009001

ANNUAL REPORT

EL 2/92 - LISLE, TASMANIA

FOR

MAC. MINING. N.L.

R.McNeil

9th June 1993

LISLE - EL 2/92
TASMANIA

- Granted 24th July 1992

- Wholly owned by Mac Mining N.L.

- Area 71 sq.kms.

- E.L 2/92 covers most of the old Lisle and Golconda goldfields in NE Tasmania (Figure 1). Approximately 250,000ozs Au were produced from alluvial/eluvial deposits, mainly prior to 1900. The Lisle goldfield was the most prolific gold producer in Tasmania after Beaconsfield (excluding bi-product gold). Newcrest is exploring the Mathinna belt.

- The geology of the area is relatively simple (Figure 2). An intrusive complex approximately 55sq kms in area underlies most of the EL and intrudes a sandstone/shale sequence which is similar in lithology and age to the rocks which host the Central Victorian Goldfields. The intrusive complex is considered to be directly related to gold mineralisation and its sub-surface position is more or less defined by the hornfels zone on Figure 2. Almost all gold has been produced from alluvials in the Lisle Basin where erosion has exposed the underlying intrusive complex. No significant hard rock deposits have been located.

- Mineralisation is thought to be related to or to have been concentrated at or near the granodiorite/sediment contact. Possible targets include high grade sulphide/quartz veins such as at Beaconsfield (about 2M ozs Au at 24g/t Au) or various styles of lower grade perhaps open pittable mineralisation. Figure 3 shows possible target types and the possible original and present ground surfaces. We believe that in the Lisle basin the original hard rock gold mineralisation exceeded 2M ozs Au has been eroded away, exposing the granodiorite and creating alluvial gold deposits. However, perhaps 70/80% of the intrusive complex does not reach the present surface and we believe that similar mineralisation to that which created the Lisle alluvials will be found elsewhere.

- Figures 4, 5 and 6 show various aspects of the aeromagnetics, structure and geochemical results from Lisle and support our contention that other major deposits probably remain undetected.

- The pattern of aeromagnetics suggests a dome type structure in the Bessell's Reward - Panama area similar to that which probably existed at Lisle. The Lisle and Bessell's Reward areas are separated by a major structure which could have significance for mineralisation.

- Geochemistry by Billiton and BP Minerals (Figure 5) defined a number of gold/As anomalous areas - notably Bessell's Reward, Panama, Lone Star Ridge and South Lisle.

- Structure, as determined from topography, also emphasises the Bessell's Reward area as being a "domed" area with granodiorite at shallow depth.

. We believe that substantial gold deposits could exist almost anywhere throughout the EL but Bessell's Reward and Lone Star Ridge/South Lisle are particularly promising.

. Prospect descriptions are given below:

PROSPECT	COMMENT
BESSELL'S ROAD/LISLE SOUTH	. Southern end of Lisle goldfield, south of Lisle granodiorite pluton. . Within regional Lisle South Bleg silt Au anomaly, values of 2.2 and 3.6ppb against background of 0.05ppb Au. Pan concentrate values of 4.7 and 11.8g/t Au. . Cross cutting magnetic high . Follow up Bleg erratic with values from 0.1 to 150ppb Au. . Reconnaissance soil Bleg elevated over 700 - 800 metres with values between 1.5ppb Au and 3.3ppb Au.
LONE STAR SOUTH	. East of Lisle on Lone Star Ridge . Soil Bleg anomaly, 700 metres at 3 to 19ppb Au, confirmed by check sampling . Could correspond to NW strike extension of elevated Bleg results in Bessell's Road Prospect . No follow up recorded
FAULKNERS ROAD	. Within Lisle granodiorite pluton . Bleg silt anomaly of 32ppb Au.Duplicate upstream sample gave 0.6ppb only
LONE STAR NORTH	. Northwest of Lisle pluton, midway between Lisle goldfield and Lone Star prospect . Bleg soil anomaly on northern end of Lone Star ridge - 400 metres at 0.85ppb Au to 9.0ppb Au. . No follow up recorded
LISLE ROAD	. Bleg soil anomaly on Lisle Road . 300 metre width with values from 0.8ppb to 19ppb Au . No follow up recorded
LISLE CREEK	. One km length of Lisle Creek has anomalous Bleg ranges from 2.6 to 60ppb Au. . Most but not all (2.6ppb Au) samples in main stream which drains Lisle alluvial goldfield and thus may not indicate insitu mineralisation.
TOBACCO CREEK	. Area of anomalous Bleg stream geochemistry north of Lisle and east of Lone Star. . Original samples were 18 and 6.5ppb Au but resampling gave 0.2ppb only. Supported by 26ppb downstream and 2.2ppb upstream . Drains ridge to north of Lone Star North anomaly

LONE STAR	. Small replica of Lisle basin. No record of workings or production. Alluvial gold. . Lone Star creek and tributaries anomalous with results such as 1.65, 4.4, 18 and 30ppb Au . Upper reaches of Lone Star Creek, beyond alluvial workings was anomalous with 2.2ppb Au. . No follow-up recorded.
PRESTONS ROAD	. Near northern end of EL. . Stream bleg anomaly with results such as 24, 12, 1.7ppb Au. . Some (except 12ppb) results are from Lisle creek and thus could indicate gold from Lisle Goldfield
GREETA ROAD	. Straddles northern boundary of EL . Stream Bleg anomaly with results such as 50, 2.4 and 2.1ppb Au
PANAMA	. Detrital gold bearing quartz at granite-sediment contact and in adjoining metamorphosed sediments. . Bleg anomaly of 7.5ppb drains this area.
MT WILSON	. Near NW corner of EL with large number of Bleg anomalous values over area of several square kilometres . Values such as 20, 17, 40 and 30 recorded. . No known workings and immediately north of Panama area.
VIRGINIA ROAD	. Gold prospect on map but no data available. . BLEG anomalous results such as 20,90 and 65ppb. 1.6ppb from tributary but most results from Lone Star creek and could be reflecting mineralisation from upstream
GOLCONDA	. Golden Crest and Enterprise Mines worked sporadically from 1890 to 1918. . Narrow gold bearing quartz veins in granite close to northern margin of granite - some high grades but average was about 10g/t Au.
BESSELL'S REWARD	. Situated on divide between Cradle and Tobacco Creeks. . Reid (1926) described bedded deposits of gold apparently in bedding plans of sandstone and slate (average 4g/t Au with samples to 15g/t Au). . Reid (1926) also described narrow persistent veins of quartz with some gold

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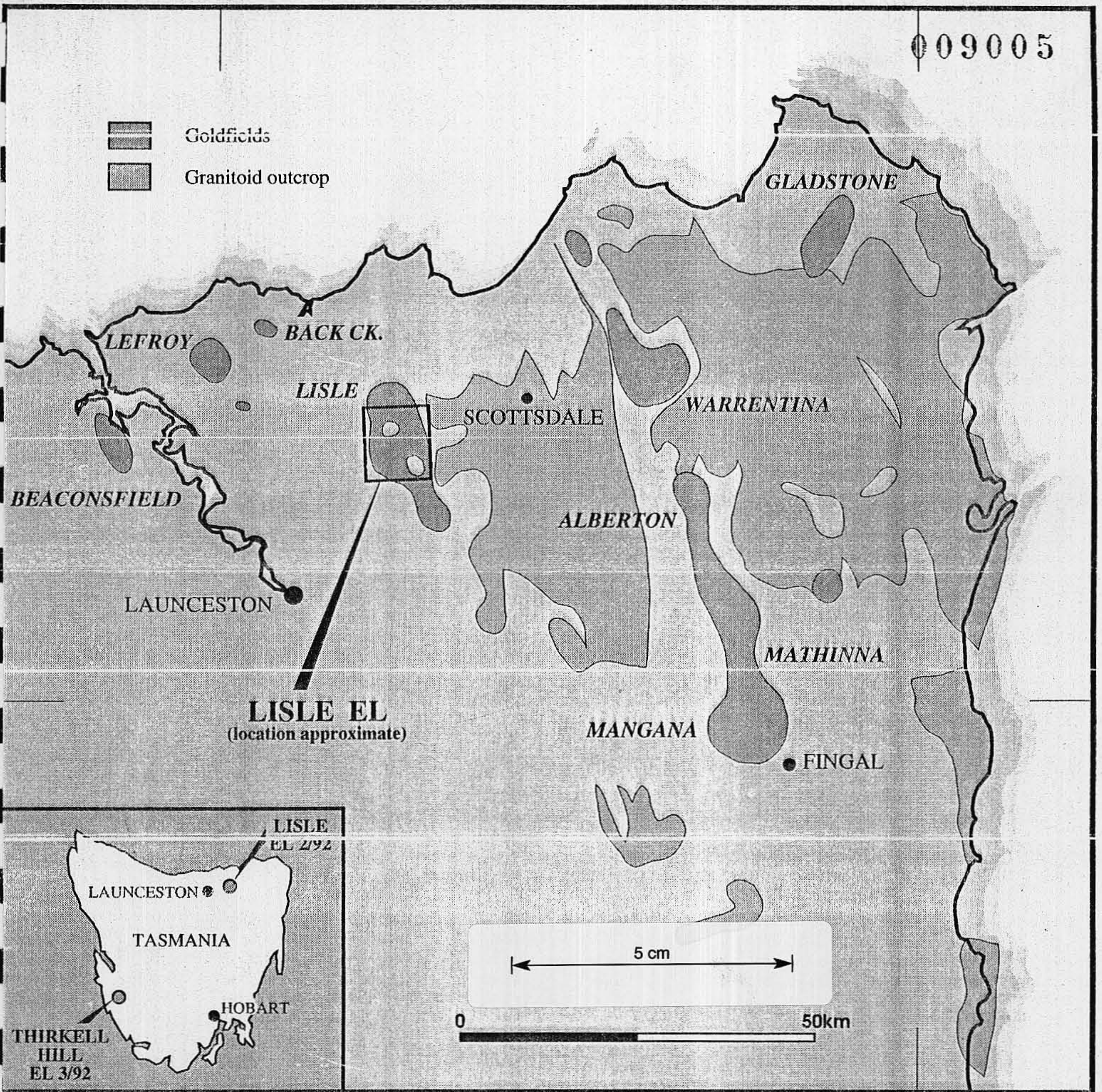


GOLD PRODUCTION - N.E. TASMANIA

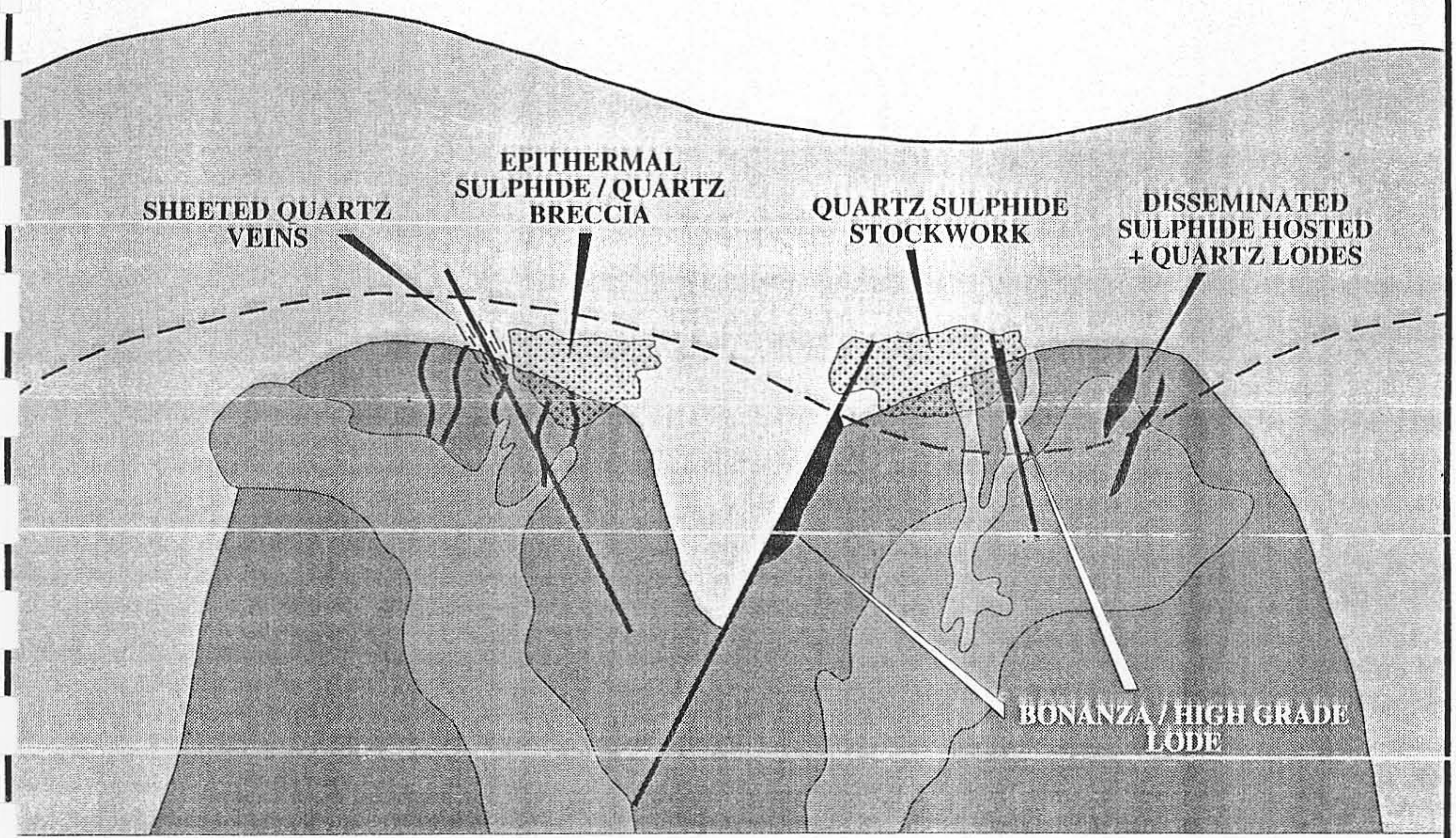
GLADSTONE	0.2t	WARRENTINA	0.1t
MANGANA	0.5t	**LISLE**	**10.0t**
MATHINNA	8.8t	BACK CREEK	0.3t
DANS RIVULET	0.1t	LEFROY	5.2t
ALBERTON	0.8t	BEACONSFIELD	27.8t

MAC MINING N.L.
LISLE

GOLDFIELDS AND GRANITOIDS IN NORTHEAST TASMANIA

MAY 1993

009006



Early stage intrusive

Late stage intrusive

Late stage differentiates

Mathinna beds - sediments

Original land surface

Present land surface at Lisle

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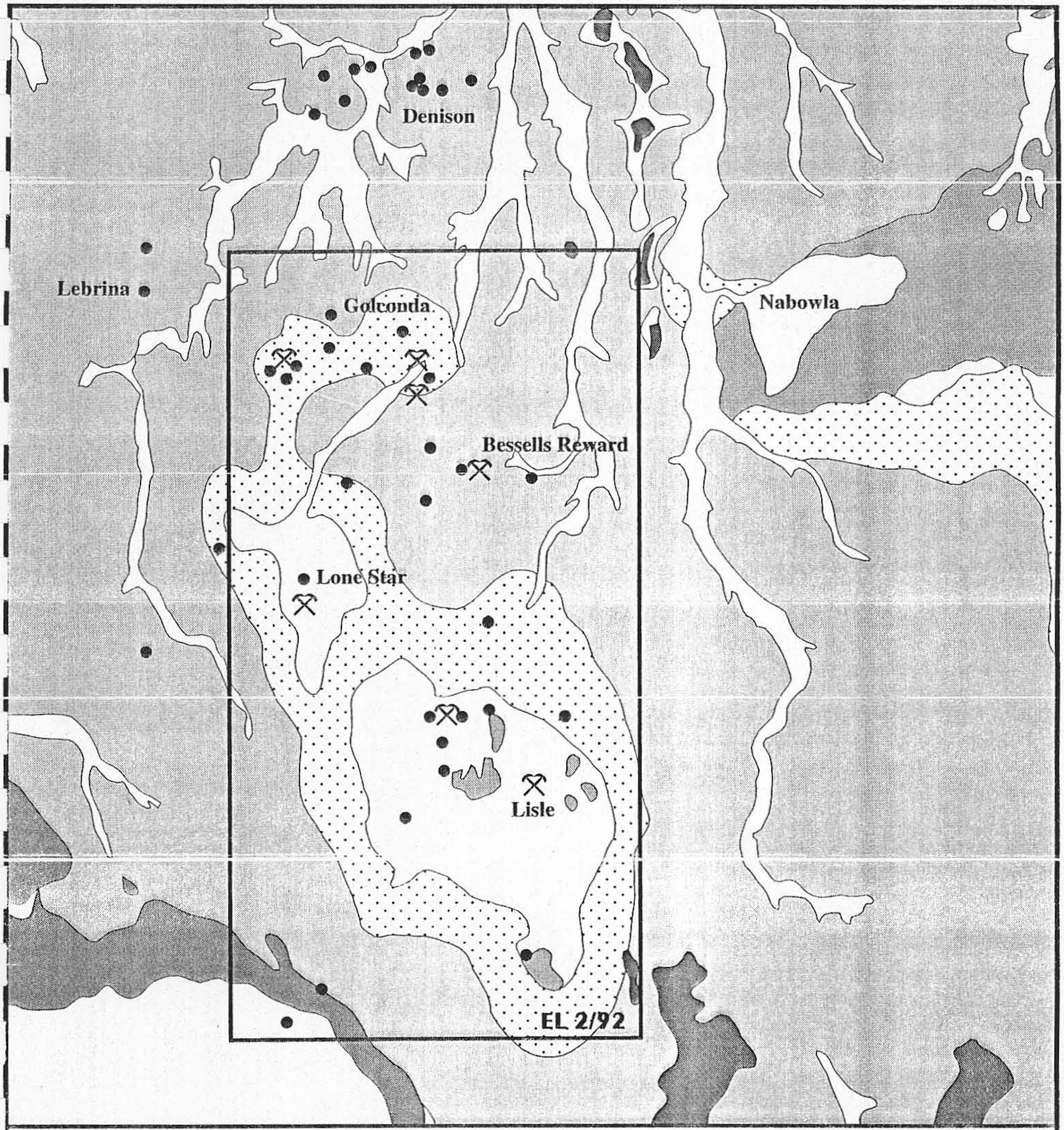
LISLE - EL 2/92

POSSIBLE TARGET MODELS

MAY 1993



Quaternary & Tertiary sediments

Tertiary basalt

Permian sediments

Reported Gold occurrence

Devonian granodiorite

Mathinna beds - hornfelsed

Mathinna beds - quartzite, slate, black shale

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LISLE - GOLCONDA AREA

REGIONAL GEOLOGY

MAY 1993

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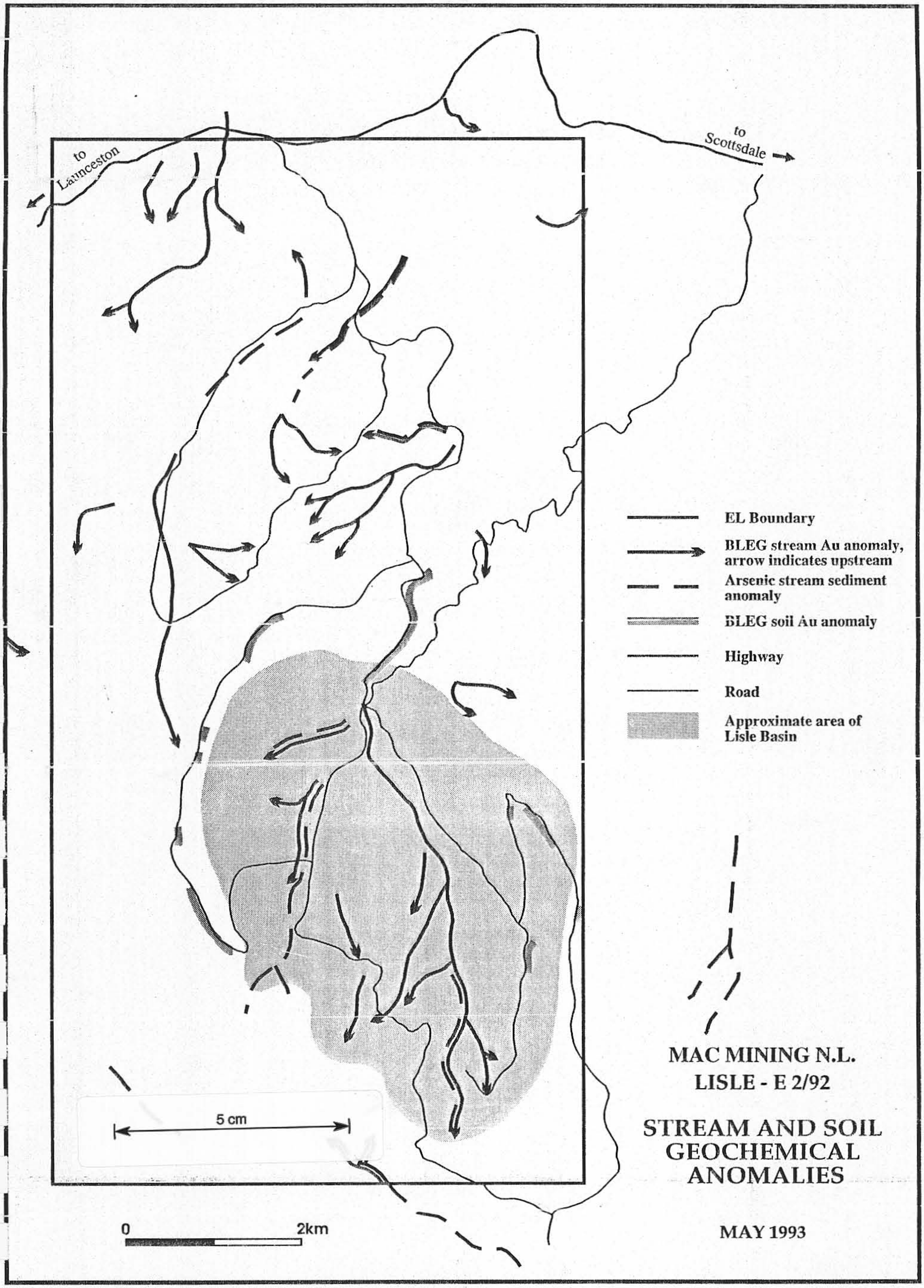
to Launceston
to Scottsdale
EL Boundary
BLEG stream Au anomaly, arrow indicates upstream
Arsenic stream sediment anomaly
BLEG soil Au anomaly
Highway
Road
Approximate area of Lisle Basin
5 cm
0
2km
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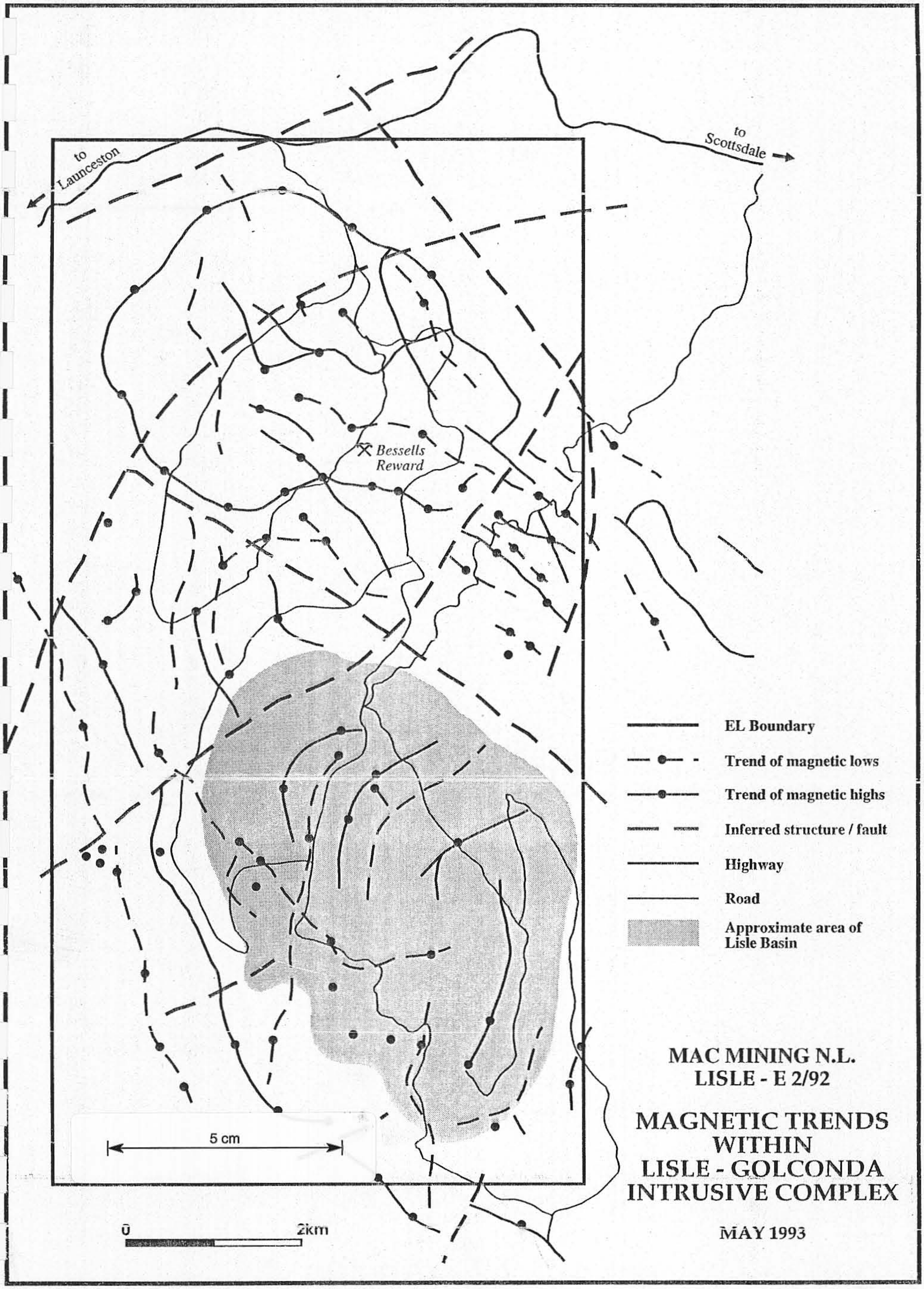
LISLE - E 2/92
STREAM AND SOIL GEOCHEMICAL ANOMALIES
MAY 1993

009009



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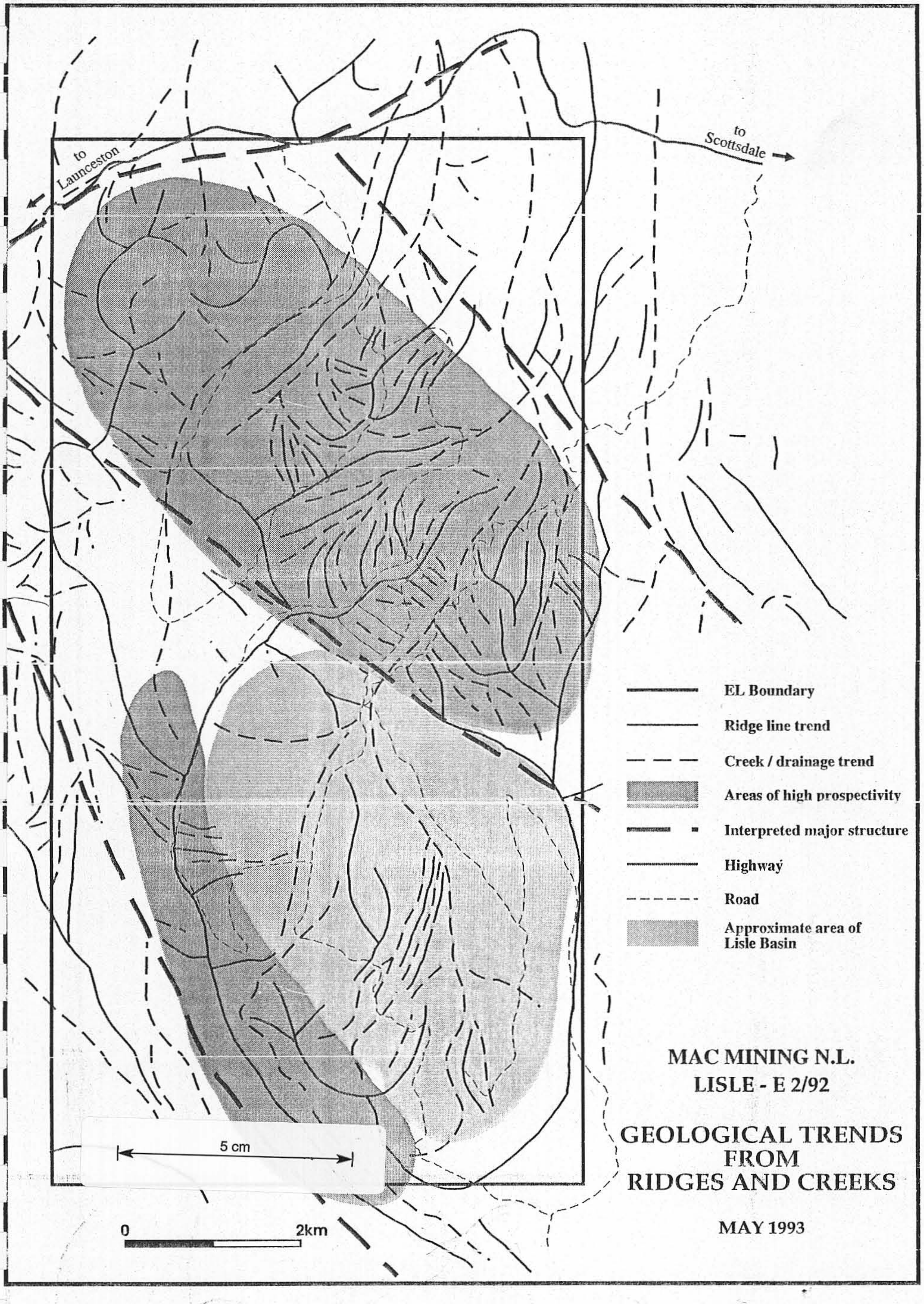
LISLE - E 2/92

MAGNETIC TRENDS WITHIN LISLE - GOLCONDA INTRUSIVE COMPLEX

MAY 1993


to Launceston
to Scottsdale
EL Boundary
Ridge line trend
Creek / drainage trend
Areas of high prospectivity
Interpreted major structure
Highway
Road
Approximate area of Lisle Basin
5 cm
0
2km
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LISLE - E 2/92
GEOLOGICAL TRENDS FROM RIDGES AND CREEKS
MAY 1993

009011

A REVIEW OF THE GEOLOGY, GEOPHYSICAL SURVEYS,

DRILLING AND OTHER EXPLORATION

OF

EL 2/92 - LISLE TASMANIA

FOR

MAC MINING N.L.

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6 April 1993

009012

A REVIEW OF THE GEOLOGY, GEOPHYSICAL SURVEYS,

DRILLING AND OTHER EXPLORATION

OF

EL 2/92 - LISLE TASMANIA

FOR

MAC MINING N.L.

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6 April 1993

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FIGURES

PLATES

1 INTRODUCTION

This report is a compilation of data for the Lisle-Golconda area (Figure 1) and interpretation of, and conclusions drawn from that data by the writer. Large sections of reports and papers by others are quoted in the text so that sufficient information should be available for the reader to judge for him/herself the writer's conclusion and recommendations for exploration.

1.1 LAND TENURE

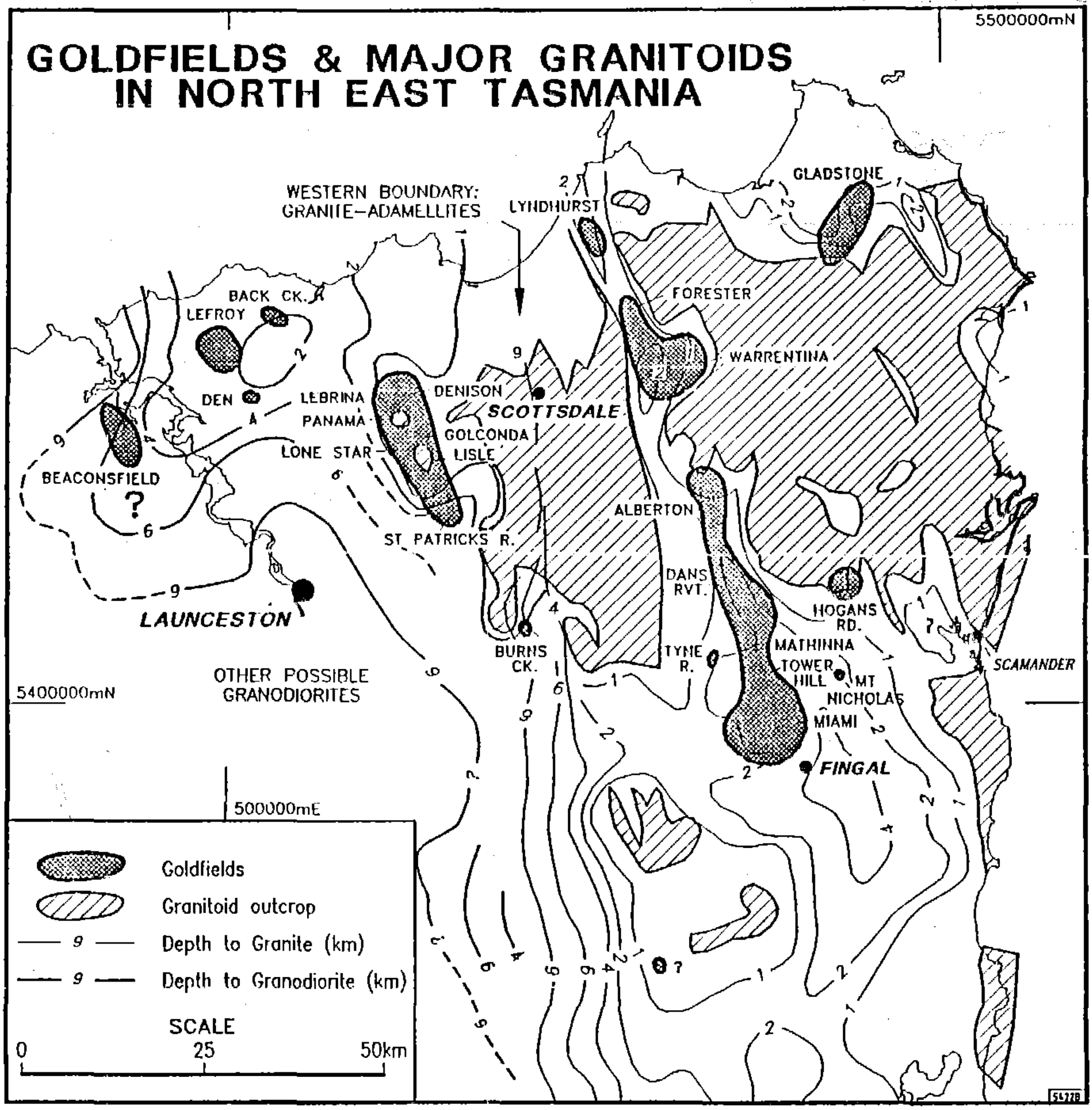
EL 2/92 (Figure 2) was issued for 1 year to RD & RJ McNeil on 24/7/92, and transferred to Mac Mining N.L. on 16/10/92. The area of the license is 71 square kilometres and the expenditure committment is $14,200. Some areas held under lease are excluded from the license (Figure 3).

1.2 LOCATION

The Lisle-Golconda area is situated approximately 30 km northeast of Launceston in northeastern Tasmania (Figure 1). The Lisle Goldfield was the site of considerable activity in the latter half of the 19th century and is reputed to have produced 250,000 ozs of gold, mainly from alluvial and eluvial workings. As can be seen from the table below, the Lisle Goldfield was Tasmania's second largest goldfield and the largest alluvial goldfield.

GOLDFIELD	GOLD PRODUCTION (t)
Gladstone	0.2
Scamander	0.01
Mangana	0.5
Mathinna	8.8
Dans Rivulet	0.1
Alberton	0.8
Warrentinna	0.1
Lyndhurst	0.02
Lisle	10
Back Creek	0.3
Lefroy	5.2
Beaconsfield	27.8
Cethana	0.2
Wynyard	0.3
Corinna	1
Lyell	0.7
Cygnet	0.1
Jane River	0.01
Total	**56.1**

Access is excellent and the area is crisscrossed with numerous forestry roads and tracks.



The distribution of the major goldfields in northeastern Tasmania, showing relationships to granitoids, after Leaman and Richardson (1992).

