TASMANIA
DEVELOPMENT
AND RESOURCES

Mineral Resources Tasmania

REPORT 1994/01

The Lisle – Golconda – Denison goldfields (including some adjacent gold mining areas)

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INTRODUCTION

Lode gold deposits are widespread in western and northern Tasmania, principally occurring in the pre-Carboniferous rocks of the Dundas Trough and Lachlan Fold Belt (fig. 1). The northeastern area is most important, with numerous gold-quartz veins occurring in the turbidite-bearing Mathinna Beds, of Ordovician to Devonian age, in the Lachlan Fold Belt. The greatest concentration of deposits occurs in a belt running through the Mathinna Beds from around Waterhouse, near the north coast, south for about 80 km almost to Fingal (Noldart and Threader, 1965; Bottrill *et al.*, 1992; Bottrill, 1992; Taheri, 1992; Bottrill and Taheri, 1994). Other deposits occur with spatial and possible genetic relationships to granitoid intrusions, and include deposits in the Gladstone, Upper Scamander (Hogans Road or Brilliant Creek) and Lisle–Denison areas (Bottrill *et al.*, 1992).

The Lisle–Denison goldfield lies in the southwestern part of the Mathinna Beds (fig. 2).

This report is of an interim nature, timed to coincide with the release of some departmental geophysical data. A more complete report, detailing specific deposits, recent drilling results and other updated data, will be released later in 1994.

HISTORY AND PRODUCTION

Minor gold discoveries in the western part of the Mathinna Beds may date back to the 1840s, but the real rush commenced in the 1860s, following the major Victorian rushes. The first workings were in the Lefroy and Back Creek areas; the Denison and Golconda alluvial deposits were not discovered until 1872, and the reefs were not opened up until 1876 and 1877 respectively (Coroneus, 1993). The Lisle goldfield (originally Mt Arthur goldfield) was discovered by Charles Bessell and partners in 1878, following their discovery of the Tobacco Creek goldfield in 1877 (Dickens, 1991). Most production occurred between 1878 and 1909, but has only been sporadic since that period. The area officially produced 2.7 t of gold by 1925, mostly from the Lisle Valley. Although Twelvetrees (1909) estimated that production to 1909 was 250,000 oz (8–9 t), others have quoted more. A large proportion of the gold was probably taken directly to the mint in Victoria by the miners. Some alluvial mining has continued into recent years. The total recorded production from lode deposits in the area is only about 74 kg (Table 1) but, as early records are very poor, the actual production would have been much greater. The locations of known deposits are shown in Figure 3.

REGIONAL GEOLOGY

The geology of the Lisle area is shown on the Pipers River (Longman *et al.*, 1964) and Launceston (Marshall *et al.*, 1965) 1:63,360 scale geological map sheets. The oldest rocks exposed in the area are the Mathinna Beds, which are quartzwacke to pelitic turbidite sequences of (?)Ordovician to Early Devonian age, and which are generally correlated with rocks of the Melbourne Trough in the Lachlan Fold Belt (Powell and Baillie, 1992). The Mathinna Beds rocks are intruded and locally contact metamorphosed by granitic to dioritic rocks of the Scottsdale Batholith, of probable Upper Devonian to Lower Carboniferous age. Geophysical interpretation (M. Roach, pers. comm.) suggests that a range of granitoid types are present. The Mathinna Beds and granitoids were overlain by sediments of the Parmeener Supergroup, which are now largely removed by erosion except in some of the more elevated areas, particularly on the flanks of Mt Arthur. Jurassic dolerite has intruded these sequences as sills and dykes, but is relatively uncommon in this area except, again, on Mt Arthur. Tertiary sediments and basalt, and Quaternary ironstone and quartz gravel beds, are

