

GEOLOGY, GEOPHYSICS AND DIAMOND DRILLING REPORT, 1985

on the

MARN CLAIMS

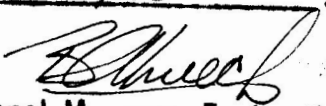
Dawson Mining District

N.T.S. 116 B/7

Latitude 64°27.5'

Longitude 138°49'

This report has been examined by
the Geological Evaluation Unit
under Section 53 (4) Yukon Quartz
Mining Act and is allowed as
representation work in the amount
of \$ 15,200


Regional Manager, Exploration and
Geological Services for Commissioner
of Yukon Territory.



Author: S.J. Mackay

Owner: Noranda Exploration Company, Limited
(No Personal Liability)

Date: January, 1986

091814

091814

This report has been examined by
the Geological Evaluation Unit
under Section 53 (4) Yukon Quartz
Mining Act and is allowed as
representation work in the amount
of \$ 15,200.



Regional Manager, Exploration and
Geological Services for Commissioner
of Yukon Territory.

TABLE OF CONTENTS

	Page
CHAPTER ONE: INTRODUCTION	
1-1: Introductory Statement	1
1-2: Location and Access	2
1-3: Physiography and Vegetation	5
1-4: History of the Claims	5
1-5: Previous Exploration	7
1-6: 1985 Work Program	8
CHAPTER TWO: GEOLOGY	
2-1: Regional Geology	9
2-2: Property Geology	11
2-3: Structure	17
2-4: Metamorphism	22
CHAPTER THREE: GEOPHYSICS - C.S.A.M.T. SURVEY	
3-1: C.S.A.M.T. Survey	24
3-2: C.S.A.M.T. Interpretation	24
3-3: C.S.A.M.T. Resistivity Inversions and Depths of Detection	28
CHAPTER FOUR: DIAMOND DRILLING	
4-1: DDH-M-85-1	33
4-2: DDH-M-85-2	36
CHAPTER FIVE: MINERALIZATION	40
CHAPTER SIX: GEOCHEMISTRY	42
CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS	43
References	
Statement of Qualifications	
Statement of Costs	

Page

LIST OF TABLES

TABLE 1:	Claim Status	6
TABLE 2:	Table of Formations	16

LIST OF FIGURES

FIGURE 1:	Claim Location Map	3
FIGURE 2:	Potential Overland Routes	4
FIGURE 3:	Geological Map of the Tombstone Area	10
FIGURE 4:	Mt. Brenner Valley Cross-Section L-122+00N	20
FIGURE 5:	MARN Claims - Geological Compilation	21
FIGURE 6:	C.S.A.M.T. Pa Inversions - DDH-M-85-1	30
FIGURE 7:	C.S.A.M.T. Pa Inversions - DDH-M-85-2	31

LIST OF MAPS

MAP 1:	Geology of Mt. Brenner Valley	in pocket
--------	-------------------------------	-----------

LIST OF APPENDICES

APPENDIX A:	Drill Logs DDH-M-85-1 and DDH-M-85-2
APPENDIX B:	Geophysical Report and C.S.A.M.T. Profiles (Bradish, 1985)
APPENDIX C:	Geochemical Results

CHAPTER ONE: INTRODUCTION1-1: INTRODUCTORY STATEMENT

The following report summarizes the geological, geophysical and diamond drilling work conducted by Noranda Exploration Company, Limited (No Personal Liability) in the Mt. Brenner valley area on its wholly owned MARN claims. All work was carried out during the 1985 field season from August 19 to October 26.

The aim of the project was to test for the presence of a mineralized skarn body located at depth and associated with the Tahkandit limestone-Mt. Brenner Stock contact. Mineralized skarn bodies, associated with the contact, occur north of the Mt. Brenner valley in the Fireweed Creek-Lake Scoville area. One such body, known as the Mini-Grid skarn, contains 250,000 to 300,000 tons with an average grade of 0.25 opt Au, 1% Cu, 0.1% W and 0.5 opt Ag.

No new skarn zones were identified by this program as barren Tahkandit limestone was intersected in both drill holes. Furthermore, it appears the Tahkandit limestone was intersected at a distance of 150 metres to 200 metres from its contact with the Mt. Brenner Stock.

1-2: LOCATION AND ACCESS

The MARN-Mt. Brenner valley claims are located 55 kilometres NNE of Dawson City, Yukon on mapsheet 116 B/7. They are situated along the western portion of the Tombstone Range, part of the Ogilvie Mountains, at latitude $64^{\circ}27.5'$ and longitude $138^{\circ}49'$. Furthermore, they are located on Brenner Creek (company name), a tributary of the Chandindu River, between Fireweed Creek and the Tombstone River.

Access to the property is by helicopter. A Hughes 500D and a Bell 206B, supplied by TNTA helicopters, were employed on a casual basis. Dawson City and Km 49 on the Dempster Highway, 29 km to the east, were used for mobilization and demobilization as well as for storage of supplies. Either location could be used for supply trips depending on weather conditions.

Land access to the property is possible along two routes:

1) west along the Tombstone River valley from the Dempster Highway to the Chandindu River valley (35 km) and then north along the Chandindu River (4 km) and then up the Brenner valley to the east;

2) the Chandindu River road, a dirt track from Dawson City to approximately the junction of the Chandindu and Tombstone River valleys, 8 km south of the property. The track would provide good winter access, however summer use would require some upgrading as portions of the track are wet and partially overgrown.

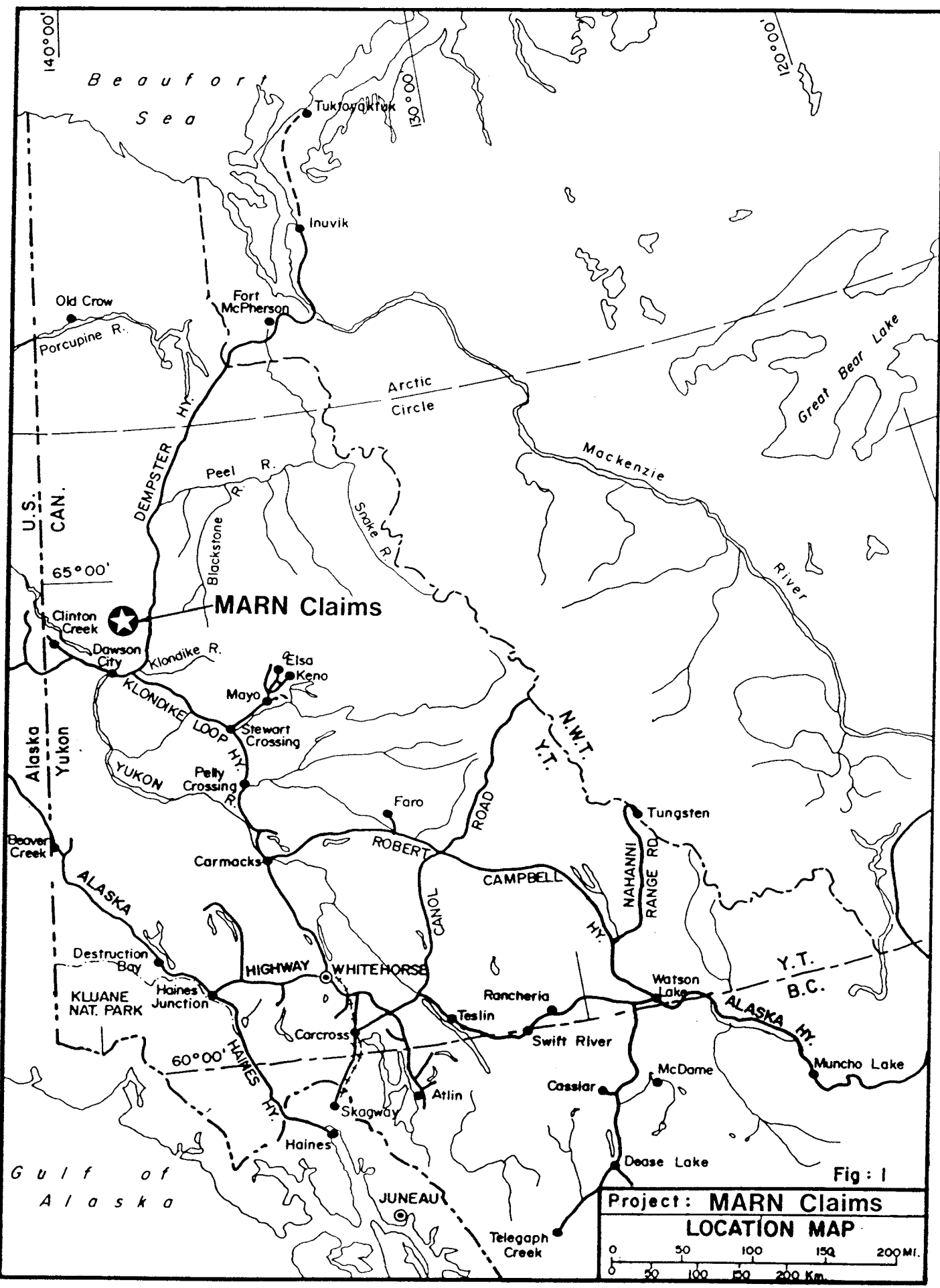


Fig: 1
Project: MARN Claims
LOCATION MAP
 0 50 100 150 200 MI.
 0 50 100 150 200 Km.

VANCAL 11928

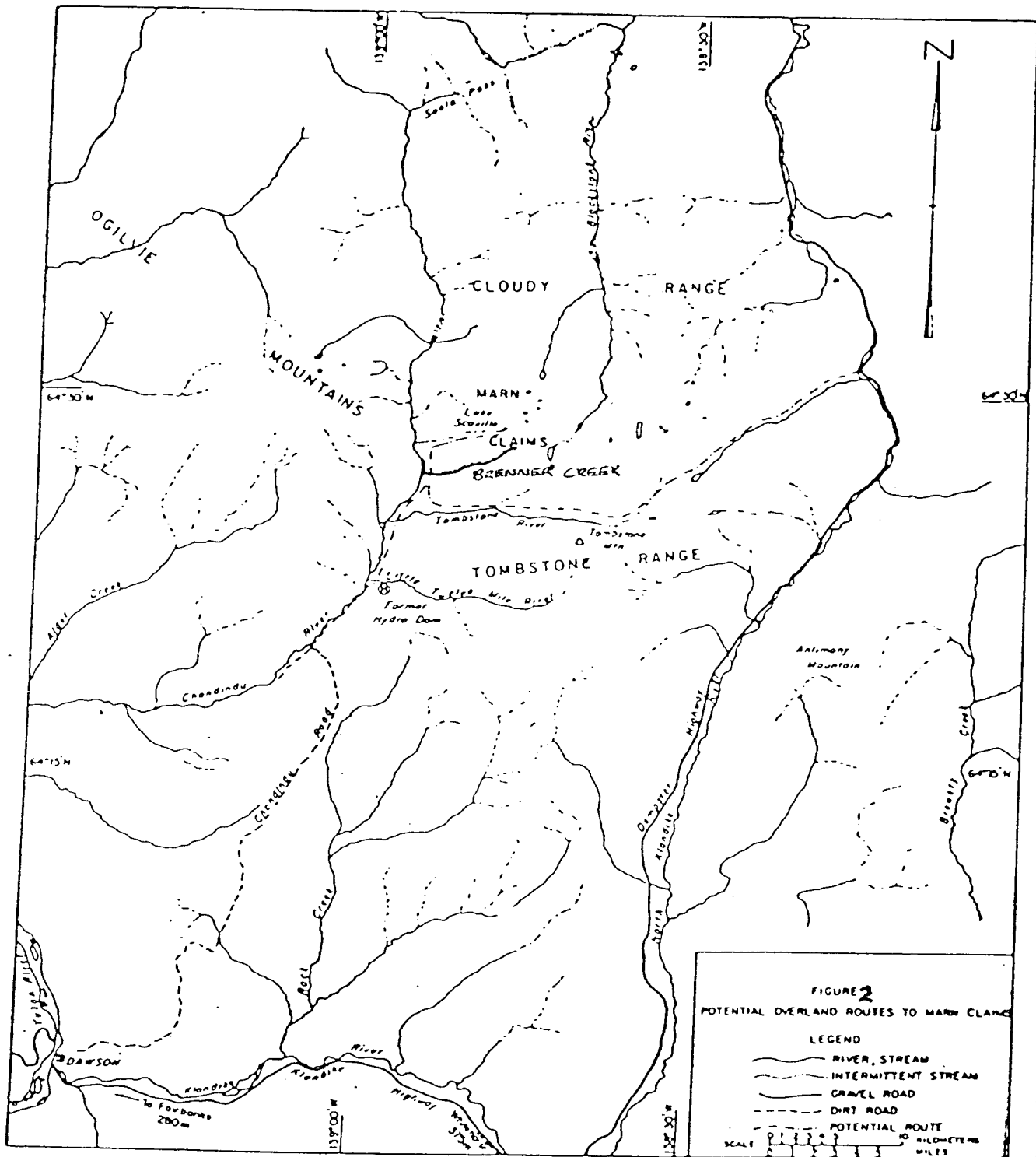


FIGURE 2
POTENTIAL OVERLAND ROUTES TO MARN CLAIMS

LEGEND

- RIVER, STREAM
- - - INTERMITTENT STREAM
- GRAVEL ROAD
- - - DIRT ROAD
- - - POTENTIAL ROUTE

SCALE 0 1 2 3 4 5
 KILOMETERS
 MILES

1-3: PHYSIOGRAPHY AND VEGETATION

The physiography of the Tombstone Mountains has been well summarized in other company and G.S.C. reports, therefore only a brief description will be included here.

