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MINES

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BILLITON AUSTRALIA

E.L. 6/90 - LISLE

Final Exploration Report

91-3296.

OPEN FILE

Author : J.P. Randell

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Distribution : 1. D.M.M.R. Hobart
2. Billiton, Melbourne
3. Billiton, Tasmania

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1. INTRODUCTION

This report summarizes results of exploration activities completed by Billiton Australia within exploration licence 6/90.

2. LOCATION & ACCESS

The licence is located within the North-East Province of Tasmania 30kms to the north-east of Launceston (Fig 1) and is accessed by numerous public and forestry roads. Topography is variable from scree covered basins to steep sided ridges and necessitates the use of 4WD vehicles or foot slogging.

3. LAND TENURE

Exploration licence 6/90, of 182km², was granted to The Shell Company of Australia Limited on 8th June 1990 for a period of 10 years renewable every 12 months. (Fig 2). The licence was acquired by the company under the Department of Mines and Mineral Resources tender system and has been renewed until 8th June 1992.

Approximately 50% of the area is classified as State Forest whilst the remainder is predominantly private land.

A small group of mining leases is excluded from the tenement area and these are detailed below in Table 1 (see also Fig 3).

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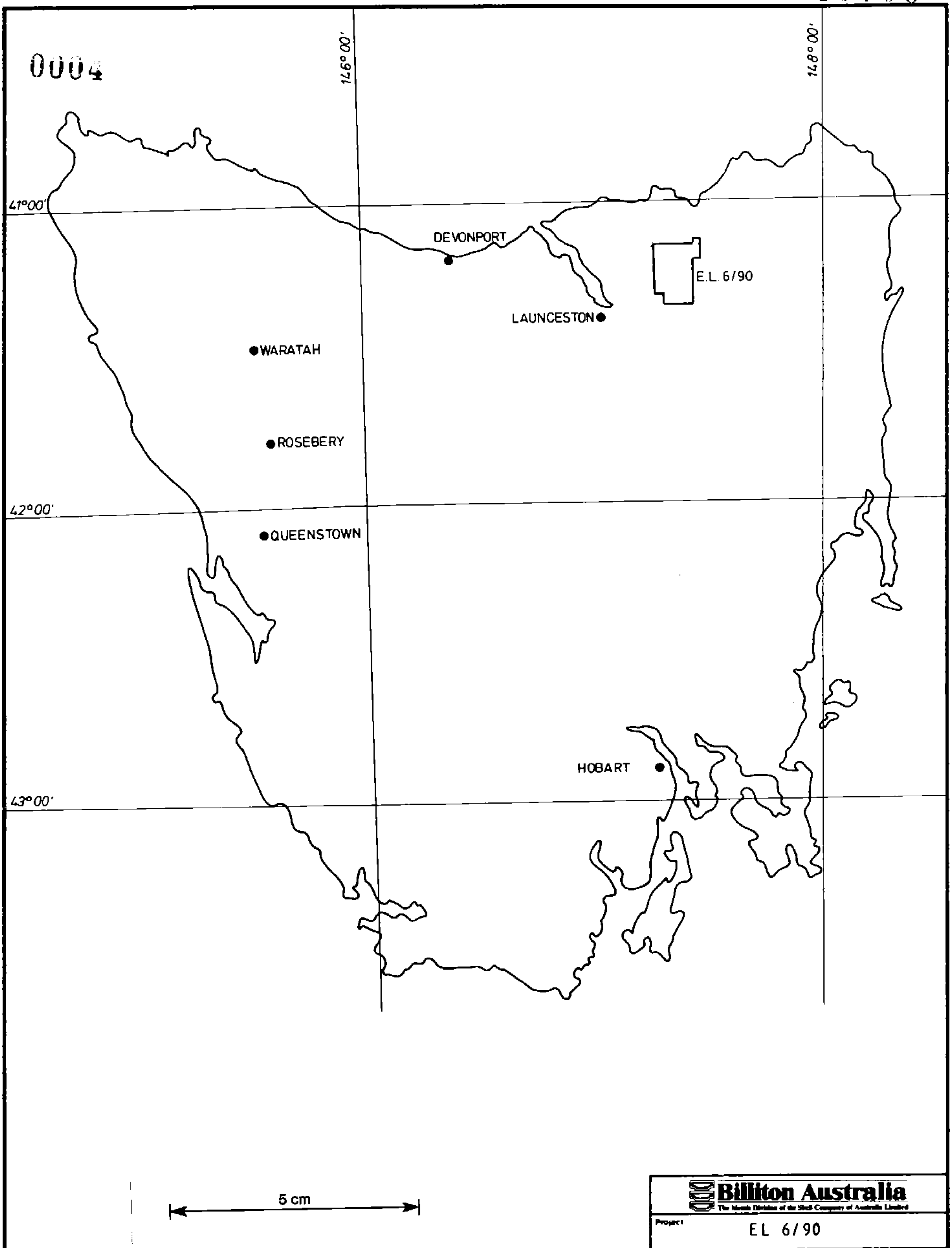

Billiton Australia

The Metals Division of the Shell Company of Australia Limited

Project	EL 6/90
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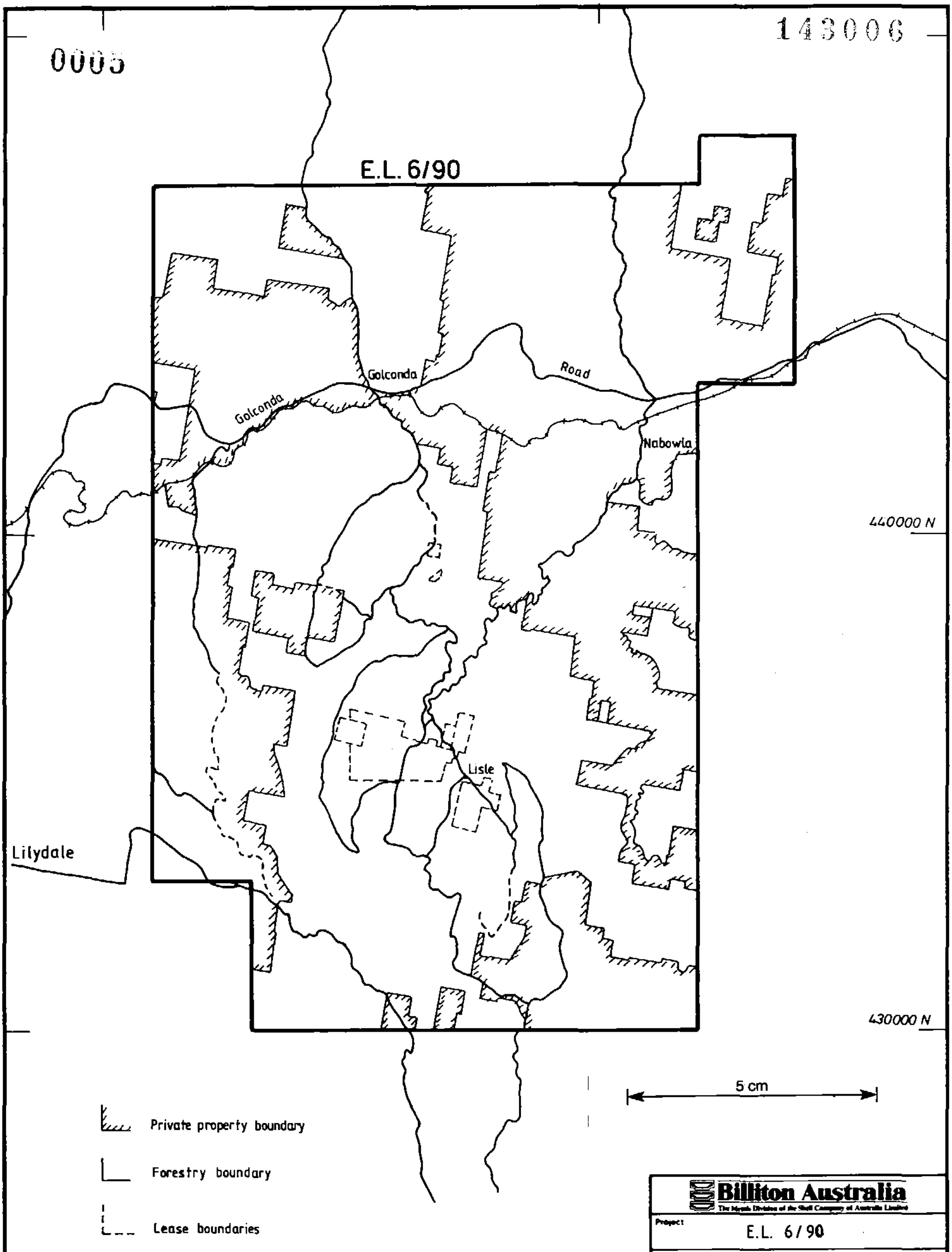

