MAR 19910001: ANDREW LAKE

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19910001

E.J. Friesen & Associates Inc.

DECLARATION

IN THE MATTER OF
METALLIC MINERAL EXPLORATION PERMIT
#6890090002

FIRST TERM ASSESSMENT REPORT.

I, the undersigned, ADRIAN GARDINER MANN, registered as a Professional Geologist in the Province of Alberta, of [redacted], Calgary, Alberta T2W 3G9, do solemnly declare:

> that the expenses detailed in the accompanying Assessment Report for Metallic Mineral Exploration Permit 6890090002 fairly reflect the expenses incurred in carrying out the exploration work on the said mineral permit during the latter half of 1990; noting that none of the personnel involved in the work were paid, but that the quoted staff costs represent a fair valuation of their work invested in the project, on the basis of time spent by the personnel, at reasonable current rates; noting that the purchase of capital items used in the exploration program have been depreciated on a straight line 3 year basis; and noting further that certain of the rental costs, regarded as realistic and fair, are deferred, contingent upon success of the project, but have been included as if accrued and paid.

I make this solemn declaration conscientiously believing it to be true, and knowing that it is of the same force and effect as if made under oath and by virtue of the Canada Evidence Act.

[redacted]

Declared before me in Calgary)
in the Province of Alberta,)
this third day of January, 1991) ADRIAN GARDINER MANN

Edna Barrieau

Commissioner for Oaths in and
for the Province of Alberta

EDNA D. BARRIEAU
Commissioner for Oaths
My Commission Expires January 24, 1992

Jan 11/91
19910009

ASSESSMENT REPORT

ALBERTA

METALLIC MINERAL EXPLORATION PERMIT
NUMBER 6890090002

COMMENCEMENT DATE - 1990 Sept 10

ANDREW LAKE
NORTHEAST ALBERTA

for

E.J. Friesen & Associates Inc.,
200, 280 Midpark Way S.E.,
Calgary Alberta - T2X 1J6

by

Adrian G Mann, P. Geol., Ph.D.

ASSESSMENT REPORT

ALBERTA METALLIC MINERAL EXPLORATION PERMIT
NUMBER 6890090002

ANDREW LAKE
NORTHEAST ALBERTA

1 EXECUTIVE SUMMARY

Reports of gossan, with associated vein quartz, arsenopyrite, nickel and gold in the literature, coupled with an indication of Archaean metasediments, and an interesting aeromagnetic signal, prompted this application for an exploration permit in the northeast corner of Alberta. Reconnaissance mapping, detailed mapping and a pilot geophysical and geochemical exercise have been done to ascertain the cause of these phenomena.

The VLF-EM geophysical work shows there is no significant conductive zone beneath the Rico #1 area of interest.

The area has been subjected to a high grade of regional metamorphism, with which pegmatitic intrusions are linked both spatially and genetically. These pegmatites have strongly iron stained marginal selvage zones, where it is hoped there could be economic mineralization. Fifty eight measured chipped channel samples were collected from these gossan zones.

Ten selected samples have been analyzed by neutron activation for a broad spectrum of elements. Significant concentrations of lanthanides were recorded. Two anomalous gold values (>50ppb Au), with coincident anomalous arsenic (>15ppm As), require further investigation. One anomalous zinc value (1080ppm Zn) is unexplained.

There remain 48 unanalysed samples in storage. It would be a pity to waste the effort of obtaining these, and some means of financing their analyses should be sought.

Adrian G Mann, P. Geol., Ph.D..
December 31, 1990

ASSESSMENT REPORT

ALBERTA METALLIC MINERAL EXPLORATION PERMIT
NUMBER 6890090002

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6 PREAMBLE

6.1 Introduction

Metasediments of the Archaean (1.7 to 1.9 ga) Tazin / Nonacho Group extend from the Northwest Territories and Saskatchewan into northeast Alberta. Despite the high grade of metamorphism, Godfrey recorded gossans and rusty zones in the Sedgewick-Lindgren Lakes area, reporting pyritization as being common, and arsenopyrite, smaltite and pyrrhotite at several places in this restricted area; and a gossan on the southwest shore of Lindgren Lake which "yielded small values of nickel, silver and gold". His map shows veins and arsenopyrite associated with the gossans which cover a discontinuous strike length of at least 4.5km.

A strongly anomalous aeromagnetic high parallels the recorded gossans, peaking some 500m to the west, and showing a particularly sharp gradient over the area of interest.

These factors, researched in the library, suggested a worthwhile target for possible pegmatite associated heavy minerals of such elements as tin, tungsten, rare earths, tantalum. Accordingly, application was made for an exploration permit, and an expedition to seek these minerals was undertaken.

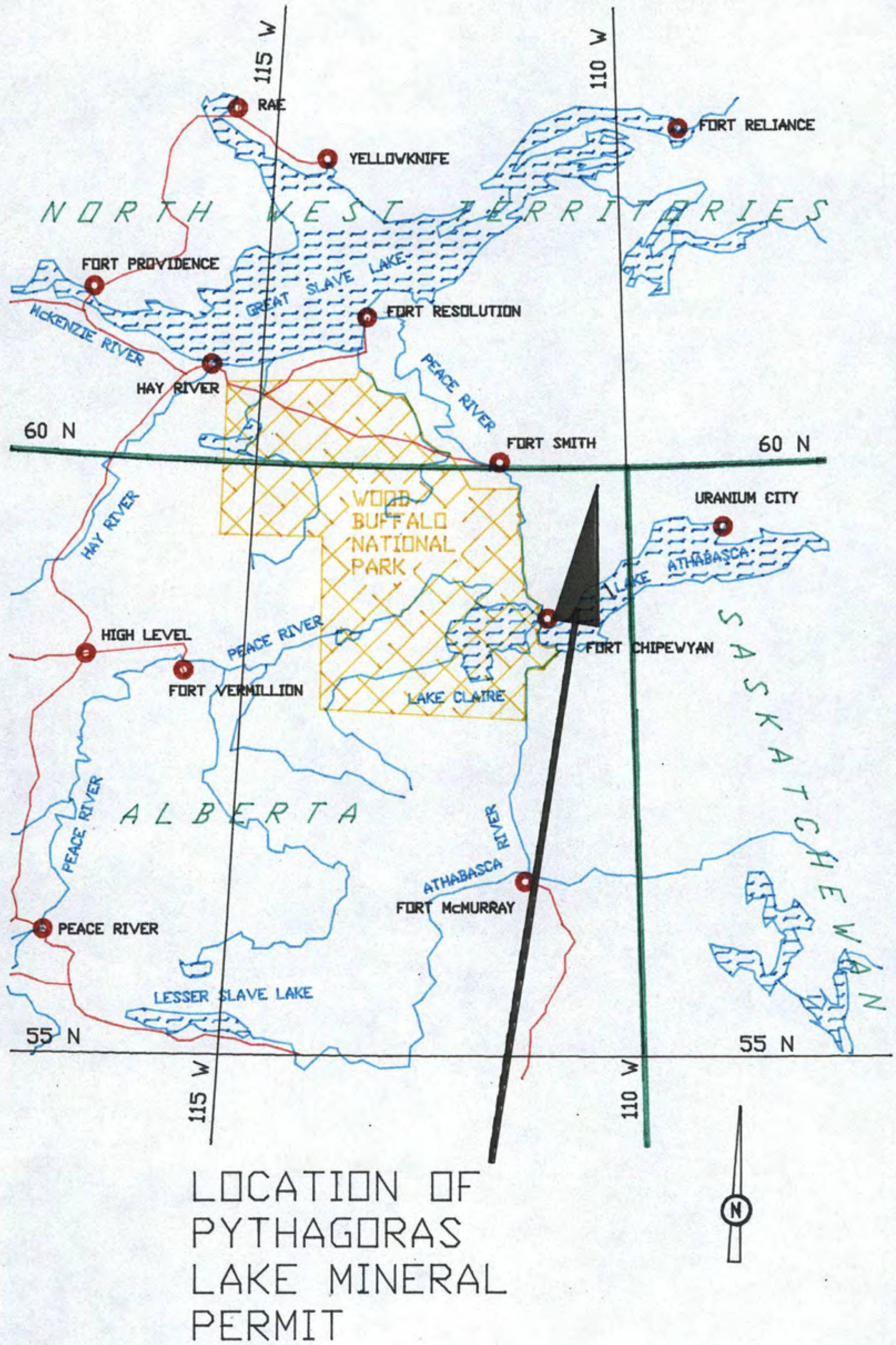
6.2 Outline of Work done

The exploration crew comprised a party of three: a geologist, a geologist/mining engineer, and an engineer; flown in to Harker Lake on the morning of Saturday, September 15 1990, and out on the afternoon of Sunday September 23 1990. A camp was established on Harker Lake, with the party commuting daily, on foot, to the permit area.

The first two days were used in reconnaissance mapping on a scale of 1:5000, transferred to 1:10 000 for presentation. Thereafter, efforts were concentrated on detailed mapping (1:500, 1:1000) of promising areas located from this and Godfrey's work by simple pace and compass/range or tape and compass/range.

A small grid of some 420m total lines was compass surveyed, taped and flagged on one area of interest. This was the focus of a pilot VLF-EM survey, using a EM 16 unit, and of very detailed mapping on a scale of 1:200.

Location of the Permit



The more heavily iron stained and weathered zones were chipped channel sampled, thickness of each exposure being measured, and care being taken never to exceed 100cm sampled thickness. In total, 58 samples were collected, of which 10 representative samples were selected and despatched via Barringer Laboratories in Calgary to MacMaster University in Hamilton for Neutron activation analysis. This is the basis of the geochemical pilot survey.

The party went equipped for sediment/soil geochemical sampling. In the initial reconnaissance traversing, the potential for such sampling was examined. With the dearth of mineral derived autochthonous soils, almost bare crests, contrasted against the heavy valley muskeg, and the random distribution of sandy glacial moraines and eskers in the valleys, this technique was dismissed as inapplicable to the scale of operations here used.

Parts of two days were lost to inclement weather, with the resulting slack time was used in mapping in and around the camp.

6.3 Location and Access

The Permit is in the extreme northeastern corner of Alberta (NTS 74M/16) as shown on figure 1; lying broadly within Township 126, Range 2, West of the fourth Meridian; bounded to the east by longitude 110°12'W and the west by longitude 110°16'W; to the north by 60°00'N and to the south by 59°56'.

The legal description, dated Sept 13 1990, of the area is as follows:

M4 R2 T126: 15L6N, L7N, L10, L11, L14S & NE, L15, L16; 22L1, L2, L3E, L6E, L7, L8, L9, L10, L11E, L16; 23L4W, 5N & SW, 6N, L11, L12, L13, L14; 26L2,L3, L4, L5, L6, L7, L10, L11, L12, L13, L14, L15; 27L1S; 35L1, L2, L3, L4E, L5, L7, L8, L9, L10, L11S, L15S, L16; 36L12N, L13.

Total Area is 712 Ha.

Access was by chartered float plane to Harker Lake out of Fort McMurray, some 215 miles (300km) to the south. All local movement was on foot.

6.4 Physical Features

Elevation is from 1100ft to 1250ft (330m to 420m) on a fairly gentle, sheet glaciated plain on which there is very little overburden. The strong gneissic foliation, coupled with parallel to subparallel faulting, and a northeast to southwest ice flow direction has imparted a distinct almost north-south fabric to the terrain, with alternating bare or poorly treed ridges; lakes, muskeg and stunted willow in the valleys; and an open parklike, though meagre, boreal forest of spruce, birch and aspen on the slopes. A fairly recent fire has felled much of the timber in the central area, so that dead fall makes heavy going of east-west traversing.

The lakes are elongated in a north-south direction, which also appears to parallel the prevailing wind directions, and which will mean that closer camp access will be possible by float plane in any future visits.

7 GEOLOGY

7.1 Previous Workers

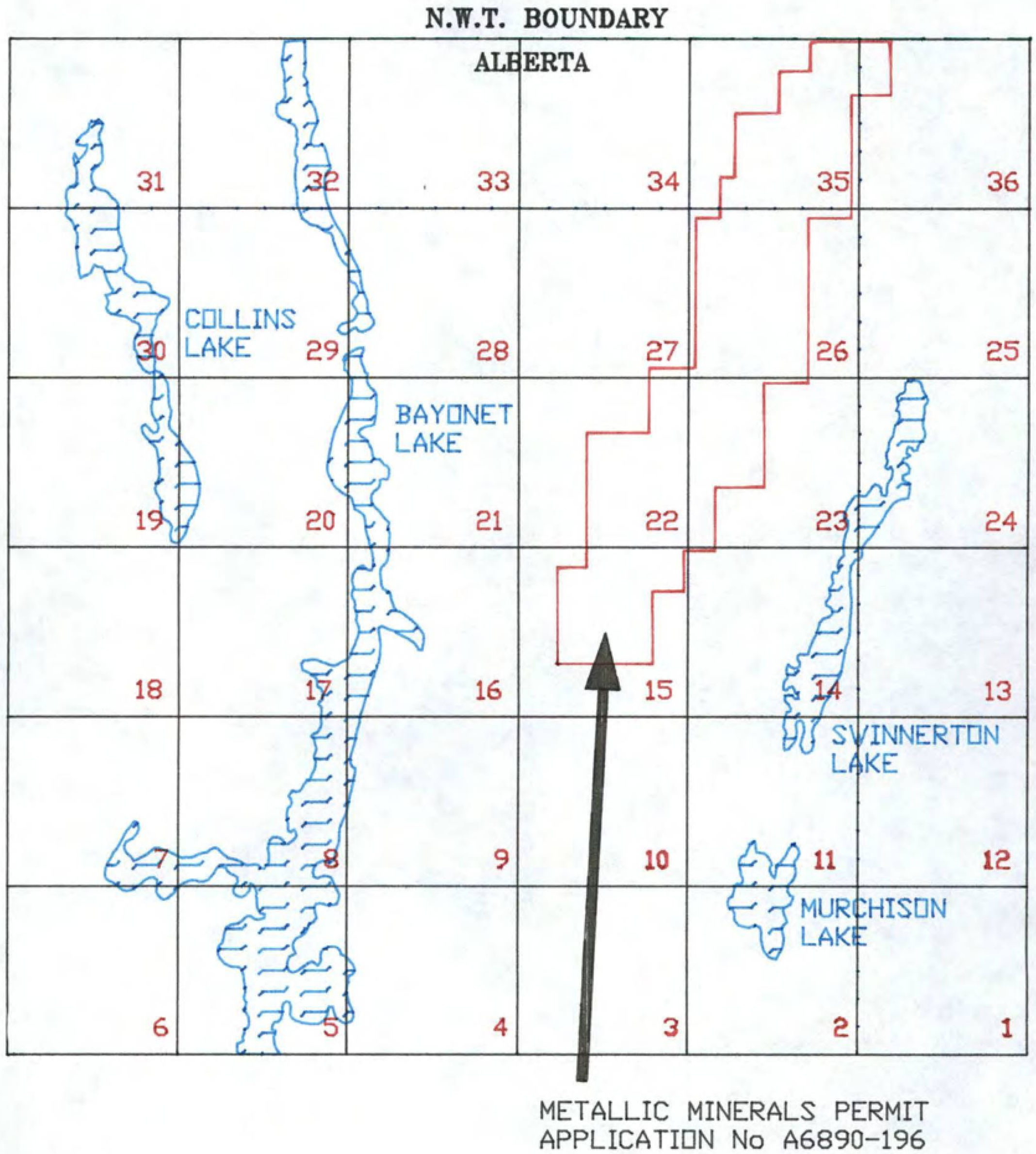
In his 1960 publication on the area, Godfrey showed and described small gossan and rusty zones in the metasedimentary rocks of the Sedgewick-Lindgren Lakes strike. He recorded that

> "pyritization is a common feature of most metasedimentary rock bands, and other sulfides (sic) such as arsenopyrite, smaltite, and pyrrhotite were noted at several points in the ... band. Quartzite and biotite schist exposed on the southwest shore of Lindgren Lake showed sulfide (sic) mineralization within gossan which yielded small values of nickel, silver, and gold."

