to C/A
- str moly smear on fract.
- 1" gouge @ 90° to C/A
- 1" gouge @ 60° to C/A

Descriptive geology:

Qtz-Mag-Ser Bx (cont'd)

* some sects ~~w/~~ str. ser in matrix
* The non-silic patches (originally mafic) are mod-str ser alt. Ser appears to dominate over chl in general. Appears to be replacing chl.

*@ 209' 4" sect ō apparent tuff text. Relict. Mag-rich ash-sized frags in silic matrix wk arg.? alt in matrix.

Mag gen 5-10% - Mostly as clots made up of fine-grained aggregates. Also assoc ō chl-~~ser~~-crb clots + on fracts

Assoc of sulph-mag, part term alt. here

% Sulphides	Drilling Interval	% Core Recovered	Core Size	Sample Interval	% Rec'y Samp. Int.
2	180–185	91	NQWL	180–190: 36588	95
4 to 6	185–195	100		190–200: 36589	98
2 to 3	195–205	95		200–210: 36590	97
1 to 2	205–210	100			
3 to 5	210–215	100		210–220: 36591	100
	215–223.5			220–230: 36592	96
	223.5–232	95			
2 to 3	232–240	95		230–240: 36593	95

HOLE NO.: EC-133
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1"=100' (1:120)
LOGGED BY: H Montanon

COMMENTS: Below about 240' chl predominates over ser.
Below 260' qtz-crb vns appear

AVE CORE REC'Y / HOLE

SECTION	ALTERATION: silica	mag	ser	chl	FRACTURING	MINERAL	GEOLOGY
240–250	str / v.str	str	wk	str	wk-mod	py-cpy	
250–290			(mod. str patches adj to some vnig)		(mod. well healed)	+ Moly	

DESCRIPTIVE GEOLOGY

Qtz-Mag Bx (con't)

- 3m mass py vlt selvaged by 1/2" qtz vlt
- 2" wide qtz-crb vlt @ 30° to C/A. Adj. bleaching of rk.
- qtz vlt (5mm) offset by fract parallel to C/A
- 2" calc vlt
- qtz-crb vlt
- appear to be tuffaceous bedding (1/4-1/2") Grain-size diff.
- 1-2mm py vlts
- fract ā chl
- 4mm calc vlt
- 1/4" shr zone chl, sulph, crb.
- 3 mm py vlt ā silica-ser selvage
- vague tuffaceous bedding parallel to C/A
- Locally patches of silica flooding related to str calc vlts

* @ 267' + 275-8' short sects ā vague narrow layering imparted by differences in grain-size. Bedding @ 90° to C/A. Prob tuffaceous bedding

* Some mag occurs as v. irreg. vns.

% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
5 to 6	240–248.5	95	NQ	240–250: 36594	95
2 to 3	248.5–253	95	NQ		
	253–263	100	NQ	250–260: 36595	99
8					
2 to 3	263–270	100	NQ	260–270: 36596	100
4	270–275	100	NQ	270–280: 36597	99
2 to 3	275–285	99	NQ		
6 to 8				280–290: 36598	99
3 to 4	285–295	98	NQ	290–300: 36599	99
	295–300	100	NQ		

HOLE NO.: EC-133
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DDa
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1"=10 (1:120)
LOGGED BY: H. Muntanion

COMMENTS:
Epid vlts cut by crb vlts
cpy assoc c̄ patchs, strgrs of mag + as fine dissem in qtz

AVE CORE REC'Y / HOLE

Columns: SECTION | ALTERATION (silica, mag, ser, chl) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % RECY SAMP INT.

Section: 300 – 360

Alteration: silica v.str (300–330), str (330–340), mod (340–350), str (350–360); mag str (330–340); ser mod, wk, mod, med-str; chl mod, str, wk-mod, v.str
Fracturing: mod-str; vein healed fract
Mineral: py-cpy; cpy-py (+ mh)

DESCRIPTIVE GEOLOGY (point notes)

- qtz-crb vlt (4mm) crb @ core ax
- calc-filled str
- Core intersects contact c̄ bx. Frags are Qtz-mag bx + matrix largely crb. Prob some clay (+ ser?) Appears to be calc clastic bx
- qtz-crb vn.
- shatter bx text. Subang-sub rnd (½") qtz frags in matrix of chl-mag-py (occupy fracts?).
- qtz-crb vlt
- h/l sulph vlts.
- contact @ 80° to c/A
- relic lap tuff (v.sitic) text?
- epid stgr.
- 3mm cpy in mag patch
- a few epid fract fills
- Irreg contact, about 65° to c/A
- ¼" str c̄ crb @ 45° to C/A
- Epid fracts cut by crb
- narrow strs @ 75° to c/A
- } stckwks crb vlts
- contact irreg; follows fract; poor contact gradational.
- Fault 75°
- 1" crb vlt. Some only h/l epid. All 20° to C/A.

Qtz-Mag Bx. (cont)

Fracts healed predom by qtz-crb + crb vlts, mostly h/l-3mm. cpy largely assoc c̄ chl-mag which mostly seem to occur along healed fracts.

329.8 – 330.3 Fsp por

Lt gry-grn rk. 20-25% 3mm Fsp phenos. part arg. alt. Vague pheno outlines. 15% chl clots alt from mafic phenos. Appears to be some ser in matrix. Non mag. No sulph.

330.3 – 341.2 Qtz-Mag Bx as above.

341.2 – 355' F.g. Fsp Por (And? Por)

Med-gry to dk gry rk. 20% mostly lmy Fsp phenos, mostly ankd only wk alt. 10-15% corroded mafic phenos, alt to mag, chl, ser?, py. Matrix str silic. Appears to be some ser. About 3% mag, 1% v. fine dissem py. Mod-wk fract filled c̄ calc + minor epid.
(Dense, v.f.g. matrix - hard)

355 – 357' Fsp Por.

- Similar to bottom of EC-131.

35% mostly 3-4 mm ankd fsp phenos. Wk-mod ser alt. Alt of the groundmass

% Sulphides	Drilling interval	% Core recovered	Core size	Sample interval	% Rec'y samp int.
tr-1	300	100		300	
5 to 6	305	99		36600 (300–310)	99
1 to 2	315	100		36601 (310–320)	100
3 to 5	324	100	N.Q. W.L.	36602 (320–330)	100
	334	100		36603 (330–341.2)	100
1 to 2	344	98		36604 (341.2–350)	99
1%	354	100		36605 (350–360)	99

HOLE NO.: EC-133
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED: June 2, 1977
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1"=100' (1:120)
LOGGED BY: H. Muntanian

SECTION	ALTERATION: silica	mag	ser	chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
360–370	v.str	str	mod-str	wk-mod	mod-str	cpy >> py (mag)		← lower contact of F.g. fsp por (Andes por) @ 45° to c/a! shear contact. shr 3mm; epid fract fill; 1" gouge. str chl-crb. wk zeol w/ vns.	Fsp por (description cont) Chl-ser, mag after maf. phenos 1-2% mag, 1% py. Some ser in matrix & str fract fill ≈ calc. 357-360.3' Fg fsp por. (Andes? por) Same as 342-355: Hornfelsed and por? zone.	5	364	100		36606 (360–370)	98
370–380	str		wk	v.wk				¼" shrs, some ≈ mag	360.3' - 500 Qtz Ser-Mag Rk F. Same comp as Qtz Mag Bx above. No obvious bx text. Gen. finer grained. Mafic clots smaller + more assimilated due to increase in silic (+/or granulation).	2 to 3	372	96		36607 (370–380)	98
380–390	v.str / mod	mod	mod			cpy >> py, bn		½" qtz on mag ser salvage	Poss. v.str all intrus? epiporphy. As the closer About 378' grades into Qtz-(mag)-ser rk. F.g. Appears to have qtz frags, v.silic tuff, and tuff. Rock very massive here. * Below 378'		382	100	NQ W.L.	36608 (380–390)	99
390–400					wk-mod			½" gouge; ← v narrow gouge	All ... ? * Below 393 mag becomes weaker + rk consist of qtz, 3-5% mag as tiny clots, 10-20% ser (+clay), minor chl + 2% sulph. No longer has	1 to 1½	392	99		36609 (390–400)	98
400–410	str		mod-str					fract ≈ str crb (includes siderite?); chl-crb fract; 2" gouge zone - clay-ser alt; 2mm mag vlt	appearance of qtz-mag bx. Poss v.silic intrus ≈ mafics corroded to chl, mag, sulph (+ ser?). Text ill-defined. Somewhat equigran.		402	98		36610 (400–410)	98
410–420	str				mod			orange speckles, prob siderite or zeolite; 2" gouge zone. Adj. vague bx text. Prob cataclastic	Sulphs virtually all cpy. Some bn. (tr) * 418'-426' More bleached. Strong Ser?		412	98 / 100		36611 (410–420)	100

HOLE NO.: EC-133
COLLAR ELEV.:
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COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 8 OF 9
REF. TO CLAIM CORNER:
SCALE: 1" = 100' (1:120)
LOGGED BY: H Muntarian

COMMENTS: Below 460' str ser noted, largely related to h/l fracts.
Gouge zones calc-rich Prob some clay.

AVE CORE REC'Y / HOLE

ALTERATION: silica | mag | ser | chl — FRACTURING — MINERAL — GEOLOGY

DESCRIPTIVE GEOLOGY

Column notes (by depth):

- 420: sm cpy pod w mag
- str crb vlts (fract fill) + crb pods
- Laumontite vlts
- 430: 1/2" gouges
- vstr crb vlts + adj. bleaching.
- 440: 1/2 str
- Gouge zone. Fault. Attitude? Prob nearly perpen. to C/A Thickness? > 3".
- Moly in seric patch.
- vstr ser-clay? alt as patches + adj to fracts
- epid vlt.
- gouge. Approx attitude. About 6" wide
- 1" gouge
- shatter bx text
- Fault w gouge planes
- Epid in some fracts

Alteration: silica str (420–), v.str (~445–455), ext (~465), v.s str (470–480); mag wk, mod, sporadic, st, mod; ser mod-str, str; chl wk, v.wk.
Fracturing: mod-str, wk-mod, str, v.str.
Mineral: cpy-py (local bn); cpy-py (moly).

Qtz - ser rk (cont)

@ 421' relic fragmented text noted. Tuff or lap tuff?
Rk v.str silic as above + here is bleached. Some small mag streaks

* Below about 460' ser(+clay?) stronger. Occurs in fracts, adj. + as small alt patches. Seems to coincide w greater Cu content.

* 454-455', 458-458.7, 464-467' Distinct section of Qtz - Mag (ser) Bx.
Irreg. mafic patches of mag - chl - sulph in silic matrix. Chl appears largely alt to ser. Str cpy dissem throughout. cpy > py.
A few other < 6" sections w patches of mag. Here much stronger cpy than other rk.

@ 460.8' 2' section w v.vague por text imparted by clay alt and ffeds (plag?)

Depth	Sulphides %	Drilling Interval	% Core Recovered	Core Size	Sample Interval	% Rec'y Samp. Int.
420	1/2 to 1	422	100			
	1 to 1 1/2	426	93		36612	96
430			96			
		435	97	NQ WL	36613	96
440		441	98		36614	98
450		450.5	99		36615	99
460	2 to 3	459.5	100		36616	100
	3 to 4	465	100			
470		472	91		36617	94
480		479	100			

HOLE NO.: EC-133
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1"=100' (1:120)
LOGGED BY:

COMMENTS: Calc still occurs on fracts

AVE CORE REC'Y / HOLE: 90.9

SECTION	ALTERATION: silica	mag	ser	chl	FRACTURING	MINERAL	GEOLOGY	DESCRIPTIVE GEOLOGY (notes)	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
480–500	v. str	mod.	str	v. wk	v. str / mod.	cpy >> py (moly)		← zeol vlt c̄ some calc. ← shatter bx. text. qtz frags surrounded by ser(-chly?) fract fills. ← irreg. 1" zeol vlt. ← mag vlk. ← fract c̄ carb c̄ sulph-rich selvaging ← moly smears + v. fine dissem ← 1" gouge ← 2".	Qtz-ser rk (cont'd) sulphs, mag + alt products largely in fracts. * 499.2' ~~...~~ narrow str, qtz-mag bx. ~~...~~ py. No cpy.	3 to 4 / <1	480, 485, 490, 494, 500	100, 97, 100	NQ WL	480–490 untagged; 490–500 36618	99, 98

END OF HOLE @ 500'

HOLE NO.: EC-134
COLLAR ELEV.: 1070'
GROUND ELEV.: 1190'
COORDINATES: 2591 N 2049+70' E.
INCLINATION: -45°
BEARING: 179°

PROJECT: RED DOG
DATE STARTED: June 17, 1982
DATE FINISHED: June 18, 1982
TOTAL DEPTH: 203'

PAGE NO.: 1 OF 4
REF. TO CLAIM CORNER: Expo 1
SCALE: 1" = 10' (1:120)
LOGGED BY: H. Montanin

COMMENTS: 10 – 36' v. str lim stain.
@ 75' lim staining ends

AVE CORE REC'Y / HOLE: 87.0%

Column headings: SECTION | ALTERATION (Silica, mag, sd, chl) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP. INT.

Section: 0 – 60

Alteration: mag str; sd str; chl v. wk; silica (varying degrees of flooding – rk too broken) very str.; mag mod.; 30 ext.
Fracturing: prob str.
Mineral: cpy-py-bn-cct-covel; (cpy > py); st dissem bn

Overburden 0–10'

Fracturing / structure notes:
- Mostly overburden but also rk chips.
- badly broken weathered.
- broken to small rk chips + weathered. Fracturing?/? matrix v. brecciated-cataclastic
- Fract? Attitude? Ground rk.
- v small rk chips Fracturing?
- Prob fault Attitude? Ground-up rk.
- W/ mag + sulph v 1/2
- Badly broken. Prob fract
- ground-up rk. Prob Fault. Fault upper contact of Dior?

10 – 16? appears to be some overburden + badly broken bedrock.

15? – 59.5' Qtz-Mag-Ser "Bx"
– appear to be of Ands tuff to lap tuff. Mafic (ands?) frags, now consisting of mag, ser (+ chl), sulph. prob Matrix qtz flooded to varying degrees. Frags are corroded - very irreg occurring as small ≤ 1/4" patches although a few are larger. Prob 20% of rk is ser which occ as clots replacing mafic frags?, along + adj to fracts + prob as matrix alt product. Sulph occ as grains conc in mafic patches, small dissem in qtz + some as strgs. With greater qtz flooding smaller mafic patches only vague.
Bn occ as v. fine dissem. Cpy tends to be replaced by cct/or covel @ edges.
* From about 45 – 59.5' bx text conspicuous. Matrix str shattered, v. fine frags. Milling? Prob cataclastic zone only continues for a few in. + then weakly fracturing.

59.5' – 76' Alt Dior?
Pale grn-gry rk. V. str alt intrus. Prob intermed comp. V. str ser +/or clay alt. Fsp completely alt. Appears to have v. low

Sulphides: 2 to 3

Drilling interval	% Core recovered	Core size	Sample interval	Sample no.	% Rec'y samp. int.
10–18	13	NQ	10–20	36619	20
18–21	50				
21–25	75		20–30	36620	68
25–33.5	65				
33.5–44	59		30–40	36621	61
44–49	90		40–50	36622	78
49–52.5	91				
52.5–59.5	89		50–60	36623	88

HOLE NO.: EC-134
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED: JO...
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 2 of 4
REF. TO CLAIM CORNER:
SCALE: 1"=100' (1:1120)
LOGGED BY: H Muntanion

COMMENTS: In intrus. calc fracts are later than those carrying zeol

AVE CORE REC'Y / HOLE

SECTION	ALTERATION: silica	mag	ser	chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
60			str	wk		Tr native Cu		} v. broken core. Poss fract?	AH Dior? (cont) qtz content 20% mafics v. str alt to chl + mag. A few lath (hbl?) pseudomorphs remain. Some epid after plag. Tr of v. fine native Cu. Cut by criss-cross zeol vning mostly h/l. Contains about 3-5% mag. Mag is hem stained. Lower contact indistinct.	<.1%	62	64		60	
70					str			v. str zeol vning. h/l – 1/4" wide			72	100		36624	93
									76 – 104.5' Qtz - Ser (Mag) "Bx" -near contact mostly alt. to ser (+clay?) Mafic patches v. corroded + apple grn color. Not str in mag but str fine dissem cpy. Mafic (coarse tuff to lap-size) patches fade out over short sections. Several ft below contact patches have darker grn color similar to 15-59.5'. Ser becomes noticeably wker (in mafic patches + on fracts)		76	83		70 / 36625	89
80	str-v.str	mod-str	v.str / str			cpy-py-(cn)		} Some gouge material. Prob fault		4	83	100		76 / 36626	100
								} broken. Some wk fracturing noted			89	95		83 / 36627	96
90			mod.		mod.			gouge. some h/l fracts w py + mag.			95	100	N.Q. W.L.	90 / 36628	96
100					v. str			4' Fault zone betw bx + intrusive. Rk in fault str ground-up. Muddy.	104.5' – 146' AH Dior? Poss same unit as @ 59.5-76'? Appears more str alt. No relic texture. Consistently str zeol + lesser calc criss-cross vning is characteristic of this unit. Mafics replaced by small corroded agregates of chl (darky grn) replaced by ser, tiny flecks of biot, py + minor epid. Some w mag. Mag about 1%. Matrix almost completely ser + clay? alt (wht, soft). Little or no qtz noted.		105	92		100 / 36629	92
110	mod-wk.	Biot				Py		@ 104.5' contact, about 75-80° to C/A Narrow (≥1") gouge. v. str zeol vlts. Mostly h/l-3mm. Some arly zeol (pink) flooding. Some crb on h/l fracts. Some fracts later than zeol. epid on fract. calc fract cuts zeol fract.		1/2 to 1	115	100		104.5 / 36630 / 110	99
120												100		120	100

HOLE NO.: EC-134 | PROJECT: RED DOG | PAGE NO.: 3 of 4

COLLAR ELEV.: | GROUND ELEV.: | DATE STARTED: | REF. TO CLAIM CORNER:

COORDINATES: N. E. | DATE FINISHED: | SCALE: 1"=100'

INCLINATION: | BEARING: | TOTAL DEPTH: | LOGGED BY: H Muntanion

ALTERATION (biot, ser+clay, chl) | FRACTURING | MINERAL | GEOLOGY

COMMENTS: Do staining on Intrusives

AVE CORE REC'Y / HOLE

DESCRIPTIVE GEOLOGY

SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP INT

Section 120–180

Alteration: biot: vk-mod (120–127), mod (127–132), wk-vwk (132–140); ser+clay: str (120–140), wk (clay) (140–), mod-wk; chl: v.wk (120–140), mafics alt to chl + crb, mag; Fracturing: v. str (120–), mod (–157), str (175–180). Mineral: py (120), py(cpy)(mag) (132–140), py (150).

Comments:
- ← 1/2" zeol.
- ← 4" zeol flooding. epid on fract. narrow gouge
- } some gouge. Several fract planes mostly 50° to C/A
- ← 1/2 zeol vlt.
- } mod density crb, zeol vlts
- Lt. to mod grey-grn color

Alt. Dior (cont).

@ about 132.5' notable increase in mag. Dissm. Here grades.

From about 132.5–140' some qtz noted + v.f.g. v.wk dissem cpy. Rare v.fine to v.mky. This may be result of some assimilation of bx unit

Not as str alt. Some epid alt + poss also sauss. A few vague fsp xl's noted. Some K Fsp??

146'–194' M.g. Crowded Monz or Dior Subpor

70% Fsp (Plag + KFsp?) phenos w interstitial (15%) alt mafic aggregates now consisting of chl, mag, crb. Py dissm mostly in these aggregates. Text may be seriate rather than por. Phenos from <2–4mm. Also interstitial fine Fsp. No qtz noted. About 2% mag, <1% py. Propyl alt. Mod zeol + some crb vning (h/l – 8mm). Pink selvages around zeol vlts, prob zeol flooding. Epid also well developed along + adj to some fracts. Some xenoliths of fine-grained por. Fsp only wk alt, prob clay.

Sulphides: 2% (120), <1% (140)

Drilling interval	% core recovered	Sample	Sample interval	% rec'y
120–125	100	36631	120–132.5	100
125–135	100	36632	132.5–140	96
135–145	91	36633	140–150	93
145–155	95	36634	150–160	95
155–165	96	No sample	160–	
165–175	98			
175–	98			

Core size: NQ

HOLE NO.: EC-134 | PROJECT: RED DOG | PAGE NO.: 4 of 4

COLLAR ELEV.: | GROUND ELEV.: | DATE STARTED: | REF. TO CLAIM CORNER:

COORDINATES: N. E. | DATE FINISHED: | SCALE: 1" = 100' (1:120)

INCLINATION: | BEARING: | TOTAL DEPTH: | LOGGED BY: H Murtaugh

SECTION	ALTERATION: silica	ALTERATION: biot	ALTERATION: ser-clay	ALTERATION: chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS: / DESCRIPTIVE GEOLOGY	AVE CORE REC'Y / HOLE	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y. SAMP. INT.
180				wk-mod	str	py		M.g. Crowded Monz or Dior Por. (cont)			185	98	W.L.		
								194-203 QFP Qtz Monz? Por		1/2					
								Believed to be another phase of RED DOG POR							
190								Fresh por. Consists of wht (v.wk sauss alt) fsp phenos pink-tinged phenos (K-spar?) 5-10% mafic, prob hbl part alt to chl phenos #2 0.2 qtz phenos. Also qtz in qtz-fsp matrix.			195	97		194		
								shr							
								← contact not obvious					N.Q.		
								← narrow shr							
								This unit has dominant orange color.							
200				v.wk	wk-mod			flooding of orange mineral Prob largely exotl.			202	80		36635	82
203								END OF HOLE 203'						203	

HOLE NO.: EC-135
COLLAR ELEV.:
GROUND ELEV.: 1190'
COORDINATES: 2591
N. 2049+70' E.
INCLINATION: -90°
BEARING: 000'

PROJECT: RED DOG
DATE STARTED: June 18, 1982
DATE FINISHED: June 19, 1982
TOTAL DEPTH: 172'

PAGE NO.: 1 OF 4
REF. TO CLAIM CORNER: Expo1
SCALE: 1" = 10' (1:120)
LOGGED BY: H. Montana

COMMENTS: Str lim stain from 10-75'.

AVE CORE REC'Y / HOLE: 93.2

Column headings: SECTION | ALTERATION (silica, mag, ser, chl) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP. INT.

Section scale: 0, 10, 20, 30, 40, 50, 60

Alteration: silica: very str (10–28); (rk too broken to judge) (28–47); v. str (44–50). mag: mod. (27–35); str (37–47); mod-str (47–60). ser: str (15–23); (also on fracts) (26–38); wk (44–47); wk (58–60). chl: wk (15–21); v. wk (21–33); wk-mod. (43–50).

Fracturing: v. str (10–16); extr. (16–42); v. str (42–50).

Mineral: cpy-py-(bn)(cct) (10–25); cpy-py-(moly)(cct) (33–48).

Geology annotations:
v. broken
gouge
same gouge
v. broken
25–37' rk decomposed
Lim stain on fracts
gouge
rk chips. Prob fault.
str moly smears on a shr.
mag vlts.

DESCRIPTIVE GEOLOGY

10–77.5' Qtz-Mag-Ser "Bx"

v. str alt rk. Orig text not preserved. Same as top of EC-134. Poss alt of ande tuff or lap tuff. Mafic frags replaced by chl (which in turn largely replaced by ser & clay), also mag + some sulph. Frags v corroded + indistinct but below 43' become distinct + appear as dk or dk grn-gry patches. Here also mag vlts, stgrs fract controlled + v. irreg.
- for more description see EC-134.