The Tombstone Mountains were unaffected by Pleistocene continental ice sheets which stopped 100 miles east of here (Tempelman-Kluit, 1970). However, they were carved by alpine glaciers emanating from higher altitude cirques within the Tombstone Mountains themselves.

Mt. Brenner valley is one of these glaciated valleys which cuts across the contact between the rugged high relief Brenner Stock and the more recessive weathered Mesozoic sediments.

1-4: HISTORY OF THE CLAIMS

Mattagami Lake Mines staked the original MARN 1-8 claims July 29, 1978. This was followed by a brief exploration program during the same year.

From July to September, 1979 an additional 54 claims, MARN 9-62, were staked following encouraging results from the June exploration program. On June 2, 1980 an additional 46 claims were staked and MARN 29 and 30 restaked. The current claim status is summarized in Table 1.

TABLE 1: CLAIM STATUS

6.

NTS	Claim Name	R/P Record	TY	UN	Rec Date	DUE	Owner
116807	MARN 1	YA 031491	TP	1	Jan 4	1996	NOREX
116807	MARN 2	YA 031492	TP	1	Jan 4	1996	NOREX
116807	MARN 3	YA 031493	TP	1	Jan 4	1996	NOREX
116807	MARN 4	YA 031494	TP	1	Jan 4	1996	NOREX
116807	MARN 5	YA 031495	TP	1	Jan 4	1999	NOREX
116807	MARN 6	YA 031496	TP	1	Jan 4	1999	NOREX
116807	MARN 7	YA 031497	TP	1	Jan 4	1999	NOREX
116807	MARN 8	YA 031498	TP	1	Jan 4	1995	NOREX
116807	MARN 9	YA 047156	TP	1	Jan 4	1992	MATTAGAMI
116807	MARN 10	YA 047157	TP	1	Jan 4	1992	MATTAGAMI
116807	MARN 11	YA 047158	TP	1	Jan 4	1992	MATTAGAMI
116807	MARN 12	YA 047159	TP	1	Jan 4	1992	MATTAGAMI
116807	MARN 13	YA 047160	TP	1	Jan 4	1992	MATTAGAMI
116807	MARN 14	YA 047161	TP	1	Aug 14	1993	MATTAGAMI
116807	MARN 15	YA 047162	TP	1	Jan 4	1992	MATTAGAMI
116807	MARN 16	YA 047163	TP	1	Aug 14	1993	MATTAGAMI
116807	MARN 17	YA 047164	TP	1	Jan 4	1992	MATTAGAMI
116807	MARN 18	YA 047165	TP	1	Jan 4	1992	MATTAGAMI
116807	MARN 19	YA 047166	TP	1	Jan 4	1992	MATTAGAMI
116807	MARN 20	YA 047167	TP	1	Jan 4	1992	MATTAGAMI
116807	MARN 21	YA 047600	TP	1	Jan 4	1994	NOREX
116807	MARN 22	YA 047601	TP	1	Jan 4	1994	NOREX
116807	MARN 23	YA 047602	TP	1	Jan 4	1994	NOREX
116807	MARN 24	YA 047603	TP	1	Jan 4	1992	NOREX
116807	MARN 25	YA 047168	TP	1	Jan 4	1992	MATTAGAMI
116807	MARN 26	YA 047169	TP	1	Jan 4	1992	MATTAGAMI
116807	MARN 27	YA 047170	TP	1	Jan 4	1992	MATTAGAMI
116807	MARN 28	YA 047171	TP	1	Jan 4	1992	MATTAGAMI
116807	MARN 29	YA 050039	TP	1	Jan 4	1990	MATTAGAMI
116807	MARN 30	YA 050040	TP	1	Jan 4	1990	MATTAGAMI
116807	MARN 31	YA 047172	TP	1	Jan 4	1992	NOREX
116807	MARN 32	YA 047173	TP	1	Jan 4	1992	NOREX
116807	MARN 33	YA 047174	TP	1	Jan 4	1991	NOREX
116807	MARN 34	YA 047175	TP	1	Jan 4	1991	NOREX
116807	MARN 35	YA 047176	TP	1	Jan 4	1992	NOREX
116807	MARN 36	YA 047177	TP	1	Jan 4	1992	NOREX
116807	MARN 37	YA 047575	TP	1	Jan 4	1992	NOREX
116807	MARN 38	YA 047576	TP	1	Jan 4	1992	NOREX
116807	MARN 39	YA 047265	TP	1	Jan 4	1992	NOREX
116807	MARN 40	YA 047266	TP	1	Jan 4	1992	NOREX
116807	MARN 41	YA 047267	TP	1	Jan 4	1993	NOREX
116807	MARN 42	YA 047268	TP	1	Jan 4	1990	NOREX
116807	MARN 43	YA 047269	TP	1	Jan 4	1992	NOREX
116807	MARN 44	YA 047270	TP	1	Jan 4	1992	NOREX
116807	MARN 45	YA 047271	TP	1	Jan 4	1990	NOREX
116807	MARN 46	YA 047272	TP	1	Jan 4	1990	NOREX
116807	MARN 47	YA 047577	TP	1	Jan 4	1988	NOREX
116807	MARN 48	YA 047578	TP	1	Jan 4	1988	NOREX
116807	MARN 49	YA 047273	TP	1	Jan 4	1990	NOREX
116807	MARN 50	YA 047274	TP	1	Jan 4	1990	NOREX
116807	MARN 51	YA 047275	TP	1	Jan 4	1990	NOREX
116807	MARN 52	YA 047276	TP	1	Jan 4	1990	NOREX
116807	MARN 53	YA 047277	TP	1	Jan 4	1990	NOREX
116807	MARN 54	YA 047278	TP	1	Jan 4	1990	NOREX
116807	MARN 55	YA 047279	TP	1	Jan 4	1988	NOREX
116807	MARN 56	YA 047280	TP	1	Jan 4	1988	NOREX
116807	MARN 67	YA 050045	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 68	YA 050046	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 69	YA 050047	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 70	YA 050048	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 71	YA 050049	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 72	YA 050050	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 73	YA 050051	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 74	YA 050052	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 75	YA 050053	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 97	YA 050075	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 98	YA 050076	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 99	YA 050077	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 100	YA 050078	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 101	YA 050079	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 102	YA 050080	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 103	YA 050081	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 104	YA 050082	TP	1	Jan 4	1987	MATTAGAMI
116807	MARN 105	YA 050083	TP	1	Jan 4	1988	MATTAGAMI
116807	MARN 106	YA 050084	TP	1	Jan 4	1988	MATTAGAMI
116807	MARN 107	YA 050085	TP	1	Jan 4	1989	MATTAGAMI
116807	MARN 108	YA 050086	TP	1	Jan 4	1989	MATTAGAMI

1-5: PREVIOUS EXPLORATION

The majority of work on the MARN claims has been concentrated in the Lake Scoville-Fireweed Creek area. During 1980, exploration work consisted of geological mapping, grid-layout, geophysical surveys (VLF-EM, magnetometer and Crone Shootback), trenching and 1,005 metres of diamond drilling. A topographic survey of the area was conducted by the firm of Hosford, Impey and Welter.

In 1981, 1,000 metres of diamond drilling was completed as well as some additional geological mapping and topographic surveys.

In 1982, some preliminary geological mapping was undertaken on the southern MARN claims-Mt. Brenner valley area as well as along the north and east perimeters of the claim block.

In 1983, drilling again commenced with 13 BQ holes totalling 1,616.87 metres. Eleven of these holes, M-83-25 to M-83-35, were collared in the Mini-Grid area. These drill holes succeeded in delineating a skarn zone of approximately 250,000 to 300,000 tons with an average grade of 0.25 opt Au, 1% Cu, 0.1% W and 0.5 opt Ag (Biczok, 1983). Holes M-83-36 and 37 were drilled along the south margin of the sill in a successful attempt to intersect the Tahkandit limestone.

Although high grade float assaying up to 0.8 opt Au has been found in the nearby "Mineral Gully", drilling has failed to locate the source. Furthermore, based on topography, the potential of this area appears to be limited (Biczok, 1983).

Previous work in the Mt. Brenner valley was undertaken in 1982 and consisted of geological mapping, grid-layout and a series of geophysical surveys. Five lines totalling 4 km were surveyed using I.P., magnetometer, Crone Shootback and VLF-EM techniques. The surveys failed to detect any conductive skarn bodies at depth or to accurately locate the monzonite-"schist" contact for any length or depth beneath the conductive overburden.

1-6: 1985 WORK PROGRAM

During the 1985 field season, work in the Mt. Brenner valley consisted of grid-layout, C.S.A.M.T. geophysical surveying, detailed geological mapping and diamond drilling.

From August 19 to 31, a Phoenix Geophysics C.S.A.M.T. crew conducted 4.85 km of Controlled Source Audio Magneto-Tellurics on 5 lines across the monzonite-"schist" contact. The purpose of the survey was to accurately locate any conductive skarn bodies at depth and to delineate the position of the monzonite-"schist" contact.

Drilling consisted of NQ and BQ size core. Two holes, numbered DDH-M-85-1 and DDH-M-85-2, were drilled totalling 867.82 metres. Both holes were drilled to test separate C.S.A.M.T. resistivity anomalies in a geologically favourable environment.

Seven mandays of geological mapping was undertaken in order to gain greater control on depths of intersection for the limestone in the drill holes and at the contact with the pluton.

CHAPTER TWO: GEOLOGY

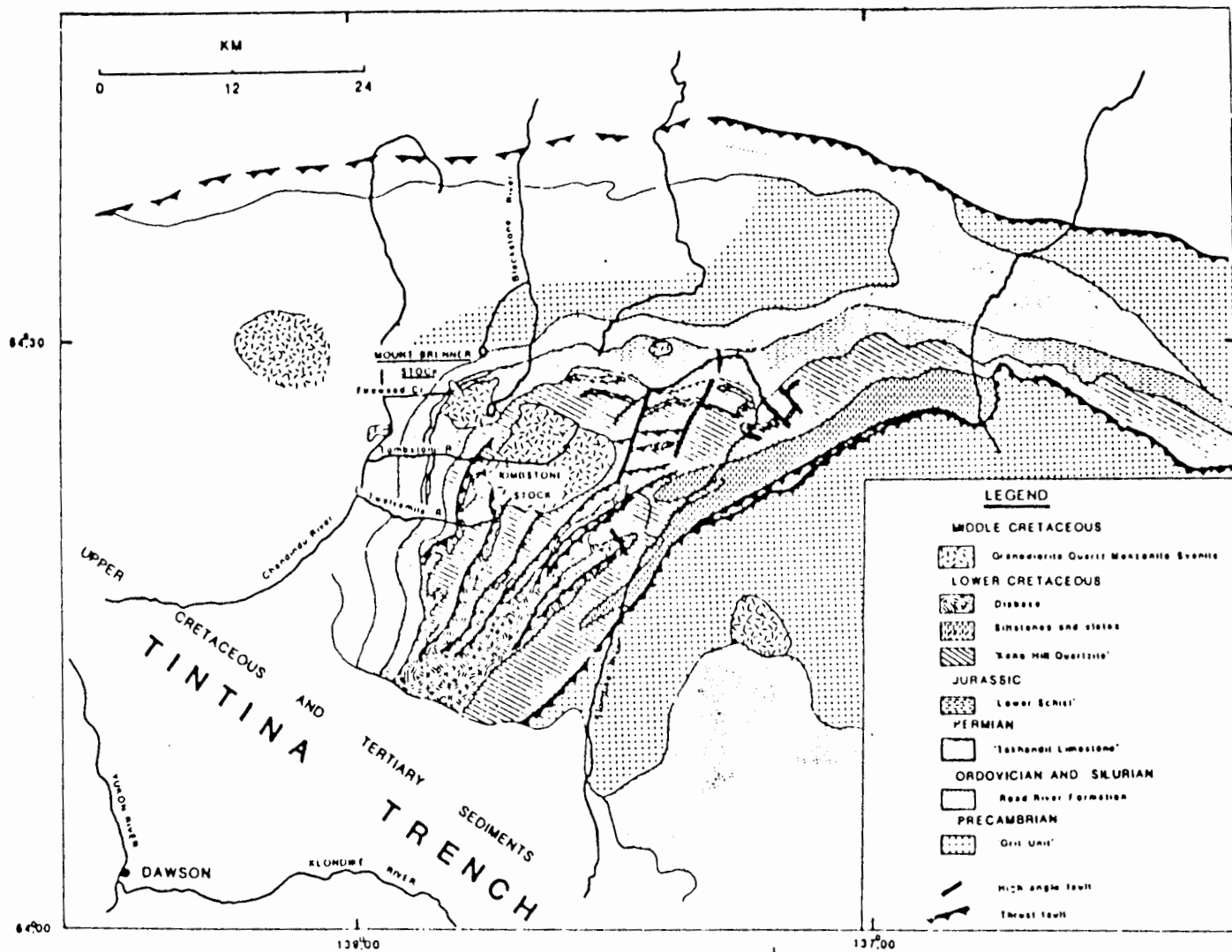
2-1: REGIONAL GEOLOGY

In general the MARN claims are located along the western portion of the Tombstone area within the much larger Selwyn Basin. The Tombstone area comprises a relatively complete succession of Mesozoic and Paleozoic sediments. Tempelman-Kluit (1970) suggests that the Mesozoic sequence of rocks in the Tombstone area were part of a belt of deposition extending to the Keno Hill area. The Tombstone River-Keno Hill belt also appears to be a homotaxial equivalent of the Kandik Formation found north of the Tintina Trench in eastern Alaska and south of the Trench in the form of the Tofty segment. His studies also suggest that the Kandik and Tofty segments formed a complete depositional basin with the Tombstone-Keno Hill belt.

