

Queensland Geological Record 2009/04

Mines, mineralisation and mineral exploration
in the Bowen, Prosperpine and Ayr
1:250 000 Sheet areas,
north Queensland

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EXECUTIVE SUMMARY

This publication describes the mineralisation, regional geology, mining history and exploration activity in the North Connors study area in north Queensland, Australia. Historically, small mesothermal and porphyry-related vein systems were mined for gold, copper and silver. Clay was mined in the Pindi Pindi area for brick production. Minor amounts of earthy lime, magnesite and rock phosphate have been produced from deposits in the study area. Historically, mines in the study area have produced at least at least 394.337kg of gold bullion, 1748.396kg of fine gold, 734.705kg of silver, 301.3t copper, 82 345t of brick clay, 102t of magnesite, 2477.5t of rock phosphate, and 109 564.3t of earthy lime.

The total known mineral endowment of the study area (based on recorded production plus known remaining resources and reserves) is at least 394.3kg of gold bullion, 46 253.4kg of gold, 1 511 724.7kg of silver, 125 813.3t of copper, 41 290t of zinc, 3850t of molybdenum, 373 400t of limestone, 4900 million barrels of oil (in oil shale), 1.28Mt of Al₂O₃ (in andalusite), 82 345t of brick clay, 102t of magnesite, 2477.5t of rock phosphate, and 109 564.3t of earthy lime.

Significant epithermal gold-silver-copper-zinc deposits at Mount Carlton – Silver Hill offer the best potential for new mine development in the near term. The study area is also prospective for porphyry Cu-Au-Mo systems and related veins, stockworks and breccias.

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ISSN 1039-5547
ISBN 978-1-921489-44-0

Issued: October 2009

REFERENCE: DENARO, T.J., FITZELL, M.J., DHNARAM, C.R., LAM, J.S. & BURROWS, P.E., 2009: Mines, mineralisation and mineral exploration in the Bowen, Proserpine and Ayr 1:250 000 Sheet areas, north Queensland. *Queensland Geological Record* **2009/04**.

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SUMMARY

This report summarises the mineralisation, regional geology, mining history and exploration activity in the Ayr, Proserpine and Bowen 1:250 000 Sheet areas (excluding the Glendon and Collinsville 1:100 000 Sheet area) in north Queensland, Australia.

Mining commenced in the study area as early as 1870 with the discovery of gold lodes on the Marengo field. Gold was also discovered on the Normanby, Kelsey Creek (Happy Valley), Strathalbyn, Mount Hector and Mount McGuire fields. Silver-lead was discovered at Flagstone Creek and Emu Plains. Mines in the study area have produced at least 394.337kg of gold bullion, 1748.396kg of fine gold, 734.705kg of silver, 301.3t copper, 82 345t of brick clay, 102t of magnesite, 2477.5t of rock phosphate, and 109 564.3t of earthy lime. Mining has also been carried out for unrecorded amounts of amethyst, graphite, limestone, salt, lead-zinc and tungsten. The most significant mine in the area was the Duffer at Dittmer.

The only current mining operations in the study area are earthy lime production at Buchanan (24.2km south-south-east of Home Hill) and the Delta Lease (27km south of Home Hill) and salt production by evaporation of seawater at Bowen.

The study area contains known amethyst, andalusite, asbestos, bismuth, brick clay, chromite, copper, earthy lime, gold, graphite, iron, lead, limestone, magnesite, molybdenum, oil shale, phosphate rock, salt, silica sand, silver, tungsten, vermiculite and zinc mineralisation. Coal measures near Pindi Pindi are not discussed in this report.

The study area has been explored for andalusite, chromite, copper, earthy lime, heavy mineral sands, gold, lead, limestone, magnesite, molybdenum, nickel, oil shale, platinum group elements, silver, tungsten, uranium and zinc since the early 1960s. Most exploration has focused in the vicinity of known deposits. Additional discoveries include a porphyry Cu-Mo deposit at Julivon Creek, epithermal gold-silver-copper-zinc vein systems at Mount Carlton – Silver Hill and oil shale deposits at McFarlane.

Known resources and reserves total 44 505kg of gold, 1 510 990kg of silver, 125 512t of copper, 41 290t of zinc, 3850t of molybdenum, 373 400t of limestone, 4900 million barrels of oil (in oil shale) and 1.28Mt of Al_2O_3 (in andalusite). The study area also contains significant undefined resources of clay, earthy lime, limestone and silica sand.

Keywords: Mineralisation; regional geology; mineral exploration; mining history; amethyst; andalusite; bismuth; brick clay; chromite; copper; earthy lime; gold; graphite; iron; lead; limestone; magnesite; molybdenum; oil shale; phosphate rock; salt; silica sand; silver; tungsten; vermiculite; zinc; Cape River Metamorphics; Mount Windsor Volcanics; Ravenswood Granodiorite Complex; Connors Volcanic Group; Campwyn Volcanics; Edgecumbe beds; Bulgonunna Volcanic Group; Ellenvale beds; Lizzie Creek Volcanic Group; Carmila beds; Back Creek Group; Blackwater Group; Airlie Volcanics; Calen Coal Measures;

Thunderbolt Granite; Mount Wickham Rhyolite; Urannah Igneous Complex; Clematis Group; Rewan Group; Whitsunday Volcanics; Proserpine Volcanics; Hecate Granite; Mount Abbot Igneous Complex; Cape Hillsborough beds; Mount Jukes Syenite Complex; Cape River Province; Thalanga Province; Lolworth–Ravenswood Block; Pama Province; Burdekin Basin; Bulgonunna Volcanic Province; Connors Subprovince; Yarrol Province; Kennedy Province; Bowen Basin; Central Queensland Cretaceous Intrusives Province; Hillsborough Basin; Queensland/Ayr; Queensland/Proserpine; Queensland/Bowen; SE55-15; SF55-04; SF55-03; 8359; 8358; 8458; 8558; 8657; 8757; 8656; 8756; 8357; 8457; 8557; 8556.

INTRODUCTION

This report presents an overview of the regional geology, mining and exploration history and mineralisation in the Ayr, Proserpine and Bowen 1:250 000 Sheet areas (excluding the Glendon and Collinsville 1:100 000 Sheet areas) and forms the North Connors study area. The Glendon and Collinsville Sheet areas have been previously described by Denaro & others (2004).

LOCATION, ACCESS, AND CLIMATE

The North Connors study area is bounded by longitudes 147°00'E and 150°00'E, and latitudes 19°00'S and 21°00'S (Figure 1). It comprises the Ayr 1:250 000 Sheet area (Bowling Green Bay, Ayr, Cape Upstart and Abbot Point 1:100 000 Sheet areas), Proserpine 1:250 000 Sheet area (Proserpine, Lindeman Island, Calen and Cumberland Islands 1:100 000 Sheet areas) and Bowen 1:250 000 Sheet area (Strathalbyn, Bogie, Bowen and Urannah 1:100 000 Sheet areas).

The main administrative centre is Bowen (Whitsunday Regional Council). The north-western part of the study area is administered by the Burdekin Shire Council. The south-eastern part is administered by the Mackay Regional Council.

Bowen (population ~9500) is 1165km by road north of Brisbane and 206km south of Townsville. Bowen is a city with an economy based on servicing the mining, agriculture, aquaculture, fishing and tourism industries. Other major population centres include Ayr and Home Hill (population ~12 000), centre of the Burdekin sugar industry; Proserpine (population ~3300), another sugar producing centre; and Airlie Beach (population ~2750), a tourism centre servicing the Whitsunday islands.

The study area (Figure 2) is accessible via a number of sealed roads and highways including:

- the Bruce Highway, close to the coast in the eastern part of the area, which runs south-east to north-west from Mackay to Townsville,
-

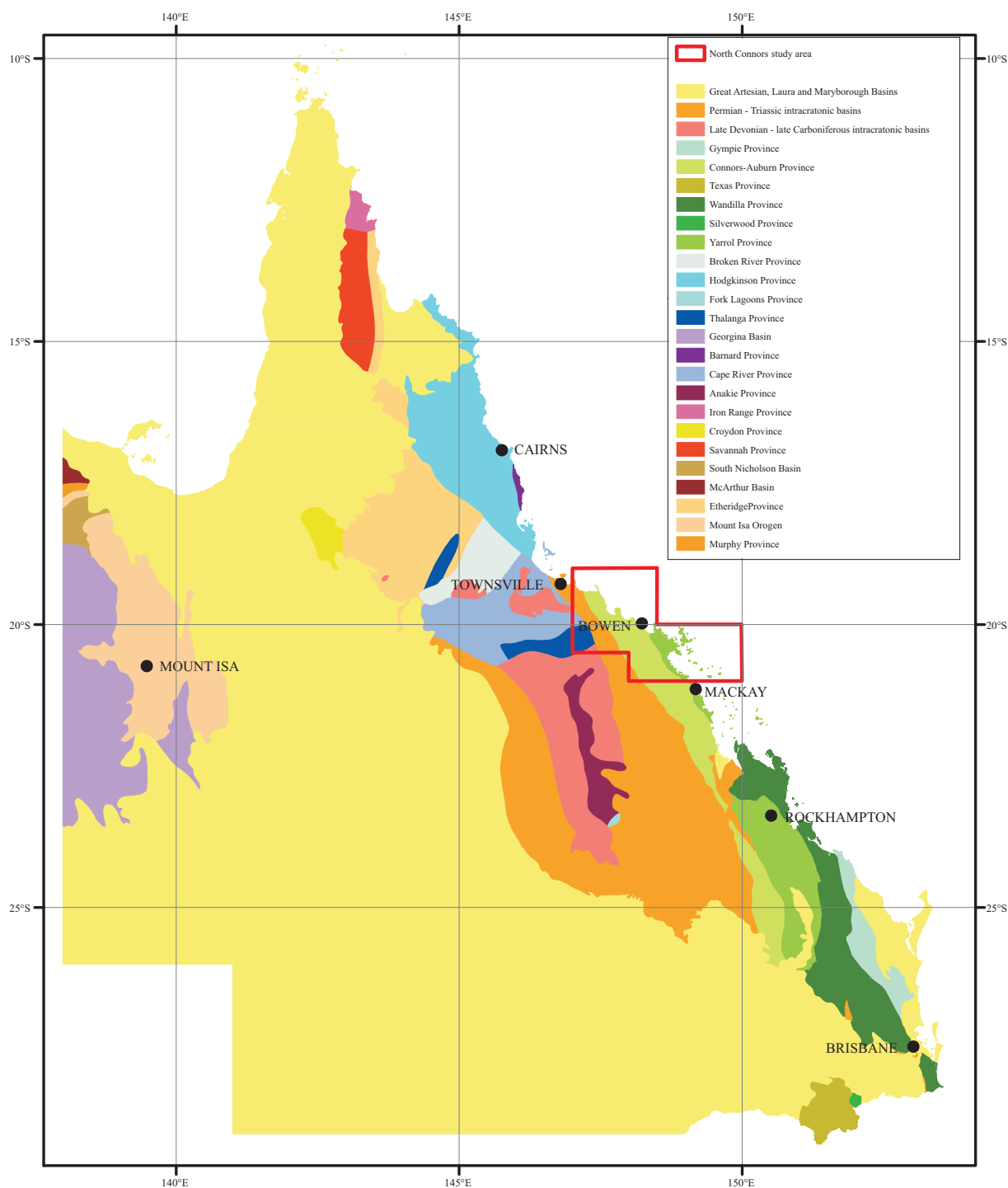


Figure 1: Location of North Connors study area

- the Bowen Developmental Road, which runs south-west from Bowen to Collinsville,
- Dalbeg Road from Home Hill along the Burdekin River to Dalbeg.

Numerous sealed roads, graded roads and dirt tracks provide good access to much of the study area. Access to most of the mines and mineral occurrences is via property, mine or exploration tracks that range in condition from good to very rough and indistinct. Many roads and tracks become impassable after heavy rain. The area is also served by the the main rail line from Brisbane to Cairns; branch

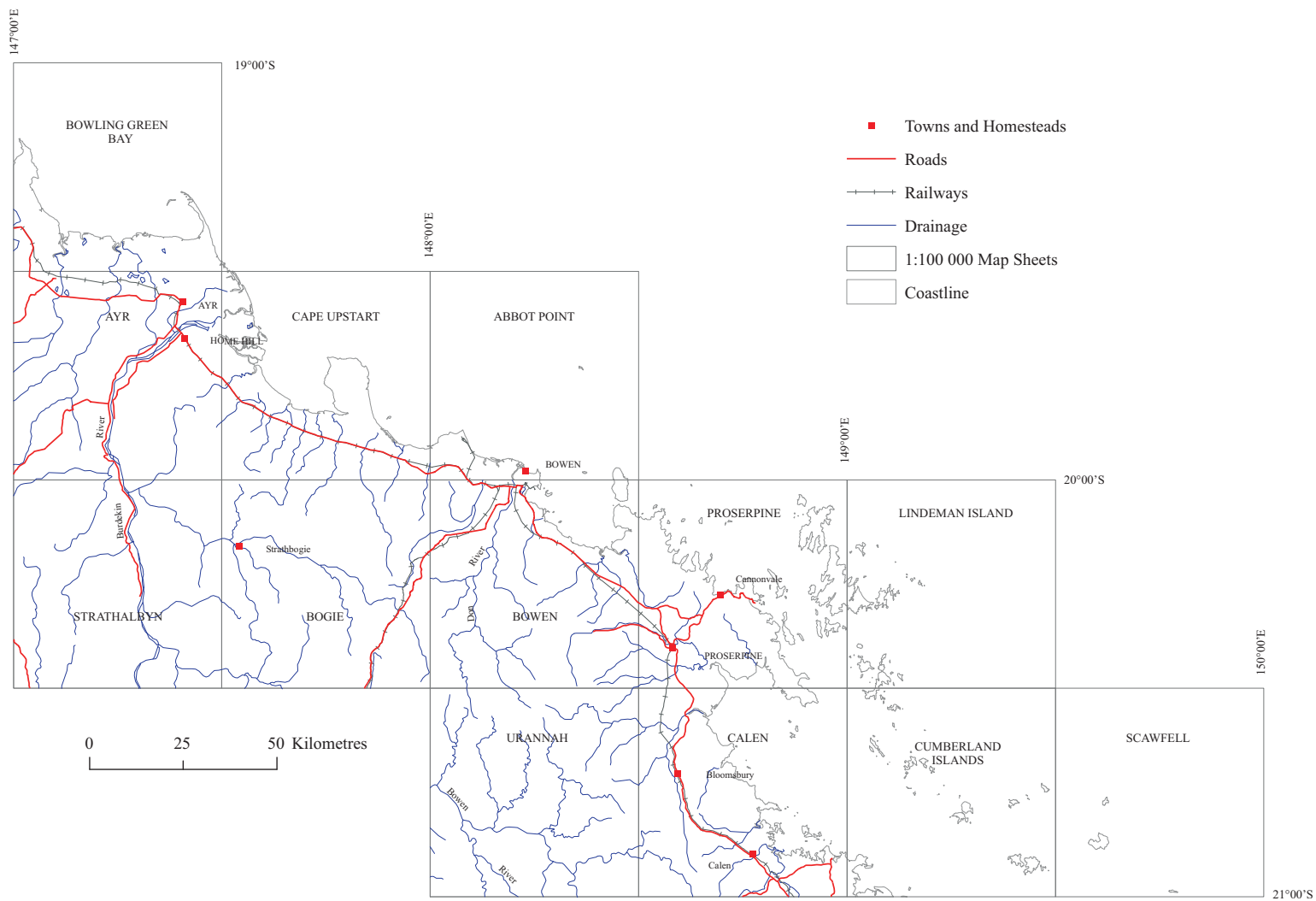


Figure 2: Locality map, North Connors study area

lines link the coal mines of the Bowen Basin via Collinsville to coal loading facilities at Abbot Point.

The climate is tropical and generally dry in winter and hot and wet in summer. Annual rainfall decreases from about 1380mm in Proserpine to 710–830mm in the Collinsville–Bowen area and 940mm in Ayr. More than half of the rain falls between December and March; February is the wettest month. The driest months are August and September. Mean maximum temperatures range from 23.5 to 25°C in July to 31.5 to 34°C in December and January. Mean minimum temperatures range from 9–13.5°C in July to 22–24°C in January and February.

GEOLOGICAL MAPPING

Most of the early geological work in the study area was concerned with the appraisal of minor economic mineral deposits and goldfields and was of limited regional significance. The main contributors were R.L. Jack (1879–1893), A.G. Maitland (1889), W.E. Cameron (1902–1903), E.C. Saint-Smith (1918–1920), C.C. Morton (1920–1948), J.H. Reid (1924–1944), L.C. Ball (1934–1945), J.E. Ridgway (1935–1947), A.K. Denmead (1946–1962) and K.R. Levingston (1962–1969).

Joint geological mapping by the Bureau of Mineral Resources (BMR) and the Geological Survey of Queensland (GSQ) in the 1960s led to the production of 1:250 000 scale geological maps and explanatory notes for the Ayr (Gregory, 1969), Bowen (Paine & Cameron, 1972; Paine & others, 1974) and Proserpine (Paine, 1972) map sheets. The Burdekin River Region 1:500 000 scale geological map (updated from the 1:250 000 mapping) covers the study area, and was compiled by Paine & others (1980). A digital version of this map was released by the Geological Survey of Queensland in 2005.

Ceramic clay resources in Queensland were summarised by Houston (1967). Siemon (1981) reported on the ceramic clay resources of the Mackay region. Connah (1958) summarised limestone resources in Queensland. Sawers & Siemon (1969) reported on the limestone resources of the Mackay district. The Geological Survey of Queensland (1978) summarised the mineral resources of the Bowen region. Porphyry-type copper and molybdenum mineralisation in eastern Queensland was investigated by Horton (1978, 1982). Murray (1990a) summarised mineralisation styles in the region.

The Geological Survey of Queensland is currently mapping the study area with a view to the production of updated geological maps.

REGIONAL GEOPHYSICAL DATA

The Geological Survey of Queensland flew the Ayr – St Lawrence magnetic/radiometric survey in 1996 at a line spacing of 400m with a sensor height of 80m. The north Bowen Basin survey was flown in 2002.

Airborne geophysical data are available as line located data as self-extracting zip ASCII files and grids as ERMAPPER grid files. Gravity data for Queensland is incorporated into the National Gravity Database. Both data sets can be downloaded from the Geophysical Archive Data Delivery System (GADDS) on the Geoscience Australia website (www.ga.gov.au). Data can also be purchased on DVD from Queensland Mines and Energy, Department of Employment, Economic Development and Innovation, for 'cost of provision'.

Contact:

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Telephone: (07) 3237 1434 Facsimile: (07) 3231 9517.

For more information about digital gravity and airborne geophysical data, please visit the Department's website (www.dme.qld.gov.au) or contact the Geological Survey of Queensland (Telephone: (07) 3362 9357; Fax: (07) 3362 9368); Email: geophysics@dme.qld.gov.au).

REGIONAL GEOCHEMICAL DATA AND EXPLORATION REPORTS

In July 2003, the then Department of Natural Resources and Mines purchased more than 1 400 000 surface and drillhole geochemistry data records from Terra Search Pty Ltd. The data were generated from open file reports submitted by companies undertaking exploration work within the State. The data are delivered in Explorer 3, ASCII and MapInfo table formats. The Explorer 3 database management system is interlinked by a matrix of relational tables and libraries, providing additional details on locations, sampling methods, sample type, preparation and analytical methods, results and precisions. Each site is located in AMG coordinates (AGD66 datum). The data are supplied on DVD. Updates to this product on a six monthly cycle have been made since 2005 and the database (as at January 2009) now includes 2 176 314 points.

For more information, please visit the Department's website (www.dme.qld.gov.au) or contact the Geological Information Hotline (Telephone: (07) 3006 4666; Fax: (07) 3362 9368; Email: geological_info@dme.qld.gov.au).

One of the most valuable sources of data on Queensland's mineral deposits and prospects is the extensive collection of company exploration reports held by Queensland Mines and Energy, Department of Employment, Economic Development and Innovation. These reports are submitted as a statutory condition of tenure. The Queensland Digital Exploration Reporting system (QDEX) is the Department's digital document management system that allows users to search, lodge and retrieve company reports over the Internet. Registration is free and documents can be downloaded or ordered on CD-ROM.

For more information about QDEX, please visit the Department's website (www.dme.qld.gov.au) or contact QDEX Support (Telephone: (07) 3237 9759; Fax: (07) 3237 1534; Email: qdexsupport@dme.qld.gov.au).

MINERAL OCCURRENCE DATA

Mineral occurrence data have been compiled from available published and open-file unpublished material. The main published data sources include Geological Survey of Queensland publications and reports, the Queensland Government Mining Journal and scientific journals. Unpublished data sources accessed for this study include Geological Survey of Queensland commodity files and company exploration reports. The assistance of Mr D.A. Morwood, formerly Senior Geological Technician with the Geological Survey, is acknowledged.

As part of the mineral occurrence mapping process, as many mines as possible were inspected in the field. In the study area, about 61% of sites were field checked in July and August 2007. Accurate locations were obtained for all field-checked mines using Garmin global positioning system (GPS) satellite navigation instruments. All Grid References in this report are given in Geodetic Datum of Australia 1994 (GDA94), Zone 55.

Three hundred and seven data records on mines, prospects and mineral occurrences in the study area have been entered into Queensland Mines and Energy's Geoscience and Resource Data Base (GRDB), which runs under Oracle software. This mineral occurrence database for Queensland contains comprehensive information on mines, prospects and mineral occurrences gathered from field investigations, reports dating back to the 1880s, and reviews of company exploration results.

The database includes details of deposit model, host rock and orebody geology, production history, resources, a bibliography for each individual deposit, and comments. It is provided to clients as decoded and concatenated data in a simple relational database structure with an MS Access 2000 interface with pre-built forms and queries. Most tables include latitude and longitude, plus MGA zone and co-ordinates for ease of display in Geographic Information System software. Data are also distributed in ArcGIS and MapInfo file formats.

The database for all of Queensland is generated annually to capture any new, corrected or updated information. Copies of this database can be purchased for 'cost of provision' from the Queensland Mines and Energy Information Centre, Level 2, Mineral House, 41 George Street, Brisbane. For more information on the department's Mineral Occurrence (MINOCC) database, contact the Geological Information Hotline (Telephone: (07) 3006 4666; Fax: (07) 3362 9368; Email: geological_info@dme.qld.gov.au).

The 2009 edition of "Queensland Minerals" (Denaro & Dhnaram, 2009), a publication covering resources, production, geology, ownership and tenure for major Queensland mineral deposits is available on CD-ROM. This report provides summary statistics and geological characteristics for major operating and historical mineral mines and undeveloped mineral resources in the State. It provides a useful reference for managers, investors and project geologists looking for an overview of the known mineral resources and current status of mineral development in Queensland. The report is updated and released annually.

Sections include:

- Overview of Queensland geology and major mineral deposits
- Summary reports for operating mines in Queensland
- Summary reports for major prospects in Queensland
- Deposits and total contained metal
- Contained metal in known reserves/resources by commodity and reserve/resource classification
- Resource/reserve classification, grade and metal content by deposit name
- Major mine production tabulation
- Deposit model and host geological province
- General contact and company contact information for principal holders of mineral exploration and mining tenure in Queensland as at November 2008.

Queensland Minerals 2009 is available free of charge from the Queensland Mines and Energy Information Centre, Level 2, Mineral House, 41 George Street, Brisbane.

The location and basic information on mineral deposits, as well as current and historic exploration and mining tenures, can be viewed as part of the Interactive Resource and Tenure Maps on the Department's website (www.dme.qld.gov.au). This interactive GIS allows the user to zoom, pan, search and display geological data with mining and exploration tenure information for the whole of Queensland. It also provides a direct link to the QDEX system.

REGIONAL GEOLOGY

A generalised regional geology of the study area is presented as Figure 3. Geological units have been amalgamated into broad age/rock type groups that reflect stratigraphy and geological environment (Table 1). Table 1 and Figure 3 are based on the Burdekin River Region 1:500 000 geology map (Paine & others, 1980) and have been compiled from reports by Gregory (1969), Paine (1972), Paine & Cameron (1972), Geological Survey of Queensland (1978), Murray (1990a), Hutton & others (1997) and Withnall & others (1997), with amendments suggested by R.J. Bultitude of the Geological Survey of Queensland. The study area is currently being remapped by the Geological Survey of Queensland.

TECTONIC ELEMENTS

Five main north-north-west- to north-west-trending structural belts can be recognised in the study area (Figure 3):

- Lolworth–Ravenwood Block
 - Bowen Basin
-

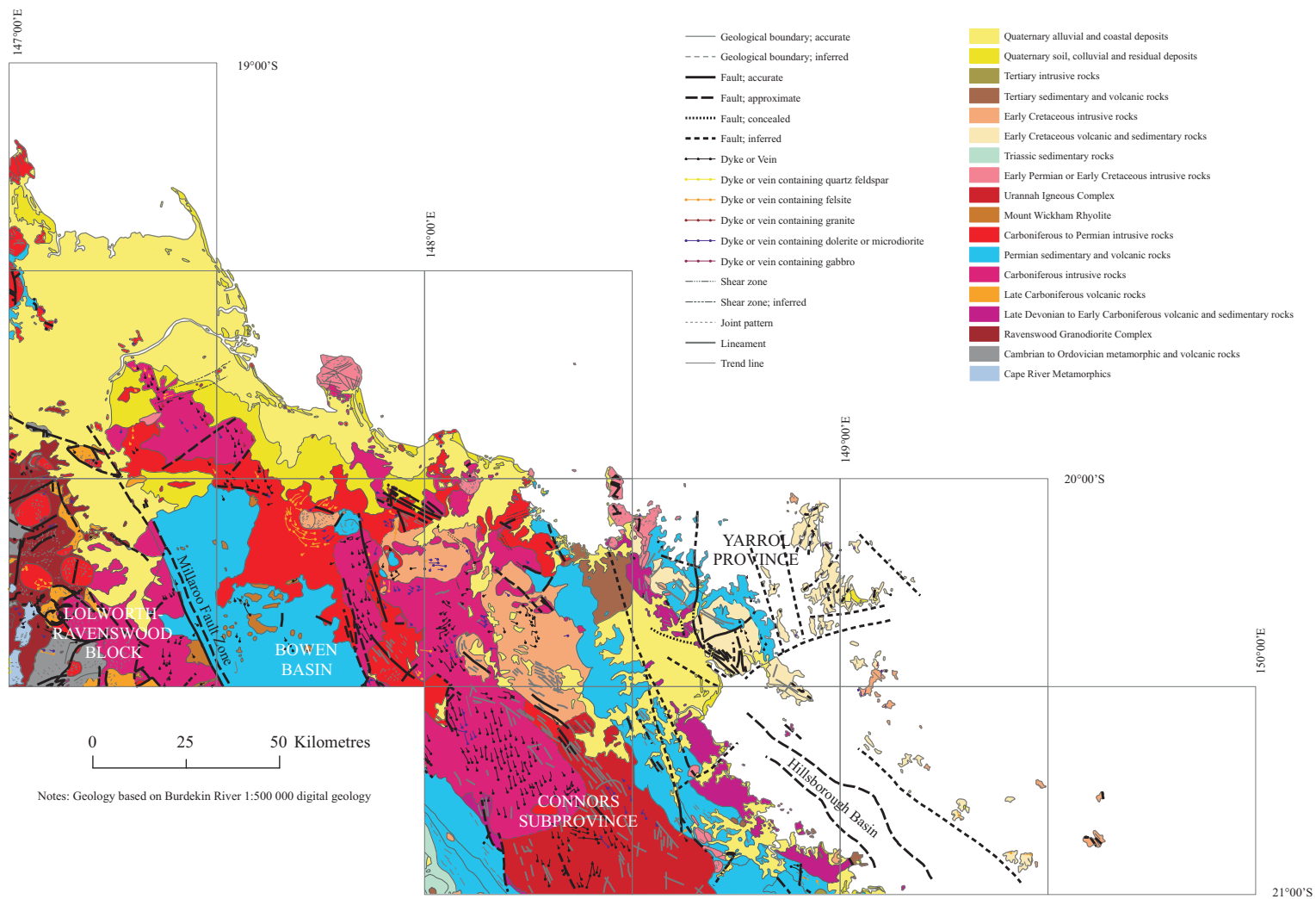


Figure 3: Simplified regional geology, North Connors study area

- Connors Subprovince
- Yarrol Province
- Hillsborough Basin

In addition, there are several igneous provinces.

Lolworth–Ravenswood Block

Cape River Province

The Cape River Metamorphics of the Cape River Province form basement to the Thalanga Province in the Rangeview area in the south-west corner of the study area.

Thalanga Province

In the study area, the Thalanga Province comprises Late Cambrian to early Ordovician sedimentary and felsic to intermediate volcanic rocks of the Seventy Mile Range Group (including the Mount Windsor Volcanics). The Seventy Mile Range Group is considered to have formed in a back-arc extensional setting related to a Late Cambrian to early Ordovician, west dipping subduction zone (Withnall & others, 1997).

Ravenswood Batholith

The Ravenswood Batholith is a large composite batholith that intrudes the Thalanga and Cape River Provinces in the south-west corner of the study area. It comprises Late Cambrian to middle Ordovician intrusions that belong to the Macrossan Province, middle Silurian to Early Devonian intrusions of the Pama Province and late Carboniferous to Early Permian intrusions of the Kennedy Province. The Late Cambrian to Early Devonian intrusions form the Ravenswood Granodiorite Complex (Paine & others, 1974), the emplacement of which resulted in widespread “regional-contact” metamorphism of the adjacent country rocks.

Burdekin Basin

The Burdekin Basin is a continental, intracratonic back-arc basin formed on the granite and metamorphic rocks of the Cape River Province and Ravenswood Batholith. Basin fill comprises Early Devonian to early Carboniferous sedimentary and volcanic rocks (Draper & Lang, 1994).

Kennedy Province

The volcanics and associated intrusives of the Kennedy Province are the products of intracontinental magmatism, probably linked to continental extension (Oversby & others, 1994; Hutton & others, 1998). Rocks of the late Carboniferous Bulgonunna Volcanic Group crop out near the Burdekin Weir in the south-west corner of the study area. They unconformably overlie the Late Devonian to early Carboniferous Drummond Basin sequence, which crops out farther to the south.