* 15'- about 43'. Includes fault zone + other str fract. Rk is v. str alt, largely to clay, ser. Sulphs appear to be lower. Rk is mostly decomposed (crumbles).

* From 15-35 introduction of mag does not appear to be as str as below.

% Sulphides	Drilling Interval	% Core Recovered	Core Size	Sample Interval	% Rec'y Samp. Int.
3	10–14.5	91		10–20: 36636	93
	14.5–24	95			
1 to 2	24–29.5	53	WL	20–30: 36637	72
?	29.5–37	93	NQ	30–40: 36638	89
	37–41.5	80			
2	41.5–47	95		40–50: 36639	94
1 to 3	47–57	99		50–60: 36640	98
	57–	97			

HOLE NO.: EC-135
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: RED DOG
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER: Expol
SCALE: 1" = 100' (1:120)
LOGGED BY: H. Muntanion

ALTERATION: silica | mag | ser | chl — FRACTURING — MINERAL — GEOLOGY

COMMENTS:

AVE CORE REC'Y / HOLE

DESCRIPTIVE GEOLOGY

Section 60–120

Alteration (60–~83): silica v. str; mag wk / v. str; ser mod-str / wk-mod; chl wk
Alteration (~80–84): silica extr-v. str; ser wk-mod
Alteration (below 84): silica Nil or v. wk; below ~110 v. str-extr; ser wk / mod.; chl v. wk
Fracturing: v. str (60–~88); mod-str (below ~88)
Mineral: cpy-(py-cc?)-(-moly) (60–~76); cpy, py (below ~90)

Comments:
- Fault zone.
- moly smear on fract plane
- narrow str.
- v. broken rk chips in Prob fault; some gouge
- zeol patches, strgrs.
- h/l fracts mostly w clay (zeol?) fills
- mag vlts on fracts.
- sharp contact @ 80° to C/A; 2mm zeol vlt along contact.
- some gouge.
- some h/l mag vlts (fract contigs)

Qtz-Mag-Ser Bx (cont).

Except for short sections cpy ≥ py. Moly smears noted on some fract planes.

77.5–79' Str alt Fsp por. Red grnish rk. str zeol vning @ 78–79' Por text. visible. Fsp phenos alt by sauss + epid alt. Fsp w some qtz matrix also alt to sauss + ser? No sulph. 12 chips hem-stained mag.

79–84 Qtz-Mag-Ser Bx w rk is pale grn gry poss bleached bxs.

84'–108.7 Alt Dior (prob porphyritic)

*84–85.5' Fsp Por. (Qtz Dior Por.)
Prob porph phase of same unit. 30% v str clay (+ser?) alt Fsp phenos. 2–3mm anhed in. Matrix consists of 65% fine qtz grains, chl (some pseudomorphs after hbl?), dissem mag (3%) tr py (dissm). Prob some clay.
Below 85.5' porph text not as conspicuous. Same unit as EC-134 59.5–76' (Alt. Dior). Here some relic por. text preserved though vague. V. str ser (+clay) alt. V low qtz (see EC-134). Mod zeol vning.

Depth	% Sulphides	Drilling Interval	% Core Recovered	Core Size	Sample Interval	Sample No.	% Rec'y Samp Int
60–67	3	67	97		60–70	36641	95
67–75.5	1	75.5	84		70–77.5	36642	91
75.5–80	Nil						
80–85.5	1/2	85.5	98		77.5–84	36643	98
85.5–95.5	Tr	95.5	95		84–90	36644	96
95.5–105.5		105.5	99		90–100	36645	97
105.5–109		109	91		100–110	36646	96
109–117	≤ 1/2	117	99		110–120	36647	99
117–120			99				

HOLE NO. EC-135 PROJECT: RED DOG PAGE NO: 2 OF 4

COLLAR ELEV: GROUND ELEV.: DATE STARTED: REF. TO CLAIM CORNER:

COORDINATES: N. E. DATE FINISHED: SCALE:

INCLINATION: BEARING: TOTAL DEPTH: LOGGED BY:

SECTION	ALTERATION: silica / mag / ser / alt	FRACTURING	MINERAL	GEOLOGY	COMMENTS: / DESCRIPTIVE GEOLOGY	AVE CORE REC'Y / HOLE	* SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y. SAMP. INT.
			(cpy, Py)									

108.7 – 109.6 Fsp Por. (Qtz Dior Por.?)
Poss similar to 84-855?
20% 2-3 mm anhed-subhed fsp phenos
v. str alt - prob clay + carb.
Matrix consists of ser?, clay (+ carb.)
alt fsp + qtz. Mafics only represented
by mag (5-6%) No sulph

109.6 – 150' Qtz-ser rk
Prob same origin as Qtz-mag-ser bx unit.
Here only a few remnant mafic, v.
corroded irregular patches remain.
These mostly consist of ser, minor mag +
sulph. Sulph, mostly cpy, <1%.
Minor zeol along some fracts.

It is poss that this is v. silic Dior
rather than ands tuff.
It is poss. a mixed zone of
assimilation (volc + Red Dog intrusive).

* Appear to be some relic. str. alt. plag
phenos.

HOLE NO. EC-135 | PROJECT: RED DOG | PAGE NO: 4 OF 4

COLLAR ELEV: | GROUND ELEV.: | DATE STARTED: | REF. TO CLAIM CORNER:

COORDINATES: N. E. | DATE FINISHED: | SCALE: 1"=100'

INCLINATION: | BEARING: | TOTAL DEPTH: | LOGGED BY: H. Muntanion

COMMENTS: No crb alt or along fracts as was the case in EC-134.

AVE CORE REC'Y / HOLE

SECTION	ALTERATION: silica	mag	ser	chl	FRACTURING	MINERAL	GEOLOGY	DESCRIPTIVE GEOLOGY	SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% RECY. SAMP INT.
120–150	v. str	mod.	mod-wk	v wk	wk-mod; mod-str; v. str	(cpy, py)		Qtz-ser rk (con't)	<1/2	127	99	NQ WL	120–130 36648	99
								* @ 132' appears to be short sect of relic intrus. text. Silicified.		137	100		130–140 36649	98
								* @ 139' 2' section of f.g. fsp por Prob ands por. Str ser (+clay?) alt. No signif py. Dissm mag.		144.5	95		140–150 36650	97
								* 141-144? section of Qtz-mag-ser "bx". Mafic patches as prev. described. ? coarse tuff to fine lap size. V. wk dissm cpy, in mag-rich patches.			99			
150–172	Nil		wk	wk	wk-mod			150 - 159.4 Qtz Dior Por. Med-dk grn gry. Crowded Por. Plag clay (+ser?) alt + locally vague. Anhed, about 2mm. Mafics alt to chl, mag + ser (ser poss > chl). 5-6% dissm fine mag. No sulph. V. str wht zeol vnlng - h/l to 3mm. Most dominant direction @ 30° to C/A.	Nil to V. wk	154.5	93		150–160 36651	96
								* 159.4 - 161.5 Inclusion of Qtz-Mag Bx. v wk tr py.	Tr	160	96		160–172 36652	80
								161.5 - 172 Mg crowded Monz or Dior Subpor. Seriate text. Fsp unalt. Prob same unit as EC-134, 146-191'. About 20% crowded mafics. Prob orig ? now part alt - mag. Appears to be some K-fsp. Fsp part clay-ser? alt. Zeol vlts in fracts. Also see description EC-134.		167	58			
172								END HOLE @ 172'		172			172	

Comments beside the log:

- 120–130: h/l fract, prob filled = zeol (clay?)
- ~129: some wk mag along fracts
- ~147: 2" gouge. 6" of f/w is extr silic. Some ser alt.
- ~160: mag also on fract. 3mm mag v/t
- ~166: Some pink staining, adj to zeol vns.

HOLE NO. EC-136	PROJECT: Expo	PAGE NO: 1 OF 9	
COLLAR ELEV:	GROUND ELEV.: 990'	DATE STARTED: June 21, 1982	REF. TO CLAIM CORNER: EXPO 217
COORDINATES: 2468+60' N. 2302 E.		DATE FINISHED: June 23, 1982	SCALE: 1"=10' (1:120)
INCLINATION: -90°	BEARING:	TOTAL DEPTH: 497'	LOGGED BY: H. Muntanion

COMMENTS: wk lim stain to 20'

AVE CORE REC'Y / HOLE: 97.3%

Column headings: SECTION | ALTERATION (silica, ser, chl) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % RECY.

DESCRIPTIVE GEOLOGY

Stickup.

0 - 13' Overburden

13 - 115' Silic-ser alt Ands tuff?

m.gry - pale gry rk. Str alt. + orig. comp + text. not obvious. Appears to be fine fragmental w gry clots varying from v. fine grain to about 1 cm. These clots believed to be mafic ash frags now consist of predom ser + py. Ser appears to be replacing chl? Locally some chl exists. Silic alt is str + pervasive. Ser mostly in frags but also pervas. (wk?) in matrix.

*Below 30' rk becomes softer + more ser (+clay?) alt. w lesser pervasive silica

* @ 36' Lap tuff - bx? (mostly angular)

Py mostly as dissem (str) but also as platy growths on fract planes. cpy tr. v. fine.

Adj to fracts stronger ser (+clay?) alt.

*Below 44' rk has massive m.gry appearance V. soft + extr ser (+clay?) alt. Argillic?

* Below 55' original tuffaceous text recognizable. Pervasive alt much wker. Some chl in alt mafic frags - also ser.

Alteration / Fracturing / Mineral columns (13-60')

- silica: str (13-30); mod? (30-41); v.str (41-53); wk (53-60)
- ser: mod. (13-30); v.str-str (30-...)
- chl: wk - v.wk (13-30); v.wk-Nil (30-40); wk-mod. (40-48); str (48-53); wk-mod (53-60)
- Fracturing: mod-str (13-30); w ser (or clay) (30-...)
- Mineral: Py (+ cpy) (13-30); (bn) (near 60)

Comments beside geology column

- 13-30' Core is v. broken.
- Fract. Some gouge. Clay-ser on plane.
- chloritic ash frag texture.
- 26-30 Mislatch
- h/l - 2mm fracts w granulation. Fracts contain ser-clay.
- Some patchy & dissem mafic fragmental text.
- platy py on plane
- 8" gouge zone @ about 70° to c/a. Patches of qtz. V.str clay alt - py pods.
- 1" shrs. w slickensides
- 2mm py (-cpy) vlts. On fracts e gouge.
- Crb on fracts

Right-hand columns

% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% RECY.
6	13-17	100	NQ WL	13-20: 36653	10
	17-21	100			
	21-26	90		20-30: 36654	60
	26-30	13			
	30-37	80		30-40: 36655	83
	37-42	90			
	42-47	88		40-50: 36656	91
	47-57	98			
3	57-	100		50-60: 36657	99

Section depths: 0, 10, 20, 30, 40, 50, 60

HOLE NO. EC-136

COLLAR ELEV:

GROUND ELEV.:

COORDINATES: N. E.

INCLINATION:

BEARING:

PROJECT: EXPO

DATE STARTED:

DATE FINISHED:

TOTAL DEPTH:

REF. TO CLAIM CORNER:

SCALE: 1" = 10' (1:120)

LOGGED BY: H Muntanen

COMMENTS: Str alt related to fract density. / zeol v/ts.

AVE CORE REC'Y / HOLE

SECTION	ALTERATION: silica	ser	pyroph	chl	FRACTURING	MINERAL	GEOLOGY
60–80	mod	wk		wk-mod	wk-mod	(bn-t) py	
73–80		mod-str		v wk-nil		py	
80–100		str-v str		nil	str		
100–105					mod		
105–110					str		
110–116					mod.		
116–120			wk		v.str		

DESCRIPTIVE GEOLOGY

Left-column notes (by depth):

- ~60': w/ crb fract-fills
- Lap-sized frag-mixed
- w/1-1mm qtz v/ts - barren
- ~75': 1-2 mm zeol (prob) ser? v/ts (wht, somewhat fibrous, v. soft).
- ~82': fract w crb
- ½" gouge
- narrow fault - prob attitude (some gouge)
- 1" shr w py.
- irreg ½" qtz-crb vn w large py (pods).
- ~97': 1½" qtz-crb vn w coarse py.
- ~110': Fault. width? Closely parallel C/A
- ~118': v.str criss-cross zeol + crb v/ts. Also py strgrs.

Silic & Ands tuff (cont'd)

- some sects w lap-sized frag.

* @ 67' some v. fine tr bn noted

* Below 73' rk is strongly bleached - softer + more perv. ser? alt. No relic text. Consists of silica, ser (+ clay?), py. Massive rk w mod density of w/1-2mm wht, soft fract fills (zeol or clay?). Many fract surf have py.

Tr. v fine blk min - appears to be mag.

True bx. Some milling

115-128 ^ Sericitized Ands. Bx.

- no contact noted. May be intrus. bx. Locally has appearance of v str alt Dior? Contains frags of variable size (up to 1½") of intrus. rk, pyrophyllitized rk + minor silic frags. All are altered. Cut by strong network of zeol + calc v/ts. Matrix appears andesitic similar to FW/... Py 3-4% as dissem + in strgrs (on fract). Py v/ts cut by crb zeol which often carry py on margins

Depth	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	SAMPLE NO.	% REC'Y SAMP INT
60–67	3	67	100		60–70	36658	100
67–77		77	100		70–80	36659	100
77–86	5	86	100		80–90	36660	100
86–91.5		91.5	100	NQ			
91.5–101.5		101.5	100		90–100	36661	100
101.5–107		107	95		100–110	36662	97
107–117		117	100		110–120	36663	99
117–120			97				

HOLE NO. EC-136

COLLAR ELEV: GROUND ELEV.:

COORDINATES: N. E.

INCLINATION: BEARING:

PROJECT: EXPO

DATE STARTED:

DATE FINISHED:

TOTAL DEPTH:

REF. TO CLAIM CORNER:

SCALE: 1" = 10' (1:120)

LOGGED BY: H. Munfanion

ALTERATION: Silica | Ser | Pyroph | chl — FRACTURING — MINERAL — GEOLOGY

COMMENTS: | AVE CORE REC'Y / HOLE

DESCRIPTIVE GEOLOGY

Section 120–180

Alteration: Silica: wk - mod (to ~142), vk-v.wk (~143–150), mod? (~151–160), (prob seric) (~165–175); Ser: str-v.str, str (~123–140), str (prob ser) / str mod (~143–150), v.str - str (~152–162); Pyroph: wk (~123–127); chl: mod-str (~143–150), Nil (~160–170)

Fracturing: v. str (~123–138); M (~137); v.str (~141–144); str (~144–150); v.str - str (~150–158)

Mineral: Py

Comments:

v str zeol? criss-cross vlts h/1 - 1/2"

Blended crb + zeol vlts

~1/4" calc vlt

str criss-cross zeol v/ts. (?, soft, wht, somewhat fibrous min).

171.5 - 172.8' Fault. Attitude?

Descriptive Geology:

Seric. Ands Bx (cont)

128 - 142.5 (Silic)-ser Ands tuff.
-similar to above. Here some vague lap-size frags seen. V-str alt-blended. Str zeol v/ts
* 136-141 extr. zeol + crb vning + blending of rk.

142.5 - 151.5 Cg. Ands tuff.
Dk grn-gry rk. str alt - prob argillic
May be Dior Por.??
30-40% wht frags - v. fine to 6mm + str clay (ser?) alt. ~20% ≤4mm ragged dk grn chl (+ser), py, mag clots. (mafic frags and or alt mafic phenos)
Matrix not as str alt. as above.
About 8% py. Much of it occurs as clusters of extr. fine grains.

151.5' - 189' Argillic alt Ands &/or Ands tuff. Lt. gry - wht.
-same as above sections but more blended. V. str. argillic? (prob clay > ser) alt. Dissem py. Has slight yellow tinge - some cpy?
Section v. blended + consists of clay (+ser?), py + prob considerable silica.

% Sulphides	Drilling Interval	% Core Recovered	Core Size	Sample Interval	% Rec'y Samp. Int.
5 to 6	127	100	NQWL	36664	100
	137	100		36665 (130)	100
2		100		36666 (140)	100
8 to 10	147	100		36667 (150)	100
<1					
5	157	100		36668 (160)	100
	167	99		36669 (170)	99
	177	100		(180)	

HOLE NO.: EC-136
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: EXPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 4 OF 9
REF. TO CLAIM CORNER:
SCALE: 1"=10' (1:120)
LOGGED BY: H. Muntanion

SECTION	ALTERATION: silica	ser-clay		chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP INT.
180	mod?	str-v.str			v.str-str			narrow shr & smeared sulphs	Arg. Alt Ands or Ands tuff (cont'd).	5		100		180 — 36670	100
								1/2" fract zone	189-203' Ands tuff. -propyl alt. Dk grn-gry zone		187				
190		v.wk		mod	v.str-str / mod			zone appear to be fine clay-ser (saus?) alt fsp phenos?	Not bleached. Wkly alt ands tuff. Fine chloritic fragment? (mafic phenos?) gen to py inclusions. Matrix fairly hard & appears somewhat silic. No indication whether silica primary or 2ndary.	2 to 3	197	99		190	99
200		Mod-str		wk				1cm dior. fragment				100		200	100
									203-239' Arg alt Ands tuff. Below 203' rk becomes more bleached. Arg? alt. Similar to above. Below 208' all bleached out.	5	207				
210				Nil								100	NQ	210 — 36671	100
		(c lay?)						*zeol vns appear later than crb.			217				
220												100		220	
		str (clay?)						6" gouge Attitude?			227				99
230									239-247.5' Ands? Coarse fragmental (Bx) -prob milled + intrusive bx. Mottled apple grn, buff + brnish. Variety of frags - nearly all volc (prob alt ands) variably alt. Some are alt. ands por. Some frags predom-			97		230 — 36672	98
								veins of cry dissm on zeol (clear) plane in fract.			237				
240												99		240	

HOLE NO.: EC-136
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:
PROJECT: EXPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:
PAGE NO.: 5 OF 9
REF. TO CLAIM CORNER:
SCALE: 1" = 10 (1:120)
LOGGED BY: H. Muntanen

COMMENTS: Zeol later than qtz vlt.
Bx-250' prob same unit as in EC-67 @ 274 (check)

Check whether min identified as biot is pyroph

AVE CORE REC'Y / HOLE

Column headings: SECTION | ALTERATION (silica, ser-clay, biot, chl) | FRACTURING | MINERAL | GEOLOGY | COMMENTS | DESCRIPTIVE GEOLOGY | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP. INT.

Section: 240, 250, 260, 270, 280, 290

Alteration: mod-str, wk-v wk, mod, wk; wk, Mod, Nil; mod-str?, wk-v wk, str-mod; mod (clay), wk-mod; v wk-Nil; str, mod

Fracturing: mod; 15/ft; mod-str

Mineral: py

Comments:
← on fract mostly veneer of py, some biot + crb.
1" irreg crb vlt
4 mm py vlt
mostly zeol. vlts
3mm py vlt cut by zeol
biot
zeol vlts // to c/A offset by those @ abt 45°
1/2" crb vlt ō py blebs.
2" qtz vn ō dissem py blebs. Cut by zeol vlts.
v. str py strgrs and/ dissem
*Zeol vns 75° to c/A cut those essentially // to c/A

DESCRIPTIVE GEOLOGY

Ands coarse fragmental (Bx) (cont)
Silic, others sausd (ser? alt) + some wk biot alt. Matrix is ground (fine frags) ō mod-str lt brn biot growths. Biot is aphanitic. Matrix appears silic. Size of frags. very variable (up to 2"). Cut by zeol vlts. (wk-mod density). Py as dissem + minor strgrs, vlts are crb.

247.5 - 249.2 Alt Ands or Ands tuff.
grn-gry. Some seralt, similar to above sections but not as bleached

249.2 - 290' Ands coarse fragmental (Bx).
- same as above ō mod aphanitic lt to med brn. biot. Prob intrusive. Hornfelsed @ upper contact.
*@ 258.5' alternate bx + lap tuff. Prob assimilated zone. Some hfelsed rk. grades from bx to tuff (c.g. to lap).
Wht, irreg (35%) frags. v. str clay (+ser?) alt. These are soft. Rk. is largely altered alt + similar to 203-239'. Poss slightly more silic. A 1/2" frag (poss frags) of biot-rich tuff occ @ 279'.
Near 290' hfelsed silic, buff colored rk. ō wk extr fine biot.
Up to 292' narrow fingers of baked rk. (@ 70° to C/A).

290' - 350.5' Arg alt Ands tuff. lap tuff
- bleached wht shows fg. relic aug-grn feldspar in matrix in vague coarse tuff & lap frags. Orig matrix now bleached (x mafic gm). Rk contains of clay (+ser?); 5-6% py. Cut by zeol vlts. Py

% Sulphides	Drilling interval	% Core recovered	Core size	Sample interval	% Rec'y samp. int.
2 to 3	240-247	99	NQ	240-250: 36673	98
6					
1/2					
5 to 8	247-257	95		250-260: 36674	97
	257-267	100		260-270	100
	267-277	100		270-280	100
	277-287	99		280-290: 36675	99
	287-297	100		290-300	100
	297-	100			

HOLE NO.: EC-136
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: EXPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 6 OF 9
REF. TO CLAIM CORNER:
SCALE: 1" = 10' (1:120)
LOGGED BY: H Muntanion

SECTION	ALTERATION: silica	ser-clay	biot	chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
300	mod?	str			str mod				Arg. alt Ands tuff-lap tuff (cont)	2%	307	100		300	99
310	v wk	Extr (clay)			Extr			308.5 – 350.5' Fault Gouge planes gen 65 to C/A (approx). Strongly gouged. Str clay alt. Some crb vlts. Also pervasive crb.		3 to 4	317	98		310 (36676)	97
320						Py					327	95		320	97
330											337	100	NQ WL	330	100
340								½" mass py vlt.	Below fault: 350.5' – 433' Ands. (Prob por) Wkly alt Propyl alt.		347	100		340 (36677)	100
350	wk?	wk		mod	str			½ crb fract w some orange stain; chl on fract plane; Py vlts h/l – 4mm	V.F.g. Dk gry-grn. Mafics chl alt. (some crb). Although v. f.g plag prob part alt to clay-ser? 1.7-2% Dissm mag. 1% dissm py. Str h/l fract alt w crb. Also calc vns up to 1" wide.	1%	357	100		350	100
360												100		360	

HOLE NO.: EC-136
COLLAR ELEV.: GROUND ELEV.:
COORDINATES: N. E.
INCLINATION: BEARING:

PROJECT: EKPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1" = 10' (1:120)
LOGGED BY: N Mc Manus

COMMENTS:

AVE CORE REC'Y / HOLE

Columns: SECTION | ALTERATION (silica, ser-clay, chl) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | SULPHIDES % | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP. INT.

DESCRIPTIVE GEOLOGY

Section 360–420

Alteration: silica wk? (360–377), mod (377–387); ser-clay v wk (360–377); chl mod (360–377), v wk (377–380), mod (380–387); 390: silica str, ser-clay wk / nil, chl wk; silica str, ser-clay wk, chl wk; 400: silica wk?, ser-clay mod-str, chl Nil; ser-clay wk, chl wk.

Fracturing: mod; mod; str; str/wk-mod; str; wk-mod; str-v.str.

Mineral: py

Annotations (left):
- py pods
- mag vlt on fract w selvage of crb w periph. py. Bleached selvage. This cut & offset by zeol vlt.
- 1/2 str mag vlt. Py vlt. Adj bleaching (w ser selvage)
- crb, py vlt w adj bleaching. (ser + prob pyroph alt)
- crb vlt. h/l - 1/2"
- 2" gouge
- crb filled fract - some gouge
- 1/2" str - crb + py
- gouge zone w crb fill. (width?)
- narrow gouge
- gouge
- 419 - 430.5' Fault zone w str crb vlt, pods.