Structural styles in the area of the MARN claims are the result of two periods of deformation. One, pre-Permian before deposition of the Tahkandit Formation and affecting mainly the Road River Formation, and the other, a late early Cretaceous period of thrust faulting which completely dominates the Tombstone area.

The Tombstone area has been intruded by two large stocks of monzonite-syenite composition. These are the Tombstone Stock and the smaller Mt. Brenner Stock. The MARN claims are associated with the latter. The stocks, dated at 91 ± 5 MY (Tempelman-Kluit, 1970), form the northern limit of a

Figure 3. Geological map of the Tombstone area.



belt of mid to late Cretaceous granitic plutons occurring north of the Tintina Fault from northwestern to southeastern Yukon.

Intrusion of these stocks throughout the Tombstone area is post deformational as the stocks sharply truncate many of the large scale structural features such as the Spotted Fawn Gulch Thrust and the McIntyre Thrust (Tempelman-Kluit, 1970).

2-2: PROPERTY GEOLOGY

Mapping of the Mt. Brenner Valley was carried out on a 1:5,000 scale using compass traverses, pacing, altimeter readings, secant level and hip chaining. In order to obtain as much control as possible, certain portions of the grid were extended in order to allow significant outcrops to be chained and paced in. The drill sites were used as a base station for altimeter readings in order to correct for barometric changes throughout the day. Good control on mapping was needed to accurately predict target depths for drill intersections of the limestone as the distance from the closest outcrop of the Tahkandit limestone to DDH-M-85-1 is 600 metres and 860 metres for DDH-M-85-2.

Four main rock units occur on the southern MARN claims, see Table 2. The following is a description of these units and their associated sub-units.

Unit 1: Rocks of Unit 1 make up the Ordovician-Silurian Road River Formation. The best exposures of the formation occur on the north side of

Brenner Valley in Road Creek. Two variations of the formation were observed.

1a: Bedded to faintly laminated black and grey chert. Average bed thickness is 10-15 cm.

1b: Interbedded black chert and shale. Chert beds are 10-15 cm thick while shale beds are 1-5 cm thick and well foliated.

Unit 2: Limestone and cherts of Unit 2 form the Permian Tahkandit Formation. The best exposures were observed along the south ridge. The unit is generally sparitic locally fossiliferous limestone with chert pebble conglomerates and black chert lenses and beds. Fresh limestone sections are buff to black in colour depending on their argillaceous content. Weathered surfaces are white to grey in colour.

Limestone sections have a detrital chert component ranging from 5% to 85% depending on the horizon. The chert pebbles and fragments are likely derived from the underlying Road River Formation. This is based on similarities in colour, texture and general appearance as well as the units stratigraphic location. The shape of the chert fragments is dominantly angular to sub-round with a much smaller component consisting of well rounded pebbles. The size range is from 1 mm up to 20 mm with the mean diameter being about 7 mm.

The upper contact of the Tahkandit is marked by a chert pebble conglomerate in which the matrix becomes more argillaceous as the overlying "schist" is approached. The upper sections of the Tahkandit have a large fragmental chert component occurring 3 ways. As matrix supported

oligomictic conglomerates, clast supported oligomictic conglomerates and as turbidites. Limestone and clay fill the interstitial spaces of the matrix supported conglomerates. Very little interstitial space exists in the clast supported conglomerates as it is occupied by well fitting sub-round to well rounded chert pebbles. Conglomerate beds range from a few centimetres in thickness up to 2 metres in thickness. Both types appear to grade into each other. The turbidite sequences are generally under 1 metre in thickness and consist of a much more angular chert component occurring in fining upwards sequences in which the matrix of limestone is much more abundant than the chert component.

The upper Tahkandit also has a large skeletal component occurring with the argillaceous limestone. Skeletal fragments consist of crinoid stems, minor crinoid polyps and various brachiopod shell fragments.

The lower sections of the Tahkandit consist of limestone and horizons of lensoidal black chert up to 1.5 metres in thickness as well as lesser amounts of detrital chert. Some shell fragment horizons do occur in this section. The lower contact of the Tahkandit with the Road River Formation is not exposed in the Mt. Brenner Valley and can only be inferred from the relative position of outcrops of the two units.

Unit 3: Unit 3 is made up of rocks of the Jurassic "Schist". The unit makes contact with the intrusive at the surface and is generally recessively weathered. The following sub-divisions represent variations within the unit. Boundaries are gradational and discontinuous due to later structural modification.

3a: Massive black shale to slaty phyllite occurs with or without minor laminated to thinly bedded quartzite.

3b: Fine to coarse-grained quartzite and argillaceous quartzite, often sub-arkosic. Laminated to massive sequences, often displays fining upwards sequences. Beds up to 3 metres thick seen.

3c: Interbedded shale and dark argillaceous limestone. Limestone is fine-grained, micritic and does not appear to be textured. This unit was observed only in the lower sequences of the Jurassic "Schist".

3d: Black chert, argillaceous chert and cherty argillite interbedded with black shale.

Unit 4: Rocks of Unit 4 form the Mt. Brenner Stock and its associated dykes and sills. The composition of the unit is dominated by a series of rocks ranging from monzonite to diorite. The grain size of the stock ranges from fine to coarse and consists of well grown euhedral plagioclase and orthoclase crystals. Both are white in colour and are therefore difficult to distinguish in the field. Mafic minerals are restricted to <40% of the rock and consist of hornblende laths with lesser amounts of pyroxene (augite?). Only minor amounts of quartz were seen indicating the presence of quartz monzonites. An increase in the amount of plagioclase was observed in some areas at the edge of the intrusion indicating a possible marginal diorite phase. This is supported by the generally dioritic composition of dykes seen cutting the surrounding country rock.

Due to late season snow conditions and the high relief of the intrusion, mapping of the stocks margin was limited mainly to talus piles at

the bottom of various slopes and descriptions of randomly occurring boulders in the valley itself.

The following sub-divisions of Unit 4 apply to the various dykes observed in the area.

4a: Biotite Diorite - Mesocratic with approximately 20% medium-grained biotite in a dark aphanitic groundmass composed of fine-grained biotite and feldspar. Often occurs at the margin of larger hornblende diorite dykes.

4b: Hornblende Diorite - Medium to coarse-grained, porphyritic and equigranular plagioclase and hornblende. Large crystals often display same flow orientation. Minor quartz observed in some areas.

4c: Syenite-Monzonite - Buff coloured. Contains 30% elongated, tabular plagioclase crystals up to 4 cm long. Mafics are hornblende occurring as euhedral to subhedral tabular crystals up to 1 cm in length, 15-25% of the rock. Both occur in a fine-grained groundmass composed of mafics and feldspar. Phenocrysts are highly flow oriented in a direction parallel to the dykes wall, giving it a trachytic texture.

Unit A: This unit is represented by dark green, slightly porphyritic amygdaloidal andesite dykes ranging from 1 metre to 5 metres in thickness. The dyke is only observed on the north ridge where it cuts the Road River Formation. The dyke is concordant to chert beds in some areas, while cutting across beds in other areas, furthermore, it is generally irregular and discontinuous. Calcite filled amygdules and fracture fillings are very common. The exact age of the andesite dykes is unknown. However, it is likely related to a Silurian or post-Silurian volcanic event known to have

TABLE 2:
TABLE OF FORMATIONS

UNIT	PERIOD	FORMATION	LITHOLOGY	THICKNESS
4	Mid Cretaceous	Mt. Brenner Stock	Intrusive monzonite, syenite, diorite, med. to coarse grain with associated dykes	
3	Jurassic	Jurassic "Schist"	Argillite to slately phyllite with interbedded fine to coarse grained quartzite, argillaceous quartzite and sub arkose, minor limestone in lower section, minor chert	450-650 m
UNCONFORMITY				
2	Permian	Tahkandit Formation	Fossiliferous micritic and sparitic limestone with interbedded chert pebble conglomerate and turbidite sequences	35-42 m
ANGULAR UNCONFORMITY				
1	Ordovician and Silurian	Road River	Black and grey chert with interbedded shale	Irregular
A	Unknown		Andesite - fine-grained, green, weakly plagioclase-phyric	Dyke(?)

taken place in the area.

2-3: STRUCTURE

Variation in structure between units in Mt. Brenner Valley is related to 3 different periods of deformation as well as the reaction of different units, of varying degrees of competency, to the same deformational stress. Deformational stresses likely occurred during the post-Ordovician, deforming the Road River Formation, the early Cretaceous, resulting in thrust faulting throughout the region and the third occurred during emplacement of the Brenner Stock in the mid-Cretaceous.

The oldest units observed in the mapping area are those of the Ordovician-Silurian Road River Formation. The large abundance of chert makes this a fairly competent unit. Structural observations of this unit in the Road Creek indicates beds which strike N-S and dip east, cut by normal faults which strike N-S and dip 90° to 45° E. Chert beds are often highly distorted with beds truncated against each other. The dip of beds ranges from vertical to 5° east. Dips change radically over relatively short distances. In one locality tight isoclinal folds were observed in the upper parts of the formation just below the contact with the overlying Tahkandit limestone. The folds have easterly dipping axial planes that plunge gently north. This type of folding indicates a period of high compression. These folds do not, however, continue into the overlying limestone. This, combined with the angular unconformity observed between the two units in

DDH-M-85-2, supports the possibility of a post-Ordovician orogenic event resulting in uplift and erosion before deposition of the Tahkandit limestone during the Permian.

Tilting of the Tahkandit limestone and deformation of the Jurassic "Schist" can be related to a second deformational event in which strata with different levels of competency behaved under the same stress.

The limestone unit has an orientation ranging from sub-horizontal to 25° east with average dip being $5-10^{\circ}$ east. The unit is not folded but appears to be down-faulted to the east by a series of high angle normal faults giving visible displacements of up to 15 metres vertical. This feature was also noted north of here in Fireweed Creek during previous programs. The down-faulting gives the unit an apparent dip of $20-23^{\circ}$ east.

The actual limestone schist contact represents a time? unconformity only as the beds themselves appear conformable and are marked by a chert pebble conglomerate 2 metres thick, in outcrop. With increasing height in the section, dips in the "schist" begin to steepen and become more irregular ranging from 5° east to vertical with some sections possibly being overturned. Due to a lack of sedimentary structures in some areas, it is difficult to tell. However dips vary dramatically over distances of tens of metres. Part of this is a result of soft sediment deformation shortly after deposition, however the majority of it is due to early Cretaceous compressional stresses.

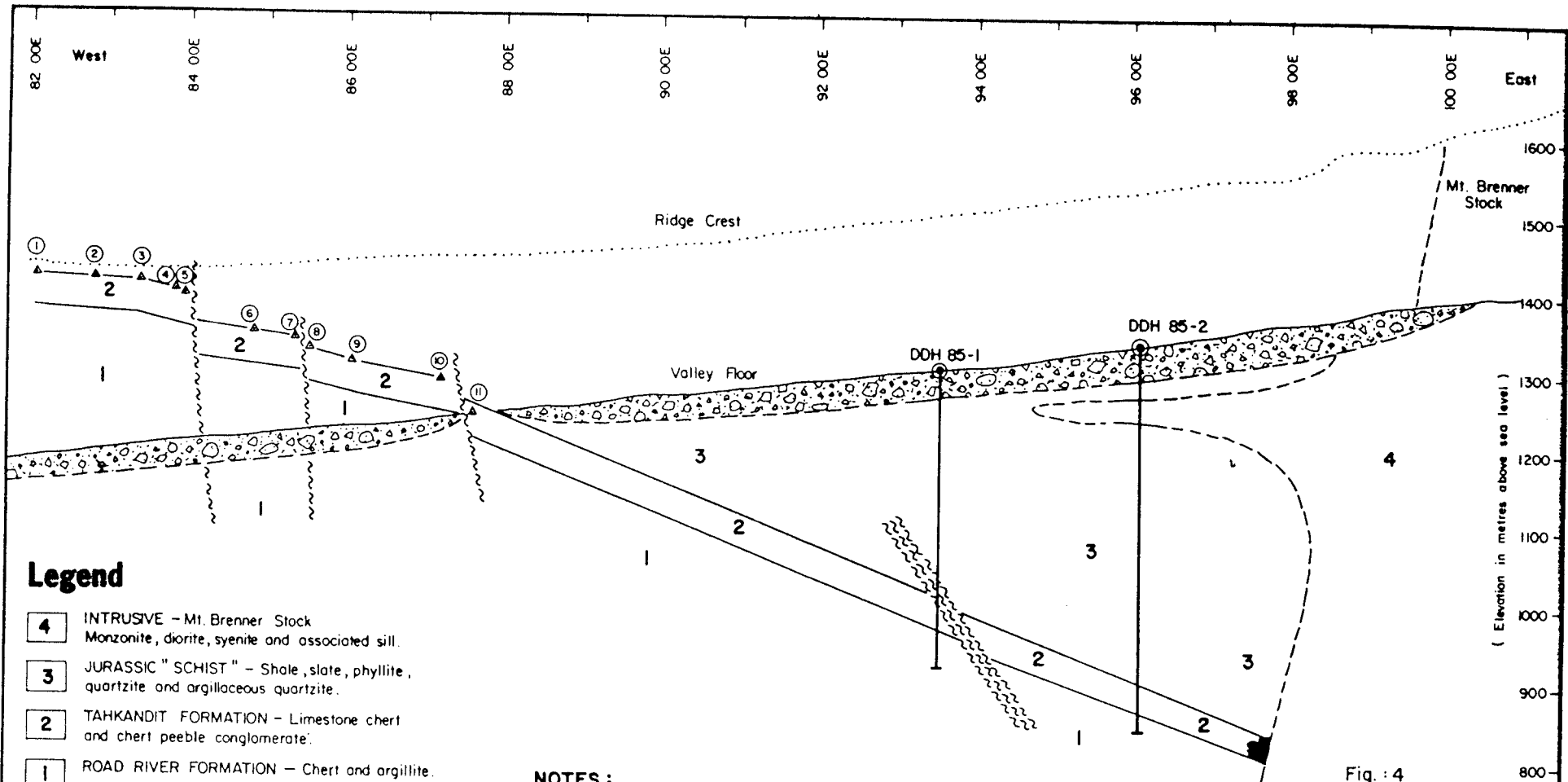
Two types of folds are associated with this period of deformation. The first and most common are broad, open, gently curving S-shaped folds which

have a wavelength of 2 metres or more, but with little amplitude. These folds are likely drag folds related to bedding plane slippage between quartzite and shale beds during early Cretaceous compressional forces.