Connors Subprovince

The Connors Subprovince (Connors Arch) contains the postulated continental margin volcanic arc behind which the Drummond Basin developed as a back-arc spreading centre. It formed behind a postulated Late Devonian to early Carboniferous subduction complex (Wandilla Province) and forearc basin (Yarrol Province). The Connors Arch is dominated by volcanic and granitic rocks that form basement to the Bowen Basin.

In the study area, the Connors Arch comprises Late Devonian to Early Permian volcanic units and the polyphase Urannah Batholith. Plutons of the Urannah Batholith were emplaced between the late Carboniferous and Cretaceous (Webb & McDougall, 1968; Allen & others, 1998) as a result of crustal extension (Allen & Chappell, 1996).

The Connors Arch is thought to have been uplifted during a major Late Permian to Early Triassic compressional event — the Hunter–Bowen Orogeny (Hutton & others, 1998).

Early Permian volcanic and sedimentary rocks of the Carmila beds and Calen Coal Measures flank the Connors Arch to the east. They are probably equivalent to parts of the Lizzie Creek Volcanic Group and the Back Creek Group in the Bowen Basin and may have accumulated in extensional basins. Fielding & others (1997) postulated that the Connors and Auburn Arches did not form a basin-marginal physiographic feature during accumulation of the Bowen Basin succession. Under this model, the Permian sediments and volcanics east of the Connors Arch are considered to have once been continuous with volcanic sequences underlying the Bowen Basin succession.

Yarrol Province

The Yarrol Province is a postulated forearc basin that formed in the late Devonian and Carboniferous above a west-dipping subduction zone (Murray, 1994). Bryan & others (2003) have proposed an alternative model, with the Yarrol Province developing as a back-arc basin during the Middle to Late Devonian. The province is represented in the study area by rocks of the Campwyn and Whitsunday Subprovinces.

Subaerial to submarine volcanic and sedimentary rocks of the Campwyn Subprovince may be a northern extension of Late Devonian to early Carboniferous rocks known farther south in the Yarrol Province (Hutton & others, 1999).

The Airlie Volcanics of the Whitsunday Subprovince have been assigned an Early Permian age but are suspected to be Triassic (Ewart & others, 1992).

Bowen Basin

The Early Permian to Middle Triassic Bowen Basin is a large intracontinental basin that was deposited to the east of the uplifted Anakie Province and

Drummond Basin. Deposition was controlled by a series of transgressive and regressive cycles (Hutton & others, 1998). The basin formed as an Early Permian magmatic rift stage (crustal extension), a mid-Permian to Late Permian sag phase, and a Late Permian to Early Triassic phase of foreland loading and contractional deformation (Holcombe & others, 1994; Fielding & others, 1990, 2000; Murray, 1990b; Hutton & others, 1998).

Units of the basin exposed in the study area include the Back Creek Group, Blackwater Group, Rewan Group and Clematis Group.

Sedimentation in the Bowen Basin came to an end in the Middle Triassic when the area was uplifted and mildly folded.

Central Queensland Cretaceous Intrusives Province

Early Cretaceous granites occur within and on both sides of the Connors Arch and include the Hecate Granite and Mount Abbot Igneous Complex. A suite of volcanics (Proserpine Volcanics and Whitsunday Volcanics) with associated small subvolcanic intrusions form the Whitsunday Islands and adjacent mainland. These intrusions and volcanics formed in an extensional environment (Murray, 2003).

Hillsborough Basin

The Hillsborough Basin is a narrow, asymmetrical, south-east-trending graben formed by Late Cretaceous or Early Tertiary block faulting related to the opening of the Coral Sea. It is asymmetrical, with a gentler slope on the south-west flank, and is bounded by the Foxdale Fault to the north-east and the Repulse Fault to the south-west. It extends inland for at least 20km and extends offshore under Repulse Bay and the Hillsborough Channel for ~70km. The basin deepens offshore, where the sequence contains up to 3000m of sediments as young as early to mid-Tertiary (Green & Bateman, 1981). It contains major oil shale deposits within the basal Cape Hillsborough beds.

Eastern Australian Cainozoic Igneous Province

The Mount Jukes Syenite Complex is shown as Early Cretaceous on the Proserpine First Edition 1:250 000 geological map (Paine, 1972). Subsequent K–Ar dating indicates the igneous complex was emplaced in the Tertiary, suggesting a possible genetic relationship with volcanic units of the Cape Hillsborough beds (McDougall & Slessar, 1972).

Cainozoic Alluvial and Colluvial Deposits

Formation and subsidence of the coastal plain during the Cainozoic led to the deposition of superficial alluvial, deltaic and littoral deposits (Gregory, 1969). Sand deposits on Whitsunday and Haslewood Islands were built up by winds and were probably derived by winnowing of unconsolidated sediments exposed during periods of lower sea level in the Quaternary (Paine, 1972).

Table 1: Regional geological units, North Connors study area

Regional unit (Figure 3)	Tectonic Element or Igneous Province	Formation/igneous unit (Burdekin River 1:500 000 digital geology)	Rock types	Age	Comments
Cape River Metamorphics	Cape River Province	Cape River Metamorphics	Siltstone, mudstone, sandstone, acid tuff, phyllite, schist, quartzite, gneiss, amphibolite, marble	Neoproterozoic – Early Cambrian	Intruded and metamorphosed by Ravenswood Granodiorite Complex and younger intrusive units (Cug-BUR, Plg-BUR, CPg-BUR, Cur-BUR and CPi-BUR). Unconformably overlain by Bulgonunna Volcanic Group
Cambrian to Ordovician metamorphic and volcanic rocks	Thalanga Province	COu-BUR	Quartz-sericite schist, quartzite, phyllite, hornfels, micaceous siltstone	Cambrian – early Ordovician	Intruded by Ravenswood Granodiorite Complex and younger intrusive units
		Mount Windsor Volcanics	Acid to intermediate volcanics (lavas and volcanoclastics), sandstone, schist, quartzite, phyllite, hornfels	Late Cambrian – early Ordovician	Part of Seventy Mile Range Group. Intruded and metamorphosed by Ravenswood Granodiorite Complex and Plg-BUR, CPg-BUR, Cur-BUR
Ravenswood Granodiorite Complex	Lolworth–Ravenswood Block; Macrossan, Pama and Kennedy Provinces	Ravenswood Granodiorite Complex	Granite, microgranite, granodiorite, tonalite; foliated in places; minor quartz diorite, diorite, trondhjemite, gabbro, pegmatite and aplite	Ordovician – Early Devonian	Easterly limit of a large composite batholith that has caused widespread 'regional-contact' metamorphism. Intrudes Cape River Metamorphics and Seventy Mile Range Group. Nonconformably overlain by Cuv-BUR. Intruded by CPg-BUR, Plg-BUR, Cug-BUR and Plr-BUR
Late Devonian to early Carboniferous volcanic and sedimentary rocks	Connors Subprovince	Connors Volcanic Group	Felsic to mafic volcanic rocks; rhyolitic to andesitic flows, high-level intrusives, and volcanoclastic rocks including ignimbrite, volcanic breccia	Late Devonian – early Carboniferous	Intruded by Cud-BUR and Urannah Igneous Complex. Unconformably overlain by Lizzie Creek Volcanic Group
		DCu-BUR	Mica schist, phyllite, hornfels, gneiss, quartzite, metamorphosed siltstone, arkose, limestone	Devonian–Carboniferous	Cross-beds indicate overturning
	Yarrol Province (Campwyn Subprovince)	Campwyn Volcanics	Acid to intermediate flows and pyroclastics, siltstone, mudstone (locally with radiolarians), quartzose to pebbly sandstone, breccia, mafic hyaloclastite; minor conglomerate, oolitic limestone	Middle Devonian – early Carboniferous	At least partly shallow marine. Intruded by PKg-BUR and Kg-BUR

Table 1 (continued)

Regional unit (Figure 3)	Tectonic Element or Igneous Province	Formation/igneous unit (Burdekin River 1:500 000 digital geology)	Rock types	Age	Comments
Late Devonian to early Carboniferous volcanic and sedimentary rocks	Yarrol Province (Campwyn Subprovince)	Edgecumbe beds	Shale, greywacke, limestone, acid to intermediate flows, pyroclastics and volcanoclastics, feldspathic and clayey sandstone, siltstone, pebble conglomerate; minor lithic sandstone and limestone	early Carboniferous	Lowermost part is shallow marine; upper part is terrestrial. Equivalent to upper part of Campwyn Volcanics. Intruded by PKg-BUR and PKd-BUR. Upfaulted against Carmila beds.
Late Carboniferous volcanic rocks	Kennedy Province	Bulgonunna Volcanic Group	Rhyolitic to dacitic ignimbrite and lava flows and domes; minor andesite and tuffaceous sediments	late Carboniferous	Probably mainly cauldron-subsidence type eruptions. Unconformable on Mount Windsor Volcanics. Intruded by Cug-BUR. Unconformably overlain by Lizzie Creek Volcanic Group and Collinsville Coal Measures (Back Creek Group).
		Cuv-BUR	Rhyolitic to dacitic welded tuffs, lavas air-fall volcanoclastics and agglomerates; minor andesite and tuffaceous sediments	late Carboniferous	Fault-controlled. Correlated with Ellenvale beds and Bulgonunna Volcanic Group. Nonconformable on Ravenswood Granodiorite Complex. Intruded by CPg-BUR, Cug-BUR, Plg-BUR and ring dykes (Plr-BUR).
	Burdekin Basin	Ellenvale beds	Rhyolitic lavas and volcanoclastics, rhyolite breccia, andesite, subgreywacke, feldspathic sandstone, conglomerate, shale, mudstone	Carboniferous	Fault-controlled
Carboniferous intrusive rocks	Kennedy Province	Cug-BUR	Adamellite, granite, granodiorite; minor marginal granophyre and porphyry.	late Carboniferous	Large batholith. Intrudes Bulgonunna Volcanic Group, Cuv-BUR, Mount Windsor Volcanics and Ravenswood Granodiorite Complex. Intruded by Plg-BUR. Nonconformably overlain by Lizzie Creek Volcanic Group. Intruded by and nonconformably overlain by Mount Wickham Rhyolite. Probably comagmatic with Bulgonunna Volcanic Group.
		Cur-BUR	Intrusive rhyolite and porphyry; minor dacite, trachyandesite, andesite, breccia.	late Carboniferous	Intrusive phase of Bulgonunna Volcanic Group and Cuv-BUR. Occurs as irregular intrusive masses and dykes. Plug with some extrusive phase at Mount Louisa. Vertical flow banding. Intrudes Mount Windsor Volcanics and CPg-BUR.

Regional unit (Figure 3)	Tectonic Element or Igneous Province	Formation/igneous unit (Burdekin River 1:500 000 digital geology)	Rock types	Age	Comments
Carboniferous intrusive rocks	Connors Subprovince	Cud-BUR	Diorite, quartz diorite, tonalite, gabbro, granodiorite; minor granite, norite, ultramafics; numerous dykes	late Carboniferous	Northernmost part of Urannah Batholith. Sheared and foliated in places. Primary layering in places. Intruded by CPg-BUR, Hecate Granite, Thunderbolt Granite and PKg-BUR. Intrudes Connors Volcanic Group. Faulted against and nonconformably overlain by Lizzie Creek Volcanic Group.
Permian sedimentary and volcanic rocks	Connors Subprovince (units in north possibly Kennedy Province)	Plv-BUR	Intermediate and acid lavas and volcaniclastics; rare conglomerate; sandstone, shale, siltstone, coal	?Early Permian	Correlated with Lizzie Creek Volcanic Group. Abundant coarse pyroclastics indicate local derivation. Strongly epidotised in places. Nonconformable on CPg-BUR. Intruded by Plg-BUR and Hecate Granite. Faulted against and intruded by Mount Abbott Igneous Complex.
	Connors Subprovince	Carmila beds	Siltstone and mudstone, volcanolithic sandstone, conglomerate and minor altered basalt; local acid to intermediate pyroclastics, flows and volcaniclastic rocks	Early Permian	Member of Lizzie Creek Volcanic Group. Intruded by Cretaceous units of Urannah Igneous Complex, Hecate Granite, PKg-BUR, PKr-BUR, Kg-BUR and Mount Jukes Syenite Complex. Down-faulted against Edgcombe beds. Probably unconformable on Campwyn Volcanics.
	?Bowen Basin	Calen Coal Measures	Quartzose sandstone, siltstone, carbonaceous shale and mudstone, coal	Early Permian	Quartzose sandstone at top is more widely distributed than rest of unit, suggesting onlap. Overlies Carmila beds, possibly disconformably. Correlated with Collinsville Coal Measures (Back Creek Group). Intruded by Urannah Igneous Complex, PKo-BUR, PKr-BUR and PKg-BUR.
	Connors Subprovince	Lizzie Creek Volcanic Group	Basaltic to andesitic lavas and volcaniclastic rocks (including breccia, agglomerate and arenite), rhyolitic to dacitic lavas and volcaniclastic rocks (including ignimbrite); local siltstone, shale and polymictic conglomerate	Early Permian	Probably equivalent to basal part of Carmila beds. Unconformable on Cug-BUR and CPg-BUR. Faulted against and unconformable on Cud-BUR. Unconformable on Bulgonunna Volcanic Group. Possibly unconformably overlain by Tiverton and Gebbie Formations (Back Creek Group). Intruded by and unconformably overlain by Mount Wickham Rhyolite. Intruded by Urannah Igneous Complex and PKr-BUR.

Table 1 (continued)

Regional unit (Figure 3)	Tectonic Element or Igneous Province	Formation/igneous unit (Burdekin River 1:500 000 digital geology)	Rock types	Age	Comments
Permian sedimentary and volcanic rocks	Bowen Basin	Back Creek Group	Quartzose to lithic sandstone, siltstone, mudstone, carbonaceous shale, calcareous sandstone and siltstone, conglomerate, coal, limestone and sandy coquinite	Early to Late Permian	Comprises Tiverton Formation, Collinsville Coal Measures, Gebbie Formation and Blenheim Formation. Possibly unconformable on Lizzie Creek Volcanic Group.
		Blackwater Group	Feldspathic and lithic sandstone, quartzose sandstone, silty sandstone, calcareous sandstone, cherty mudstone, carbonaceous mudstone, carbonaceous shale, coal, pebble and cobble conglomerate, tuff; commonly abundant plant fossils and fossil wood	Late Permian	Lacustrine, fluvial and paludal sediments. Conformably overlies Back Creek Group. Conformably overlain by Rewan Group.
	Yarrol Province (Whitsunday Subprovince)	Airlie Volcanics	Acid to intermediate volcanoclastics and lavas	?Early Permian (may be Triassic)	Possibly equivalent to Carmila beds. Probably unconformable on Edgcombe beds. Faulted against Whitsunday Volcanics. Intruded by PKd-BUR, PKg-BUR and Kg-BUR.
Carboniferous to Permian intrusive rocks	Connors Subprovince	Thunderbolt Granite	Hornblende-biotite granite, porphyritic microgranite, altered granodiorite, granitic gneiss, aplitic microgranite dykes	Early Permian	Intrudes Cud-BUR. Intruded by Hecate Granite.
	Connors–Auburn Province and Kennedy Province	Plg-BUR	Granite, granodiorite; minor quartz ?monzonite, quartz ?syenite, microgranite, gabbro, norite	Early Permian	Subvolcanic stocks emplaced along ring fractures. Early Permian isotopic ages obtained from Mount Elliot and Cape Cleveland stocks. Intrude Ravenswood Granodiorite Complex, Plv-BUR, Cuv-BUR, Mount Windsor Volcanics, Cud-BUR and CPg-BUR.
		CPg-BUR	Granite, granodiorite; minor microgranite, quartz diorite, granophyre, microtrondhjemite	late Carboniferous – Early Permian	Plutons of more than one age. Sheared and foliated in places. Intrude Ravenswood Granodiorite Complex, Mount Windsor Volcanics, Cud-BUR, Cuv-BUR and Carmila beds. Relationship to Plv-BUR unknown but Plv-BUR is probably younger. Intruded by PKg-BUR, Mount Wickham Rhyolite, Hecate Granite and Mount Abbott Igneous Complex. Faulted against Cug-BUR. Nonconformably overlain by Lizzie Creek Volcanic Group and Plv-BUR.

Regional unit (Figure 3)	Tectonic Element or Igneous Province	Formation/igneous unit (Burdekin River 1:500 000 digital geology)	Rock types	Age	Comments
Carboniferous to Permian intrusive rocks	Kennedy Province	Plr-BUR	Porphyritic rhyolite and microtrondhjemite	Early Permian	Ring dykes and possible cone sheets. Intrude Cuv-BUR, Ravenswood Granodiorite Complex and Cug-BUR. Possibly related to Plg-BUR.
		CPi-BUR	Olivine dolerite, microdiorite, gabbro, pyroxene diorite; minor pyroxene ?monzonite and meladiorite	late Carboniferous – Early Permian	Small intrusions, locally concordant. Intrude Mount Windsor Volcanics. Intruded by CPg-BUR.
Mount Wickham Rhyolite	Connors Subprovince	Mount Wickham Rhyolite	Mainly flow-banded porphyritic rhyolite, rhyolitic breccia; subordinate trachyte, dacite, obsidian and agglomerate	mid Permian – Early Triassic	Plugs and flows. Intrude and unconformably overlie Lizzie Creek Volcanic Group, Cug-BUR and Mount Windsor Volcanics.
Urannah Igneous Complex	Connors Subprovince	Urannah Igneous Complex	Hornblende-biotite granite and granodiorite, hornblende diorite, quartz diorite, biotite granite, hornblende gabbro, hornblende microdiorite; abundant dykes	late Carboniferous – Early Permian or Early Cretaceous	Forms southern part of large composite batholith (Urannah Batholith). Intrudes Lizzie Creek Volcanic Group, Carmila beds, Calen Coal Measures and Connors Volcanic Group.
Early Permian to Early Cretaceous intrusive rocks	Connors Subprovince or Central Queensland Cretaceous Intrusives Province	PKg-BUR	Leucogranite, microgranite, granite; minor ?syenite, diorite, gabbro, rhyolite porphyry	Early Permian, Early Triassic or Early Cretaceous	Epizonal stocks. Intrude Edgecumbe beds, Carmila beds, Calen Coal Measures, Airlie Volcanics, Plv-BUR, Cud-BUR, CPg-BUR, PKd-BUR and PKr-BUR. Intruded by numerous dykes.
		PKr-BUR	Intrusive rhyolite, possibly some dellenite and trachyte	Early Permian or Early Cretaceous	Stocks intrude Calen Coal Measures, Lizzie Creek Volcanic Group and Carmila beds. Intruded by PKg-BUR and Urannah Igneous Complex.
		PKo-BUR	Altered porphyritic dolerite	Early Permian or Early Cretaceous	Intrudes Calen Coal Measures. Probably faulted against Urannah Igneous Complex.
	Yarrol Province or Central Queensland Cretaceous Intrusives Province	PKd-BUR	Quartz diorite, microdiorite, dolerite, gabbro	Early Permian or Early Cretaceous	Intrudes Edgecumbe beds and Airlie Volcanics. Intruded by PKg-BUR and numerous dykes.

Table 1 (continued)

Regional unit (Figure 3)	Tectonic Element or Igneous Province	Formation/igneous unit (Burdekin River 1:500 000 digital geology)	Rock types	Age	Comments
Triassic sedimentary rocks	Bowen Basin	Clematis Group	Medium to coarse-grained, cross-bedded, quartzose to sublabilite and micaceous sandstone; siltstone, mudstone and granule to pebble conglomerate; some fine conglomerate and grey and red mudstone	Early to Middle Triassic	Fluvial. Conformable on Rewan Group.
		Rewan Group	Lithic sandstone, pebbly lithic sandstone, siltstone, green to reddish brown mudstone; minor volcanolithic pebble conglomerate (at base)	Late Permian to Early Triassic	Predominantly fluvial. Conformable on Blackwater Group.
Early Cretaceous volcanic and sedimentary rocks	Yarrol Province (Whitsunday Subprovince)	Whitsunday Volcanics	Rhyolitic to andesitic volcanoclastic rocks, ignimbrites and flows, conglomerate, sandstone, hydrothermally altered quartz-feldspar porphyry	Early Cretaceous	Intramontane, calm water and minor terrestrial deposits. Extensively faulted. Probably faulted against Airlie Volcanics. Intruded by Kg-BUR. Comagmatic volcanic plug on Pentecost Island.
		Proserpine Volcanics	Rhyolite, andesite; minor volcanoclastics	Early Cretaceous	Probably terrestrial equivalents of the Whitsunday Volcanics. Unconformable on Edgumbe beds and Airlie Volcanics. Intruded by Kg-BUR.
Early Cretaceous intrusive rocks	Central Queensland Cretaceous Intrusives Province	Hecate Granite	Biotite-hornblende granodiorite, hornblende monzogranite, biotite monzogranite; minor aplitic microgranite, diorite	Early Cretaceous	Intrudes Urannah Igneous Complex, Thunderbolt Granite, Cud-BUR, CPg-BUR, Carmila beds and Plv-BUR.
		Mount Abbot Igneous Complex	Alkali granite, quartz syenite, quartz monzodiorite	Early Cretaceous	Subvolcanic complex, probably associated with ring-fracturing. Felsite cone sheets. Intrudes CPg-BUR.
		Ki-BUR	Granodiorite, diorite, rhyolite, gabbro, microdiorite	Early Cretaceous	Small laccoliths and bosses. Intrude Lizzie Creek Volcanic Group and Bowen Basin sediments.
		Kg-BUR	Leucocratic alkali granite, granophyre, quartz syenite.	Early Cretaceous	Epizonal stocks thought to be comagmatic with Whitsunday and Proserpine Volcanics. Most stocks intrude Whitsunday Volcanics. One stock intrudes Campwyn Volcanics and is intruded by a Tertiary trachyte plug. Another stock intrudes Airlie Volcanics and probably Proserpine Volcanics.

Regional unit (Figure 3)	Tectonic Element or Igneous Province	Formation/igneous unit (Burdekin River 1:500 000 digital geology)	Rock types	Age	Comments
Tertiary sedimentary and volcanic rocks	Hillsborough Basin	Cape Hillsborough beds	Acid volcanics, conglomerate, shale, argillaceous sandstone, basalt, oil shale	Tertiary	Continental. Unconformable on and faulted against Campwyn Volcanics. Unconformable on Carmila beds. Small trachyte or rhyolite plugs that are probably related to volcanics in the Cape Hillsborough beds intrude Campwyn Volcanics and Kg-BUR at Halliday Bay.
		Tn-BUR	Clayey sandstone, sandy claystone, feldspathic sandstone, polymictic pebble and cobble conglomerate, minor siltstone, minor oil shale	Tertiary	Lateritised. Near-shore marine to estuarine environment with extensive shallow lakes, swampy in places, on uneven basement. Unconformable on Devonian to Triassic rocks.
		Tx-BUR	Coarse to pebbly clayey sandstone, sandy claystone, conglomerate, siltstone; minor claystone and arkosic sandstone	Tertiary	Ferricrete capping in places. Thin veneer on Edgecumbe beds and PKg-BUR.
Tertiary intrusive rocks	Eastern Australian Cainozoic Igneous Province	Mount Jukes Syenite Complex	Granophyric quartz syenite, alkali granite and granodiorite	Tertiary	Epizonal. Intrudes Carmila beds.
Quaternary soil, colluvial and residual deposits	Cainozoic Alluvial and Colluvial Deposits	Qr-BUR, Qs-BUR	Clay, silt, sand, gravel and soil; colluvial and residual deposits. Sand and silica sand in beach ridges and coastal dunes	Quaternary	Includes residual earthy lime deposits derived from weathering of coarse-grained diorite south of Home Hill, residual soils developed on deeply weathered granite and ancient and present strandline dunes (including some old blow-out dunes).
Quaternary alluvial and coastal deposits	Cainozoic Alluvial and Colluvial Deposits	Qa-BUR	Alluvium, coastal mud flats, outwash and scree; minor evaporites, colluvium, soil	Quaternary	Levees, flood plains, deltas, littoral flats and pans, piedmont fans. Outwash fans around Mount Dalrymple, Mount Roundback, Mount Little, Station Hill.

The alluvial, residual and outwash deposits are undergoing dissection at present. Deposition of littoral mudflats and sandbars is ongoing (Paine & Cameron, 1972).

MINING HISTORY

Mines in the study area have produced at least 394.34kg of gold bullion, 1748.40kg of fine gold, 734.71kg of silver, 301.3t copper, 82 345t of brick clay, 102t of magnesite, 2477.5t of rock phosphate, and 109 564.3t of earthy lime

Table 2: Recorded gold, silver and copper production, North Connors study area

Mine	Years	Ore (t)	Au (kg)		Ag (kg)	Cu (t)
			Bullion	Fine		
Albion (Normanby Goldfield)	1872–1912	453.90	12.191			
Albion (Marengo Goldfield)	–1879	1.12	0.027			0.01
Andromache (Mount Hector Goldfield)	1935–1941	1043.94	1.236	18.693		
Armistice (Mount Dangar)	1962	10.17	0.132			
Birthday Gift (Mount McGuire Goldfield)	1932–1935	288.61	17.934			
Black Snake (Normanby Goldfield)	1890–1893	99.95	1.701			
Caledonia (Marengo Goldfield)	1891	36.88	0.507			
Canadian (Normanby Goldfield)	1890–1893	113.28	3.570			
Cedar Ridge (Mount Hector Goldfield)	1931–1948		29.122	35.399	4.38	
Commonwealth (Kelsey Creek Goldfield)	1907	70.10	1.471			
Dillons (Normanby Goldfield)	1898	12.90	0.267			
Dray (Kelsey Creek Goldfield)	1933	4.10	0.350			
Duffer (Kelsey Creek Goldfield)	1935–1947, 1949–1951, 1954, 1968–1969, 1971	23059.05	29.445	1691.56	729.57	300.27
Enterprise (Normanby Goldfield)	1875–1895	13.61	0.151			
Enterprise (Mount Hector Goldfield)	1935	5.08	0.619			
Eureka (Normanby Goldfield)	1890–1901	293.83	2.168			
Evening Star (Mount Hector Goldfield)	1932	4.06	0.068			
Glengarry (Normanby Goldfield)	1890-1897	596.00	16.000			
Golden Fleece (Kelsey Creek Goldfield)	1893–1894, 1899–1908	134.72	6.777			
Golden Gem (Kelsey Creek Goldfield)	1965–1969	20.55	3.572	1.389		

Table 2 (continued)

Mine	Years	Ore (t)	Au (kg)		Ag (kg)	Cu (t)
			Bullion	Fine		
Golden Gusher (Mount McGuire Goldfield)	1936	35.56		0.280	0.156	
Golden Hill (Albert Creek area)	1940	3.20	0.176			
Grace Darling (Normanby Goldfield)	1873–1902	2157.50	50.180			
Hibernia (Normanby Goldfield)	1872–1873, 1891–1893	167.59	4.300			
Highland Mary (Normanby Goldfield)	1902–1903	58.93	5.700			
Hill Top Workings (Kelsey Creek Goldfield)	1941	7.11	0.409			
Homeward Bound (Marengo Goldfield)	1933–1934	205.24	57.432			
James Frankie Reef (Marengo Goldfield)	–1879	19.30	10.275			
Just in Time (Normanby Goldfield)	1873–1906	259.49	12.037			
La-di-da (Normanby Goldfield)	1873	11.18	0.291			
Lamington (Kelsey Creek Goldfield)	1898–1901, 1904–1907	418.49 (+117.35m ³ tailings)	12.832			1.02
Last Try (Mount Hector Goldfield)	1934–1935, 1939–1940, 1949	94.49	4.481	0.148	0.04	
Lionel Diggings (Strathalbyn Goldfield)	1880–1883		10.358			
Loch Neigh (Kelsey Creek Goldfield)	1941	12.00	0.567			
Lucky Strike (Mount McGuire Goldfield)	1962	4.57	0.062			
Marquis (Normanby Goldfield)	1872–1874, 1924	144.01	5.655			
Motley (Marengo Goldfield)	1935	20.93	0.796			
New Zealand (Normanby Goldfield)	1873, 1892–1893, 1898	187.24	7.984			
Perseverance	1876, 1898–1905	149.86	5.824			
Resurgam (Normanby Goldfield)	1923–1925	78.23	2.832			
Rosebud (Normanby Goldfield)	1890–1892	76.66	1.936			
Scorpion (Kelsey Creek Goldfield)	1935–1941	7.87	2.886			
Seymour's Reef (Marengo Goldfield)	1877, 1879	2.00	0.190			
Star of Hope (Normanby Goldfield)	1873, 1888–1894	426.21	21.979			
Three Hundred Ounce Patch (Marengo Goldfield)	–1879		9.330			
Tiger Rose (Mount Hector Goldfield)	1935	7.11	0.684			

Table 2 (continued)

Mine	Years	Ore (t)	Au (kg)		Ag (kg)	Cu (t)
			Bullion	Fine		
Tigers Mate (Marengo Goldfield)	1935	1.02		0.033	0.124	
Toomeys Reef (Marengo Goldfield)	1878–1879	12.19	0.407			
True Blue (Normanby Goldfield)	1892	39.12	2.082			
Union Jack (Normanby Goldfield)	1890–1891, 1897, 1906, 1920	128.46	1.349			
Unnamed 273802 (Mount Gordon area)	1931–1932, 1940	36.20	0.327	0.894	0.435	
Unnamed 301210 (Normanby Goldfield)	1873	30.48	0.700			
Unnamed 305206 (Normanby Goldfield)	1874	25.40	0.855			
Unnamed 307203 (Normanby Goldfield)	1874	3.05	0.187			
Venture (Normanby Goldfield)	1873, 1877	107.70	2.982			
Victor Tunnel (Normanby Goldfield)	1893–1897, 1902	197.61	4.607			
Welcome (Normanby Goldfield)	1872–1874, 1877–1896	301.81	17.940			
Welcome (Mount Gordon area)	1936	5.60	0.334			
Welcome Dick (Normanby Goldfield)	1890, 1892–1894	168.00	4.570			
Westwood Hill Reef (Marengo Goldfield)	–1937	60.96	0.933			
Young Crusader (Kelsey Creek Goldfield)	1940–1941	4.06	0.560			
TOTAL			394.337	1748.396	734.705	301.30

