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ABMINCO N.L.

YEAR END REPORT - QUEEN HILL

Consolidated Lease 43M/73

and surrounding

Exploration Licence 47/71

Year ending 23/11/1976

D.C. Simpson

May 1977

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SUMMARY

The objective of the year's work was to test the source of an airborne magnetic anomaly occurring within a horizon prospective for cassiterite sulphide mineralisation.

A programme of ground magnetics, to define the airborne anomaly, was carried out. Following interpretation of the data from the survey, one diamond hole was drilled to test the source of the anomaly.

Drilling showed that the anomaly was caused by disseminated pyrrhotite over an intersection width of 111 metres. This section averaged 0.25% Sn_c which included a 23m section of zero grade (unsampled). Within this zone is a 5.65m section averaging 1.95% Sn_c. The cassiterite is fine grained, being less than 50μ in diameter. No stannite appears to accompany the mineralisation.

Drilling also established the existence of a second stratigraphic horizon prospective for cassiterite sulphide bodies. In the position drilled, this horizon is over 150m thick.

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INTRODUCTION

Ownership

Consolidated Mineral Lease 43M/73 (141 hectares) held by Gippsland Minerals N.L.

Surrounding this lease is Exploration Licence 47/71 of 24 square kilometres held by Gippsland Minerals N.L. and current to December 21, 1976. An area of 5 square kilometres was added to this licence during the year.

To the north and west of this area are two further Exploration Licences, EL 22/73 of 76 square kilometres (St. Dizier) and EL 13/76 of 22 square kilometres (Heemskirk), both held by Abminco N.L.

Renewal dates are: E.L. 22/73 - December 17, 1976
E.L. 13/76 - April 26, 1977

Six Mineral Leases surrounding CML 43M/73 were pegged in early November 1976 and await processing by the Mines Department.

Was this done?

To increase the security of tenure within the Consolidated Lease, application was made by the Mines Department on our behalf to have all abandoned private land* resumed by the Lands Department and converted to Crown Land. Under the Mining Act the lessee (i.e. Gippsland Minerals N.L.) would then have full rights to the land.

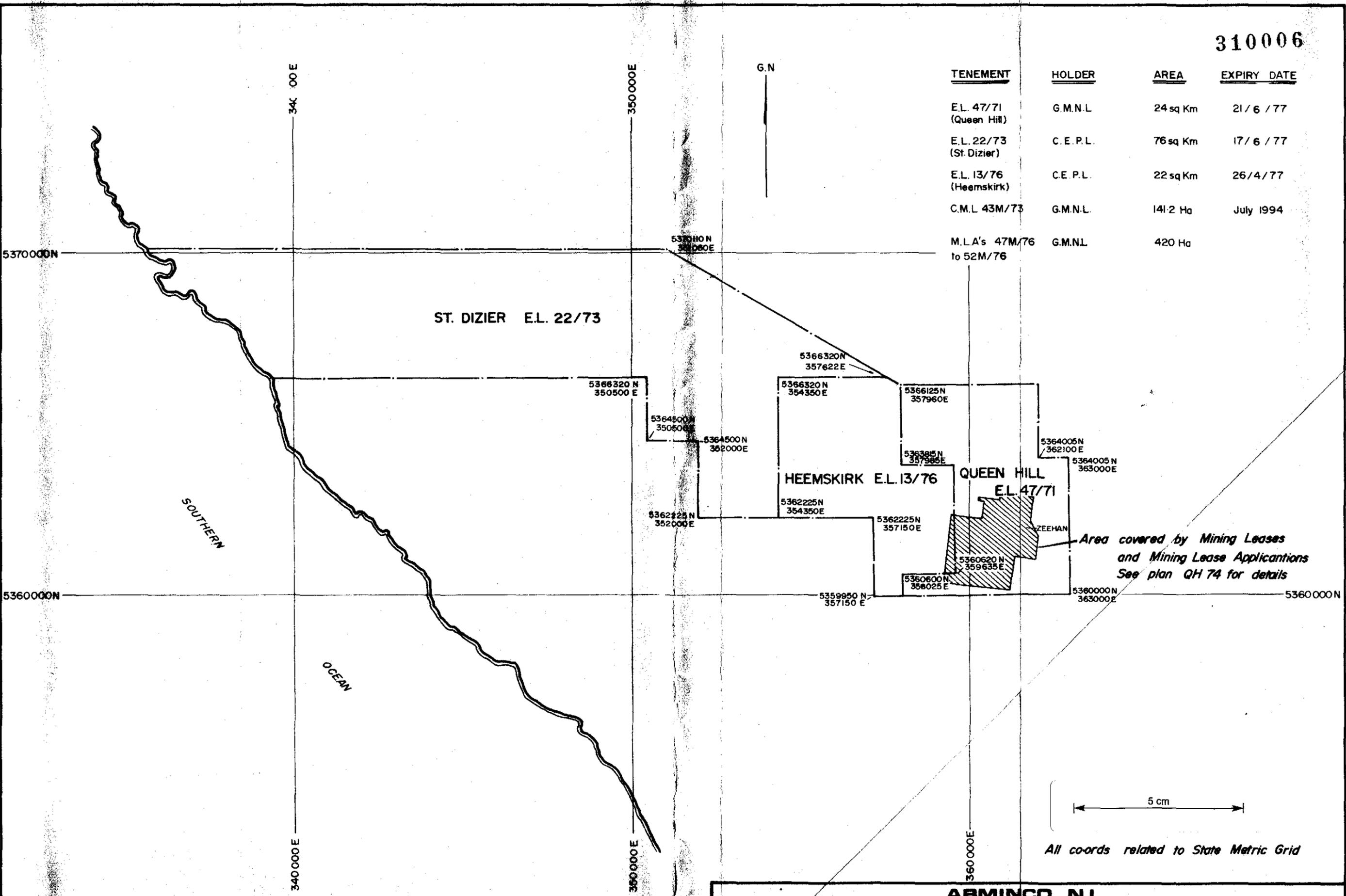
Following granting of the six leases recently applied for, a similar application will be made to have any remaining abandoned land within those leases reverted to the Crown for subsequent inclusion in the Mineral Leases.

The Consolidated Mineral Lease and EL 47/71 are the subject of a joint venture agreement between Gippsland Minerals N.L. and Cominco Exploration Pty. Ltd. for Abminco N.L., whereby Abminco has increased its equity to a maximum of 60% (as allowed under the agreement). At present the terms of the agreement are being re-negotiated to:

*Abandoned land is defined as private land which is unoccupied and has not had rates paid on it for six years or more.

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TENEMENT	HOLDER	AREA	EXPIRY DATE
E.L. 47/71 (Queen Hill)	G.M.N.L.	24 sq Km	21/6/77
E.L. 22/73 (St. Dizier)	C.E.P.L.	76 sq Km	17/6/77
E.L. 13/76 (Heemskirk)	C.E.P.L.	22 sq Km	26/4/77
C.M.L. 43M/73	G.M.N.L.	141.2 Ha	July 1994
M.L.A's 47M/76 to 52M/76	G.M.N.L.	420 Ha	

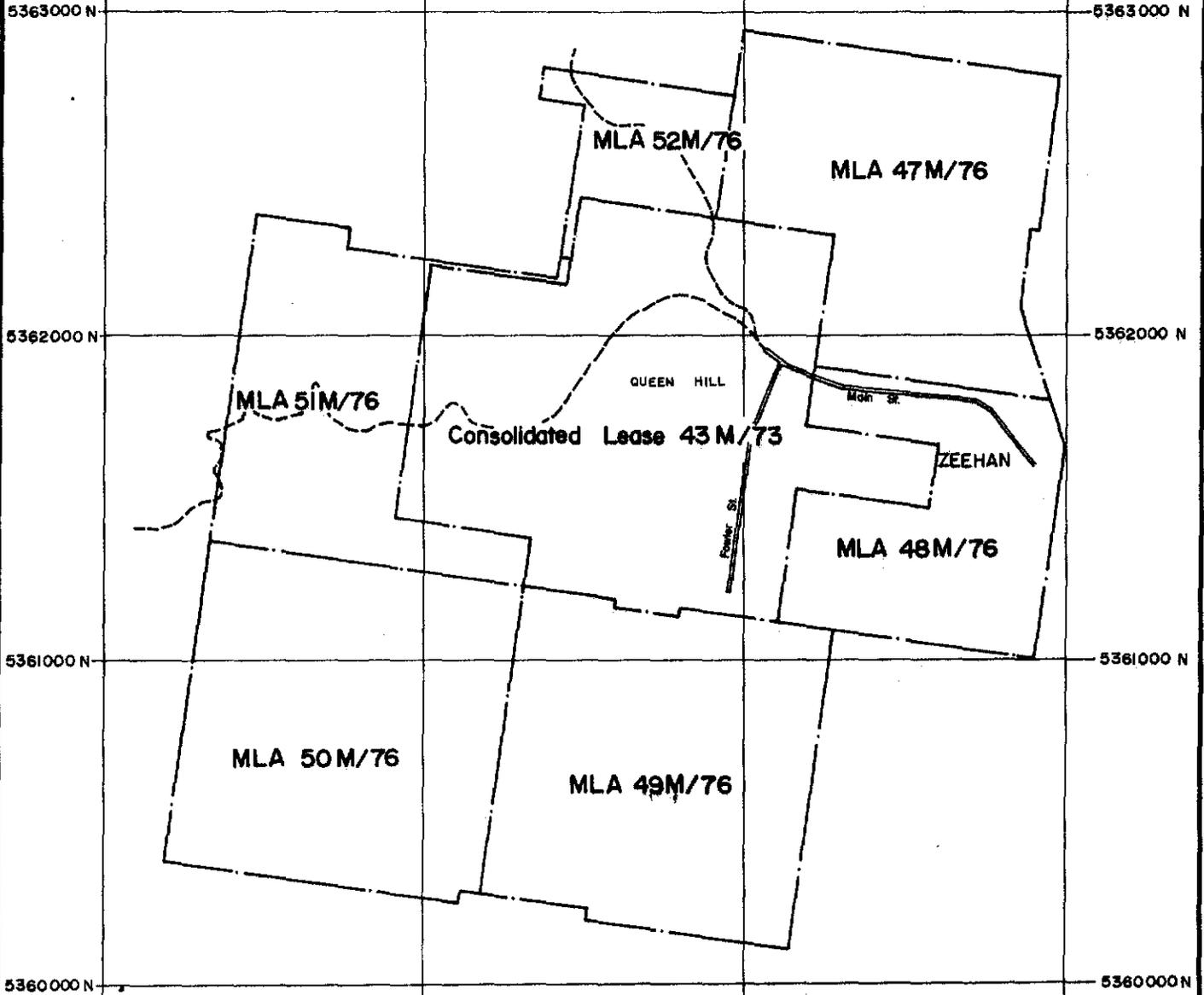
Area covered by Mining Leases and Mining Lease Applications
See plan QH 74 for details

All coords related to State Metric Grid

ABMINCO N.L.	
Drawn: RKY	ST. DIZIER - QUEEN HILL AREA Location of Tenements
Traced:	
Checked:	
Revised: Date:	
Location code:	
Scale: 1:100,000	
Date: January 1977	
Plate N°: QH 75	

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ABMINCO N.L.

