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Rio Tinto Exploration Pty. Limited

A.C.N. 000 057 125
A member of the Rio Tinto Group

EL 36/96 Pieman 1
First Annual Report
for the 11 Month Period Ending 11 December 1997
Tasmania, Australia

Author: SAJ Russell

Date: December 1997

Submitted to: Chief Geologist - SE District

Copies to: Rio Tinto Exploration, GER - Bundoora
Mineral Resources Tasmania
Rio Tinto Exploration, SE District - Bundoora

Submitted by: Sarah Russell

Accepted by: [illegible signature]

Rio Tinto Report No. 23623

97-4098

ANNUAL REPORT
EL 36/96 - PIEMAN 1
RIO TINTO - SAJ RUSSELL

Abstract

Pieman No 1, EL 36/96 was granted to Rio Tinto Exploration Pty. Limited on 11 January, 1997. The licence covers 44 sq km and is centred approximately 9 km north of the township of Corinna in north-west Tasmania (Plan Tv1161).

Rio Tinto acquired EL 36/96 to explore for economic diamondiferous pipe-like structures. Approximately 30 diamonds have been found in creeks draining the Cambrian metasediments of west coast Tasmania, the majority from Sunday Creek.

The Mineral Resources Tasmania West Coast aeromagnetic survey shows a bullseye anomaly in the catchment of Longback Creek, north of Sunday Creek. Rio Tinto has no knowledge of this anomaly being tested for diamonds.

Work conducted during the first year of tenure has included;

- A comprehensive data review conducted by J G Purvis & Associates Pty. Limited.
- Purchase of Mineral Resources Tasmania 1996 NW Tasmanian aeromagnetic data.

It was concluded that;

- There are 3 known alluvial diamond occurrences in the area. Sabbath Creek, the principal occurrence is covered by EL 36/96, Pieman. 2 other occurrences, named Harvey's Creek and Middleton Creek lie outside the EL.
- Mt Lyell Co (1979-1980) is the only party to have actively explored the area for diamonds. Work was limited to 17 drainage samples and geological traverses. Possibly kimberlitic chromites were found in the known diamond bearing drainages and also in a bulk sample of auriferous Tertiary gravels.
- Mt Lyell noted a 250m circular feature on aerial photos in Sabbath Creek. A traverse over the feature found outcropping siltstone and slate. Soil samples were collected, but only assayed for base metals.
- Only one magnetic anomaly has been drilled. Geopeko drilled a hole into Longback 1, a large strong bullseye within EL 36/96, and attributed it to pyrrhotite in dolomitic sediments. Longback 1 catchment is not drained by known diamond bearing streams.
- Although there are no magnetic anomalies in the catchment of Sabbath Creek, 2 small weak (18 and 12 nT) bullseye anomalies exist immediately to the north of Sabbath Creek . These have never been examined.
- The widespread auriferous Tertiary gravels contain a heavy mineral suite dominated by ilmenite, chromite, spinel and topaz.

It was recommended that;

- Complete a detailed interpretation of the 1996 AGSO aeromagnetic data.
- Review all previous in house work on diamond sampling in NW Tasmania.
- Compile summary maps showing alluvial diamond occurrences.
- Immediate follow up of bullseye magnetic anomalies north of Sabbath Creek using ground magnetics, loam and rock chip sampling, stream sediment/gravel sampling and geological mapping.

Table of Contents

List of Plans

List of Tables

List of Appendices

1. Conclusions and Recommendations

Conclusions:

- There are 3 known alluvial diamond occurrences in the area. Sabbath Creek, the principal occurrence is covered by EL 36/96, Pieman. 2 other occurrences, named Harvey's Creek and Middleton Creek lie outside the EL.
- Mt Lyell Co (1979-1980) is the only party to have actively explored the area for diamonds. Work was limited to 17 drainage samples and geological traverses. Possibly kimberlitic chromites were found in the known diamond bearing drainages and also in a bulk sample of auriferous Tertiary gravels.
- Mt Lyell noted a 250m circular feature on aerial photos in Sabbath Creek. A traverse over the feature found outcropping siltstone and slate. Soil samples were collected, but only assayed for base metals.
- Only one magnetic anomaly has been drilled. Geopeko drilled a hole into Longback 1, a large strong bullseye within EL 36/96, and attributed it to pyrrhotite in dolomitic sediments. Longback 1 catchment is not drained by known diamond bearing sediments.
- Although there are no magnetic anomalies in the catchment of Sabbath Creek, 2 small weak (18 and 12 nT) bullseye anomalies exist immediately to the north of Sabbath Creek . These have never been examined.
- The widespread auriferous Tertiary gravels contain a heavy mineral suite dominated by ilmenite, chromite, spinel and topaz.

Recommendations:

- Complete a detailed interpretation of the 1996 AGSO aeromagnetic data.
- Review of in house information on diamond sampling in NW Tasmania.
- Compile summary maps showing alluvial diamond occurrences.
- Follow up surface location of any bullseye targets located from aeromagnetic data.
- Ground magnetic traverses, orientation geochemistry , loam sampling and geological mapping over bullseye anomalies north of Sabbath Creek.

2. Introduction

Pieman No 1, EL 36/96 was granted to Rio Tinto Exploration Pty. Limited on 11 January, 1997. The licence covers 44 sq km and is centred approximately 9 km north of the township of Corinna in north-west Tasmania (Plan Tv1161).

Rio Tinto acquired EL 36/96 to explore for economic diamondiferous pipe-like structures. Approximately 30 diamonds have been found in creeks draining the Cambrian metasediments of west coast Tasmania, the majority from Sunday Creek.

ML 12M/96 (5ha) is wholly within and excluded from the licence area of EL 36/96. ML 37M/90 overlaps an area of approximately 1ha in the south eastern portion of the Pieman licence.

The geology of the area is dominated by Proterozoic sediments such as pelitic siltstone, conglomerate and quartz arenite of late Pre Cambrian age. There are also common outliers of Tertiary gravels. The licence is cross cut by a large NE - SW oriented fault and an earlier phase of dominantly NW - SE oriented faulting.

The Mineral Resources Tasmania west coast aeromagnetic survey shows a bullseye anomaly in the catchment of Longback Creek, north of Sunday Creek. Rio Tinto has no knowledge of this anomaly being tested for diamonds.

3. Review of Previous Work

3.1 Prior to Current Tenement

A comprehensive summary of historical exploration is shown in Appendix 1.

4. Exploration Completed in 11 Month Period Ending 11 December 1997

The following work was conducted on EL, 36/96 Pieman No 1 during the current tenement;

- Literature review conducted by J G Purvis & Associates Pty. Limited.
- Purchase of Mineral Resources Tasmania 1996 NW Tasmanian aeromagnetic data.

Major findings from the literature review are summarised in Appendix 1.

5. Rehabilitation

No field word was conducted, hence no rehabilitation was required.

6. Expenditure

Expenditure for EL 36/96, Pieman No 1 for the 11 month period ending 11 December 1997 is $14,877.

7. References

Hutton, MJ	1980	EL 26/78 Pieman 1 Precious Stones, Relinquishment Report. TCR 80-1517

8. Location

Burnie	SK55-03	1:250,000
Pieman	7914	1:100,000
Interview	3239	1:25,000
Meredith	3439	1:25,000

9. Keywords

Tasmania * Diamonds * Proterozoic * Sabbath Creek * Aeromagnetics * alluvial

Table 1

EL 36/96 Pieman 1
Expenditure Table

	11 months ending 11/12/97
Drilling	0
Contractors	7,085
Laboratory	0
Rent & Property	103
Payroll & Benefits	2,400
Field & Transport	682
Travel & Accommodation	0
Computer Services	517
Professional	0
Office & Miscellaneous	1,570
District Administration	760
Regional Costs	1,100
Tenements	660
TOTAL	**14,877**

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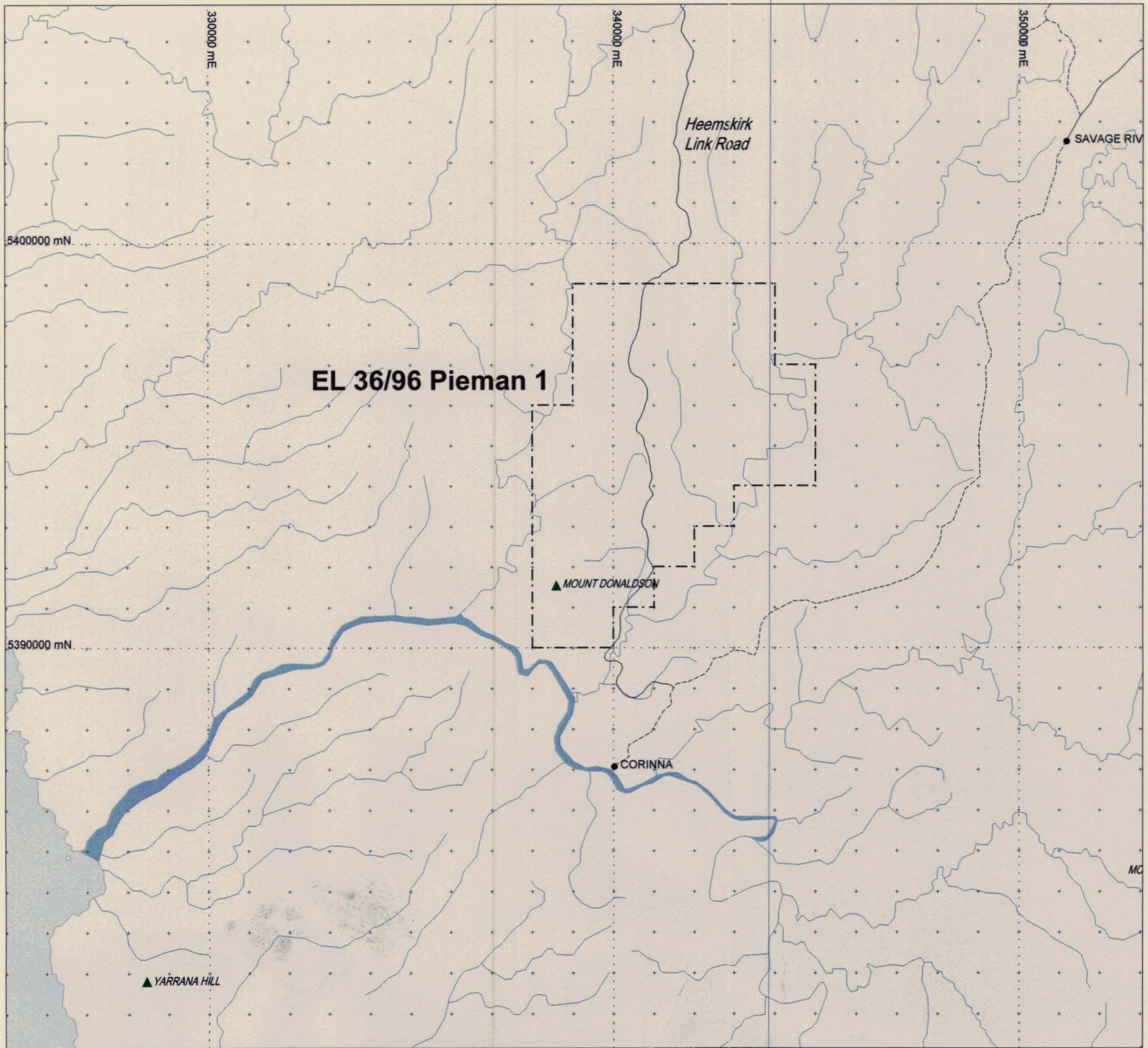


Projection: Australian Geodetic Datum 1966 (AGD66), AMG Zone 55

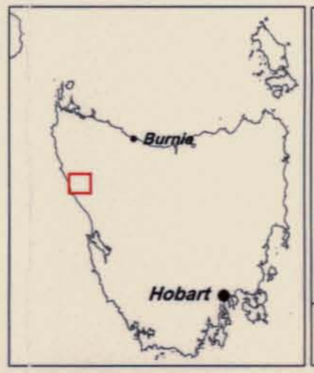
Key

- town
- mountain
- track
- minor road
- main/secondary road
- highway
- river (perennial)
- river (non-perennial)
- EL

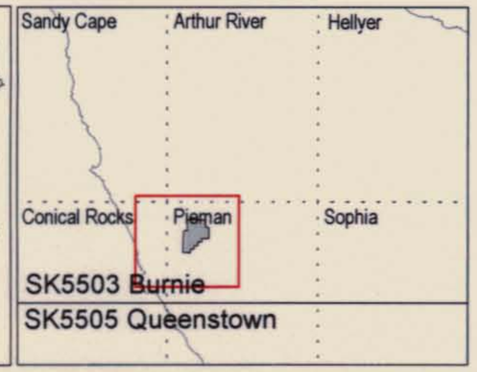
5 cm

0 2 4 6km

Scale 1:100,000



Location Diagram



Map Sheet Reference

RIO TINTO EXPLORATION PTY. LIMITED

EL 36/96 Pieman 1

Location Plan

Author: Torbjorn von Strokirch	Reference: SK55-03 Burnie
Drawn: Tony Sargeant	File Name: Tv1161.wor
Date: August 1996	Report No: 23623
Scale: 1:100,000	Plan No: Tv1161

Appendix 1

Review of Historical Exploration Data

260010

J. G. PURVIS & ASSOCIATES PTY. LIMITED
CONSULTING AND CONTRACT GEOLOGISTS
A.C.N. 009 545 591

"Sunnymead",
Bass Highway,
(P.O. Box 34),
Hadspen, Tasmania 7290

Facsimile : (003) 93 6044
Telephone : (003) 93 6240

9th June 1997

Torbjorn von Strokirch,
Manager - Tasmania,
CRA Exploration Pty. Limited,
Private Box 3,
Bundoora MDC,
VICTORIA 3083.

Dear Torbjorn,

Enclosed is my summary report on the Mt Donaldson diamond occurrence. I hope it is what you wanted.

I was surprised by the long history of exploration in the general area and the large number of Company reports in the Tasmanian Mines Department files. Unfortunately, very little of the previous work has any relevance to the search for diamonds.

I have photocopied and kept a lot of references that contain background information on the area - geological mapping, drainage sampling, rock sampling etc. I judge that these don't really contain anything of value to you at this stage, but you can have them if you want. I just didn't want to clutter up the report with less-than-pertinent data.

I attach an account. The job took the full five days I'm afraid.

Let me know if I can be of further assistance.

Yours sincerely,

Gerald Purvis

Gerald Purvis.

J. G. PURVIS & ASSOCIATES PTY. LIMITED

Memo to: Torbjorn von Strokirch 9th June 1997
From: Gerald Purvis

Re: MT DONALDSON DIAMOND OCCURRENCE
WESTERN TASMANIA (EL 36/96)

As requested, I have:

a) Located the alluvial diamond occurrences and compiled data on them.
b) Summarized previous exploration carried out within EL 36/96.

Copies of relevant references and other data are attached.

MAIN POINTS OF NOTE:

1. There are three known alluvial diamond occurrences in the area. Sabbath Creek, the principal occurrence, is covered by EL 36/96. Harvey's Creek and Middleton Creek lie outside the EL.

2. Mt Lyell Co (1979-80) is the only party to have actively explored the area for diamonds. Work was limited to 17 drainage samples and geological traverses. Possibly-kimberlitic chromites were found in the known diamond-bearing drainages and also in a bulk sample of the auriferous Tertiary gravels.

3. Mt Lyell noted a 250m circular feature on aerial photos in Sabbath Creek. A traverse over the feature found outcropping siltstone and slate. Soils were sampled but assayed only for basemetals.

4. None of the magnetic anomalies in the area have been tested for diamonds. Some have been tested for tin-tungsten or basemetals, without success.

5. Only one magnetic anomaly has been drilled. Geopeko put a hole into Longback 1, a large strong bullseye within EL 36/96, and attributed it (questionably) to pyrrhotite in dolomitic sediments. Longback 1 is not drained by known diamond-bearing catchments.

6. Although there are no magnetic anomalies in the catchment of Sabbath Creek, two small weak (18 &12 nT) bullseye anomalies immediately north of Sabbath Creek have never been examined.

7. The widespread auriferous Tertiary gravels contain a heavy mineral suite dominated by ilmenite, chromite, spinel and topaz.

INTRODUCTORY COMMENTS:

A) Peter Temby reported on the Donaldson diamond occurrences in 1980 (I accompanied him on a brief field examination of the area). I am acutely aware that in some instances the CRAE files probably contain better data than available in the Tasmanian Mines Dept.

B) I viewed the Dept's copies of the 1996 AGSO aeromagnetics and presume you have this data. Enclosed is a small reduced overlay of the magnetic contours with the names Geopeko gave to the anomalies, some of which they investigated.

KNOWN DIAMOND OCCURRENCES:

Only 16 or at most 18, authenticated alluvial diamonds have been found, ranging up to 0.33 carats in weight. All were found prior to 1910, in and around alluvial gold workings.

Confirmed localities are **Sabbath Creek** immediately north of Mt Donaldson, with at least 7 stones recorded and the only occurrence within EL 36/96, **Middleton Creek** just north of Corinna, and **Harvey's Creek** 3km west of Savage River Township. Some diamonds may also have come from the Little Savage River (also known as Badger Creek) into which Harvey Creek flows, but this can't be confirmed. See Figures 1 & 2.

References:

Petterd, 1910: Catalogue of the Minerals of Tasmania. Tas Mines Dept
Twelvetrees, 1918: Diamonds in Tasmania. Mines Dept Circular No.4
Twelvetrees, 1914: The Bald Hill Osmiridium Field. GS Bull No.17

SUMMARY OF EXPLORATION IN EL 36/96 AREA:

(See Table 1 and Figures 1 & 2).

In 1956 **RTAE** covered the area with aeromagnetics as part of large regional survey.

In the early 1960's **Pickands Mather** stream sediment sampled tributaries along the Donaldson River.

From 1970-72 the area was held by **Renison** as part of a tin-tungsten search, which included an aeromagnetic survey. No work from this programme is documented within EL 36/96.

In 1973 **ESSO** flew Input EM and aeromagnetics over much of NW Tasmania. EM anomalies X7 to X12 lie within EL 36/96. X7, X8 and X12 were ground checked by Esso and ascribed to black shale sources, although outcrop only occurred at X7. X12, described as having no associated magnetic response, is shown on Esso maps in the vicinity of Geopeko's Longback 1 major magnetic anomaly (see below). Anomalies X9-11 were later investigated by EZ (see below).

In 1977 Mt Donaldson was briefly held by **CRAE** under EL 1/77 (Sn/W).

From 1978-81 **Mt Lyell** held the whole area under two overlapping EL's - one for all metals, the other for diamonds-only. The exploration programmes were run in conjunction. Very limited drainage bulk sampling was done at selected widely-spaced sites for diamonds, while drainage, rock and soil sampling was done for metals. Possibly-kimberlitic chromites were found in the known alluvial diamond localities and a small circular feature noted from aerial photos in Sabbath Creek. A massive pyrite lens up to 1.2m thick and 100m long was found in Proterozoic dolomite in Sabbath Creek but contained no anomalous base or precious metals.

In 1982 the **Tasmanian Mines Dept** flew detailed aeromagnetics over NW Tasmania. Several magnetic anomalies were outlined within the area of EL 36/96, including a 400m diameter 1000nT anomaly on the Longback Ridge 6km NNE of Mt Donaldson. See Figure 2.

Cominex (H. Nolan) pegged EL 37/82 over the anomaly because they considered it might be a kimberlite. They apparently only did ground magnetics over it before Joint Venturing the EL to **Geopeko** in 1983. EL 37/82 covered the eastern two-thirds of EL 36/96 (see Figure 1).

Geopeko tested the magnetic anomaly (which they named Longback 1) for its Sn/W potential. They did grid-based ground magnetics, mapping, soil and rock sampling. They drilled a 302m diamond hole through the centre of the anomaly, intersecting a wide zone of 1% disseminated pyrrhotite in Proterozoic dolomitic grey shales and black shales. Sn/W and basemetal values were very low (Au assayed later by RGC - values negligible). Although magnetic susceptibility measurements of the core were an order of magnitude less than expected from modelling, and the distribution of the wide zones of apparently-syngenetic pyrrhotite quite unlike the modelled target of three dyke-like bodies oriented at right angles to the sedimentary dip and strike, Geopeko regarded the anomaly as tested.

Geopeko then turned their attention to other magnetic anomalies in the area, pegging two new EL's: EL 57/83 over Mt Donaldson itself (covering the western third of the current EL 36/96), and EL 17/83 to the north. See Figure 1. They cut reconnaissance lines and did ground magnetics, soil, rock and drainage sampling, over 3 anomalies (none of which lie within EL 36/96 - see Figure 2). Longback 2 (100nT) on EL 37/82 was attributed to outcropping magnetic Proterozoic amphibolite and pyrrhotitic siltstone. Don 1 (50nT) and Don 2 (130nT) on EL 57/83 were attributed to outcropping magnetite-bearing Proterozoic siltstones. Sn/W and basemetal values were universally low. Geopeko transferred the EL's to **Cominex** and withdrew from the area in early 1985.

Cominex, and JV partners **EZ** (1987-89) and **Aberfoyle** (1989-90), switched the focus of exploration to silica flour, gold and basemetals. This followed the 1984 discovery of mineable silica flour deposits over silicified Proterozoic dolomite at Brookside Prospect, 4km east of Mt Donaldson on EL 37/82 (outside EL 36/96). They pegged EL 35/85 south of Mt Donaldson to cover the southern extensions of the silica flour deposits.

In 1987 hard rock gold mineralization was discovered along a dolomite/mudstone contact at Brookside. This mineralization was later tested by **Aberfoyle** with 5 unsuccessful short diamond drillholes totalling 311m.

Cominex, EZ and **Aberfoyle** found further (uneconomic) silica flour and minor gold in drainage, on all three EL's (37/82, 57/83 & 35/85), including in Guthrie Ck in the SE corner of the current EL 36/96. Microscopic examination of the drainage samples determined that the gold was derived from two sources: the Tertiary gravels and locally from the Proterozoic sequence.

Studies showed the Tertiary gravels were deposited in a fluvial lead flowing east to west across the Arthur Lineament and then SSW down the dolomite units (broadly along the present trend of the Savage River), where the recessive weathering of the carbonates allowed the accumulation of several tens of metres of gravels in places. The gravels contain a characteristic HM suite of ilmenite, chromite, spinel, topaz, tourmaline and cassiterite.

EZ examined the gold potential of EL 37/82 and targetted the untested ESSO EM anomalies X9, X10 and X11 (all within the area of EL 36/96). Drainage and rock sampling gave a best result of 1.4g/t Au from rock float at X6, on a dolomite/siltstone contact 2km east of EL 36/96. Grid-based soil sampling over X6 produced no gold values and EZ withdrew from the JV in 1989.

One legacy of the EZ programme was a comprehensive review of the 1982 aeromagnetics and 1987 Tasgrav gravity data, by **D. Leaman** (see attached Mines Dept Report No. 89-2959A).

Although **Aberfoyle** concentrated on the Brookside Prospect they also did mapping, drainage and rock sampling for gold and basemetals at selected sites in the southern part of EL 57/83 (within EL 36/96), as well on EL 35/85. This defined weak gold values in Guthrie Creek in the SE corner of EL 36/96.

Cominex relinquished EL 57/83 in October 1990, and EL's 37/82 & 35/85 in April 1992. Apart from the ML mentioned below, the Mt Donaldson ground remained vacant until pegged by **CRAE** in 1996.

In 1981 **J. Stephens** pegged EL 26/81 over the Mt Donaldson area. He replaced this in 1982 with the smaller EL 47/82. No work on these EL's was ever reported to the Mines Dept. In 1982 Stephens was granted a 3 sq km ML (50M/82) over the upper part of Sabbath Creek (see Figure 1). It is possible Stephens took out his EL's and ML 50M/82 to look for alluvial diamonds, as he held a gemstones-only ML over alluvials in the Whyte River and Rocky River at this time.

ML 50M/82 was subsequently owned by **I. Gregory** and existed within EL 57/83 during the entire 7 year life of that EL. Sometime after 1989 the ML was reduced to 30ha. It was apparently relinquished in 1996. A 5ha ML 12M/96 is currently held by **L. Sharman & A. Casey** in the same area (ie: within EL 36/96).

J. G. Purvis.

J.G. Purvis.

9th June 1997

TABLE 1

EXPLORATION HISTORY OF EL 36/96 AREA (post March 1964)

Licence	*Holder*	*Tenure*	*Target*	*Reports* (Mines Dept No)
EL 20/69	J. HOOD	March 69-Oct 70	?	None
EL 48/70	RENISON	Nov 70-May 72	Sn / W	71-754 71-829 72-876 72-886 72-899 72-909
EL 2/73	ESSO	Jan 73-Jan 74	Cu/Pb/Zn	73-964 74-987
EL 1/77	CRAE	March 77-Oct 77	Sn / W	N/A
EL 26/78	Mt LYELL	Nov 78-Nov 80	Diamonds	81-1517
EL 27/78	Mt LYELL	Nov 78-Nov 81	Cu/Pb/Zn/Sn/W	81-1520
EL 26/81	J. STEPHENS	Dec 81-Dec 82	?	None
EL 47/82	J. STEPHENS	Dec 82-Aug 83	?	None
EL 37/82	COMINEX	Sept 82-April 92	Sn/W/Au/Si	84-2111 85-2364 85-2366 86-2540 87-2655 88-2767 88-2800 89-2959 89-2959A 91-3250 92-3324 94-3617
EL 57/83	COMINEX	Sept 83-Oct 90	Sn/W/Au/Si	84-2153 87-2655 88-2767 88-2886 88-2887 89-3066 90-3191 90-3191A 90-3191B

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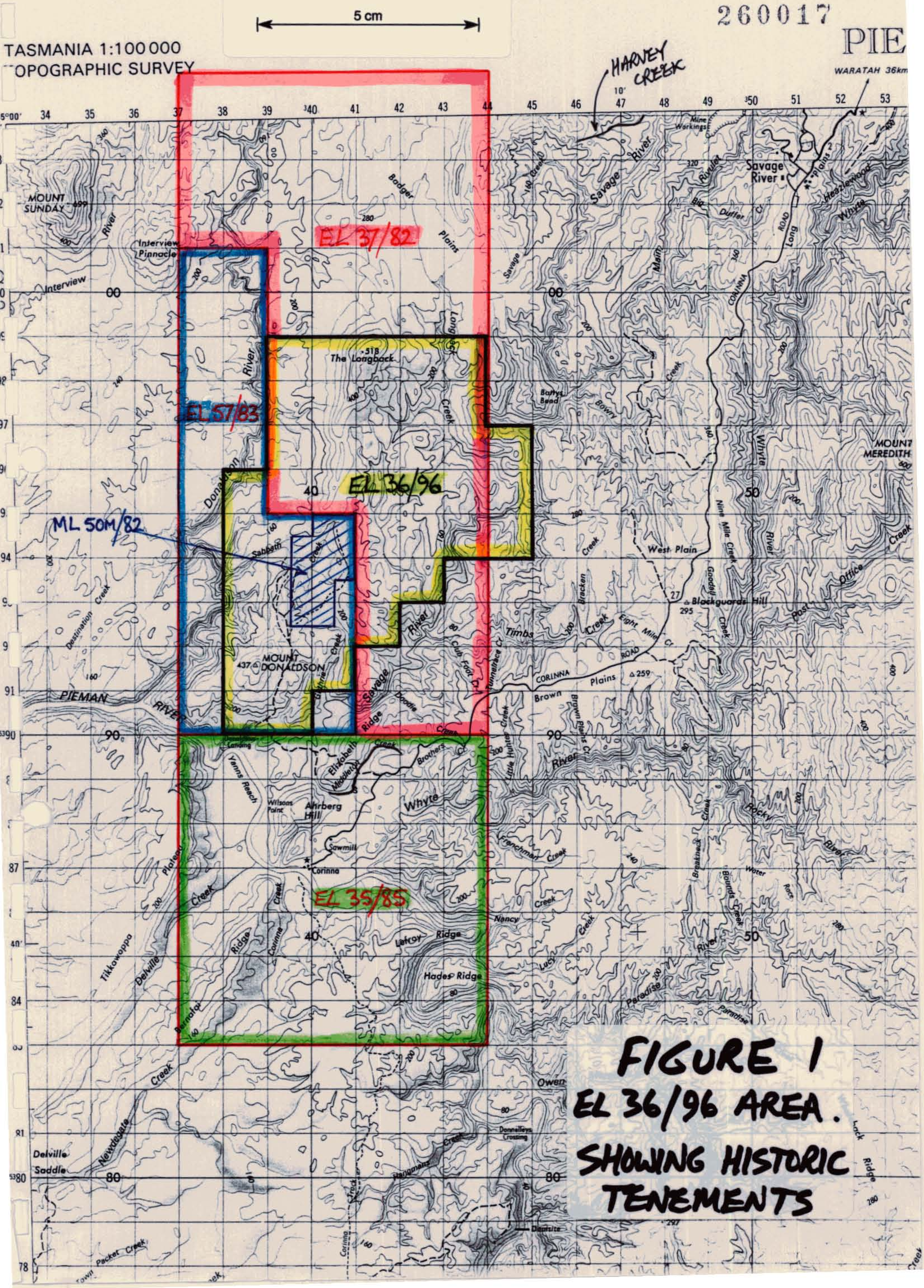
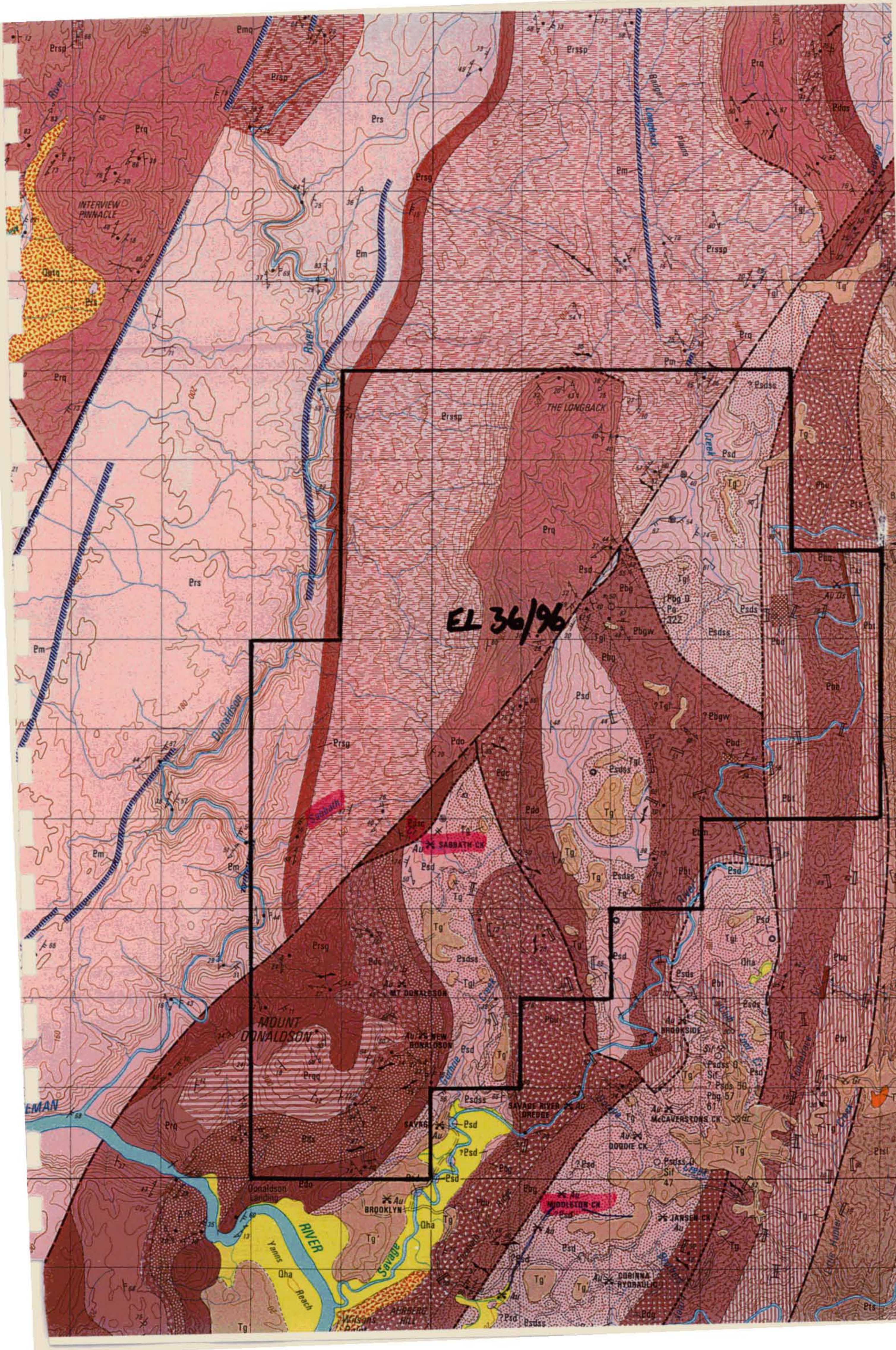


FIGURE 1
EL 36/96 AREA.
SHOWING HISTORIC TENEMENTS


EL 36/96
INTERVIEW PINNACLE
THE LONGBACK
MOUNT DONALDSON
SABBATH CK
MT DONALDSON
NEW DONALDSON
SAVAGE RIVER DREDGE
BROOKSIDE
McCAVERSTONS CK
DOODIE CK
BROOKLYN
MIDDLETON CK
JANSEN CK
CORINNA HYDRAULIC
RIVER
Savage
Yanns Reach
Donaldson
Prq
Prs
Prssp
Prsg
Pm
Psd
Psdss
Pdo
Pbd
Pbgw
Pbg
Pbl
Tg
Tgl
Qha
Qptq
Au

260018

AGSO AEROMAGNETICS (1996) 1:50,000

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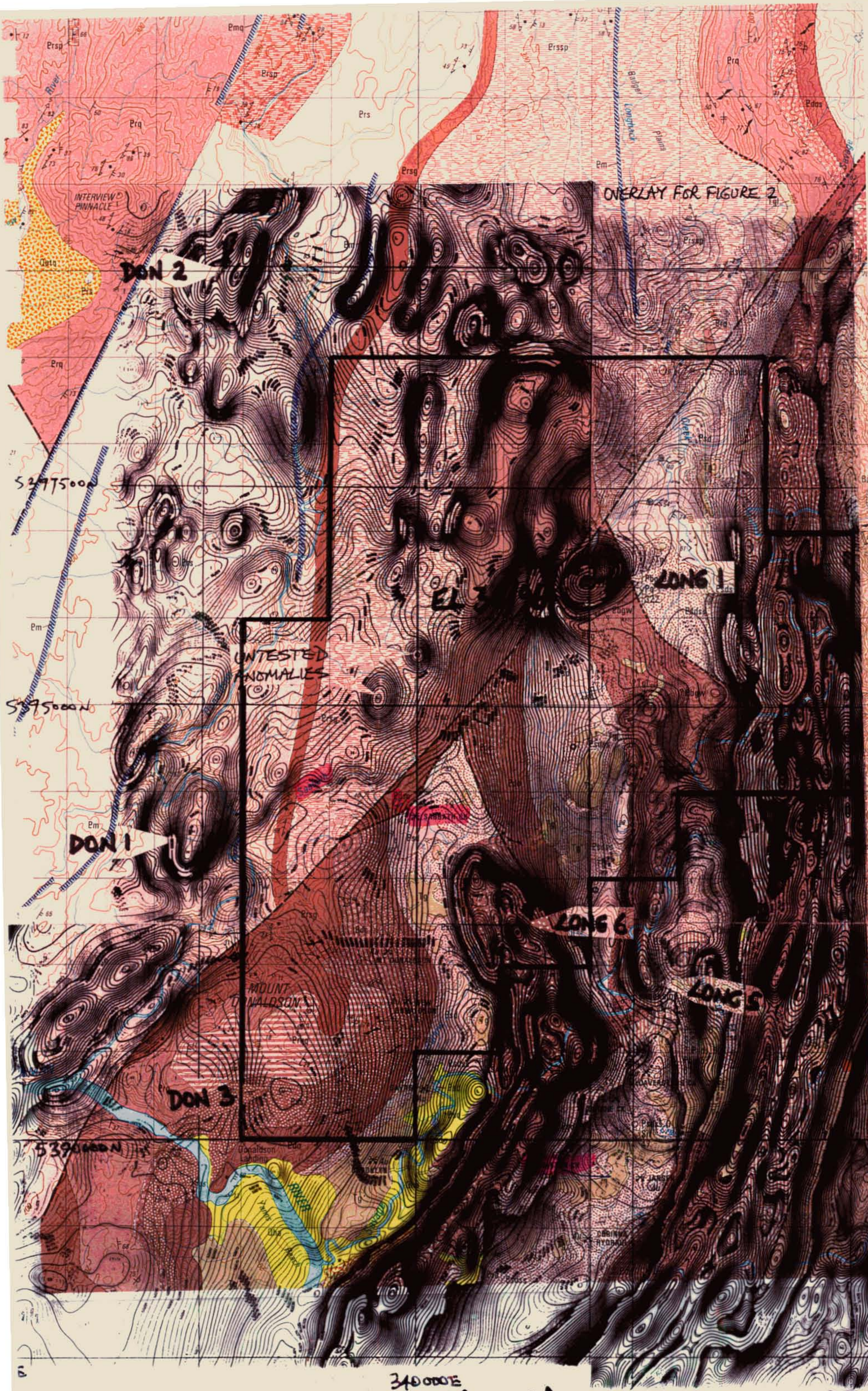

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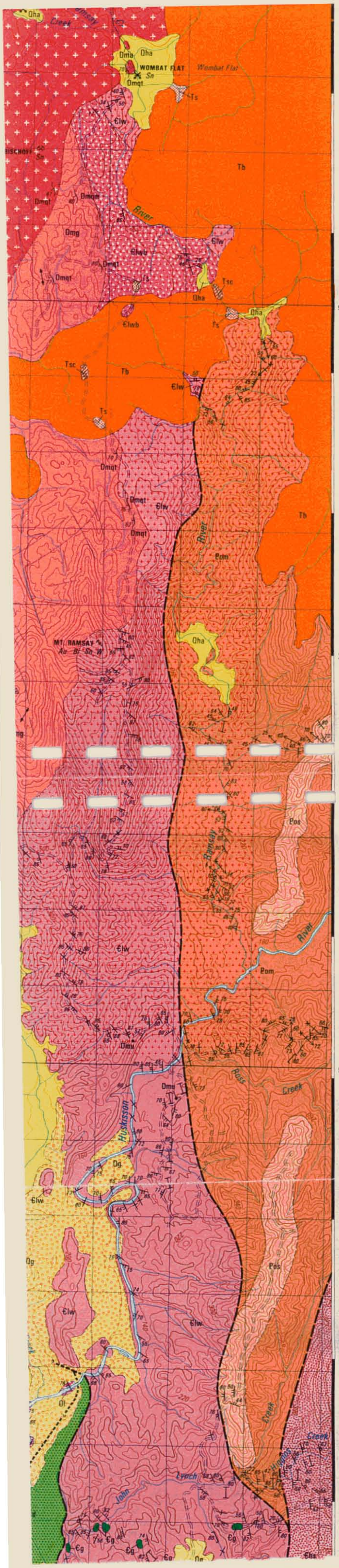

CA

TERTIARY

Erosional Surface

Tu — Tg/Tg' — Quartzose gravel and sand (Tg) with lignitic silty clay (Tg').

Tb / Tsc — Tholeiitic and alkali-olivine basalt (Tb); interlayered sand, silt and conglomerate (Tsc).

Tg' / Ts — Quartzose gravel and sand with lignitic silty clay (Tg'), with upper Eocene – Oligocene microflora at CP479917, CP436899; minor gravel with lag of gravel and bedrock derived vein quartz (Tgl); interbedded sand and clay (Ts).

Low-Angle Unconformity

CARBONIFEROUS PERMIAN

Pt — Tillite.

Angular Unconformity

PALAEOZOIC

EARLY DEVONIAN-SILURIAN

S-Du — Db — Sandstone, siltstone and mudstone (correlate of Bell Shale).

Df — Dominantly quartz sandstone sequence (correlate of Florence Quartzite).

Sa / Sas / Sal — Siltstone, mudstone and calcareous siltstone (Sa) with limestone (Sal) or quartz sandstone (Sas) layers. (correlate of Austral Creek Siltstone, Keel Quartzite, Amber Slate).

Sc — Quartz sandstone with minor mudstone and granule conglomerate layers (correlate of Crotty Quartzite).

ORDOVICIAN

Ou — Ol — Limestone and impure limestone with variable texture (correlate of Gordon Limestone).

Os — Poorly-sorted quartz sandstone and minor mudstone.

Fault Contact

MIDDLE–LATE CAMBRIAN

€mu — €h / €hs — Laminated siltstone, graded sandstone and lithicwacke, pebbly sandstone and conglomerate.
Acid-intermediate tuffaceous layers with siliceous conglomerate units towards the top of the succession. Fossiliferous horizons indicated (●).

HUSKISSON GROUP (Correlate of part of the DUNDAS GROUP)

EOCAMBRIAN (?) – CAMBRIAN

€cw / €cwb — Mafic volcaniclastic lithicwacke, siltstone and mudstone with minor carbonate, chert and basalt. Areas of dominantly pillow basalt indicated (€cwb). Associated occurrences of pyroxene and spinel phyric andesite (€ba) and aphyric, grain size zoned basalt (€bm) indicated.

Cleveland – Waratah Association

€lw / €lwb — Mafic volcaniclastic lithicwacke, siltstone and mudstone with minor carbonate and basalt, in the John Lynch Creek – Wombat Creek area. Areas of dominantly planar flow basalt indicated (€lwb).

Eu — Ecc — Mafic volcaniclastic lithicwacke, siltstone and mudstone with minor carbonate and tholeiitic basalt, in the Mt Lindsay – Wilson River area.

CRIMSON CREEK FORMATION

Esrr — Red chert and mudstone with minor conglomerate layers.

Esu — Esl — Laminated siliceous siltstone with minor quartz sandstone and conglomerate horizons.

Ess — Black mudstone, siltstone and minor sandstone (dominated by soft sediment deformation).

(Renison Bell Formation)

SUCCESS CREEK GROUP

Angular Landscape Unconformity in Pieman River – Misty Valley area, unknown relationship in Heazlewood River area.

NA AF ST OF EXTEN 484O 338761)

PROTEROZOIC

LATE PRECAMBRIAN

Pbu — Pbt — Interbanded, slaty or phyllitic to relatively massive, green to grey, tuffaceous and pelitic chloritic metasiltstone with fine-gr oliated, ritic and even grained, actinolitic, subalkaline metabasalt and minor metamorphosed basaltic wacke.

Pbg — Grey tuffaceous and pelitic metasiltstone predominant; with scattered layers of pebbly basaltic wacke (Pbgw)

Pbb — Metabasalt abundant.

Pbm — Relatively massive metabasalt or fine-grained metadolerite.

Pbq — Interbedded micaceous quartzwacke and pelitic siltstone.

Pbd — Dolomite.

Bernafai Volcanics extend from CP406928 – CP343800, shown as Pbu

Conformable boundaries through CP412952, CP409910

Psd — Pale grey and cream, fine-grained, locally oolitic dolomite with stromatolites e.g., CP427973 (Psd), interbanded, richly carbonaceous siltstone at CP431971; with variably silicified dolomite (Psds); mainly lag of dolomite silicification products including silica flour (Psdss) commonly obscured by Tertiary-derived slope-wash deposits.

Savage Dolomite extends from CP403938 – CP336797, shown as Psd, Psdss

Conformable boundaries through CP412952, CP400910

Pdg — Grey, slaty, pelitic siltstone with minor banded chert.

Pdu — Pdos / Pdo — Grey, slaty, pelitic siltstone with minor banded chert and thin interlayers of silicified oolitic carbonate.

Pds / Pdsc / Pdc — Micaceous quartzwacke in graded beds with interlayered slaty, locally chloritic, pelitic siltstone and mudstone (Pds), and poorly-sorted conglomerate with well-sorted conglomerate and sandstone near base (Pdc)

Ahrberg Group = Pdu, etc, Pdg; Psd; Pbu, etc.

Angular unconformity around CP397916, paraconformity elsewhere

Prs — Slaty to relatively massive, chloritic siltstone and minor mudstone in planar-banded associations of pale- to medium-grey green (Prs), dark grey (Prsg) or dominantly grey with thin, commonly lenticular, graded beds of pale siltstone and sandstone on scoured bases (Prsp) Prs and Prp undifferentiated (Prssp)

Interview Slate and quartzite extends West from around CP364906, shown as Prs

Prq — Common to dominant micaceous quartz sandstone and cross-bedded quartzarenite with siltstone (Prq); dominantly silicified quartzarenite (Prqq)

Pou — Poq — Quartzwacke with coarse detrital muscovite interbedded with siltstone, mudstone, dolomite and minor congolmerate.

Pom — Thinly bedded, dark grey, slaty to relatively massive, pelitic siltstone and mudstone (Pom); with minor chert in the Heazlewood River area; and dolomite, conglomerate and minor lava and volcanic breccia in the Misty Valley area.

Pos — Graded beds of quartzwacke interlayered with sparsely-chloritic pelitic siltstone and mudstone with interbeds containing coarse detrital muscovite around CQ530020, dominantly better-sorted. indurated quartz sandstone with local coarse detrital muscovite siltstone and minor mudstone east of the Stanley River.

Transitional metamorphic boundary

Posm — Micaceous quartz schist with locally preserved graded beds, interlayered with grey and green, pelitic phyllite and minor fine-grained schist.

Oonah Formation = Pos, Pom, Poq, Posm

Transitional to relatively sharp lithological boundary

Pts — Interbanded green to grey phyllite and fine-grained schist, usually comprising muscovite and quartz with trace to dominant chlorite, albite and dolomite, with scattered, thin layers of actinolitic amphibolite (Pts); with micaceous quartz schist and relatively minor porphyroblastic schist (Ptsq) and grey phyllite common or dominant (Ptsqg); with intervals of boudinaged, thin beds and probable flattened clasts of annealed meta-quartzarenite (Ptsl), thin, boudinaged quartz-feldspar porphyry at CP457921.

Pta — Usually chloritic phyllite and schist with dominant to common layers of foliated, fine- to rarely coarse-grained, occasionally chloritised, hornblendic, sub-alkaline amphibolite containing common magnetite (Pta), with rare magnetite (Pta') tuffaceous texture at CP461921, amygduloidal at CP441857; with lenses of massive or richly disseminated magnetite – subordinate pyrite (Ptam, Ptamd); with common to dominant layers of magnesite – subordinate dolomite (Ptac); predominantly felsic albite schist with relict medium-grained microcline-albite granitoid (Ptaa)

Arthur Metamorphic Complex
(Whyte Schist) = Posm; Pts, etc; Pta, etc
Timbs Group = Pts, etc, Pta, etc.
Bowry Formation extends from CQ486041 to CP357761 and includes Ptac, Ptaa, Ptam, Ptamd and some of Pta, Pts.

IGN ROC

260021

Data on Known Alluvial Diamond Occurrences

For free distribution.]

TASMANIA

MINES DEPARTMENT CIRCULAR

No. 4

Diamonds in Tasmania

BY

W. H. TWELVETREES, Government Geologist

Issued under the authority of
The Honourable Sir NEIL ELLIOTT LEWIS, K.C.M.G.
Minister for Mines for Tasmania

Hobart:
JOHN VAIL, GOVERNMENT PRINTER

B83577 1918

by and sinking below Tertiary and Recent terrace gravels of a more or less auriferous nature. These gravels are being dissected by the streams, in the beds of which intermittent prospecting has won gold, osmiridium in small quantities, and the diamonds. No serpentinised rock is known in the immediate neighbourhood, though some veins of nickel-ore were met with in the Rocky River Mine, a few miles from Corinna, when that mine was being worked in 1900. Four miles from Corinna on the main road to Waratah is a patch of Tertiary basalt, but this is unrelated to the diamond occurrences. Serpentine is said to occur on Serpentine Hill between the Rio Tinto Mine and Specimen Reef, but the nearest great massif of serpentine rock is the Bald Hill Range. Unless some yet undiscovered serpentine exists on the Donaldson Range, it is most likely that the diamonds which have been found there are derived from the serpentine of the Upper Savage and Bald Hill.

No porphyritic peridotite, such as the South African kimberlite, has been found at Bald Hill; the rocks there are ordinary serpentinised peridotite and pyroxenite, with here and there some gabbro, forming the outermost ultrabasic fringe of the great granite mass of the Meredith Range. Still, kimberlite belongs to this rock-group; and one may assume with a high degree of probability that the diamonds found have been liberated from these rocks. Diamond has been found in Africa embedded in the mineral olivine, and olivine is an important constituent of the Bald Hill serpentinised rocks.