Billiton Australia
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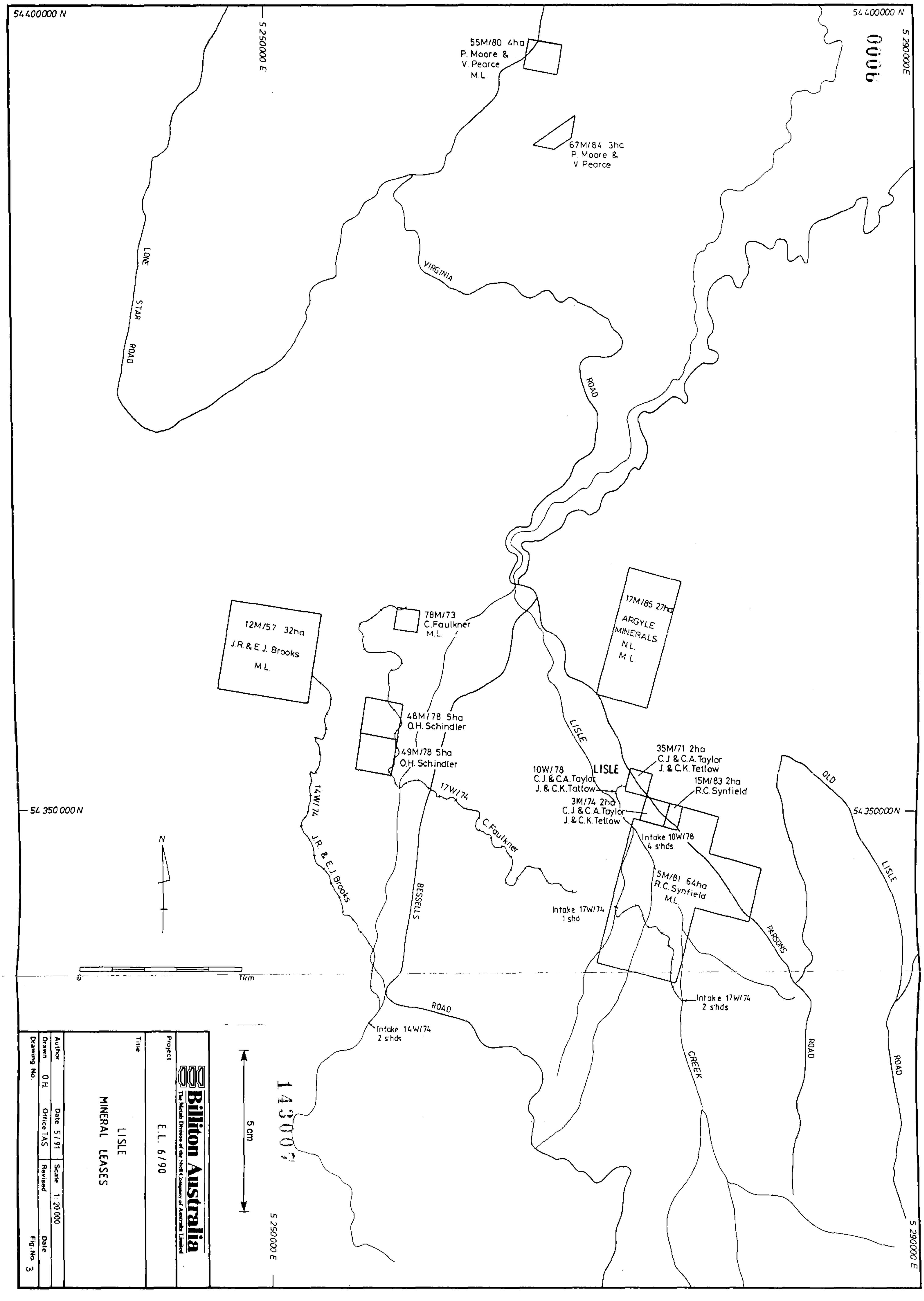

5 440000 N
5 250000 E
5 290000 E
55M/80 4ha
P. Moore &
V. Pearce
M.L.
67M/84 3ha
P. Moore &
V. Pearce
LONE STAR ROAD
VIRGINIA ROAD
12M/57 32ha
J.R. & E.J. Brooks
M.L.
78M/73
C. Faulkner
M.L.
17M/85 27ha
ARGYLE MINERALS N.L.
M.L.
48M/78 5ha
O.H. Schindler
49M/78 5ha
O.H. Schindler
LISLE
35M/71 2ha
C.J & C.A. Taylor
J. & C.K. Tetlow
10W/78
C.J & C.A. Taylor
J. & C.K. Tatlow
15M/83 2ha
R.C. Synfield
3M/74 2ha
C.J & C.A. Taylor
J & C.K. Tetlow
Intake 10W/78
4 s'hds
5M/81 64ha
R.C. Synfield
M.L.
14W/74
J.R. & E.J Brooks
17W/74
C. Faulkner
Intake 17W/74
1 shd
Intake 17W/74
2 s'hds
Intake 14W/74
2 s'hds
5 350000 N
BESSELLS ROAD
LISLE CREEK
PARSONS
OLD LISLE ROAD
N
0
1km
5cm
Billiton Australia
The Metals Division of the Shell Company of Australia Limited
Project E.L. 6/90
Title LISLE MINERAL LEASES
Author
Date 5/91
Scale 1:20 000
Drawn OH
Office TAS
Revised
Date
Drawing No.
Fig. No. 3

TABLE 1 : LEASES

TENEMENT	OWNER	AREA	VOLUME
12M/57	J.R. & E.J. Brooks	32ha	OS.Heads
35M/71	C.J., C.A. Taylor, J. & C.K. Tetlow	2ha	OS.Heads
78M/73	C. Faulkner	2ha	OS.Heads
3M/74	C.J., C.A. Taylor, J. & C.K. Tetlow	2ha	OS.Heads
14W/74	J.R. & E.J. Brooks	0ha	2S.Heads
17W/74	C. Faulkner	0ha	1S.Heads
48M/78	O.H. Schindler	5ha	OS.Heads
49M/78	O.H. Schindler	5ha	OS.Heads
10W/78	C.J., C.A. Taylor, J. & C.K. Tetlow	0ha	4S.Heads
55M/80	P. Moore & V. Pearce	4ha	OS.Heads
5M/81	R.C. Synfield	64ha	OS.Heads
1M/82	P.A. Moore & V. Pearce	1ha	OS.Heads
15M/83	R.C. Synfield	2ha	OS.Heads
67M/84	P.A. Moore & V.D. Pearce	3ha	OS.Heads
17M/85	Argyle Minerals N.L.	27ha	OS.Heads
14M/90	Argyle Minerals N.L.	11ha	OS.Heads

4. REGIONAL SETTING

The licence consists predominantly of Mathinna Beds sandstones and siltstones of Ordovician age into which has been intruded various Devonian granitoid phases (Fig 4). Compositionally, these range from adamellites to granodiorites and in the licence occur as apophyses or cupolas partially obscured by Quaternary cover.