And (poss cone and tuff) (cont'd)

- adj to crb filled (± py) fracts are narrow bleached selvages (ser + prob some pyroph alt)

where str vn density wider bleach zones. These have lower mag content.

* 389.5 - 392.5', 395 - 398'
Bleached and. str silic w chl ash frags. Chloritic clots (w py) are irregular shape. Matrix str silic. 3-5% dissem py. Wk ser (+clay?) alt in matrix.

* 398 - 407' increase in fract intensity + rk more bleached - more strongly arg alt. Softer + appears less silic.

@ about 407'
* Some vague vitric f.g. por text noted. (alt andes).

@ 409' mafic (chloritic) and frags

@ 418'. wk epid in small plates. + h/l vlts

Sulphides %	Drilling interval	% Core recovered	Core size	Sample interval	% Rec'y samp. int.
1 to 2	-367	100	NQ WL	360–400: 36678	99
1/2	-377	97			97
3 / 1/2 / 3 to 5	-387	98			98
	-397	98			99
2	-407	100		400–420: 36679	100
	-417	99			99
		99			

HOLE NO.: EC-136
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:
PROJECT: EXPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1" = 10' (1:120)
LOGGED BY: K Montomer[?]

ALTERATION: Silica | ser-clay | chl — FRACTURING — MINERAL — GEOLOGY

COMMENTS: The ands unit may be mixture of ands por, ands + ands por Relic text only vague

AVE CORE REC'Y / HOLE

DESCRIPTIVE GEOLOGY

Section 420–480

Alteration / fracturing / mineral notes: wk? ; mod-str clay in fault ; wk-v wk ser? ; wk ; v.str ; wk ; mod ; v.str ; mod ; wk-mod? ; str (clay) ; vwk-wk ; 3 ; mod-str ; Py ; str (clay?) ; str-extreme ; nil ; wk ; str ; mod ; str-

Geology column notes:
- Here qtz + some crb in fault.
- cataclastic bxiation
- gouge.
- 3" shr zone. Adj. bleaching (some silic).
- 442'-443' v. broken core. Some h/l py in fracts
- str bleaching.
- 1/2-1" wide qtz crb vn on fract
- shr zone almost ∥ to C/A
- str bleaching
- 461-463 Fault str gouge. Str crb.
- 468.5-471.5 Fault
- 473-489' Fault. 3" gouge. about 45° to C/A
- 2" gouge
- Sand frag ē qtz vns. V.wk alt

Ands or Ands Por (cont)

Wk py mostly in h/l strgrs. + @ 424' vague por text noted.

433'-435' Dioritized ands.

- granular, fairly f.g. bleached + propyl alt dior? Injected along fracts about 10-15° to C/A. Cut by some zeol vlts + epid along some fracts. + @ 435 chl and ~~-str~~ frag ~~tex~~ prob fault
* Pol... [illegible]

442-471.5' Arg? alt c.g. And or And por.

Med to lt grey col. Somewhat bldhed + prob mod-str ser (clay?) alt. H/l fracts ē py. .5% dissem py. Has fg gran text Vague due to alt.

@ 455' M.g. text. Prob dior. Str bleached due to fract + introducts of crb - qtz.

471.5'-478'? M.g. Dior

- salt-pepper text. Grn-grey col. Consist of 20% chl (after mafics) 3% dissem mag, gen in chl, Propyl alt. Fsp alt to crb, epid (+ clay?) Tr dissem py. Also in strgrs. In fault Dior is bxiated.

Depth	% Sulphides	Drilling interval	% Core recovered	Core size	Sample interval	% Rec'y samp. int.
420–427	3 to 5	427	99	NQ WL	36680	94
427–437	1	437	98			99
437–447	5	447	100			99
447–457		457	95			96
457–467	2 to 3	467	97		36681	97
467–477	<1/2	477	97			94
477–			88			

HOLE NO.: EC-136
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: EXPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1" = 10' (1:120)
LOGGED BY: H Montanon

SECTION	ALTERATION: silica	ser-clay		M	FRACTURING	MINERAL	GEOLOGY	COMMENTS	DESCRIPTIVE GEOLOGY	AVE CORE REC'Y / HOLE	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
480	some vns.	shr?		mod	extreme			← 2"? qtz-crb vn bx (cataclastic) ← about 4" qtz-crb vn. Attitude? A cpy blob noted.	<u>478? – 497' Ande or Ande tuff</u> Similar to above sects. Some change in grain size - from m.g. to c.g mafic (chloritic) ash frags to f.g. (492–497'). ≤ 2% dissem py. Some on fracts which are invariably filled w <u>crb</u>		2	480–482	88	NQ	480	89
490	wk?	mod (ser			mod.	PY		← 2mm qtz vlt offset by crb-py vlt ← ½" shr w crb, py				482–487	90		36682	
497												487–497	96		497	96

END OF HOLE @ 497'

HOLE NO.: EC-137 | PROJECT: EXPO | PAGE NO.: 1 OF 2

COLLAR ELEV.: | GROUND ELEV.: 1080' | DATE STARTED: June 24, 1982 | REF. TO CLAIM CORNER: EXPO 237

COORDINATES: 2473+40' N. 2322+30' E. | DATE FINISHED: June 25, 1982 | SCALE: 1" = 10' (1:120)

INCLINATION: -90° | BEARING: | TOTAL DEPTH: 90' | LOGGED BY: H Muntean

COMMENTS: Abandone hole @ 90'. Tricone stuck @ 76'.

AVE CORE REC'Y / HOLE

SECTION	ALTERATION	FRACTURING	MINERAL	GEOLOGY	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y. SAMP INT
0					Stickup		0				
10					Overburden. - attempted to core below 20'± but only boulders. - subsequent triconing. Tricone broke in hole @ 76'.						
20					Bedrock @ about 85'.		20	2			
30							30	2			
40							40	0			
50							50	4			
60							57	35			
							59				

HOLE NO.: EC-137
COLLAR ELEV.:
GROUND ELEV.: 1080'
COORDINATES: 2473+40' N. 2322+20' E.
INCLINATION:
BEARING:

PROJECT: EXPO
DATE STARTED: June 24, 1982
DATE FINISHED: June 25, 1982
TOTAL DEPTH: 90'

REF. TO CLAIM CORNER:
SCALE: 1" = 10' (1:120)
LOGGED BY: H Montanin

SECTION	ALTERATION			Propyl	FRACTURING	MINERAL	GEOLOGY	COMMENTS: / DESCRIPTIVE GEOLOGY	AVE CORE REC'Y / HOLE	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y. SAMP. INT.
60								Over burden				22			
											-67	16			
70											-69	13			
											-77	18			
80															
				Wk.				Broke core { Dior 85-87' is M.g. Below 87' is f.g. Wk propyl alt. <1% dissem sulph Wk tr-py		<1	-87	90			
90											90				

HOLE NO.: EC-137A
COLLAR ELEV.:
GROUND ELEV.: 1080'?
COORDINATES: 2473+40' N. 2322+20' E.
INCLINATION: -90°
BEARING:

PROJECT: EXPO
DATE STARTED: Jun 25, 1982
DATE FINISHED: JUN 27, 1982
TOTAL DEPTH: 447'

PAGE NO.: 1 OF 7
REF. TO CLAIM CORNER: EXPO 237
SCALE: 1" = 10' (1:120)
LOGGED BY: H Montania

AVE CORE REC'Y / HOLE: 95.5%

SECTION (Ft.)	ALTERATION: silic	ALTERATION: ser	ALTERATION	ALTERATION: chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
0–90 (10 — Z — 80)									Stickup 0 – ; Overburden – 90'						
90–120	mod; stm; mod	str-v.str; wk-v.wk; wk; str-v.st; str-v.str		mod; wk-v.wk; mod; wk-v.wk; mod.	wk-mod; str-v.str; wk. mod.	py-cpy		Rk has grn gry color. Feeder dike-sill in volc. pile? Coarse flow? smoky. 103–106.5' Fault zone. Gouge str alt. Dissm py. Str crb. qtz v.lt + adj silic floodip ū v. fine gy; ← gouge. Vs tr alt; 2mm py vlt cut by crb vlt.; ← 1mm mag vlt; 10" fault zone. 60° to C/A.	90'–190' Fg. porphyritic Grdr? or Dioritized (qtz Dior?) Ands tuff-lap tuff? -rk has spotty appearance ū 20% chloritic-mag clots gen varying from 2-4mm Poss alt pheno but may be tuff-lap mafic frags 1-2 mm subhed + some euhed. smoky gry plag often recognizable. Matrix is fspathic. Some Subhed mafic pheno seen. 2% dissm mag (ū chl). Mostly ≤ 1% dissm sulph, wk cpy gen. assoc. ū mafic clots. Rk gen Propyl alt Prob 10% qtz grain. Cut by mod. narrow crb vning in fracts. + rare qtz vning. Adj to fracts + qtz vns str-v str ser alt + some silic alt. Also greater sulph. Also breakdown Hn, mag adj to frac zones.	≤1 to 2 (Gen ≤1% in rel. unalt sects)	96; 103; 107.5; 117	68; 96; 87; 100; 100	NQ WL	90; 36683; 100; 36684; 110; 36685; 120	79; 93; 100

HOLE NO.: EC-137A | PROJECT: EXPO | PAGE NO.: 2 OF 7

COLLAR ELEV.: | GROUND ELEV.: | DATE STARTED: | REF. TO CLAIM CORNER:

COORDINATES: N. E. | DATE FINISHED: | SCALE: 1"=10' (1:120)

INCLINATION: | BEARING: | TOTAL DEPTH: | LOGGED BY: H Montanios

SECTION	ALTERATION: silic	ser	chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
120	M	S	W				1" pink crb vlt; 2mm py vlt	F.g por Grdr ? (Dioritized And. tuff - lap tuff?). (cont)	<1 to 2	120–127	100		36686	100
130	wk / mod	wk / mod-str	mod	wk-mod / str			1" calc vlt. (some siderite)	* Below 127' gen. stronger ser, silic. alt. Short sects not phyllic alt (propyl alt). May contact gen inversely prop to gen sil alt. Rk variably bleached.		127–137	100		36687	98
140		str / v.str	wk	wk-mod / str	py - cpy		v.str ser alt adj to str py, crb vning; vns 80° to C/A offset thru ~10° to C/A	Some fine h/l vlts of py. Py content 3-5% in v.str ser alt sections		137 / 138.5–147	87 / 100		36688	100
150	v.str	mod-str					py vning on fract. Silic flooding (narrow); Oxidation, prob due to str crb fract vning. Silic flooding; py h/l vlt c v.narrow chl selvage; Fault zone 158–159.5'	Below 150' increase in silic. Relict text. less obvious	3 to 5	147–157	100	NQ WL	36689	99
160	str / str-mod?	wk	mod	mod			2" zone qtz flooding		1 to 2	157–167	96		36690	97
170	str	wk-mod		v.str			some mag on shr; 1' gouge. Fault attitude?; some qtz flooding		<1	167–177	100		36691	98
180										177–	93			

HOLE NO.: EC-137A | PROJECT: EXPO | PAGE NO.: 3 OF 7

COLLAR ELEV.: | GROUND ELEV.: | DATE STARTED: | REF. TO CLAIM CORNER:

COORDINATES: N. E. | DATE FINISHED: | SCALE: 1"=10' (1:120)

INCLINATION: | BEARING: | TOTAL DEPTH: | LOGGED BY: H Montanian

COMMENTS: Do T.S. 209'

AVE CORE REC'Y / HOLE

Columns: SECTION | ALTERATION (silic, ser, chl) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP. INT.

Section: 180, 190, 200, 210, 220, 230

Alteration – silic: str-v.str; str; ser: str-mod, wk, mod; chl: mod, wk

Fracturing: v.str, mod, v.str-only, wk-mod, mod-str

Mineral: mg-cpy (+ moly)

Notes beside geology column:
- same gouge. v.str silic.
- h/l mag v lts
- 1mm mag vlt
- moly smr.
- str intro of mag. Increase in cpy
- shr
- v.str crb, qtz injections fy v/b stgrs
- shr
- 6" crb zone
- h/l-2mm py v/ts
- Mag stgrs + blebs. About 10% mag
- 1° qtz vn wk dissem cpy
- Shr ū crb
- ½ crb vlt ū qtz selvage
- 4" gouge zone. 80° to C/A
- qtz vlt ¼" ū dissem mg/selvage
- py vlt ū silica selvage
- Bleached zone

DESCRIPTIVE GEOLOGY

F.g. por Grdr (Dioritized And tuff?) (cont).

-some silic selvaging adj to fracts

Fracts predom filled ū crb, some silica vns.

• about 190' h/l mag vlts. Str silic.

190 – 289? Ando (Dioritized And?) or Ando tuff?

-similar comp as above unit but appears finer grained. Dk grn-gry except for str alt sect.

Prob Hornfelsed ande?

As above cpy occ as fine dissem in silica - as vague v/ts + pervasive qtz. About 2% mag! Locally 5-6%, prob 2nd - hfls ic?

As above sulph increase in str silic, bleached (+ ser) zones. (5%)

% Sulphides: ½ to 2; (up to 5% in narrow bleached zones)

Core size: NQ WL

Drilling interval	% Core recovered	Sample interval	% Rec'y samp. int.
–185.5	93	36692	70
185.5–191	42		
191–197	95	36693	97
197–207	100	36694	100
207–217	99	36695	95
217–222.5	85	36696	93
222.5–232.5	95		
232.5–237	93	36697	95
237–	99		

Sample interval marks: 180, 190, 200, 210, 220, 230

HOLE NO.: EC-137A

COLLAR ELEV.: GROUND ELEV.:

COORDINATES: N. E.

INCLINATION: BEARING:

PROJECT: EXPO

DATE STARTED:

DATE FINISHED:

TOTAL DEPTH:

PAGE NO.: 4 OF 7

REF. TO CLAIM CORNER:

SCALE: 1" = 10' (1:120)

LOGGED BY: H Montinini

COMMENTS:

AVE CORE REC'Y / HOLE

DESCRIPTIVE GEOLOGY

Columns: SECTION | ALTERATION (silica, ser, chl) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP. INT.

Section: 240 – 300

Alteration:
- silica: str (240–244); v.str (244–248); str (248–251); extr v str (251–256); str (256–272 wk?); v.str (266–278); str-v str (278–290)
- ser: mod (240–244); str (244–248); wk (256–266); mod-str (266–278); v wk-str (278–290)
- chl: mod (240–244); v wk (244–248); mod (248–256); wk-v wk (264–272); wk (272–290)

Fracturing: mod; v str; m; v str; mod; str; mod; str; str-v str

Mineral: Py-Cpy

Comments (annotations):
- 3mm mag vlt
- 245-247' Fault zone Str gouge, Crb-clay
- 248-249' Fault
- silic zone (flooded)
- 253.2-254.5' Fault gouge.
- 1/4" qtz vn
- pink crb vning. Adj. bleaching
- 1-2 mm qtz vlts
- shr ē ser selvage
- 2mm mag vlt
- fract ē 1" crb vlt.
- 10" fault zone. Str gouge Clay + crb. + ser.
- Bleached
- 4" gouge
- py veneer on fract.
- 15" fault

Descriptive Geology:

Hornfelsed (dioritized?) Ands or And tuff (cont)

Adj to qtz vns on chl-mag telets ē py (propyl selvages).

285? – 373' F.g. por Grdr? or Dior. And tuff - lap tuff.

- similar to 90-190'
str alt - phyllic. Str-v str silicified (smoky gry ptn)

Sulphs mostly on fracts

% Sulphides	Drilling Interval	% Core Recovered	Core Size	Sample Interval	% Rec'y Samp. Int.
<1	240–247	99	NQ	36698 (240–250)	99
3 to 5	247–254	100		36699 (250–260)	99
1	254–264	99		36700 (260–270)	99
	264–274	98		36701 (270–280)	97
3 to 5	274–284	97		36702 (280–290)	97
1	284–294	97		36703 (290–300)	96
3	294–300	95			

HOLE NO.: EC-137A
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: EXPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 5 OF 7
REF. TO CLAIM CORNER:
SCALE: 1" = 10' (1:120)
LOGGED BY: H Montanion

SECTION	ALTERATION: silic	ALTERATION: ser	ALTERATION	ALTERATION: chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
300	str-v.str	mod-v.str		mod / wk	str-v.str			} ser-rich ū 6% clean mag. ← 15" gouge ← str cry blebs adj to qtz vns	Fg. por Grdr? or Diritized And tuff or lap tuff (cont)	<1; 2 to 3	304	95		300; 36704	98
310	mod?	v.wk-wk			mod				308-323.5' rk has fresh appearance. Mafics alt to chl. Not clear if qtz predom primary or 2nd ary. Here propyl alt. Has porph text. ū smoky gry Fsp phenos. Very fresh	<1	314	100		310; 36705	98
320	str; mod?	str; wk						← fract ū py veneer ← shr ū crb	* 323.5 - 326 Str silic + ser alt. Increase in	2 to 3; 1	324	96		320; 36706	97
330	str				str						334	98	NQ	330; 36707	97
340					mod			Shrs ū injn of crb, qtz, minor mag.	* 344-347 very silic sect 7% sulph; about .22 Cu.	3; 1	344	96		340; 36708	89
350	str	str			str-exeme			← 2' gouge zone ← bxiated ← 18" gouge zone } fault ← shatter bx due to strong Fault zone 358.5 - 370' (aprx)		2 to 3	352; 353	84; 90; 100		350; 36709	96
360														360	

HOLE NO.: EC-137A
COLLAR ELEV.:
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BEARING:

PROJECT: EXPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1" = 10' (1:120)
LOGGED BY: H Munteanu

COMMENTS: some mag is hem stained
Chl well-developed on shrs. - often w hem + crb.

AVE CORE REC'Y / HOLE

SECTION	ALTERATION: silic	ser		chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS
360–370	str	str		wk	v str-extreme			crb-clay (+ prob ser) developed in fault. Str mag diss. ← cataclastic bx.
373–388	mod-str			v wk	str			← gouge w clay, py. (4"); ← 1% qtz vns w finely diss cpy, interior py. Mag conc on selvages. Also cpy (b/l) on fract @ core & fagtz vn. Some wk epid
385–395	wk-mod					py-cpy		← some b/l epid strgrs-fracts fills which cut qtz vlts; small shrs.
395–415	str				mod			chl, crb dominant on shrs. str qtz vlts w adj flooding; ← 1" gouge; hem stain on fract.; Here fsp phenos epid + sauss alt; ← 5" gouge zone; 406.3 – 408.5' Fault. Gouge, clay alt
413–420	wk / str			mod.	mod	(tr moly)		1" qtz vlt; qtz vlt w epid centre; Fault 415 – 420.5'. Gouge. Str diss py X'ls.

DESCRIPTIVE GEOLOGY

F.g. por. Grdr? or Dioritized And tuff - lap tuff (cont).

360 – 373'
Rk is v. f.g. granular str mag.
Appears to be hfls zone.
Dk grn-gry blk color. Cpy mostly assoc w qtz vns.

373' – 447' Q.F.P. (more mafic (sill) than @ ISCU)
- contact attitude not known.
Dk grnish rk. Locally bleached to paler grn-gry color.
15% 2-4mm Grn subhed-anhed fsp phenos
Dk grn. v str sauss-ser? alt.
15% 3-5 mm rounded qtz phenos.
These often contain chl-py inclusions but appears to be due to subsequent b/l veining.
2-3% mag mostly as b/l strgrs.
1-2% sulphd mostly as strgrs.
Matrix pale-med grn-gry, aplitic, fairly silic + wk ser? alt.
Mod-str qtz veining w pervasive silic. Seems to str w fine diss mag assoc w silica flooding.
Rk. prob somewhat contam by incorp of volcs
* 391 - 402. pervasive mag in silic matrix
* 413' Tr of epid alt of fsp

SULPHIDES %	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
<1	363	100		360	
		97		36710	98
	370			373	
		97		36711	97
	380		NQ WL	380	
		93		36712	93
	390			390	
		92		36713	92
	400			400	
3+4	407	100		36714	99
				410	
≤1		98		36715	97
	417	95			

HOLE NO.: EC-137A
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: EXPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH: 447'

REF. TO CLAIM CORNER:
SCALE: 1"=10'
LOGGED BY: H. Montanion

COMMENTS: H/l fracts ē crb. Also on faults + shrs.

AVE CORE REC'Y / HOLE

SECTION	ALTERATION: silic	ser		arg/chl	FRACTURING	MINERAL	GEOLOGY	DESCRIPTIVE GEOLOGY (notes)	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y. SAMP. INT.
420	str	str		Dk grn color. short sects ē mod	mod brk; str-v str; v brk; mod str; mod	Py (Cpy)		Str qtz vning ↓ most 1/4-1/2" — 2" qtz vn; ← 1" gouge; ← 1" gouge; 1" gouge. ground-up sulphs; h/l fract ē crb; 1/2" gouge zones; 1" gouge ē crb fill	QFP (cont). " — text destroyed where qtz vning is str. * 418 — Bleached. Increase in qtz vning. Text largely destroyed 425-432'. Below 432' por text well-defined. * 435-447 sects of pervas (buff colored) silica in matrix. Pheno ~~continue~~ to be str ~~sauss-sericit~~	1; 2 to 4; ≤1	427; 437; 447	95; 98; 93		420 36716; 430 36717; 440 36718; 447	96; 97; 93
430															
440	vstr														
447															

END OF HOLE @ 447'

HOLE NO.: EC-138
COLLAR ELEV.:
GROUND ELEV.: 1000'
COORDINATES: 2461+35' N. 2310+80' E.
INCLINATION: -90°
BEARING:

PROJECT: EXPO
DATE STARTED: JUNE 27, 1982
DATE FINISHED: June 30, 1982
TOTAL DEPTH: 447'

PAGE NO.: 1 OF 11
REF. TO CLAIM CORNER: EXPO 238
SCALE: 1" = 10' (1:120)
LOGGED BY: H Muntanion

COMMENTS: Wk hem stain on mag.

AVE CORE REC'Y / HOLE: 93.7%

SECTION (Ft.)	ALTERATION: silic	ser		chl	FRACTURING	MINERAL	GEOLOGY	COMMENTS	DESCRIPTIVE GEOLOGY	SULPHIDES %	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
0–15									Stickup 0 -. Overburden - 15'		15			15	
15–60	v.str	v.wk; wk		mod	v.str - str (mostly h/l-healed gen > 2-5/in)	Py-Cp		str h/l mag vlts (on fracts). Also h/l - 2mm fract crb. (some up to 1"). 28-29' (15") str gouge. Mostly silica-clay str py blebs attitude? ½" shr. v.str clay (+ser?) stringers py. 65° to C/A. 1" qtz vn 30 to C/A c h/l py vlte. 2" fault. - qtz, clay, crb, py. Narrow silica-ser selvage. Chl, mag vlt cut by crb. ½" qtz vlt 30° to C/A c h/l py. criss-cross strgrs. 4" gouge-shr. About 70° to C/A. Fract c crb, Chl selvage (+ mag, py). 2" qtz vn c some h/l py strgrs. 45° to C/A. ¼" pink crb vlts. ½" qtz vlt on fract. Wk sulph dissm. shr c str crb @ 15° to C/A	15-135' And tuff. v.str silic rk (v. hard-brittle) Mafic ash frags (part chl-mag alt) visible. Appear to be a few short sects (< 1"-a few in) c very vague frag text. Color grades from med grn-gry to dk gry-blk (alternating). Blk color due to v. fine dissem mag in silic matrix (hornfelsing) Dk color also dependent upon chl. Much of silica may be hornfelsic but some is hydrothermal - wk qtz vning + qtz selvages emanating from fracts gen c chl-mag (+sulph). Mag vlts, strgrs are common but very ununiform distr'l bution (gen h/l - 2mm). Gen > 1/in. Most fracts coated c crb (latest stage) Most < ¼" but up to 1" wide. Can see only bleaching. Alt is predom silicic + chloritic. Matrix has v. wk ser alt. Tr of epid alt. Sulphs only wk dissem. Most related to fracts. Some coarse blebs on fracts. Gen v. fine. @ 50' a br. text noted due to str silic. Mafic-chloritic frags. Some wk ser also in frags.	1 to 2; 1; < 1	17, 27, 30, 37, 40, 47, 53, 60	65, 95, 100, 100, 100, 94, 100, 97	WL N.Q.	20 (36719), 30 (36720), 40 (36721), 50 (36722), 60 (36723)	83, 97, 100, 96, 98

HOLE NO.: EC-138 | PROJECT: EXPO | PAGE NO.: 2 of 11

COLLAR ELEV.: | GROUND ELEV.: | DATE STARTED: | REF. TO CLAIM CORNER:

COORDINATES: N. E. | DATE FINISHED: | SCALE: 1" = 10' (1:120)

INCLINATION: | BEARING: | TOTAL DEPTH: | LOGGED BY: H. Montanaro

COMMENTS: a drab grn bladed, semi-acicular med-grain min common on fracts. Prob. actinolite. Resinous lustre
In fault str clay alt - prob same ser.