Table 3: Recorded brick clay, magnesite, rock phosphate and earthy lime production, North Connors study area

Mine	Years	Brick clay (t)	Magnesite (t)	Rock phosphate (t)	Earthy lime and lime (t)
Buchanan	1972-1978, 1997-2003, 2005-2007				41 353.4
Delta	1996-2004				39 098.8
Holbourne Island	1918-1922			2477.5	
Mookarra Earthy Lime	1952-1953				914.4
Mount Pring	-1918		102		
Parkers Lime	1974-1978				8075.2
Pindi Pindi Brickworks	1959-1977	82 345 (+4091m ³)			
Terryglen	1996-2003				20 122.5
TOTAL		82 345	102	2477.5	109 564.3

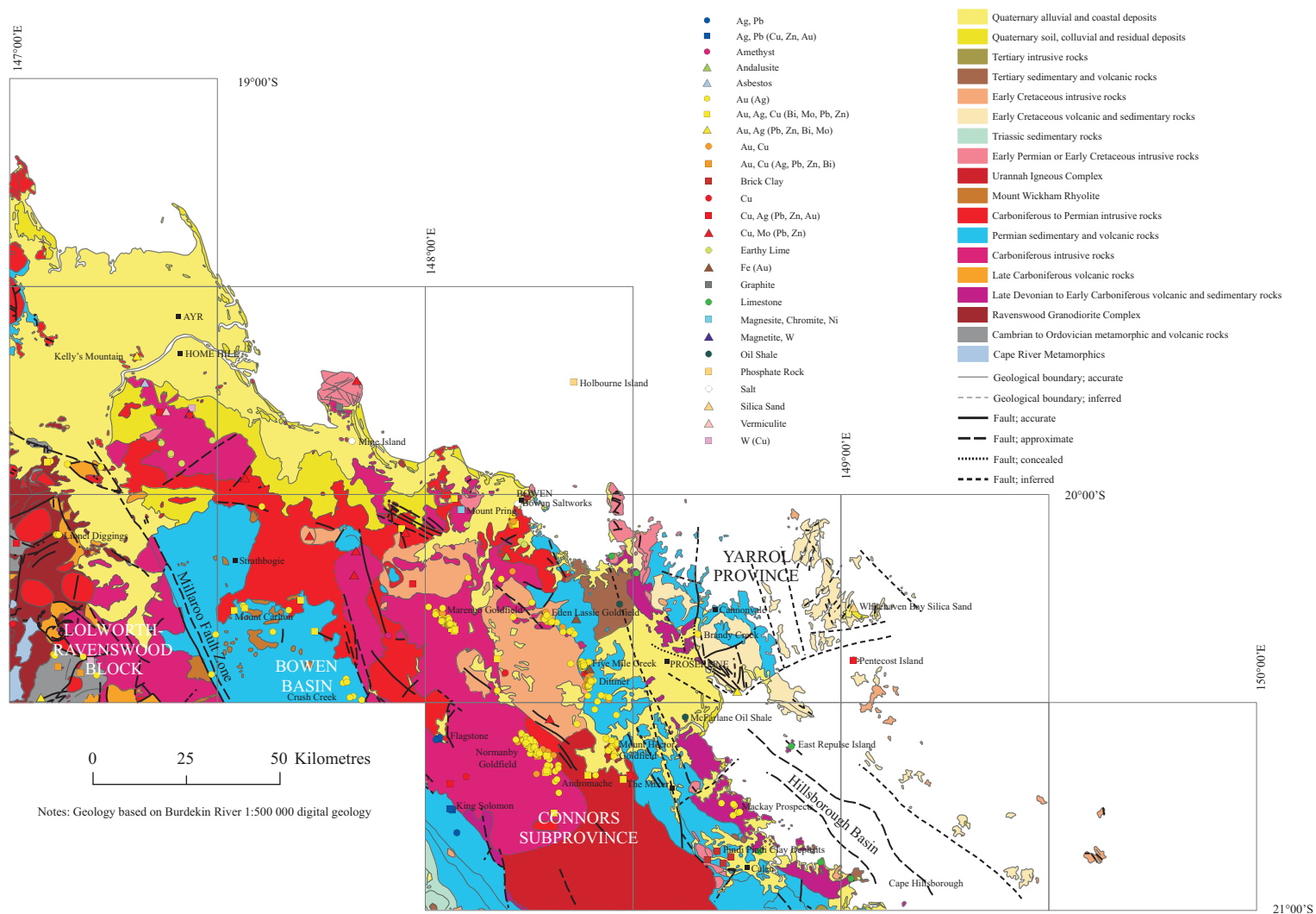


Figure 4: Mineral deposits by commodities, North Connors study area

(Tables 2 and 3). Mining has also been carried out for unrecorded amounts of amethyst, graphite, limestone, salt, lead-zinc and tungsten. Figure 4 shows the distribution of mineral deposits in the study area by commodities. Cu (t)

Mining commenced in the study area as early as 1870, with the discovery of gold lodes on the Marengo Goldfield. The Normanby, Kelsey Creek (Happy Valley) and Strathalbyn fields were also discovered in the 1870s. Silver-lead was mined at Flagstone Creek and Emu Plains in the 1880s. Gold was discovered at Mount Hector and Mount McGuire Eden Lassie) in the 1930s. Mining continued sporadically on most fields up until the end of the 1930s. The last major gold mine to close was the Duffer in 1971. Selective open cut mining and vat leaching were carried out at Andromache in 1981 and 1982 but did not prove economic. Buddha Gold Mines NL carried out alluvial gold mining along Five Mile Creek between 1987 and 1996.

Clay was mined for brick production at Pindi Pindi between 1934 and 1977.

The only current mining operations in the study area are earthy lime production at Buchanan (24.2km south-south-east of Home Hill) and the Delta Lease (27km south of Home Hill) and salt production by evaporation of seawater at Bowen.

The following description of the mining history of the North Connors study area is based in part on reports by Gregory (1969), Paine (1972) and Paine & Cameron (1972), supplemented by more detailed reports on individual mines and goldfields, as well as data compiled from Annual Reports of the Department of Mines.

AMETHYST

Amethyst crystals were found at *Binbee*, 43.5km east-south-east of Strathbogie Homestead, in the 1960s when the railway line was constructed. Fossickers have dug shafts and pits in two man areas (Horton, 1976). No production is recorded.

BRICK CLAY

Clay deposits at the old *Pindi Pindi* Brickworks were worked by Evans Firebrick Pty Ltd for firebricks and blocks from 1934 to 1938. Pindi Fire Bricks Pty Ltd produced building bricks in 1942 and 1943. A. Giaiotti reopened the plant as the Pindi Pindi Brickworks in 1951. This was sold to G. Fatseas in 1953 and to J.A. Bicton and S. Macken in 1955. A.R. Porter purchased the plant in 1958 and later traded as Clabrick Pty Ltd (Siemon, 1981).

Clabrick Pty Ltd produced building bricks, firebricks and fireblocks using clay and shale sourced from four locations in the Pindi Pindi area (Houston, 1967). In 1977, Clabrick was sold to Claybrick Industries Pty Ltd and the plant was moved to Glenella. The ruins of the brickworks can still be seen near the railway line on the north side of the Bruce Highway in Pindi Pindi.

COPPER

The only significant copper producer in the study area was the *Duffer* mine at Dittmer. Dittmer Gold Mines Pty Ltd produced 300.3t of copper between 1935 and 1947. Minor copper production has been recorded from the *Lamington* (Kelsey Creek Goldfield) and *Albion* (Marengo Goldfield) mines.

A prospector named Wilkie mined copper ore at *Euri Creek*, 45.0km east of Strathbogie Homestead, for about 4 years in the 1910s. A parcel of 5t was sent to Mount Morgan in 1914 but apparently was never treated.

EARTHY LIME

Earthy lime has been produced from several small deposits in the Home Hill and Bowen areas for local use as agricultural lime.

Parkers Lime deposit (K & D Lime), 33.5km south of Ayr, was worked by J. Morato from 1974 to 1978. J. Morato Enterprises Pty Ltd worked the nearby *Terryglen* (Plumtree Creek) deposit from 1996 to 2003. The lease has been held by B.M. Connolly since 2004 but no further production has been reported.

Earthy lime is currently mined at the *Buchanan* deposit in the headwaters of Wangaratta Creek, 24.2km south-south-east of Home Hill. Lime was produced by the Inkerman Lime Company from 1972 to 1978. W.D. & J. Helander Pty Ltd commenced production in 1997. The leases are currently held by G., R. and R.A. Tama.

Earthy lime is also currently produced from the *Delta* (Kirkie Lime) lease in the headwaters of Plumtree Creek, 27km south of Home Hill. The lease is held by A.J. and L.W. Oats.

Earthy lime has been mined at *Duck Creek* and *Mookarra Earthy Lime*, near Mookarra railway siding 10.5km south of Bowen and at Isavale, 16.5km south-west of Bowen.

GOLD±SILVER

Normanby Goldfield

The Normanby Goldfield (Figure 5) is 64km south of Bowen.

Sam Verge discovered gold in Green Creek, about 4.8km upstream from its confluence with Dart Creek, in 1872. He followed up these indications and discovered the Hibernia Reef, from which he got some gold in white quartz at the surface. Verge, McCartney and Duffey took up a prospecting claim over the Hibernia. The Marquis, Welcome, Star of Hope, Albion, Grace Darling and other reefs were taken up almost immediately (Jack, 1879).



Photo 1: Grace Darling mine, Normanby Goldfield

By November 1872, the township of Normanby was established and more than 100 diggers were on the field. By December 1872, 200 men were working alluvial and reef claims. By 1876, gold recoveries were decreasing as the reefs pinched out at depth or refractory sulphide ores were encountered below the water table. Many of the miners left for the Palmer and Charters Towers fields. The last battery on the field was dismantled and removed in 1878.

Interest in the field was revived in 1885, when outside capital was introduced from Charters Towers. The Normanby Goldfield was proclaimed on 28 January 1887. Many of the old mines on the Grace Darling – Welcome line were reopened. The Lady Norman battery, comprising ten head of 8cwt stamps, two shaking tables, two copper tables, four Berdan pans and a buddle, was erected at a site some 2km south of the township in 1889 and commenced crushing in 1890. A pump and winding gear were erected at the Grace Darling in 1891 and up to 19 men were employed at the mine. The Marquis Gold Mining Company commenced mining the Marquis lode in 1891 but the company was liquidated in 1892. Winding and pumping gear from the Marquis mine were erected at the Glengarry in 1892 but this mine flooded in 1894. By 1900, the Grace Darling had reached a depth of 60m, but a declining lode width and increasing sulphide content led to the closure of the mine in 1901. The Grace Darling was one of the major sources of local ore and the field now went into decline. A disastrous fire at the battery and a prolonged drought early in the century led to the virtual abandonment of the area in 1902 (Kinnane & Syvret, 1988). The population on the field averaged 100 from 1885 to 1902, with a maximum of 300 in 1891, when Normanby was a flourishing township (Morton, 1920).

Sporadic attempts to re-open the field have proved largely unsuccessful. The Grace Darling was promoted on the London market in 1905. The old battery was

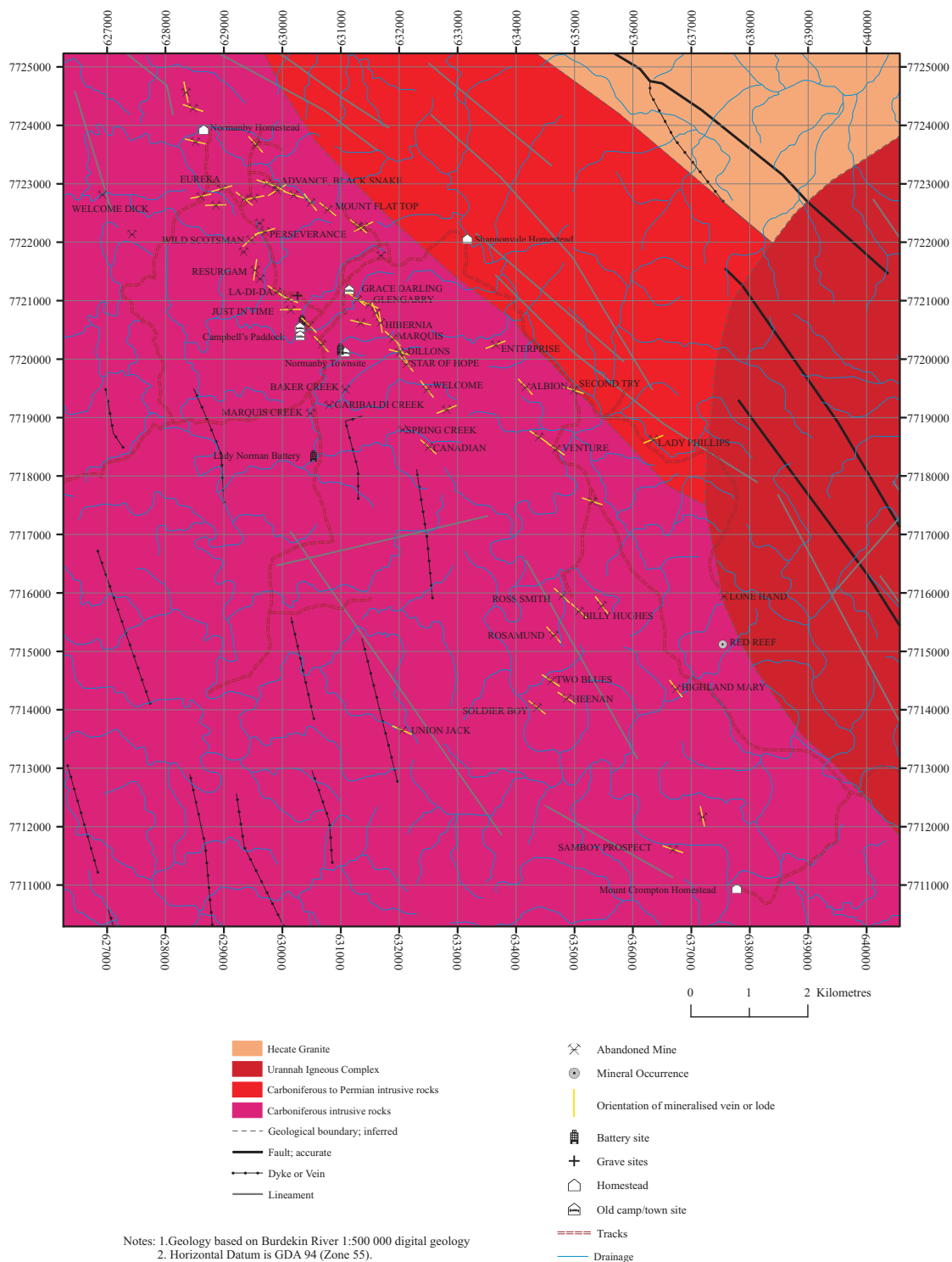


Figure 5: Normanby Goldfield



Photo 2: Remains of Lady Norman battery, Normanby Goldfield



Photo 3: Remains of winding gear, Resurgam mine, Normanby Goldfield



Photo 4: Remains of winding gear, Welcome mine, Normanby Goldfield

refurbished by Mr S. Thorpe and renamed the Revival. However, capital could not be raised and only two small mines, the Faith and Perseverance, maintained intermittent production. The battery was destroyed by a second fire in 1908 and these mines also closed (Kinnane & Syvret, 1988). The population of Normanby was 46 in 1910, the last official record reported. Total production from 1972 to 1906 was 206.283kg of gold from 7755.1t of stone crushed (Morton, 1920). At least 62kg of alluvial gold was also produced.

The Billy Hughes and associated reefs were discovered by P.F. Meredith in 1920 and a public company (the Billy Hughes Gold Mining Company NL) was formed to mine this and other reefs including the Two Blues, Heenan, Soldier Boy, Meredith (Venture), Resurgam, Grace Darling, Glengarry, Marquis, Perseverance and Union Jack (Frederick I). The battery was rebuilt and minor production was recorded from several small mines. The Resurgam mine was abandoned in 1926 and the Billy Hughes closed in 1927.

Some of the reefs were active during the Depression years of the 1930s (Kinnane & Syvret, 1988). The Second Try and Venture were prospected by B. Nolan in 1937 (Ridway, 1937b).

Prospecting work was carried out on the Albion reef by L. Breen and party in 1948 and by another party in 1966 (Levingston, 1966a, 1966b).

Attempts to reopen the Marquis mine in the 1960s were unsuccessful, resulting in the loss of life.

Mount Hector Goldfield

The Mount Hector Goldfield (Figure 6), 32km south-west of Proserpine, was mainly active in the 1930s. The Cedar Ridge mine, 3.2km east of Mount Hector Homestead, was the largest producer and operated from 1932 to 1939 (Ridgway, 1935a). The Gumoller, on the same vein, was a much smaller producer and was prospected and worked by A.C. Stevenson, S.C. Stevenson and J.N. Foale from 1937 to 1946 (East, 1946a, 1946b). T.J. Mee worked the Enterprise in 1935. The Last Try reef was worked intermittently from 1934 to 1949. G. Neilson and N. Oates produced some ore from the Tiger Rose in 1935.



Photo 5: Last Try workings, Mount Hector Goldfield

The Gap workings, in the headwaters of Birds Nest Creek, were held by Jephson, O'Sullivan and Paskins in 1935. Production was recorded up until 1941. The mine was called the Lady Linden when held by Jepson in 1961. In 1980, Euromet Ltd entered into a joint venture with Mineral Resources Development Company Pty Ltd to mine gold deposits on Mining Lease 495 "Andromache" which covered the old workings (Aurex Pty Ltd, 1985). In 1981 and 1982, Mineral Resources Development carried out selective open cut mining and vat heap leaching. Metallurgical problems led to the closure of the mine and liquidation of the company.

The Evening Star, 1.7km south of Cattle Vale Homestead, was worked by J. McGill in 1932. Ore was treated at the Evening Star Battery.

Marengo Goldfield

The Marengo Goldfield (Figure 7) was discovered in about 1870 and was opened up in 1871. Claims were taken up by working miners who lacked the funds to



Photo 6: Andromache workings, Mount Hector Goldfield

properly develop the reefs (Jack, 1879). The first battery erected was named the Venture and was commissioned in May 1871. The field was never officially proclaimed and never seemed to flourish. The mines were worked sporadically from 1871 to 1879. Chinese miners worked alluvial gold at Bee Creek.

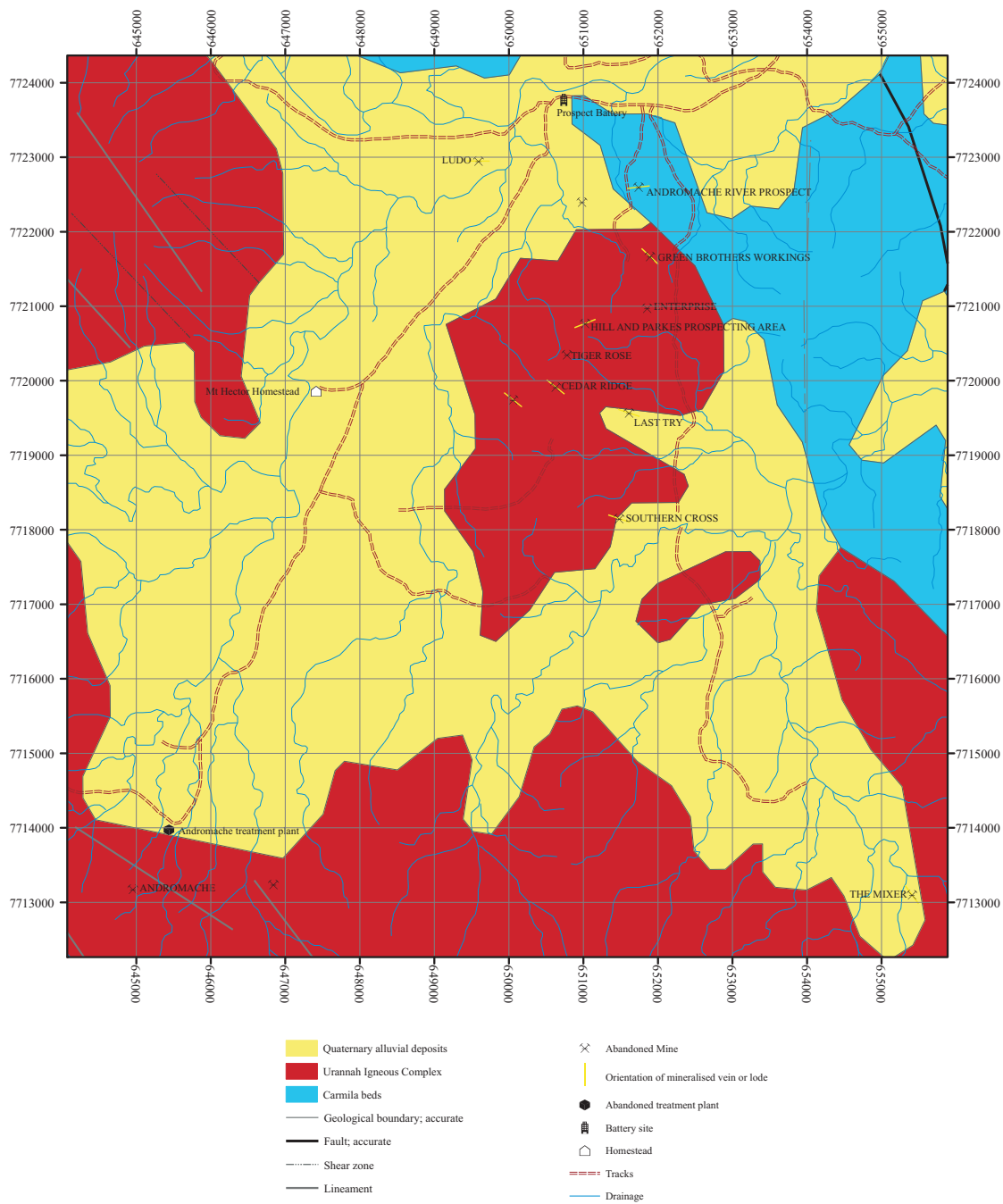
Some work was carried out at the Homeward Bound mine in 1910 and 1911. A minor increase in mining activity occurred in the mid-1930s. A five-head stamper battery was erected at the Homeward Bound in 1933 but the mine was abandoned in 1934 due to water influx. The Motley was worked by York and Claes in 1935. In the same year, B. Oldham sent ore parcels from the Tigers Mate mine to Chillagoe for treatment. J. Barry treated ore from the Westwood Hill Reef in 1937.

Kelsey Creek (Happy Valley/Dittmer) Goldfield

The first mines in the Kelsey Creek (Happy Valley) Goldfield (Figure 8) were opened up in the early 1870s. Alluvial gold was also mined in the early years.

The mines at Five Mile Creek (Happy Valley) were worked intermittently from the 1890s to the 1930s. The Golden Tunnel adit was driven 82m in 1885 to 1886. A single-head stamper battery was at the Golden Fleece (Iron Duke) mine from 1898 to 1900. A five-head stamper battery was erected at the Commonwealth mine at Happy Valley in 1907.

Buddha Gold Mines NL carried out alluvial gold mining along Five Mile Creek and the lower branches of Little Nuggety and Big Nuggety Gullies between 1987



Notes: 1. Geology based on Burdekin River 1:500 000 digital geology
 2. Horizontal Datum is GDA 94 (Zone 55).

0 1 2 Kilometres

Figure 6: Mount Hector Goldfield



Photo 7: James Frankie workings, Marengo Goldfield

and 1996. Processing was carried out at a plant at the downstream end of the mined area.

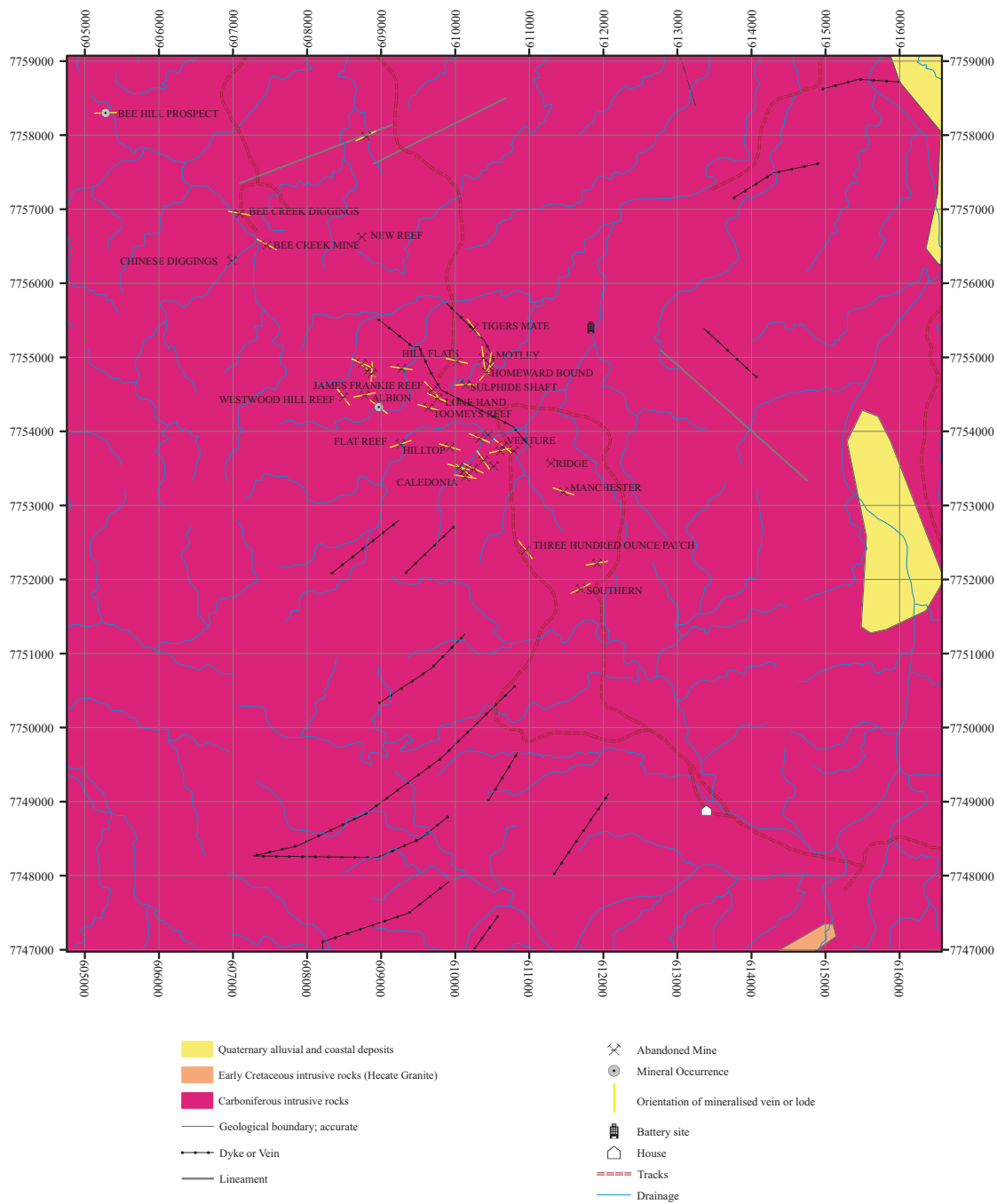
The *Lamington* lode, on La-di-da Creek 49.7km south-south-east of Bowen, was discovered in 1898 and worked by the New Lamington Gold Mining Company Ltd. A five-head stamper battery was erected in 1899 and excavation of the adits commenced in 1904. The battery was moved to its current site in 1907 and the mine was abandoned in 1910.

The *Duffer*, at the head of Kelsey Creek, was the largest gold producer on the field. It was discovered by the Thoroughgood and Sinclair brothers in 1934. Kelsey Creek Gold Mines Pty Ltd (later Dittmer Gold Mines Pty Ltd) took over the leases from the discoverers in 1937. The mine was worked continuously until 1948. Production from lower grade stockpiles and a small amount of new underground mining continued until 1951. The operation was abandoned in 1952. Stopping was carried out on a number of levels from several shafts and adits.

Intermittent mining was carried out by Clarke Spur Mining Company from 1968 until 1971. Mining was carried out at the nearby Golden Gem lode by J.L. Martin and party. Buddha Gold Mines NL dewatered the Dittmer mine in 1980 to carry out sampling. Alluvial gold mining has also been carried out in the area.

Mount McGuire Goldfield (Eden Lassie and Longford Creeks)

Mount McGuire is 35km south-east of Bowen and immediately north of Lake Proserpine (Figure 9). Several large quartz veins in the upper reaches of Eden Lassie and Longford Creeks were worked from 1930 to 1936. The main producers



Notes: 1. Geology based on Burdekin River 1:500 000 digital geology.
 2. Horizontal Datum is GDA 94 (Zone 55).

0 1 2 Kilometres

Figure 7: Marengo Goldfield



Photo 8: Adit at Dittmer (Duffer) mine, Kelsey Creek Goldfield

were the Golden Gusher, Crazy Cat, Anniversary, Lady Ellen, Birthday Gift and Top Camp.

The *Birthday Gift* was worked by Edwards, Voss and Newman from 1931 to 1935 (Morton, 1932a; Ridgway, 1935f). A two-head stamper battery and small cyanide plant were installed.