Discoveries of Diamonds in Tasmania.

An incorrect reference to diamonds in Tasmania is made in Max Bauer's work on "Precious Stones" (Spencer's translation, 1904, p. 225), as follows:—

> "Tasmania has recently been added to the list of diamond-producing countries. According to newspaper reports, a large number of stones were found at the end of the year 1894 in Corinna, one of the richest goldfields of the island. The reported occurrence caused a rush of diamond-seekers into Tasmania from the Australian mainland; many companies for the exploitation of the deposits sprang up, but apparently with no marked results."

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The real facts are that 16, or at most 18, diamonds have been authenticated. They were mostly about $\frac{1}{5}$-carat in weight, one reaching $\frac{1}{3}$-carat.

These have all been found near Corinna in the Donaldson Range district, between the Savage and Donaldson Rivers. In December, 1894, L. Harvey, prospector for the New Donaldson Sluicing Company, brought to Launceston two diamonds, one of which he stated that he had found in Sunday Creek, on the west side of Mt. Donaldson, which flows into the Savage, and the other in Harvey's Creek, which falls into the Badger, also a tributary of the Savage River. These were transparent octahedra, tinted straw-yellow at the apices.

In the same year the late Mr. Leslie Jolly brought a diamond back from the same district: this also had the characteristic tinge of yellow at the apices.

Another prospector (Lawson) found five specimens at the Donaldson Range; the exact locality has not been verified, but they are believed to have been discovered in either Middleton's Creek or the Badger. They also had the same tinge at the apices.

In 1906 Mr. T. Batty, of Long Plain, found a specimen in Harvey's Creek. It weighed ·025 gramme or about $\frac{1}{8}$-carat. It was a brilliant octahedral crystal, tinted faint greenish-yellow at the apices. The crystal faces had the curves characteristic of diamonds. It contained numerous fluid cavities of microscopic size.

Another specimen has been recorded from Middleton's Creek, which flows into the Savage River north of Corinna.

A parcel of gem sand from near the Hellyer River, in the Waratah district, was sent to England by the Van Diemen's Land Company many years ago, and this was reported to contain a small diamond. It has not been possible to ascertain the locality of this sand.

It is quite a usual thing for diamonds from different fields and countries to be distinguished by certain differences and similarities, and one may record the constant yellow apices as characteristic of the Savage River or Donaldson district as a diamond province.

Information for Prospectors.

The few diamonds which have been found hitherto are sure and certain indications that more remain to be discovered. They were found at a time when unusual

Tasmania

DEPARTMENT OF MINES

EOLOGICAL SURVEY BULLETIN

No. 17

e Bald Hill Osmiridium Field

BY

W. H. TWELVETREES, Government Geologist

Issued under the authority of
The Honourable J. E. OGDEN, Minister for Mines

Tasmania:
JOHN VAIL, GOVERNMENT PRINTER, HOBART

1914

XI.—DIAMONDS.

The peridotite rock of the Bald Hill possesses additional interest as being the probable source of the few small diamonds which have been found from time to time in the neighbourhood of Mt. Donaldson, near Corinna, in gold-bearing wash.

In 1894, L. Harvey, prospector of the New Donaldson Sluicing Company, found a small diamond in Harvey's Creek, which heads in the Donaldson Range and falls into the Savage River; and another in Sunday Creek on the west side of Mt. Donaldson, flowing also into the Savage. Lawson found some also in Sunday Creek, and another has been recorded from Middleton's Creek, which flows into the Savage River north of Corinna. The respected prospector, Mr. T. Batty, found one in Harvey's Creek in 1906. Mr. W. F. Petterd, in his "Catalogue of the Minerals of Tasmania," mentions 16, or at the most, 18, stones as authenticated. These gems were mostly octahedra, about one-eighth of a carat in weight, one reaching one-third of a carat. They have a slight yellow tinge at the apices.

These have all been found in the district round the Donaldson Range between the Savage and Donaldson Rivers. The range consists of slates, sandstone, and conglomerate of Pre-Silurian age, and no serpentine rock is known in the neighbourhood. Between the Rio Tinto Mine and Specimen Reef serpentine is said to exist on Serpentine Hill, but the main exposure of peridotite rock, from which these diamonds were probably derived, is the Bald Hill Range. A parcel of gem sand from near the Hellyer River was sent to England by the Van Diemen's Land Company many years ago, and it is said that a small diamond was detected in it; if so, it most likely came from the Bald Hill massif. Osmiridium is found associated with gold in some of the creeks round Mt. Donaldson, and unless some yet undiscovered serpentine exists there, it seems likely that the creeks are dissecting ancient gravels, to which the Bald Hill peridotites contributed. It is not probable, however, that many stones will come to light on the osmiridium field itself; the chances are greater lower down the Savage. Whatever finds eventuate will certainly be casual ones. Prospecting for the gems would be an almost hopeless task. It is sufficient for the present merely to draw the attention of those who are working in this region and recommend that a look-out be kept for diamonds while sluicing.

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Mt Lyell Company Diamond Data

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THE MOUNT LYELL MINING AND RAILWAY COMPANY LIMITED

EXPLORATION LICENCE 26/78 (TASMANIA)

PIEMAN

PRECIOUS STONES

RELINQUISHMENT REPORT

NOVEMBER, 1980

M. J. HUTTON

Distribution:

Mount Lyell (2)
Tas. Mines Dept. (1)

CONTENTS

260029

260030

LIST OF FIGURES

LIST OF TABLES

APPENDICES

260031

SUMMARY

E.L. 26/78, Pieman, was granted on 23rd May, 1979, as an exploration lease for precious stones, specifically diamonds. The lease covers 1380 sq. km of N.W. Tasmania and includes the drainage basins of the Donaldson, Savage, Heazlewood and Whyte Rivers as well as the lower reaches of the Pieman River (Figure 1).

Following airphoto interpretation and literature review ten bulk stream sediment samples (averaging 71.3 kg), one bulk tertiary gravel sample (44 kg) and one bulk beach sand sample (121 kg) were collected from the area.

The samples were initially sieved at Mount Lyell to obtain the 1.68 mm to 0.30 mm size fractions. Gravity and magnetic separation were carried out in Perth, W.A., prior to sizing and microscopic examination by an experienced observer.

Most samples contained chromite which may be kimberlitic. No other kimberlite indicators were found.

Total expenditure on E.L. 26/78 was $ 22 044. No further expenditure is warranted. The licence was relinquished on 23rd November, 1980.

1. INTRODUCTION

1.1 EARLY HISTORY

The Pieman River area was the scene of a rush in the early 1880's following the discovery of gold in Middleton Creek. Gold was also found in other tributaries of the Donaldson, Savage and Whyte Rivers as well as in patches of Tertiary gravels perched on the intervening divides and spurs.

Copper, lead, silver and osmiridium were also found in the area but the alluvial gold attracted most attention from prospectors.

In 1894 a prospector, L. Harvey, while sluicing gold for the New Donaldson Sluicing Co., found a small diamond in Harvey's Creek and another in Sabbath Creek (originally known as Sunda y Creek). Further finds of diamond were made in Middleton, Sabbath and Harvey's Creeks.

Petterd (1910) records 16, or at the most 18, diamonds as authenticated. All stones showed good octahedral crystallization, with rounded facets, yellow tinges at the apices and a uniformity of size, nearly all being 0.125 carats with the largest weighing 0.33 carats.

The diamonds were obtained from shallow alluvials during sluicing operations for gold and osmiridium. It is possible that many more were missed by the early prospectors who were primarily after the precious metals.

The only reported search for diamonds in the Pieman area was "a presumably careful examination of Harvey's Creek" which failed to reveal any of a larger size than the original small specimens (Petterd, 1910, p. 64).

1.2 GEOLOGICAL SETTING

The geology of E.L. 26/78 is shown in Figure 2 which is based on the Burnie 1:250,000 sheet and airphoto interpretation.

Two zones of unmetamorphosed Precambrian sediments, the Rocky Cape Group and the Burnie Formation, are separated by the Arthur Lineament, a belt of low-grade regionally metamorphosed schists, quartzites and amphibolites. The Rocky Cape Group consists of a marine sequence of laminated mudstone (Interview Beds), quartz sandstones and conglomerates (Donaldson Group) with minor basaltic lavas and tuffs (Bernafai Volcanics), chert (Delville Chert) and dolomite (Savage Dolomite).

Deformation of the Precambrian sediments occurred during the Penguin Orogeny which produced north-east trending folds. The age of the orogeny is considered to be about 700 m.y., based upon K-Ar dating of probably syn-tectonic sodic dolerite intrusions which parallel fold trends.

Metamorphic rocks of the Arthur Lineament appear to be derived from the sedimentary rocks and dolerites, and result from shearing and metamorphism caused by the eastward movement of the Rocky Cape Group during the Penguin Orogeny (Williams and Turner, 1974).

A thick sequence of turbidite sandstones, mudstones and volcanics (Crimson Creek Formation) were deposited in a trough which developed on the eastern flank of the Rocky Cape Block during Late Proterozoic-Early Cambrian.

The Bald Hill Ultramafic Complex was intruded into the Cambrian sediments as a tectonically emplaced dismembered ophiolite. The layered pyroxenites, dunites and peridotites are associated with basaltic volcanics, dolerite dykes and gabbros with similarities to oceanic tholeiites (Rubenach, 1973). Reid (1921, p. 15) states: "microscopical examination of slides cut from olivine-bearing rocks (peridotite) of Bald Hill shows the presence of diamond". This suggests that the diamonds in the alluvials may have come from zones of locally high pressures created during deformation of the ultramafics (analogous to Pavlenko, et al, 1974).

A small patch of Siluro-Devonian Eldon Group sediments occurs between Bald Hill and the Meredith Adamellite which was emplaced during the Late Devonian.

Prolonged erosion followed the granite emplacement and ended with the deposition of glacio-marine sequences of the Parmeener Super-Group (Williams and Turner, 1974). Although only small patches of the Permian rocks remain in E.L. 26/78, the flat plateau topography may represent the pre-Parmeener peneplain, the overlying sediments having been removed by subsequent erosion. The lack of Jurassic dolerite, which covers much of eastern Tasmania, may also be due to erosion.

This latter point is significant since the Tasmanian Jurassic dolerite and the majority of kimberlites throughout the world are postulated to be associated with the intial breakup of Gondwana land. Therefore there is little chance that kimberlites of that age will be found in N.W. Tasmania as they would have suffered extensive erosion along with the Jurassic dolerite and Permian sediments.

The Tertiary gravels which are found at Brown's Plains, on the divide between the Savage and Whyte Rivers, are part of a possibly marine sequence which now occurs discontinuously throughout N.W. Tasmania. At the western end of Brown's Plains the gravels are silicified and overlain by basalt of approximate Miocene age (Twidale, 1957). These gravels have been worked in the past for gold.

A relative drop in sea level since the Tertiary has given rise to the present river system which is strongly controlled by the regional structural trends. Unconsolidated gravels have been deposited at several terrace levels in the major river velleys (Montgomery, 1894) and are probably due to a pulsatory fall in sea level (Twidale, 1957).

2. EXPLORATION COMPLETED 1978-80

2.1 RECONNAISSANCE

Bulk samples of panned concentrates were collected from Middleton Creek and Sabbath Creek during reconnaissance field trips in October, 1978, and January, 1979 (Table 1). The samples were partly processed by tabling at Mount Lyell before being forwarded to Associated Minerals Consolidated at Capel, W.A., where the heavy mineral fraction was concentrated. The concentrates were inspected by a consultant petrologist who reported no kimberlite indicators.

2.2 AIRPHOTO INTERPRETATION

Colour aerial photographs, at 1:15,000 scale, covering most of E.L. 26/78, were obtained from the Tas. Lands Dept. (F598, Burnie Concession, Runs 26W to 36W). The photos were used to assist in regional geological mapping, to locate zones of high fracture density, to locate unusual circular features which may be pipe-like intrusives and to update Lands Dept. topographic maps with recent logging tracks which were possible access routes. This investigation was conducted in conjunction with E.L. 27/78, Donaldson (all minerals).

A small circular feature, about 250 m diameter, was located in the Sabbath Creek area. Subsequent track cutting and soil sampling revealed slates and siltstones of the Interview Beds underlying the feature.

Airphoto interpretation also produced minor modifications to the geological mapping previously carried out in the Mt. Donaldson-Corinna area (Spry, 1964) but significant fracture zones were not detected.

2.3 LITERATURE REVIEW

The review of previous data included:

(i) old Mines Dept. reports, chiefly dealing with the alluvial gold workings and mineral deposits of the Corinna-Waratah district, with occasional references to diamonds;

(ii) M. Rubenach's Ph.D. thesis on the Bald Hill Ultramafic Complex;

(iii) Company reports, including Renison's airmagnetic and Esso's INPUT-air magnetic surveys.

Previous geological mapping and air magnetic contours were transferred to 1:50,000 base maps and compared with the airphoto interpretation.

Zones of high air magnetics correlate with basic rocks of the Bernafai Volcanics, amphibolites of the Arthur Lineament and the Bald Hill Ultramafic Complex. All other units gave relatively flat magnetic responses.

2.4 GEOCHEMISTRY CONSULTANT'S REPORT

A geochemistry consultant was contracted to report on reconnaissance geochemical techniques for diamond exploration. The main points of the report (Marshall, 1979) are included as Appendix 1.

2.5 BULK SAMPLING

Twelve bulk sediment samples were collected during March-April, 1980 (Table 2; Figures 3 to 5). Ten bulk samples came from streams and rivers (average 71.3 kg), one from Tertiary gravels outcropping along the Corinna Road (44 kg) and one from beach sands at Pieman Heads (121 kg).

At the sampling points the sediments were sieved to -6 mm. In the case of stream sediment samples the material came from likely heavy mineral traps (crevices, bars, etc.) at several points over a length of 1-2 km of the stream course.

The areas chosen for sampling can be grouped into two categories:

(i) streams draining Ultramafic rocks - Jones Creek, Roaring Mag Creek, Heazlewood River, White River, Nineteen-Mile Creek, Loughnan Creek;

(ii) Streams draining alluvial deposits - Sabbath Creek, Middleton Creek, Harvey's Creek, Longback Creek, and the Brown's Plains Tertiary gravel deposits.

The Pieman Heads beach sands were taken to obtain a "regional" sample.

2.6 SAMPLE PROCESSING

To reduce the weight of the samples for shipping they were sieved at Mount Lyell to extract the 1.68 mm to 0.30 mm size fraction (-10# +50# B.S.S.). This fraction was based on a consultant's experience with kimberlite exploration in W.A. where indicator minerals are generally coarse-grained (see Appendix II).

260035

TABLE 1

RECONNAISSANCE BULK SAMPLING, 1978-79

Sample No.	Location	Sample Type	Weight	Fraction
24601	Middleton Creek	Panned Cons.	5 kg	-10 mm
24602	Middleton Creek	Panned Cons. of 24601	100 g	- 2 mm
24603	Sabbath Creek	Panned Cons.	18 kg	-10 mm
24604	Sabbath Creek	Panned Cons. of 24603	100 g	- 2 mm
24605	Sabbath Creek	Panned Cons.	5 kg	- 2 mm
24606	Sabbath Creek	Tabled mids of 24605	1 kg	- 0.5 mm
24607	Sabbath Creek	Tabled Cons. of 24605	500 g	- 0.5 mm

TABLE 2

BULK SAMPLING, 1980

		Weight	
Sample No.		-6 mm	1.68-0.3 mm
24608	Middleton Creek	86 kg	30.5 kg
24609	Sabbath Creek	99	37
24618	Brown's Plains	44	17
24619	Jones Creek	67	16.5
24626	Roaring Mag Creek	65	21.3
24637	Heazlewood River	74	17.5
24639	Whyte River	67	20.5
24642	Nineteen-Mile Creek	54	14.5
24643	Harvey's Creek	60	16.5
24650	Loughnan Creek	73	21
24653	Pieman Heads	121	92.5
25712	Longback Creek	68	23.5

TABLE 3

SAMPLE PROCESSING, OBSERVED FRACTIONS

Sample No.	Fraction Intervals *		
	Non-mag	9 Amp Mag	5 Amp Mag
24608	A, B, C	A, B, C	
24609	A, B, C	A, B, C	
24618		Sample not split	
24619	A, B, C		A, B, C
24626	ABC		
24637	A,B		A, B
24639	A, B, C		A, B, C
24642	A,B		A, B
24643	A, B, C	A, B	
24650	A, B, C		A, B, C
25712		Sample not split	

* A = 2.0 - 1.0 mm
B = 1.0 - 0.8 mm
C = 0.8 - 0.5 mm

The samples were forwarded to Perth Metallurgical Laboratories, W.A., where heavy mineral concentrates were prepared by gravity methods. The concentrates were then split into magnetic and non-magnetic fractions, some of which were further screened into various size fractions to reduce the volume of each sample to be observed (Table 3).

2.7 RESULTS

The samples were examined by Mrs. Christine Doyle, a contract mineralogical observer who was trained and worked for Tanganyika Holdings. Details of her report are included as Appendix III.

In summary, most samples contained chromites which may be kimberlitic. The identification of possible pyrope garnets in sample 24650 (Loughnan Creek) was not confirmed by Geoff Blackburn, a consultant petrologist, who reported that they are either rutile or ruby. Apparently the identification of kimberlitic chromites is also subjective as they vary from place to place.

3. CONCLUSIONS

The bulk sampling programme on E.L. 26/78 has failed to detect a kimberlitic source for the diamonds reported to have been found during gold-sluicing operations around the turn of the century.

Geologically, N.W. Tasmania does not appear to be favourable for the formation of kimberlites, which require a stable, thick continental crust. Ferguson, et al (1979) state: "it is unlikely that diamondiferous kimberlites of Permian or younger age exist in most of south-eastern Australia." Also, the amount of erosion since the Mesozoic would have removed richer upper levels of a kimberlite pipe. The report of diamondiferous "peridotite" from Bald Hill (Reid, 1921) may also suggest that the diamonds may not have come from a true kimberlite, but instead were formed in zones of high stresses created during folding of the ultramafics (analogous to Pavlenko, et al, 1974). Such occurrences would probably not yield any diagnostic heavy minerals apart from diamonds themselves.

It may also be possible that the grain size chosen for microscopical examination, which was based on West Australian experience, was too coarse under the local conditions of high rainfall and steep terrain. However, examination of the -0.5 mm fraction would prove to be both difficult and time consuming, and therefore costly.

It appears, then, that the chances of discovering an economically viable diamond deposit in N.W. Tasmania is remote and any further exploration would be difficult and costly. Therefore it is concluded that E.L. 26/78 does not warrant any further expenditure.

4. EXPENDITURE

Table 4 shows the total expenditure on E.L. 26/78 during the period 1978-81.

TABLE 4

E.L. 26/78 EXPENDITURE, 1978-81

Salaries and Wages	$ 9 302
Burden Charges	3 572
Access	706
Geochemistry	2 285
Materials	1 933
Equipment and Facilities	765
General Costs	2 468
Indirect Costs	1 013
TOTAL	$ 22 044

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SUGGESTIONS FOR KIMBERLITE EXPLORATION, EL 26/78

N. J. MARSHALL - GEOCHEMISTRY CONSULTANT

As a cautionary note, there remains the possibility that the 16-18 small alluvial diamonds found in auriferous alluvials within EL 26/78 (Twelvetrees, 1918) were derived from erosion of the folded ophiolite sequence, rather than from any kimberlite intrusive, with its characteristic geochemistry and indicator minerals. See the later discussion on Pavlenko's paper,(enclosed). Classical kimberlites occur in pipes as groups or clusters, probably related to deep seated zones of weakness in stable continental platform areas. (Nixon, chapter 1).

1. Kimberlites are most likely to occur along, or nearer, to areas of greatest crustal fracturing, which may be expressed as zones of statistically greater fracture trace density.

   Thus sampling density and field examination should be biased toward zones of increased fracture trace density, cross-cutting features and dykes. Other favorable loci are lithologic boundaries, particularly where unconformable.

   Thus a prime recommendation is that a detailed photo-geologic study be carried out to define likely loci for kimberlitic intrusives.

   Sampling should concentrate preferentially in these areas, which should be more directly related to a source area and therefore less likely to be diluted by barren components.

2. Kimberlitic dykes, if located, can be important tracers for pipes.

   There are 3 types of kimberlitic dyke association, according to the associated heavy mineral suite. (Nixon, chapter 2).

   a) ilmenite + olivine.

   b) ilmenite + garnet.

   c) olivine.

   Kimberlitic dyke wash produces olivine (yellow-green,glassy), + enstatite, bronzite, ilmenite, sporadic garnets of various colors (green, red, violet, orange), chrome diopside (green) and chromite, from disaggregated ultrabasic and eclogite nodules.

   Thus it is important to examine all heavy mineral concentrate prior to magnetic separation, with a binocular microscope and also with a petrographic microscope, using refractive index oils, for mineral identification.

   It would also be worth-while using UV light examination of heavy minerals under the binocular microscope, to look for <u>scheelite</u> and fluorescent diamond.

3. All stream cobble lithologies should be noted in the course of sampling, as well as the geology of adjacent outcrops.

   Sampling should be designed to collect material from drainage basins consisting, as much as possible, of only one rock type - mixed sources introduce contamination problems, dilution by more "barren" material, and complexities in interpretation.

4. Illustrations in the Nixon monograph show large (up to 30 cm diameter) rounded, gneissic xenoliths of basement rock.

   Kimberlitic nodules can consist of ultrabasics containing olivine, enstatite, bright green chrome diopside, chromite and wine red pyrope garnet. Such nodules can weigh 10 kg. or more, are ovoid, and have resistant minerals (eg garnet) protruding from a worn, polished surface. They are in fact deep crustal xenoliths.

   Monomineralic nodules usually of pyrope, also occur in the + 1 cm fraction; other nodules include pale, grass green enstatite, brown bronzite, olivine, and chromite octahedra.

   It is emphasized that in the environment of W. Tasmania, a skilled geologist equipped with a hand lens should examine float samples for possible kimberlitic xenoliths, which would survive in the stream debris. ie) do not rely entirely on panned concentrates of the finer fractions.

   Such detailed observation would also aid in interpreting drainage basin lithology, and hence in evaluating geochemical and petrological stream sediment results.

5. The whole heavy mineral fraction should be sized to several fairly narrow limits, prior to magnetic separation at Capel using a Cook separator.

   The heavy mineral fraction should be analyzed by XRF methods for Nb, Ni, Cr, Ba, Sr, Th, Zr, P, and TiO_2. La and Ce analyses would form a useful back-up.

   Unpulverized splits of each fraction should be retained for electron probe work if required at a later stage.

6. In addition, analyses for Sn, Mo and W are desirable for the possibility of detecting such mineralization in its own right.

7. Such chemical analysis is far cheaper than labor-intensive, and therefore expensive, petrological examination, and is sufficiently comprehensive, in my opinion, to identify source rocks of kimberlitic affinity. Petrological examination should then proceed as follow-up, on these.

   It is also important to weigh the concentrates, and each representative fraction (various magnetic fractions), relative to the weight of original sample.

8. Prior to magnetic separation, the magnetite fraction should be removed with an Eclipse type magnet, weighed (to normalize data as percentage of total HM fraction) and analyzed for base metals, with a view to defining base metal mineralization. - see report by N.J. Marshall, April, 1979 "Geochemical Exploration for Base Metals, West Coast Tasmania, pages 2, and 10-12.

9. The ilmenite fraction from the Cook separator should be analyzed at Capel for Mg and Ti to identify picro-ilmenites. The garnet fraction should be analyzed to look for high Mg and Cr, and low Ca - pyrope garnet.

   Chrome diopside is an important indicator of distinctive appearance, as is any lilac garnet exhibiting an alexandrite effect.

10. Interpretation of such chemical analyses is facilitated where sampling is within one rock type.

   Where mixed source rocks occur, electron probe analyses (comparatively expensive) are required to identify, say, a few Mg rich ilmenite (picro-ilmenite) grains among a predominance of normal ilmenite grains from basalts and other mafic/ultramafic rocks.

11. When applying geochemical techniques, as suggested by Gregory and Tooms, (1969), we must bear in mind the anticipated contrast of elements relative to the rock types occurring in the area.

The following phased approach is suggested for consideration, on EL 26/78 bearing in mind problems of access, and the expense of heavy mineral sampling and subsequent treatment and data acquisition. Also significant, is the rapid dilution by barren material in this rugged terrain, requiring a comparatively high density (and hence cost) of even bulk heavy mineral samples if kimberlites of only a few tens of meters of surface exposure are to be located.

1) Areas of recorded diamond occurrence: Middleton's Ck., Sabbath Ck, Harvey's Ck. Heavy mineral bulked composites as described in letter of June 13th. These are high priorit areas, in view of the documented occurrence of diamonds. Weigh concentrate, and relate to initial sample weight. Split into two halves - one to retain. Other half to be further split for pulverizing and chemical analysis for Ni, Cr, Zr, Nb, Ba, Sr, Th, P, TiO_2, La, Ce.
   Other portion to be put through magnetic concentrator - examine fractions petrologically, and electron probe the ilmenite and garnet fractions for picro-ilmenite and pyrope indicators.

2) Mouth of Pieman R. and junctions of Donaldson R., Savage R., and Whyte R. - ie) 4 samples.
Large (100-200 kg.) bulk samples of -1 cm. collected over a km or so, to be treated as above.
The mouth of the Pieman R. should be sampled where there is some wave sorting and/or tidal sorting influence to concentrate placer minerals.

3) Remainder of EL 26/78, concentrating on photo-geologically anomalous zones.

a) -80# stream sediment (conventional) geochemistry for Ni and Cr to locate ultramafic associations away from the known Heazlewood River Complex, area.
Sampling at 1 km intervals, or less where side tributaries are encountered in the course of sampling.
If base metals are also of interest, then Cu, Pb, Zn should also be analyzed, or one could use the approaches advocated in my April 1979 report for base metal exploration in W. Tasmania.

b) subject to orientation studies from the Heazlewood River Complex drainage, one could sample Fe-Mn nodules in streams on a more regional basis, for Ni to define ultramafic source areas, rather than using conventional stream sediments.

c) Heazlewood River Complex <u>and any other Ni-Cr source areas located by above approach</u>:

Analyze stream sediment samples for P_2O_5, Ba, Nb (+ Ni, Cr), La, Ce (XRF) (NB Ba may also accumulate in Mn coated stream pebbles).
In the absence of orientation data, to "play safe" both - 10 + 20#, and - 80# should be collected and analyzed.
I would expect P_2O_5, Ba, Ni and the rare earths to be concentrated as hydrolyzates in the finer, clay dominated fraction, (also, to a certain extent Nb), and Nb, Ba and Cr should concentrate in the coarser fraction.
At this stage, sampling at intervals of the order of ½ km is advocated. (within outlined Ni-Cr source areas)

* Incidentally, any chromite rich nodules, or black, natural heavy mineral chromite accumulations, in streams, should be sampled and tested by fire assay for platinoids of the alpine ultramafic association.

d) Any areas of anomalous geochemistry in the above elements in association with Ni and Cr, should then be bulk sampled (as described in letter of June 13) for heavy minerals. These samples should then be examined petrologically, and magnetic separates of the ilmenite fraction and garnet fraction (checked petrologically) analyzed (XRF) to identify picro-ilmenite and pyrope.

If the drainage lithology is multiple, and petrological examination shows that magnetic separates are not virtually monomineralic, then electron probe analyses is required.

N.B. The magnetic response of picro-ilmenite should also be established - it may not report in the normal ilmenite fraction.

12. Finally, should any kimberlitic source be indicated, follow-up sampling would enter the next stage of exploration - base of slope and ridge and spur soil sampling, followed by grid sampling.

13. Rock chip samples of outcrop and float will, if kimberlitic, in this unweathered environment be recognizable by texture and mineral assemblage.
A useful field test for "ultramafic" rocks to check kimberlitic affinity might be to apply concentrated acid. Kimberlites are high in carbonate content, and narrowing down to carbonatites + kimberlites is sufficient at this stage of exploration.
A more diagnostic geochemical test would be a Ni-Cr-Nb-Zr-P etc. association, and, of course, petrology.

20 JUL 1980

260044

G.V. BLACKBURN GEOSERVICE

P.O. BOX 6

GLENFORREST, W.A. 6071

17th July, 1980

Mr. Keith Wells,

Exploration Manager
Goldfields Exploration Pty. Ltd.,
643 Murray Street,
WEST PERTH, W.A. 6005

Dear Keith,

MINERALOGICAL EXAMINATION OF HEAVY MINERAL CONCENTRATES FOR DIAMOND INDICATOR MINERALS

I can sympathise with you on this problem as unless you have sufficient work to justify the full time employment of a mineral observer it can be difficult and expensive to get the samples treated.

Problem one concerns sample size. If the sample is large it will take many hours to observe each grain in the sample. I understand that some of your heavy mineral samples are currently several kilos in weight which could mean 40 - 50 hours observation for each sample, i.e. high cost and a very slow process. The only solution is to reduce the sample bulk by splitting. This can be done in various ways but preferably samples should be split in such a manner so that the indicator minerals are concentrated in the portion to be observed. Hence, normal splitting methods (Jones Riffle Splitter, quartering) etc. are out. Two better methods are:

(i) splitting by sizing, and
(ii) splitting by susceptibility.

I prefer a combination of both methods. Neither of these methods will guarantee that 100% of the indicators will end up in the sample portion to be observed, however, experience has shown that with care recoveries of indicator minerals into selected size and magnetic fractions should be much greater than 95%. (There is probably a much greater loss of indicator minerals during the concentrating process).

Generally speaking it can be said that kimberlitic minerals are coarse grained and hence should appear in the coarser fractions of the stream sample. (It is also true that the number of indicator grains increase as size fraction decreases.) Fortunately, the coarser size fractions are relatively quick to observe. It is suggested that for routine work you observe the -1.0mm + 0.8mm size fraction and for more serious work the -0.8mm +0.5mm fraction.

Splitting the sample magnetically will reduce the sample bulk considerably. Kimberlitic pyropes occur near the non magnetic end of the scale and kimberlitic ilmenites occur near to the middle of the scale. It is possible to split out small fractions of original samples which will contain the indicators. Recovery cannot be guaranteed to be perfect as with all metallurgical processes however I believe the time and cost considerations of an exploration programme need to be balanced against the need to recover every grain. The various magnetic settings vary from instrument to instrument. Further data can be provided should you need it.

Microscopical Observations of Heavy Mineral Concentrates
by C. Doyle, Contract Mineralogical Observer

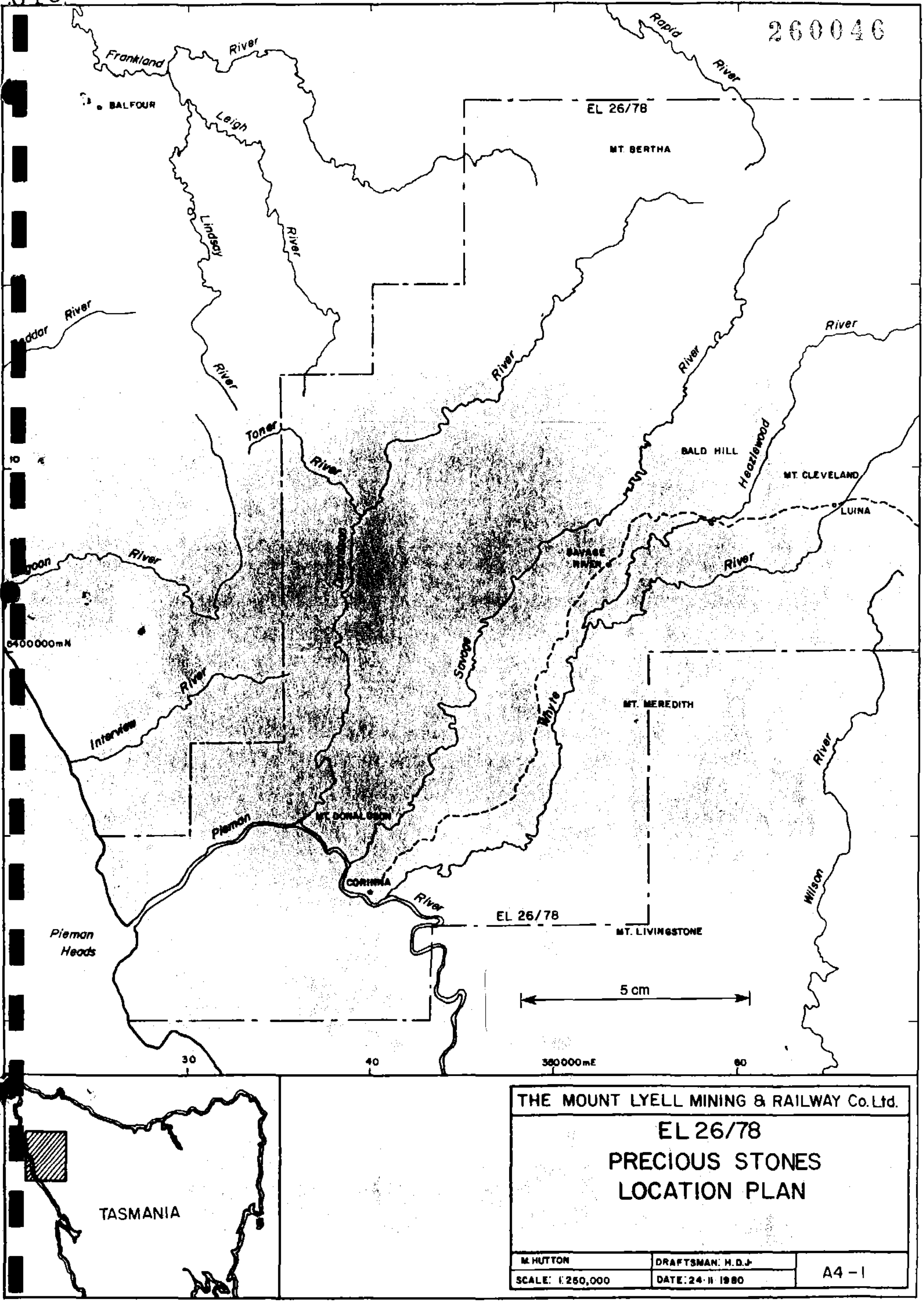
260045

Sample No.	Fraction	Observation
24608 (Middleton Creek)	Non-mag, 0.8-0.5 mm	Chromite, probably kimberlitic, broken octahedron, lustrous centre, pitted surrounds, dull surface.
	9A mag, 0.8-0.5 mm	Predominantly chromite, many possibly kimberlitic. One grain looks like picroilmenite.
24609 (Sabbath Creek)	Non-mag	Zircon-like grains, probably topaz.
	9A mag	Full of octahedra of chromite, many slightly rounded-pitted with lustrous core; could be kimberlitic.
24618 (Brown's Plains)	Entire sample	A great number of (probable) topaz. Chromites are mostly matte, pitted surfaces; could be kimberlitic.
24619 (Jones Creek)	All fractions	Numerous chromites
	Non-mag 0.8-0.5 mm	One grain which could be olivine.
24626 (Roaring Mag Creek)	Non-mag	Few chromites.
24637 (Heazlewood River)	Non-mag	Number of chromites, mostly octahedra and a few twin octahedra. No definite kimberlitic.
	5A mag	Number of chromites.
24639 (Whyte River)	Non-mag 0.8-0.5 mm	One bright green grain, like chrome diopside although possibly not emerald enough in colour. A few chromites.
	Non-mag 1.0-0.8 mm	One unknown grain, orange, blocky, no fluorescence.
	5A mag 2.0-1.0 mm	A few chromites.
24642 (Nineteen-Mile Creek)	Non-mag	A number of chromites
	5A mag	Few chromites
24643 (Harvey's Creek)	Non-mag	Small number of chromites One red grain, possibly pyrope?
	9A mag	A number of possibly kimberlitic chromites.
24650 (Loughnan Creek)	Non-mag 1.0-0.8 mm	One orange garnet, possibly pyrope.
	Non-mag 0.8-0.5 mm	Purple pyrope? One orange-pink pyrope? 3 garnets.
	5A mag	Few chromites.

NOTE: Identification of pyrope garnets not verified by C. Blackburn, Consultant Petrologist.

018

260046



THE MOUNT LYELL MINING & RAILWAY Co. Ltd.

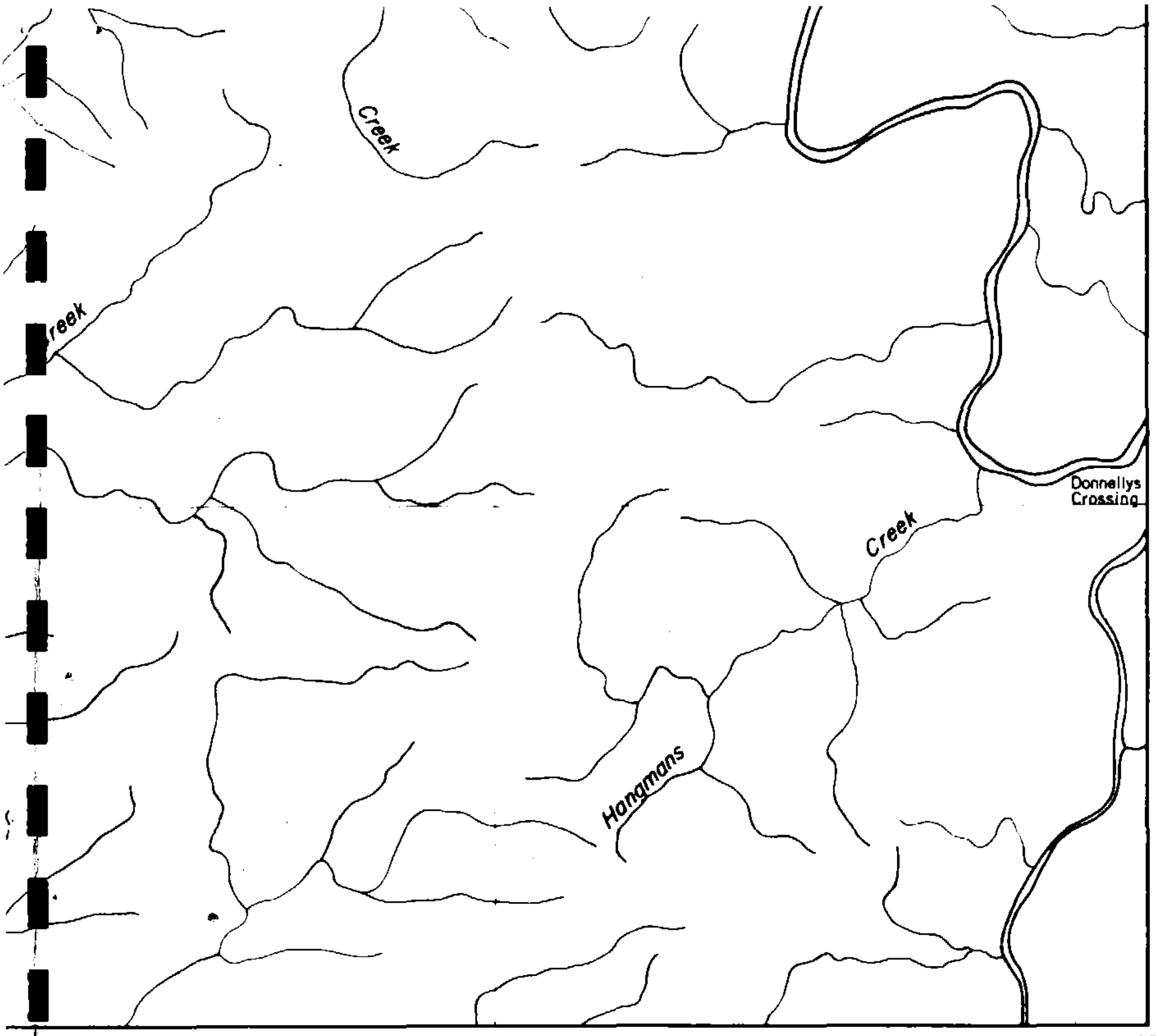
EL 26/78

PRECIOUS STONES

LOCATION PLAN

M HUTTON	DRAFTSMAN: H.D.J.	A4 - 1
SCALE: 1:250,000	DATE: 24.11.1980	

260047



CORINNA SHEET

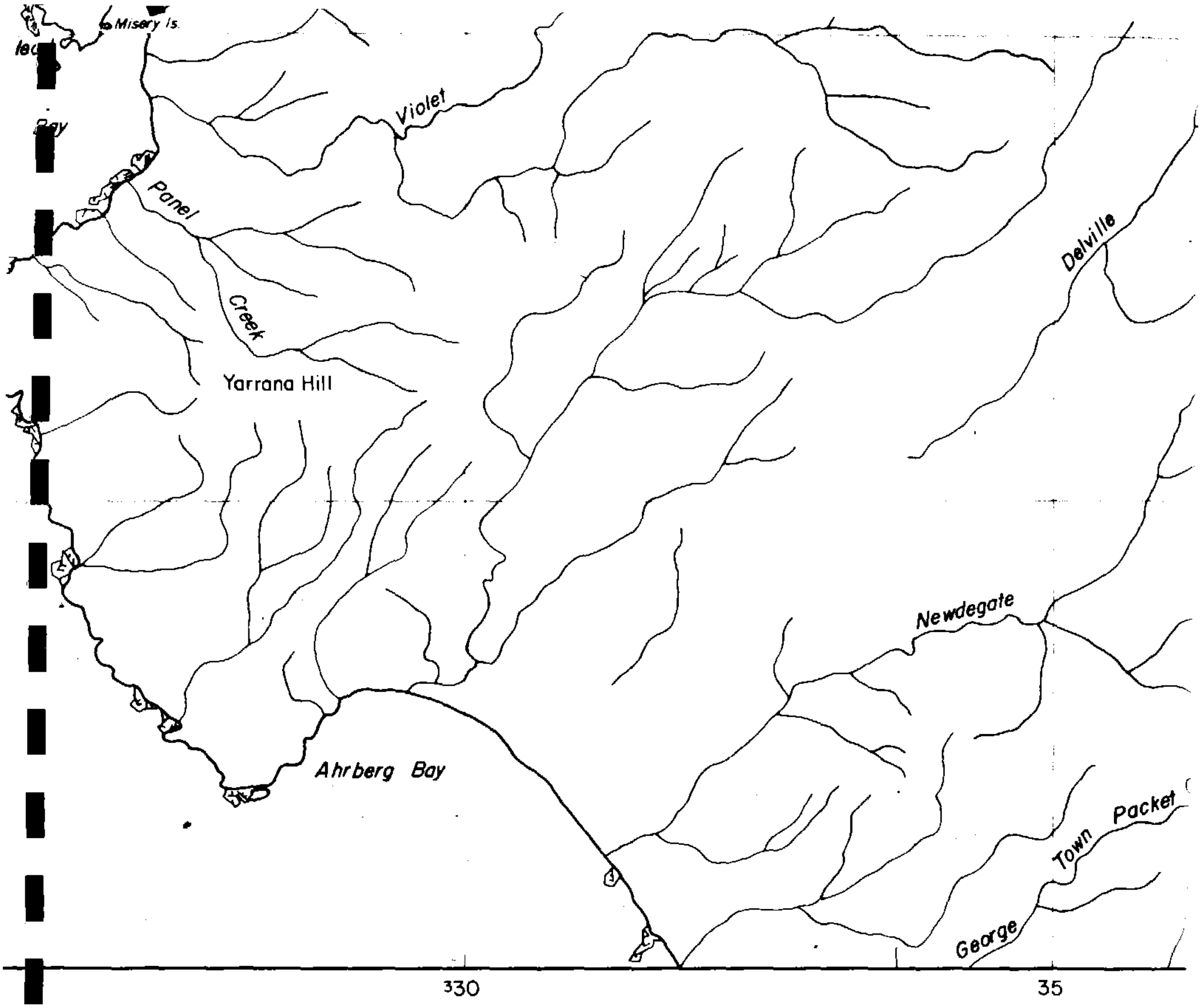
5 cm

SCALE 1:50,000

0 1 2 3 4 5 KILOMETRES

81-1517

MOUNT LYELL MINING & RAILWAY Co. Ltd.			
E.L. 26/78 PRECIOUS STONES BULK SAMPLING LOCATIONS -6mm SEDIMENTS			3013
Date: 9·12·80	Author: M. HUTTON	Drawn by: H.D.J. & P.J.R.	A1 - 4

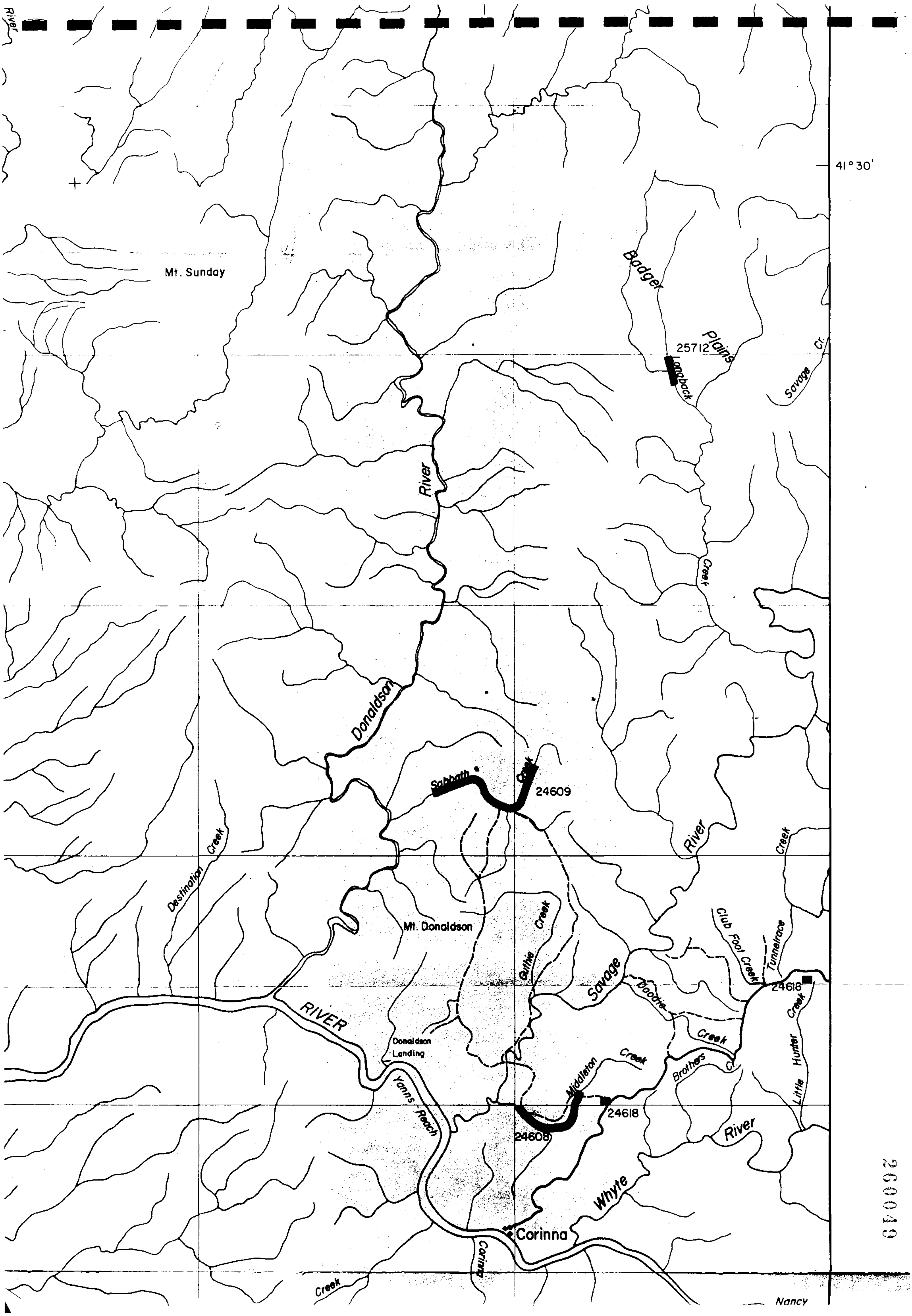


260048

Sampling location

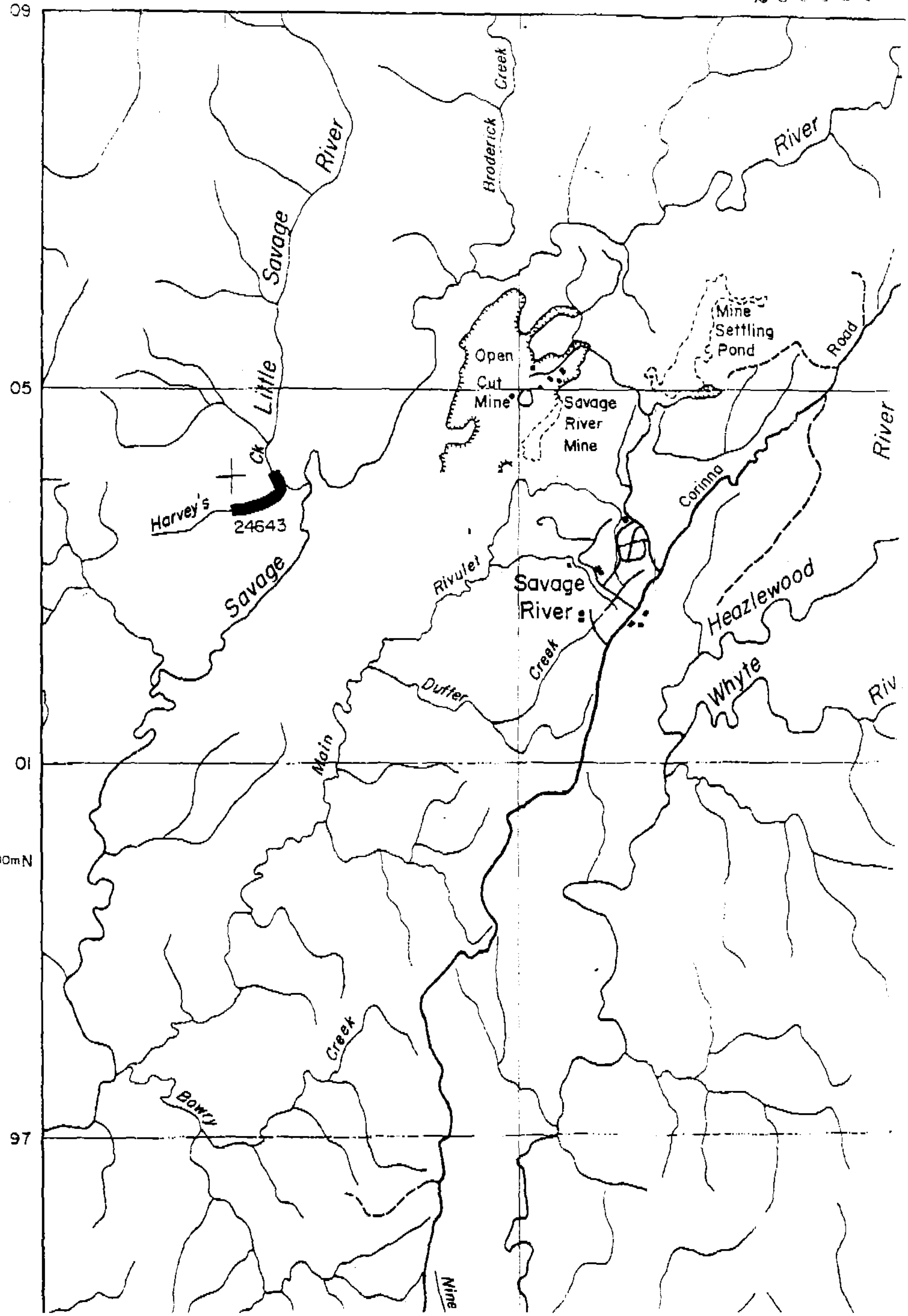
24611 Sample number

4 wheel drive track



River
41°30'
Mt. Sunday
Badger
Plains
25712
Longback
Savage
Cr.
River
Creek
Donaldson
Sabbath
Creek
24609
River
Creek
Destination
Creek
Mt. Donaldson
Guthrie
Creek
Club Foot Creek
Tunnelrace
Savage
Doodie
24618
Creek
RIVER
Donaldson
Landing
Creek
Middleton
Creek
Brothers
Cr.
Little
Hunter
Yanns
Reach
24618
24608
River
Whyte
Corinna
Corinna
Creek
Nancy
2600419

260050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Harvey's
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Mine
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River
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Mine
Settling
Pond
Road
Corinna
River
Rivulet
Savage
River
Heazlewood
Creek
Dutter
Whyte
Riv
Main
Creek
Bowry
Nine

260051

Mt Lyell Company All Minerals Data

THE MOUNT LYELL MINING AND RAILWAY COMPANY LIMITED

81-1520

260052

EXPLORATION LICENCE 27/78 (TASMANIA)

DONALDSON

ALL MINERALS

PROGRESS REPORT

JANUARY, 1981

M. J. HUTTON

Distribution:
Mt. Lyell (2)
Tas. Mines Dept. (1)

260053

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

260055

S U M M A R Y

E.L.27/78, Donaldson, was granted on 22nd January, 1979, as an exploration lease for all minerals. The lease covers 172 sq. km in the vicinity of the Donaldson River, N. W. Tasmania.