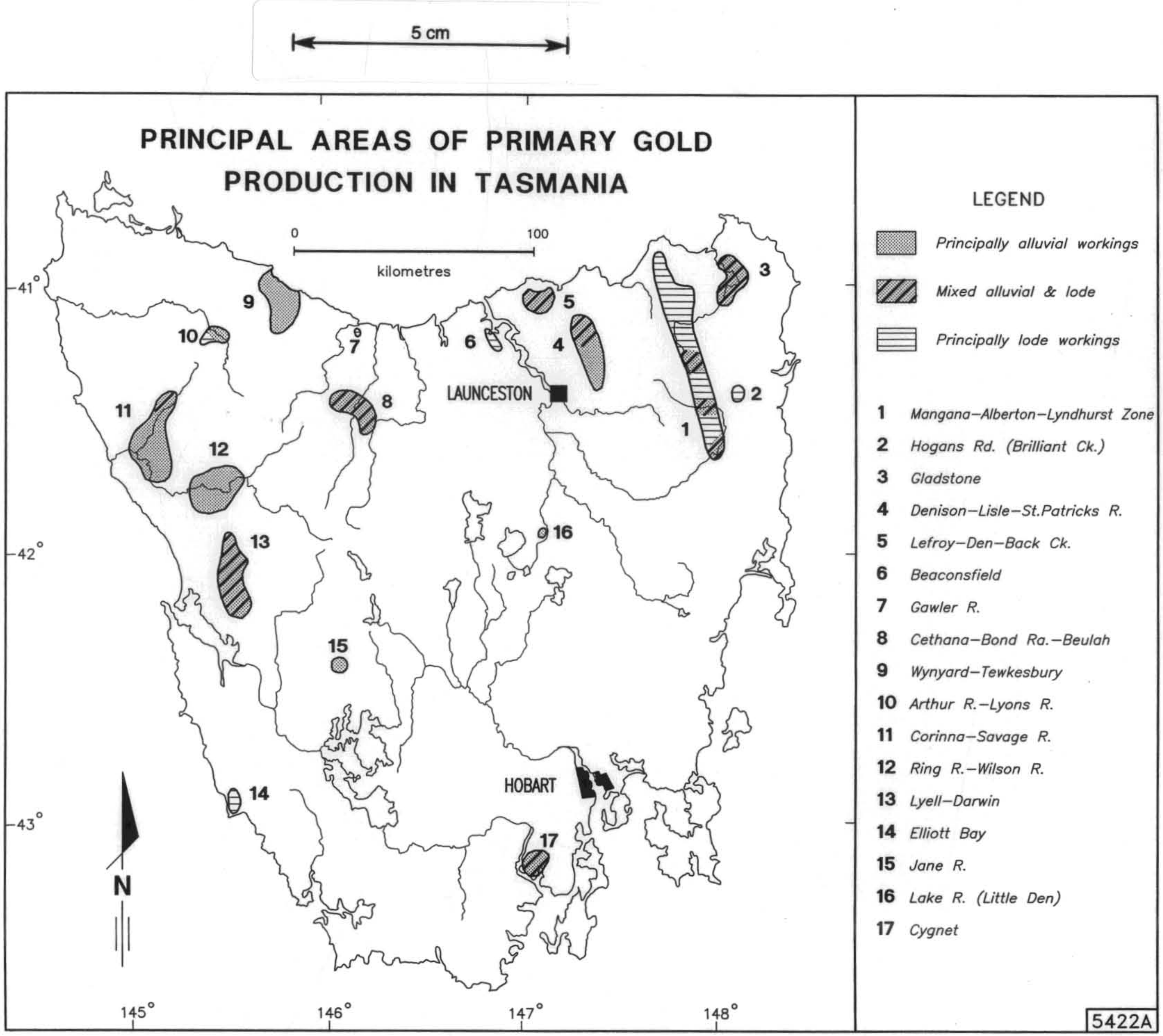

Figure 1
The distribution of gold deposits in Tasmania

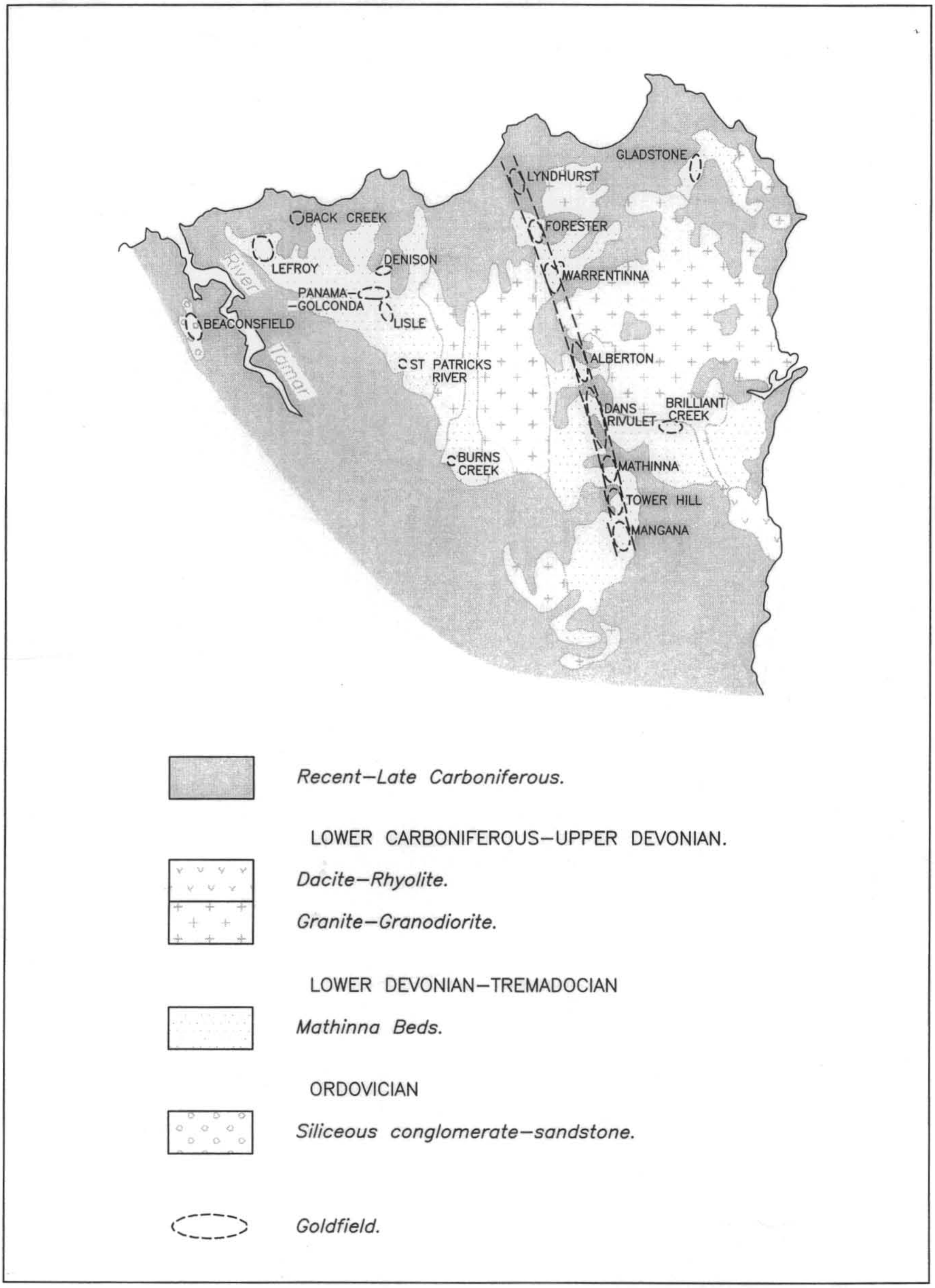

Figure 2

The geology and major goldfields of northeastern Tasmania

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Table 1

Recorded production and grades of gold mines in the Lisle area

Mine	*Gold production (kg)*	*Tonnes ore*	*Average grade (g/t)*
Lisle alluvials	77500.2		0.3–0.5 g/m^3
Tobacco and Cradle Creeks	62.0		
Drinkwater Creek	1.6		
Total alluvial	77563.7		
Golden Crest	2.9	773	4
Sir William Denison	0.3	31	10
Alacrity	10.3	214	48
Royal Treasury	0.2	32	6
Kelly	0.1	5	20
Lebrina	1.2	197	6
Lone Star mine	0.6	39	15
Golconda	0.4	23	17
Enterprise (Golconda)	50	3573	14
Mt Wilson	0.2	13	15
Queensland	3.1	384	8
Exhibition	0.4	30	13
Enterprise (Panama)	4.1	443	9
Panama Assoc.	0.5	15	33
Total lode	74.2	4716	16

preserved as remnants of old plateau surfaces in many areas. The river valleys are partly filled with Cainozoic alluvium, perhaps Tertiary in part.