Mount Dangar

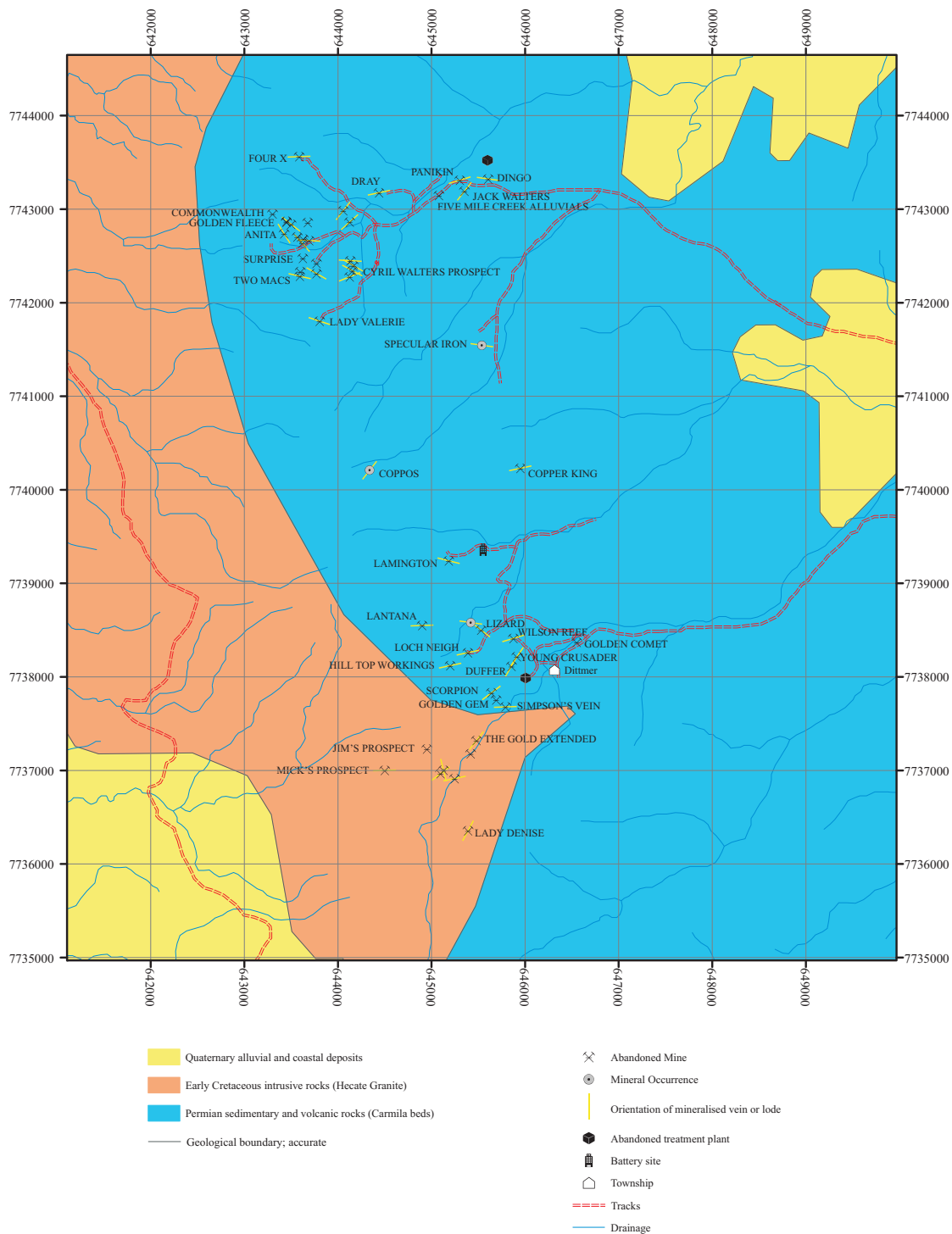
Rickert and party discovered gold at the *Armistice* lode, near Mount Dangar, in 1962. A trial crushing was sent to the Venus Battery in Charters Towers (Levingston, 1962).

Mount Gordon

Hocking and party mined the *Welcome* reef, 1.7km south of Mount Gordon, from 1935 to 1937.

Albert Creek area

The *Golden Hill* mine, 57km south-south-east of Bowen, was worked by Schultz and others in 1940. Doulen and party sank a shaft on the Golden Treasure in 1937.



Notes: 1. Geology based on Burdekin River 1:500 000 digital geology.
 2. Horizontal Datum is GDA 94 (Zone 55).



Figure 8: Kelsey Creek Goldfield

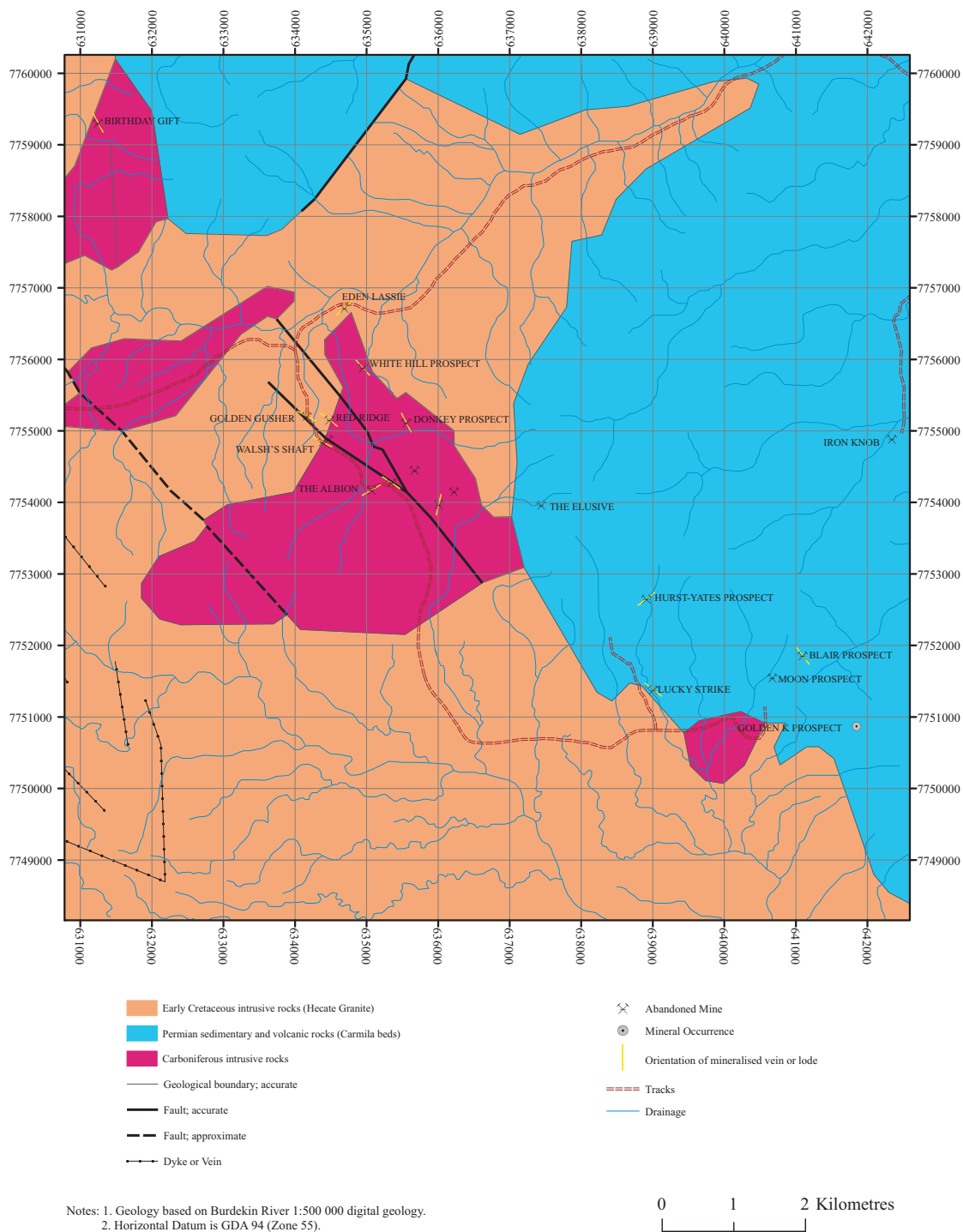


Figure 9: Mount McGuire Goldfield

Brandy Creek

A. Totley discovered gold–silver mineralisation at *Brandy Creek*, 10.6km north-east of Proserpine, in 1909. A shaft was excavated but payable ore could not be located (Saint-Smith, 1918b).

Breakfast Creek

Stone pitching along the banks of *Breakfast Creek* and its tributaries, 38.8km south-east of Ravenswood, and *Gold Creek*, 46.8km south-east of Ravenswood, indicates that these streams were worked historically for alluvial gold.

Strathalbyn Goldfield

The Strathalbyn Goldfield was gazetted on 10 June 1880. The *Lionel Diggings*, 21km north-west of Strathalbyn, were worked from 1879 to 1885. Spents Brothers' Strathalbyn Mill, comprising five head of 7cwt stampers, was on the field from 1881 to 1885 but was subsequently moved to the Croydon Goldfield. Known claims worked included the Cumberland PC (Bell and McAra), Cumberland No.1 (Norman and Johnson), Bonnet PC (Spent and party) and Bonnet No.1 (Johnson and party). Protection areas were worked by Grace and Lefenon, Peterson, Vicars and party and A. Spent.

GOLD-SILVER-COPPER±BISMUTH±MOLYBDENUM±LEAD±ZINC

Mount Carlton

In 1979, Cunningham and Firth sent two small shipments of hand-picked ore from *Mount Carlton* to Mount Isa. The material was mined from a small, oxidised shear zone on ML 231. The samples assayed 15.65% Cu, 1741g/t Ag and 6.0g/t Au and 0.32% Cu, 378g/t Ag and 40.4g/t Au (Ley & Gloyn, 1981).

GRAPHITE

A small low-grade graphite deposit, 10km south-south-east of Cape Upstart, was worked in the 1900s.

LIMESTONE

Mining leases were held over the *East Repulse Island* limestone deposit, 34.3km south-east of Proserpine, between 1909 and 1947 and attempts were made in 1911 to 1916 to work the deposit for agricultural lime. A small open cut was excavated into the western end of the deposit and an estimated 35.6t of broken limestone stockpiled (Simmonds & Tucker, 1960). Mining was unsuccessful due to difficulties with access, loading and the lack of a water supply on the island. No material appears to have been shipped from the island.

Limestone at *Ben Lomond Hill*, 26.4km south-east of Bowen, was discovered by E.J. Strange in ~1890. The Ben Lomond Limestone Syndicate held the deposit from 1915 to 1917. Trial testing showed the material could be burnt to produce good quality lime. Although 101.6t of limestone was at grass in 1917, no material was ever despatched from the site (Saint-Smith, 1918a).

MAGNESITE

Minor amounts of magnesite were produced from Mount Pring, 16.2km west of Bowen, up until 1918.

PHOSPHATE

The Holbourne Island Phosphate Company Ltd worked rock phosphate deposits on *Holbourne Island*, 34km east-north-east of Abbot Point, from 1918 to 1922. Material was dug by hand, bagged and transported using a 400m long tramline to a beach, where it was taken by punt to vessels for shipping to the coast. The material shipped graded 10.48 to 22.00% P₂O₅ and proved difficult to market (Saint-Smith, 1919c; Reid, 1944a; Young, 1944).

SALT

Salt has been produced by evaporation of seawater brines at Mine Island, 19.5km east-south-east of Cape Upstart. There are abandoned saltworks at this site but no record of the historical production.

The *Bowen Saltworks* were established in 1925 by the Bowen Salt Company. Cheetham Salt Ltd purchased the operation from Central Queensland Salt in 1981. Seawater is pumped into a series of evaporative ponds, increasing in salinity as it is moved through the pond system. The water is then moved to the crystallisation pond where salt crystals form and are then harvested.

SILICA SAND

The Bowen Mineral Company held dredging leases over the *Whitehaven Bay* silica sand deposits from 1962 to 1968 but was unable to obtain finance to develop them.

SILVER-LEAD±COPPER±ZINC±GOLD

Emu Plains Silver Field

Copper ore with a very high percentage of silver was discovered on the eastern bank of the Bowen River at Emu Plains in about 1888. Several claims were taken up and shafts were excavated, mainly on the *King Solomon* and *Queen Sheeba*



Photo 9: King Solomon workings, Emu Plains Silver Field

(Maitland, 1889; Cameron, 1902). Mining ceased in 1890. Production figures were not recorded.

Silver-lead veins were worked at *Tent Hill*, near the junction of the Broken and Bowen Rivers, probably around the same time as the King Solomon.

Flagstone

The *Flagstone* (Orchid, Rose and Thistle, Prosperity, Starlight) silver-lead mine was worked from 1888 to 1890. The size of the workings indicates that a considerable amount of work was carried out. The main shaft was reportedly 49m deep. No production has been recorded.

Bloomsbury area

The *Mixer* mine, 12km west-north-west of Bloomsbury, was first worked as the German Mission in about 1880. Silver-lead ore was packed to Bowen for shipment to Germany. J.B. Godkin worked the deposit for silver-lead-zinc as the Godkin mine in 1924 and 1925. Blair, Matthews and Retsel worked the mine for copper-lead-zinc as the Mixer in 1952 to 1954 (Cribb, 1954). Production from this mine has not been recorded.

TUNGSTEN

In 1947, the Six Mile Syndicate opened up workings to investigate the *Rangeview Scheelite* deposit, 46.1km south-east of Ravenswood. Although some hand-picked ore was produced, there is no record of it having been sold (Ridgway, 1947).



Photo 10: Flagstone workings

MINERALISATION

The study area contains known amethyst, andalusite, asbestos, bismuth, brick clay, chromite, copper, earthy lime, gold, graphite, iron, lead, limestone, magnesite, molybdenum, oil shale, phosphate rock, salt; silica sand, silver, tungsten, vermiculite and zinc mineralisation (Figures 4 and 10). Coal measures occur near Pindi Pindi but are not discussed in this report.

Table 4 lists known mineral resources and reserves within the study area. These total 44 505kg of gold, 1 510 990kg of silver, 125 512t of copper, 41 290t of zinc, 3850t of molybdenum, 373 400t of limestone, 4900 million barrels of oil (in oil shale) and 1.28Mt of Al_2O_3 (in andalusite). The study area also contains significant undefined resources of clay, earthy lime, limestone and silica sand.

The total known mineral endowment of the study area (based on recorded production plus known remaining resources and reserves) is at least 394.3kg of gold bullion, 46 253.4kg of gold, 1 511 724.7kg of silver, 125 813.3t of copper, 41 290t of zinc, 3850t of molybdenum, 373 400t of limestone, 4900 million barrels of oil (in oil shale), 1.28Mt of Al_2O_3 (in andalusite), 82 345t of brick clay, 102t of magnesite, 2477.5t of rock phosphate, and 109 564.3t of earthy lime.

The following description of mineralisation in the North Connors study area is based in part on reports by Gregory (1969), Paine (1972), Paine & Cameron (1972), Geological Survey of Queensland (1978) and Murray (1990a).

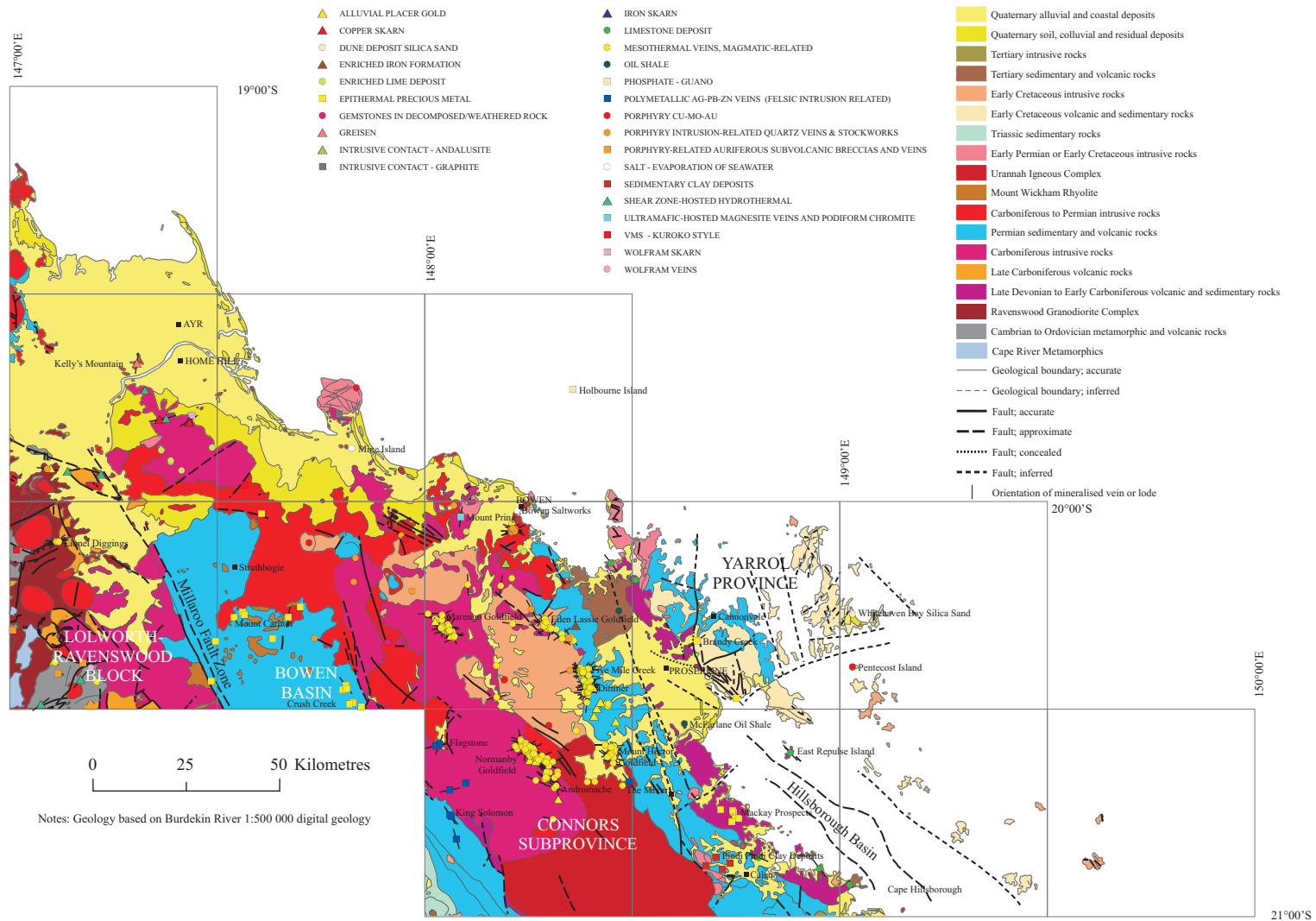


Figure 10: Mineral deposits by deposit model, North Connors study area

**Table 4: Known mineral resources and reserves,
North Connors study area, as at December 2008**

Deposit	Category	JORC compliant	Resource/reserve	Contained commodity	Reference
Ben Lomond Hill	Inferred	No	285 000t limestone	285 000t limestone	Australian Mining Engineering Consultants (1996)
Crush Creek (BV7)	Inferred	Yes	828 000t at 2.16g/t Au and 4.89g/t Ag	1788kg gold, 4048kg silver	Conquest Mining Limited (2006)
East Repulse Island	Inferred	No	88 400t limestone above high water mark	88400t limestone	Simmonds & Tucker, 1960)
Herbert Creek East	Indicated	Yes	351 000t at 2.17g/t Au and 4.2g/t Ag	761kg gold, 1474kg silver	Conquest Mining Limited (2007)
Julivon Creek Prospect	Inferred	No	35Mt at 0.16% Cu and 0.01% Mo.	54 600t copper, 3850t molybdenum	Leitch & Fletcher (1972)
McFarlane Oil Shale	Measured	Yes	12 900Mt at 65L/t oil	4800 million barrels oil	Southern Pacific Petroleum NL (2002)
	Indicated	Yes	100Mt at 63L/t oil	100 million barrels oil	Southern Pacific Petroleum NL (2002)
Mount Carlton	Indicated and inferred	Yes	966 000t at 1.35g/t Au, 38g/t Ag and 0.345% Cu	1304kg gold, 36 708kg silver, 3332t copper	Conquest Mining Limited (2007)
Mount Carlton – Western Lodes	Indicated and inferred	Yes	558 000t at 1.49g/t Au and 120g/t Ag	831kg gold, 66 960kg silver	Conquest Mining Limited (2007)
Mount Cavana	Inferred	No	~9.7Mt at 13.2% Al ₂ O ₃	1 280 400t Al ₂ O ₃	Clayton & Bichard (1988)
Silver Hill	Measured	Yes	9.2Mt at 2.0g/t Au, 72.0g/t Ag, 0.34% Cu and 0.24% Zn	18 400kg gold, 662 400kg silver, 31 280t copper, 22 080t zinc	Conquest Mining Limited (2008)
	Indicated	Yes	9.8Mt at 1.6g/t Au, 47.0g/t Ag, 0.27% Cu and 0.15% Zn	15 680kg gold, 460 600kg silver, 26 460t copper, 14 700t zinc	Conquest Mining Limited (2008)
	Inferred	Yes	4.1Mt at 1.4g/t Au, 68.0g/t Ag, 0.24% Cu and 0.11% Zn	5740kg gold, 278 800kg silver, 9840t copper, 4510t zinc	Conquest Mining Limited (2008)

AMETHYST

Amethyst and quartz crystals occur in vughs in the Thunderbolt Granite at *Binbee*, 43.5km east-south-east of Strathbogie Homestead. Crystals up to 20mm across and 5–30mm long have been found. The crystals exhibit two stage of growth, with clear to relatively deep amethyst coloured growth upon a stem of clear or milky quartz. Many of the crystals are fractured or contain sufficient inclusions to make them valueless (Horton, 1976).

ANDALUSITE

Andalusite-bearing quartzite crops out at *Mount Cavana*, 15.5km south of Bowen. The quartzite comprises very fine grained quartz, muscovite, andalusite and almandine garnet with fine-grained pyrite and is possibly a contact metamorphosed roof pendant in an area of Carboniferous to Permian intrusives. The deposit has been estimated to contain ~9.7Mt of quartzite grading 12–15% Al₂O₃ (average 13.2%) (Clayton & Bichard, 1988).

BRICK CLAY

Shale, mudstone and claystone of the Calen Coal Measures in the *Pindi Pindi* area were worked to supply brick clay to the Pindi Pindi brickworks up until 1977. There were clay pits adjacent to the brickworks, near the old Fleetwood Colliery (2.5km south-west of Pindi Pindi), within old Mining Lease 153 (3.7km west-north-west of Pindi Pindi) and within old Mining Lease 265 (6km west of Pindi Pindi). All of the old pits have been infilled.



Photo 11: Calen Coal Measures exposed in Pindi Pindi Clay Quarry

COPPER-SILVER±LEAD±ZINC±GOLD

Skarns

Copper mineralisation occurs in a magnetite-garnet-calcite skarn in Carboniferous granite at the *Bronze Queen* mine, 25.5km south of Ayr. Sampling by Spectrum Resources NL (1988b) returned up to 3.46% Cu and 40ppm Ag.



Photo 12: Calc-silicate skarn, Bronze Queen mine

Volcanogenic massive sulphides

The *Landers Creek Prospect*, 13.2km east of Ravenswood, is a stratabound Cu-Pb-Zn-Ag deposit hosted by tuffaceous rocks of the Mount Windsor Volcanics. A 0.1m thick zone of massive pyrite-galena-sphalerite is underlain by disseminated sulphides at the top of pyritic pyroclastics in a stratigraphic position equivalent to outcropping barite. Alteration comprises pervasive silicification and localised chloritisation and sericitisation and is not significant in the hanging wall and footwall tuffs.

Percussion drilling by Carpentaria Exploration Company Pty Ltd returned intersections of 0.1m at 1930ppm Cu, 3.39% Pb, 7.09% Zn and 24ppm Ag and 3m at 1.03% Pb. A 2.4m intersection averaging 2720ppm Cu, 905ppm Pb, 5005ppm Zn and 3ppm Ag included assay results of 1.12% Cu, 1.95% Zn and 6ppm Ag (Carpentaria Exploration Company Pty Ltd, 1980). Follow-up percussion and diamond core drilling returned several significant intersections but these results are currently confidential.

Porphyry intrusion-related quartz veins and stockworks

Quartz veins at *Euri Creek*, 45.0km east of Strathbogie Homestead, carry copper mineralisation (Saint-Smith, 1919a). Mineralisation occurs along vertical and 45° east dipping north-trending joint sets in greisenised and chloritised hornfels and granite and granodiorite of the Hecate Granite.

Drilling intersected average grades of 69.8m at 0.03% Cu and 91.2m at 0.2% Cu (including 11m at 0.93% Cu) (Boyd, 1976). Core drilling by Magnum Resources Ltd returned 90m at 0.3% Cu, 0.05g/t Au and 3.8g/t Ag from 9m (including 9.5m at 1.6% Cu, 0.2g/t Au and 15g/t Ag from 27.5m) (Shatwell, 1982).

COPPER-MOLYBDENUM±LEAD±ZINC

Porphyry Cu-Mo-Au

Copper, molybdenum, lead and zinc mineralisation occur in quartz veins and disseminated in dolerite and diorite dykes in Carboniferous granodiorite and granite at *Beaks Mountain*, 34km south-west of Cape Upstart. Alteration comprises silicification, sericitisation and propylitisation (chlorite-epidote). Otter Exploration NL carried out stream sediment and soil sampling, detailed mapping, percussion and core drilling, an IP survey and costeaning. Soil sampling delineated Cu-Pb-Zn and Mo anomalies. Drill cuttings assayed up to 2800ppm Cu, 2400ppm Pb, 3300ppm Zn and 500ppm Mo. IP anomalies were tested with the core holes but no economic mineralisation was intersected (Zerwick, 1973; Munoz, 1974).

Molybdenum and copper mineralisation are associated with shear zones and greisen alteration along the contact between Permian granite and mafic igneous rocks at *Kingfish Bay*, in the Cape Upstart National Park and 8.5km east of Cape Upstart. Exploration by Australian Selection Pty Ltd indicated that mineralisation is patchy and weak. Rock chip samples assayed up to 200ppm Mo, 120ppm Cu and 300ppm Zn (Appleyard, 1967).

Minor copper mineralisation and alunite-pyrite-pyrophyllite-silica alteration have been observed in quartz-feldspar porphyry of the Whitsunday Volcanics on *Pentecost Island*, 46.7km east of Proserpine. Samples assayed up to 525ppm Cu, 1570ppm Zn and 300ppm Pb (Paine, 1972).

Quartz veins and disseminated pyrite in granite and granodiorite at the *Otter Ridge (Mount MacKenzie)* prospect, 43.3km east-north-east of Strathbogie Homestead, were drilled by Otter Exploration NL. The intrusives were calculated to contain an average of 148ppm Cu, 21ppm Mo and 33ppm Zn (Burban, 1974).

The *Mount Abbot Prospect*, 19.5km east-north-east of Strathbogie Homestead, comprises a 'microbreccia' that is intensely chloritised, sericitised and argillised. It contains very fine-grained pyrite, magnetite, chalcopyrite, molybdenite, pyrrhotite and chalcocite, with minor native gold. Three angled core holes returned weighted copper analyses of 0.092% Cu, 0.074% Cu and 0.06% Cu.

Average Mo content was 25ppm and the highest gold assay result was 0.06ppm (Zerwick, 1975b).

The *Julivon Creek Prospect*, 58.5km south of Bowen, is a porphyry Cu-Mo system with fracture-controlled quartz-sulphide veinlets concealed by shallow soil cover. It is hosted by granodiorite and aplite of the Hecate Granite. Soil sampling by Carpentaria Exploration Company Pty Ltd delineated a 900m by 350m Cu-Mo anomaly. Drilling returned assay results of up to 5850ppm Cu and 4600ppm Mo (Leitch & Fletcher, 1972).

The *Emu Creek Lease*, 46.1km south of Bowen, comprises disseminated pyrite and chalcopyrite in two small microgranite intrusions of the Cretaceous Hecate Granite. Six bulk samples collected by Carpentaria Exploration Company Pty Ltd assayed <0.1% Cu (Bennett, 1972).

Porphyry intrusion-related quartz veins and stockworks

Extensive zones of anomalous copper (500 to 1300ppm) and >30ppm Mo correlate with microbreccia and quartz-sericite-pyrite alteration in the Mount Abbot Igneous Complex at the *Stockyard Creek Prospect*, 30.4km east of Strathbogie Homestead (Zerwick, 1975a). Malachite and molybdenite occur in outcrop and stream float.

The *Springs* prospect, 30.2km east of Strathbogie Homestead, comprises an argillic-sericitic-pyritised, quartz-veined quartz-feldspar porphyry and porphyritic microgranite with minor Cu and Mo mineralisation. A sample of a gossanous vein collected by Otter Exploration NL assayed 0.26% Cu, 0.014% Mo, 0.2% Pb and 0.24% Zn (Zerwick, 1974).

EARTHY LIME

Weathering of dolerite dykes and epidote-chlorite altered Carboniferous granite in the *Plumtree Creek* and *Wangaratta Creek* areas, south of Ayr, has produced earthy lime deposits beneath black soil cover. Gypsum rosettes are associated with the mineralisation. Named deposits include Buchanan, Delta, Parkers Lime, Stockyard Creek and Terryglen.

Dolomite and small concretions of clayey lime occur in the weathering profile over Carboniferous to Permian diorite or gabbro at *Mookarra*, 10.7km south of Bowen, and at *Isavale*, 16.5km south-west of Bowen. A sample from Mookarra assayed 48.0% lime, 3.5% magnesia, 3.3% siliceous insolubles and 41.5% loss on ignition (Connah, 1958).



Photo 13: Earthy lime formed by weathering of dolerite dyke, Buchanan

GOLD±SILVER

Mesothermal veins

Gold-bearing, euhedral buck quartz-pyrite veins at the *Lionel Diggings*, 21km north-west of Strathalbyn, are hosted by granite of the Ravenswood Granodiorite. Vein-controlled silicification and sericitisation are evident. The 0.1–0.2m wide veins trend 060–090° and were mined to depths of ~30m.