Data compilation involved a review of past exploration by Renison and Esso, University of Tasmania mapping and airphoto interpretation.

A total of 71 stream sediment, soil and rock chip samples were collected from the Toner River and Sabbath Creek - Corinna areas, and assayed for Cu, Pb, Zn, Co, Mn, ±Ag, Fe, Sn, WO_3, Mo, Au and S. No anomalous zones were detected but the sampling was not thorough enough to conclude that the area holds no potential for economic mineralization.

Total expenditure to date amounts to $8,679.

260056

1. INTRODUCTION

1.1 TENURE

E.L.27/78, Donaldson (all minerals) was granted on 22nd January, 1979. The lease covers 172 sq. km and is situated in the Donaldson River region of N. W. Tasmania (Fig. 1).

The lease was explored in conjunction with E.L.26/78, Pieman (precious stones); the bulk of the field work was conducted during March-April, 1980. Base camp was established at Corinna.

The area was thought to have potential for stratabound tin-tungsten-sulphide deposits (replacing dolomitic sequences) and strataform base metal deposits (associated with intermediate volcanics). Alluvial gold deposits were of secondary interest.

1.2 TOPOGRAPHY

The major topographic feature of E.L.27/78 is the Donaldson River which flows roughly southwards into the Pieman River about 6 km downstream from Corinna. Savage River cuts across the south-east corner of the lease.

Most of the area is covered with mature eucalyptus and myrtle forests which have been exploited for timber. The north-west portion, around Toner River and Mt. Vero, is covered with button-grass and low scrub.

Resistant ridges of quartzite rise sharply from flat plains underlain by shales and dolomites. In the south-east portion rapid erosion by the major streams has deeply dissected flat-topped ridges which were once a Tertiary peneplain.

1.3 ACCESS

The major access route to the area is a gravel road from Savage River to Corinna. Logging tracks, accessible to four-wheel-drive vehicles, lead from this road to the banks of the Savage River and Sabbath Creek. A helicopter was utilized to gain access to the Toner River and Longback Creek areas.

1.4 PREVIOUS EXPLORATION

Attention was drawn to the area in the early 1880's following the discovery of alluvial gold in Middleton Creek. Gold was sluiced from several creeks in the area, more notably Middleton Creek, Sabbath Creek, Savage River, Whyte Creek and the terraces of gravels which occur at several levels in the major river valleys. The township of Corinna was the main depot for the gold field.

Furing 1907-11 T. B. Moore led a Mt. Lyell exploration party which examined occurrences of copper mineralization in the Toner River - Mt. Hadmar, Norfolk Range and Balfour areas. The mineralization was reported to contain pyrite-chalcopyrite with minor bornite, chalcocite, tenorite and native copper, primarily aligned along shear zones and other fractures in schists (Moore 1909-11). Grades in excess of 20% Cu were recorded for some samples but tonnages were not sufficient to warrant mining.

During the late 1950's and early 1960's Department of Mines and University of Tasmania geologists conducted mapping programmes in the Corinna-Zeehan-Pieman Heads area (e.g. Spry and Ford, 1957).

Pickands Mather and Company International (P.M.I.) conducted regional stream sediment sampling programmes over much of the West Coast in the early 1960's but do not appear to have followed up anomalies detected in the Corinna area.

Between December 1970 and December 1972 the area was covered by E.L.'s 48/70 and 49/70, both of which were explored under a joint venture agreement between Australian Consolidated Industries (A.C.I.) and The Consolidated Syndicate (Mt. Lyell, Renison and C.G.F.A.). Apart from a regional aeromagnetic survey, with flight lines spaced at approximately 650 m, the work concentrated on tin and tungsten prospects associated with the coastal granitic intrusives.

Esso Australia Ltd. took up the area, under E.L.2/73, in January 1973. Geoterrex operated an airborne magnetic and electromagnetic (INPUT) survey over E.L.2/73 in March 1973. Several "high quality" E.M. responses were produced by black shales in a north-trending zone within Precambrian sediments (Neale, 1974). Most of these anomalies were checked on the ground.

1.5 GEOLOGICAL SETTING

E.L.27/78 is underlain by the Rocky Cape Group, a sequence of unmetamorphosed Precambrian sediments, intermediate to basic volcanics and dolerite intrusives (Figs. 2, 3). Spry and Ford (1957) and Spry (1964) mapped the sequence in the Corinna-Zeehan - Pieman Heads region but the remainder of E.L.27/78 has been poorly mapped.

The stratigraphic succession revealed along the Pieman River is as follows (Spry, 1964):

Top	Savage Dolomite
	Delville Chert
	? Unconformity
	Bernafai Volcanics
	Corinna Slate
	Donaldson Group
	Interview Slate and Quartzite
	Oonah Quartzite and Slate

Igneous rocks include: Precambrian dolerite dyke swarms, mainly occurring intrusive into the Interview Slate and Quartzite; Devonian granitic intrusives, which are found in a belt along the coast and as a large batholith in the Mt. Meredith Range; Tertiary basalts, which, along with Tertiary gravel deposits, occur in patches along ridge tops.

The only recorded mineralization in the area is the structure-controlled pyrite-chalcopyrite deposits in the Toner River area. They occur in E-W oriented shear zones, sometimes associated with extensive quartz veining, within slates and siltstones of the Interview Slate and Quartzite. Neale (1974) also reports ubiquitous pyrite in black slates of the same formation.

Structural elements trend roughly NE in the southern part of the lease, and NNE in the northern part. The Interview Slate and Quartzite forms a broad anticline but cleavage is related to minor folds which are not genetically related to the major structure (Spry, 1964). The Corinna Slate and succeeding formations occur in a faulted block between the Donaldson Group (to the west) and the metamorphosed Whyte Schist (to the east). The Corinna Slate occurs in the core of an anticline, flanked by Bernafai Volcanics. The Savage Dolomite occurs in a synclinal structure (Fig. 4).

2. EXPLORATION COMPLETED 1978-80

260058

2.1 GEOLOGY

Because of the scarcity of outcrop the area was not thoroughly mapped. Outcrop details were recorded during the stream sediment sampling programme.

Spry's (1964) interpretation map was used as the geological base for the exploration programme. This was amended by airphoto interpretation (F 598, Burnie Concession, 1:15,000, colour photos) and the minor amount of geological mapping.

Massive grey to cream dolomite was found in the bed of Sabbath Creek, east of the Mt. Donaldson Range. In places the dolomite contained small lenses of pyrite. One 1.2 m thick lens of massive pyrite was associated with nearby float of gossanous ironstone which was traced along strike for about 100 m. In Guthrie Creek, about 300 m upstream from the Savage River, dolomite was found faulted against pyritic black shales which probably belong to the Donaldson Group. Occasional black siliceous bands in the shales resemble the Delville Chert.

Near Doodie Creek Bernafai Volcanics are well exposed along the banks of the Savage River and in road cuttings nearby. Although primary textures are virtually destroyed by a strong foliation and alteration the rock resembles a green fine-grained andesite with small elongated phenocrysts of plagioclase and mafic minerals replaced by chlorite. In nearby stream sediments light green epidote is common.

Further north near Timb's Creek a 10 m waterfall consists of a grey slate or fine-grained tuff which contains large (up to 20 cm) angular clasts of a light green volcanic which also contain disseminated blebs of pyrite-pyrrhotite.

Between these two occurrences Delville Chert float was found on the west bank of the Savage River.

2.2 GEOCHEMISTRY

1. Introduction

During 1978-80 34 stream sediment, 24 soil and 13 rock chip samples were assayed for Cu, Pb, Zn, Co, Mn, ±Ag, Fe, Sn, WO_3, As, Mo, Au, S. Most samples came from the southern portion of the lease, between Corinna and Sabbath Creek. A few old prospectors' workings in the Toner River were also chip sampled.

2. Stream Sediments

Of the 34 stream sediment samples collected, 11 came from the Toner River area and 23 from the southern portion of the lease. The fractions assayed were:

-80# Total extraction (Tx)
-80# Cold extraction (Cx)
-10#+80# Hydroxylamine-HCl digestion (H/H).

The samples were assayed for Cu, Pb, Zn, Mn, Fe, Co, Sn, As, WO_3 and Mo. Three panned concentrate samples collected for the E.L.26/78 programme were also assayed for Sn, As, WO_3 and Mo.

Background Tx values were 15 ppm Cu, 15 ppm Pb, 30 ppm Zn, 100 ppm Mn, 5 ppm Co, 25 ppm Sn, 20 ppm As, 20 ppm WO_3 and 25 ppm Mo.

26059

There were no strongly anomalous samples, highest values obtained were 95 ppm Cu, 70 ppm Pb, 180 ppm Zn, 1250 ppm Mn, 50 ppm Co, 50 ppm Sn, 45 ppm As, 40 ppm WO_3 and 70 ppm Mo. Samples from creeks draining the Bernafai Volcanics showed higher backgrounds for Cu (60 ppm) and Zn (70 ppm).

3. Soils

23 soil samples were collected from the Sabbath Creek area: 18 from a track cut up the northern side of the valley to a circular airphoto feature and 5 from an area near an outcropping lens of massive pyrite in dolomite.

The samples were sieved to -80# and assayed for Cu, Pb, Zn, Ag, Mn, Co, Sn, As, WO_3 and Mo (Appendix B). The only assays of note came from a 125 m wide zone along the cut track underlain by what appeared to be a weathered intermediate volcanic. Highest values were 154 ppm Cu, 130 ppm Pb, 106 ppm Zn, 2 ppm Ag, 35 ppm Sn, 60 ppm As, 40 ppm WO_3 and 50 ppm Mo.

4. Rock Chips

7 rock chip samples came from the Toner River workings and 6 came from the southern portion of the lease. They were assayed for Cu, Pb, Zn, Ag, Au, S, Mn, Co, Fe, ±Sn, As, WO_3 and Mo (Appendix C).

The Toner River samples were either random mine dump and trench samples (24692, 24693, 24695, 24698) or picked samples of mineralization (24694, 24696, 24699). Sample 24696 came from a 5 cm wide lens of pyrite-chalcopyrite in the E wall of a N trending trench at the Copper Reward workings. It returned values of 12.2% Cu, 37 ppm Ag, 2.5 ppm Au and 22.3% S The random dump samples averaged about 1.25% Cu, 6 ppm Ag, <0.1 ppm Au and 1.6% S.

All other samples gave insignificant assays.

3. CONCLUSIONS

Exploration completed on E.L.27/78 during 1978-80 failed to detect any anomalous zones which may be due to economic mineralization. However, exploration to date has not been very thorough; most field work was aligned towards the E.L.26/78 programme. More attention could be paid to the dolomitic sequences near Sabbath Creek and the Bernafai Volcanics near the Savage River.

The copper mineralization near Toner River is not likely to prove to be economic at depth. Surface indications suggest that it is patchy and localised along structural elements. The surface exposures were thoroughly examined by T. B. Moore during 1907-11 and Esso's INPUT survey failed to obtain any response, despite the fact that such mineralization is usually conductive.

5. REFERENCES

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– , and FORD, R. (1957): A reconnaissance of the Corinna-Pieman Heads area - Geology. Pap. & Proc. Roy. Soc. Tas., 91. 1-7.

APPENDIX A – DONALDSON STREAM SEDIMENTS 260061

SAMPLE NUMBER	-80# Tx. Values in ppm unless otherwise indicated									%
	Cu	Pb	Zn	Mn	Co	Sn	As	WO_3	Mo	Fe
24645	6	10	5	-	-	-	-	-	25	0.3
24646	18	20	60	210	10	35	35	20	10	2.0
24647	7	10	40	30	-	20	40	-	15	0.5
24648	12	40	100	260	25	30	20	40	20	2.9
24649	14	30	65	280	15	10	15	-	30	2.3
24654	33	30	160	120	25	25	5	-	20	2.8
24655	17	10	65	250	25	50	40	-	45	2.1
24657	18	10	11	80	-	20	-	20	55	1.0
24659	15	10	58	210	-	15	35	-	35	1.5
24661	8	10	17	120	-	25	25	-	45	0.4
24662	50	30	65	620	25	25	25	-	70	3.2
24663	55	20	58	820	50	30	35	-	40	4.6
24666	57	10	49	580	30	25	15	40	55	3.9
24667	64	10	125	1250	30	30	-	-	25	4.8
24669	72	10	21	120	25	30	20	20	45	1.8
24670	10	-	22	600	10	15	20	-	15	1.9
24671	9	10	40	250	10	10	-	-	15	1.6
24697	7	-	-	110	-	35	-	-	5	0.5
25701	10	10	15	70	-	-	-	20	5	1.2
25702	11	-	12	70	-	10	10	-	5	0.8
25703	6	-	-	60	-	25	-	-	10	0.4
25704	5	10	-	60	-	25	30	-	20	0.4
25705	9	-	25	100	-	10	10	-	20	1.6
25706	7	10	10	70	-	25	5	-	15	0.8
25707	16	20	7	90	-	35	-	-	10	0.8
25708	12	20	8	60	-	30	-	-	15	0.5
25709	5	10	16	80	-	30	-	30	15	1.6
25710	-	10	6	70	-	30	5	-	10	1.1
25714	-	-	5	80	-	20	-	-	20	0.4
25719	95	70	180	870	45	35	45	30	10	4.65
25720	40	50	90	540	20	25	30	-	20	1.86
25723	70	10	60	1030	40	30	35	-	10	3.85

SAMPLE [redacted]MBER	-80" Cx Values in ppm unless otherwise indicated						-10" + 80" H/H. ppm in solution			
	Cu	Pb	Zn	Mn	Co	Fe%	Zn	Mn	Fe	Co
24645	-	-	-	-	-	.19	.17	.50	28.0	-
[redacted]646	-	-	32	140	7	.22	.37	13.2	9.5	.17
[redacted]647	-	-	24	20	-	.16	1.08	.98	24.0	.17
24648	-	10	47	160	18	.22	.15	9.6	5.7	.13
[redacted]649	-	-	37	200	16	.35	.26	10.6	20.7	.26
24654	12	-	38	30	6	.29	1.06	5.36	40.0	.24
[redacted]655	-	-	10	160	10	.27	.35	21.7	24.9	.95
[redacted]657	-	-	-	20	-	.07	.28	4.21	24.7	.07
24659	-	-	15	170	-	.23	.28	19.2	8.8	.11
[redacted]661	-	-	9	120	-	.13	.47	23.5	6.6	.15
24662	-	-	17	500	13	.49	.36	80	15.4	.81
[redacted]663	7	-	12	460	17	.48	.19	130	8.4	1.53
[redacted]666	7	-	10	250	7	.23	.27	110	7.9	.81
24667	-	-	6	360	-	.24	.31	190	15.1	1.04
[redacted]669	36	-	-	40	11	.17	.19	4.3	28.6	.57
24670	-	-	-	340	-	.39	.17	64	19.9	.48
[redacted]671	-	-	12	190	6	.29	.11	19.5	3.8	.11
[redacted]679	-	-	-	-	-	.07	.01	.30	26.0	-
25701	-	-	-	-	-	.10	.33	.72	21.0	-
[redacted]702	-	-	6	-	-	.12	.32	.61	18.4	-
25703	-	-	-	-	-	.08	.10	.42	19.3	-
[redacted]704	-	-	-	-	-	.05	-	.12	16.0	-
[redacted]705	-	-	-	-	-	.11	.22	.40	18.7	-
25706	-	-	-	-	-	.12	.09	.45	16.7	-
[redacted]707	7	-	-	-	-	.19	-	.16	33.5	-
25708	22	60	27	-	-	.08	.16	.43	12.4	-
[redacted]709	-	-	-	-	-	.24	.11	.43	36.8	-
[redacted]710	-	-	-	-	-	.14	-	.32	22.0	-
25714	-	-	-	-	-	.09	.04	.22	26.8	-
[redacted]719	30	50	50	650	15	.57	.34	49	4.0	.17
[redacted]720	10	20	20	380	5	.30	.38	85	5.0	.32
[redacted]723	15	-	10	440	5	.22	.27	280	6.0	1.05

26062

APPENDIX A (cont.) - DONALDSON STREAM SEDIMENTS

\- = Less than detection limit

Tx, Cx: Cu-5 ppm; Pb-10; Zn-5; Mn-10; Co-5; Sn-5; As-5; WO_3-20; Mo-10; Fe-0.01%

H/H: Zn-0.01 ppm; Co-0.01. All Cu and Pb values $<$ 0.01 ppm for 20g in 40 ml.

DONALDSON SOILS

SAMPLE NUMBER	-80# Tx. Values in ppm unless otherwise indicated									
	Cu	Pb	Zn	Ag	Mn	Co	Sn	As	WO_3	Mo
24613	9	20	33	2	2900	45	-	10	-	15
24614	20	30	86	-	1.2%	40	15	-	-	15
24615	21	30	62	-	4700	25	-	30	-	30
24616	24	30	57	-	2.0%	40	35	20	-	40
24617	10	30	45	-	2200	50	5	25	40	30
24674 *	-	10	-	-	70	-	n.a.	n.a.	n.a.	n.a.
24675	-	20	14	-	110	-	n.a.	n.a.	n.a.	n.a.
24676	5	20	6	-	20	-	5	25	-	30
24677	91	50	36	-	380	25	10	25	20	50
24678	154	60	81	2	570	45	30	10	20	25
24679	127	130	92	2	400	45	10	30	-	5
24680	32	60	106	-	260	30	15	60	-	20
24681	144	50	64	-	310	35	10	25	-	10
24682	142	60	102	2	820	45	20	10	20	35
24683 *	13	10	16	-	50	-	5	30	-	20
24684	-	-	-	-	-	-	15	-	-	25
24685	-	10	-	-	20	-	-	-	-	25
24686	-	10	-	-	20	-	n.a.	n.a.	n.a.	n.a.
24687	43	10	17	-	50	10	n.a.	n.a.	n.a.	n.a.
24688	-	30	-	-	-	-	n.a.	n.a.	n.a.	n.a.
24689	-	10	-	-	-	-	n.a.	n.a.	n.a.	n.a.
24690	-	10	-	-	-	-	n.a.	n.a.	n.a.	n.a.
24691 *	-	10	-	-	10	-	n.a.	n.a.	n.a.	n.a.
25727	400	500	750	n.a.	200	40	n.a.	n.a.	n.a.	n.a.

* = "A" horizon sample n.a. = not assayed

- = Less than detection limit (Cu-5 ppm; Pb-10; Zn-5; Ag-2; Mn-10; Sn-10; As-5; WO_3-20; Mo-10; Co-10).

24613 - 24617 come from the Sabbath creek area near an outcrop of massive pyrite lens in dolomite.

24674 - 24691 come from the access track cut from Sabbath Creek to an airphoto circular feature. The track was sampled at 25m intervals (24674 at 00 on the north bank of Sabbath Creek, 24691 at 425m).

APPENDIX C – DONALDSON ROCK CHIPS.

260065

SAMPLE NUMBER	Values in ppm unless otherwise indicated												
	Cu	Pb	Zn	Ag	Au	S%	Mn	Co	Fe%	Sn	As	WO_3	Mo
24610	-	10	-	-	-	46.6	-	30	36.0	n.a.	n.a.	n.a.	n.a.
24611	25	90	10	-	-	0.2	1500	-	31.0	n.a.	n.a.	n.a.	n.a.
24612	460	20	35	0.3	-	0.3	1000	50	55.0	35	10	20	15
24668	430	20	100	0.2	-	0.1	740	80	8.5	n.a.	n.a.	n.a.	n.a.
24672	360	-	10	0.2	-	-	40	-	1.9	n.a.	n.a.	n.a.	n.a.
24692	0.12%	-	10	0.4	-	1.5	50	30	2.9	25	75	-	10
24693	1.50%	-	30	4.7	-	2.1	60	10	3.1	n.a.	n.a.	n.a.	n.a.
24694	6.40%	-	85	19	-	8.1	30	20	7.9	20	-	170	15
24695	1.06%	-	55	2.7	-	1.5	130	20	4.1	n.a.	n.a.	n.a.	n.a.
24696	12.2%	30	160	37	2.5	22.3	50	470	23.0	30	80	180	25
24698	2.32%	-	50	17	0.2	1.3	50	20	4.3	n.a.	n.a.	n.a.	n.a.
24699	6.0%	-	130	41	0.1	7.6	60	20	7.6	50	-	160	35
25713	360	30	45	-	-	4.2	90	50	5.0	n.a.	n.a.	n.a.	n.a.

- = Less than detection limit
Cu-10 ppm; Pb-10; Zn-10; Ag-0.1; Au-0.1; Mn-10; Co-10; Sn-5; As-5; WO_3-20; Mo-5; S-0.1%; Fe-0.1%.

n.a. not assayed

24610 - Sabbath Creek. Pyrite lens in dolomite.

24611 - Sabbath Creek. Ironstone above 24610.

24612 - Sabbath Creek. Ironstone.

24668 - Savage River. Grey slate.

24672 - Savage River. Black shale

24692 - Toner River. Bulk dump at small trench.

24693 - Toner River. Copper reward shaft, bulk dump.

24694 - Toner River. Copper reward N-trench, picked dump.

24695 - Toner River. Copper reward N-trench, random chip.

24696 - Toner River. Copper reward N-trench, pyrite vein.

24698 - Toner River. Copper reward E-trench, bulk dump.

24699 - Toner River. Copper reward E-trench, picked dump.

25713 - Longback Creek. Pyrite black shale.

01

260066

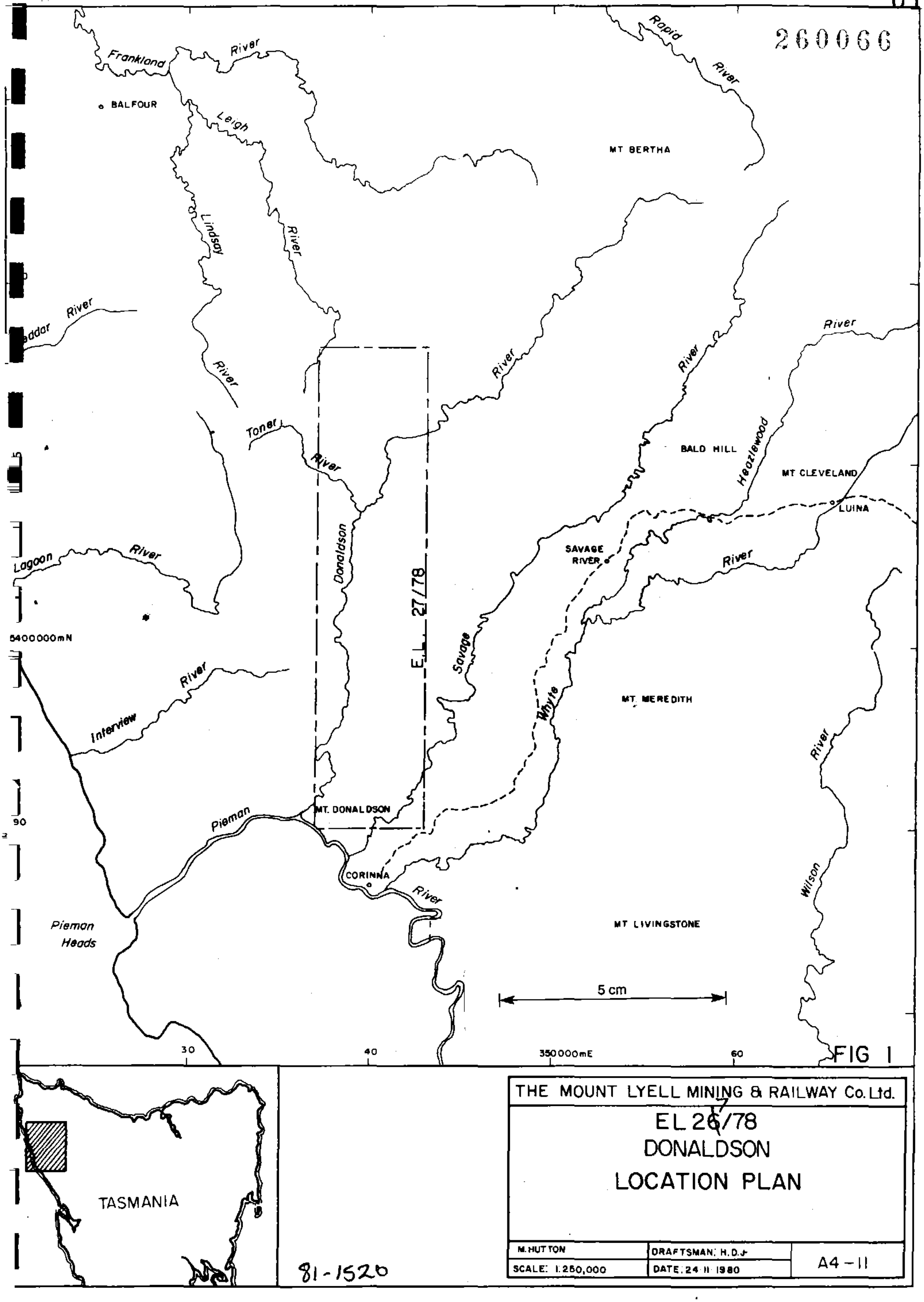


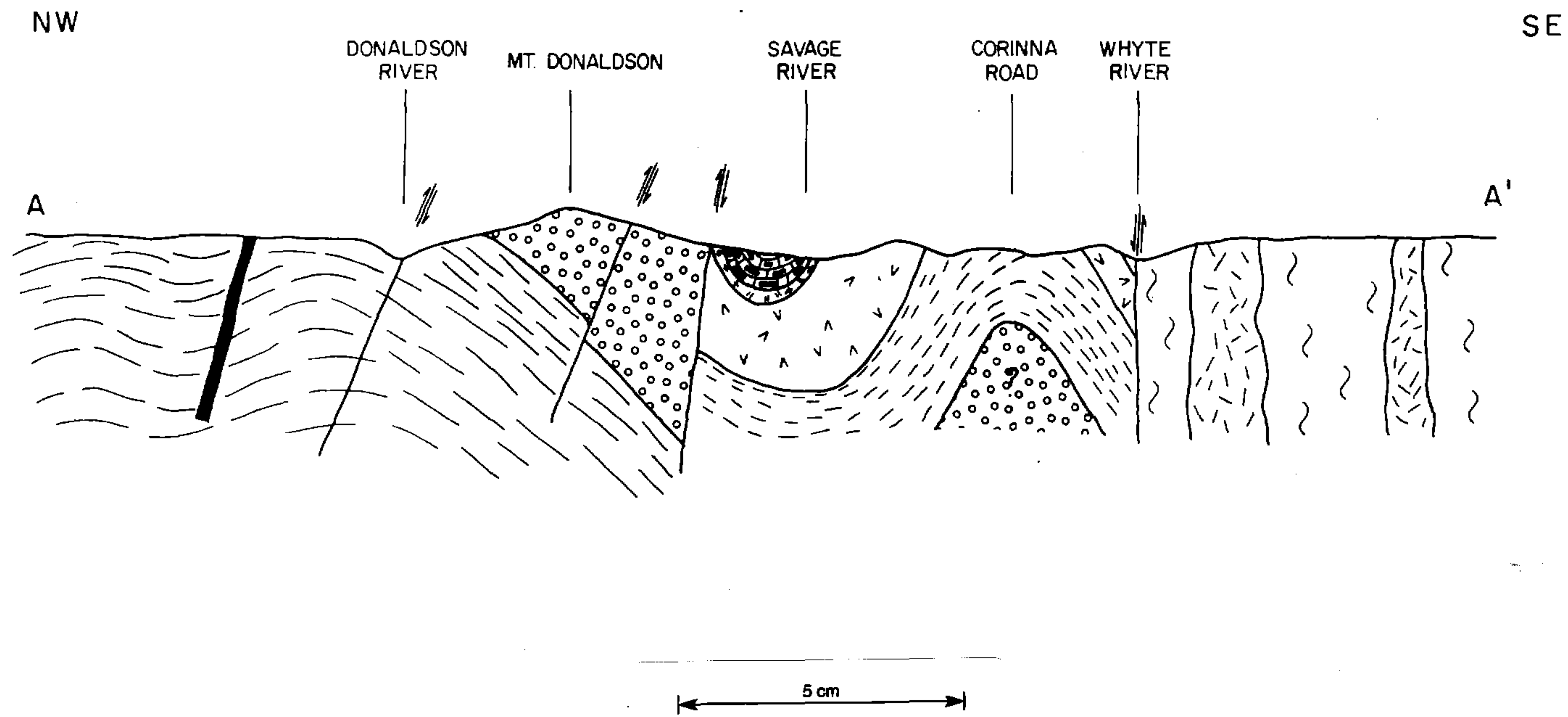
FIG 1

THE MOUNT LYELL MINING & RAILWAY Co. Ltd.

EL 2~~6~~7/78
DONALDSON
LOCATION PLAN

M. HUTTON	DRAFTSMAN: H.D.J.	A4 – 11
SCALE: 1:250,000	DATE: 24·11·1980	

81-1520



Diagrammatic section after Spry (1964)

FIG 4

Savage Dolomite		Interview Slate	
Delville Chert		Whyte Schist	
Bernafai Volcanics		Amphibolite	
Corinna Slate		Dolerite dyke	
Donaldson Group			

$\frac{V}{H} = 1$

0 1 2
KILOMETRES

THE MOUNT LYELL MINING & RAILWAY Co. Ltd.

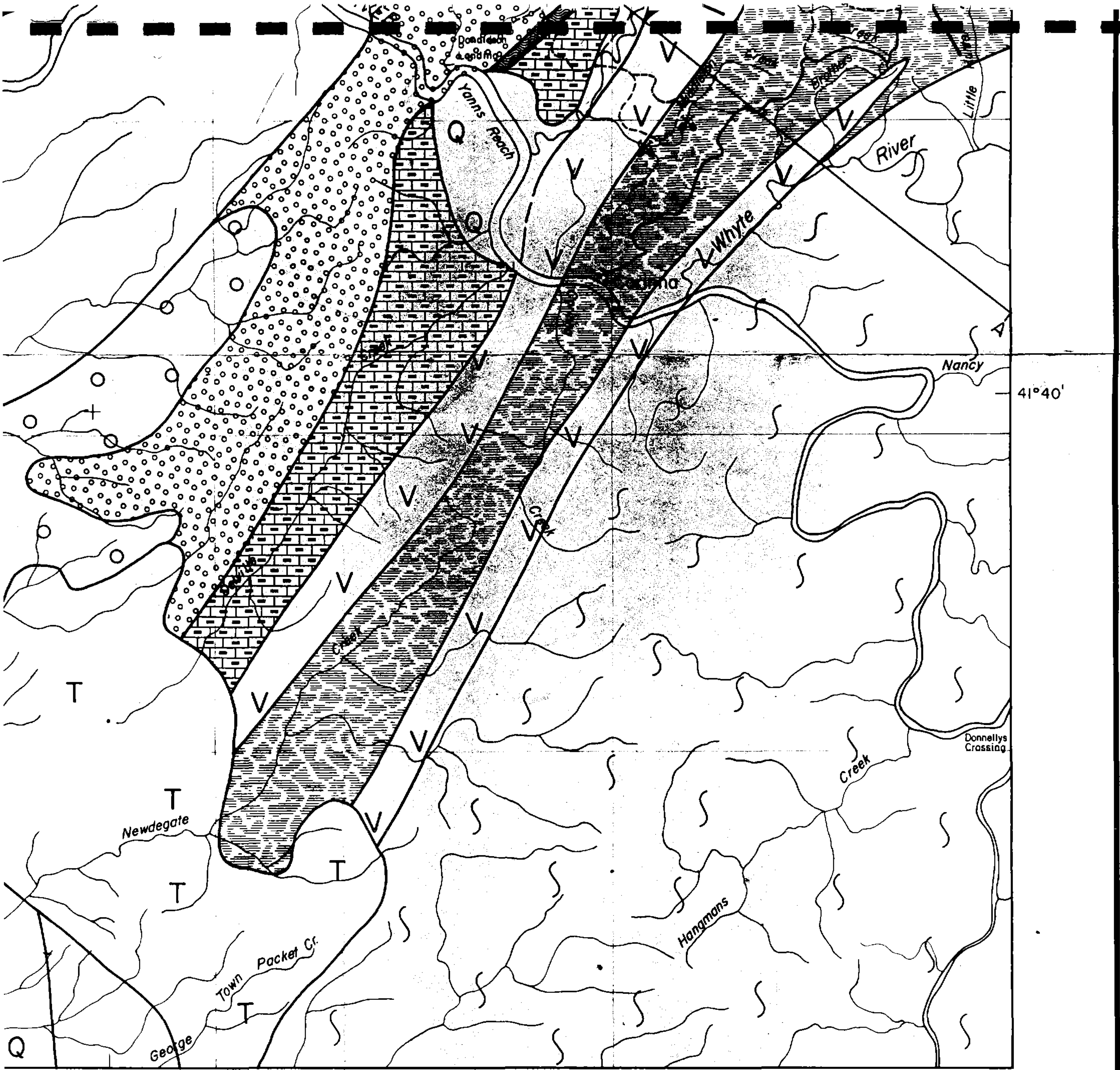
EL 27/78
DONALDSON

GEOLOGICAL CROSS SECTION

M HUTTON	DRAFTSMAN: P. J. R.	A4 - 10
SCALE: 1:250,000	DATE: 19-1-1980	

260067

81-1570



CORINNA SHEET

dunes, alluvium

---- Four wheel drive tracks

Alluvial gold workings

SCALE 1: 50,000

0 1 2 3 4 5 KILOMETRES

mite

5 cm

canics

e

oup

e & Quartzite

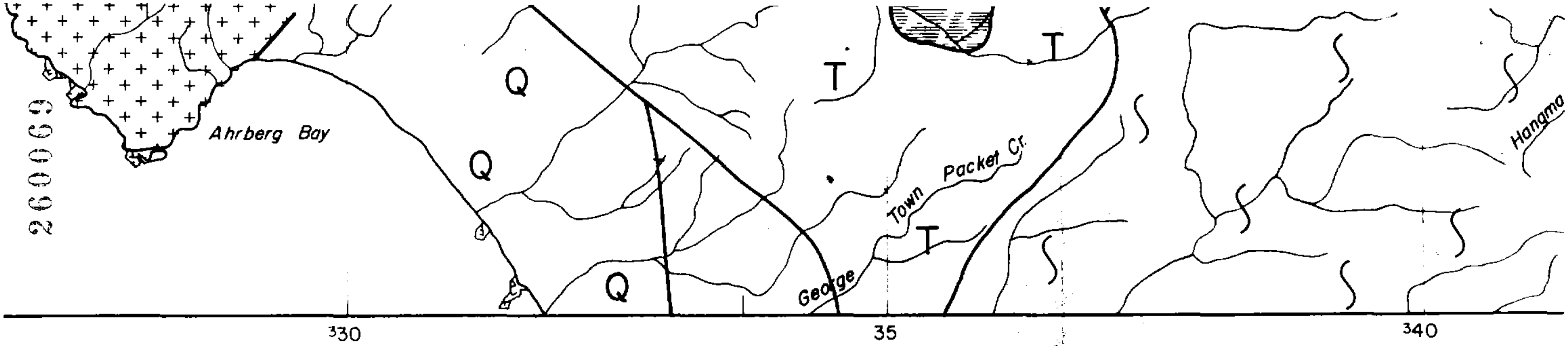
e dyke swarm

FIG 2

MOUNT LYELL MINING & RAILWAY Co. Ltd.			
E.L. 27/78 DONALDSON INTERPRETIVE GEOLOGY			
Date: 15/1/81	Author: M HUTTON	Drawn by: P RIMMER	A1-9

81-1520

1165



LEGEND

QUATERNARY	Q	Coastal sand dunes, alluvium
TERTIARY	T	Basalt
	O	Gravels
DEVONIAN	+ +	Adamellite
PRECAMBRIAN		Savage Dolomite
		Delville Chert
	V V	Bernafai Volcanics
		Corinna Slate
		Donaldson Group
		Interview Slate & Quartzite
	ʃ ʃ	Whyte Schist
	//	Sodic Dolerite dyke swarm

5 cm

SCA

0 1 2

MOUNT LYELL M

E

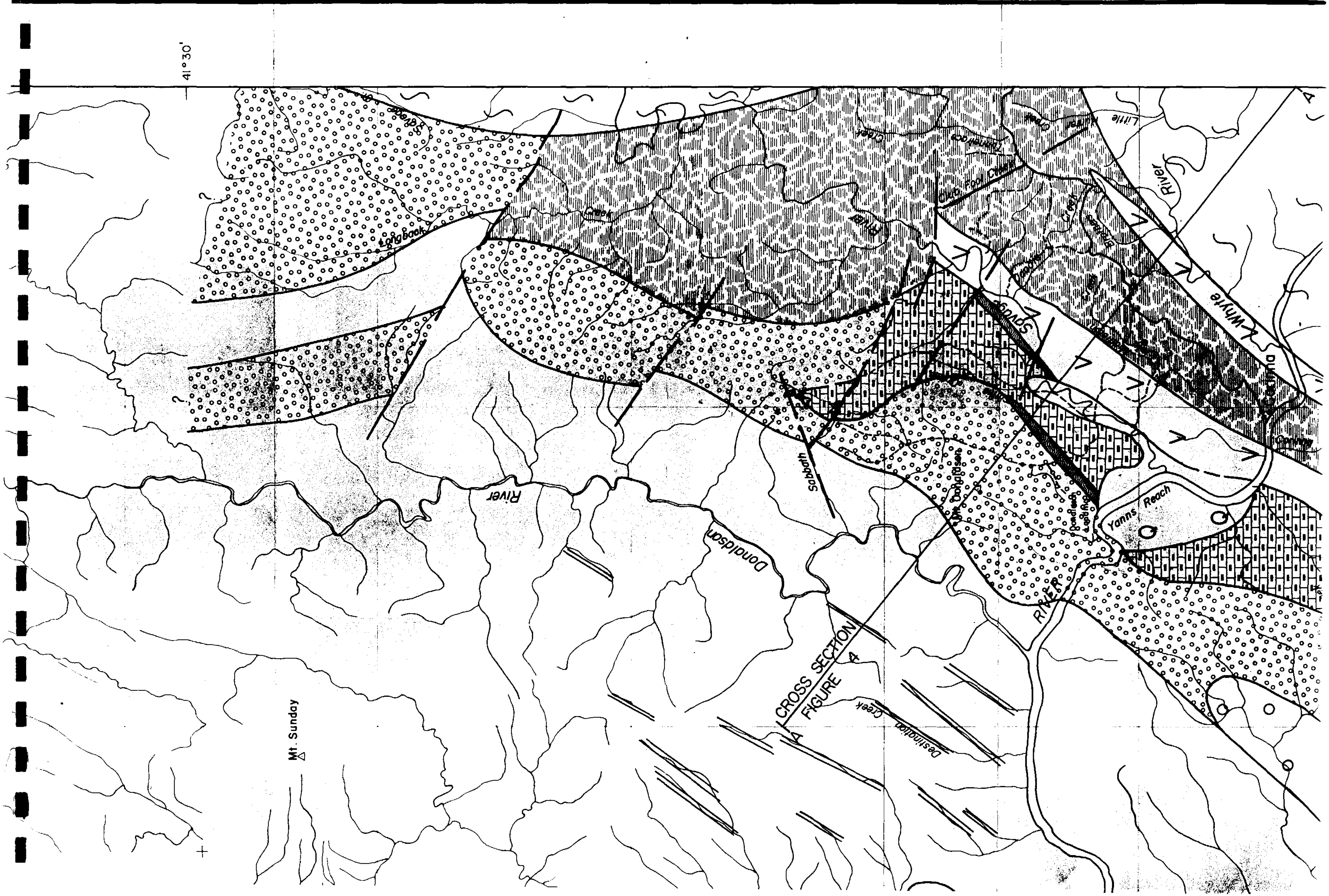
D

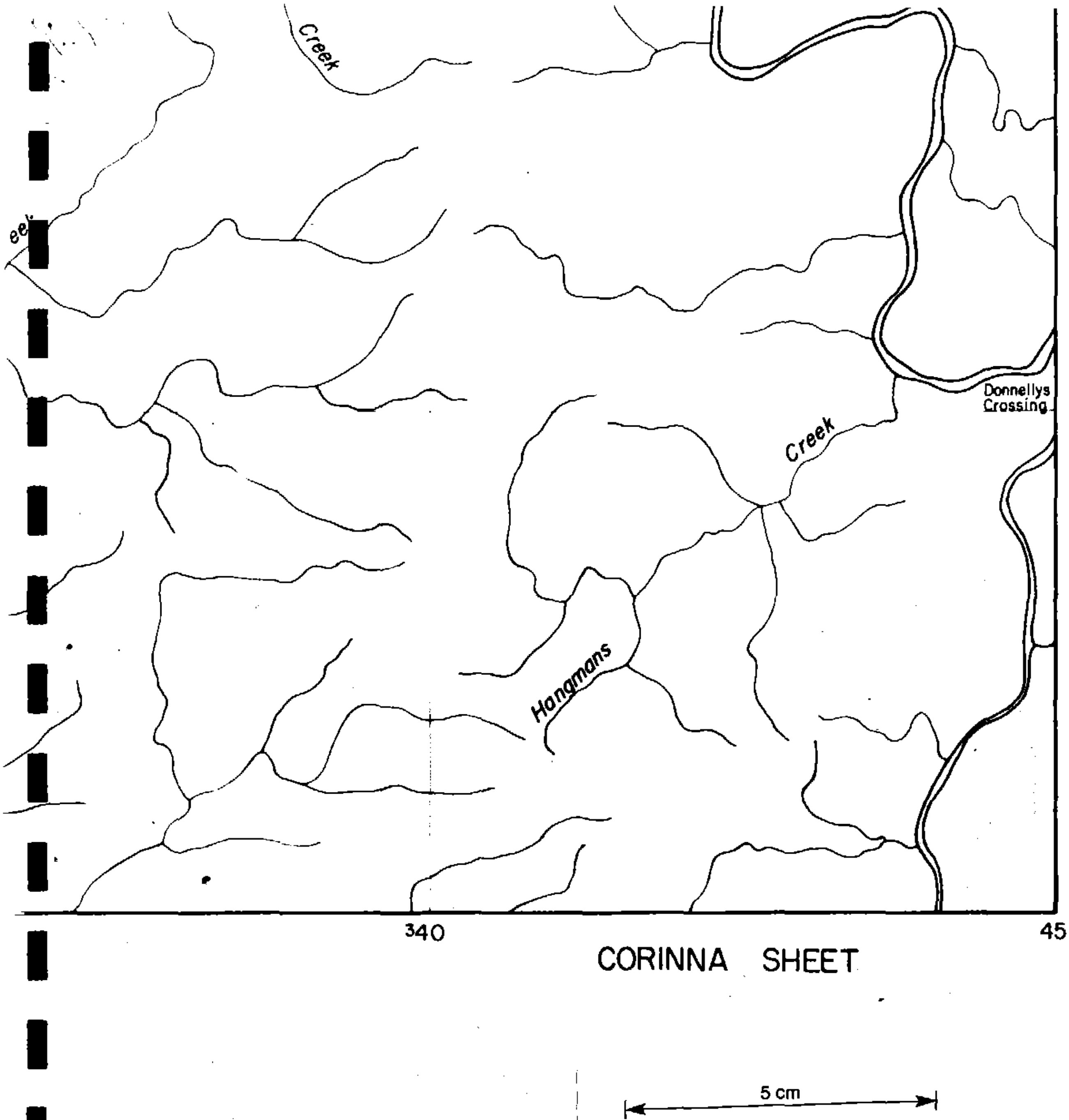
INTERP

Date: 15/1/81 | Author: M H

81-1520

260070


41°30'
Longback
River
Donaldson
Sabbath
Savage
Whyte
River
Little
Club Foot Creek
Yanns Reach
RIVER
CROSS SECTION
FIGURE 4
A
A
Destination Creek
Mt. Sunday



SCALE 1: 50,000

0 1 2 3 4 5 KILOMETRES

FIG 5

MOUNT LYELL MINING & RAILWAY Co. Ltd.