The second type of folding observed is that of a chevron style fold. This style of folding is visible only on the north ridge towards the western portion of the valley. It consists of closed folds with vertical axial planes striking approximately 30° E of north. The axial planes of these folds is also a plane of weakness which has resulted in some slippage.

The third stage of deformation occurred during the mid-Cretaceous and is associated with emplacement of the Mt. Brenner Stock. Deformational effects represented by tight isoclinal to asymmetrical folding, on a small scale, are seen only in close proximity to the contact with the intrusion. Axial plane of these folds dip east at about 45° and there is also a well developed axial plane cleavage. This type of contact implies that assimilation of the Jurassic "Schist" at the margins of the stock was slight. This style of folding was observed up to 100 metres from the contact with the stock.

Figure 4 summarizes the cross-sectional geology of Mt. Brenner Valley based on surface outcrops, drill hole information and geophysics. Figure 5 is a compilation of the geology of the entire MARN claims.



Legend

- 4 INTRUSIVE - Mt. Brenner Stock
Monzonite, diorite, syenite and associated sill.
- 3 JURASSIC "SCHIST" - Shale, slate, phyllite,
quartzite and argillaceous quartzite.
- 2 TAHKANDIT FORMATION - Limestone chert
and chert pebble conglomerate.
- 1 ROAD RIVER FORMATION - Chert and argillite.
- Overburden
- Potential Skarn zone
- Shear zone or Fault
- ▲ ② Surveyed point / Station number

NOTES :

1. Stations surveyed using compass, altimeter,
hip chain and pacing.
2. Station ⑩ is overlaying chert and cherty argillite.
3. Station ⑪ is partway through upper section of
limestone.
4. Surveyed points are projected from south ridge on
to line 122+00N.
5. South ridge monzonite - Schist contact is shown
above Valley Floor.

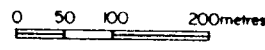


Fig. : 4

REVISED	Mt. Brenner Valley (MARN Claims)		
	Cross Section Line 122 00N		
PROJECT No	SURVEY BY	DATE	
N.T.S. 16877/10	SJM	FEB 86	
DWG No	DRAWN BY	SCALE	
	AI	1: 5 000	
NORANDA EXPLORATION			
OFFICE: Whitehorse			

MARN 11125

20.

2-4: METAMORPHISM

Two stages of metamorphism are apparent in the Mt. Brenner Valley. An earlier phase of dynamic metamorphism is visible throughout the entire Jurassic "Schist" and is recognized by the presence of slates, slaty cleavage and the development of a very fine-grained phyllite, composed mainly of chlorite. This early stage of metamorphism is related to early Cretaceous compressional forces which resulted in thrust faulting elsewhere.

The second, later stage of metamorphism, was of a thermal nature and is associated with the intrusion of the Mt. Brenner Stock and its associated dykes in the mid-Cretaceous. The metamorphic effects of the intrusion can be recognized by the presence of a thermal aureole extending up to 250 metres from the "schist"-monzonite contact. The thermal aureole is characterized mainly by the presence of bladed prismatic crystals of fibrolitic sillimanite. These crystals range from less than 1 mm in length to 4 mm and are only observed in beds with an extremely high argillite content. In the more quartzite rich beds sillimanite is absent, however fine-grained, reddish brown biotite is often present.

As the intrusion is approached, sillimanite crystals in the argillaceous beds become coarser grained. Immediately adjacent to the intrusive there is a highly silicified hornfelsed contact. A large part of the silicification is likely due to recrystallization of the extremely quartz rich beds which make contact with the intrusive at the surface.

Thermal effects of dykes cutting the Jurassic "Schist" are essentially

the same as that of the intrusion except they occur on a much smaller scale. Where dykes cut the limestone, the effects appear to be relatively minor. In outcrop, only Unit 4c, the Syenite-Monzonite dyke, was seen to cut the limestone for any significant distance. The metamorphic effects appear to be limited to minor recrystallization and there was no skarn development at the contact. On the north ridge where Unit 4b, the Biotite Diorite, cuts the limestone, gossan is associated with minor recrystallization at the contact and again no skarn minerals were observed. This relationship is also observed in both drill holes where dykes cut the limestone.

CHAPTER THREE: GEOPHYSICS - C.S.A.M.T. SURVEY

3-1: GEOPHYSICS - C.S.A.M.T. SURVEY

During the period August 19 to 31, 1985 a Phoenix Geophysics crew completed 5 lines of C.S.A.M.T. surveying, totalling 4.85 km. Three lines 120+00N, 122+00N and 124+00N were completed initially. Lines 121+00N and 123+00N were then done in order to give greater detail and to verify initial results.

C.S.A.M.T. or Controlled Source Audio Magneto-Tellurics is a relatively new method of geophysical surveying involving real time measurements of electric and magnetic fields from a remote electromagnetic source. Readings are taken for 16 frequencies ranging from 8192Hz down to 0.25 Hz. Depth penetration with the C.S.A.M.T. system is a function of frequency and earth resistivity. It was hoped that the lower frequencies of the system would provide increased depth detection through the conductive overburden and the locally graphitic Jurassic "Schist".

3-2: C.S.A.M.T. - INTERPRETATION

When dealing with the survey data certain factors must be kept in mind. There is no linear depth relationship between apparent resistivity values for the same frequency at different stations. Each resistivity reading is

an average value over a 50 metre distance corresponding to the receiver dipole length. A change in apparent resistivity does not necessarily correspond to a change in rock type.

The following is a line by line correlation of the C.S.A.M.T. data with the observed outcrop and drill hole geology in the Mt. Brenner Valley area. In certain areas this appears to be a contradiction between the observed geology and the measured apparent resistivities. Keeping the above factors in mind, many of these discrepancies can be researched to give a more complete picture of the subsurface geology.

Bradish (1985) divided the apparent resistivities into three gross resistivity units (see Appendix B). Unit A, a high resistivity package greater than 1,000 ohm-metres, related to the intrusive. Unit B, an intermediate package between 100 and 1,000 ohm-metres, called the transition unit. Unit C, characterized by low resistivities of less than 1 ohm-metre to 100 ohm-metres, attributed to conductive shales. Geological mapping indicates the relationship between resistivity units and rock units is not as simplified as this. Rocks of the same unit are not strictly confined to these resistivity boundaries and therefore overlap.

L-12,400 - This line is located at the base of the north ridge slope. Mapping based solely on apparent resistivities places the intrusive contact much farther to the west than surface geology would indicate. Geological mapping places the contact at L-127+00N, 96+50E on the north ridge and approximately 98+75E on L-124+00. Resistivity mapping places the contact at 93+25E on the same line. This point now appears to correspond to the

westerly edge of the sill intersected in DDH-M-85-2. This is also where the dyke observed on the north ridge would make contact with the sill at depth below a layer of talus and overburden at the base of the slope. This would imply that some of the low R values observed beneath the sill are not erroneous results but correspond to more conductive Jurassic "Schist" beneath.

L-12,300N - Not much can be said about this line as there is very little control available. The line is closer to the central part of the valley and bedrock is likely under 30-40 metres of overburden. Much of the data below 32 Hz appears to be erroneous.

L-12,200N - This line forms the central part of the valley and is also the line drilling was conducted on. Overburden in the area of the drill holes ranged from 30-45 metres in thickness. The monzonite-"schist" contact inferred at 96+00E by resistivity values again appears to be much farther west than is actually the case. The contact has been extrapolated geologically to approximately 98+75E at the surface. The sill which was interpreted between 128 Hz and 16 Hz was intersected in DDH-M-85-2 from 66.78 metres to 93.2 metres. Six frequencies read below the sill however never penetrated deep enough to pick up the limestone-chert boundary which would be expected to have a significantly higher resistivity. The limestone unit does not appear anywhere on this profile. It is likely that the conductive Jurassic "Schist" unit is preventing depth penetration of all frequencies.

L-12,100N - Again the resistivity map shows the contact of the

intrusive too far to the west. The high resistivity contact observed is likely the western edge of the subsurface sill and the main body of the intrusive lies farther east of the profile itself. Again there is no indication of the limestone to the west, up dip, where it is closer to the surface.

L-12,000N - This line has the greatest amount of surface information with which to correlate with as much of the line east of 94+00E is over outcrops of the Jurassic "Schist" unit. The most easterly outcrop of this unit is at 99+50E where the unit is hornfelsed and silicified to a great degree. There are two possible explanations as to why Jurassic "Schist" crops out in an area where resistivity values indicate intrusive. The first is that Jurassic "Schist" is represented by the relatively conductive layer at the two highest frequencies with values of 25 ohm-metres to 1,800 ohm-metres. This would mean the underlying high resistivity layer is actually the main intrusive which extends west under the Jurassic "Schist" at a shallow depth. Unfortunately there is no surface expression of this relationship. This leads us to a second possibility. That is the low resistivity layer seen in the upper two frequencies is a surface effect resulting from the thin layer of talus and overburden covering parts of the line. The high apparent resistivity of the underlying Jurassic "Schist" is a result of two factors. The units which make contact with the intrusive are dominantly quartzites with lesser argillaceous content. The intense heat of the intrusion has resulted in a high degree of silicification and welding of these quartzite beds. The more argillaceous beds in this area

have been thermally metamorphosed to somewhere between a slate and a fine-grained chlorite phyllite. These factors could account for an increase in the apparent resistivities of the "schist" unit in the area of the intrusion corresponding to the transition unit.

It should be noted that the dyke which crops out on the south ridge does not extend across the valley to the north ridge, as previously mapped. This is confined by the lack of a high resistivity zone on L-12,000N in the western portion as this is the location where the presumed dyke would be expected to cross the profile.

See Appendix B for C.S.A.M.T. profiles as well as the geophysics report of Bradish, 1985.

3-3: RESISTIVITY INVERSIONS AND DEPTHS OF DETECTION

The following section will deal with resistivity inversions and their application to the MARN C.S.A.M.T. survey as well as the depth of detection of the C.S.A.M.T. survey.

The resistivity inversions were supplied by Mike Cormier of Phoenix Geophysics (pers. comm.). C.S.A.M.T. inversions work best with flat lying units of homogenous resistance as they give a one dimensional layered profile. Problems arise when the one dimensional profile is applied to a three dimensional situation such as exists here. Figures 6 and 7 represent inversions for stations closest to DDH-M-85-1 and DDH-M-85-2 respectively.

For DDH-M-85-1 the inversion shows fairly good correlation with drill

hole logs. A sharp contrast is shown between overburden and the erosional surface of the bedrock "schist". The schist maintains a fairly consistent resistivity of 10-20 ohm-metres to a depth of 364 metres. At this point a sharp increase in Pa occurs. This point is assumed to be the contact between the "schist" and the limestone, which actually occurs at approximately 300 metres giving a 64 metre discrepancy between the inversion depth and the actual depth of contact. Nevertheless the profile gives a realistic depth of detection of 360 metres or greater and has a shape similar to what would be expected.

For DDH-M-85-2 two inversion profiles were done, one on either side of the drill hole, see Figure 7. For the most part correlation of the inversion to the geology of the hole is poor to non-existent. The only correlation observed is at 95+75E where the depth to bedrock is predicted within 9 metres. The rest of the data does not correlate and based on geology gives an unrealistic depth of detection of 2,900 metres or greater while implying the "schist", sill, limestone and chert all have the same Pa of 7,000 to 10,000 ohm-metres without differentiating between them. Clearly the inversion data has a limited degree of reliability and should be treated with caution in future surveys.

The effect of a conductive layer on depth detection can be seen on the western portion of L-12,000N. Outcrop and drill hole data clearly show the limestone horizon dips east below all 5 C.S.A.M.T. lines. However, on no line does the higher resistivity limestone appear on a profile. At L-12,000N, 9,000E the nearest outcrop of limestone is 150 metres to the west.