Rhyolite, dacite and tuff of the Mount Windsor Volcanics host gold-bearing quartz veins and stockworks at the *Sullivans Reward (Six Mile Bore) Prospect*, 49.9km south-east of Ravenswood. Vein-controlled silicification and sericitisation are associated with the mineralisation. Stream sediment BLEG sampling by Danamore Pty Ltd outlined a 1000m by 750m area with high significant gold results, corresponding to an ?argillised zone recognised from aerial photography. Soil sampling delineated a number of zones of coincident Au-Ag-Cu anomalism. Rock chip sampling returned up to 26.5g/t Au from outcrops of volcanics with quartz veining. Costeaning returned intervals of 4m at 0.125g/t Au, 20m at 0.04g/t Au, 2m at 0.21g/t Au, 4m at 0.1g/t Au and 2m at 0.15g/t Au (Barr, 1996). Drill testing returned intersections including 2m at

0.87g/t Au from 20m, 4m at 0.52g/t Au from 44m, 2m at 0.31g/t Au from 90m, 2m at 0.27g/t Au from 58m, 6m at 0.17g/t Au from 22m and 6m at 0.11g/t Au from the surface (Barr & others, 1997).

The *Armistice* lode, near Mount Dangar 25km south-south-west of Bowen, comprises quartz veining in the chloritic, sheared footwall of a diorite dyke in Carboniferous granite (Levingston, 1962). The lode strikes 170° and dips 80° to the west. Gold is associated with vughs and iron oxide stringers in quartz. Rock chip samples collected by Agip Australia Pty Ltd assayed up to 17.3g/t Au and 305ppm Cu (Agip Australia Pty Ltd, 1980).

A small gold-quartz vein at *Mount Gordon*, 6.0km south-south-west of Bowen, is hosted by Carboniferous to Permian granite.

A gold-bearing buck quartz vein at *Pharlap*, near the junction of Spring Creek and The Don River 51km south of Bowen, is adjacent to a diorite dyke in sericitised Carboniferous granite and microdiorite. The vein strikes 068°. Rock chip sampling by Kennecott Explorations (Australia) Ltd returned up to 28g/t Au and 192g/t Ag (Carman, 1988).

The *Silver Wattle* reef, on the north-western slope of Mount Quondong 54.4km south-south-east of Bowen, strikes 000° and dips 70° to 80° to the west. It is hosted by andesite, tuff and breccia of the Carmila beds. There is an apparent association of higher gold grades with porphyry dykes (Ridgway, 1941e).

High sulphidation epithermal veins

Minor subeconomic gold-silver mineralisation of possible high sulphidation epithermal affinities occurs in a shear zone along the margins of a diorite dyke in andesite of the Whitsunday Volcanics at *Brandy Creek*, 10.6km north-east of Proserpine. Ore samples collected in 1909 assayed up to 32.27g/t Au and 489.8g/t Ag. However, samples collected in 1918 contained no gold or silver (Saint-Smith, 1918b). Mineralisation would appear to be patchy. Higher grades are due to surface enrichment and decline rapidly with depth.

A 3km long by up to 45m wide shear zone that is exposed on *Conway Beach*, 19.2km east-south-east of Proserpine, also represents high sulphidation epithermal mineralisation in interbedded rhyolites, quartz-feldspar porphyry and tuff of the Whitsunday Volcanics. The zone is silicified and pyritised. Rock chip samples collected by Cyprus Mines Corporation assayed up to 0.12ppm Au, 2.2ppm Ag, 220ppm Cu, 3440ppm Pb and 450ppm Zn (Twitchel, 1969).

High sulphidation epithermal mineralisation occurs at the *Mackay prospects*, 28–36km north to north-north-west of Calen. CRA Exploration Pty Ltd discovered these prospects from a pronounced gold stream sediment anomaly in 1988 and carried out extensive exploration, including mapping, stream sediment, soil and rock chip sampling, ground magnetic, IP, resistivity and electromagnetic surveys and percussion and diamond core drilling up until 1992.



Photo 14: Outcrop of silicified and pyritised volcanics, Conway Beach

Mineralisation comprises quartz vein stockworks and breccias in pervasively silicified, pyritised and intensely argillised andesite, basalt, volcanoclastic rocks and quartz porphyry of the Campwyn beds. Quartz textures include comb and colloform quartz. Vein minerals include native gold, pyrite, sphalerite, galena and chalcopyrite. The vein systems crop out as leached caps with small gossanous zones.

Specks of gold were panned from soils and rock chip samples assayed up to 10ppm Au and 373ppm Ag (Muggeridge & Promnitz, 1990). Drilling at the Mackay 37 Prospect returned 13.85m at 0.288% Zn from 55.15m, 1.5m at 0.445% Zn from 43m, 1m at 0.16ppm Au from 37m and 2.25m at 0.105ppm Au from 14.8m. Drilling at the Mackay 58 Prospect returned 1m at 2.71ppm Au from 21m and 28m at 0.25ppm Au from 34m (including 11m at 0.38ppm Au). Drilling at the Mackay 62 Prospect returned 5m at 1.97ppm Au from 41m, 0.45m at 5.36ppm Au and 154ppm Ag from 26m and 10.4m at 1.11ppm Au and 46.1ppm Ag from 36m (Muggeridge & Mutton, 1991).

Low sulphidation epithermal veins

A number of quartz vein prospects of probable low sulphidation epithermal type occur in the Lizzie Creek Volcanics east of the Burdekin River and north of the Bowen River in the Strathbogie area.

Epithermal quartz veins and breccias are hosted by the Lizzie Creek Volcanics (or possibly the Mount Wickham Rhyolite) in the Millaroo Fault Zone at the *Boundary Prospect*, 68.5km east-south-east of Ravenswood. The prospect is held by Conquest Mining Ltd and exploration results are confidential.

Rhyolitic and quartz-feldspar crystal tuffs of the Lizzie Creek Volcanics host epithermal quartz vein and breccia mineralisation at the *Quartz Hill Prospect*, 72.3km east-south-east of Ravenswood. Quartz and chalcedony display colloform, crustiform and saccharoidal textures, as well as replacement of bladed calcite. Alteration comprises silicification and argillisation. Adularia is present.

BP Australia Gold Pty Ltd identified an area of intense clay alteration with 1–2m zones of silicification and brecciation extending over a strike length of 1700m at the *Powerline Prospect*, 21.7km south-south-east of Strathbogie Homestead. The veins and alteration are hosted by andesite, tuffs, conglomerate and lavas of the Lizzie Creek Volcanics intruded by the Mount Wickham Rhyolite. Quartz textures include cryptocrystalline and banded silica, comb quartz, massive milky quartz and recemented quartz vein breccia. The best drilling intersection was 8m at 0.75ppm Au from 16m (Walker, 1985).

Menzies Gold NL applied for mining leases over the prospect in 1987. Aberfoyle Resources Ltd carried out percussion drilling under a joint venture. The best intersection was 1m at 0.16g/t Au (Adams & Hesper, 1990). The results of more recent exploration by Gold Fields Australasia Pty Ltd and Conquest Mining Ltd are confidential.

CRA Exploration Pty Ltd and Basin Gold Pty Ltd delineated a number of epithermal quartz vein and breccia prospects along the Clarke Range in the Crush Creek area, south-east of Strathbogie Homestead in the late 1980s, including the *Beta*, *Bowhunters*, *BV1*, *BV5*, *Crush Creek (BV7)*, *Delta* and *Ortiz (BV13)* prospects.

Crustiform, colloform, cockade and brecciated quartz-chalcedony-adularia-carbonate veins host gold and minor sulphide minerals. Veins occur in the Lizzie Creek Volcanics and associated trachyte/rhyolite domes. The andesitic volcanics and volcaniclastics of the Lizzie Creek Volcanics are silica flooded and propylitised (epidote-chlorite alteration). Veins are commonly spatially associated with and may replace coarse, possibly mesothermal carbonate veins. Systems typically enlarge into variably brecciated and chalcedonic veined, moderately intensely silicified sheets at shallow depths (Leah & Mutton, 1988). Individual veins and breccia systems are up to 350m long and 40m wide and are resistant to erosion, forming low ridges.

Drilling returned intersections including:

- Bowhunters — 6m at 1.18ppm Au and 18ppm Ag from 10m, 8m at 0.93ppm Au and 2ppm Ag from 32m (including 2m at 1.58ppm Au from 34m) and 32m at 0.21ppm Au from 32m (including 8m at 0.36ppm Au from 44m) (Leah, 1990).
- BV1 — 2m at 0.35g/t Au from 6m, 14m at 0.12g/t from 44m (including 2m at 0.3g/t Au from 52m), 96m at 0.16g/t Au from surface (including 2m at 2.12g/t Au from 54m), 114m at 0.6g/t Au from surface (including 6m at 5.88g/t Au from 10m and 6m at 2.75g/t Au from 96m) (Leah & Mutton, 1988).
- BV5 — 2m at 0.12g/t Au from 8m and 4m at 0.11g/t Au from 52m (Leah & Mutton, 1988).
- Crush Creek (BV7) — 3m at 2.29ppm Au from 74m, 26m at 0.63ppm Au from 159m and 16m at 1.02ppm Au from 124m (Leah & Mutton, 1988).
- Ortiz (BV13) — 16m at 4.0g/t Au from the surface (including 4m at 14.9g/t Au from 4m), 4m at 0.5g/t Au from 14m (including 2m at 3.2g/t Au from 26m, and 8m at 6.4g/t Au from 1m (including 1m at 1.4g/t Au from 1m and 5m at 9.8g/t Au from 4m) (Leah & Mutton, 1989).

Conquest Mining Ltd has delineated an inferred resource of 828 000t at 2.16g/t Au and 4.89g/t Ag for the Crush Creek (BV7) prospect (Conquest Mining Limited, 2006).

The *Mount Dillon Prospect*, 15.3km north-north-east of Strathbogie Homestead, comprises subhorizontally bedded pyrite, clay and silica altered dacitic to rhyolitic pyroclastics with mineralised quartz veins. Ashton Mining Ltd drilled eight reverse circulation holes that returned intersections including 24m at 0.36g/t Au (including 8m at 0.49g/t Au) and 18m at 0.34g/t Au (including 8m at 0.49g/t Au). Silver was uniformly low (Ashton Mining Limited, 1989).

Alluvial and eluvial deposits

Alluvial/eluvial gold has been mined at the *Last Chance* (40.5km south-west of Ayr), *Breakfast Creek* (38.8km south-east of Ravenswood), and at Gold Creek (46.8km south-east of Ravenswood).

Most of the creeks and gullies in the main part of the *Normanby Goldfield*, 64km south of Bowen, were mined for alluvial gold, including Baker, Garibaldi, Marquis and Spring Creeks. Alluvial mining has also been carried out along stretches of Grant Creek. Grades in the lower reaches of the creek are uneconomic (Cherry, 1993).

Colours of gold have been panned from *Goorganga*, *Paradise*, *Albert* and *Gold Creeks*, 61km south-south-east of Bowen (Fuller & Hoskings, 1981; Smith, 1990).

Alluvial gold has been worked in the headwaters of *Bee Creek* in the Marengo Goldfield, 38km south-west of Bowen. The gold may be sourced from lag remaining from lateritic conglomerates that may have covered the nearby

tableland (Hall, 1994). Alluvial gold was also worked at the *Three Hundred Ounce Patch* at Marengo.

Alluvial gold has been mined along *Five Mile Creek* and the lower branches of Little Nuggety and Big Nuggety Gullies at Happy Valley in the Kelsey Creek Goldfield, 46km south-south-east of Bowen.

Alluvial mining has been carried out at the *Golden Comet* mine on Kelsey Creek, downstream from the Duffer mine, and in tributary gullies at Jims Prospect.

GOLD-SILVER-COPPER±BISMUTH±MOLYBDENUM±LEAD±ZINC

Porphyry intrusion-related quartz veins and stockworks

Gold occurs with sulphides in quartz veins and stockworks in the Ravenswood Granodiorite at the *Triple Chance*, 50.5km south-west of Ayr. Samples of dump material have assayed up to 4ppm Au and 3650ppm Cu (Watters, 1988). Rock chip samples collected by Sons of Gwalia Ltd assayed 1.35–11.7g/t Au, with elevated Cu and Zn (Porter, 1994).

Matrimony Ridge, 42.6km east-north-east of Strathbogie Homestead, comprises quartz veins and breccia hosted by silicified, sericitised and propylitised, Permo-Carboniferous granite, granodiorite and dacite. Rock chip samples collected by Western Mining Corporation Ltd assayed 6.3–16.8g/t Au (Peters & others, 1989).

The *Birthday Gift*, 27.2km south of Bowen, is a vein/breccia lode that trends south-east. It crops out as an iron oxide gossan. Mineralisation comprises gold, pyrite, chalcopyrite and bornite in a quartz-siderite gangue. Copper carbonates occur in the oxidised zone.

There are two quartz veins. The “North–South Vein” strikes 140° and dips steeply north-east. It is lenticular and was payable over a 24m length, 2.7m width and to 15.24m depth. The “East-West Vein” strikes 030° and dips steeply to the north-west. It was payable over a 6.7m length, 0.9m width and to 9.14m depth. The main source of production was the intersection of the veins (Ridgway, 1935f). The veins are hosted by Carboniferous diorite <100m from the contact with the Cretaceous Hecate Granite.

The *Murderer's Creek Reef*, 47.6km south-south-east of Bowen, is a 100m long by 0.15m wide gossanous quartz vein system that strikes 065° and dips 70° to the south-east. The comb quartz vein contains pyrite, chalcopyrite, malachite and iron oxides and is hosted by microdiorite and granite of the Cretaceous Hecate Granite. A second reef reportedly crops out 300m east of the main historically worked vein. A reef sample assayed 150mm at 35g/t Au and 43g/t Ag (Morton, 1921a).

Spaghetti City, 17.7km west of Bowen, is a 1000m long by 0.5–2m wide gossanous quartz vein with malachite and pyrite. It is hosted by Carboniferous

diorite. Rock chip and dump samples assayed up to 13.2g/t Au, 125ppm Ag, 2950ppm Cu, 250ppm Pb, 160ppm Zn, 11ppm Mo and 10ppm As (Peters & others, 1989).

Gold-copper-quartz veins occur in shear zones 2km south of *Mount Gordon* and 7km south-south-west of Bowen. Individual veins are up to 120m long, 0.15–2.4m wide and were historically worked to depths of up to 15m. They strike north-east, east and south-east, with steep dips. Veins comprise euhedral buck and comb quartz with pyrite, malachite and azurite. The host rocks are Carboniferous to Permian granite, biotite granite, hornblende diorite, gabbro and quartz monzonite. Veins are associated with a diorite porphyry and dolerite dyke swarm. Vein-controlled silicification and propylitic (chlorite-epidote) alteration are common. Western Mining Corporation carried out geological mapping and sampling of the veins and associated workings. Better assay results ranged from 3.8–69.8g/t Au (Peters & others, 1988).

Porphyry-related auriferous subvolcanic breccias and veins

The *Mount Glenroy Prospect*, 42.2km south-south-east of Ravenswood, comprises gold, pyrite, arsenopyrite, chalcopyrite, galena and molybdenite in veins and breccia hosted by silicified, pyritised and sericite-chlorite altered rhyolite and dacite of the Mount Windsor Volcanics intruded by porphyry of the Mount Wickham Rhyolite.

Small breccia pods are aligned along a 025° trend that is interpreted as a major regional structural feature (Harris, 1999). The breccias comprise hydrothermally brecciated clasts of porphyritic rhyolite, quartz and dolerite (Mount Windsor Volcanics) close to the contact with the Mount Wickham Rhyolite. The Mount Wickham Rhyolite is crackle brecciated and fine-grained at the margin. Pervasive quartz-sericite-pyrite alteration occurs in the breccia. Mineralisation occurs as matrix-cavity infill and comprises quartz-carbonate gangue and pyrite-chalcopyrite±sphalerite-galena-arsenopyrite. Earlier vein mineralisation comprising quartz-pyrite-molybdenite occurs in porphyry clasts. Drilling by Dalrymple Resources NL returned an intersection of 4m at 0.241g/t Au from 274m (Shepherd & others, 1997).

Although no significant mineralisation has been found at Mount Glenroy, the mineralising system is analogous to Mount Leyshon and warrants further exploration (Harris, 1999).

The *Pinnacle (Old Rangeview) Prospect*, 44km south-east of Ravenswood, is another breccia system hosted by the Mount Windsor Volcanics and a Carboniferous intrusive/extrusive complex of granite, diorite, dacite porphyry, rhyolitic-dacitic tuff and ignimbrite (Washburn, 1996). The prospect is a prominent, 10km by 2km, arcuate, east-trending Landsat and aeromagnetic feature. Stream sediment sampling by Hunter Resources Ltd delineated a 3km long zone with up to 10.3ppb Au. Soil sampling indicated that the anomalism is sourced from a 50 by 100m zone of silica-pyrite altered ignimbrite (Hunter, 1988).

Breccia samples collected by Danamore Pty Ltd assayed up to 0.41g/t Au. Reverse circulation drilling to test the breccia zone did not return any significant results (English, 1995).

The *Three Peaks* prospect, 26.5km south-south-east of Ravenswood, is a multiphase magmatic/hydrothermal breccia pipe of probable Permo-Carboniferous age that intrudes metasediments of the Mount Windsor Volcanics and the Ravenswood Granodiorite (Wilde, 1996). Angular to rounded polymictic clasts are altered to quartz-sericite (Kalnejals, 1970). Gangue minerals include pyrite, quartz, chalcedony and alunite. Comb quartz veining occurs in the breccia. Test drilling intersected 1–10% pyrite but assay results for Au, Ag and base metals were low (Wilde, 1996).

The *Moon Prospect*, 36.6km south-south-east of Bowen, comprises three intrusive breccia pipes in rhyolitic tuff of the Carmila beds. Sericitic alteration halos around the pipes are cut by faulting. Mineralisation consists of pyrite, chalcopryrite, quartz and calcite. Drilling by Itahira Pty Ltd intersected 1m at 0.2ppm Au (John & others, 1981).

Low sulphidation epithermal veins

Gold, silver and copper mineralisation occur in a zone of chalcedonic veining, brecciation and clay-silica and quartz-sericite-pyrite alteration in quartz porphyry rhyolite at the *Strathmore Prospect*, 19.8km south-east of Strathbogie Homestead (Ley & Gloyn, 1981).

High sulphidation epithermal veins

Gold, silver and copper occur in advanced argillic high sulphidation epithermal systems at *Mount Carlton*, *Herbert Creek East* and *Silver Hill*, 44km north-west of Collinsville. These prospects form Conquest Mining Ltd's Mount Carlton Project, with combined resources of 42 716kg gold, 1 506 942kg silver, 70 912t copper and 41 290t zinc (Table 4).

Gold, chalcopryrite, sphalerite, galena and pyrite occur with quartz and chalcedony in veins and breccia zones hosted by silicified, argillised and alunited rhyodacitic rocks in cryptodomes that are part of the Lizzie Creek Volcanics. Colloform banded, comb and replacement quartz textures are evident. The veins strike east-west and dip north at moderate to steep angles. Veins at Mount Carlton are offset by north-north-east-trending faults.

Mesothermal veins

Gold-bearing mesothermal quartz and quartz-calcite-siderite-ankerite veins, stockworks and quartz-carbonate matrix breccias in the *Normanby Goldfield*, 64km south of Bowen, crop out as brown, iron-stained honeycomb quartz ('brownstone') in silicified, sericitised and chlorite-epidote altered hornblende-feldspar diorite, quartz diorite, granodiorite, granite, microdiorite, microgranite, pegmatite, andesite and dolerite of the polyphase Carboniferous to Cretaceous Urannah Igneous Complex and in roof pendants of hornfelsed,



Photo 15: Quartz vein in diorite, Just in Time reef, Normanby Goldfield

metamorphosed lithic sandstone, argillite, tuffaceous sediments and schist of probable Carboniferous–Permian age. Many of the veins are associated with shear zones along the margins of fine-grained diorite and porphyry dykes. One mine is hosted by the Hecate Granite. The auriferous veins appear to be the youngest component of a complex succession of rock types (Morton, 1921a).

The veins have a Au-Ag-Pb-Cu-Bi-Zn mineral assemblage with native gold, pyrite, chalcopyrite, galena, sphalerite, malachite, azurite, cerussite, arsenopyrite and bismuthinite. Gold occurs in irregular shoots. Most gold occurs in pyrite; free gold is associated with bismuthinite. Quartz gangue exhibits euhedral buck, anhedral buck, laminated, ribbon, brecciated and comb textures. Individual mineralised sections are 15–380m long, 0.1–30m wide (generally 0.15–0.3m wide), and were worked to depths of up to 68m. The depth of oxidation is ~27m.

Most lodes trend east-south-east to south-east and dip 45° to 90° to the north-east (Figure 5). These lodes form some prominent mineralised zones such as the Grace Darling – Welcome line (2300m long) and Black Snake – Mount Flat Top line (1800m long) and were the most significant producers on the field. Other veins form a set striking 050° to 070° and dipping 70° to 90° north-west. These include the Rosebud–Advance line (600m long) and Wild Scotsman – Perseverance line (300m long).

The major producing veins of the Grace Darling – Welcome, Black Snake – Mount Flat Top and Rosebud–Advance lines are held by N. Mather under MDL 206. Acapulco Mining NL has been exploring these veins, particularly the Mount Flat Top stockworks, under EPM 11343. Exploration results are currently confidential.



Photo 16: Rosamund reef, Normanby Goldfield

Gold-bearing mesothermal quartz and quartz-calcite veins and stockworks in the *Mount Hector Goldfield*, 32km south-west of Proserpine, crop out along gossanous ridges in silicified and sericitised biotite granite, hornblende diorite, microgranite, andesite and pegmatite of the multiphase Carboniferous to Cretaceous Urannah Igneous Complex and hornfelsed volcanic rocks, agglomerate and rhyolite of the Early Permian Carmila beds. Many of the veins are associated with shear zones along the margins of microdiorite and andesite porphyry dykes.

The veins have a Au-Ag-Pb-Cu-Bi-Zn mineral assemblage with native gold, pyrite, chalcopryrite, galena, sphalerite, malachite, azurite, chrysocolla, bismite and bismutite. Quartz gangue exhibits euhedral buck, laminated, brecciated and comb textures. Individual mineralised sections are 15–750m long, 0.1–6m wide, and were worked to depths of up to 23m. Most lodes trend 120° to 125° and dip either near-vertically or gently to the south-west (Figure 6). Others strike 070° to 100° and dip steeply south or at shallow angles to the north or south.

Gold-bearing mesothermal quartz veins at the *Grass Humpy Prospect*, 83.4km south of Bowen, are hosted by argillised and silicified Palaeozoic metasedimentary and metavolcanic rocks and by late Carboniferous granodiorite, pegmatite and andesite dykes. Gold occurs with pyrite, galena and chalcopryrite in euhedral buck quartz veins over a strike length of 1500m and width of 1m. Veining strikes 090° to 100° . Rock chip samples assayed up to 8.6g/t Au, 48g/t Ag and 13.8% Pb (Cherry, 1988).

Gold-bearing mesothermal quartz and quartz-calcite-siderite veins, stockworks and breccias in the *Marengo Goldfield*, 37km south-south-west of Bowen, crop



Photo 17: Flat Reef, Marengo Goldfield

out as gossanous quartz in shear zones in silicified, sericitised and chlorite-epidote altered granite, microdiorite, microgranodiorite, monzogranite, hornblende diorite, andesite, schist (sheared chloritised diorite) and granodiorite of probable Carboniferous age. Minor argillic and potassic (selective alteration of hornblende biotite) alteration are also evident.

The veins have a Au-Ag-Cu mineral assemblage with native gold, pyrite, chalcopyrite, malachite and azurite. Gold occurs in irregular shoots. Quartz gangue exhibits euhedral buck, laminated, ribbon, brecciated and comb textures. Individual mineralised sections are 10–270m long, 0.1–2m wide (generally 0.2–0.4m wide), and were worked to depths of up to 30m. Most lodes trend east to south-east and dip 40° to 90° to the north-east (Figure 7). Other veins form sets striking north-east and north.

Gold-bearing mesothermal quartz and quartz-calcite-siderite veins, stockworks and breccias in the *Happy Valley (Five Mile Creek) area*, 46km south-south-east of Bowen, crop out as gossanous quartz in shear zones in silicified, sericitised and chlorite-epidote altered andesite and pyroclastic rocks of the Carmila beds, diorite of the Urannah Batholith and granite of the Hecate Granite. The lodes are in the contact aureole of the Hecate Granite.

These Au-Ag-Cu veins are characterised by native gold, pyrite, pyrrhotite, arsenopyrite, chalcopyrite and malachite in a quartz-calcite-siderite-magnetite gangue. Gold occurs in irregular shoots. Quartz gangue exhibits euhedral buck, laminated and comb textures. Individual mineralised sections are 10–400m long, 0.2–1m wide, and were worked to depths of up to 20m. Most lodes trend north-east or south-east and dip steeply (Figure 8).

Gold-bearing mesothermal quartz and quartz-calcite veins, stockworks and breccias in the *Kelsey Creek-La-di-da Creek area*, 50km south-south-east of Bowen, crop out as gossanous quartz in shear zones in silicified and chlorite-epidote altered agglomerate, andesite, tuff, porphyry and volcanoclastic rocks of the Carmila beds and granite and porphyry of the Hecate Granite.

These Au-Ag-Cu veins comprise native gold, pyrite, chalcopyrite, bornite, galena, chalcocite, covellite and malachite in a quartz-calcite-magnetite gangue. Gold occurs in irregular shoots. Quartz gangue exhibits euhedral buck and comb textures. Individual mineralised sections are generally 10–200m long, 0.1–1m wide, and were worked to depths of up to 30.5m. Most lodes trend north-east or east-north-east and dip steeply to the north (Figure 8).

The *Duffer* or Dittmer mine was the largest gold and copper producer in the Kelsey Creek area. A narrow gold-bearing quartz vein occurs along the footwall of a fissure up to several metres wide that trends 022° and dips 55° north-west. The lode is at least 500m long, averages 0.13m in width and was worked to ~180m depth. Mineralisation comprises free gold, pyrite, chalcopyrite, galena, bournonite (Cu-Pb-Sb sulphate) and pyrrhotite in a quartz-calcite gangue (Reid, 1940; Morton, 1946). Gold is fine-grained (<0.33mm) and grades increase with increasing chalcopyrite, galena and bournonite. Brecciation is common. The host rocks are silicified and pyritised andesite and pyroclastic rocks of the Early Permian Carmila beds intruded by a diorite dyke and the lode crops out near the contact with a boss of intrusive diorite that is probably a variant of the Cretaceous Hecate Granite. The main contact with the Hecate Granite is <1km from the mine (Paine & Cameron, 1972).

Gold-bearing mesothermal quartz and quartz-calcite-siderite veins, stockworks and breccias in the *Mount McGuire Goldfield (Eden Lassie and Longford Creeks)*, 32km south of Bowen, crop out as gossanous quartz in silicified, sericitised and chlorite-epidote altered andesite, tuff, rhyodacite and volcanic rocks of the Early Permian Carmila beds, granodiorite and granite of the Cretaceous Hecate Granite, and Carboniferous diorite, granite, granodiorite, tonalite, andesite and dolerite. Mineralisation occurs within the contact aureole of the Hecate Granite.

These Au-Ag-Cu veins contain native gold, pyrite, chalcopyrite, arsenopyrite, malachite and azurite. Gold occurs in irregular shoots. Quartz gangue exhibits euhedral buck and comb textures. Individual mineralised sections are 15–200m long and 0.15–3m wide and were worked to depths of up to 15m. Major vein systems such as the Golden Gusher and White Hill Prospect are >1000m long. Most lodes trend north-east or south-east and dip steeply to the south (Figure 9).

The *Pretty Bend* mine, 42.8km south of Bowen, is on a gold-quartz vein in granite. Samples from a shaft assayed 137.8g/t Au and 397.9g/t Ag. The Red Baron Prospect, 19.1km south of Bowen, comprises iron-stained quartz outcrops and float with pyrite and chalcopyrite, hosted by Carboniferous diorite and volcanic rocks of the Carmila beds. Rock chip sampling by Buddha Gold Mines NL returned up to 100ppm Au and 81ppm Ag (John & others, 1981).

Mesothermal quartz veins in the *Albert Creek area* (Golden Hill, Golden Treasure) carry gold, pyrite, sphalerite and chalcopyrite. Veins are up to 0.24m wide and are hosted by conglomerate, andesite and volcanic rocks of the Early Permian Carmila beds and Carboniferous diorite and porphyry.

The *Stuart Prospect*, near Pipe Case Creek 31.2km south of Bowen, comprises three parallel quartz veins that carry gold, pyrite and chalcopyrite. The veins trend 090° in granodiorite, granite and microgranite of the Cretaceous Hecate Granite. Gossanous quartz samples from the veins assayed up to 0.68ppm Au (Australian Explorers (Petroleum and Minerals) Pty Ltd, 1991).

Shear-hosted veins

The *Gold Creek Prospect*, 46.8km south-east of Ravenswood, comprises quartz veining and breccias in a south-east-trending shear zone in rhyolitic to dacitic volcanics and tuffs of the Mount Windsor Volcanics intruded by propylitised feldspar porphyry. The veins carry copper, lead and zinc sulphides and secondary minerals. Rock chip sampling by Carpentaria Exploration Company Pty Ltd returned up to 2.60% Cu, 41.8% Pb, 4.04% Zn, 158ppm Ag, 1.02ppm Au and 120ppm Ba (Purvis, 1978).

Dump samples collected by Danamore Pty Ltd assayed up to 6g/t Au. Drilling returned a best intersection of 1m at 8.21g/t Au and 2640ppm Cu from 18m (English, 1995).

GOLD-SILVER±LEAD±ZINC±BISMUTH±MOLYBDENUM

Greisens

Multiple quartz veining events are associated with greisen developed in Carboniferous granite at *Kelly's Mountain*, 14.5km south-west of Ayr. Mineralisation comprises pyrite, arsenopyrite, bismuthinite, molybdenite, ?galena and gold in quartz veins and blows.

G. Turner prospected the area in 1930 and excavated two shafts and a number of pits and costeans. Samples from the main shaft assayed up to 3.95g/t Au, 400g/t Ag and 6.35% Pb (Laun, 1930).