AVE CORE REC'Y / HOLE

ALTERATION: Silic | Ser | Chl | FRACTURING | MINERAL | GEOLOGY

DESCRIPTIVE GEOLOGY

SECTION	DESCRIPTIVE GEOLOGY		SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y. SAMP. INT.
60	← pink crb 1½" clay gouge 70° to C/A	Except for fault fracts well healed		60			60	
		And for And tuff (cont'd) Orig text. gone absent.	<1		73		36724	78
70	67.5–70.5' Str gouge Fault @ 68.5' 6" zone of pink crb + qtz boxwork. Str clay below		±½	67			70	
		Adj to fault are narrow zones of extr ser alt ± str chloritic py.			91		36725	
	1' gouge. clay, crb, qtz			74				
	76–79' v. str gouge Fault Attitude?				80		36726	86
80	narrow str (± crb) @ 75° to C/A			79			80	
	82–85.1' Fault v. str gouge-clay, crb, str chloritic coarse py, minor cpy. Prob some ser				100			
				87				75
90					17		90	
	96–98' extr fault gouge			94			36727	67
	99–102'				100			
100	102–104' extr ser alt in FW of fault	@ 105' v. fine xline text. Ando		99			100	
					90		36728	92
	1" gouge 70° to C/A offset by fract			107				
110	¼" qtz vn 15° to C/A ± maf, py, cpy	# 114'–135' med grn-grey color. Wkly bleached. Largely due to increase in crb vning. Increase of finely disseminated cpy. Adj to vns are patches of chl (+ minor ser) in maf + str chloritic cpy + py	1 to 2	115	96		36729	96
	hairline gouges				96			
120								

N 8 W.L.

HOLE NO.: EC-138
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: EXPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 3 OF 11
REF. TO CLAIM CORNER:
SCALE: 1"=10' (1:120)
LOGGED BY: H. Muntanion

COMMENTS: Lt red brn min identified as biot. prob pyroph. (check, ε t.s.) Mag vlts nearly all b/l. Cpy gen related to mag vlts + small patches.

AVE CORE REC'Y / HOLE

Columns: SECTION | ALTERATION (silic, ser, biot (pyroph), chl.) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP INT.

Section 120–180. Alteration: silic mod (120–124), v.str (124–137), vwk–nil (137–148), (primary?) vwk–wk (150–156), vwk (156–160); ser wk 3; chl v3 k, mod., wk, nil, wk; biot mod, wk. Fracturing: extr, v.str, md-wk, wk, wk–mod, str, ext, mod-str. Mineral: cpy > py; (tr moly).

Core notes:
- ← 1" shr.
- 121.5–125, shr zone str clay, crb (prob some cas) ← about 1" mass py in shr.
- ← mod epid alt assoc ε crb vning. Bleached.
- ← blebs cas (str)
- ← epid-chl on fract.
- shr zone ε chl layers between crb vns in shr. 10° to C/A
- ← Cpy str on b/l fracts + narrow selvages
- ← epid on fract
- ← 1" crb vn.
- ← epid on vlts
- ← shr zone (1" @ 30° to C/A) terminate crb vns
- 1" crb vlt
- 1/4" qtz vlt. Only tr sulphs. Adj silica flooding ε str hydrotiss. speck moly
- 1/2" gouge
- vnits ε alt selvaging
- 2" fault. V. str silic clay, prob small str fine py. in strgrs.
- 1" shr 25° to C/A Crb filled.
- 6" fault gouge
- 2" gouge Adj sil-ser selvage Py

DESCRIPTIVE GEOLOGY

And +/or And tuff (cont)

some sects of rel. unalt And ε preserved amph? (pyx) Most sects propyl alt – mostly chl + wk epid

135 – 150 Por And. (no discernible contact)

– fsp planes (1mm) visible, Fairly vague. Similar comp to above and unit. Also str silic? Primary silica in matrix (dacite rk??)

– str mag vlts, stringers, gen b/l. near upper contact.

– wk qtz, crb vning. Resinous drab-grn amph (actin??) min noted, particularly at fract.

– stronger dissem cpy (about .2% Cu)

* 146–150' this unit has red. brn fine to v. fine biot (pervasive) in matrix. Significant decrease in mag.

150' – 174 And +/or And tuff

Hornfelsed

* @ 155' appear to be some fine tuff layering. 45° to C/A. Some mag-sulph. vlts ε epid.

174–192? Por And.

Fresh – as 135–150' No biot alt.
– appears to be fault controlled. wk fract

% Sulphides	Drilling interval	% Core recovered	Core size	Sample interval	% Rec'y samp int.
3 to 4	124.5	96		120–130: 36730	98
≤1	134.5	99		130–140: 36731	96
2	143	99		140–150: 36732	98
.1 to 2	147	100	W.L.		
		100		150–160: 36733	97
≤1/2	157				
1	158.5	80			
		100	NQ	160–170: 36734	98
≤1/2	167 / 168	90			
		97		170–180: 36735	92
1 to 2	174	89			

HOLE NO.: EC-138
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:
PROJECT: EXPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:
PAGE NO.: 4 OF 11
REF. TO CLAIM CORNER:
SCALE: 1" = 10' (1:120)
LOGGED BY: H Mortanion

COMMENTS: The whole sect below 135' may be porphyritic w sections where text has been destroyed by the introduction of silica-crb along fracts.

AVE CORE REC'Y / HOLE

DESCRIPTIVE GEOLOGY

ALTERATION: silic / ser / chl
- 180–212: str?; (increase only to fault); chl: vwk-wk; 197–203: wk epid; chl str
- 202–207: wk epid; chl str; fracturing str
- 220–226: mod epid; chl mod-str
- 224–231: silic v.str; wk-mod epid; chl mod-str
- 231–240: silic v.str

FRACTURING: mod-str; extr; str; v str - extreme; str

MINERAL: cpy-py (except in fault) (to hooly)

Comments by depth:
- chl-py-mag clots adj to fracts
- Mostly w/l fracts w crb, some sulph, some w mag
- crb up to 1/4"
- qtz up to 5mm.
- 5m qtz vn. Barren.
- str chl, wk epid alt. Due to proximity of fault. narrow shr 50° to C/A
- 1/2" qtz vn.
- 201-204' Fault. Gouge. str crb-clay; dissem py. About 30° to C/A
- 205.5-207' Shr. Str crb. some silica-py. some epid alt. 1" gouge 35° to c/A
- 215-219.5' Fault. Str-gouge qtz, crb, clay (+ser?) py dissem (2%) crb flooding
- 1" qtz vlt - cut by narrow crb vlts
- broken core
- 6" gouge 50°? to C/A
- qtz vns 1/4-2". At selvages str chl, some epid alt - str dissem py.

Por. And (cont)

f.g. granular text recognizable intermittently. Locally destroyed due to str silica-crb introduction.
Rk gen. dk gry, fresh appearance - very hard - poss pervasive silic.
Some pyroxene? phenos survive. chl appears only developed on fracture selvages
wk dissm sulph - most on w/l fracts.

192 - 270.3' And for And Tuff to Lap. tuff
- no recognizable por. or granular text.
Below 195' some wk bleaching due to increase in fract & due to proximity of fault.

@ 237' narrow zone of v. fine por text Prob flow.

Section	% Sulphides	Drilling Interval	% Core Recovered	Core Size	Sample Interval	Sample No.	% Rec'y Samp. Int.
180	1 to 2		89		180	36736	95
	≤1	184					
		185.5	100				
190			98		190	36737	95
		195	90				
		198					
200	2		95		200	36738	81
		205.5					
210	1 to 2		63		210	36739	69
		216					
220	≤1		78	NQ	220	36740	90
		224	98				
230					230	36741	86
		234	78				
240		240			240		

HOLE NO.: EC-138
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: EXPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1" = 10'
LOGGED BY: H. Montanea

COMMENTS: chl is being alt to ser in some sects. Qtz flooded sects + faults devoid of mag.

AVE CORE REC'Y / HOLE

Columns: SECTION | ALTERATION (silic, ser, biot (Pyroph), chl) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | SULPHIDES % | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP. INT.

Section 240–300.

Alteration (silic): v.str (to ~278); v.str (~278–283); extr. (~283–292); v.str (~295–300); str? (~272–278)
Alteration (ser): str (~243–248); str–mod (~247–256); mod–str (~287–290); str, v.str (~294–298); wk, mod (~296–300)
Alteration (ser upper): wk (~241–244)
Alteration (biot): wk (~272–276)
Alteration (chl): wk/str, mo str (~240–245); v.wk–nil (~290–298); mod (~298–300)
Fracturing: str, extr (~240–244); str (~245–250); extr (~266–270); mod (~272–276); str (~278–282)
Mineral: (tr moly)–cpy–py–py (~240–250); moly smears (~267–278); py>cpy (~279–285); tr dissem moly (~287–300)

Comments (geology column):
242–246' Fault Gouge @ 35–40° to C/A. Crb/clay–py.
2" qtz vlt Barren
minor bxiation.
str. 15° to C/A. Narrow ser silica sehups. Adj qtz flooding, mod–str chl lt.
265.8–270.3' Fault Gouge qtz, ser, clay wk sulph. Attitude?
Str moly smears sehaping broken qtz vnlt.
1–2mm cpy, py vlt. Moly
h/l sulph vlts.
moly smears on silica-healed fract
moly on fracts.
Bx – most probably cataclastic. Extr sil. some sect wk dissem py. Shr zone v. bleached. Adj str sil-ser alt zone.
3mm py-cpy vlt } str chl-ser py-cpy patches in silic matrix

Descriptive Geology:

And &/or And tuff (cont)

250–275, 278–305' Bleached rk mostly due to stronger silic.

Altered Pyx. Por.??

* 261–263 2' sect of CALC-SILIC ATE RK. (Skarn) About 50–60% tremolite (acicular blades) Remainder is sil, crb, 3% cpy, py, fract controlled–wk dissem, 2% dissem mag. Prob result of intense crb infil– subsequent metam.

270.3–270.6' Fsp. porph. – pinkish color. Pink fsp phenos Mg. Pervasive silica. Chl lt. 2% py (dissem)

270.6–272 And &/or And tuff.
~~276–305~~ str silic. Rk gen bleached. but for short sect. (275–278')

*282–312' qtz flooding. Patches of remnant ando as chl–py (crb) aggregates.

272–276 Por. And.
fine fsp phenos recognizable.
272–275 patches w/ v. fine (aphanitic) biot development – pervasive.
Str silica, similar to above Por and.
* However, not clear whether this 2nd or primary silica

Sulphides %	Drilling Interval	% Core Recovered	Core Size	Sample Interval	% Rec'y Samp. Int.
1 to 2	240–246	60		240–250: 36742	76
3	246–256	100		250–260: 36743	92
1 to 2, 3	256–266	81		260–270: 36744	69
1 to 2	266–270.6	52	W.L.		
	270.6–276	100		270–280: 36745	97
	276–280	100			
3 to 5	280–287	93	N.Q.	280–290: 36746	94
1 to 2	287–297	96		290–300: 36747	97
	297–300	100			

HOLE NO.: EC-138		PROJECT: EXPO	PAGE NO.: 6 of 11
COLLAR ELEV.:	GROUND ELEV.:	DATE STARTED:	REF. TO CLAIM CORNER:
COORDINATES:	N. E.	DATE FINISHED:	SCALE: 1"=10'
INCLINATION:	BEARING:	TOTAL DEPTH:	LOGGED BY: H. Muntanion

COMMENTS: crb occurs on essentially all fracts

AVE CORE REC'Y / HOLE:

Columns: SECTION | ALTERATION (Silic, ser, Pyroph., chl) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y. SAMP. INT.

Section: 300–360

Alteration notes (Silic): v.str-str (300–310); str? (primary?) str (310–330); str-v str (330–340); str (2nd'ary) str (340–350); str. / extr / v.str (350–360)
Alteration notes (ser): v.wk-nil; nil (350–360); mod str
Alteration notes (Pyroph.): wk (~335)
Alteration notes (chl): mod; wk; Nil; mod.; Nil
Fracturing: mod; mod; wk; str-v str; str
Mineral: py, cpy; moly smears

Geology column comments:
- } silica flooding — *Some chl-sulph patchs in silica matrix. Sulph blobs
- %. py. cpy blobs
- ← 1cm py. cpy patch
- mostly h/l crb fracts
- ← 1' fault-gouge 45° to C/A
- 4mm cpy, py vlt Chloritic selvage
- ← narrow gouge. Turquoise clay.
- ← 3" shr zone
- shr 30° to C/A. Crb filled. Numerous h/l-1mm criss-cross qtz vns ō moly
- Fault-gouge 45° to C/A
- 1" shr ō crb + py vlts. 1" wide
- py strg ō crb
- Fracts ō chl, py adj bleaching (silica).
- ← py vlts (h/l-3mm) ō moly smears

Descriptive Geology:

And +/or And tuff (cont)

* 304–329 Por Ande. (Same as 174–182)
- appears to be fresh except near contact. (As above por and units) Some relic (+ then) amph phenos but part alt to chl. Str dissem cpy, py (3%) • .5–.62 Cu. Wk dissem moly
- Dk grn gray color. Very hard. Silic matrix. Silica may be predom primary? H/l mag vlts.
- * 3 ?–3 ?' some 2nd qtz flooding (rk somewhat bleached)
- Str devel. of trem. (also in rare vlts) Has Hfls appearance Calc-Sil rk.?? Extremely hard.
- * @ 318' relic pyrox. - part amph-chl alt (up to 4mm) phenos. Some fsp phenos. Mostly euhedral. ([illegible] may)
- * 315–327' Also h/l mag vlts. Only tr sulph in matrix. Gen in vlts.

329–342? Alt. Pyx Por ??
- Same as 261–263? Calc-Silicate Rk? Pyx phenos (up to 4mm). Some retrograde to Trem.? - wk chl. 3% dissem py ≤1% mag.
- prob fault controlled

342–368? Por. Ande
- as above. Alternating dk grey (fresh looking) sections + bleached alt sects
- Some fine por. (fsp + pyx) phenos visible in some sects

% Sulphides	Drilling Interval	% Core Recovered	Core Size	Sample Interval	% Rec'y Samp. Int.
1 to 2	302	100		300	
	305	93		36748	98
3 to 4		100		310	
	315			36749	99
1 to 2		98		320	
≤1/2	325		WL	36750	97
	332	96		330	
2 to 3		100		36751	99
1 to 2	342	96	N.Q.	340	
	347.5			36752	97
		97		350	
2 to 3	357	96		36753	97
				360	

HOLE NO.: EC-138
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: EXPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

PAGE NO.: 7 of 11
REF. TO CLAIM CORNER:
SCALE: 1" = 10' (1:120)
LOGGED BY: H Muntanion

AVE CORE REC'Y / HOLE

SECTION	ALTERATION: silic	ser	pyroph.	chl	FRACTURING	MINERAL	GEOLOGY
360–370	str / v.str	v.wk / str / v.wk	wk	wk / mod	v.str / mod-str	py (+ moly)	
370–380					mod / wk		
380–390	(str?)	str	wk	v.wk	v.str / str		
390–400	str-mod		str	Nil	mod		
400–410	(wk?)-mod ? / wk-mod						
410–420	str-v.str	wk	wk	wk-mod			

COMMENTS:

- ← moly smears.
- 1" shr w crb
- } str py vlts, strgrs. Also moly smears on fracts. str ser. very bleached
- 5" shr zone. Some gouge.
- 6" gouge zone
- 3mm qtz vlts w py
- Fault zone w bxiation - some gouge zones 60° to C/A. Very bleached
- Blebs, small pods py
- 2" gouge Bx in FW.
- ½" gouge.
- 1" gouge
- shr @ 65° to C/A
- shr zone (width?) @ 15° to C/A
- crb vlts (up to ¼") w sulph on foliation planes
- 2" shr w crb fill. Also py strgrs 30° to C/A
- 7" shr zone w crb, py v/ts. 45° to C/A

DESCRIPTIVE GEOLOGY

Por. And (cont)

- intermittent dk gry (fresh) + silica flooded (bleached) sects.

Below 368' por text no longer obvious

364 - 370' And tuff. (Por?) grn gry color.
- consists of 15-20% chl-py clots in a gry silic matrix.
- some clots give vague indication of pseudomorphy phens.
4-6% py dissm. Also py vlts.
Also wk-mod crb coated fracts.

370 - 378' Por And
- some phenos obvious. Same comp as 364-370'. Very likely same unit but orig. text. obliterated.

378-384.6 Fault zone. Bx. (cataclastic)
Consists of qtz vns, py vlts, stringers. Relic chloritized ser and remnants, crb vlts (on fracts) Repeating shr + gouge zones. Zone is very bleached. Also H brn patche where 2nd biot has developed.
*382-384.6' Bx zone. Same comp. well developed qtz frags - subrnd to subang. variable size up to 1 cm.

382 - 413' Silicified pyroph. bx.
Below gouge zone @ 386.6 Bx zone as above, prob. milled... w qtz frags but also alt Por frag. noted.
This unit is buff colored.

% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y SAMP. INT.
1 to 1½	364–367	96		36754 (364–367)	97
	367–368.5	100			
4 to 6	368.5–375.5	99		36755 (370–378)	96
	375.5–384.6	88		36756 (378–384.6)	88
	384.6–	99		36757 (384.6–390)	99
1		99	NQ		
3 to 5	–395		NQ	36758 (390–400)	99
	395–405	100	NQ	36759 (400–410)	100
4 to 6	405–415	100		36760 (410–420)	100
	415–	100			

HOLE NO.: EC-138 | PROJECT: EXPO | PAGE NO.: 8 of 11

COLLAR ELEV.: | GROUND ELEV.: | DATE STARTED: | REF. TO CLAIM CORNER:

COORDINATES: N. E. | DATE FINISHED: | SCALE:

INCLINATION: | BEARING: | TOTAL DEPTH: | LOGGED BY:

SECTION	ALTERATION	FRACTURING	MINERAL	GEOLOGY	COMMENTS:	AVE CORE REC'Y / HOLE	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y. SAMP. INT.

DESCRIPTIVE GEOLOGY

Silicified pyroph bx (cont). The bx text not well defined throughout. consists of subrnd, gen tightly packed poly lithic frags ranging up to about 1" in size. Most are pure silica ± silica ± wk ser alt. Some are Por. (intrus) Str ser-silic frags (prob endo) also occur + rare pyroph frags occur. The matrix is pyroph + silic Py, (gen f.g.) appears to be dissm equally in matrix + frags. Cut by crb-filled fracts.

@ 405, 407' relic salt-pepper text. Short sects (several in) of prob silicified intrusive rk. 5% dissm py grains (≤ 2 mm) grown in alt mafic (now predom pyroph – tan, fine, flaky min) A few vague lath pseudoplenos remain.

413 – 425 Pyroph alt. Grdr?, Dior.? Prob. tuffaceous

Below fault.

Med gry py-rich rk. Locally vaguely granular, prob intrus of unknown comp.

V. str silic ± corroded mafic clots now consist of ser (minor chl?), py. Red brn pyroph (?) occurs in random patches + specks. Most of py as stringers on healed fracts ± str ser. (+ chl?) assoc.

Cut by fracts filled ± crb.

HOLE NO.: EC-138 PROJECT: EXPO PAGE NO.: 9 OF 11

COLLAR ELEV.: GROUND ELEV.: DATE STARTED: REF. TO CLAIM CORNER:

COORDINATES: N. E. DATE FINISHED: SCALE: 1" = 10' (1:120)

INCLINATION: BEARING: TOTAL DEPTH: LOGGED BY: H Muntanio

COMMENTS: @ 463-5' appears to be biot rather than pyroph.

AVE CORE REC'Y / HOLE

Columns: SECTION | ALTERATION (silic, ser, pyroph, chl) | FRACTURING | MINERAL | GEOLOGY | DESCRIPTIVE GEOLOGY | % SULPHIDES | DRILLING INTERVAL | % CORE RECOVERED | CORE SIZE | SAMPLE INTERVAL | % REC'Y SAMP. INT.

Section: 420–480

Alteration notes: silic: str-v.str, str, v.str, str?, v.str; ser: str-mod, wk-mod, mod, v.wk, wk, wk-mod; pyroph: mod-str, Nil, wk, str, wk, Nil, wk, wk, Nil; chl: wk, mod, nil, wk, mod, mod

Fracturing: wk-mod, str-v.str, str-v.str, str-mod, str, extr, extr, str, str

Mineral: (tr. moly), py, (cpy), (tr cpy), (tr. moly), py (tr. moly)

Comments (margin):

Py vlts are h/l - 1mm

patches of py (up to 1cm) ō str ser (+chl?) assoc. Strgrs. silica, sulph (unknown) and/gtd crb vlt. Moly in silica

2" wide crb vlt.

4" str zone ō crb vlts. sulph (+moly).

8" gouge zone. Attitude. Str clay.

1/2" crb-qtz vn. Py veneer on healed fract.

2" shr, 55° to C/A

crb vns cut by same fracts ō py veneer.

} str zone About 1' gouge. str decomposed sulph.

narrow gouge

6" shr 45° to C/A. Str ground-up py.

5mm py vlts 45° to C/A

3mm py vlts

moly assoc ō margins of crb vlts

Descriptive Geology:

Pyroph alt Intrus. (Grdr? Dior?) (cont'd)

428-432' Silic Intrus (Grdr? Dior?)

-gry-grn rk. Matrix str silic. Vague granular text + locally mafic phenos now alt to chl (wk ccc) ō py grains associated. As above fract ō crb vlts. 4-6% dissem py. No pyroph.

425-428' Silic pyroph Bx. (as above)

432-465.5' Pyrophyllitized Silic Bx.

In FW of narrow shr (4") Description similar to above. Mostly silic frags here. Also some pyroph frags. Some ser developed in matrix. Cut by criss-cross vlts. Some ō moly (wk) smears.

From about 446-452' appears to be assimilation ō intrus? (as above).

Bx text resumes @ 454', though relatively vague

Below 442' pyroph is minor constituent.

*460.3-461 - intrusive

465.5' - 475 Por. And or Hbl. Por.

med to dk gry color. Similar unit as 304-329'. Mafic phenos orig. biot and/or pyx now alt to chl. Retrograde alt appears stronger here than 304-329'. A few relic phenos of pyx part preserved. Also fresh, unalt plag phenos. Euhedral. Matrix str silic. Primary or 2nd? 5?. dissem py.