Although the Mathinna Beds cover much of northeastern Tasmania, the geology is relatively poorly known, mainly because of poor outcrop and a lack of marker beds. The bedding strikes approximately 340–360° and the sediments consist of sandstone, quartzite, siltstone and pelites (phyllite, shale or slate), with local hornfelsing close to granitoid bodies (McClenaghan *et al.*, 1982). The folding and syntectonic metamorphism (greenschist facies) in the Mathinna Beds is considered to pre-date the intrusion of granitoids (McClenaghan *et al.*, 1982). The major mineralogy is simple, usually quartz and muscovite, with lesser chlorite, heavy minerals, etc. The metamorphic aureoles are commonly sharply defined, varying from 800 m to about 5 km in width, depending upon the dip of the contact (McClenaghan *et al.*, 1982). Within these aureoles the sediments are commonly spotty and/or hornfelsed, and may contain biotite, andalusite and/or cordierite. Cordierite-rich hornfels (with quartz, feldspar and biotite) makes up much of the rim around the Lisle Valley and much of the other high ridges in the area.

MINERALISATION STYLES

The area is locally highly mineralised, with at least 66 significant known gold deposits within or in close proximity to the area (Appendix 1 and fig. 2). The mineral deposit data is derived from the Departmental MIRLOCH database of mineral deposits. About half of these deposits are in lodes, but more than 99% of the gold produced was from the alluvial and residual deposits. The various styles are discussed below.

Lisle

The workings are spatially closely related to granitoid intrusions in Mathinna Beds (Roach, 1991; fig. 4). Hornblende/biotite/magnetite-bearing granodiorites are present, but more alkali-feldspar rich phases also occur. The metamorphic aureoles are commonly sharply defined and vary from 800 m to about 5 km in width, depending upon the dip of the contact (McClenaghan *et al.*, 1982). Within these aureoles the sediments are commonly spotty and/or hornfelsed, 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.

Workings at Lisle were in alluvium and eluvium in a basin-shaped depression, possibly representing an old lake bed of Tertiary age (Reid, 1926; Marshall, 1970). There were numerous patchy gold-rich horizons in the possible lacustrine sediments, and in carbonaceous horizons underlying talus, which produced relatively pure, free, angular (crystalline?) gold (Noldart, *in* Marshall, 1970). 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 intrusive rocks. Inclusions of mica, rutile and magnetite in the gold grains also suggest that the gold was more likely to have been disseminated in the hornfels or