5 cm

FROM BOTTRILL ET AL (1992)

FIGURE 1

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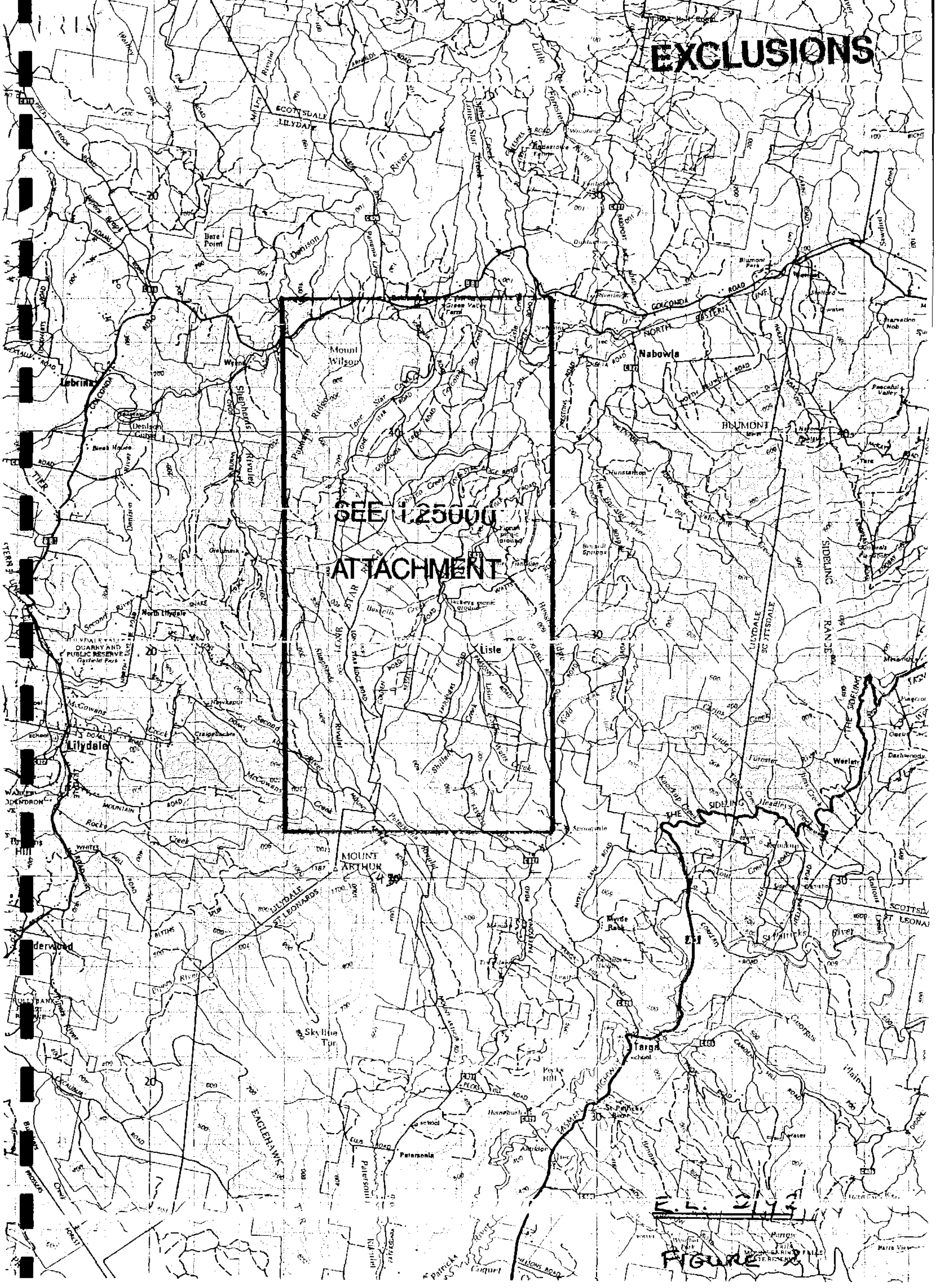
EXCLUSIONS
SEE 1:25000
ATTACHMENT
Mount Wilson
Nabowla
Lebrina
Lilydale
North Lilydale
Lisle
Blumont
Targa
Patersonia
MOUNT ARTHUR
Skyline Tier
SIDELING RANGE
SCOTTSDALE
LILYDALE
GOLCONDA
ROAD
FIGURE 2

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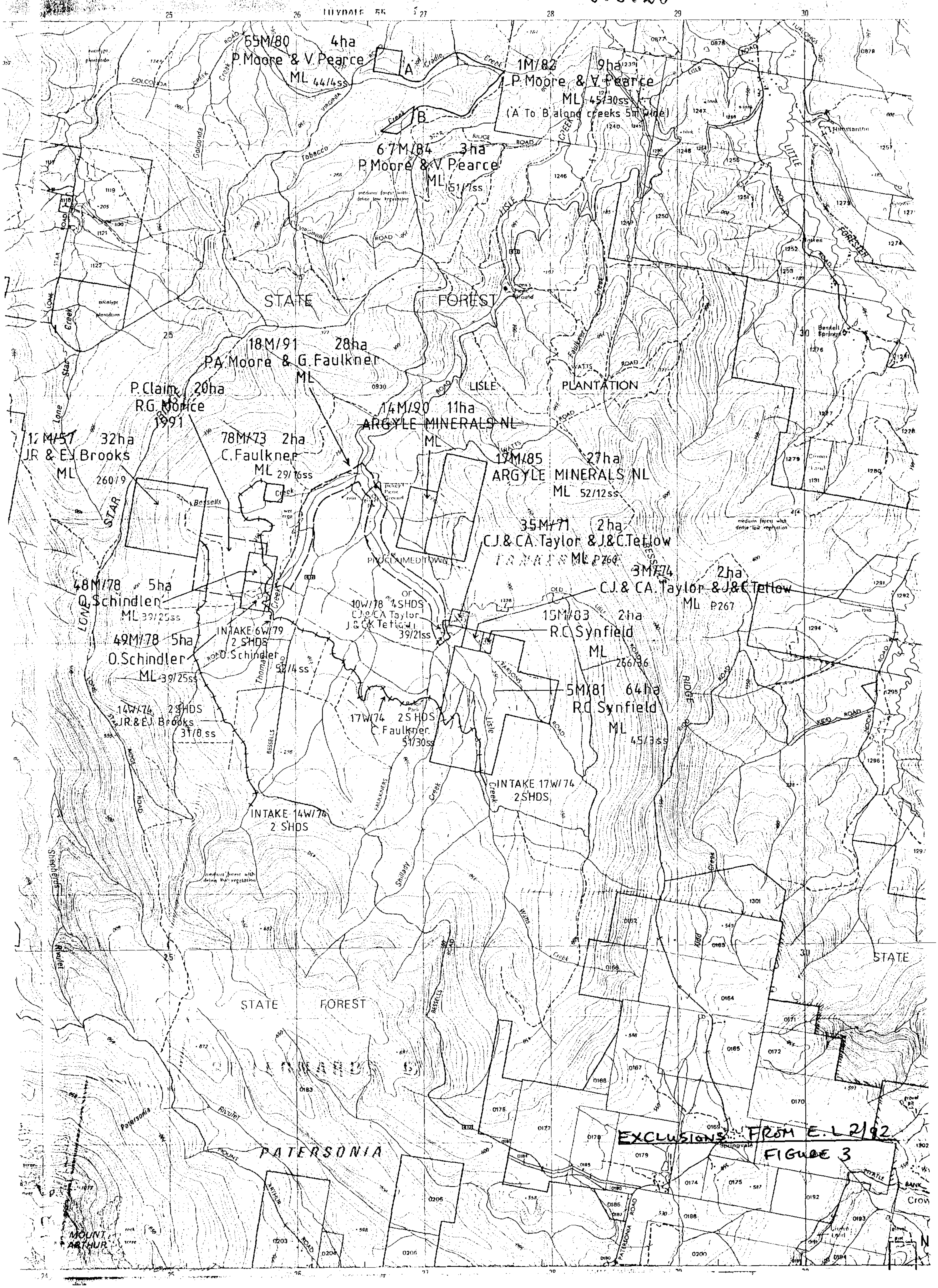


EXCLUSIONS FROM E.L 2/92

FIGURE 3

1.3 TOPOGRAPHY

Maximum relief in the area is approximately 400 metres. Granitic exposures tend to form basins or depressions such as the Lisle and Lone Star Basins and Mathinna Beds from the ridges (Figure 4). There are exceptions and at the north end of the Lisle Basin granitic exposures form hills several hundred metres above the outlet to the Basin. A creek/ridge interpretation of the topography is shown in Plate 2. The writer suggests this interpretation reflects the underlying and overall structure of the area. Each linear on Plate 1 is not necessarily a fault or structure but the pattern of breccias is important in determining structural directions and intensity of structure (see Section 3.5).

Although steep hill slopes are common the topography would not hinder exploration except to the extent that talus obscures bedrock geology.

Much of the area is under plantation for both eucalypt and radiata pines. This also is not a problem for exploration.

1.4 HISTORY OF EXPLORATION

Modern exploration commenced with Comalco in 1976. Comalco completed stream sediment sampling and rock chip sampling but because of analytical errors their rock chip results are of uncertain value.

From 1983 - 1986 BP Minerals/Seltrust carried out a program of mapping, rock chip sampling, stream sediment sampling, aeromagnetic surveying and open hole percussion drilling - mainly within the Lisle Basin. Their work showed a geochemical association of gold with arsenic, silver, chalcopyrite and pyrite but little else of particular significance.

The aeromagnetic survey results were of interest as they partly delineated the subsurface expression of the Lisle magnetic granitoid cupolas and also defined a zone of low magnetic intensity concentrically disposed around the granitoids. BP/Seltrust interpreted this latter zone to be one of alteration (magnetite degration) and were particularly interested in small discrete magnetic highs that were scattered throughout this zone. Perhaps they regarded these as potential pyrrhotite hosted auriferous deposits.

BP/Seltrust followed up magnetic and geological targets using open hole percussion drilling mainly within the granodiorite in the base of the Lisle Basin, but the program suffered from poor drilling conditions. Holes averaged 40-50m depth but often collapsed before a satisfactory test was completed. Samples were collected and analysed for gold but the AAS technique was employed for analysis. Most holes terminated in clays ex-granitoid although some intersected both Mathinna Beds and granitoids.

Argyle Minerals from 1986 to 1988 carried out an aerial photo interpretation followed up by limited rock chip sampling and bulk sampling at the Denison River Goldfield.

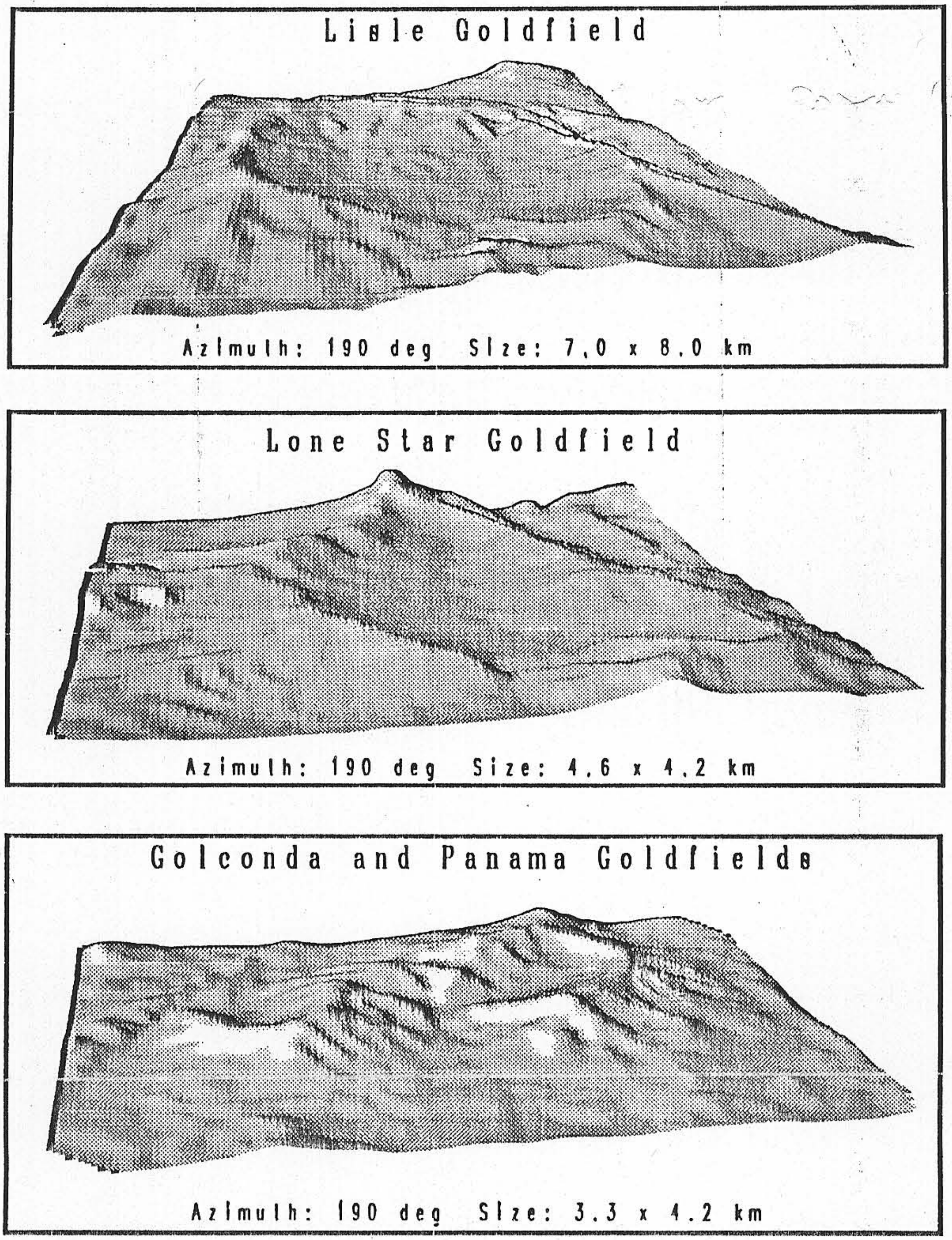
Billiton in 1990-91 completed a preliminary regional assessment and a prospect specific preliminary assessment.

The regional assessment was a stream sediment survey of much of NE Tasmania and included three samples at each site (about 30 samples).

- 5 kg bulk sample for BLEG Au
- −80 mesh silt sample for Au, Pb, Sn, As, Cu, Zn and Ag
- Pan concentrate sample for Au, Pb, Su, As, Cu, Zn and Ag

Several broad anomalous areas were defined.

Project exploration included a detailed BLEG Au only survey (214 samples) and a reconnaissance BLEG soil survey. Broad anomalous areas were defined by both surveys but Billeton relinquished the EL without follow up. Billeton also funded a post graduate student from CODES (University of Tasmania) to study the nature of gold observed at Lisle and adjacent mineral fields (Roach 1991)



Perspective views of the Lisle, Lone Star, Golconda and Panama goldfields. All views are looking towards the south with simulated illumination from the northeast and no vertical exaggeration.

FROM ROACH (1992)

FIGURE 4

2 SUMMARY AND CONCLUSIONS

This review of all available data, including past exploration results, suggests to the writer that the source of the Lisle alluvial/eluvial mineralisation was a multi million oz gold deposit situated in an unknown host environment at or near the uppermost granodiorite - sediment contact. Available data also suggests that similar multi million oz gold deposits could occur at shallow depths elsewhere in EL 2/92, notably (but not exclusively) SW of the Lisle Basin and in the Bessell's Reward area. No substantial exploration has been completed by others for such deposits. The principal results and conclusions from the study are as follows:

- A single intrusive complex underlies the Lisle - Golconda area. This intrusive complex is predominantly granodiorite, may include several intrusive phases and has both magnetic and non magnetic phases.

  The complex underlies approximately 55 square kilometres.

- The intrusive complex is divided by NE trending structures into two parts, named here, the Lisle complex and the Golconda - Bessell's Reward complex.

- The Lisle complex extends from the south end of the Lisle Basin to northwest of Lone Star. It has been extensively eroded within the Lisle and Lone Star basins, and is known to underlie the northern part of Lone Star ridge at shallow depth.

- The Golconda - Bessell's Reward complex is deeper and reaches surface only in a few places. The Bessell's Reward area shows the effects of a doming intrusive at depth. The depth to granodiorite is probably quite variable throughout this complex but may not be particularly deep at Bessell's Reward.

- The Scottsdale Batholith is separate and apparently unrelated to the Lisle - Golconda pluton.

- The Mathinna Beds which overlie the granodiorite include hornfels, quartzite, sandstone, shale and black shale. The black shales are reasonably widespread and may comprise a mappable unit. In some areas (but not all) they contain trace but significant gold and other metals. Some workers have suggested the dark black hornfels present in a few locations is metamorphosed black shale.

- A large thermal halo within the Mathinna Beds surrounds much of the intrusive complex. Although mapping does not show hornfels in the Bessell's Reward area we believe granodiorite probably underlies the area at a depth of a few hundred metres or less.

- Within the Lisle Basin and except for the southern granodiorite outcrops, the granodiorite forms a marked topographic depression. This suggests that some of the granodiorite, immediately at and below the upper contact, may in many areas be hydrothermally altered (argillic alteration) and thus susceptible to erosion.

. Approximately 250,000 ozs of gold have been produced from alluvial/ eluvial deposits in the Lisle Basin. The origin of this gold is still conjectural. It may have occurred as a low/medium grade stockwork

and/or disseminated type deposit at or near the contact of the granodiorite; within hydrothermal breccias or disseminated with pyrite within the hornfels zone; with quartz in leakage zones/structures well away from the granodiorite/hornfels contact; or concentrated at the granodiorite/hornfels contact because of the relative impermeability of the hornfels. There is evidence to support each of the above hypotheses and all may have occurred but we do not know if one particular style dominated.

. The black shales within the Mathinna Beds may have been an impermeable or less permeable barrier to hydrothermal fluids. Higher grade gold mineralisation may be deposited beneath black shale units (and above the granodiorite).

. It is not known what role the intrusive complex had in gold mineralisation. It seems likely that it was important, at least as a source of heat. However, the granodiorite, where mineralised, was obviously in place before mineralisation occurred. Perhaps as Leaman (1992) suggests there is a particular phase of the intrusive complex genetically associated with mineralisation.

. In Lisle Basin, prior to deposition or placement in the lake beds/ alluvium at the bottom of the Lisle Basin, the gold was being transplanted in solution. There is some evidence that some of the gold was moved mechanically into the highest lake sediments prior to deposition in the lowermost sediments. Carbonaceous matter may have been the main precipitating agent. Most gold in solution probably exited the basin by way of Lisle Creek and the total volume of gold eroded may have been ten times (or more) the amount recovered from the alluvials. Geochemistry indicates a long "train" of gold downstream in Lisle Creek although no alluvial gold deposits have been located.

. Experience elsewhere (in the tropics particularly) has shown that gold is often leached from its host and travels downstream in solution for variable distances before it can be detected with conventional stream sediment geochemistry. This applies particularly to fine grained gold associated with sulphides, but also occurs with fine grained gold associated with quartz deposits, particularly if the quartz is highly fractured. At Lisle, most, if not all workers, considered that the primary gold was fine grained or very fine grained and thus probably moved in solution some distance before nuggetting or the formation of visible particles took place. Perhaps this means the source of the Lisle gold was hundreds of metres vertically above the present Lisle Basin and exploration of the granodiorite - sediment contact around the present Lisle Basin may not yield economic mineralisation.

. A problem with the suggestion that the alluvial gold at Lisle was derived from the upper part of the granodiorite or the uppermost contact zone is defining a sequence of events which is compatable with the retention of gold in the present day base of the Lisle Basin.

.. The basin is formed by the erosion of hydrothermally altered granodiorite which is more susceptible to erosion than the surrounding thermally altered sediments.

.. The basin is dammed at some stage and lake sediments deposited. Cainozoic deposits are reported up to 40 metres above present drainage levels.

.. Gold is deposited chemically and mechanically in the lake sediments. There are reports of gold up to 200 metres above lowermost gold workings. Gravel wash was not a pre-requisite for gold accumulation.

.. Reaching the basin by Lisle Creek re-distributes some of the gold into recent alluvial sediments.

. If this was the sequence of events surely if the gold originated in the uppermost granodiorite, whether it was eroded chemically or mechanically, most would have exited the Lisle area <u>before</u> a significant basin formed. Some may have moved down vertically and stayed within the confines of the basin but we believe it would have been a relatively small percentage of the total gold available. A large gold resource is indicated prior to erosion.

. No comprehensive exploration program has ever been completed for hard rock gold in the Lisle-Golconda area. Programs by Comalco, BP Minerals and Billiton have provided some good data but in my opinion never quite "came to grips" with the problem. Geochemical surveys by Billiton and the aeromagnetic survey by BP Minerals provide excellent data on which to base further exploration.

. Geochemical surveys by Comalco, BP Minerals and Billiton (minor work by CRA) have shown that:

.. Gold is fine to very fine grained and in general has not nuggetted.

.. There is a general association of gold and arsenic and although primary gold may not always have arsenic directly associated we believe it is a valuable pathfinder and may provide evidence of "leakage zones" above gold mineralisation.

.. There are large anomalous arsenic/gold areas in the vicinity of Panama - Golconda Bessell's Reward; northern divide of the Lisle Basin; southern Lone Star Ridge - SW rim of the Lisle Basin. These areas, particularly Bessell's Reward and anomalous values on Lone Star ridge may be indicating "leakage zones" from major subsurface mineralisation.

.. The granodiorite/sediment content may be close to surface in a number of area.

.. Several areas warrant close spaced soil geochemistry and ground magnetics and drill targets are likely to follow such work.

.. There is ample evidence that the Lisle - Golconda intrusive complex is associated with large quantities of gold. Economic gold deposits are probably dependent on suitable host preparation - brecciation and/or fracturing of the uppermost parts of granodiorite cupolas, the contact zone and the thermally altered sediments, or brecciation and fracturing along major fault zones.

. Much exploration in the past has been focused on the Lisle Basin itself and in particular the present granodiorite/sediment contact within the Lisle Basin - without much success in either locating the contact accurately or testing it. However, although this target has merit, further exploration should concentrate on locating near surface but non outcropping granodiorite cupoles where geochemistry suggests such bodies may be hydrothermally altered and mineralised. Such bodies could be similar in total gold content to the original Lisle hard rock source which we believe has probably been largely or completely eroded.

. Structural targets similar to the Beaconsfield lode could exist. Detailed structural analysis of the district, including image processing of the aeromagnetic data is warranted and structures should be compared to geochemical anomalies and followed up where appropriate.

3 GEOLOGY OF THE LISLE GOLCONDA AREA

Several historical goldfields including Lisle, Cradle Creek, Lone Star, Golconda and Panama occur within EL 2/92. Detailed descriptions of each of these fields are provided by Thureau (1882), Twelvetrees (1909) and Reed (1926). The geology of the region (from Roach 1992) is shown in Figure 5, and geology and Mac Mining sample locations with respect to topography are shown on Plate 1.

3.1 ROACH (1992)

Roach (1992) provides the best overall description of the geology of the area. He comments as follows: *"The study area lies to the west of the bulk of the Devonian Scottsdale Batholith which intruded the Mathinna Beds, a thick, poorly-documented succession of regionally metamorphosed turbiditic sediments of presumed Siluro-Devonian age. The Mathinna Beds crop out over much of the study area, where they consist of steeply-dipping, NW-trending beds of quartzite with minor finer-grained interbeds. The topography in the northern portion of the region is subdued, and outcrop is poor or obscured by widespread Tertiary sediments and Quaternary alluvium. To the south, the land surface rises abruptly towards a deeply-dissected plateau approximately 600m above sea level. In the far southwest of the area the Jurassic dolerite-capped peak of Mount Arthur rises above the plateau to a height of over 1100 metres. Tertiary Basalt flows are present, both on the plateau and at a number of isolated locations at lower levels to the north.*

Many of the known sites of gold mineralisation show a close spatial association with small cupolas of granodiorite which have intruded the Mathinna Beds up to 10 km west of the main boundary of the Scottsdale Batholith. The granodiorite is highly weathered at the surface, and its outcrop is often obscured by surficial sediments. Granodiorite was exposed by mining activities in the Lisle, Golconda, Panama and Lone Star goldfields. The outcropping areas of granodiorite are interpreted to be the apical regions of a larger subsurface body, the extent of which is roughly delineated by the extent of the mapped area of hornsfelsed sediments.

A particularly prominent feature of the intrusions is their surface expression. Marked topographic depressions occur in all areas where the granodiorite is exposed. The strongly-hornsfelsed sediments within the contact aureole of the intrusion are resistant to both chemical and mechanical weathering, while the granodiorite appears to be particularly susceptible to chemical breakdown, and is consequently eroded. The largest of these features is associated with the intrusion at Lisle (Figure 4. Here the resultant crater-like feature has dimensions of approximately 4 x 5 km and a depth of up to 350 metres. The slopes on the flanks of the depression are steep, and considerable thicknesses of talus have been shed from the enclosing ridges into the basin, the floor of which is flat or gently undulating. The single hydrological outlet from the Lisle valley is to the north through a narrow, deeply incised gully. The smaller intrusions, such as at Panama or Golconda, display the same basic form as the intrusion at Lisle.

3.1.1 GRANITE CHEMISTRY AND PETROLOGY

The marked variations in the magnetic susceptibility of the various granodiorite units suggested that these units may also be distinctive geochemically. A suite if 15 samples from Lisle, Golconda, Panama and the western margin of the Scottsdale Batholith, known as the Diddleum pluton (McClenaghan, 1989), were analysed for major and trace elements. Plots of Sr vs Rb and K_2O vs Al_2O_3 are shown in Figure 6.

There appears to be a fairly clear distinction between the rocks of the Scottsdale Batholith and the granodiorite from the Lisle area. There is also a possible geochemical difference between the magnetic and the non-magnetic rocks from Lisle.

Figure 6 shows a Sr vs Rb plot for selected Tasmanian granitoids, including the analyses from Lisle. The granodiorites, from the Lisle area fall within a well-defined field. In terms of Rb and Sr, the Lisle granodiorite is the least fractioned of the Tasmanian granitoids.

Thin sections of the various granite samples were examined in an attempt to explain their variable magnetic properties. All the samples, including those from the Scottsdale Batholith, contain small amounts of finely disseminated magnetite and ilmenite. The strongly magnetic samples from Lisle and Golconda were distinguished by the presence of aggregates of magnetite associated with clots of hornblende and biotite".

3.2 BOTTRILL ET AL (1992)

Bottrill et al (1992) comments on geology as follows:

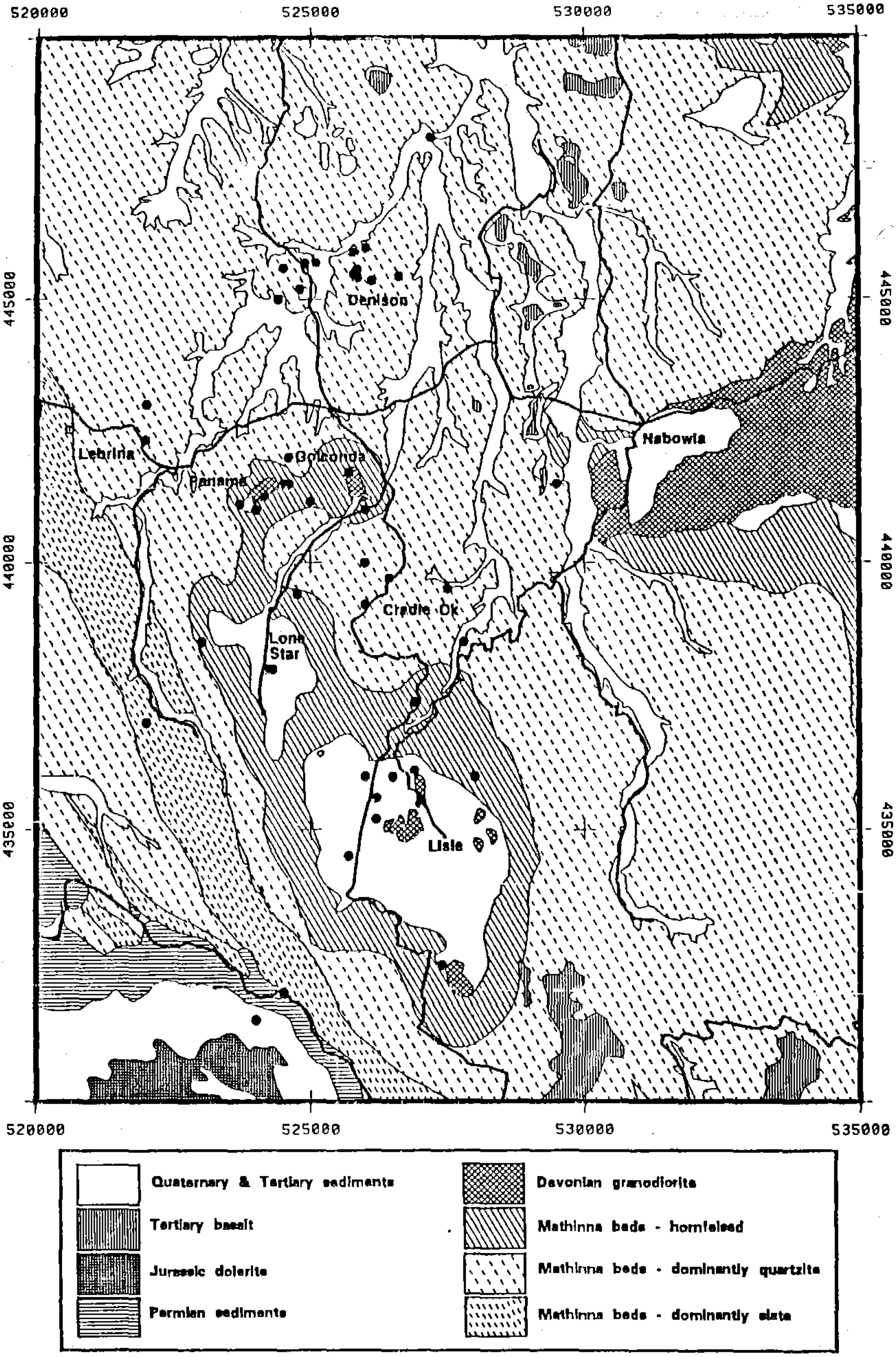
" The workings are spatially closely related to granitoid intrusions in Mathinna Beds (Roach, 1991). Hornblende-biotite-magnetite bearing granodiorites are present, but more alkali-feldspar rich phases occur. The metamorphic aureoles are commonly sharply defined, varying from 800m to about 5km in width, depending upon the dip of the contact (McClenaghan et al., 1982). Within these aureoles the sediments are commonly spotty and/or hornsfelsed, and may contain biotite, epidote-clinozoisite, tourmaline, andalusite and cordierite, as well as recrystallised quartz, muscovite and chlorite. Small quartz and greisen veins and granitic dykes occur in the aureole.

3.3 ASKINS (1977) - COMALCO

Askins (1977) - Comalco comments on geological mapping as follows (Figure 7):

" A reconnaissance geological map was compiled using airphoto enlargements. The dark blue-grey hard hornfels referred to by Twelvetrees (1909) was regarded as important since Twelvetrees had noted the presence of gold in it. Hence its distribution in outcrop was mapped, and an attempt was made to trace this rock beyond the contact metamorphic aureole. However the initial investigations failed to identify the pre-metamorphic equivalent of this hornfels, but it is suspected to be black shale.

009030

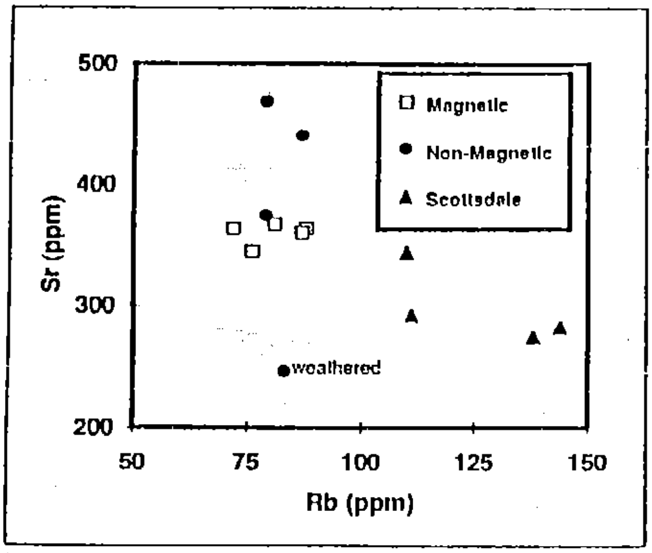


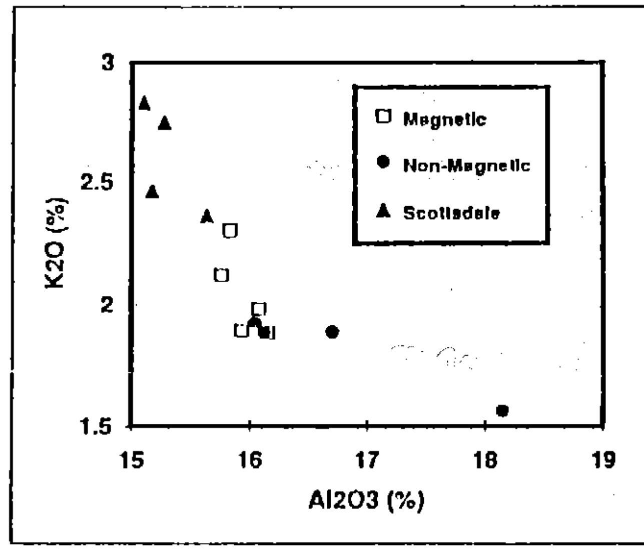
Geology of the Lisle–Golconda Goldfield. Mineralised locations from the MIRLOCH database are shown as black dots. (1:100 000, AMG grid).

5 cm

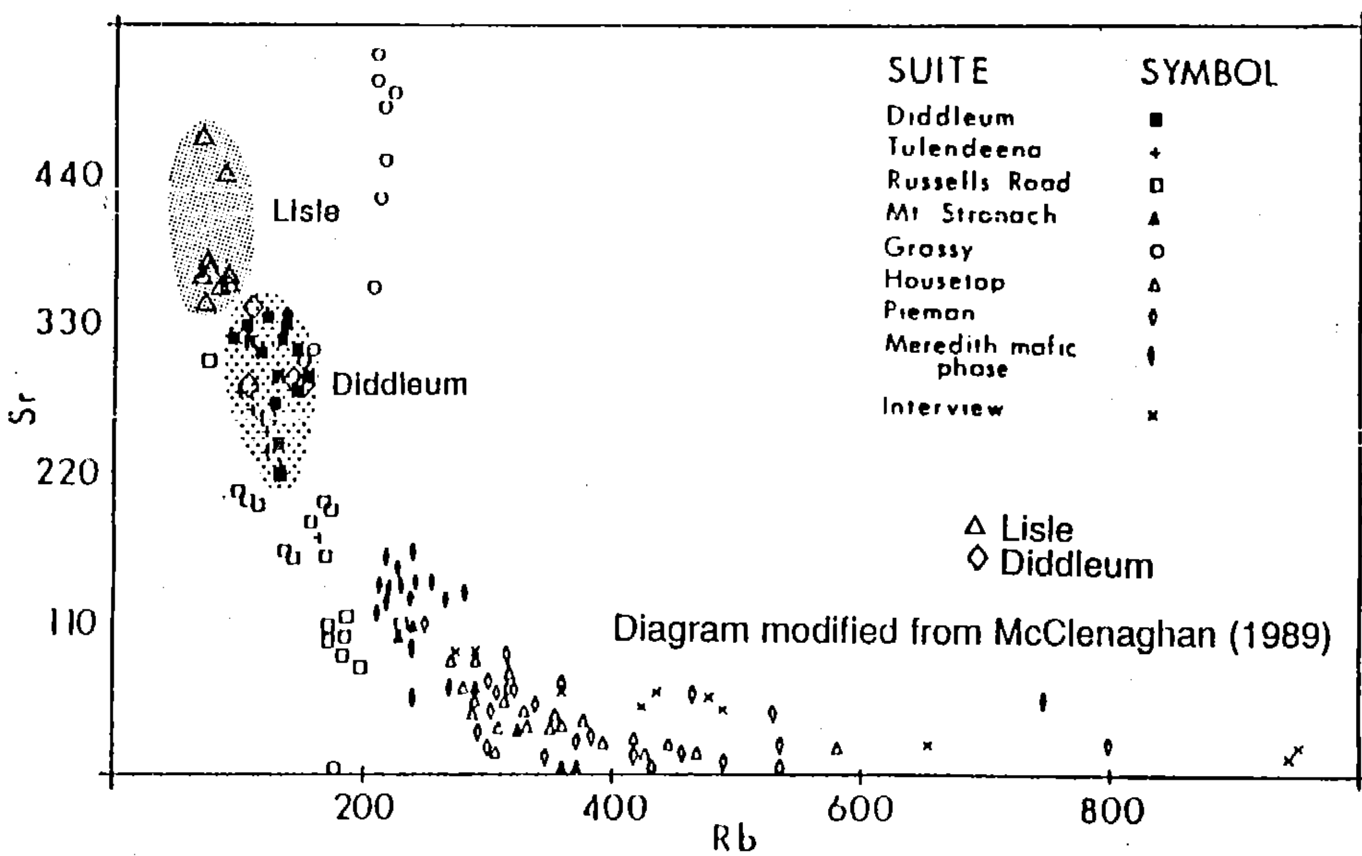
FROM ROACH (1992)

FIGURE 5





Plots of Sr vs Rb and K vs Al for the Lisle granodiorite and the western portion of the Scottsdale Batholith.



Plot of Sr vs Rb for the Lisle granodiorite compared to other Tasmanian granitoids.
Modified from McClenaghan (1989).

FROM ROACH (1992)

FIGURE 6

It was thought that this rock could originally have been a carbonaceous dolomitic siltstone having some similarities to rocks at the Homestake mine, Dakota, (Slaughter, 1968). However it is merely a cordierite-biotite hornfels.

No tuffaceous beds described by Reid (1926) were located."

3.4 STORER (April 1984) - BILLETON

Storer (April, 1984) comments on geology as follows:

"The rock types contained within EL 20/83 consist almost exclusively of Palaeozoic rocks. Ordovician sediments - the Mathinna Beds, have been intruded by a number of discrete intrusions of granitic affinity.

Tertiary Basalts overlie rocks in the south-east of the licence area, while dolerite - part of the sequence that occupies the base of Mt.Arthur - outcrops to the south-west.

3.4.1 ORDOVICIAN

The oldest rocks in the district are the sandstone and shales of the Mathinna Beds. Reid reported that the sandstones and shales are intercalated with tuffs and lavas. No evidence for this suggestion was found during geologic mapping of the licence area. Strong linear magnetic high visible on the aeromagnetic data is suggestive of a sedimentary origin - the possibility exists for them to represent basic volcanic flows interbedded with the sediments.

Dip and strike measurements were taken at each favourable locality. The object of this was to identify any regional trend to bedding with particular emphasis on disturbances to this trend due to updoming associated with granitic intrusions. A rough north-west strike is observable in the bedding measurements, however, results are too confused to substantiate any likely updoming.

3.4.2 DEVONIAN (?) - INTRUSIVE ROCKS

Granitic rocks have been mapped by Reid occupying the valley floors at Lisle, Panama, Lone Star and Golconda.

Granitic rocks were observed at Lisle and at Golconda. Two occurrences of quartz veined granitic rocks were noted. Petrologic examination of samples from the Lisle intrusion indicate the rocks are hornblende-biotite granodiorite and biotite granite. Few localities were observed where the rocks outcrop. Those outcrops observed were typically highly weathered.

The intrusive rocks mapping by Reid at Panama, Lone Star and Cradle Creek were not located in the present study. The Lisle, Lone Star, Panama and Golconda intrusions are probably apophyses of the main Scottsdale Granite.

.....Two samples of rock were sent for petrologic examination.

3.4.2.1 ***Biotite - Hornblende Tonalite** (E 59034)*

This is a biotite-hornblende tonalite, based strictly on its composition; if preferred, it could be termed a granodiorite, as there seems to be little real classifactory distinction between the two terms.

The rock is composed of about 50-60% sodic andesine, as stubby prismatic crystals, with about 20% interstitial anhedral quartz, and 20% of ferromagnesian minerals; about 5% K-feldspar occurs in cores of andesine crystals, and may represent late magmatic corrosion. The ferromagnesian minerals are mainly stout flakes of dark brown biotite, with associated minor green prismatic hornblende; both minerals are fresh.

The rock is pervasively brecciated, and it is believed that this occurred prior to alteration; in fact, some of the alteration may well be of a hydrothermal argillic type, not merely weathering, and would logically have post-dated (and perhaps have been related to) the brecciation event.

Primary accessory minerals include fine magnetite, euhedral zircon, and apatite needles.

The rock is fresh except for incipient alteration of the cores of plagioclase crystals, with the development of matted sericite flakes.

The fabric is very uniform, with an average grain-size of 1-2mm, suggesting that the rock was derived from a homogenous major intrusion.

3.4.2.2 ***Brecciated, Altered Granite (?)** (E 59037)*

This rock is largely weathered and decomposed, though some textural and other features are preserved, enabling it to be broadly classified as a granite-granodiorite, i.e., anywhere in that compositional range, depending on the interpretation of the available evidence.

Quartz is conspicuous, as irregular, splintery fragments representing shattered coarser patches, and there are many expanded (exfoliated) books of semi-opaque, kaolinised, and iron-stained mica, believed to have been biotite altered to degraded vermiculite; interstitial patches of formless, chaotic kaolinite masses represent argillised feldspar. Since vestiges of lamellar twinning are usually preserved when plagioclase is altered, the absence of such relict features suggests that the feldspars were potassic. Tentatively, therefore, the rock could have been a biotite granite, and thus different from E 59034, especially as there us no indication of hornblende."

4.3.2.3 ***Scottsdale Batholith***

Rocks of the Scottsdale Batholith were observed to outcrop in the eastern portion of the Exploration Licence. The batholith is usually a medium to coarse grained grey biotite hornblende granodiorite. The radiogenic age-determination of the Scottsdale Granite is a minimum of 370+ 10m.y., corresponding to a Devonian age.

3.4.3 *JURASSIC DOLERITE*

Outcrops of tholeitic dolerite are observed in the south-west portion of the licence area where they form the base of Mt.Arthur. The rocks have been mapped here and elsewhere as Jurassic in age.

3.4.4 *TERTIARY*

The deposits at Lisle fall into two categories. Wholly alluvial - those deposits below 230-245m, and those above 245m which are partly eluvial. Gold is associated with both forms of deposits. Gold occurs in basal units underlying thick talus debris - up to 30m thick - on the walls of the Lisle Valley. The genesis of the high level gold deposits is uncertain - but Reid suggested that they mark the surface of a paleo lake bed."

3.5 STRUCTURE

Although structure would normally be considered of great importance in a gold district there has been no concerted attempt to apply structural analysis in the Lisle - Golconda area.

Hunting undertook a airphoto interpretation for BP Minerals and a part of their study is shown as Figure 9. Billiton completed a major lineament study of NE Tasmania using Landstat which shows a major "mineralising lineament" passing through Lisle and Golconda (Figure 10).