Younger cover rocks of Cainozoic-Mesozoic age occur in the extreme south-west and south-east of the area and occupy an area of approximately $20km^2$.

The granitoids are typically strongly weathered and altered and tend to occupy topographic lows surrounded by more resistive Mathinna Beds sediments. The latter occur as elongate ridges aligned with the regional strike, generally in a north-westerly direction.

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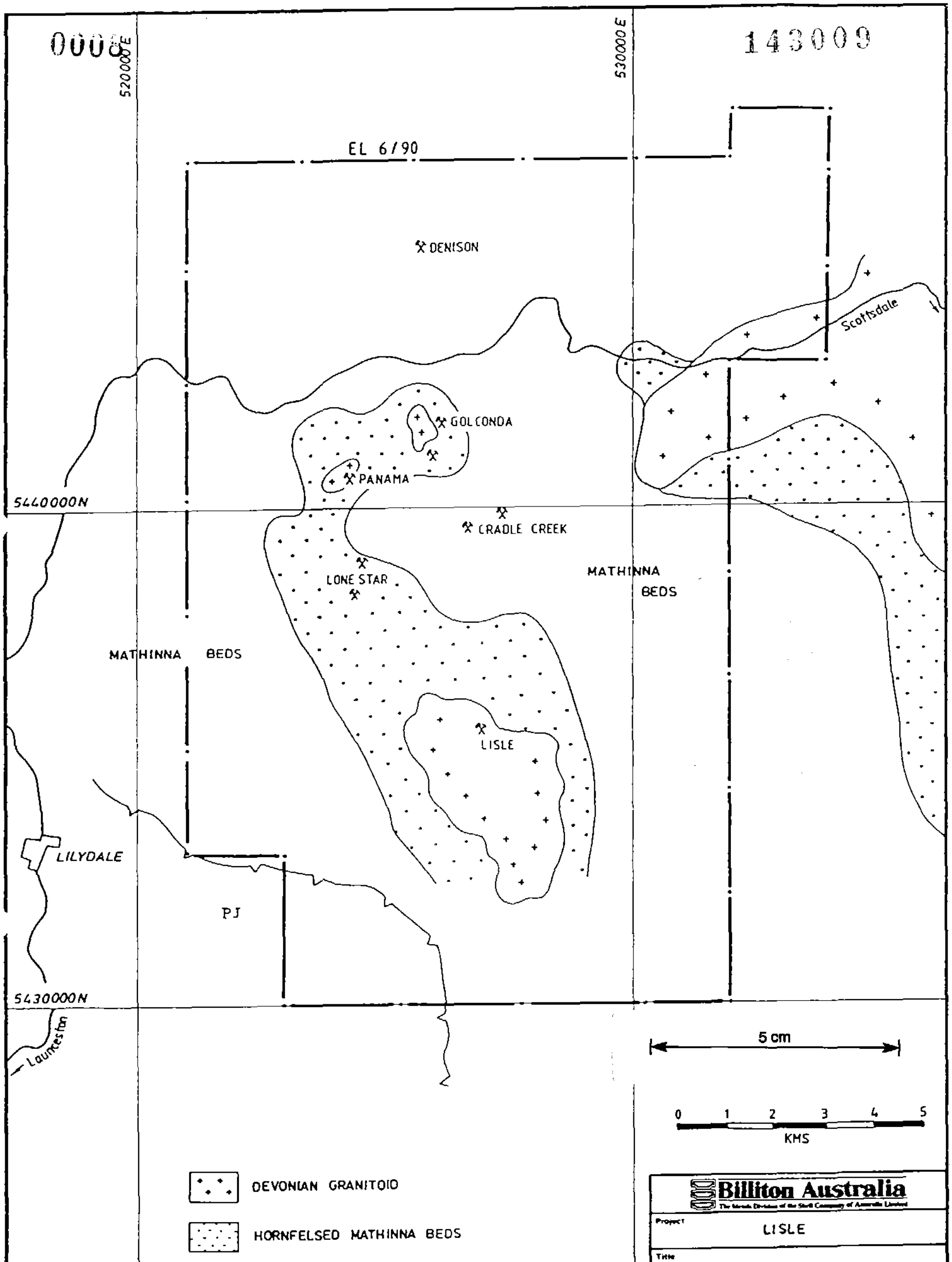

Billiton Australia

Project: LISLE

Title: REGIONAL SETTING

Author JPR	Date 4/90	Scale 1:100 000	
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Drawing No.			Fig. No. 4

Six named goldfields occur within the licence and consist of a variable number of old shafts, pits, adits and alluvial sluicing operations. Production has been recorded from the Lisle, Golconda, Panama, Cradle Creek, Denison and Lone Star Goldfields and almost 8 tonnes of gold has been reportedly won.

5. MINERALIZATION

The Lisle Goldfield is by far the largest mineral field in terms of historical production and extent of old workings. Gold was won essentially from sluicing and panning of numerous streams and documented evidence suggests that the gold has not travelled far. Workings included alluvium and eluvium in terraces and slopes along Main (Lisle), Bessells and Thomas creeks, in a basin-shaped depression possibly representing an old lake bed. There were numerous patchy gold rich horizons in these lacustrine sediments and carbonaceous horizons underlying talus, which produced relatively pure, free, angular (?)crystalline gold. This type of gold suggested a secondary origin.

There does not appear to be an obvious association with quartz veins although minor bedrock gougings were reportedly hosted by thin quartz lodes. The Lisle area is part of a large 5km x 4km topographic depression that is covered by a blanket (10-20m) of pebbly talus from the surrounding hills. Despite extensive searching there appears to be no sizeable bedrock host in the surrounding hills and prospectors have puzzled over the ultimate source of the gold.

Whilst recorded production was only 0.25 tons of gold, it is estimated that total production exceeded 8.5 tons.

The Lone Star and Cradle Creek Goldfields are also in part alluvial but in the main these and the others (Denison, Panama, Golconda) exhibit the more typical quartz vein association. Veins are generally narrow (2-10cms) and of limited strike but some reports indicate the presence of reticulating series of quartz veinlets associated with the old workings.

One mineralization style of interest is alluded to in several old reports at several localities (Cradle Creek, Tobacco Creek). The literature reports the occurrences of "gold impregnated sandstones" which appear to be localized in the contact aureole of the granitoids. These presumably relate to disseminated mineralization hosted by fine sulphide species and/or very fine anastomosing quartz veinlets (as observed at Hogans Road) and could well be the host for much of the mineralization at Lisle.

6. PREVIOUS WORK

The licence covers the mining district of Golconda-Lisle and has been comprehensively reported on by Government Geologists of the day (Twelvetrees, 1909, McIntosh Reid, 1926). They report extensive alluvial and hard rock operations throughout the district but particularly in the Lisle area and have estimated a total historical production of 0.25 million ounces of gold won predominantly from alluvial slucing operations. The bedrock source of the gold has remained an enigma since those days as no evidence can be seen at surface for the mineralization host.

Modern exploration has been carried out by Comalco in the 1970's but details of their programmes are not available. From 1983 - 1986 BP Minerals/Seltrust carried out a programme of mapping, rock chip sampling, stream sediment sampling, aeromagnetic surveying and open hole percussion drilling. Their work enabled a characterization of the various gold workings into alluvial, quartz vein hosted and disseminated and showed a geochemical association of gold with arsenic, silver, chalcopyrite and pyrite. The aeromagnetic survey results were of interest as they 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 degradation) and were particularly interested in small discrete magnetic highs that were scattered throughout this zone. Presumably they regarded these as potential pyrrhotite hosted auriferous deposits.