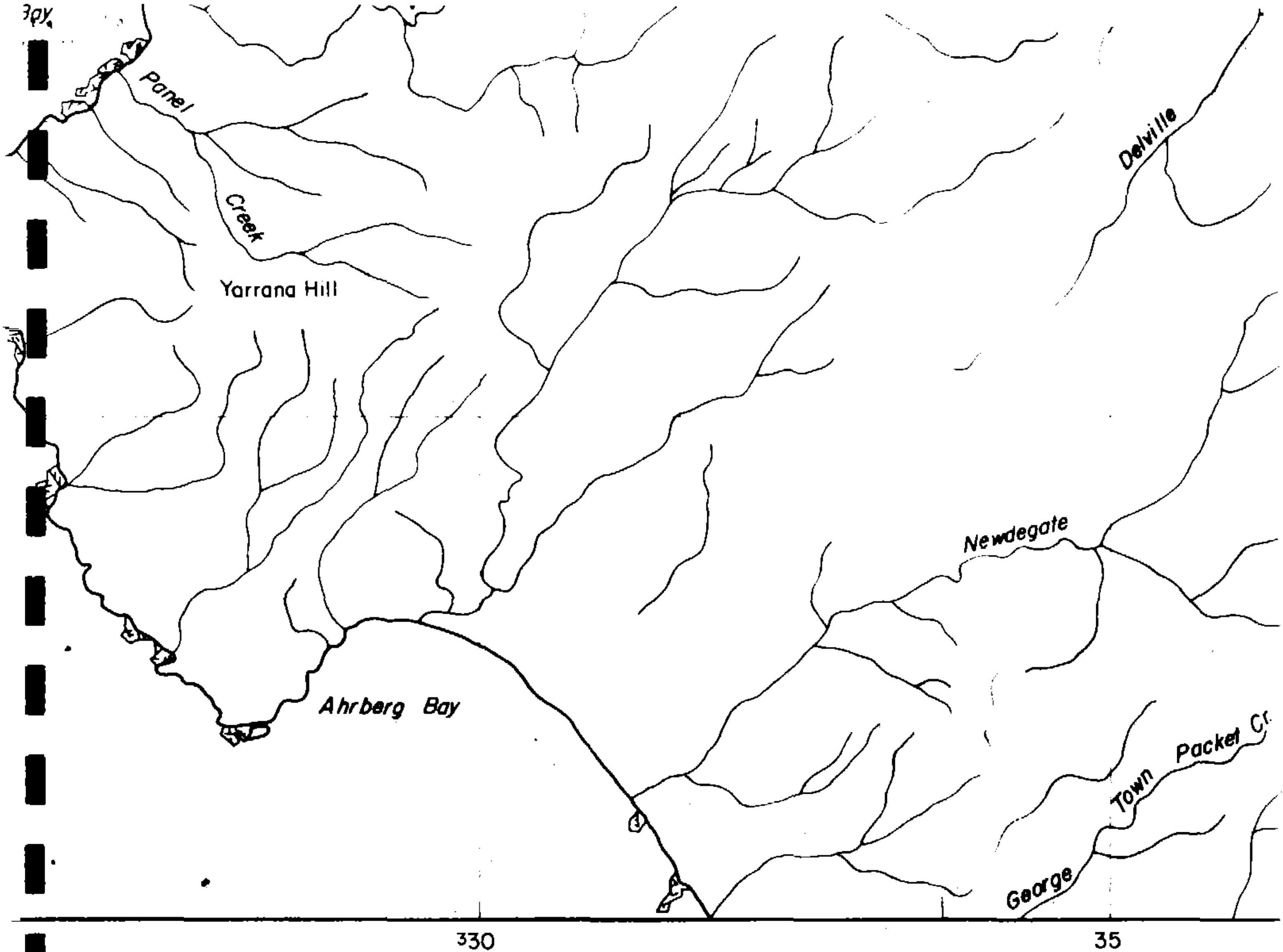
E.L. 27/78 260071

DONALDSON

SAMPLE LOCATIONS

Date: 14/1/81	Author: M. HUTTON	Drawn by: P. RIMMER	A1 — 8

81-1520

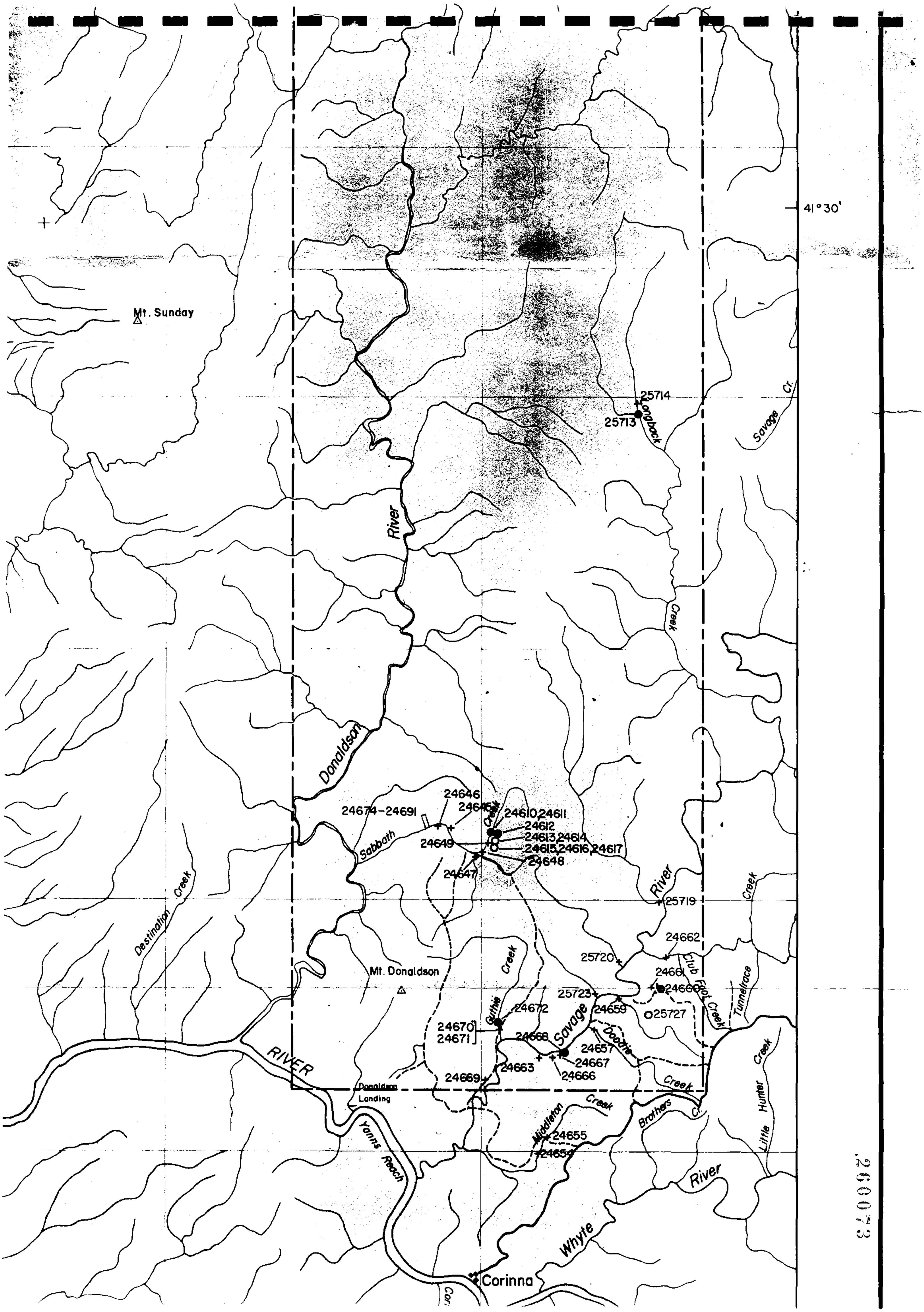


Lease boundary ———— – ———— – ————

Stream sediment + 24697

Soil sample ○ 24692

Rock chip ● 24660


41°30'
Mt. Sunday
Savage Cr.
25714
25713
Longback
River
Creek
Donaldson
24646
24674-24691
24646
Creek
24610,24611
24612
24613,24614
24615,24616,24617
24649
Sabbath
24648
24647
River
25719
Creek
Destination Creek
24662
25720
Club Foot Creek
24661
24660
Tunnelrace
Mt. Donaldson
Guthie Creek
25723
24659
25727
24672
24670
24671
24668
Savage
Doodle
24657
Creek
24667
24666
24663
24669
RIVER
Donaldson Landing
Creek
Brothers Cr.
Little Hunter Creek
Middleton Creek
24655
24654
Yanns Reach
River
Whyte
Corinna
260073

Geopeko First Report EL 37/82

84-2111

001

260075

GEOPEKO

A DIVISION OF PEKO-WALLSEND OPERATIONS LTD

PROGRESS REPORT ON LONGBACK

E.L. 37/82

TASMANIA

J. PEMBERTON,
DEVONPORT.
MARCH, 1984.

84-2111

CONTENTS

LIST OF FIGURES

LIST OF PLANS

1. INTRODUCTION

On May 9th, 1983 Geopeko signed an option agreement with COMINEX to aquire up to 94% interest in Exploration Licence 37/82. The E.L. covers an area of 65sq km between the Donaldson and Savage Rivers approximately 8km south west of Savage River township. Access to the northern part of the E.L. is restricted to helicopter while logging tracks off the Corinna road allow restricted access by 4W.D. vehicles to the south of the E.L. The topography is steep and covered by rainforest, eucalyptus forest and button grass plains.

Initial reconnaissance by Geopeko was completed over a five day period in May, 1983 and fulfilled Stage 1 of the option agreement with Cominex (see appendix A). Stage 2 was iniated in December 1983 with the establishment of a camp at the Longback 1 prospect. Gridding contractors cut 7.85 line km in December and January with the baseline having a magnetic bearing of 052^{o}.

Field work was completed over a three week period in January. This entailed geological mapping, ground magnetics and hand held power auger geochemical sampling.

A drill hole was targetted late in February based on the modelling of the ground magnetics.

2. GEOLOGY

The Longback 1 prospect falls into the Proterozoic Phi Group of Professor Carey (quartzite, dolomite + shale). A major north east trending linear is adjacent to the magnetic anomaly and referred to as the Savage Fault. To the west of this fault is the Sigma Group (shales, lavas and dolomite).

Mapping on the Longback 1 grid is generally confined to stream section, auger chips and float in up turned tree roots (see Outcrop Map Plan No 1 and Interpretation Map Plan No 2). The lithologies from west to east are:-

1. Stromatolitic dolomite
2. Black pyrite shale and grey dolomitic shale with interbedded green siltstone in the north (±200m)
3. Pebbly tremolitic mudstone and shale with a trace of pyrrhotite (±300m).
4. Silicified carbonate.

The sequence strikes north south across the grid and swings to the east on the northern part of the grid. Dip is usually to the west at ±60° while cleavage appears to fan from 340° to 020° and dip near to vertical. Kink banding of this cleavage indicates a Taberabberan deformation of the earlier Tyennean orogeny.

Petrological reports on rock specimens KR 12735 (Pebbly mudstone), KR 11158 (Silicified carbonate), KR 11159 (Weathered shale) and KR 11161 (Dolomite) are included in Appendix B. Rock chip geochemistry for 13 samples are included in Appendix C and locations on Outcrop Map Plan No1.

3. GEOCHEMISTRY

A total of 150 C horizon hand held power auger samples were taken over the ground magnetic anomaly. The results for Cu, Pb, Zn, Ag, Fe, Ba, Sn, W and As are presented on plans 3 to 13. REsults are tabulated in Appendix D. A liberal interpretation of contour intervals was applied to detect any geochemical trends that might have been present.

The geochemistry did not reveal any base metal anomalies except for a spot high in the carbonate on the northern part of the grid. This sample contained 185ppm Cu, 220ppm Pb and 480ppm Zn. Ba was anomalous over the magnetic anomaly (upto 1.48%) and had an antipathetic relationship with iron.

Spot W anomalies were obtained over the quartz gravels and indicate the auger bit as a source of contamination

4. GEOPHYSICS

The grid was read using a Geometrics G-816 with a G-856 as a base station. Readings were taken at 10m intervals. The results from this survey are discussed in Appendix E. Contours of the results are presented in Plan 14.

5. CONCLUSIONS

The results of this work indicated a favourable environment and target for tin bearing pyrrhotite mineralization. A drill hole was planned with a collar position of 10150E 9290N at an inclination of -50° drilling in a north westerly direction (322° magnetic) to intersect three modelled dyke like bodies.

The drill hole was completed at 302m while this report was being compiled. A sequence of Black Shales and Dolomitic Grey Shales with pyrrhotite was intersected. Logging and splitting of this core will proceed on the completion of this report.

260082

GEOPEKO

A DIVISION OF PEKO-WALLSEND OPERATIONS LTD.

INTER-OFFICE MEMO

TO: B.T. WILLIAMS DATE: 30-6-83

FROM: R.R. LARGE COPIES TO: G.H. Sherrington

SUBJECT: LONGBACK PROSPECT

An option agreement was signed with a Tasmanian Syndicate "COMINEX" on May 9, 1983 to aquire up to 94% interest in Exploration Licence 37/82, 10 km south west of Savage River, Western Tasmania. This memo outlines the exploration results to date and recommends that we should proceed to Stage 2 of the option.

Option Agreement: The agreement is a staged option as follows:

Stage	Option	Equity	Duration	Programme
Stage 1	$5,000	None	3 months	Reconnaissance grid, magnetics, geology
Stage 2	$10,000	None	12 months	Detail ground surveys and one drill hole
Stage 3	$20,000	94%	Indefinite	Prospect evaluation

Stage 1 has been completed and it is recommended that Geopeko complete Stage 2 in the 1983/84 season.

Access: The E.L. is in a remote area between the Donaldson and and Savage Rivers. The only present access is by helicopter - a 10 minute flight from Savage River Mine. In the summer it may be possible to push a Bombardier track 5km north from Mt Donaldson to gain access to the Longback Prospect and reduce helicopter costs.

Previous Work: No significant exploration has been carried out in the E.L. The 1982 Mines Department aeromagnetic survey covers the E.L. and defined a number of anomalies (see fig 3). The Longback anomaly is an isolated and intense bulls-eye shape and was selected by Cominex as a possible Kimberlite pipe. Six traverses were cut across the anomaly by Cominex in early 1983 which partly defined its shape. I visited the area in February 1983, and concluded that the anomaly represents a favourable target for pyrrhotite-tin mineralization.

Work by Geopeko:

In May 1983 Geopeko undertook a crash programme to allow further evaluation of the Longback anomaly.
This work included - reconnaissance gridding
- magnetics
- geological mapping
- drainage sampling

Geology:

Professor Carey placed the anomaly in the Proterozoic Phi Group (quartzite, dolomite and shale) near the contact with Sigma Group and adjacent to the Savage Fault a major north east trending feature extending from Pieman Heads to Savage River Mine. (see figure 3) Mapping by John Pemberton (see figure 4) has defined a north-south striking sedimentary sequence dipping west at around 50°. Passing west to east the lithologies are

- massive dolomite
- grey shale with minor pyritic black shale and lenses of dolomite (~ 200m thick)
- pebbly mudstone (~ 300m thick)
- Quartzite

North of the Savage Fault outcrops of massive quartzite occur on the Longback ridge.

Magnetics:

On the ground the magnetic anomaly has a complex shape. (see figure 5, Plans 1 and 2). It is composed of two parts-

a) A roughly circular anomaly of about 1000nT maximum with diameter of 400m

b) A group of smaller spiky anomalies of 300-700nT lying directly east of the main anomaly.

The circular anomaly lies over the contact of the black shale and pebbly mudstone sequence. Outcrops of dolomite occur on the contact about 150m north of the anomaly. The centre of this anomaly is on a topographic high.

Insufficient data is available to model the magnetic anomaly, however its general features suggest a pipe-like body centred below 10100E, 9450N plunging grid east.

Calceraous pebbly mudstone carrying 2-5% pyrrhotite was located at 9500N, 10350E beneath one of the spikey anomalies to the east of the main anomaly. Walley Fander reported minor chalcopyrite with the pyrrhotite in a sample of the rock (see attachment).

Geochemistry:

Twelve drainage -80 mesh samples were analysed from the grid area and are listed in Table 1. No significantly anomalous values for Cu, Pb, Zn, Sn, W or Au are obvious, however the data set is very small and background values are unknown for this environment.

Geochemical values for eleven rock chip samples from the grid are given in Table 2. The pyrrhotite bearing pebbly mudstone from 9500N, 10350E returned 230ppm Cu, 180ppm Zn and 1500ppm Ba. All the shale and pebbly mudstone samples south of the Savage Fault have elevated levels of barium from 570 to 3200ppm Ba. Two samples of the western dolomite horizon contain above-average gold (430ppb and 530ppb).

DISCUSSION

The Longback Prospect has many positive criteria indicative of a pyrrhotite-tin body.

1. Isolated magnetic anomaly indicative of a pipe like body cross cutting the stratigraphy.

2. Host rocks consist of black shales, dolomites and calcareous pebbly mudstones. The dolomites are favourable reactive hosts for replacement.

3. The anomaly lies adjacent to a major fault which represents a potential feeder zone.

4. The anomaly lies midway between the Meredith granite and the Interview Granite both of which have associated Sn-W mineralization.

The lack of anomalous Sn or W stream geochemistry is the only negative feature.

FUTURE PROGRAMME

In order to assess the potential of the Longback Prospect the following Stage 2 programme is required.

a) Accurately survey and infill the grid to allow for detailed magnetic interpretation of the anomaly.

b) Bedrock geochemistry over the central part of the anomaly.

c) Selected traverses of dipole-dipole IP.

d) One diamond drill hole to test the main anomaly.

A budget sheet for this programme is enclosed. Total base cost is $80,000.

RECOMMENDATION

That Geopeko proceed to Stage 2 of the Longback Option agreement, and undertake the programme outlined above in the 1982/83 summer season.

FIGURES

1.	Regional Geology	1:500,000
2.	Aeromagnetics	1:100,000
3.	Photo-interpretation Geology	1:100,000
4.	Prospect Geology	1:5,000
5 .	Magnetic Contours	1:5,000

Plan 1:	Magnetic Profiles	1:2,500
Plan 2:	Magnetic Contours	1:2,500

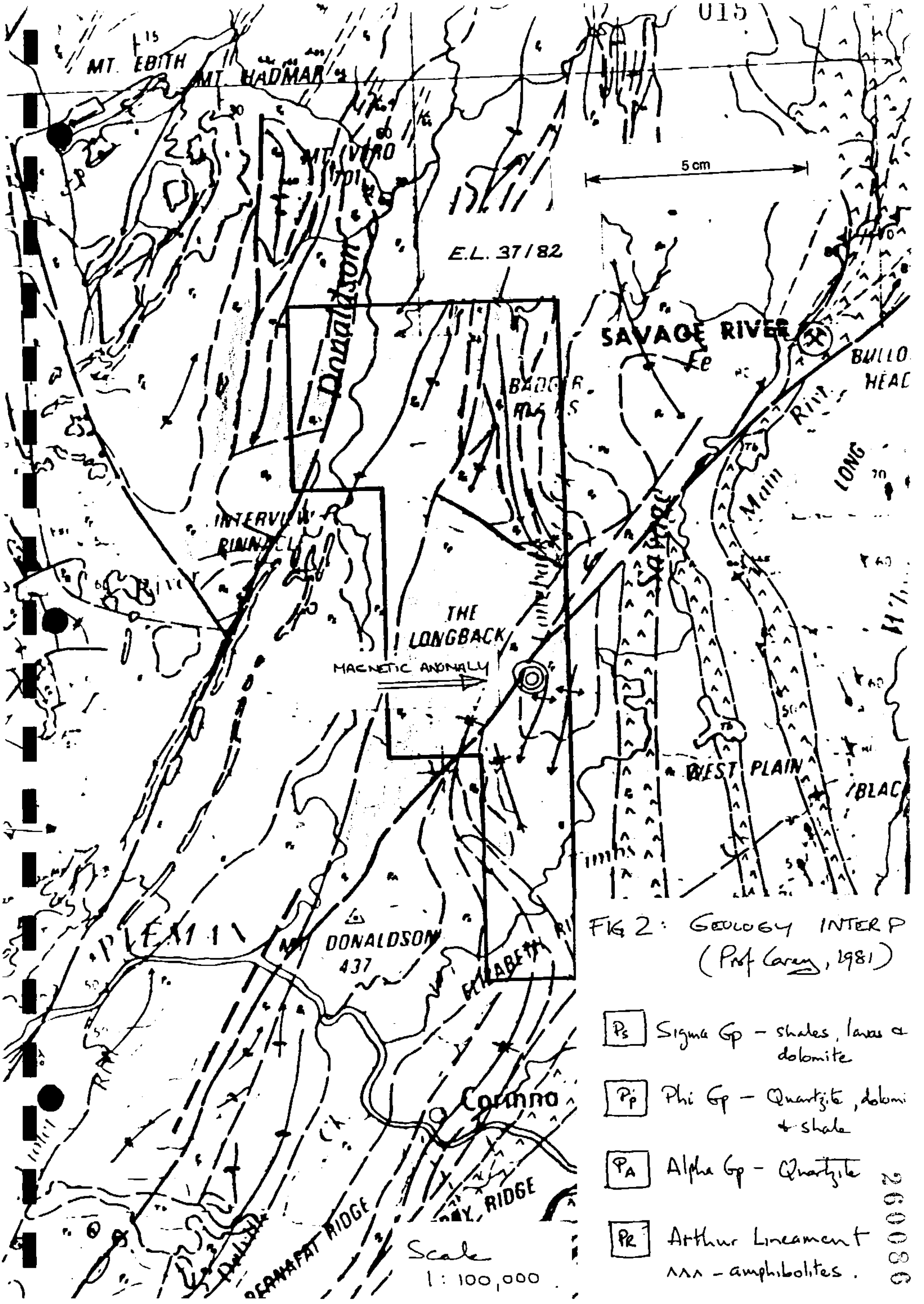
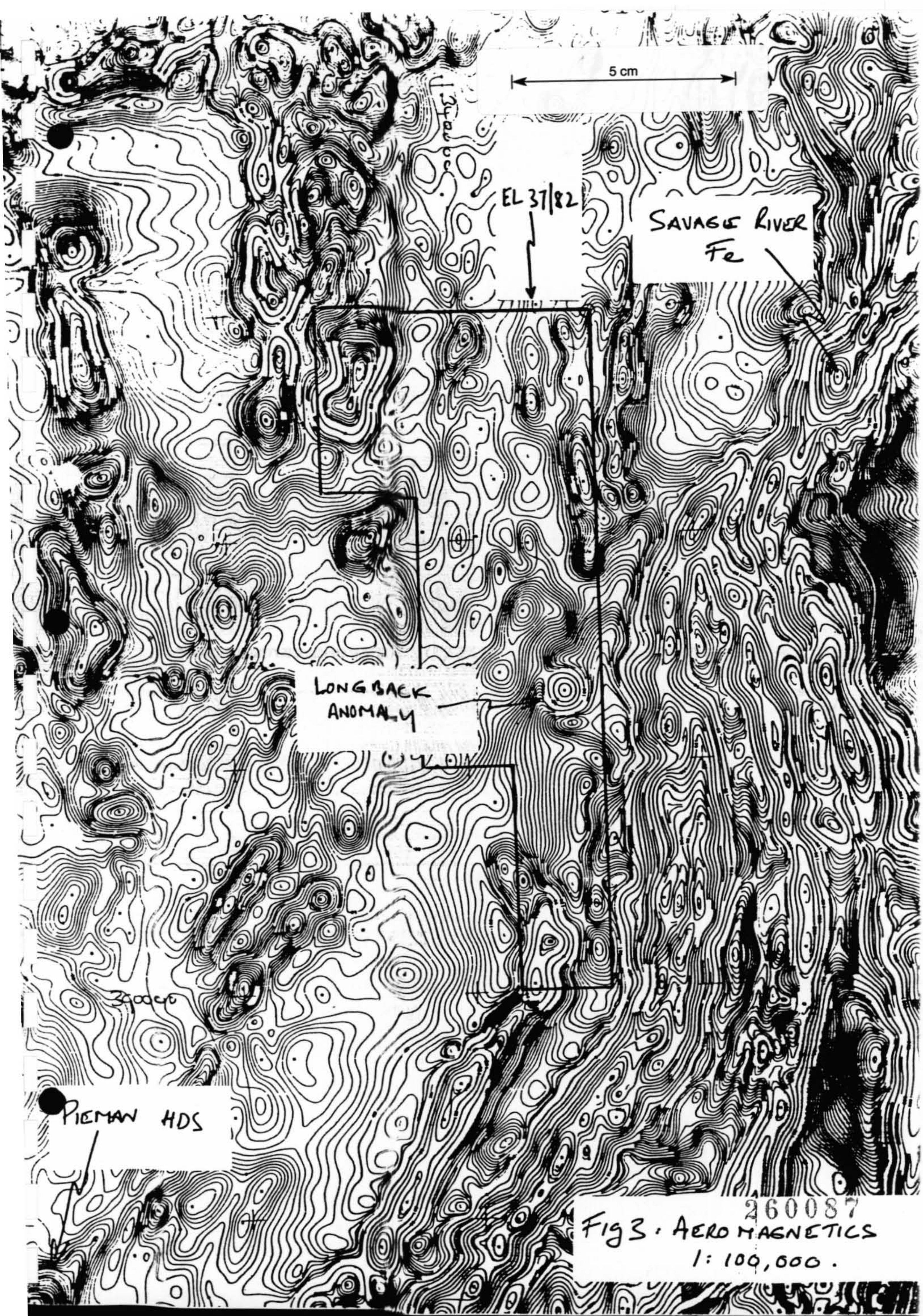


FIG 2: GEOLOGY INTERP
(Prof Carey, 1981)

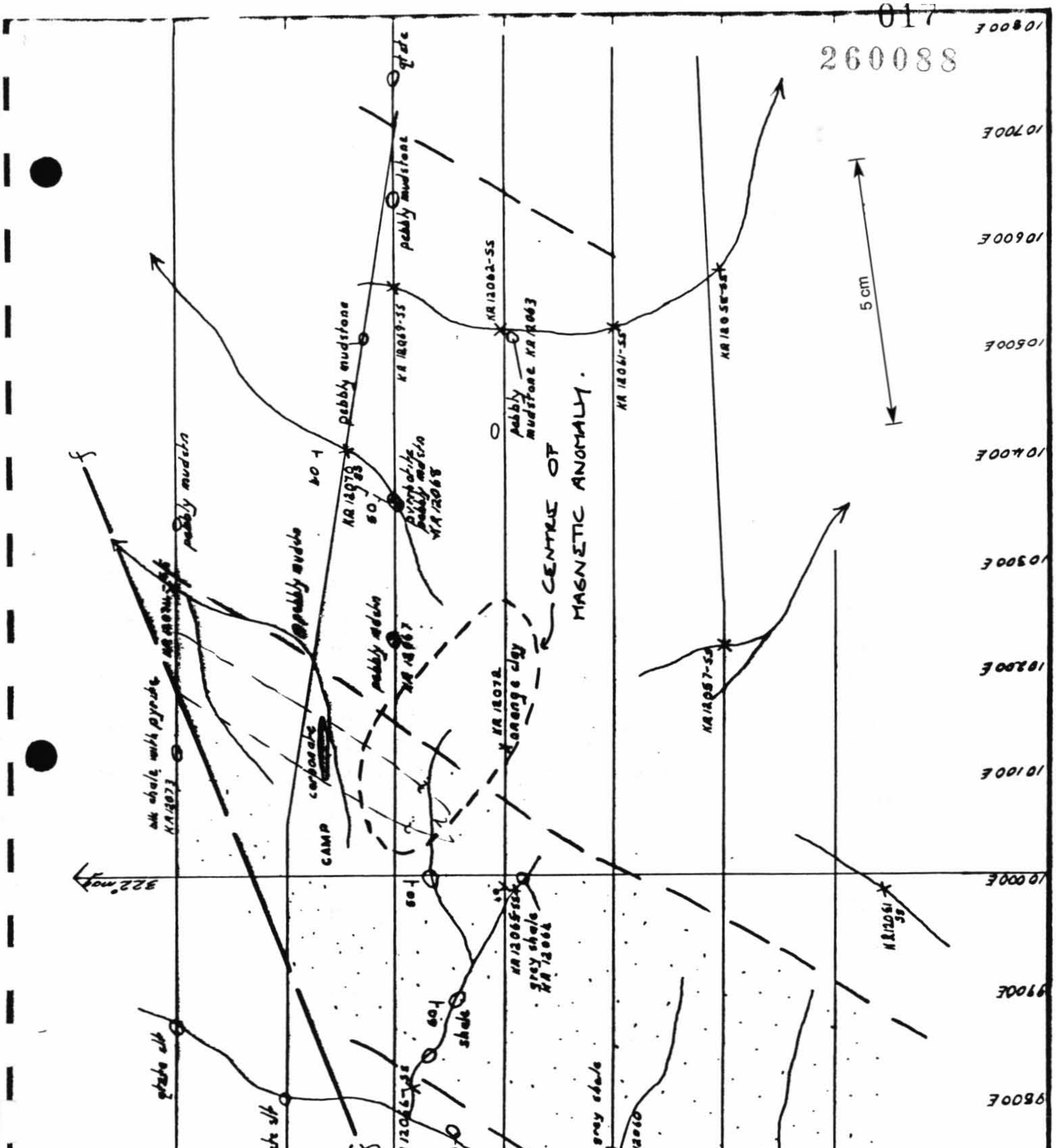
Ps	Sigma Gp – shales, lavas & dolomite
Pp	Phi Gp – Quartzite, dolomi[te] & shale
PA	Alpha Gp – Quartzite
PR	Arthur Lineament ^^^ – amphibolites.

260080



260087

Fig 3. AERO MAGNETICS
1: 100,000.



GEOPEKO

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LONGBACK PROSPECT

DATE	DWN	1:5000
GEOL	CHKD	

FIG. 4

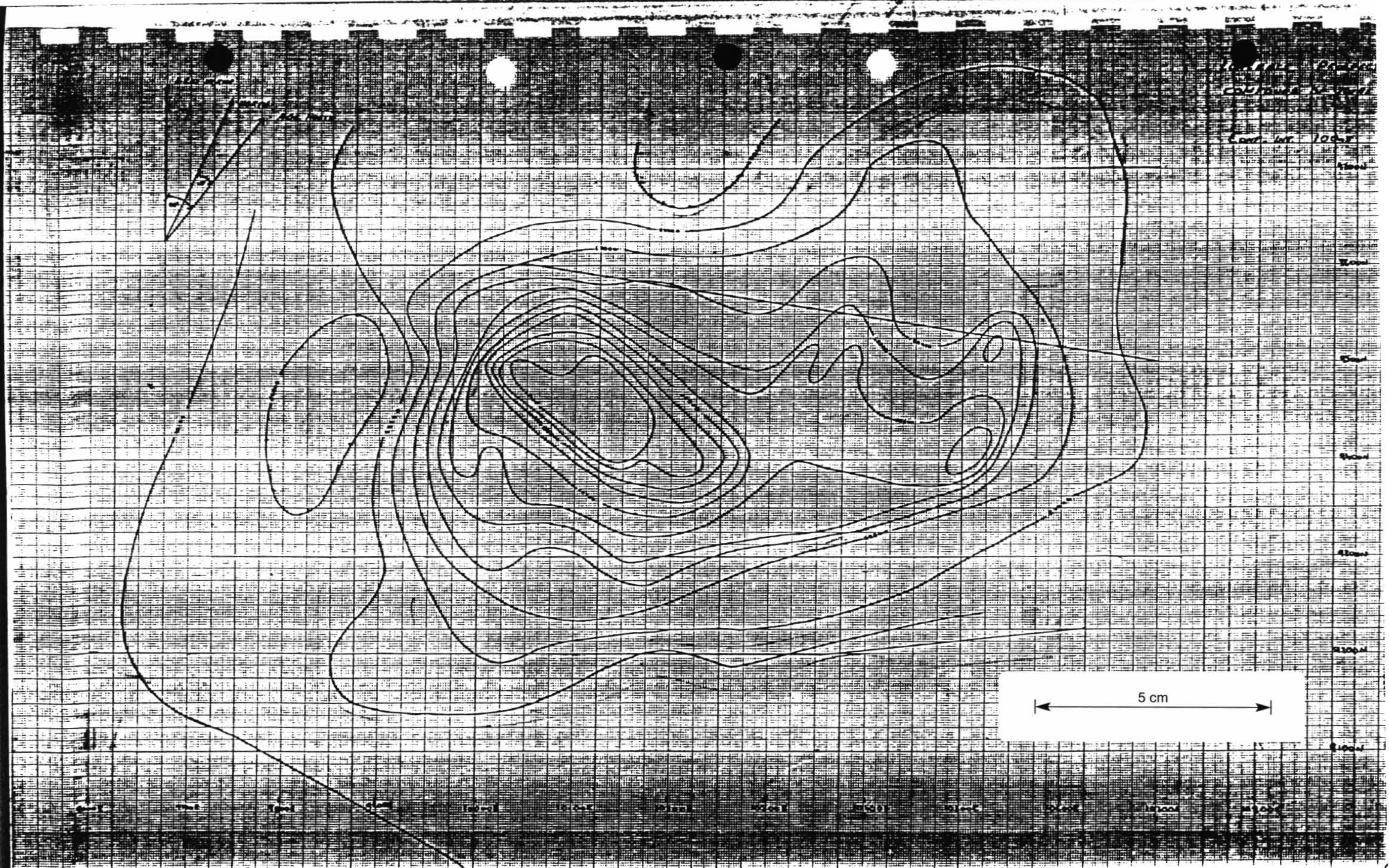


FIG 5 : MAGNETIC CONTOURS
1:5,000.

630002

APPENDIX E

LONGBACK 1 MAGNETICS - J. SUMPTON

260091

GEOPEKO

A DIVISION OF PEKO-WALLSEND OPERATIONS LTD

INTER-OFFICE MEMO

TO: R.R. LARGE DATE: 2-2-84

FROM: J.D.H. SUMPTON COPIES TO: J.Pemberton

SUBJECT: LONGBACK I MAGNETICS

During the early part of January the newly cut grid covering the Longback I magnetic anomaly was the subject of a magnetic intensity survey. The newly aquired data conforms well with the data from the reconnaissance grid, given the inexactitudes of the latter and the 90° change in the orientation of the traverse lines.

The change in traverse line direction was decided on in order to cross the apparent 'strike' of the anomaly at an angle close to 90°. This has been largely successful inasmuch as the anomaly appears to resolve itself into three subparallel bodies trending more or less grid east-west (see Fig 1). These bodies are interpreted as having fairly shallow depths to top towards the western end of the anomaly, and, especially in the case of the northern two bodies, to increase in depth to the east. The sharp truncation of the anomaly in the west may be the result of faulting. The relative positions and qualitatively interpreted geometries and depths from surface of these bodies is such that I have chosen to approximate them by three dyke like bodies of considerable (effectively infinite) strike extent. Using this basic model geometry I have generated numerically calculated curves which match reasonably well the observed profiles from lines 10050E, 10100E and 10150 E. These bodies and profiles are shown on Figs 2,3 and 4. In each case the calculated profile has been produced by three two dimensional dykes dipping at between 55° and 70° to the south.

Although this interpretation gives rise to model interpretations which are reasonably consistant from line to line, and which are consistant with my original qualitative interpretation of three sub parallel dyke like bodies, it rests on a number of assumptions and simplifications whose affects on the reliability of the interpretation should be noted. Though I have modelled three dykes of infinite depth and strike extent, all constrained to dip at the one angle and all magnetised by induction only, none of these assumptions may be entirely true. The bodies may be truncated or conjoined at depth, and with appropriate adjustments to dips and susceptibilities being made, the profile generated will change little. There is some evidence for shallow depth extent in the sharp low present on the northern flanks of the anomaly, particularly on line 10100E and the flanking lows seen in the airborne data. The assumption of infinite strike extent is likely to reasonably sound, except in the case of line 10050E which is close to the western edge of the anomaly. There is no good evidence that remnant magnetisation is significantly affecting the observed anomaly, but it should be noted that remnance is often significant, especially in cases where the major magnetic material is pyrrhotite, which we are hoping is the cause of this anomaly. In examining the attached models it should be noted that the interpreted widths (and inversely the magnetic susceptibilities) of the bodies are rather

260092

arbitrary and generally the interpretation is insensitive to the actual figures shown, i.e. a widish body of low susceptibility and a narrow body of high susceptibility produce curves which are not significantly different and do not appreciably alter the shape of the composite curve.

In conclusion, given the qualifying remarks above and bearing in mind that there are always an infinite number of possible geometrics which can cause a potential field anomaly.
(and in this case we have no geological 'filter' to aid us in the interpretation of quite a complex anomaly), the model of three subparrallel dyke like bodies dipping to south and becoming deeper to the east reasonably satisfies the observed magnetic patterns,

Regards,

John Sumpton

JOHN SUMPTON
Geophysicist.

260093

040

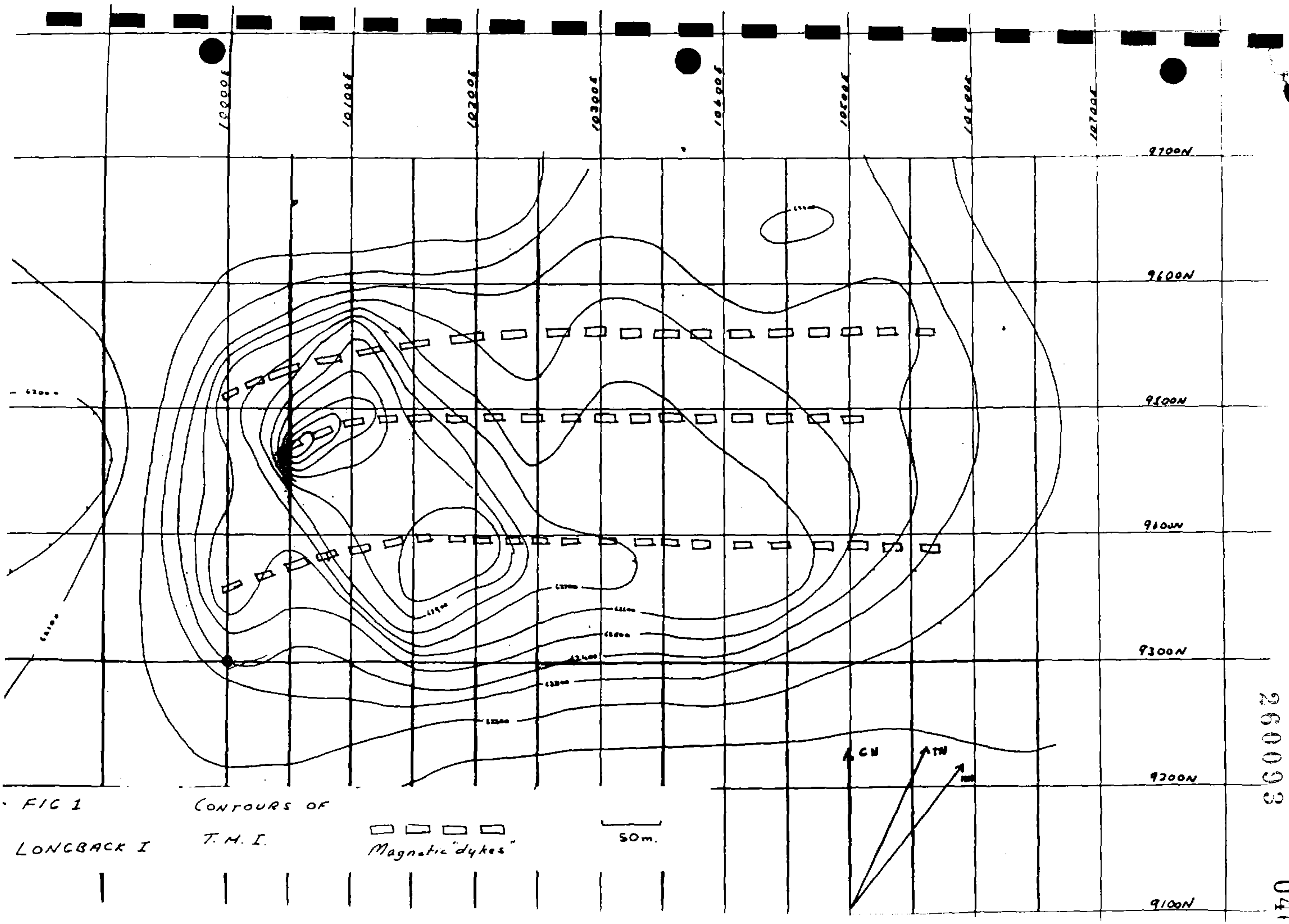


FIG 1 LONGBACK I

CONTOURS OF T.M.I.