We have concluded a study of topography and attempted to define structures using the aeromagnetic data. Plate 2 is an interpretation of ridge line and creek topography and in conjunction with structure from aerial photographs and aeromagnetics gives a fairly comprehensive view of the overall structural pattern in the area.

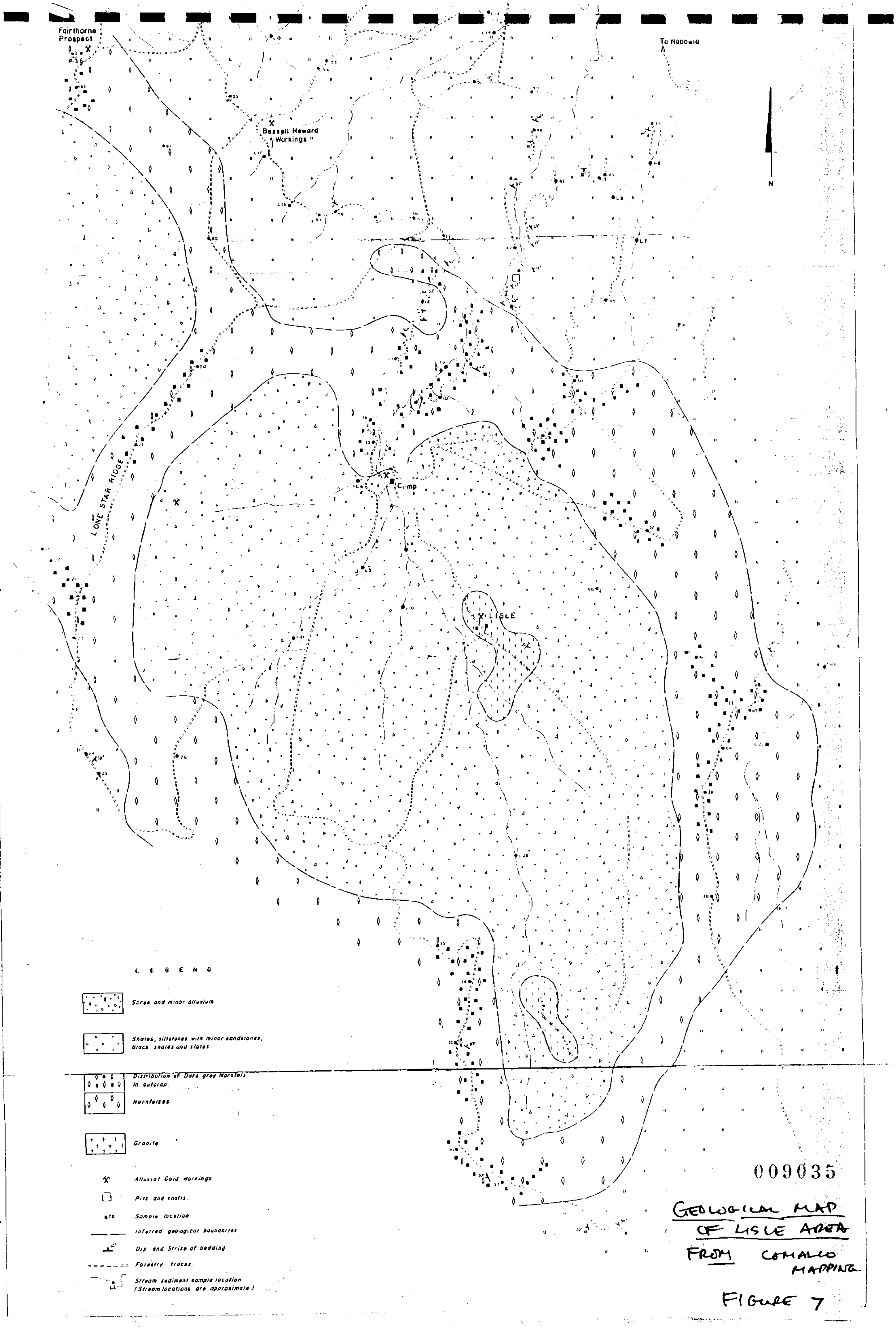
As mentioned in the section on geophysics the Lisle-Golconda area is centered between two NW to NNW trending lineaments. Much of the structure

is probably related to granodiorite intrusion. The area between Watts Road/Bessell's Ridge in the south and Panama in the north (Bessell's Reward-Golconda area) shows curved and linear structures which reflect the strain caused by a doming granodiorite at depth.

A major NW trending lineament/structure separates the Lisle - Lone Star part of the intrusion complex from the Panama - Watts Road section. Further major structures appear to be reflected by Lisle Creek where it breaches the Lisle Basin, and Lone Star Creek near Lone Star Road.

Obviously not all features on Plate 1 are structures but we believe the pattern shown here reflects the overall structural pattern.

Further image processing of the aeromagnetic data and detailed airphoto analysis could help to define prospective structures for Au mineralisation (in conjunction with geochemistry).



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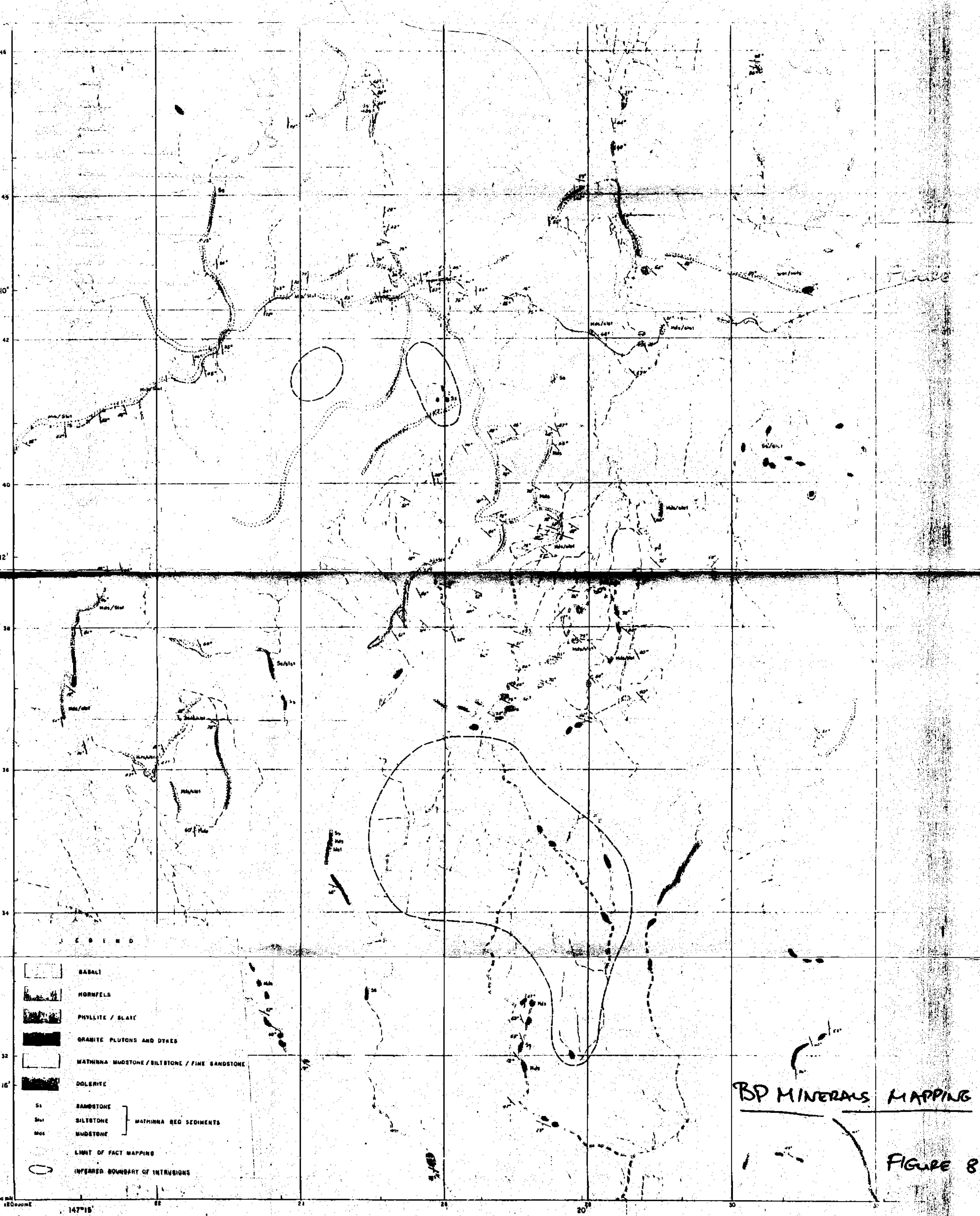
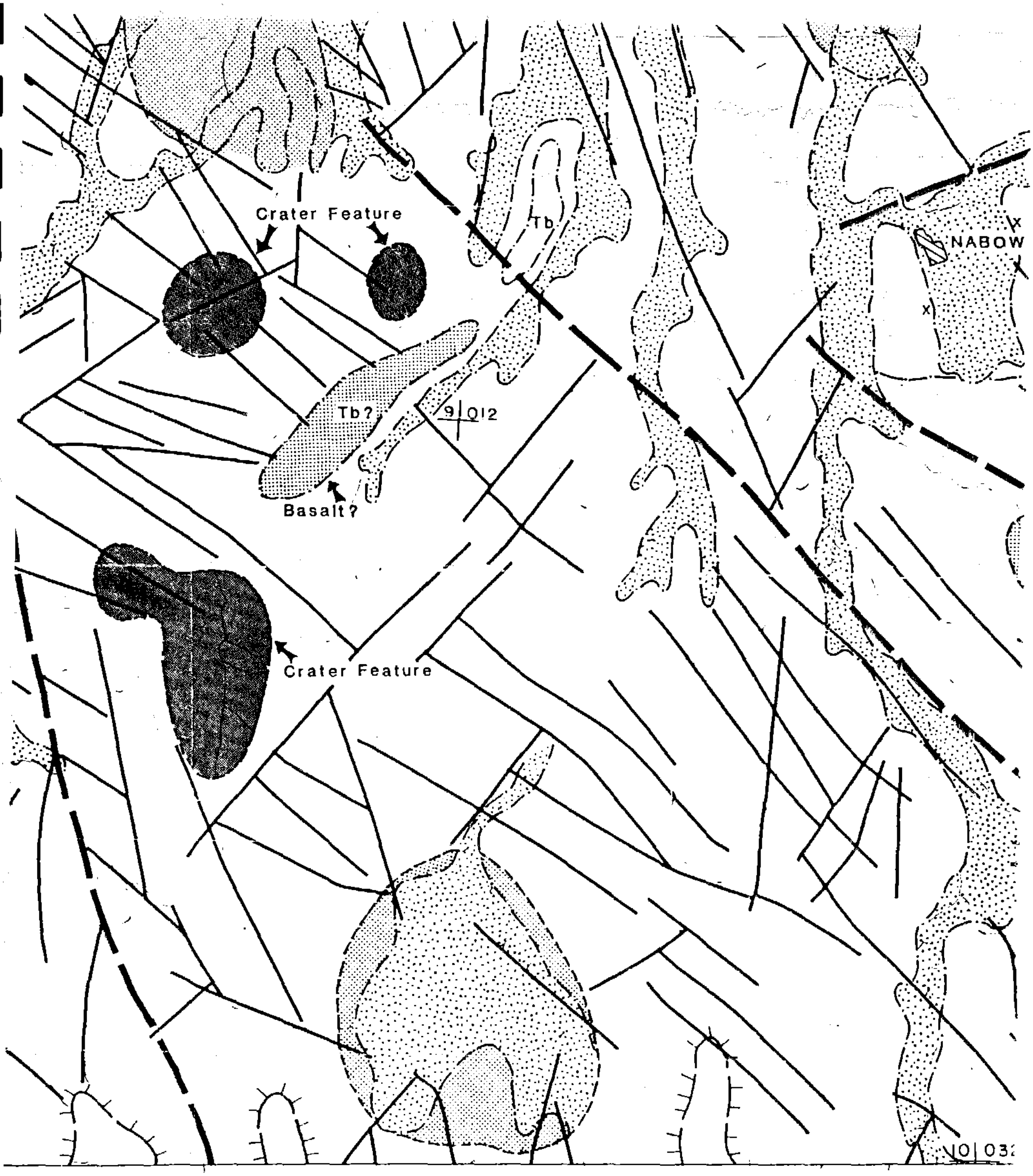
GEOLOGICAL MAP OF LISLE AREA FROM COMALCO MAPPING

FIGURE 7


LEGEND
BASALT
HORNFELS
PHYLLITE / SLATE
GRANITE PLUTONS AND DYKES
MATHINNA MUDSTONE / SILTSTONE / FINE SANDSTONE
DOLERITE
Ss SANDSTONE
Slst SILTSTONE
Mds MUDSTONE
MATHINNA BED SEDIMENTS
LIMIT OF FACT MAPPING
INFERRED BOUNDARY OF INTRUSIONS
147°15'
41°16'
12'
10'
20'
BP MINERALS MAPPING
FIGURE 8

009036



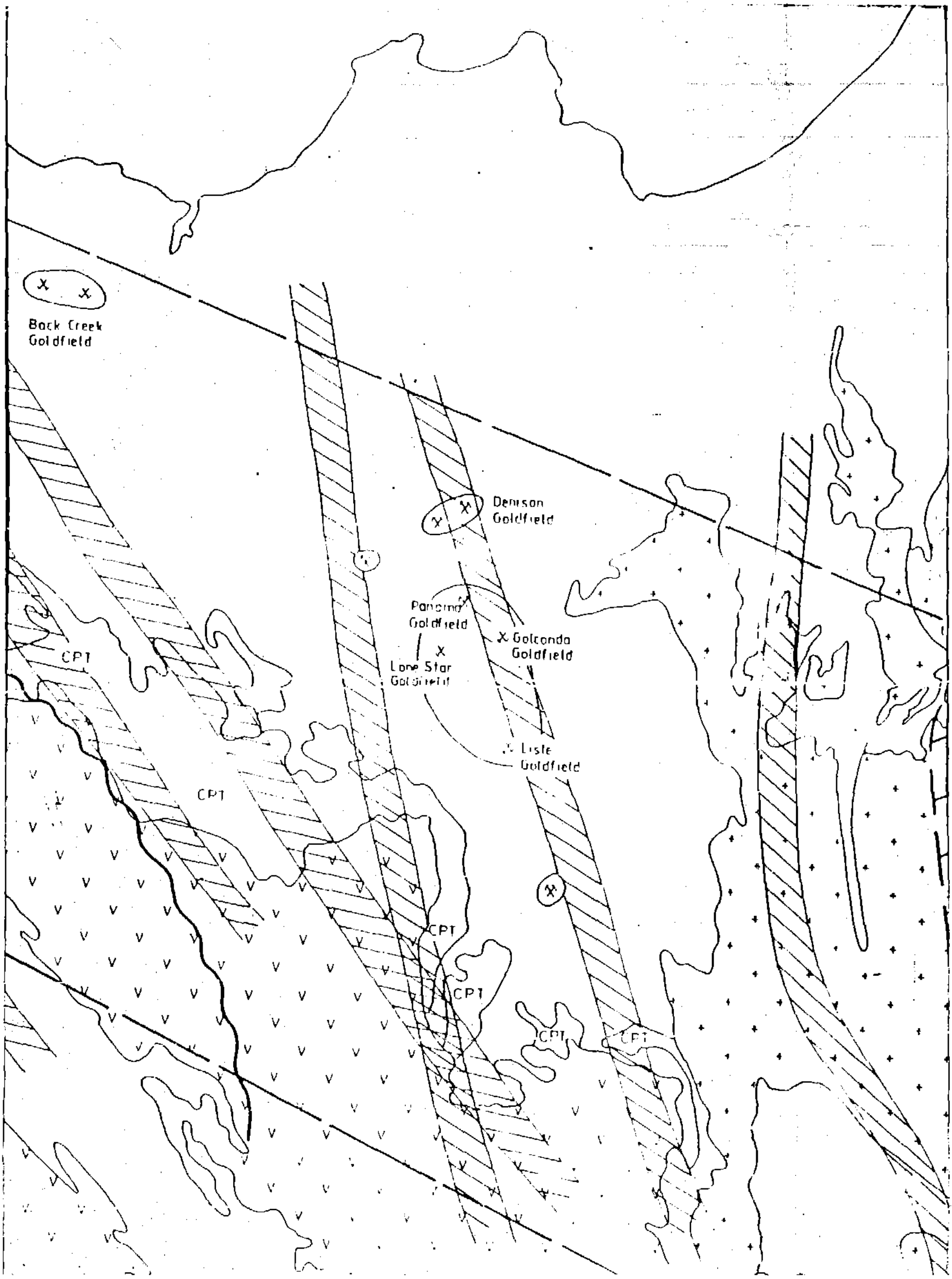
PART OF LANDSAT INTERPRETATION BY HUNTING'S FOR BP MIN

IEET INDEX

FIGURE 9

LISLE AREA

009037



MINERALISING LINEAMENTS
FROM RANDELL (DEC 91)
BILLITON.

MAC MINING NL

FIGURE 10

Scale	Date	Author	

4 MINERALISATION

The predominant known mineralisation is alluvial and/or eluvial gold but some bedrock or primary mineralisation has been mined. The source of most of the alluvial/eluvial gold is still conjectural.

4.1 PRIMARY - HARD ROCK GOLD

Three areas within EL 2/92 were mined/prospected on a small scale for primary gold - Panama, Golconda and Bessell's Reward. There are no records of production.

In contrast to alluvial gold at Lisle, at Golconda and Panama the underlying intrusive is just exposed and almost all the gold came from quartz veins in or near the granodiorite. At Bessell's Reward there is no granodiorite exposed.

4.1.1 PANAMA GOLDFIELD

Marshall (1969) summarises the data on the Panama Goldfield as follows:

"The Panama area is located 1½ miles SW of Golconda. There is no information available on the area covering the period of active mining. Reid (1926) recorded the occurrence of detrital gold bearing quartz and stated:- "The rich pieces of ore came from a vein in the soft granitite floor of the basin upon which they lay,... Neither this vein nor any of the others opened in the many long adits and shafts is of economic importance,... One or two allow profitable operation on a very small scale."

Reid also recorded the presence of gold bearing quartz reefs at the granite-sediment contact and in the adjoining metamorphosed sediments. Arsenopyrite, pyrite, galena, sphalerite and chalcopyrite were reported as accessory minerals".

4.1.2 GOLCONDA GOLDFIELD

Marshall (1969) summaries the data on the Golconda Goldfield as follows:

"Located 1 mile south of Golconda the Golden Crest and Enterprise mines were worked sporadically from about 1890 to 1918.

The Golden Crest workings were on a gold bearing quartz reef in granite close to the N margin of the granite. Mineralisation was reported by Reid (1926) to be predominantly in cracks and fractures in the quartz vein with only minor occurrences in the more massive quartz. Accessory minerals were arsenopyrite, pyrite and chalcopyrite in that order of abundance.

The gold was unevenly distributed throughout the reef with occasional bunches of very rich ore occurring as short narrow shoots. The overall average grade was too low for economic mining. The vein varied from 6 to 24 inches in width and unavoidable wall rock dilution during mining further lowered mill head ore grades.

In the Enterprise mine a number of 6 inch quartz veins occurred but the ore shoots were small and irregular. The average gold content of the veins was reported to be about 6 dwts. per ton."

4.1.3 BESSELL'S REWARD MINE

Marshall (1969) summarises the data on the Golconda Goldfield as follows:

"Note: - This mine is incorrectly located on the Pipers River geological map sheet. Its true location is 4/10 miles due south of the position shown. It lies on the divide between the headwaters of Cradle and Tobacco Creeks.

Reid (1926) distinguished between 'Bedded Deposits' and 'Quartz Veins' in his discussion of primary gold occurrences in this locality. Describing the 'Bedded Deposits' he stated: -

> *'These consist of narrow beds of sandstone intercalated with wider beds of purple, grey, and bluish-black slates. The strike is N 50° to 60° W and the dip at high angles to the north-east. They vary in thickness from 1 to 6 feet, and are uniform both along the strike and dip. Where opened on this property the seams are at every point gold-bearing, but the content varies considerably. A number of samples taken from the several seams of sandstone exposed in the trenches yielded gold in the proportion of 2 dwts. 3 gr. per ton (average of 10 samples), and two in the proportions of 9 and 11 dwt. per ton."*

He then described the quartz veins:-

> *'Narrow, persistent veins of quartz (1 to 4 inches) form crosscourses to the gold-bearing sandstones, trending north 45° to 65° east and dipping north-west. The quartz is commonly of the milk-white variety, mineralised in parts, and, as a rule, almost barren. A few rich specimens have been found.'*

Further descriptions of individual prospects and pits indicate that where these sandstones were tested and found to be gold-bearing there was usually close association with quartz veining.

It is probable that the gold was introduced into the sandstone by media of these veinlets, and that the sandstones are not gold-bearing throughout. The gold content of the sandstone is low and erratic in distribution and no economic concentrations were found."

4.2 ALLUVIAL AND ELUVIAL GOLD

The probability of a substantial deposit of alluvial gold remaining in the Lisle - Golconda area is considered low. However the past alluvial operations should be studied for clues to the hard rock gold source. Approximately 250,000 ozs have been recovered from alluvial/eluvial operations.

The following discription is quoted largely from Marshall (1969) and although it is easily available elsewhere I have included it here to make this report as complete as possible. Marshall (1969) in turn, quotes from other reports including Thureau (1894), Twelvetrees (1909) and Reid (1926).

4.2.1 HISTORY OF ALLUVIAL MINING

Marshall (1969) summarises the history of alluvial mining as follows:

"Discovered in late 1878 by the Bessell brothers, the Lisle goldfield was the focus of a rapid influx of miners, which raised the number of men on the field from about 100 in January 1879, to some 2,500 within a few months.

By the end of 1879, mining activity had settled to a steady level with a reported yield of about 400 fine ounces per week. However, this peak was not long maintained, and in July 1881 Mr.B.Shaw, Commissioner of Goldfields, reported:-

> *'The yield of alluvial gold has greatly fallen off, and does not now exceed an average of eighty ounces a week. Most of the shallow deposits in the creeks have been worked out and the principal mining is on the high ground,.... The population at the time the Census was taken was 350, of whom 185 were men. The number has since decreased.'*

In July, 1882, Thureau described several attempts to explore for lode and vein deposits. Considerable emphasis was placed on this phase of mining at that time.

By September, 1894, Montgomery reported that the population was 'only about 30 miners' with all activity centred on alluvial deposits. All work on the alluvial deposits up to this time had been by ground sluicing with later, low pressure hydraulic sluicing.

In 1899 a Launceston company, The Lisle Dredging Company, was formed to work the Main Creek deposits on the eastern flank of the basin. A total of 1,605 fine ounces is recorded as recovered from this operation over the period 1901 to 1904.

In 1909 Twelvetrees reported:-

> *'The present output as reported to the Department of Mines is from 30 to 40 ounces per month, but there is reason to believe that it is slightly in excess of this.'*

At this period 13 claims or leases were being actively worked giving employment to 23 men.

Later efforts by Hobart companies to work the Main Creek deposits (New Bonanza Gold Mining Co., N.L.) and the deposits on the W flank of the basin along Bessells and Thomas Creeks (Lisle Hydraulic Gold Mines N.L.) were largely unsuccessful. The recorded production from the latter Company was 1,349 fine ounces over the period 1914 to 1918.

Over recent years (up until 1969), activity on the field has been restricted to individuals or small parties prospecting or working small claims on a part time basis"."

4.2.2 HOST GEOLOGY FOR ALLUVIAL/ELUVIAL DEPOSITS

The alluvial gold occurs within Cainozoic sandstones and conglomerates. Marshall (1969) describes them as follows:

"These deposits occur in isolated patches and narrow strips which rise above the present alluvial flood plain. Along the Pipers River and Little Forester-Denison River drainage system, the upper limit is less than 50 feet abovewater level, but at Lisle and to the West of Springfield they are found up to 125 feet above present drainage. Although this relationship suggests contemporaraneity there is no certainty that the patches are co-eval; nor can their stratigraphical relationship with the 'overlying' quartz gravels be assured, even though their more indurated nature and similarity to Tertiary sandstone and conglomerate might suggest that they be placed at the base of the sequence.

Exposures are confined to man-made excavations, the deposits typically being represented by float of well-rounded, frequently disc-like or ellipsoidal pebbles and cobbles of Mathinna siltstone and sandstone, dispersed on a soil which often possesses a high content of silt-sized grains, but which may largely be clay. Well rounded vein quartz pebbles are generally present in subordinate amounts, whereas Ordovician (?) quartzite and conglomerate cobbles at 5022E/9284.5N, and quartz granules W of Springfield, are respectively local expressions of upstream Lower Permian deposits and adjacent Devonian igneous rock.

In the Lisle-Golconda district where the deposits are auriferous and have been extensively studied, cross sections are available. Those other than in the Lisle Basin will be dealt with first. According to Reid (1926, P.40) the 6 to 8 inch auriferous horizon at Tobacco and Cradle Creeks underlies approximately 7 feet of clay. That it directly overlies Mathinna is not stated, but from an examination of what are now exceedingly poor exposures, this would appear to be so (confirmed pers. comm. Noldart, 1967). The indurated rock consists of well-rounded pebbles and small cobbles of vein quartz and Mathinna sandstone, siltstone, and slate, embedded in a sandy clay matrix.

For Lone Star Valley the information is scanty. Reid (1926, p.34) reports that the deposits consist of 'water-worn quartz and friable white sandstone and rest on soft decomposed granite.' This was partially confirmed at 5183E/9235N where one finds abundant well rounded pebbles and cobbles, of quartz and hornsfelsed Mathinna Beds, in association with sub-angular vein quartz up to 8 inches in diameter. In a small pit West of the track (5181E/9242.5N) a pale bluish-grey sticky clay with occasional quartz granules overlies highly decomposed granite.

The deposits at Lisle fall into two categories: those below 750-800 feet which are wholly alluvial; those above 800 feet which are partly eluvial. The former, typically exposed at 5209E/9220N and 5204.5E/ 9219.4N, consist of well-rounded, frequently ellipsoidal pebbles and cobbles of Mathinna sandstone and vein quartz which although ranging in size from about ½ to 8 inches, generally have a longest diameter of 3 to 4 inches. Interstitial to the framework, which may be either continuous or slightly disrupted, is a matrix of predominantly silty clay with mica. The overlying pale grey clay *with quartz granules is thought to have been derived from granite and to be part of the composite soil profile.*

The high-level deposits, exposed at 5211E/9220N on the eastern side of the valley, and at 5198E/9220N on the west, consist of poorly sorted sub-angular to rounded pebbles and small cobbles of quartz, Mathinna sandstone and slate, and rarely granite, in a matrix of sandy clay or siltstone. The rudaceous fraction either forms a disrupted framework conglomerate, or is sufficiently dispersed for the rock to be termed a pebbly siltstone. Separating the auriferous basal unit from the talus are occasional sandstone lenses and unconsolidated sandy beds which may be water lain.

The genesis of the high-level deposits is uncertain, but Reid's suggestion (op.cit.,p 21) that they mark the surface of a lake-bed is not without merit. Slightly rounded eluvial material sliding off steep slopes into a lake would suffer little further attrition or sorting, and could form a strictly comparable deposit. The low-level accumulation in the shallow portion of the basin, was presumably laid down at a later date when the lake was contracting, perhaps to a series of shallow pools within a braided stream network, and Lisle Creek was approaching its present base-level. The better sorted well rounded character of the deposit is in keeping with such an origin."

4.2.3 LISLE GOLD WORKINGS

Marshall (1969) describes the gold workings as follows:

"Economically the entire production from the field was won from alluvial, eluvial and 'lead' deposits along Main (Lisle) Creek on the flank of the basin; along Bessells and Thomas Creeks on the West flank; and from the slopes and terraces above them. Gold also occurs in small quartz veins in the granite, and in the adjoining contact metamorphosed Palaeozoic sediments, but no economic concentrations have been found.

Auriferous gravels and wash have been exploited on at least three levels on and above Main Creek as evidenced in a report by Thureau (1882):-

> *'...not less than three successive deposits of gravel occur above each other, the highest being 600 feet above the much more recent and present drift alluvial in the "Gorge"...*
>
> *But what concerns us most is the fact of the remnants of these gravelly deposits proving* auriferous *to more or less an extent. At the entrance to Titmus' "upper tunnel," a sandy, quartziferous wash (O.N.on plan),* older pliocene, *is found, which, though limited in extent, is sufficiently developed to establish its position of having once formed a portion of a shingly beach, composed principally of rounded quartz and of hard metamorphic schists. It also contains gold, which latter circumstance is of some importance, as this deposit occurs* above *the junction or contact of the schists with the granitoid rocks lower down.*
>
> *The second auriferous deposit (V.V),* newer pliocene, *occurs some three hundred feet down the range, and it, as well as the first, now appears to skirt the contour lines of the ranges,....., this second auriferous deposit occurs within the decomposed syenitic granite exclusively, and rests directly upon it.'*

This report by Thureau contains the only specific reference to the higher level deposits. These deposits were apparently worked out or abandoned prior to examination by later workers.

Montgomery (1984) commented only on the lower deposits:-

> *'The bottom of the valley has been worked for some five or six hundred feet in width, from which it would appear that the auriferous material could not have been confined to one narrow lead but must have spread over some distance. Round the edges of the flatter ground at the foot of the slopes of the surrounding hills, there are large terraces of alluvial material, some of which have been successfully worked.'*

Twelvetrees (1909) commented only on the lower alluvial deposits as follows:-

> *'The ground which has been worked, and some of it re-worked, forms a belt of 500 or 600 feet in width along Main Creek, and also a belt on the western side of the valley along Bessell's Creek. The large terraces at the foot of the hills on each side -of the valley have likewise been worked with great success.'*

Reid (1926) in a brief general description of the field stated:-

> *'An area of ground 200 yards wide and 1 mile along has been worked along Lisle or Main Creek, and ground about half that extent has been worked along Bessell Creek. The richest ground formed the beds and banks of the streams, but profitable dirt was found also high up on the eastern and northern hillsides in tributary gutters of the two streams beneath a great depth of talus material. The terrace stones are angular, and waterworn only in the beds and banks of the streams.'*

Present day examinations of the deposits can add nothing to the above extracts. The old workings are inaccessible due to vegetation, talus and scree creep, landslips and collapse of working faces. The lower level and terrace deposits are recognisable, although generally masked by spoil material, but the highest level deposits recorded by Thureau could not be located."

In respect to gold distribution Marshall (1969) noted that:

> *'There does not appear to be any pattern of distribution of gold within the gravels. It occurs erratically throughout, subject only to some enrichment at or near the base.'*

From a report prepared by Charles Bessell in 1894, on behalf of a proposed hydraulic mining company, Twelvetrees (1909) quoted extracts containing the following observations:-

> *'As to the probable yield per cubic yard, this is rather a difficult question to deal with, as in some places the gold is distributed through the ground from the surface to the bottom, while in others it is confined to the wash on the bottom, which*

varies from 1 foot to 5 or 6 feet ... I may state that there are many indications of false bottoms existing on the terraces; in fact, Cashman and party are at present working under 2 feet of false bottom, and again, it can be seen where I am now working at the camp...'

Twelvetrees recorded the occurrence of gold 'in the grass, over a loose stratum of sand and stones 40 feet deep,' on the E hill slopes towards the head of Main (Lisle) Creek. From workings on Thomas Creek on the W side of the valley he recorded the following succession:-

> *'Below the surface is red ironstone gravel for 4 feet, resting on 4 feet of sandy silt. Below this is a stratrum of stones of quartz and grey sandstone for a foot in thickness, which rests upon 6 feet of clay and stones of slate. The whole deposit lies on granite bedrock. In each bed there is gold, but the heaviest gold is on the bottom.'*

He further commented from observations in the Lockwoods Terrace workings on the west slopes above Thomas Creek:-

> *'The best gold, as usual, was found at the bottom; still, a little was obtained all through the deposit.'*

From the New Bonanza Gold Mining Company's workings on the east terrace towards the north (Gorge) end of the basin Reid (1926) recorded:-

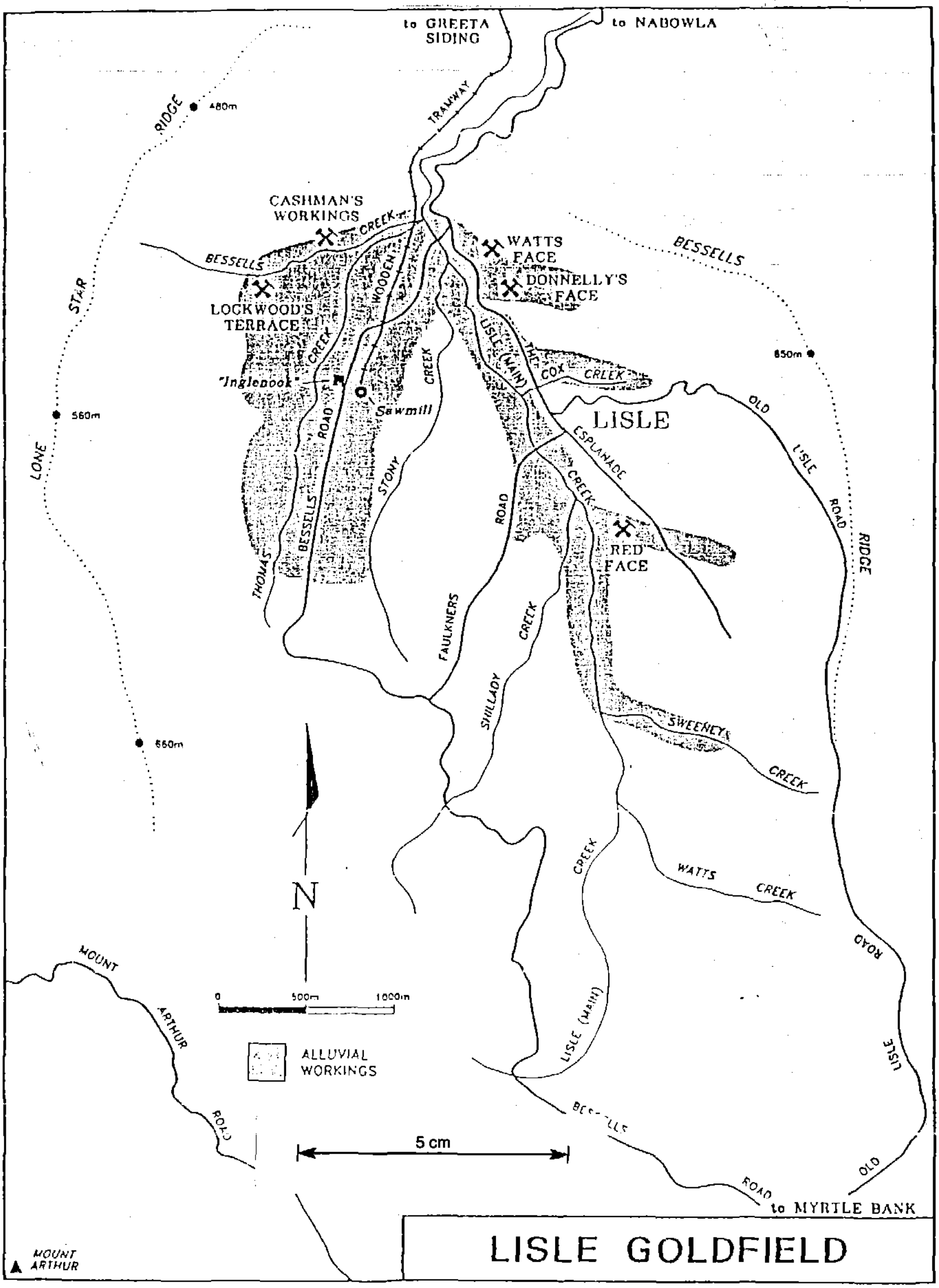
> *'2 to 4 feet of gold-bearing wash overlain by 15 to 20 feet of barren sandstone talus and yellowish-red soil,' but from workings only a few hundred feet to the south on the same slopes he reported that a little gold was found 'in the talus here where quartz is prominent.'*

Gravel or 'wash' was not a prerequisite for gold accumulations. At Donnelly's Creek and terrace workings the following sections were observed by Twelvetrees:-

> *'The top part of the terrace for 10 or 11 feet consists of clay and anguar stones of reddish sandstone, highly micaceous and ferruginous... This rubble bed passes downward at one part of the face into bottom layer of yellowish drift sand and clay 4 feet thick. This layer contains some rounded pebbles and yielded the heaviest gold. At the same time prospects were obtained from the upper beds, and nearer the road gold was won from all through the deposit, which there consisted nearly entirely of surface clay with scarcely any stone.'*

In general the terrace and higher level deposits appear to have carried some gold throughout the entire thickness, although not always in payable quantities, whilst the deposits on the valley floor are more typically 'wash' or 'placer' deposits with the concentration of gold in the lower sections.

.......The lake concept of Reid(1926) could feasibly explain the successive auriferous gravel horizons. Contraction of the lake surface with attendant superposed drainage on the unconsolidated lake sediments would result in a continuous erosion of these sediments and the recycling, probably several



LISLE GOLDFIELD

Draftsman :- Andrew S. Mc Guinness 22/10/91

FROM THE DEPT MINES RPT 1991/17

FIGURE 11

times, of the gold content. This would result in rich concentrations in the basal wash of the present valley floor."

The geographic distribution of gold workings is shown in Figure 11 (from Report 1991/17). This figure shows quite clearly that the workings and presumably gold deposition is closely associated with the present day positions of three creeks, Lisle, Thomas and Bessells. If the lake and terrace concept is correct the ultimate source of he gold would appear to be immediately upslope from the workings on the NW and NE slopes of the Lisle Basin. This, however, is only one possibility and the source of the gold is discussed in greater detail in section 4.3.

4.2.4 LONE STAR, TOBACCO CREEK AND CRADLE CREEK WORKINGS

Marshall (1969) describes these alluvial goldfields as follows:

"The Lone Star Goldfield is located on the upper reaches of Lone Star Creek, 3 miles south of Golconda and 2 miles northwest of Lisle. The goldfield is a small replica of the Lisle basin. A small valley underlain by granite and surrounded by high ridges of metamorphosed sedimentary rocks has been filled to varying depths by Cainozoic gravels, auriferous in part. These are in turn overlain be scree and talus material from the surrounding hills.

Information on the deposits is scanty and there is no record of production from the area. Reid (1926) very briefly described the area and commented:-

> *'Some of the claims were highly productive, some were poor...*
>
> *The wash-dirt consists largely of water-worn quartz and friable white sandstone and rests on soft decomposed granite. A shaft ... did not reach the bottom rock at 50 feet.*
>
> *Here the gold is much coarser than the generality of that at Lisle... It is interesting to note that the gold is closely associated with white sandstone which is suggestive of its origin from beds of that rock,...'*

There is no record of any occurrence of, or any attempt to mine, lode or other primary gold deposits in the Lone Star basin.

Examination of the old workings indicated that the gold bearing gravels were restricted to a narrow zone along Lone Star Creek and mainly confined to the eastern banks. Recent cultivation, etc., has, however masked the outline of much of the worked area and the full extent of the workings cannot be determined.

Alluvial gold was discovered by Mr.C.Bessell in Tobacco Creek, 2 miles north of the Lisle basin in 1877 about 18 months prior to the discovery of the Lisle deposits. Subsequent production from Tobacco and Cradle Creeks is reported by Twelvetrees (1909) to have been 'about 2000ozs.

The deposits consist of 6 to 18 inches of gold bearing gravels resting on menbers of the Mathinna Beds and overlain by up to 10 feet of clay and soil. The following description was given by Twelvetrees (1909):-

'The stones of slate in the wash are angular, and the gold is not water worn. When pieces of any size are found the gold is usually attached to quartz. The run of gold extends for nearly 20 chains, and has been worked up to the brow of the hill... The gold in this creek is coarser than at Lisle, and nuggets up to 15dwts have been found. The ground has been worked over three or four times, the workings widening each time.'

He further stated that at the top of the hill dividing the two creeks,

'some quartz veins have been found, one of which carried gold.' indicating the source of at least portion of the gold.