Drawn: RKY	QUEEN HILL - ZEEHAN AREA LOCATION OF MINERAL LEASES	Location code:
Traced:		Scale: 1:20,000
Checked:		Date: January 1977
Revised: Date:		Plate N° QH 74

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- 1) allow the incorporation of the remaining Exploration Licences into the joint venture;
- 2) allow continuation of the exploration programme without the formation of an operating company.

Under the proposed modified agreement Abminco may increase its equity to 70%.

Location

Latitude 41°52'S Longitude 145°19'E

Queen Hill is adjacent to Zeehan township. The exploration licences extend north and west from this area.

Previous Exploration

- 1953 Geophysics: BMR
- 1963 - 1964 Clutha (Placer) drilling - 1 hole down dip at Queen Hill
- 1964 - 1965 BMR further geophysics
- 1969 - 1971 Gippsland Minerals diamond drilling
- 1971 - 1976 CEPL diamond drilling.

Previous Production

Queen Hill-Zeehan Queen

16,532 tons Pb, 1,973,746 oz. Ag from 36,725 tons ore.

Stormsdown - 5.27 tons Sn

Surrounding E.L. 47/71

Major producers were:

- Zeehan Montana 49,580 tons Pb, 7,058,122 oz. Ag.
Tons of ore mined unknown.
- Zeehan Western 26,300 tons Pb, 4,800,000 oz. Ag from 50,384 tons ore
- Montana Silver Lead 2,304 tons Pb, 279,348 oz. from approx. 43,700 tons ore

Objective

Work was directed to defining and testing the source of a magnetic anomaly within a sequence of dolomitic rocks to the east of Queen Hill.

EXPLORATION AND DEVELOPMENT

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Metallurgical Testing

A programme of metallurgical research is being conducted by Mr. K.A. Foo of Aberfoyle Management Pty. Ltd. on cassiterite-sulphide ores. Part of this work is on ore from Queen Hill.

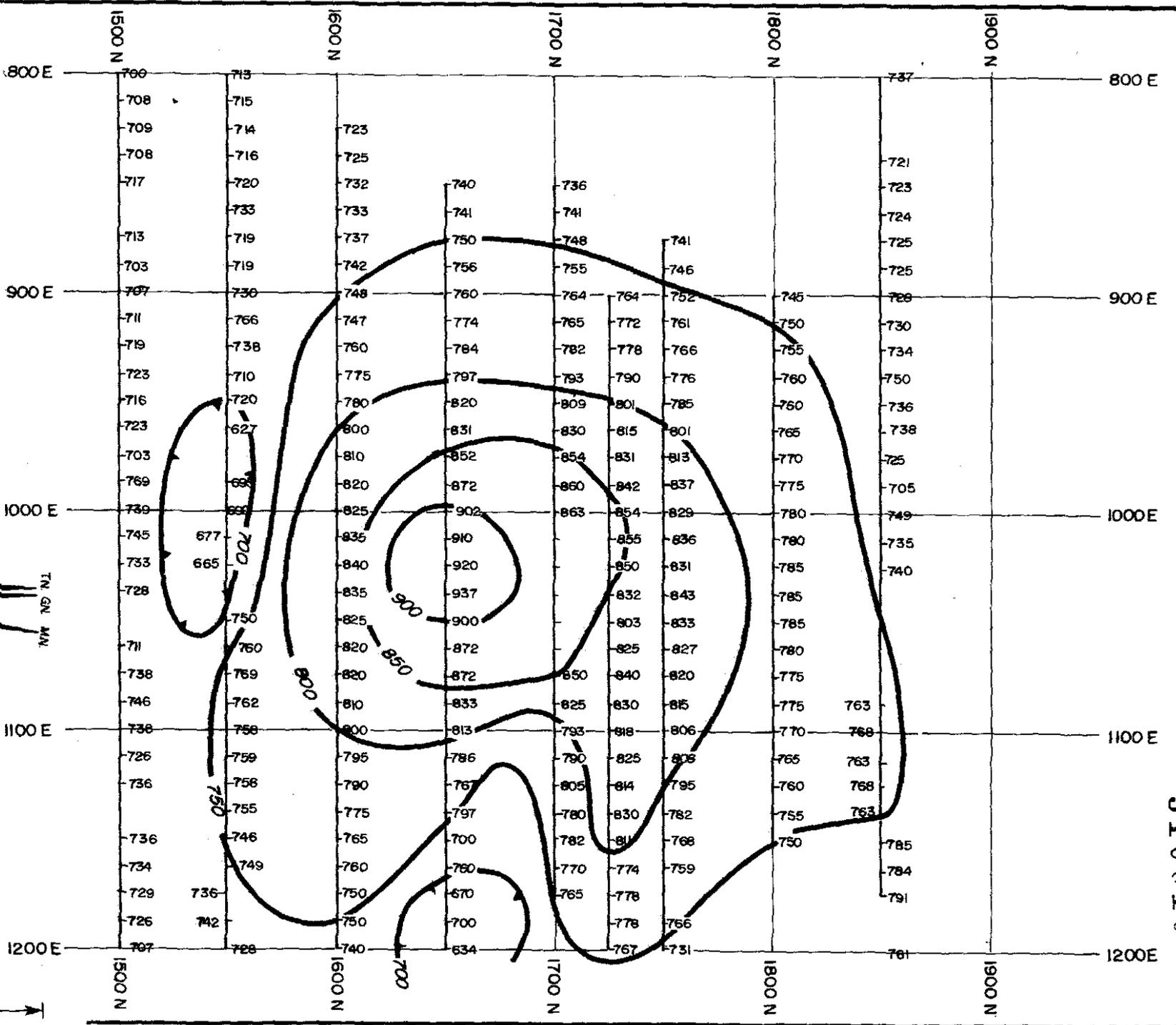
Geophysics

A ground magnetic survey was carried out at Queen Hill to delineate a magnetic anomaly obtained from an airborne survey conducted several years before (and flown primarily as a Turair survey). The ground survey, using a proton magnetometer was carried out on 9 east-west lines at 50m spacings from 1500N to 1950N, with 12.5m station spacing, giving a total of 4.5 line kilometres. Extra caution was exercised in taking readings as approximately half the survey area is within the town of Zeehan. Readings in many cases were taken offline in order to reduce the effect of scrap iron, buildings, etc. No influence from low or high voltage power lines was noted during the survey.

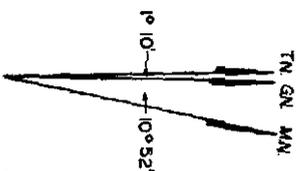
Diurnal Control for the survey was by the use of a base line tie to the cross line.

The corrected results are shown on Plate QH 65. As seen from the plan, a roughly circular anomaly is located with a centre at 1650N 1030E. The relationship of the ground magnetic results to the results of the airborne programme can be seen by comparing Plates QH 30b and 65. It will be noted from the airborne magnetic map that the anomaly is about 150 γ above regional background. Also on this plate can be seen a lobe on the western side of the circular anomaly extending from the 800 to 830 γ contours. This is interpreted as the anomaly due to one pyrrhotite-rich portion of the Queen Hill body (i.e. that part intersected in DDH G26).

Profiles drawn from the results of the ground magnetic survey are shown on Plate QH 66. Distortion of the profiles due to cultural effects within the town is evident. In order to reduce the effect of these distortions, some profiles were smoothed using a 5-point running average technique. The original results and the smoothed version are both shown. Interpretation of the data gave a depth to the centre of the source approximately 100m vertically below grid co-ordinates 1040E, 1640N. A near vertical or steep westerly dip was assigned to the source.