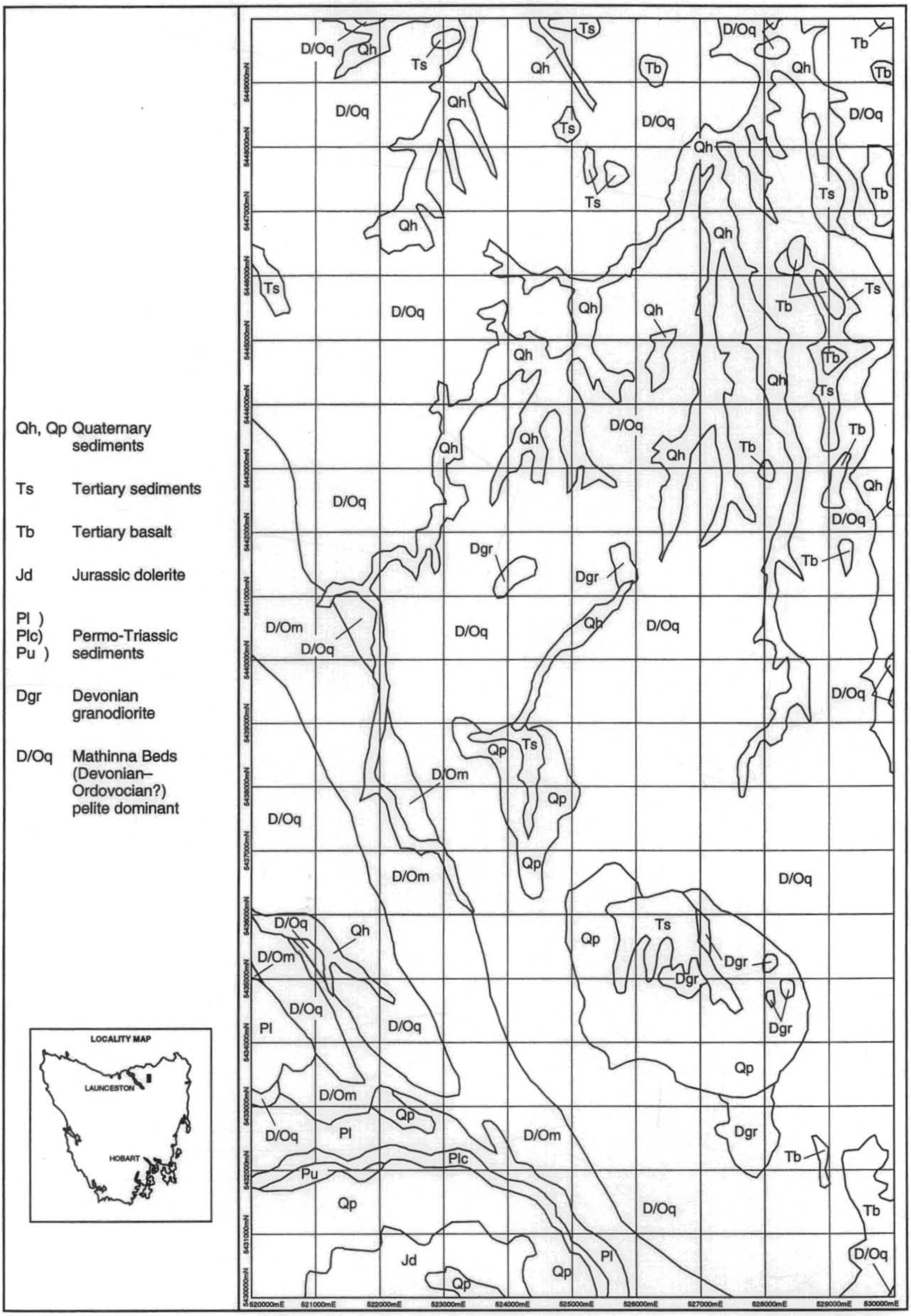

Figure 4

Geological map, Lisle–Denison area

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granitoids than in quartz veins, while rare gold-limonite composites in placers suggest gold-bearing pyrite may have originally been present (Bottrill, 1986).

Some gold was, however, found in small quartz veins in the granitic rocks underlying the alluvial sediments (Thureau, 1882; Montgomery, 1894). Recent drilling by the then Department of Mines revealed very minor quartz-carbonate-pyrite alteration zones in the magnetite and pyrite-bearing granodiorite, with trace gold (to 0.05 g/t; Bottrill, in prep.). Gold veins in granitoids are poorly represented in Tasmania, and those described at Lisle by Montgomery (1894) consisted of a belt 1–1.6 m wide with veinlets 6–40 mm wide, striking "076° (magnetic?), dipping 48° NW", in weathered 'granites' in the Titmus and Dodgson Sections. "A little gold" was apparently recovered from both the veins and granite (Montgomery, 1894). Thureau (1882) described other veins in 'syenite' as reaching widths of up to 0.6 m, and being disjointed by the host rock. He noted "the whole of the granitoid formation to be traversed by attenuated quartz veins charged with very fine gold". Thureau (1882) also described weakly gold-bearing, ferromanganese-stained quartziferous formations at the granitoid/hornfels contacts, and the presence of relatively coarse gold with quartz detritus in the vicinity of these contacts. In general, however, quartz veins were rare in the Lisle Valley. Thureau (1882) also noted the presence of grey-coloured mica, hornblende and possibly corundum-bearing dykes cutting the granite. It could be speculated that these are lamprophyric, which would have genetic implications for gold mineralisation, although no recent studies have recognised the dykes.

Denison, Golconda and other goldfields

Numerous deposits were worked near Lisle, including the Lone Star, Tobacco, Cradle, Panama, Golconda, Lebrina and Denison goldfields (Noldart, *in* Marshall, 1970). Most of these goldfields contained both alluvial and lode deposits, and are described briefly below.

Gold occurs in quartz-rich veins and breccia in many areas of the Mathinna Beds, and the following is a generalised description, not necessarily applicable to all veins in this particular area.

The veins are usually small and, although often very gold-rich (up to 1354 g/t; Twelvetrees, 1907), are typically erratic in size and grade. The quartz is usually milky, white or glassy, but where auriferous is dense, fine grained, laminated or breccia-textured and blue-grey in colour, with minor sulphides, or limonite and scorodite where weathered. The sulphides include pyrite and arsenopyrite, with lesser chalcopyrite, galena, sphalerite, tetrahedrite and bournonite. Stibnite is important at Lefroy and possibly in the Golconda–Denison area, while orpiment (bindheimite or stibiconite?) is recorded from several mines in the Golconda–Denison area. Minor muscovite, chlorite, orthoclase and carbonates (ankerite and siderite) may also be present. The veins vary in thickness from a few centimetres to about eight metres, and in length from about seven to 500 metres. The veins in the central Mathinna Beds are commonly bedding-parallel or axial planar, striking about NNE and usually dipping steeply. Elsewhere, including in the Lisle–Denison and Lefroy areas, the veins usually strike about ENE. Some veins are saddle reefs and some are sub-horizontal. The veins are commonly extensional, in fold limbs and hinges. Many lodes are breccia zones, and these breccias are cemented by cherty to medium-grained quartz.

The Denison goldfield consisted of a number of auriferous quartz veins in Mathinna Beds, similar to Lefroy in style, striking ENE, and probably overlying granodiorites (Roach, 1991).

The Panama field miners worked veins in both granitoids and hornfels. Reconnaissance geochemical surveys have indicated minor gold in hornfels (up to 3 g/t) and some very gold-rich quartz-sulphide veins (up to 210 g/t; Bottrill, in prep.).

Stockwork-hosted gold mineralisation (to about 1 g/t) in arenite has been reported at Bessells's Reward, near Cradle Creek (Roach, 1991). Minor gold veins occur in the St Patricks River–Myrtle Bank area south of Lisle, and one of these deposits contained ruby silver and gold in a porphyry dyke, suggestive of epithermal mineralisation (Reid, 1926). There is a supposed lamprophyre occurrence in the Den Ranges, perhaps related to nearby gold occurrences (Noldart, *in* Marshall, 1970).

RECENT GEOLOGICAL WORK: THE STATE OF KNOWLEDGE

Geology

The area was mapped at a scale of 1:63,360 by the Geological Survey of Tasmania (now Mineral Resources Tasmania) (Longman *et al.*, 1964; Marshall *et al.*, 1965). Reconnaissance studies by Mineral Resources Tasmania are in progress, and include geochemistry, metamorphic and ore petrology, and drilling. Fluid inclusion studies in other parts of the Mathinna Beds (Taheri and Bottrill, 1994) indicate that gold was deposited from metamorphic fluids, in contrast to the studies of G. Davidson (unpublished data) who identified magmatic fluid-related gold veins in other parts of northeastern Tasmania.