These workings are now completely overgrown and cannot be properly examined but recent prospecting operations in Tobacco Creek tend to confirm these findings. There would be little prospect of large scale mining operations."

4.3 ORIGIN OR SOURCE OF GOLD

The source of gold at Lisle and neighbouring Lone Star has been the subject of endless speculation and although studied by several workers there is at present no definitive answer. Certainly the 250,000 ozs produced came from somewhere nearby and the total gold shed into the system is likely to have been in the millions of ounces. This of course implies nothing in relation to the grade of the source which could have been very low (less than 1 g/t Au), high (plus 20 g/t Au)or combination of low and high grades.

The main purpose in discussing the origin or source of alluvial gold from the Lisle Basin is to determine where else in the Lisle - Golconda area to explore for primary deposits

4.3.1 MARSHALL (1969)

Marshall (1969) discusses the source of the gold as follows:

"There is little doubt that the origin of the gold in the district is closely related to the intrusion of the Devonian granites, but the source of the gold exploited from detrital alluvial concentrations is not clear.

Thureau (1882) considered that it was derived from the contact metamorphosed sediments adjacent to the granite. From observations of gold bearing gravels above the granite-sediment contact near the Gorge and from other observations such as the following, he stated:-

'On examination, and from facts gathered at Lisle, miners have traced the gold up the slopes of the Bessell's Rivulet, and I was assured that approaching a certain line of altitude, coarser gold had occasionally been found than in any of the lower alluvium.. Bearing in mind that the whole of the granitoid formations are traversed by attentuated quartz veins charged with very fine gold, it may be inferred that if any vein matrices with coarse gold - of whatever form the former may assume - exist, the probability is that they occur at or near the points of contact of the granitoid with the metamorphic or other schists on the Lisle divide, and in the eastern foothills of Mount Arthur.'

Montgomery (1984) reported:-

> *'A set of gold-bearing veins have been discovered in the granite bedrock which may turn out to be of some importance. There are five or six of these veins lying close together, and forming a belt three to five feet wide which contains gold. The veins consist of ¼ to 1½ inches in thickness of quartz, quartz and kaolin, and quartz and oxides of iron and manganese, running very straight over considerable distances... All along the course of the set of veins where they have been exposed a little gold can be got by crushing them. The soft granite in which they lie yields a little gold, but the principal value seems to be in the veins themselves which require crushing.'*

However no mention was made of the higher level deposits nor of any other possible origin for the gold.

Twelvetrees (1909) with respect to the deposits on the eastern side of the basin, considered that the bulk of the gold was shed from the altered sediments and stated:-

> *'There may possibly be a few gold-bearing veins in the surrounding hills, but any gold which they may have contributed must have been in considerable amount, and they may be neglected in this enquiry... An important clue to the solution of the problem is furnished by the discovery of visible gold in the dark metamorphic sandstone frequently referred to in this report. One of the rock specimens which I brought home showed distinct specks of gold free from gold (sic) or pyrite. Unfortunately, I have not been able to observe this in any other specimens, though I have broken hundreds of stones. However the fact that gold is present in the sandstone is undoubted, and is sufficient to outweigh innumberable negative results.*
>
> *The suggestion which I advance is that the bulk of the Lisle alluvial gold has been derived from the wasting away of the impregnated stratified rock near its contact with the granite.'*

Reid (1926) pointed out that under normal conditions of disintegration, considerable quantities of gold could reasonably be expected to have been carried through the Gorge and deposited along the river flats below the Gorge, whereas prospecting in these areas had been largely fruitless. His conclusion was:

> *'that almost all the gold won from detrital and alluvial deposits is of secondary origin',*

and further considered that the source was from quartz veins in the sandstone. He summarised the evidence as follows:-

> *'Generally both metamorphosed sandstone and vein quartz are barren, but some pieces of quartz contain a little gold, and occasional specks are found in the sandstone. The fact that gold is found in association with quartz and altered sandstone suggests the idea that it originated in quartz-veins contained in*

sandstone. Moreover, the coarsest gold is found high in the hillsides, near the edge of the granitite mass and not in that rock.

The following is a summary of the evidence:-

1. *All the gold at Lisle has been won from alluvial, detrital, and chemical deposits.*

2. *The free gold is almost pure; that locked up in quartz contains a high proportion of silver.*

3. *Except that found in creek beds, the surface of the gold is rough.*

4. *The gold is generally of fine to medium grain, pennyweight nuggets being rare.*

5. *Gold-quartz specimens are conspicuously rare.*

6. *Gold is everywhere found in association with quartz.*

7. *The quartz, except one or two veins in granite, is barren, or almost barren.*

8. *Sulphidic ore minerals, such as arsenopyrite and chalcopyrite, commonly associated with gold at Panama, Golconda, Denison, and Lebrina, are not known at Lisle.*

9. *Gold is found associated with vegetable matter and charcoal underneath talus material all the way up the hillside on the east side of Lisle Creek.*

10. *Very little gold is found in the talus material.*

11. *Gold is found on the east and north sides only of Lisle basin where metamorphism has been most intense.*

12. *Almost all the gold has been derived from veins in the contact rocks.*

13. *The granite, even along the more acidic fringe where it has been affected by the agents of metamorphism, is barren, or almost barren.*

14. *That section only from the outlet of the gorge to a point 1½ miles upstream is known to contain gold in profitable proportion.*

15. *Very little gold is found in the beds of creeks outside the basin.*

With regard to item 7, it is interesting to note that very little gold is found in the talus material, but a comparatively great *quantity is found underneath it associated with organic matter, such as decomposed vegetation and charcoal. The fact opens the way to anoth line of research worthy of further pursuit: that is, deposition from gold-bearing solutions.'*

From the available literature most of the gold in the Lisle valley appears to have been derived from sources at or near the granite/sediment contact. However the actual locations or forms of such gold deposits are not known. Gold was found in, or adhering to, quartz fragments, particularly towards the headwaters of tributaries of Main (Lisle) Creek. This type of occurrence was moe frequent than was suggested by Reid. Gold also occurs as disseminations in the metamorphosed sediments, probably erratically distributed and confined to wall rock adjacent to gold bearing quartz reefs.

Emphasis has been placed on the consistent association of quartz rubble with gold, particularly in areas of richer concentrations, and earlier workers regarded this as an indication of derivation of the gold from the breakdown of quartz reefs. Emphasis has also been placed on the high degree of purity of the gold in the free state compared to the appreciable percentages of silver contained in gold found adhering to quartz.

Reid's suggestion of the progressive leaching of gold from quartz reefs followed by redisposition is feasible. It would explain most of the phenomena associated these deposits such as: the relative purities of gold; the gold distribution related to grain size; the occurrence of barren quartz rubble with suspected gossaneous structure; the association of angular gold with organic matter, the lack of associated sulphides; and the lack of gold in quartz reefs exposed in higher level workings.

On the other hand, the gold-in-sediments theory of Twelvetrees (1909) does not appear feasible. Where the sediments were demonstrably gold bearing they were variously reported as 'hard', 'baked', 'silicified', etc. Rocks of this nature are not readily susceptible to penetration by solutions of other agencies unless impregnation occurred before metamorphism while the sediments had a more open grained texture. Examination of the talus shed from these metamorphosed rocks indicates that mechanical breakdown predominates with minor chemical breakdown occurring on joint faces. No gossanous structures have been recorded in the talus from these rocks.

If these rocks were the host for most of the gold found in the Lisle basin then it would be expected that gold-in-sediment specimens are rare and were probably derived from breakdown of wall rock which has been contaminated by intruded gold bearing quartz veins."

4.3.2 ROACH (1992)

Roach (1992) carried out a mineralogic study of gold grains from the Lisle and Denison goldfields. He wrote as follows:

"Gold grains from Denison were typically larger than those recovered from Lisle, however there was a wide variation within each sample set. The overall morphology of grains from both locations was similar, with grains ranging from sub-rounded to well rounded in both samples. A number of the grains from Denison had pieces of vein quartz embedded within them, but this was not observed in the samples from Lisle. Several grains from Lisle had

partial black coating of oxides; this feature was not observed in the samples from Denison. In detail the grains from Lisle had an irregular or rough surface texture while the majority of those from Denison had a smooth surface. These characteristics support the contention that the mode of formation of the alluvial deposits at the two locations was different.

....Many of the grains from both localities displayed the thin gold-rich rims discussed by Groen, Graig and Rimstidt (1990). At Denison all of the gold grains were solid and displayed no internal structure. In contrast, many grains from Lisle showed evidence for complicated internal structures. This feature was best developed in a sample from the Tasmanian Alluvials lease at Lisle, supplied by R.S.Bottrill from the Tasmanian Department of Mines. In this sample, the majority of grains showed evidence of complicated internal structures... There is a clear gradation between testures such as these and apparently solid grains. The fineness of most of this gold is very high, in excess of 980. The regions between the gold layers are now voids and, consistent with the observations of Twelvetrees (1909) and Reid (1926), may have originally been layers of organic material. Baker (1978) suggested the importance of humic compounds in the transportation and deposition of gold at Lisle. The extremely fine textures may also be suggestive of biological involvement in gold deposition (Mineyev, 1976).

The textural evidence supports the contention of Reid (1926) that "all the gold won from detrital and alluvial deposits is of secondary origin". At this stage the primary source of the gold is unknown. Work is in progress to measure the background gold concentrations of the granodiorite and the adjacent Mathinna Beds to determine whether the volume of material eroded from the valley could account for the inferred gold resource. The geomorphology of the valley, with is thick layer of sediments and largely enclosed hydrology, is almost certain to have strongly influenced the process of secondary enrichment of gold in the placer."

4.3.3 <u>BOTTRILL ET AL (1992)</u>

In a publication "Gold in Tasmania" Bottrill et al (1992) summarise what they considered to be the main points on the Lisle mineralisation.

"Workings at Lisle included alluvium and eluvium in a basin-shaped depression, possibly representing an old lake bed of Tertiary age (Reid, 1926; Marshall, 1969). There were numerous, patchy, gold-rich horizons in the possible lacustrine sediments, and in carbonaceous horizons underlying talus, which produced relatively pure, free, angular (cryatalline?) gold (Noldart in Marshall, 1969). This type of gold suggested a secondary origin (i.e. in situ *reprecipitation of dissolved gold from groundwater (Reid, 1926; Bottrill, 1986). Some gold grains are highly porous and/or colloform, while some have silver-rich cores and silver-depleted rims (Bottrill, 1991; Roach, 1991), confirming that some gold is detrital and some reprecipitated.*

Auriferous quartz was relatively rare, both in alluvium and bedrock, and Twelvetrees (1909) found evidence for gold originating in the contact metamorphosed sandstone of the Mathinna Beds surrounding the basin, near the contact with Devonian granitoid intrusives. Inclusions of mica, rutile and magnetite in the gold grains suggest that the gold was more likely to have been disseminated in the hornfels or granitoids than in quartz veins, while rare gold-limonite composite grains in placers suggest gold-bearing pyrite *may have been originally present (Bottrill, 1986). Some gold was, however, found in small quartz veins in the granitic intrusive underlying the alluvial materials (Thureau, 1882; Montgomery, 1894). Recent drilling by the Department of Mines revealed very minor quartz-carbonate-pyrite alteration zones in the magnetite-pyrite bearing granodiorite, with trace gold (to 0.05 g/t).*

4.3.4 DISCUSSION - CONCLUSIONS

Most writers seem to consider that primary gold mineralisation at Lisle occurred at or near the granodiorite/sediment contact, either within the intrusive or the sediments or both. However even this broad conclusion is still largely speculative.

- Primary gold away from Lisle (but within the Lisle intrusive complex) is known to occur in thin and discontinuous quartz veins both within the granodiorite and sediments. Quartz veins in the sediments can occur at the contact or an unknown but perhaps considerable distance from the contact. Gold also occurs in "sandstone' and hornfels, in trace amounts in some black shales, and trace to minor amounts (0.01 to 0.1g/t) within the granodiorite. One of B.P's holes intersected 4m at 0.1g/t.

- However we have no direct evidence for a large body of mineralisation in any of these environments or hosts. Roach (pers.comm) has suggested that a large volume of granodiorite may have contained trace gold and was leached to provide the known alluvial deposits, but the limited drilling into granitic rocks does not confirm widespread gold at or above 0.02g/t, (limit of detection of assay method).

- Certainly at Lisle it appears that much of the gold travelled in solution prior to deposition or precipitation in the creek alluvium and uppermost lake sediments. The source gold was probably fine to very fine grained.

- Roach (1992) suggested that "the geomorphology of the Lisle Basin is a significant factor in the development of the alluvial deposit". We do not disagree with this statement.

- However the formation of the Lisle Basin also has other implications. Erosion of the "soft" granodiorite caused the formation of the basin. Was the granodiorite easily weathered because it was extensively hydrothermally altered? Not all granodiorite is easily weathered as shown by outcrops in southern Lisle Basin several hundred metres above the outlet level.

- For a lake to form in the Lisle Basin as has been suggested by others, the erosion of the granodiorite must have been completed to approximately the present day outline before the lake formed. Lake sediments could not have originated from erosion of the main mass of granodiorite or the granodiorite at the top of the cupola. This rock was removed to form the basin and it, and most of any gold it contained, would have been well downstream from the Lisle Basin when the lake and subsequently the present alluvial gold deposits formed.

- The original gold deposit must have been very large if it occurred either within the granodiorite or sediments near the granodiorite cupola and this deposit was the source of the alluvial gold which was ultimately trapped in the Lisle Basin.

- The Lisle-Golconda intrusive complex is probably genetically related to the gold mineralisation. However, some granodiorite was intruded before the gold mineralising episode (fractured granodiorite contains gold) and the phase of granodiorite intrusion with which the gold originated has not yet been defined. The Lisle-Golconda complex is not a part of the Scottsdale Batholith.

4.4 POSSIBLE TARGET TYPES AT LISLE-GOLCONDA

Randell (Dec 1991) described possible target or host situations at Lisle (Figure 12). His main target was as follows:

"the main target was a sheeted/stockwork quartz vein system proximal to granitoid margins and within the hornsfelsed contact aureole. A strong structural control is likely and the expected low grade (1-4g/t Au) may have precluded active prospecting earlier this century."

I believe that a sheeted/stockwork quartz vein system could also occur within the granodiorite - particularly in the cupola region. However, whether within granodiorite or sediment it would not outcrop as it would probably have been eroded in the Lisle Basin and similar deposits would occur at shallow depths elsewhere in the Lisle-Golconda area.

Other possible targets in the Lisle-Golconda area which could host gold deposits of 1,000,000 ounces plus include:

- disseminated sulphide hosted, probably within the uppermost or near contact areas of granodiorite but perhaps also within the metamorphic aureole.

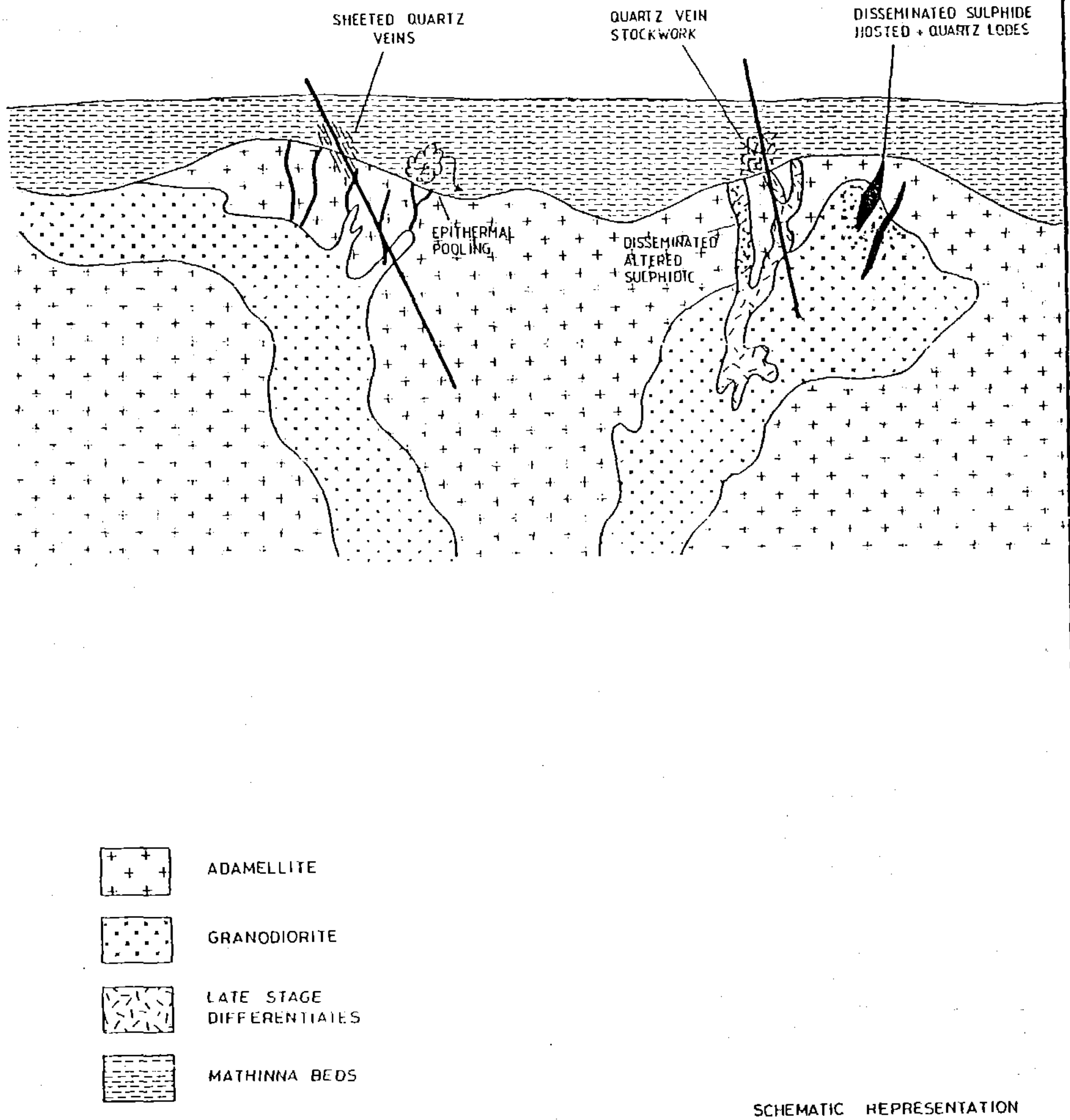
- Fault hosted high grade quartz and/sulphide plus gold such as the Tasmanian Mine at Beaconsfield. Such a deposit could occur between the granodiorite and an overlying conformable zone such as black shale.

- Sheeted quartz veins within the uppermost granodiorite or in the granodiorite - sediment contact zone.

Bottrell et al (1972) describe the Tasmania Mine as follows:

".......... produced 26.6 t of gold from about 1.1 Mt of ore, up until 1914, and Beaconsfield Gold Mines Ltd have been endeavouring to reopen the mine to develop an estimated resource of about 0.7Mt at 24g/t for 16.8 t gold (Hicks and Sheppy, 1990).

The principal reef in the area, the Tasmania reef, is developed in conglomerate .... of probable early Ordovician age. .... Recent studies by Powell and Baillie (in press) have indicated that the The Cabbage Tree Formation is a probable time equivalent of the Mathinna Beds, separated by



SCHEMATIC REPRESENTATION
OF
Au MODEL TYPES

FIGURE 12

the Tamar Fracture Zone. The other reefs present in the area are also confined to the same formation.

The Tasmania reef occupies a minor fault and averages two metres in thickness, about 400m in length, and more than 800m in depth (this and following data from Hicks and Sheppy, 1990). The ends of the reef, where they approached the overlying limestone of the Gordon Group and some underlying pebble conglomerate, are highly branched and ragged. The reef is zoned, with an ankerite-rich core, a quartz-rich outer zone, and a gold-sulphide enriched contact zone between these two zones. Wallrocks are locally altered with carbonates and pyrite, and partly assimilated. Sulphides include pyrite, arsenopyrite, chalcopyrite and minor sphalerite, galena and tetrahedrite. Most of the gold occurs as fine inclusions (<5 um) in pyrite. Later fracturing and brecciation of the reef has resulted in recrystallisation, forming secondary, coarse-grained quartz, calcite, pyrite, chalcopyrite and gold (to several millimetres), as high-grade shoots parallel to bedding."

We believe that a substantial amount of gold was eroded from the granodiorite and/or sediments which at one time occurred above the present Lisle Basin. The amount of gold is likely to have been in the millions of ounces.

Only a small proportion of the gold remained in the Lisle Basin as alluvial/eluvial gold.

This gold could have occurred in any of the environments/models described above or it could have occurred in some other environment such as pyrhotite hosted massive suphide etc.

The gold most likely occurred in the granodiorite cupola area, in the contact area or just above the contact area. Thus the main body of primary gold within the Lisle Basin has been eroded.

However, other similar environments to pre erosional Lisle occur oin the Lisle-Golconda area, particularly the general area of Bessell's Reward (and more generally the entire zone above the intrusive complex between Watts Road and Panama); the S.W. ridge area of the Lisle Basin, including southern Lone Star Ridge; and the northern ridge area of Lisle Basin (Lisle Road geochemical soil anomaly). Other less well defined target areas also have been noted.

There is evidence of "leakage" of gold and arsenic at the surface in parts of these areas (see Section 5) - possibly from significant sulphide/gold accumulations at depth.

Previous exploration of the Lisle-Golconda area has not in any way downgraded the potential of this area. The gold is present - if suitable depositional structures or environments existed outside the former Lisle cupola (now Lisle Basin), major gold deposits could be awaiting discovery.

5 GEOCHEMISTRY

Geochemical surveys have included stream, rock and soil surveys.

5.1 STREAM GEOCHEMISTRY

EL 2.92 has been subject to five separate stream geochemical surveys by four companies - Comalco, CRA, BP Minerals and Billiton. Most of these surveys were not comprehensive and some are of doubtful value. Billiton concluded the only comprehensive survey - a BLEG survey in 1991. However even this survey is difficult to interpret because of order of magnitude differences betwen original and follow up analyses.

5.1.1 COMALCO

Comalco collected -80 Mesh samples and panned for gold at 25 sites. However it appears that the -80 Mesh samples were only analysed for Cu, Pb, Zn and As and the panned samples were not assayed at all, nor were maps produced showing where gold could be panned. Four samples could be considered anomalous for As and ranged from 12 to 44 ppm As. However sample L13 which contained 44ppm As is shown as occurring in two places - Cradle Creek and a tributary of Lisle Creek north of Cradle Creek. Sample 21 is in the middle section of Thomas Creek (12ppm As), sample 22 (17ppm As) is not located on Comalco's map and sample 25 (17ppm As) is east of Lisle in the upper reaches of the Little Forester River.

No Cu, Pb or Zn results are regarded as anomalous.

Askins (1977) - description of their survey is given below:

"Panning was carried out and stream sediment samples collected at all points shown on the attached geological map (Figure 7).

Panning revealed that almost all of the alluvial gold is very fine grained. No other commercially valuable heavy minerals were detected.

Stream sediment samples were sieved to -80 Mesh BSS and analysed for Cu, Pb, Zn by AAS after hot acid digestion and for As with a colormetric method. Results are tabulated in Appendix 1 (of Askins 1977). Only arsenic showed some promise for use as a pathfinder for gold as some streams draining known gold prospects contained more than 10ppm As. However not all streams known to carry gold contained higher values so the method can best be regarded as a guide only."

5.1.2 C.R.A

As part of EL 53/80 CRA concluded a widely spaced stream sediment sampling program over what is now EL 2/92. About 28 samples were taken from within EL 2/92 and analysed for Cu, Pb, Zn and As (Figures 13 to 16).

As results are of interest and against a regional background of 0 to 6 ppm As show a number of anomalous results in the Lisle-Golconda area.

In particular the upper reaches of Thomas Creek (4 samples), Lisle and Shillady creeks in the Lisle Basin are anomalous. The eastern divide of the Lisle

Basin draining into the Little Forrester River is weakly anomalous, two creeks draining the Panama area are anomalous and Lone Star Creek is highly anomalous (250ppm As).

The results in the Lisle Basin are of interest in that they all occur well above the limit of known alluvial-eluvial gold and appear to be derived from Mathinna Beds.

5.1.3 BP MINERALS

BP Minerals (Storer 1984) collected approximately 47 samples and analysed the -40 Mesh fraction for Au by AAS and for numerous other metals and elements by ICP (Seltrust Laboratory in Perth). The program suffered from a lower limit of detection of 0.1g/t for gold and 20ppm for Arsenic.

The only sample with detectable gold (0.1g/t) came from a creek south of the Lisle Basin and south of Bessell's Road which drains the Mathinna Beds and ridge line on the south west side of the Lisle Basin. This sample is supported by 20ppm As and 24 ppm As in samples downstream and a Billiton low level BLEG anomaly upstream.

Much of BP's sampling was from creeks just outside the present limits of EL 2/92 and few samples were taken within Lisle Basin, and Golconda-Panama areas. Bessell's Creek yielded an As value of 26ppm but no gold. Billiton's survey yielded a pan concentrate result of 11.8g/t Au and 11 As for approximately the same location.

BP detected an area of zinc anomalism apparently derived from the Tertiary basalts in the SE corner of the EL.

5.1.4 BILLITON SURVEYS

Billiton undertook a regional survey in 1989 which included various gold and other selected metal analyses and a detailed BLEG anomaly survey in 1991.

5.1.4.1 1989 Survey

Randell (December 1991) described the regional survey as follows:

"At each sample point, three samples were collected.

viz 1) 5kg BCL - ¼ sediment fraction (Au)

2) 50g -80# sediment fraction (Au,Ag,Cu,Pb,Zn,As,Ba)

3) Pan concentrate (Au,Ag,Cu,Pb,Zn,As,Ba)

Sample type 1 were collected from active portions of the drainage over a 20 metre radius and excluding sediment trap sites or stream banks. Care was taken to ensure collection of all size fractions after coarse screening. Samples were collected in large plastic bags then excess *water decanted after settling. After despatch to Classic Comlabs laboratory in Adelaide these samples were analysed for cyanide soluble gold by the BCL (bulk cyanide leach) method. (Otherwise known as the BLEG (bulk leach extractive gold) technique).*

Sample type 2 were collected from sediment traps and quickly screened on site to remove much of the coarser material. Upon returning to the field office these samples were dried then seived to -80#. The finer fraction was then despatched to Classic Comlabs for assay for Au (fire assay); Cu,Zn,Ag (AAS); Pb,As, Ba (XRF).

Sample type 3 was coarsely panned on site then panning completed upon return to the field office. Samples were despatched and assayed, similarly to the -80# samples.

..... As a first pass, a total of 73 sample sets were collected (BCL, -80#, PC) and assayed.

Subsequently, two further phases of sampling were completed and in all 282 sites were sampled.

Results of this survey were scanned visually and subsequently a basic statistical treatment applied to determine anomalous values. The statistical results for the gold analyses from all three sample types are shown on Figure 17. The assays indicate a total of 13 anomalous sites clustered about four regions.

viz	*Back Creek - Lefroy*	*16847, 16846*
	Alberton - Mangana	*17013, 17019, 16807, 16465, 17008, 16429, 17077*
	Golconda - Lisle	*16404, 16410, 16884*
	Gladstone	*16829*

Further reconnaissance was carried out in these four areas and as a result of this the Golconda-Lisle area was applied for under tender and a detailed compilation of the Alberton-Mangana trend completed. The other two areas at Back Creek - Lefroy and Gladstone were not considered to show favourable characteristics for the type of mineralisation sought."

Randall (April 1991), in a separate report on the Lisle area described the regional survey as follows:

"As part of a regional survey of the North-East Province the licence was screened with a stream sediment survey and within the area of EL 6/90, a total of 26 sample sites have been evaluated.

(Samples 16401-12, 16454, 16867-70, 16876-80, 16882, 16884, 16897-98). At each site, a 7kg bulk sample, -80# sample and panned concentrate sample was collected and later analysed for Au and a range of pathfinder elements. The bulk samples were treated using cyanide leach extraction while the remainder were fire assayed for Au,

RF'd Pb, Sn, As and AAS'd Cu, Zn and Ag.

...... Results indicate three areas of anomalous BLEG geochemistry, one of which lies in the extreme north-east corner of the licence.

Area 1 is situated at the southern end of the Lisle Goldfield at the contact of ?hornsfelsed Mathinna Beds with a granitoid cusp. BLEG Au

values of 2.2, 3.6ppb Au were recorded here against a background of 0.05ppb Au. Panned concentrate values of 4.7, 11.8gt Au were also recorded from samples at the northern end of the field (Lisle Basin).

Area 2 includes the Lone Star, Cradle Creek Goldfields with some anomalous responses recorded at the northern end of Lisle and from the Golconda area. Maximum BLEG Au values of 38ppb Au were recorded from 4 samples collected here.

Area 3 is interesting in that it is in an area of no known mineralisation approximately 10km north-east of Golconda. Two sample sites recorded anomalous BLEG Au values of 4.3 and 7.5ppb Au respectively. The drainage patterns here would suggest that the area of interest is located at the contact of a granite lobe and hornfelsed sediments."

The results of the regional survey from EL 2/92 and surrounding area are shown on Figures 18 and 19. Figure 19 shows BLEG, -80 mesh and pan concentrate gold, and Figure 18 shows Cu, Zn and As analyses from -80 Mesh fraction. The gold and arsenic anomalous creeks are also indicated on Plate 3 with the detailed BLEG results (1991 program).

The statistical treatment of the gold results by Randell (December 1991) led Billiton to place lower limits on anomalous results of 14ppb for BLEG, 0.27ppm for -80 Mesh and 1-2g/t for pan concentrates. However Randall in April 1991 inferred that for Lisle the background was 0.05ppb and results of 2.2ppb were anomalous.

The problem of threshold and anomalous values in the Lisle-Golconda area are discussed further in section 5.1.4.3.

A few arsenic results from the regional survey are of interest. Sample 16898 from a creek south of Bessell's Road (and south of the Lisle Basin Rim) gave a value of 46ppm As. This is the same stream that returned anomalous As and 0.1g/t Au in silt in the -40 Mesh fraction from the BP Minerals survey.

Highly anomalous results of 260ppm and 130ppm respectively were recorded in Lone Star and Golconda Creeks at Golconda. The Golconda Creek result may be particularly significant in that this creek is not known to drain granitic rocks or known mineralisation.

5.1.4.2 1991 BLEG SURVEY

Billiton in 1991 completed a detailed BLEG stream sediment survey of the area of EL 2/92 and surrounding area. This was the most comprehensive and best survey of the various stream sediment surveys carried out. However only gold was assayed and only BLEG samples were taken.

The results are displayed together with other stream sediment results on Plate 3 and actual values are shown on Figures 20 to 22. Randall (April 1991) describes Billiton's survey as follows:

"..... a total of 214 stream sediments (Samples 18601-18814) were collected from streams draining Mathinna Beds sediments and Devonian granitoids. Approximately 5kg of stream sediment was collected at

each site and sieved on site to retain the -¼" fraction. Samples were then despatched to Classic Laboratories, Adelaide for cyanide leach gold determination. Results were compiled and a basic statistical treatment completed. Eleven anomalous sites were then re-sampled by duplicate sampling and sampling upstream (Samples 18815-18852, 38 in total). A similar analysis scheme was completed on these samples.

The results indicated two anomalous populations from a basic statistical data analysis viz. mildly anomalous 17-30ppb Au, strongly anomalous >30ppb Au. A maximum assay of 150ppb Au was recorded from Bessell's Road while nine other anomalies, ranging from 32-60ppb Au, were recorded. Follow up sampling was completed and results are shown below.

Anomaly	Original Assay	Duplicate Assay	Original Upstream	Duplicate Upstream
Denison East	50	1.95	-	140
Greeta Road	50	2.1, 2.4	-	2.3
Prestons Road	24	1.7	24	1.65
Mt.Wilson	(a) 40	30	-	7.5, 10
	(b) 20	7.5, 0.85	-	17, 1.95
Denison	17	11	-	1.15
Virginia Road	20	90	-	65, 4.1
Lone Star	(a) 30	-	1.65	-
	(b) 18	-	-	4.4, 0.65
Tobacco Creek	18	6.5	-	0.2
Lisle Road	60	22	-	7.0, 22, 2.6
Faulkners Road	32	1.75	-	0.6
Bessell's Road	(a) 150	1.0	-	0.1
	(b) 20	0.5	-	20

* *All results are in ppb Au.*

* *' - ' Represents 'no sample taken'.*

The poor agreement between original and duplicate assays is of concern and suggests four possibilities : viz

1. *the gold mineralisation is coarse and erratic in distribution*

2. *samples from the same site have been collected from different sediment trap types,*

3. *the rate of effluent discharge may have affected the amount and type of sediment retained,*

4. *there is a lack of precision or sensitivity in the laboratory method.*

All are plausible and the true answer may be a combination of all four. At this stage, a detailed orientation survey would need to be planned to addresss all influencing factors. Confirmatory results were obtained for the Mt.Wilson, Virginia Road, and Lisle Road anomalies and field inspection is warranted to explain the source of these anomalous results."

5.1.4.3 **Discussion of Billiton BLEG Results**

"Anomalous" results are quoted at several different levels by Randell for the Billiton surveys. At one point he suggests background is 0.05ppb Au and results of 2ppb Au or more are significant, at other times he quotes statistical analysis which suggests the lower limit of anomalism is about 17ppb Au.

The samples were collected at three (or perhaps more) separate times. Regional samples (perhaps two sample sets here also), detailed BLEG and follow up BLEG. A visual inspection of all results suggests that reproducability of sample results from samples taken at or near the same place at different times is quite poor. Statistical analysis of the different sample sets is likely to give quite different threshold values. I personally believe that statistical analysis of Billiton's BLEG results has and will lead to quite erronious conclusions regarding anomaly levels or thresholds.

Billiton's original and follow-up results are compared below (taken from Billiton 1:25000 plan of area)

ORIGINAL ASSAY	FOLLOW UP DUPLICATE
150	1.0
20	0.5
60	22
24	17
18	6.5
50	2.4
48	1.95
20	90
20	0.85
40	30
0.15	0.3
20	75
32	1.75
2.1	0.4
20	38

A visual perusal of these results, Randall's (April 1991) comment that regional background is 0.05ppb, and the clustering of values in certain parts of the Lisle-Golconda area suggest to me that samples with values of 0.5ppb Au or greater may be significant and values of 1.0ppb Au are significant and anomalous. The very high values may or may not indicate proximity to mineralisation. At present, because of the absence of orientation data, we do not know if these very high values have special significance. Lone Star and Lisle Creeks are anomalous throughout their lengths within EL 2/92. These anomalous results are not highlighted on the detailed figures as the source area cannot be determined. Other writer's have noted the absence of alluvial

goldfields downstream from Lisle and infer that the gold entering the Lisle basin did not exit through Lisle Creek. Based on the geochemistry this is unlikely to be true - but it may be further evidence that the gold is carried in solution and for alluvial deposits to form a precipitating agent is required.

The results below (in ppb) are all samples taken by Billiton in Lisle Creek - from south to north. F indicates a follow up sample.

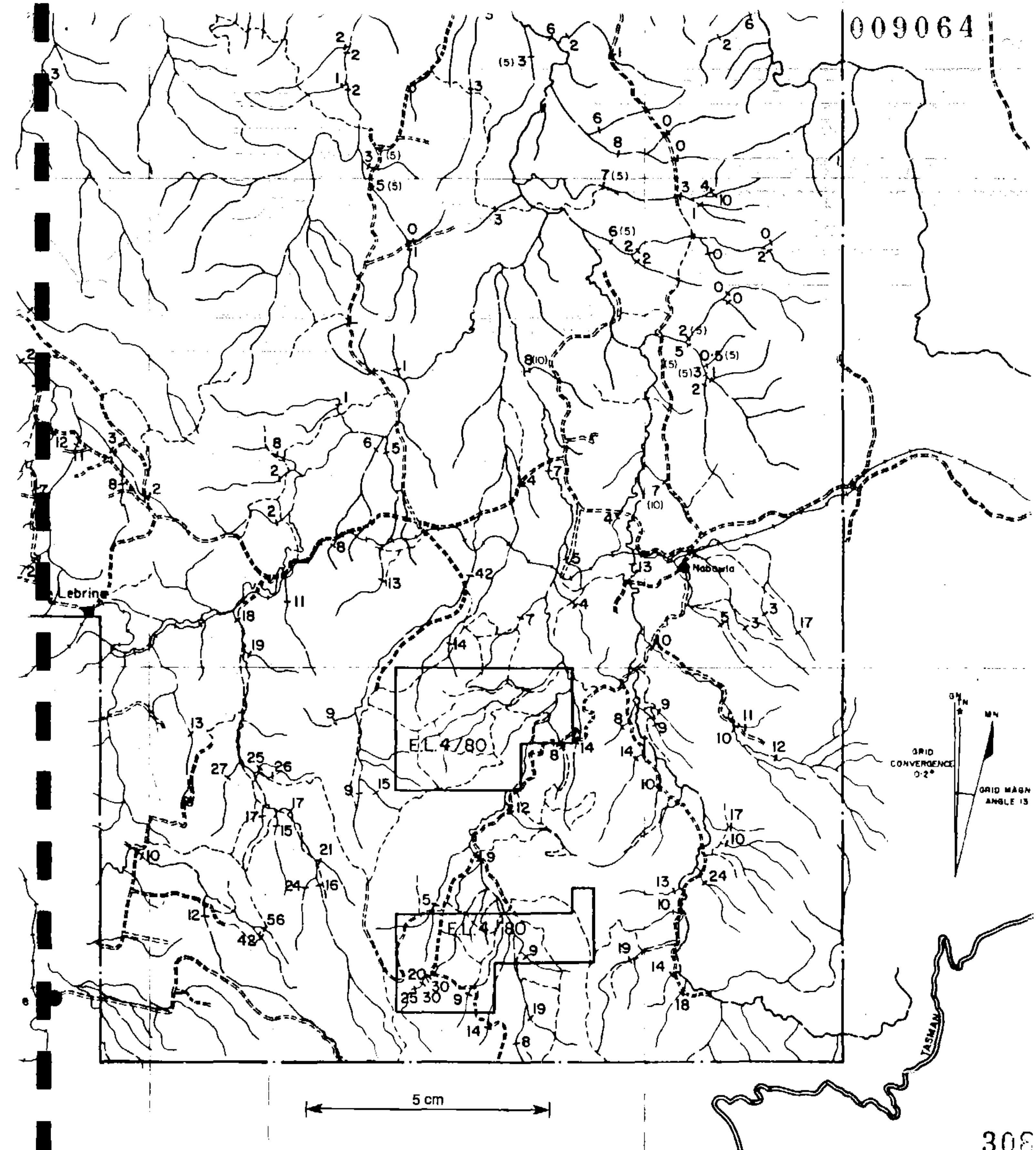
> 0.1, 0.1, 150, 1.0 (F), 20, 3.6, 26, 2.2, (entrance to Lisle Basin), 22 (F), 11, 4.6 (F), 24, 1.65 (F), 24, 17 (F), 15, 2.3 (F), 50.

The above results are highly variable but are mostly anomalous from within a few hundred metres of the source of the creek to as far downstream as the survey was undertaken. The degree of anomalism is approximately the same throughout and does not decrease downstream from the entrance to the Lisle Basin.

Lone Star Creek exhibits similar results except that there may actually be an increase in anomalism with distance from the Lone Star Basin.

Creeks in anomalous areas are not usually anomalous to the source of the creek. BLEG Au values decrease rapidly and very markedly in the upper reaches of most anomalous streams, particularly if and where the gradient of the stream changes to steep or very steep.