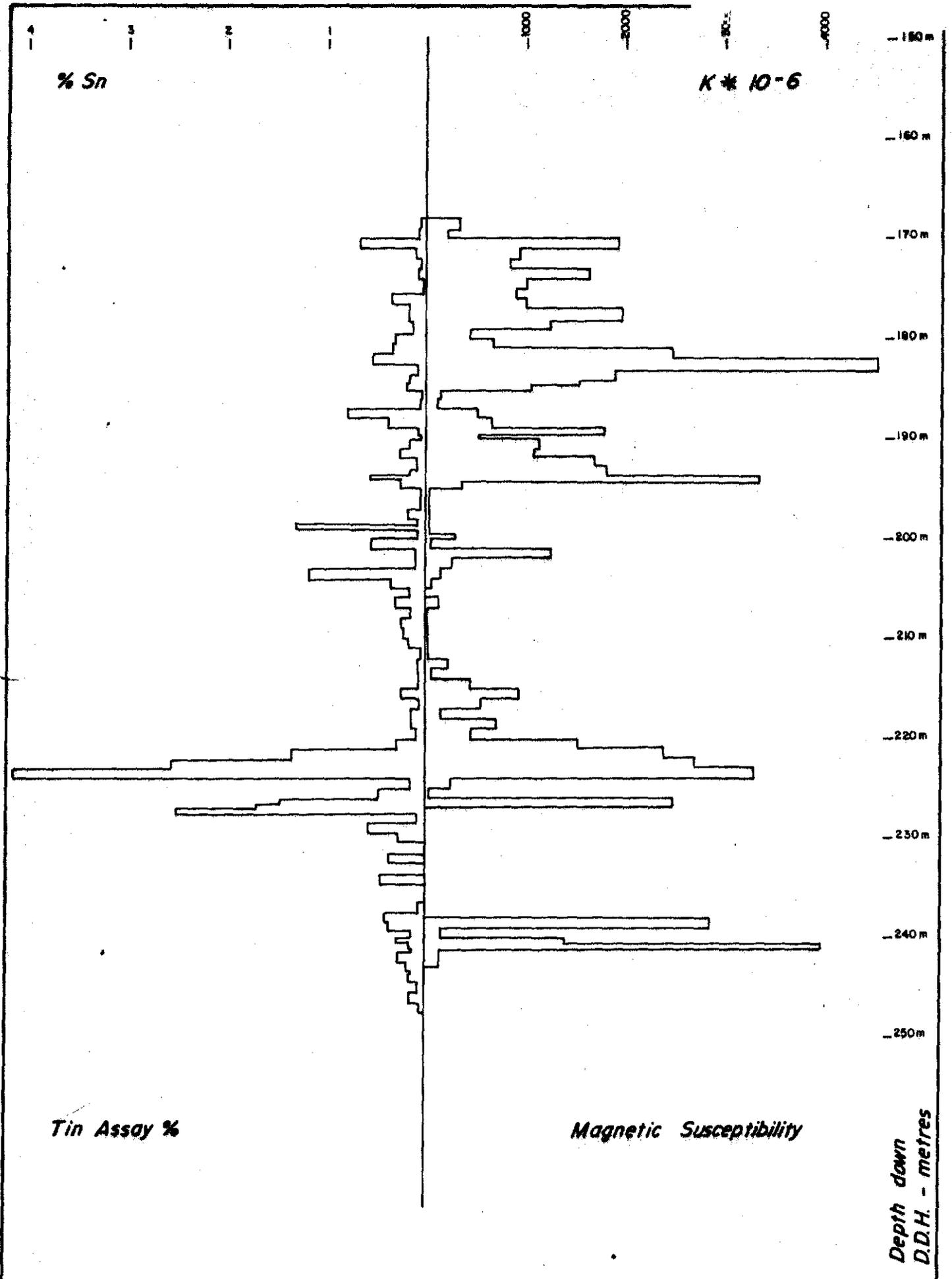


Contour interval 50 gammas (smoothed).
 $I_0 = -72^{\circ}S$
 $T_0 = 62700$ gammas



COMINCO EXPLORATION PTY. LTD.	
Drawn SSW	Location code
Traced RKY	Scale 1:2500
Checked	Date June 1976
Revised	Plate No QH 65
Contours of total magnetic intensity NORTH WEST TASMANIA QUEEN HILL SEVERN ANOMALY	

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ABMINCO N.L.		
Drawn: D.C.S.	NORTH WEST TASMANIA QUEEN HILL DDH G39 - Histogram Correlating Tin Assays with Magnetic Susceptibility	Location code:
Traced: P.F.		Scale:
Checked:		Date: 9th December 1976
Revised: _____ Date: _____		Plate: QH 72

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Following drilling of the source, selected core was tested for magnetic susceptibility, the corrected results of which are tabulated in Appendix I. A histogram showing the relationship between tin assay and susceptibility is shown on Plate QH 72. Half core was centred in the susceptibility bridge, rotated and the maximum value read. The reading was then corrected for volume. Modelling of these parameters using sphere, thin dyke and thick dyke models suggests that (with allowance made for noisy results) the mass of magnetic material was not fully explained. The inference is that more magnetic material is located at a greater depth. Unmineralised core gives no magnetic response so it is evident that the rock mass itself is not contributing to the magnetic intensity, via a background magnetite content.

Diamond Drilling

One surface diamond drill hole of 364 metres was drilled to test the magnetic anomaly discussed in geophysics above. Details of the hole are listed below:-

Hole No	:	G39
Collar Co-ords	:	1640N, 1173E
Bearing (Mag)	:	258 ^o
Dip at collar	:	-41 ^o
Length	:	364m
Core size	:	HQ 0-160m NQ 160-364m
Intersection	:	221.6 to 227.25m
Interval	:	5.65m
% Sn	:	1.95

In spite of the possibility of a steep westerly dip (as interpreted from the magnetic data) the hole was drilled from the eastern side to reduce the length of the drill hole. As can be seen from the cross section, Plate QH 64, the stratigraphy dips steeply east.

The drill hole was successful in:

- i) obtaining a high grade intersection of tin mineralisation, being 5.65m at 1.95% Sn (as cassiterite) with true width estimated to be 4.8m
- ii) intersecting a zone of significant pyrrhotite-pyrite mineralisation from 135-246 metres. This zone averages 0.25% Sn including a 23 metre interval of zero grade unsampled.

- iii) drilling through to the quartzite of Queen Hill (proper) thus establishing the relationship of the above mineralised rocks to the sequence on Queen Hill.

GEOLOGY

Regional Setting

The Queen Hill area lies in the south-eastern corner of a large block (+250 square km.) of Proterozoic quartzites and slates. Basic volcanics are recorded in the Queen Hill-Oonah Hill area. The south eastern corner of the block is largely faulted and abuts Cambrian to Devonian sediments to the east and south.

The Devonian Heemskirk Granite batholith (areal extent 130 sq.km) lies 8 km to the west of the area. Several quartz porphyry dykes have been noted within 2 km of Queen Hill.

Lithology

The description of the rock types is divided into two groups informally named here the Queen Hill sequence and the Town sequence. The significance of this division is discussed under Structural Geology. Descriptions are from the lowest stratigraphic unit. Compositional data is largely after Lutley (1975).

Queen Hill Sequence

1. Interbedded siltstones, shales and quartzites

A very variable sequence being almost pure quartzite in places and elsewhere having high shale content. The quartzites generally occur well below the Queen Hill sequence (i.e. <500m) where they are characteristic of the Oonah Quartzite and slate. The siltstones and shales form a monotonous sequence without any identifiable internal markers between the basic volcanics and the massive quartzite of Queen Hill.

The shales are composed of fine quartz and chlorite and are generally dark grey to black reflecting the larger carbonaceous content.

Locally sericitic varieties are developed. The siltstones are more

quartzose, containing silt-size quartz grains and interstitial chlorite. Rhythmic banding, composed of graded units with a few centimetres in thickness, cross bedding and ripple marks occur. It is in this sequence that undoubted facing structures were identified from drill core. This is discussed under Structural Geology. Where deformation has been intense, the shale and siltstones at the surface are often bleached to a light buff or white colour.

Within this sequence sections of pyritic shales are observed, e.g. between the Queen Hill body and the Montana volcanics; also in DDH G33 pyritic shales were intersected in a position interpreted to be the stratigraphic equivalent of the volcanics.

2. Basic Volcanics

These rocks generally occur at surface as a very weathered brown-orange colour containing abundant clay. Fresh rock at surface is rare.

The rocks have been described in the past as melaphyres and spilites. (The term spilite is used here to denote a basaltic rock composed of albite, chlorite, augite, epidote \pm calcite.) There is considerable doubt, however, that the rocks are positively identified as spilites. Albite has only been tentatively identified in a couple of cases as the rocks are generally glassy. Sodium is low when compared with other spilites.

The field association is, however, consistent with them being spilites, i.e. a marine environment - early in the development of a geosyncline (Dundas Trough) - pillow structures (both macro and micro) - related cherts and carbonates.

3. Shale siltstones and quartzite - very similar to 1. above.

4. Massive Quartzite (30-60m thick)

This rock when weathered is bleached and almost white, but generally this is only a thin skin. A fresh surface is pale grey showing a

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consistent grain size, saccharoidal texture and high quartz content.

Quartz grains are rounded with occasional grains of chert, muscovite and interstitial chlorite. Bands of massive quartzite often occur in the shale siltstone unit.

This unit thins markedly at about the gap between Queen and Montana Hills. This zone may represent a ridge at the time of deposition.

The rock type forms the spine of Queen and Montana Hills, and is considered to be a useful stratigraphic marker. Similar rocks are reported to occur on Oonah and Numbeena hills.

The following rock type descriptions are based on the author's observations of drill core, plus limited petrographic work. It is emphasised that identification is tentative in some cases and should not be regarded as conclusive. Further definitive work is planned in the coming year.

Town Sequence

5. Dolomite

A very fine grained massive rock, pale grey, bluish grey to buff coloured. Dolomite identification is based upon tests using warm and cold acid on powdered material. No x-ray or chemical identification is available.

The dolomites which occur stratigraphically above the massive quartzite have not been observed on the surface.

6. Dolomitic sandstone

A fine grained sandstone with variable dolomite content, but commonly 10-30%. Thin-section work suggests that the rock contains some tuffaceous material.

7. Chert

Correlation on drill cross-sections suggests that this rock is a sedimentary unit but a consultant petrologist has identified

the rock as a silicified dolomite.

The rock in hand specimen is a pale grey massive rock with conchoidal fracture and very tough. No bedding has been identified in the rock.

8. Intermediate Lava

This is a very fine grained massive lava of "andesitic" composition, essentially plagioclase in a matrix of altered volcanic glass and carbonate. The carbonate is thought to be due to late stage (deuteric) metasomatism.

Flow structures are observed in thin-section but not in hand specimen.

9. Siltstone, Shale, Argillite

This group is probably the most common rock type and occurs in thick units and is interbedded with other rocks.

The shales are generally dark grey with a high sericite content. They are occasionally pyritic.

Quartz is the major component in the siltstones which often grade to sandstones, with argillaceous matrix and often relatively coarse (1-2mm) muscovite.

This last group (i.e. shales, siltstones and argillites) is very variable and thus of little use in correlation between drill holes.

10. Dolomitic Siltstone

The rocks differ only in grain size from the dolomitic sandstones.

The above rock types numbered 5-10 are in stratigraphic order youngest last but siltstones, shales and argillites occur locally throughout as shown in the graphic stratigraphic succession.

Metamorphism

The rocks regarded as pre-Cambrian (i.e. Oonah quartzite and slate) are regionally metamorphosed to very low grades. The sequence to the east of the massive quartzite (Queen Quartzite) appears to be metamorphosed far less than that to the west. It is suspected (DCS opinion) that the difference reflects that a disconformity or low angle unconformity exists about the level of the quartzite. Locally mild metamorphism is observed above this level but is thought to be due to movements associated with the Tabberaberan Orogeny.