Glacial flow is shown by Godfrey to be consistently from the northeast towards the west and southwest. Winding eskers are common in the Central valley, as Godfrey noted.

The pink potash granite gneiss of the west is sharply fault bounded along the edge of this central valley, as too is the grey biotite gneiss to the east. Godfrey describes the rocks of the central valley as a metasedimentary unit, distinguishing clearly between this and the granitic bodies to the east and west.

Burgan et al (1973) reported an anomaly (#2943) immediately west of Wells Lake in the north, from an airborne radiometric survey. The anomaly coincides poorly with some unspecified "occurrences" from preexisting reports, to the west and north of Pythagoras Lake. This appears to have been followed up on foot on June 10 1970, in a single traverse from Harker Lake to Lindgren Lake, down to Pythagoras and so back to Harker. Results are not recorded.



MAP OF ALBERTA TOWNSHIP 126
RANGE 2 WEST OF 4th MERIDIAN
TO SHOW LOCATION OF PERMIT

7.2 Regional Geology

The oldest rocks are Godfrey's metasediments, now manifest as paragneisses and banded migmatites, locally garnetiferous. These are distributed along the central valley as alternately banded quartz-orthoclase(?)-almandine zones of from 2 to 150cm thickness, and mafic, probably amphibolitic zones of from 1 to 70cm thickness. The paragneiss has a range of grain size, from fine, equigranular, almost schistose rock to coarsely recrystallized pegmatoids, sodic feldspar augen-gneiss, porphyroblastic potassic feldspar paragneisses.

7.3 Local Geology

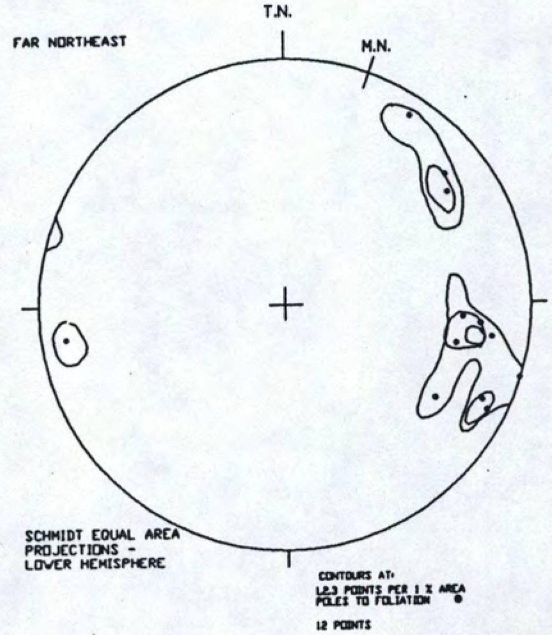
The Pythagoras valley marks a distinct change between the western pink potassic metasomatized quartz-albite-microcline-biotite gneisses and gneissic granites (Plate I), and the eastern grey quartz-albite-biotite gneisses.

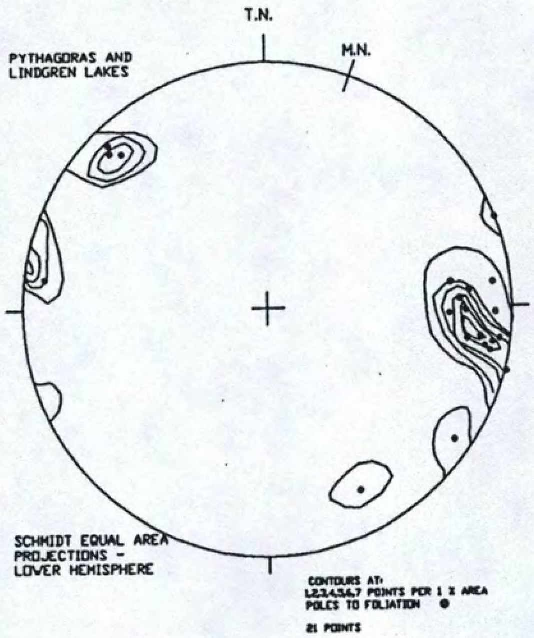
Within the limited area studied, there is little to demonstrate the origin of the metamorphic rocks observed, as almost all primary features have been obliterated by the all embracing regional metamorphism and the pervasive, and perhaps synchronous, potassic metasomatism.

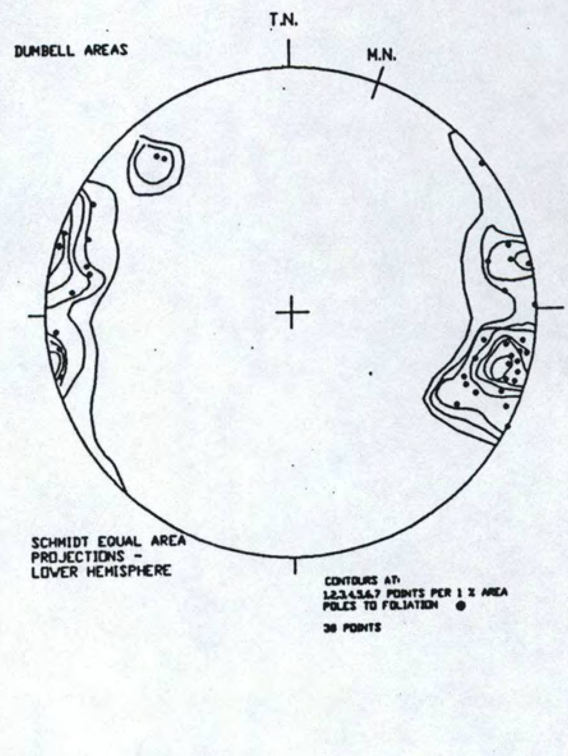
The central valley, with its numerous meandering eskers and the high degree of muskeg cover, has exceptionally poor outcrop. This is a paradoxically two edged sword, suggestive of extreme deformation and mineral degradation, and therefore high propensity for ore mineral impregnation; but at the same time offering little in the way of clues as to what lies beneath the cover and marshes.

In the west, the paragneisses grade into pink banded gneissic biotite granite. Although a fault scarp defines the edge of the valley, there is no sharp distinction between the metasediments and these granitic gneisses as Godfrey's map suggests. Still retained within the granites are relict paragneisses and pegmatoids, closely akin to the rocks of the central valley. Northwards, in the region of Lindgren Lake, the gneissic banding becomes further obliterated, a red, barely banded, potassic granite of most pleasing aspect. The rock is markedly more foliated close to the fault zone, and is distinctly dissimilar to the grey biotite-quartz-plagioclase gneiss which lies east of Wells Lake.

Synoptic Equal Area Plots of Structural Data from the Far Northeast Pythagoras and Lindgren Lakes and the Dumbell Areas







8 DETAILED INVESTIGATIONS

8.1 North and North Central Area

8.1.1 Pythagoras Lake Block

Several iron stained rusty selvage zones on the margins of intrusive pegmatites in migmatites constitute this zone. No samples were taken.

8.1.2 Lindgren Lake Block

A banded iron stained zone, not clearly related to either pegmatite or quartz veining outcrops directly on the lake shore over a strike length of 15m. A second, less strongly iron stained, exposure occurs 50m inland from the lake shore, to the north-northwest, and roughly along strike of, the above mentioned deposit. No samples were taken.

8.1.3 Structural Comment

Fold axes were measured in the field at 55° -> 207° and 37° -> 196°. Foliations are concentrated almost exclusively at 353°/72°W in the Pythagoras and Lindgren areas, and at 350°/70°W with great circle scatter about an axis of rotation 30° -> 290° in the extreme northern area of reconnaissance.

8.2 Dumbell Lake

8.2.1 Rico #1 Block

There is strong iron staining; closely, though not exclusively, allied to pegmatite intrusion. Two distinct modes of rust staining are apparent:

> 8.2.2 pegmatite selvage staining, which is parallel, or subparallel, to the foliation, and follows the folding, whether pre- or syn-migmatitic being immaterial.
>
> 8.2.3 pinnate and cymoidal staining relating to the late stage faulting which dissects the exposures. This is particularly well depicted on the small fault which strikes southeast between 80N +10E and 90N +20E (pinnate), and on the northeast striking faults on the baseline at 103N and 108N (cymoidal).

The evidence is against the staining being a mere function of garnet weathering.

8.2.4 Rico #2 Block

The Rico #2 Block is similar in structure and mineralogy to the Rico #1 Block. There is a large slightly altered pegmatite body that lies to the east of the zone of interest. Several gossanous veins are also graphitic.

8.2.5 Structural Comment

Classical "text-book" examples of refolded folds, Ramsey's (1967) "mushroom" structure at the nose of a fold, "banana" folds, dome and basin features are all magnificently exposed in the migmatites of this area (Plates II - IV). Fold axes were measured in the field at 52° -> 255°, 37° -> 242°, 72° -> 237°. Foliations dip steeply west, with some exceptions steeply east, concentrated at 342/75W, and a lesser concentration at 009/86W.

8.3 Southern Area

8.3.1 Debbie Lake

Country rock is biotite gneiss, grey to pink and relatively homogeneous. Zones of large (5 to 25mm diameter) mauve garnets in grey crystalline quartz veins are interbanded with the gneiss (Plate V), locally showing fine examples of pinch and swell and protoboudinage (Plate VIII).

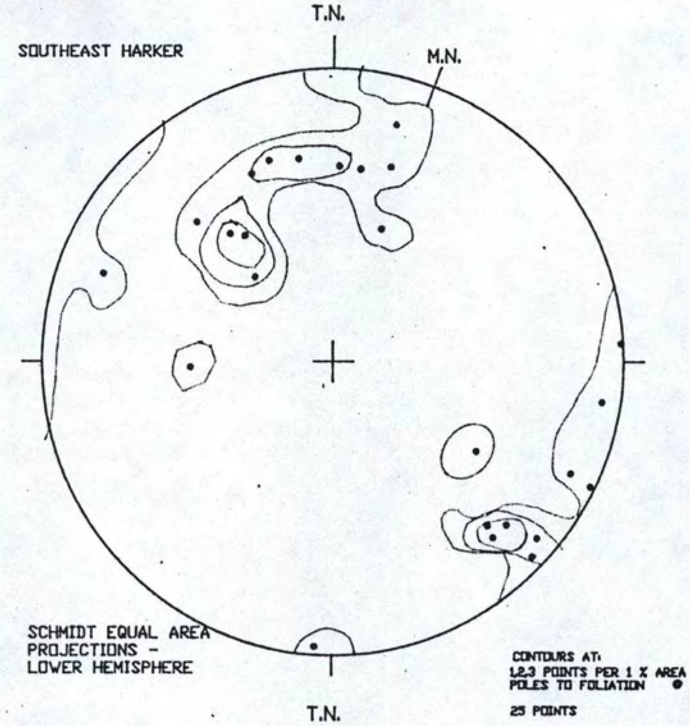
The principal features of the area are strong and wide (4 - 10m), white to pink feldspar quartz pegmatites with moderately well developed iron rich selvage, best manifest along the west edge of the individual pegmatites. Although the pegmatites are robust, paucity of outcrop in this marshy area makes individual units difficult to trace much beyond each separate outcrop. Of particular interest is the massive size of feldspars in the pegmatites, with certain individual crystals exceeding 15cm in cross sectional maximum axis. (Plate VII)

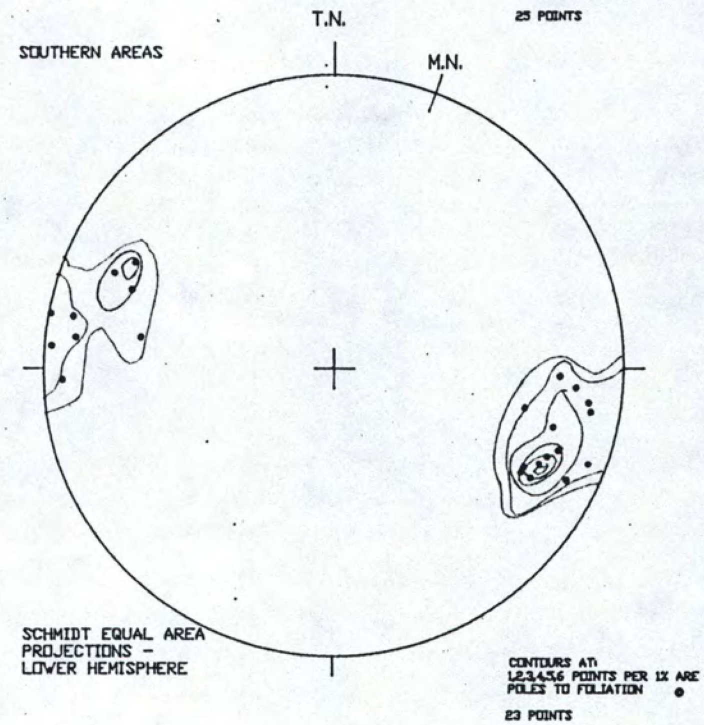
It was noted that white lichen is preferentially concentrated along the pegmatites, rather than the more mafic gneisses (Plate XII).

8.3.2 Lac Arlette

A prominent and robust pegmatite, of constant 8m thickness, follows the northwestern lake edge in mafic paragneisses. The pegmatite lies on the south end of a long ridge of pegmatite intruded paragneisses which show intense and repeated deformation, all coaxial about a shallow dipping southern axis of rotation. The outcrops of the ridge are shot throughout with good iron staining which appears to relate closely to the pegmatites.

Synoptic Equal Area Plots of Structural Data from the Southeast Harker and Southern Areas





The lake shore pegmatite has an exceptionally strongly iron stained selvage zone along its eastern margin, filled with small ramifying quartz stringers, and attaining a thickness of nearly 5m, nowhere less than 2.5m in the nearly 70m of continuous exposure.

8.3.3 Structural Comment

The foliation in the Lac Arlette exposure is dominantly easterly dipping, concentrated at 333°/67°E, whereas the foliations at Lake Debbie verge to the west, concentrated at 332°/70°W. Is it coincidence that iron staining in better developed to the west of the pegmatites at Debbie Lake, and to the east of them at Lac Arlette? Fold axial lineations, measured in the field, have southerly vergence: 49° -> 241°, 35° -> 212°, 13° -> 203°, though it is difficult to know whether the scatter is real or merely reading error.

8.4 Lake Harker

8.4.1 Teriyaki Bay

A strongly iron stained zone of constant 60 to 80 cm thickness over a 14m exposed strike length, reminiscent in part of sedimentary banded iron formation, forms the eastern selvage of a robust 100cm wide white feldspar pegmatite vein in grey and pink granitic gneisses.

8.4.2 Landing Knoll

8.4.2.1 Crapper Exposure

Almost along strike to the Teriyaki bay exposures is a tightly contorted pegmatite in grey, leucocratic orthoclase augen gneiss; a clean, white quartz-almandine gneiss; and in tight amphibolite gneiss. Iron staining is concentrated along the immediate 10 to 40 cm walls of the pegmatite, which follows foliation but which shows no apparent preference for one or other lithological unit. One sample (13692) was taken at this site, over a 40cm iron oxide rich selvage.