009064



308

LEGEND

Highway

Major Road

Minor Road

10 (70) Stream Sediment Sample with results in p.p.m. -80#
(-10 + 80#)

CRA EXPLORATION PTY. LIMITED

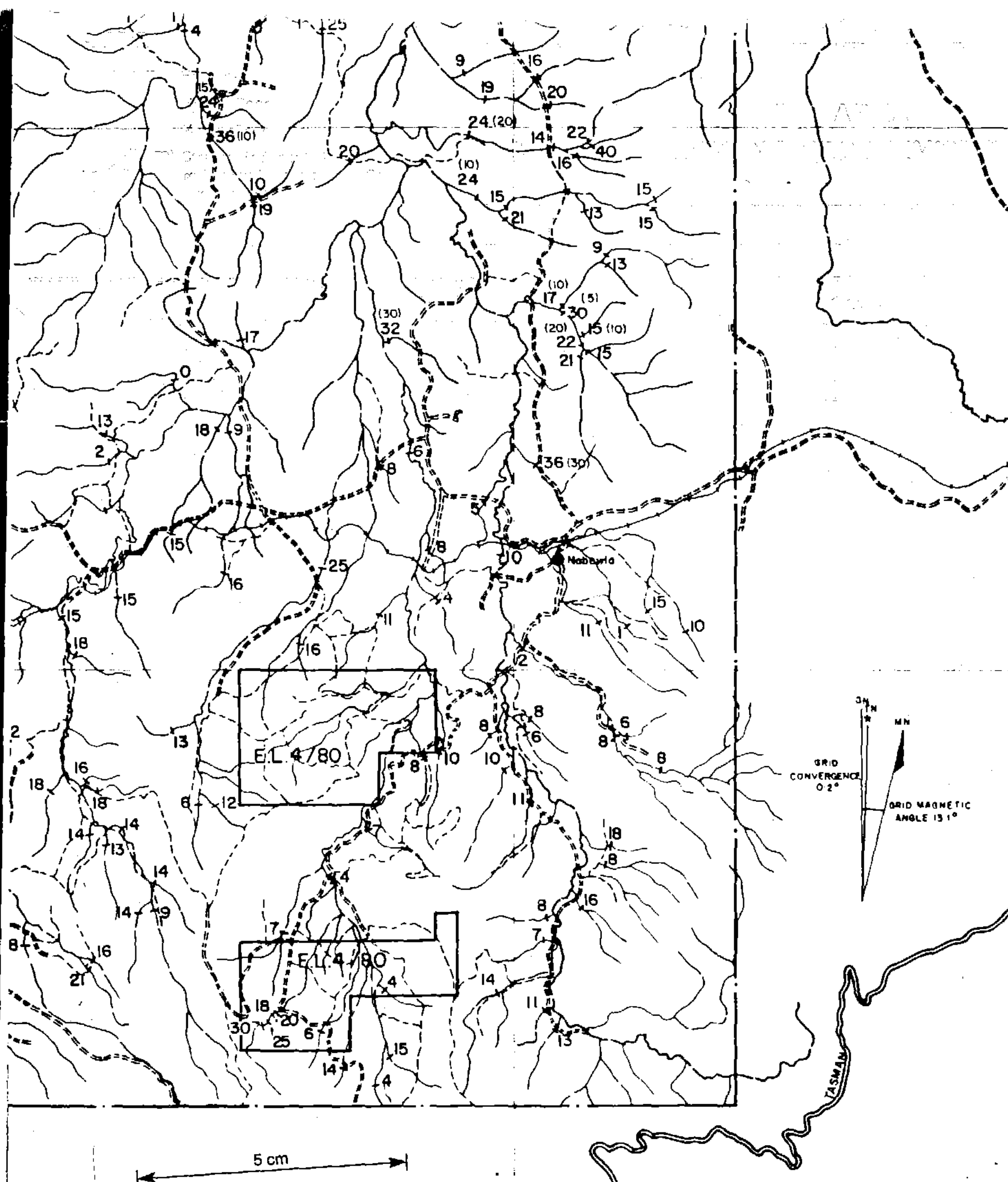
E.L. 53/80

PIPERS RIVER AREA

STREAM SEDIMENT GEOCHEMIST

Cu

Geologist G.B.	Scale 1:100,000	Report No. 11
Drawn TGDS.	Date Nov 1982	Plan No TASh



009065 3087

LEGEND

- Highway
- Major Road
- Minor Road
- 10 (70) Stream Sediment Sample with results in p.p.m. -80# (-10 + 80 #)

CRA EXPLORATION PTY. LIMITED

E.L. 53/80

PIPERS RIVER AREA

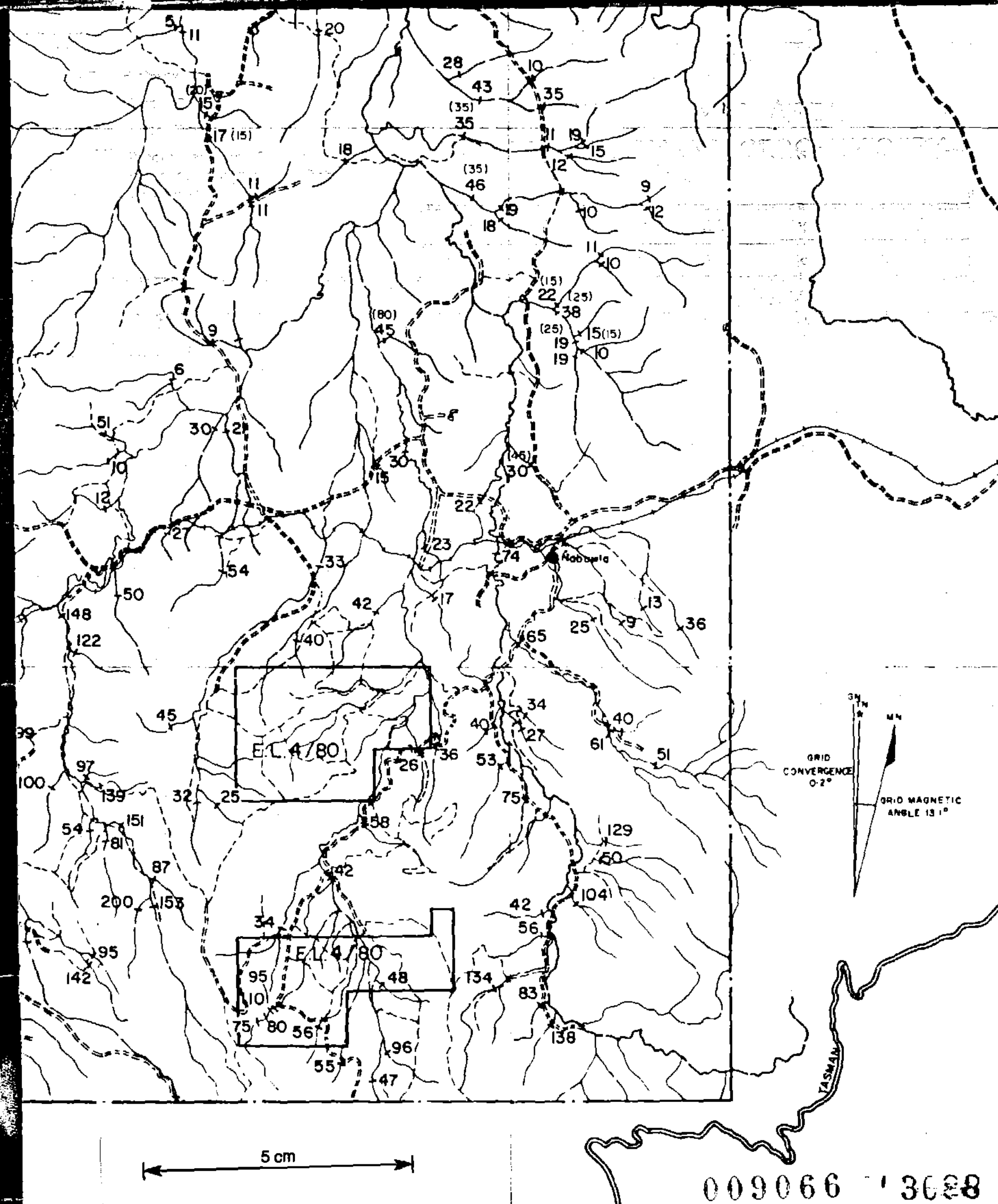
STREAM SEDIMENT GEOCHEMISTRY

Pb

Geologist : G.B.	Scale 1:100,000	Report No. 11845
Drawn T.G.D.S.	Date Nov. 1982	Plan No. TAS h 095

83- 1955

FIGURE 14



009066 '3028

LEGEND

Highway

Major Road

Minor Road

Stream Sediment Sample with results in p.p.m. -80 # (-10 + 80#)

CRA EXPLORATION PTY. LIMITED		
E.L. 53/80 PIPERS RIVER AREA **STREAM SEDIMENT GEOCHEMISTRY** **Zn**		
Geologist G.B.	Scale 1 100,000	Report No. 11845
Drawn T.G.D.S.	Date Nov. 1982	Plan No. TAS h 096

83-1955

FIGURE 5

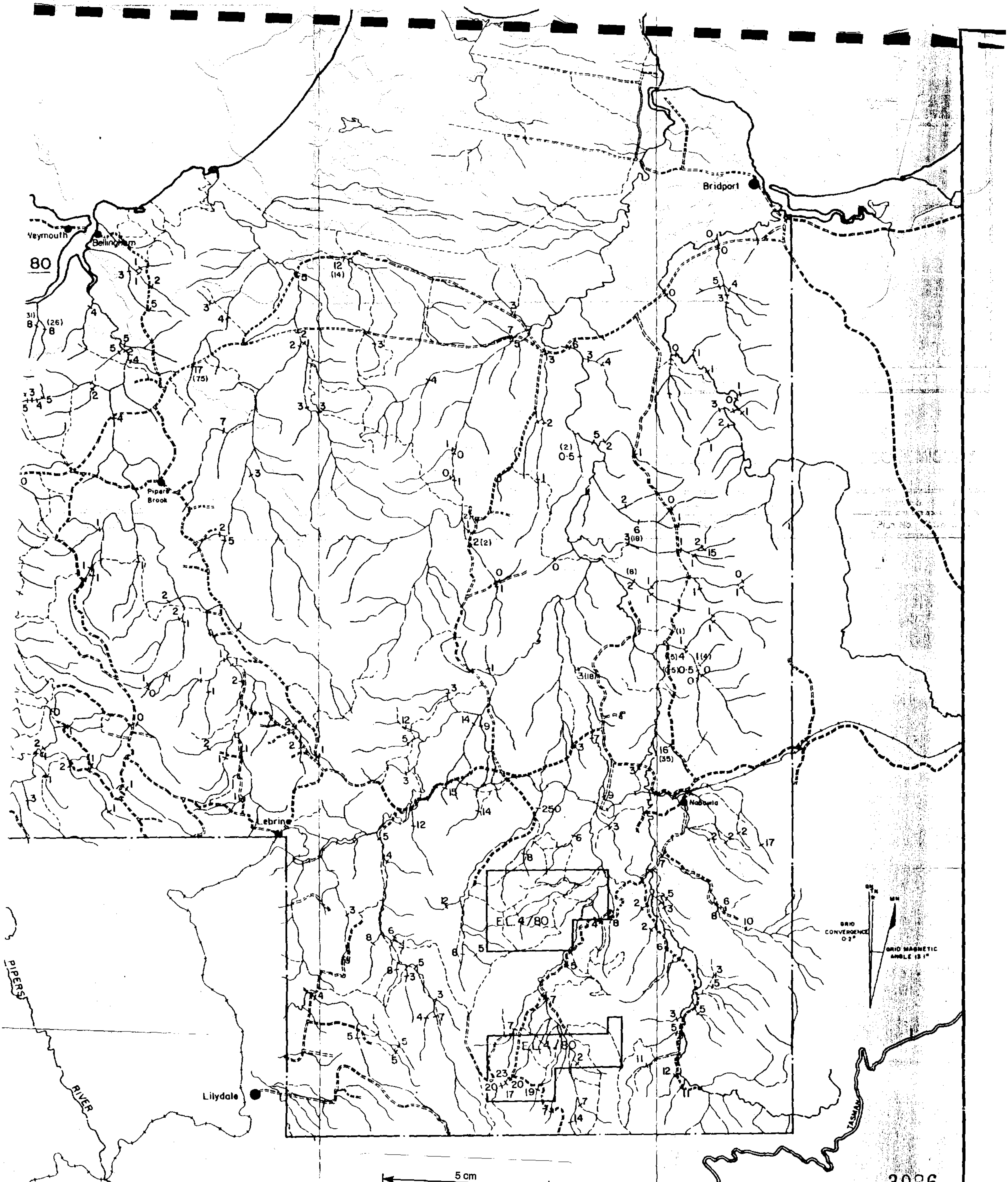
AU ASSAY STATISTICS

SAMPLE TYPE	SAMPLE NUMBER	MEAN	STD DEV. (SD)	MEAN + 1 SD	MEAN + 2 SD	RANGE	COUNT	FREQ. (%)	CUMUL. FREQ(%)	INFLEXION POINTS	PRIORITY 1 SAMPLE NUMBER	PRIORITY 1 AU ASSAY	PRIORITY 2 SAMPLE NUMBER	PRIORITY 2 AU ASSAY	PRIORITY 3 SAMPLE NUMBER	PRIORITY 3 AU ASSAY
BLEG	279	1.9	12.2	14.1	26.3	0-0.1	127	45.5	45.5	2,30	17013	160	17019	110	17008	22
						0.1-0.5	90	32.3	77.8				16807	46	16465	14
						0.5-1.0	27	9.7	87.5				16404	38		
						1.0-5.0	23	8.2	95.7							
						5.0-10.0	6	2.2	97.9							
						10.0-50.0	4	1.4	99.3							
						50.0-100.0	0	0	99.3							
						>100.0	2	0.7	100							
		(ppb)	(ppb)	(ppb)	(ppb)					(ppb)		(ppb)		(ppb)		(ppb)
-80#	280	0.05	0.2	0.25	0.45	0-0.05	253	90.4	90.4	0.25,1.5	16404	2.3	16429	1.92	16829	0.37
						0.05-0.1	12	4.3	94.7				17019	1.66	17077	0.27
						0.1-0.5	10	3.6	98.3				16465	0.76		
						0.5-1.0	2	0.7	99				16847	0.72		
						1.0-2.0	2	0.7	99.7							
						>2.0	1	0.3	100							
		(ppm)	(ppm)	(ppm)	(ppm)					(ppm)		(ppm)		(ppm)		(ppm)
PAN CON	277	0.19	0.98	1.17	2.15	0-0.05	234	84.5	84.5	0.3,2.0	16410	11.8	16429	8.6	1684[illegible]	1.99
						0.05-0.1	12	4.3	88.8				16404	4	17013	1.96
						0.1-0.5	20	7.2	96				16807	3.9	16884	1.2
						0.5-1.0	2	0.7	96.7				16465	2.9		
						1.0-5.0	7	2.5	99.2				17019	2.3		
						5.0-10.0	1	0.4	99.6							
						>10.0	1	0.4	100							
		(ppm)	(ppm)	(ppm)	(ppm)					(ppm)		(ppm)		(ppm)		(ppm)

TABLE 17

REGIONAL BLEG STATISTICS
AFTER BILLETON, RANDELL (DEC 91)

000667



LEGEND:

- Highway
- Major Road
- Minor Road
- 10 (70) Stream Sediment Sample with results in p.p.m. - 80 # (-10 + 80 #)

2 1 0 2 Kilometres

SCALE 1:100,000

FIGURE 16

890600

CRA EXPLORATION PTY. LIMITED

E.L. 53/80

PIPERS RIVER AREA

STREAM SEDIMENT GEOCHEMISTRY

As

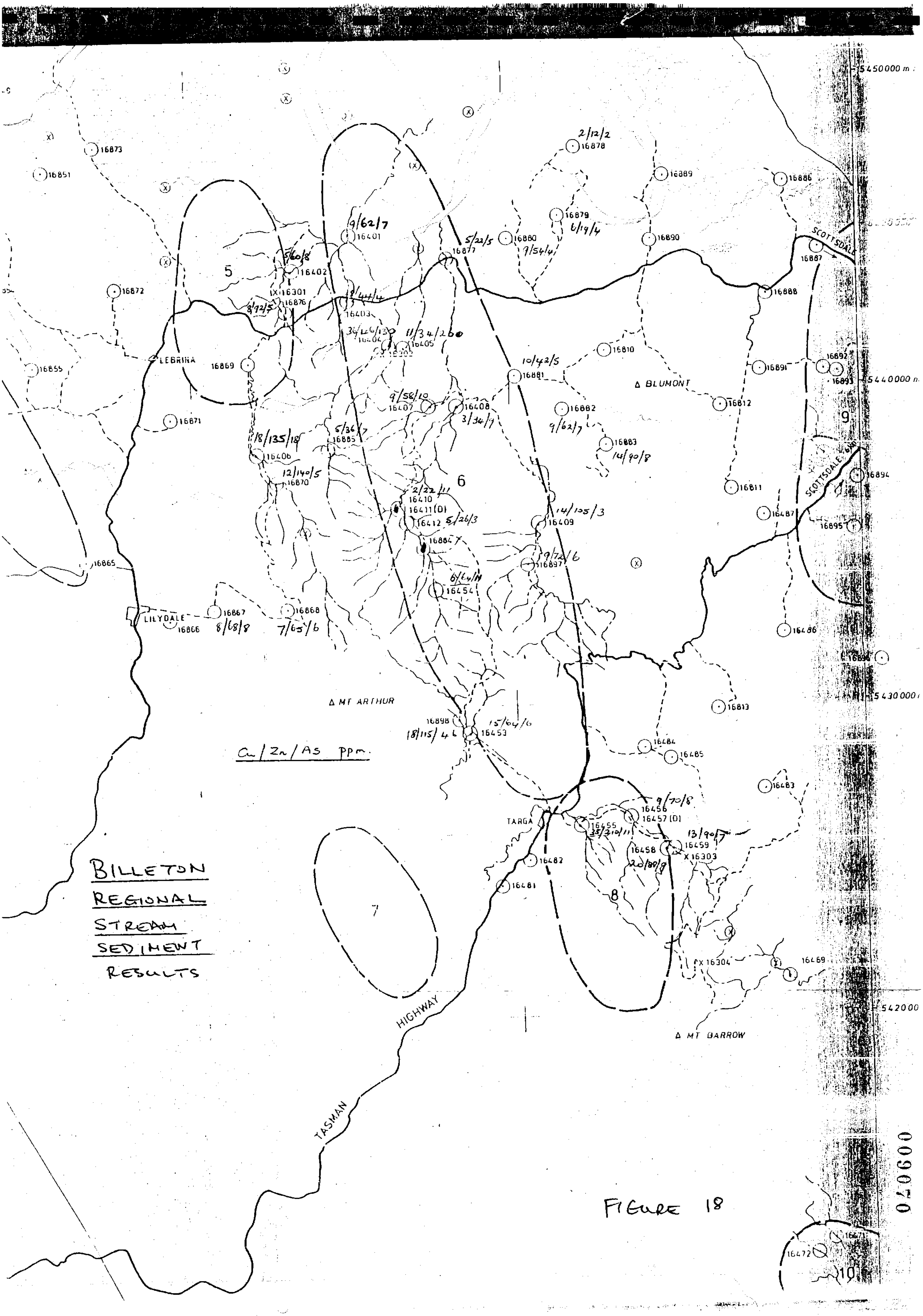
Geologist: G.B	Scale 1:100,000	Report No. 11845
Drawn: TGDS	Date: Nov. 1982	Plan No. TASh 098

AU ASSAY STATISTICS

SAMPLE TYPE	SAMPLE NUMBER	MEAN	STD DEV. (SD)	MEAN + 1 SD	MEAN + 2 SD	RANGE	COUNT	FREQ. (%)	CUMUL. FREQ(%)	INFLEXION POINTS	PRIORITY 1 SAMPLE NUMBER	PRIORITY 1 AU ASSAY	PRIORITY 2 SAMPLE NUMBER	PRIORITY 2 AU ASSAY	PRIORITY 3 SAMPLE NUMBER	PRIORITY 3 AU ASSAY
BLEG	279	1.9	12.2	14.1	26.3	0-0.1	127	45.5	45.5	2,30	17013	160	17019	110	17008	22
						0.1-0.5	90	32.3	77.8				16807	46	16465	14
						0.5-1.0	27	9.7	87.5				16404	38		
						1.0-5.0	23	8.2	95.7							
						5.0-10.0	6	2.2	97.9							
						10.0-50.0	4	1.4	99.3							
						50.0-100.0	0	0	99.3							
						>100.0	2	0.7	100							
		(ppb)	(ppb)	(ppb)	(ppb)					(ppb)		(ppb)		(ppb)		(ppb)
-80#	280	0.05	0.2	0.25	0.45	0-0.05	253	90.4	90.4	0.25,1.5	16404	2.3	16429	1.92	16829	0.37
						0.05-0.1	12	4.3	94.7				17019	1.66	17077	0.27
						0.1-0.5	10	3.6	98.3				16465	0.76		
						0.5-1.0	2	0.7	99				16847	0.72		
						1.0-2.0	2	0.7	99.7							
						>2.0	1	0.3	100							
		(ppm)	(ppm)	(ppm)	(ppm)					(ppm)		(ppm)		(ppm)		(ppm)
PAN CON	277	0.19	0.98	1.17	2.15	0-0.05	234	84.5	84.5	0.3,2.0	16410	11.8	16429	8.6	16847	1.98
						0.05-0.1	12	4.3	88.8				16404	4	17013	1.96
						0.1-0.5	20	7.2	96				16807	3.9	16884	1.2
						0.5-1.0	2	0.7	96.7				16465	2.9		
						1.0-5.0	7	2.5	99.2				17019	2.3		
						5.0-10.0	1	0.4	99.6							
						>10.0	1	0.4	100							
		(ppm)	(ppm)	(ppm)	(ppm)					(ppm)		(ppm)		(ppm)		(ppm)

TABLE 17

REGIONAL BLEG STATISTICS
AFTER BILLETON, RANDELL (DEC 91)



BILLETON REGIONAL STREAM SEDIMENT RESULTS

FIGURE 18

009070

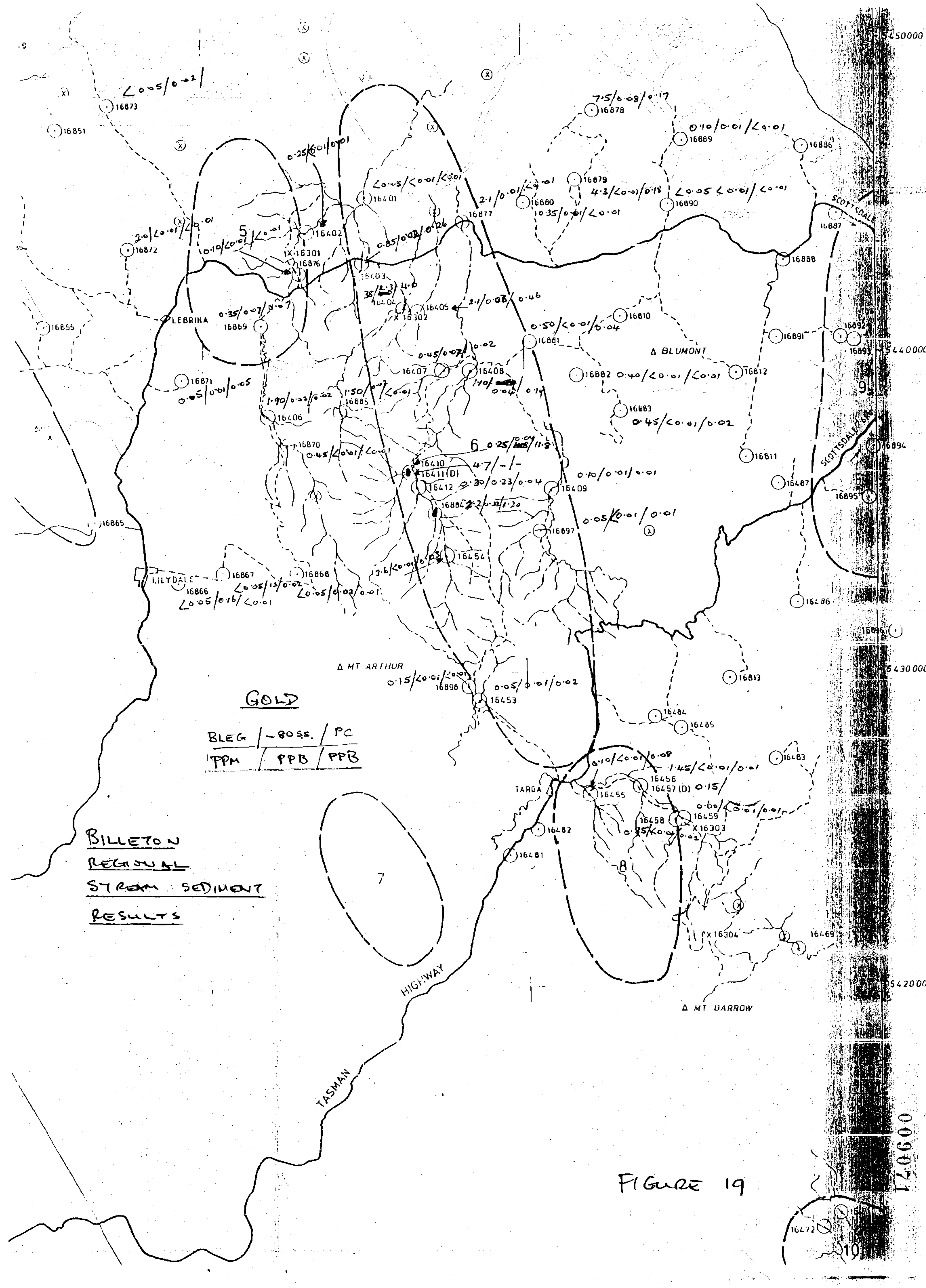
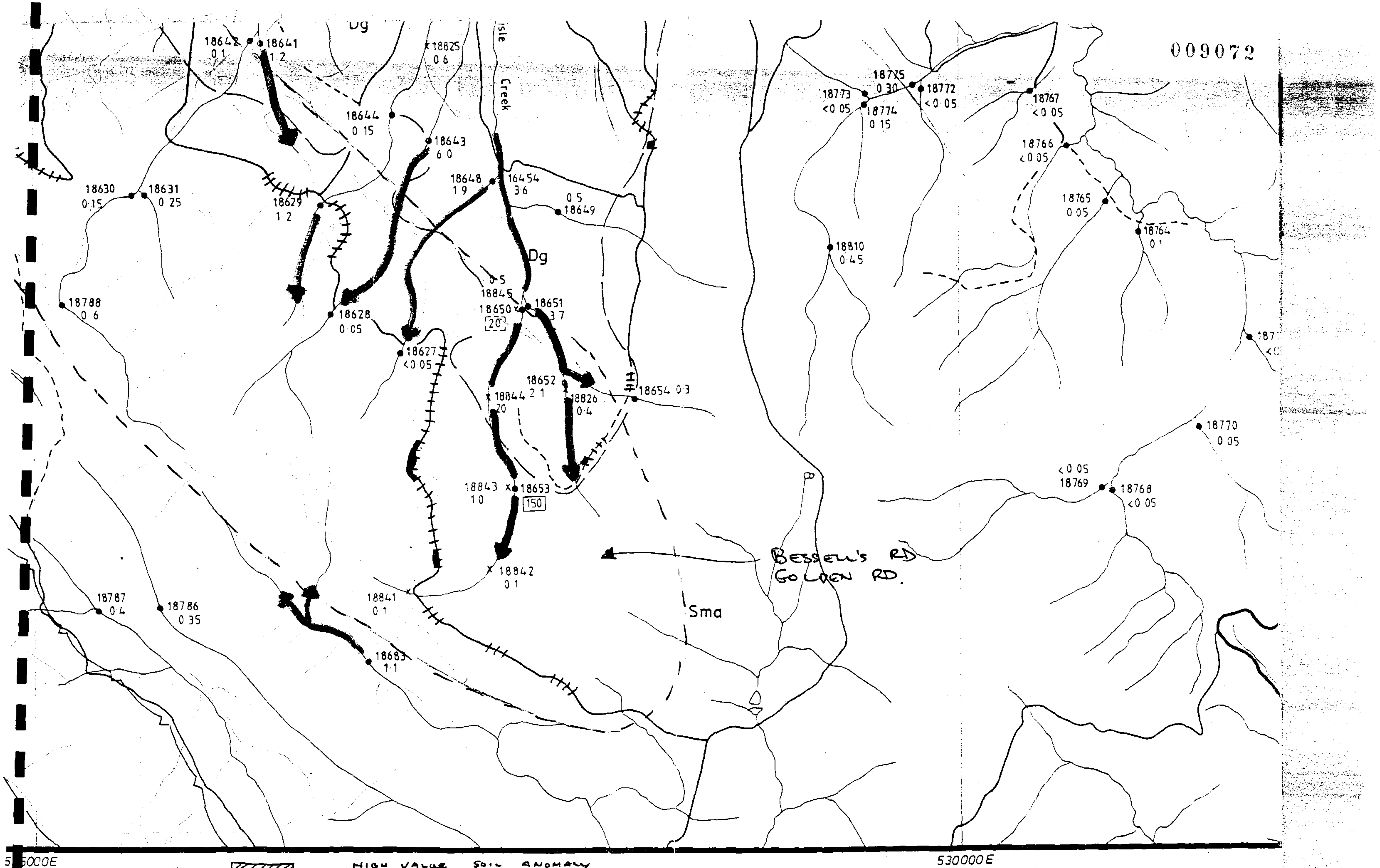


FIGURE 19

120600

009072

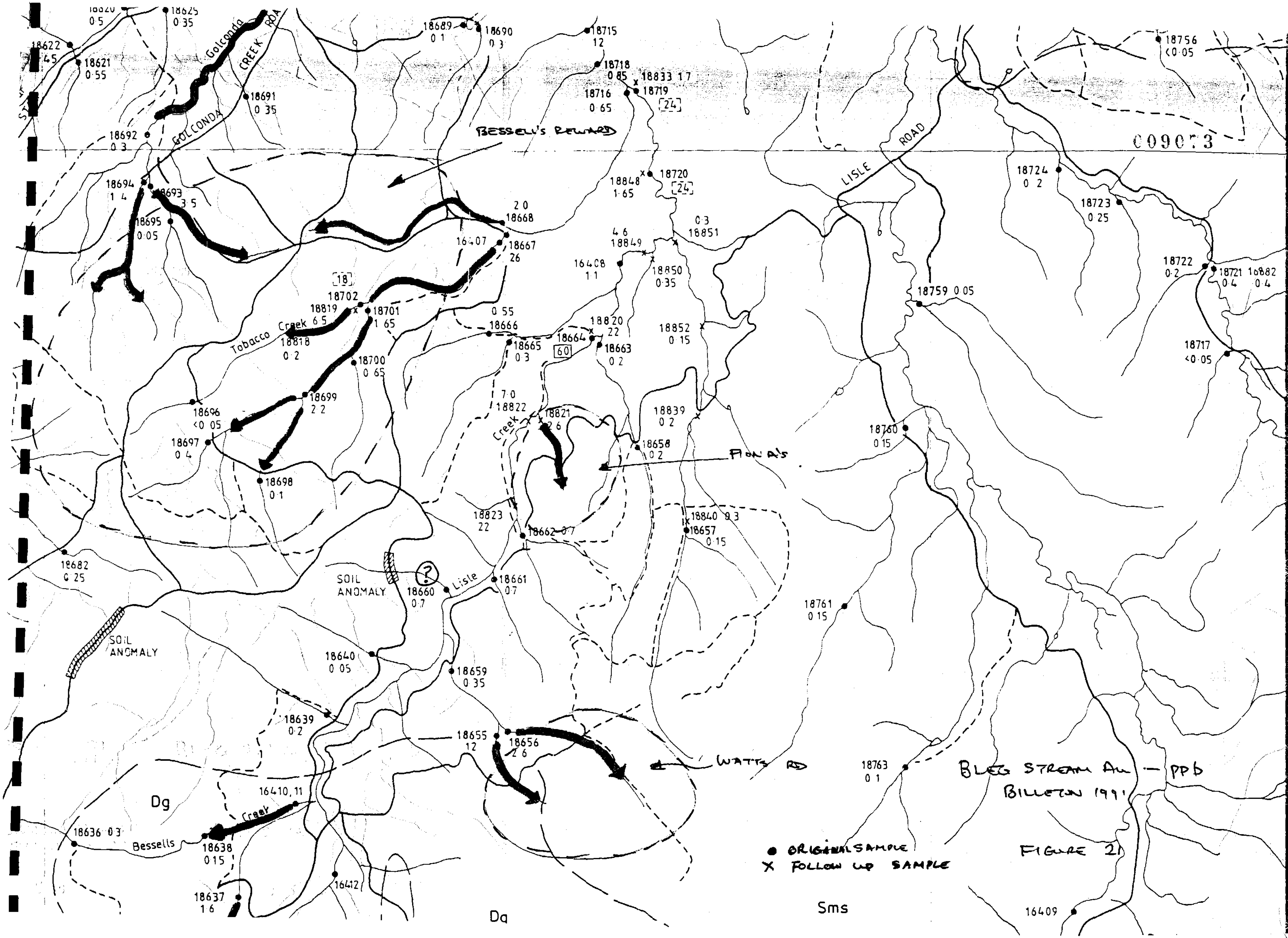


HIGH VALUE SOIL ANOMALY

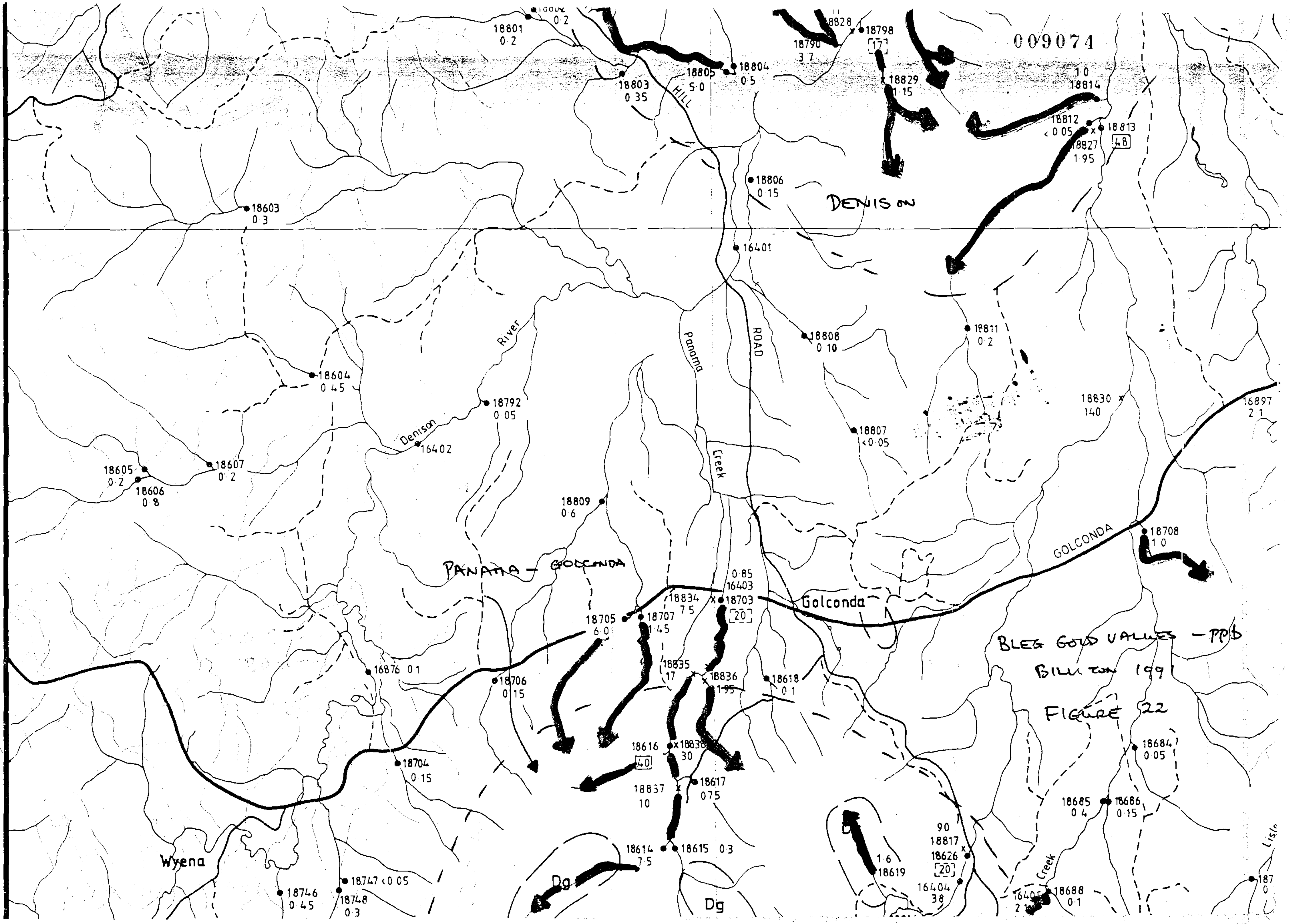
LOW AND INTERMEDIATE VALUE SOIL ANOMALY

Sample site • 18787 Sample no
0.4 Assay ppb Au

BLEG SILT Au – ppb
BLEG SOIL ANOMALIES
BILLITON



C09073
18620 0.5
18625 0.35
18622 .45
18621 0.55
Golconda
CREEK ROA
GOLCONDA
18691 0.35
18692 0.3
18689 0.1
18690 0.3
18715 12
18718 0.85
18833 1.7
18716 0.65
18719
24
BESSELL'S REWARD
LISLE ROAD
18756 <0.05
18720
24
18848 1.65
18724 0.2
18723 0.25
18694 1.4
18693 3.5
18695 0.05
2.0 18668
16407
18667 26
0.3 18851
4.6 18849
16408 1.1
18850 0.35
18722 0.2
18721 0.4
16882 0.4
18
18702
18819 6.5
18701 1.65
18759 0.05
Tobacco Creek
18818 0.2
0.55 18666
18665 0.3
18664
60
18820 22
18663 0.2
18852 0.15
18717 <0.05
18700 0.65
18699 2.2
7.0 18822
Creek
18821 2.6
18839 0.2
18696 <0.05
18697 0.4
18658 0.2
FIONA'S
18760 0.15
18698 0.1
18823 22
18662 0.7
18840 0.3
18657 0.15
18682 0.25
SOIL ANOMALY
?
18660 0.7
Lisle
18661 0.7
18761 0.15
SOIL ANOMALY
18640 0.05
18659 0.35
18639 0.2
18655 12
18656 2.6
WATTS RD
18763 0.1
BLEG STREAM Au — ppb
BILLETON 1991
Dg
16410, 11
Creek
18636 0.3
Bessells
18638 0.15
16412
18637 1.6
Dg
Sms
16409
● ORIGINAL SAMPLE
X FOLLOW UP SAMPLE
FIGURE 21



BLEG GOLD VALUES – PPB
BILLITON 1991
FIGURE 22

As anomalism often persists further up the creeks than BLEG Au anomalies suggesting that gold may also be originating near the source of several creeks but is not reflected in the silt geochemistry. This would be a reflection of the transport of gold in solution rather than as particles.

Evidence that gold should be present or should be transported within the upper reaches of some streams are the gold BLEG soil anomalies along Lone Star Ridge.

5.1.5 STREAM GEOCHEMICAL ANOMALISM

Much of the Golconda area shows low level Au and As anomalism compared to the surrounding areas. The results shown diagrammatically on Plate 3 combine all four companies work. Unfortunately there are still many gaps in the results and all five combined surveys do not in total constitute a comprehensive stream geochemical survey. The results do not point towards targets in small discrete areas. Rather they tend to define fairly large areas which are gold and/or arsenic anomalous and suggest that a substantial part of the area from the southern end of the Lisle Basin, NNW to north of Panama Ridge has potential to host "hard rock" gold deposits.

Specifically, the following points have been noted:

- Much of the Lisle Basin above the granitic / Mathinna contact is anomalous in As and Au. However, geochemical data is insufficient to determine if this anomalism is caused by widespread, and low value mineralisation or by specific higher grade areas shedding As and Au.