Below 475' bleached to lt gry color due to increase in fract + intro of crb-silica. Matrix rk is v. str silic. Por text wkly preserved.

* Below about 475' appears to grade to very silic coarse-grained intrusive?

% Sulphides	Drilling Interval	% Core Recovered	Core Size	Sample Interval	% Rec'y Samp. Int.
4 to 6	425	100		420–430: 36761	100
5 to 8		100		430–440: 36762	100
2	435				
4 to 6		100		440–450: 36763	94
	445	87	3 L		
	454		N.Q	450–460: 36764	95
		100			
	461	97		460–470: 36765	97
2 to 3	471	100		470–480: 36766	100

HOLE NO.: EC-138
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: EXPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

REF. TO CLAIM CORNER:
SCALE: 1" = 10' (1:120)
LOGGED BY: H Muntanus

COMMENTS:

AVE CORE REC'Y / HOLE

SECTION: 480 – 540

ALTERATION:

Silic	Ser	Pyroph	Chl
v.str (480–486); str? (486–497); v.str (497–519); Nil? (519–524); v.str–extreme (524–540)	mod-wk (480–496); mod-str (506–519); Nil (519–524); mod-str (524–540)	wk (496–507); wk-k (527–540)	mod (480–518); wk (519–524); wk (524–540)

FRACTURING: str; v.str; mod-str; v.str; mod; str

MINERAL: py (moly, py)

GEOLOGY: (graphic log)

DESCRIPTIVE GEOLOGY

Comments (by depth)

- criss-cross h/l fracts w crb.
- 1/2" massive py vlt 30° to C/A
- narrow gouge zones 75° to C/A
- some pyroph? alt
- narrow shr
- moly assoc w crb vlts
- 1' shr zone. Str decomposed sulph. 50° to C/A str crb.
- 4" shr zones. Same as above. Shr. 20° to C/A 50° to C/A
- silica-crb flooding
- h/l- 4mm py vlts. Chl selvages
- 1/2" shr zone w shred sulph
- qtz-crb vn (1/2") 20° to C/A w moly smears
- narrow shr
- 3" bx zone w frags of And por. Patch of pyroph.
- bx zone

Description

Por. And (cont)

F.g. por text as described above continues @ 487'. intermittantly bleached.
- Fresh appearance.

475 – 487' Silic intrus. (Grdr?, Dior?)
- Same as 428-432

487-498 Por And.
- Same as 465.5 - 475'
No distinct contact visible

498 – 517.5 Silic intrus (Grdr? Dior?)
- same as above. Unit is str. bleached - silicified. wk-mod ser. alt.

517.5 – 522.5' Por And (Diabase?) Intrusive Dike.
- here blk color (same as 174-192')
- dissem mag. Fresh, unalt. wkly retrograde pyx phenos + some unalt plag phenos. Tr py, py.
@ 519' 6" finger of lt grn-gry F.g. QFP. Crowded. Mafics Chl alt.

522.5 – 542.5' Silic. intrus. (Grdr? Dior?)
- same as 498-517.5'
- mod to str ser alt. V. str silic destroying orig text. 3-5% dissem py. assoc to mafic (ser-chl) clots. Tr fine grey.
- Below 535' intrus. is Por. (Eq por)

% Sulphides	Drilling Interval	% Core Recovered	Core Size	Sample Interval	Sample No.	% Rec'y Samp. Int.
5	481	100		480		
		97			36767	98
2 to 3	487			490		
4 to 5		100			36768	99
	497			500		
		100			36769	100
2	507			510		
		98	N.Q. WL		36770	99
≤1/2	517			520		
3 to 5		100			36771	100
	527			530		
		100			36772	100
	537	100				

HOLE NO.: EC-138
COLLAR ELEV.:
GROUND ELEV.:
COORDINATES: N. E.
INCLINATION:
BEARING:

PROJECT: EXPO
DATE STARTED:
DATE FINISHED:
TOTAL DEPTH:

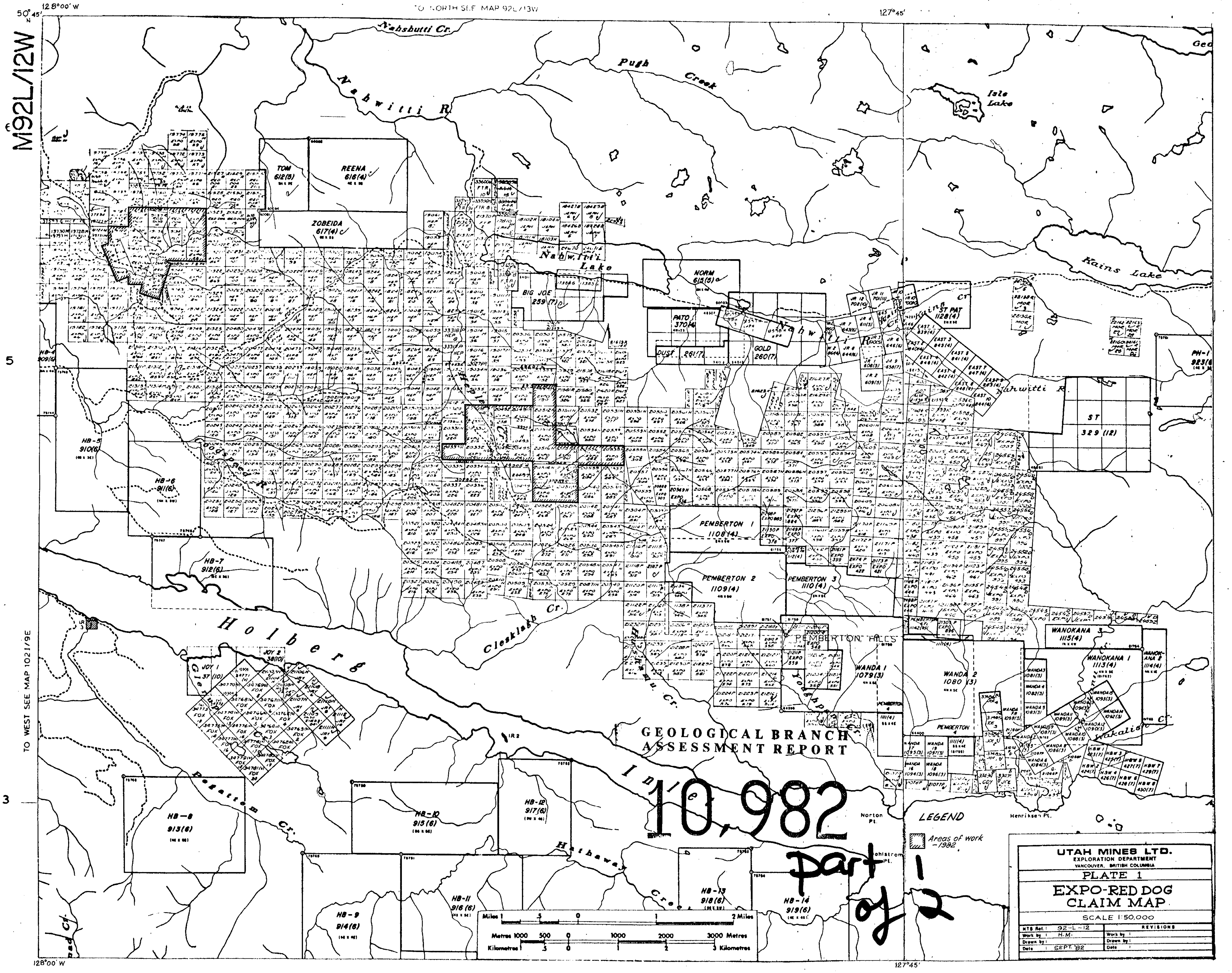
REF. TO CLAIM CORNER:
SCALE: 1" = 10' (1:120)
LOGGED BY: H Montanez

COMMENTS:

AVE CORE REC'Y / HOLE

SECTION	ALTERATION: silic			ALTERATION: chl	FRACTURING	MINERAL	GEOLOGY	DESCRIPTIVE GEOLOGY	% SULPHIDES	DRILLING INTERVAL	% CORE RECOVERED	CORE SIZE	SAMPLE INTERVAL	% REC'Y. SAMP. INT.
540								6" str zone to str crb, py. 50° to C/A						
540–542.5	str			mod				@ 536, 538-540' Intrus is bxiated. Poss due to v-str crb veining. 540 - 542.5' I-Silic Dior? Similar to above. Mafics chloritized	4	542.5	100			100

END OF HOLE 542.5'


M92L/12W
50°45'
128°00' W
TO NORTH SEE MAP 92L/13W
127°45'
TO WEST SEE MAP 102I/9E
Nahsbutti Cr.
Nahwitti R.
Pugh Creek
Isle Lake
Nahwitti Lake
Kains Lake
Nahwitti R.
Holberg Inlet
Cleskiakh Cr.
Hathaway Creek
Ragattem Cr.
Norton Pt.
Henriksen Pt.
Wohlstrom Pt.
TOM 612(5)
REENA 616(4)
ZOBEIDA 617(4)
NORM 612(5)
BIG JOE 259(7)
PATO 370(4)
DUST 261(7)
GOLD 260(7)
ST PAT 1128(4)
ST 329(12)
PH-1 923(6)
HB-4 909(6)
HB-5 910(6)
HB-6 911(6)
HB-7 912(6)
HB-8 913(6)
HB-9 914(6)
HB-10 915(6)
HB-11 916(6)
HB-12 917(6)
HB-13 918(6)
HB-14 919(6)
PEMBERTON 1 1108(4)
PEMBERTON 2 1109(4)
PEMBERTON 3 1110(4)
PEMBERTON HILLS
WANDA 1 1079(3)
WANDA 2 1080(3)
WANOKANA 1 1113(4)
WANOKANA 3 1115(4)
JOY 1 37(10)
JOY 2 38(10)
GEOLOGICAL BRANCH
ASSESSMENT REPORT
10,982
part 1 of 2
LEGEND
Areas of work -1982
UTAH MINES LTD.
EXPLORATION DEPARTMENT
VANCOUVER, BRITISH COLUMBIA
PLATE 1
EXPO-RED DOG
CLAIM MAP
SCALE 1:50,000
NTS Ref.: 92-L-12
Work by: H.M.
Date: SEPT. '82
REVISIONS
Miles 1 0 1 2 Miles
Metres 1000 500 0 1000 2000 3000 Metres
Kilometres 1 0 1 2 3 Kilometres

EXPO 11 | EXPO 12 | EXPO 32 | EXPO 31 | EXPO 52 | EXPO 53

EXPO 4 | EXPO 2 | RED DOG 6 | RED DOG 4 | RED DOG 2 | EXPO 51

EXPO 3 | EXPO 1 | RED DOG 5 | RED DOG 3 | RED DOG 4 | EXPO 21

RED DOG 13 FR.

EXPO 10 FR. | RED DOG 7 | RED DOG FR. | RED DOG 14 | EXPO 22

EXPO 5 | RED DOG 8 | RED DOG 9 | T2 FR. | T2 FR.

EXPO 45 | RED DOG 10 | EXPO 41 FR | RED DOG 12 | EXPO 25 | EXPO 23

EXPO 46 | EXPO 44 | EXPO 42 | RED DOG 11 | EXPO 24 | EXPO 26

EXPO AREA

EXPO 84 | EXPO 83 | EXPO 60 | T1 FR.

EC-133 (-45°, T.O. 152m)
EC-135 (-90°, T.O. 52m)
EC-134 (-45°, T.O. 62m)
EC-131 (-51°, T.O. 189m)
EC-132 (-50°, T.O. 335 metres)
EC-132A (-71°, T.O. 155m)

ROAD NE 62 | ROAD NE 62 B | ROAD NE 62 H | ROAD NE 62

Goodspeed River | creek | Lake

DEEP | DEEP

GEOLOGICAL BRANCH
ASSESSMENT REPORT
10,982

LEGEND

- Picket Line with station designation constructed from May 23 to Aug. 26, 1982
- Induced Polarization Survey coverage
- Moderate Induced Polarization Anomaly
- Strong Induced Polarization Anomaly (>50 m rads)
- Diamond Drill Hole drilled in 1982
- Road
- Road improvement during June 1982
- Road construction from May 23-31, 1982
- 900 Contour (in feet)
- River or creek

part 1 of 2

PLATE 2

UTAH MINES LTD.
EXPLORATION DEPARTMENT
VANCOUVER, BRITISH COLUMBIA

RED DOG PROPERTY — Expo Area

LOCATION MAP
RED DOG LINECONSTRUCTION, INDUCED POLARIZATION SURVEY and DIAMOND DRILL HOLE
Scale 1:2400
FT 0 200 400 FT

NTS Ref. : 92-L-12	REVISIONS
Work by : H. MUNTANION	Work by : H.M.
Drawn by : R.N. Gopal	Drawn by : R.N.G.
Date : MAY, 1981	Date : Oct. 1982

232,000 E | 233,000 E | 234,000 E | 235,000 E | 236,000 E | 237,000 E | 238,000 E | 239,000 E | 240,000 E

256,000 N

255,000 N

254,000 N

253,000 N

252,000 N

251,000 N

250,000 N

249,000 N

EXPO No. 193

EXPO No. 194

DON No. 1 FRACT.

EXPO No. 191

EXPO No. 192. M.C.

EXPO No. 324

EXPO No. 323

DON No. 2 FRACT

EXPO No. 190

EXPO No. 326

EXPO No. 325

LEGEND

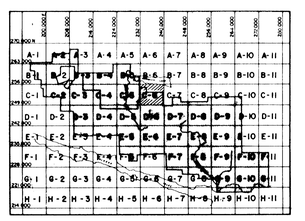
SYMBOLS

Transit Survey, Hubs

Picket Line, Showing line and station designation constructed and LP surveyed in 1982

665 | 670 / 697 | 694 — Hep Claim Boundary Unsurveyed, showing claim number and claim post

DDH Diamond Drill Hole Elev. 2153 — " " "



n

Part 1 of 2

GEOLOGICAL BRANCH
ASSESSMENT REPORT

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PLATE 3

UTAH MINES LTD.
EXPLORATION DEPARTMENT
Vancouver British Columbia

EXPO GROUP

LOCATION MAP

HUSHAMU LINECONSTRUCTION and INDUCED POLARIZATION SURVEY

Work by : H.M.	Date : OCT. 1982	NTS Ref.	92-L-12
Drawn by : Drafting Section	Revised :	MAP	C-6

200 100 0 200 400 600
SCALE IN FEET

HEP 68
HEP 66
HEP 64
HEP 55
HEP 57
HEP 59
EXPO 189
DON 2 Fr.
EXPO 502 Fr.
EXPO 198
EXPO 197
EXPO 218
EXPO 217
EXPO 238
DON 16 Fr.
EXPO 1012 Fr.
EXPO 1011 Fr.
EXPO 1009 Fr.
EXPO 200
EXPO 199
EXPO 220
EXPO 219
EXPO 240
DON 15
DON 13
EXPO 222
EXPO 221
EXPO 242
EXPO 202
EXPO 201
DON 9 Fr.
EXPO 224
EXPO 223
EXPO 244

Part 1 of 2

GEOLOGICAL BRANCH
ASSESSMENT REPORT

10,982

LEGEND:

- MAJOR TOPOGRAPHIC CONTOUR (Interval 100 Feet)
- MINOR TOPOGRAPHIC CONTOUR (Interval 25 Feet)
- ROAD
- CREEK WIDTH DEFINED: Continuous Intermittent
- CREEK <10' Wide
- SWAMP
- SLIDES
- EXPO CLAIM BOUNDARY UNSURVEYED Showing Claim Number And Claim Post
- SURVEYED SHOWN SOLID LINE
- TRANSIT SURVEY HUBS
- PICKET LINE Showing Line And Station Designation constructed and LP surveyed in 1982
- INCLINED DIAMOND DRILL HOLE showing azimuth And Total Depth
- VERTICAL DIAMOND DRILL HOLE Showing Total Depth
- EC-136 Diamond Drill Hole drilled in 1982
- Caterpillar road

PLATE 4

UTAH MINES LTD.
MINERAL EXPLORATION & DEVELOPMENT DEPARTMENT
VANCOUVER BRITISH COLUMBIA

EXPO GROUP

LOCATION MAP
HUSHAMU LINECONSTRUCTION,
INDUCED POLARIZATION SURVEY
& DIAMOND DRILL HOLE

Work By H.M. Date November 1972 NTS Ref 92-L-12
Drawn by C.D., E.C., R.N.G. Revised Oct. 1982 MAP D-5

SCALE IN FEET
200 100 0 200 400 600

EXPO 324
EXPO 323
EXPO 190
EXPO 325
EXPO 326
EXPO 237
EXPO 257
EXPO 258
EXPO 239
EXPO 280
EXPO 279
EXPO 259
EXPO 260
EXPO 241
EXPO 282
EXPO 281
EXPO 262
EXPO 261
EXPO 243
EXPO 284
EXPO 283
EXPO 264
EXPO 263

DON 2 Ft.
DON 4 Ft.
DON 14 Ft.
DON 13 Ft.
DON 6 Ft.
DON 12 Ft.

HUSHAMU LAKE

CORE STORAGE FACILITY

Part 1 of 2

GEOLOGICAL BRANCH
ASSESSMENT REPORT

10,982

LEGEND:

- MAJOR TOPOGRAPHIC CONTOUR (Interval 50 Feet)
- MINOR TOPOGRAPHIC CONTOUR (Interval 25 Feet)
- ROAD
- CREEK WIDTH DEFINED: Continuous Intermittent
- CREEK <10' Wide
- SWAMP
- SLIDES
- EXPO CLAIM BOUNDARY UNSURVEYED Showing Claim Number And Claim Post
- SURVEYED-SHOWN SOLID LINE
- TRANSIT SURVEY HUBS
- PICKET LINE: Showing Line And Station Designation constructed and IP surveyed in 1982
- INCLINED DIAMOND DRILL HOLE Showing Inclination And Total Depth
- VERTICAL DIAMOND DRILL HOLE Showing Total Depth
- EC-137 Diamond Drill Hole drilled in 1982

PLATE 5

UTAH MINES LTD.
MINERAL EXPLORATION & DEVELOPMENT DEPARTMENT
VANCOUVER, BRITISH COLUMBIA

EXPO GROUP

LOCATION MAP
HUSHAMU LINECONSTRUCTION, INDUCED POLARIZATION SURVEY & DIAMOND DRILL HOLE

Work by H.M.	Date: November 1982	NTS Ref 92-L-12
Drawn by C.D., EC, R.N.G.	Revised Oct 1982	MAP D-6

SCALE IN FEET
200 100 0 200 400 600

EXPO 245

EXPO 247

EXPO 249

EXPO 251

LEGEND:

- MAJOR TOPOGRAPHIC CONTOUR (Interval 100 Feet)
- MINOR TOPOGRAPHIC CONTOUR (Interval 25 Feet)
- ROAD
- CREEK WIDTH DEFINED: Continuous Intermittent
- CREEK <10' Wide
- SWAMP
- SLIDES
- EXPO CLAIM BOUNDARY UNSURVEYED: Showing Claim Number And Claim Post
- SURVEYED-SHOWN SOLID LINE
- TRANSIT SURVEY HUBS
- PICKET LINE: Showing Line And Station Designation constructed and I.P. surveyed in 1982
- D.D.H. C-28 T.O. 535 I-50° INCLINED DIAMOND DRILL HOLE: Showing Inclination And Total Depth
- D.D.H. 69 T.O. 680 VERTICAL DIAMOND DRILL HOLE: Showing Total Depth

	230,000E	231,000E	232,000E	233,000E	234,000E	235,000E	236,000E	237,000E	238,000E	239,000E	240,000E
242,000N											
241,000N											
240,000N	A-1	A-2	A-3	A-4	A-5	A-6	A-7	A-8	A-9	A-10	A-11
239,000N	B-1	B-2	B-3	B-4	B-5	B-6	B-7	B-8	B-9	B-10	B-11
238,000N	C-1	C-2	C-3	C-4	C-5	C-6	C-7	C-8	C-9	C-10	C-11
237,000N	D-1	D-2	D-3	D-4	D-5	D-6	D-7	D-8	D-9	D-10	D-11
236,000N	E-1	E-2	E-3	E-4	E-5	E-6	E-7	E-8	E-9	E-10	E-11
235,000N	F-1	F-2	F-3	F-4	F-5	F-6	F-7	F-8	F-9	F-10	F-11
234,000N	G-1	G-2	G-3	G-4	G-5	G-6	G-7	G-8	G-9	G-10	G-11
233,000N	H-1	H-2	H-3	H-4	H-5	H-6	H-7	H-8	H-9	H-10	H-11

part 1 of 2

GEOLOGICAL BRANCH
ASSESSMENT REPORT

10,982

PLATE 6

UTAH MINES LTD.
MINERAL EXPLORATION & DEVELOPMENT DEPARTMENT
VANCOUVER BRITISH COLUMBIA

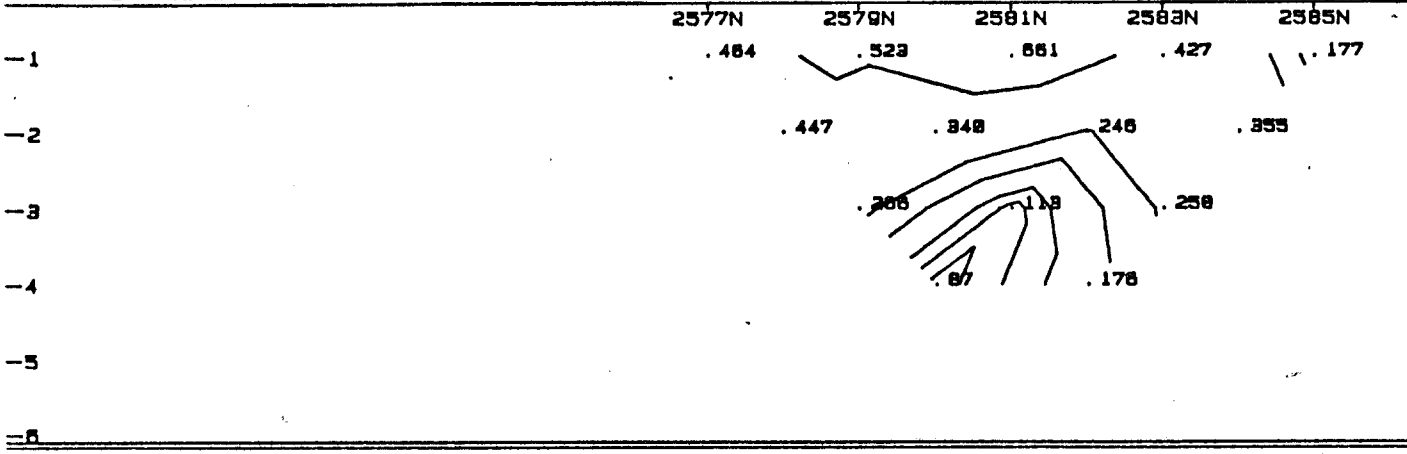
EXPO GROUP

LOCATION MAP
HUSHAMU LINECONSTRUCTION
and
INDUCED POLARIZATION SURVEY

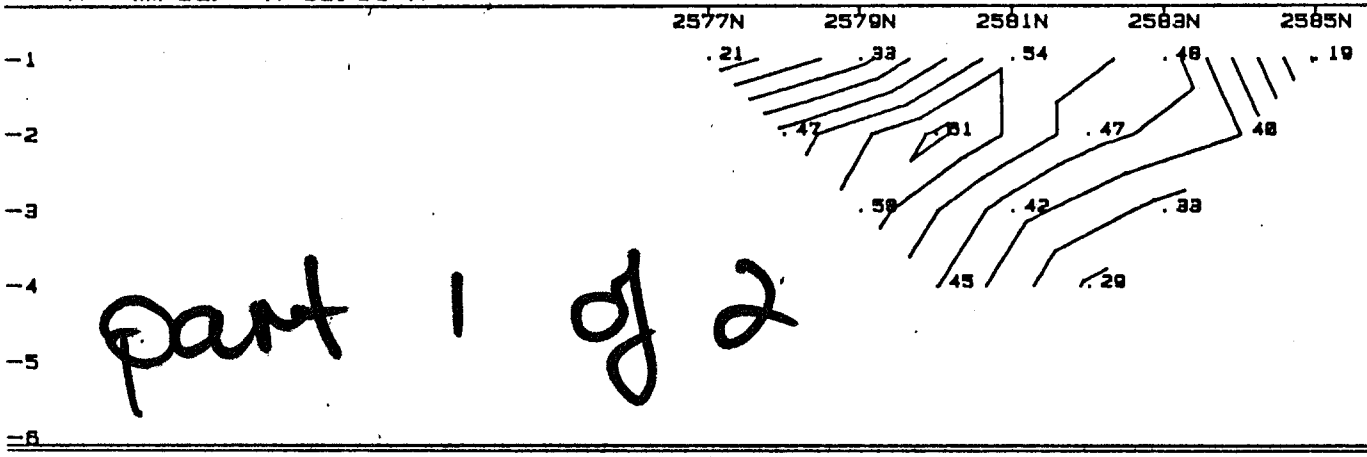
Work by: H.M. | Date: November 1982 | NTS Ref. 92-L-12
Drawn by: C.D., E.C., B.M.G. | Revised: Oct 1982 | MAP of C-6