8.4.2.2 Landing Exposure

This exposure is most instructive and quite fascinating. Zoned pegmatite dykes intrude the tightly folded biotite gneiss, the folds being picked out by the intrusives, which do not themselves appear to have been deformed.

Rust staining picks out the iron rich zones in the pegmatite. The full cross section of one such dyke was chip channel sampled, from the western feldspar-quartz zone (60cm 13696), the quartz core (60cm 13564), iron rich selvage #2 in pegmatite (30cm 13693 in 110cm), to the eastern iron rich selvage #1 in pegmatite (50cm 13693 in >120cm).

The exposure demonstrates very clearly the intimate relationship which exists between pegmatite selvage and "gossan" in this general area. It also dispels the impression which had suggested itself, that the iron staining is solely a manifestation of decrepitation of the garnets. Whereas this does occur in places, it is by no means general, and strong iron staining is apparent in this exposure without garnets in close proximity.

8.4.3 Structural Comment

The initial impression is of almost isoclinal folding of both the gneisses and the syn-migmatitic pegmatites, but close inspection suggests that intrusion was equally into the fold and the ill defined axial planar cleavage formed by the stress which caused the folding. The folding is cylindrical about an axis of rotation $50^\circ \rightarrow 210^\circ$. Another fold axial lineation verges at a shallow angle to the south $11^\circ \rightarrow 221^\circ$. These are probably coincident elements, although on an individual basis it is difficult to determine whether their 41° angular disparity is real or a function of reading error. An apparently later flexure $35^\circ \rightarrow 127^\circ$ may be at least partly responsible for the spread.

Foliation shows a wide spread of directions, some scattered about the plane subtended by the late flexure, with concentration at $040^\circ/45^\circ$SE, and principal concentration at $046^\circ/72^\circ$NW.

9 GEOPHYSICAL PILOT STUDY

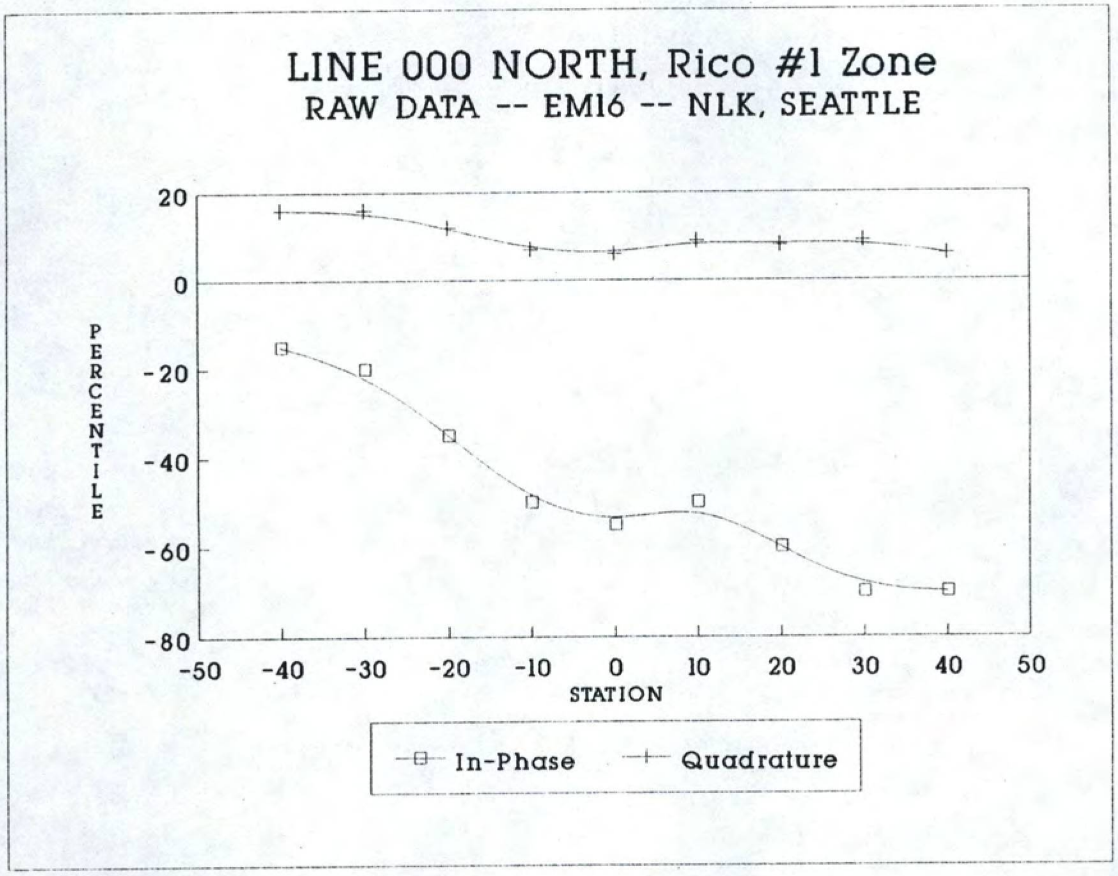
9.1 Aeromagnetic Database

A strongly anomalous aeromagnetic high parallels the recorded gossans of the Pythagoras Lake system, peaking some 500m to the west, and showing a particularly sharp gradient over the area of interest. Ground investigation was unable to pinpoint the source of the aeromagnetic high.

9.2 VLF-EM Investigation

A small grid was established at the Rico #1 zone, to run a VLF-EM geophysical survey. A total of 420m of line grid was established by chain and compass. The base line, with an azimuth of 020°, was 125m long with crosslines every 25m. Readings were taken every 10m on the crosslines. A Geonics EM16 unit was used for the survey. The transmitting station was NLK in Seattle, Washington.

The VLF-EM result shows no major conductor in the survey area. However, an anomaly just east of the baseline indicates a possible fault or lithologic contact. This area is generally covered and field confirmation was not possible. Figures 3.2 to 3.7 depict the profiles obtained.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-40
-60
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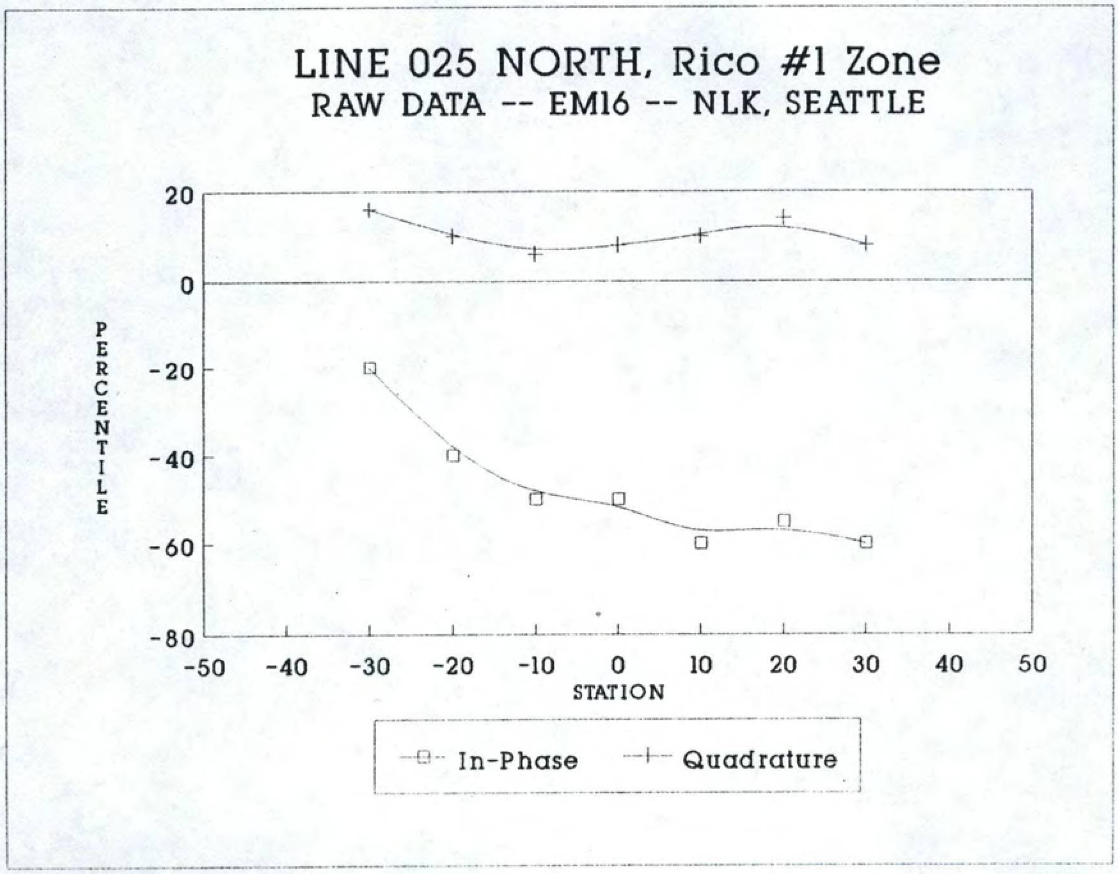
-40
-30
-20
-10
0
10
20
30
40
50
STATION
In-Phase
Quadrature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-10
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10
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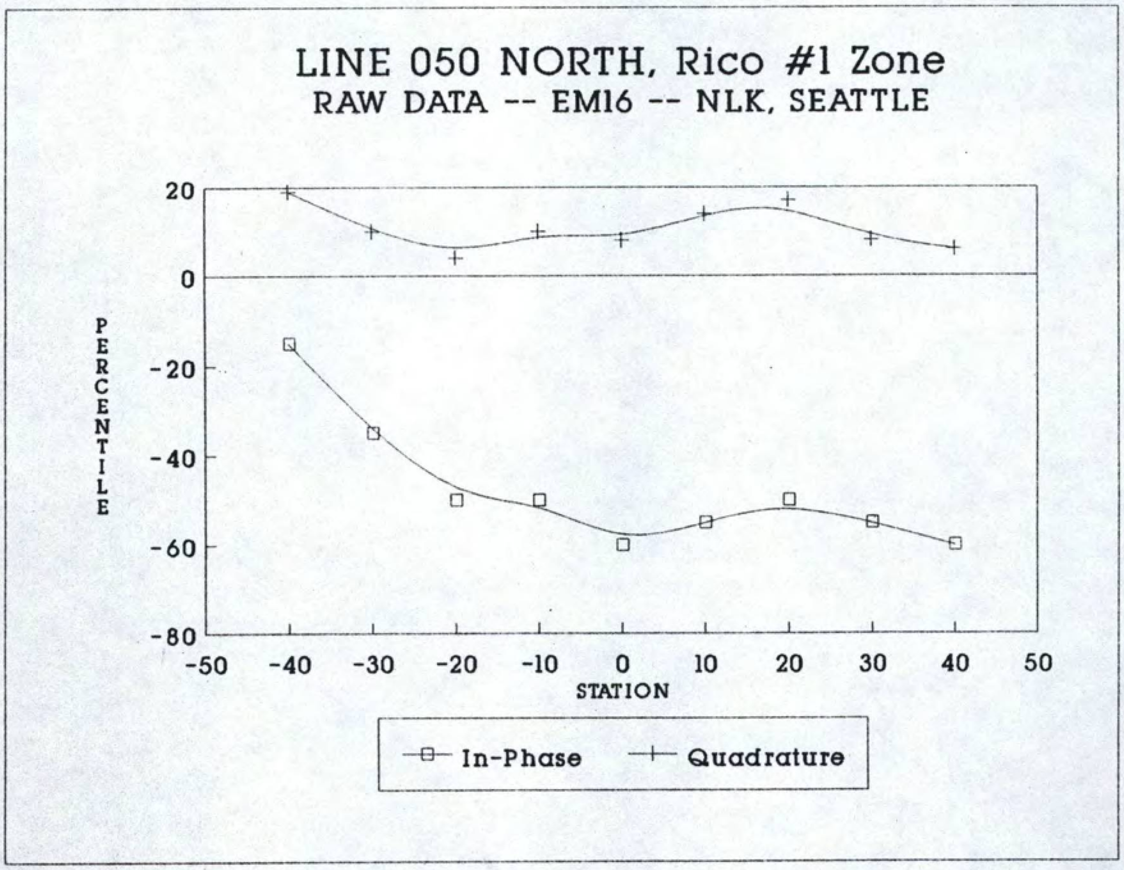
30
40
50
STATION
In-Phase
Quadrature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STATION
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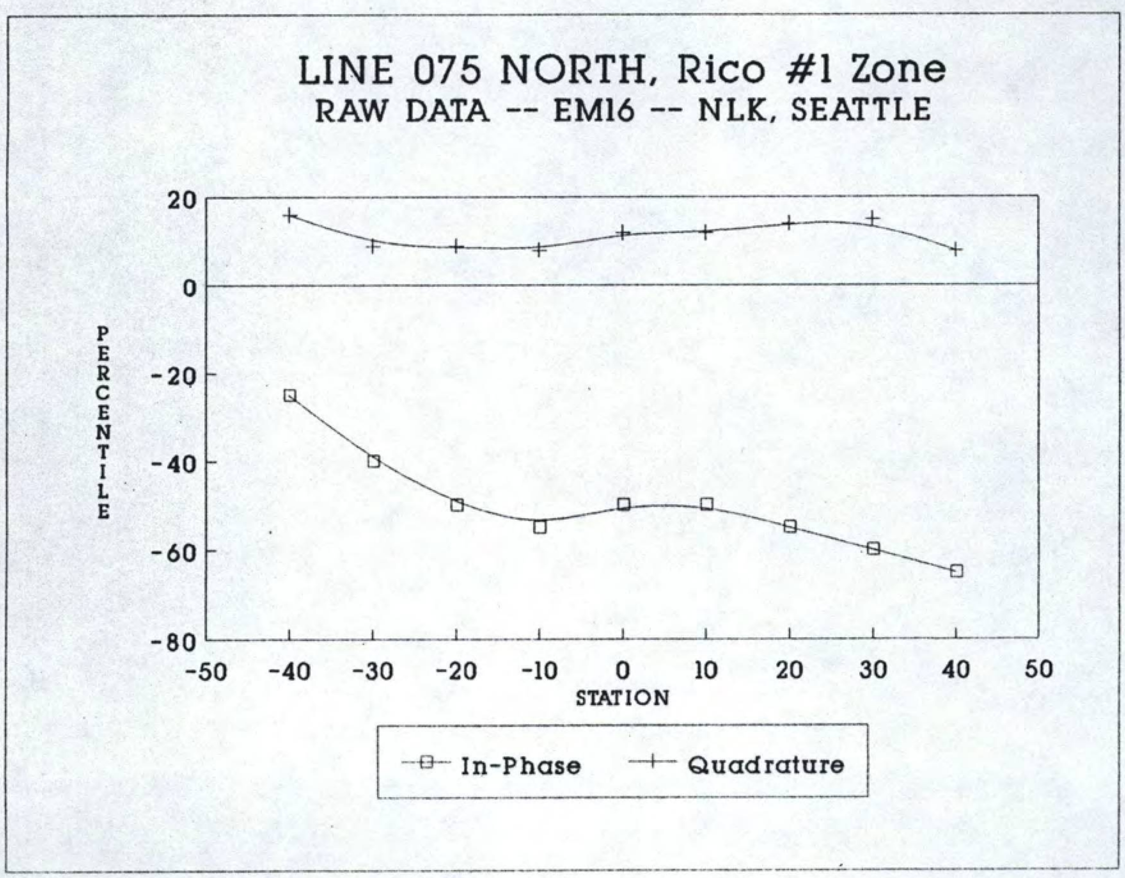
Quadrature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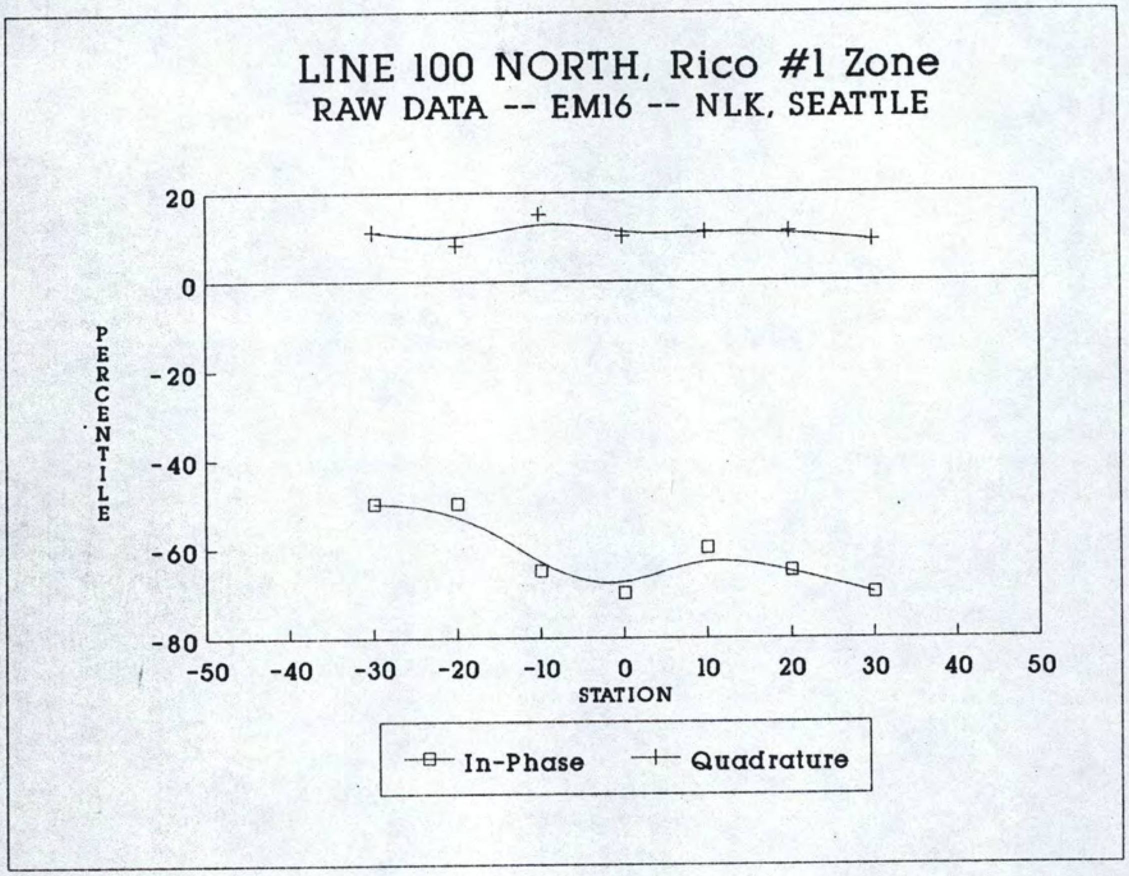
40
50
STATION
In-Phase
Quadrature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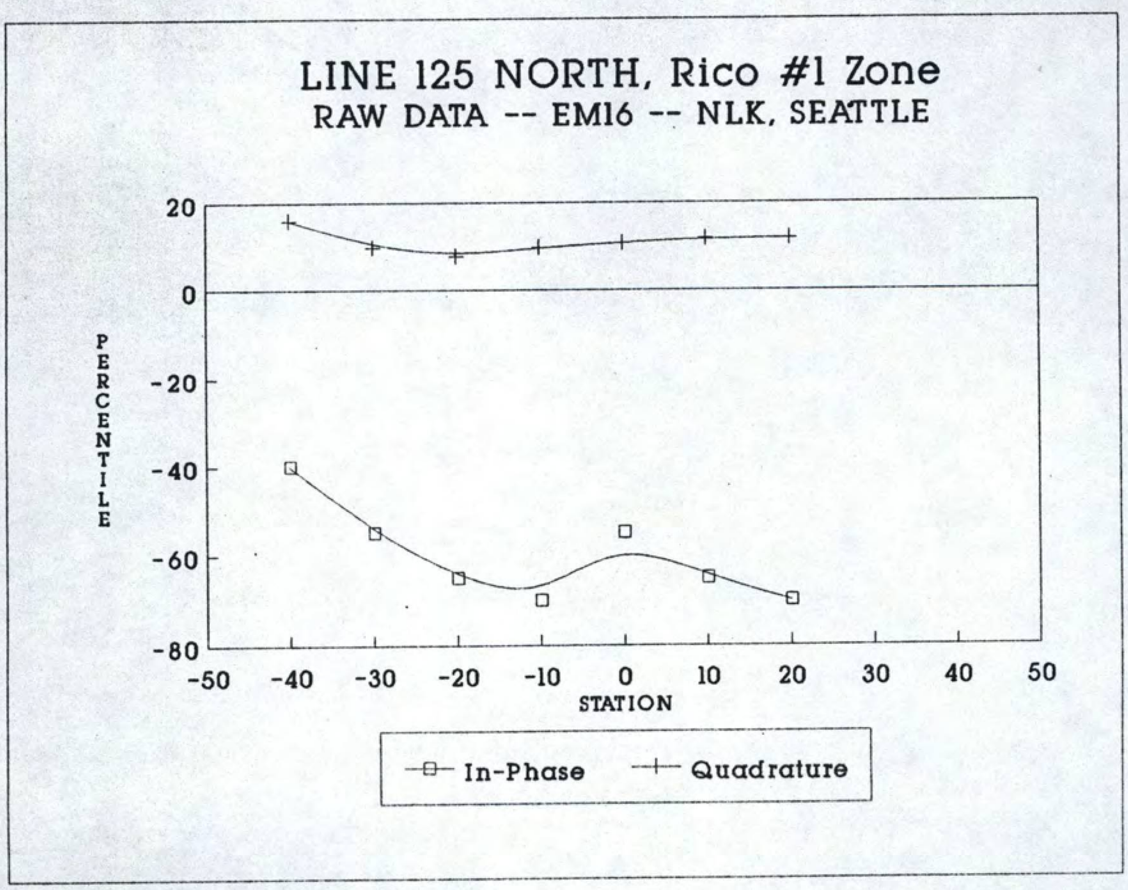
STATION
In-Phase
Quadrature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PERCENTILE
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-40
-30
-20
-10
0
10
20
30
40
50
STATION
In-Phase
Quadrature