BP/Seltrust followed up magnetic and geological targets using open hole percussion drilling but the programme 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 may have intersected both Mathinna Beds and granitoids. No anomalous assays were recorded.

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. The results indicated limited potential and little else of value was completed.

7. EXPLORATION COMPLETED BY BILLITON

Exploration has involved both a preliminary regional assessment and a prospect specific preliminary assessment. Literature and previous exploration results have been reviewed and a research project is current. Details are presented in Billiton report 08.5297 and summarized below:

a) Regional BLEG Stream Sediment Survey: As part of a regional survey of the North-East Province the licence was screened with a stream sediment survey and within the are of EL 6/90, a total of 26 sites have been sampled. 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, XRF'd Pb, Sn, As and AAS'd Cu, Zn and Ag.

b) Comprehensive BLEG Stream Sediment Survey: A total of 214 stream sediments 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 -1/4" fraction. Eleven anomalous sites were then re-sampled by duplicate sampling and sampling upstream.

c) BLEG Composite Soil Survey: A reconnaissance soil sampling programme was completed over the ridges surrounding the Lisle valley. A total of 264 samples were collected by compositing five 0.5kg soil samples collected every 20m along road edges where undisturbed soil could be obtained. Three anomalous areas were re-sampled by compositing five 0.5kg soil samples collected every 10m within the anomalous sample interval. (28 in total).

d) Research: A post-graduate student from the C.O.D.E.S. Key Centre, Hobart has been studying the mineralization styles and nature of the gold observed within the Lisle and adjacent mineral fields. In addition, a total of 300 gravity readings have been taken across the Lisle valley to investigate the subsurface contact of the Devonian granitoids.

8. EXPLORATION RESULTS

The regional stream sediment sample results indicated three anomalous areas whilst the comprehensive stream survey delineated a total of nine anomalies. Poor agreement between original and duplicate assays raised several possibilities, none of which have been satisfactorily proven.

Composite soil sampling also delineated anomalous areas (16 samples in total) and infill sampling generally confirmed the presence of three anomalies. The level of anomalism is however quite low.

Research by the University of Tasmania is ongoing but has concentrated on determining the character of the gold mineralization by detailed examination and analysis to provide a possible origin for the gold at Lisle. Work is continuing (see Appendix 1) but results have been inconclusive to date.

9. CONCLUSIONS

The Lisle licence covers six groups of old gold mining operations that are spatially (and perhaps genetically) associated with small cupolas of Devonian granitoid that have intruded Ordovician Mathinna Beds sandstones and siltstones. There was some evidence to suggest that the favourable locus for the mineralization is within the contact metamorphosed aureole of these granite bodies. However, it is equally plausible that the mineralization has been hosted by the Lisle granitoid and the alluvial concentrations merely represent the natural accumulation after degradation of the host.

Results of the geochemical surveys have been in part ambiguous and whilst several low order soil anomalies were defined their ultimate source has not been determined.

10. RECOMMENDATIONS

A programme of percussion drilling is technically feasible to evaluate the contact aureole of the Lisle granitoid. This programme would be reconnaissance by nature as there has been little success in identifying targets through the overburden.

The soil anomalies remain unexplained and may be best evaluated by shallow costeaning.

Future exploration must be a balance between the perceived potential for success and the capital risk. At this point in time and knowledge, there is insufficient evidence to support a drilling programme and it is recommended that no further exploration be carried out.

The licence should be relinquished immediately.

APPENDIX 1

Six Monthly Report - Lisle Area

Six Monthly Report - Lisle Area For Billiton Australia

Michael Roach
Centre for Ore Deposit and Exploration Studies.
The University of Tasmania

1. Introduction.

The Lisle and associated goldfields were significant producers of gold in the 1880's. Approximately 8 tonnes of gold was recovered, almost entirely from alluvial workings. The most productive area was the Lisle valley which accounted for the majority of the reported production. The source of the alluvial gold in the Lisle valley is uncertain.

The aim of this project is to attempt to determine the origin of the alluvial gold from the Lisle Valley and to assess the potential for the existance of disseminated style mineralisation, suitable for extraction by open cut methods.

2. Geology Of The Lisle - Golconda Area

The Siluro-Devonian Mathinna Beds sediments in the Lisle - Golconda area have been intruded by Devonian granodioritic plutons. The Lisle, Panama, Lone Star and Golconda Goldfields are closely spatially associated with these intrusive bodies. The Denison Goldfield and the Lebrina Mine in contrast are remote from the surface expression of the granodiorite, while the Cradle and Tobacco Creek goldfields lie within the mapped contact aureole.

Mineralisation in the Denison Goldfield and at the Lebrinna Mine is within clearly defined quartz reefs cross-cutting the Mathinna Beds sediments. At Golconda, production from the Enterprise and Golden Crest mines was from mineralised quartz veins both within the Mathinna Beds and the granodiorite. At Cradle and Tobacco Creeks, alluvial gold was sourced from numerous thin quartz veins and also from "gold impregnated sandstones" (Reid, 1925). At Lisle, production was almost entirely from alluvial deposits, no major hard rock source of the gold has been identified.

Clearly within the Lisle - Golconda area there are a variety of different styles of mineralisation. The relationships between these styles and the importance of the granodiorite in the genesis of these deposits is unknown.

3. Fieldwork

A total of 20 days fieldwork was spent in the Lisle Golconda area between November 1990 and February 1991. During this period five days were spent taking samples of alluvial gold and of material from a number of the old hard rock mines and prospects, the remaining time was spent acquiring gravity measurements.

3.1 Alluvial Gold Samples

Samples of alluvial gold were obtained from two locations in the Denison Goldfield (samples A1 & A2) and from four sites in the Lisle valley (samples A3,A4,A5 & A6). Locations of these samples are shown in figure 1. In addition a sample of spirals product from the former Tasmanian Alluvials Pty. Ltd. operations in the Lisle valley was obtained from the Tasmanian Dept. of Resources and Energy, courtesy of R.Botrill.

Attempts to obtain samples of alluvial gold from Cradle Creek, Tobacco Creek, the Panama Valley and from Lisle Creek downstream of the Lisle valley were unsuccessful.

3.2 Hard Rock Prospect Samples

Samples of quartz vein material, Mathinna Beds and granitic rocks were obtained from the following prospects and mines:

Globe Mine - Denison Goldfield
Brookland Mine - Denison Goldfield
West Wiangatta Mine - Denison Goldfield
Lebrina Mine - Lebrina
Enterprise Mine - Golconda
Bessells Reward Mine - Cradle Ck. Area
Fairbrother Prospect - Lone Star

The Golden Crest Mine at Golconda was also located however only highly weathered granitic material was apparent on the dump.

3.3 Gravity Survey

A total of 190 gravity stations were acquired in the area bounded by the Lisle and Nabowla 1:25,000 map sheets. These stations were located to infill the pre-existing 142 stations from the TASGRAV database.

Second order base stations were established from the first order station at Launceston Airport. These were located at Jacky's Picnic Ground at Lisle and at the Golconda turnoff on the Lilydale - Scottsdale road.

The majority of measurements were made close to clearly defined geographic features. In these cases the uncertainty in the location of the station is less than 25m. Almost all

Figure 1. Lisle - Golconda Area - Alluvial Gold Sample Locations

stations would be located to within 50m of their true position.

Elevations were determined barometrically using a single barometer, with maximum loop periods of two hours. Barometric loops were tied to all readily available SPM's and spot heights. Elevation estimates are thought to be accurate to within 2m in areas of low topographic relief, increasing to 3-4m in steep and broken topography.