Structural Geology

The Proterozoic rocks are regionally folded about an east-south-east trending axis. Palaeozoic rocks are folded about similar axes. In the area of Queen Hill-Montana-Severn (see Plate 73 for location) dips are steep to the east or rarely steep to the west. Facing data obtained recently has established that the sequence youngs eastward. This was established principally from graded bedding and load casts in the sediments above and below the massive quartzite.

Faulting appears to be less common to the east of Queen Hill, i.e. in the Montana-Severn areas. Micro-faulting associated with small scale slumping in unconsolidated sediments is, however, a common feature.

The Queen Hill sequence is now correlated with the upper part of the Success Creek phase of the Pre-Cambrian Oonah quartzite and slate.

The base of the Town sequence is defined as the base of the massive quartzite unit (Queen Quartzite) and correlated with the base of the Crimson Creek Formation (Cambrian).

At this boundary is a change in the style of sedimentation from deep to shallow marine, with more massive rock types as opposed to thinly bedded ones.

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MINERALISATION

Mineralogy and Texture

Mineralisation in the "Severn" body is of the cassiterite-sulphide type with the dominant sulphide being pyrrhotite. Non-sulphide gangue minerals are very rarely visible to the naked eye. Insufficient thin and polished section studies are available to comment on the significance of gangue mineralogy.

The mineralisation occurs within carbonate-rich siltstones and sandstones. Description is as follows:-

Pyrrhotite occurs as disseminations, fine grained aggregates and stringers. The high grade section in DDH G39 from 281-224.3m contains up to 60% pyrrhotite, of which ~80% is disseminated grains (<2mm), the remainder in veins.

The fine grained nature of the pyrrhotite is in contrast to the coarse grained material seen at Queen Hill, Renison and Cleveland.

Pyrite is generally coarse grained and in places appears similar to parts of the Queen Hill body. No bedded fine grained pyrite was observed as seen at Queen Hill.

Pyrite often occurs as veinlets and stringers occasionally forming a stockwork, where it is sometimes accompanied by quartz and carbonate.

Cassiterite. This has only been observed in thin-section to date and description is based on few samples.

Crystals are often euhedral, except in aggregates where they are anhedral, generally less than 40 μ in diameter. Aggregates average 200 μ diameter. Colour in thin-section is a pale yellow-brown.

Cassiterite, while its abundance is related to pyrrhotite, does not appear to be enclosed in sulphide but rather associated with carbonate or other rock forming minerals such as clays.

Stannite has not been observed to date and copper assays are very low. A list of tin assays for all core sampled to date is included in Appendix I.

A spectrographic scan conducted on a composite of samples from the best grade intersection generally confirms the mineralogy is seen in hand specimen and thin-section. Zircon is suspected from the values shown in Appendix II. (Emission Spec. sheet) but was not identified in thin-section.

Rutile and/or ilmenite was not identified but Ti assay suggests its occurrence.

Phosphorous occurs in vivianite (observed) and possibly apatite (tentatively identified in thin-section).

Tourmaline was observed in various parts of the core and is reflected in the boron assay.

Quartz occurs locally in veinlets with carbonate, pyrite and pyrrhotite. Minor chlorite and tourmaline are suspected but identification needs thin section-support.

Vivianite is relatively common and occurs as coarse grained dark blue crystals on joints faces and less commonly as a fine blue powder. Its presence appears to be closely related to sulphide concentration. One exception is its presence on joints in dolomite stratigraphically below the mineralisation, e.g. G39 at 320.5m

Alteration

Very little alteration of the host or surrounding rock is observable.

Minor alteration is seen in the dolomites stratigraphically below the mineralisation where thin veinlets of chlorite-carbonate-vivianite occur.

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FINANCE

Expenditure for the 12 months ended November 23, 1976 are as follows:

Consolidated Lease 43M/73

Miscellaneous	1,914
Geology	3,896
Survey	1,186
Geophysics	3,606
Geochemistry	446
Diamond Drilling	25,480
Tenure	2,995
Legal	6,200
Total for Consolidated Lease	<u>\$40,543</u>

Exploration Licence 47/71

Miscellaneous	1,123
Geology	958
Survey	162
Geophysics	1,662
Geochemistry	7
Diamond Drilling	360
Tenure	828
Total for Exploration Licence	<u>\$5,100</u>

CONCLUSIONS

1. Diamond drilling successfully tested the source of a magnetic anomaly and established the existence of a new cassiterite-sulphide body, with promising tonnage potential to be defined by further drilling.
2. Drilling also established the relationship of the sequence drilled to the sequence of the Queen Hill deposit.
3. The best intersection obtained was 5.65m x 1.95% Sn_c from 221.6 to 227.25m
4. This intersection occurs within a 11m wide mineralised zone averaging 0.25% Sn including an 23m section of zero grade unsampled.
5. The mineralisation is of the cassiterite-sulphide type, and thought to be a replacement of dolomitic sediments (mostly sandstone).

RECOMMENDATIONS

The following recommendations are made:-

1. An active drilling programme be directed towards defining the dimensions of the promising mineralisation discovered in G39.
2. Exploration of the upper basic volcanic-shale contact be carried out using geological mapping, trenching and geophysics.

REFERENCES

- Lutley, W. (1975) Cassiterite Sulphide Mineralisation at Queen Hill, Zeehan, Tasmania. (Unpub. M.Sc. Thesis University of Adelaide).

Signed:

D. Simpson
D.C. Simpson
Geologist

Endorsed:

K.R. Yates
K.R. Yates
Chief Geologist

DCS: IMM

May 26, 1977

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APPENDIX I

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RESULTS OF MAGNETIC SUSCEPTIBILITY MEASUREMENTS OF DRILL CORE

FROM DDH G39 QUEEN HILL RELATED TO TIN ASSAYS

Project: Queen Hill G39

Date 18/3/76

Job Type. Susceptibility -vs- %Sn

Depth	Sample No.	Kx10 ⁻⁶	%sn	Snppm
140m	88797		0.57	
141m	88796		1.58	
168	88856	0		260
169	88855	317		410
170	88854	205	0.10	
171	88853	1932	0.67	
172	88852	975		130
173	88851	820		850
174	88850	1670		200
175	88798	1550	0.07	
176	88849	1000	0.34	
177	88848	1972	0.14	
178	88847	1226	0.15	
179	88846	430	0.12	
180	88845	656	0.30	
181	88844	3250	0.33	
182	88843	4509	0.52	
183	88842	1890		930
184	88841	1511	0.14	
184.5	88840	1106	0.18	
185	88839	125	0.02	
186	88838	100	0.06	
187	88837	530	0.79	
188	88836	240	0.87	
189	88835	1780	0.09	
189.5	88834	515	0.04	
190	88833	1160	0.16	

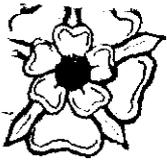
Depth	Sample No	Kx10 ⁻⁶	%Sn	Snpmm
191	88832	1150	0.24	
192	88831	1656	0.08	
193	88830	1782	0.16	
193.5	88829	3340	0.56	
194	88828	366	0.24	
195	88827	0	0.05	
196	88826	492	0.04	
197	88825	0	0.19	
198	88824	0	0.11	
198.5	88823	0	1.31	
199	88822	0	0.1	
200	88821	0	0.09	
200.5	88820	280	0.18	
201	88819	58	0.56	
202	88818	1228	0.07	
203	88817	216	0.08	
204	88816	140	1.19	
205	88815	52	0.35	
206	88814	-	0.14	
207	88813	130	0.30	
208	88812	-	0.12	
209	88811	-	0.24	
210	88810	-	0.22	
211	88809	-	0.18	
212	88808	-	0.01	
213	88807	200	0.05	
214	88806	74	0.02	
215	88805	526	0.04	
216	88804	914	0.23	
217	88803	560	0.02	
218	88802	146	0.13	
219	88801	704	0.11	
220	88800	414	0.09	
221	88799	1542	0.27	
222	88793	2400	1.32	
223	88794	2700	2.93	
224	88795	3300	4.18	
225	88857	260	0.15	
225.5	88858	0	0.49	

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Depth	Sample No	Kx10 ⁻⁶	%Sn	Snppm
226	88859	2500	1.41	
226.5	88860	0	1.71	
227	88861	0	2.50	
228	88871	0		430
229	88872	?	0.53	
230	88873	0	0.23	
231				
232	88888	0	0.33	
233				
234	88889	60	0.44	
236				
237	88874	0		310
238	88875	2890	0.39	
239	88876	135	0.37	
239.5	88877	1400?	0.12	
240	88878	225	0.27	
240.5	88879	3989	0.14	
241	88880	130	0.23	
242	88881	0	0.18	
243	88882	125	0.13	
244	88883	100	0.14	
244.5	88884	0		390
245	88885	0		300
246	88886	0	0.14	
247	88887	0		510

APPENDIX II



GEOCHEMICAL RESULTS

SEMI-QUANTITATIVE EMISSION SPECTROSCOPY

All Values in ppm

UNLEY, S.A. 5061
PHONE: 272 2412, 272 2518
TELEX: AA82623

020

310027

Samples from: COMINCO EXP COY PTY. LTD.

Area: QUEEN HILL DR C39 221.6 - 227.25m

Samples of: CONCENTRATE.