Rock chip sampling by Australian Selection Pty Ltd (1967) returned up to 1180ppm Mo. Fourteen percussion drillholes were drilled. Intersections included 1.52m at 300ppm Mo from 38.1m, 1.52m at 250ppm Mo from 36.6m, 1.83m at 220ppm Mo from 27.1m, 1.52m at 230ppm Mo from 33.5m, 1.52m at 840ppm Mo from 41.1m, 1.52m at 1100ppm Mo from 33.5m, 1.52m at 1100ppm Mo from 45.7m and 1.52m at 400ppm Mo from 15.2m. Kennecott Explorations (Australia) Pty Ltd drilled two core holes in 1971 but did not intersect any economic mineralisation down to 203.6m.

Rock chip samples collected by Duval Mining (Australia) Ltd assayed up to 1600ppm Mo. Gradient array and dipole-dipole IP indicated the presence of a

large scale sulphide system. Four core holes were drilled to 710m. Although molybdenum mineralisation with up to 300ppm Mo was encountered, particularly associated with breccia pipes at depth, no economic mineralisation was intersected (Porter & Seed, 1982).

Spectrum Resources NL (1988a) collected rock chip samples of breccia pipes and brecciated quartz lodes that assayed up to 0.03g/t Au.

Shear-hosted veins and breccias

At the *Stones Creek Prospect*, 47.3km south-south-east of Ravenswood, gold occurs with pyrite in narrow quartz veins and breccias in dacitic to rhyolitic tuffs and tuffaceous sandstone of the Mount Windsor Volcanics. Small pods of massive sulphides occur in the veins. Mineralisation is within a major, north-east-trending shear structure.

The prospect was discovered from stream sediment and rock chip sampling carried out by Carpentaria Exploration Company Pty Ltd. A float sample assayed 1800ppm Cu, 9400ppm Pb, 3240ppm Zn, 160ppm Ag and 1.14ppm Au (Purvis, 1978). Rock chip sampling by Otter Exploration NL returned up to 1.4% Pb and 83ppm Ag (Barker & Richard, 1981). Sampling by CRA exploration Pty Ltd returned up to 4.26% Pb, 290ppm Ag and 1.13ppm Au (Hughes, 1985).

GRAPHITE

A 1.2–2.4m thick seam of low-grade graphite occurs in Devonian to Carboniferous coal measures 10km south-south-east of *Cape Upstart*. Graphite formed due to contact metamorphism from nearby Permian to Cretaceous granite (Dunstan, 1926).

IRON

Skarns

Magnetite occurs with garnet, calcite, hematite and copper mineralisation in a skarn in Carboniferous granite at the *Bronze Queen* mine, 25.5km south of Ayr. Magnetite skarn also occurs with tungsten mineralisation at the Old Dip Skarn, 7.4km to the east of the Bronze Queen.

Residual deposits

Ironstone boulders and nodules form a 2–5m deep residual ochre deposit of varied colour at *Iron Knob*, 34km south-south-east of Bowen. The ironstone comprises limonite, goethite and earthy hematite and crops out in the right bank of Greta Creek at the base of a hill of silicified volcanic rocks of the Early Permian Carmila beds. In 1949, Denmead attributed the deposit to the leaching and redeposition of iron with clay at the base of the hill. He estimated the resource to be 6100t but expected the extraction of uniform ochre to be difficult (Paine &

Cameron, 1972). Rock chip sampling by Buddha Gold Mines NL returned up to 0.03ppm Au (John & Luna, 1983).

Mesothermal veins

An outcrop of specular hematite occurs at the *Specular Iron* prospect, on a spur between two branches of Three Mile and One Mile Creek 48.5km south-south-east of Bowen. Hematite occurs mainly as infill in highly brecciated quartz-calcite vein structures striking 090° and dipping 70° to the south in volcanic rocks and chert of the Carmila beds. Drilling established that mineralisation persists to at least 30m depth. Laboratory testing indicated that the hematite is suitable for use in paint manufacture (Australian Explorers (Petroleum and Minerals) Pty Ltd, 1991).

LIMESTONE

Limestone lenses occur in the Edgcumbe beds at *Cork Hills*, 24.8km east-south-east of Proserpine. A small lens of oolitic fossiliferous limestone occurs in the Campwyn beds at Cape Hillsborough, 73.8km south-east of Proserpine (Connah, 1958).

A 3.6–12.2m thick bed of dark grey limestone (Campwyn beds) crops out over a distance of 164.6m on the southern end of *East Repulse Island*, 34.3km south-east of Proserpine. The outcrop reaches a maximum height of 16.7m above high water mark. The limestone is underlain by andesitic rocks and overlain by mudstone and andesite (Simmonds & Tucker, 1960; Sawers & Siemon, 1969).

Grab samples assayed 51.4–54.1% CaO, 0.6–1.2% MgO, 0.6–0.8% Fe₂O₃, 0.5–1.7% Al₂O₃, 1.6–3.3% SiO₂, a trace P₂O₅ and 41.7–42.6% loss on ignition. The neutralising value was 94.0–95.6%. Estimated resources were calculated as 88 400t above highest water mark, assuming a dip of 30° to 40°. Up to 30 580m³ of overburden would have to be removed to expose the limestone for working (Simmonds & Tucker, 1960).

Connah (1958) reported that a 3m thick bed of fossiliferous oolitic limestone forms a conspicuous outcrop and is interbedded with andesitic tuff of the Campwyn beds near *Home Creek*, east of the old St Helens homestead. Connah (1958) also reported that thin lenticular beds of impure limestone are interbedded in 15.2m of calcareous sandstone that dips south-west at 25 and crops out above the high water mark on the beach 1.6km north of Seaforth. Quarryable reserves are negligible. A sample from small isolated exposures on a ridge near Victor Creek assayed 47.5% CaO.

Limestone of the early Carboniferous Edgcumbe beds crops out at the foot of the north-western slope of *Ben Lomond Hill*, 26.4km south-east of Bowen. The fine-grained limestone is greyish blue in colour and contains oolites and crinoid fragments. It is part of a quartzite, shale and sandstone sequence that strikes south-east and dips steeply north-east. It is silicified along contacts with granite of Early Permian or Cretaceous age and is veined with secondary calcite and

epidote. Limestone samples assayed 38.2–53.3% lime, 7.0–22.2% silica, 0.7–2.8% iron oxide, 0.2–4.4% alumina, trace magnesia, 0.04–0.06% sulphuric anhydride, 0.02–0.03% phosphorus, 31.1–42.4% loss on ignition and a trace moisture (Saint-Smith, 1918a). Samples collected by Connah (1953) assayed 52.0–52.2% calcium oxide, 0.8% magnesium oxide, 0.2% pyrite, 0.4% iron oxide, 0.5–0.7% aluminium oxide, 4.5% siliceous insolubles, 0.6–1.2% organic matter, 40.1–40.6% carbon dioxide and 0.05% moisture at 105°C.

Australian Mining Engineering Consultants (1996) carried out drilling at Ben Lomond Hill for Proserpine Lime Pty Ltd and estimated inferred resources of 285 000t of limestone.

MAGNESITE-CHROMITE-NICKEL

Magnesite, chromite and minor nickel occur in serpentinised and partly lateritised diorite and gabbro at *Mount Pring*, 16.2km west of Bowen. Stockworks of magnesite veins up to 1.2m thick occur over an 850m by 500m area, filling the plane of a reverse fault (Paine & Cameron, 1972; Geological Survey of Queensland, 1978). Analyses of the veins in 1919 indicated an average of 97% magnesium carbonate (Saint-Smith, 1919b). Small veinlets of chromite and asbestiform anthophyllite are present in the gabbro.

OIL SHALE

The Tertiary Hillsborough Basin contains major oil shale deposits. The basin sequence comprises:

- an upper oil shale unit with at least 500m of graded sandstone beds with laminated oil shale and siltstone,
- a transitional oil shale unit with 80–180m of thin graded sandstone beds with laminated oil shale and siltstone,
- a lower oil shale unit with 400m of massive, brownish black and brown lamosite,
- a 10–50m thick carbonaceous unit with sandstone, coal and carbonaceous shale, and
- a basal sandstone unit that is at least 140m thick and comprises fine to very coarse sandstone.

The oil shale was deposited in a shallow, saline and euxinic lake or bay. The sandstone intercalations in the upper two units indicate later regression of the lake or bay. The lower part of the brown oil shale and the upper part of the brownish black oil shale aggregate ~200m and are the main zones of interest. Resources have been calculated as 6.25 billion barrels of *in situ* shale oil using a cut-off grade of 40 litres oil/tonne of oil shale at zero per cent moisture (Green & Bateman, 1981).



Photo 18: Bulk sampling pit, McFarlane Oil Shale

The *McFarlane (Condor) oil shale deposit* is 20km south-south-east of Proserpine. Queensland Energy Resources Ltd currently holds MDL 202 over the deposit. The most recent open file resource estimate comprises indicated resources of 100Mt at 63L/t oil and measured resources of 12 900Mt at 65L/t oil, using a cut-off of 50L/t at eight weight percent moisture, for a total of 4.9 billion barrels of oil (Southern Pacific Petroleum NL, 2002). In August 2008, the Queensland Government announced a 20 year moratorium on exploration and development of the deposit.

The smaller *Pluto Oil Shale Prospect* is 51km south-east of Bowen. The grain size is coarser than at McFarlane and grades are correspondingly lower. Drilling intersected a thick sequence of kerogenous siltstone and mudstone underlain by sandstone containing minor coal seams and carbonaceous shale. A total of 26m of oil shale with an oil yield of >40L/t on a moisture free basis was intersected between 21m and 437m (Green & Lindner, 1981). The maximum oil yield was 64L/t (Green, 1982). The oil shale shallows markedly to the north-west.

PHOSPHATE ROCK

Holbourne Island, 34km east-north-east of Abbot Point, consists of granite but the island is fringed by raised coralline deposits that have been phosphatised by the leaching of phosphoric acid from guano accumulations. The distribution of high-grade phosphate rock is extremely variable, with marked compositional differences laterally and horizontally. The average thickness of phosphatised

coral is 2.7–3m and grades generally are poor (<8% P₂O₅) (Saint-Smith, 1919c; Reid, 1944a; Young, 1944). Reid (1944a) concluded that there was potential for 30 000–40 000t of low to medium grade phosphate rock grading 20% P₂O₅. Saint-Smith (1919c) concluded that the material would have little practical use as fertiliser.

SILICA SAND

Silica sand occurs in a series of south-east-trending, thickly vegetated dunes that rise >60m above sea level at *Whitehaven Bay* on Whitsunday Island, 48.9km east-north-east of Proserpine. These dunes cover ~10km². The Bowen Mineral Company reported a potential resource of 810Mt and an analysis result of 99.89% silica (Paine, 1972). These deposits are now within a National Park.

SILVER-LEAD±COPPER±ZINC±GOLD

Polymetallic veins

The *Flagstone* (Silver Orchid) silver-lead-zinc lode crops out as a prominent gossanous ridge on the west side of the Normanby Road, 67.1km south-south-west of Bowen. Stockwork and breccia veining occur in a shear on the footwall of an andesite dyke trending 060° to 075° and dipping 70° to 80° north-west. Galena, pyrite, pyrrhotite, sphalerite and chalcopyrite occur in a brecciated quartz-siderite-barite lode that is 300m long and up to 1.5m wide. Cerussite occurs with iron oxides in the oxidised zone. Drilling by Minefields Exploration NL intersected narrow veining with minor sulphides at ~40m depth (Gibbs, 1985). The surrounding country rocks are biotite granite (Thunderbolt Granite) and metasilstone. The lode can be traced to the south-west as the *Prosperity* lode and to the north-north-east as the *Lotta Silver*.

Silver-lead-copper mineralisation in the *Emu Plains Silver Field*, 84.5km south of Bowen, comprises calcite-siderite veined and brecciated lodes with galena, tetrahedrite, cerussite, malachite and azurite along shear zones in dacitic lithic tuff, andesite, basalt and metasediments of the Lizzie Creek Volcanics. The narrow lodes trend south-east and are near-vertical. Ore samples collected from the *King Solomon* lode in 1889 assayed 9.18–244.9kg/t Ag (Maitland, 1889). Surface ore from the *Tent Hill* lode assayed 13.9% Pb and 393.4g/t Ag (Cameron, 1902).

Copper-bearing veins have been reported to occur at *Robard Creek*, 74.9km south-south-west of Bowen. A 0.6m wide quartz-calcite vein stockwork breccia 4.5km to the west-south-west contains pyrite, chalcopyrite, galena and secondary copper minerals. The lode strikes 070° and dips 85° to the north. The host andesites exhibit vein-controlled silicification and chlorite-carbonate alteration. Quartz textures indicate some epithermal characteristics.

The Mixer, 77.7km south-south-east of Bowen, is a 1.2m wide quartz-siderite-barite-tourmaline vein that strikes 135° and dips north-east. It

contains sphalerite, galena, chalcopyrite in the primary zone and secondary copper, lead and zinc minerals in the oxidised zone. The host microgranite of the Urannah Igneous Complex is sericitised and kaolinised. A sample of sulphide ore from the bottom of a shaft assayed 53.4% Cu, 9.4% Pb, 13.1% Zn, 0.2% Fe and 19.6% S. Gossan samples assayed up to 32.5% Pb, 1683.8g/t Ag and a trace Au (Cribb, 1954). Rock chip samples collected by Mount Isa Mines Ltd assayed up to 0.775ppm Au (McIntosh, 1989). Battle Mountain (Australia) Incorporated rock chip samples assayed up to 3.19g/t Au, 0.89% Cu, 6.87% Pb and 620g/t Ag (Jones, 1995).

TUNGSTEN±COPPER

Skarns

Wolframite and scheelite occur in quartz veins and disseminated in skarn mineralisation in gneiss and amphibolite at *Cox's Costeans*, 24km south of Ayr. The deposit is within the Inkerman Shear Zone.

Diamond drilling by Jemma Exploration Pty Ltd in 1970 returned grades of <0.5% WO₃ over 1.5m intersections. Rock chip sampling of skarns by Otter Exploration NL returned up to 1100ppm W, 9ppm Mo, 100ppm Cu, 130ppm Pb, 1400ppm Zn, 24ppm Co, 26ppm Ni, 30ppm Bi, 2.7ppm Ag, 170ppm Sr, 2300ppm Mn, 22ppm Cd, 44ppm Sb, 5ppm As, 16ppm Sn and 0.32ppm Hg, with gold below the detection limit. Eleven skarn sections up to 3.15m wide were identified in the Jemma Exploration drill core. Grades estimated by fluorescence were <0.75% WO₃. Sampling by A.O.G. Minerals Pty Ltd returned up to 0.07% W (Nethery & others, 1976).

The *Old Dip Skarn*, 25.5km south of Ayr, is also associated with the Inkerman Shear Zone. Rock chip samples have assayed up to 0.02% WO₃ (Nethery & others, 1976).

Veins

Scheelite and wolframite occur disseminated with pyrite, magnetite and copper mineralisation in a small, flatly dipping quartz pipe/lens at the *Rangeview Scheelite* prospect, 46.1km south-east of Ravenswood (Ridgway, 1947). The host rhyolite of the Mount Windsor Volcanics is silicified and propylitised (chlorite-epidote-carbonate alteration) adjacent to the pipe.

Twenty-six bags of picked stone from the No.1 shaft and underlie assayed 1.9% WO₃. An additional 12t assayed 0.53% WO₃. Reject, copper-bearing ore assayed 9% Cu and 1.01% WO₃. Hand-picked ore assayed 7.6–10.36% WO₃ (Ridgway, 1947).

VERMICULITE AND ASBESTOS

Biotite-vermiculite-bearing schists and gneisses occur at *Six Mile Creek*, 25km south of Ayr. They occur over widths of tens of metres around a granite pinnacle and are conformable with belts of hornblende schist and gneiss and tremolite-actinolite schist. Alteration of biotite to vermiculite may be associated with the major east-north-east-trending Inkerman Shear Zone (Carruthers, 1954).

Amphibole asbestos occurs in contorted tremolite-actinolite schists near their contact with a diorite intrusion forming a hill that is part of *Stokes Range*, 19.5km south-south-west of Ayr. The asbestos forms a 0.23m wide vein and is mainly slip fibre, with some mass fibre and cross fibre. Long fibres cannot be obtained from the rock (Carruthers, 1954).

MINERAL EXPLORATION

INTRODUCTION

In 1930, an amendment to the Mining Act formally defined the Authority to Prospect and indicated the entitlements and obligations of the holder of an Authority. The early Authorities were bounded by topographic features such as streams and roads, and were identified by geographical names or their areal extent. In 1954, a numbering system for Authorities to Prospect was introduced. Subsequently, boundaries were defined by straight lines joining geographical co-ordinates. A general limit of 100 square miles (259km²) was introduced later but some Authorities exceeded this area. The first Authority in the North Connors Project area was Authority to Prospect 205M, which was granted to Enterprise Exploration Company Pty Ltd in 1962.

Authorities to Prospect took on their present form in 1971, consisting only of whole sub-blocks selected so that they form one continuous area that does not contain more than 100 sub-blocks. A sub-block is an area bounded by consecutive minutes of latitude and longitude; each is uniquely identified by the name of a 1:1 000 000 Sheet, a block number and a sub-block letter. Usually, the number of sub-blocks in an Authority must be reduced to half after it has been held for 12 months.

In 1988, the terminology for Authorities to Prospect was changed when they were renamed Exploration Permits for Minerals (EPMs). However, the numbering system continued on from the old Authority system. For ease of reference, all historical Authorities to Prospect are referred to as Exploration Permits (EPMs) in this report.

Although most mineral Exploration Permits are taken out for “all minerals excluding coal and petroleum”, exploration programs are generally directed to a specific objective. The main targets in the Sheet area have been gold, silver, copper, molybdenum and oil shale. Exploration has also been carried out for lead, zinc, nickel, magnesite, chromite, platinum group elements, tungsten, uranium,

andalusite, earthy lime, heavy mineral sands and limestone. Figures showing the location of Exploration Permits and a table listing the Permit holders, exploration techniques used and relevant company reports are supplied in Appendix 1. Recently granted Permits and applications may not be listed in this Appendix and for current Permits the reader is referred to the Interactive Resource and Tenure Maps on the Department's website.

GOLD AND SILVER

Armuna to Roma Peak Area

EPM 4977 was granted to *Bowen Gold Mines Pty Ltd* in September 1987 and the title was subsequently transferred to *Western Mining Corporation Ltd*. Exploration comprised stream sediment (476 samples) and rock chip (38 samples) samples, a literature review, geological compilation and mapping, and interpretation of Landsat imagery. The highest assay result from stream sediment sampling was 100ppb Au from the Mount Buckley East Anomaly. The Stockyard Creek Anomaly returned 21ppb Au. The Permit was relinquished in September 1983.

Bloomsbury – Mount Charlton – Mount Jukes Area

EPM 5179 was granted to *CRA Exploration Pty Ltd* in January 1988. The target was porphyry and epithermal style precious metal deposits. Exploration comprised a review of previous exploration, assessment of available BMR magnetic and radiometric data, and a regional stream sediment sampling program. No significant BMR magnetic or radiometric anomalies occurred within the tenement area. Cyanide leach stream sediment samples assayed up to 800ppt Au. This result was not supported by the gold, arsenic, and base metals contents of accompanying -80 mesh stream sediment samples. The Permit was relinquished in October 1988.

EPM 5244 was granted to *CRA Exploration Pty Ltd* in February 1988. The target was porphyry and epithermal style precious metal deposits. Exploration comprised a review of previous exploration, a regional stream sediment sampling program (31 -6mm gravel/sand samples and 31 -80 mesh stream sediment samples) and float and outcrop examination during geological traversing. Assay results delineated a zone of moderate As contents in -80 mesh samples but no significant gold grades in cyanide leach samples. The -80 mesh samples assayed up to 10ppb Au, 96ppm Pb, 193ppm Zn, 60ppm Cu and 22ppm As. None of these results indicated a significant near-surface resource in the catchments sampled. Only two rock chip samples were collected. None of the results were considered to be anomalous.

BMR aeromagnetic contours for the Proserpine 1:250 000 Sheet area showed significant highs over the Mount Jukes intrusive complex and over the township of Mount Pelion. The source of the magnetic high was believed to be quite deep. The Permit was relinquished in December 1988.

EPM 5510 was granted to *CRA Exploration Pty Ltd* in August 1988. The target was porphyry and epithermal style precious metal deposits. Initial exploration comprised a review of previous exploration results, an analysis of BMR regional aeromagnetic data and a regional stream sediment sampling program (40 bulk cyanide leach sand samples and 40 -80 mesh stream sediment samples). Float and outcrops were examined during the stream sediment sampling program. No catchments containing anomalous gold contents were located and there were no anomalous values from the other elements analysed. The maximum gold assay result for cyanide leach sampling was 0.6ppb and the maximum assay result for -80 mesh samples was 0.002ppm Au, 15ppm Pb, 91ppm Zn, 83ppm Cu, 6ppm As and 4.35% Fe.

Geochemical sampling highlighted a catchment containing anomalous gold in a small gully 500m south-east of Bloomsbury (the Mackay 19 Anomaly). The initial bulk leach stream sediment sample assayed 2.6ppb Au. Follow-up sampling included bulk leach sampling results of up to 11ppb Au and -200 mesh sampling results of up to 43ppb Au. Twenty-three -2 mm sieved bulk cyanide leach and 23 unsieved silt and clay samples were collected from the Mackay 19 Anomaly. The maximum value result from the BCL sampling was 33.2ppb Au; the -80 mesh sampling returned up to 10ppb Au and the -200 mesh sampling returned up to 22ppb Au.

The Permit was conditionally surrendered in August 1990 in favour of EPM 7254.

EPM 5841 was granted to *CRA Exploration Pty Ltd* in April 1989. The target was epithermal and porphyry style mineralisation. Exploration included a literature review, image processing of BMR regional aeromagnetic data, a regional stream sediment sampling program (11 Bulk Cyanide Leach samples and one -200# mesh sample) and regional float examination.

No anomalous drainages were identified and the Permit was relinquished in November 1989.

Bogie River to Exmoor Area

EPM 10018 was granted to *Dilkera Resources Pty Ltd* in June 1994. The target was breccia pipe style gold mineralisation. Exploration included an interpretation of Landsat TM imagery, geological and topographic maps and regional airborne magnetics. A review of historical production data and previous exploration was carried out, followed by minor field reconnaissance and sampling. The Permit was relinquished in May 1996.

Briaba to Collinsville Area

EPM 4969 was granted to *CSR Ltd* in September 1987. Reconnaissance stream sediment and rock chip sampling in the Clarke Range area did not locate any significant gold mineralisation. Areas of hydrothermally altered dacitic volcanic rocks were found in the area.

The Permit was joint ventured with CRA Exploration Pty Ltd, which carried out detailed rock chip and drainage sampling. Results indicated little probability for locating hydrothermal gold mineralisation within the tenement area. The Permit was relinquished in November 1988.

EPM 5005 was granted to *Australian Overseas Mining Ltd* in October 1987. The target was epithermal and porphyry-related gold deposits. Exploration included a literature review, regional stream sediment sampling, gridding, mapping, ground magnetics, soil and rock chip sampling, and percussion drilling at the Bowhunters Quarry prospect. Airborne magnetics and radiometrics were also flown over part of the Permit. Landsat Thematic Mapper imagery was purchased to cover the Permit and surrounding areas. CRA Exploration Pty Ltd entered into a farm-in and joint venture agreement (51%) with Australian Overseas Mining Ltd in late 1987.

The regional bulk cyanide leach sampling program returned no grades >750ppt Au. However, -200 mesh stream sediment samples collected at the same sites gave anomalously high lead assay results in several samples, with a maximum result of 1110ppm Pb. Rock chip samples collected during regional traversing returned some scattered, anomalous gold grades. This work identified a small, weakly gold mineralised epithermal alteration system in the Bowhunters Prospect area. Gridding, mapping, ground magnetics, and soil and rock chip sampling were completed over the prospect. Rock chip samples assayed up to 22.5ppm Au. Five percussion holes were drilled to test the zone. The best intersection was 6m at 1.18g/t Au from 10m in drillhole PD87BH1. All five holes intersected elevated but sub-economic gold mineralisation in the target zones.

No significant precious metal (Au, Ag), base metal (Cu, Pb, Zn) or indicator element (As, Sb, Hg) assay results were returned from the regional reconnaissance rock chip samples collected from outside of the Bowhunters prospect area. The Bogie 27 Anomaly was delineated from aerial radiometrics but was not considered worth following up. The Alteration 28 Anomaly was related to a weakly epidote altered, diorite complex exposed in a road gravel scrape. This anomaly was not worthy of being followed up.

The Bowhunters Prospect was remapped in detail late in 1989 and soil and rock chip anomalies were resampled. Mineralisation at the prospect is related to a set of south-east-trending quartz veins, with a shoot of mineralisation developed preferentially at the intersection of the vein structures with a trachyte ignimbrite contact. Fifty-nine rotary air blast holes totalling 464m were drilled on four lines to test for signs of alteration and mineralisation. No intersections of interest were found in the magnetic feature that was located in an area of cover adjacent to the prospect. Some low-level gold anomalies were noted to the north-west of the previously drilled area along the strike direction of the known veins.

The small size of the mineralised zone did not provide any encouragement for a target of interest to CRA, which withdrew from the joint venture. Control of the Permit reverted to Australian Overseas Mining Ltd. The Permit was relinquished in July 1990.

EPM 11483 was granted to *Gold Fields Australasia Pty Ltd* in April 2000. The target was epithermal gold-silver mineralisation. Under an agreement signed in April 2002, *Conquest Mining Ltd* purchased a 40% interest in the tenement and was in joint venture to earn another 40% of the tenement through exploration expenditure by 30 August 2004.

The Permit was reduced from 85 to 43 sub-blocks in April 2003. Exploration comprised a collation of previous exploration results, field inspections and limited mapping. No strong geochemical signatures were identified in the relinquished area and field mapping did not identify any significant areas of epithermal quartz veining. An additional 16 sub-blocks were relinquished in April 2005, by which time *Conquest* had earned an 80% interest in the Permit. *Conquest* had reviewed previous exploration results for the Mount Vista area and carried out limited ground examination of structures identified from airborne magnetic data. Eight prospecting traverses were carried out across Lizzie Creek Volcanics stratigraphy on Belmore and Sonoma Stations. Rock sampling did not delineate any new gold targets. The Permit was relinquished in May 2006.

EPM 13007 was granted to *Resolute Resources Ltd* in November 2004. *Conquest Mining Ltd* acquired 100% of the tenement in 2006. Eleven sub-blocks were relinquished in November 2006. Exploration targeted porphyry Cu-Au and epithermal Au-Ag mineralisation in the Lizzie Creek Volcanics and intrusives of the Urannah Complex. Exploration comprised a review of previous exploration and compilation of GIS data sets. No significant prospects were identified in the relinquished area. Exploration results for the remaining sub-blocks are confidential.

Conder Hills and Tonga Range

EPM 3778 was granted to *Poseidon Minerals Ltd* in September 1984. The target was gold mineralisation in breccia pipes. Aerial photograph studies identified 27 target areas for follow-up field investigations. These were examined on the ground but showed no signs of alteration or mineralisation. Eleven photo targets were not inspected due to access difficulties imposed by the landholder. The Permit was relinquished in December 1984.

EPM 5294 was granted to *CRA Exploration Pty Ltd* in March 1988. The target was porphyry and epithermal style precious metal deposits. Exploration included a review of previous exploration in the area, a regional stream sediment sampling program using both gravel/sand samples (35 samples) for bulk cyanide leach extraction for gold and standard -80 mesh stream sediment samples (35 samples) for base and indicator elements. Float and outcrop examination was carried out in conjunction with geological traversing. Eleven rock chip sample were collected.

The maximum cyanide leach assay result was 5.3ppb Au; three samples assayed >1ppb Au. The maximum assay result for -80 mesh samples was 0.005ppm Au, 68ppm Pb, 93ppm Zn, 73ppm Cu and 18ppm As. None of the rock chip samples returned any significant gold or base metal contents, although most showed signs of silicification and/or pyritisation.

Infill stream sediment sampling at the Mackay 7 anomaly (5.2ppb Au) repeated the results from original bulk cyanide leach sample, but with a significantly lower gold content; the anomaly was not clearly delineated. Soil sampling and geophysical target follow-up failed to explain the Mackay 7 anomaly. Fourteen rock chip samples were collected from the Mackay 7 anomaly and five from the Mackay 22 anomaly. The best assay result was 0.16ppm Au for a quartz vein float sample. Only one of 37 soil samples returned weakly anomalous gold at 130ppb.

The Permit was conditionally surrendered in August 1990 and the ground was taken up as part of new EPM 7254.

EPM 5490 was granted to *CRA Exploration Pty Ltd* in July 1988. The target was porphyry and epithermal style precious metal deposits. Exploration included geological traversing, reconnaissance stream sediment sampling (15 -6mm gravel/sand, 76 -2mm, 15 -80 mesh and 76 -200 mesh samples), follow-up rock chip sampling (138 samples), a detailed airborne magnetic and radiometric survey and follow-up of magnetic and radiometric anomalies.

Stream sediment samples returned grades of up to 47.9ppb Au. Thirty-five samples returned zinc assay results of >100ppm Zn, with a maximum of 715ppm Zn. The maximum copper assay result was 173ppm. A large area of altered dacite/rhyolite volcanics in the central portion of the Permit area displayed strongly anomalous cyanide leach gold in most drainages. Rock chip samples from the anomalous area assayed up to 7.0ppm Au and 373ppm Ag; other significant assay results included 3.84ppm Au, 3.60ppm Au, 1.63ppm Au, 1.19ppm Au and 0.99ppm Au.

Interpretation of detailed airborne geophysical data delineated six magnetic and 17 radiometric responses of possible economic interest. These targets were followed up with a combination of ground magnetics, ground spectrometry, geological interpretation and rock chip sampling.