10 GEOCHEMICAL PILOT STUDY

Of the 58 samples collected 10, selected as being representative, were submitted for nuclear activation analysis. Analytical certificates are attached (Appendix 16.1). Results are detailed in fig 3.8.

High sodium/low calcium is a function of the alkali feldspars present.

The pegmatite-associated heavy elements sought all have very low to nil concentrations, although there are interesting, albeit subeconomic, kicks from the Lanthanides. Even from the Lac Arlette occurrences the concentrations of uranium and thorium are unexceptional, although Godfrey reported radioactivity from this exposure. Iron is universally relatively low, considering the intensity of staining in the zones from which the samples were taken. Nickel values are all below detection limit.

Arsenic values are also low, except in samples 13632, from the erratic boulder of gossan at Eddie #1 (Plate XI), and 13683, from the eastern selvage of a pegmatite at Rico #1. Strangely, these coincide with lower iron and barium values. As one might expect, gold and arsenic show some correlation.

Surprisingly, there are two samples with notable, if not economic, gold values of more than 50ppb. Also notable is a sharp kick up to 1080ppm zinc at the Harker Lake landing.

PYTHAGORAS LAKE - NORTHEAST ALBERTA
SAMPLE RECORD

Number	Location	Description	Rock Type	Thick	Au ppb	Ag ppm	As ppm	Ba ppm	Br ppm	Ca %	Co ppm	Cr ppm	Cs ppm	Fe %	Hf ppm	Hg ppm	In ppm	Mo ppm	Na %	Ni ppm	Rb ppm	Sb ppm	Sc ppm	Se ppm	Sn %	Sr %	Ta ppm	Th ppm	U ppm	W ppm	Zn ppm	La ppm	Ce ppm	Nd ppm	Sm ppm	Eu ppm	Tb ppm	Yb ppm	Lu ppm
13551	L Debbie	Centre N	Peg Slvg	120	<5	<5	<2	390	<1	<1	<5	280	4	4.17	7	<1	<5	<5	0.94	<50	190	<0.2	16	<5	<0.02	<0.05	<1	20	4.5	<0.4	163	44	44	34	4.4	0.70	<0.5	1.91	0.41
13552	L Debbie	comp	Peg Slvg 50 part	20+20	7	<5	3	480	<1	<1	5	430	<2	3.91	3	<1	<5	7	1.57	<50	110	<0.2	11	<5	<0.02	<0.05	<1	32	7.5	<0.4	149	60	50	120	8.4	0.90	1.50	3.99	0.66
13553	L Debbie	South	Qtz vein West	20																																			
13554	L Debbie	Centre S	Peg Slvg	60																																			
13555	L Debbie	South	Peg Slvg West	30																																			
13556	L Arlette	Metre 1	Peg Slvg	100																																			
13557	L Arlette	Extreme S	Peg Slvg	100	54	10	19	920	<1	<1	<5	160	<2	5.35	7	<1	<5	<5	0.92	<50	200	<0.2	16	<5	<0.02	<0.05	3	22	3.2	<0.4	<50	44	94	30	5.0	1.10	<0.5	1.30	0.20
13558	L Arlette	Waterside	Peg Slvg IRON	100																																			
13559	L Arlette	Metre 3	Qtz vein	100																																			
13560	L Arlette	Metre 5	Peg Slvg	100																																			
13561	L Arlette	Metre 4	Peg Slvg	100	11	<5	3	920	<1	2	6	200	2	3.63	5	<1	<5	<5	2.05	<50	180	<0.2	11	<5	<0.02	<0.05	<1	20	4.2	<0.4	<50	42	86	33	4.4	1.50	<0.5	0.97	0.18
13562	Landing	South	Peg Slvg E - W P	40																																			
13563	T'yaki B		Peg Slvg	80	8	<5	<2	690	<1	<1	11	254	<2	5.60	11	<1	<5	17	1.06	<50	130	0.4	13	<5	<0.02	<0.05	<1	27	<0.5	<0.4	<50	53	100	42	6.3	1.20	<0.5	0.82	0.25
13564	Landing	South	Qtz core Fold W	100																																			
13676	Rico #1	75N21.0W-20.2W	Peg Slvg	80																																			
13677	Rico #1	20.2W-19.4W	Peg Slvg	80																																			
13678	Rico #1	19.4W-18.6W	Peg Slvg	80																																			
13679	Rico #1	18.6W-17.8W	Peg Slvg	80																																			
13680	Rico #1	17.8W-17.0W	Peg Slvg	80																																			
13681	Rico #1	17.0W-16.0W	Peg Slvg IRON	100	<5	<5	3	590	<1	<1	<5	250	2	6.24	7	<1	<5	9	0.53	<50	130	<0.2	14	<5	<0.02	<0.05	<1	23	3.4	<4	83	43	87	37	5.3	1.00	<0.5	2.17	0.35
13682	Rico #1	75N10.0E-10.6E	Peg Slvg E Zone	60																																			
13683	Rico #1	73N10.2E-11.4E	Peg Slvg E Zone	120	52	<5	44	550	<1	<1	<5	310	<2	5.28	5	<1	<5	<5	0.37	<50	150	<0.2	13	<5	<0.02	<0.05	<1	28	4.1	<4	171	50	95	37	5.9	0.90	<0.5	1.15	0.25
13684	Rico #1	69N 8.5E- 7.9E	Peg Slvg W Zone	60																																			
13685	Rico #1	71N 8.2E- 8.7E	Peg Slvg W Zone	50																																			
13686	Dumbell	Far S-SW	Qtz vein IRON	80																																			
13687	Dumbell	Far S-CW	Peg Slvg IRON	80																																			
13688	Dumbell	Far S-CE	Peg Slvg	80																																			
13689	Dumbell	Far S-NE	Peg Slvg	80																																			
	Dumbell	Bivoac W	Peg Slvg IRON	80																																			
13690	Dumbell	Bivoac C	Peg Slvg	60																																			
13691	Dumbell	Bivoac E	Peg Slvg	65																																			
13692	Crapper	East	Amph Slvg	40	<5	<5	<2	700	<1	<1	11	340	<2	5.21	6	<1	<5	12	2.43	<50	200	0.4	14	<5	<0.02	<0.05	<1	23	4.7	<4	225	37	74	26	4.2	1.00	<0.5	1.46	0.26
13693	Landing	North	Peg Slvg Central	30																																			
13694	Landing	North	Peg East	50																																			
13695	Landing	East	Peg Slvg East	50																																			
13696	Landing	North	Peg West	60																																			
13697	Landing	Central	Peg Slvg W Cent	60																																			
13698	Landing	Central	Peg Slvg E Cent	40	10	<5	<2	890	<1	<1	15	210	3	13.80	18	<1	<5	<5	1.42	<50	150	<0.2	40	<5	<0.02	<0.05	3	33	5.4	<4	1086	68	130	45	5.4	1.50	1.50	4.49	0.32
13699	Landing	South	Peg Slvg	50																																			
13700	Landing	South	Qtz vein IRON	20																																			
13626			Gossan	75																																			
13627			Gossan	75																																			
13628			Gossan	75																																			
13629			Gossan	75																																			
13630			Qtz vein	70																																			
13631			Qtz vein	60																																			
13632	Eddie #1	Esker	Gossan Float	Grab	30	<5	93	<100	<1	<1	7	230	4	4.14	8	<1	<5	<5	2.83	<50	220	<0.2	19	<5	<0.02	<0.05	<1	23	4.9	<4	138	48	95	41	6.2	1.10	<0.5	2.17	0.35
13633	Eddie #1	Esker	Gossan Float	Grab																																			
13634	Rico #2		Gossan	50																																			
13635	Rico #2		Gossan	60																																			
13636	Rico #2		Gossan	50																																			
13637	Rico #2		Gossan Graphit	60																																			
13638	Rico #2		Gossan	50																																			
13639	Rico #2		Gossan	55																																			
13640	Rico #2		Gossan	45																																			
13641	Rico #2b		Gossan	30																																			
13642	Rico #2b		Gossan	45																																			

PYTHAGORAS LAKE STAFF TIME ALLOCATIONS

INITIAL GEOLOGICAL INVESTIGATION

Proj No: 90081
Proj Name:

NAME		RATE /hr	M	T	W	Th	F	Sa	Su	Week ending 09-Sep-90	M	T	W	Th	F	Sa	Su	Week ending 16-Sep-90	M	T	W	Th	F	Sa	Su	Week ending 23-Sep-90	M	T	W	Th	F	Sa	Su	Week ending 30-Sep-90	TOTALS FOR SEPT
EJF	P	$50								$0						###	###	$1,000	###	###	###	###	###	###	###	$3,500								$0	$4,500
	T	$15								$0								$0								$0								$0	$0
AGM	P	$50	###			###	###			$1,500				###	###	###	###	$2,000	###	###	###	###	###	###	###	$3,500	###	###	###	###	###			$2,500	$9,500
	T	$15		###	###					$300	###	###	###					$450								$0								$0	$750
RC	P	$50								$0	###	###				###	###	$1,400	###	###	###	###	###	###	###	$3,400								$0	$4,800
	T	$15								$0			###	###	###			$225								$0		###	###	###	###			$345	$570
Computer		$25	0	###	###	0	0	0	0	$300	###	###	###	75	75	0	0	$675	0	0	0	0	0	0	0	$0	0	75	90	90	90	0	0	$345	$1,320
																																			$21,440

NAME		RATE /hr	M	T	W	Th	F	Sa	Su	Week ending 07-Oct-90	M	T	W	Th	F	Sa	Su	Week ending 14-Oct-90	M	T	W	Th	F	Sa	Su	Week ending 21-Oct-90	M	T	W	Th	F	Sa	Su	Week ending 28-Oct-90	TOTALS FOR OCT	TOTALS
EJF	P	$50								$0								$0								$0								$0	$0	$4,500
	T	$15								$0								$0								$0								$0	$0	$0
AGM	P	$50								$0								$0		###	###					$1,000								$0	$1,000	$10,500
	T	$15	###	###	###	###	###			$750	###	###	###	###	###			$750	###			###	###			$450								$0	$1,950	$2,700
RC	P	$50	###	###						$400								$0								$0								$0	$400	$5,200
	T	$15		###	###	###	###			$330								$0	###	###	###					$240								$0	$570	$1,140
Computer		$25	###	###	###	###	###	0	0	$1,080	###	###	###	###	###	0	0	$750	###	90	60	###	###	0	0	$690	0	0	0	0	0	0	0	$0	$2,520	$3,840
																																			$6,440	$27,880

11 DISCUSSION OF RESULTS

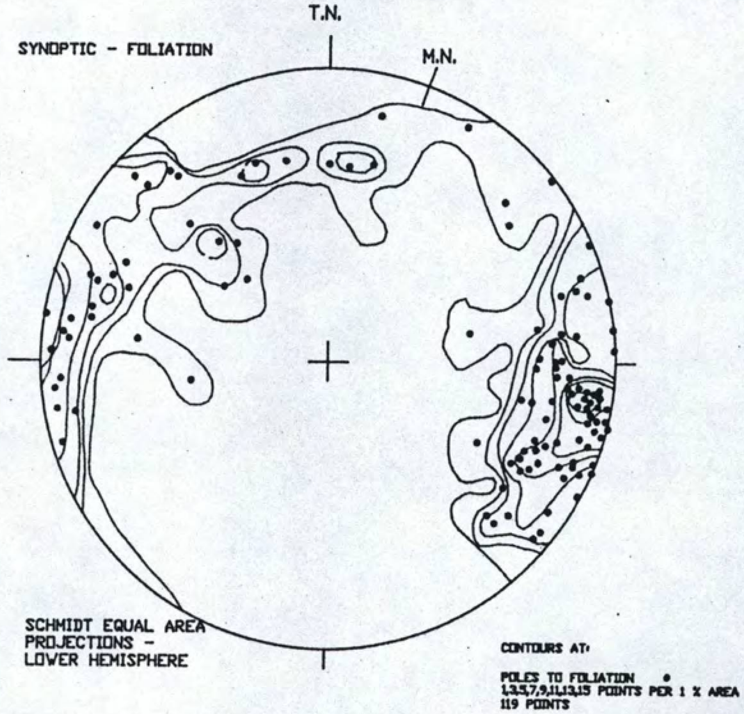
11.1 Metamorphic grade

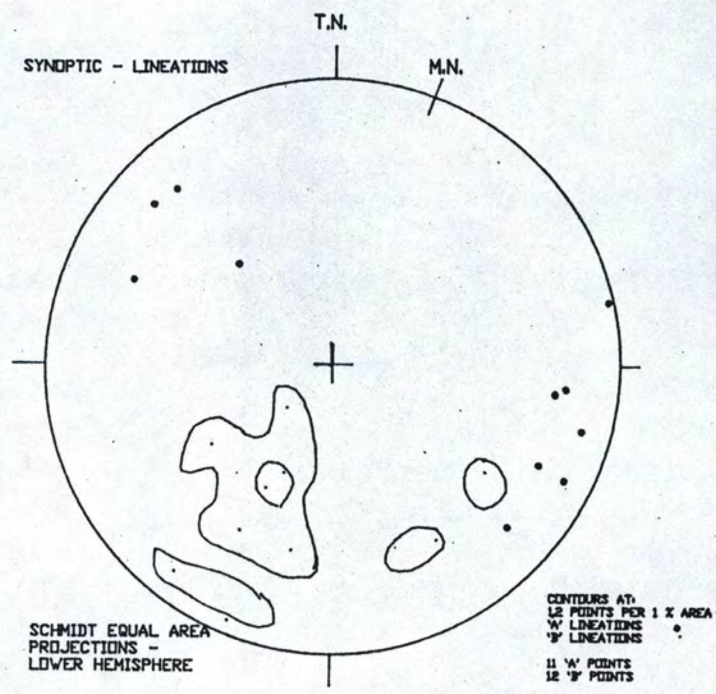
The grade of metamorphism is high.

Garnets are commonplace in Godfrey's "metasedimentary rocks", and the general assemblages of quartz-microcline-orthoclase-biotite (quartzofeldspathic suite), and of quartz-almandine-biotite-plagioclase-orthoclase (pelitic suite) are suggestive of Turner and Verhoogen's (1960 p545) staurolite-almandine subfacies and sillimanite-almandine-orthoclase subfacies of the almandine-amphibolite facies of regional metamorphism. The high concentration of pegmatites, but the paucity of muscovite and amphiboles suggests that although pressures were high - 4000 to 8000 bars - water pressures were lower than load pressures. Temperature of formation would be of the order of 550°C to 750°C.

Barth T.F.W., (1962 p 321) concurs with the temperature realm (500°C maximum) for the amphibolite facies, but suggests further that the presence of biotite is not so much an indication of a wet metamorphism, but rather one of high $K_2O/(Mg,Fe)O/Al_2O_3$ ratio. Certainly the abundance of microcline in the area would reinforce this idea. On his classification, the rocks would tend towards the granulite facies, again reinforced by field evidence of migmatization. Where the potash/alumina ratio drops too low to allow formation of microcline, garnets develop (Williams, Turner and Gilbert 1954 p 236)

Synoptic Equal Area Plots of All Structural Data from the Area





11.2 Structural Investigation

If ore exists, the shearing, pegmatites and the migmatites of the central valley are the most probable loci of that ore. Whether the pegmatites predate or post date the migmatization, anatexis and folding is irrelevant to the structural effect on the ore, because the shape of the pegmatites mimics the strain effects of the stress on the gneisses which accompanied that metamorphism and remelting.

The structural picture is simple. Foliations are concentrated about 349°/80°W, with a scattering describing a partial great circle subtended by a small peak to the scatter of fold axes 50° -- 210°. The foliation concentration is a coincidence of both foliation and axial planes to the folds of these foliations; a normal phenomenon of coaxially refolded migmatites (Turner & Weiss 1963 p 449ff). The interpretation is that any orebody discovered within the disturbed central Pythagoras valley will probably be oriented almost due north, with a western dip. If there is linearity to the body, it will probably pitch within this plane at a moderate to shallow angle towards the south.

11.3 Comparison to other similar areas

The tantalocolumbite bearing pegmatites of the northwest Cape Province in South Africa are characterized by zoning, and by fine grained disseminations of these minerals. Muscovite is a common accessory in the pegmatites (von Backstrom J.W., 1973). In Zimbabwe, tantalocolumbite is again associated with zoned micaceous pegmatites with a quartz core and well developed greisenized wall-rocks. The feldspar of the pegmatites is albite, and common associated ore minerals are beryl, lithium minerals and cassiterite. The tantalite is generally coarsely concentrated in the quartz core, or is finely disseminated in the selvage and greisen. Microlite, the calcium tantalate, and simpsonite, the aluminium tantalate, are selvage and quartz core related respectively (Anderson 1957 p50).

From personal observations, cassiterite at Kamativi occurs in the quartz core of a zoned garnet- and muscovite- rich pegmatite. Wolframite at Tshontanda, and wolframite and scheelite at Richardsons kop and elsewhere in the Esigodini valley (all in Zimbabwe) are associated with fluorite- and muscovite- rich quartzitic veins. Scheelite in the San Francisco mines of Rio Grande do Norte in Brazil occurs in quartz-fluorite-phlogopite veins in similar granitic gneisses.

In Namibia, the Arandis tin pegmatite near Swakopmund occurs in like paragneisses. The greissenized side walls, and outer zones of the pegmatite are intensely iron stained, giving rise to a most handsome purple gossan. It appears that it was from within these greissenized selvages that most of the economic ore was won when the mine was operational.

Schwartz and Surjono (1990) record the chemical and mineralogical associations of the classical biotite-granite hosted tin deposits of Belitung island, most of which is related to greisenization about irregular quartz veins. The trace and minor element chemistry they report is not dissimilar to that of the elements analysed in these Pythagoras claims (Table I).

Schwartz and Surjono pinpoint muscovitization, through potassic metasomatism, as the 'barometer' process, with increase in soda associated with concentration of tin, tantalum and tungsten. Further sodic enrichment, in the albitization process, decreases concentration of these elements. Temperatures of formation of the deposit appears to have been rather lower than that guessed for this, Pythagoras deposit.

Table I Representative Analyses of Comparable Pegmatites from Elsewhere in the World

		BELITUNG ISLAND Indonesia			GREY RIVER Newfoundland	
		Med grain biot gran	Greisen	Alb'zed mesogranite	Med grain biot gran	Greisen
n		5	38	5	5	10
Fe_2O_3 (%)		1.77	3.78	1.40	4.11	2.30
CaO (%)		1.0	0.33	2.81	2.44	1.86
Na_2O (%)		2.69	0.19	7.43	2.76	0.23
Ba	ppm	124	20	<15	626	487
Ce	ppm	152	50	<20		1.1
Cr	ppm			15		
Cs	ppm	13	46	16		
La	ppm	92	38	22	0.7	
Mo	ppm	<3	11	3		
Nb	ppm	17	20	39	14	10
Nd	ppm				1.2	
Ni	ppm	<5	<5	<5	8	
Rb	ppm	420	825	370	207	1968
Sc	ppm	3	<2	2		
Sn	ppm	11	3000	2110	35	
Sr	ppm	62	8	70	192	17
Ta	ppm	7	23	13		
Th	ppm	90	55	123		
U	ppm	19	13	33		
V	ppm	<15	<15	<15	65	
W	ppm	10	1110	914	5	
Y	ppm	101	45	51	40	227
Zn	ppm	50	6650	3520	58	42

Witt (1988) discusses greisenization and potassic metasomatism of tin-tungsten mineralization associated with like biotite granites of northern Queensland, Australia, in which he finds temperatures similar to those here envisaged, but with apparently high salinity. Grade of metamorphism is not as high. Working in the same vicinity as Witt, Charoy and Pollard (1989) noted the close association between feldspathic alteration and concomitant silica depletion - termed episyenitization - and rare earth, uranium and tin-tungsten concentration.

The tungsten rich quartz vein deposits of Grey River, Newfoundland occur in Appalachian granitic gneisses and schists intruded by Devonian potassic granites. The age apart, this is a very similar environment, at rather lower metamorphic grade, to the Pythagoras area, and the minor element and trace element geochemistry reflect that (Higgins, 1985) (Table I).

The grade of metamorphism encountered by Bowles in the northwest Cape Province, South Africa, is akin to that found in the Pythagoras area. He found wolframite-scheelite bearing quartz veins within and concordant to the foliation of biotite schists in garnetiferous biotite granulite. Just north of the Orange River, in Namibia, the same metamorphic domain is host to Tantalum rich pegmatites within the Tantalite Valley meta-gabbro complex (Moore et al, 1979). Conditions of 525°C to 650°C at 5 kbar obtained.

12 CONCLUSIONS AND RECOMMENDATIONS

The common factor in those deposits quoted from the literature, or from personal observation elsewhere in the world, appears to be muscovite, which is here missing. Perhaps the metasomatism of this area was too potassic, or the water content of the proto-melt was too low, to allow deposition of these minerals.

Prior to embarking on the prospecting expedition, the metamorphic regime of the area was regarded as being probably too high grade to allow for the possibility of economic gold deposits. This view appeared to be supported by observations in the field. It was therefore a surprise to have encountered anomalous gold reinforced by anomalous arsenic values in the gossans. The two gold and their associated arsenic kicks require investigation.

The zinc anomaly in the gossan zone southeast of Harker Lake, requires some explanation, some investigation.

The lack of coarse grained (>2mm) primary micas in the Pythagoras area precluded following the guidelines of Moller and Morteani, who recommend analysis of white mica and feldspars from pegmatites, seeking high Ta, Cs, F, Li; low K/Rb ratio; high Ta/W ratio. However, one can look for certain of their criteria, such as intense albitization and potassic feldspar metasomatic growth in rocks of high temperature, low pressure metamorphism, within or close to orthoamphibolites in granite-greenstone terrane. There is generally a spatial and chemical relationship to coarse leuco-granites with low Fe, Ca, Mg contents, greater Li and Rb than other, "average" granites, low K/Cs, Th/U, and Al/Ga ratios and very low Mg/Li (<30) ratios.

The values returned from the NAA analysis are remarkably high in rare earths. The high soda, low lime values are consistent with tin-tungsten-tantalum mineralization patterns from elsewhere in the world. High metamorphic grade suggests that tungsten minerals, which are less sensitive to temperature-pressure regimes, or tantalum-rare earth minerals would be more expected than would tin minerals, but the high grade does not rule out relict tin.

There are almost fifty samples, carefully collected from potentially mineralized zones throughout the area, which have not been submitted for analysis. A source of funds should be sought for these analyses, if only for the sake of completion. Cost to analyze all samples by NAA for the 35 elements listed would be of the order of $3500 to $4000, preparation included.

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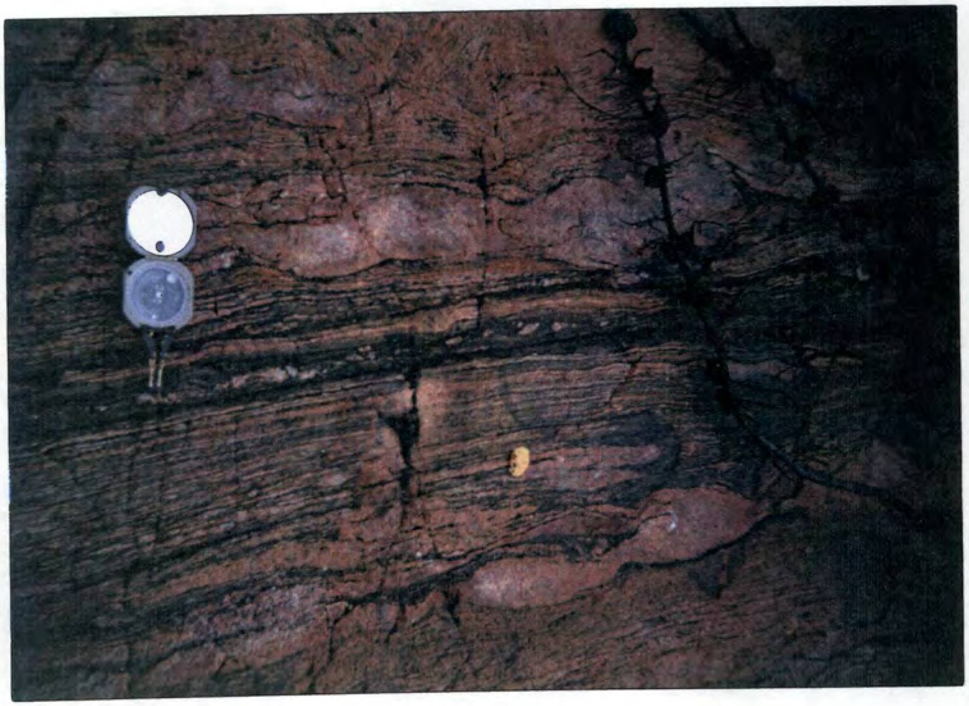


Plate I Typical exposure of the pink feldspar biotite gneiss. Bare Bottom Hill.