200 100 0 200 400 600
SCALE IN FEET

RHO (ohm-m) A=60.96 M — RED DOG L2042E (R2042E) 12/07/82 — C.I.=Log

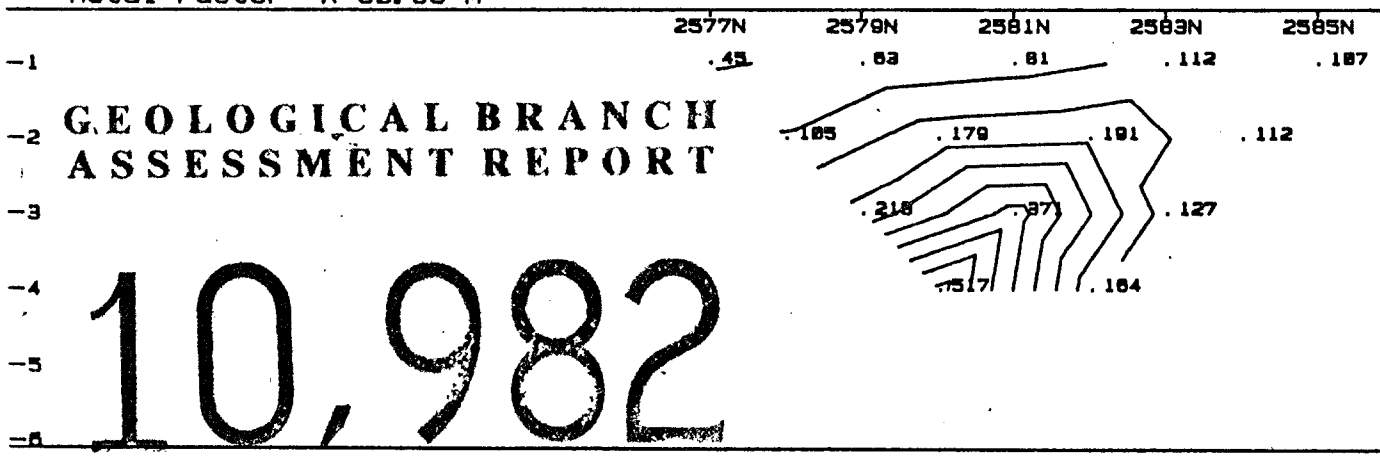


M (mrad) A=60.96 M — C.I.=5



part 1 of 2

Metal Factor A=60.96 M — C.I.=50



GEOLOGICAL BRANCH
ASSESSMENT REPORT

10,982

UTAH MINES LTD.
EXPLORATION DEPARTMENT
VANCOUVER, BRITISH COLUMBIA

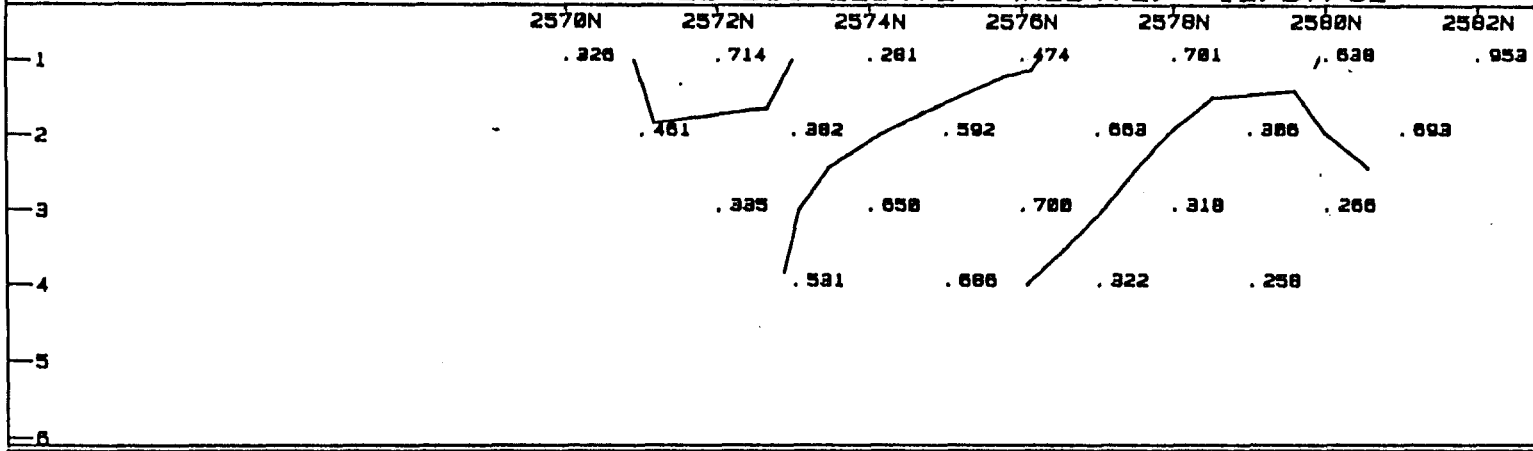
Plate 7

INDUCED POLARIZATION PSEUDOSECTION
LINE 2042 E

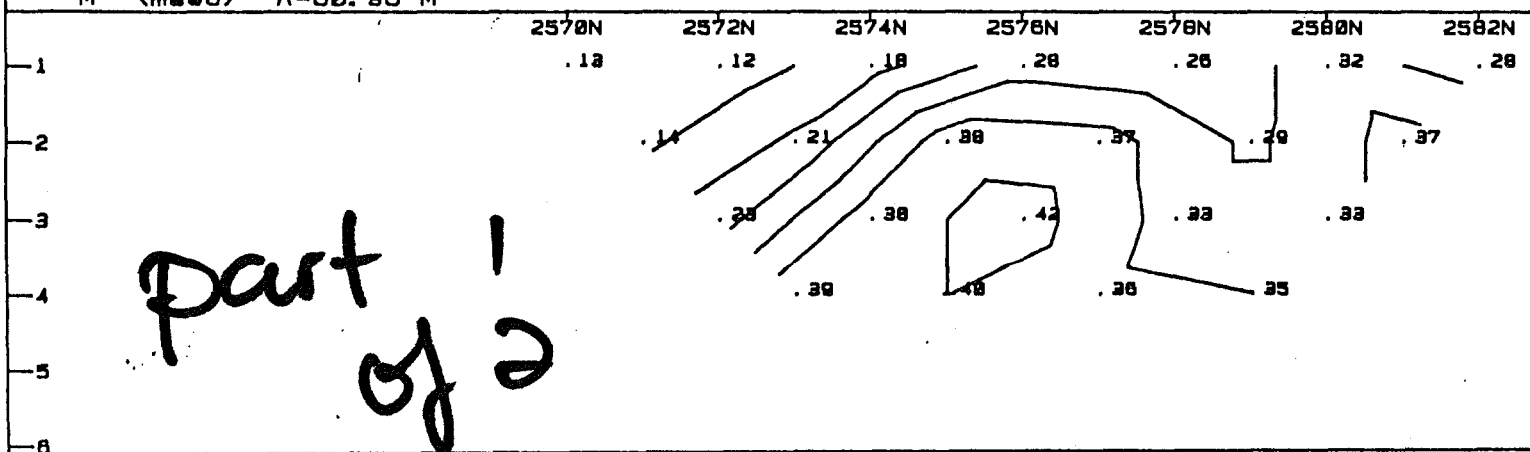
RED DOG— EXPO

NTS Ref.: 92-L-12	REVISIONS
Work by : A.M.	Work by :
Drawn by: R.N.G.	Drawn by:
Date : OCT. 1982	Date :

RHO (ohm-m) A=60.96 M — RED DOG L2047E (R2047E) 12/07/82 — C.I.=Log

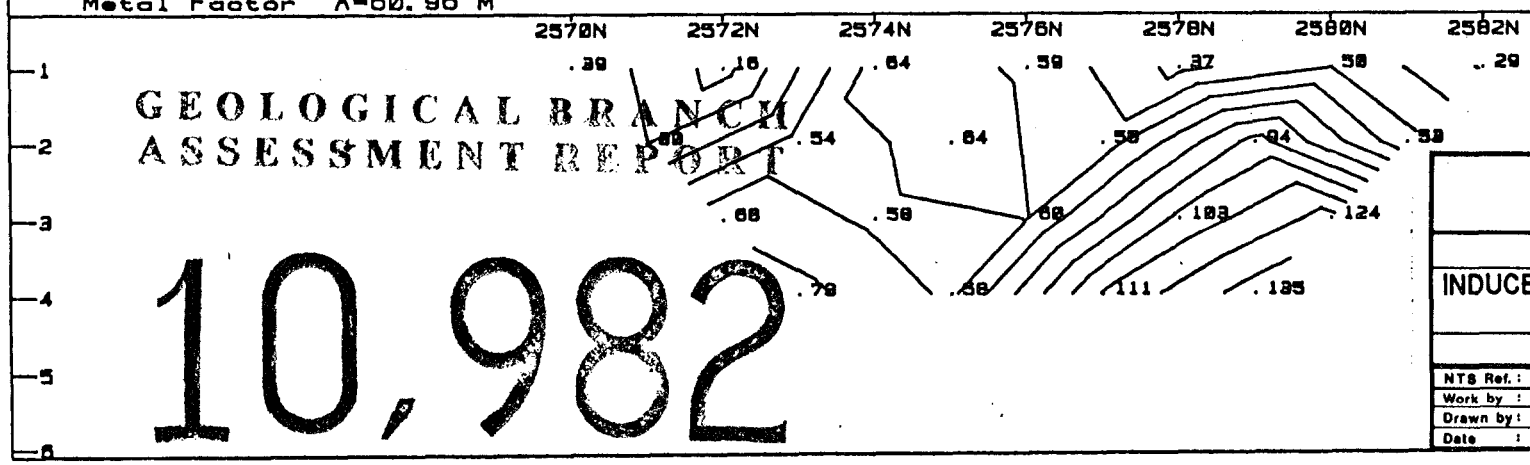


M (mmho) A=60.96 M — C.I.=5



part 1 of 2

Metal Factor A=60.96 M — C.I.=10



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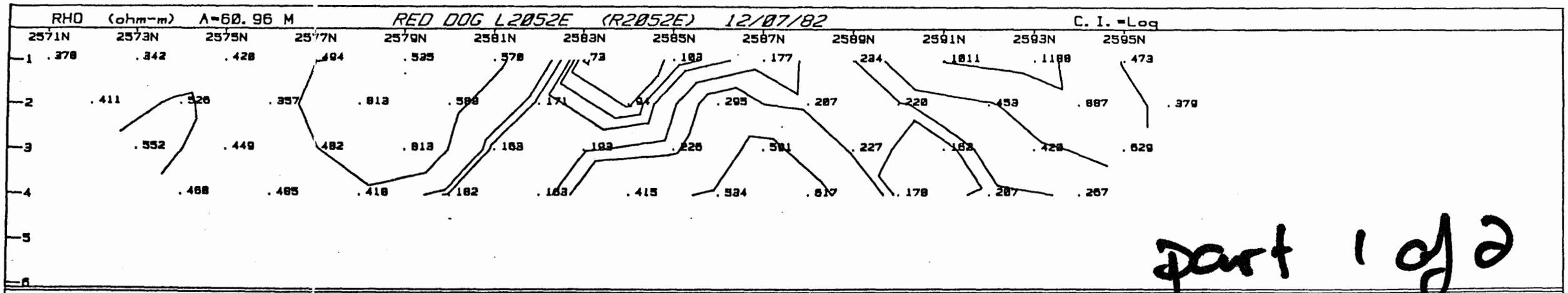
VANCOUVER, BRITISH COLUMBIA

Plate 8

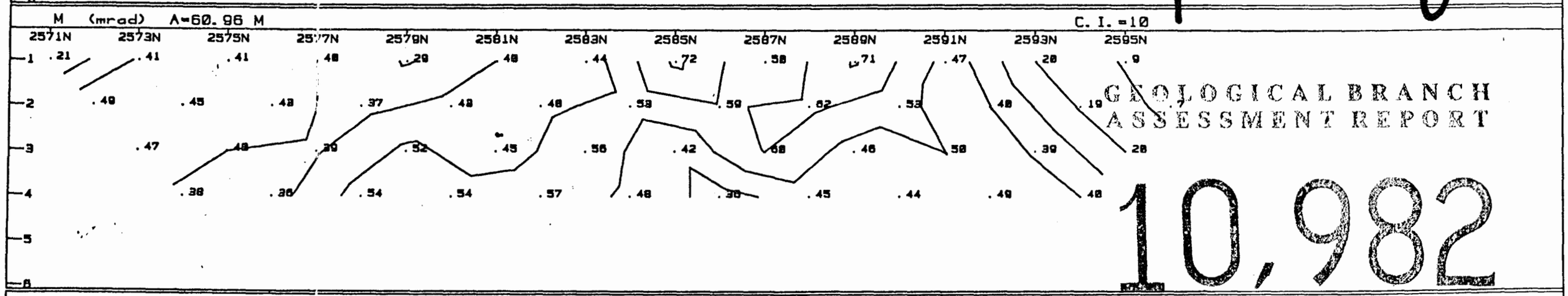
INDUCED POLARIZATION PSEUDOSECTION
LINE 2047 E

RED DOG — EXPO

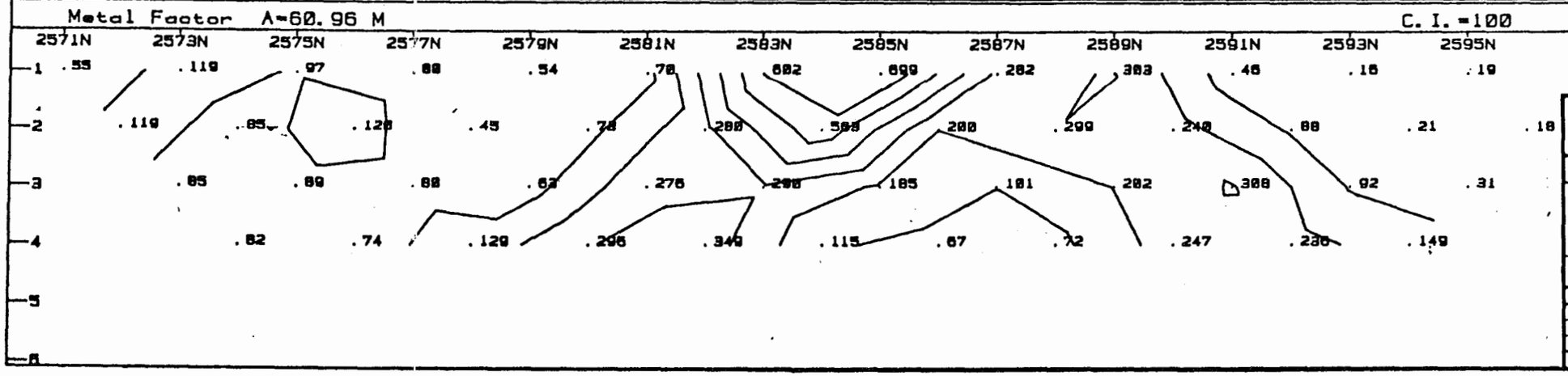
NTS Ref. :	REVISIONS
Work by : H.M.	Work by :
Drawn by :	Drawn by :
Date : OCT. 1982	Date :



part 1 of 2



10,982



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VANCOUVER, BRITISH COLUMBIA

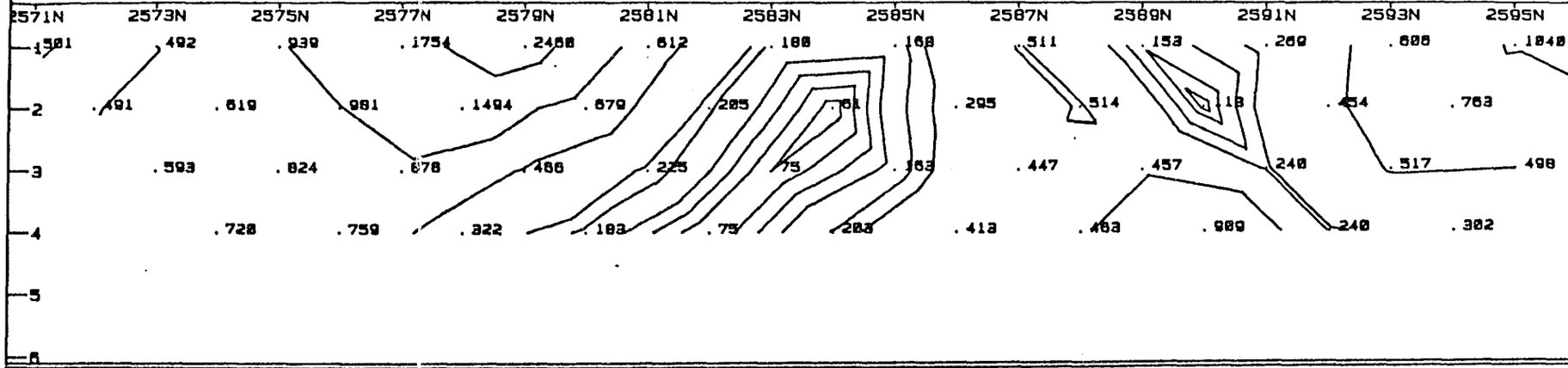
Plate 9

INDUCED POLARIZATION PSEUDOSECTION
LINE 2052 E

RED DOG—EXPO

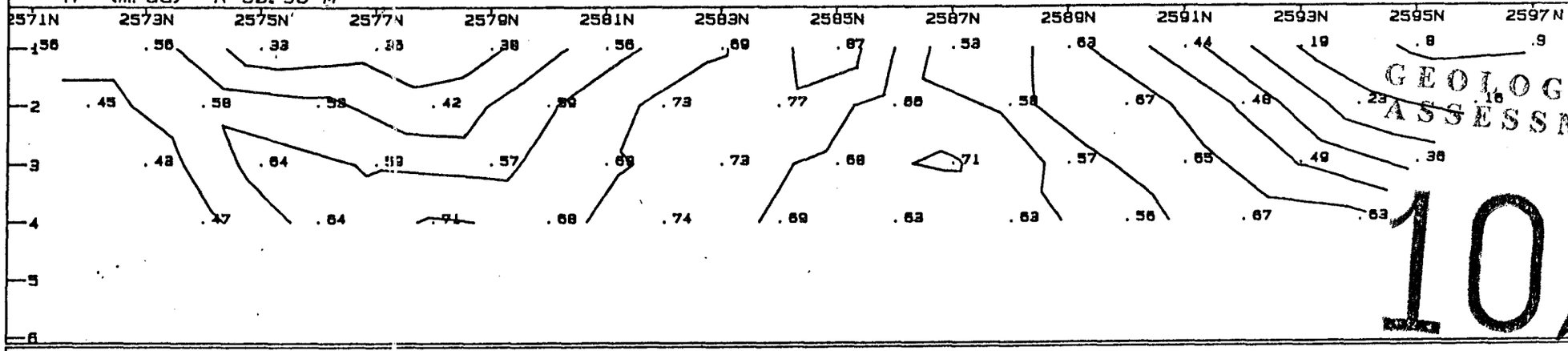
NTS Ref. :	REVISIONS
Work by : H.M.	Work by :
Drawn by :	Drawn by :
Date : OCT. 1982	Date :

RHO (ohm-m) A=60.96 M — RED DOG L2057E (R2057E) 12/07/82 — C.I.=Log

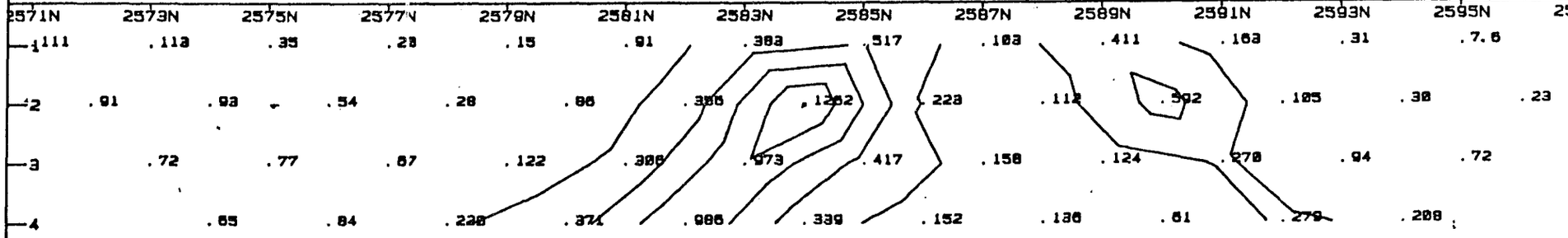


part 1 of 2

M (mrad) A=60.96 M — C.I.=10



Metal Factor A=60.96 M — C.I.=250



UTAH MINES LTD.
EXPLORATION DEPARTMENT
VANCOUVER, BRITISH COLUMBIA

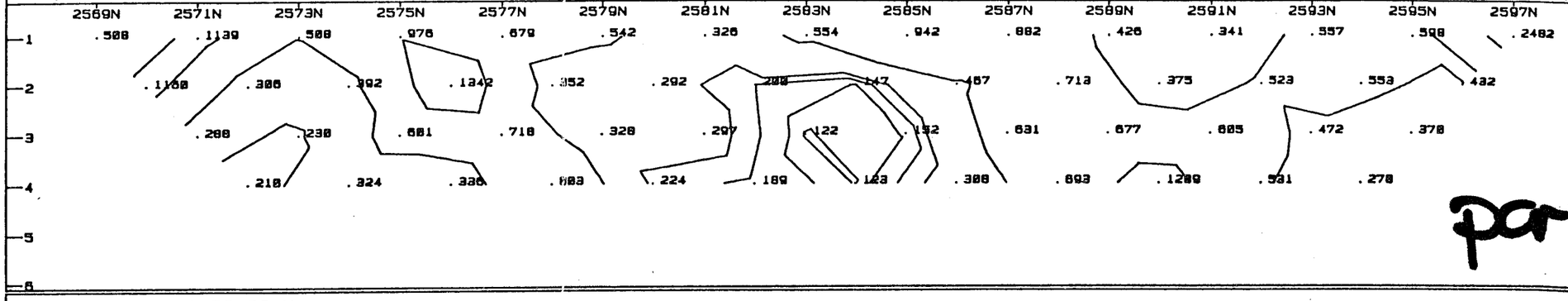
Plate 10

INDUCED POLARIZATION PSEUDOSECTION
LINE 2057E

RED DOG — EXPO

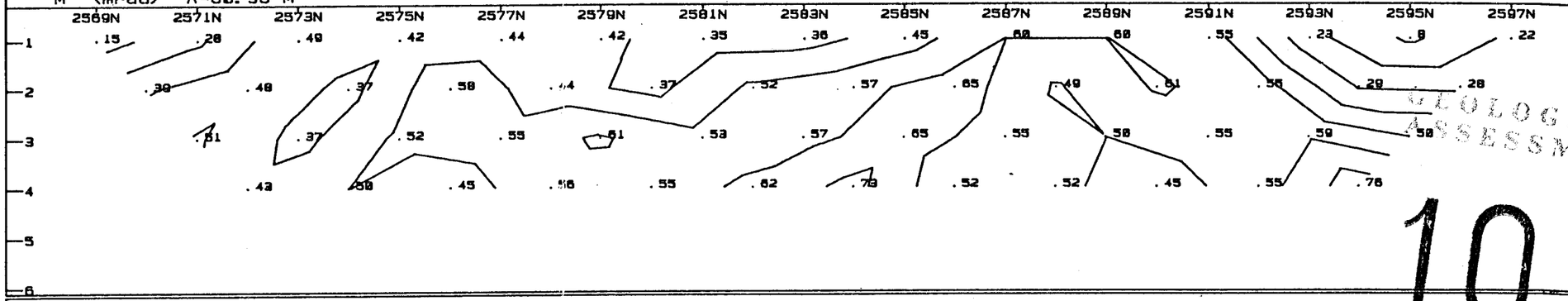
NTS Ref.:	REVISIONS
Work by : H.M.	Work by :
Drawn by:	Drawn by:
Date : OCT. '82	Date :