Batch No.: A 1308

(Your O/N 6051)

Sheet No.: 1

Date: 19/3/76

GROUP	CONC.		SAMPLE IDENTIFICATION						
	A.1294								
ES 1	Be (1)	10							
	Co (5)	<5							
	Cr (20)	200							
	Ir (2)	<2							
	Mn (5)	100							
	Mo (3)	10							
	Nb (20)	<20							
	Ni (3)	300							
	Os (10)	<10							
	Pd (10)	<10							
	Pt (10)	<10							
	Re (10)	<10							
	V (10)	300							
	W (50)	100							
Ta (100)	<100								
Th (100)	100								
ES 2	Ag (0.1)	0.5							
	As (50)	<50							
	Au (3)	<3							
	Bi (1)	100							
	Cd (3)	<3							
	Cu (0.5)	100							
	Ge (1)	<1							
	In (5)	<5							
	Pb (1)	100							
	Sb (30)	<30							
	Sn (1)	>10000							
	Tl (1)	<1							
Zn (20)	<20								
ES 3	Ba (30)	500							
	Ce (20)	>10000							
	Ce (300)	<300							
	La (100)	100							
	Se (50)	<50							
	Sr (30)	30							
	Ti (100)	>10000							
	Y (10)	<10							
Zr (100)	2000								
ES 4	Hg (30)	<30							
	P (100)	10000							
	Te (20)	<20							
ES 5	K (5)								
	Li (1)								
	Na (50)								
	Ca (30)								
	Rb (10)								
ES 6	B (10)	5000							

SAMPLES WILL BE DISPOSED OF AFTER TWO MONTHS UNLESS WE ARE OTHERWISE ADVISED



027

310028

APPENDIX III

Drill Hole Record



028

Property	Queen Hill	District		Hole No.	G39		310029
Commenced	11/2/76	Location	Zeehan	Tests at		Hor. Comp.	
Completed	15/3/76	Core Size	HQ and NQ	Corr. Dip	41°	Vert. Comp.	
Co-ordinates	1640N 1173E			True Brg.	258° magnetic	Logged by	D.C. Simpson
Objective	Test magnetic anomaly below Fowler St., Zeehan.			% Recov.		Date	

Metres		Description
From	To	
157.8	159.4	<p><u>Interbedded siltstones, sandstones and shales.</u> This section is slumped for the most part with an imposed slaty cleavage developed locally. ~ 55° to CA. Creamy coloured carbonate veins with associated crystalline pyrite common. Rock fragments completely enclosed in carbonate at 158.5.</p> <p><u>Mineralisation</u> - disseminated crystalline pyrite developed in both sandy and shaley rocks. Vein pyrite also.</p>
159.4	163.0	<p><u>Pale green-grey fine grained sandstone - limey in parts.</u> This rock shows little bedding but shows irregular variations in grain size and is assumed to be slumped. Some pale mudstone blocks can be seen in places. Carbonate veins common. Some shaley patches towards end of section.</p> <p><u>Mineralisation</u> - Some dissem. pyrite towards end of section.</p> <p><u>Structure</u> - Good bedding developed at 162 in shales 60° to ca (possible grading indicating top of sequence up-hole - sample for T.S.) (162.7m) (sample No. 138453)</p>
163.0	184.9	<p><u>Slumped siltstones, shales, mudstones - dolomitic in parts</u> (some of which appear to have been re-crystallised) Slumping or soft sediment shearing is regular with little of the "chaotic" features occurring at Cleveland. Sediments are characterised by long wispy fragments, approx 10 times as long as thick, although subspherical particles do occur. Carbonate veins are virtually absent from this section - except for a few thin veins at 177-179.</p> <p><u>Lithic sandstone</u> from 180.65-181.00 - even grain size ~ 0.5-1.0mm. Lithic particles are probably shale or dark mudstone - needs T.S. check - rock gives positive dolomite test. (sample no. 138454).</p> <p>Some parts of this section extremely hard - possibly silicified.</p> <p><u>Mineralisation</u> - significantly mineralised section with pyrite and pyrrhotite predominating. Pyrite predominates up to about 173 but total sulphide does not exceed 20% and averages about 10%. Py generally co g both as stringers and disseminated. Po occurs in fine grained aggregates and stringers, also disseminated. Some dissem. po only visible with hand lens (138455 from 174.6 shows vein and stringer po.)</p> <p>Vivianite is a conspicuous gangue mineral often visible on joints and fractures which are often completely coated with co. platy crystals. It also occurs as a blue powder on joints. Quarts is occasionally seen as a gangue mineral and chlorite is suspected (by colour) but is too fine to observe). (138456 from 172.4 for T.S. for gangue minerals).</p>

Drill Hole Record



U29

Property	Queen Hill	District	Hole No.	G39	310030
Commenced		Location	Tests at		Hor. Comp.
Completed		Core Size	Corr. Dip		Vert. Comp.
Co-ordinates			True Brg.		Logged by
Objective			% Recov.		Date

Metres		Description
From	To	
184.9	188.4	<u>Lithic sandstone with minor mudstone.</u> Medium brown-grey fine grained sandstone with fragments of pale mudstone or sh. Sandstone is massive. Mudstone is pale khaki colour. Dark mineral developed in tension cracks. Dark minerals developed elsewhere possibly graphite. <u>Mineralisation</u> - pyrrhotite and pyrite veins developed locally. Some contain quartz and fine grained dark gangue minerals (?tourmaline). Alteration (darkening) of joint walls can be seen in several instances. Total sulphide content is less than 1%.
188.4	189.2	As above but showing strong alteration and development of disseminated po and vein po and py, ga and carbonate (?siderite). Good magnetic response.
189.2	189.7	As 184.9-188.4. Only mineralisation is some fine dissem. po. less than 1%.
189.7	197.6	<u>Slumped siltstones and mudstones and shales.</u> Mid grey to pale grey unit, fine grained with dolomitic sections. Very similar to 163.00-184.90. Bedding where undisturbed possibly ~45-60° to ca. <u>Mineralisation</u> - co.gr. py and po developed throughout. Sulphide content averages 10-15%. Po generally as stringer and sometimes disseminated. Pyrite usually as coarse aggregates. Thin carbonate veins common. Vivianite developed on fractures locally.
197.6	198.2	<u>Fine lithic sandstone</u> similar to 184.9-188.4. Minor po developed 197.9
198.2	201.80	<u>Slumped siltstones, mudstones.</u> As 189.7-197.6. Generally dolomitic - parts are recrystallised. <u>Mineralisation</u> - this section differs from above in that pyrite is the only sulphide developed where it averages 20-25%. It occurs as coarse aggregates, dissemination and veins. Vein at 198.2-198.45 consists of py. qtz and carbonate py ~70% (138457 TS for py min ?cassiterite).
201.8	205.3	Similar to above but po and py approx equal proportions. Some po v.gine grained.

Drill Hole Record



30

310031

Property	Queen Hill	District	Hole No.	G39
Commenced		Location	Tests at	Hor. Comp.
Completed		Core Size	Corr. Dip	Vert. Comp.
Co-ordinates			True Brg.	Logged by
Objective			% Recov.	Date

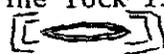
Metres		Description
From	To	
205.3	206.0	<u>Pale brown mudstone and siltstone</u> - massive and with thin mineralised veins cross-cutting. Slump breccia developed at 205.7 - breccia blocks less than 1.0 cm. Minor po developed in veins and one replacement zone < 3cms across.
206.0	212.1	<u>Slumped mudstones, siltstones</u> - light grey to mid-grey. Well mineralised section - predominantly sulphide is pyrite which is coarse grained.
212.1	215.7	<u>Sandstone with interbedded siltstone.</u> This rock is a fine grey-brown sandstone with good sorting - grains are sub-rounded to subangular. Rock has a speckled appearance because of some darker grains present. Good bedding is preserved at 214-214.3 in siltstones where CBA = 30°. Graded bedding and cross bedding here both indicate top of sequence up-hole. Lithic fragments are also present locally. <u>Mineralisation</u> - Numerous thin veins cut across the rock - contain quartz, carbonate, pyrrhotite and pyrite and a fine dark mineral. Total sulphide less than 1%. <u>Structure</u> - bedding mentioned above. However, slumping of large blocks may account for some low CBA's.
215.7	216.8	<u>Slumped siltstones, mudstones and sandstones.</u> Parts of this section could be described as "chaotic". Locally is well mineralised. Slump breccia block of mudstone evident at about 216. (138458 ~ 216m) <u>Mineralisation</u> - quartz carbonate and pyrite with pyrrhotite are developed in veins - po is also dissem. in sandy sections. Pyrite is generally coarse grained. Sulphide content av. 5-10%
216.8	221.0	<u>Sandstone, siltstone and mudstones</u> - well bedded in parts - elsewhere chaotic jumbling of rock types. Rocks most are a light kakhi colour except where alteration from fractures has imposed a dark greeny grey colouration. Alteration locally affects greater than 70% of the rock. The sandstones have a speckled appearance as above CBA variable 15-60°. <u>Mineralisation</u> - vein pyrrhotite is commonly developed in this section. Alteration (mentioned above) is derived from these veins. Disseminated po. well developed at top and base of section in sst. Vivianite (x-talline) occurs on sc fractures and in veins.

Drill Hole Record



031

Property	Queen Hill	District	Hole No.	G39	310032
Commenced		Location	Tests at		Hor. Comp.
Completed		Core Size	Corr. Dip		Vert. Comp.
Co-ordinates			True Brg.		Logged by
Objective			% Recov.		Date

Metres		Description
From	To	
221.0	224.3	<p><u>Pyrrhotite lode</u> - host rock is a lithic sandstone which was possibly dolomitic. Dissem. pyrrhotite accounts for about 80% of the po the remainder of which is in veins with pyrite, quartz, vivianite and trace of carbonate. Total sulphides average 40%. locally to 60%. Some recrystallised carbonate visible close to veins. (138459 - 224m) Rock is massive with no primary foliation exhibited. Pyrite veins cut core at 35-60°. Very strong magnetic response Depths not accurate 224.3-227 because of 15% core loss. Core has been redrilled because inner tube did not latch on first run.</p>
224.3	225.6	<p><u>Pyrite lode.</u> Coarse grained pyrite as stackwork of veins. quartz and carbonate are major gangues. Host rock (possibly a siltstone or mudstone) is silicified in places. Pyrite content 50-60%. Fine grained disseminated pyrite in host rock mostly toward end of section. Some x-talline vivianite on fractures.</p>
225.6	227.3	<p><u>Dolomitic sandstone</u> with minor shaley bands. Disseminated pyrite which is fine grained occurs in the upper part of the section. Coarse grained pyrite with co. carbonate and quartz predominates towards the base. Carbonate turns orange on exposure to air (siderite?).</p>
227.3	230.6	<p><u>Dark grey muststone</u> pyritic in parts (as stringers) with some carbonate veins. (This section grades into the following section) Uniform and massive at top becoming less uniform towards base - ie slumped.</p>
230.6	237.6	<p><u>Slumped mudstone, siltstone, sandstone unit.</u> Pyritic locally with numerous thin carbonate veinlets. The rock is variably dolomitic - est. 30% dolomite. Slumping has disrupted some beds to produce elongate "augen"  Some parts appear to be silicified. Est. sulphide content. 2-3%. Soft sediment faulting at ~237m.</p>
237.6	238.4	<p><u>Dolomitic sandstone</u> with abundant pyrrhotite. Po content est as 40%. Carbonate has developed orange colour on expo- Towards base sequence is slumped and intermixed with mudstone. Thin quartz veins cut across core in places.</p>