The mineralogy of gold in the alluvial sediments has been studied by Bottrill (1986) and Roach (1992) and indicates:

(a) at least some of the gold has originated in either granitoids and/or hornfels, and

(b) much of the gold has been remobilised and reprecipitated in the sediments.

Roach (1992) has studied the geochemistry of the granitoids and related these to the origin of gold.

Geophysical Coverage

Gravity station coverage is in the regional category, with about one station per square kilometre (Richardson and Leaman, 1987). Some more detailed work is being conducted by Roach (1992).

Detailed aeromagnetic data for most of the area was derived by BP Minerals from flights at a spacing of about 200 m (Storer, 1984, 1985), with only limited outer areas, with flight spacings of 1.5 km, assessed as regional (Bureau of Mineral Resources Aeromagnetic Survey, 1988). Richardson (1990) re-interpreted these studies of the area to give a better picture of Mathinna Beds/granitoid relationships.

No airborne radiometric surveys are known in the area.

Geochemical Coverage

Detailed and regional surveys (stream sediment, rock chip and soil), for limited commodities (mostly gold), have been conducted in and about specific mines and prospects by exploration companies.

In the Panama valley, near Lisle, geochemical surveys by this department (Bottrill, in prep.) indicate anomalous gold in unexceptional looking and apparently unveined hornfels (to 3 g/t), as well as small but rich quartz veins (to 210 g/t; Bottrill, in prep.).

Drilling Coverage

Two holes have been drilled in the Lisle Valley by this department in an attempt to define the alluvial gold source (Bottrill, in prep.). These holes indicate some weakly anomalous gold (to 0.05 g/t) in altered, sulphidic granodiorite.

Twenty-nine percussion drill holes, to about 60 m, were drilled by BP Minerals to identify the source of alluvial gold at Lisle (Storer, 1987). Five auger holes (to 10 m) were drilled in alluvial sediments at Lisle by J. Beams (see below).

Extensive backhoe testing of alluvial sediments around Lisle, up to about 6 m depth, has been conducted by Alec White but the results are not available.

RECENT MINERAL EXPLORATION (1950–)

The goldfield has been the site of numerous small mining operations, but little extensive or systematic exploration using modern techniques. The principal exploration licences held over the area are summarised below:

EL 32/70 — G. J. Roberts

A small soil geochemical survey to follow up some stream sediment tin anomalies in the Lisle Ridge found by Mineraux P/L in 1969 failed to define any anomalies (Fleming and Knight, 1970). Traces of molybdenite were found at the Enterprise mine.

EL 25/76 — Comalco

Exploration for stratiform gold at Lisle and Bessells Reward, using stream-sediment and rock-chip geochemistry plus surface mapping, failed to define targets (Askins, 1977). Askins considered that the gold may have originated in the surrounding black shale.

EL 4/80 — J. E. Beams

Auger drilling (five holes to 10 m, poorly recorded) and panning in the Tobacco Creek/Cradle Creek area and south Lisle Valley failed to locate any economic mineralisation (Beams, 1983).

EL 53/80 — CRA Exploration P/L

Reconnaissance stream-sediment surveys for gold and base metals covered this area, but the anomalies were not followed up (Broadbent, 1982). There was, however, considered to be some potential for disseminated gold in the aureoles.

EL 20/83 — BP Minerals/Seltrust

Surveys included stream-sediment and rock-chip geochemistry, surface mapping, remote sensing, aeromagnetics, ground magnetics and percussion drilling (29 holes to about 60 m), to identify the source of alluvial gold at Lisle (Storer, 1985). There was considered to be some potential for disseminated gold in the granite and aureoles, but no economic mineralisation was identified.

EL 32/85 — Argyle Minerals

Stream-sediment analysis of the Denison alluvial sediments indicates only a small, low-grade resource (about 50 oz @ 3 oz/100 cubic yards: Cromer, 1987*a*). The veins are also of low grade. At Golconda, veins contain up to 64 g/t Au (Cromer, 1987*a*, *b*). Drainage patterns were assessed by photogeology.

EL 6/90 — Billiton

Reconnaissance mapping, stream-sediment and rock-chip geochemistry delineated some anomalies, but these were not followed up in any detail (Randell, 1991, 1992). Roach (1992) described the mineralogy and possible sources of some of the alluvial gold, plus granite petrology, geophysics and other data.

SUMMARY OF PROSPECTIVITY

The principal style of gold mineralisation in the area is turbidite-hosted, mesothermal, quartz-sulphide-gold veins, very similar to the Phanerozoic deposits of central Victoria, Nova Scotia, Alaska, Wales and many other areas (Nesbitt, 1991). Early gold mining focused on the rich but relatively small veins, while more modern exploration and mining has focused on open-cuttable resources such as disseminated, stockwork and multiple-vein style deposits.

Historically, production from the goldfields dates from 1878, with most production being between 1878 and 1920. Most of the goldfields were abandoned before any organised mining development occurred. Many early miners and prospectors believed that much of the gold in the lodes was a result of surficial enrichment and that rich grades were unlikely to continue to depth. Consequently few deposits were worked below 30 metres. This theory was disproved by the Golden Gate (Mathinna) and Tasmania (Beaconsfield) reefs, which continue to depths of at least 580 m and 800 m respectively (still at about 24–30 g/t), and produced approximately 36 tonnes of gold. The Tasmania mine was larger than any single gold mine in Victoria.