RHO (ohm-m) A=60.96 M — RED DOG L2062E (R2062E) 12/07/82 — C.I.=Log



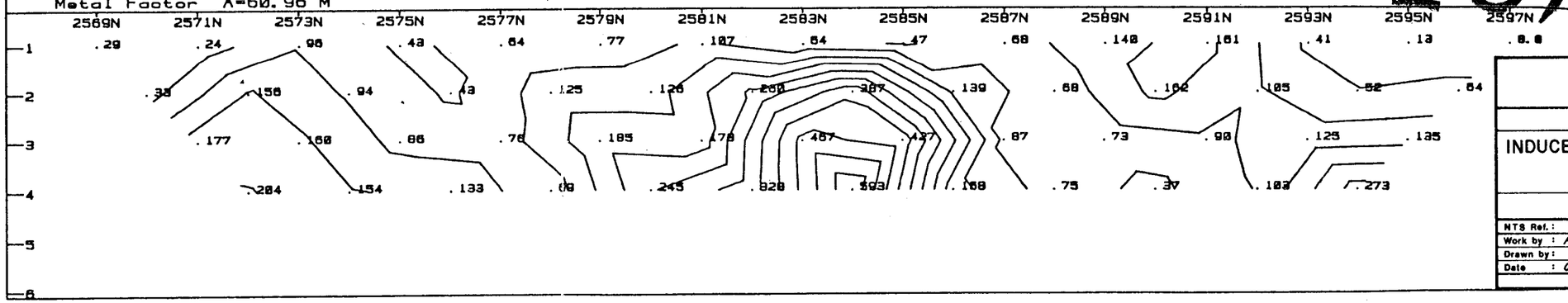
part 1 of 2

M (mrad) A=60.96 M — C.I.=10



10,982

Metal Factor A=60.96 M — C.I.=50



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VANCOUVER, BRITISH COLUMBIA

Plate II

INDUCED POLARIZATION PSEUDOSECTION
LINE 2062 E

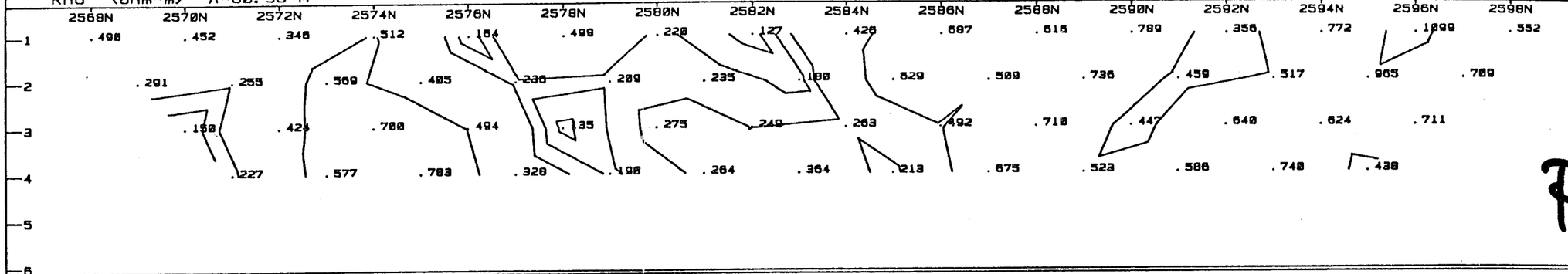
RED DOG—EXPO

NTS Ref.:	REVISIONS
Work by : H.M.	Work by :
Drawn by:	Drawn by:
Date : OCT. 1982	Date :

RHO (ohm-m) A=60.96 M

RED DOG L2067E (R2067E) 12/07/82

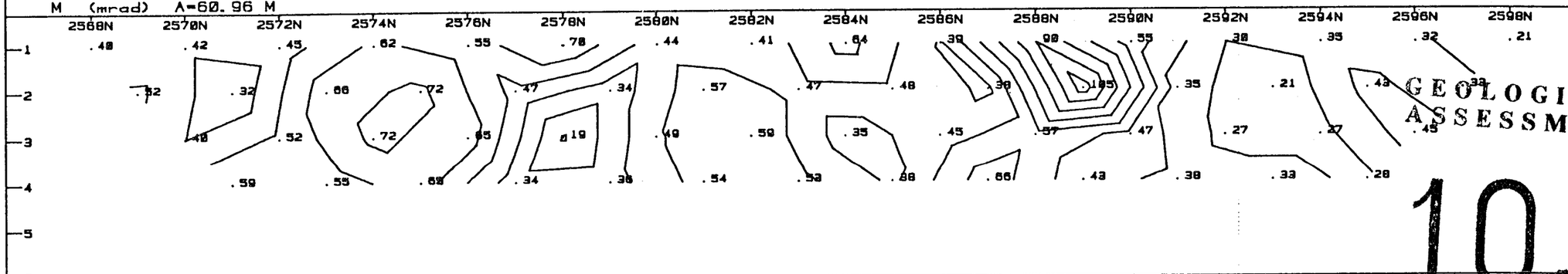
C. I. =Log



Part 1 of 2

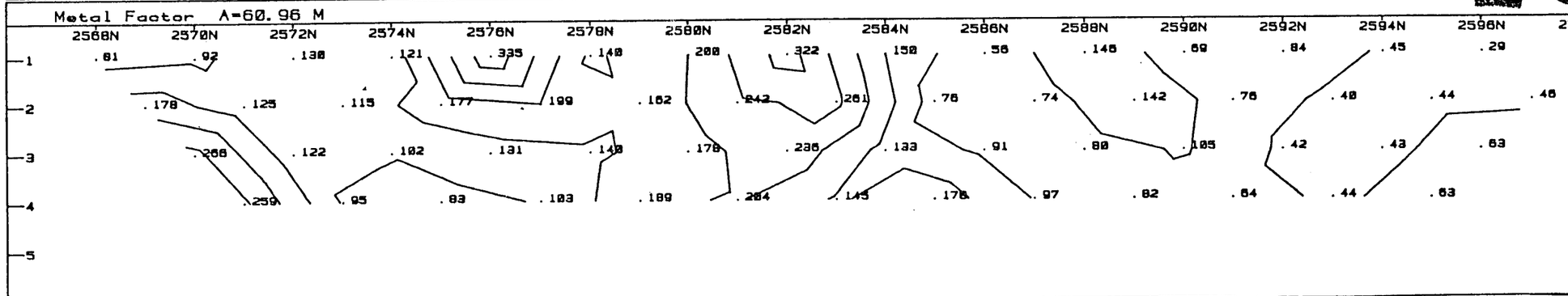
M (mrad) A=60.96 M

C. I. =10



Metal Factor A=60.96 M

C. I. =50



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EXPLORATION DEPARTMENT
VANCOUVER, BRITISH COLUMBIA

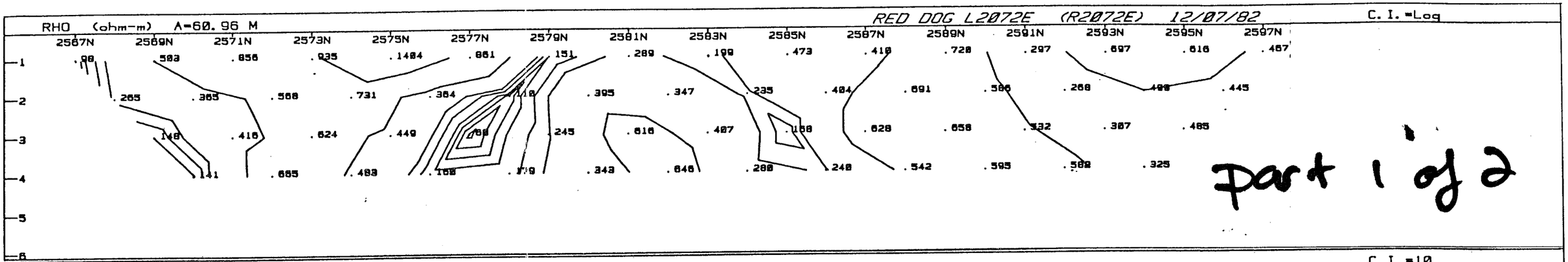
Plate 12

INDUCED POLARIZATION PSEUDOSECTION
LINE 2067E

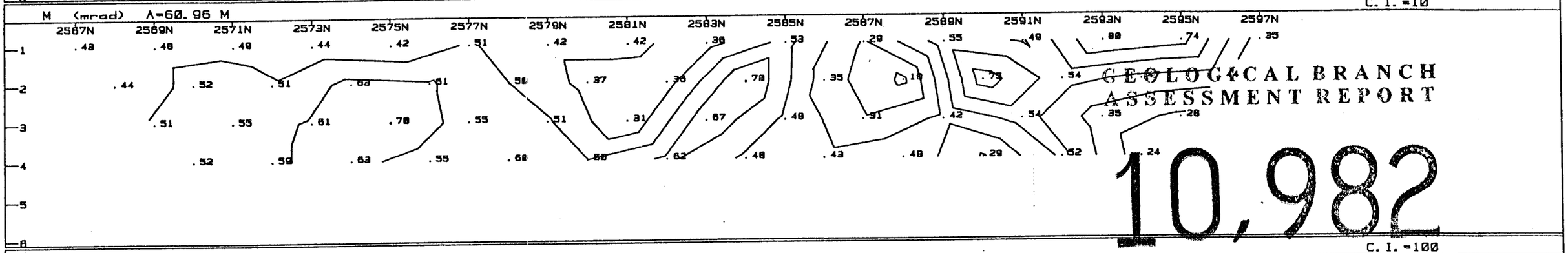
RED DOG — EXPO

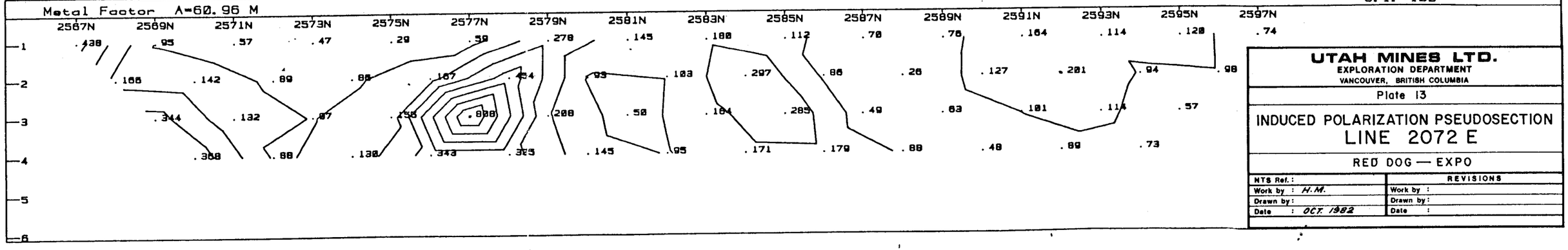
NTS Ref.:	REVISIONS
Work by : H.M.	Work by :
Drawn by:	Drawn by:
Date : OCT. 1982	Date :

RED DOG L2072E (R2072E) 12/07/82



Part 1 of 2





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VANCOUVER, BRITISH COLUMBIA

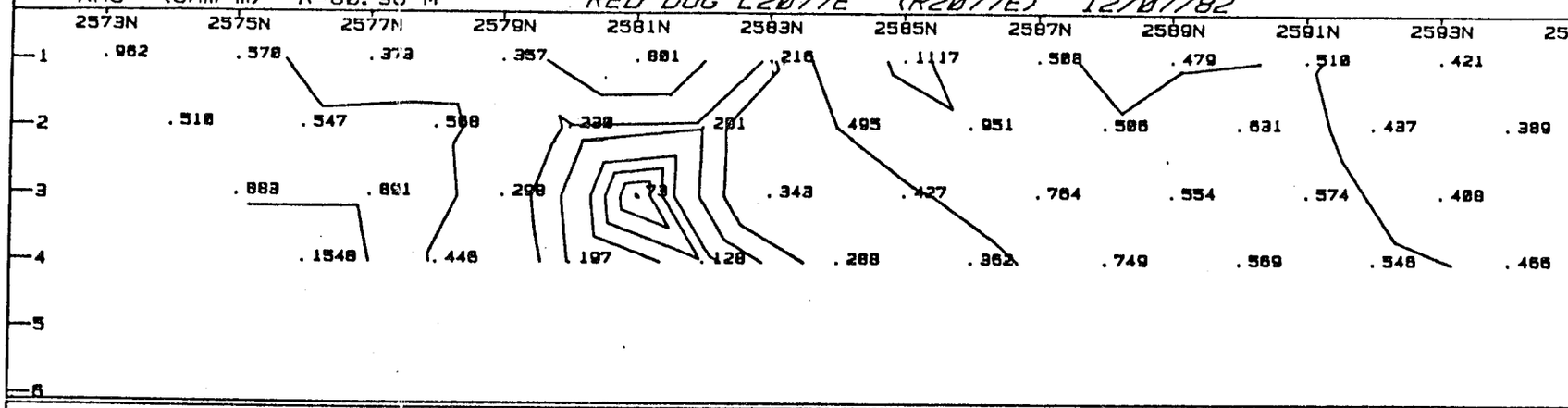
Plate 13

INDUCED POLARIZATION PSEUDOSECTION
LINE 2072 E

RED DOG — EXPO

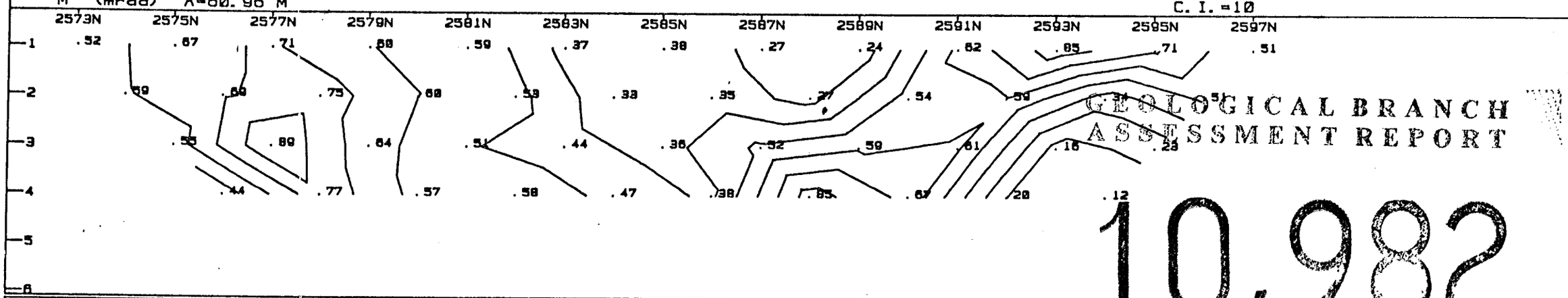
NTS Ref. :	REVISIONS
Work by : H.M.	Work by :
Drawn by :	Drawn by :
Date : OCT. 1982	Date :

RHO (ohm-m) A=60.96 M — RED DOG L2077E (R2077E) 12/07/82 — C.I.=Log

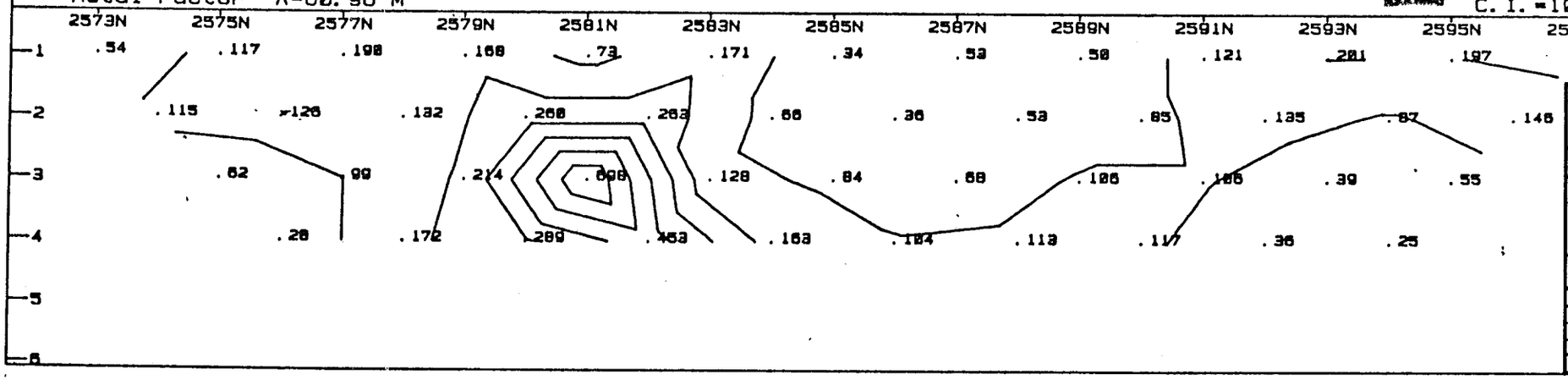


part 1 of 2

M (mrad) A=60.96 M — C.I.=10



Metal Factor A=60.96 M — C.I.=100



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EXPLORATION DEPARTMENT
VANCOUVER, BRITISH COLUMBIA

Plate 14

INDUCED POLARIZATION PSEUDOSECTION
LINE 2077 E

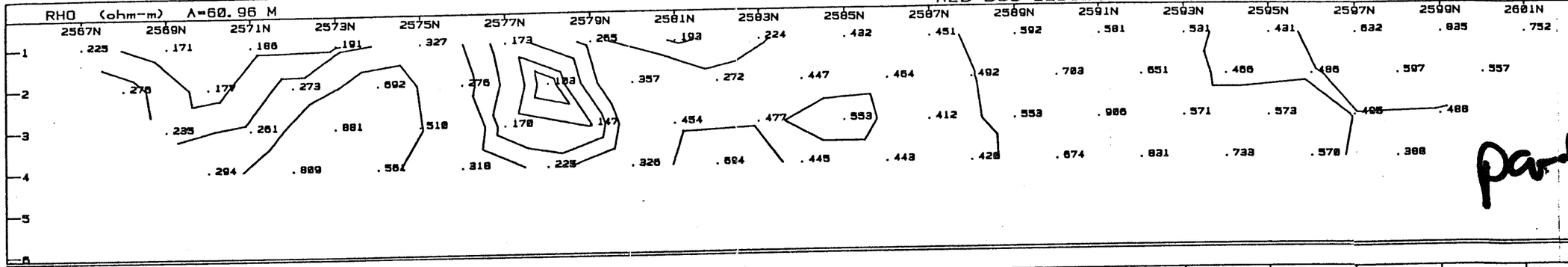
RED DOG — EXPO

NTS Ref.: 92-L-12	REVISIONS
Work by : H.M.	Work by :
Drawn by:	Drawn by:
Date : OCT. 1982	Date :

RED DOG L2082E (R2082E) 12/07/82

C. I. =Log

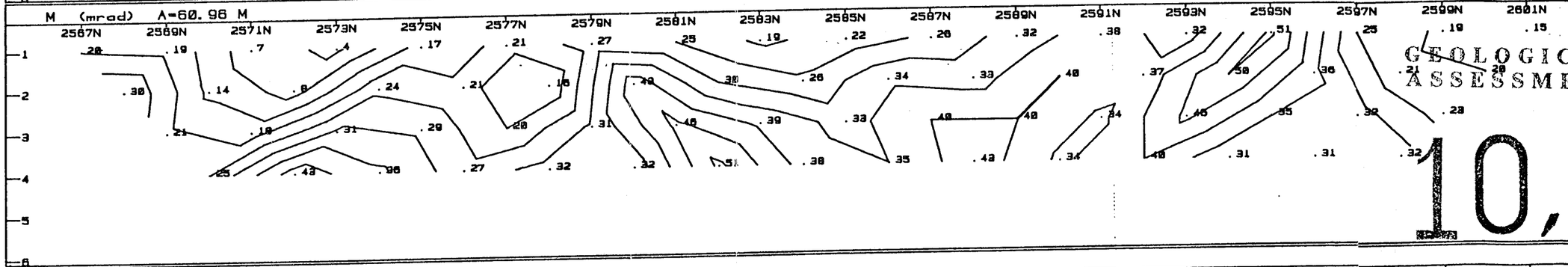
RHO (ohm-m) A=60.96 M



part 1 of 2

C. I. =5

M (mrad) A=60.96 M

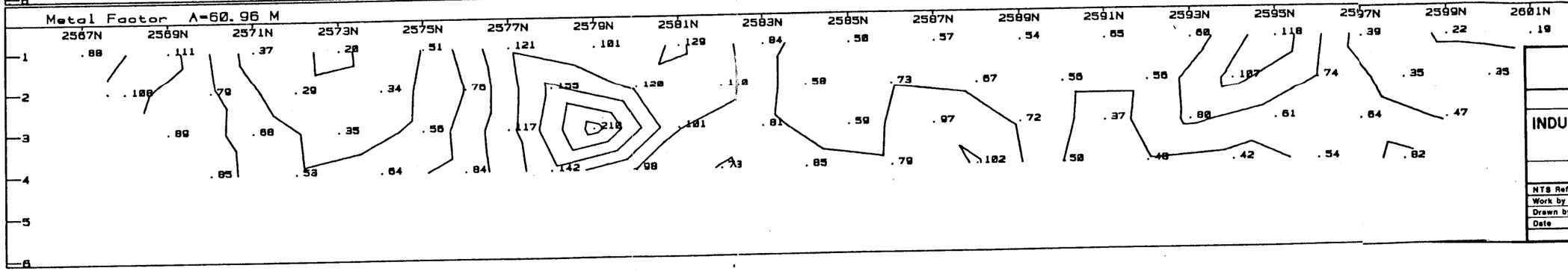


GEOLOGICAL BRANCH
ASSESSMENT REPORT

10,982

C. I. =25

Metal Factor A=60.96 M



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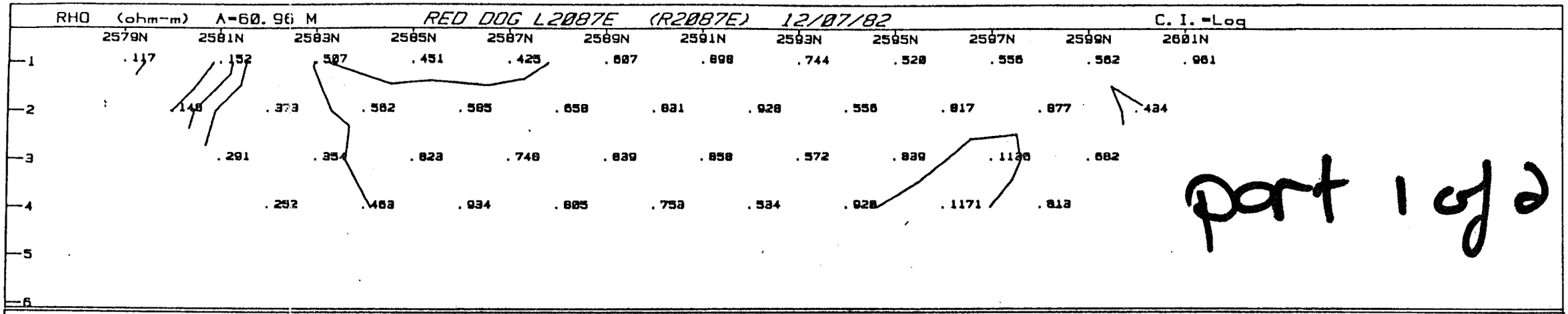
VANCOUVER, BRITISH COLUMBIA