- On present data a broad area of high potential based on As and BLEG gold is indicated in the SW Lisle Basin towards the headwaters of Lisle,

  Shillady and Thomas Creeks (Bessell's Road - Golden Road or Lone Star Ridge South). This area is also defined by As and BLEG Au anomalous results from south of the Lisle Basin divide and by BLEG soil anomalies on Lone Star Ridge and Bessell's Road. The anomalies on the ridge line and to the south of Lisle Basin indicate Au and As persists high into the Mathinna Beds and are not restricted to the granite - Mathinna contact zone. The maximum BLEG analysis was 150ppb and maximum As 46ppm.

- The Lone Star Ridge South area is defined by the following anomalous results: 1.2ppb Au in south branch of Thomas Creek, 1.2ppb Au and 19ppm As in "Faulkners Road" Creek, 6.0ppb Au in Shillady Creek, 1.9ppb in creek south of Shillady Creek, 14ppm As, 3.6, 0.5, 20, 20, 150 and 1.0ppb Au in upper Lisle Creek, 3.7, 2.1ppb Au in Walls Creek, 1.1ppb Au and 20, 24 and 46 ppm As in creek draining Mathinna Beds south of the Lisle Basin, 12, 23, 20, 17 and 20 ppm as in SW Thomas Creek.

- There is no stream geochemistry available for the eastern slopes of the Lisle Basin but CRA samples taken from streams draining east from the eastern side of the Basin (Bessell's Ridge) are anomalous in As (11, 12 and 11ppm As). There are also low order soil gold anomalies along the upper part of Old Lisle Road and Parsons Road (East Lisle).

- Watts Road anomaly is defined by two BLEG Au stream sediment results - 12 and 2.6ppb Au. BLEG soil sampling along Watts Road did not give any anomalous results.

- A single BLEG anomaly, 2.6ppb, occurs north of Fiona's Picnic Ground, Lisle Creek.

- The Bessell's Reward area is a large area (4-5 sq kms) defined by BLEG and pan concentrate gold and includes the upper reaches of Tobacco Cradle and Golconda Creeks. Anomalous results include pan concentrates of 8.3ppm Au and silt sample of 0.07 ppm Au, in Tobacco Creek, 44ppm As and 2.0 ppb Au in Cradle Creek, and BLEG results of 26, 18, 6.5, 1.65, and 2.2 ppb in Tobacco Creek, 3.5 and 1.4 ppb in Golconda Creek and 1.65ppb in an eastern tributory of Lone Star Creek. In addition there is a 260ppm As result downstream in Golconda Creek which could originate in the Bessell's Reward area.

- In Southern Lone Star Creek there is a single BLEG value of 2.2ppb Au.

- In a western tributary of Lone Star Creek (Lone Star West) there is a single BLEG value of 1.05ppb and an arsenic value of 12ppm.

- The Panama-Golconda area is an area of anomalous geochemistry about 5 sq kms in area, centred on the old Panama Mine. Anomalous BLEG values include 6.0, 1.45, 20, 75, 17, 1.95, 30, 40, 10, 7.5 and 1.6ppb Au. There are two anomalous As values of 14 and 15ppm.

- A single point BLEG anomaly occurs near Greeta Road and the railway line (Greeta Road) and a further single point BLEG anomaly occurs at Green Valley farm east.

5.2 ROCK GEOCHEMISTRY

Comalco and BP Minerals undertook fairly extensive soil sampling programs near areas of known mineralisation or in other areas of perceived interest. Mines Department workers have also sampled old mines. BP Minerals assayed approximately 140 samples and Comalco 123 samples. However BP used an AAS method to determine gold with a lower detection limit of 0.1g/t Au and Comalco's results are in doubt because of analytical errors.

Excluding Comalco's samples (see later this section) the main significant rock analyses are listed below:

SAMPLE NO	DESCRIPTION/ LOCATION	AU g/t	As ppm	Fe %	SOURCE
59020	Gossanous siltstone, Panama	0.16	2224	7.32	BP
59025	Quartz, Panama	0.97	94	0.4	"
59026	Pyritic Quartz, Bessell's Ck (1187 Pb)	9.8	8723	2.71	"
59028	Quartz,Golden Crest (8764 Cu)	10.5	1627	1.81	"
59029	" "	0.17	1783	1.1	"
59030	Quartz, Enterprise	3.12	<20	0.6	"
59021	Weathered hornfels, Panama	<0.02	318	7.93	"
59022	Gossanous rock, Panama	0.05	3214	40.26	"
59024	Weathered Hornsfels,Panama	<0.02	329	7.65	"
59042	Sandstone, Bessells Reward	0.1	175	25.6	"
59102	Fe-stone in Carbonaceous shale	0.1	61	37.6	"
59148	Quartz with sulphides, (134Pb), Denison	1.6	650	5.2	"
59167	Fe-stained sandstone	<0.02	110	45.9	"
59160	Quartz, Panama North	22.0	340	6.4	"
59106	Quartz, Denison (687Pb)	1.2	763	1.9	"
-	Hornfels, Panama Quartz, sulphide, Panama	3.0 210.0			Bottrill et al 1992
-	Quartz veins mined at Enterprise-average grade	9.6			Marshall 1964
-	Sandstone at Bessells Reward - average of 10 samples - Maximum	3.4 17.5			Marshall 1969

Askins, (1977) describes Comalco's rock sampling program and results as follows:

"Rock samples were collected initially to test whether the dark hornfels and the rocks near the Bessell's Reward prospect contained significant gold.

Analyses of initial samples PA/T/LISLE 1-16 by both fire assay and AAS means did not find any significant values - all being less than 0.05 ppm.

Because no obvious gold bearing rock type was discovered in this initial sampling, a program of sampling all well exposed areas was commenced. All rock types were sampled; hornsfels, shales, black shales, siltstones and to a lesser extent sandstones. Sixty six samples (prefixed SK/T/-) were chipped from the localities shown on the map. All were analysed for gold by fire assay.

Six significant analyses were obtained:-

SAMPLE NO.	*GOLD, ppm*	*DESCRIPTION*
SK/T/L 5	*0.94*	*Quartz off dump*
14	*0.36*	*Hard dark hornfels. Chip sample across 25-30m of outcrop. Minor sugary quartz veins and granite dykes throughout.*
18	*0.33*	*Black shale enclosed in earthy brown sandstone.*
47	*0.41*	*Light grey spotted sandstone (midly hornfelsed), with quartz veinlets.*
51	*0.28*	*Purplish to light earthy brown shale.*
62	*0.38*	*Dump material, mainly hornfels, Fairthorne prospect.*

No one particular rock type was found to be gold bearing therefore no efforts to map and sample particular rock units like black shale were justified as this stage.

The samples 14, 18, 47 and 51 were chip sampled over wide areas of outcrop, so these areas were resampled in detail:

Original sample	*Resampling*
SK/T/L 14	*RD/T/L 67 - 81*
18	*101 - 113*
47	*114 - 123*
51	*82 - 100*

Five significant gold analyses were obtained from this resampling program, ranging up to 1.3ppm in a purplish siltstone.

However these values were suspected to be incorrect and so repeat analyses were requested. The repeat values except, for sample 120 which is quartz vein material, indicate that the original values were incorrect, and that none of the resamples contained significant gold."

In view of the analytical problems experienced by Comalco all their results must be regarded as being unreliable and in doubt. Their entire rock sampling program is thus of little value in determining which rock types may contain gold.

BP Minerals significant results were shown earlier in this section. Their reports do not discuss their rock chip sampling in any detail but most high results were from quartz vein material in the Panama and Golden Crest area. It is of interest to note that As is high at Panama and Golden Crest area but low at Enterprise! A few of the hornsfels and sediment samples showed trace gold (up to 0.16g/t) with moderate to high arsenic (175 to 2224ppm). One sample of carbonaceous shale returned 0.1g/t Au and 37.6% Fe.

Other sampling by Mines Department geologists have given results of 3.0g/t in hornfels and up to 210g/t in quartz veins (Bottrell et al 1992). As mentioned earlier (Reid in Marshall 1969) describes gold in "sandstone" at Bessell's Reward with an average of 10 samples returning 3.4g/t Au.

5.2.1 MAC MINING SAMPLING

Mac Mining completed a brief reconnaissance of EL 2/92 in February 1993 and analysed 24 rock samples. Most of these samples were from the vicinity of BLEG soil anomalies and were intended to try and define the source of these anomalies. It was unsuccessful.

The samples are described below and the analyses are listed on the accompanying assay sheets. Locations are indicated on Plate 1.

Sample No	Location	Description
1A	Upper Parsens Rd, Lisle	"Spotted" hornsfels
1B	" " " "	Fine grained hornsfels
4	Bessells Rd, Soil BLEG Anomaly	Fractured & Fe stained Mathinna Beds
5	" " " "	" " "
6A	Lone Star Ridge Soil BLEG Anomaly	Quartz
6B	" " " "	Hornfels
6C	" " " "	Quartz
6D	" " " "	Hornsfels with numerous minor iron stained fractures
6E	" " " "	Siliceous hornfels (chert based?)
6F	" " " "	Hornfels
7	" " " "	Black shale
9A to 9F	Golconda	Quartz - minor sulphides in some samples
10	Lisle Road Soil BLEG anomaly	Chip sample of Mathinna Beds
11	" " " "	Hornfels - some iron stained veinlets
12	Bessell's Reward	2.5cm chip sample across Black Shale
13A	" "	Grey Siltstone - some iron staining
13B	" "	" "
14A	Tobacco Creek	Hornfels with 1.5cm quartz vein
14B	" "	Quartz

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ANALYTICAL REPORT

CLIENT: MAC MINING N L
ADDRESS: 2 VILLAGE HIGH ROAD
BENOWA
QLD 4217

CONTACT: MR B MCNEIL

LABORATORY: STAFFORD
BATCH NUMBER: ST5637-0

No. of SAMPLES: 24
DATE RECEIVED: 18/03/93
DATE COMPLETED: 30/03/93

D No: SAMPLE TYPE: ROCK PROJECT No:

SAMPLE NUMBER	ELEMENT UNIT METHOD	Cu ppm IC586	Pb ppm IC586	Zn ppm IC586	Ag ppm IC586	As ppm IC586
	1A	39	9	73	<1	8
	1B	16	6	45	<1	16
	4	91	13	66	<1	7
	5	77	21	78	<1	15
	6A	6	<5	7	<1	3
	6B	41	16	48	<1	20
	6C	6	<5	8	<1	3
	6D	22	20	15	<1	17
	6E	32	15	26	<1	12
	6F	26	14	17	<1	8
	7	10	16	16	<1	12
	9A	12	<5	8	<1	38
	9B	5	<5	5	<1	3
	9C	7	<5	7	<1	4
	9D	7	<5	7	<1	5
	9E	17	<5	9	<1	49
	9F	11	<5	5	<1	42
	10	24	12	60	<1	15
	11	35	16	54	<1	16
	12	43	31	20	<1	66
	13A	23	10	31	<1	6
	14A	10	9	27	<1	5
	14B	6	<5	25	<1	11
	13B	20	12	40	<1	8
ECTION LIMIT:		5	5	5	1	1

MENTS: *** DUPLICATE ASSAYS.

Laboratory
0 79 9155 Fax: (077) 79 9729
ers Laboratory
0 87 4155 Fax: (077) 87 4220
Laboratory
063) 63 1722 Fax: (063) 63 1189
Laboratory
0 46 1390 Fax: (054) 46 1389

Perth Laboratory
Phone: (09) 249 2988 Fax: (09) 249 2942
Kalgoorlie Laboratory
Phone: (090) 21 1457 Fax: (090) 21 6253
Southern Cross Laboratory
Phone: (090) 49 1292 Fax: (090) 49 1374

All pages of this report have been checked and approved for release

Signed

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No. of SAMPLES: 24
DATE RECEIVED: 18/03/93
DATE COMPLETED: 30/03/93

DE No:　　SAMPLE TYPE: ROCK　　PROJECT No:

SAMPLE NUMBER	ELEMENT UNIT METHOD	Fe % IC586	Bi ppm IC586	Sb ppm IC586	Au ppm PM205	Au PM205 ppm CHECKS
	1A	3.43	<5	<5	0.003	
	1B	4.30	<5	<5	0.001	
	4	3.22	<5	<5	0.001	
	5	3.13	<5	<5	0.006	
	6A	0.59	<5	<5	0.001	
	6B	2.20	<5	<5	0.002	
	6C	0.77	<5	<5	0.001	
	6D	1.73	<5	<5	0.001	
	6E	1.35	<5	<5	0.003	
	6F	1.69	<5	<5	0.002	
	7	0.56	<5	<5	0.020	
	9A	1.14	<5	<5	0.394	0.458
	9B	0.67	<5	<5	<0.001	
	9C	0.90	<5	<5	<0.001	
	9D	0.95	<5	<5	<0.001	
	9E	1.25	<5	<5	0.041	0.032
	9F	1.31	<5	<5	0.001	
	10	2.34	<5	<5	0.001	
	11	3.51	<5	<5	0.001	
	12	5.03	<5	<5	0.004	
	13A	2.30	<5	<5	0.007	
	14A	1.24	<5	<5	0.001	
	14B	1.27	<5	<5	<0.001	<0.001
	13B	3.36	<5	<5	0.001	
ECTION LIMIT:		0.01	5	5	0.001	0.001

MMENTS:

- The Mathinna Beds are not the source of gold at Lisle.

- Trace gold is present in one black shale (0.02g/t Au) sample, but there is no Au in the second sample. Slightly elevated Cu and As is also present in the black shale which does not contain trace gold.

- Quartz samples from the slopes east of Golden Crest at Golconda contain trace gold (0.4 and 0.04g/t Au) and some samples contain trace As (up to 49ppm).

- The best Au result from any sample taken near Billiton's soil BLEG anomalies was 0.02g/t in a black shale. In most cases no gold was detected in rock samples from BLEG anomalous areas (including quartz).

5.3 SOIL GEOCHEMISTRY

No detailed soil geochemistry appears to have been completed within EL 2/92 but Billiton in 1991 did undertake a reconnaissance BLEG soil program along certain roads and ridges in and surrounding the Lisle Basin.

Randall, (April 1991) describe this program as follows:

"......... a reconnaissance soil sampling program was completed over the ridges surrounding the Lisle Valley. A total of 264 samples (Samples 19401-19664) were collected by compositing five 0.5kg soil samples collected every 20 metres along road edges where undisturbed soil could be obtained. Each composite sample weighed approximately 2 - 2.5kg and was analysed by Classic Laboratories, Adelaide, using a cyanide leach gold determination. Three anomalous areas were re-sampled by compositing five 0.5kg soil samples collected every 10 metres within the anomalous sample interval (Samples 19669-19696, 28 in total). These were also analysed using a cyanide leach method.

.... Results of this survey indicate that from a total population of 264, 16 anomalous samples were recorded. Thresholds of 3-5ppb Au (mildly anomalous) and 5.5ppb Au (strongly anomalous) were calculated. The anomalous samples are quite well grouped into three localities with the best being on the western side of the granite. A strike of 700m of 2.4-19ppb Au is indicated for this anomaly.

Infill sampling was completed and generally confirm the earlier results.

Original Sample (100m comp)	*BLEG Assay*	*Repeat Samples (50m comp)*	*Repeat Assay*	*Main Anomaly Width*	*Anomaly Name*
19407	1.55	19669	1.40		
		19670	17		
19408	19	19671	19		LISLE ROAD
		19672	14	150m	ANOMALY
19409	1.85	19673	0.8		
		19674	6.5		

19576	3.7	19675	2.6		
		19676	4.0		
19577	1.6	19677	0.85		LONE STAR
		19678	6.0	150m	ANOMALY
19578	2.8	19679	2.6		
		19680	4.1		
19579	3.7	19681	9.0		
		19682	6.5		
19610	3.0	19683	5.5		
		19684	2.5		
19611	12	19685	2.8		
		19686	0.25		
19612	19	19687	13		
		19688	14		
19613	2.6	19689	1.5		
		19690	2.8		LONE STAR
19613	9.5	19691	4.3	100m	SOUTH
		19692	4.0		
19615	2.4	19693	5.5		
		19694	0.4		
19616	17	19695	0.2		
		19696	0.35		"

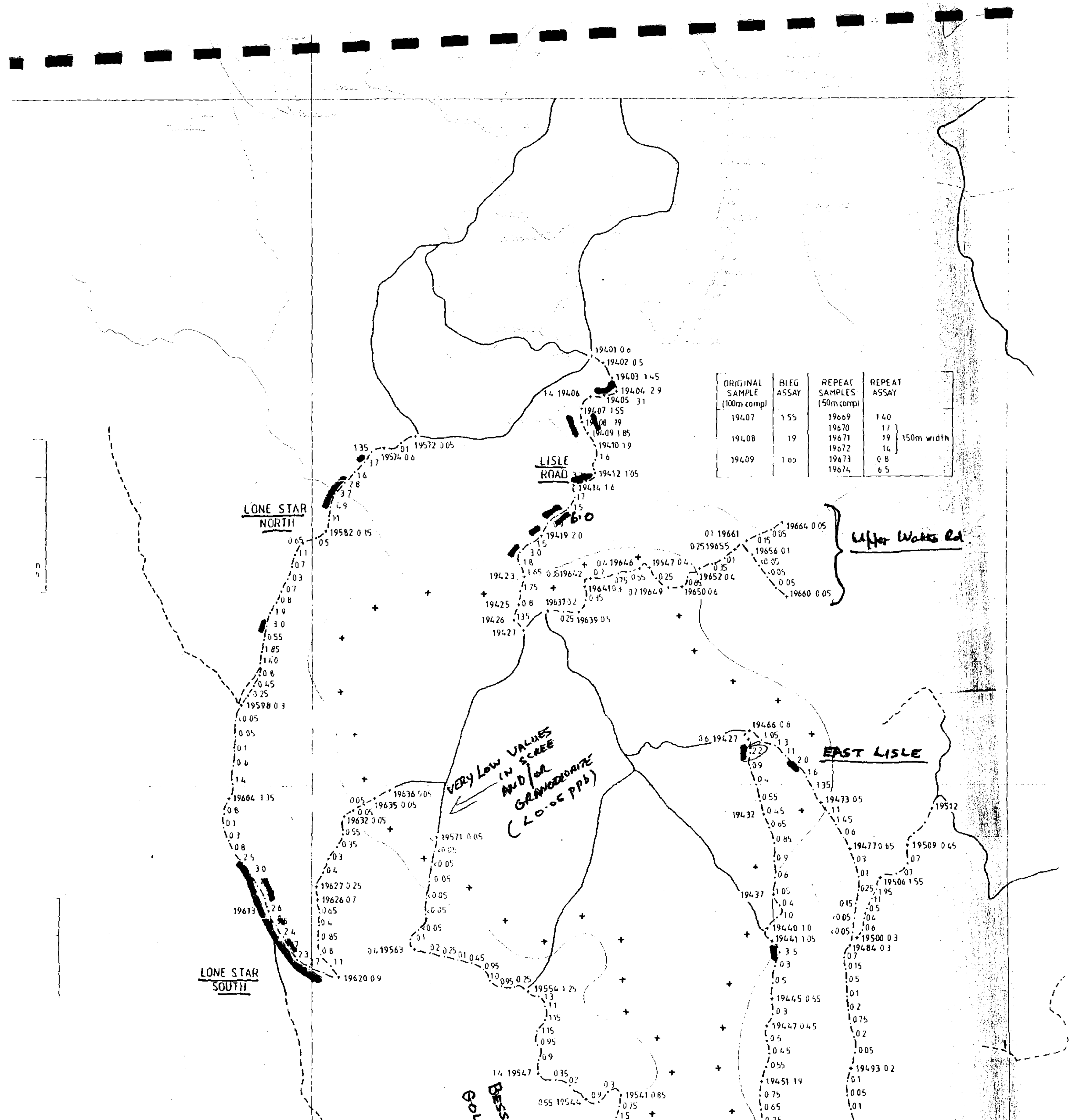
Billiton soil BLEG results are shown on Figure 23 and with other geochemical anomalies on Plate 3.

A visual examination of the data suggests to me that although Billiton's thresholds certainly define the major and highest value anomalies, as with the regional stream geochemistry, regional soil background is of the order of 0.05ppb Au and often values above 1ppb Au form coherant anomalies and could be significant. Halos of values at 1-3ppb often surround the high values.

In addition to Billiton's three anomalies I suggest there are significant soil anomalies over much of upper Bessell's Road within the Bessell's Road - Golden Road stream sediment anomalous area; east of Lisle township site (East Lisle); and over much of Lisle Road (Figure 23). This latter area includes the Lisle Road anomaly of Billiton.

An observation on the soil geochemistry is that the soil over Mathinna Beds around most of the western and northern Lisle Basin rim contain low levels of gold and may be considered anomalous compared to the background values in soil over scree and some granite areas (0.05ppb Au or less) such as the lower parts of Golden and Bessell's Road (shown on Figure 23) and the

Mathinna Beds in the NE part of the survey area (Upper Watts Road). The latter area is actually outside the Lisle basin rim.



ORIGINAL SAMPLE (100m comp)	BLEG ASSAY	REPEAT SAMPLES (50m comp)	REPEAT ASSAY	
19407	1 55	19669	1 40	
		19670	17	150m width
19408	19	19671	19	150m width
		19672	14	150m width
19409	1 85	19673	0 8	
		19674	6 5	

BLEG SOIL VALUES AND ANOMALIES FROM RANDELL (APRIL 91) FIGURE 23

6 GEOPHYSICS

An aeromagnetic survey was flown by BP Minerals and gravity data is available from the Department of Mines gravity data base and Roach (1992).

6.1 AEROMAGNETIC SURVEY INTERPRETATION BY BILLITON

Storer (1984) describes the aeromagnetic survey as follows:

" Helicopter survey by Geometrics International Corporation of 1083 line km covering most of the Lisle EL except for Mt.Arthur in the south-west corner (Figures 24 and 25).

Flight line direction	*100-180 deg. mag.*
Flight line spacing	*200m*
Tie line direction	*090-270 deg. mag.*
Tie line spacing	*3,000m*
Sensor mean terrain clearance	*70m*
Time base	*0.8 sec.*
Flying speed	*approx. 60 knots*
Navigation	*Visual from 1:25,000 photos*

6.1.1 LISLE GOLDFIELD AREA

In the Lisle Goldfield area there is a large oval more magnetic zone with a long tail to the south. Amplitudes vary up to 200nT above background. The zone of higher magnetics is interpreted to outline the main body of the Lisle granodiorite. The magnetic response is interpreted to be due to the presence of finely disseminated magnetite and ilmenite within the granodiorite. Fine magnetite was noted in one petrologic specimen while ilmenite was recorded from mineral concentrate samples collected from the Lisle Goldfield area.

Within the zone of higher magnetics are two arcuate NE-SW trending lower magnetic zones. A possible interpretation is that these zones represent areas of alteration within the main body of the intrusion (see also drilling section).

A small magnetic high is located on the south-western margin of the main body of higher magnetic relief interpreted as representing the main Lisle intrusion. This anomaly may well be related to anomalous gold values reported from plant material by Baker. No rocks are observed to outcrop in the area.

A discrete magnetic high is located to the north-northwest of the main Lisle intrusion. This feature has been interpreted to represent a possible granite cupola at depth. The anomaly lies outside the Licence area, in ground currently held exempt from exploration by the Tasmanian Mines Departement.

No estimates are available for the likely depth of any intrusion.

6.1.2 GOLCONDA GOLDFIELD AREA

No magnetic expression exists for the area of known intrusive outcrop in the area of the Golconda Goldfield.

To the north of Lisle towards Golconda there are several NW-SE trending linear magnetic zones with amplitudes between 100nT and 200nT. There is no obvious geological source for these zones. However, the topography has a similar general trend. This suggests a sedimentary rather than intrusive source to the magnetic zones. One other possibility might be basic volcanic flows interbedded with sediments that are now steeply dipping.

6.1.3 NABOWLA AREA

North and east of the Golconda linear trends are two quite different magnetic areas. One around Nabowla itself is a uniform magnetic zone. This is almost certainly an extension of the Scottsdale Batholith further to the east. The other zone mostly to the north of the Batholith is of very variable magnetic intensity with some more intense lows and highs of 300-400nT. This suggests an intrusive and/or extrusive source. Possibilities, taking the limited geology into account are dolerite sheets (c.f. southwest of Mount Arthur), basic volcanics or possibly a magnetic rich granite quite different to the Scottsdale Batholith.

6.1.4 SPRINGVALE AREA (South of Lisle)

To the southeast of the postulated Lisle intrusive is a zone of very intense variable magnetics. This zone partially correlates with Tertiary basalts. These basalts are almost certainly the source of the intense magnetic variations.

6.1.5 OTHER AREAS

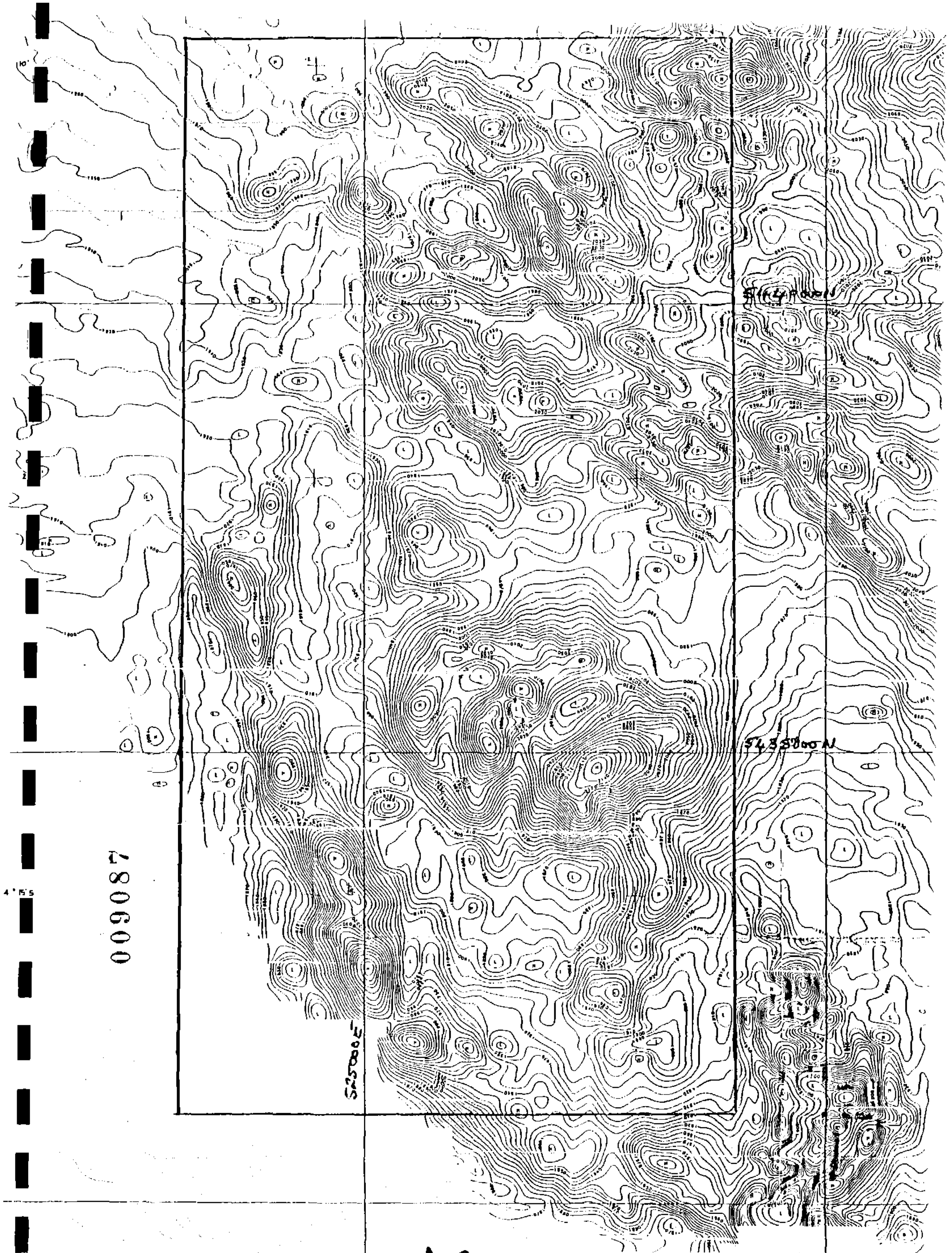
To the south and west of Lisle is a long linear magnetic high roughly correlating with the Lone Star Ridge on the Lisle 1:25,000 topo map. This is most probably a dyke or magnetic unit within the sediments."

6.2 INTERPRETATION BY RICHARDSON (1990)

Richardson (1990) commented on the aeromagnetic survey as follows:

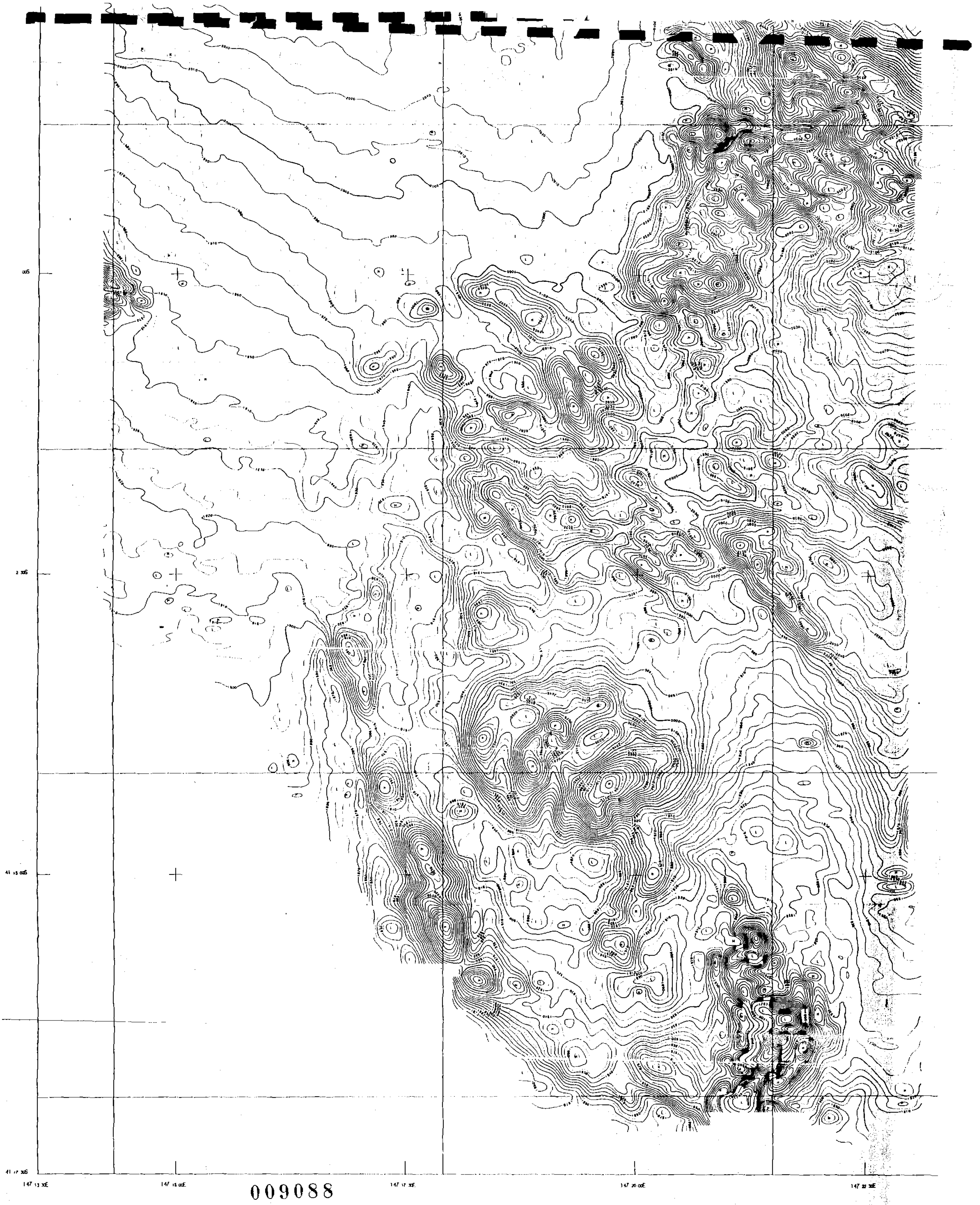
"Examination of the aeromagnetic data showed that the terrain clearance varied from 64m to 302m, with an average of 121 metres. The data were corrected to a uniform terrain clearance of 150 metres and a unifrom barometric altitude of 1200 metres using the method discussed in Richardson (1989).

..... Most of the features related to granite/granodiorite distribution. There are clearly-defined areas of basalt in the west and south-east of the area (Areas 1 and 2 on Figures 26 and 27 appears to result from a combination of basalt and granitoid effects. The granitoid mass has a quite distinct margin at its northern boundary.



AEROMAGNETIC CONTOURS
LISLE - GOLCONDA

FIGURE 24



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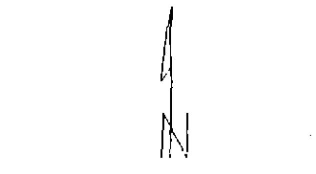
SURVEY SPECIFICATIONS

AIRCRAFT	: BELL JETRANGER HELICOPTER
MAGNETOMETER	: GEOMETRICS G803 MAGNETOMETER UNIT RECORDING TO 0.1 NANOTESLA.
CYCLE RATE	: 0.8 SECONDS
AIRSPEED	: 60 KNOTS
ACQUISITION	: G714 GEOMETRICS AQUISITION SYSTEM
DETECTOR HEIGHT	: 70 m MEAN TERRAIN CLEARANCE.
NOMINAL FLIGHT LINE SPACING	: 200 m TRAVERSE LINES 3000 m TIE LINES.

LOCATION DIAGRAM

5 cm



LEGEND

CONTOUR INTERVAL - 5 nT

1000 NANOTESLA CONTOUR
100 NANOTESLA CONTOUR
10 NANOTESLA CONTOUR
5 NANOTESLA CONTOUR

IGRF REMOVED (1980 MODEL) + 2000 nT

FIGURE 25

BP mine

L

MAGNE

The Lisle granite (Area 4 on Figures 26 and 27), stands out distinctly, as do the Bessell Reward, Golconda and Panama areas (5, 6 and 7 on Figures 26 and 27). Much of the granite is at shallow depth as shown by the high relief on the magnetic maps and the alteration on the geological maps.

...... Two profiles (A-B, C-D on Figure 28) were selected across the anomaly corresponding to the Lisle granite to allow determination of consistent models. Data from the continuation to 1300 metre barometric altitude were used to allow calculations to be performbed with a planar datum. The initial models, which consisted of a magnetic granodiorite in non-magnetic surrounds, used a susceptibility of 0.4×10^{-3} cgs as used when modelling in the Mangana-Alberton area (Richardson, 1989). During modelling it was found that a much higher susceptibility was required, and when some core was located the measured susceptibility (after partial correction for core diameter) was at least 1.5×10^{-3} cgs. It should be noted that the core contained visible sulphides. The final models used a susceptibility of 2×10^{-3} cgs.

Section A-B (see Richardson 1991) shows two granodiorite highs at shallow depth separated by a zone of essentially non-magnetic material with granodiorite at a depth of about four kilometres. Section C-D (see Richardson 1991) shows a single granodiorite high at shallow depth. Both sections show that the magnetic parts of the Lisle granite dip steeply on all margins. Both sections are not through true two-dimensional structures, resulting in some discrepancies between the sections.

..... With the information gained from the modelling it is possible to pick areas if shallow granodiorite. Figure 29 shows a number of such areas but any drilling should be preceded by both geological and magnetic ground checks. All core should be logged for magnetic susceptibility and should more data be required to better define drilling targets, a detailed gravity survey should be carried out. Altitude-corrected maps and a sorted located data tape are available from the Division of Mines and Mineral Resources."

6.3 AEROMAGNETIC AND GRAVITY INTERPRETATION BY ROACH (1992)

Roach (1992) comments on aeromagnetic and gravity data as follows:

"Regional geophysical data was used to provide some constraints on the gross structure of the goldfield, in particular the form of the associated intrusions and their relationship to known mineralisation. In addition the geophysical data also provided important information on the composition of the exposed granitic rocks.

..... The isolated high-frequency negative magnetic anomalies closely correspond to the mapped outcrop of Tertiary basalt flows, and indicate a strong reverse remnant magnetisation.

The linear high-frequency negative magnetic anomalies occur above areas of Mathinna Beds outcrop. The trend of these anomalies is parallel to the regional strike, and they are inferred to result from magnetic units within the Mathinna Beds. Highly weathered samples of these units have magnetic susceptibilities ranging from 2 to 8×10^{-3} SI. Many of these linear anomalies are abruptly truncated along an irregular boundary trending roughly NE.

This is suggestive of the presence of a major structural feature with this orientation. Unfortunately outcrop in this area is extremely poor and it is not possible to confirm this interpretation by surface mapping.

An irregular magnetic anomaly is associated with a portion of the Lisle goldfield. This anomaly results from a magnetic component of exposed granodiorite. Clearly, however, the granodiorite is not uniformly magnetic, the strong anomaly being restricted mainly to the northeastern corner of the valley. Outcrop within the Lisle basin is extremely poor and there is only one location in the south where it is possible to sample granodiorite which is not totally weathered. Here it consists of a uniform grey, medium to fine-grained hornblende, biotite granodiorite. Both highly magnetic and effectively non-magnetic samples were obtained from this location. The two rock types appear identical in hand specimen. Many measurements were taken on the available outcrop, yielding susceptibility values of either less than $0.3x10^{-3}$ *SI or between 4 and* $12-10^{-3}$ *SI. The average measured density of both rock types was 2.71* t/m^3.

A zone of magnetic anomalies resulting from the magnetic granodiorite stretches north from the Lisle valley to Panama. A small anomaly is associated with the outcropping granodiorite at Panama but no anomaly is directly associated with the intrusion at Golconda. Samples of granodiorite from the dump of the Enterprise mine at Golconda, and from the Department of Mines Lisle DDH 1 and 2 near Golconda, confirm the bimodal distribution of magnetic susceptibility. From a magnetic perspective there are clearly two different types of granodiorite within the Lisle-Golconda area. The differences in magnetic responses are not simply the result of either weathering or alteration.

The magnetic survey extends east to the western margin of the Scottsdale Batholith near Nabowla. The granodiorite exposed at Nabowla is very similar in hand specimen to the Lisle granodiorite. It has a magnetic susceptibility of approximately $0.2x10^{-3}$ *SI and a density of 2.71* t/m^3.

A low amplitude, very long wavelength anomaly is apparent in the north of the survey. This represents the southern margin of a major regional magnetic anomaly delineated by the Bureau of Mineral Resources regional magnetic coverage. Its amplitude and wavelength are indicative of a deep, highly magnetic source beneath the Mathinna Beds.

A semi-regional gravity survey was conducted in order to attempt to further constrain the distribution of granodiorite. Existing data from the Department of mines gravity database was infilled to a density of approximately one station per square kilometre over the majority of the area. A grey-scale image of residual Bouger anomaly is shown in Figure 29. The residual Bouger anomaly map was derived using the 1991 version of the Tasmanian regional gravity field of Leaman and Richardson (1989). Bouger corrections were made for a density of 2.67 t/m^3.

A large negative anomaly is associated with the Scottsdale Batholith. The minimum of this anomaly, to the east of the study area, is consistent with a thickness of approximately 8 km of granite with a density of 2.62 t/m^3. *The effective boundary of this large anomaly extends well beyond the mapped outcrop of the batholith.*

A small, irregular minima in residual Bouguer anomaly is associated with the bulk of the Lisle granodiorite. This is consistent with the low density contrast (−0.04 t/m^3) between the granodiorite and the enclosing Mathinna Beds, which have a measured density of 2.75 t/m^3. A more pronounced local minimum in the gravity field is located to the north beneath the Denison goldfield. This anomaly occurs in an area of Mathinna Beds outcrop, remote from exposures of granodiorite.

Two dimensional forward modelling of gravity and magnetic data was conducted for a series of sections oriented approximately east-west. An example of one of these sections, passing through the Lisle valley, is shown in Figure 30.