4. Gold Grain Morphology

Alluvial gold grains from both the Denison Goldfield and the Lisle Valley were examined using a combination of optical microscopy and scanning electron microscopy. A wide variety of grain morphologies were apparent in both samples and no clear distinction could be made between them on the basis of gross morphology alone.

It is likely that the samples obtained from the Denison Goldfield had travelled no more than 150m from their source which is inferred to be the line of east-west striking quartz veins, marked by a number of small shafts and costeans. No gold can be panned from the creek above this line.

Despite the minimal degree of transportation the gold grains from Denison display shapes ranging from irregular and highly angular forms to well rounded almost spherical particles (Figure 2). The surface of the majority of grains is smooth. The average size of gold particles panned from the Denison Goldfield is 0.50 x 0.31 mm.

Pieces of vein quartz were attached to five gold grains from Denison out of a total of xx grains collected. No grains from the Lisle Valley were observed to have attached vein quartz.

Gold from the Lisle Valley also shows considerable variation in morphology although there are less highly angular grains than at Denison. The surface texture of most grains from Lisle is quite rough and a number of grains had what appeared to be a crusty coating of black material, possibly manganese oxide (Figure 3). The average size of gold grains from the Lisle Valley is 0.51 x 0.34 mm.

5. Gold Trace Element Study

The aim of this study was to determine the trace element signature of alluvial gold grains from the Lisle Valley and to compare this signature to the signature of other gold occurrences in N.E. Tasmania.

Variation in gold fineness in placer deposits is a well known phenomena with fineness often increasing with the distance of

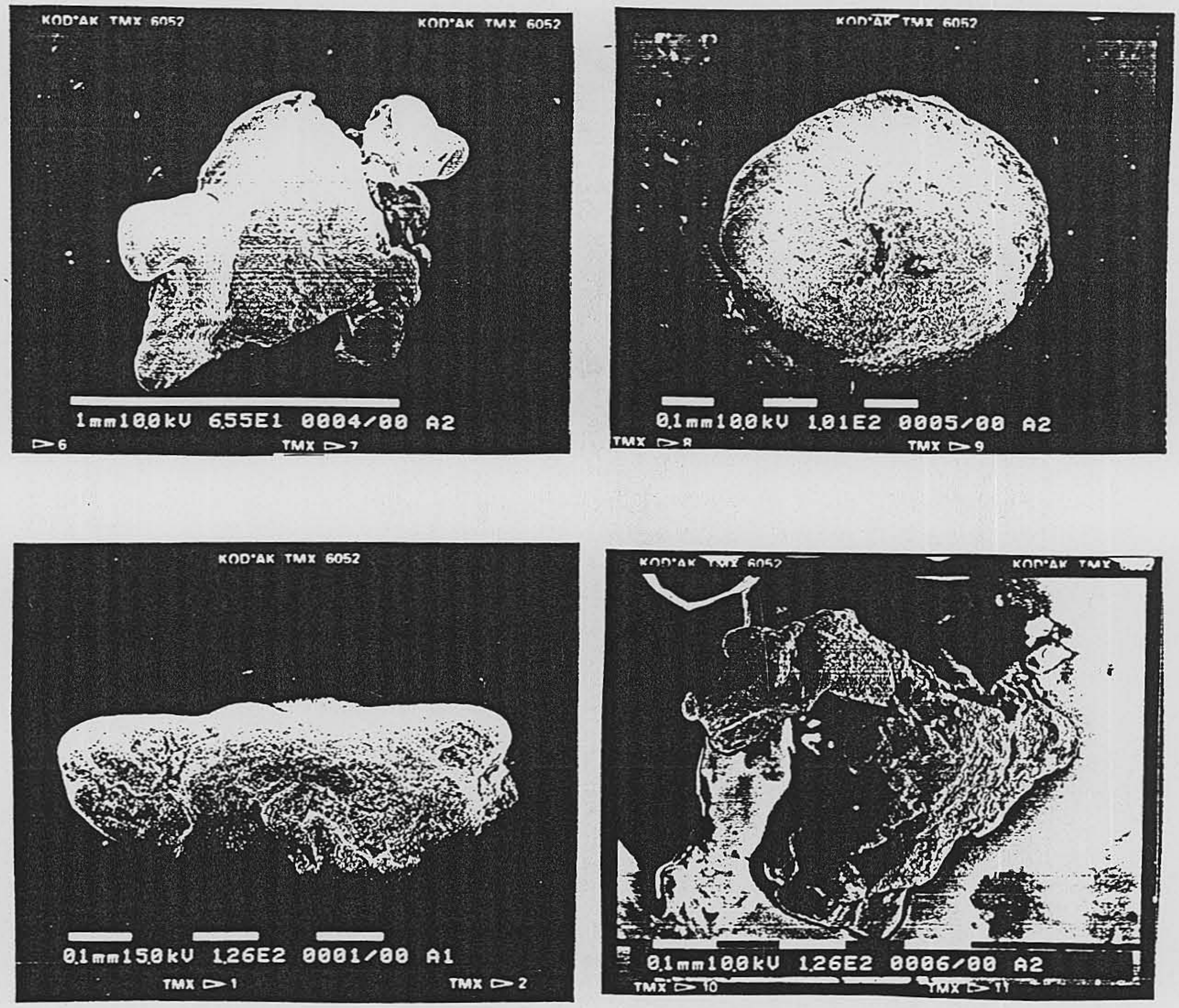


Figure 2. SEM Photomicrographs of Gold Grains From The Denison Goldfield
Note the variation in the degree of rounding and the smooth surface texture.