The area, therefore, is highly prospective for gold in rich, small to medium-sized quartz reefs (style 36a of Cox and Singer, 1986), in sheeted veins and stockworks. Gold-bearing stockworks have been described in arenaceous units at the Bessells Reward mine, just north of Lisle (Roach, 1991). There is a high prospectivity for disseminated or stockwork gold in the Mathinna Beds and granites, although the nature of this mineralisation is poorly understood. Disseminated gold in turbiditic greywacke has been described in very similar settings, with quartz-gold veins, in the Meguma area, Nova Scotia, but is very low in grade (Crocket *et al.*, 1986).

Two medium to large gold mines of this mesothermal vein type have operated as underground workings in Tasmania; the Tasmania mine at Beaconsfield, and the New Golden Gate mine at Mathinna. The Tasmania mine has produced 26.6 t of gold from 1.1 Mt of ore, with reserves of 0.67 Mt of ore grading 24 g/t (Hicks and Sheppy, 1990). The Golden Gate mine produced 7.9 t of gold from 0.3 Mt of ore grading 26 g/t, but reserves are unknown (Noldart and Threader, 1965). There seems to be great potential for locating similar deposits within this area but, unfortunately, most recent exploration has been rather superficial. No lode deposits in this area have been drilled, at least in the last 70 years, and only a few systematic geological, geochemical or geophysical surveys have been conducted over the mines in this time, on either a regional or detailed scale.

The area also has good potential for more placer gold deposits, although these have, in general, been better tested than the lode deposits.

The area requires:

(1) a detailed structural geological investigation of veining and other structures;

(2) systematic geochemical sampling (soil, stream sediment and rock chip);

(3) application of various geophysical techniques (e.g. airborne and ground magnetics);

(4) petrology and ore genesis studies of mineralisation and host rocks;

(5) lineament and fracture analysis to identify controlling structures in this and other goldfields;

(6) drill testing of the granite/hornfels contacts.

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[8 April 1994]

APPENDIX 1

Mines and mineral deposits of the Lisle – Golconda area

Ref. No.	*Name, reference, AMG co-ordinates*	*Commodity*	*Co-ord error*	*Map Sheet*	*Status*	*Size*	*Host rock*	*Mineral. age*	*Form*	*Strike (°)*	*Explor.*
31065	Junction of Lisle and Lone Star Creeks: BH's 527200 mE, 5 448 100 mN Reid, 1926	Au	4	83151	MOC	ND	JCS	QT	PLAC	ND	PS DR
31011	Denison Goldfield 526 000 mE, 5 446 000 mN Cromer, 1987a	Au	2	83151	MAR	ND	JCS	ND	PLAC	ND	PS
31007	Brooklyn 525 800 mE, 5 445900 mN Marshall, 1970; Reid, 1926	Au	2	83151	AMX	ND	MAT	LD	VEIN	80	PS
31053	Star 524 900 mE, 5 445 700 mN Reid, 1926; Marshall, 1970	Au	2	83151	AMX	ND	MAT	LD	VEIN	80	PS
31051	Sir William Denison 525 100 mE, 5 445 700 mN Reid, 1926; Marshall, 1970	Au, Pb	2	83151	AMX	ND	MAT	LD	VEIN	80	PS
31001	Alacrity 524 500 mE, 5 445 600 mN Reid, 1926; Marshall, 1970	Au	2	83151	AMX	ND	MAT	LD	VEIN	80	PS
31044	Northern Globe 525 850 mE, 5 445 570 mN Cromer, 1987a	Au	2	83151	AMX	ND	MAT	LD	VEIN	ND	PS
31019	Globe (North Workings) 525 800 mE, 5 445 500 mN Reid, 1926; Marshall, 1970; Cromer, 1986	Au	2	83151	AMX	ND	MAT	LD	VEIN	80	PS
31061	Western Globe 525 790 mE, 5 445 480 mN Cromer, 1987a	Au	2	83151	AMX	ND	MAT	LD	VEIN	ND	PS
31064	Wyangata; Wiangata 526 610 mE, 5 445 440 mN Marshall, 1970; Reid, 1926	Au	2	83151	AMX	ND	MAT	LD	VEIN	50	PS
31052	Southern Globe 525 860 mE, 5 445 420 mN Cromer, 1987a	Au	2	83151	AMX	ND	MAT	LD	VEIN	ND	PS
31024	Jim's Costean 526 120 mE, 5 445 360 mN Cromer, 1987a	Au	2	83151	AMX	ND	MAT	LD	VEIN	ND	PS
31060	West Wiangata 527 200 mE, 5 445 300 mN Reid, 1926; Marshall, 1970	Au	2	83151	AMX	ND	MAT	LD	VEIN	50	PS
31029	Lady Hamilton 524 800 mE, 5 445 200 mN Reid, 1926	Au	2	83151	AMX	ND	JCS	QT	PLAC	140	PS
31070	Section 1656-G Panama 524 400 mE, 5 445 000 mN Reid, 1926	Au, Pb, As, Zn	2	83151	AMX	ND	MAT	LD	VEIN	50	PS
31030	Lebrina Goldfield 522 000 mE, 5 443 000 mN Cromer, 1987a	Au	2	83151	MAR	ND	JCS	ND	PLAC	ND	PS
31031	Lebrina Mine 521 970 mE, 5 442 330 mN Reid, 1926; Marshall, 1970; Cromer, 1987a, 1987b	Au	2	83151	AMX	ND	MAT	LD	VEIN	60	PS