FIG 2

LONGBACK I LINE 10050E

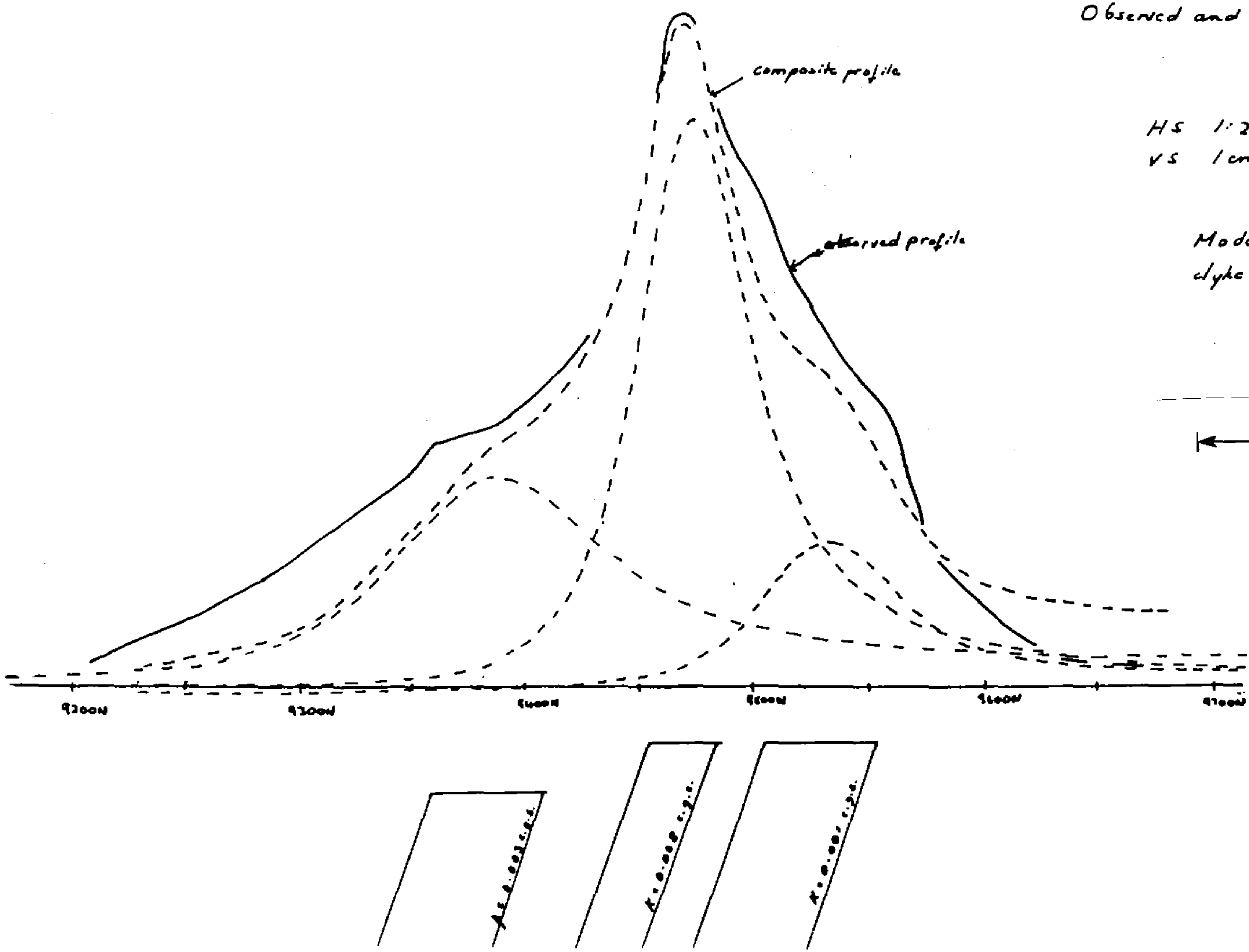
Total Magnetic Intensity

Observed and calculated profiles

HS 1:2500
VS 1cm = 100nT

Models are two dimensional dyke like bodies

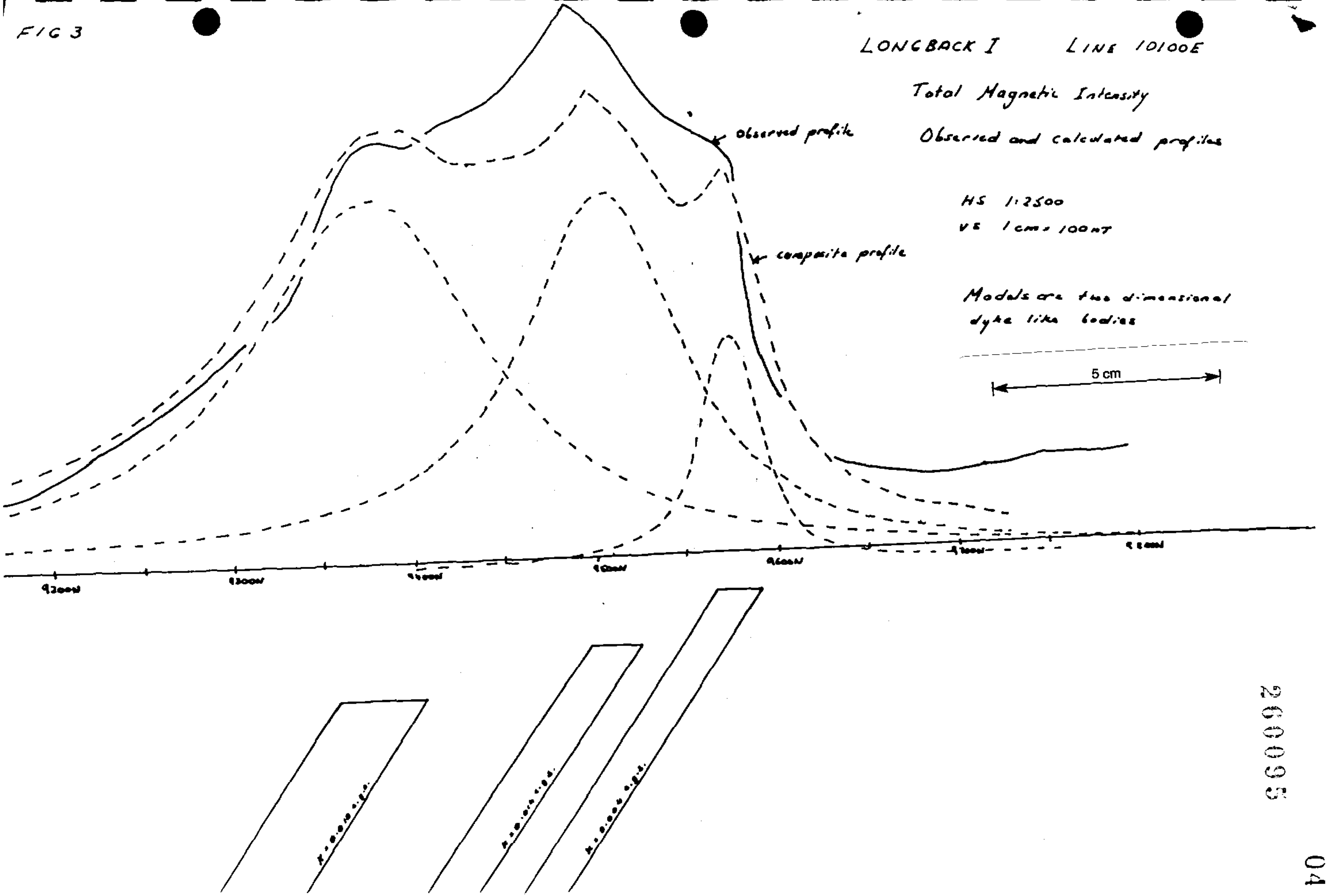
5 cm



260094

04

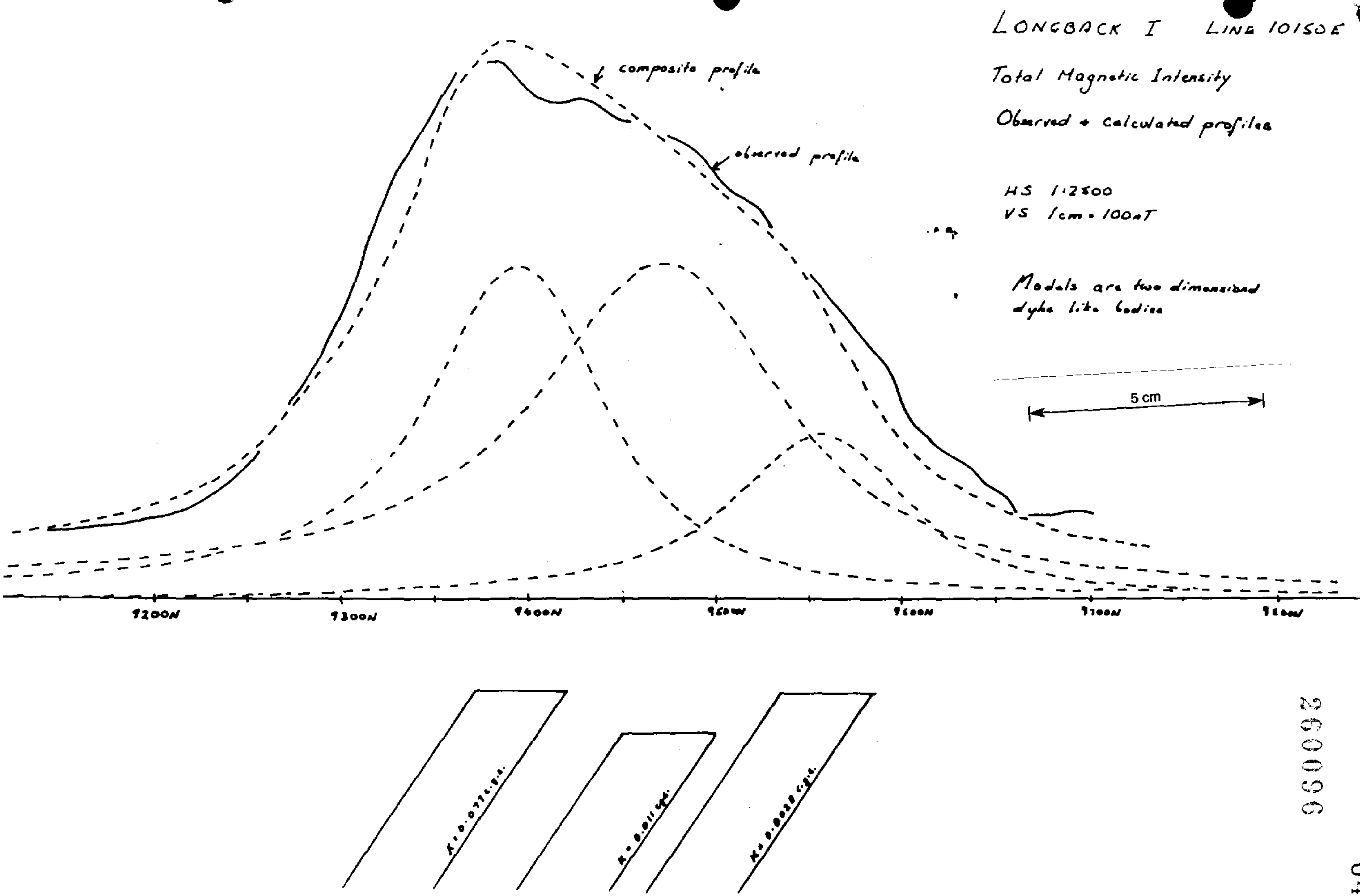
FIG 3



260095

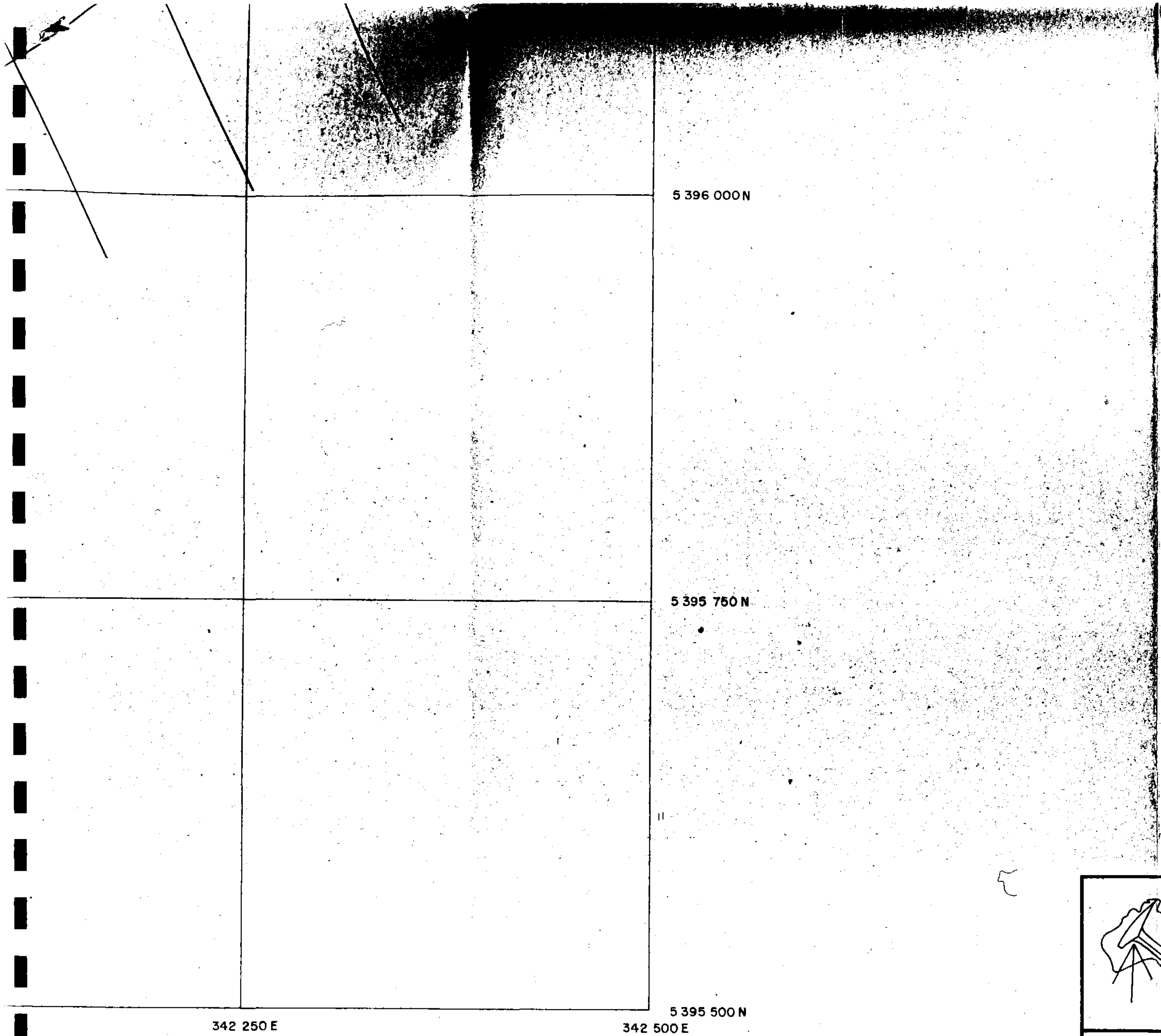
04

FIG 4



260096

U41



MAGNETIC CONTOURS

260097

—— 62300 —— magnetic contour

Contour Interval : 100 nT

Base Instrument : G 856

Field Instrument : G 816

Observer : J. Sumpton

Date : Jan 84

5 cm

GEOPEKO

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Scale 1:2500

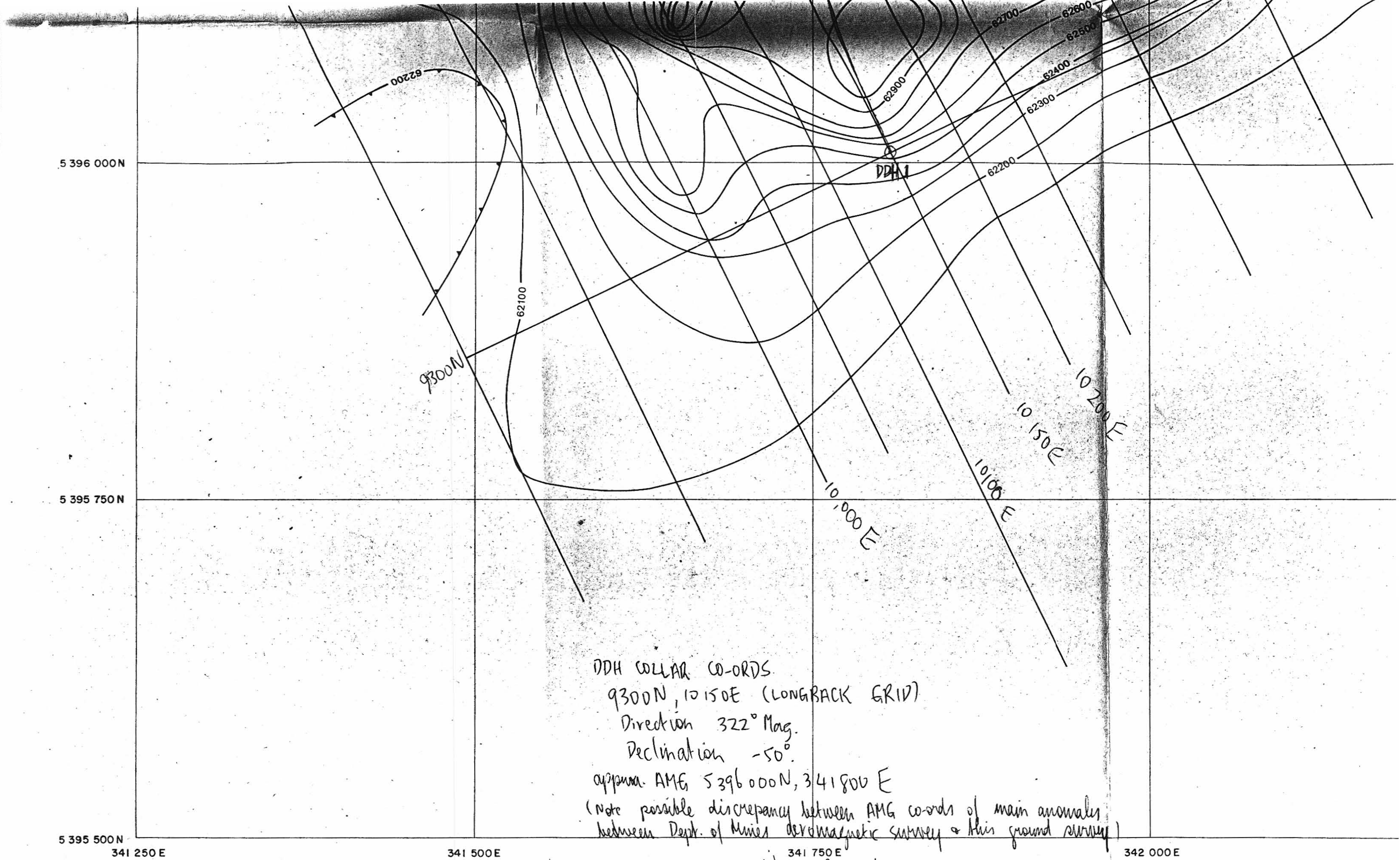
50 0 50 100 150 20

Map Reference : Taken from 1:100 000 PIEMAN-7914

E.L. 37/82 LONGBACK , TASMANIA

Contours of Total Magnetic I

Geologist : Date : Drawn : PLAN NO: 14.



DDH COLLAR CO-ORDS
9300N, 10150E (LONGBACK GRID)
Direction 322° Mag.
Declination -50°.
approx. AMG 5396000N, 341800 E
(Note possible discrepancy between AMG co-ords of main anomaly between Dept. of Mines aeromagnetic survey & this ground survey)

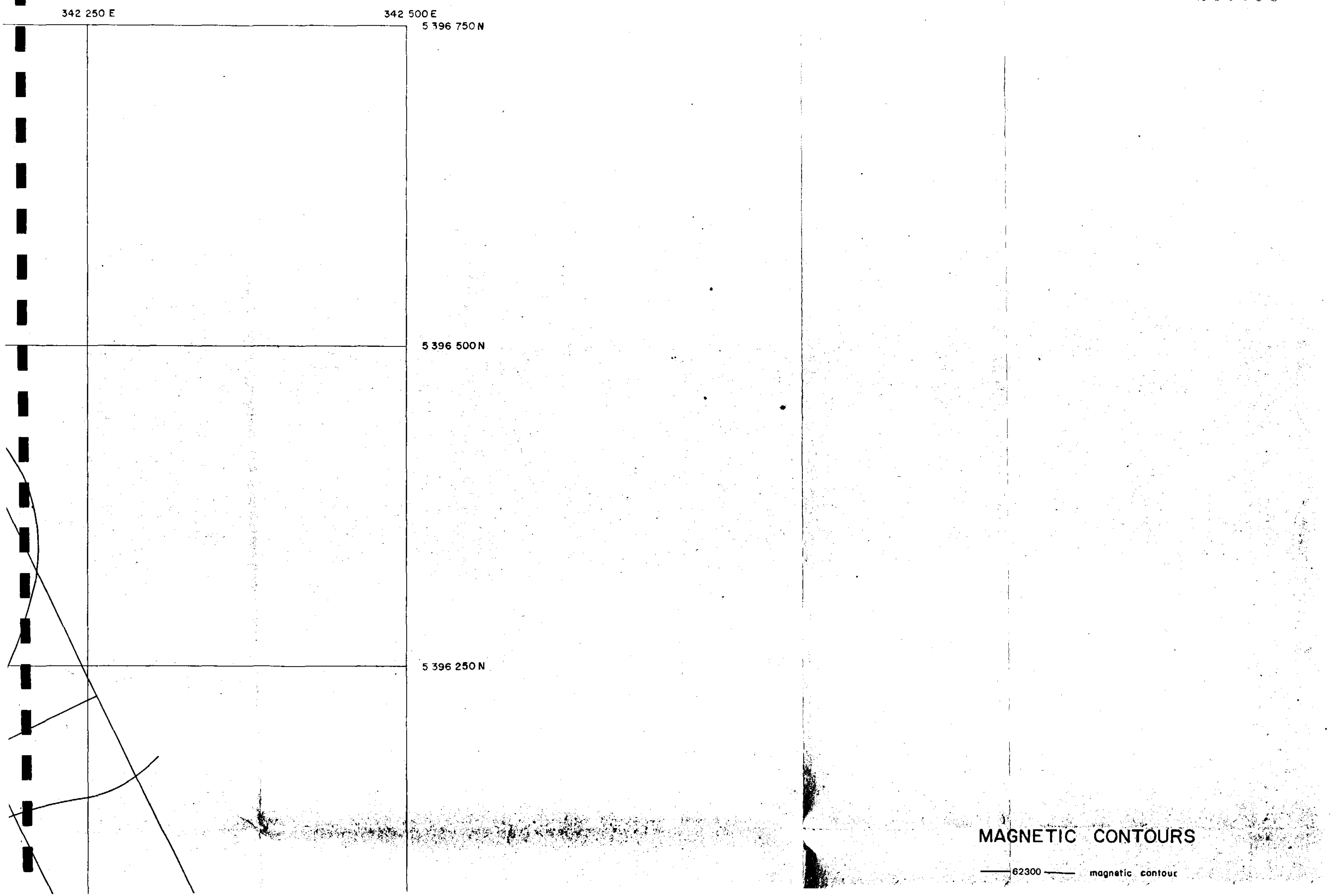
- Information supplied by Ross Large 3/12/85.

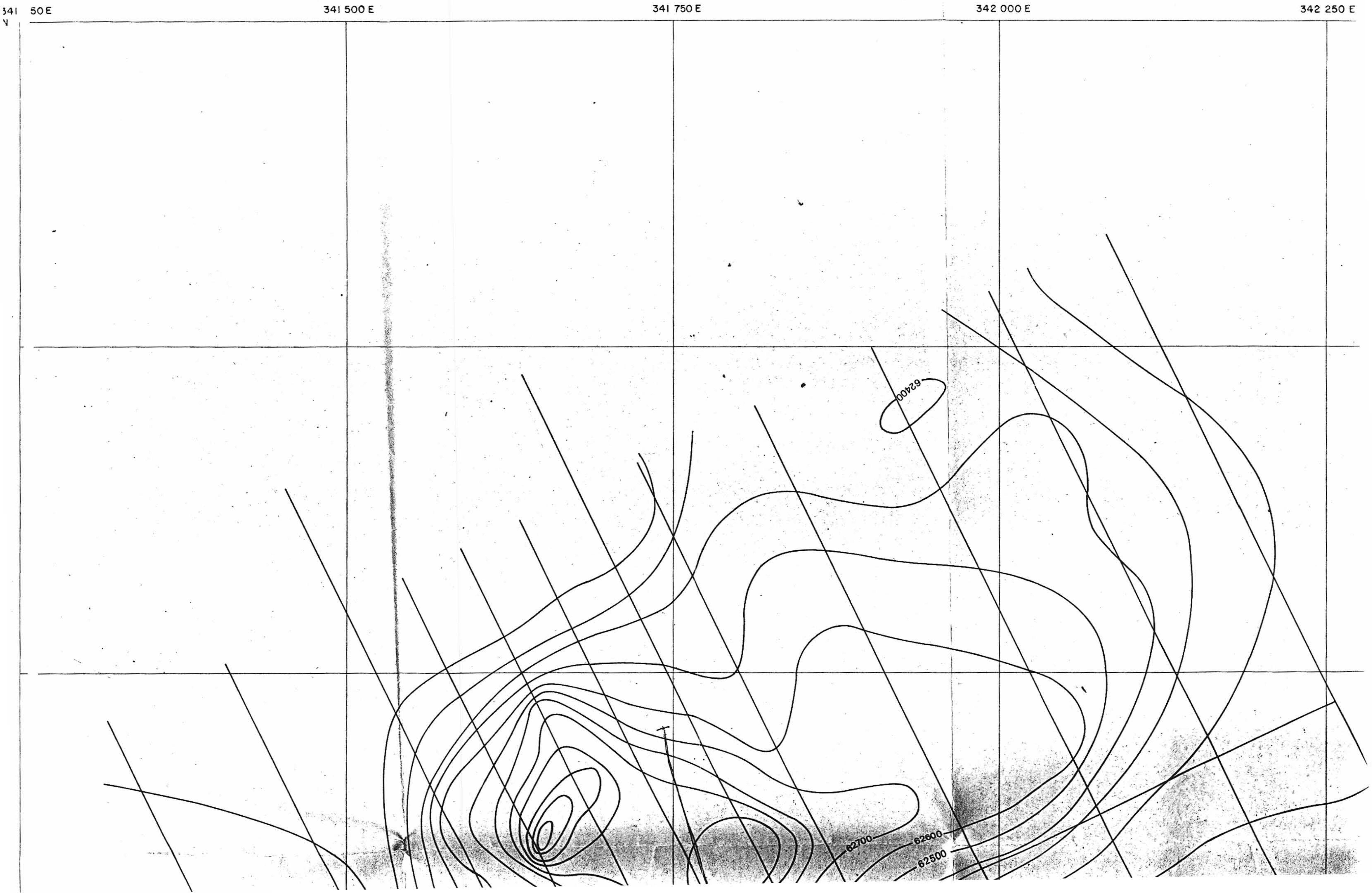
5 cm

MAP AREA : 1·56 km²

260098

260099


342 250 E
342 500 E
5 396 750 N
5 396 500 N
5 396 250 N
MAGNETIC CONTOURS
62300
magnetic contour


341 500 E
341 750 E
342 000 E
342 250 E
62400
62700
62600
62500

Geopeko Final Report EL 37/82

GEOPEKO

A DIVISION OF PEKO-WALLSEND OPERATIONS LIMITED

PROGRESS REPORT ON E.L. 37/82

LONGBACK

TASMANIA

J. PEMBERTON

MAY, 1984.

260103

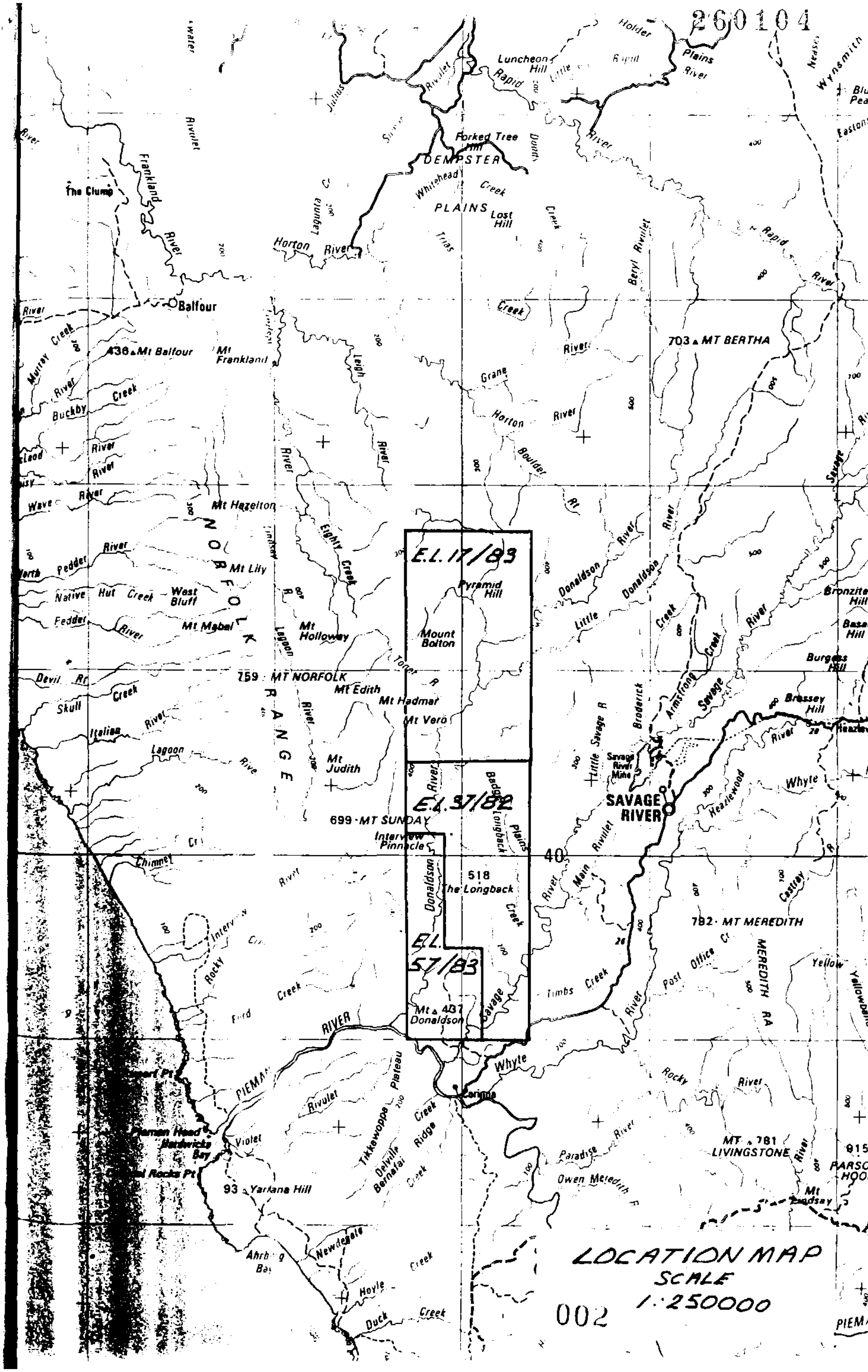
CONTENTS

APPENDIX

FIGURES

PLANS

260104


E.L. 17/83
E.L. 37/82
E.L. 57/83
SAVAGE RIVER
Savage River Mine
NORFOLK RANGE
759 MT NORFOLK
699 MT SUNDAY
703 MT BERTHA
782 MT MEREDITH
MEREDITH RA
MT 781 LIVINGSTONE
DEMPSTER PLAINS
Forked Tree Hill
Lost Hill
Luncheon Hill
Balfour
436 Mt Balfour
Mt Frankland
The Clump
Mt Hazelton
Mt Lily
West Bluff
Mt Mabel
Mt Holloway
Mt Edith
Mt Hadmar
Mt Vero
Mt Judith
Pyramid Hill
Mount Bolton
Interview Pinnacle
518 The Longback
Mt 437 Donaldson
Corinna
PIEMAN
RIVER
Donaldson River
Little Donaldson
Savage River
Whyte
Pieman Head
Hardwicks Bay
93 Yarlana Hill
Ahrberg Bay
Tikkawoppa Plateau
Delville Bernafai Ridge
Bronzite Hill
Basal Hill
Burgess Hill
Brassey Hill
Mt Lindsay
Horton River
Heazlewood
40
LOCATION MAP
SCALE
1:250000

002

1. INTRODUCTION

E.L. 37/82 covers an area of 65sq km south west of Savage River township. This report covers the work done following the Annual Report of April 1984.

Appendix 1 has the log and results from DDH 1 at Longback 1 with the magnetic interpretation.

One other magnetic anomaly was followed up in late summer and those results are discussed in this report.

2. MAGNETIC FOLLOW UP OF AIRBORNE ANOMALY LONGBACK 2

Longback 2 was a moderate anomaly in the north west of the E.L. adjacent to Mt Vero. Three magnetic profiles were obtained over the anomaly and these are presented on Figure 1 with the soil sample localities. Results for the soil samples are presented in Appendix 2. Rock samples collected were as follows:-

KR 11176 - 10100E 10350N - Felsic amphibolite
KR 11177 - 10850E 10350N - Grey pyritic siltstone

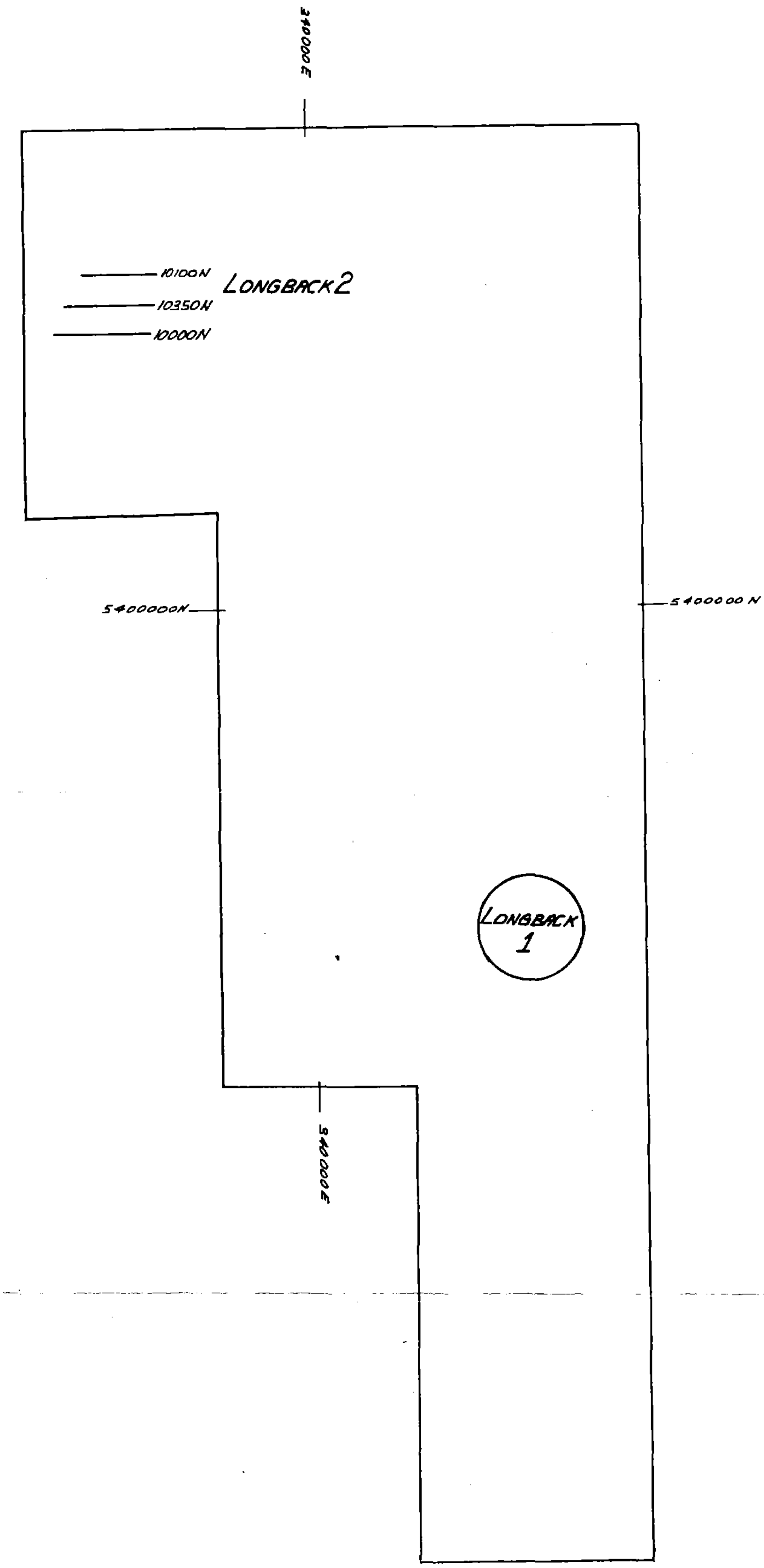
Panned concentrates collected were:-

TD 10505 - 10700N 10850E
TD 10506 - 10700N 10300E

The anomaly was interpreted as a combination of magnetic amphibolite and pyrrhotite in laminated siltstones. Soil sample and panned concentrate results were not encouraging.

CONCLUSION

The results from the drill hole at Longback 1 and the reconnaissance of Longback 2 were not regarded as encouraging. Further work in the E.L. would concentrate on a regional approach to exploration with a panned concentrate survey and mapping.



LONGBACK E.L. 37/82

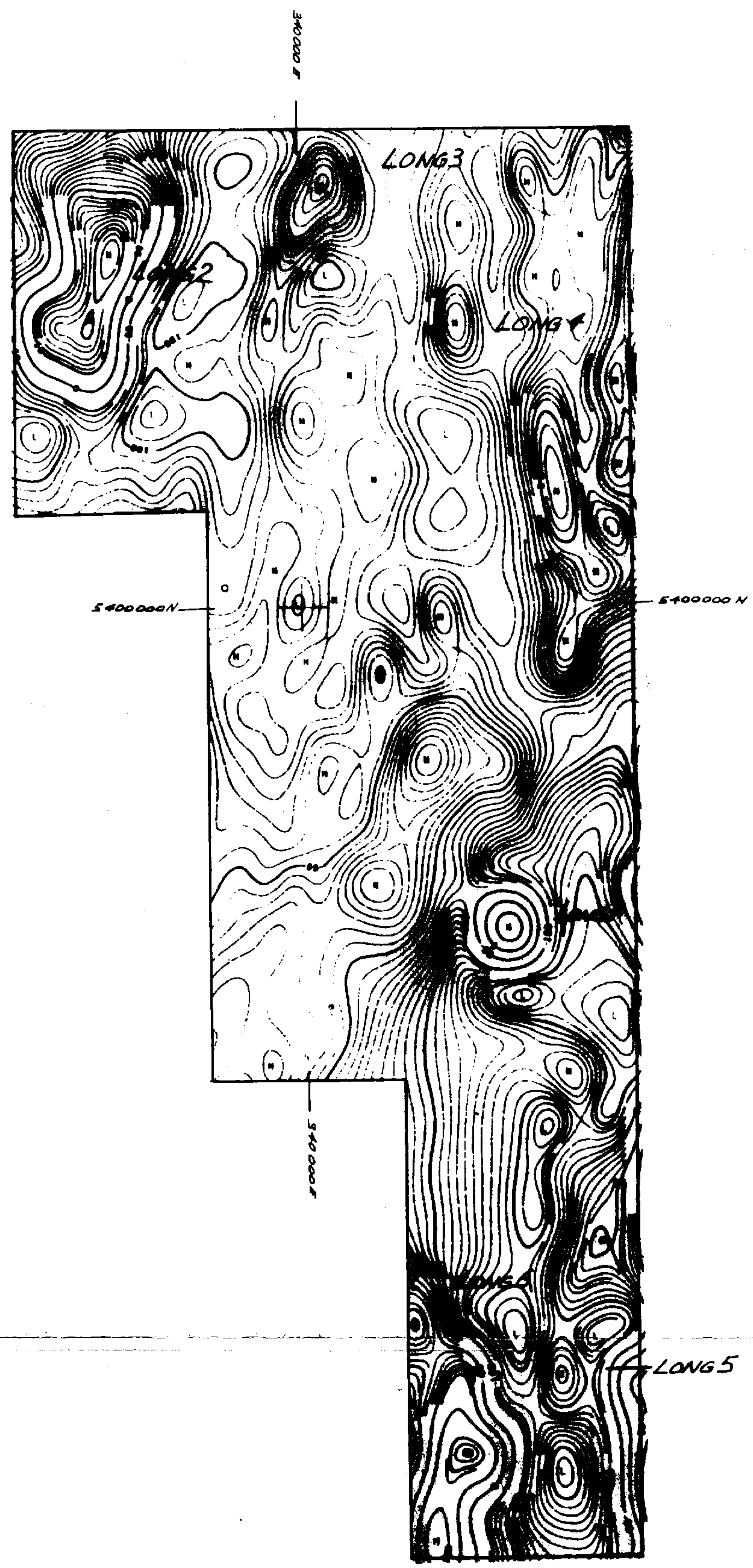
TASMANIA

1 : 50000

PROSPECT MAP

+ RECONNAISSANCE GRID

260108



LONGBACK E.L. 37/82

TASMANIA
1:50000
AEROMAGNETICS
+ PROSPECT MAP

5 cm

2601109

260110

GEOPEKO

A DIVISION OF PEKO-WALLSEND OPERATIONS LTD.

TER-OFFICE MEMO

TO: W. HERRMANN DATE: 21-5-84

FROM: J. PEMBERTON COPIES TO: H. Nolan

JECT: LONGBACK 1 DDH 1

The core from DDH 1 at Longback 1 has been logged and assayed (at 5m intervals). These results and J. Sumpton's magnetic interpretation are appended.

From these results it is my interpretation that we have adequately tested the magnetic target and that the pyrrhotite is of a syngenetic nature.

Regards,

J. Pemberton

JOHN PEMBERTON.

GEOPEKO TASMANIA DRILL LOG

Prospect LONGBACK / Hole no. DDH1

DEPTH (m) from	DEPTH (m) to	GRAPHIC LOG	ANGLE TO CORE AXIS So	ANGLE TO CORE AXIS S1	GEOLOGICAL DESCRIPTION	Alteration	MINERALISATION py	MINERALISATION po			Fracturing	Sample No.	From (m)	To (m)	Rec ( )	ASSAYS (Lab: A.L.S.) Cu	Pb	Zn	Ag	Fe %	Sn	W	Ba
0	1																						
1	2																						
2	3																						
3	4				4.5m Start of hole.																		
4	5				4.5m to 23m - Weathered / oxidised grey			t															
5	6				+ brown shale.			t				KR12801	5	6		35	30	95	2	8.35	<5	<10	1650
6	7							t															
7	8				Magnetic mineral - disseminated f.gr.			t															
8	9				- pyrrhotite			t															
9	10							t															
10	11							t				KR12802	10	11		65	30	80	1	4.41	<5	<10	1850
11	12							t															
12	13							t															
13	14							t															
14	15				So becomes visible			t															
15	16		18	10				t				KR12803	15	16		30	35	95	1	8.07	<5	<10	1850
16	17							t															
17	18							t															
18	19							t															
19	20							t															
20	21							t				KR12804	20	21		50	35	110	1	7.84	<5	<10	1600
21	22							t															
22	23				23m to 47m - Grey oxidised shale			t															
23	24							t															
24	25							t															
25	26							t				KR12805	25	26		25	30	95	1	7.88	<5	<10	1500
26	27							t															
27	28							t															
28	29							t															
29	30							t															
30	31							t				KR12806	30	31		150	40	100	1	8.36	<5	<10	1100
31	32				Disseminated + veined po - up to 1% in			t															
32	33				places			t															
33	34				[illegible]			t															
[illegible]	[illegible]		[illegible]	[illegible]				t															
[illegible]	[illegible]							t				[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]							t															
37	38							t															
38	39							t															

260111

GEOPEKO TASMANIA DRILL LOG

Prospect LONGBACK / Hole no. RDH 1

DEPTH (m) from	DEPTH (m) to	GRAPHIC LOG	ANGLE TO CORE AXIS So	ANGLE TO CORE AXIS S1	GEOLOGICAL DESCRIPTION	Alteration	MINERALISATION py	MINERALISATION po	MINERALISATION cpy	Fracturing	Sample No.	From (m)	To (m)	Rec ( )	ASSAYS (Lab:) Cu	Pb	Zn	Ag	Fe %	Sn	W	Ba
39	40							t														
40	41							t			KR12808	40	41		100	25	105	1	5.12	<5	<10	1750
41	42							t														
42	43							t														
43	44							t														
44	45							t														
45	46							t			KR12809	45	46		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<10	2100
46	47							t														
47	48				47m to E.O.H. Black shale + Grey Dolomite			t														
48	49				49.8 Early brecc. py with later sieving py as		t	t														
49	50		25	12	brec. infilling		t	t														
50	51				Irregular carbonate veins as crosscutting		t	t	t		KR12810	50	51		120	25	90	1	5.52	<5	<10	2150
51	52				+ // to S1.		.05	t	t													
52	53						.05	t	t													
53	54				51 to 54 broken zone. Py on cleavage planes		.05	t	t													
54	55				- trace cpy		.05	t	t													
55	56						.05	t			KR12811	55	56		115	20	80	1	5.43	<5	<10	2500
56	57		15	12	So + S1 in opp. direction		.05	t														
57	58						.05	t														
58	59				58.85 good eg. of syngenetic po+py with		.05	t														
59	60				carb.		.05	t														
60	61						.05	t			KR12812	60	61		100	20	80	2	5.47	<5	<10	2250
61	62				Sequence of alternating laminated beds		.05	.05														
62	63				of black + grey shale + .05mm to .5mm		.05	.05														
63	64				with wider bands from .5cm to 5cm.		t	.05														
64	65				So + S1 still opp.		t	.05														
65	66		20	18	Increase in po content from 60m	-	t	.05			KR12813	65	66		125	25	90	2	5.85	<5	<10	2000
66	67				on - appears as disseminated blebs		t	1														
67	68				+ beds.		.05	1														
68	69						t	t														
69	70		0		So flattens // to core axis		.05	1														
70	71				S1 cleavage of beds // to S1		.05	1			KR12814	70	71		120	20	100	1	5.55	<5	<10	1000
71	72						t	1														
72	73				Po veining		t	2														
73	74						t	.05														
[illegible]	[illegible]						.05	.05														
[illegible]	[illegible]						[illegible]	.05			[illegible]	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
76	77		22	18	So + S1 same direction		t	t														
77	78						t	t														

GEOPEKO TASMANIA DRILL LOG

Prospect LONGBACK I Hole no. DDH 1

DEPTH (m) from	DEPTH (m) to	GRAPHIC LOG	ANGLE TO CORE AXIS So	ANGLE TO CORE AXIS S1	GEOLOGICAL DESCRIPTION	Alteration	MINERALISATION py	MINERALISATION po			Fracturing	Sample No.	From (m)	To (m)	Rec (%)	ASSAYS (Lab:) Cu	Pb	Zn	Ag	Fe %	Sn	W	Ba
78	79				Carb bedding/veining ± 5m		t	1															
79	80				80.2 Surry Pt [illegible] interformational body –		t	1															
80	81		25	20	pebbly rock [illegible] SHS, some		t	1				KR12816	80	81		105	25	150	1	7.44	<5	<10	1200
81	82				Disseminated po		t	1+															
82	83				Dolomite bed up to 30 cm thick		t	1															
83	84						t	1															
84	85						t	1															
85	86						t	1				KR12817	85	86		105	20	125	1	3.76	<5	<10	1000
86	87						t	1															
87	88						t	1															
88	89						t	1															
89	90		20	20			t	1															
90	91						t	1				KR12818	90	91		110	20	110	2	6.69	<5	<10	1400
91	92				bedded po		t	2															
92	93				〃 carb		t	1															
93	94						t	1															
94	95						t	1															
95	96						t	1				KR12819	95	96		65	25	85	1	2.93	<5	<10	1300
96	97						t	1															
97	98						t	1															
98	99		30	24			t	1															
99	100						t	1															
100	101						t	1				KR12820	100	101		70	25	85	1	3.69	<5	<10	1150
101	102						t	1															
102	103						t	1															
103	104						t	1															
104	105						t	1															
105	106						t	1				KR12821	105	106		80	30	85	1	4.55	<5	<10	1300
106	107						t	1															
107	108						t	1															
108	109						t	1															
109	110				Increase in [illegible] carb beds from 109 to 121		t	1															
110	111		36	25			t	1				KR12822	110	111		70	30	70	1½	4.02	<5	<10	1350
111	112						t	1															
112	113						t	1															
113	114						t	1															
114	115						[illegible]	[illegible]															
115	116						t	1				KR12823	115	116		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<5	<10	[illegible]
116	117						t	[illegible]															

GEOPEKO TASMANIA DRILL LOG

Prospect Lanfrack / Hole no. DDH 1

DEPTH (m) from	DEPTH (m) to	GRAPHIC LOG	ANGLE TO CORE AXIS So	ANGLE TO CORE AXIS S1	GEOLOGICAL DESCRIPTION	Alteration	MINERALISATION py	MINERALISATION po	MINERALISATION cpy		Fracturing	Sample No.	From (m)	To (m)	Rec (.)	ASSAYS (Lab:) Cu	Pb	Zn	Ag	Fe %	Sn	W	Ba
118	119				117 to 120 Carb veining ± 5% Carb.		5	1															
119	120						5	1															
120	121		20	20	Same		5	1				KR12821	120	121		80	30	75	1	3.94	<5	<10	1100
121	122						5	1															
122	123						5	1															
123	124						5	1															
124	125						5	1															
125	126						5	1				KR12825	125	126		[illegible]	[illegible]	55	1	[illegible]	<5	<10	[illegible]
126	127						5	1															
127	128						5	1															
128	129						5	1															
129	130		65	18	Same		5	1															
130	131				So disrupted more competent & slightly		5	1				KR12826	130	131		90	30	85	1	4.98	<5	<10	1400
131	132				bed // to S1.		5	1															
132	133						5	1															
133	134						5	1															
134	135						5	1															
135	136						5	1				KR12827	135	136		90	30	85	1	5.12	<5	<10	1650
136	137						5	1															
137	138						5	1															
138	139						5	1															
139	140		45	18			5	1															
140	141						5	1				KR12828	140	141		70	35	100	1	2.86	<5	<10	1700
141	142						5	1															
142	143						5	1															
143	144						5	1															
144	145						5	1	5														
145	146						5	1				KR12829	145	146		80	45	90	1	4.11	<5	<10	3600
146	147						5	1															
147	148						5	1															
148	149						5	1															
149	150		40	26	Carb vein - [illegible] // to So		5	1															
150	151						5	1				KR12830	150	151		90	35	85	[illegible]	4.63	<5	<10	2250
151	152						5	1															
152	153						5	1															
153	154						5	1															
154	155						[illegible]	[illegible]															
155	156						5	1				KR12831	155	156		[illegible]	[illegible]	[illegible]	1	4.96	<5	<10	1650
156	157						5	1															

GEOPEKO TASMANIA DRILL LOG

Prospect Longback / Hole no. DDH1

DEPTH (m) from	DEPTH (m) to	GRAPHIC LOG	ANGLE TO CORE AXIS So	ANGLE TO CORE AXIS Si	GEOLOGICAL DESCRIPTION	Alteration	MINERALISATION py	po	gy		Fracturing	Sample No.	From (m)	To (m)	Rec (.)	ASSAYS (Lab:) Cu	Pb	Zn	Ag	Fe %	Sn	W	Ba
158	159						t	1	t														
159	160		6	18	gp.		t	1															
160	161						t	1				KR12832	160	161		130	40	80	2	5.41	<5	<10	2300
161	162				So flatten from 166 through to 167		t	1															
162	163						t	1															
163	164						t	1															
164	165				Sequence of interbedded black shales +		t	1															
165	166				siltstones, sequence remains unchanged through		t					KR12833	165	166		110	35	70	2	4.57	<5	<10	1950
166	167				the hole.		t	1															
167	168						t	1															
168	169						t	1															
169	170		40	25			t	1															
170	171						t	1				KR12834	170	171		75	40	75	2	4.00	<5	<10	2250
171	172						t	1															
172	173						t	1															
173	174						t	1															
174	175						t	1															
175	176						t	1				KR12835	175	176		70	35	95	1	3.38	<5	<10	1850
176	177						t	1															
177	178						t	1															
178	179						t	1															
179	180		35	30			t	1															
180	181						t	1				KR12836	180	181		110	35	100	1	5.76	<5	<10	1250
181	182						t	1															
182	183						t	1															
183	184				184 to 195 decrease in po %		t	t															
184	185						t	t															
185	186						t	t				KR12837	185	186		65	30	75	1	3.47	<5	<10	910
186	187						t	t															
187	188						t	t															
188	189						t	t															
189	190		30	28			t	t															
190	191						t	t				KR12838	190	191		55	30	80	<1	2.57	<5	<10	1000
191	192						t	t															
192	193						t	t															
193	194						t	t															
[illegible]	[illegible]						[illegible]	[illegible]															
195	196						t	[illegible]				KR12839	195	196		20	30	[illegible]	[illegible]	3.00	<5	<10	[illegible]
196	197						t	[illegible]															

GEOPEKO TASMANIA DRILL LOG

Prospect Longback / Hole no. DDH1

DEPTH (m) from	DEPTH (m) to	GRAPHIC LOG	ANGLE TO CORE AXIS So	ANGLE TO CORE AXIS S1	GEOLOGICAL DESCRIPTION	Alteration	MINERALISATION py	MINERALISATION pr			Fracturing	Sample No.	From (m)	To (m)	Rec (%)	ASSAYS (Lab:) Ga	Pb	Zn	Ag	G%	Sn	W	Ba
197	198						tr	tr															
198	199				bedded seds		tr	tr															
199	200						tr	tr															
200	201		50	26	Same		tr	tr				KR12840	200	201		65	30	80	1	2.28	<5	<10	1050
201	202						tr	tr															
202	203						tr	tr															
203	204				[illegible] – ? .05?		tr	tr															
204	205				[illegible]		tr	tr															
205	206						tr	tr				KR12841	205	206		70	35	95	1	3.37	<5	<10	1150
206	207						tr	.05															
207	208						tr	.05															
208	209		50	34	same [illegible]		tr	.05															
209	210						tr	.15															
210	211						tr	.05				KR12842	210	211		90	50	100	1	5.09	<5	<10	1100
211	212						tr	.25															
212	213						tr	[illegible]															
213	214						tr	.35															
214	215						tr	.05															
215	216				215-217 broken zone – fault?		tr	.05				KR12843	215	216		80	35	80	1	4.49	<5	<10	[illegible]
216	217						tr	.05															
217	218						tr	.05															
218	219				[illegible]		tr	1															
219	220		60	36			tr	1															
220	221						tr	1				KR12844	220	221		80	35	140	1	3.93	<5	<10	2250
221	222						tr	.35															
222	223						tr	.05															
223	224						tr	.05															
224	225						tr	.05															
225	226						tr	.05				KR12845	225	226		95	25	50	2	6.39	<5	<10	[illegible]
226	227						tr	.05															
227	228						tr	.05															
228	229						tr	.05															
229	220		35	35			tr	.05															
230	231						tr	.05				KR12846	230	231		105	30	65	1	5.57	<5	<10	1900
231	232						tr	.05															
232	233						tr	.05															
[illegible]	[illegible]						[illegible]	[illegible]															
234	[illegible]						[illegible]	[illegible]															
235	236						tr	.5				KR12847	235	236		110	25	80	2	5.91	<5	<10	1900

SHEET OF

GEOPEKO TASMANIA DRILL LOG

Prospect Longback / Hole no. AOH1

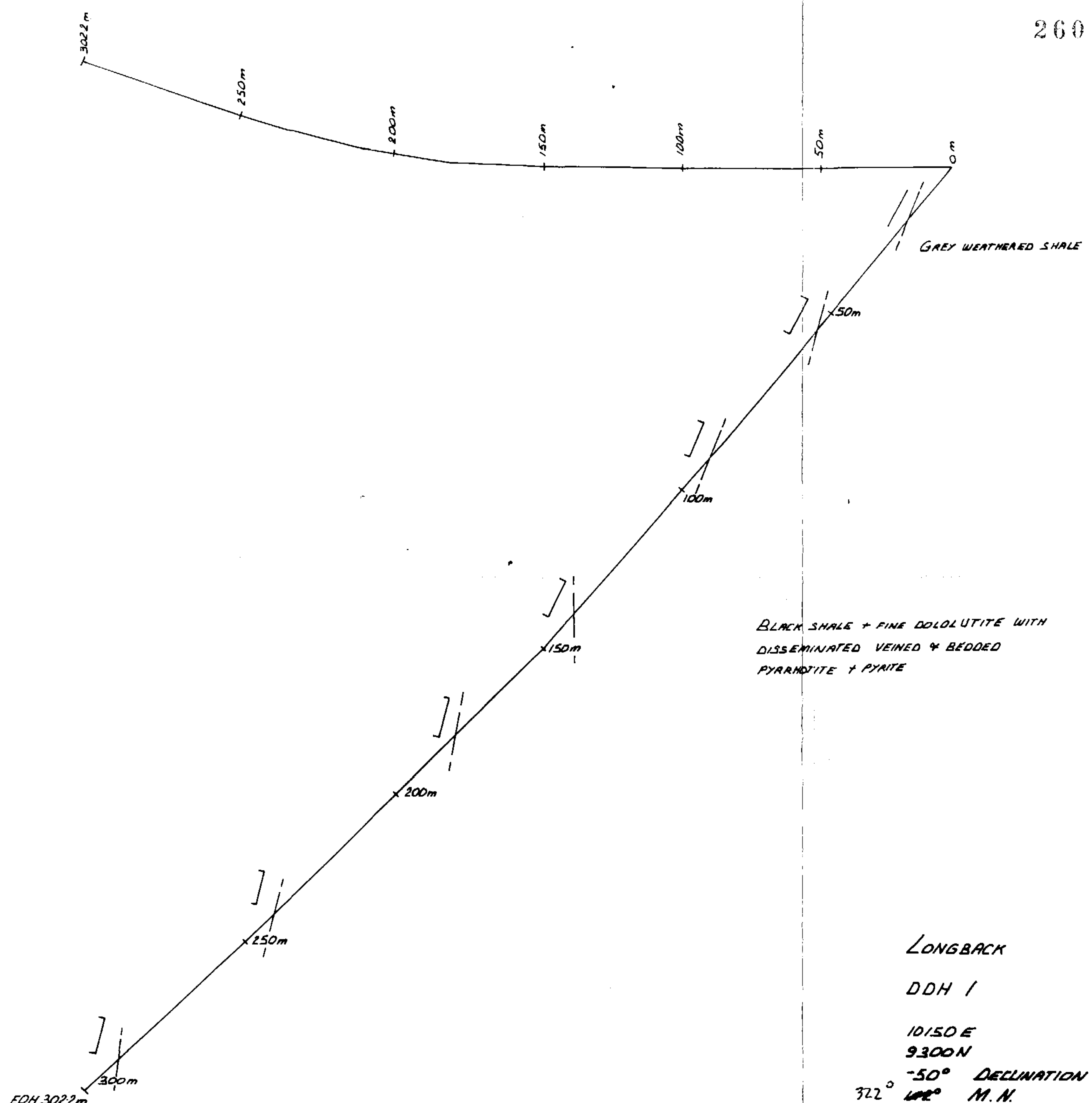
DEPTH (m)		GRAPHIC LOG	ANGLE TO CORE AXIS		GEOLOGICAL DESCRIPTION	Alteration	MINERALISATION				Fracturing	Sample No.	From (m)	To (m)	Rec (%)	ASSAYS (Lab:)							
from	to		So	S1			py	po								Cu	Pb	Zn	Ag	Fe%	Sn	W	Ba
237	238				224 to 240 Pelelutite predominate		4	·5															
238	239				over Black shale		5	·5															
239	240						6	·5															
240	241		33	33	same		[illegible]	·5				KR12848	240	241		70	25	60	1	4.40	<5	<10	2000
241	242				241.5 – 5cm Carb vn		4	5															
242	243				Carb vn increase [illegible]		4	·5															
243	244						4	5															
244	245						·	5															
245	246						4	5				KR12849	245	246		70	25	140	1	3.94	<5	<10	1800
246	247						4	5															
247	248						4	5															
248	249						4	·5															
249	250		30	30	same		4	·5															
250	251						4	5				KR12850	250	251		65	35	85	1	5.11	<5	<10	1150
251	252						4	5															
252	253						4	4															
253	254						4	4															
254	255						4	4															
255	256						4	4				KH12851	255	256		60	30	75	1	3.93	<5	<10	1150
256	257						4	4															
257	258						4	4															
258	259						5	5															
259	260	/	16	36	sp		4	5															
260	261						4	·5				KH12852	260	261		100	30	115	1	5.21	<5	<10	1200
261	262				10cm Carb vn		4	·5															
262	263						4	·5															
263	264						5	·5															
264	265						4	·5															
265	266						4	·5				KH12853	265	266		90	30	105	1	5.81	<5	<10	1050
266	267						4	·5															
267	268						4	·5															
268	269						6	6															
269	270	-	35	35	same		4	5															
270	271						4	5				KH12854	270	271		[illegible]	30	900	1	3.68	<5	<10	1050
271	272						[illegible]	6															
272	273				[illegible]		[illegible]	6															
[illegible]	[illegible]																						
[illegible]	275						[illegible]	[illegible]															
275	276						4	·5				KH12855	275	276		65	30	100	1	3.92	<5	<10	1750

SHEET OF 2

GEOPEKO TASMANIA DRILL LOG

Prospect *Loveback* / Hole no. *ODH1*

DEPTH (m) from	DEPTH (m) to	GRAPHIC LOG	ANGLE TO CORE AXIS So	ANGLE TO CORE AXIS Si	GEOLOGICAL DESCRIPTION	Alteration	MINERALISATION py	MINERALISATION po			Fracturing	Sample No.	From (m)	To (m)	Rec (%)	Cu	Pb	Zn	Ag	S %	Sn	W	Ba
276	277				Description of So [illegible] with			.5															
277	278				[illegible] py			.5															
278	279							5															
279	280		35	30	same			5															
280	281							.5				KH17856	280	281		75	35	100	1	3.84	<5	<10	1700
281	282							5															
282	283							5															
283	284																						
284	285							-															
285	286							5				KH12857	285	286		65	40	85	<1	4.07	<5	<10	1500
286	287							.5															
287	288							.5															
288	289							.5															
289	290		40	35	same.			.5															
290	291							-				KH12858	290	291		95	30	115	1	5.53	<5	<10	1750
291	292							-															
292	293							5															
293	294							5															
294	295							.5															
295	296							.5				KH12859	295	296		115	35	155	1	9.27	<5	<10	780
296	297							.5															
297	298							.5															
298	299							.5															
299	300							5															
300	301							.5				KH12880	300	301		65	30	95	2	3.67	<5	<10	1600
301	302																						
302	302.2				E.OH. 302.2m.																		