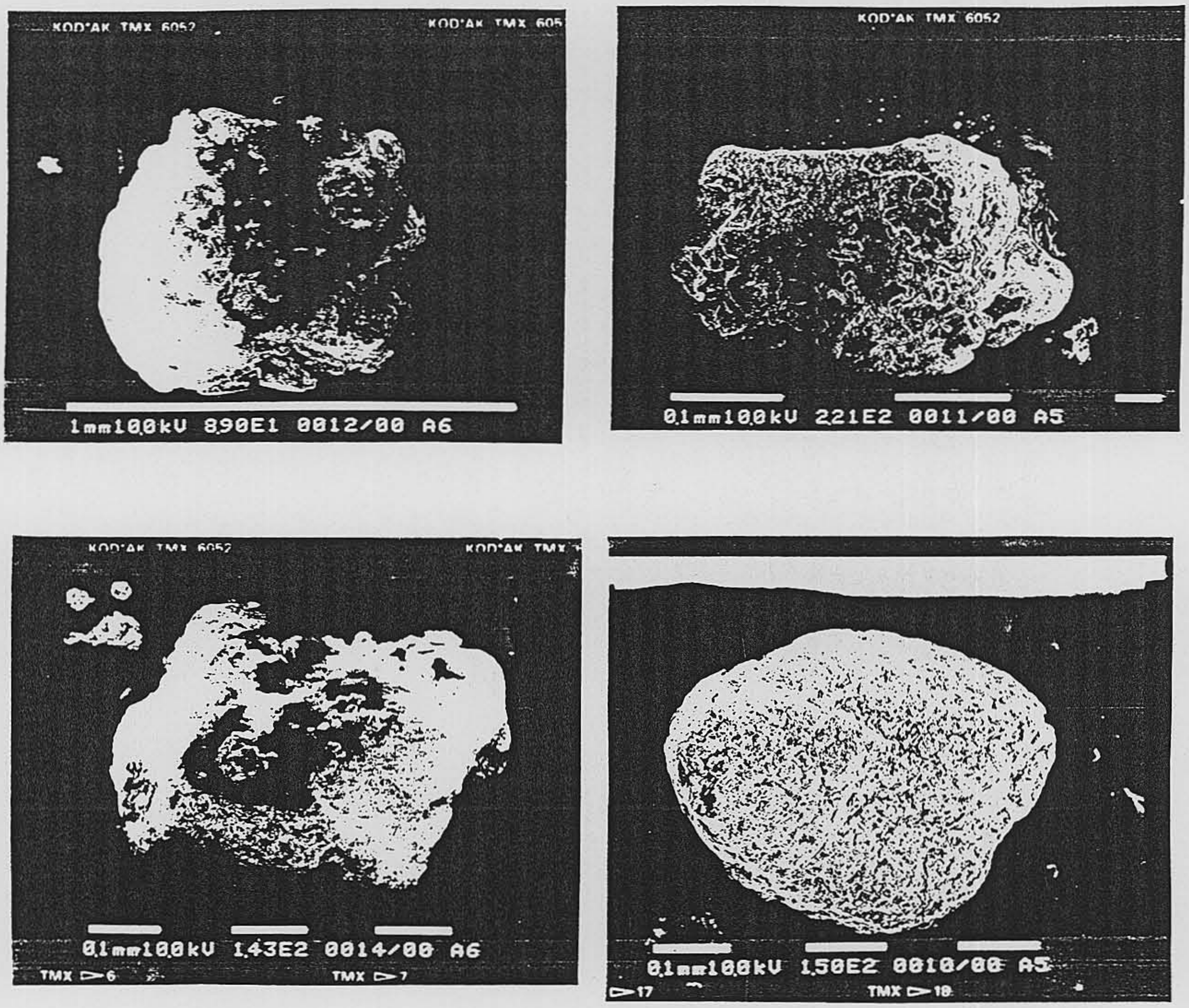


Figure 3. SEM Photomicrographs of Gold Grains From The Lisle Valley
Note the oxide coatings and the rough surface texture.

transportation (Groen J.C. et al. 1990). There is obviously a high degree of mobility of both gold and silver in the placer environment which renders fineness useless as a means of fingerprinting the source of an alluvial deposit.

It was hoped that accurate microanalysis of the gold grains from Lisle would reveal a trace component which was immobile during weathering and subsequent deposition and could thus be used in order to categorise the deposit.

Conventional electron beam X-Ray microanalysis is not sufficiently sensitive to detect minor trace element components within gold grains. As a result, the proton or PIXE probe at CSIRO North Ryde was used for this work due to its greater sensitivity and lower detection limits.

Alluvial gold grains from Lisle and Denison were mounted in resin and polished to reveal their internal structure. In addition ten thin sections were cut of visibly mineralised quartz vein material from prospects and mines in the Lisle Golconda area for comparison with the alluvial grains. A total of only three gold grains were located in these sections, one in a sample from the Brookland Mine at Denison and two from the Enterprise Mine at Golconda.

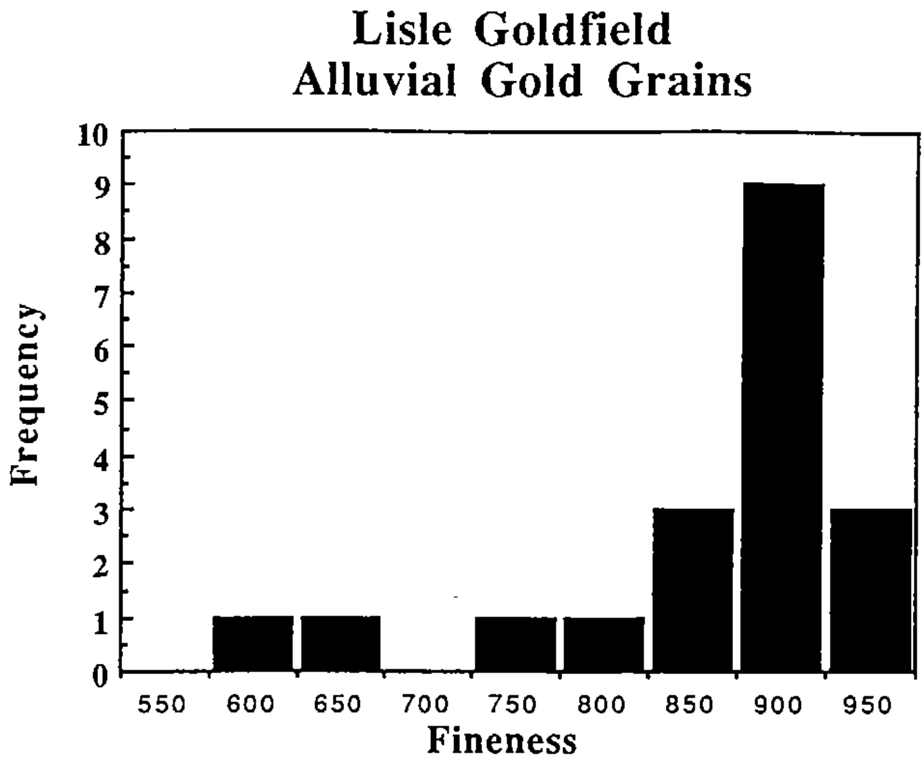
The centre of each grain was probed in order to get the best estimate of the composition of the original detrital particle. Table 1 summarises the elements which were analysed along with typical minimum detection limits for each element.

Table 1. Elements Analysed by PIXE Probe

Element	MDL (ppm)
Au	150
Ag	130
Fe	400
Mn	2000
Cu	80
Pb	150
Zn	100
Bi	500
Hg	1500
Ti	300
Te	300

Two runs were carried out for each analysis, one using a 200um Al filter and the other with a 200um Be filter. This was done in order to detect both high and low energy X-Ray emmisions. A total of 41 grains were analysed, this included several samples from other N.E. Tasmanian goldfields.

Almost all samples contained only Au and Ag in various proportions with no other elements present above the detection limit. In a small number of grains Cu was present



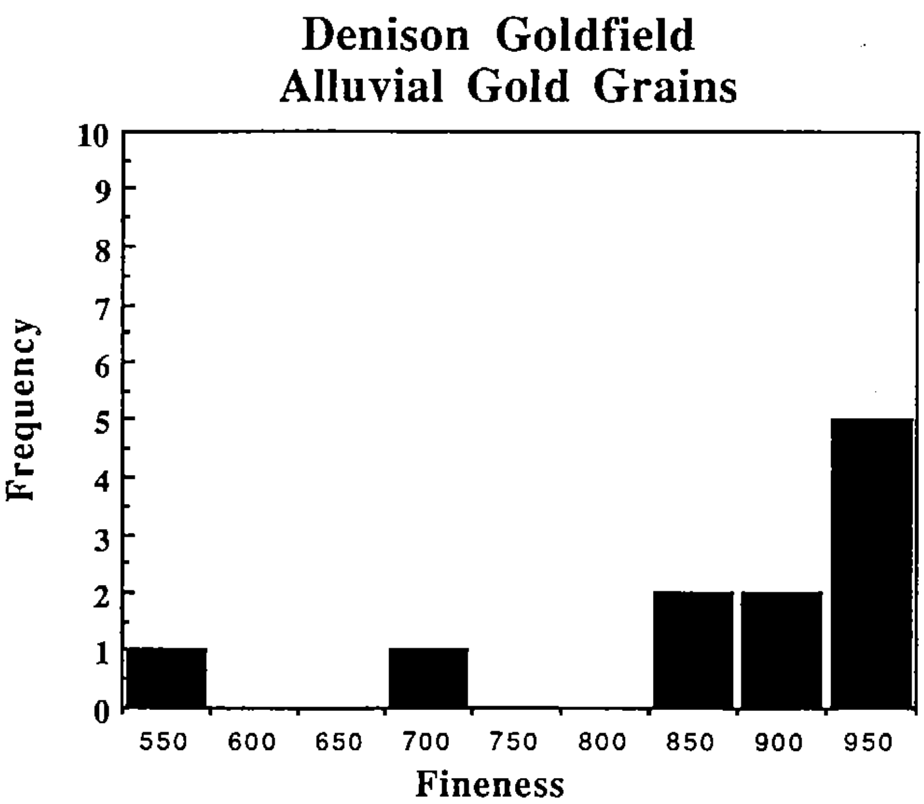


Figure 4. Histograms of Gold Fineness - Lisle and Denison Goldfields

at levels only slightly above the minimum detection limit. Two samples from Lisle had elevated Fe and Ti levels and it is probable that the proton beam had penetrated and struck an inclusion of ilmenite below the surface of the grain.