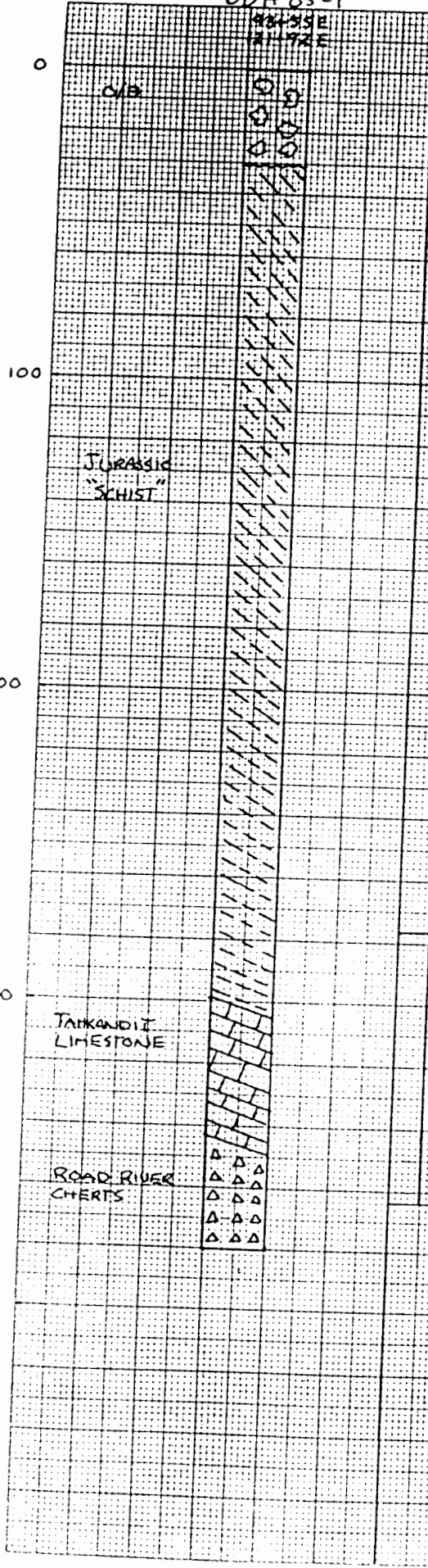
DDH 85-1

0 20 40 60 80 100

OHM-METERS

FIGURE 6

0
100
200
300
400



CSAMT APPARENT RESISTIVITY INVERSIONS

LAYER	ρ_a	THICKNESS	DEPTH
1	60	32	32
2	2	17	49
3	20	228	277
4	10	87	364
5	350	?	?

350 OHM-METERS

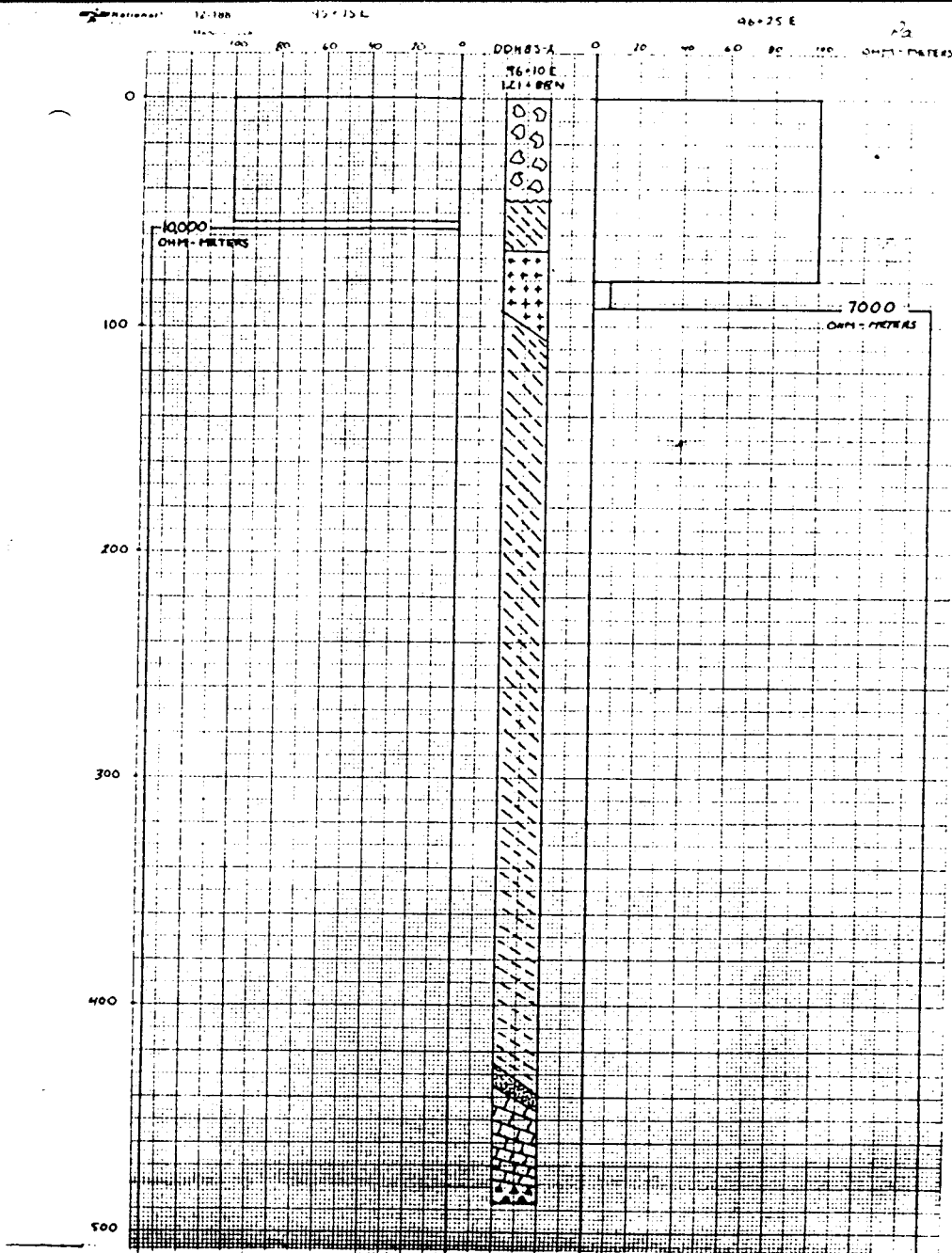


FIGURE 7

CSMT APPARENT RESISTIVITY INVERSION
9505E

LAYER	ρ_a	THICKNESS(m)	DEPTH(m)	LAYER	ρ_a	THICKNESS(m)	DEPTH(m)
1	100	54	54	1	100	80	80
2	5	3	57	2	8	17	92
3	10000	2422	2479	3	7000	2000	2092
4	15	403	2912	4	50	320	2412
5	1000	?	?	5	775	?	?

Based on an apparent dip of 22° , the limestone should be at a depth of 60 metres below the surface. If the unit dips at 10° as it does in the closest outcrop to L-12,000, then the depth to the top of the unit is 26 metres. Using this information it is apparent the depth of detection over certain areas of the Jurassic "Schist" is less than 60 metres and may be as shallow as 25 metres.

The more likely scenario to the problem above is that the C.S.A.M.T. survey does not have the capabilities to decipher the relatively small widths of the individual sill and limestone units and in fact is seeing in the order of 10 km of profile.

CHAPTER FOUR: DIAMOND DRILLING

On September 10, 1985 a Longyear Super 38 drill was mobilized to the MARN-Mt. Brenner valley. Drilling was undertaken in order to test 2 C.S.A.M.T. resistivity anomalies for the presence of mineralized skarn bodies associated with the Brenner Stock-Tahkandit limestone contact. The limestone was intersected in both drill holes, however there was no indication of any skarnification even at the contacts of dykes which cut the unit. In thin section only minor recrystallization of calcite was observed. Furthermore, the effects of the intrusion were no more noticeable in DDH-M-85-2 than they were in DDH-M-85-1 which was drilled 250 metres farther away from the contact.

4-1: DDH-M-85-1

DDH-M-85-1 was collared at L 121+92N, 93+55E on September 12, 1985 and completed on September 23rd at a total depth of 380.43 metres. The hole was drilled in order to test a resistivity low estimated to be at approximately 125 metres depth. Numerous problems were encountered due to deeper than anticipated overburden and a series of over-pressured aquifers located at depth. NW casing was sunk to a depth of 13.7 metres at which point casing was terminated due to sanding in around the casing making the hole too tight to put the remaining 5 foot and 10 foot sections down. As a result of this,

NQ size drilling proceeded ahead of the casing. At 31.3 metres, Jurassic "Schist" bedrock was hit. At a depth of 36.6 metres the hole started making a significant amount of water. At 71.7 metres the hole was reduced to BQ size rod. This was necessary because of the intense vibration of the NQ rods in cavities, resulting from water pressure washing away fine sands in the uncased sections of overburden around the NQ rods. At 82.4 metres the core tube, with core, and the overshot were propelled out of the hole by an overpressured aquifer horizon. Moderate to high water pressure continued for the entire length of the hole. At 314.2 metres the core tube with core and the overshot were again forced out of the hole, at which point the swivel became jammed in the rollers at the top of the mast. Water pressure at the point was still great enough to spray above the mast. The overpressured aquifers are likely related to surface waters percolating down through joints and cleavages within the Jurassic "Schist". The greatest pressure was observed close to the fault which occurs from 272 metres to 296 metres. The water is likely being squeezed through associated shear zones. The water had a slight sulphur smell which is probably related to the breakdown of pyrite and pyrrhotite in the Jurassic "Schist".

Detailed logs for DDH-M-85-1 are located in Appendix A. Figure 8 depicts a graphic log displaying the various lithologies encountered. Jurassic "Schist" was encountered directly below overburden from 31.10 to 298.40 metres and consisted of a series of argillites and slates, which were often laminated, and very fine to coarse-grained quartzites. From 86.35 metres to 106.50 metres there was a shale chip conglomerate. This appears

to be related to soft intraformational deformation which is common throughout much of the core and is often overprinted by a later structural shearing which affected the entire unit. About 50% of the unit is composed of quartzite, argillaceous quartzite and greywacke of varying degrees. Dips of these beds are irregular, having large changes of up to 30° over a few metres. Numerous gradational bedded quartzites and other sedimentary features such as rip up clasts indicate all beds are right way up.

The finely disseminated sulphide which occurs throughout much of the core is dominantly pyrrhotite with lesser amounts of pyrite. This explains the brown, often gossanous, weathered surface of the Jurassic "Schist" as seen in outcrops.

The "schist" unit is cut by numerous small and large scale shear zones at various angles ranging from 5° to 70° to the core axis. The most common dip direction appears to be east, however it is often difficult to tell due to broken sections. These numerous shear zones clearly display the incompetency of the unit. From 272.4 metres to 296.6 metres, a strong shear zone displaying good cataclastic textures, especially around chert clasts, was intersected. Textures and foliation made an angle of 30° to 55° with the core axis. The shear zone was characterized by calcite, healed breccias, slickensides, clay, mylonite, minor silicification associated with chert, as well as disseminated and veinlet pyrite. The shear zone cuts across the "schist" limestone contact obscuring an original depositional features.

The upper contact of the Tahkandit was taken at 298.4 metres using the

limey chert pebble conglomerate, seen in outcrops, for a marker horizon. The Tahkandit Formation generally consists of limestone chert pebble conglomerates and chert beds. Certain sections have an abundance of fossils, mainly crinoid stems and brachiopods. Overall very similar to what is seen in outcrops. The limestone core was cut by approximately 10 sheared or breccia zones many of which were calcite sealed. These breccia zones are likely related to the major shear zone which cuts the limestone and forms the upper contact of the Tahkandit.

Dykes cutting the core were of a diorite composition. In all, 4 dykes cut the core. Dykes often displayed chilled margins, however showed little effect on the country rock. Only minor recrystallization of calcite was observed where dykes cut the limestone. Core widths of the dykes ranged from 2 metres to 5 metres.

4-2: DDH-M-85-2

DDH-M-85-2 was collared on September 26, 1985 at L-121+88N and 96+10E. The hole was completed on October 9, 1985 at a total depth of 487.4 metres. The purpose of the hole was to test 2 C.S.A.M.T. resistivity lows which were separated by a zone of high resistivity presumed to be a sill or tongue projecting out from the main intrusion.

Drilling was initiated with NQ rod and NW casing. At 29.3 metres the casing became sanded in. Drilling ahead continued with the NQ. At 44.5 metres, just above bedrock, loss of circulation resulted in the NQ rod

becoming stuck. At this point in order to save the hole, a 400 lb. jam hammer was mobilized to the site. Repeated jamming succeeded in freeing the NQ but not the NW casing. NQ drilling continued to 119.0 metres where problems with constant loss of circulation and sanding in of the uncased overburden necessitated that drilling be reduced to BQ size rod. Drilling then continued to the total depth of the hole with only minor problems.

In DDH-M-85-2 Jurassic "Schist" was encountered from 44.81 metres to 435.7 metres. The lithologies were essentially the same as those encountered in DDH-M-85-1 except for some minor differences in the upper and lower parts of the sections. At 46 metres the axial plane of a small scale isoclinal fold, dipping 45°, was intersected. It is difficult to tell if this was a result of soft sediment deformation or later structural deformation of the unit. Shear foliation on either side of the axial plane would indicate structural deformation. Below this point sedimentary structures, which are numerous, indicate all beds are right way up. A biotite quartzite, not observed in DDH-M-85-1, was encountered from 50.8 metres to 55.5 metres. This horizon displayed well formed cross-bedding which indicated beds are right way up.

The sill seen in C.S.A.M.T. profiles was encountered from 66.8 metres to 93.2 metres. This is far shallower than the predicted 200 metre (Bradish, 1985) depth of intersection. Some actinolite, quartz, calcite and pyrrhotite pods were observed along fractures within the sill near its contact. These are likely the result of retrograde alteration of mafics in the diorite. Plagioclase phenocrysts displayed flow orientation giving the

sill the same general appearance as the main intrusion. Fibrolitic sillimanite was well grown in the slates surrounding the sill. In general, sillimanite crystals were more abundant and well grown in this hole.

From 396.6 to 424.4 metres, a sequence of interbedded limestone and cherty argillite or slate was intersected. This sequence was not observed in the first hole as it was likely obscured by the fault, however a similar sequence was observed on the south ridge just above the Tahkandit limestone. The limestone beds have a true thickness of up to 30 cm and were light grey to white in colour, argillaceous and micritic. Below this sequence, from 424.4 metres to 435.7 metres, was a fairly massive unit of fine-grained, buff coloured quartzite. Again this sequence was not observed in the first hole due to the fault, but was observed on the north ridge just above the Tahkandit Formation. The Tahkandit limestone was intersected from 435.7 metres to 476.2 metres. Since the unit dips at the same orientation, about 20° in both holes, the 40.5 metre intersection in DDH-M-85-2 as opposed to the 45.1 metre intersection in DDH-M-85-1 indicates the limestone thins to the east. This assumes 0° deviation of the drill stem.