LONGBACK

DDH 1

10150E
9300N
-50° DECLINATION
322° M.N.
SCALE 1:1000

Information supplied by Dr R.R.Large to UPL 3/12/85.

260120

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CONSULTING ANALYTICAL CHEMISTS

LABORATORY REPORT

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32 Shand Street
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PO Box 66,
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Phone: (07) 352 5577
Telex: ALSEV 42344

GEOPEKO LIMITED.
P.O. BOX 598
DEVONPORT, TAS. 7310

Batch Number: D138

MR. J. PEMBERTON

No. of Samples: 60
Date Received: 29/04/84
Date Completed: 02/05/84

K 861, KP3387 Sample Type: DRILL CORE

SAMPLE NUMBER	Element Unit Method	Cu ppm G001	Pb ppm G001	Zn ppm G001	Ag ppm G001	Fe % G001
KP 12801		35	30	95	2	8.35
KP 12802		65	20	80	1	4.41
KP 12803		30	35	95	1	8.07
KP 12804		50	35	110	1	7.84
KP 12805		25	30	95	1	7.88
KP 12806		150	40	100	1	8.36
KP 12807		90	25	120	<1	3.72
KP 12808		100	25	105	1	5.12
KP 12809		85	10	115	1	4.50
KP 12810		120	25	90	1	5.52
KP 12811		115	20	80	1	5.43
KP 12812		100	20	80	2	5.47
KP 12813		125	25	90	2	5.85
KP 12814		120	20	100	1	6.55
KP 12815		105	20	110	1	6.52
KP 12816		105	25	150	1	7.44
KP 12817		105	20	125	1	6.98
KP 12818		110	20	110	2	6.69
KP 12819		65	25	85	1	2.93
KP 12820		70	25	85	1	3.69
KP 12821		80	30	85	1	4.55
KP 12822		70	30	70	1	4.02
KP 12823		85	35	95	<1	4.09
KP 12824		80	30	75	1	3.94
KP 12825		55	25	65	1	3.77
KP 12826		90	30	85	1	4.99
KP 12827		90	30	85	1	5.12
KP 12828		70	35	100	1	2.86
KP 12829		80	45	90	1	4.11
KP 12830		90	35	85	1	4.63
DL		2	5	2	1	0.01

Signatory: G J Kilmister

260121

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Telex: ALSEV 42344

GEOPEKO LIMITED.
P.O. BOX 598
DEVONPORT. TAS. 7310

Batch Number: D139

MR. J. PEMBERTON

No. of Samples: 60
Date Received: 28/04/84
Date Completed: 02/05/84

K 861, KP3387

Sample Type: DRILL CORE

SAMPLE NUMBER	Element Unit Method	Sn ppm XRF 1A	W ppm XRF 1A	Ba ppm XRF 1A		
KR 12801		<5	<10	1650		
KR 12802		<5	<10	1850		
KR 12803		<5	<10	1850		
KR 12804		<5	<10	1600		
KR 12805		<5	<10	1500		
KR 12806		<5	<10	1100		
KR 12807		<5	<10	2150		
KR 12808		<5	<10	1750		
KR 12809		<5	<10	2100		
KR 12810		<5	<10	2150		
KR 12811		<5	<10	2500		
KR 12812		<5	<10	2250		
KR 12813		<5	<10	2000		
KR 12814		<5	<10	1550		
KR 12815		<5	<10	1450		
KR 12816		<5	<10	1200		
KR 12817		<5	<10	1000		
KR 12818		<5	<10	1400		
KR 12819		<5	<10	1300		
KR 12820		<5	<10	1150		
KR 12821		<5	<10	1300		
KR 12822		<5	<10	1350		
KR 12823		<5	<10	1800		
KR 12824		<5	<10	1100		
KR 12825		<5	<10	1150		
KR 12826		<5	<10	1400		
KR 12827		<5	<10	1650		
KR 12828		<5	<10	1700		
KR 12829		<5	<10	2400		
KR 12830		<5	<10	2250		
		5	10	10		

Signatory: G J Kilmister

260122

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GEOPEKO LIMITED,
P.O. BOX 598
DEVONPORT, TAS. 7310

Batch Number: D139

MR. J. PEMBERTON

No. of Samples: 60
Date Received: 28/04/84
Date Completed: 02/05/84

K 861, KP3387 Sample Type: DRILL CORE

SAMPLE NUMBER	Element Unit Method	Cu ppm G001	Pb ppm G001	Zn ppm G001	Ag ppm G001	Fe % G001
KR 12831		65	45	50	1	4.96
KR 12832		130	40	80	2	5.41
KR 12833		110	35	70	2	4.67
KR 12834		75	40	75	2	4.09
KR 12835		70	35	95	1	3.38
KR 12836		110	35	100	1	5.76
KR 12837		65	30	75	1	3.47
KR 12838		55	30	80	<1	2.57
KR 12839		60	30	75	1	3.00
KR 12840		65	30	80	1	2.78
KR 12841		70	35	95	1	3.87
KR 12842		90	50	100	1	5.09
KR 12843		80	35	80	1	4.49
KR 12844		80	35	140	1	3.93
KR 12845		95	25	50	2	6.39
KR 12846		105	30	65	1	5.54
KR 12847		110	25	80	2	5.91
KR 12848		70	25	60	1	4.40
KR 12849		70	25	140	1	3.84
KR 12850		65	35	85	1	5.11
KR 12851		60	30	75	1	3.93
KR 12852		100	30	115	1	6.21
KR 12853		90	30	105	1	5.86
KR 12854		65	30	95	1	3.69
KR 12855		65	30	100	1	3.92
KR 12856		75	35	100	1	3.84
KR 12857		65	40	85	<1	4.07
KR 12858		95	30	115	1	5.53
KR 12859		115	35	155	1	9.27
KR 12860		65	30	95	2	3.67
		2	5	2	1	0.01

Signatory: G J Kilmister

260123

GEOPEKO

A DIVISION OF PEKO-WALLSEND OPERATIONS LTD.

INTER-OFFICE MEMO

TO: W. HERRMANN — DATE: 7-5-84

FROM: J. SUMPTON — COPIES TO: J. Pemberton

SUBJECT: MAGNETIC SUSCEPTIBILITY LOG, LONGBACK DIAMOND DRILL HOLE.

The magnetic susceptibility of the drill core from the Longback drill hole has been measured and a copy of the log is appended.

Obviously the pattern of distribution of magnetic material is considerably more complicated than the simple three dyke-like bodies which I used to model the anomaly prior to drilling. This is of course nearly always the case and as one drill hole is, as unlikely to allow adaquate interpretation of the gross structure as the surface total magnetic intensity profile, I am not yet ready to completely discard the predrilling interpretation, oversimplification though it may be. Having said this it is clear that the drill hole intersected abundant magnetic material in the form of disseminated pyrrhotite.

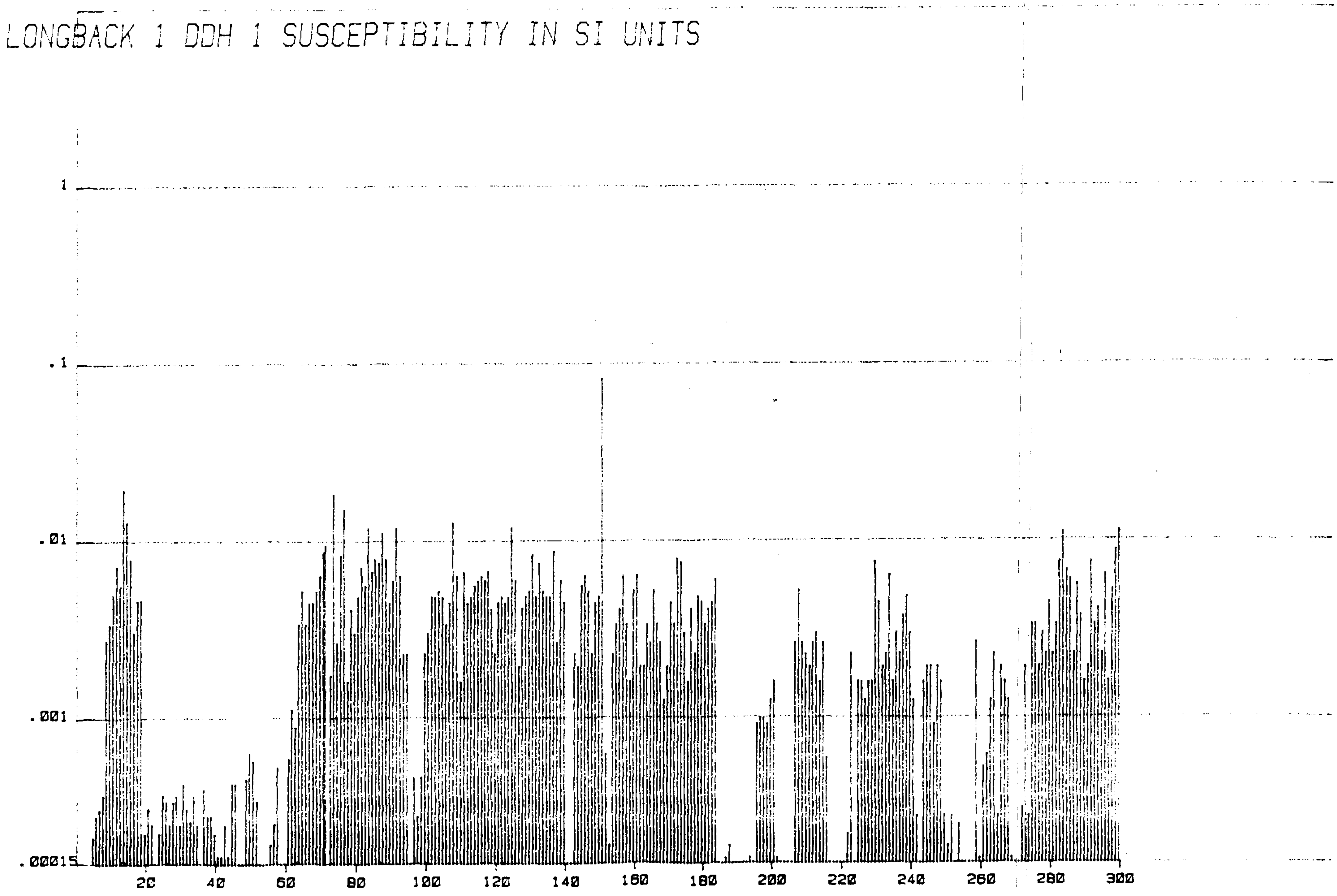
Magnetic susceptibility measurements on the drill core show that, below a drilled depth of 60m, the average susceptibility is about 200×10^{-6} c.g.s. units. This figure is probably about on order of magnitude lower than one would have expected from the amplitude of the surface anomaly. It is therefore recommended that selected sections of oriented drill core be sent to the C.S.I.R.O. for analysis of their magnetic properties. High Koenigsberger ratios are quite common in these environments, and the low measured susceptibility could be greatly enhanced by a significant remnant component. From geological and geometic considerations I believe it is very unlikely that the drill hole has passed underneath a more magnetic body, the only other serious possiblity.

In summary the Longback diamond drill hole intersected a great thickness of weakly to moderately magentically susceptible lithologies. Some further measurement of other magnetic properties is recommended to assist in the reconciliation of the drill hole data with the observed magnetic intensity at surface.

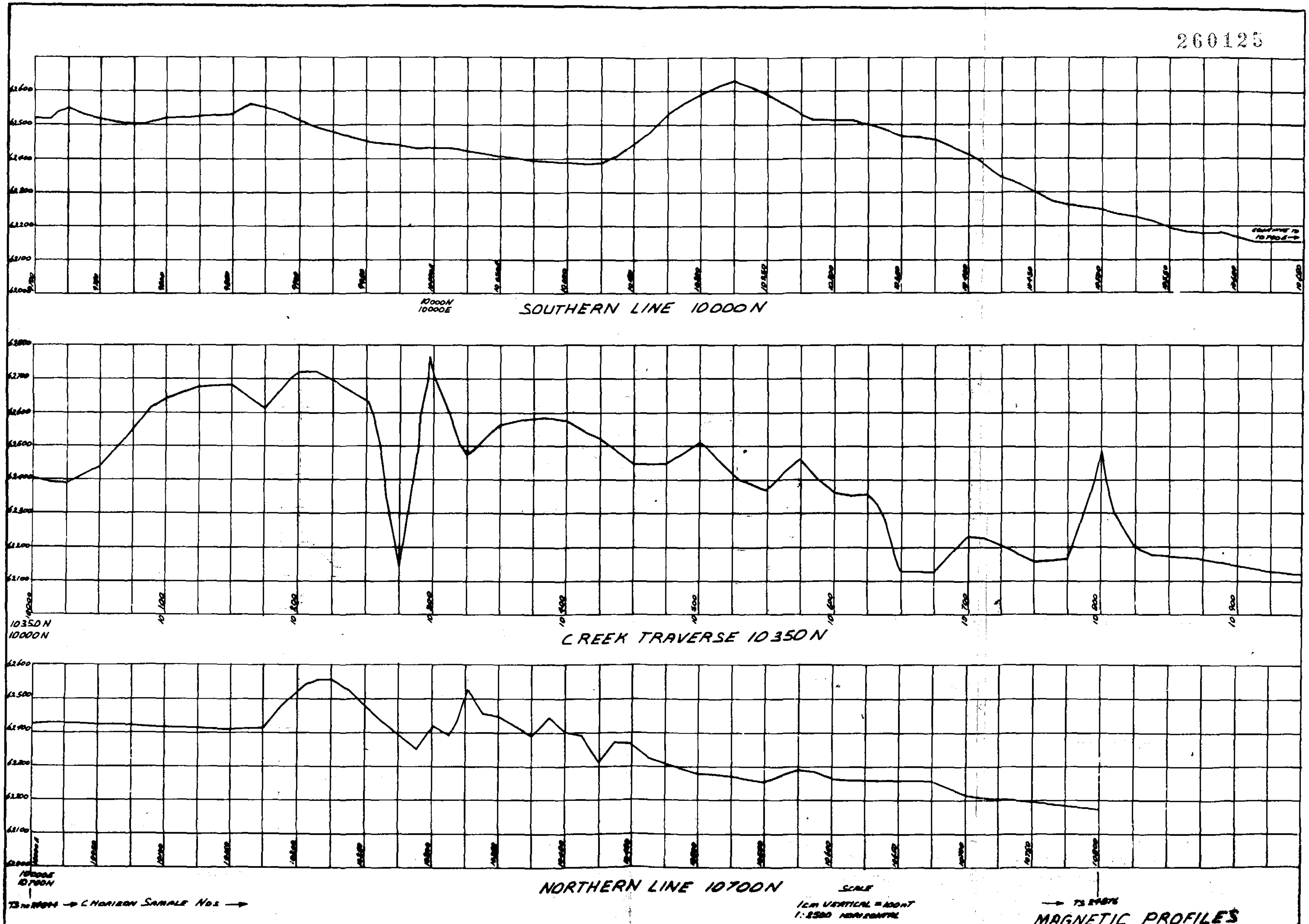
Regards,

John Sumpton

JOHN SUMPTON,
Geophysicist.


LONGBACK 1 DDH 1 SUSCEPTIBILITY IN SI UNITS
1
.1
.01
.001
.00015
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300

260125



MAGNETIC PROFILES
FOR LONG 2 + SOIL SAMPLE
LOCALITIES FIG 1

260126

Geopeko Only Report on EL 57/83

260127 84-2153

6659/84.

GEOPEKO
A DIVISION OF PEKO-WALLSEND OPERATIONS LIMITED

ANNUAL REPORT ON E.L. 57/83

MT DONALDSON
TASMANIA

J. PEMBERTON
MAY, 1984

84-2153

CONTENTS

APPENDIX

FIGURES

PLANS

1. INTRODUCTION

The Mt Donaldson E.L. covers an area of 29sq km south west of Savage River in Western Tasmania. Access to the south east is by logging tracks across the Savage River with the rest of the area being restricted to helicopters.

Two magnetic anomalies were followed up using a tin skarn model of pyrrhotite/magnetite replacement mineralization. The area falls on the western boundary of the Arthur Lineament and is composed of Precambrian metasediments bounded by major fault structures.

2. MAGNETIC FOLLOW UP AT DON 1

Don 1 was a discrete moderate anomaly in heavy rainforest and rugged topography. The aeromagnetics are displayed on Plan 1 and the reconnaissance grid on Plan 2. C-Horizon auger samples were taken over the peak of the anomaly on line OON (see Figure 1).

The results from both the magnetics and soil sampling were disappointing (see Appendix 1). Outcrop over the peak of the anomaly was sampled:-

KR 11190 - OON 225E - Felsic Amphibolite
KR 11191 - OON 100E - Magnetite bearing siltstone

The anomaly was therefore attributed to these two source rocks.

3. MAGNETIC FOLLOW UP AT DON 2

Don 2 was a complex moderate anomaly in semi-open country. Two lines were cut and read for magnetics with line 10200N being power augered (see profiles on Figure 2 and soil sample locations). Rock samples collected were:-

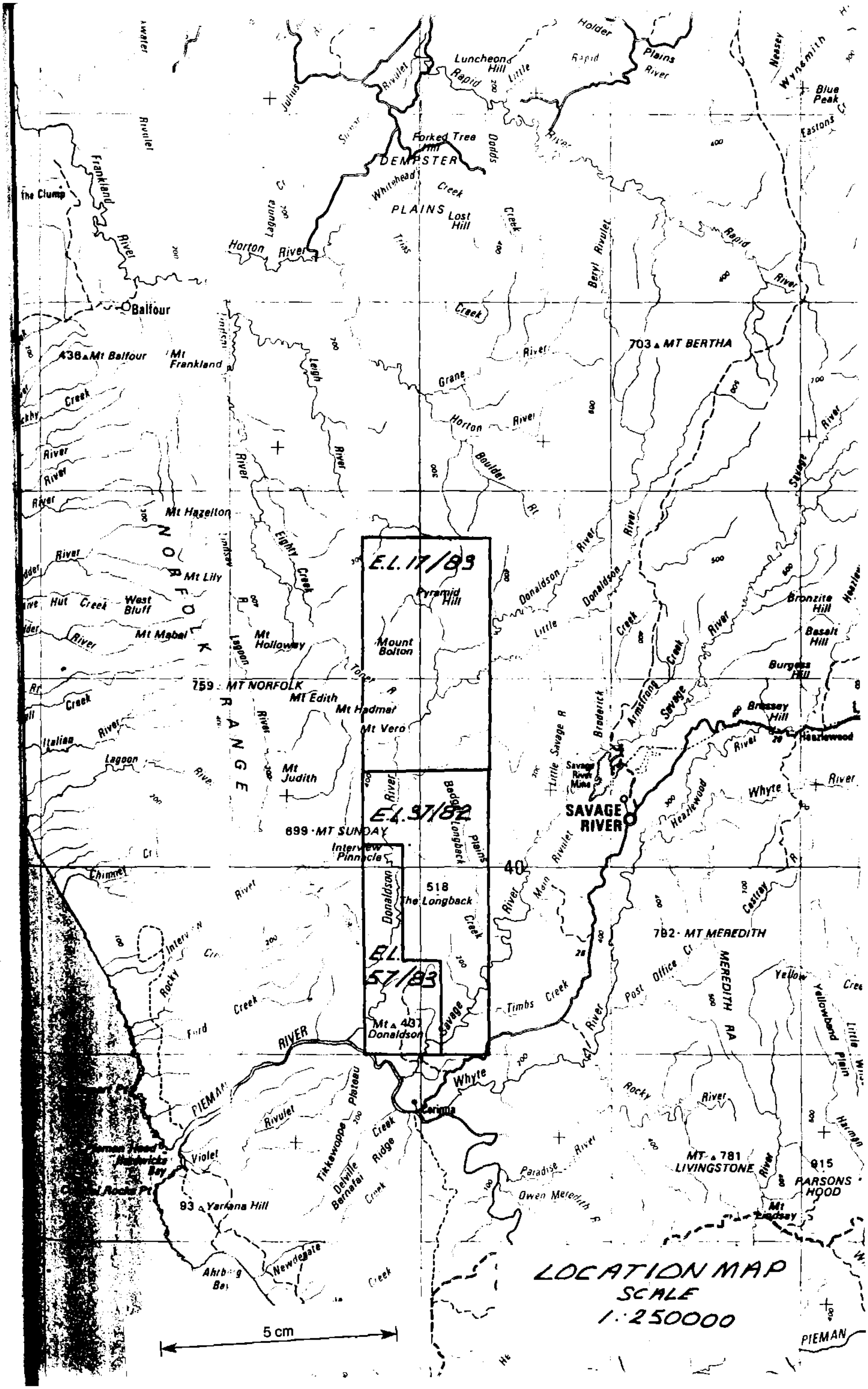
KR 11172	-	10 000N	10 000E	- green siltstone
KR 11173	-	10 000N	9 720E	- magnetite bearing siltstone
KR 11186	-	10 200N	9 470E	- magnetite bearing siltstone
KR 11187	-	10 200N	9 480E	- magnetite bearing siltstone
KR 11188	-	10 200N	9 520E	- magnetite bearing siltstone
KR 11189	-	10 200N	9 700E	- magnetite bearing siltstone

The auger results were below background and the anomaly was considered explained by the abundant disseminated magnetite in outcrop.

4. CONCLUSION

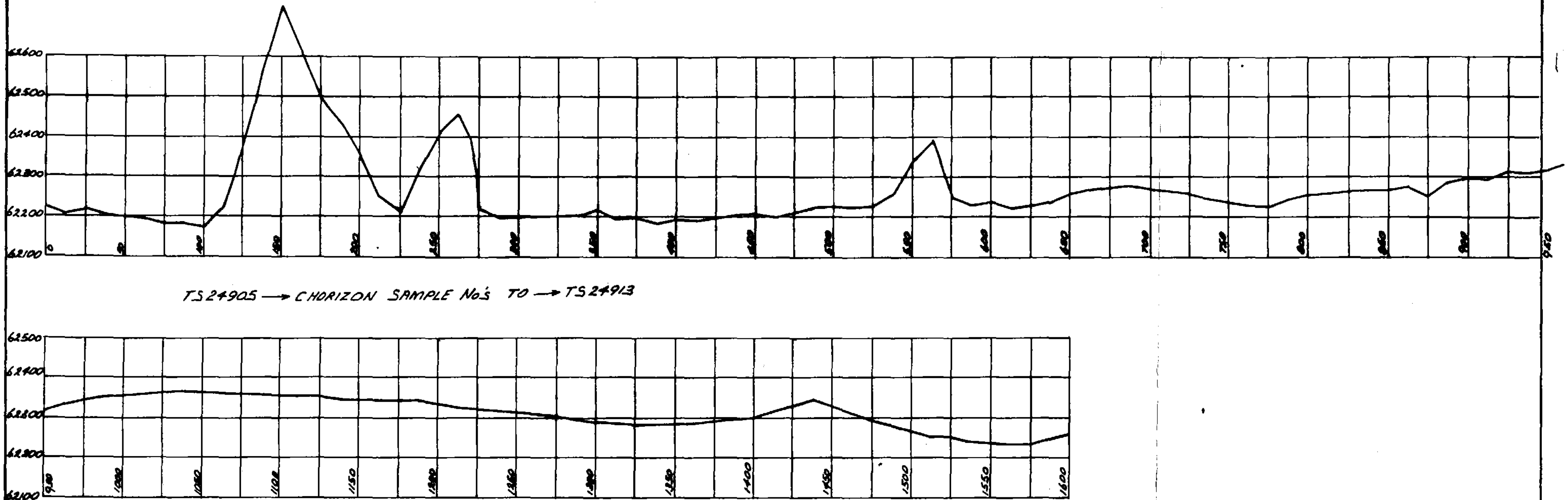
No encouragement was obtained from the follow up of these two anomalies. Any further work would concentrate on a regional approach with panned concentrate sampling and mapping.

260133

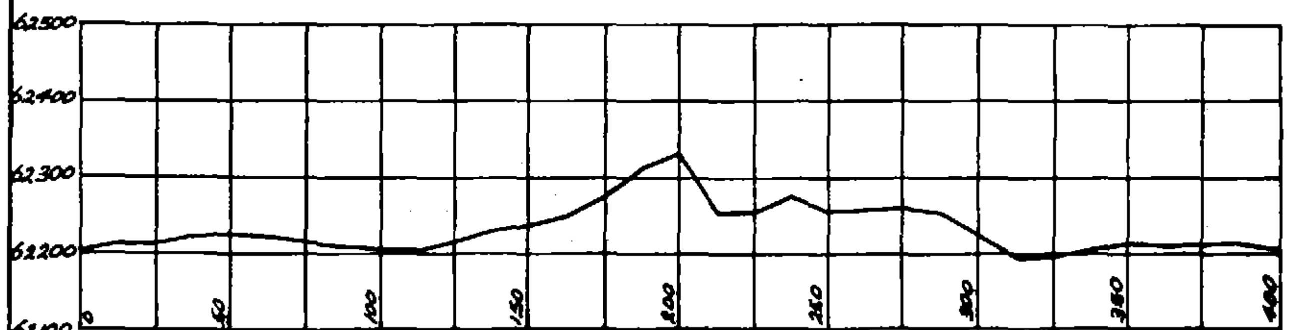


E.L. 17/83
E.L. 37/82
E.L. 57/83
LOCATION MAP
SCALE
1:250000
5 cm
DEMPSTER PLAINS
Luncheon Hill
Forked Tree Hill
Lost Hill
Horton River
Balfour
438 Mt Balfour
Mt Frankland
The Clump
703 MT BERTHA
Blue Peak
Mt Hazelton
NORFOLK RANGE
Mt Lily
West Bluff
Mt Mabel
Mt Holloway
Pyramid Hill
Mount Bolton
759 MT NORFOLK
Mt Edith
Mt Hadmar
Mt Vero
Mt Judith
699 MT SUNDAY
Interview Pinnacle
518 The Longback
Mt 437 Donaldson
Donaldson River
Savage River Mine
SAVAGE RIVER
Bronzite Hill
Basalt Hill
Burgess Hill
Brassey Hill
Heazlewood
782 MT MEREDITH
MEREDITH RA
PIEMAN RIVER
Corinna
Whyte
93 Yarlana Hill
Ahrberg Bay
Newdegate
MT 781 LIVINGSTONE
915 PARSONS HOOD
Mt Lindsay
Tikkawoppa Plateau
Delville Bernafai Ridge
40

260134



LINE OON



LINE 150N

SCALE
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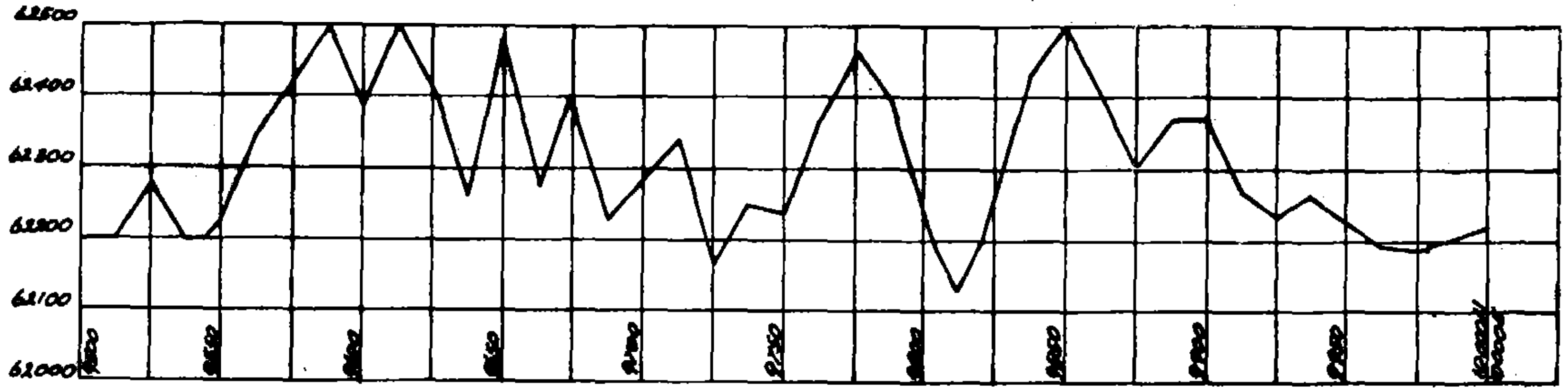
1:2500 HORIZONTAL

MAGNETIC PROFILES
FOR DON 1 + SOIL SAMPLE
LOCALITIES

FIG 1

260135



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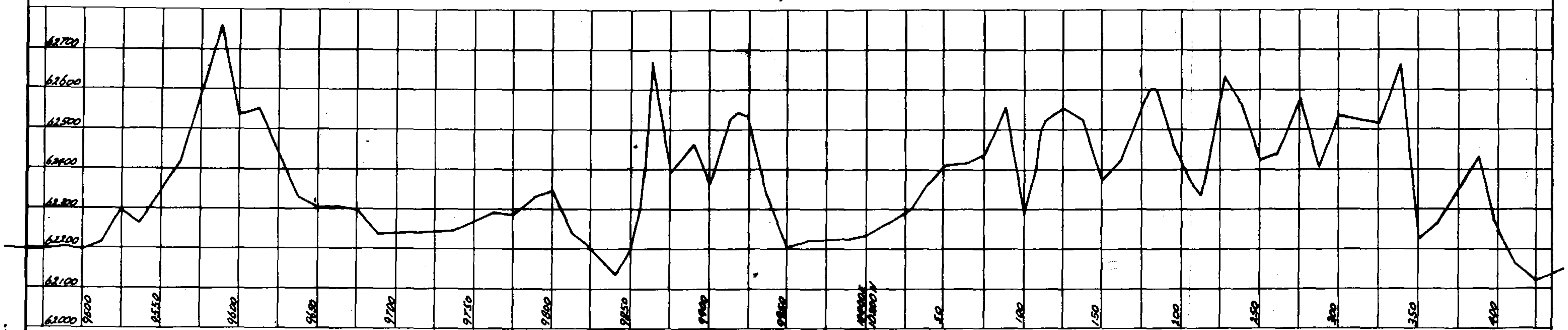


TS 24803 → C HORIZON SAMPLE No'S →

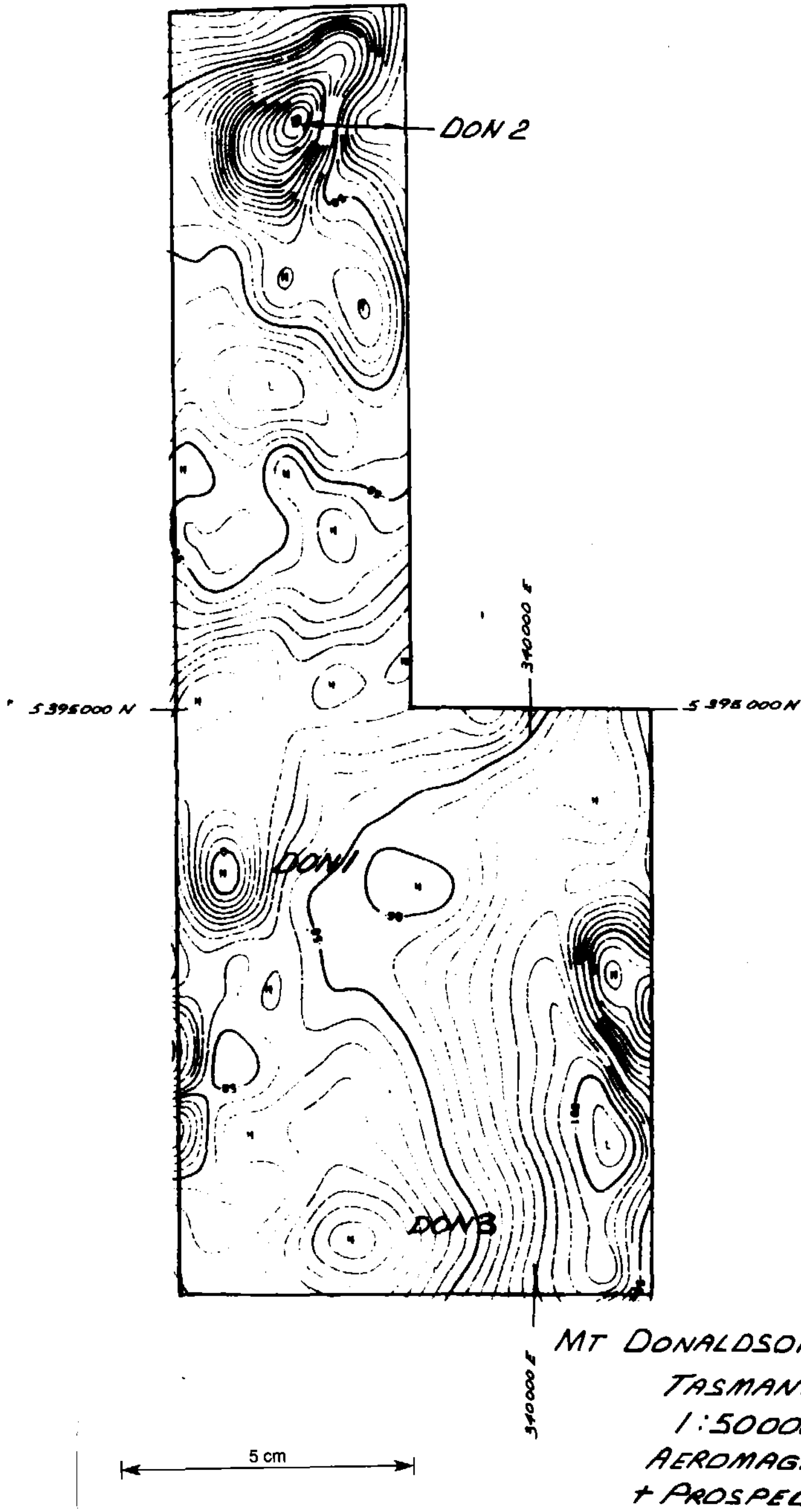
→ To TS 24843 AT 10450 E

SCALE
1cm VERTICAL = 100 nT
1:2500 HORIZONTAL

MAGNETIC PROFILES
FOR DON 2 + SOIL SAMPLE
LOCALITIES

FIG 2

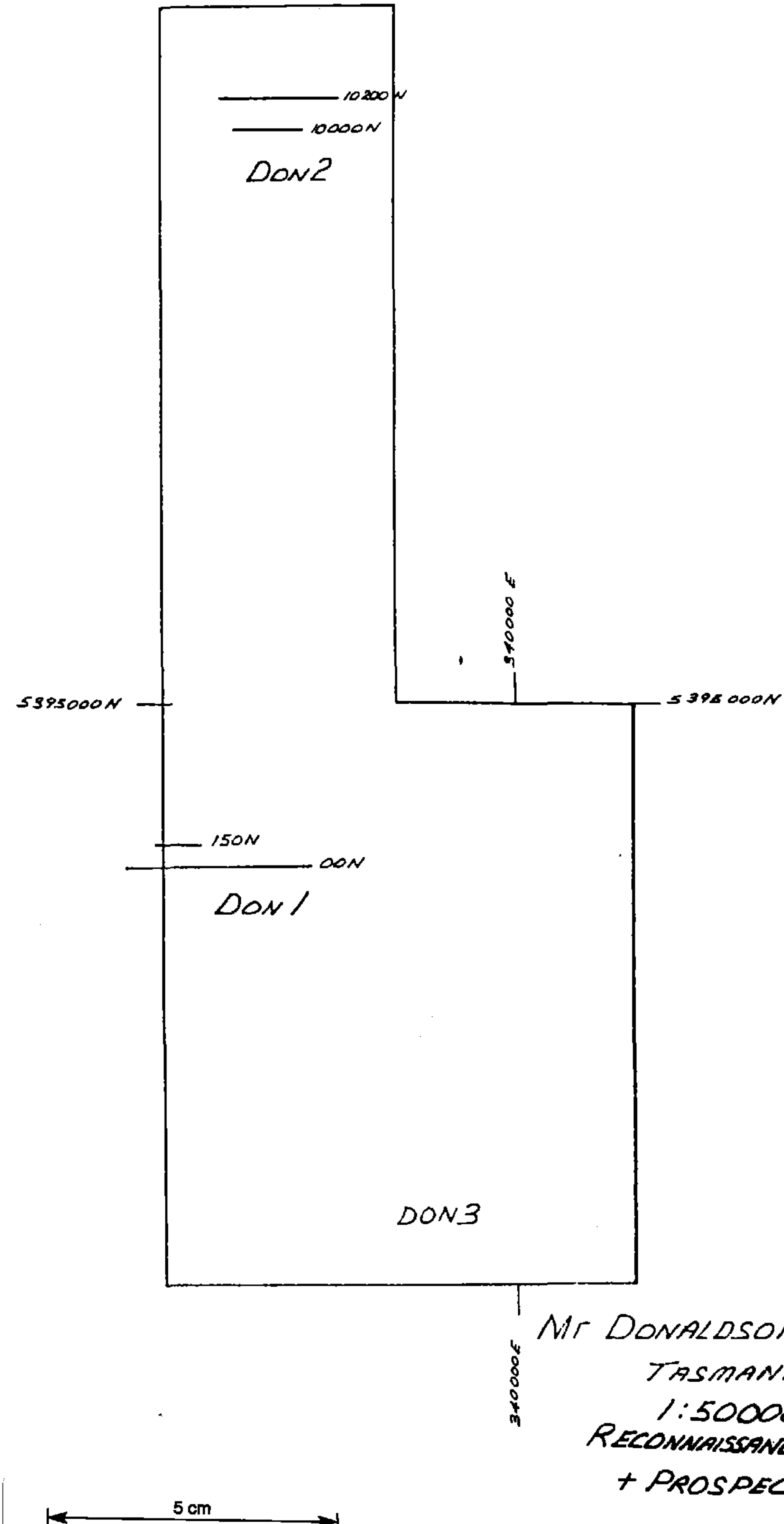
260136



MT DONALDSON E.L. 57/83
TASMANIA
1:50000
AEROMAGNETICS
+ PROSPECTS MAP

PLAN 1

260137



Mr DONALDSON E.L. 57/83
TASMANIA
1:50000
RECONNAISSANCE GRIDS
+ PROSPECTS MAP

PLAN 2

260138

D. Leaman's Review of Magnetic and Gravity Data

EL 37/82

89-2959A

260139

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EL 37/82 - THE LONGBACK, TASMANIA

REVIEW OF MAGNETIC AND GRAVITY DATA

by
Dr. D.E. Leaman

for
NORGOLD LIMITED

September 1988

LONGBACK

89-2959A

260140

CONTENTS

FIGURES

260141

SUMMARY

Regional aeromagnetic and gravity data in the region of EL 37/82, known as the Longback, north of Corinna in western Tasmania has been examined in detail.

The review has been directed toward identification of any factors which might relate to primary gold occurrences since crystalline gold has been recorded locally and clarification of the structural geology - in particular consideration of those features which might have controlled fluid movement.

Within the limitations imposed by the spacing of the regional data it is possible to infer that the known primary gold occurrences lie within a few hundred metres of intersections of established or inferred NNW-trending faults within dolomite units and E-W structures with limited surface expression. All anomalous mineralisation within the licence can be so accounted including the E-W-trending pyrrhotite system investigated for tin potential by Geopeko (Longback DDH 1).

Magnetic data also indicate that the Bernafai Volcanics consist of discrete magnetic units and dislocations of these can be recognised. Near 5395500 mN the entire unit appears to be altered. The units mapped as Bernafai and Upper Volcanics appear to be the same unit, simply limbs of a syncline north of Brookside.

Both magnetic and gravity analyses indicate that either the identification of two dolomite units is incorrect, that their properties are very distinct or that large parts of the succession are either overturned or overthrust north west of the Brookside Prospect. The geology is far from simple but the critical breaks and discontinuities can be identified. These should be sampled for mineralisation.

260142

INTRODUCTION

EL 37/82 - The Longback, (Figure 1) - straddles the Savage River NE of Corinna in western Tasmania. Although held by Hugh Nolan, it has been subject to some joint venture agreements - in particular Geopeko and Norgold/Savage Resources.

Exploration by Geopeko included regional airphoto interpretation, some review of aeromagnetic data, ground magnetic follow-up, sampling and drilling all targetted on tin potential (Pemberton, 1984 a,b).
Norgold/Savage Resources - managed exploration directed at gold potential has included some detailed mapping and additional sampling (Taylor, 1988). The licence holder has contributed detailed description of gold content and character. Gold of "probable local derivation" has been identified at four sites (see Figure 2).

Figure 2 also in indicates a geological setting and implied stratigraphy younging from the Donaldson Group (see also Taylor, 1988). Where dips have been recorded, near the Longback grid and EM anomaly X6, all are between 50 and 70 degrees to the west. Consideration of Large (1987) and discussion with N. Turner following preliminary analysis indicates that the geology offered is both assumptive and presumptive north of the Brookside Prospect. There is no clear view, nor any assurance of separated volcanics or dolomite units north of site X6 or Brookside (N. Turner pers comm).

Although regional aeromagnetic data was considered by Geopeko (Pemberton, 1984a) and by Large (1987) all such treatments have been qualitative and cursory. Gravity data have not been reviewed previously.

This report details a careful review of extant magnetic data, reprocessed if necessary and synthesized with relevant geological or other geophysical data, undertaken to identify gold targets. The review has considered any signature characteristics decipherable with present information or exploration and any anomalous sources. An overview of the structural setting has also been attempted.

DATA USED

Geological information has been drawn from sources described in Taylor (1988), Large (1987) and some discussion with N. Turner of the Department of Mines.

The aeromagnetic survey used was acquired by the Mines Department in 1981 (refer Corbett et al, 1982; Leaman, 1986a). It is limited by line coverage (500 m spacing) but the sample spacing is of the order of 40 m at 150 m nominal clearance.

Gravity data have been extracted from the Tasgrav (Richardson and Leaman, 1987) and Mt Read Volcanics data bases. The coverage of older data is variable but the effective overall spacing of all data is about 1 km. There are gaps.

Discussion of these surveys has been framed as a detailed expansion of regional studies by Leaman (1986a, b; 1987; 1988 a, b).

METHODS

The magnetic data have been inspected in contour presentation, as by Geopeko and Large (1987), in light of the most recent geological compilation. All lines were then assessed individually for formation characteristics and the results compared or contrasted with previous observations or inferences. Particular correlations or patterns which could be related to potentially mineralised sites were emphasized. As the coarse line spacing precludes detailed or reliable derivative transformation by area methods each line between 5390 and 5397 000 mN was processed into first and second vertical derivatives and analytic signal. Subsequently all other lines were analysed in second vertical derivative format and the patterns re-assessed.