Plate II Dome and basin expression of a refolded fold in migmatites. Rico #2 at 75N 25W

Plate III Iron staining picking out the core of a refolded, folded pegmatite in migmatites - Rico #2 area, 60N 15W

Plate IV Classical "mushroom" on the nose of a fold: pegmatite to the right, amphibolite to the left. Rico #2 at 75N 20W.

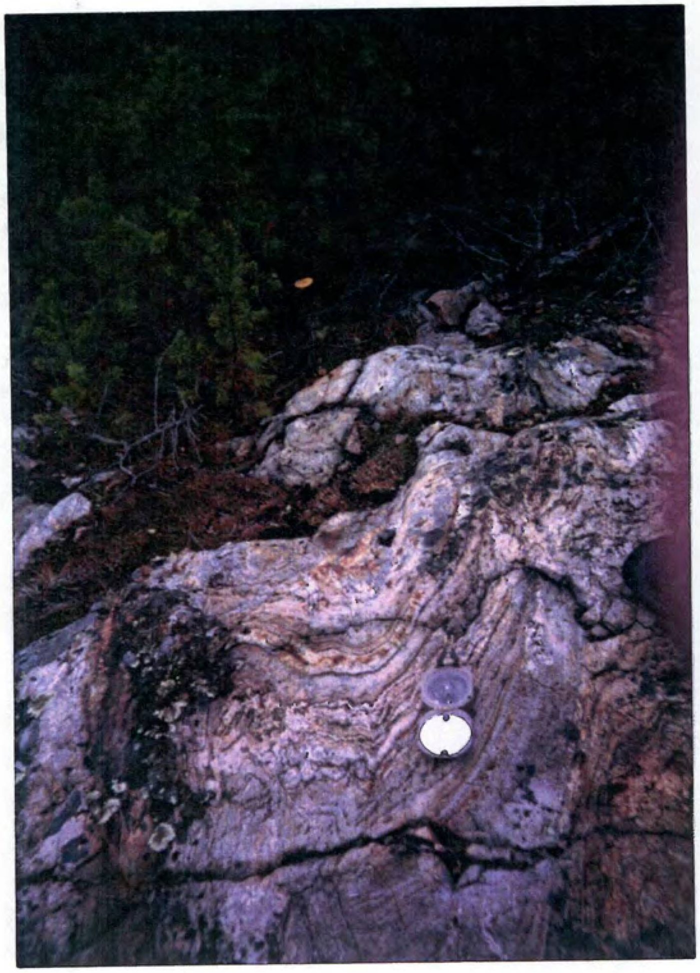


Plate V Tightly folded pegmatitic migmatites with garnet crystals confined to a different band. Southwest of Debbie Lake.

Plate VI Large unweathered garnets in pegmatitic zone. Rico #1.

Plate VII White coarse grained pegmatite on the right invading grey biotitic migmatites. Note the large (150mm) feldspar crystal to the right and below the scale. North Debbie Lake.

Plate VIII Pinch and swell structure of a pegmatite in migmatites. Debbie Lake.

Plate IX Gossan zone in migmatites - Debbie Lake South.

Plate X Gossan within a tightly folded migmatite. Rico #2 at 70N 15W.

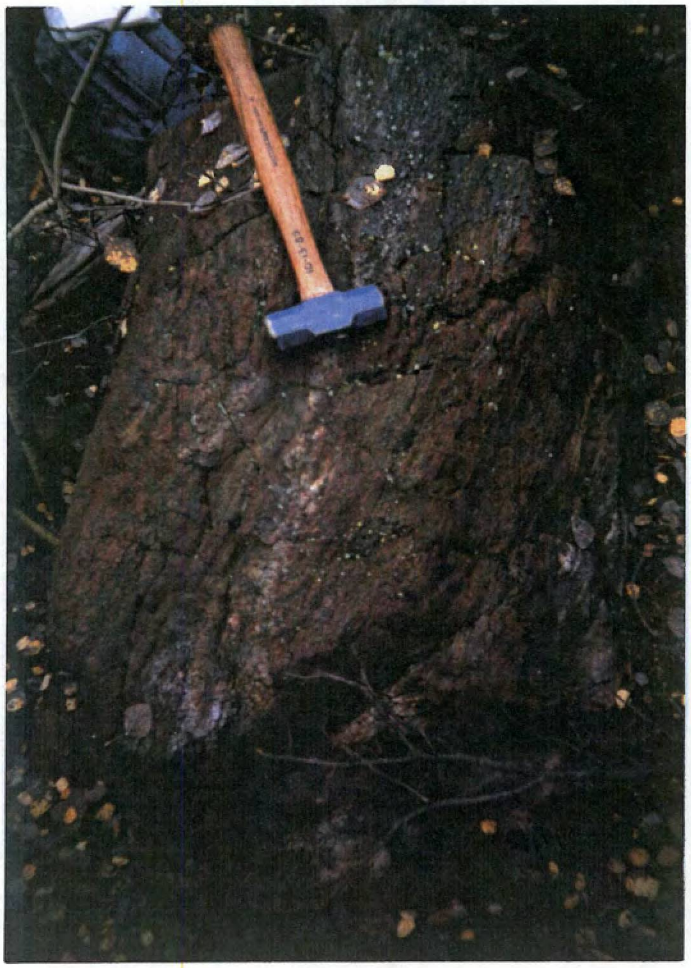


Plate XI   Erratic gossan boulder. Eddie's Gossan.

Plate XII White lichen following the suboutcrop of a thin pegmatite band in migmatites - southwest of Debbie Lake.

14 APPENDICES

14.1 Analytical Certificates

Activation Laboratories Ltd. Work Order: 2160 Report: 2158

Sample description	AU	AG	AS	BA	BR	CA	CO	CR	CS	FE	HF	HG	IR	MO	NA	NI	RB	SB	SC	SE	SN
	PPB	PPM	PPM	PPM	PPM	%	PPM	PPM	PPM	%	PPM	PPM	PPB	PPM	PPM	PPM	PPM	PPM	PPM	PPM	%
13551	<5	<5	<2	960	<1	<1	<5	260	4	4.17	7	<1	<5	<5	9430	<50	190	<0.2	16	<5	<0.02
13552	7	<5	3	480	<1	<1	5	430	<2	3.91	3	<1	<5	7	15600	<50	110	<0.2	11	<5	<0.02
13557	54	10	19	920	<1	<1	<5	160	<2	5.35	7	<1	<5	<5	9240	<50	200	<0.2	16	<5	<0.02
13561	11	<5	6	920	<1	2	6	280	2	3.63	5	<1	<5	<5	20500	<50	180	<0.2	11	<5	<0.02
13563	8	<5	<2	690	<1	<1	11	250	<2	5.60	11	<1	<5	17	10600	<50	130	0.4	13	<5	<0.02
13632	30	<5	93	<100	<1	<1	7	230	4	4.14	8	<1	<5	<5	28300	<50	220	<0.2	19	<5	<0.02
13681	<5	<5	3	590	<1	<1	<5	250	2	6.24	7	<1	<5	9	5330	<50	130	<0.2	14	<5	<0.02
13683	52	<5	44	550	<1	<1	<5	310	<2	5.28	5	<1	<5	<5	3740	<50	160	<0.2	18	<5	<0.02
13692	<5	<5	<2	700	<1	<1	11	340	<2	5.21	6	<1	<5	12	24300	<50	200	0.4	14	<5	<0.02
13698	10	<5	<2	890	<1	<1	15	210	3	13.8	18	<1	<5	<5	14200	<54	150	<0.2	40	<5	<0.03

Activation Laboratories Ltd. Work Order: 2160 Report: 2158

Sample description	SR	TA	TH	U	W	ZN	LA	CE	ND	SM	EU	TB	YB	LU
	%	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM	PPM
13551	<0.05	<1	23	4.5	<4	103	40	84	24	4.4	0.7	<0.5	1.91	0.41
13552	<0.05	<1	32	7.5	<4	149	60	120	53	8.4	0.9	1.5	3.99	0.66
13557	<0.05	3	22	3.2	<4	<50	44	94	30	5.0	1.1	<0.5	1.30	0.20
13561	<0.05	<1	20	4.2	<4	<50	42	86	33	4.4	1.5	<0.5	0.97	0.18
13563	<0.05	<1	27	<0.5	<4	<50	53	100	42	6.3	1.2	<0.5	0.82	0.25
13632	<0.05	<1	23	4.9	<4	138	48	95	41	6.2	1.1	<0.5	2.17	0.35
13681	<0.05	<1	23	3.4	<4	93	43	87	37	5.3	1.0	<0.5	1.21	0.24
13683	<0.05	<1	28	4.1	<4	171	50	95	37	5.9	0.9	<0.5	1.15	0.25
13692	<0.05	<1	23	4.7	<4	225	37	74	26	4.2	1.0	<0.5	1.46	0.26
13698	<0.05	3	33	5.4	<4	1080	68	130	45	8.4	1.5	1.5	4.49	0.82

14.2 Personnel Involved

Ed J. Friesen, P. Eng. — Project Leader
Box 1233
High River, AB
T0L 1B0

Dr. Adrian G. Mann, P. Geol. — Senior Geologist
[redacted]
Calgary, AB
T2W 3G9

Agerico A. Cadiz, — Geologist/Mining Engineer
[redacted]
Calgary, AB
T2P 2B5

14.3 Detail of Expenditures

The attached schedule represents the time invested in the project. Note that the three personnel were logged at two different rates, depending on whether they were performing professional or mundane tasks. No actual expenditure for staff time was incurred, but a value for that time at standard rates is given.

The second schedule details all expenditures for the project.

TRAVEL:

CALGARY TO FT. MCMURRAY---1600KM @ $.35/KM (RETURN)	$568.00
TRAILER RENTAL	$100.00
AIRCRAFT CHARTER--CONTRACT CHARTER	$2,520.00

EQUIPMENT:

TRAILER HITCH	$403.90
TENT	$150.00
WALKIE-TAKIES	$81.20
CAMERA EQUIPMENT	$162.00
POWER SAW	$112.50
EM 16 VLF UNIT--RENTAL NOBLE PEAK RESOURCES	$1,000.00
COMPASSES ETC--RENTAL SPS GEOTEC SUPPLIES	$1,000.00
SUNDRIES	$120.84
FIRST AID KIT	$64.91

PROVISIONS:

FOOD		$322.50
FUEL		$300.00
PERSONNEL PROFESSIONAL	PER SCHEDULE	$20,200.00
PERSONNEL TECHNICAL	PER SCHEDULE	$7,680.00
ANALYSES BARRINGER--ACTIVATION LABS		$212.50
ENERGY MINES OF CANADA		$14.00
ALBERTA AIR PHOTOS		$70.00
XEROX--COLOUR PLATES 5 SETS		$90.80
STATIONARY & PUBLICATIONS		$150.00
	TOTAL EXPENDITURES	$35,323.15

15 CERTIFICATION

I, the undersigned, certify that:

15.1 I am a graduate of the Universities of London, England and Witwatersrand, South Africa;

15.2 I hold the degrees of Ph.D., M.B.A., B.Sc.(Special Geology)(Honours);

15.3 I am a member in good standing of:-
the Society of Economic Geologists,
the Geological Societies of South Africa and Zimbabwe,
the Institution of Mining and Metallurgy,
the Canadian Institute of Mining and Metallurgy;

15.4 I am registered:
in Alberta as a Professional Geologist,
in Britain as a Chartered Engineer;

15.5 I have practised as a geologist continuously since first I graduated in 1965 in central and southern Africa, south and north America;

15.6 The data on which this report is based derives from
a study of the quoted literature;
a field visit from 15 to 23 September 1990 in which information was collected by myself and my associates, who worked under my close supervision;
consideration of the analytical results of the samples and readings taken during that visit;

15.7 the stated expenditures are a true representation of those incurred by and on behalf of E.J. Friesen & Associates Inc. in the exploration of the permit during the period stated;

15.8 the work presented in this report is a fair and honest reflection of my understanding of the geology of the permit area; but as part owner of the permit, I have a vested interest in the property under study.

30/12/90

ADRIAN G MANN P.Geol., Ph.D.
31 December, 1990
Calgary, Alberta

16 MAPS

General Geology of the Permit

Lake Debbie - Detailed Geology

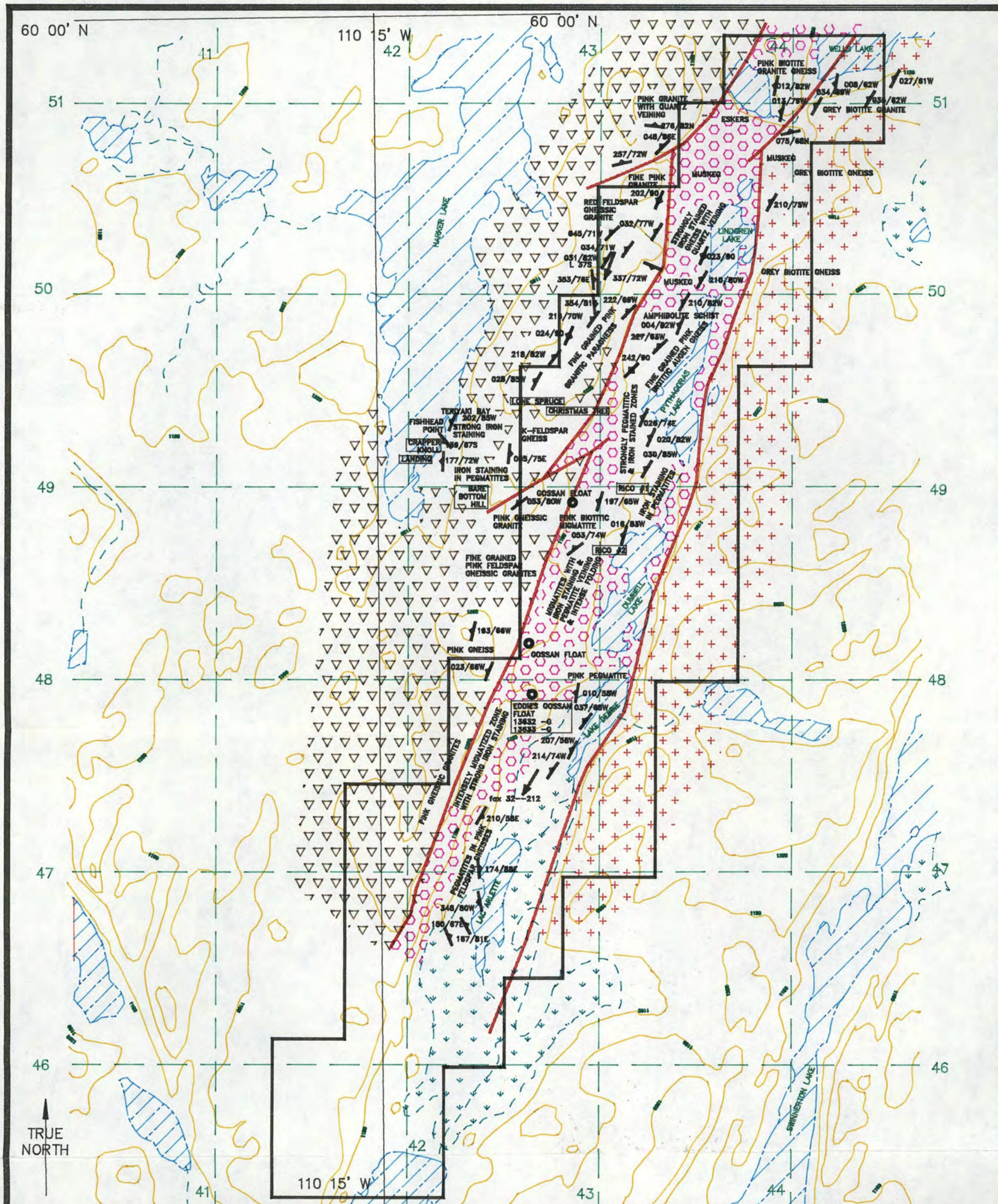
Lac Arlette Area - Detailed Geological Map