The measured density of the granodiorite which crops out on the western margin of the Scottsdale Batholith is 2.71t/m^3. The magnitude and gradient of the gravity anomaly in this area immediately implies that this granodiorite is relatively thin and that it is underlain by large volumes of low density granite. presumed to be similar in properties to the granite exposed near Scottsdale. The thickness of the corridor of Mathinna Beds sediments separating the Lisle granodiorite and the Scottsdale Batholith is poorly constrained because of the low density contrast between the Mathinna Beds sediments and the granodiorite. For the section shown in Figure 30, the thickness of Mathinna Beds is between 3 and 4 kilometres.

The flattening of the gravity profile associated with the Lisle intrusion implies the presence of large volumes of granodiorite in the subsurface. The magnetic data acts to further constrain the model. The sharp peaks in the observed magnetic field at Lisle result from the geometry of the upper surface of the magnetic granodiorite. The wavelength and amplitude of the overall anomaly, however, provides an indication of the total volume of the magnetic component, suggesting a thickness of up to 2.5 kilometres.

The gravity low in the area of the Denison goldfield has no associated magnetic anomaly. The anomaly runs across the regional Mathinna Beds strike. Approximately ten gravity stations fall within its boundary. The anomaly does not correlate with the mapped distribution of /tertiary and Quaternary sediments.

The most likely explanation for this anomaly is the presence of a subsurface granitic intrusion. The Mathinna Beds are exposed across the entire area and there is no additional outcrop information with which to constrain the gravity model. As a result, the geometry of the inferred body is determined principally by the chosen density contrast. It is possible, however, to place an upper limit on the body's density due to the fact that no contact aureole has been mapped at the surface. This results in an upper estimate of 2.65 t/m^3 and implies that the pluton beneath the Denison goldfield has a different composition to the granodiorite exposed at Lisle and Golconda, where the measured density is 2.71 t/m^3.

6.4 INTERPRETATION BY LEAMAN (1992)

Leaman comments as follows:

"Figure 31 suggests that several granodiorite members are present in the Lisle-Golconda area but that only one is associated with known gold deposits. The properties of this intrusive are almost identical with those inferred in the vicinity of Golden Ridge, Mathinna, Lyndhurst and Gladston. This correlation, wherever data is available seems more than co-incidence."

Leaman' granodiorite members are also shown on Figure 32 relative to magnetic contours.

6.5 DISCUSSION

There have been various interpretations and conclusions drawn from the aeromagnetic data about the distribution and type of granitic rocks, not all of which are in agreement.

We have completed some additional interpretation which is shown on Plate 4. The grid and some roads have been superimposed on to Plate 4 to provide better location data for comparison with other data. Magnetic highs and lows and interpreted magnetic trends are marked.

To obtain an alternate view of the overall structure of the Lisle-Golconda area the magnetics pattern should be viewed in conjunction with the topographic interpretation (Plate 2).

We have concluded the following:

- The Lisle-Golconda region is flanked and contained by NW to NNW structures which parallel Shepherds Rivulet to the SW and the Little Forester River to the East. The region is cut off at the northern end by a NE trending structure (Roach 1992).

- Within this zone there appears to be two main parts to the intrusion complex, one extending from the southern end of the Lisle Basin to the northern end of the Lone Star Basin and the second trending SE from Panama and Mt William to Watts Road and the north end of Bessell's Ridge.

- The granitic complex is divided by a major structure(s) which trends NW along the northern edge of the Lisle and Lone Star basins (and forms the above parts in the complex. This discontinuity is evident on both magnetics and topography.

- Although we note two parts to the granitic complex,both are part of a single intrusive complex. As interpreted by Roach (1992), Leaman (1992) and Richardson (1991) the depth to the top of granodiorite is quite variable over the Lisle-Golconda area.

- The topography above the northern intrusive (Bessell's Reward-Golconda) - does not indicate NW trending Mathinna Beds as suggested by Billiton (Randall April 1991) but in fact suggests a strain pattern (semi-circular plus radiating tension fractures) which would have resulted from a doming intrusion at depth.

- The magnetic trends over the northern intrusive (Bessell's Reward - Golconda) may be interpreted as semi circular in part and thus caused by granite at depth rather than linear magnetic units in the Mathinna Beds. This northern granodiorite is cut and modified by a major NE. trending structure along the line of the Lisle Creek Valley. This structure may also separate and/or displace the Lisle and Lone Star granitic bodies.

In relation to conclusions by others we comment:

- The arcuate zones referred to by Randell (April 1991) within the Lisle magnetic feature as possibly being alteration within the granodiorite one more likely to be caused by non magnetic granodiorite.

- The magnetic high to the NNW of the main Lisle granodiorite outcrops is caused by a sub surface granodiorite. This body was intersected in drill holes.

- We agree with Richardson (1990) that most of the magnetic features are related to granite/granodiorite distribution.

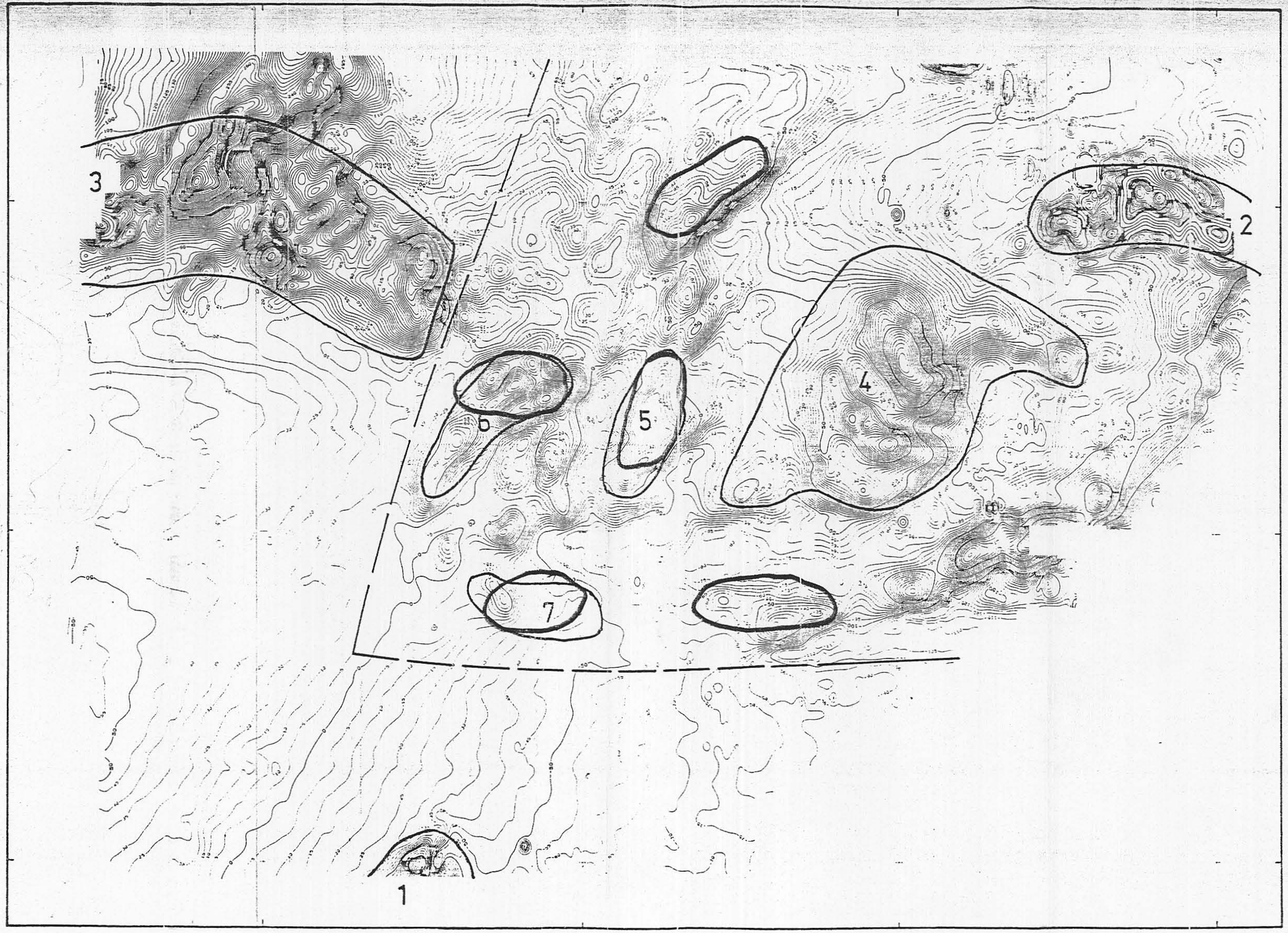
- We agree with Roach's (1992) conclusion that: *"Geophysical and geochemical data indicate that the granodiorite exposed at Lisle is different in physical properties and composition from the western portion of the Scottsdale Batholith. The Lisle granodiorite is a separate and distinct intrusion."*

- Roach (1992) also concluded that: *"The Lisle granodiorite may be subdivided into a magnetic and non-magnetic phase. There are slight geochemical differences between the two lithologies. The distribution of the two phases, and field relationships between them, is complex. The relative importance of either phase as a potential source of gold is unknown."*

These appear reasonable conclusions on the basis of limited data. However, if there are interfingering magnetic and non magnetic granodiorite phases interpretation of the magnetics must become complex and difficult.

- Leehman (1992) suggested several granodiorite phases, only one of which is associated with mineralisation. He also showed the distribution of the potentially favourable granodiorite. If his conclusion is correct it could significantly assist exploration, but on present data we consider the conclusion premature.

FIGURE

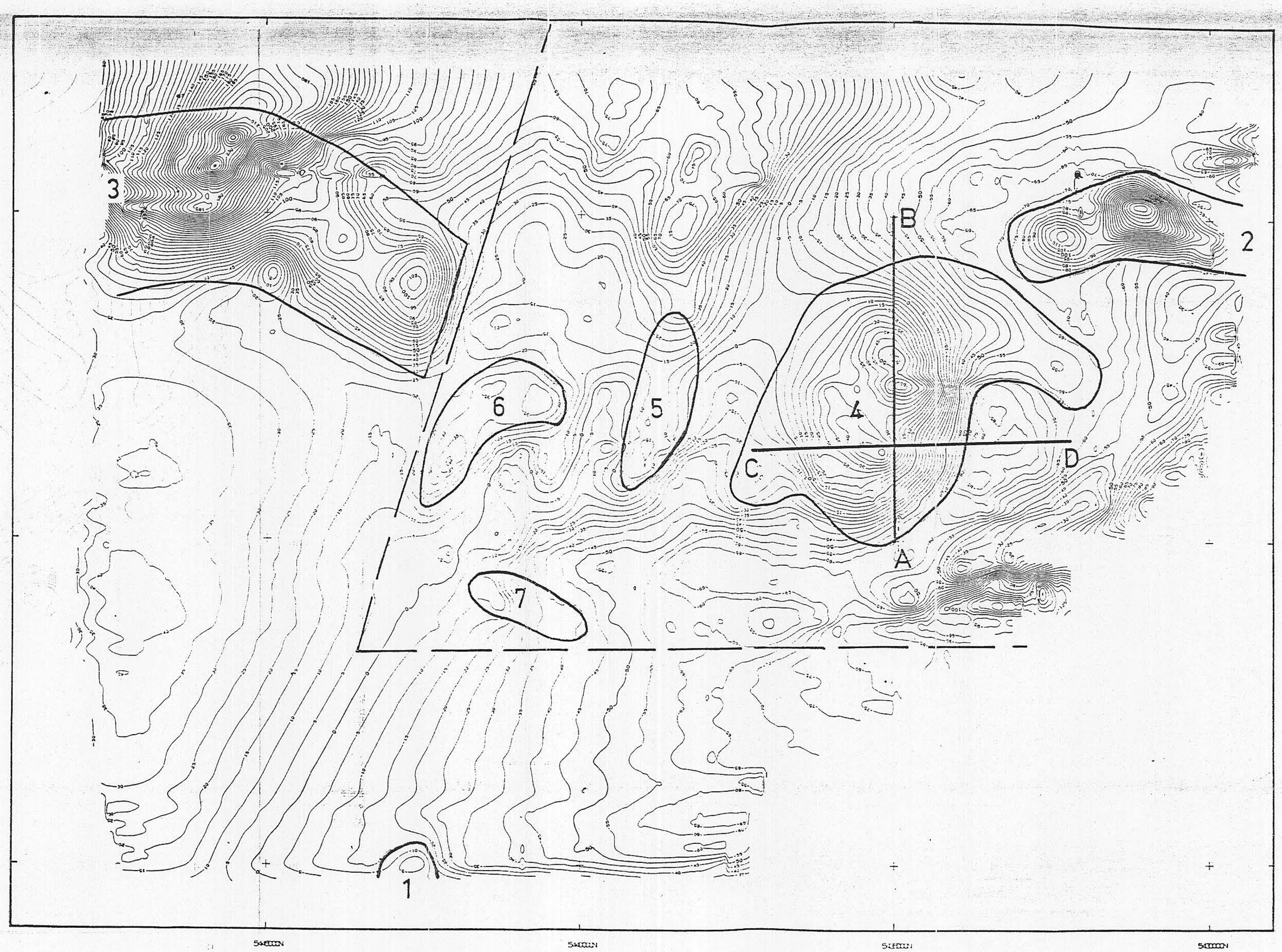


Residual magnetic intensity contours at 150 m terrain clearance.

FROM RICHARDSON (1990)

FROM RICHARDSON (1990)

FIGURE 26

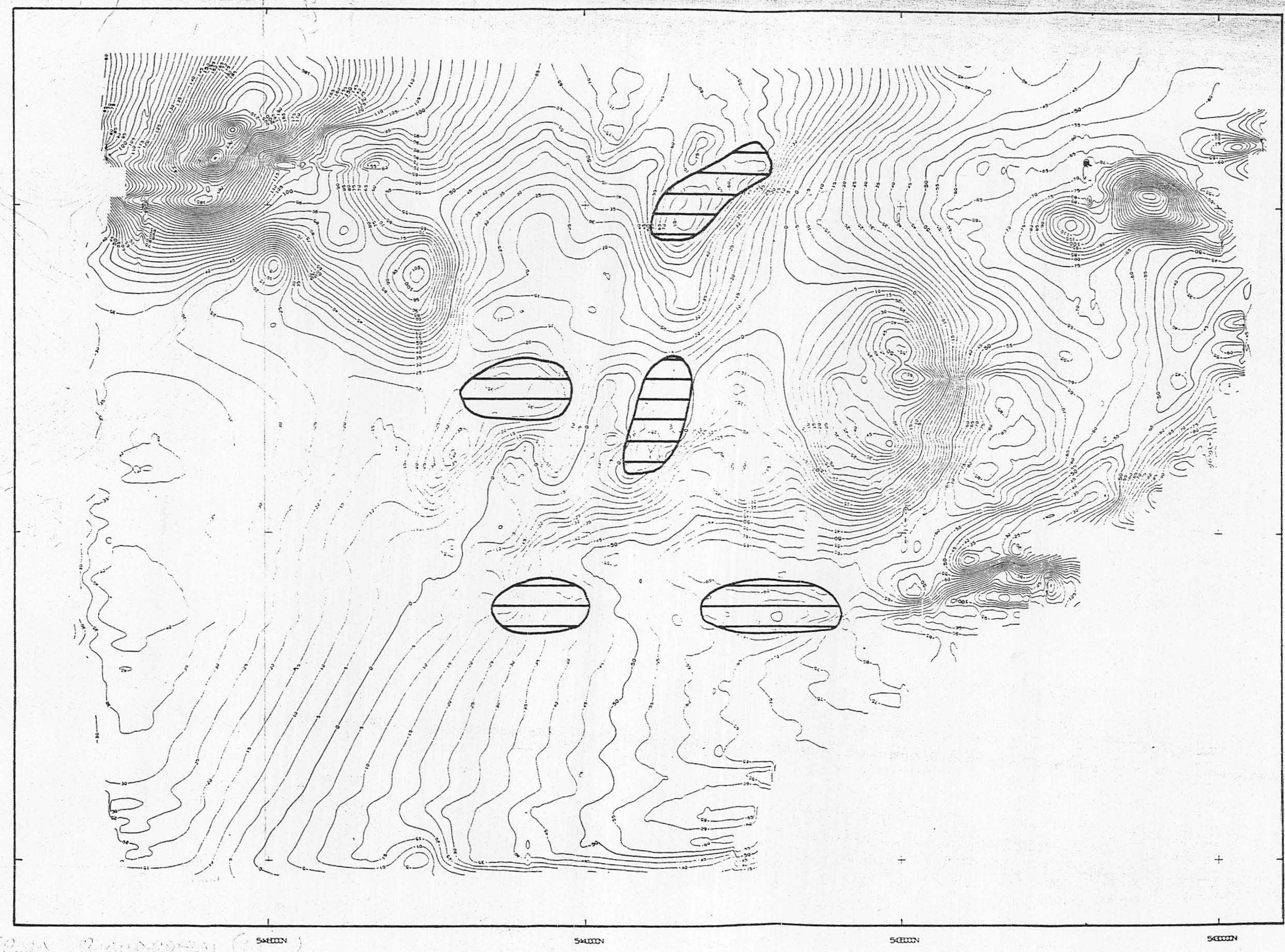


Residual magnetic intensity contours at 1300 m barometric altitude.

FROM RICHARDSON (1990)
FIGURE 27

009096

FIGURE



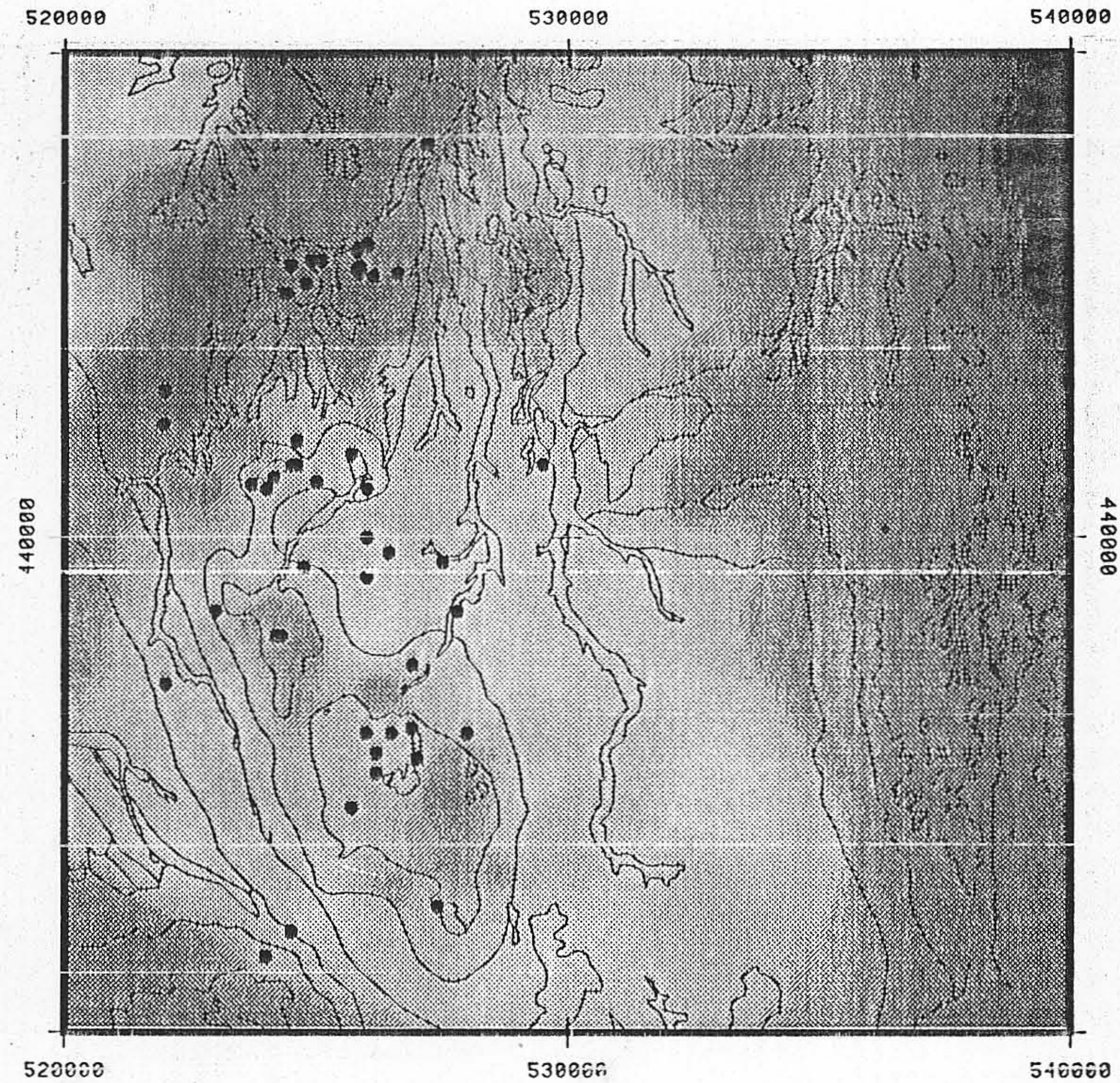
. Areas of granodiorite warranting further investigation.

FROM RICHARDSON (1990)

FROM RICHARDSON (1990)

FIGURE 28

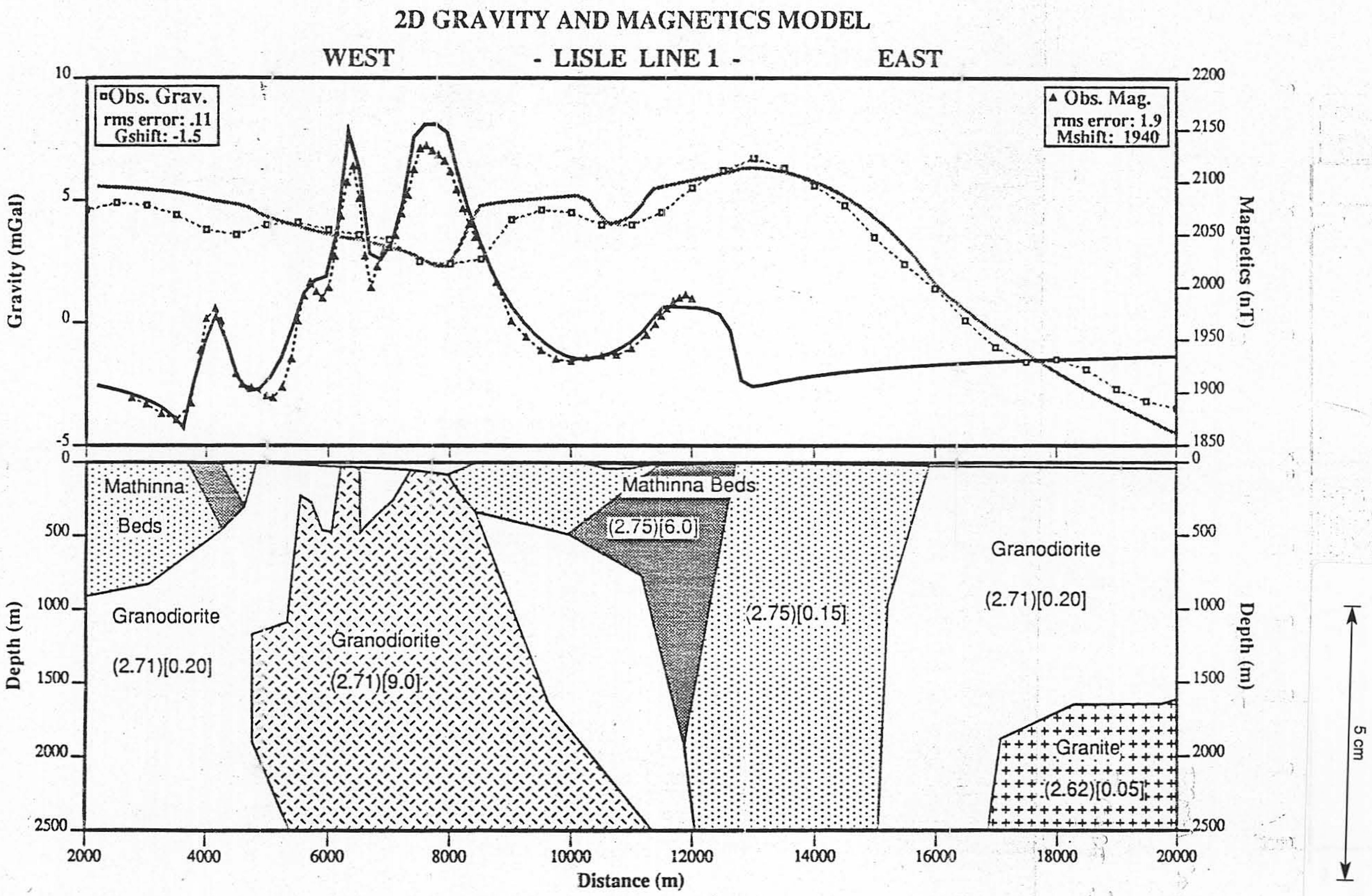
009097



Grey-scale image of residual Bouguer anomaly with geology and gold occurrence locations overlaid. Bouguer reduction density 2.67 t/ m^3, Mantle91 regional field removed (Leaman and Richardson, 1989) (1:150 000, AMG grid).

FROM ROACH (1992)

FIGURE 29

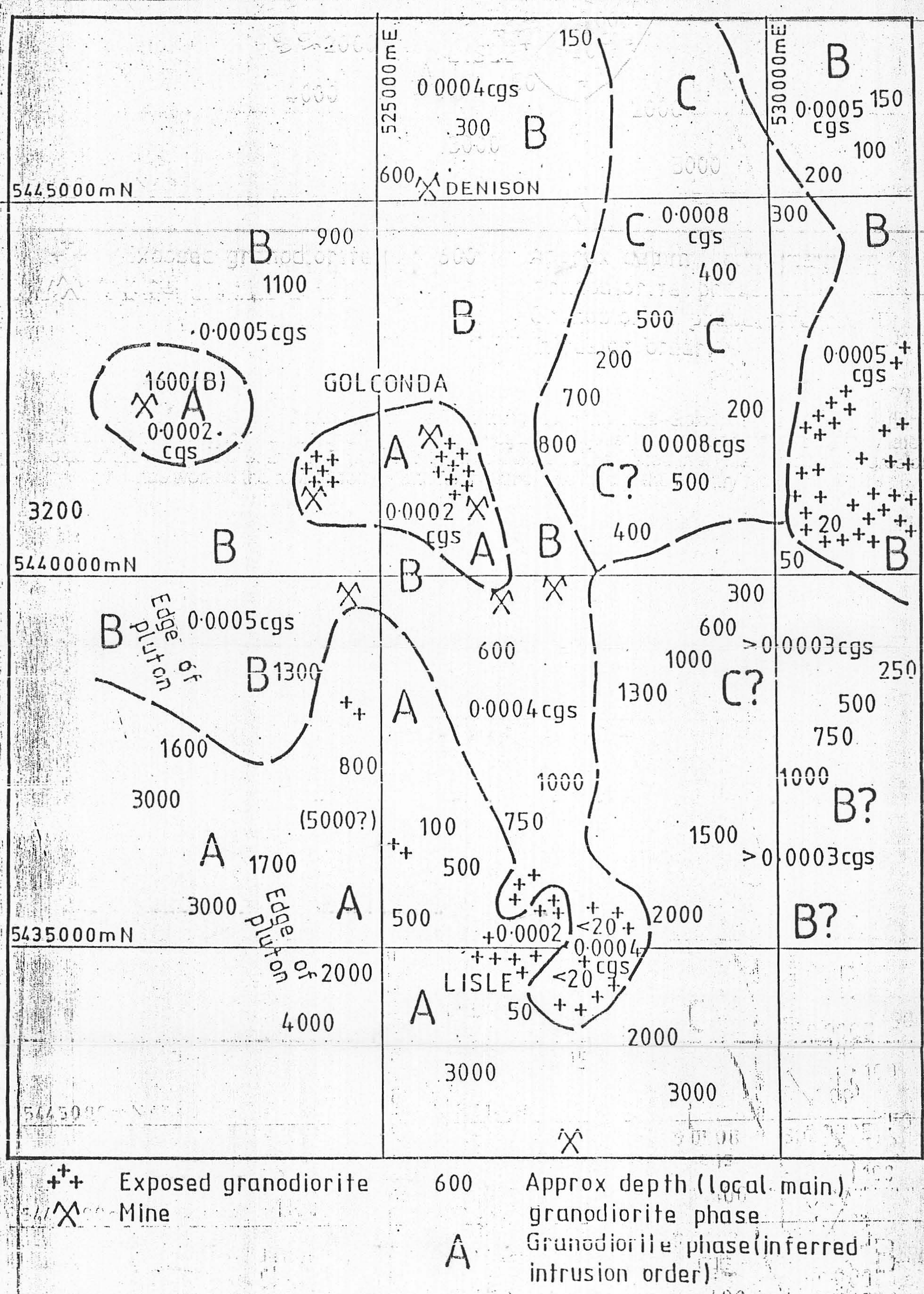


Two-dimensional gravity and magnetics model section crossing the Lisle valley. Values in curved brackets are densities (t/m^3), values in square brackets are magnetic susceptibilities [$\times 10^{-3}$ SI].

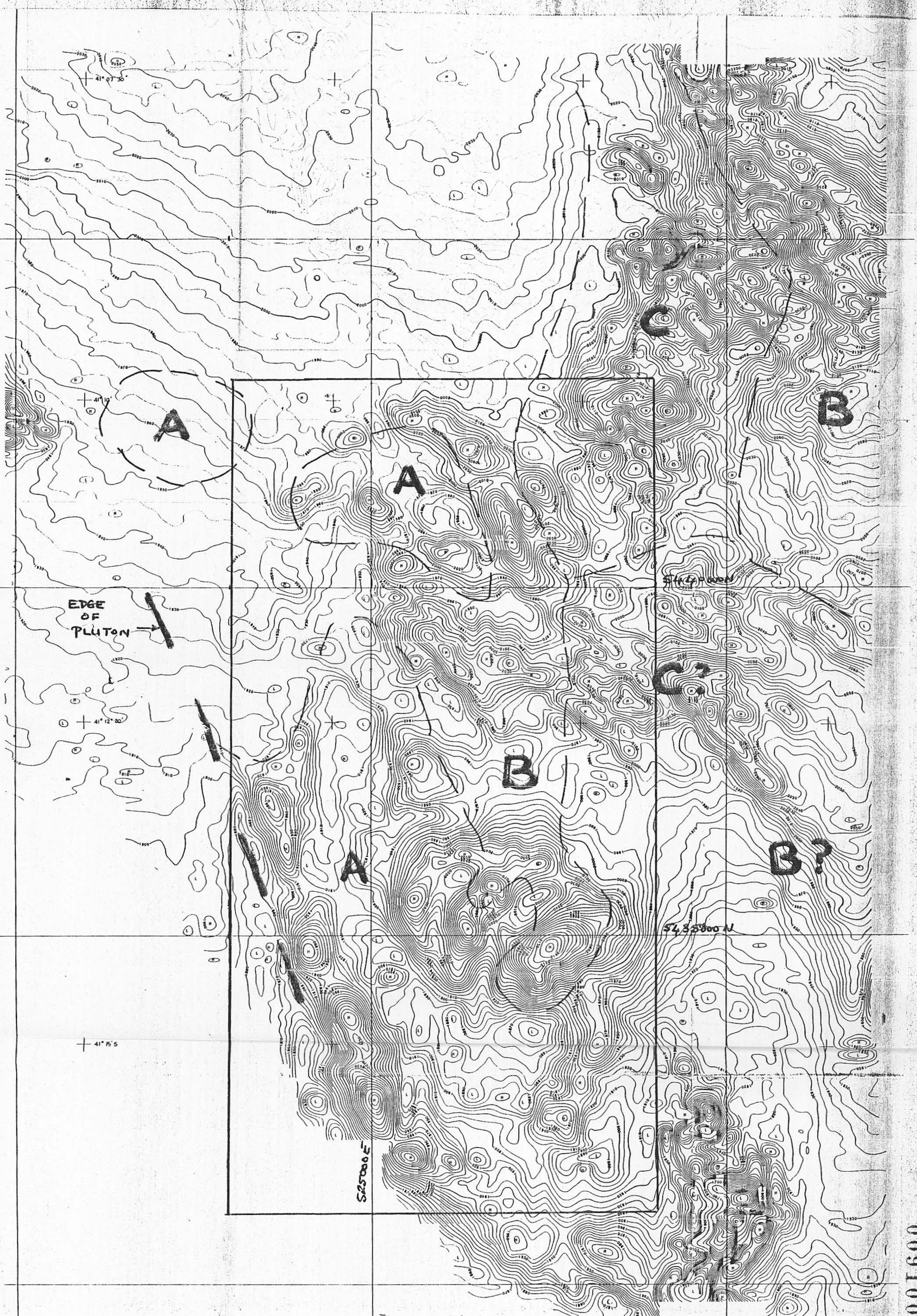
Figure 30

From Roach (1992)

00098



An interpretation of the possible distribution of granodiorite types in the Lisle–Golconda area. These plutons intrude each other in the inferred order and have largely escaped subsequent dilation and intrusion by later granitoids of the Scottsdale Batholith. The alluvial gold at Lisle is concentrated in a valley trap where erosion has worked the roof of body A and its metamorphic halo in the country rocks.



LEAMAN'S DIFFERENT GRANITIC BODIES FROM LEAMAN (1992)

FIGURE 32

7 DRILLING

No definitive drilling has been carried out in the Lisle-Golconda area.

BP Minerals drilled 28 percussion holes in 1984 (Figure 33) which varied in depth between 8 and 63 metres and averaged approximately 30 metres. Most holes were drilled across the plan of the Lisle basin and were wholly within soil, scree and granitic rocks. A few holes penetrated the Mathinna - granitic contact.

The Tasmanian Department of Mines drilled two diamond core holes in the Golconda area.

7.1 B. P. MINERALS PROGRAM

Storer (1985) reported on BP's program as follows:

"On the basis of geochemical, geophysical and geologic criteria, seven separate localities were identified for follow-up drilling.

7.1.1 METHOD

Drilling was by a truck mounted Warman 500. Due to access problems, all holes were sited on existing roads. Samples were collected at two metre intervals initially and split on site to yield a 2kg sample. Samples were crushed at the Seltrust laboratory in Temora and samples were thn composited and mixed before being sent to the SMC Analytical Laboratory in Perth for analysis. Samples were composited on the basis of logged lithologic sequence.

Drilling to test the main Lisle intrusive and its contact zone with the surrounding metamorphosed Mathinna Beds was hampered by the weathering which extends to depths in excess of 30 metres in most areas tested.

Details of the drilling are as follows:-

LOCALITY	*NO OF HOLES*	*NO OF DRILL SITES*	*RATIONALE*
1	*6*	*4*	*Granodiorite-sediment. Contact zone - Bessell's Creek.*
2	*3*	*4*	*Anomalous Au in plants and small subsidiary magnetic high.*
3	*2*	*2*	*Anomalous Au in plants.*
4	*7*	*4*	*Inferred alteration zone within granodiorite and granodiorite/ metasediment contact.*
5	*6*	*3*	*Inferred alteration zone within granodiorite.*

6	3	2	*Magnetic High - inferred buried granite cupola.*
7	2	1	*Golconda Goldfield-quartz veined granitic intrusion.*

*7.1.2 **<u>LISLE GOLDFIELD</u>** Localities 1, 3, 4, & 5*

Four of the localities drilled were located within the interpreted area of the main Lisle intrusive.

Outcrop over the intrusive body is scant and only four localities were noted at which granitic rocks outcrop. Vegetation is typically thick and alluvials/ colluvials for the most part ocver the valley floor. Typically, thick talus material obscures the contact relationship with the country rocks. At only one locality (Locality 1) along Virginnia Road near the junction of Virginnia Road and Bessell's Creek Road can the contact zone be narrowed down to within a 10 metre wide zone.

7.1.2.1 <u>Locality 1:</u> This ground is currently under licence to Mr.L. Locslei. Drilling in this area was undertaken with the agreement of the current licence holder.

A series of six inclined holes were drilled to test the granodiorite-metasediment contact zone along the northern bank of Bessell's Creek. The contact zone can be traced along the bank of Bessell's Creek which marks an abrupt change from the steep topography of the Mathinna Beds to the relatively flat lying topography of the weathered Lisle granodiorite.

Bessell's Creek and Lisle Creek were two main sites of alluvial gold production.

<u>HOLE</u>	*<u>DEPTH</u>*	*<u>Au ASSAY</u> (ppm)*	*<u>COMMENT</u>*
TLP-15	30m	<0.02	Biotite granite/diorite. Minor disseminated vein py/aspy?. Minor fluorite.
TLP-16	63m	≤0.02	Quartz diorite - Biotite-granite Minor vein and diss. py/aspy?.
TLP-17	8m		Alluvials
TLP-18	36m	<0.02	Weathered Biotite granite (clay)
TLP-19	23m	<0.02	Weathered Biotite granite (clay)
TLP-27	26m	≤0.06	Weathered Biotite granite (clay)

7.1.2.2 <u>Locality 2:</u> The work of Baker (1983) identified a zone of anomalous gold in plant material along Golden Road. Three holes were drilled to test the source of these anomalous gold values. The *anomalous gold values occur across the inferred contact zone between granodiorite and metasediment.*

The western extension of the anomalous values is regarded as possibly being related to a small magnetic high along the south-western margin of the main intrusion.

HOLE	DEPTH	AU ASSAY (ppm)	COMMENT
TPL-24	56m	≤0.03	Weathered Biotite granite/diorite, disseminated pyrite.
TLP-25	30m	≤0.04	Weathered muscovite (biotite) granite (clay).
TLP-26	40m	≤0.01	Weathered granite (clay), strongly siliceous/hematitic rounded pebbles of unknown affinity in clay.

7.1.2.3 ***Locality 3***

Two holes were drilled on the southern arm extension of the main Lisle intrusion. These holes were located along a track upslope from anomalous values reported by Baker. The holes were sited upslope from the actual anomalies to allow for some downslope movement of soil. The holes were aimed to be sited over the granitic body, inferred from sparse outcrop and from the aeromagnetics.

The anomalous Au values reported by Baker, in this locality, are of interest as they are located some 150m above the valley floor.

HOLE	DEPTH	AU ASSAY (ppm)	COMMENT
TLP-13	0.20m 20-50m	 <0.02	Talus Weathered Biotite Granite
TLP-14	0-12m 12-50m	 <0.02	Talus Weathered Biotite Granite

7.1.2.4 ***Locality 4 and 5:*** *Interpretation of aeromagnetic data revealed two zones of low magnetic intensity transecting the generally highly magnetic Lisle granodiorite body. These zones have been interpreted to be the result of alteration within the granodiorite.*

The northern of the two zones was tested by a series of holes along Bessell's Road which runs along the length of the zone. An attempt was made to locate and drill the contact zone with the surrounding metasediments (TLP-5 and 6, and TLP-20).

The southern of the two inferred alteration zones is transected by a number of tracks. Drilling was not planned for the main area around the Lisle township, as this is currently held under a number of separate mining licences.

HOLE	DEPTH	Au ASSAY (ppm)	LOCATION 4
TLP-1	29m	<0.02	Weathered biotite Mus. Granite (clay)
TLP-3	24m	≤0.03	Weathered biotite Mus. Granite (clay)
TLP-3	27m	≤0.03	Weathered biotite Mus. Granite (clay)
TLP-4	26m	<0.02	Weathered biotite Mus. Granite (clay)
TLP-5	34m	≤0.02	Weathered biotite Mus. Granite (clay)
TLP-6	29m	<0.02	Weathered biotite Mus. Granite (clay)
TLP-20	0-12m 12-50m	 <0.02	Talus Mathinna Beds
			LOCATION 5
TLP-7	0-18m 18-50m	 <0.02	Talus Weathered Mus.-Bio. granite (clay)
TLP-8	0-16m 16-40m	 <0.03	Talus Weathered Mus.-Bio. granite (clay)
TLP-9	23m	<0.02	Weathered Bio. granite (clay)
TLP-10	28m	≤0.02	Weathered Qtz rich-Musc Biot granite
TLP-11	36m	<0.2	Weathered Biotite granite

7.1.3 LOCALITY 6

A discrete magnetic high located to the north-northwest of the main Lisle intrusion had been interpreted as a possible granitic cupola at depth. The magnetic high, which was located by a ground magnetics traverse, was tested by one vertical and two inclined holes along the Lone Star Ridge Track. The results of the drilling substantiated the presence of a granitic body, which, despite the lack of metamorphosed contact rocks or any surface expression of the intrusive body, proved to be very near surface.