Eleven dykes cut DDH-M-85-2. This is an increase of 7 over DDH-M-85-1 indicating the closer proximity to the intrusion. Where dykes cut the limestone, again there was no skarnification, however there was recrystallization of the limestone and calcite veining along some of the dyke limestone contacts.

The Tahkandit-Road River Formation contact is an angular unconformity. Although it was indicated elsewhere on property, this is the only location

it was observed. Drilling was terminated at a depth of 487.4 metres in cherts of the Road River Formation. Figure 9 represents a graphic log of DDH-M-85-2.

The Devonian "Black Clastic Unit" (Biczok, 1981) mapped in the northern MARN claims was not observed anywhere in the Mt. Brenner Valley. At all locations the Tahkandit Formation appeared to overlie the Road River Formation black cherts and argillites.

CHAPTER FIVE: MINERALIZATION

No skarn mineralization was observed in either drill hole or in outcrop. The only sulphides observed were arsenopyrite, pyrite and pyrrhotite occurring in minor amounts.

Arsenopyrite occurs with quartz as late stage porphyry veins associated with dykes extending from the main intrusion. These veins are narrow, generally 1 cm to 3 cm wide, and are very discontinuous. Furthermore, they were only seen on the south ridge occurring with the diorite. Only minor gold values (860 ppb) occur with these veins. Samples of arsenopyrite veins collected elsewhere on the MARN during previous work programs gave similar results.

Pyrite and pyrrhotite generally occur together as disseminations, nodules and fracture fillings within the Jurassic "Schist" and the Tahkandit Formation. Geochemical results indicate there is a minor amount of arsenic associated with pyrite and pyrrhotite.

Pyrrhotite is generally much more abundant than pyrite in the Jurassic "Schist". Due to the fine-grained nature of their occurrence, the exact relationship between them is difficult to tell. However due to their absence in more quartzite rich beds, it is likely their occurrence is related to the original aerobic environment present during deposition. This is also indicated by the local occurrence of graphite.

Both pyrite and pyrrhotite have been remobilized into joints and

fractures where they form small veinlets and coatings in the "schist" and limestone. In DDH-M-85-2 a 1 mm wide sulphide veinlet contained 880 ppb Au, 1,080 ppm Zn, 178 ppm Pb and 402 ppm As. These were the highest values recorded in both drill holes (see Appendix C). Pyrrhotite also occurred with actinolite, calcite and quartz in pods of retrograde alteration within the upper part of the sill in DDH-M-85-2. This showed only slightly anomalous gold values of 100 ppb Au.

CHAPTER SIX: GEOCHEMISTRY

All samples were run for Cu, Ag, Au, As, Zn, Pb, W and Bi. These are the metals enriched in the Mini-Grid skarn on the northern MARN claims. Two samples of barren Tahkandit limestone were analyzed in order to provide background values with which to compare drill core analysis with. Both samples were taken from outcrops of the limestone on the north ridge and give similar results.

	Cu	Ag	Zn	Pb	W	Au	Bi	As
	(All values in ppm except Au in ppb)							

#72377	4	0.2	28	4	1	10	38	28
#72378	6	0.2	22	4	1	10	56	30

Elevated values were observed in several samples, however very few significant anomalies are present. Furthermore, there are even fewer coincident multi-element anomalies.

High Cu, Ag and W in sample 93512 are associated with pyrrhotite chert nodules. Elevated Zn, Pb, Au and As values in sample 93529 are associated with 2 thin fracture filling sulphide veinlets less than 1 mm thick.

The only strong correlation is between anomalous Au and As values. Higher than normal Au values are always associated with anomalous As values. However anomalous As values do not always correlate with high Au values.

Other anomalies appear to be erratic and are likely no more than elevated background values. Some appear to be a result of local increases in pyrrhotite and pyrite, however this is not always the case.

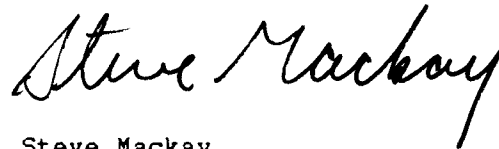
CHAPTER SEVEN: CONCLUSIONS AND RECOMMENDATIONS

The 1985 drill program failed to locate any skarn bodies in the Mt. Brenner Valley. Although the Tahkandit limestone was intersected in both drill holes, it appeared to be relatively unaltered. Geological mapping places the contact 150 metres to 200 metres east of DDH-M-85-2 at depth. The unaltered nature of the rocks and a review of the geophysical data lends support to this location. To drill this location would require a hole approximately 600 metres deep.

Precious metal skarn development on the MARN requires a specific geological environment involving late stage hydrothermal circulation of metallic bearing solutions through skarnified limestone entrapped by dioritic sills. The highly argillaceous, cherty and generally impermeable nature of the Tahkandit limestone make skarn development elsewhere erratic and discontinuous. This, combined with the economic considerations of drilling a hole 600 metres deep and the inability of present geophysical methods to accurately delineate the geological environment necessary for this type of skarn development, make further work in the Mt. Brenner Valley and along much of the contact impractical. Therefore no further work is recommended for this area even though the potential for a skarn body still exists.

The mineral gully zone still holds some potential though as high grade float assaying up to 0.8 opt Au, found during previous exploration programs, has yet to be traced to a source. With sufficiently high metal prices, further work in the form of diamond drilling would be warranted in this area.

Respectfully submitted,

A handwritten signature in cursive script that reads "Steve Mackay". The signature is written in black ink and is positioned to the right of the typed name.

Steve Mackay
Geologist

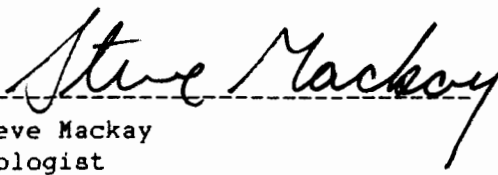
REFERENCES

- Biczok, J.L., 1979. Preliminary Report, MARN 1-8 Claims. Mattagami Lake Exploration Ltd. Assessment Report.
- Biczok, J.L., 1980. Exploration Report No. 2, MARN 1-62 Claims. Mattagami Lake Exploration Ltd. Assessment Report.
- Biczok, J.L. and Kemp, R., 1980. Exploration Report No. 3, Geology, Geophysics and Drilling; MARN 1-108 Claims. Mattagami Lake Exploration Ltd. Assessment Report.
- Biczok, J.L., 1981. Exploration Report No. 4, Geology and Drilling, 1981, MARN 1-108 Claims. Mattagami Lake Exploration Ltd. Assessment Report.
- Biczok, J.L., 1982. Exploration Report No. 5, MARN 1-108 Claims, 1982. Noranda Exploration Company, Limited Assessment Report.
- Brown, I.J., 1985. Gold-Bismuth-Copper Skarn Mineralization in the Marn Skarn, Yukon. M.Sc. Thesis, University of Alberta.
- Green, L.H. and Roddick, J.A., 1961. Geology, Dawson, Yukon Territory. G.S.C. Map 1284A to accompany G.S.C. Memoir 364 by L.H. Green.
- Tempelman-Kluit, D.J., 1969. Geology, Tombstone-Upper Klondike River, Yukon Territory. G.S.C. Map 1248A to accompany G.S.C. Bulletin 180.
- Yamashita, M., 1984. C.S.A.M.T. Controlled Source Audio Magneto-tellurics. Phoenix Geophysics Report.

STATEMENT OF QUALIFICATIONS

I, Steve Mackay, of the City of Edmonton, Alberta, do hereby
certify:

1. That I was employed as a geologist by Noranda Exploration Company, Limited (No Personal Liability) during the 1984 and 1985 field seasons.
2. That I am a graduate of the University of Alberta, Edmonton, Alberta with a Bachelor of Science Degree, Specialization in Geology.
3. That I am a member of the Canadian Institute of Mining and Metallurgy.
4. That I supervised the work described in this report.



Steve Mackay
Geologist

STATEMENT OF COSTS

PROJECT: MARN Claims

1. C.S.A.M.T. Survey:		
Phoenix	\$15,289.00	
Labour (Norex)	3,000.00	
Air Transport + fuel	6,750.00	
Land Transport	600.00	
Supplies, lodging, etc.	1,500.00	
	-----	\$ 27,139.00
2. Drilling:		
Arctic Diamond Drilling	\$72,000.00	
Labour (Norex)	19,000.00	
Air Transport + fuel	58,000.00	
Land Transport	17,600.00	
Food and lodging	7,500.00	
Supplies, equip. repairs, etc.	12,000.00	
	-----	186,100.00
Report Writing		1,000.00

		\$214,239.00

APPENDIX A

DRILL LOGS DDH-M-85-1 and DDH-M-85-2

APPENDIX B

GEOPHYSICAL REPORT AND C.S.A.M.T. PROFILES

C.S.A.M.T. SURVEY REPORT

Author: Lyndon Bradish
District Geophysicist (Norex)

Date: September 9, 1985

=====

During the period August 19-31 the Phoenix Geophysics CSAMT crew was employed on the Marn project. Five lines of 50 m dipole CSAMT were completed on Lines 120+00N, 121+00N, 123+00N and 124+00N. Several days were lost due to weather and difficulties in finding a suitable transmitter dipole location.

Several geological features were identified as shown on the attached map. Three gross resistivity units were identified within which three zones of interest were detected.

- Unit A:** This is a high resistivity package (typically greater than 1000 ohm-meters) which is believed to be sourced by the intrusive and is so indicated on the map.
- Unit B:** This intermediate resistivity package (typically 100-1000 ohm-meters) appears to be a transition unit between the intrusive and sediments but could also be a lower resistivity portion or margin of the intrusive.
- Unit C:** Low resistivities characterizes this unit which is attributed to the (conductive) shales. Resistivities range between 10 and 100 ohm-meters with localized lows down to less than 1 ohm-meter.

Several anomalous target zones have been identified within the survey area and are as showing on the plan map.

- Zone 1:** This zone is located on the west flank of the transition unit (B) and is detected on all five lines surveyed. The character of the anomaly grades uniformly from a small dimensional tabular zone of limited depth extent (L.12400N/9300E at a target depth of approximately 100 m) to a steeply dipping narrow source at depth at L.12100N/9375E and 12000N/9375E.
- Zone 2:** This target occurs at the interface between the high resistivity intrusive (Unit A) and the intermediate or transition (Unit B). This zone is poorly defined on Lines 12000N and 12100N but is well defined on all remaining lines to the south. This zone extends (?) to depth and appears to be cut at a depth of approximately 200 meters by a possible sill (?) which links the intrusive and transition units (A and B). The data recorded on Line 12000N suggests a significant thickness of this zone however, there is also a change in the signature of the intrusive and transition units (A and B).

Zone 3: This zone was detected on Lines 12400N and 12100N. The signature of this anomaly is very similar to that of 2 above but is of smaller dimension and appears to pinch out in the vicinity of Line 12300N

CSAMT RESULTS - DETAILED DISCUSSION

L.12400N: The intrusive, Unit A is mapped grid east of 9300E-9325E and the data shows the intrusive is buried beneath a low resistivity layer (sediments/shale and/or overburden) and cropping out of the the intrusive would not be expected.

Three zones of interest are noted to occur on this line and define the north ends of zones 1, 2 and 3 as discussed in the previous section.

Zone 1: Located between 9275E and 9325E and at a target depth estimated to be at approximately 100 meters. This zone occurs within the sediments but is in close proximity to the intrusive.

Zone 2: This part of Zone 2 is narrow and is recorded at Station 9575E. This zone appears to extend to depth and the pseudo section shows it to be split or broken at frequency of 32 Hertz.

Zone 3: Located at an interpreted depth of 125 m this zone is located in a depression or trough on the top surface of the intrusive. The zone is located between 9800E and 9875E.

Within the intrusive (i.e. east of 9300E) steep resistivity gradients are observed below 32 Hertz and appear to define low resistivity zones within the intrusive. These "anomalies" are due to the minimum coupling of the magnetic signal with the sensor which in turn is caused by the high resistivity of the intrusive. These features are to be ignored as it is invalid data and unfortunately creates unavoidable "holes" in the data set. This effect is seen in all of the following lines:

L.12300N: This line was completed to provide additional detail data on Zones 2 and 3.

Zone 2: Zone 2 was detected in the vicinity of 9550E - 9650E and is very poorly defined. There is indication that this steeply dipping source extends to depth.

Zone 3: The south end of this zone is well defined as a narrow source at Station 9725E, frequencies 512 and 256 Hz. There does not appear to be any depth extent to this source.

L.12200N: The data record on this line differs somewhat from the data recorded to the north in that the western portion of the intrusive is of a lower resistivity and is herein called the "transition unit". To the north this transition unit is clearly mapped as a high resistivity intrusive. The exact source of this transition unit is unclear as it could be a wide dike which is connected (?) by a sill to the intrusive as seen by the high resistivity layer at 9575E-

9675E, $f=32$ Hz or it could be the edge of the intrusive which is partially cut by the low resistivity source at 9575E-9625E. This particular pattern can be traced to the adjacent lines to the south.

- Zone 1:** This zone is poorly defined but is observed at the west edge of the transition unit (9325E-9375E).
- Zone 2:** This anomaly extends to depth but is cut by a sill (?) which links the intrusive with the transition unit. Target location is 9575E-9625E however, it appears there is a "tail" extending to the east and is seen at frequency 256-512 Hz.
- Zone 3:** No evidence of this zone is recorded on this data set. There is the possibility that Zone 3 has merged with Zone 2 and may be responsible for the "tail" as mentioned above.