Harker Lake - Crapper Exposure - Detailed Geological Map

Harker Lake - Landing Exposure - Detailed Geological Map

Rico #1 Block - Detailed Geology

Rico #2 Block - Detailed Geology



PINK BIOTITE GNEISS		LAKE
GREY BIOTITE GNEISS		RIVER
PEGMATITIC GNEISS		SWAMP/MUSKEG
FAULT		
177/85W	FOLIATION – Shewing Strike/Dip	
54 -> 321	LINEATION – Shewing Direction/Plunge	

SCALE

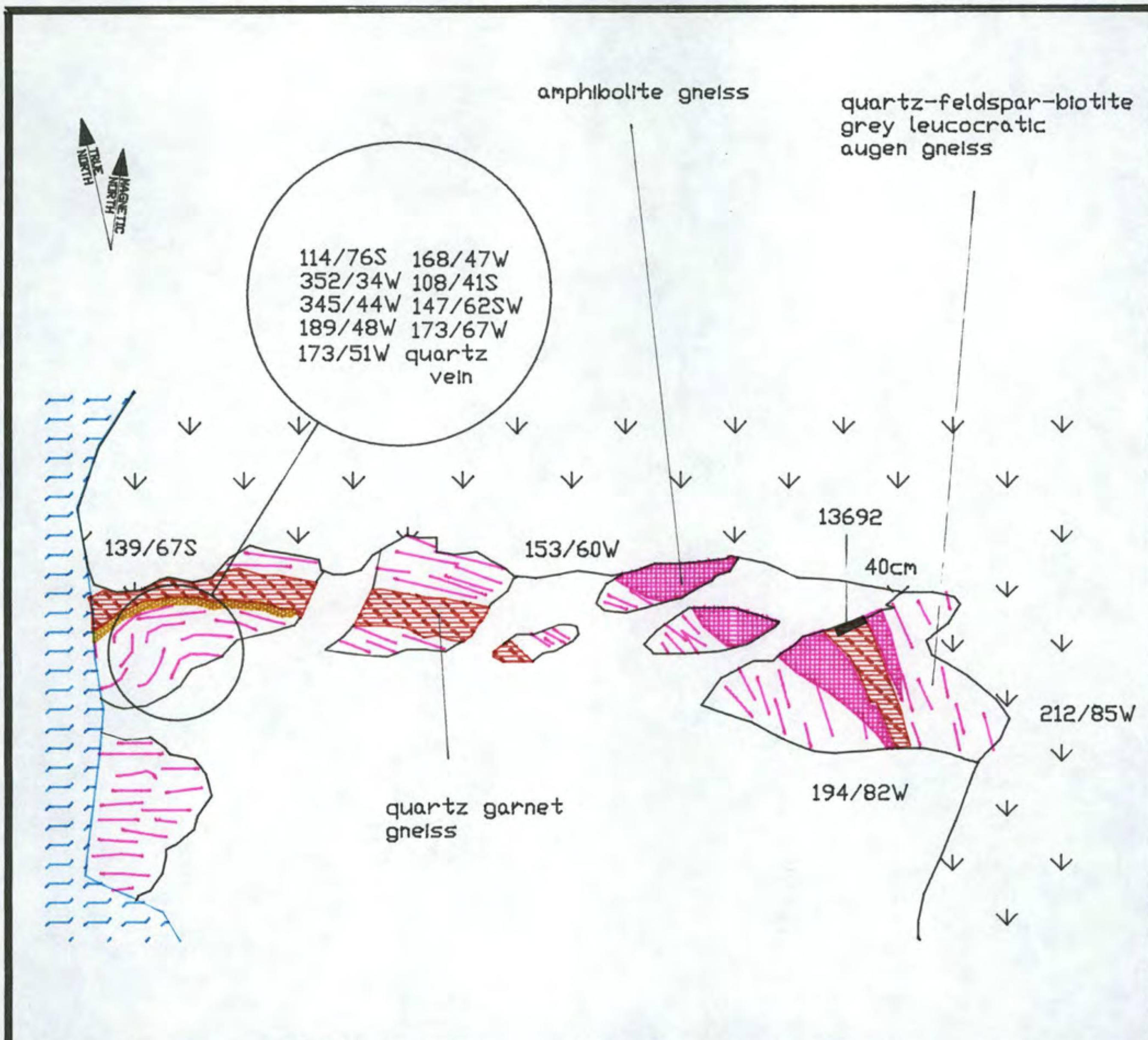
0m 500 1000m

E.J.Friesen & Associates Inc.
Calgary Alberta

TITLE
PYTHAGORAS LAKE AREA GENERAL GEOLOGY OF THE PERMIT

DRAWN BY	CHECKED BY	DATE
A MANN & E A CADIZ		21 9 90
APPROVED BY	DATE	REVISION NO
PROJECT NUMBER	SCALE	CAD FILE
900801		PY1000F
DRAWING NO.		NTS
E:\900801\PY1000F		74M/16

PROFESSIONAL GEOLOGIST
ADRIAN MANN
ALBERTA



	PEGMATITE	177/85W	FOLIATION - Shewing Strike/Dip
	IRON STAINED SELVAGE		
	QUARTZ	54 -> 321	LINEATION - Shewing Direction/Plunge
	MAFIC BANDING		
	AMPHIBOLITE	13697 60cm	SAMPLE NUMBER - Shewing Thickness

SCALE

0 1 2 3 4 5m

LAKE

RIVER

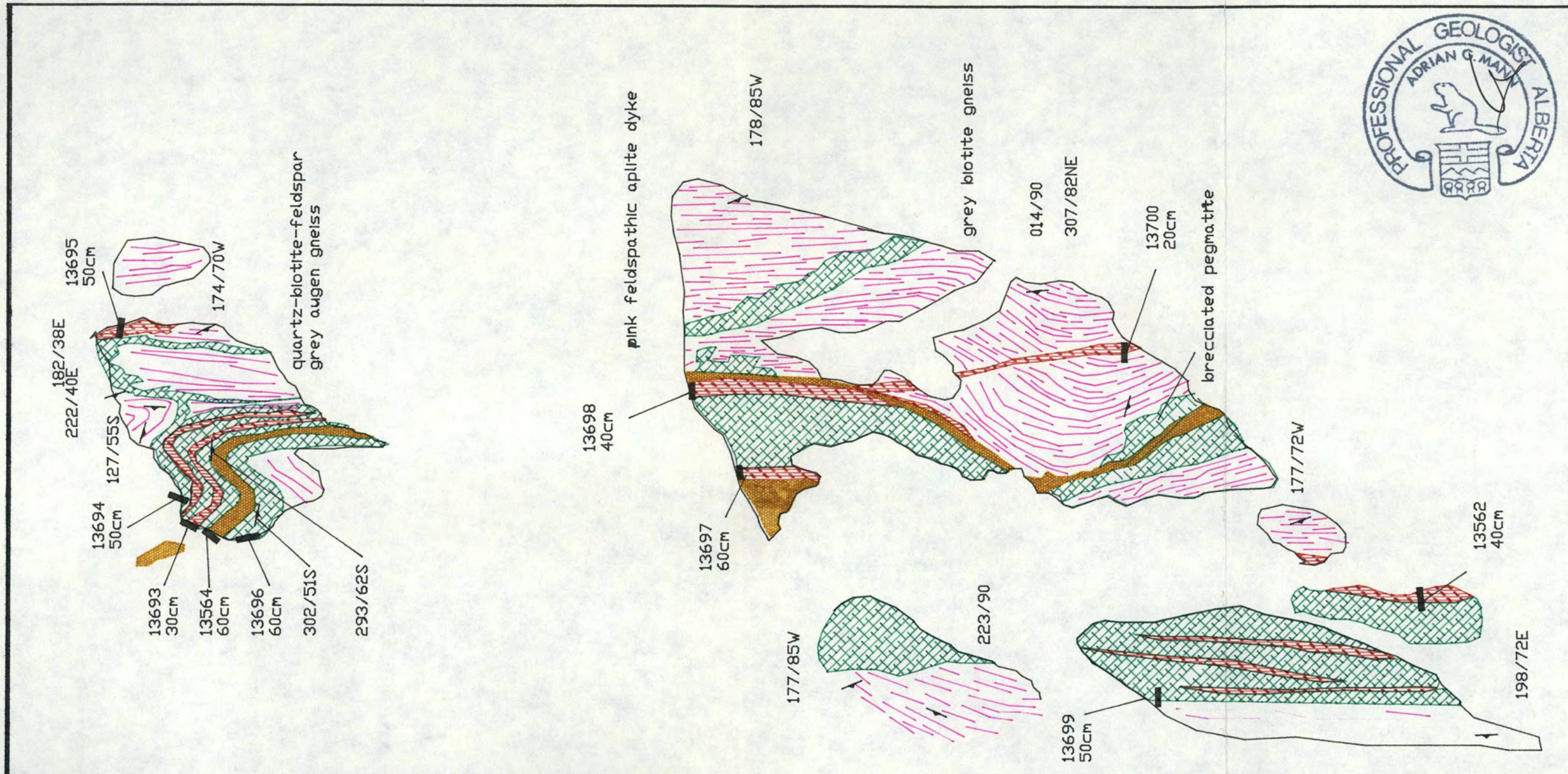
SWAMP/MUSKEG

E.J.Friesen & Associates Inc.
Calgary Alberta

TITLE
HARKER LAKE
LANDING AREA - CRAPPER EXPOSURE
DETAILED GEOLOGICAL MAP

MAPPED BY	MAP METHOD	DATE
A G MANN	MINIGRID	1990 Sept 20
DRAWN BY	CHECKED BY	CAD FILE
A G MANN	E A CADIZ	CRAPPER
PROJECT NUMBER 900801		DATE 1990 Oct 12
DRAWING NO. E:/90081/CRAPPER		

PROFESSIONAL GEOLOGIST ADRIAN G. MANN ALBERTA



177/85W ...ATION
- Shewing Strike/Dip

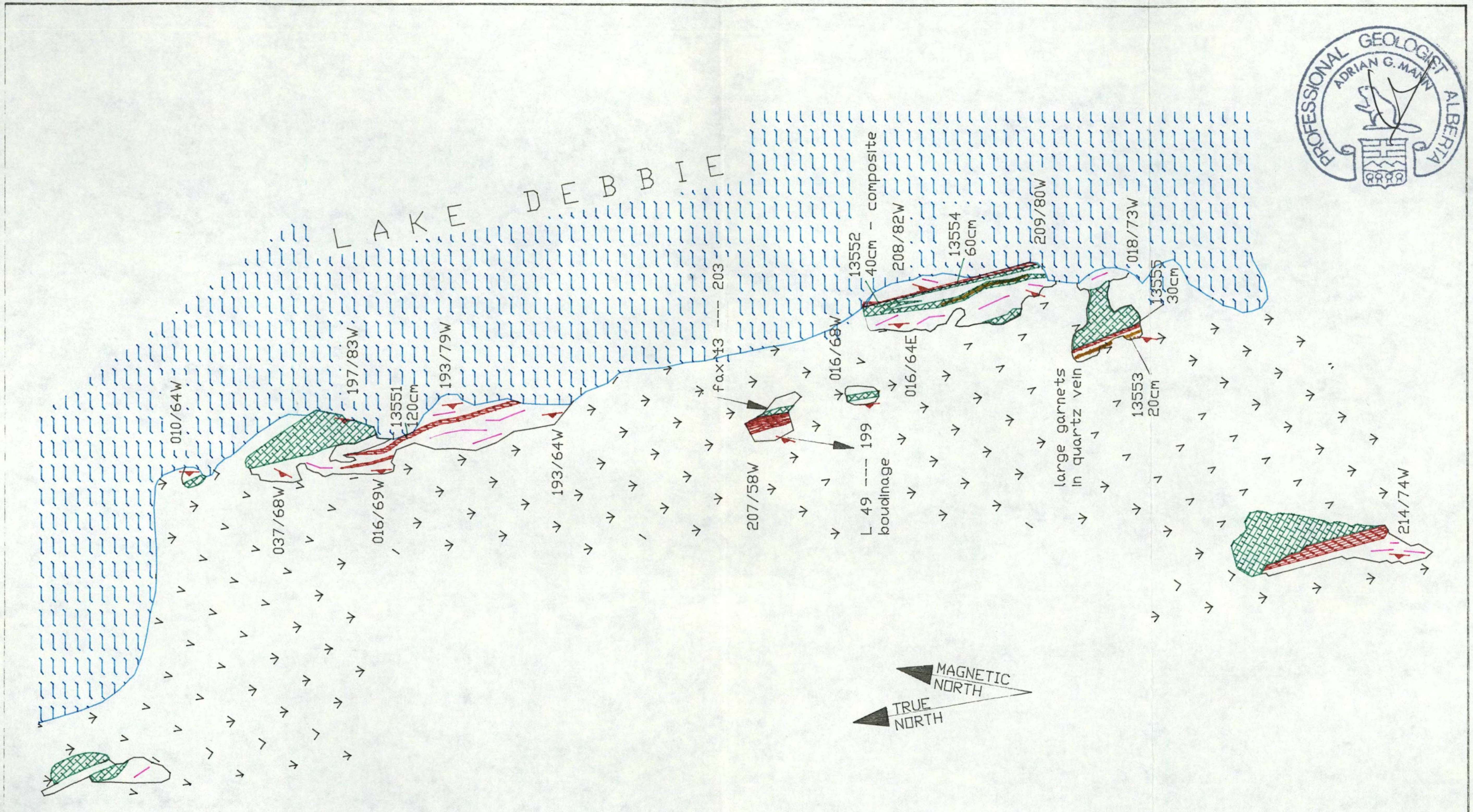
54 -> 321 LINEATION
- Shewing Direction/Plunge

13697
60cm SAMPLE NUMBER
- Shewing Thickness

SCALE
0m 1 2 3 4 5 6m

E.J.Friesen & Associates Inc.
Calgary Alberta

TITLE HARKER LAKE LANDING AREA - LANDING EXPOSURE DETAILED GEOLOGICAL MAP		
MAPPED BY A G MANN	MAP METHOD MINIGRID	DATE 1990 Sept 21
DRAWN BY A G MANN	CHECKED BY E A CADIZ	CAD FILE LANDING
PROJECT NUMBER 900801		DATE 1990 Oct 05
DRAWING NO. E1/90081/LANDING1		REV.