Plate 15

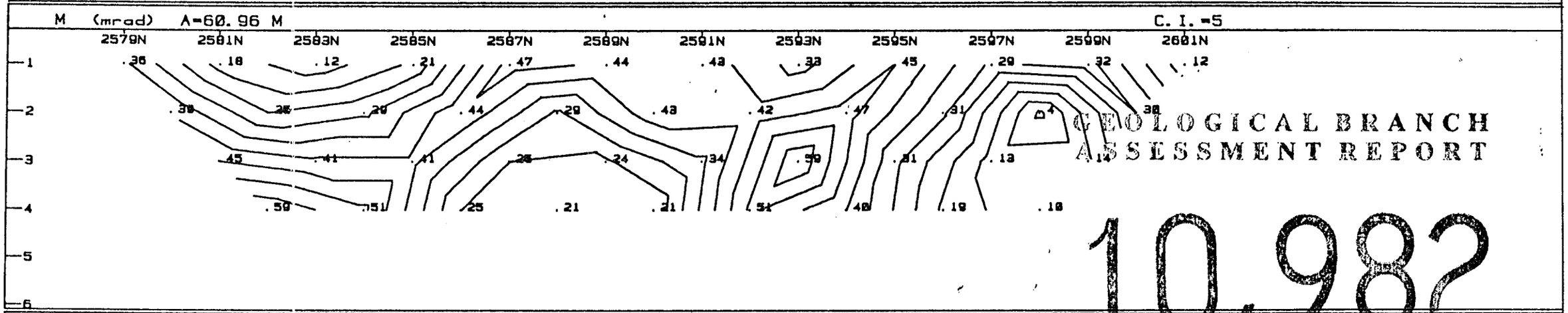
INDUCED POLARIZATION PSEUDOSECTION
LINE 2082 E

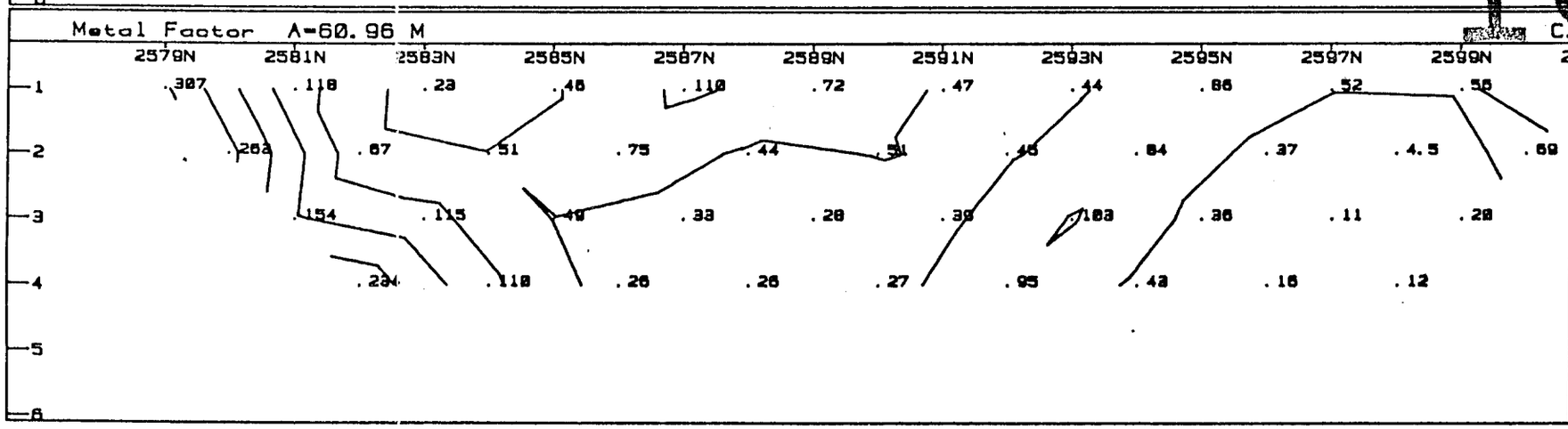
RED DOG — EXPO

NTS Ref. :	REVISIONS
Work by : H.M.	Work by :
Drawn by :	Drawn by :
Date : OCT. 1982	Date :



part 1 of 2





UTAH MINES LTD.
EXPLORATION DEPARTMENT
VANCOUVER, BRITISH COLUMBIA

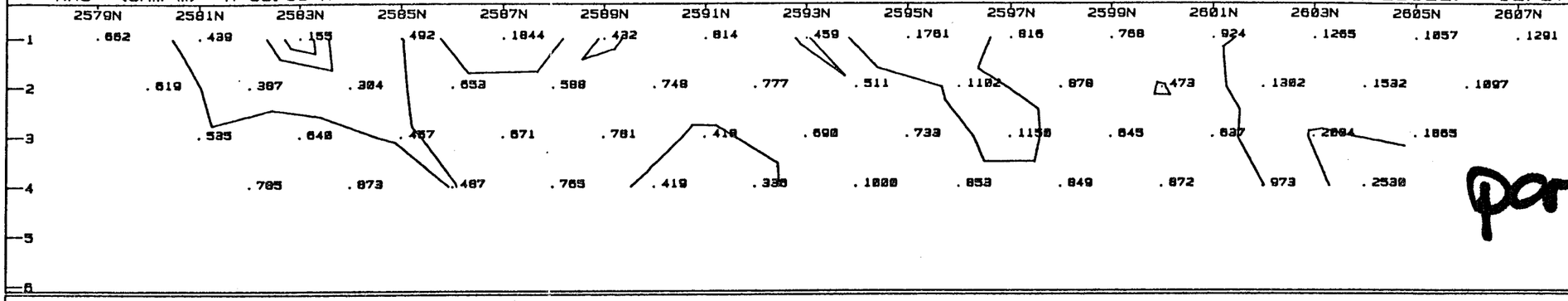
Plate 16

INDUCED POLARIZATION PSEUDOSECTION
LINE 2087 E

RED DOG — EXPO

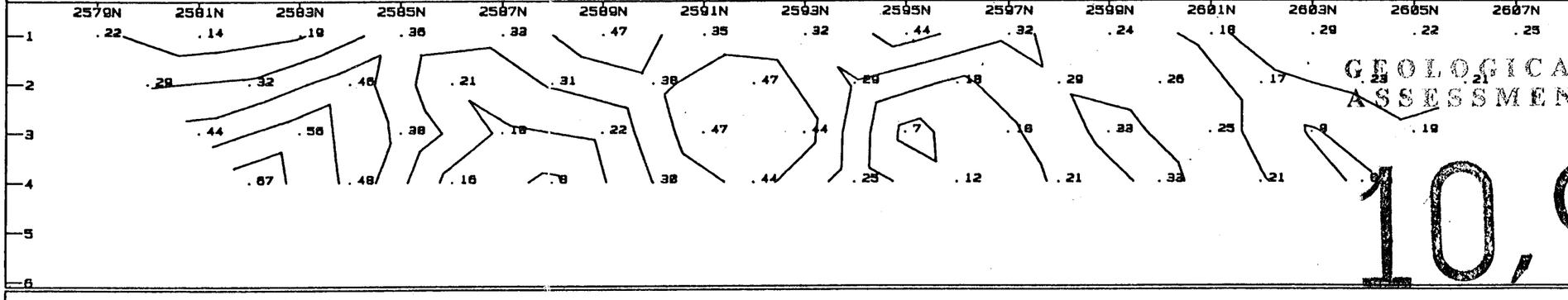
NTS Ref.:	REVISIONS
Work by : H.M.	Work by :
Drawn by:	Drawn by:
Date : OCT. 1982	Date :

RHO (ohm-m) A=60.96 M — RED DOG L2092E (R2092E) 12/07/82 — C.I.=Log

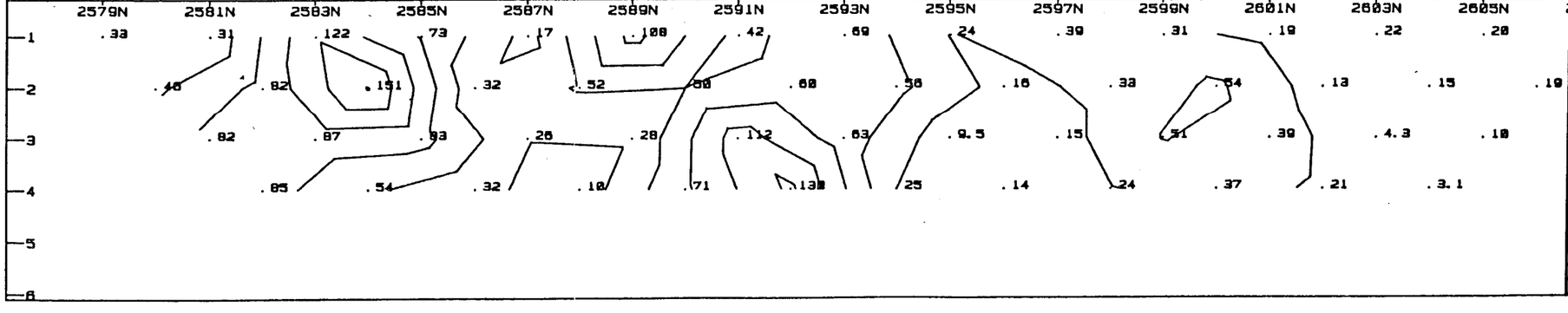


part 1 of 2

M (mrad) A=60.96 M — C.I.=10



Metal Factor A=60.96 M — C.I.=25



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VANCOUVER, BRITISH COLUMBIA

Plate 17

INDUCED POLARIZATION PSEUDOSECTION
LINE 2092 E

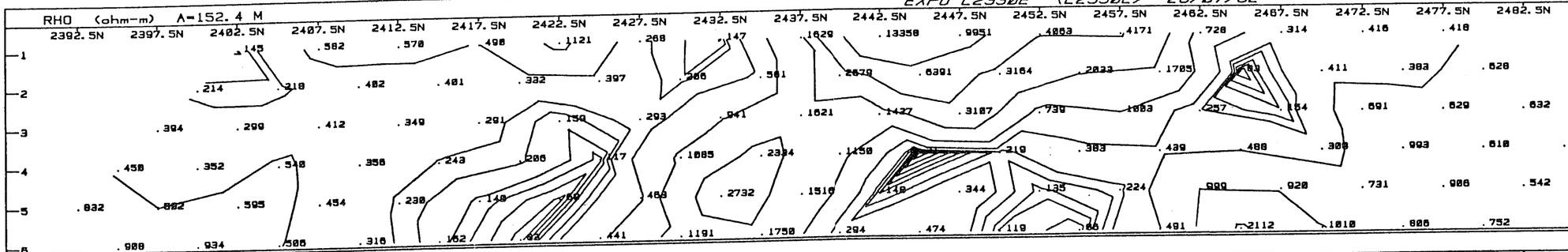
RED DOG—EXPO

NTS Ref. :	REVISIONS
Work by : H.M.	Work by :
Drawn by :	Drawn by :
Date : OCT. 1982	Date :

EXPO L2330E (E2330E) 26/07/82

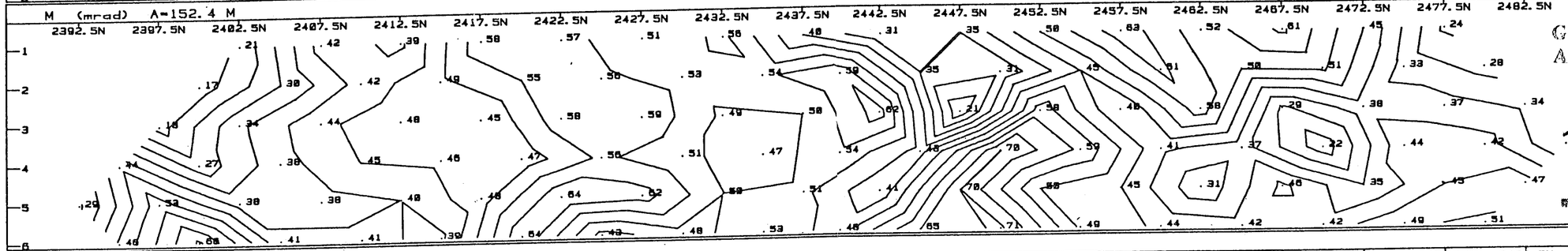
C. I. =Log

RHO (ohm-m) A=152.4 M



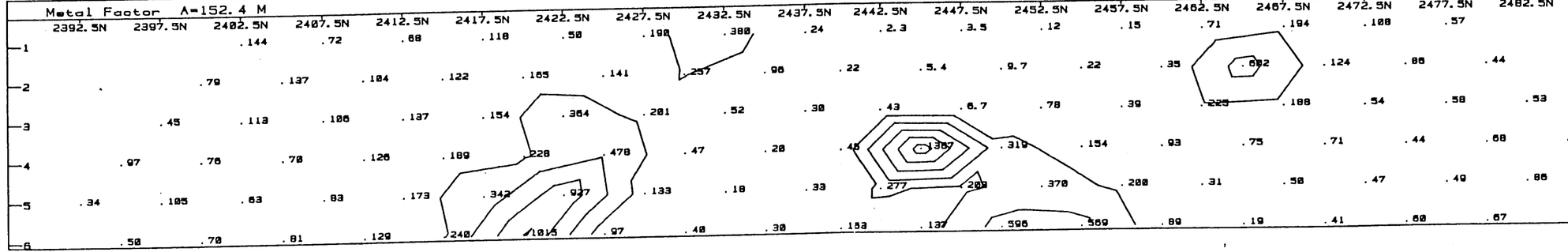
C. I. =5

M (mrad) A=152.4 M



C. I. =250

Metal Factor A=152.4 M



part 1 of 2

GEOLOGICAL BRANCH
ASSESSMENT REPORT

10,982

UTAH MINES LTD.
EXPLORATION DEPARTMENT
VANCOUVER, BRITISH COLUMBIA

Plate 18

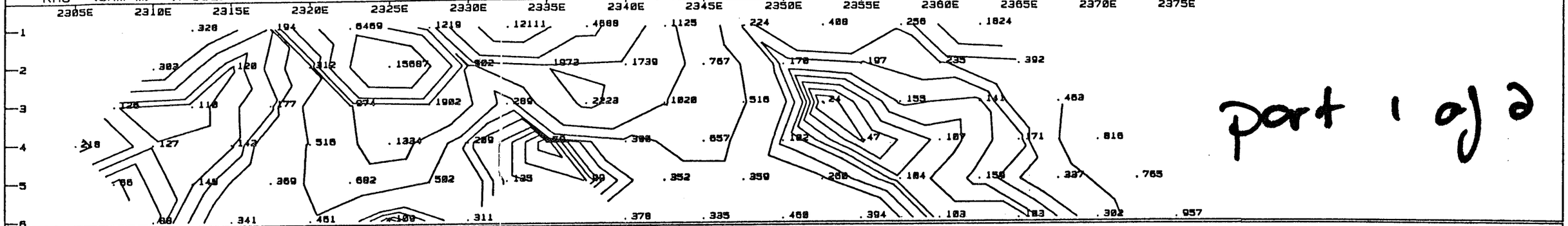
INDUCED POLARIZATION PSEUDOSECTION
LINE 2330E

EXPO

NTS Ref.: 92-L-12	REVISIONS
Work by : H.M.	Work by :
Drawn by: R.M.G.	Drawn by:
Date : OCT. 1982	Date :

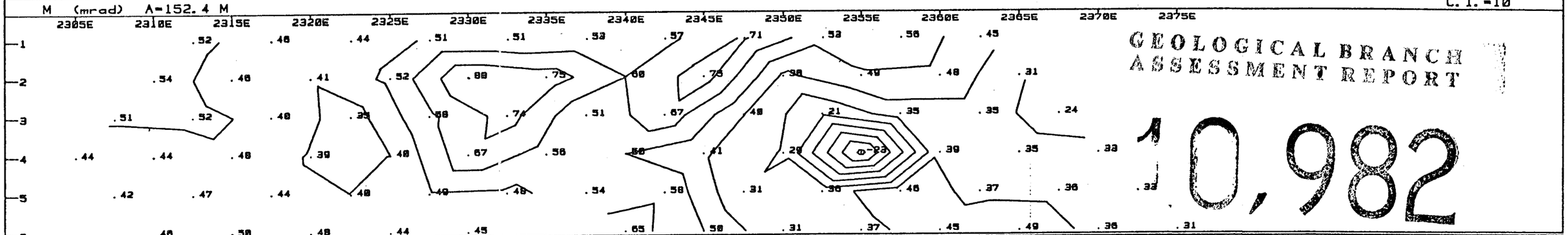
EXPO L2440N (E2440N) 26/07/82

RHO (ohm-m) A=152.4 M C.I.=Log

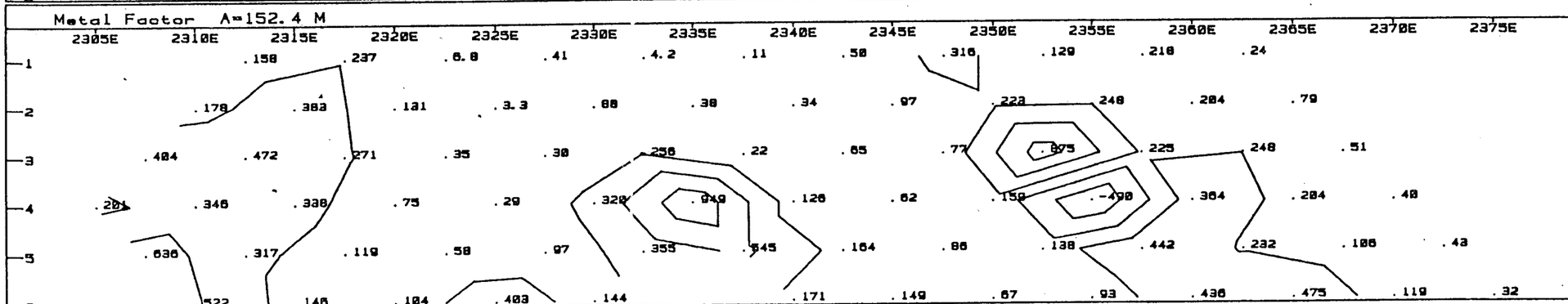


part 1 of 2

M (mrad) A=152.4 M C.I.=10



Metal Factor A=152.4 M C.I.=250



UTAH MINES LTD.
EXPLORATION DEPARTMENT
VANCOUVER, BRITISH COLUMBIA

Plate 19

INDUCED POLARIZATION PSEUDOSECTION
LINE 2440 N

EXPO

NTS Ref.:	REVISIONS
Work by : H.M.	Work by :
Drawn by:	Drawn by:
Date : OCT. 1982	Date :

EXPO 190
EXPO 324
EXPO 323
EXPO 325
EXPO 326
EXPO 237
EXPO 257
EXPO 258
EXPO 239
EXPO 259
EXPO 260
EXPO 241
EXPO 261
EXPO 262
EXPO 243
EXPO 263
EXPO 264

DON 2 Fr.
DON 4 Fr.
DON 14 Fr.
DON 13 Fr.
DON 6 Fr.
DON 12 Fr.

HUSHAMU LAKE

232,000 E | 233,000 E | 234,000 E | 235,000 E | 236,000 E | 237,000 E | 238,000 E | 239,000 E | 240,000 E

249,000 N | 248,000 N | 247,000 N | 246,000 N | 245,000 N | 244,000 N | 243,000 N | 242,000 N

LEGEND

- Soil sample
- Rock sample
- 3 / 14 — Cu (ppm) / Mo (ppm)

SYMBOLS

- Transit Survey, Hubs
- Picket Line, Showing line and station designation
- 665 / 697 — 678 / 694 — Hep Claim Boundary Unsurveyed, showing claim number and claim post
- DDH — Diamond Drill Hole, Elev. 215.3
- " " "

Part 2 of 2

GEOLOGICAL BRANCH
ASSESSMENT REPORT

10,982

PLATE 20

UTAH MINES LTD.
EXPLORATION DEPARTMENT
Vancouver British Columbia

EXPO GROUP

GEOCHEMISTRY

COPPER, MOLYBDENUM

Work by H.MUNTANION	Date Sept. 1982	NTS Ref. 92 - - 12
Drawn by Ram N. Gopal	Revised	MAP D-6

200 100 0 200 400 600
SCALE IN FEET

EXPO 190
EXPO 324
EXPO 323
EXPO 326
EXPO 325
EXPO 237
EXPO 257
EXPO 258
EXPO 239
EXPO 259
EXPO 260
EXPO 241
EXPO 262
EXPO 261
EXPO 243
EXPO 264
EXPO 263

DON 2 Fr.
DON 4 Fr.
DON 14 Fr.
DON 13 Fr.
DON 6 Fr.
DON 12 Fr.

HUSHAMU LAKE

232,000 E | 233,000 E | 234,000 E | 235,000 E | 236,000 E | 237,000 E | 238,000 E | 239,000 E | 240,000 E

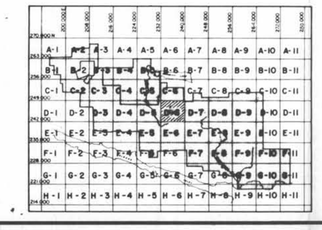
249,000 N | 248,000 N | 247,000 N | 246,000 N | 245,000 N | 244,000 N | 243,000 N | 242,000 N

LEGEND

- Soil sample
- Rock sample
- Hg (ppb) / As (ppm) | Au (ppb)

SYMBOLS

- Transit Survey, Hubs
- Picket Line, Showing line and station designation
- Hep Claim Boundary Unsurveyed, showing claim number and claim post
- DDH Diamond Drill Hole



GEOLOGICAL BRANCH
ASSESSMENT REPORT

10,982

part 1 of 2

PLATE 21

UTAH MINES LTD.
EXPLORATION DEPARTMENT
VANCOUVER, BRITISH COLUMBIA

EXPO GROUP

GEOCHEMISTRY
GOLD, ARSENIC & MERCURY

Work by H.M.	Date: Oct. 1982	NTS Ref. 92-L-12
Drawn by R.N.G.	Revised:	MAP D-6

200 100 0 200 400 600
SCALE IN FEET