L.12100N: This fill-in line further defines Zones 1 and 2. There is exceptional continuity seen from L.12200N. Note that the low resistivity zone at 9725E-9825E, $f=1$ to 0.25 Hz is bad data.

- Zone 1:** A pronounced crust of conductivity is seen to be at the west edge of the transition unit. This vertical zone extends to depth.
- Zone 2:** This zone has identical physical characteristics as on L.12200N but is of lower resistivity.

L.12000N: Significant changes are evident on this data set although the same basic picture as for Lines 12200N and 12100N exist. They are as follows:

- 1) The resistivity of the intrusive has decreased to values typical of the transition unit (B). Note that all resistivity values east of 9775E should be multiplied by 0.36 - an error which will be corrected at a later date.
- 2) The shale unit (A) has somewhat higher resistivities with discreet zones of low resistivity. Target Zone 1 has diminished in size at 9375E/ $f=12$ Hz.
- 3) The assumed sill linking Units B and C is no longer evident however, the large low resistivity package below 9575E-9725E may be limiting the depth penetration of the system.

Zone 1: Somewhat smaller in dimension its response is still evident at 9375E/ $f=12$ Hz.

Zone 2: The resistivity of this zone has decreased significantly and has a wider expression.

A repeat set-up over Zone 2 was carried out to check instrument repeatability. This short section shows good correlation considering the low resistivity environment.

CONCLUSIONS

Three zones of interest have been identified by the CSAMT survey and all warrant additional investigation to determine the sources. Specifically they are:

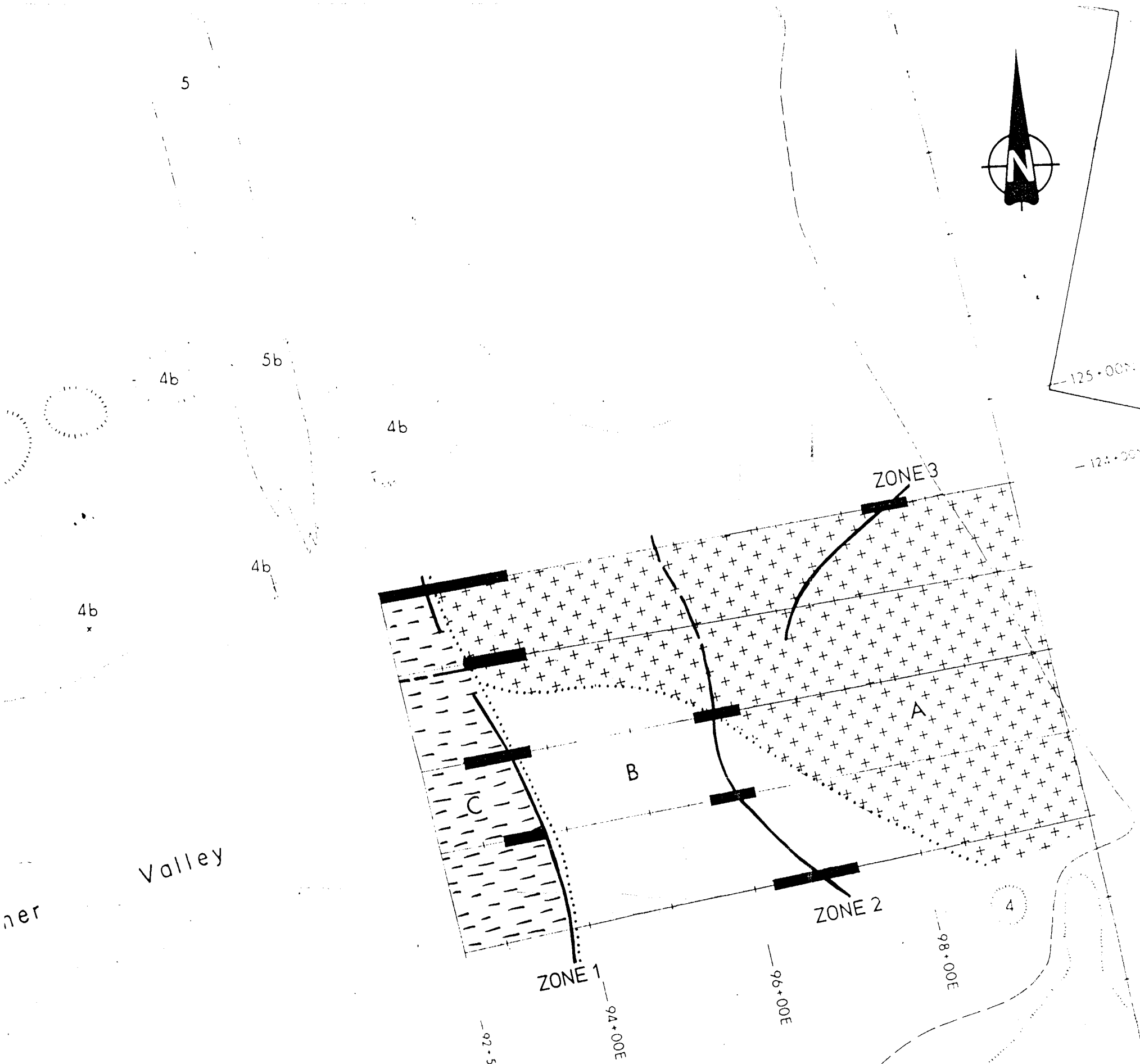
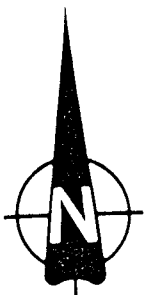
Zone 1: L.12400N/9300E
L.12300N/ not covered by survey
L.12200N/9350E
L.12100N/9375E
L.12000N/9375E

Zone 2: L.12400N/9575E
L.12300N/9600E
L.12200N/9600E
L.12100N/9600E
L.12000N/9675E

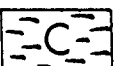
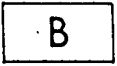
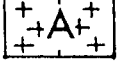
Zone 3: L.12400N/9850E
L.12300N/9725E

All three targets warrant investigation. Zone 1 should be drilled between Lines 12100N-12400N, Zone 2 between 12100N-12200N and Zone 3 on Line 12400N. Drill locations may be dictated by topography.

LB/ie



LEGEND

-  Low Resistivity (Shales)
-  Intermediate Resistivity (Intrusive or Transition Zone)
-  High Resistivity (Intrusive)

 Resistivity Anomaly Width and Assumed Central Axis

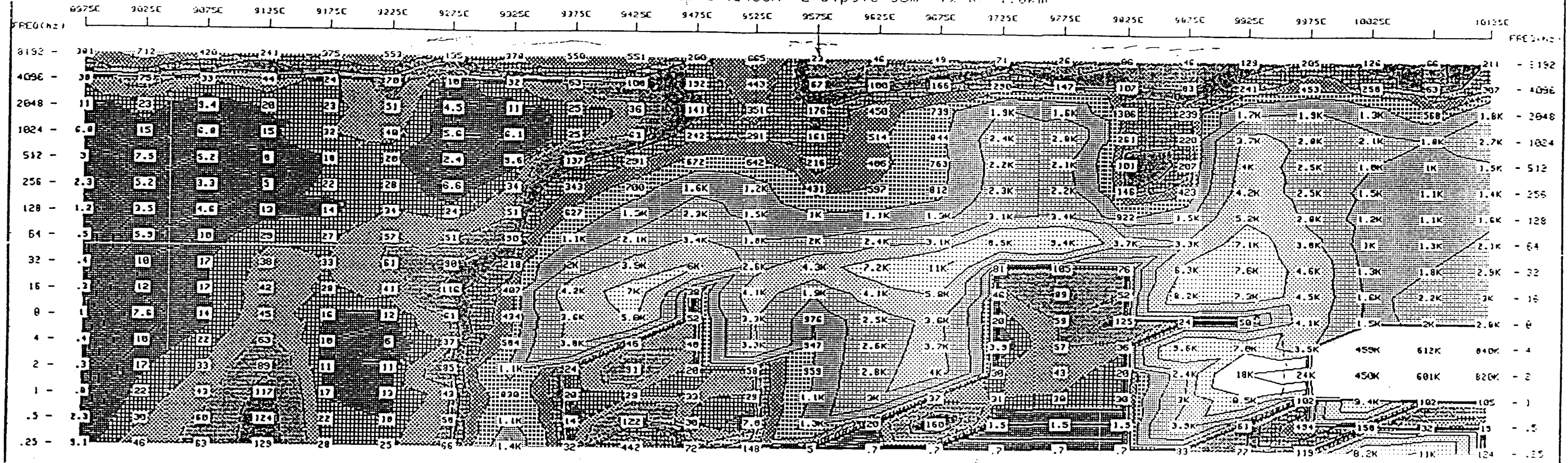
 Resistivity Contacts



MARN C.S.A.M.T. SURVEY

CSAMT APPARENT RESISTIVITY (NEAR-FIELD CORRECTED)

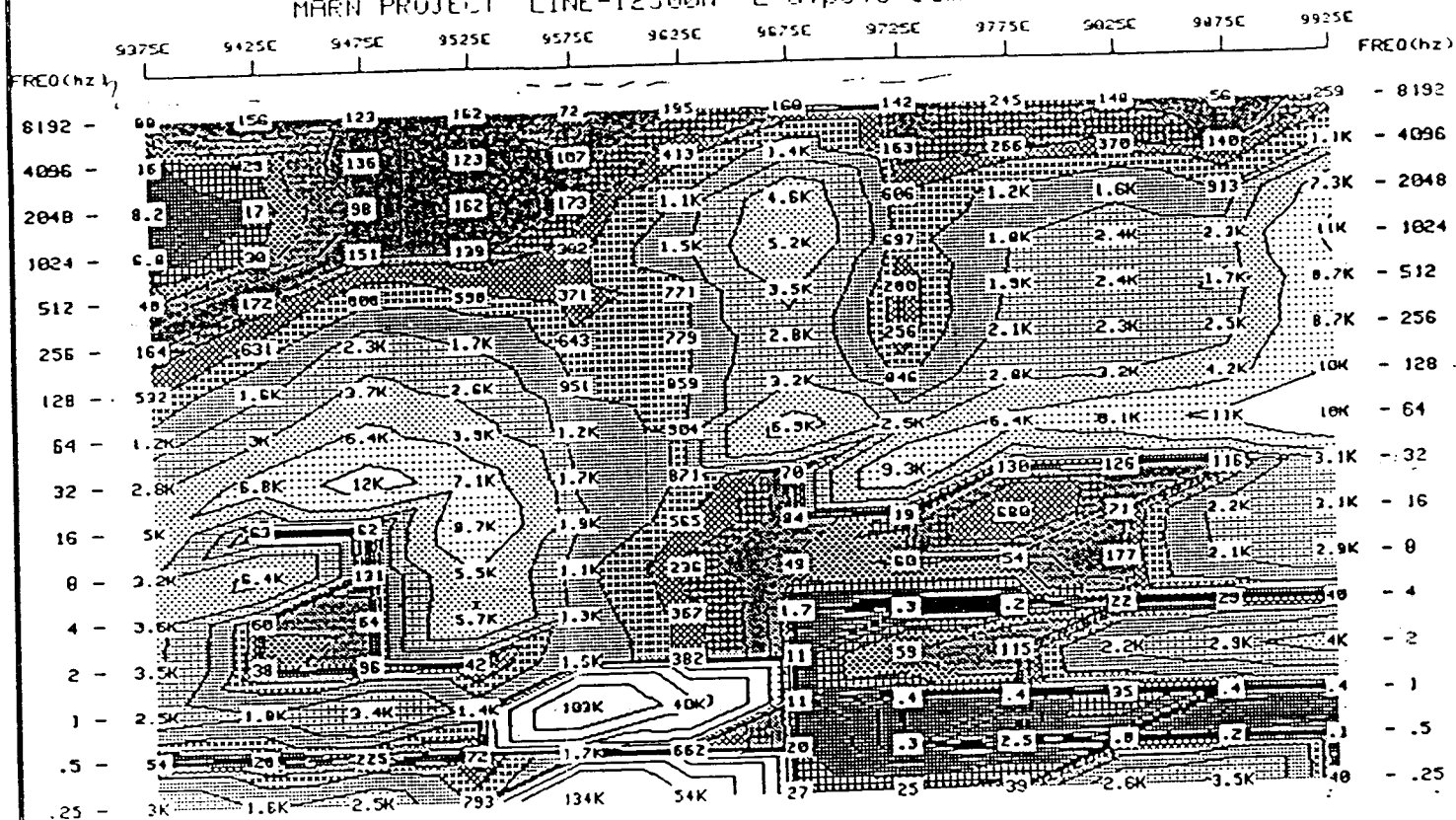
MARN PROJECT LINE-12400N E-dipole=50m Tx-Rx=1.8km



Resistivity in ohm-m : Contour (1.-1.8-3.2-5.6-10.)
 Surveyed by PHOENIX GEOPHYSICS and NORANDA in August 1985

CSAMT APPARENT RESISTIVITY (NEAR-FIELD CORRECTED)