Anomaly character was then reviewed in terms of structural implications and some concepts, e.g., Large (1987), tested. Gravity data have been used to support the regional setting and confirm structural implications derived from magnetic studies.

260144

DISCUSSION

Regional geophysical data have offered some tantalising suggestions about the Longback area and, although not specific, demand detailed review of the data set particular to EL 37/82. Figure 4 sketches major trends inferred in two previous compilations (Leaman, 1986a; 1987). The inset was derived from consideration of all information, including gravity data available in 1986, while the main part of the diagram was based on the data used here (also Figure 3). A systematic fracture or lineament pattern is implied with E-W, or nearly so, elements stressed. This stress was applied since the work cited has indicated, contrary to gross or obvious surface trends, that most mineralised sites in the region contained an impressed E-W component or could be related to such major lineaments identifiable in regional data.

More recent work commissioned for the Mt Read Volcanics Project has provided a total geological setting for the region (Leaman, 1988a, b). This work indicates that the Longback lies close to the margin of the Rocky Cape basement core and that major stratigraphic units onlap from the east. The Arthur Lineament zone marks the deep position of the basement margin on this hypothesis. That work also indicated that Devonian granites are not emplaced beneath EL 37/82 but the eastern face of the Pieman or Interview Pluton is only about 5 km removed from the pyrrhotite occurrences proven on Geopeko's Longback grid. It is possible that there are projections of this surface to the east (note negative residual in NW corner of Figure 17) but detailed review was not undertaken for the regional study (Leaman, 1988a) since the data has only recently been acquired and was beyond the scope of the present study. Even so, there are no grounds for rejection of any concept introducing fluids from the Pieman Granite not far removed to the west.

Too far for Fe skarn. Too deep anyway!

Aeromagnetic profiles from the 1981 Mines Department survey are presented in Figures 5 to 9. The contour presentation is shown in Figure 3 at a scale of 1:63360. The profiles are offered in direct overprint format, rather than conventional stacked form, in order to stress base level relationships and amplitudes. The largest possible scales have been employed.

Figure 5 includes profiles at or south of the Brookside Prospect (lines 1850, 1860; see also Figure 2). All profiles consist of a large excursion near 344 000 mE and a long tail to the west. West of 340 500 the field is not anomalous; nor is it near 342 500 for all but line 1860. Each profile must be related to the others and to the total compilation (Figure 13). This shows that the narrowing wedge between the strong anomalies of the upper volcanic sequence and Arthur Lineament rocks and the Brookside area cuts out the shelf effect near 343 300 - as seen on lines

1840 to 1860. With the exception of the anomaly at 342 600 (line 1860) all other features lie SW of what I have termed the West Brookside Fault (to distinguish it from the smaller feature at the prospect).

Similar character is evident in Figure 6. The features west of the West Brookside Fault diminish in magnitude until lines 1890, 1901 and 1915 appear to show no effect at all. This is not the case (below). There is no magnetic source on these lines at shallow depth west of 342 500. The anomaly immediately north of Brookside is shown to extend northward with a slight migration west then east. It is not an isolated feature as implied in the contour presentation (Figure 3). It may be noted that small variations (less than 200 nT) on lines 1820 to 1915 are asymmetric west to east.
The recently discovered mafic lavas and tuffs within the Corinna Dolomite at 5393 500 mN appear to be reflected in the field and its offset eastward (see line 1890 at 343 000). Modelling shows that this is simply due to the synclinal limbs of a continuous slab of volcanics (note Figures 14 and 15). In this context the exposure is not something special or unanticipated and similar so-called occurrences of the "upper volcanics" are almost certainly of the same style but often closer to the Lineament rocks.

Figure 7 extends the pattern but the greater width of the fault wedge between the Savage Fault and the West Brookside Fault shows that most units are virtually non magnetic or that magnetic sources are deeply buried. Lines 1920 and 1930 show that the Brookside pattern terminates and lines 1930 and 1940 are virtually non anomalous geometric responses to units east of 344 000. As will be shown below, line 1960 is not abnormal; but line 1950 contains a marked isolated feature. This was termed Longback 1 by Geopeko and further explored (see below).

Figure 8 shows that the character of line 1960 is repeated. All lines now sample much of the Rocky Cape Group west of the Savage Fault and these rocks are only slightly magnetic and quite distinct from the rocks west of the West Brookside Fault and unlike units east of the Savage Fault anywhere. The materials east and west of the Brookside Faults are comparable (see also mapping inferences shown in Figure 2).

Figure 9 samples Rocky Cape Group and Lineament rocks only and the amplitude pattern is different. This is geology unlike anything SE of the Savage Fault.

Some of the features described above can be correlated with available geological mapping. Others are anomalous. The comments by Large (1987) concerning the magnetic responses of the dolomites and volcanics based on the contour maps are not wholly accurate - especially with respect to the Corinna Dolomite. Apart from the upper volcanics and rocks associated with the Arthur Lineament magnetic contrasts are relatively small. There

260146

is, however, excellent general correlation with the Bernafai Volcanics and the mafic exposures within the syncline of Corinna Dolomite. Several other features occur within the area of Corinna Dolomite (see Figure 13).

In general terms the Bernafai Volcanics generate an effect of 100 to 250 nT. But this is not regular or continuous. Thus the "bulls-eye" of Longback 1 (line 1960) is not entirely anomalous. The lines which precede it are! The point effect of Longback 1 is located at the geometric termination of the volcanics and locally introduced pyrrhotite seems to have doubled the natural response. In this respect lines 1930 and 1940 are abnormal since these do not reflect the volcanic character at all and almost certainly indicate altered rock. I do not believe dthe observation of Input EM anomalies 9, 10 and 11 and the trend changes mapped to be either independent or fortuitous. This relationship is stressed in Figure 13 where E-W offsets are implied near 5395 000 mN and where the volcanics are made up of at least two magnetic units.

The E-W orientation of offsets shown in Figure 13 is, in my opinion, regionally critical. They were noted in coarser studies (Leaman, 1987). Furthermore, sites with anomalous Au, As are removed by less than one line spacing in all cases. Is it also accidental that pyrrhotite-bearing features within the Longback 1 anomaly also trend E-W? This is normal to the obvious grain (see also Pemberton, 1984a).

Some explanation of Figure 13 must be provided.
Comparison of Figure 13 and profiles (Figures 5 to 9) and map (Figure 3) suggests more detail than apparently justified. Figure 13 relies on the derivative profiles controlled by the basic profiles. Only three examples of the derivative profiles have been included in this report, for lines used as exemplary of the issues (Figures 10 to 12). The profiles of analytic signal and second derivative are the most useful; the first helps separate rock volume sources while the latter defines source positions and contrasts. yes!
Analysis of this type resolves several of the ambiguities described above and enables, within the line spacing limits, definition of offsets. It reveals that the upper volcanics are compound and consist of discrete units where they merge with the responses of the Lineament rocks. The Bernafai Volcanics are also compound and discontinuous; the altered zone near Longback 1 being offset twice by about 500 m. It is also possible to infer the positions of the Savage and West Brookside Faults and the boundaries of the Donaldson Group as well as the volcanic units. Response positions are dotted in Figure 13. Boundary effects are subtle and only noted in second derivative presentation. Interpetation of unit continuity, broad spaced dots, between identified positions, close spaced dots, is somewhat limited by line spacing but many inductions are beyond debate.
Figure 13 offers some clarification of the geological

260147

26

compilation. While precise identification and correlation of the magnetic units is debatable it is evident that future compilations and mapping must have regard to these conclusions. Of perhaps more interest are the features or trends noted within the dolomitic units. These may represent lithologic changes where the implied width exceeds 100 m (as in the Corinna Dolomite east of the Brookside Prospect) but faults are implied in other instances. The angular gold site P18 near South Longback Creek is clearly fault-related. The anomalous arsenic site 23 bears a similar relation and EM anomaly X6 and related gold occurrences may lie on the same feature. Modelling, however, shows X6 to be a special site (below).

Before considering these implied structures in more detail it is necessary to review all direct correlations.

How? What vol? Draw a section!

There is no direct response from the region of the Brookside Prospect. But nor is there response from volcanics present and this implies alteration. Available mapping, and structural inference (e.g., Large, 1987), implies Bernafai Volcanics beside and beneath the prospect. The absence of response is significant since the volcanics are exposed and the Geopeko Longback 5 anomaly to the north is related to them (see also Figure 13).

Site X6, and its anomalous gold occurrences, lies at the contact between (or anticlinal axis of) Bernafai Volcanics - folded around to form the so-called upper volcanics - and the rocks of the Lineament (Figure 14). This juxtaposition wholly accounts for the shoulder effect on lines 1840 to 1870 and this is probably repeated at a sinistral offset two kilometres further north (immediately south of X11). This explains the exposed mafics within the Corinna Dolomite which represent the tip of the concealed, folded volcanics.

The Brookside Prospect and X6 are separated by another feature - possibly a fault or fold axis within the Corinna Dolomite. This merges with the margin of, or, Bernafai Volcanics further north.

Location P12 is apparently non anomalous (line 1915) until seen in context. The main unit in the Bernafai Volcanics is offset at this northing and the unit contact shifted at P12. Note that the fold/fault contact bulge mapped near X6 also lies at this northing and the fault along the South Longback Creek (inferred) intersects the boundary nearby. An association of coincidences?

The Peko-drilled anomaly (Longback DDH1)(line 1950) falls within mapped volcanics with clear correlation between mapping and magnetics. As noted above the correlation is not anomalous but the magnitude of response is. Geopeko considered this as a tin target midway between the Meredith and Interview Granites. The site may be midway but there is no simple or close relationship with any Devonian Granite (Leaman, 1988a). See comments at start of discussion, above.

Reports in Pemberton (1984 a) ascribed the source of the anomaly to three E-W dykes dipping south. This fascinating orientation was not understood by Geopeko but three gross pyrrhotite concentrations were encountered in the drill hole (Pemberton, 1984 b) which was directed northward and away from the volcanics.
Detailed surface magnetics did not suggest a sizeable reduction in magnetic intensity to the south. The zone identified between E-W offsets (above, Figure 13) is certainly anomalous and the offsets have clearly controlled emplacement of sulphides.
The implied contrasts for the Longback anomaly are also odd. Horizon measurements from the core average 0.0006 cgs for the magnetic members and bulk out at less than 0.0004 cgs overall - values an order of magnitude less than the observed anomaly would require. Pemberton (1984 b) considered results similar to my estimates and concluded that the pyrrhotite encountered could not account for the anomaly, but that remanence might explain the difference. I believe his conclusion to be correct but do not think remanence to be the explanation. I suggest that the anomaly is due to the combined effects of volcanics and pyrrhotite and that the more magnetically significant volcanics were not included in the drill hole - largely due to its orientation.

Profile analysis, leading to the interim summation of Figure 13, can provide a clearer view of unit and lithologic distribution. Such analysis cannot assess the relative significance of the faults or other sources known or inferred.

Divergent profile styles were tested quantitatively. Some of the results are presented in Figures 14 and 15. Figure 14 (line 1860) offers a test of structural concepts at Brookside. Each test contained some common elements.
The strongly magnetic materials east of the EL have a contrast in excess of 0.004 cgs and dip steeply east. It is possible to generate west-dipping solutions for the first anomaly peak but these solutions cannot account for the multi-peak overall character. Effort was therefore directed toward test of proposals by Large (1987). Figure 14 shows that his concept of fractured synclines is essentially valid but that the unit scale and distribution of volcanic rocks is not wholly as mapped. The model is true to available dip information. It suggests that distinction between Savage and Corinna Dolomites and Bernafai and upper volcanics may be artificial. Critically, it establishes the scale and position of disruptions. Note the relationship between crystalline gold sites at Brookside and X6. Each involves major offsets. The pattern SW of the West Brookside Fault is different.

Does not account Ros dol at X 6

Line 1890 (Figure 15) is representative of the problems and issues north of Brookside. All recovered dips are steep and westerly although facings are uncertain or unknown. Most recordings are west of 342 000 and east of 343 500 mE. Within these constraints an array of solutions has been tested. It is not possible to accomodate a simple west-dipping solution and it appears likely that a small syncline continues north of Brookside. Its axis is broken. This solution implies that the recently mapped volcanics within the Corinna Dolomite south of EM site X11 is the east limb of the fold.

The concept for the block between the Brookside and West Brookside Faults, as defined in Figure 14, cannot continue. The W-dipping limb of the second fold is either absent, offset or very deep. The anomaly pattern indicates this limb may recur west of the inferred fault in South Longback Creek (about 342 000, Figure 15). The presence of this deep limb explains the broad spread of anomaly on all profiles to the north and the misfit between pure negative tails to the lineament responses. The deep limb becomes shallower northward. It must dip west and this poses severe problems for the presumed stratigraphy. Although the model does not present all the geological boundaries clearly it does imply that the section west of the inferred fault at 341 600 or even 342 500 at the western side of the volcanics (and may equate with an extension of the Brookside Fault) is overturned. This is based on the dip relationship and presumed stratigraphy which states that the Donaldson Group and Savage Dolomite are older units. How else could the volcanics underlie them? Are the inferred faults reverse or thrusts? Their position and orientation and relationships with better established boundaries would suggest not.

It should also be noted that the inferred unit boundaries SW of the West Brookside Fault do not correlate well with the magnetic data inferences (see Figure 13). The mapping compiled for Norgold is in error.

An alternative perspective may be gained from the regional gravity data. Although the available coverage is gappy and relatively coarse (min spacing 1 km) some patterns are evident (Figure 16). The Lineament zone is in three parts and marked by strong gradients. These are suggested by broken lines trending roughly NE-SW. The most northern of these is the Savage Fault. There are suggestions of E-W offsets, especially near 5395-5396 000 mN.

In order to clarify the gravity image a regional separation has been effected. This has been based on the crustal model for NW Tasmania devised by Leaman (1988 c) and the residual stresses the significance of the E-W feature noted above - near Longback DDH 1. The magnetic implications are confirmed and the E-W content of the local anomaly are related to a major crustal feature. The Input EM anomalies nearby are no accident. The residual pattern indicates some discrete blockiness in geology but the effect of the Lineament is paramount.

The gravity field required further clarification. First stage modelling was directed at explanation of the dominant effects

260150

related to the Lineament. Once this could be explained, in a manner consistent with the magnetics, it was removed and the resultant anomaly is shown, for line 1890, in Figure 18. The possible solution is critical to ultimate appraisal of structure SE of the Savage Fault and NE of the West Brookside Fault and must be compared with the magnetics solution of Figure 15.

The models for line 1890 show that the only rocks of gravimetric consequence lie between the Savage Fault and the inferred faults west of the mapped Bernafai Volcanics. (Possibly to the extended position of the Brookside Fault). The Bernafai Volcanics are not of relevance, nor is the Corinna Dolomite. The model is imperfect and better fits are obtained by relating the eastern edge of the effect to the Savage Dolomite/Bernafai Volcanics boundary and dipping the Savage Fault to the west. The profile transects the West Brookside Fault and the small subsidiary gradient near the anomaly crest is presumably related.
The model does not distinguish Donaldson Group and a slab of generally west-dipping Savage Dolomite (out to the Savage Fault but not beyond) can explain the effect. The notch in the model west of 341 500 will accept, at comparable dip, the implied volcanic wedge from Figure 15.

? No Donaldson Gp SE Sav. Ft

The gravity model thus supports the implication of overturning and does so by demonstrating that no thick dolomite sequence underlies the volcanic members of the Brookside syncline (Figure 14). The Corinna Dolomite inferred there, in the fold core, is either the same unit as the dolomite above the volcanics in Figure 18 or the entire sequence is overturned between the Savage Fault and the Lineament. The simpler solution merely requires the Donaldson Group to be locally misidentified or to be overthrust. If the sequence is as inferred in all previous reports then the Savage Dolomite has not been exposed, if present at all, since it must underlie the entire section and thus not be resolved gravimetrically.

CONCLUSIONS

Review of regional gravity and magnetic data has confirmed the geological complexity of the Longback area and demonstrated that understanding is some way off. The review has, however, established some relationships of exploration significance and directed attention toward key aspects of the geology.

1. Sites with crystalline gold can be associated with faults, only one of which - the Brookside Fault - has been mapped conventionally with any confidence. Several structures of this type are concealed within the dolomite units.
   I predict that any primary gold occurrences will be concentrated near the intersections of these NNW-SSE trending features and unit boundaries or E-W offsets. No

260151

30

known occurrence is more than 500 m from such a point but present data do not allow higher resolution of gradients or features.
Similar comments apply to other mineralisation.

2. E-W features are significant. The orientation of pyrrhotite rich features near 5396 000 mN is not accidental. Other units have been displaced up to 500 m at this northing. Comparable offsets occur one kilometre south and these have generated a set of Input EM anomalies.
The major E-W zone lies between 5395 and 5396 000 mN and is unambiguously observed in gravity data. The properties of the Bernafai Volcanics are altered in this zone.
A lesser feature of this type, or one more poorly defined by the available data, occurs near Brookside.

3. The geology, although complex and difficult to interpret and integrate, has been clarified a little by this review. Unit continuity and members can be assessed. It would appear that the so-called upper volcanics are in fact fold repeats of the Bernafai Volcanics in the area north of Brookside. It is also possible that there is no lower dolomite in the same area or, if there is, that it is nowhere exposed.
Given the available dip and facing information it seems likely that the Donaldson Group has been incorrectly identified or, if present, then it has been overthrust onto the Corinna or upper dolomite unit.
The prevalence of silicification and alteration within the Corinna Dolomite NE of Brookside can be directly related to the number of faults and cross-cutting features identified within the syncline.

RECOMMENDATIONS

1. Further sampling of the dolomite in the immediate vicinity of the inferred faults is suggested. Attempts should be made to sample near the E-W features. This has only been satisfactorily completed near X6 to date.

2. The zone of apparently altered but offset Bernafai Volcanics within the corridor at 5395-5396 000 mN should be explored for all metals. The targets may be in the adjacent dolomite.

3. Given the scale and nature of the responses and interpretation there may be little point in resolution of the stratigraphic issues. It may, however, be important to resolve the attitudes of some boundaries and inferred faults. Sampling traverses should give regard to observation of facing and dip directions. This information may well resolve the discussion about overthrusting of parts of the section and allow resolution of the stratigraphic question as well as separate fault styles.

260152

31

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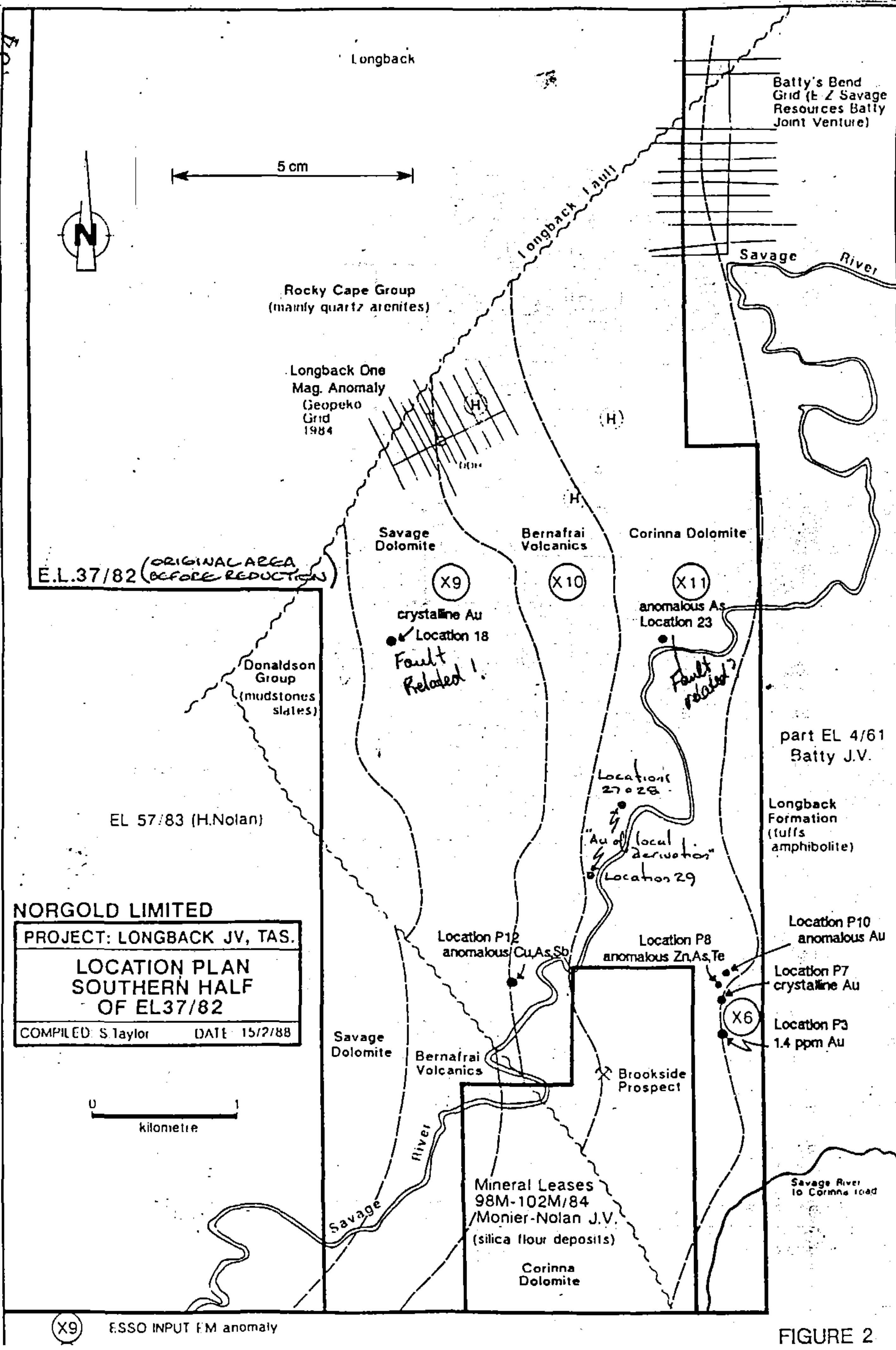
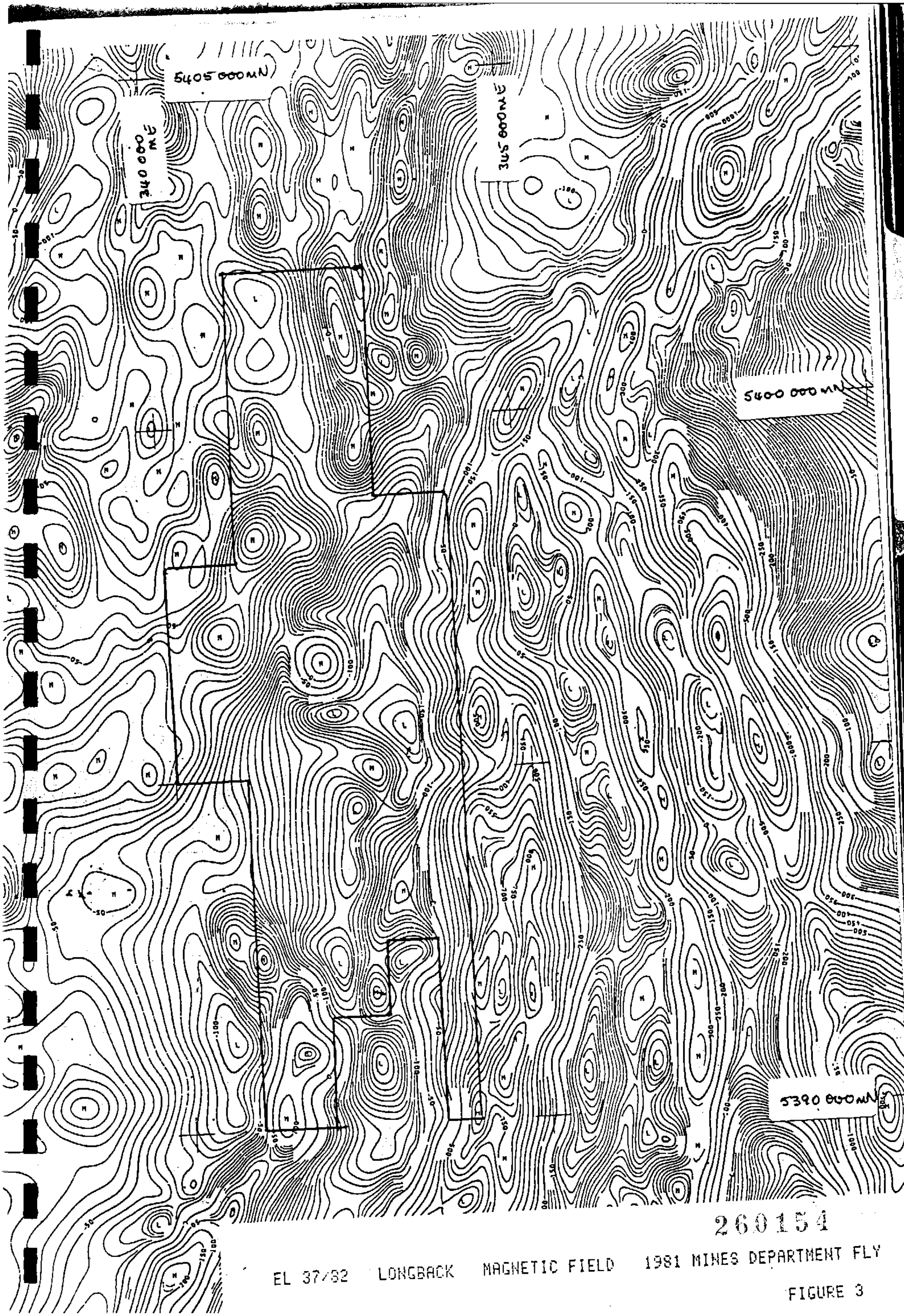


260153
Longback
Batty's Bend Grid (E Z Savage Resources Batty Joint Venture)
5 cm
N
Longback Fault
Savage River
Rocky Cape Group (mainly quartz arenites)
Longback One Mag. Anomaly
Geopeko Grid 1984
H
Savage Dolomite
Bernafrai Volcanics
Corinna Dolomite
E.L.37/82 (ORIGINAL AREA BEFORE REDUCTION)
X9
X10
X11
crystalline Au Location 18
Fault Related!
anomalous As Location 23
Fault related?
Donaldson Group (mudstones slates)
part EL 4/61 Batty J.V.
Locations 27 & 28
"Au of local derivation"
Location 29
EL 57/83 (H.Nolan)
Longback Formation (tuffs amphibolite)
NORGOLD LIMITED
PROJECT: LONGBACK JV, TAS.
LOCATION PLAN SOUTHERN HALF OF EL37/82
COMPILED S.Taylor DATE 15/2/88
Location P12 anomalous Cu,As,Sb
Location P8 anomalous Zn,As,Te
Location P10 anomalous Au
Location P7 crystalline Au
X6
Location P3 1.4 ppm Au
Savage Dolomite
Bernafrai Volcanics
Brookside Prospect
0 1 kilometre
River
Savage
Mineral Leases 98M-102M/84 /Monier-Nolan J.V. (silica flour deposits)
Corinna Dolomite
Savage River to Corinna road
X9 ESSO INPUT EM anomaly

FIGURE 2



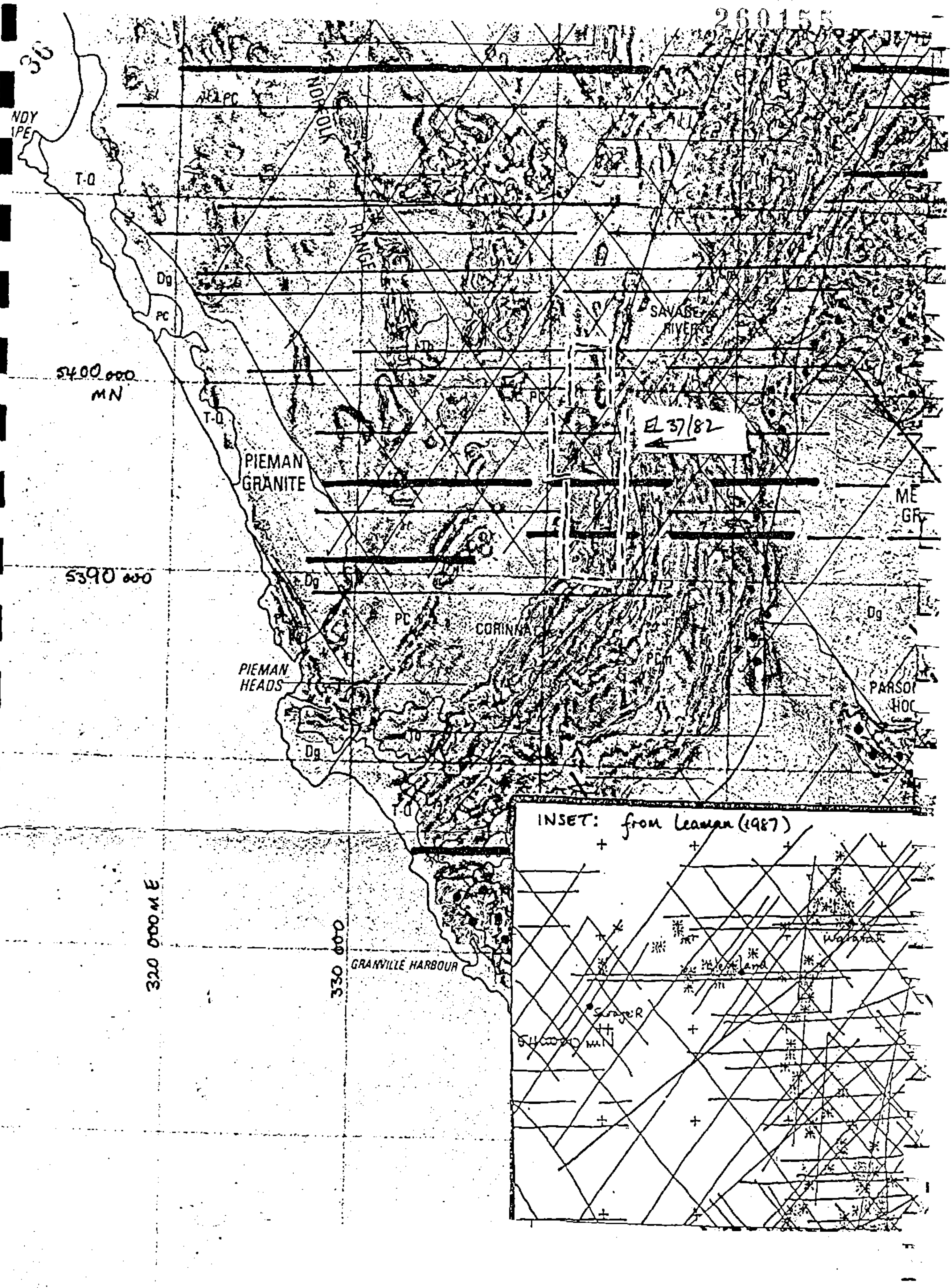
260154

EL 37/82 LONGBACK MAGNETIC FIELD 1981 MINES DEPARTMENT FLY

FIGURE 3

APPENDIX 2

260155



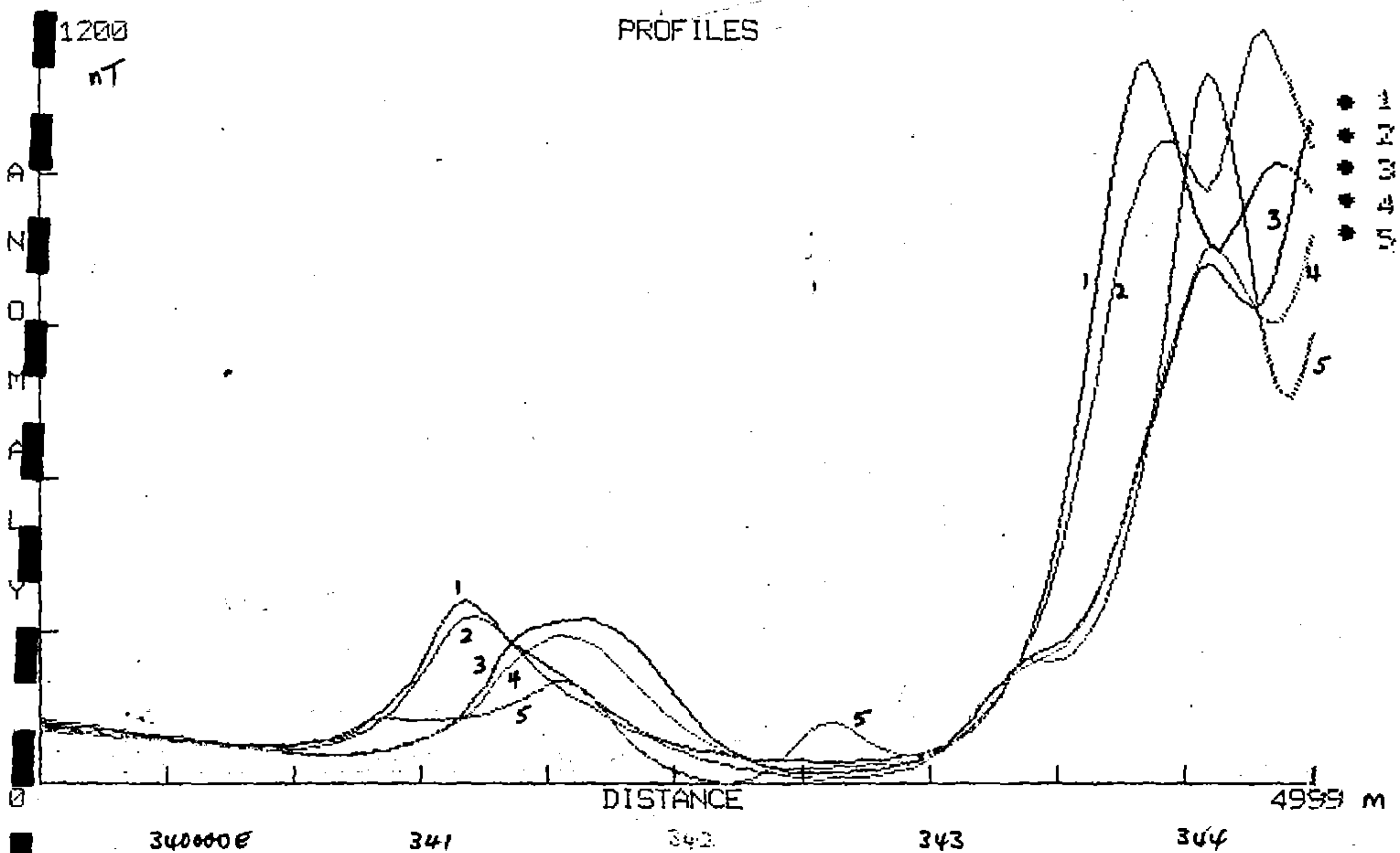
REGIONAL TRENDS INFERRED FROM PREVIOUS STUDIES
(Leaman, 1986a, b; 1987)

260156

LEAMAN GEOPHYSICS
G.P.O. Box 320 D,
Hobart, Tasmania 7001

			Nominal northing
1	B:M1820	LONGBACK PROJECT LINE 1820	5390 N
2	B:M1830	LONGBACK PROJECT LINE 1830	905
3	B:M1840	LONGBACK PROJECT LINE 1840	912
4	B:M1850	LONGBACK PROJECT LINE 1850	914
5	B:M1860	LONGBACK PROJECT LINE 1860	919

ZERO SHIFT : 151



EL 37/82 MAGNETIC PROFILES 5390-5392000 N FIGURE 5

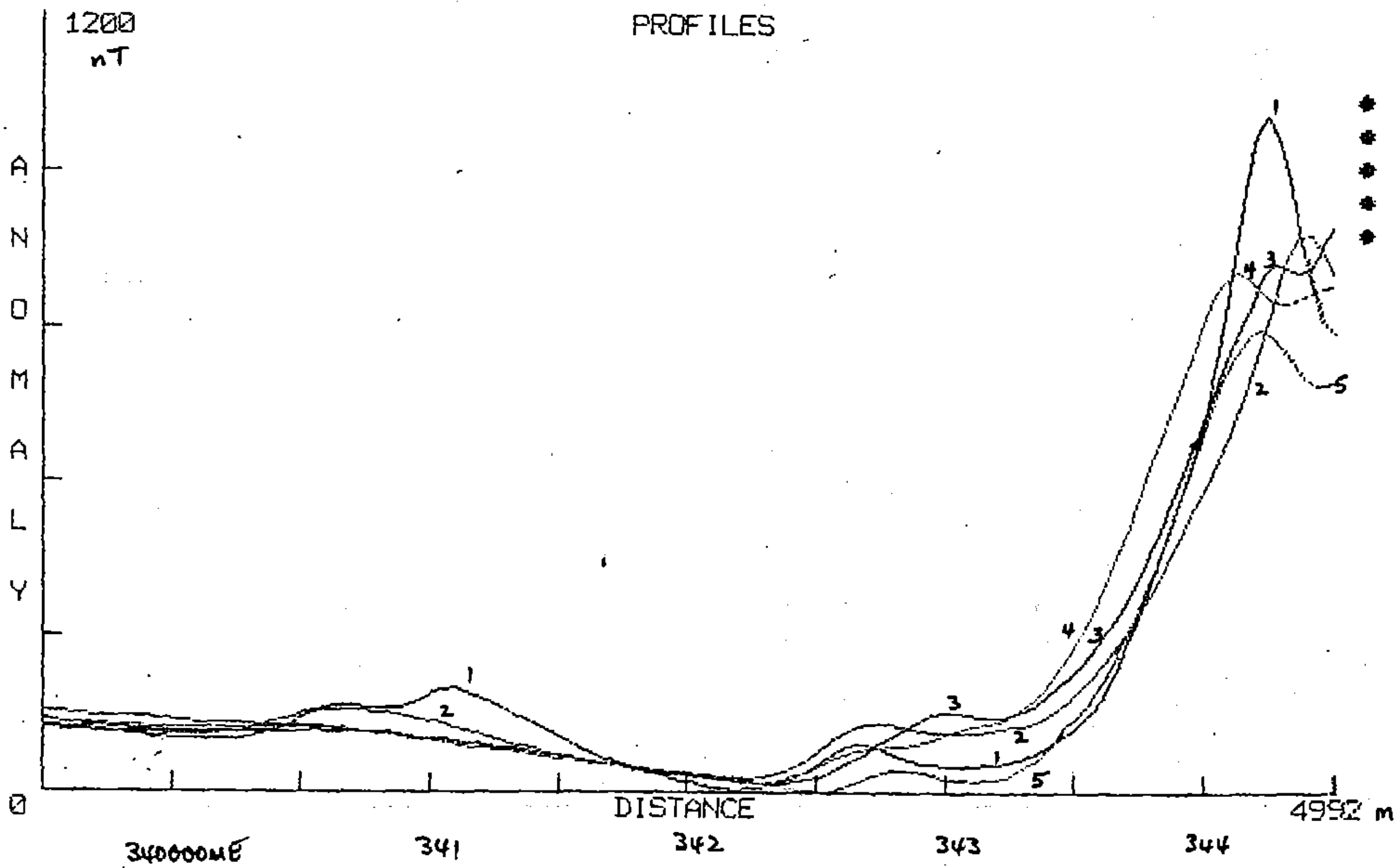
38

260157

LEAMAN GEOPHYSICS
G.P.O. Box 320 D,
Hobart, Tasmania 7001

1	B:M1870	LONGBACK PROJECT LINE 1870	53925 N
2	B:M1880	LONGBACK PROJECT LINE 1880	93
3	B:M1890	LONGBACK PROJECT LINE 1890	935
4	B:M1901	LONGBACK PROJECT LINE 1901	94
5	B:M1915	LONGBACK PROJECT LINE 1915	945

ZERO SHIFT : 170



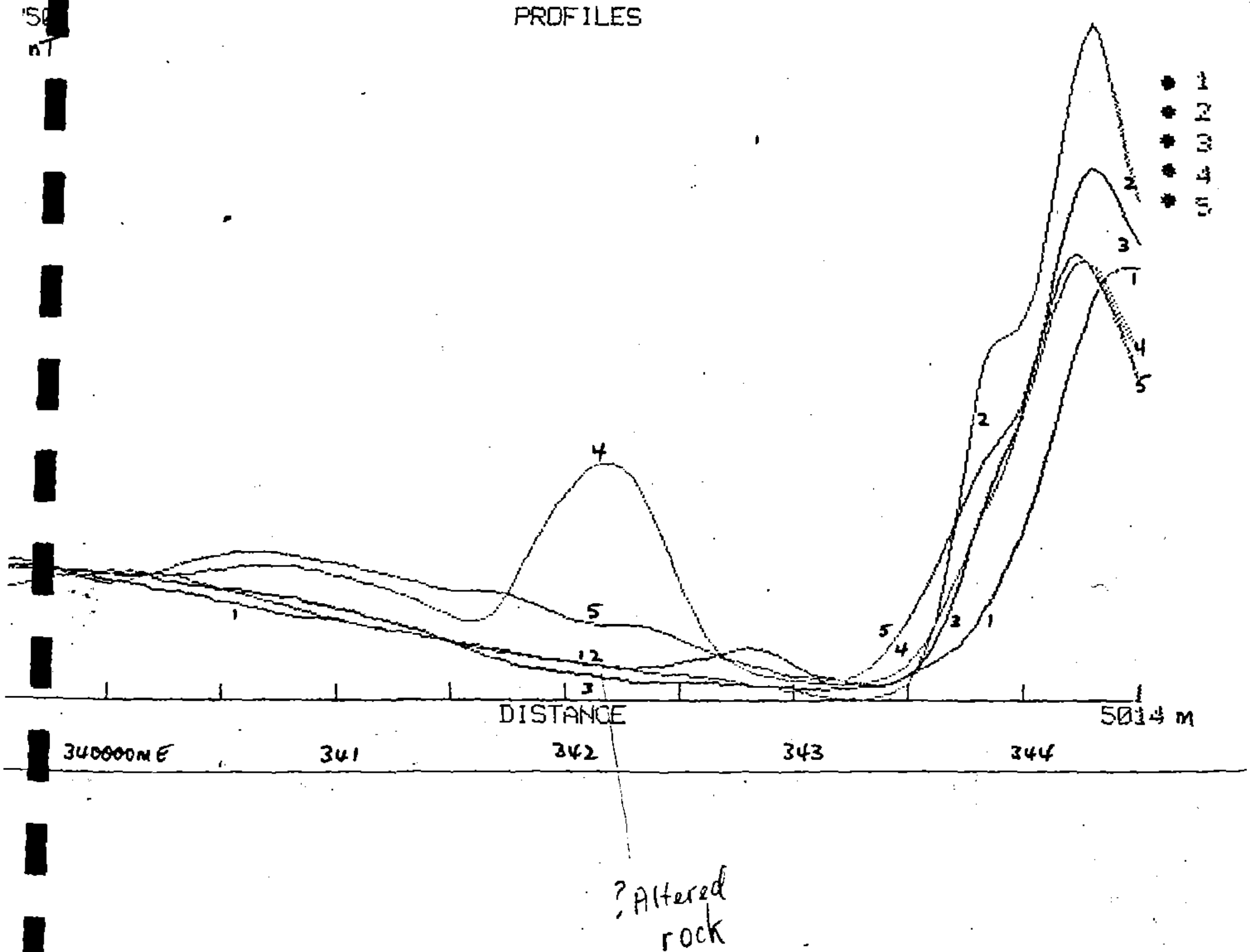
EL 37/82 MAGNETIC PROFILES 53925-53945000 N FIGURE 6

260158

LEA AN GEOPHYSICS
G.P . Box 320 D,
Hobart, Tasmania 7001

B:M1920	LONGBACK PROJECT LINE 1920	5395 N
B:M1930	LONGBACK PROJECT LINE 1930	955
B:M1940	LONGBACK PROJECT LINE 1940	96
B:M1950	LONGBACK PROJECT LINE 1950	966
B:M1960	LONGBACK PROJECT LINE 1960	971

SHIFT : 173



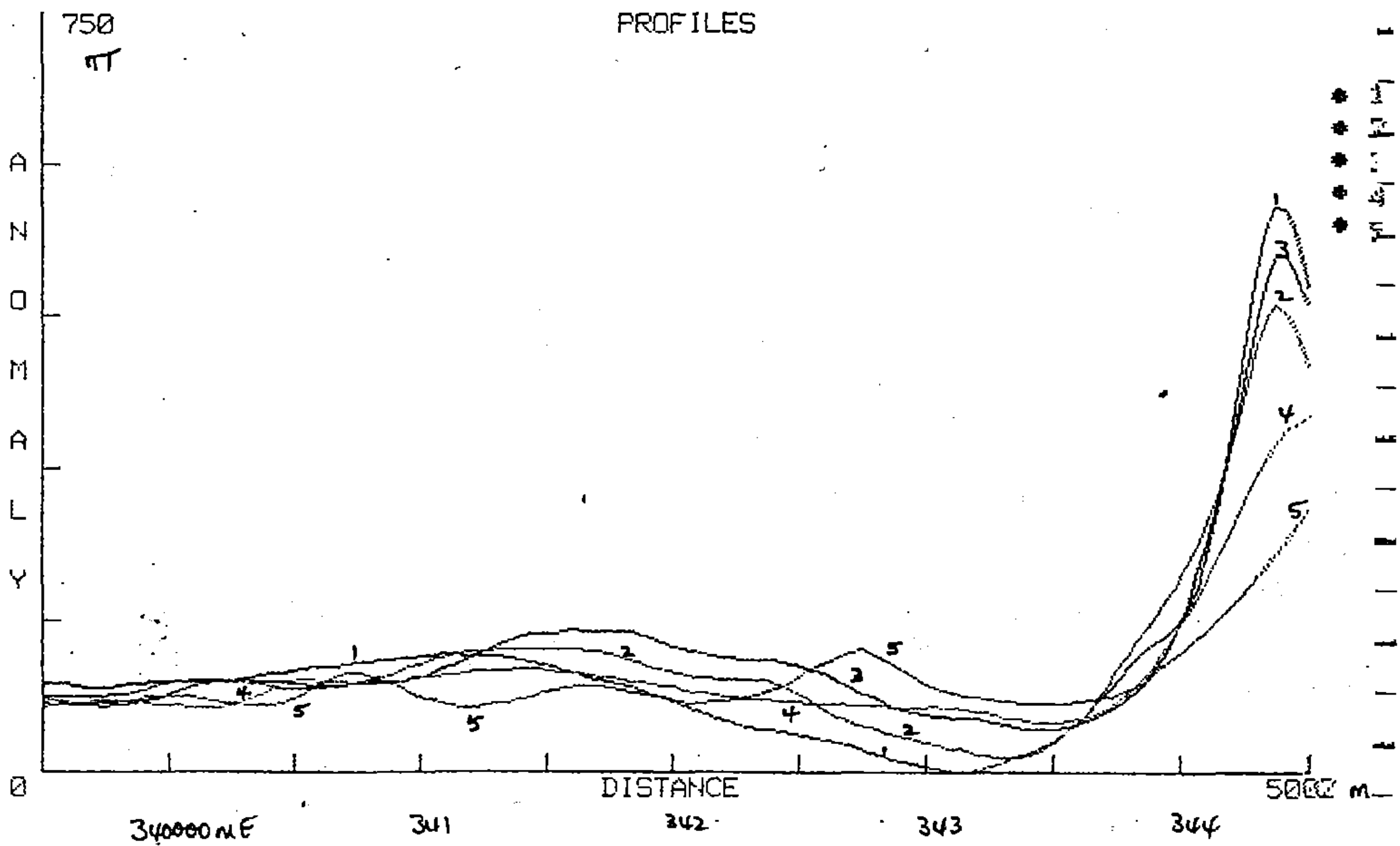
EL 37/82 MAGNETIC PROFILES 5395-5397000 N FIGURE 7

260159

LEAMAN GEOPHYSICS
G.P.O. Box 320 D.
Hobart, Tasmania 7001

1	B:M1970	LONGBACK PROJECT LINE 1970	5397500 N
2	B:M1980	LONGBACK PROJECT LINE 1980	98
3	B:M1990	LONGBACK PROJECT LINE 1990	985
4	B:M2000	LONGBACK PROJECT LINE 2000	99
5	B:M2010	LONGBACK PROJECT LINE 2010	995