Regional and prospect geological mapping, stream sediment follow-up sampling, rock chip sampling, ground magnetics, and ridge, spur and grid soil sampling delineated seven areas of moderate to strong gold in soil anomalism — the Mackay 34, Mackay 37, Mackay 41, Mackay 58, Mackay 60, Mackay 61 and Mackay 62 anomalies. Gold in soil grades of 0.5–1.0ppm Au were encountered at four of the prospects (Mackay 34, Mackay 37, Mackay 58 and Mackay 62). Rock chip samples from the anomalous areas assayed 1.0–10.0ppm Au. Ground magnetics and IP/Resistivity surveys at four of these prospects helped to define targets for drill testing. The Permit was conditionally surrendered in August 1990 to form part of new EPM 7254.

EPM 5958 was granted to *CRA Exploration Pty Ltd* in July 1989. The target was epithermal and porphyry style precious metal mineralisation. Exploration comprised detailed stream sediment (bulk cyanide leach and -200 mesh), rock chip (50 samples) and grid soil (53 samples) sampling, percussion drilling (three holes for 198m), detailed geological mapping and image processing and analysis of detailed airborne geophysics.

Midge Mountain (Mackay 6 prospect) displayed strongly gold anomalous rock chip and soil sampling results; surface rock chip samples assayed up to 9g/t Au. The three drillholes did not intersect any significant gold mineralisation. The best intersection was 22m at 0.16g/t Au. Stream sediment samples returned up to 11ppb Au for -200 mesh samples and 0.9ppb Au for bulk leach samples. Soil samples assayed up to 174ppb Au. The Permit was conditionally surrendered in 1990 and became part of EPM 7254.

EPM 6074 was granted to *CRA Exploration Pty Ltd* in October 1989. The target was porphyry and epithermal style precious metal deposits. Exploration comprised an airborne radiometric and magnetic survey, interpretation of the airborne data, and ground follow-up of the defined radiometric and magnetic anomalies. Rock chip sampling of two potassium/total count radiometric targets did not reveal any anomalous gold or base metals. All gold assay results were 4ppb or less. The Permit was conditionally surrendered in 1990 to form part of new EPM 7254.

EPM 7254 was granted to *CRA Exploration Pty Ltd* in August 1990. The target was porphyry and epithermal style precious metal deposits. Exploration comprised prospect geological mapping, GEMCO soil auger drilling, rock chip sampling, RAB drilling, percussion/diamond drilling and IP/resistivity and ground magnetometer traversing.

The GEMCO soil auger program comprised 149 holes at the Mackay 62 and Mackay 37 prospects. The gold in soil anomaly was extended 200m to the west at Mackay 62. No new significant areas of gold anomalism were delineated at Mackay 37.

The percussion /diamond drilling program comprised 13 pre-collared diamond core holes and 14 shallow RAB holes for 985m. The best drilling results came from the Mackay 62 and Mackay 58 North prospects. At Mackay 62, the best intersection was 5m at 1.97ppm Au in a strongly pyritic siliceous breccia from 41m. Minor sphalerite and galena were present in the mineralised zone. Broad but weak gold mineralisation was intersected in another hole, with a best intersection of 10.4 m at 1.11ppm Au and 46.1ppm Ag from 36.0m. One hole at Mackay 58 North intersected a leached cap of ferruginous, vuggy porphyry containing a broad zone of weak gold mineralisation (28m at 0.25ppm Au).

Drilling results for the Mackay 37 prospect was disappointing, with no significant gold grades detected in six holes. Broad, weak zinc and lead mineralisation was present over several metres in several of the holes, with grades of up to 0.4% Pb and 0.5% Zn.

An additional eight reverse circulation precollared core holes (944m) were drilled. The only zones of significant gold mineralisation intersected were all narrow. The better intersections included 2m at 1.82ppm Au at Mackay 62 and 1m at 2.43ppm Au at Mackay 58 South. Weak zinc mineralisation was intersected at Mackay 58 North, with 3m at 0.3% Zn and 2m at 1.18% Zn.

A grid was established and geologically mapped at 1:1000 scale at the Bloomsbury Prospect, where rock chip sampling had returned anomalous gold grades coinciding with a very small area of brecciated, colloform textured quartz veining on the eastern grid margins. An additional 27 rock chip samples were collected during geological mapping. Three samples from the quartz vein outcrop returned significant gold assay results. One hundred and seventeen soil samples were collected over three phases of soil sampling of the Bloomsbury prospect. This outlined an anomalous area with >50ppb Au that coincided with an outcrop of granodiorite. Several ground magnetic surveys were carried out. A magnetic low corresponded to the area of contact of the granodiorite and andesitic volcanics.

It was concluded that there was little potential for the discovery of a significant gold deposit in the area and the Permit was relinquished in July 1992.

EPM 12975 was granted to *Chalcophile Resources Pty Ltd* in December 2000. Chalcophile Resources became a wholly-owned subsidiary of Diatreme Resources Ltd in May 2001. A literature review was completed. The Permit was relinquished in September 2001 due to difficulties in gaining access to the land.

Flagstone Creek to Eungella Area

EPM 452 was granted to *Uranium Consolidated NL* in November 1967. The area was taken up because it had potential for silver mineralisation in the eastern half and disseminated copper-gold mineralisation in the western half. Regional geochemistry and inspections of old workings were carried out. This exploration showed that the eastern half of the Permit was generally unprospective. Anomalous copper grades were found in the Devlin Pocket area.

The Permit was relinquished in April 1968.

EPM 4626 was granted to *Battle Mountain (Australia) Incorporated* in March 1987. A helicopter-assisted stream sediment sampling program was carried out but this was interrupted by Cyclone Charlie. A number of stream sediment gold anomalies were identified.

Reconnaissance exploration and rock chip sampling (200 samples) were carried out as follow-up, but this sampling failed to repeat the results or locate sources of economic significance. This resulted in the Permit being surrendered in February 1989.

EPM 4859 was granted to *Battle Mountain (Australia) Incorporated* in August 1987.

Initial reconnaissance over the Hills of Scone Prospect intersected mineralisation associated with quartz stockworks in andesitic volcanics. A fifteen hole 1394m drilling program was completed.

Results of the drilling program were disappointing and no ore grade intersections were obtained. Semi-detailed mapping and sampling were carried out over the

prospect to gain an appreciation of the extent and magnitude of the auriferous zone. The Hills of Scone Prospect was used for an orientation stream sediment sampling program. Seven types of sample were collected at each of 31 sites. The sample types were rock float, minus 80# stream sediment, pan concentrate, and bulk stream sediment (4 types).

Only three significantly elevated stream sediment assay results were obtained — 0.8ppb Au, 2ppb Au and 1.5ppb Au. All came from drainages draining from or along strike from the Hills of Scone Prospect. A quartz stockwork was shown to be variably developed over a strike length of 3km, with best gold grades confined to a 600m by 100m zone. Highest gold grades were associated with hematitic or jasperoidal veins. Rock float samples generally returned assays results of >0.1g/t Au (up to 6.2g/t Au) in drainages derived from the Hills of Scone area. Individual veins were not of sufficient size or grade to be considered potentially economic.

The Massey Creek Prospect contained narrow zones of hydrothermally altered rock with up to 5g/t Au in selected occurrences. The potential tonnage and grade was indicated very small. Soil sampling produced highest assay results of 106ppb and 108ppb Au. Most assay results ranged from 20–50ppb Au. Soil sampling indicated a very low gold content across a zone some 400m wide.

The Permit was relinquished in September 1989.

EPM 4953 was granted to *Bernard Exploration NL* in September 1987. CRA Exploration Pty Ltd carried out exploration as part of a joint venture agreement. The target was epithermal precious metal deposits. Exploration comprised a review of previous work, regional stream sediment sampling, flying of airborne magnetics and radiometrics and Landsat TM interpretation.

Stream sediment samples assayed <100 to 1600ppt Au, with three samples assaying above the nominal 1000ppt Au anomalous threshold. Sixteen rock chip samples assayed <0.01–0.02ppm Au, 3–116ppm Cu, <5–55ppb Pb, 2–2200ppm Zn, <0.1–0.4ppm Ag, <2–48ppm As, <0.2–0.8 Hg and <0.2–44ppm Sb.

A preliminary integration of magnetic and radiometric data with available Landsat TM imagery failed to delineate any magnetic, radiometric or spectral signatures analogous to known epithermal-mesothermal precious metal mineralisation elsewhere within similar rock types. The Permit was relinquished in August 1989.

EPM 4954 was granted to *Bernard Exploration NL* in September 1987. A literature review was followed by prospecting and reconnaissance mapping, including selected rock sampling. This prospecting, although limited, highlighted the difficulty of field mapping and sampling due to the inaccessible terrain. No conclusions were reached on the Permit's prospectivity other than the potential outlined in the literature review report. The Permit was relinquished in August 1988.

EPM 5121 was granted to *Battle Mountain (Australia) Incorporated* in January 1988. Exploration included a helicopter-assisted geochemical stream sediment

sampling program. Follow-up work comprised stream sediment and rock chip sampling. Rock chip, float, heavy mineral concentrate and bulk cyanide leach samples were collected from a total of 181 sites.

Only 20 BCL samples returned anomalous results. These ranged from 0.8–1.4ppb Au and 1.1–24.5ppb Ag and the best result was 4.2ppb Au and 137.6ppb Ag from the same sample. The Permit was relinquished in September 1989.

EPM 6064 was granted to *Australian Consolidated Minerals (ACM) Gold Operations Pty Ltd* in October 1989. The area was applied for to search for epithermal precious metal deposits similar to those at Wirralie and Pajingo.

Exploration included a helicopter-supported bulk stream sediment sampling program (139 samples). The highest assay result was 1.26ppb Au. Several low-order anomalies were delineated within the northern portion of the Permit. Follow-up stream and rock chip sampling were carried out in the anomalous drainage basins in conjunction with geological mapping. The anomalies could not be reproduced and assay results were not encouraging. The Permit was relinquished in August 1990.

EPM 8622 was granted to *Menzies Gold NL* in February 1992. The target was epithermal Au mineralisation. Menzies Gold extended mapping carried out by Battle Mountain (Australia) Incorporated and Dalrymple Resources Ltd. Menzies located a new area of mineralisation that had not been mapped by the previous explorers. This area was mapped and 97 rock chip samples collected. Twenty-two samples returned >1g/t Au and the highest assay result was 55g/t Au. The mineralised zone extended for 4000m north-westerly and was 100–500m wide.

Plutonic Operations Ltd signed a joint venture agreement on 21 July 1993 and became the operators of the project from that date. Follow-up work included gridding, geological mapping, rock chip, soil and stream sediment sampling, and ground magnetic and IP/resistivity surveys. This work was carried out with the aim of better defining potential drill targets within the mineralised zone. Results of the geophysical exploration delineated a possible alteration zone within the central portion of the mapped area.

Several quartz±granite clast breccia reefs were mapped. The best grade from sampling of these reefs was 86.5ppm Au. Rock chip sampling also returned assay results of 36.7ppm and 24.8ppm Au from another quartz reef sampled. Gold and silver soil geochemistry reflected the results of the rock chip sampling but failed to delineate any subsurface extensions to the mapped linear reefs or mineralised rhyolite. Stream sediment samples assayed 0.1–8.5ppb Au and 7.7–152.0ppb Ag.

Five reverse circulation holes totalling 500m were drilled to test outcropping intrusive rhyolite and associated contact breccias within granite near the western margin of the Urannah Igneous Complex. Surface rock chip sampling of the rhyolite and haematitic breccia exposures had indicated the presence of high gold grades. The drillholes successfully intersected both the rhyolite intrusives and marginal breccia. However, assay results from these intersections were lower than

the surface rock chip grades and the prospect was significantly downgraded. The best drilling result was 1m at 0.94g/t Au from 34–35m in drillhole URCOO4.

The Permit was relinquished in February 1997.

EPM 9736 was granted to *Artadze Pty Ltd* in March 1994. *Peregrine Resources (Australia) NL*, through its subsidiary *Diamond Resources NL*, entered into an option agreement with *Artadze Pty Ltd* to assess the tenement for breccia pipe style gold mineralisation. Exploration comprised a literature review, review of aerial photography and Landsat imagery, review of magnetic and other geophysical data, review of geological and structural interpretive data and target generation.

The major targets identified were from Landsat imagery. A diatreme-like circular feature conforms with a regional north-west-trending structure and magnetic high over Mount Poole. The north-east portion of the tenement contains a number of high and low magnetic bullseye targets in conjunction with another diatreme-like circular feature. Multiple dykes capable of hosting mesothermal-epithermal type quartz reef deposits were also present.

After reviewing the target areas and matching them with recorded geochemistry and limited drilling results from previous exploration, it was evident that nearly all targets had been effectively tested. Sampling results were generally very low and a commercial scale deposit of any realistic size was unlikely to occur. The Permit was relinquished in March 1996.

EPM 13059 was granted to *Conquest Mining Ltd* in November 2004. Exploration focussed on identifying epithermal gold-silver mineralisation within the Lizzie Creek Volcanics, the Connors Arch and the Urannah Complex. A regional structural interpretation, photo geological mapping, review and processing of geochemical data and interpretation of Landsat imagery were completed. A number of targets were identified. Aster satellite imagery was processed to identify a range of minerals and alteration. The only image that appeared to be regionally robust was the sericite-phengite plot. The Permit was relinquished in October 2006.

EPM 14154 was granted to *Conquest Mining Ltd* in November 2004. The target was epithermal gold-silver mineralisation within the Lizzie Creek Volcanics of the Bowen Basin, volcanic rocks of the Connors Arch and granitic intrusives of the Urannah Complex. Exploration included a regional structural interpretation and photo geological mapping, review and processing of geochemical data, and interpretation of Landsat imagery. A review of previous exploration results was also carried out.

A prominent magnetic high in the centre of the tenement was identified as a potential target. Further review of the data, particularly the geochemistry, indicated unfavourable exploration potential and the Permit was relinquished in June 2006.

EPM 14155 was granted to *Conquest Mining Ltd* in November 2004. The target was epithermal gold-silver mineralisation within the Lizzie Creek Volcanics of the Bowen Basin, the Connors Arch volcanics and the Urannah Complex granitic intrusives (including the Thunderbolt Granite). The results of this exploration are confidential.

Glendon to Sandalwood Creek Area

EPM 4817 was granted to *Regent Mining Ltd* in July 1987. The target was epithermal veins within the Bulgonunna Volcanics in the area surrounding Sandalwood Creek. Exploration was managed by Elliott Exploration Company Pty Ltd. During the first six months, air photo and Landsat studies were followed by helicopter-supported reconnaissance BCL stream sediment sampling. One hundred and ninety-four samples were collected and highlighted 16 anomalous drainage zones. The best assay result was 3.8ppb Au. Follow-up sampling comprised 132 rock chip and 167 BCL stream sediment samples. No quartz was found in the areas sampled and float in creeks showing little sign of mineralisation. The best stream sediment assay result was 2.25ppb Au. Only two rock chip samples assayed >0.02g/t Au. The Permit was relinquished in October 1988.

Goorganga Creek Area

EPM 3889 was granted to *Seltrust Mining Corporation Pty Ltd* in December 1984. The target was epithermal, exhalative and breccia pipe hosted gold deposits. Exploration highlighted an 18 square kilometres anomalous zone in contiguous areas of upper Goorganga Creek and upper Albert Creek. Pan concentrates returned up to 40ppm Au and rock float Samples assayed up to 1000ppm Ag and 6534ppm Pb.

Rock chip samples collected upstream of the pan concentrate Au anomalies were generally below the detection limits for precious metals. It was concluded that gold mineralisation is sporadic and low-grade and that there are no economically significant deposits. The Permit was relinquished in November 1985.

EPM 5474 was granted to *Donald Smith* in July 1988. The target was alluvial gold deposits. Exploration comprised detailed prospecting and panning of alluvial wash. It was determined that average grades were too low for a bulk mining operation. The Permit was relinquished in July 1989.

EPM 5542 was granted to *Forsayth NL* (60%) and *Golden Plateau NL* (40%) in October 1988. The target was precious metal mineralisation. Exploration comprised air photo interpretation, a geological reconnaissance and stream sediment (15 samples) and rock chip (five samples) sampling. No significant stream sediment anomalies were found, the best assay result being 5ppm Au and 95ppm Pb from the same sample. Several samples of silicified and brecciated lahar contained moderate As (115ppm) and Sb (25ppm). Major base metal assay results were low. The Permit was relinquished in November 1989.

Grant Creek Area

EPM 4938 was granted to *Steven John McDonald* in September 1987. The target was alluvial gold deposits and granite-hosted hydrothermal gold-pyrite-quartz vein deposits associated with shear zones in an area in the southern extension of the Normanby Goldfield. Exploration concentrated on the more accessible northern sector, where there were two gold-bearing quartz reefs — the Samboy Prospect west of Kitty Creek and the Grass Humpy prospect between Grant and Grass Humpy Creeks. Alluvial deposits were located in Grant and Kitty Creeks.

Stream sediment sampling was carried out by Chenron Pty Ltd to test the alluvial deposits in Grant Creek. Results were inconclusive. The highest grade was 0.11g/cubic metre for active creek sediments and 0.253g/cubic metre for bank samples. About 70% of pan samples from about 8km of creek and terrace systems showed gold colours and averaged 8 to 10 colours per dish.

Follow-up exploration concentrated on the reef systems. Costeans were excavated across exposed portions of the Samboy reef and some 2t of samples were collected. These were processed through a one-head stamper battery but little free gold was recovered. Dish prospecting of soils defined likely extensions of the reef systems. Detailed exploration at Grass Humpy Creek indicated that the reef occurs at the contact between porphyritic dioritic intrusives and metasediments/volcanics.

Bulk sampling was carried out to define areas with potentially economic grades. Nine pits were excavated in Grant Creek. The gold recovered ranged from large well rounded grains to fine flattened flakes. Grades ranged from 0.034g/t to 0.451g/t Au. Following the failure of negotiations to joint venture the project and the closure of access by heavy rainfall, the Permit was relinquished on 22 May 1989. Lease applications were lodged over Grant Creek.

EPM 7544 was granted to *Graham Lamont Harvey* in February 1991. Field exploration was constrained by drought and technical difficulties. Some granite-hosted hydrothermal gold-pyrite-quartz veins were located associated with shear and breccia zones. Alluvial gold deposits in Grant Creek were tested but returned non-economic results.

Pan sampling from pits excavated with a small backhoe did not detect more than a trace of alluvial gold from more than 50 sample sites on Grant Creek. Two bulk samples from the area where gold had been detected were processed through a trailer-mounted test plant. The results were poor. Samples from the Grass Humpy prospect assayed 0.02 Au and 0.03ppm Au only. The Permit was relinquished in February 1994.

Leichhardt Range - Mount Ben Jonney -Dalrymple Mountain - Louisa Mountain Area

EPM 4413 was granted to *Carpentaria Gold Pty Ltd* in September 1986. The target was gold mineralisation in the Mount Dalrymple area. Exploration

comprised stream sediment, rock chip and soil sampling, percussion drilling, and ground magnetic and IP surveys.

Fifty six stream sediment samples were collected and analysed for gold using BCL and for other elements using ICP analysis. A low order gold anomaly was highlighted in the north-west part of the Permit. A 500m soil traverse and follow-up 25m by 25m soil grid were completed. Two hundred and ninety-seven -60 mesh samples were collected over the soil anomaly; one sample assayed 1600ppb Au.

In 1987, a ridge and spur BCL soil sampling program (294 samples) was completed. Assay results supported the known anomaly, with a highest result of 107.3ppb Au. Smaller gold and silver anomalies were delineated on the central northern face of mount Dalrymple during this sampling phase. Ninety-eight rock chip samples were collected, but results were disappointing, with only two samples assaying >0.1g/t Au (2.32g/t Au and 9.4g/t Au). Nineteen percussion drillholes also returned low grade intersections, with assay results generally <0.1g/t Au. The Permit was relinquished in October 1990.

EPM 4832 was granted to *Paul Ray* in July 1987 and was transferred to *Salamander Resources Pty Ltd* during the first year. The target was gold mineralisation within granitoid intrusions. Exploration comprised geological mapping, stream sediment sampling and rock chip sampling during four reconnaissance trips over the Permit.

Thirty rock chip and 29 stream sediment samples were collected during the first year. Anomalous stream sediment assay results were centred over two areas — around the Premier mines in the Ravenswood 1:100 000 Sheet area and around Mount Louisa and the Gregory Ranges in the Ayr 1:100 000 Sheet area. Two samples from near the Premier mines assayed 1.44ppm Au and 1.24ppm Au. A sample from the Gregory Ranges assayed 1ppm Au. Rock chip sampling results was disappointing, with a best assay result of 0.254g/t Au.

In May 1988, Salamander Resources Pty Ltd ended into a joint venture with *Metana Minerals NL* and all sub-blocks in the Ayr 1:100 000 Sheet area were relinquished. Two reconnaissance trips with stream sediment and rock chip sampling were undertaken in the Ravenswood area, where the Crooked Creek and Conical Hill prospects were identified by consultants Terra Search Pty Ltd. A rock chip sample from the Conical Hill Prospect assayed 1.17g/t Au and stream sediment samples assayed up to 15ppb Au. No sample from the Crooked Creek Prospect assayed above 0.01ppm Au. One sample from the north-east end of the prospect assayed up to 770ppm Cu. Follow-up mapping and sampling by Metana Minerals did not identify any significant mineralisation in these two areas.

Metana Minerals withdrew from the joint venture in February 1989 due to the poor sampling results and the Permit was relinquished in June 1989.

EPM 5379 was granted to *Millaroo Mines NL* in May 1988. The target was alluvial placer gold deposits along the Burdekin River. Reconnaissance mapping along the creeks and rivers identified two prospect areas. The first was ~12km

north of Millaroo, where the Burdekin River changes direction, cutting through the range. Sand and gravel cover an area of $\sim 2\text{km}^2$, providing an estimated alluvial resource of 20 million cubic metres of material. The second area was located north of the bridge linking Ayr to Home Hill, where sand and gravel cover an area of $\sim 4\text{km}^2$. This equates to around 40 million cubic metres of alluvial material, assuming the thickness of the alluvium is 10m. Two heavy mineral samples were collected from the second area, but analytical results were not attached to the report.

Follow-up work was restricted by heavy flooding. The Permit was relinquished in February 1990.

EPM 5684 was granted to *Ashton Mining Ltd* in December 1998. The target was the gold and base metal potential of outliers of Mount Wickham Rhyolite and the acid volcanics and intrusives around Mount Louisa.

Three hundred and six stream sediment samples were collected and were analysed via BCL, AAS and x-ray fluorescence. First-pass stream sediment sampling identified five gold anomalies but follow-up sampling failed to reproduce those results. Rock chip samples collected during an initial reconnaissance trip produced poor results; the best result was 60ppm Cu, 140ppm Zn, 18ppm Pb, <1ppm Ag and <0.05ppm Au. Follow-up rock chip sampling (44 samples) returned anomalous base metal grades, with up to 280ppm Zn, 110ppm Cu and 460ppm Pb.

No mineralisation with significant economic potential was found, despite the anomalous gold and base metal results in some drainage systems. The Permit was relinquished in November 1989.

EPM 7253 was granted to *Poseidon Exploration Ltd* in January 1991. The Mount Dalrymple area was explored for Mount Leyshon type mineralisation and high-level mineralisation associated with Permo-Carboniferous volcanic rocks. An interpretation of aerial magnetics, gravity and other geophysical data supported previous mapping of the area. Three rock chip and one stream sediment sample were collected during a brief reconnaissance inspection; the samples returned background levels only of gold and other elements. One sample assayed 70ppm As.

The Permit was relinquished in June 1991 after studies of the Mount Leyshon mineralisation style significantly downgraded the potential of the Mount Dalrymple area.

EPM 7738 was granted to *Poseidon Exploration Ltd* in January 1991. The target was porphyry style gold deposits in the Ravenswood–Lolworth Block. During the first year, exploration focused on a detailed literature review and interpreting geological features from airborne magnetic and radiometric surveys. This interpretation highlighted variations in known intrusive units as well as identifying a number of small intrusive bodies that were previously unmapped. Both features were considered to be prospective for porphyry style gold.

One hundred and one stream sediment samples were collected within the Permit. The best assay result was 25.4ppb Au. The area around Mount Chev and Bunkers Hill produced 10 anomalous results. Follow-up soil sampling over a 1km by 1km area produced very low gold and base metal grades. Additional stream sediment sampling returned five samples with >1ppb Au, with two samples assaying 11.8ppb Au and 12.3ppb Au. Geological investigations of the area around the old Bunkers Hill and Mount Chev workings indicated that mineralisation is limited to small veins and stockworks. The Permit was relinquished in May 1993.

EPMs 10017, 10019 and 10020 were granted to *Eurella Resources Pty Ltd* in December 1994 and were part of the company's Strathalbyn Project. The target was gold in quartz veins and joints. A review of previous exploration was carried out. Previous geochemical results indicated a moderate potential only for precious metal mineralisation. No field work was carried out. The Permit was surrendered in March 1996.

Marengo Goldfield

EPM 4435 was granted to *Xenolith Gold Ltd* (formerly Idameneo (No.126) Pty Ltd) in February 1986. Exploration was aimed at proving sufficient ore to support a small, high-grade mining operation centred upon old workings in the One Mile Mountain area.

Photogeological and field mapping were carried out in the Mount Marengo area and rock chip sampling was carried out over the Permit area. Rock chip sampling confirmed the presence of gold mineralisation in quartz veins at three selected locations. Average assay results of 5.4ppm Au and 50.2ppm Ag and 2.1ppm Au and 9.0ppm Ag were obtained from the Flat Reef and Westwood Reef, respectively. Quartz veins in the Homeward Bound area assayed 0.3–6.7ppm Au and 1–92ppm Ag. Samples were also collected from outcrops and mullock heaps around abandoned workings. Samples of shear zone material from these localities returned significant Au grades, but Au grades are sporadic and are confined to narrow, gossanous quartz veins.

Seven of the original fourteen sub-blocks were relinquished in September 1987. An RC drilling program of 38 holes totalling 1000m was carried out over four areas of old gold workings (Toomey's Reef, Flat Reef, Homeward Bound Reef and Westwood Reef). The deepest hole reached 50m. The resulting generally low Au grades were not compatible with the high grades obtained by surface rock chip sampling. The nine highest grades intersected in drillholes ranged from 0.62–1.13g/t per metre; eight of these intersections were zones of weathered, fissured and “gossanous” quartz similar to that encountered at the surface. These results suggest that supergene enrichment may be significant in the Mount Marengo area and has taken place through sulphide leaching in the brecciated quartz veins. The economic potential of sulphide ores below about 5m was considerably downgraded by the drilling results.

Detailed geological mapping and a literature review were carried out in 1988. Stream sediment and rock chip sampling were carried out to locate additional sources of Au-Ag enrichment. Several new areas were identified. A substantial,

shallow-dipping quartz vein was discovered at the New Reef prospect; surface sample assayed up to 24g/t Au. Eight costeans were excavated in the Homeward Bound, Toomey's, Bee Creek Diggings, Caledonian Diggings, New Reef, Flat Reef and Westwood Reef areas. A costean was also excavated through abandoned workings to the west of the Homeward Bound Reef but did not intersect any mineralisation. Four bulk samples were collected from costean material for metallurgical testing. Assay results from costean samples were disappointing. Bulk sampling indicated that overall grades are sub-economic. The Permit was relinquished in December 1988.

EPM 9734 was granted to *Artadze Pty Ltd* in March 1994. *Peregrine Resources (Australia) NL*, through its subsidiary *Diamond Resources NL*, entered into an option agreement with *Artadze* to assess the tenement for breccia pipe style gold mineralisation. Exploration comprised a literature review, review of aerial photography and Landsat imagery, review of magnetic and other geophysical data, review of geological and structural interpretive data and target generation.

Identified targets included probable north-west and south-east extensions of the Marengo auriferous sheet vein systems and structural trend. A regional ring structure in the north-west corner of the Permit area was also identified. The third target was a projected south-west extension of the Marengo field and reef system that exhibited extreme high and low magnetic anomalies.

After reviewing the target areas and matching them with recorded geochemistry and limited drilling results from previous exploration, it was evident that nearly all targets had been effectively tested. Sampling results were generally very low and a commercial scale deposit of any realistic size was unlikely to be present. The Permit was relinquished in March 1996.

EPM 9922 was granted to *Artadze Pty Ltd* in April 1994. The targets were epithermal breccia pipe mineralisation and massive porphyry deposits. Exploration comprised a literature review, collation and review of aerial photography and Landsat imagery, collation of geological and structural interpretive data and target generation.

The Permit was one of five held by the company. *Peregrine Resources Australia NL* entered into an agreement with *Artadze* that required *Peregrine* to undertake exploration for the period covering the first year of the Permit. *Peregrine* did not provide *Artadze* with appropriate annual reports after the agreement was terminated. The Permit was relinquished in September 1995.

EPM 11031 was granted to *Probe Resources NL* in July 1996. The tenement was acquired to investigate a reported occurrence of granite-related gold mineralisation. Investigations were limited to several days of reconnaissance of the Permit area. The reported granite proved to be of dioritic composition, with minor Cu Au mineralisation in narrow shear zones. No potential for economic mineralisation was observed. Pan concentrate sampling in the Three Hundred Ounce Patch area indicated minor, copper-contaminated, detrital gold. Dollied rock samples from the same area proved negative. The Permit was relinquished in August 1996.

Mount Abbot to Bowen Area

EPM 2178 was granted to *AGIP Australia Pty Ltd* in September 1979. AGIP had carried out a preliminary literature review of the uranium potential of the Tasman Geosynclinal zone in early 1979. This study suggested potential for locating epigenetic sandstone type, hydrothermal vein type and “porphyry” type uranium mineralisation. Initial exploration comprised reconnaissance geological mapping and a ground radiometric survey. This was followed by a 377 line kilometre heliborne spectrometer survey and ground examination of anomalous radioactive areas. Several rock types were examined petrographically.

The survey failed to locate any significant uranium mineralisation. However, minor thorium-uranium mineralisation was located in pegmatite. The Armistice Gold Prospect was examined and several samples were collected from the old mine dumps for assay. Very fine grains of free gold were observed in several samples. Samples assayed up to 17.3g/t Au and 305ppm Cu. The Permit was relinquished in February 1980.