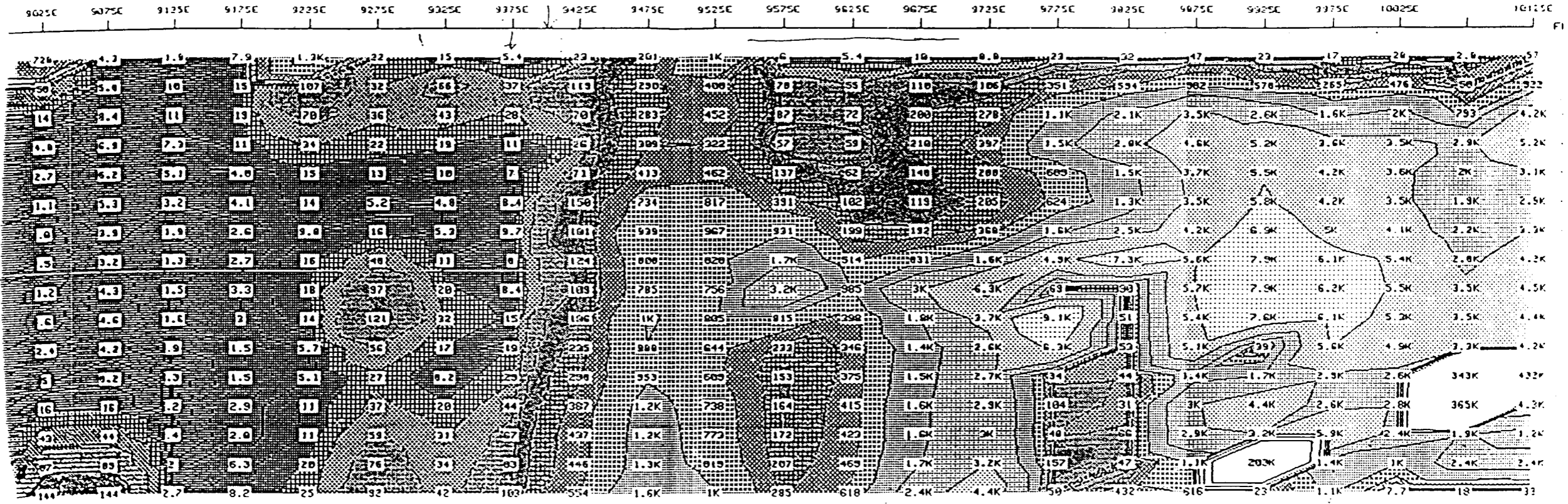
MARN PROJECT LINE-12300N E-dipole=50m Tx-Rx=1.9km



Resistivity in ohm-m : Contour (1.-1.8-3.2-5.6-10.)
 Surveyed by PHOENIX GEOPHYSICS and NORANDA in August 1985.

CSAMT APPARENT RESISTIVITY (NEAR-FIELD CORRECTED)

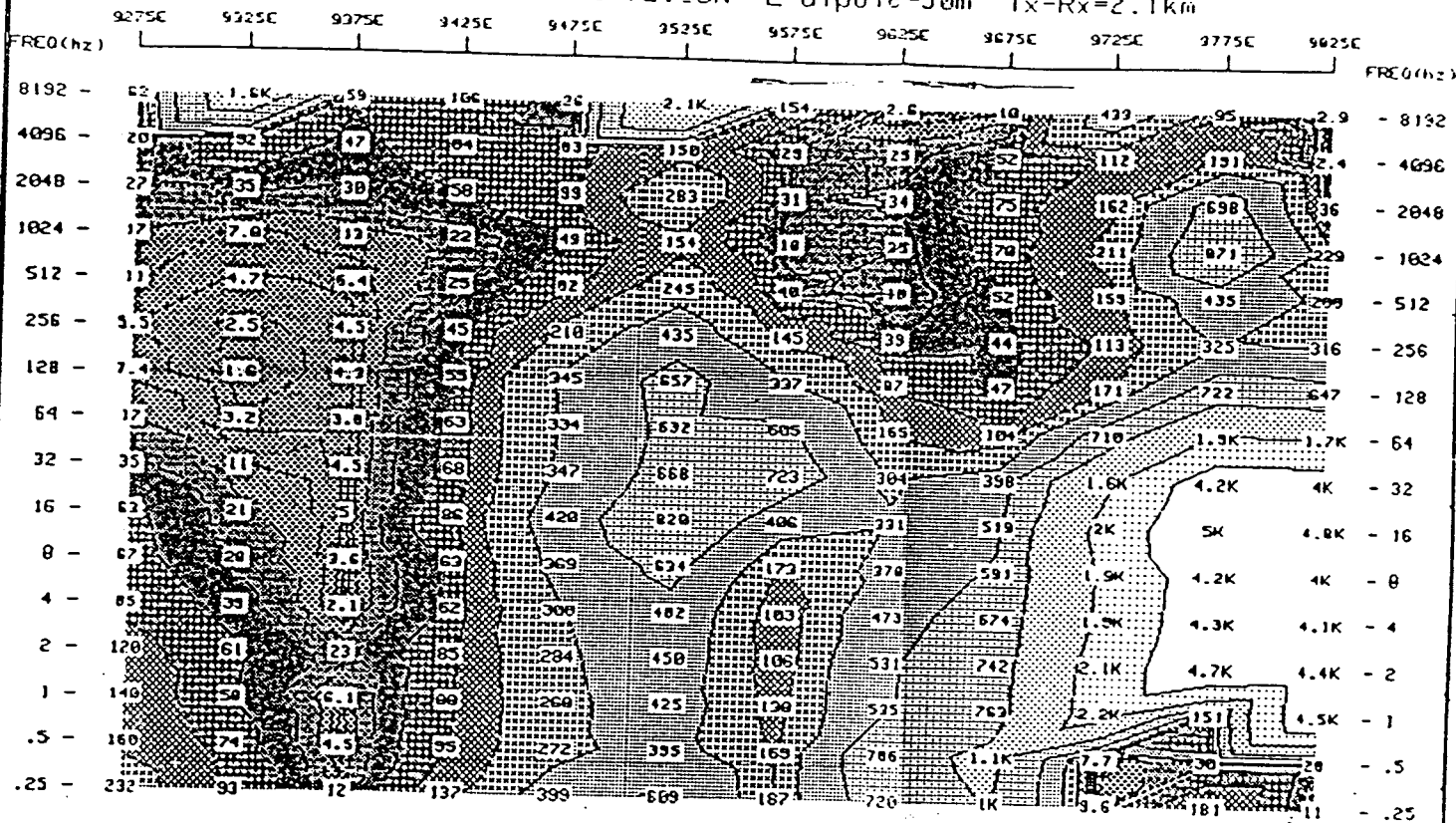
MARN PROJECT LINE-12200N E-dipole=50m Tx-Rx=2.0km



Resistivity in ohm-m : Contour (1.-1.8-3.2-5.6-10.)
 Surveyed by PHOENIX GEOPHYSICS and NORANDA in August 1985.

CSAMT APPARENT RESISTIVITY (NEAR-FIELD CORRECTED)

MARN PROJECT LINE-12100N E-dipole=50m Tx-Rx=2.1km



Resistivity in ohm-m: Contour (1.-1.8-3.2-5.6-10.)
 Surveyed by PHOENIX GEOPHYSICS and NORANDA in August 1985.

50 m

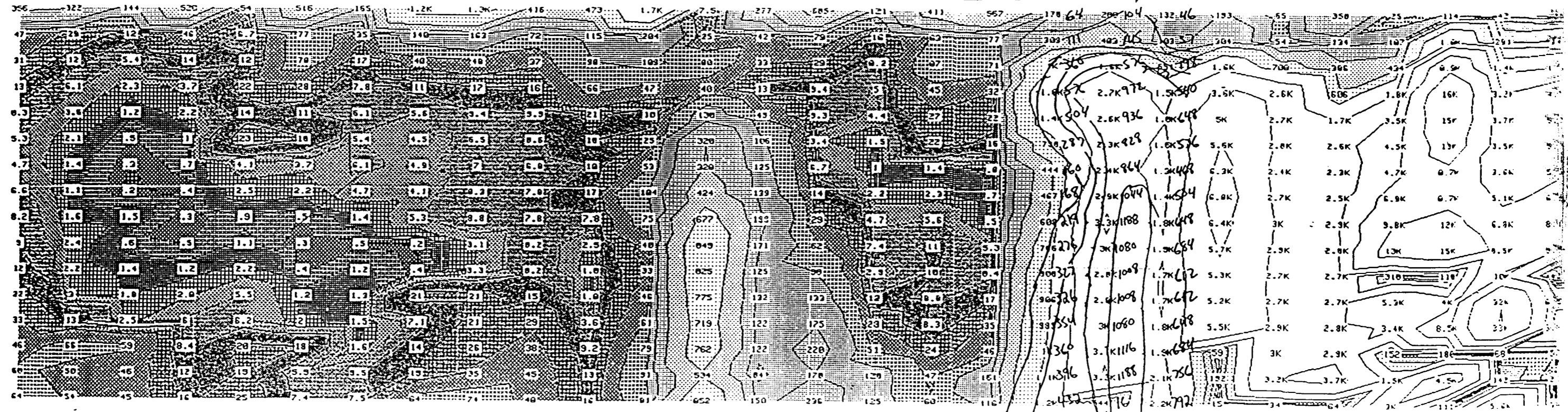
30 m data

CSAMT APPARENT RESISTIVITY (NEAR-FIELD CORRECTED)

manually corrected data

MARN PROJECT LINE-12000N E-dipole=50m Tx-Rx=2.2km

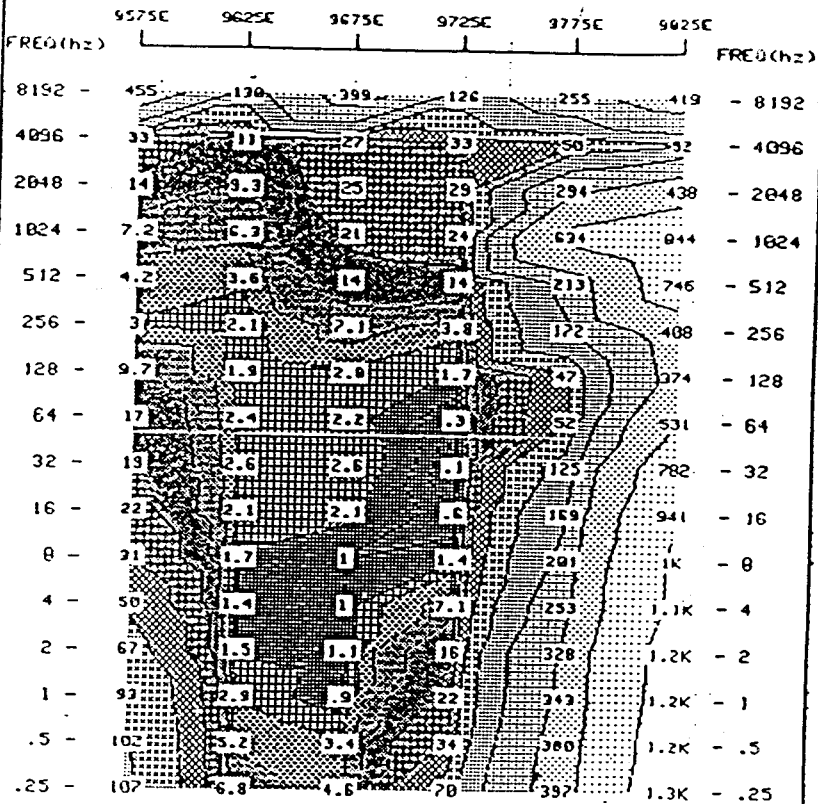
1075E 0925E 0975E 9025E 9075E 9125E 9175E 9225E 9275E 9325E 9375E 9425E 9475E 9525E 9575E 9625E 9675E 9725E 9775E 9825E 9875E 9925E 9975E 10025E 10075E 10125E



Resistivity in ohm-m; Contour (1-1.8-3.2-5.6-10.1
 Surveyed by PHOENIX GEOPHYSICS and IMPRIDA in August 1985.

APPARENT RESISTIVITY (NEAR-FIELD CORRECTION)

MARN PROJECT LINE-12000N



Resistivity in ohm-m : Contour (1.-1.8-3.2-5.6-10.)
 Surveyed by PHOENIX GEOPHYSICS and NORANDA in August 1985.

APPENDIX C

GEOCHEMICAL RESULTS



Legend

- CRETACEOUS**
- 4** Mt. Brenner stock, monzonite, syenite and diorite.
 - 4a** Biotite diorite
 - 4b** Hornblende diorite
 - 4c** Syenite - monzonite
- JURASSIC**
- 3** Jurassic "Schist" - Argillite, slate fine grained phyllite, Quartzite and argillaceous quartzite. Minor limestone and chert.
 - 3a** Black shale to phyllite. Minor quartzite.
 - 3b** Quartzite and argillaceous quartzite.
 - 3c** Interbedded shale and dark argillaceous limestone.
 - 3d** Black chert and argillaceous chert.
- PERMIAN**
- 2** Tahkandit Limestone - Sparitic fossiliferous, argillaceous limestone with chert pebble conglomerate and chert lenses.
- ORDOVICIAN - SILURIAN**
- ROAD RIVER FORMATION —
- 1** Black chert and shale
 - 1a** Black and grey chert
 - 1b** Interbedded black chert and shale
- SILURIAN ?**
- A** Andesite, dark green, amygdaloidal.

Symbols

- Outcrop
- Geological contact (definite, approx.)
- Fault or shear zone
- Bedding (vert., incl., overturned)
- Bedding, may in part be foliation (vert., incl.)
- Foliation (vert., incl.)
- Dominant Cleavage (vert., incl.)
- Fold (arrow points down plunge, bar shows dip of axial plane)
- (F)** **(Q)** **(S.C.)** Fossil locality / Quartz / Sub-crop

091814

Map 1

REVISED	Mt. Brenner Valley (MARN Claims)	
	Geology	
PROJ. No.	SURVEY BY: SJM	DATE: FEB 86
N.T.S. 116 B 7/10	DRAWN BY: AI	SCALE: 1:5000
DWG. No.	NORANDA EXPLORATION	
	Whitehorse	
	OFFICE:	