Ref. No.	*Name and AMG co-ordinates*	*Commodity*	*Co-ord error*	*Map Sheet*	*Status*	*Size*	*Host rock*	*Mineral. age*	*Form*	*Strike (°)*	*Explor.*
31021	Golden Crest 525 700 mE, 5 441 720 mN Marshall, 1970; Reid, 1926	Au, Cu, As	2	83151	AMX	ND	DGN	LD	VEIN	ND	PS
31072	Everett's Tunnel; ML 1516-G 523 950 mE, 5 441 500 mN Reid, 1926; Coreonus, 1992	Au, As, Zn, Pb, Cu	5	83151	AMX	ND	MAT	LD	VEIN	235	PS
31069	Jack's #2; ML 1492-G 524 600 mE, 5 441 500 mN Reid, 1926; Coreonus, 1992	Au	2	83151	AMX	ND	MAT	LD	VEIN	150	PS
31047	Partridge Creek 529 500 mE, 5 441 500 mN Reid, 1926	Au	2	83151	AMX	ND	MAT	LD	DISS	ND	PS
31046	Great Panama (N); Sydney and Panama Tunnel 524 200 mE, 5 441 400 mN Cromer, 1987a; Coreonus, 1992; Plan 415	Au	2	83151	AMX	ND	DGN	LD	VEIN	ND	PS
31094	Queenslander 525 700 mE, 5 441 400 mN ML Plans	Au	4	83151	PEX		MAT	LD	VEIN	ND	PS
31068	Jack's #1; ML 1346-G 524 450 mE, 5 441 350 mN Reid, 1926; Coreonus, 1992	Au, As	2	83151	AMX	ND	MAT	LD	VEIN	ND	PS
31117	West Panama 524 100 mE, 5 441 300 mN Plan 415	Au	3	83151	PEX					ND	PS
31071	Golden Pyramid (Central); ML1623-G 523 850 mE, 5 441 250 mN Reid, 1926; Coreonus, 1992	Au	2	83151	AMX	ND	DGN	LD	VEIN	ND	PS
31115	Great Panama 523 700 mE, 5 441 200 mN Plan 415	Au	3	83151	PEX					ND	PS
31116	Golden Panama 523 900 mE, 5 441 100 mN Plan 415	Au	3	83151	PEX					ND	PS
31013	Enterprise 526 000 mE, 5 441 100 mN Reid, 1926	Gem, Au, Cu, As	2	83151	AMX	ND	DGN	LD	VEIN	ND	PS
31118	Wilson and Symmonds Reef 523 800 mE, 5 441 000 mN Plan 415	Au	3	83151	PEX		MAT	LD	VEIN	70	PS
31045	Panama Goldfield 524 000 mE, 5 441 000 mN Cromer, 1987a; Marshall, 1970	Au	2	83151	MAR	ND	DGN JCS	LD	VEIN PLAC	ND	PS
31020	Golconda Goldfield 526 000 mE, 5 441 000 mN Marshall, 1970; Cromer, 1987a	Au	2	83151	MAR	ND	MAT	LD	VEIN	ND	PS
31006	Brock Prospect 526 000 mE, 5 440 000 mN Reid, 1926	Au	5	83151	AMX	ND	MAT	LD	VEIN	ND	PS
31114	Eastman 526 800 mE, 5 439 800 mN Reid, 1926	Au	4	83151	PEX		MAT	LD	VEIN	ND	PS
31004	Bessells Reward 526 440 mE, 5 439 700 mN Reid, 1926; Marshall, 1970; Cromer, 1987a	Au	2	83151	AMX	ND	MAT	LD	VEIN	60	PS

Ref. No.	*Name and AMG co-ordinates*	*Commodity*	*Co-ord error*	*Map Sheet*	*Status*	*Size*	*Host rock*	*Mineral. age*	*Form*	*Strike (°)*	*Explor.*
31026	Kelly Prospect; Dormers Shaft 524 300 mE, 5 439 600 mN Reid, 1926	Au	2	83151	PEX	ND	MAT	LD	VEIN	100	PS
31009	Cottrell-Dormer Prospect 526 000 mE, 5 439 500 mN Reid, 1926	Au	3	83151	PEX	ND	MAT	LD	DISS	ND	PS
31091	Cradle Creek Goldfield 527 500 mE, 5 439 500 mN Cromer, 1987a	Au	2	83151	MAR	ND	JCS	ND	PLAC	ND	PS
31014	Fairthorne Prospect 524 750 mE, 5 439 400 mN Reid, 1926	Au	2	83151	AMX	ND	MAT	LD	VEIN	80	PS
31113	Titmus 526 800 mE, 5 439 400 mN Reid, 1926	Au	4	83151	PEX		MAT	LD	VEIN	ND	PS
31015	Falkiner Creek 528 300 mE, 5 438 500 mN Reid, 1926	Au	2	83151	AMX	ND	MAT	LD	DISS	ND	PS
31037	Lone Star Goldfield 524 200 mE, 5 438 000 mN Reid, 1926	Au	2	83151	MAR	ND	JCS	LD	PLAC	ND	PS
31036	Lone Star Creek 524 300 mE, 5 438 000 mN Reid, 1926	Au	2	83151	AMX	ND	JCS	QT	PLAC	ND	PS
31090	Kelp and Boultbee's 522 000 mE, 5 437 000 mN Marshall, 1970	Au	4	83153	PEX		MAT	LD		ND	PS
31012	Dunns Adit 525 500 mE, 5 436 500 mN Reid, 1926	Au	4	83151	AMX	ND	DGN JCS	LD	VEIN PLAC	ND	PS
31066	Old Lease 1455-G Lisle 526 000 mE, 5 436 500 mN Reid, 1926	Au	5	83151	AMX	ND	DGN PSG	LD	VEIN RESD	ND	PS
31112	Lisle Hydraulic 526 500 mE, 5 436 500 mN Reid, 1926	Au	3	83151	AMX		JCS		PLAC TT	ND	PS
31058	Watts Prospect 527 500 mE, 5 436 500 mN Reid, 1926	Au	2	83151	AMX	ND	MAT	LD	VEIN	60	PS
31103	Cashman's Workings 525 700 mE, 5 436 300 mN Reid, 1926	Au	3	83151	PEX		JCS		PLAC RESD	ND	PS
31108	Dunns 526 500 mE, 5 436 300 mN Reid, 1926	Au	3	83151	PEX		DGN			ND	PS
31105	Bessells Creek 525 600 mE, 5 436 200 mN Reid, 1926	Au	3	83151	PEX		JCS		PLAC	ND	PS
31102	Watts Face 526 700 mE, 5 436 100 mN Reid, 1926	Au	3	83151	PEX		JCS		PLAC RESD	ND	PS
31043	New Bonanza 526 900 mE, 5 436 100 mN Reid, 1926	Au	2	83151	AMX	ND	JCS	LD	VEIN	ND	PS