HOLE	DEPTH	AU ASSAY (ppm)	COMMENT
TLP-21	0-50 50-63	 <0.2	Mathinna Beds Biotite Quartz Diorite - fine disseminated sulphides
TLP-22	0-29 28-63	 <.02	Mathinna Beds Biotite Quartz Diorite
TLP-23	0-8 8-57	 ≤.04	Mathinna Beds Altered Quartz Diorite

7.1.4 LOCALITY 7

A quartz vein flooded intrusive has been observed to outcrop in the Golconda area. No samples were collected during the initial survey due to the proximity of an existing dwelling. Gold was produced from the Golden Crest Mine at Golconda. Production was associated with a quartz vein within hornblende granite close to the metasediment contact.

Two drill holes were sited to test the intrusion. The availability of sites was limited to the existing Public Road, as permission for drilling was not obtained from the local landholder.

HOLE	DEPTH	Au ASSAY (ppm)	COMMENT
TLP-28	38m	<0.02	Coarse grained biotite granite
TLP-29	0-8m		Talus
		≤0.06	Grey-green fine grained intrusive Minor disseminated sulphide.

7.1.5 CONCLUSIONS

On the basis of the above results, the potential for a large tonnage, low grade gold deposit associated with the intrusive bodies of Lisle and Golconda is difficult to support. This does however not preclude the intrusive rocks as the source rock for the alluvial gold mineralisation at Lisle.

The ubiquitous occurrence of minor vein and disseminated pyrite ± arsenopyrite in drill holes where solid rock was intersected is suggestive of a weak mineralising system. Low levels of gold may well be associated with this weak mineralisation.

The Lisle area is characterised by deep weathering with the valley floor of the main Lisle intrusion lying some 300-350 metres below the surrounding ridge line of metamorphosed Mathinna Bed sediments. At a concentration of 0.01ppm gold, a volume of rock measuring approximately 1000mx1000mx250m, if completely leached of its gold content, would be sufficient to produce the 7500kg of alluvial gold produced from the Lisle goldfield."

7.2 DISCUSSION

I have drawn the following conclusions in regard to the BP drilling.

- 22 holes tested the floor of the Lisle valley - most intersected soil and granite only, four also tested talus (maximum 18m in Hole 7).

. Only three holes intersected values above detection limit (0.02g/t Au) - *H26 had best results* and averaged 0.05 g/t Au to total depth of 40m. This included 4m at 0.10 g/t Au. Hole 25, which is near H26 intersected 20m at 0.04g/t and H27 at Bessell's Creek intersected a trace of gold.

. 13 holes tested two "*alteration*" zones (based on aeromagnetics) within the granite but none intersected detectible gold. Based on the drill logs it is not possible to conclude whether or not these zones are in part altered or whether the granite is less magnetic (or more magnetic). No sulphides were recorded although Fe staining is noted.

. 6 Holes in the floor of the valley attempted to locate the Mathinna - granite contact in the Bessell's Creek area. All failed. Minor sulphides noted in two holes and one hole had 4m at 0.6 g/t Au.

. One hole (20) in the NE part of the valley was entirely within Mathinna Beds.

. One hole (24) in the upper part of Thomas Creek intersected the Mathinna - granite contact. Trace (0.03g/t) Au was recorded in the granite. The Mathinna Beds above the contact <u>were not</u> sampled.

. Three holes were drilled in a magnetic anomaly near the ridge in the NW part of the Lisle Basin (actually between Lisle and Lone Star basins) and encountered granite beneath 30-50m of Mathinna Beds. H23 intersected 16m at 0.04g/t Au. These holes are near a BLEG soil anomally defined by Billiton in 1991.

The drilling mainly tested the granite immediately beneath the present day weathered surface. The Mathinna - granite contact was intersected in two holes only. Significant gold in granite was only encountered in the western holes near Thomas Creek and one hole on the divide between the Lisle and Lone Star basins.

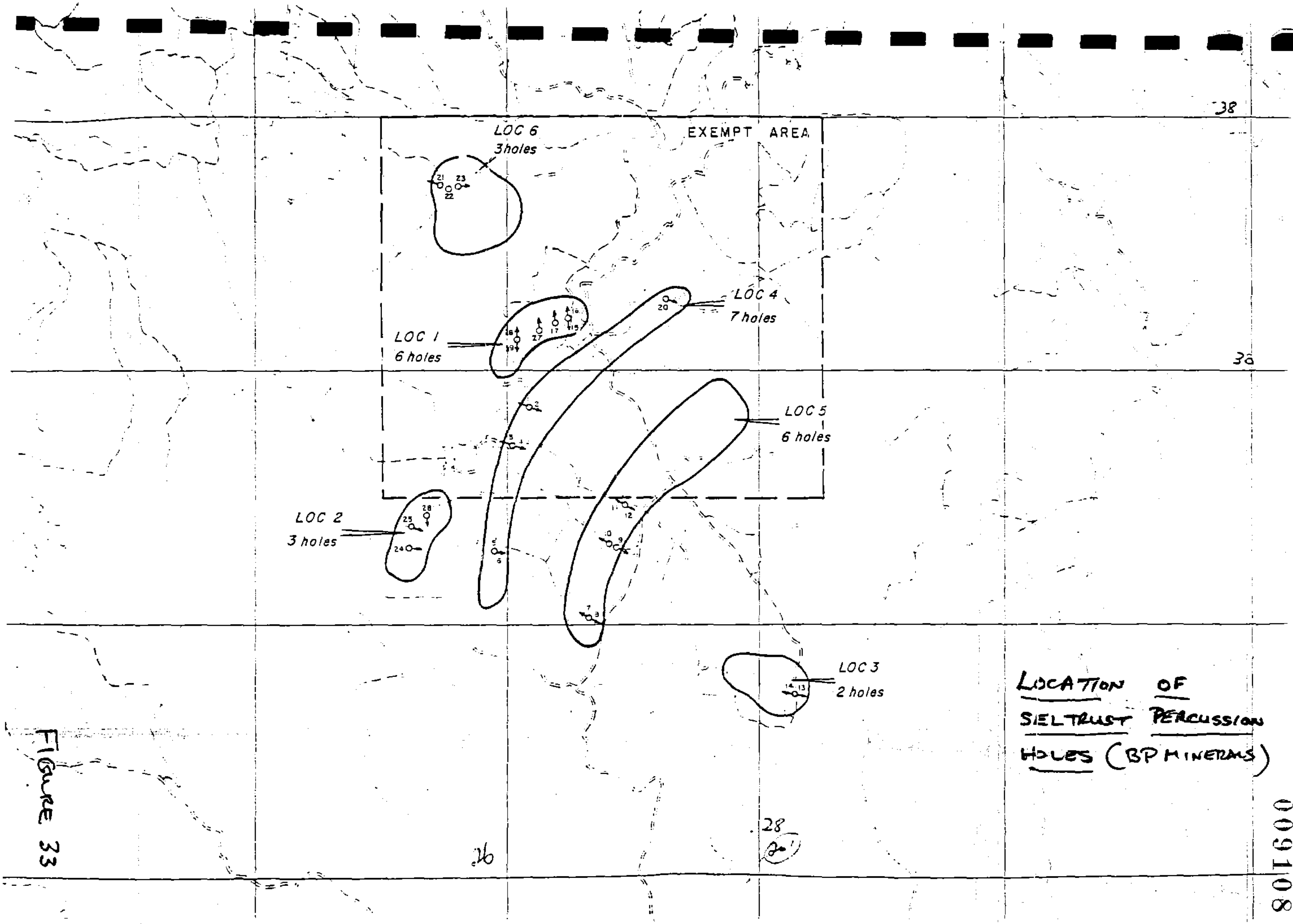
In most holes the talus and Mathinna Beds were not sampled or assayed and no elements other than gold was analysed in any hole. Thus the drilling tells us nothing about the gold or other metal values in the Mathinna Beds or in the Hornfels Zone. No hornfels were actually logged. The drilling did prove <u>rare</u> and very low grade mineralisation in the granite.

No structures were apparently defined or tested.

The assaying was done using a geochemical method, apparently AAS, and had a relatively high detection limit of 0.02g/t Au. We can only guess as to the reliability of the assaying.

Stoner (1985), in the conclusions noted earlier in this section, mentions *"the ubquitious occurrence of minor vein and disseminated pyrite ± arsenopyrite in drill holes"*. The logs and assays don't fully support this conclusion as such mineralisation is noted in only a few places. It <u>may be</u> inferred in other areas by iron staining. However, it is a large leap to Stoner's conclusion that the alluvial gold is derived from widespread 0.01g/t Au mineralisation in granite and I do not believe there is any evidence to justify such a conclusion.

Stoner (1985) also concludes "*on the basis of the drilling results the potential for a large tonnage, low grade gold deposit associated with the intrusive bodies of Lisle and Golconda is difficult to support*". I disagree and believe the drilling does not support or deny the existence of such a body or bodies except within the intrusives where drilled. The postulated widespread low value gold within the intrusion, with elevated values at or near the margin with the Mathinna Beds (H25) is regarded as quite positive and indicative of a widespread mineralising system. Within the Lisle basin only holes 24 tested the likely prospective zone - i.e just above and below the Mathinna - granite contact. All holes except 24 and 25 may have been well away from the contact zone.



LOCATION OF SIELTRUST PERCUSSION HOLES (BP MINERALS)

FIGURE 33

8 SUGGESTED EXPLORATION

Previous exploration at Lisle has not significantly limited exploration opportunities in the Lisle-Golconda area. Rather the exploration has substantially expanded opportunities, particularly away from the Lisle Basin.

Exploration opportunities can be sub-divided into three broad entities.

- Disseminated sulphide, stockwork, or sheeted vein type deposits associated with the cupola region of the granodiorite - sediment contact, either at the contact, within the sediments or within the granodiorite. Such deposits could be in the 2 to 10 million oz size, are unlikely to outcrop, would occur outside the confines of the present Lisle Basin and should be detectable by geochemistry to locate "leakage" above such deposits with assistance from magnetics to map subsurface granodiorite phases.

- Structure or fault controlled high grade mineralisation, also probably above granodioritic cupolas. Such deposits could be in the 500,000 to 3,000,000 oz size. Such structures could be detected by a combination of geochemistry, magnetic surveys, air photo interpretation and CSAMT - resistivity type surveys.

- Disseminated, stockwork or sheeted vein type deposits associated with the granodiorite-sediment contact within the Lisle Basin. Such deposits could be obscured by a few metres of scree. Because the present granodiorite-sediment contact in the Lisle Basin is probably several to many hundreds of metres below the original cupola or top of the Lisle Basin intrusive we believe this target type has a lower probability than either of those above but should not be ignored. These deposits could be in the 500,000 to 1,000,000 oz size.

The thrust of any exploration should be as follows:

- Obtain widespread geochemical soil Au, As, Sb coverage and ground magnetic data, initially in areas of known Au and As soil or stream sediment anomalism and then gradually extend the coverage to other structural/magnetic target areas.

- Detailed interpretation and image processing of the aeromagnetic and ground magnetic data should be completed to define, if possible, near surface granodiorite cupolas and faults.

- Detailed air photo interpretation to plot all possible linears and structures that could provide mineralisation hosts.

- CSAMT surveys to define possible host structures.

- Drilling to test targets defined from any or all of the above surveys.

The soil geochemistry/magnetics would be completed on a nominal 200 metre by 20 metre grid.

In practise the sampling would most economically be carried out by ridge and/or road sampling (there are numerous roads and tracks) and traversing at an angle to each ridge/road at 150 to 250 metre intervals.

Sample locations would be determined from and plotted onto aerial photographs enlarged to 1:2500 and similar enlargements of topographic maps (published maps and air photos available at 1:25,000). Chaining and GPS measurements would be used for further control.

This method of sampling would avoid expensive survey gridding and create few if any problems in areas of forestry plantations.

In a few areas traditional surveyed grids may be appropriate.

Two areas have been selected for initial sampling - Bessell's Reward Project and Lone Star Ridge South Project (Plate 5).

Suggested grid and ridge lines to be sampled are indicated. All roads/tracks within each project area would also be sampled. The number of samples within Bessell's Reward project is approximately 3,000, and within Lone Star Ridge South is approximately 2,200.

In the Bessell's Reward area there are numerous roads and tracks and it may be appropriate to sample these, plus easily accessed ridge lines before filling in the cross lines.

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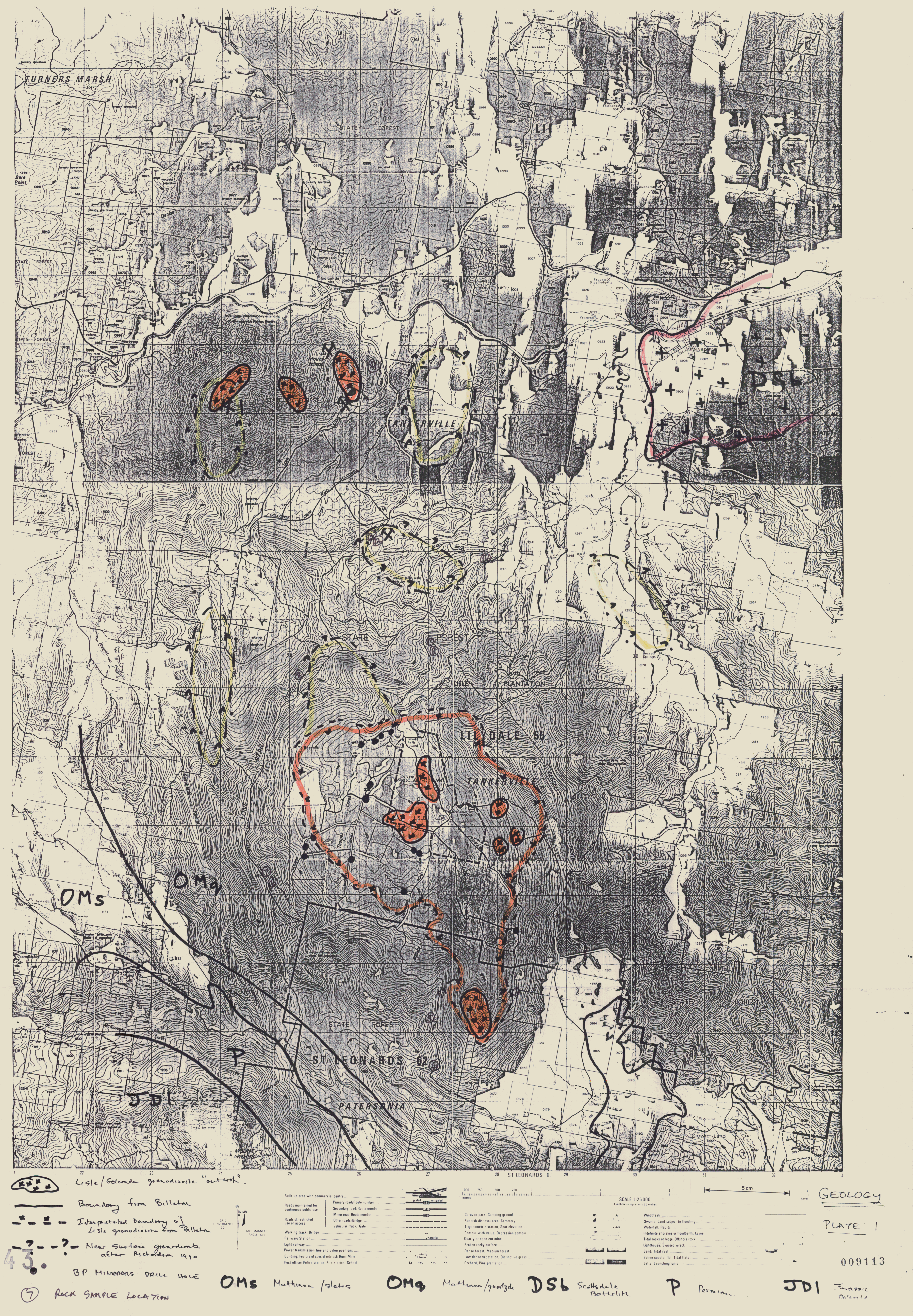

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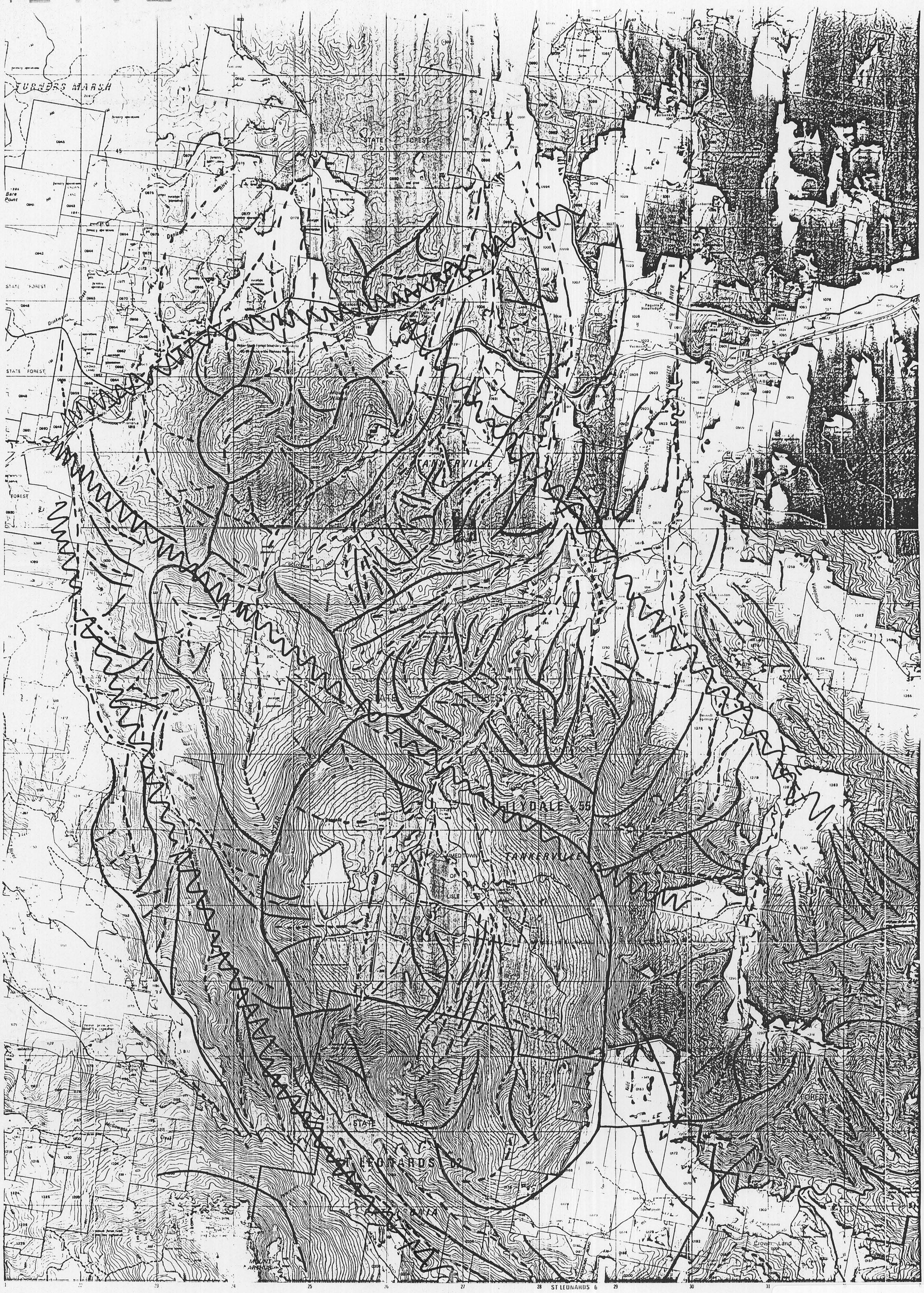


— Ridge line trend

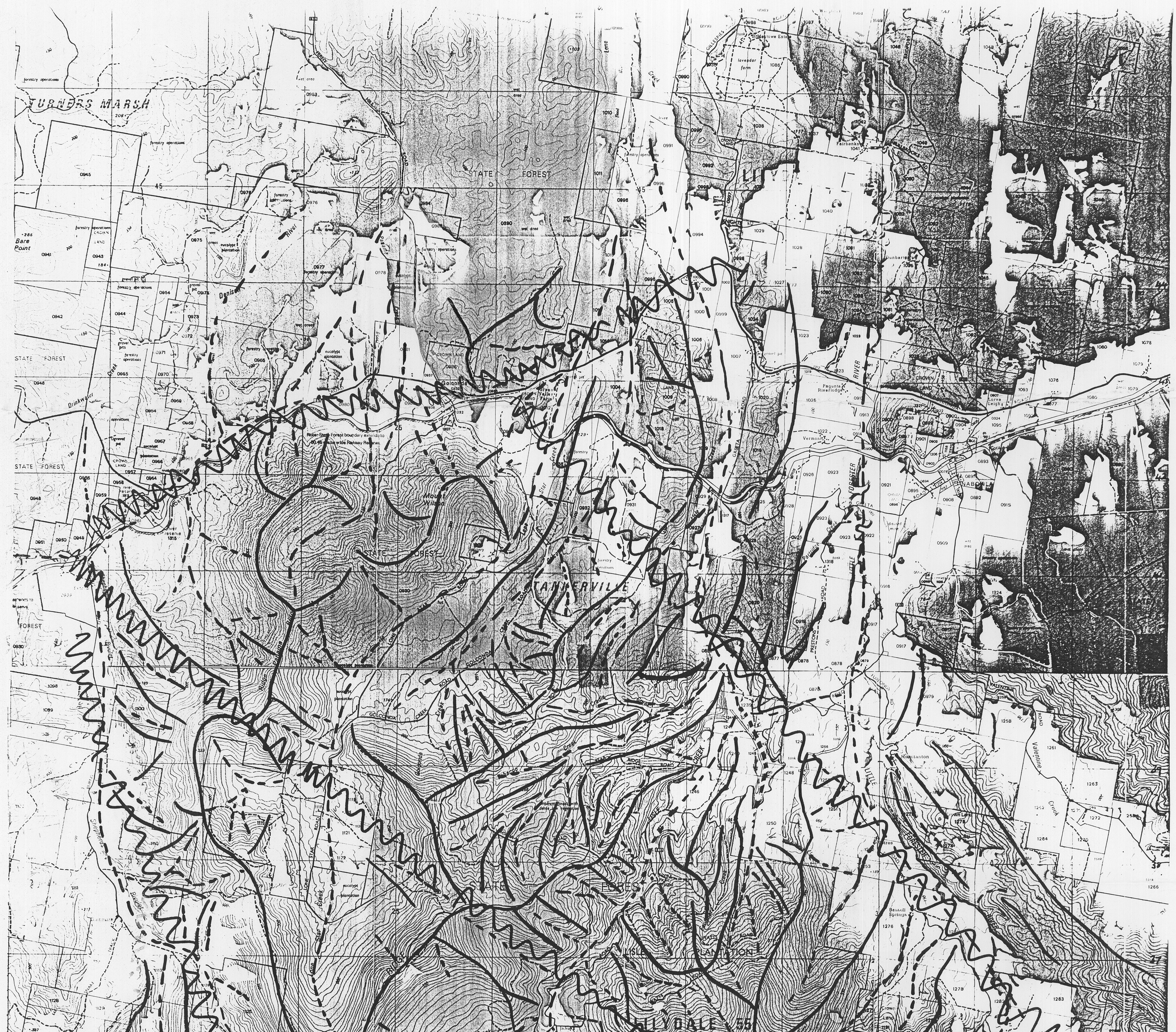
- - - - CREEK Trend

ʌʌʌʌ Major Structure (interpreted.)

5 cm

TOPOGRAPHIC INTERPRETATION

PLATE 2



Ridge line trend

CREEK Trend.

Major Structure (interpreted.)

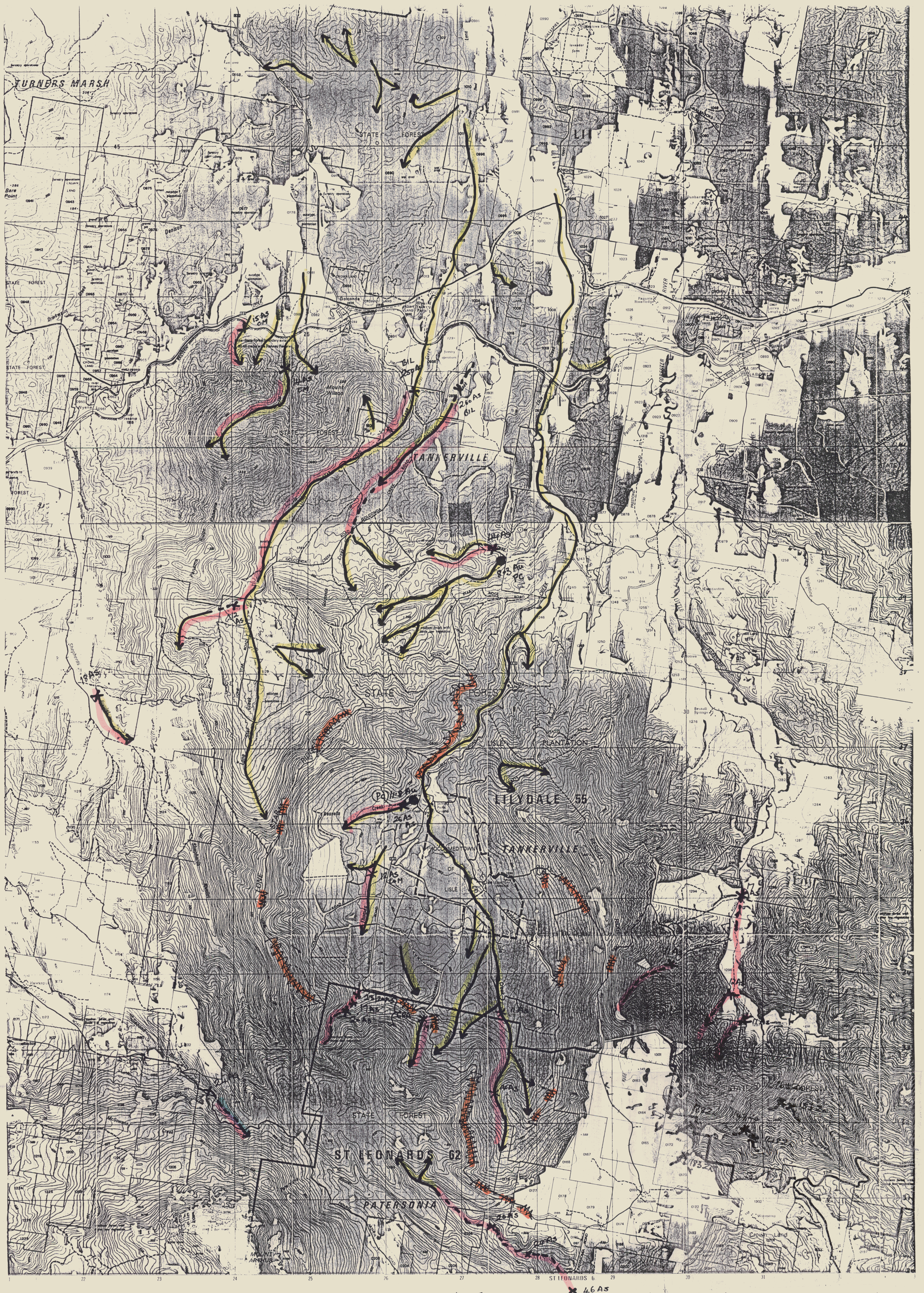
SCALE 1:25 000

009115

93-3443.

TOPOGRAPHIC INTERPRETATION

PLATE 2



→ Au BLEG ANOMALY (STREAM)

-x- - - As STREAM ANOMALY (11 As)

∧∧∧∧ BLEG SOIL ANOMALY

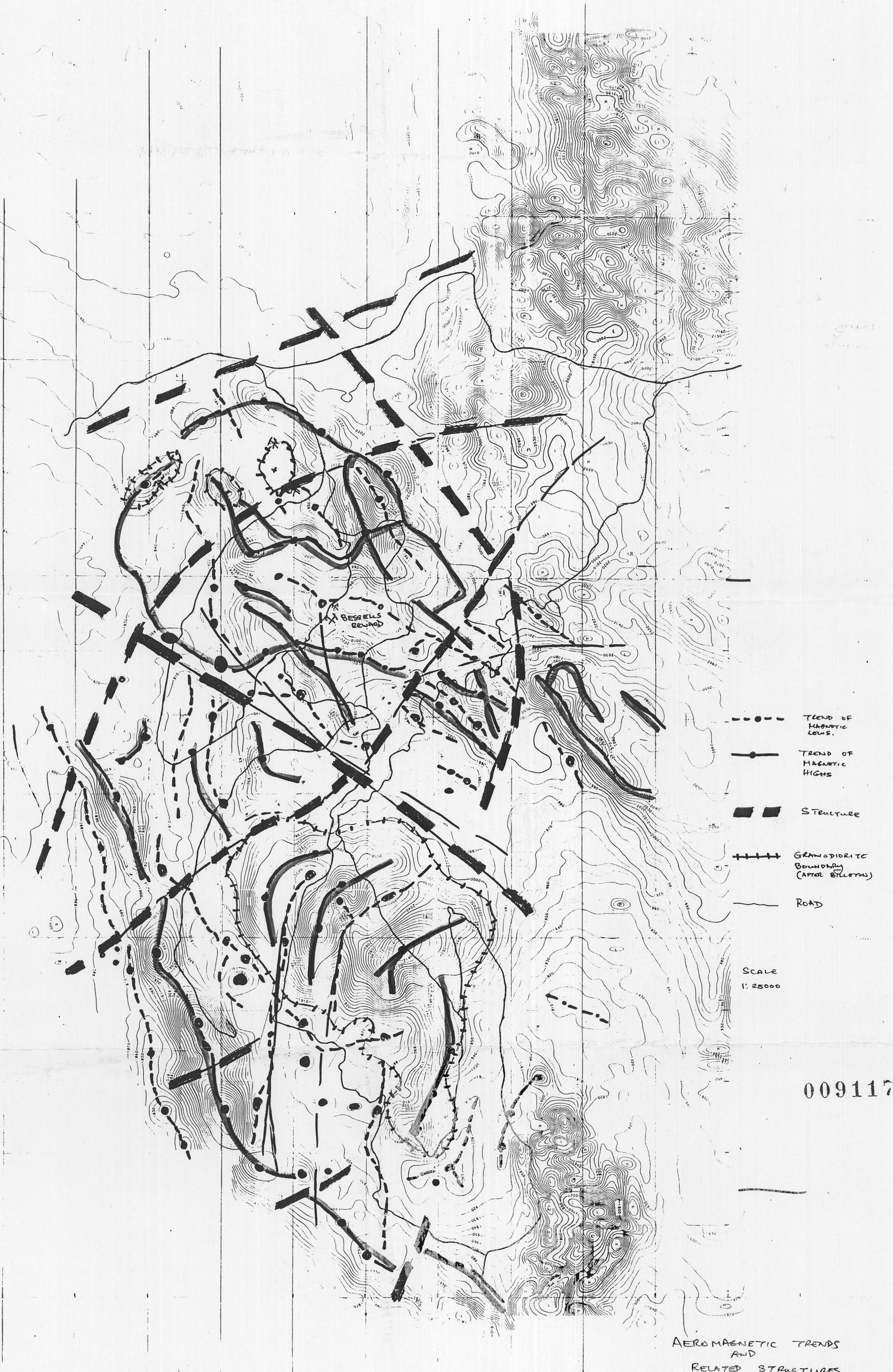
● 1.8 PC PAN CONCENTRATE Au

009116

STREAM AND SOIL GEOCHEMICAL ANOMALIES

PLATE 3

93-3443.



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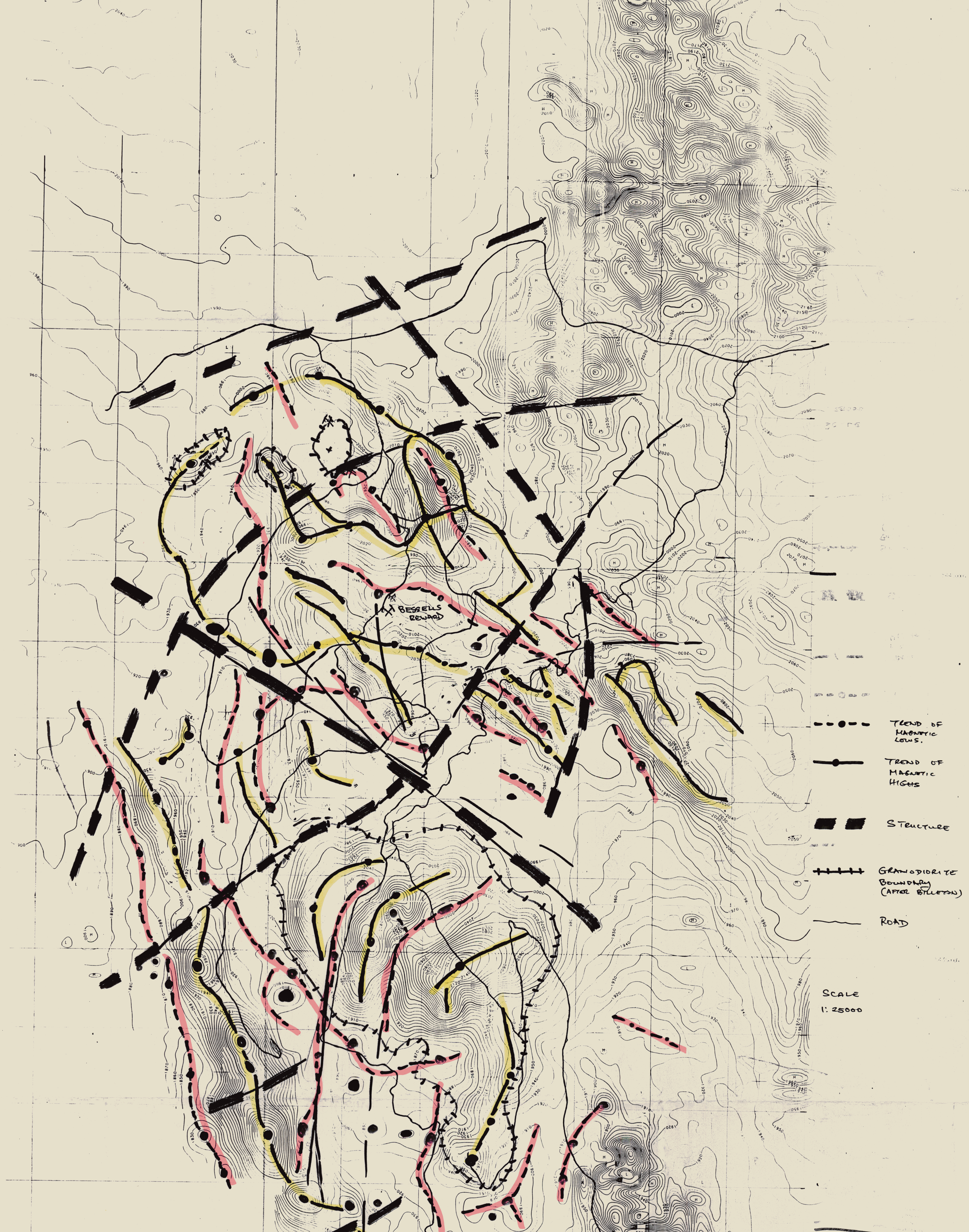
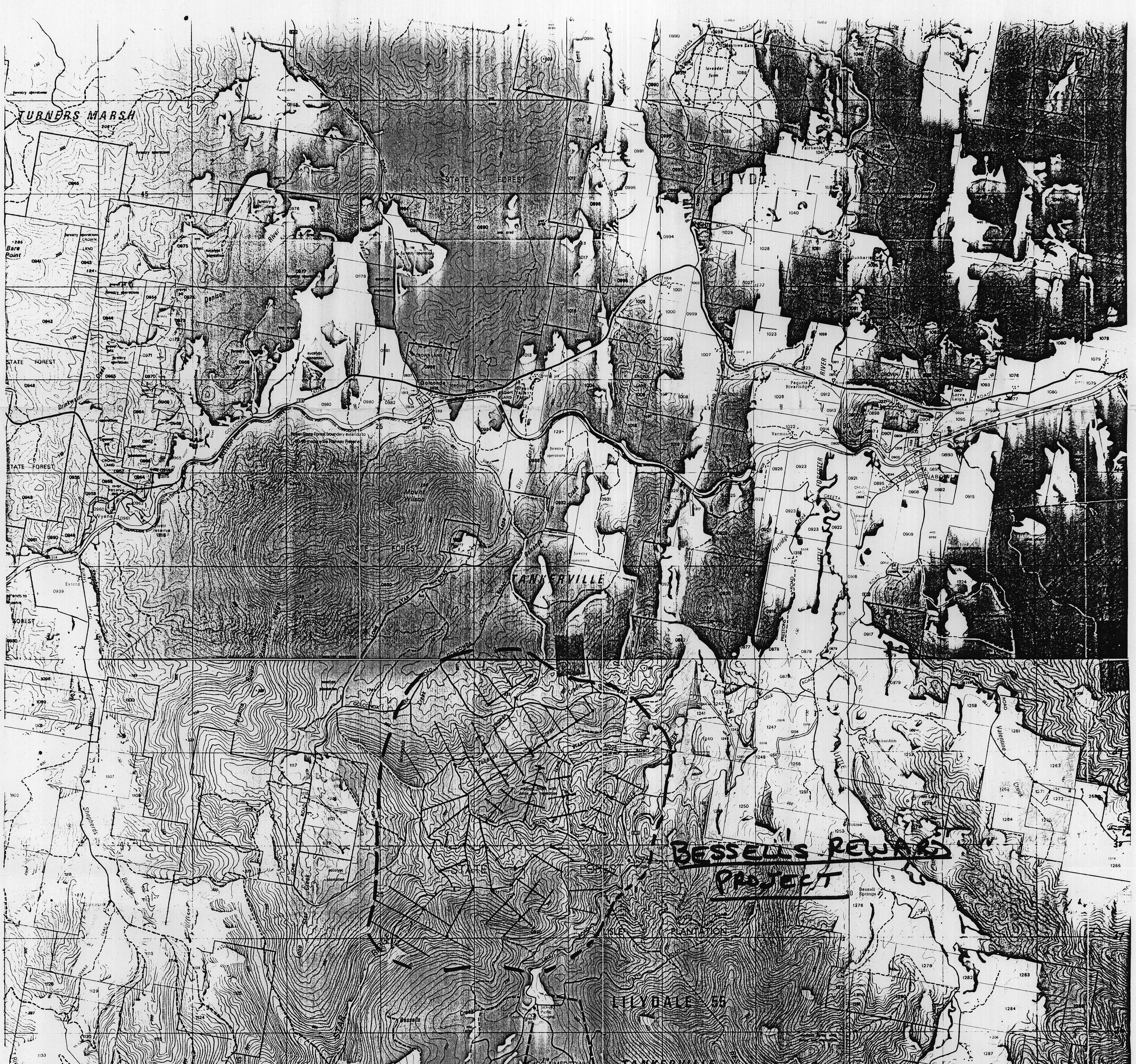
AEROMAGNETIC TRENDS AND RELATED STRUCTURES

PLATE 4



AEROMAGNETIC TRENDS AND RELATED STRUCTURES

PLATE 4



SOIL SAMPLE PROJECT AREAS

ROADS, TRACKS AND LINES (INDICATED) TO BE SAMPLED AT 20m INTERVALS

009119

93-3443.

PLATE 5