Drill Hole Record



032

Property	Queen Hill	District	Hole No.	G39	310033
Commenced	Location		Tests at	Hor. Comp.	
Completed	Core Size		Corr. Dip	Vert. Comp.	
Co-ordinates			True Brg.	Logged by	
Objective			% Recov.	Date	

Metres		Description
From	To	
238.4	239.8	Carbonate (dolomitic?) bearing mudstone, with wide spread pyrite disseminated and in coarse aggregates. Pyrite content est. 20%.
239.8	241.0	Pyrite-pyrrhotite lode. Pyrite generally coarse grained and in veins. po fine and disseminated. Estimated sulphide content 30%. Host rocks are dolomitic mudstone and sandstone.
241.0	241.6	Sandstone - fine grained sandstone dolomitic with disseminated pyrite. Py ~10%.
241.6	249.6	Slumped mudstone-siltstone unit. Light brown green to dark grey rock with speckled carbonate in places. Carbonate veinlets also developed. Mineralisation - Strong development of pyrite as stringers, replacement blebs and as framboids. Arsenopyrite vein at 245.8. Sulphide content 245.4-245.9 ~50%. Remainder 10-20%. Core bedding angle ~50° (Note - slumping)
249.6	251.3	Dolomitic siltstone/fine sandstone. Pale grey to cream massive rock with numerous carbonate veins. Minor pyrite veins up to 3mm wide.
251.3	252.3	Fault zone. Very broken core - dolomitic sst with knots of co.gr. pyrite.
252.3	253.0	Massive Quartzite. Light grey massive quartzite with disseminated pyrite and occ. quartz vein.
253.0	266.0	Interbedded mudstones, shales and siltstones. Thinly bedded sequence - beds often less than 1mm thick. A micaceous sequence with slumping developed alternately with relatively undeformed sections. Some of the shales and siltstones are pyritic, i.e. bedded pyrite. Occasional co. gr. pyrite developed as viens. This sequence resembled that between the quartzite and volcanics on Queen Hill. CBA in undeformed section ~60-70.
266.0	284.6	Interbedded mudstones, siltstones and shales alternating with massive dolomitic siltstones/mudstones. At 266, 271-272, 275 and 282 an unusual "swirl" structure is developed in the dolomitic rock. (138461 for TS). Sequence does not show the slumping developed in the previous section. Although parts are crenulated. Minor disseminated pyrite is common throughout the section. Core bedding angle 45-60°

Drill Hole Record

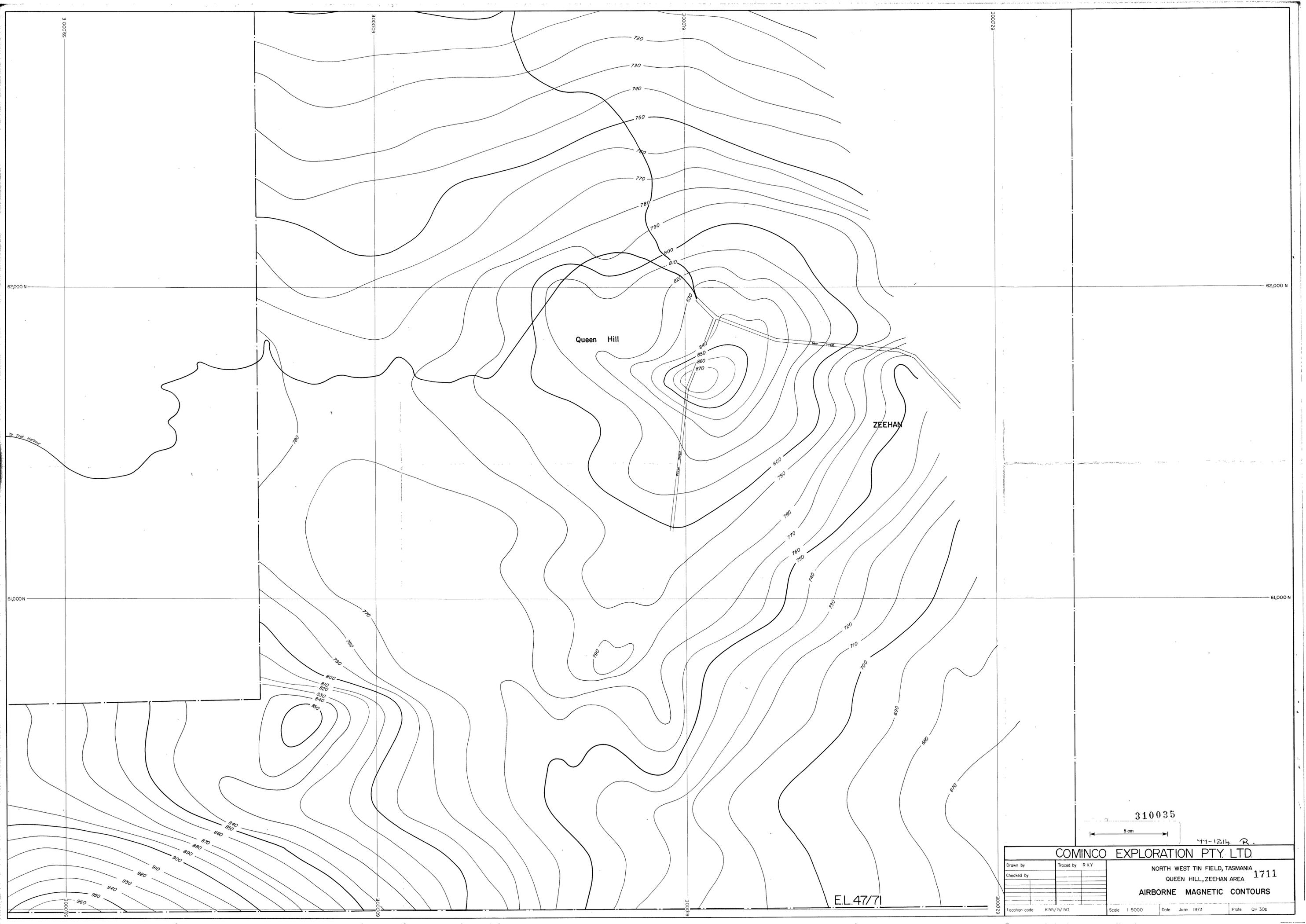


033

Property	Queen Hill	District	Hole No.	G39	310034
Commenced		Location	Tests at		Hor. Comp.
Completed		Core Size	Corr. Dip		Vert. Comp.
Co-ordinates			True Brg.		Logged by
Objective			% Recov.		Date

From	To	Description
284.6	298.0	<u>Massive dolomites and dolomitic mudstones.</u> Occasional sandy patches developed. Quartzite 286.4-286.8, 288.4-288.9, 295.3-295.6. Dolomites are very pale green-grey or faint pinkish brown. (138462 from 293.6 - ident. CO ₃) <u>Mineralisation</u> - Rare py. vein only and occ. dissem. py.
298.0	304.4	<u>Interbedded siltstones, quartz sandstones</u> - pale grey undeformed generally. Occasional quartz veins also carbonate veins. Quartz veins normal to bedding. CBA 55°.
304.4	307.2	<u>Quartzite.</u> White to pale grey quartzite, massive and cut by numerous carbonate veins. White (and clear) quartz veins cut across the core. <u>Mineralisation</u> - nil
307.2	310.7	<u>Bedded siltstones and sandstone with minor mudstone.</u> Similar to 298-304.
310.7	343.2	<u>Bedded siltstones, massive dolomites, dolomitic mudstones.</u> Dolomites generally not more than 1.5 metres thick. Dolomite content of this section much higher than further up hole. Quartzite developed 317.3-317.7 and 318.5-318.8. Section becoming a little darker grey around 340m. Dolomites are characterised by a web-like network of greenish veinlets (alteration?) which are approx. normal to bedding. Fine brown carbonate can be seen in the centre of some of these veinlets. Thin sulphide veinlets occur locally and on some joint faces traces of powdery vivianite occur, e.g. 320.3-320.5. CBA 65-70° (138463 - 320.5; 138464 - 326.3)
343.2	364.2	<u>Quartzite</u> - Massive quartzite light grey to white some siltstone beds near start of section. Occasional quartz veins with pyrite developed. Graphite occurs locally on slip planes.

364.2 E.O.H.



Queen Hill

ZEEHAN

EL.47/71

310035

5 cm

47-1214 R.