PROFESSIONAL GEOLOGIST
ADRIAN G. MANN
ALBERTA

PEGMATITE

IRON STAINED SELVAGE

QUARTZ

MAFIC BANDING

AMPHIBOLITE

177/85W FOLIATION
- Shewing Strike/Dip

54 -> 321 LINEATION
- Shewing Direction/Plunge

13697 60cm SAMPLE NUMBER
- Shewing Thickness

LAKE

RIVER

SWAMP/MUSKEG

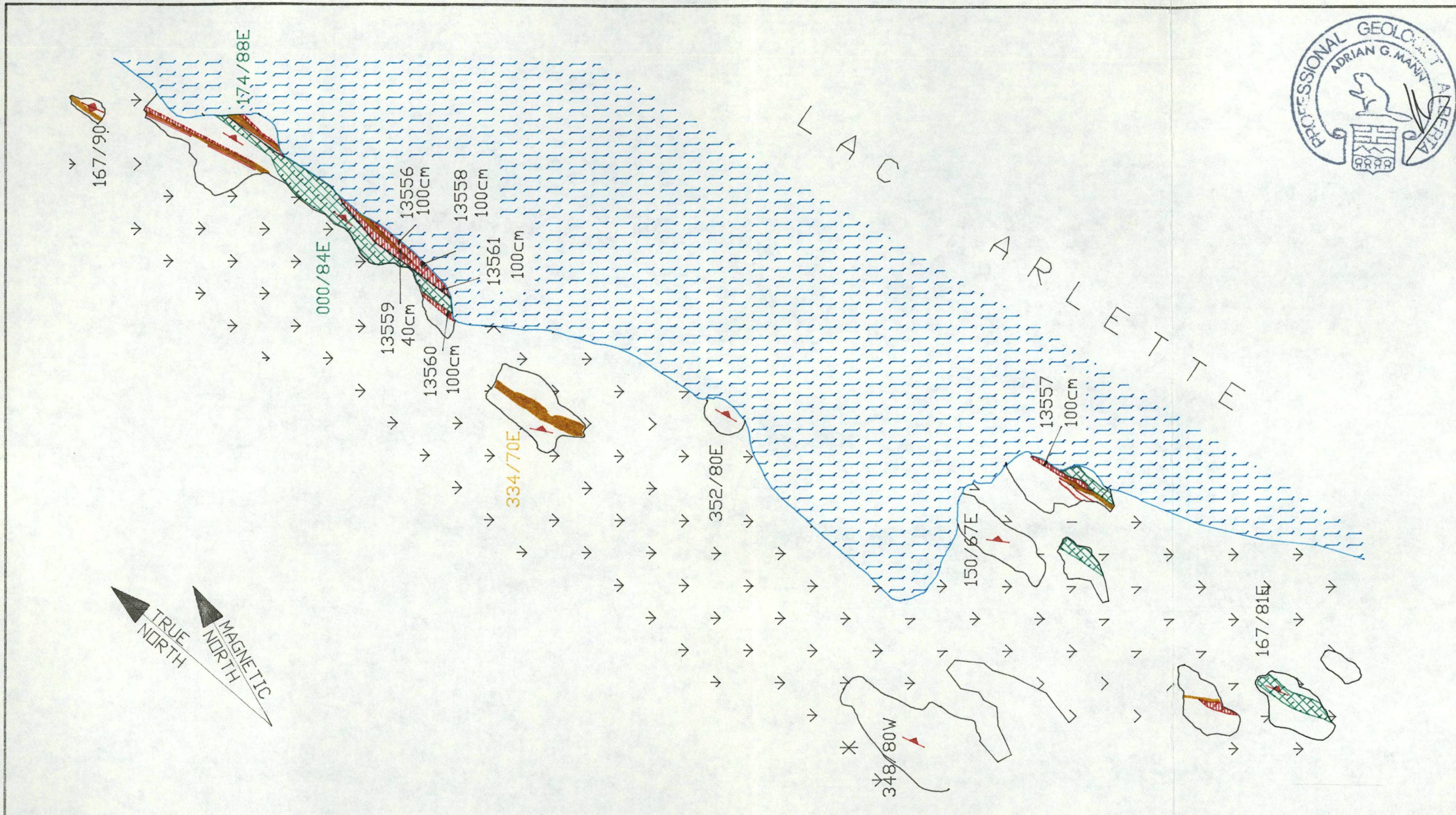
Professional Stamp

SCALE

0 10 20 30 40 50m

E.J.Friesen & Associates Inc.
Calgary Alberta

TITLE LAKE DEBBIE DETAILED GEOLOGY	
SCALE	DATE
DRAWN BY A MANN	CHECKED BY	CAD FILE DEBBIE
PROJECT NUMBER 900801	DATE 26.11.90
DRAWING NO. E:\900801\DEBBIE	REV.



EXPLANATION:

PEGMATITE

IRON STAINED SELVAGE

QUARTZ

MAFIC BANDING

AMPHIBOLITE

177/85W FOLIATION - Shewing Strike/Dip

54 -> 321 LINEATION - Shewing Direction/Plunge

13697 60cm SAMPLE NUMBER - Shewing Thickness

LAKE

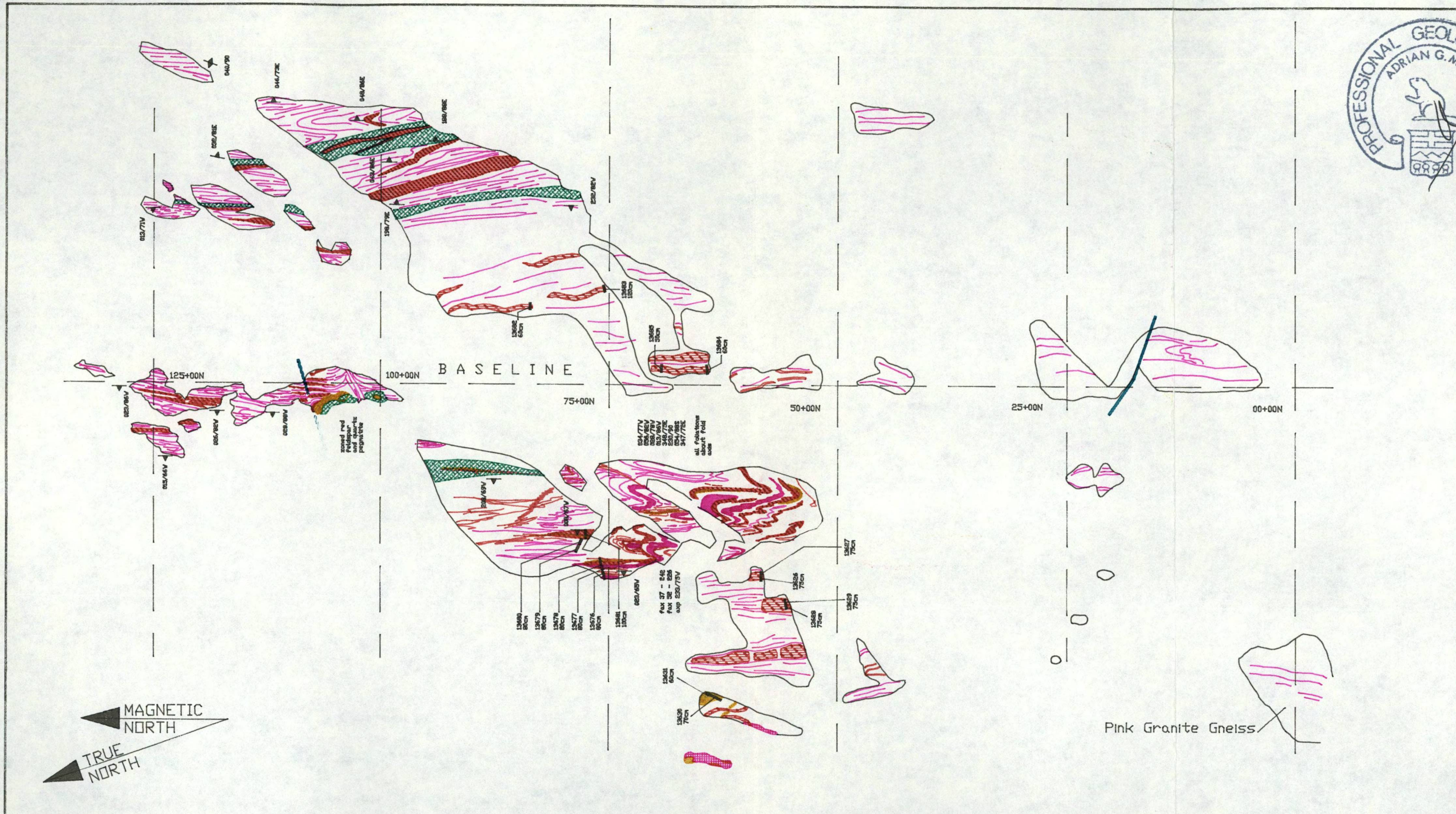
RIVER

SWAMP/MUSKEG

SCALE

E.J.Friesen & Associates Inc.
Calgary Alberta

TITLE		
LAC ARLETTE AREA DETAILED GEOLOGICAL MAP		
DRAWN BY A MANN	CHECKED BY	DATE 26.9.90
APPROVED BY	DATE	REVISION NO
PROJECT NUMBER 900801	SCALE	CAD FILE POUPEE
DRAWING NO. E:\900801\POUPEE		NTS 74M/16



EXPLANATION:

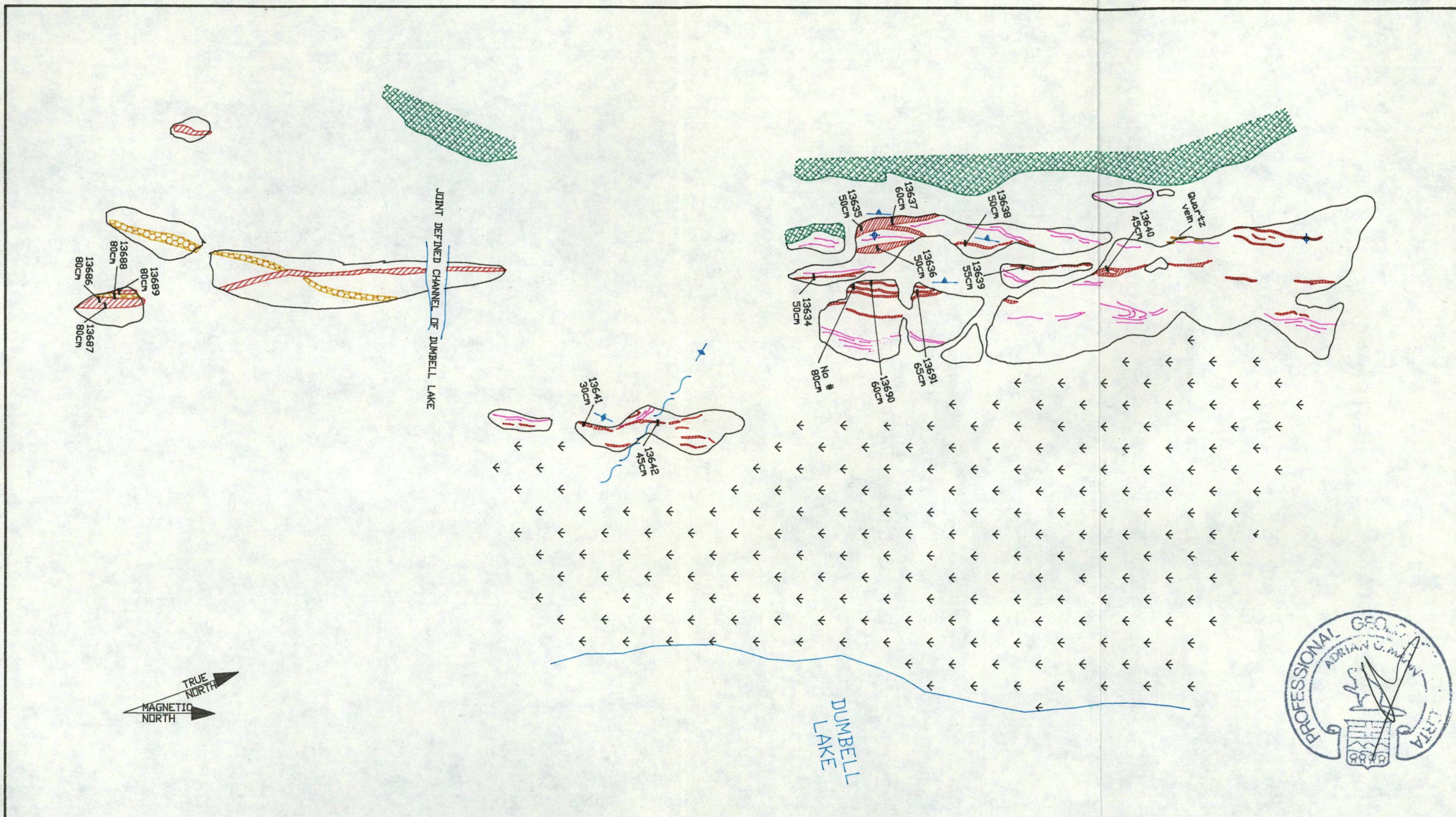
PEGMATITE	177/85W	FOLIATION - Shewing Strike/Dip		LAKE	
IRON STAINED SELVAGE					
QUARTZ	54 -> 321	LINEATION - Shewing Direction/Plunge		RIVER	
MAFIC BANDING					
AMPHIBOLITE	13697 60cm	SAMPLE NUMBER - Shewing Thickness		SWAMP/MUSKEG	

SCALE

0m 5 10 15 20m

E.J.Friesen & Associates Inc.
Calgary Alberta

TITLE RICO # 1 BLOCK DETAILED GEOLOGY		
DRAWN BY A MANN & E A CADIZ		DATE 9.9.90
APPROVED BY	DATE	REVISION NO
PROJECT NUMBER 90081	SCALE	CAD FILE RICO1ALL
DRAWING NO. E:\900801\RICO1ALL		NTS 26.11.90



EXPLANATION:

PEGMATITE	177/85W	FOLIATION - Shewing Strike/Dip	LAKE
IRON STAINED SELVAGE			
QUARTZ	54 -> 321	LINEATION - Shewing Direction/Plunge	RIVER
MAFIC BANDING			
AMPHIBOLITE	13697 60cm	SAMPLE NUMBER - Shewing Thickness	SWAMP/MUSKEG

SCALE

10 5 0 10 20m

E.J.Friesen & Associates Inc.
Calgary Alberta

TITLE
RICO #2 ZONE
DETAILED GEOLOGICAL MAPPING

DRAWN BY	CHECKED BY	DATE
EAC/AGM		20/09/90
APPROVED BY	DATE	REVISION NO
PROJECT NUMBER 90081	SCALE 1:1000	CAD FILE RICO2BPL
DRAWING NO. E:\900801\RICO2BPL		NTS 74M/16