Ref. No.	*Name and AMG co-ordinates*	*Commodity*	*Co-ord error*	*Map Sheet*	*Status*	*Size*	*Host rock*	*Mineral. age*	*Form*	*Strike (°)*	*Explor.*
31104	Lockwood's Terrace 525 500 mE, 5 436 000 mN Reid, 1926	Au	3	83151	PEX		JCS		RESD PLAC	ND	PS
31034	Lisle Goldfield 526 500 mE, 5 436 000 mN Cromer, 1987a; Marshall, 1970; Reid, 1926	Au, Sn, Mo, Gems	2	83151	MAR	ND	MAT	QT	PLAC VEIN	ND	PS
31067	Hill Range east of New Bonanza 528 000 mE, 5 436 000 mN Reid, 1926	Mo	5	83151	PEX	ND	DGN	LD	DISS	ND	PS
31101	Donnelly's Face 526 700 mE, 5 435 900 mN Reid, 1926	Au	3	83151	PEX		JCS		PLAC RESD	ND	PS
31110	Donnelly's Adits 527 000 mE, 5 435 900 mN Reid, 1926	Au	3	83151	PEX		MAT	LD	VEIN	90	PS
31111	Searles Adits 527 200 mE, 5 435 900 mN Reid, 1926	Au	3	83151	PEX		MAT JCS	LD		ND	PS
31109	Lisle Gold Mine 525 500 mE, 5 435 700 mN Reid, 1926	Au	3	83151	AMX		JCS		PLAC RESD	ND	PS
31035	Lisle Hydraulic Gold Mines 526 000 mE, 5 435 500 mN Reid, 1926	Au	2	83151		ND	JCS	QT	PLAC	ND	PS
31093	Loretta 526 700 mE, 5 435 500 mN ML Plans	Au	3	83151	PEX		MAT	LD	VEIN	ND	PS
31106	Cox Creek 527 100 mE, 5 435 500 mN Reid, 1926	Au	3	83151	PEX		JCS		PLAC	ND	PS
31022	Haye's Leases; Stoney Creek 526200 mE, 5 435200 mN Reid, 1926	Au	2	83151	PEX	ND	JCS	QT	PLAC	ND	PS
31033	Lisle Creek Workings 527100 mE, 5 435000 mN Reid, 1926	Au	2	83151	AMX	ND	JCS	QT	PLAC	ND	PS
31100	Red Face 527300 mE, 5 434800 mN Reid, 1926	Au	3	83151	PEX		JCS		PLAC RESD	ND	PS
31055	Thomas Creek 525700 mE, 5 434500 mN Reid, 1926	Au	2	83151	PEX	ND	JCS	QT	PLAC	ND	PS
31107	ML 78 PG 528400 mE, 5 434500 mN ML Plans	Au	3	83151	PEX					ND	PS
31099	Sweeney Creek 527600 mE, 5 434200 mN Dickens, 1991	Au	3	83151	PEX		JCS		PLAC RESD	ND	PS
39005	Lisle South 527400 mE, 5 432500 mN Longman *et al.*, 1964	Au, Mo, Sn, Gems	2	83152	AMX		JCS			ND	PS
39022	North of Mt Arthur 524500 mE, 5 432000 mN Reid, 1926	Au	2	83152	PUN	ND	PSG	JC	PLAC	ND	PS

Key to MIRLOCH listing abbreviations

CO-ORDINATE ERROR

1	<50 m
2	<100 m
3	<500 m
4	< 1 km
5	>1 km

STATUS

OPM	Operating mine
NOR	Non-operating mine — reserves known
NOX	Non-operating mine — reserves unknown
AMR	Abandoned mine — reserves known
AMX	Abandoned mine — reserves unknown
AMO	Abandoned — mined out
PEX	Prospect — explored
PUN	Prospect — unexplored
MAR	Mineralised area
MOC	Mineral occurrence

SIZE OF DEPOSIT

ND	Not determined
VS	Very small: < 100 tonnes (or cubic metres)
SM	Small: 100 t – 10 000 t
ME	Medium: 10 000 t – 1 000 000 t
LA	Large: 1 000 000 t – 10 000 000 t
VL	Very large: > 10 000 000 t

HOST ROCK

PCS	Precambrian sequences
CSS	Cambrian sedimentary sequences
CIG	Cambrian igneous sequences
MRV	Mount Read Volcanics and correlates
OMS	Owen Conglomerate/Moina Sandstone and correlates
GLE	Gordon Limestone/Eldon Group and correlates
MAT	Mathinna Beds
DGN	Devonian granitoid
PSG	Parmeener Supergroup
JCS	Jurassic–Cenozoic sequences

AGE OF MINERALISATION

ND	Not determined
PC	Precambrian
EC	Eocambrian–Early Cambrian
MC	Middle–Late Cambrian
OD	Ordovician–Early Devonian
LD	Late Devonian (granite associated)
PT	Permo-Triassic
JC	Jurassic–Cretaceous
TT	Tertiary
QT	Quaternary

FORM OF DEPOSIT

VMS	Volcanic massive sulphide
STFM	Stratiform
VEIN	Vein (single, sheet, saddle)
STWK	Stockwork
DISS	Disseminated
REPL	Replacement
PIPE	Pipe
PLAC	Placer
RESD	Residual
OTHR	Other (noted in references)

EXPLORATION OF DEPOSIT

NO	Nil or no known exploration
PS	Prospecting
GM	Geological mapping
GC	Geochemical surveys
GP	Geophysical surveys
DR	Drilling