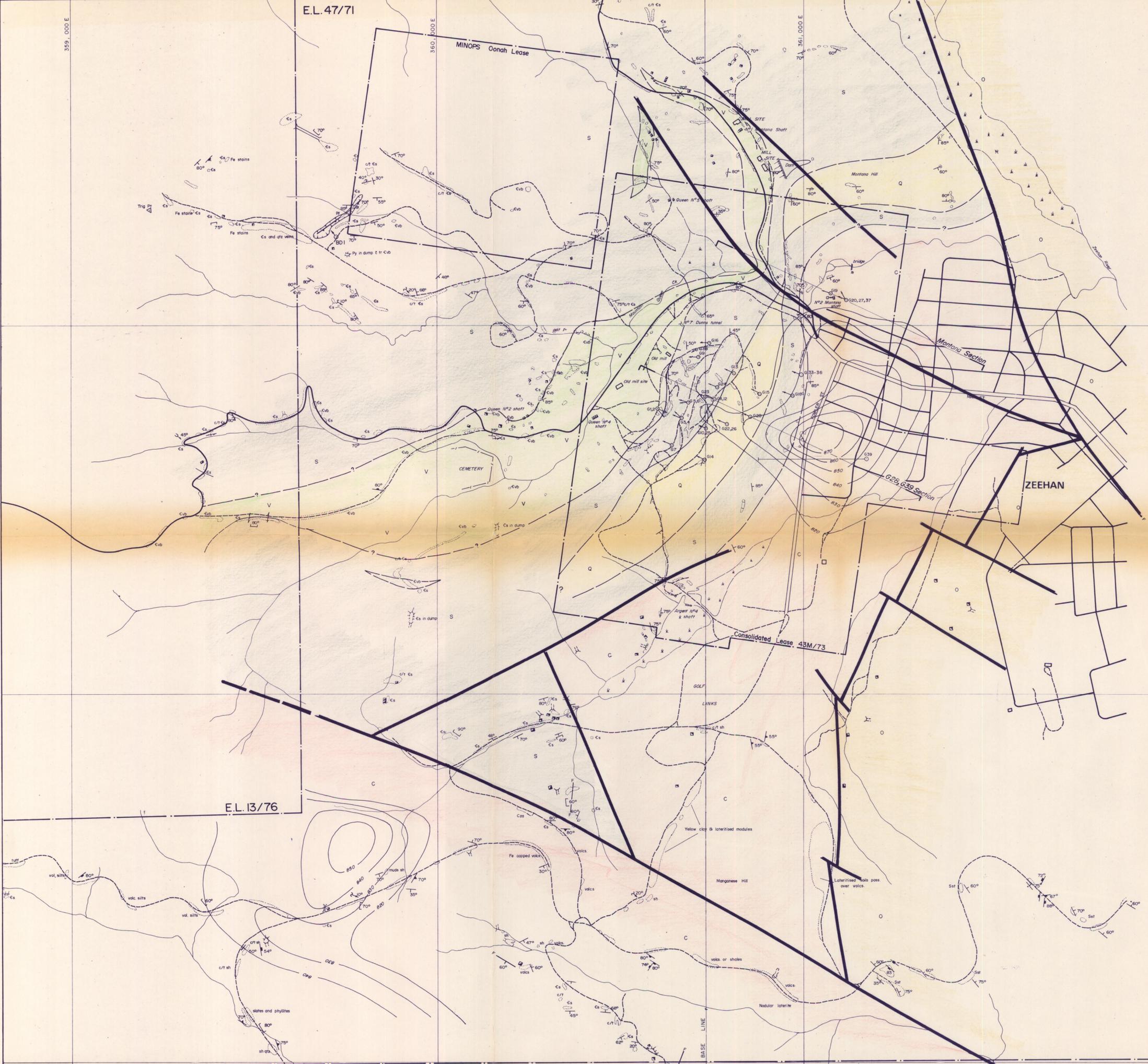
COMINCO EXPLORATION PTY. LTD.

Drawn by	Traced by R.K.Y.
Checked by	

NORTH WEST TIN FIELD, TASMANIA
 QUEEN HILL, ZEEHAN AREA 1711

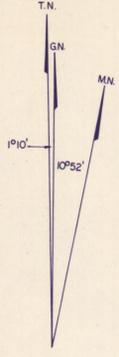
AIRBORNE MAGNETIC CONTOURS

Location code K55/5/50 Scale 1:5000 Date June 1973 Plate QH 30b



E.L. 47/71

E.L. 13/76



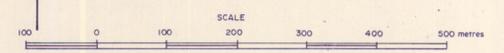
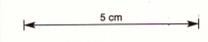
- CAMBRIAN**
 - O Ordovician and younger sediments
 - C Crimson Ck Formation - Siltstones shale dolomitic sed. minor chert.
 - S Beaded Quartzite, slate and shale
- PRE CAMBRIAN**
 - Q Massive Quartzite
 - V Basic Volcanics

N.B. Quaternary Sediments not shown

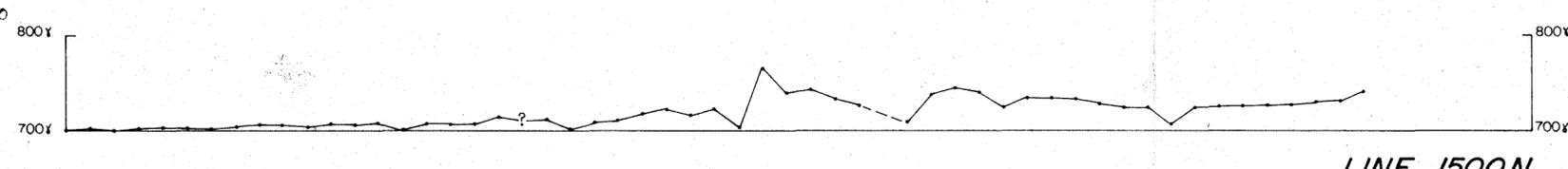
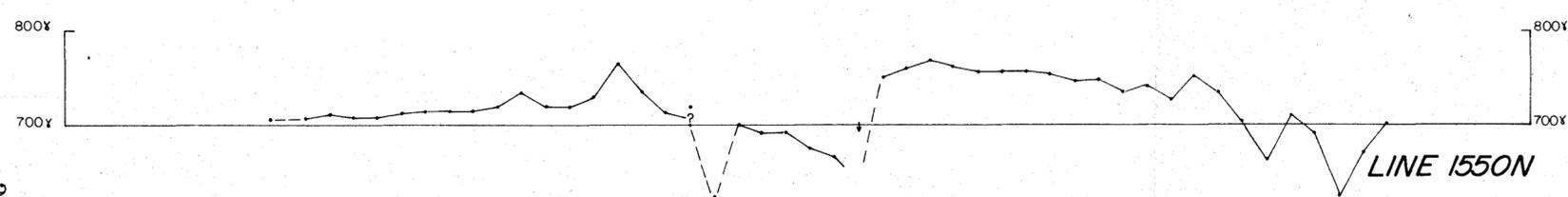
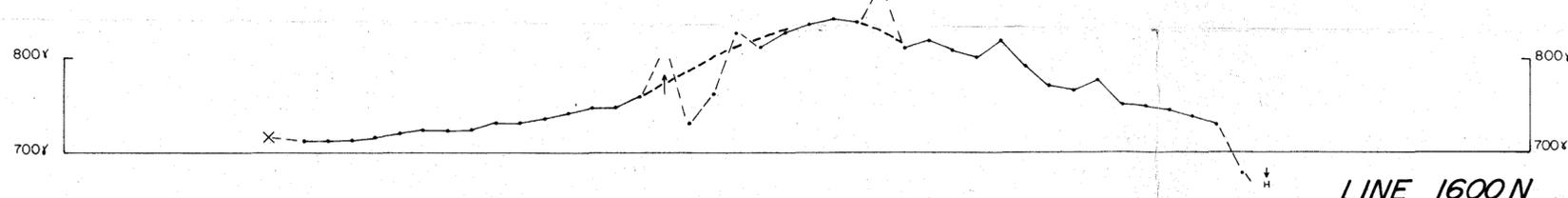
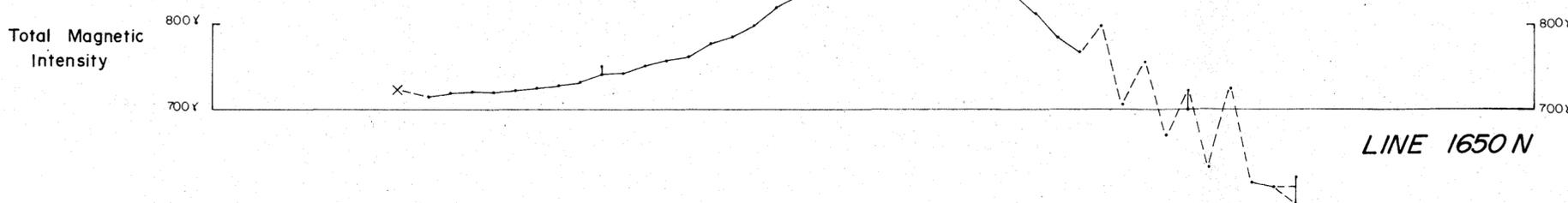
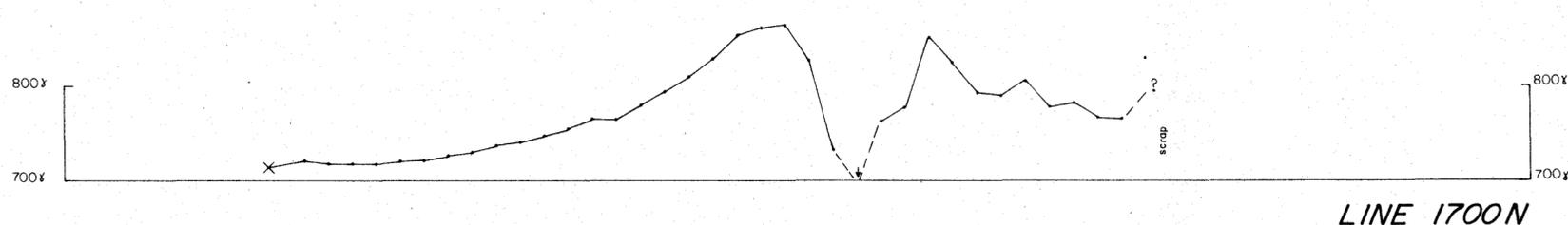
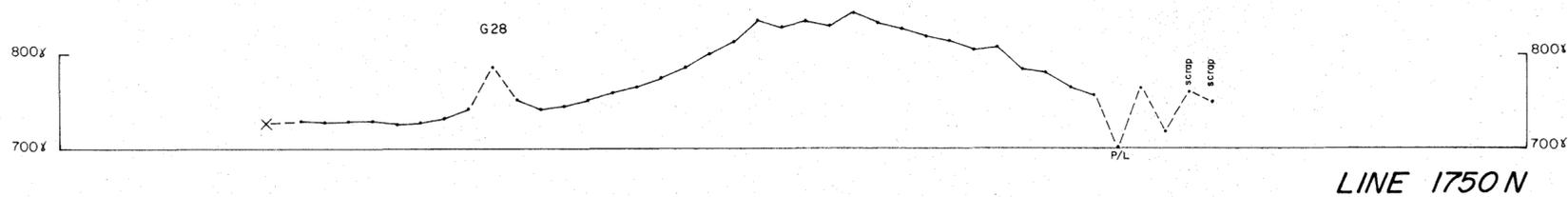
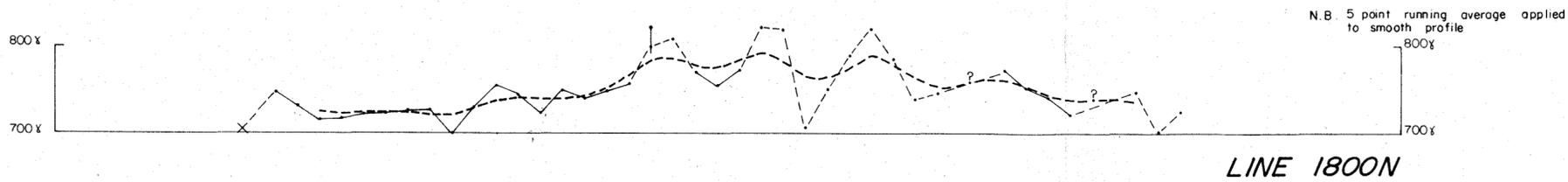
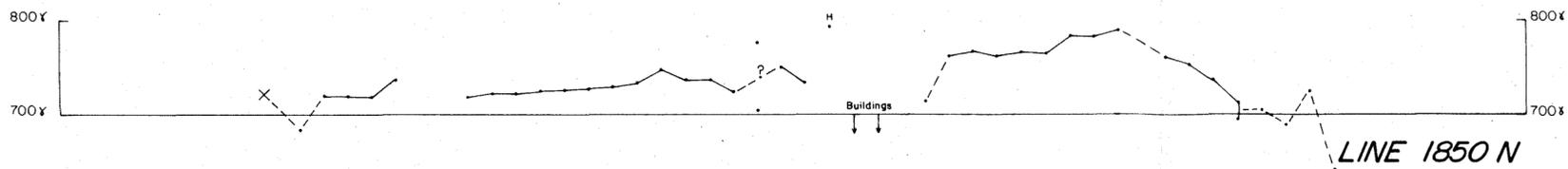
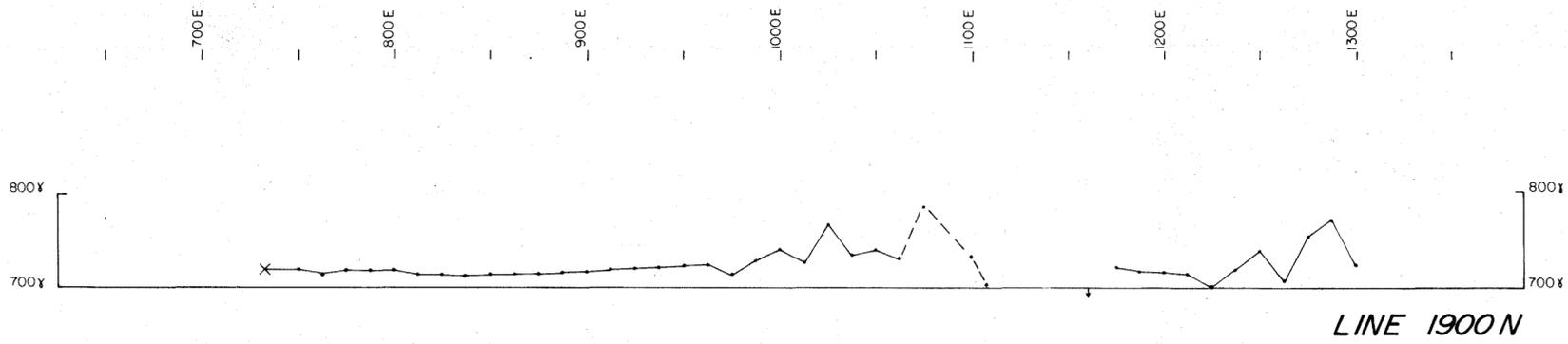
- Airborne magnetic anomaly (selected contours only)
- Fault - established
- position approx.
- Geological boundary - position accurate
- approximate
- inferred
- Diamond drill hole
- Cleavage
- Schistosity
- Bedding with dip
- Joints
- Shearing
- Flow banding
- Road
- Track
- Creek
- Shaft
- Adit
- Tenure boundary