The fineness distribution for alluvial samples from Lisle and Denison are shown in Figure 4. The fineness of the gold from Denison is slightly higher, however this difference may not be significant. The fineness of the vein gold from Denison was 907 while the gold grains from the Enterprise Mine at Golconda had a fineness of only 760 and 762.

The purity of the gold grains is an unexpected and a disapointing result. It indicates that it is not possible to fingerprint the alluvial gold from Lisle in terms of its trace element composition.

6. Gold Grain Textures

A large proportion of the alluvial grains from both the Denison and Lisle Goldfields displayed the classical gold rich rim development, discussed by Groen J.C. et al.(1990). It is uncertain whether this represents deposition of high fineness gold from solution or the preferential removal of silver from the grain rim.

In addition to the development of gold rich rims, approximately 15% of the grains from Lisle show an extremely complex internal structure. Examples of these structures are shown in Figure 5 and 6. All the gold grains from Denison are solid and show no internal structure apart from the development of gold rich rims..

The highly porous grain shown in Figure 5 closely resembles the "spongy" gold of secondary origin, found in laterites The fineness of this gold is extremely high, greater than 995. On the right hand end of the grain is a region of non porous gold which may be replacing the spongy substrate. This gold has a fineness of only 599.

Figure 6 shows electron micrographs of a grain which displays fine concentric layering. The centre of this layering is now a void as are the zones between the gold layers. The concentric layering appears to have overgrown several solid grains of gold which may have been original detrital grains. The fineness of the layers is from 948 to 964 while the solid gold particles have a fineness of 981.

These textures are clear evidence that a significant proportion of the alluvial gold in the Lisle Valley may have precipipitated more or less in situ from gold rich ground waters. It is probable that the agent for the reduction of the aqueous gold ions from solution to form metallic gold was organic material present in the placer.

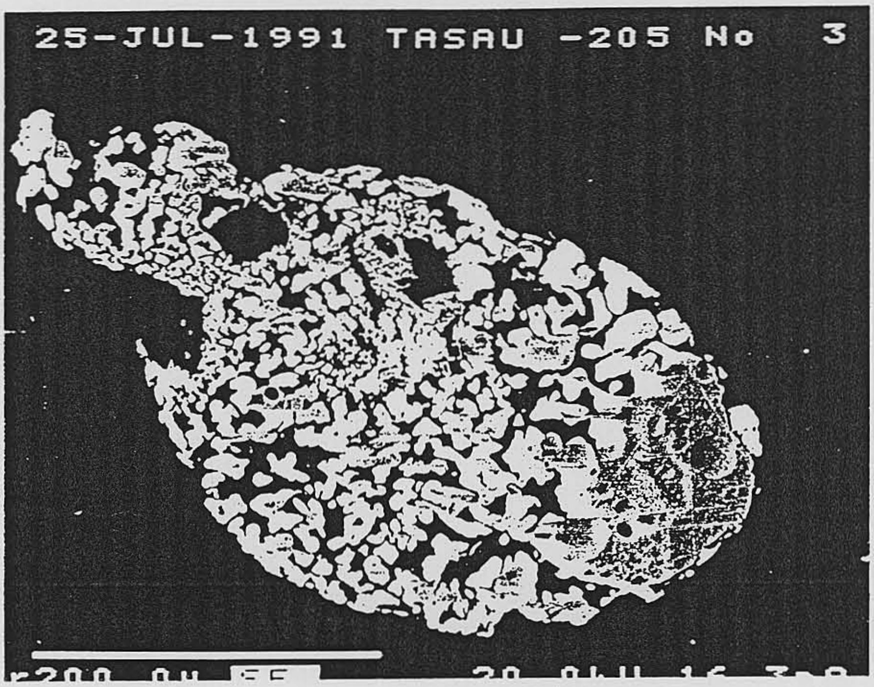


Figure 5. SEM Photomicrograph of a Section Through a "Spongy" Gold Grain From the Lisle Valley.

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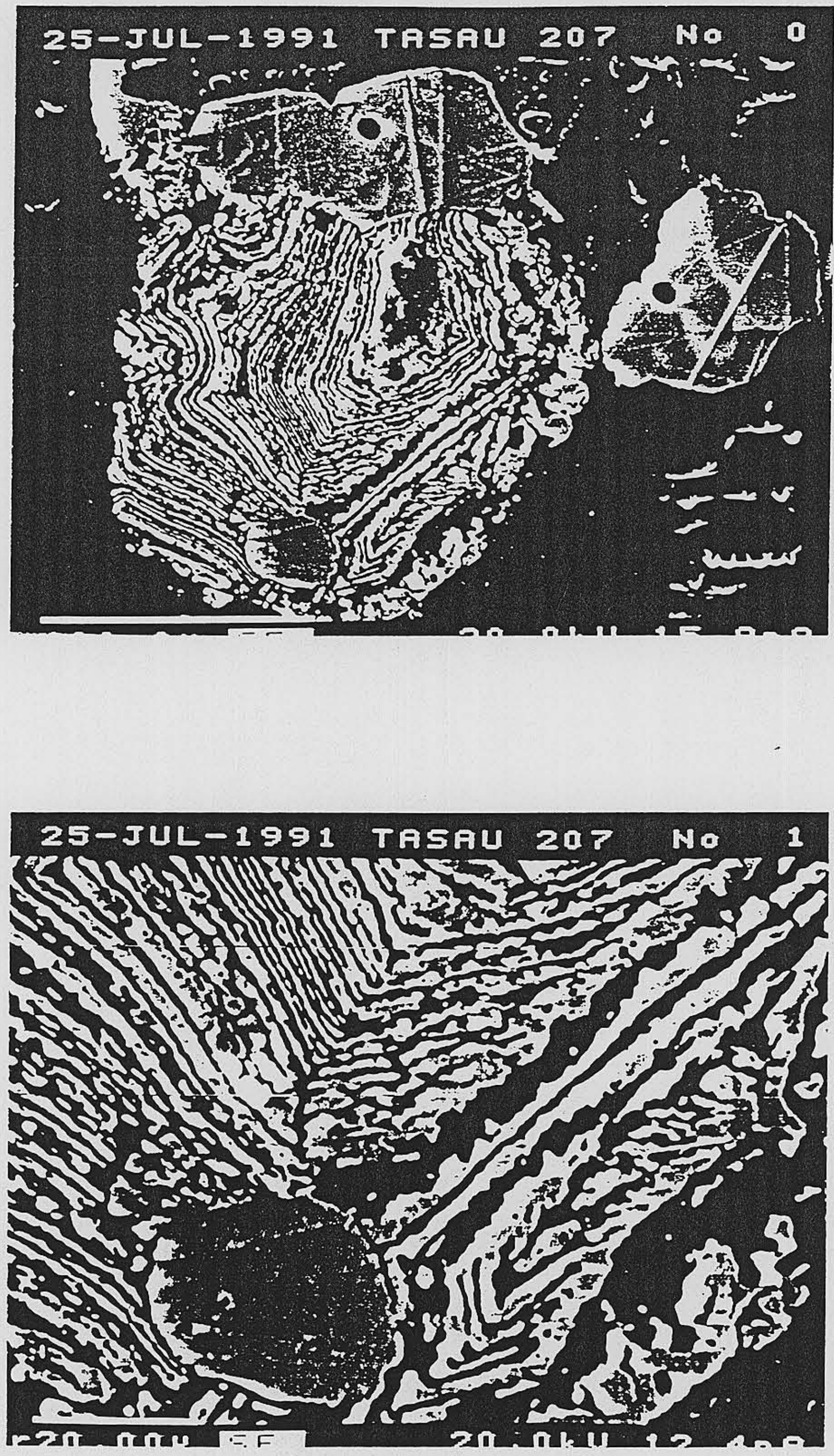