ZERO SHIFT : 145



EL 37/82 MAGNETIC PROFILES 53975-5399500 N FIGURE 8

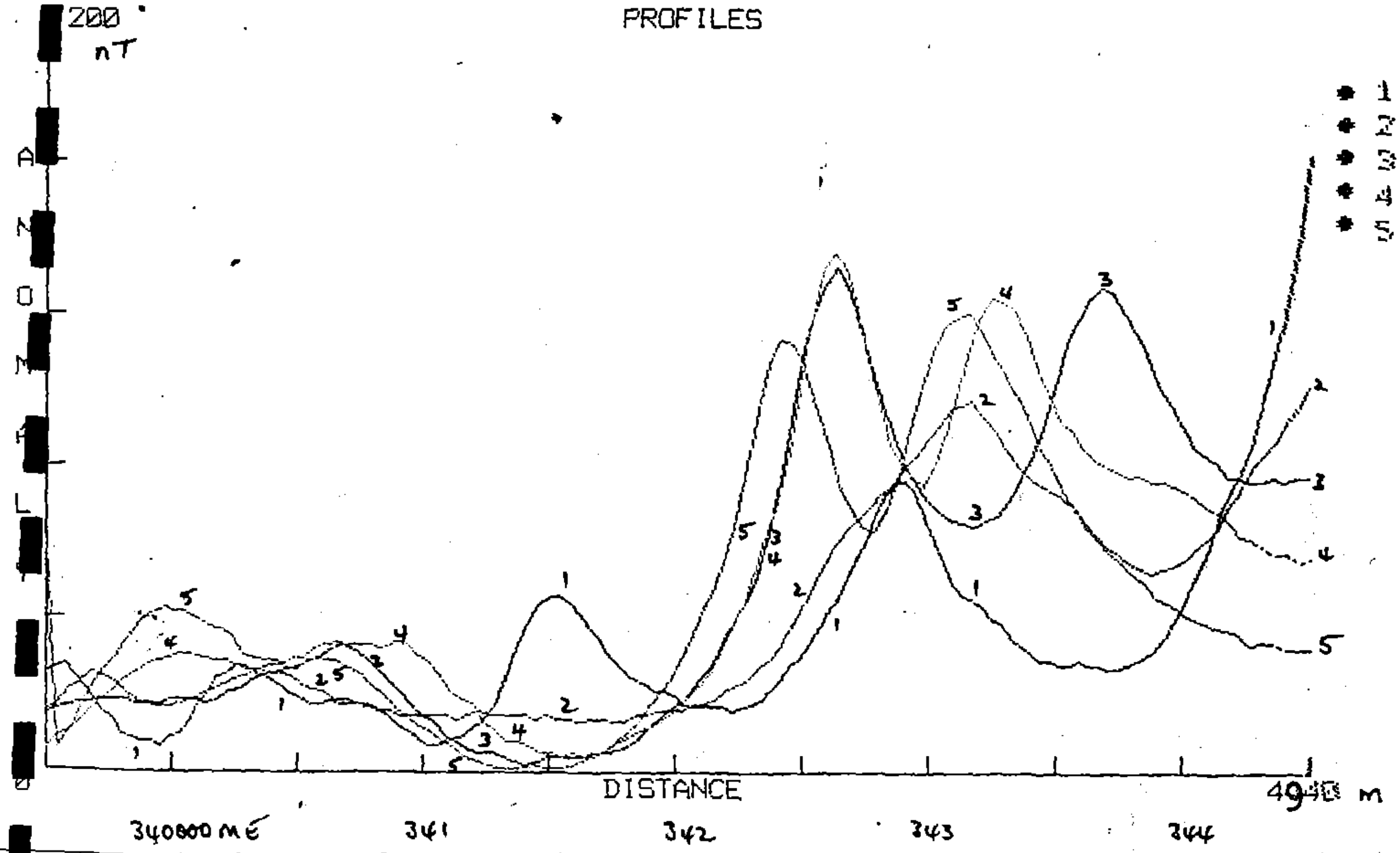
260160

LEAMAN GEOPHYSICS
G.P.O. Box 320 D.
Hobart, Tasmania 7001

1	B:M2021	LONGBACK PROJECT LINE 2021	5400 N
2	B:M2030	LONGBACK PROJECT LINE 2030	005
3	B:M2047	LONGBACK PROJECT LINE 2047	01
4	B:M2050	LONGBACK PROJECT LINE 2050	015
5	B:M2060	LONGBACK PROJECT LINE 2060	019

ZERO SHIFT : 98

PROFILES



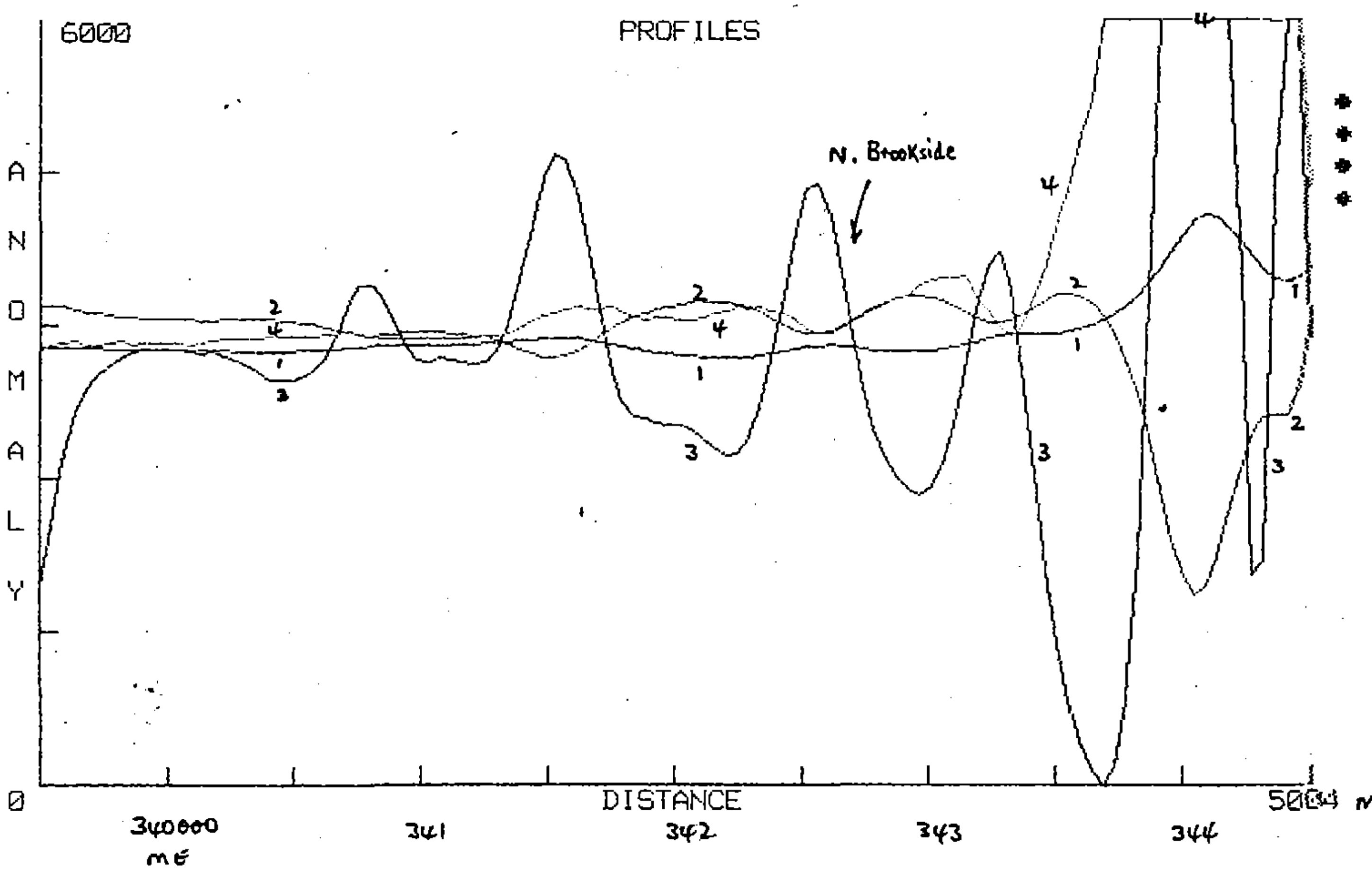
EL 37/82 MAGNETIC PROFILES 5400-5402000 N FIGURE 9

42

260161

LEAMAN GEOPHYSICS
G.P.O. Box 320 D.
Hobart, Tasmania 7001

1 B:M1860 LONGBACK PROJECT LINE 1860
2 B:VD11860 FIRST VERTICAL DERIVATIVE LONGBACK 1860
3 B:VD21860 SECOND VERTICAL DERIVATIVE LONGBACK 1860
4 B:AS1860 ANALYTIC SIGNAL LONGBACK 1860
ZERO SHIFT : 3494.699



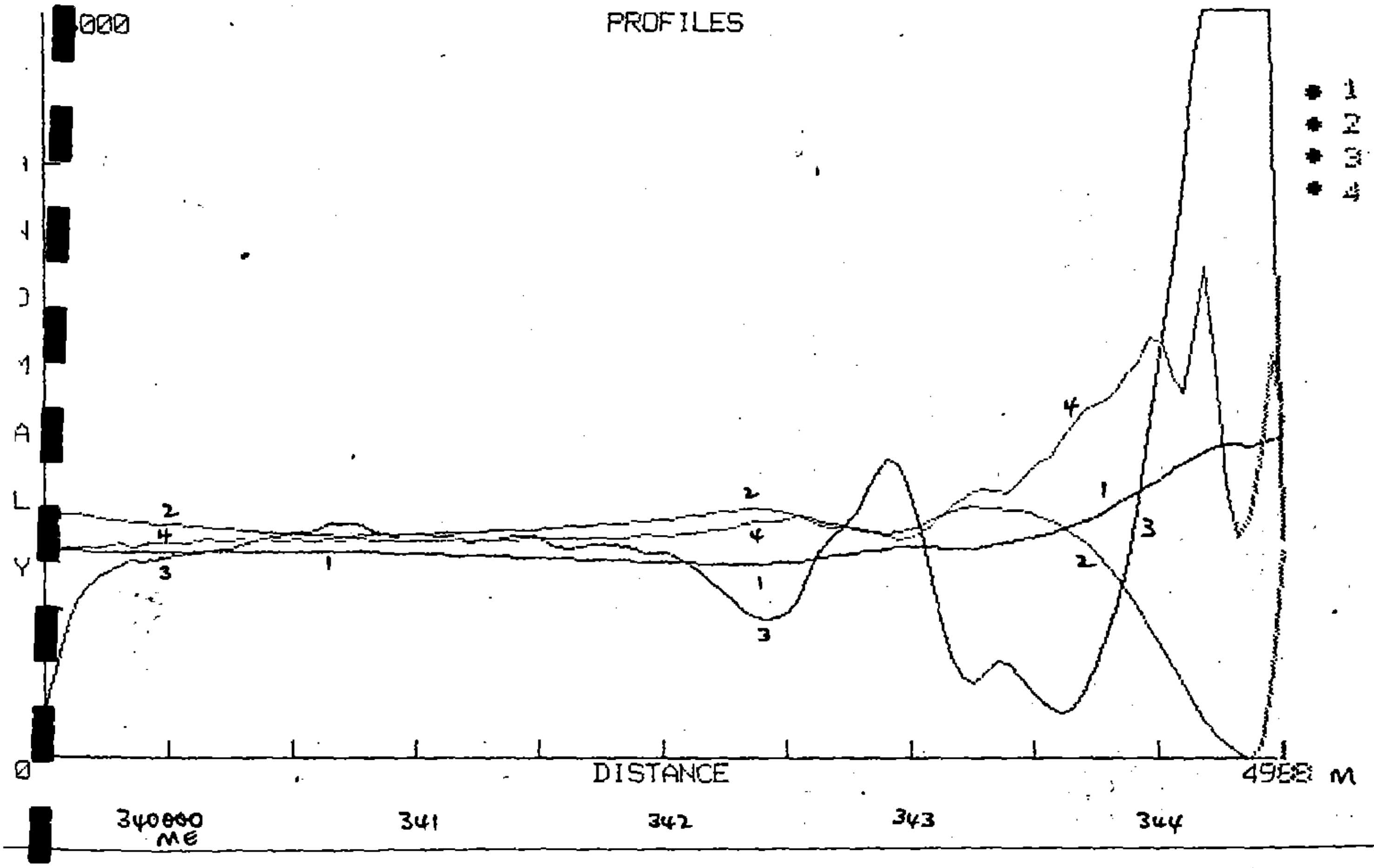
EL 37/82 DERIVATIVE PROFILES LINE 1860 FIGURE 10
(ADJ BROOKSIDE)

260162

LEAMAN GEOPHYSICS
G.P.O. Box 320 D,
Hobart, Tasmania 7001

APPENDIX 2

B:M1890 LONGBACK PROJECT LINE 1890
B:VD11890 FIRST VERTICAL DERIVATIVE LONGBACK 1890
B:VD21890 SECOND VERTICAL DERIVATIVE LONGBACK 1890
B:AS1890 ANALYTIC SIGNAL LONGBACK 1890
ERO SHIFT : 1457.835



EL 37/82 DERIVATIVE PROFILES LINE 1890 FIGURE 11

260163

44

LEAMAN GEOPHYSICS
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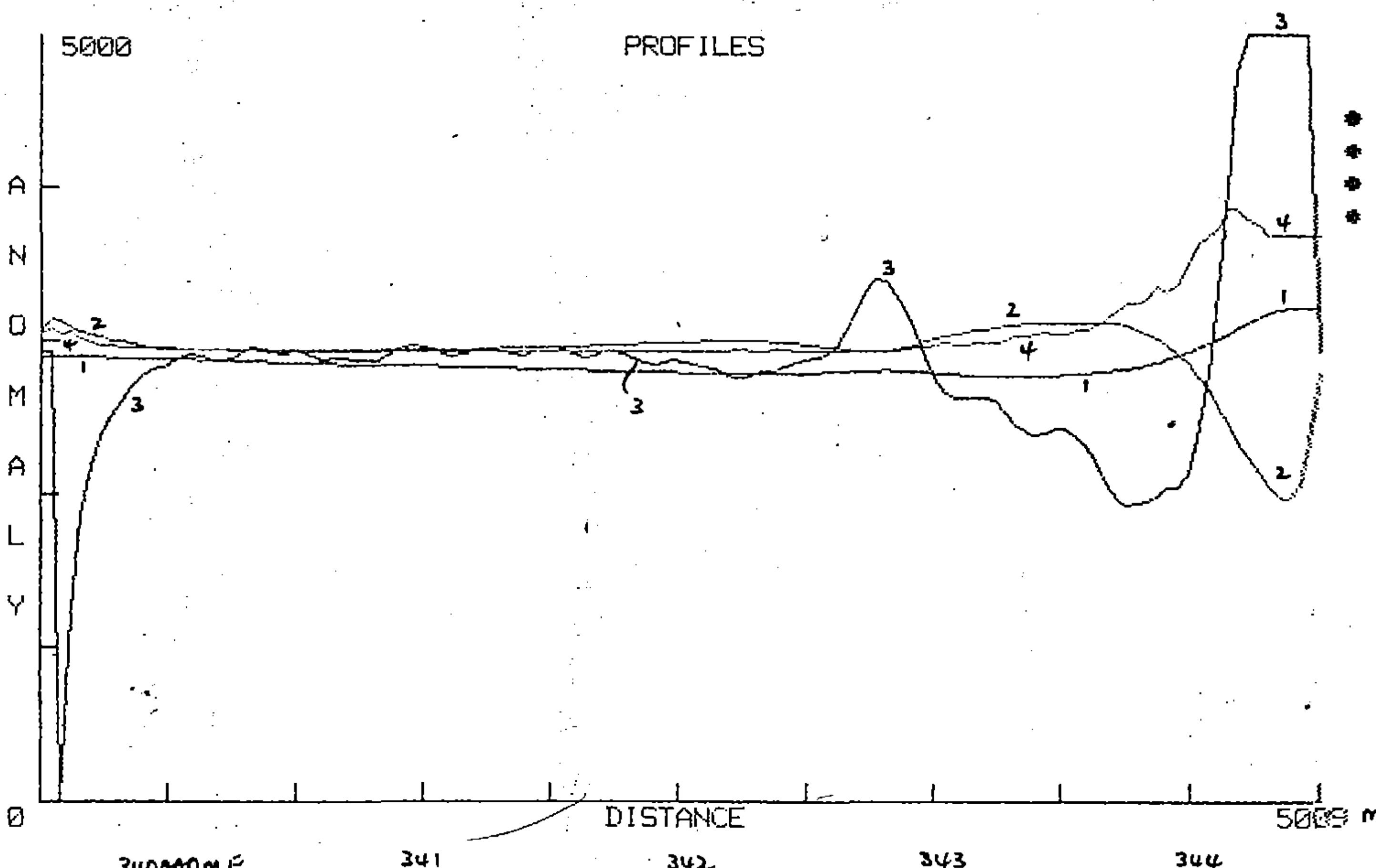
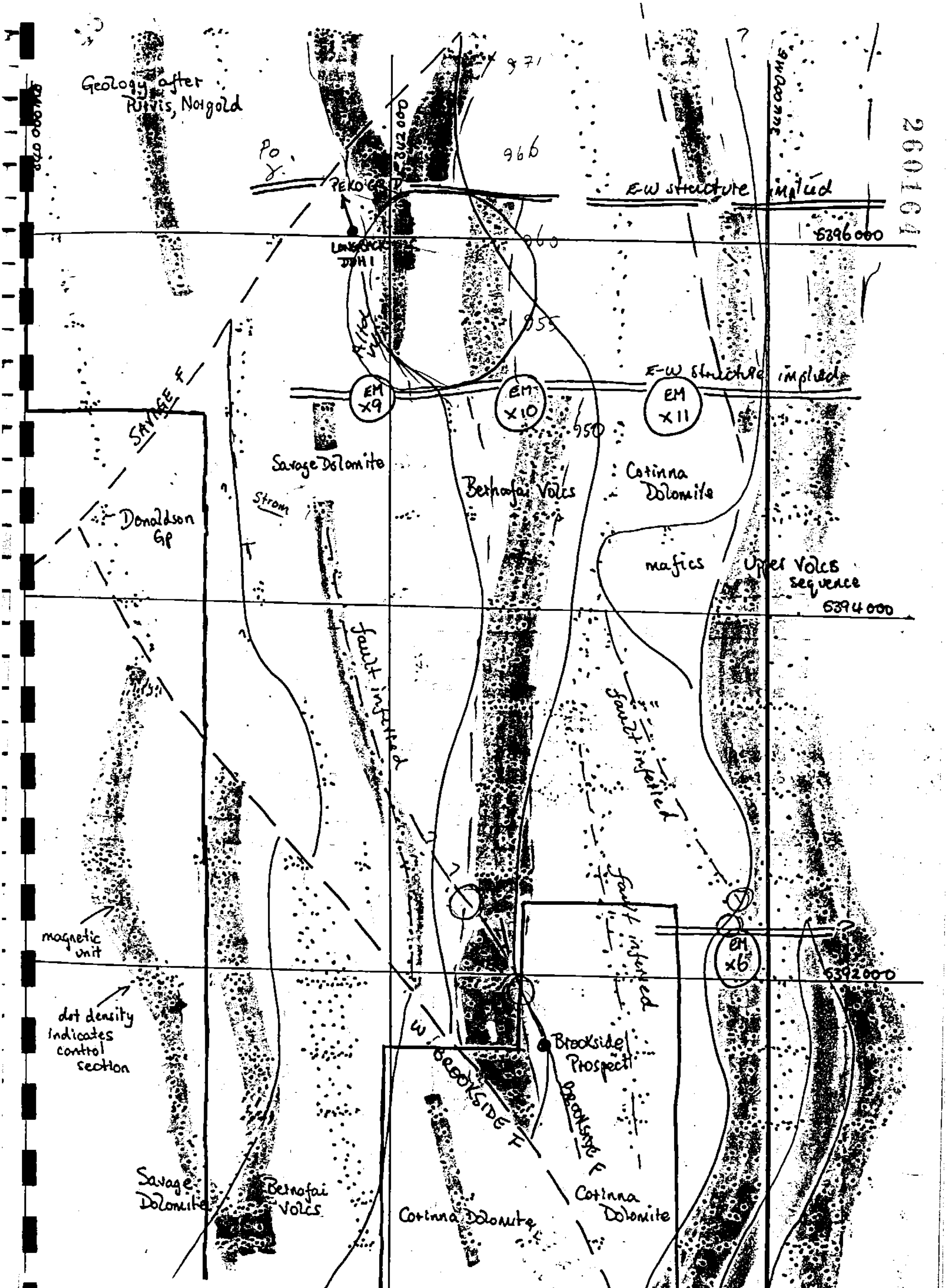
Hobart, Tasmania 7001

1	B:M1920	LONGBACK PROJECT LINE 1920
2	B:VD11920	FIRST VERTICAL DERIVATIVE LONGBACK 1920
3	B:VD21920	SECOND VERTICAL DERIVATIVE LONGBACK 1920
4	B:AS1920	ANALYTIC SIGNAL LONGBACK 1920

ZERO SHIFT : 2923.757



EL 37/82 DERIVATIVE PROFILES LINE 1920 FIGURE 12



LEAMAN GEOPHYSICS
G.P.O. Box 320 D,
Hobart, Tasmania 7001

EL 37/82 SUMMARY OF INDUCTIONS FROM MAGNETIC PROFILES

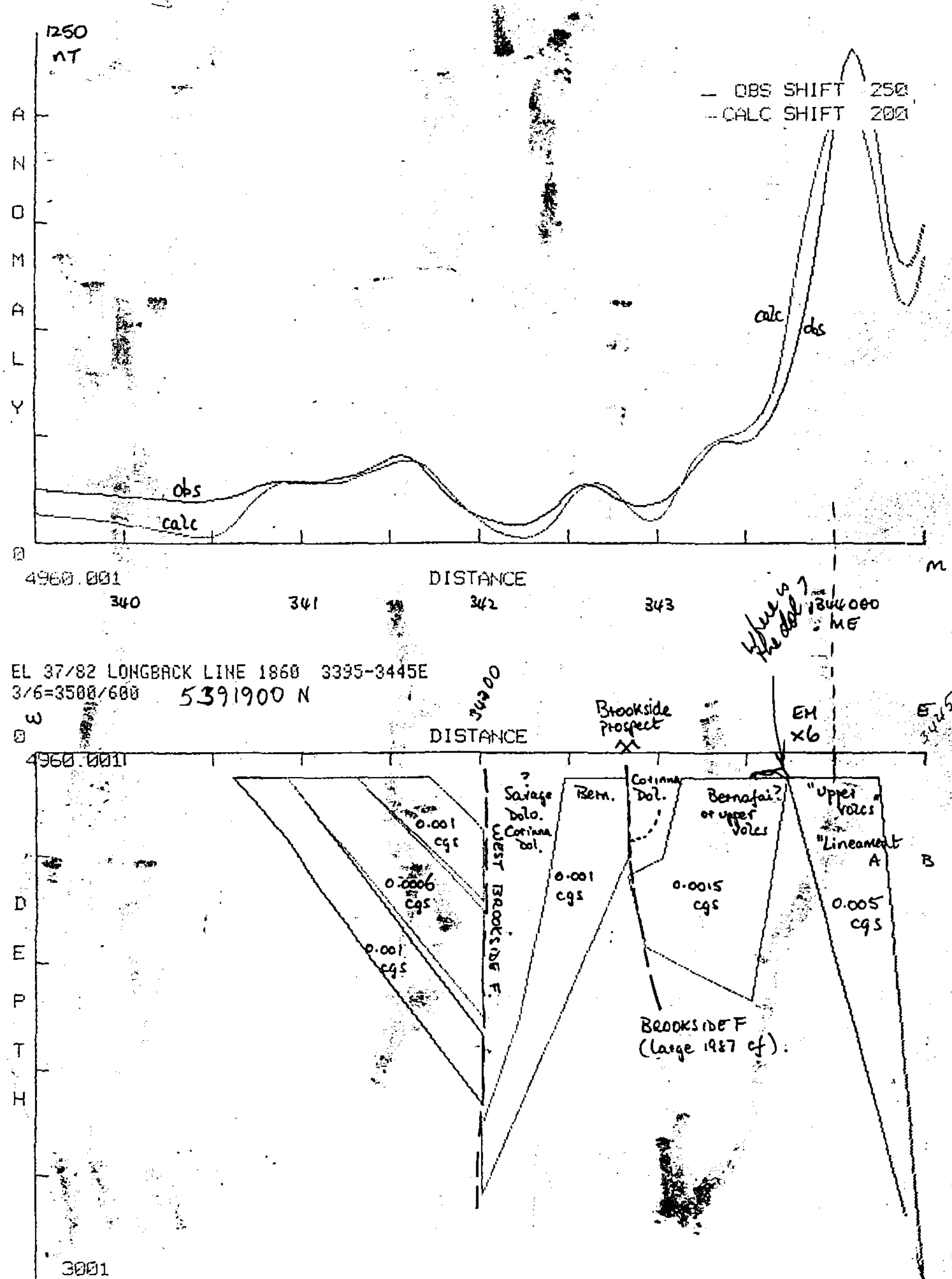
260165

LEAMAN GEOPHYSICS
G.P.O. Box 320 D.
Hobart, Tasmania 7001

FIELD DATA

INTENSITY	INCLINATION	DECLINATION	OBS LEVEL	LINE DIRECTION
62500.0	-72.0	13.0	0.0	90.0

LINE PARAMETERS - ORIGIN,LIMIT,INCR : 0 4960.001 44.68469



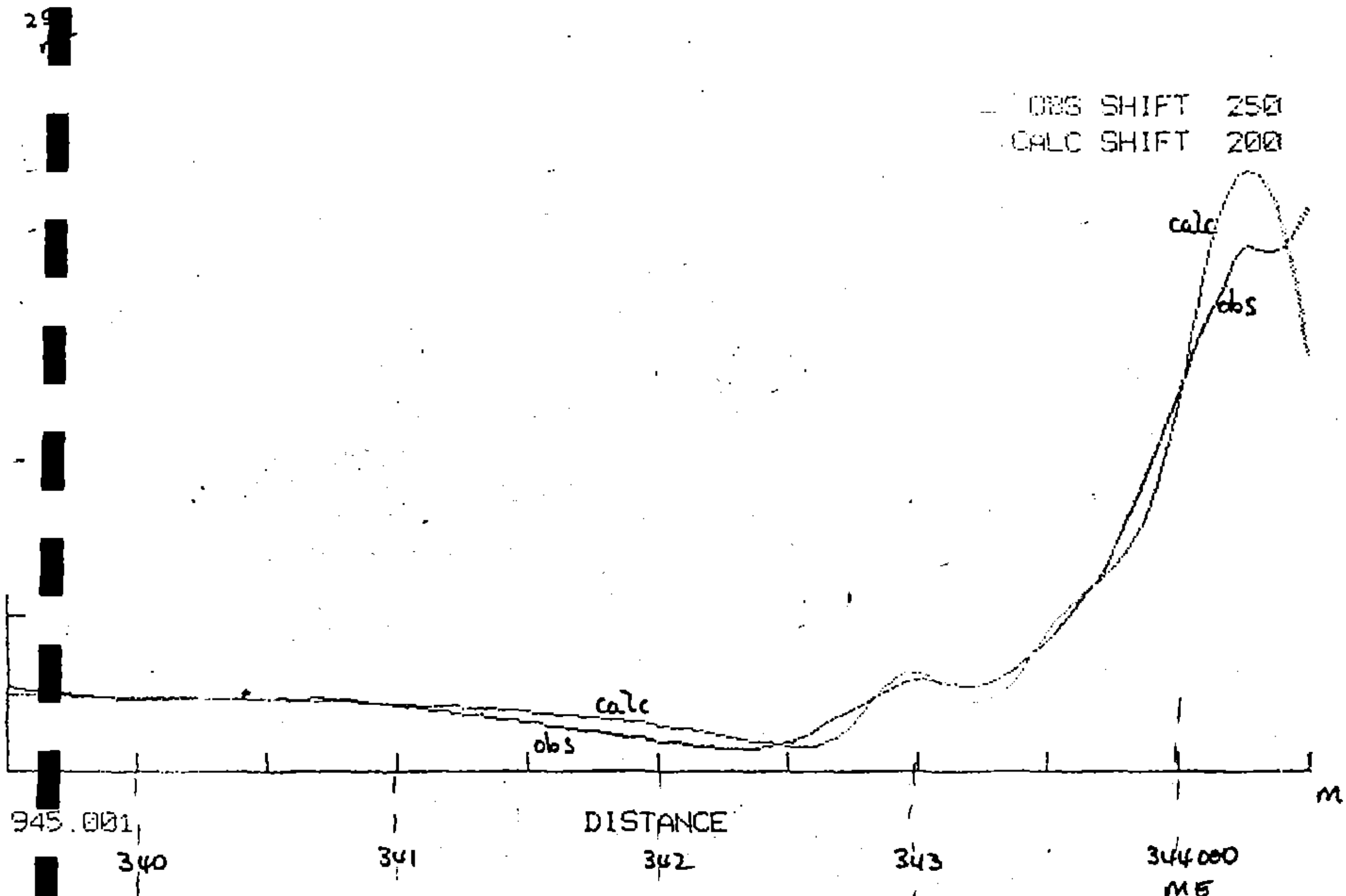
EL 37/82 2D MAGNETIC MODEL LINE 1860 FIGURE 14

260166

LEAMAN GEOPHYSICS
G.P.O. Box 320 D,
Hobart, Tasmania 7001

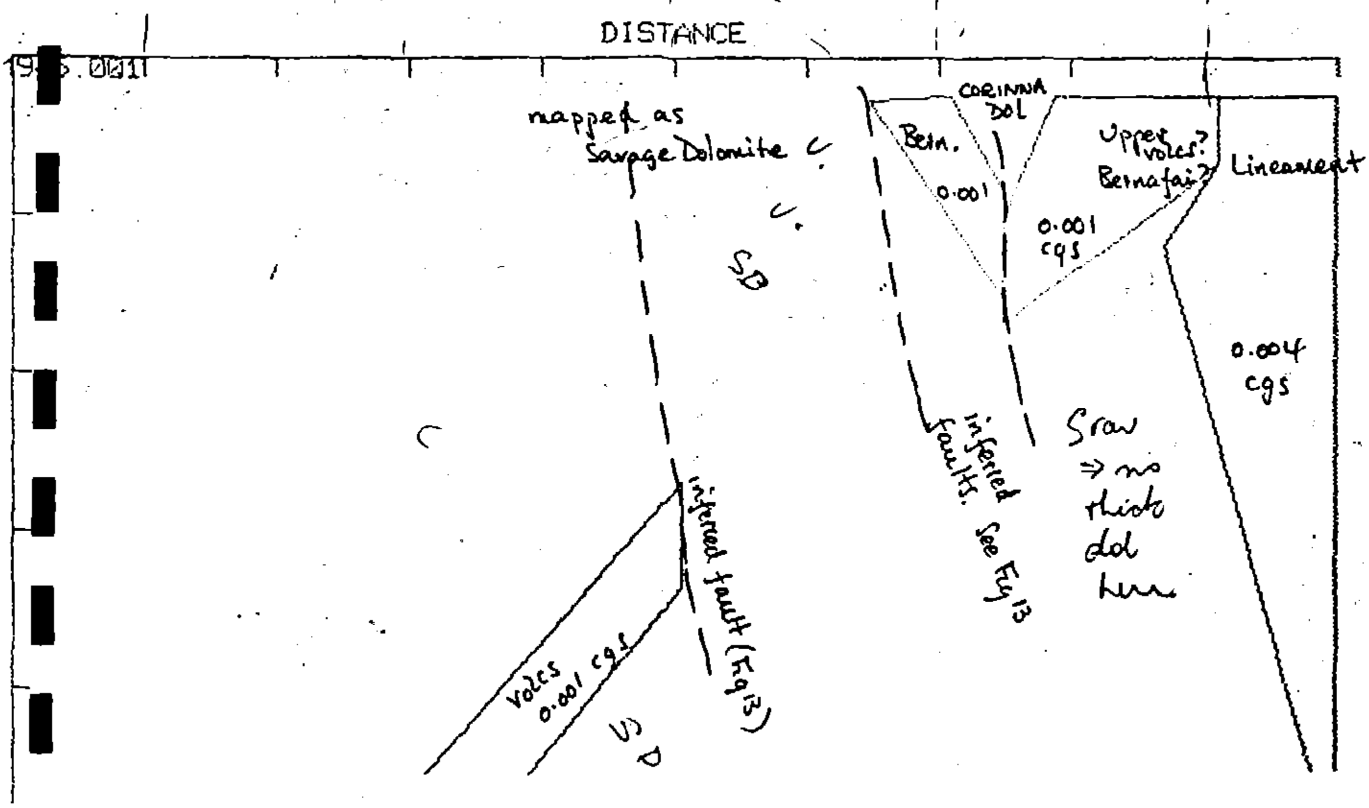
.D DATA
:N TY INCLINATION DECLINATION OBS LEVEL LINE DIRECTION
50 0 -72.0 13.0 0.0 90.0

: RAMETERS - ORIGIN,LIMIT,INCR : 0 4945.001 43.76107



37/82 LONGBACK LINE 1890 3395-3445E
J 2 3 K4=004

5393500

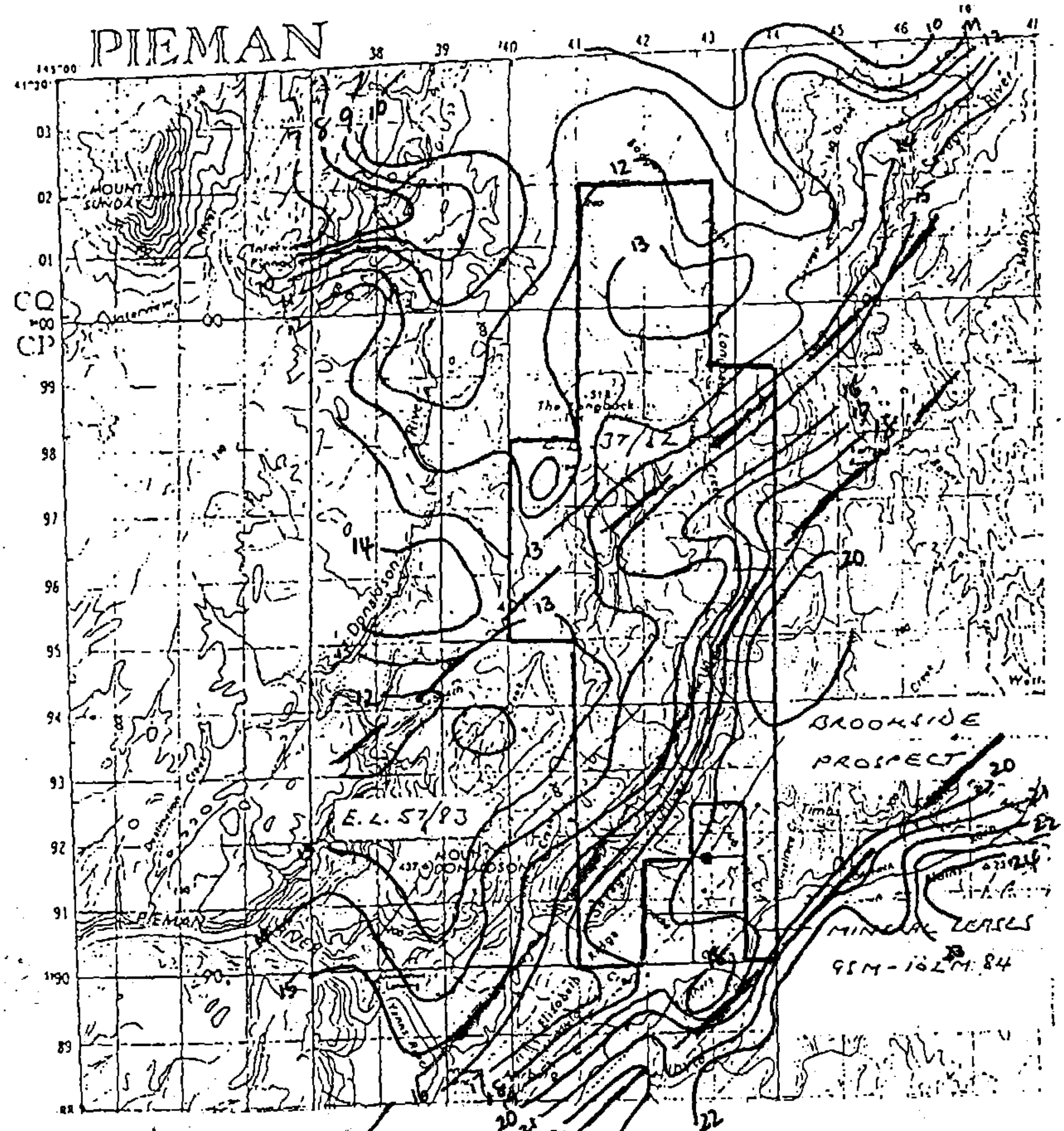


APPENDIX 2

APPENDIX 3

APPENDIX 4

APPENDIX 5



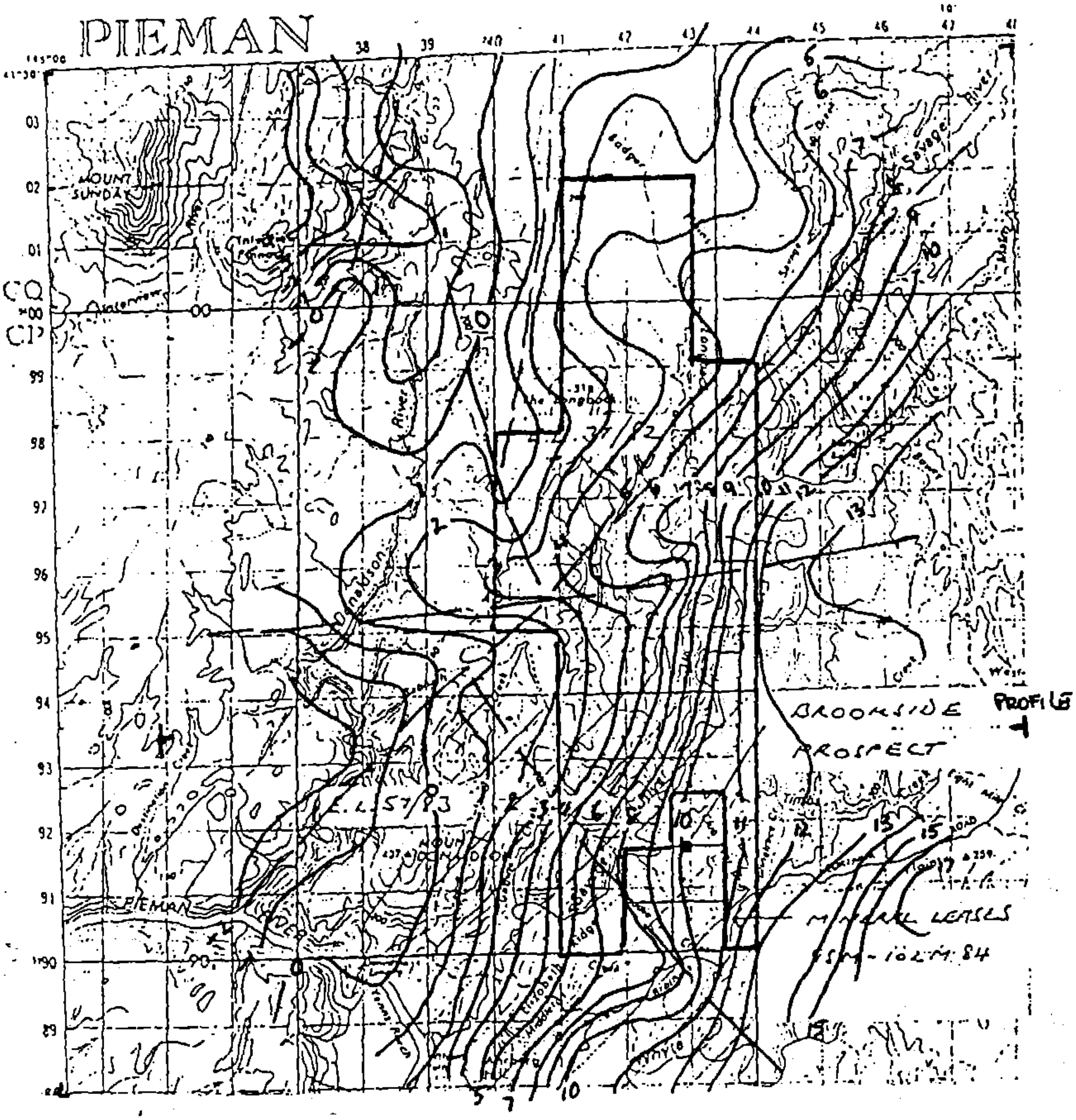
EL 37/82 - The Longback

CORINNA-SAVAGE RIVER REGION: BOUGUER ANOMALIES (TASGRAV DATA BASE)

FIGURE 16

LEAMAN GEOPHYSICS
G.P.O. Box 320 D,
Hobart, Tasmania 7001

260168



EL 37/82 - The Longback

CORINNA-SAVAGE RIVER REGION: RESIDUAL BOUGUER ANOMALY FIGURE 17

APPENDIX 2

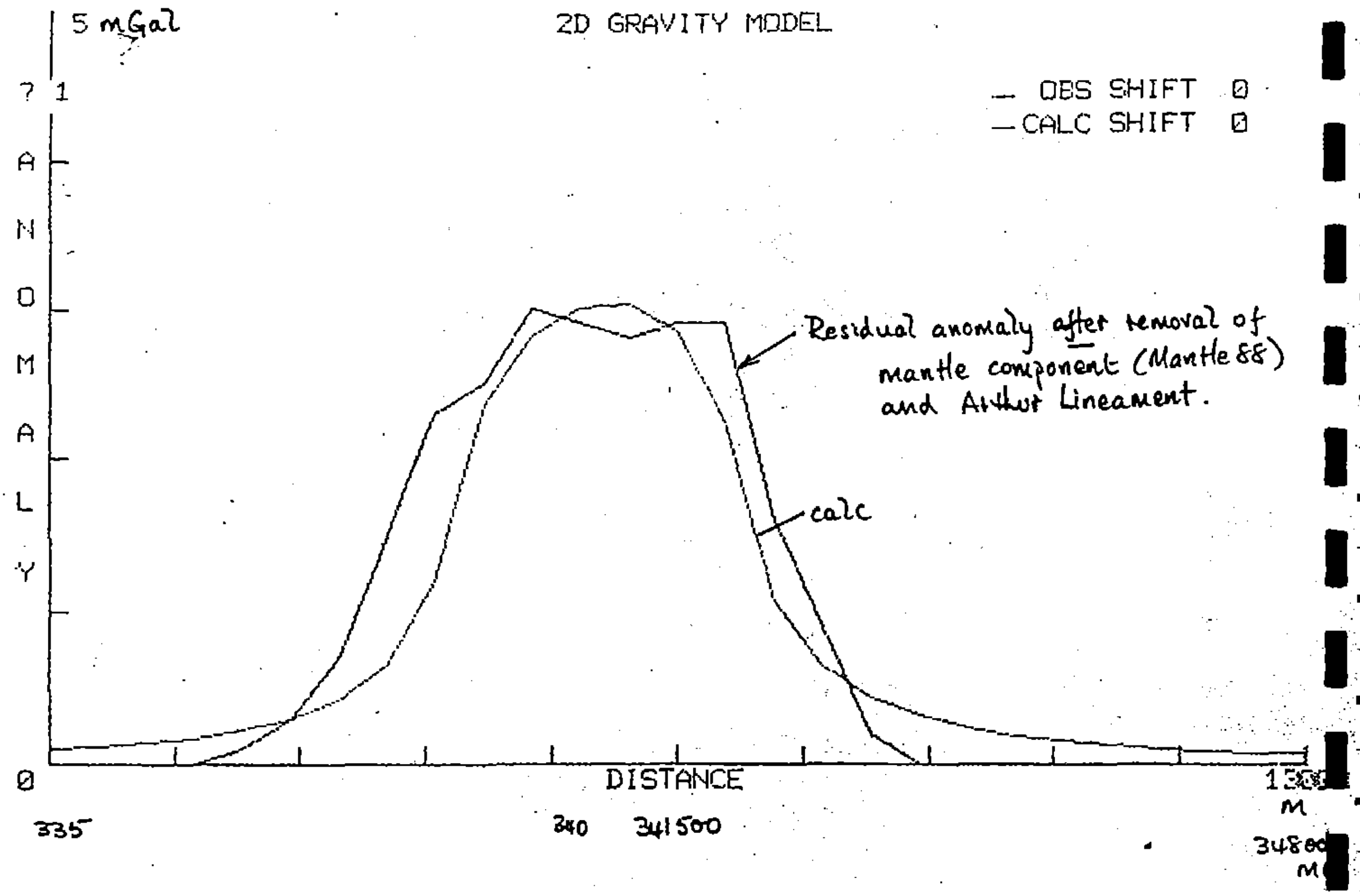
APPENDIX 3

EL 37/82 LONGBACK 53935N 335-348E RESIDUAL

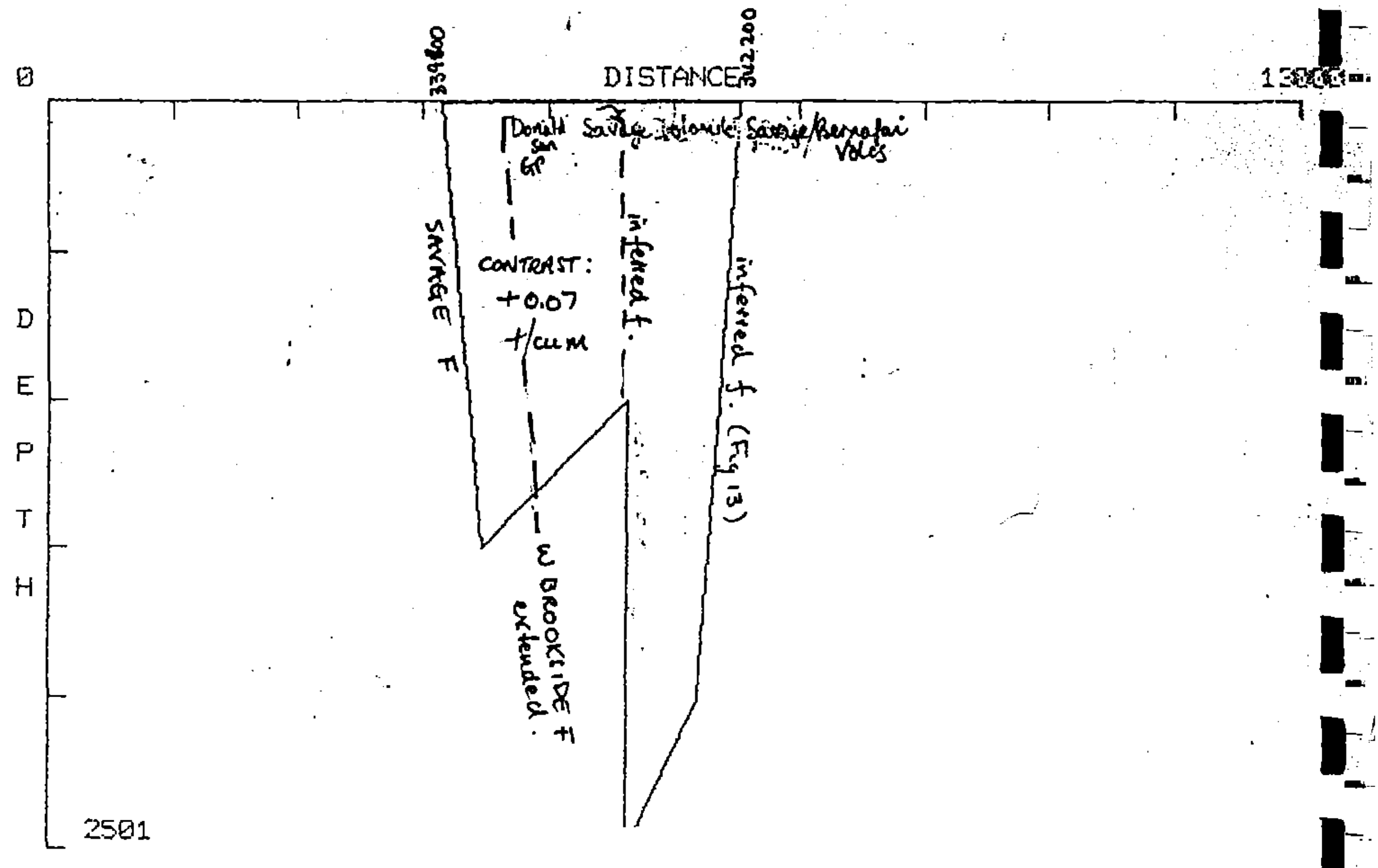
260169

LEAMAN GEOPHYSICS
G.P.O. Box 320 D,
Hobart, Tasmania 7001

LINE PARAMETERS - ORIGIN/LIMIT/INCR : 0 13000 500



EL 37/82 LONGBACK 53935N 335-348E RESIDUAL



EL37/82 2D GRAVITY MODEL LINE 1890 FIGURE 18