Geology after mapping by C.E.P.L. and Blissett (1962)

310036

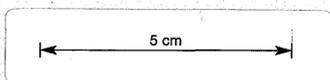


COMINCO EXPLORATION PTY LTD	
Drawn DCS	Checked RKY
77-12-14 NORTH WEST TIN FIELD, TASMANIA QUEEN HILL, ZEEHAN AREA (1708) INTERPRETIVE GEOLOGICAL PLAN	
Location code	Scale 1:5,000 Date November 1975 Plate QH 62



Total Magnetic Intensity

Location code:	
DRAWN BY: S.S.W.	TRACED BY: P.F.
CHECKED BY:	
COMINCO EXPLORATION PTY. LTD.	
310038	
NORTH WEST TASMANIA	
QUEEN HILL 1710	
Ground Magnetic Profiles 1976	
Scale: 1:2500	Date: 22nd July 1976
	Plate: QH 66



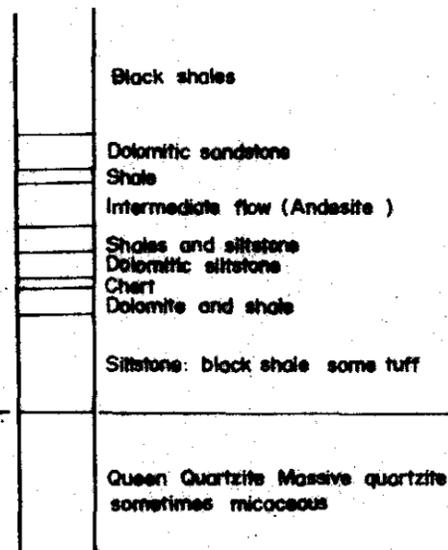
CAMBRIAN

PRE-CAMBRIAN

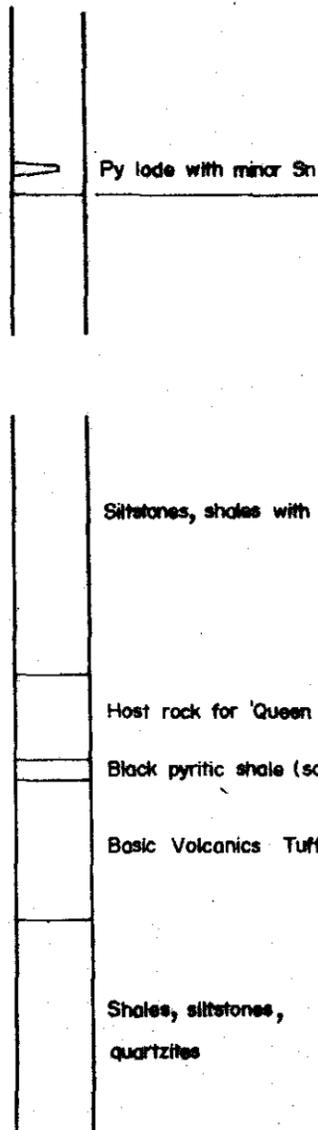
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'QUEEN HILL' SEQUENCE SUCCESS CREEK PHASE
OONAH QUARTZITE AND SLATE

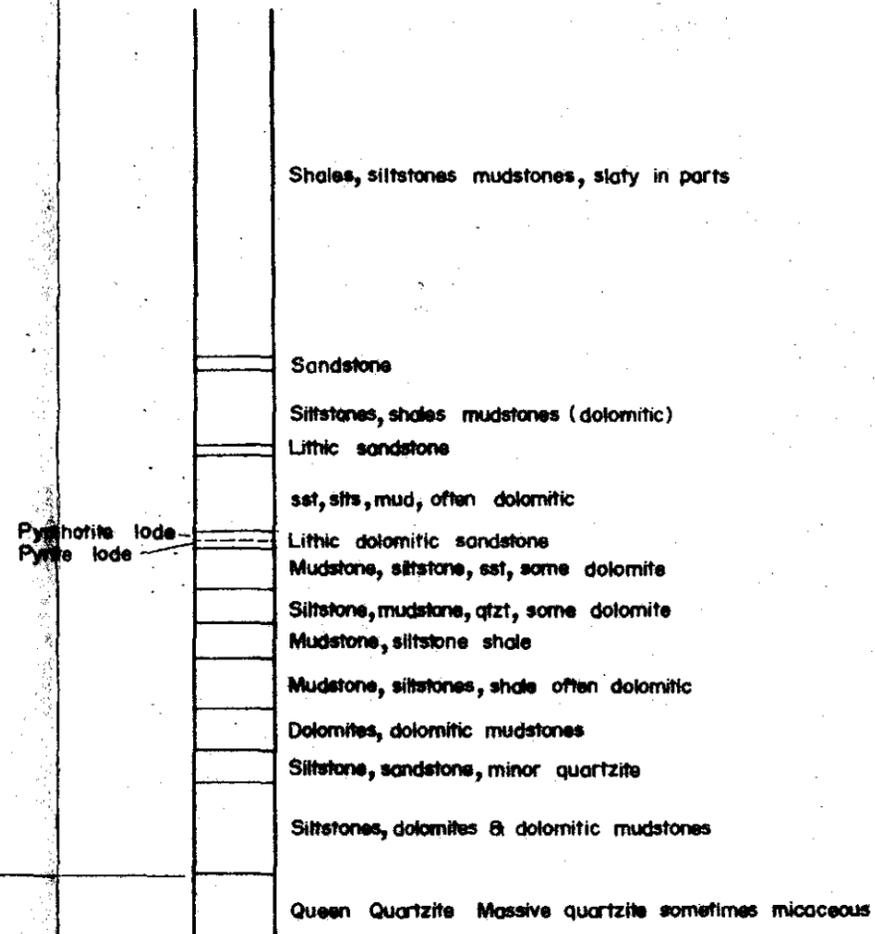
'MONTANA'



'QUEEN HILL'



'SEVERN'



SCALE 1:2500

300 metres

200

100

0 metres

1710-A

310039

77-1214 R

5 cm

ABMINCO N.L.

Drawn	DCS
Traced	RKY
Checked	
Revised	Date

QUEEN HILL - ZEEHAN
STRATIGRAPHIC SUCCESSION

Location code
Scale Vertical 1:2,500
Date December 1976
Plate No QH 73