Figure 6. SEM Photomicrographs of a Concentrically Layered Gold Grain From the Lisle Valley

Reduction of gold ions by organic material has been reported from placer deposits in the Victorian goldfields (Wilson A.F. 1984). Old reports on mining operations in the Lisle Valley also support this observation with some of the richest ground reported as also having the highest organic component (Twelvetrees W.H. 1909, Reid A.M. 1925).

The recognition of the importance of secondary deposition of gold in the Lisle Valley is not new. Reid (1925) proposed that the majority of the alluvial gold at Lisle was formed by this mechanism. While a proportion of the gold is clearly of secondary origin it is however likely that many grains are original detrital grains.

The apparently high degree of secondary enrichment in the Lisle Valley may be due more than anything else to the special geomorphology which would have lead to a largely enclosed hydrological basin.

7. Granite Petrology

The magnetic survey conducted of the Lisle - Golconda area by Seltrust Minerals in 1984 suggested that the physical properties of the exposed granitic rocks were not uniform. Zones of both highly magnetised and apparently unmagnetised intrusives were detected.

Unfortunately, due to extremely poor outcrop, unweathered granitic material could be sampled from only three locations. The outcrop relationship between the two types of intrusives cannot be observed in the field.

Samples were obtained, from the head of the Lisle Valley at 527850 mE 431900 mN AMG, the dump of the Enterprise Mine at Golconda and from the Tasmanian Department of Mines Lisle DDH 1 at Golconda. The material from the Lisle Valley and Lisle DDH 1 has a high magnetic susceptibility ($5 - 10 \times 10^{-3}$ SI) whereas the sample from the Enterprise Mine has a susceptibility of only 0.15×10^{-3} SI.

Thin sections of rocks from each location were prepared and examined in transmitted and reflected light. The two samples with high magnetic susceptibility were characterised by the presence of hornblende as the main ferromagnesian mineral. Biotite was observed only as a phase replacing irregular hornblende aggregates which often had relict cores of pyroxene. The dominant opaque mineral was magnetite which was distributed preferentially within the mafic aggregates. Small amounts of pyrite and chalcopyrite were also observed. These samples may clearly be categorised as I type or magnetite series granitoids.

In contrast, the material from the dump of the Enterprise Mine contains no hornblende and abundant biotite which has a patchy distribution throughout the rock. The dominant opaque phase in this sample is pyrite , with subsidiary chalcopyrite and a small amount of magnetite. The pyrite occurs both distributed throughout the body of the rock and concentrated along the margin of a 2mm thick quartz vein which crosses the specimen. The amount of pyrite in this sample is unusual, it may be directly related to the mineralising process which formed the quartz veins mined at the Enterprise Mine, however the presence of disseminated grains within the groundmass of the rock suggests a significant primary pyrite component. This rock would be classified as an S type or ilmenite series granitoid.

It is highly unlikely that these two rocktypes could be related to each other by fractional crystallisation or by alteration processes and it is almost certain that they represent seperate and distinct intrusive bodies. The lack of outcrop precludes an investigation of the field relationships, however the proximity of Lisle DDH 1 to the Enterprise Mine indicates that the relationship between these two bodies is probably complex. A positive connection between either of these intrusives and gold mineralisation can not be proven from the limited outcrop information.

8. "Gold Impregnated Sandstones"

Reid (1925) described the geology and mineralisation of the Cradle and Tobacco Creek area, in particular the Bessell's Reward Mine. Here much of the gold was recovered from disseminated mineralisation in the Mathinna Beds sediments. This style of mineralisation was described as "Gold Impregnated Sandstones".

Material sampled from old heaps at 526450 mE 439200 mN AMG consists of iron-stained Mathinna Beds material spotted with small grains of limonite. In polished section remnant disseminated asenopyrite crystals are apparent. Two samples of this material were submitted for assay, returning values of 0.85 and 0.13 g/t gold.

This style of mineralisation, if widespread, presents the possibility of a resource suitable for modern high volume low grade mining operations. This area is worthy of further investigation, unfortunately the lack of outcrop and the thick layer of talus means that the only practical way to explore here would be by drilling.

9. Geophysical Investigations

9.1 Magnetics

The 1984 magnetic survey of the Lisle - Golconda area highlights some important aspects of the local geology. No numerical modelling has yet been attempted using this dataset, however some qualitative observations are appropriate.

The first thing which is apparent is that the granodiorite at Lisle has a strong magnetic signature whereas the western portion of the Scottsdale Batholith appears to be non magnetic. This factor alone implies that the two units differ in their mineralogy and chemistry and that they represent two distinct intrusives. No samples from the Scottsdale Batholith have yet been collected in order to test this conclusion.

On closer inspection of the anomaly at Lisle, it is apparent that not all of the inferred outcrop of the granodiorite is magnetised and that a broad swathe through the centre of the Lisle Valley appears to be non-magnetic. It is probable that this zone may mark the concealed outcrop of a dyke-like intrusive with properties similar to the non magnetic ilmenite series granitoid, sampled from the dumps of the Enterprise Mine at Golconda. Other alternatives would be a deep vertical zone of pervasive alteration which has destroyed the primary magnetite within the granodiorite or perhaps a thin septum of Mathinna Beds sediments within the intrusive. The deep cover of talus and alluvium in this area precludes investigation of this zone except by drilling.

A small magnetic anomaly is associated with the Panama goldfield, but no anomaly is apparent at Golconda which is consistent with the observed properties of the rocks from the Enterprise Mine. The strongly magnetic granodiorite from Lisle DDH 1 which was drilled not very far from the Enterprise Mine suggests that the relationship between these two granitoids is complex.

No magnetic anomaly is associated with the Denison Goldfield.

9.2 Gravity

The Scottsdale Batholith is associated with a major gravity depression, indicating that it has considerable depth extent. The edge of this depression correlates well with the mapped boundary of the batholith.

The Lisle granodiorite is associated with a much smaller but still quite distinct gravity low which passes to the north through the Lone Star valley, to the west of the Panama and Golconda Goldfields and on beneath the Denison Goldfield. The extent of the gravity anomaly is greater than the extent of the magnetic anomaly associated with the Lisle intrusive. The northern extension of this anomaly may result from a body of the non-magnetic ilmenite series granitoid exposed at Golconda. No numerical modelling has been carried out to provide an estimate of the depth to the top of an intrusive beneath the Denison Goldfield. This will be undertaken when physical property measurements have been carried out on the various granitic rocktypes and the Mathinna Beds.

10 Program - August to December 1991.

No further work on the alluvial gold grains is planned

Several days fieldwork to obtain samples for physical property testing and to look for additional fresh exposures of granitic rocks in the Lisle Area.

XRF analysis of the granitic rocks.

Numerical modelling of both the magnetic and gravity data.

11. Expenditure

PIXE probe analysis (3 Days)....................$2000
Travel & Field Expenses........................$569
Assays and sample preparation.................$385

Total.......................................$2954

12. References

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