EPM 4648 was granted to *CSR Ltd* in March 1987. The target was gold mineralisation associated with ring-dyke fractures peripheral to the Mount Abbot Igneous Complex and stockwork veining and breccia pipe development in the Kurungle Volcanics. A program of drainage geochemistry including bulk stream sediment (97 samples) and ferruginous stream gravel (87 samples) sampling was completed. This program was supported by a photogeological study aimed at detecting structural dislocation and/or alteration features associated with the Mount Abbot Igneous Complex or the Kurungle Volcanic suite.

Regional sampling results were disappointing, with assay results for concentrates ranging from <0.01–0.77ppb Au, 0.01 to 0.16ppm Cu and 0.75–17.0ppb Ag. Ferruginous gravel samples assayed <2–90ppm As, <3–28ppm Sb, 10–185ppm Cu, 20–315ppm Sb and 25–290ppm Zn. Four rock chip samples were collected from the volcanics east of the Permit area; assay results for gold were low.

An airphoto study indicated that the Mount Abbot intrusives are deeply eroded, and no obvious alteration or structural features were detected associated with the intrusives or ring dykes. The Permit was relinquished in December 1987.

EPM 5055 was granted to *CRA Exploration Pty Ltd* in November 1987. The target was epithermal and porphyry-related precious metal deposits. Exploration comprised a review of previous work in the area, a regional stream sediment sampling program and follow-up stream sediment and rock chip sampling. Landsat Thematic Mapper data were acquired and interpreted for the entire Permit. Two rock chip/grab/float samples were collected during the regional reconnaissance and infill stream sediment sampling program. Analysis of the Landsat TM data did not delineate any spectral responses analogous to known epithermal, mesothermal and porphyry alteration systems within the Lizzie Creek Volcanics.

The regional bulk cyanide leach sampling program (50 samples) defined one catchment with 4.85ppb Au. Check sampling recorded a gold assay of 2.25ppb

~750m upstream from the original sample site. Rock chip sampling (9 samples) of pyritic quartzite, muscovite schist and aplitic rocks returned no anomalous base or precious metal contents. Fifty -200 mesh stream sediment samples assayed up to 220ppb Au, 103ppm Zn, 103ppm Cu, 1140ppm Mn, <1ppm Ag and 6ppm As. Grab and float sampling failed to locate the source of the gold within the small (1km²) anomalous catchment. The Glenore Prospect was also gridded and soil sampled (80 samples). This work failed to locate any zones of significant mineralisation. No grades above 0.02ppm Au and 2ppm Ag were returned from geochemical assays.

Seventy-five rock chip/grab/float samples were collected during the detailed ground inspection/follow up of geochemically anomalous catchments. Four samples of weakly pyritic vein quartz assayed 0.01–0.07ppm Au and three samples of epidote-altered microgranite, pegmatite and aplite assayed up to 0.01ppm Au. The Permit was relinquished in November 1989.

EPM 5178 was granted to *CRA Exploration Pty Ltd* in January 1988. Exploration comprised a regional stream sediment sampling program, float and outcrop examination, and some geological traversing. Gravel/sand samples assayed up to 500ppt Au. Base metal and arsenic assay results were generally very low, with the exception of two copper anomalies related to a known, very weak copper system in the north-west portion of the tenement. Several of the -200 mesh samples assayed >10ppb Au but these anomalies were not supported by cyanide leach gold anomalies or elevated base metal assay results. The maximum assay result of 58ppb Au was from a sample in a catchment draining an adjacent CRAE tenement. The Permit was relinquished in November 1988.

EPMS 5259 and 5288 were granted to *Bowen Gold Mines Pty Ltd* in November 1988 and the title was subsequently transferred to Western Mining Corporation. Exploration was reconnaissance in style and comprised data compilation, geological reconnaissance, and stream sediment, rock chip and soil sampling.

Eight anomalies were delineated in *EPM 5259*. At the Sheep Station Creek Anomaly, rock chip samples assayed 2.81ppm, 17.9ppm and 12.4ppm Au. Rock chip sampling of breccia at Hill 122 returned little gold but gossanous float in nearby drainages assayed 1–2g/t Au. Sampling in an area of tectonic breccia south-east of Hill 122 suggested that this area is unmineralised. Waterless Reef, south-west of Hill 122, comprises two, north-west-trending, 0.5m thick, gossanous, limonitic quartz veins; assay results for samples from here were disappointing, especially for gold. Herod Creek, on the west side of Mount Mackenzie, had several small drainages with moderately anomalous stream sediment samples and rock grab samples assaying 1–3g/t Au.

Exploration was also carried out at the Otter Ridge, Mount Greentop and Split Creek Anomalies. Rock chip samples from the Matrimony Ridge – Separation Saddle Prospect assayed 6.3–16.8g/t Au. Other high assay results included 105g/t Ag and 3600ppm Pb from one sample and 60g/t Ag, 3200ppm Pb and 1870ppm Zn from another. Porphyry mineralisation defined by intense pervasive sericitisation, hematite, brecciation, tourmaline and propylitic assemblages occurs within 1–200m of the main Matrimony Ridge mineralisation. At the Spaghetti

City Prospect, the best results of rock chip sampling were 13.2g/t and 12.8g/t Au at an occurrence named Phil's Pit. The highest copper assay result was 2950ppm from another site in gossanous, knobby quartz. At Pink Slip Knoll, a siliceous gossanous breccia occurrence, rock chip samples assayed up to 0.04g/t Au and 3700ppm Cu. Stream sediment sampling also indicated anomalous copper (120–170ppm). Rock chip samples of a tourmaline breccia assayed up to 2.16g/t Au.

Reconnaissance stream sediment and rock chip sampling within EPM 5288 demonstrated locally anomalous gold zones. Gold mineralisation is associated with gossanous, limonitic quartz veins and with porphyry copper mineralisation. Some rock chip samples were examined petrologically and soil sampling reconnaissance lines were surveyed across many of the quartz reefs. Geological mapping suggested that the anomalous gold in stream sediment samples is related to north-trending chalcopyrite-pyrite-quartz veins. Alteration consists of sericite and epidote and is confined to the vein areas. Many of the gold-bearing veins assayed 10–110g/t Ag. Promising assay results (7–95g/t Au) were returned from many of the rock chip samples. The mineralisation appears to be confined to several types of gossanous, limonitic, boxwork-bearing quartz veins that range in thickness from 0.1–1.5m. The target areas included Beluga Reef, Major Creek and Mount Cavana.

The Permit was relinquished in September 1989.

EPM 5354 was granted to *Western Mining Corporation Ltd* in February 1988. The Permit was acquired to explore for porphyry and vein style gold mineralisation. Exploration comprised detailed soil and mapping grids, rock chip sampling, magnetometer and induced polarisation ground geophysics and excavation of nine costeans to cross cut gold-quartz vein mineralisation at the Mount Gordon Project. The costeans were 10–200m long, 0.75m wide and 2–3m deep. They were geologically mapped and channel sampled.

The geological mapping indicated that most mineralisation is directly related to quartz fissure lodes that contain Au and, to a lesser extent, Ag, Cu, Zn and Te. Porphyry-style mineralisation may be present at Middle Hill and the Africander Breccia. A ground magnetometer survey highlighted the variety of dioritic and gabbroic bodies in the tenement area. No highly anomalous areas were delineated during the gradient array induced polarisation survey or the dipole-dipole IP survey.

The main geochemical sampling program was over the Mount Gordon soil grid. Results were disappointing and did not reproduce the results of the original reconnaissance soil line over Maloney's Reef, where anomalous soil samples assayed 600–3000ppb Au. Some anomalous assay results came from the Africander Breccia on the eastern side of the grid.

The main prospects in the Permit are the individual vein occurrences, namely, Welcome, Blue Mine, Maloney's and Try Again. Some of these had recorded production. The best channel sample assay result from two costeans excavated at the Welcome Lode was 50.0g/t Au. Some quartz material stockpiled around the

dump at the Blue Mine assayed 25.1g/t Au. Grab samples from the Stop No.7 Reef assayed 3.8g/t and 13.0g/t Au. At Kevin's Reef, grab samples from small pits assayed up to 69.8g/t Au for a limonitic quartz vein. A grab sample from a pit at Stop No.5 assayed 16.3g/t Au. Several rock chip samples collected from Maloney's Reef were anomalous in gold. The best result was 200.0g/t Au and other high results included 39.0g/t, 96.0g/t and 19.10g/t Au for quartz vein float. The best assay result from the Try Again workings was 29.0g/t Au for quartz float. Soil sampling at the Africander Breccia delineated a small area with >50ppb Au. Rock chip samples assayed up to 6g/t Au locally.

Fourteen reverse circulation and diamond core holes totalling 799m were drilled at the Africander Breccia and gossanous zones. Pyrite (2–8%) was recovered in most holes. Five holes were drilled to test a high soil sampling response, down from the breccia hill. Moderately anomalous gold grades were typically intersected from the first 25m, with the best result being 1m at 15.4g/t Au. This result was interpreted to be due to enrichment at a palaeowater table, and was not substantiated by any of the closely surrounding holes. The Permit was relinquished in April 1989 because the known mineralisation had not proved to be widespread.

EPM 5620 was granted to *Western Mining Corporation Ltd* in February 1988. Exploration comprised mainly reconnaissance prospecting and stream sediment sampling. The Permit was relinquished in September 1988 after little work was done.

Mount Carlton - Crush Creek - Birralelee Area

EPM 3142 was granted to *Ashton Mining Ltd* in November 1981. The target was disseminated epithermal Au mineralisation in acid volcanics of the Mount Wickham Rhyolite. BHP Minerals Ltd entered into a joint venture with Ashton Mining and a detailed mapping and rock sampling program outlined anomalous epithermal gold and silver mineralisation in Mount Wickham Rhyolite at the Mount Carlton Prospect. Eight rock chip samples were collected from the most favourable alteration and fracturing. The results were disappointing, with maximum grades of 0.077ppm Au and 108ppm Pb. In the silicic zone immediately to the east of the Mount Carlton prospect, mapping and sampling were carried out to check for extensions of mineralisation from Mount Carlton. The better assay results from 17 samples included 124ppm Cu, 3850ppm Pb, 72ppm Zn, 67ppm Ag and 68ppm As from one sample and 0.219ppm Au with low base metal assays from another sample.

Five core holes totalling 434m were drilled in the area. Two holes intersected 9m at 0.514ppm Au and 68ppm Ag and 3m at 0.961ppm Au and 11ppm Ag in Mount Wickham Rhyolite. Outcrop mapping and drilling indicated that the Mount Wickham Rhyolite forms flat-lying caps over barren Lizzie Creek Volcanics. A ground magnetic survey was carried out over the Mount Carlton prospect and magnetic susceptibility measurements were made on drill core. There was no evidence for a deep mineralised system. The Permit was relinquished in October 1982.

EPM 3891 was granted to *Seltrust Mining Corporation Pty Ltd* in December 1984. The target was epithermal or breccia pipe Au mineralisation associated with late Permian to early Triassic Mount Wickham Rhyolite volcanism. Exploration comprised a literature review, Landsat study, 1:25 000 airphoto interpretation and ground checking of 40 airphoto anomalies. Results were largely negative. None of the 40 photo features checked had any associated gold mineralisation and only one locality showed significant alteration. Sulphides occurred in trace amounts at this site but quartz veining was rare. The outcrop did not warrant rock chip sampling.

It was recommended that, after relinquishment of 57 sub-blocks of the Permit, EPMs 3891 and 3922 be consolidated into a single tenement. EPM 3891 was conditionally surrendered in July 1985.

EPM 4051 was granted to *BP Australia Gold Pty Ltd* in July 1985. The target was epithermal or breccia pipe hosted gold deposits associated with the late Permian to early Triassic Mount Wickham Rhyolite. Exploration comprised a literature review, airphoto interpretation, ground checking of airphoto anomalies, rock chip sampling, detailed geological mapping and 672m of reverse circulation percussion drilling in nine holes at the Strathmore and Powerline Prospects. Mapping and sampling at the Strathmore and Powerline Prospects highlighted the potential for gold mineralisation within silicified, pyritic and locally brecciated zones.

Three holes tested the Strathmore Prospect over a 2km strike length. Assay results were very low throughout. Six holes totalling 363m tested the Powerline Prospect over a 1.5km strike length. The best intersection was in drillhole PDHOP-4, where 8m averaged 0.75ppm Au between 16m and 24m. This result indicated some potential for small, medium-grade Au-Ag mineralised zones.

Rock chip sampling and mapping at the McGregor and Capsize prospects indicated no potential for gold mineralisation. The Permit was relinquished in October 1985.

EPM 4052 was granted to *A I H Gold Pty Ltd* in July 1985. The target was epithermal gold associated with the Permo-Triassic Mount Wickham Rhyolite. Exploration included an airphoto analysis, stream sediment and rock chip sampling, and ground traverses.

Intense silica-pyrite kaolinite alteration zones were located on the eastern parts of Mount Wickham. No significant Au or Ag assay results were obtained from rock chip or stream sediments. The highest gold assay result was 0.2ppm. Sporadic anomalous As (up to 215ppm) and more widespread anomalous Pb (up to 360ppm) assay results were obtained from rock chip samples. The absence of significant gold led to the relinquishment of the Permit in November 1985.

EPM 4310 was granted to *Ashton Mining Ltd* in June 1986. Exploration focussed initially on the Mount Carlton prospect and confirmed the existence of a gold-bearing epithermal system associated with the late Permian to Early Triassic Mount Wickham Rhyolite volcanic episode. *Carpentaria Gold Pty Ltd* agreed to farm into the property in September 1987 and became the operators of the

exploration program. Regional exploration comprised stream sediment sampling and detailed airborne geophysics. All results confirmed the Mount Carlton prospect as the main zone of interest. Minor exploration was carried out at the Strathmore and Powerline prospects.

The Permit was conditionally surrendered in December 1989, when the remaining sub-blocks were amalgamated with portions of EPMs 4415 and 4728 to form EPM 7258. Exploration results for the Mount Carlton prospect are confidential.

EPM 4415 was granted to *Ashton Mining Ltd* in September 1986. The Permit was acquired to investigate the potential of the Permo-Triassic Mount Wickham Rhyolite volcanic episode for epithermal gold mineralisation. The Permit was conditionally surrendered in May 1990. Exploration results are confidential.

EPM 4728 was granted to *Ashton Mining Ltd* in April 1987. The target was epithermal gold deposits associated with the late Permian to Early Triassic Mount Wickham Rhyolite. Reconnaissance rock chip sampling delineated two areas (Boundary and Glen King prospects) where anomalous gold was associated with quartz veins and silicified breccia zones. Follow-up mapping and sampling confirmed the anomalous grades of up to 9.3g/t Au.

Ashton Mining Ltd and *Carpentaria Gold Pty Ltd* entered into a joint venture over this tenement as well as two surrounding Permits in November 1987, with *Carpentaria Gold* as operator. *Carpentaria* carried out a reconnaissance BCL/-80 mesh stream sediment sampling survey, rock chip sampling and the drilling of seven core and two percussion holes at Boundary and Boundary South. The highest assay result was 0.65g/t Au.

The results of subsequent exploration are confidential. The Permit was conditionally surrendered in April 1980.

EPM 4840 was granted to *CRA Exploration Pty Ltd* in August 1987. The target was porphyry-related and epithermal gold mineralisation. Area selection was based on BMR magnetic intensity maps. A large aeromagnetic low was located near the intersection of two major linear structures. This was found to be associated with a known large alteration zone.

Exploration comprised a literature review, regional cyanide leach sampling (128 samples) and -30 mesh/-200 mesh stream sediment sampling (65 samples). Follow-up of initial 1ppb Au cyanide leach anomalies resulted in the discovery of large alteration systems at the BV 4 and BV 8 prospects. Gridding, geological mapping and rock chip sampling were completed over portions of these prospects and delineated scattered areas with elevated gold and silver. Assay results from sampling at the BV 4 prospect included 2.8ppb Au and 2.35ppb Au. Assay results from the BV 8 prospect, which contained silicified rhyolite/trachyte and numerous pyritic and silicified rocks, included 3.65ppb Au, 2.05ppb Au, 1.95ppb Au, 1.65ppb Au and 1.55ppb Au. An area draining two zones to the west and south-west of McGregor Peak assayed 4.45ppb Au and 2.6ppb Au.

Two hundred and fifty rock chip samples were collected from throughout the Permit, with particular emphasis on the BV 4 and BV 8 prospect areas. Non-coincident maximum assay results were 2000ppm Pb, 460ppm Zn, 240ppm Cu, 103ppm Ag, 0.78ppm Au, 145ppm As and 105ppm Mo. The general lack of good coherent outcrop and complex rock relationships meant that little structural data was collected.

An airborne magnetic and radiometric survey was carried out and Landsat Thematic Mapper data were acquired. Stream sediment anomalies were followed up with check and infill stream sediment sampling, detailed ground inspections and rock chip, grab and float sampling. Results did not delineate any new mineralised alteration systems.

Following an assessment of results for the entire Blue Valley project area, it was decided to suspend field work on the McGregor Peak permit until critical drill testing was completed on prospects within adjacent Permits. Drill testing did not identify any economic mineralisation and indicated that the epithermal mineralising events responsible for the BV 4 and BV 8 alteration system, although widespread, were weak and unlikely to have resulted in a near-surface gold deposit within CRA's target range. The Permit was relinquished in November 1990.

EPM 5070 was granted to *CRA Exploration Pty Ltd* in November 1987. The target was epithermal and mesothermal gold deposits. A review of previous exploration was followed by regional cyanide leach and -80 mesh/-200 mesh stream sediment sampling (185 samples), regional rock chip sampling (976 samples), gridding and mapping. Airborne magnetic and radiometric surveys were flown over most of the Permit, followed by a ground magnetic survey. Detailed soil and rock chip sampling and percussion/reverse circulation drilling were carried out in selected areas. Landsat Thematic Mapper imagery covering the Permit and surrounding areas was purchased.

Several catchment areas proved to be anomalous in gold in cyanide leach gravel samples. Float inspection and analysis led to the discovery of epithermal style quartz veins and follow-up geological traversing led to the discovery of the Blue Valley prospects (BV1, BV2, BV3, BV5, BV7 and BV10). Detailed geological mapping was also carried out over these prospects. A geological sketch map was prepared for a portion of BV3. These maps showed the variety of epithermal style alteration, veining and brecciation at the Blue Valley prospects and emphasized the potential of the area to host significant gold deposits.

The stream sediment sampling program returned a maximum copper assay result of 324ppm for a -80 mesh sample collected at a site with visible malachite and rare native copper. Thirty-one samples (17% of the total collected) assayed >1000ppt Au and were regarded as anomalous. Assay results for 976 rock chip samples assisted in the discovery and definition of mineralised zones in the six epithermal prospects. Significant gold grades were located at BV1 (up to 8.16ppm), BV5 (up to 2.45ppm) and BV7 (up to 164ppm). Elevated Ag and As contents general coincided with high Au.

Six reverse circulation holes (total 682m) and later four percussion holes (total 457.8m) were drilled at the BV1 prospect to test a narrow epithermal vein system cropping out over a 500m strike length. The best mineralised zones were in hole RC87BV1 with 14m at 0.12g/t Au from 44m (including 2m at 0.30g/t Au from 52m) Other intersections included 2m at 2.12g/t Au from 54m, 4m at 1.68g/t Au from 88m, 6m at 5.88g/t Au from 10m, 6m at 2.75g/t Au from 96m, 4m at 4.01g/t Au from 136m (including 1m at 15.3g/t Au from 137m), 2m at 1.17g/t Au from 30m and 8m at 1.68g/t Au from 64m.

Two reverse circulation holes were drilled (total 196m) at BV5 to test the thickness of a gold-bearing silicified (epithermal) cap overlying a sequence of intermediate volcanics and volcanoclastics. The high gold grades at the surface did not continue at depth. The better intersections were 2m at 0.12g/t Au from 8m and 4m at 0.11g/t Au from 52m.

First pass core drilling (495.85m) was completed at BV7. The better intersections were 3m at 2.29ppm Au from 74m, 26m at 0.63ppm Au from 159m and 16m at 1.02ppm Au from 124m.

An integrated interpretation of the airborne geophysical and Landsat TM data was carried out and this work identified several magnetic, radiometric and TM spectral responses analogous to known epithermal-mesothermal gold mineralisation in the Collinsville area.

Systematic rock chip sampling was carried out over bedrock exposures at the BV7 prospect, and an additional two core holes and three RC holes were drilled. Numerous intersections contained anomalous gold up to 1g/t but none were economic or near economic. The data indicated that, although the BV7 alteration system is of substantial size, the mineralised veins are narrow and there appeared to be no untested zones of sufficient dimensions to host a near-surface zone of economic mineralisation of interest to CRA. Little evidence was present to support the conceptual idea that grades might increase with depth. The Permit was relinquished in November 1990.

EPM 5213 was granted to *CRA Exploration Pty Ltd* in February 1988. The target was epithermal and mesothermal precious metal mineralisation in the Mount Bella Vista area. Exploration comprised regional -6 mm bulk cyanide leach (69 samples) and -80 mesh/-200 mesh stream sediment (49 samples) sampling and an airborne magnetic and radiometric survey. Follow-up and check sampling of all >1ppb Au cyanide leach anomalies identified the source of each anomaly but failed to locate any primary epithermal or mesothermal mineralisation. The best -6 mm sample assay result was 2600ppt Au. No Au or indicator element anomalies were returned from -80 mesh/-200 mesh samples. The only base metal anomaly was 100ppm Zn. Nineteen rock chip samples were collected. The best assay results were 0.27ppm Au, 25ppm Pb, 150ppm Zn, 123ppm Cu, <1ppm Ag and 34ppm As.

Interpretation of airborne geophysical and Landsat TM data, and ground follow-up did not reveal any responses or inferred sources analogous to areas of

known mineralisation elsewhere in the district. The Permit was relinquished in April 1989.

EPM 5396 was granted to *CRA Exploration Pty Ltd* in May 1988. The target was epithermal precious metal mineralisation within the Lizzie Creek Volcanics. Exploration comprised a regional reconnaissance -6 mm cyanide leach (44 samples) and -80 mesh stream sediment (44 samples) sampling program, with supporting grab, float and rock chip sampling. An airborne magnetic and radiometric survey was completed over most of the Permit and Landsat Thematic Mapper data were acquired. Regional 1:100 000 scale geological mapping was carried out in conjunction with an integrated interpretation of the airborne geophysical and Landsat TM data. Ground checking of two radiometric responses did not identify any new mineralisation.

Gold anomalies were delineated in two areas — a small valley in the west of the Permit and area 3km north-east of the Strathmore prospect. Gold anomalies in the small valley ranged from 16–48ppb and were associated with cyanide leach anomalies ranging from 1–1.4ppb Au. In the area 3km north-east of the Strathmore prospect, a weak 18ppb Au anomaly with no supporting cyanide leach anomalism was developed on black clay soils over an adamellite basement. Base metal anomalism was restricted to the Strathmore Prospect; limited reconnaissance rock chip sampling here returned assay results of up to 0.13ppm Au.

Several phases of check and infill sampling identified two significant epithermal systems at the BV13 and Powerline Prospects. Assay results from -6mm cyanide leach sampling ranged from 1–2.7ppb Au. Results from -80 mesh stream sediment sampling ranged from 15–92ppb Au.

Follow-up of cyanide leach anomalies (1.1–31.3ppb Au) led to the discovery of an epithermal, chalcedonic quartz vein system at the BV13 prospect. Gridding, mapping, detailed ground magnetics and rock chip sampling. Rock chip samples of narrow, epithermal, chalcedonic, colloform-crustiform quartz veins assayed up to 15.6ppm Au. Base metal analyses from the vein system were generally low, with assay results rarely exceeding 500ppm Pb, 150ppm Zn and 400ppm Cu. Spotty Pb assay results up to 3150ppm were returned from silica-flooded andesites across the prospect. One sample from a small pod of weakly malachite-stained, silicified andesite assayed 8400ppm Cu, 2000ppm Ag, 28ppm U, 310ppm As and 1280ppm Sb. A ground magnetic survey was completed and sixteen percussion holes, ranging in depth from 44–98m were drilled for a total of 932m to test the auriferous, epithermal quartz vein system at shallow depths. This drilling returned better intersections of 4m at 15.0g/t Au from 4m and 2m at 1.0g/t Au from 38m.

In the Powerline Prospect area, cyanide leach anomalies ranged from 1–7.9ppb Au and -80 mesh samples ranged from 15–55ppb Au. Anomalies within the central portion of a circular feature were related to a weakly auriferous epithermal vein system previously identified by BP and held by Menzies Gold under MLAs 638–641. Rock chip samples from small, discontinuous pods of epithermal

chalcedonic quartz veining along the south-eastern margin of the Powerline Circular feature assayed up to 3.2ppm Au.

A short program of RAB drilling (59 holes for 312m) was completed to test the bedrock geochemical expression of features delineated during the ground magnetic survey over a portion of the BV13 grid. The best assay result was 0.58ppm Au. CRA concluded that the mineralisation at BV13 consists of numerous thin veins with low potential for CRA's target size. The Permit was relinquished in November 1990.

EPM 7258 was granted to *Ashton Mining Ltd* in May 1990. The tenement was originally an amalgamation of portions of EPMs 4310, 4415 and 4728 held by Ashton Mining Ltd and *Carpentaria Gold Pty Ltd* under a joint venture agreement, with Carpentaria Gold as operator. The target was epithermal gold-silver mineralisation within the Mount Wickham Rhyolite. Ashton Mining Ltd withdrew from the joint venture during September 1992. The Permit was relinquished in June 1994. Exploration results are confidential.

EPM 7776 was granted to *Carpentaria Gold Pty Ltd* in July 1991. The target was structurally-controlled epithermal and subvolcanic breccia style gold mineralisation, similar to the Mount Carlton Prospect.

Forty-four sub-blocks out of an original 99 were relinquished in June 1993. Work completed in the relinquished area included a literature review, reconnaissance -2mm cyanide leach stream sediment sampling program for Au, Ag and Cu, rock chip sampling and geological mapping at 1:25 000 scale.

The Permit was surrendered in June 1994. Exploration results are confidential.

EPM 9445 was granted to *Coal and Allied Operations Pty Ltd* in July 1993. The target was alluvial placer gold. Exploration comprised geological mapping, stratigraphic drilling, geochemical exploration, interpretation of aeromagnetic data, and ground and aerial magnetic surveys.

Exploration mainly focused on geological mapping and determining structural relationships in the area. Mineral prospectivity was assessed based on the occurrence of sub-basins and palaeochannels observed during mapping. The lower and upper horizons of a possible palaeochannel (determined from aerial magnetic interpretation) were determined to have little potential for gold mineralisation. Seventy-five core samples from three diamond holes were assayed for gold and base metals but no assay results were anomalous. The Permit was relinquished in January 1997.

EPM 9937 was granted to *Basin Gold Pty Ltd* in February 1994. The target was epithermal and porphyry style mineralisation in the Permo-Carboniferous Lizzie Creek Volcanics. The Permit covered areas previously held by CRA Exploration Pty Ltd, including the Blue Valley and Bowhunters prospects.

Battle Mountain (Australia) Incorporated entered a joint venture with Basin Gold Ltd in September 1996. A joint venture was arranged with Resolute Mining in

1997. *Resolute Ltd* gained 100% control of the Permit from the joint venture partners in February 2000. Under an agreement signed in April 2002 with Gold Fields Australasia Pty Ltd, *Conquest Mining Ltd* purchased a 40% interest in EPMs 9937, 11147, 11480 and 11483 and was in joint venture to earn another 40% of the tenements through exploration expenditure. Exploration results are confidential.

EPM 10164 was granted to *Carpentaria Gold Pty Ltd* in June 1994. The targets were subvolcanic breccia systems and epithermal gold mineralisation. Exploration was managed by MIM Exploration Pty Ltd. Nine prospects that displayed epithermal style veining, brecciation, sinter, alteration and associated anomalous gold geochemistry were located within the Permit, which was formed from the amalgamation of EPMs 7258 and 7776.

Forty sub-blocks were relinquished in June 1998. Exploration within this area included a literature review, stream sediment and soil sampling, an airborne magnetic and radiometric survey, and geological mapping. An additional four sub-blocks were relinquished in June 1999. Exploration within these sub-blocks had delineated two areas of intense clay + pyrite ± silica alteration in brecciated rhyodacitic lithic tuffs and a zone of *en echelon* quartz veins. Rock chip samples assayed up to 0.21g/t Au and 90g/t Ag.

Exploration during the 12 months from June 1998 to June 1999 was limited to promotional efforts to attract potential joint venture partners. Gold Fields Australia Pty Ltd entered into an option to joint venture and undertook exploration and expenditure for the joint venture. Gold Fields focussed their exploration on the Ortiz and Powerline prospects.

Twenty-one sub-blocks were relinquished in June 2000. By this time, MIM had drilled 188 holes within the tenement to investigate the Mount Carlton, Herbert Creek East, Mount Herbert North, Boundary, Quartz Hill, Mount Wickham, Capsize, Strathmore and Ortiz prospects. A small resource of 94 000t at 4.9g/t Au had been delineated at Herbert Creek East.

Thirty-five sub-blocks were relinquished in June 2002. The area relinquished covered the Quartz Hill Prospect, which is dominated by north-east-trending quartz veins with abundant chalcedonic bands. The host rocks are rhyolitic pyroclastics that are probably associated with rhyolite flows at Mount Wickham. Three core and five percussion holes drilled by MIM had failed to intersect any significant mineralisation. Gold Fields concluded that although Quartz Hill is an epithermal low sulphidation system, there is no potential for economic mineralisation.

Conquest Mining Ltd entered into a Joint Venture with Carpentaria in 2004 and purchased 100% of the project tenements, including EPM 10164, in December 2004. Exploration results are confidential.

EPM 11147 was granted to *Battle Mountain (Australia) Incorporated* in July 1996. The tenement was acquired to explore for epithermal style precious metal mineralisation and porphyry Cu-Au style mineralisation within the Carboniferous

to Permian Lizzie Creek Volcanics. In September 1996, a joint venture agreement was reached between Battle Mountain Australia and *Basin Gold Pty Ltd* (the holder of adjoining EPM 9937).

Thirty-three sub-blocks were relinquished in January 1997. Exploration undertaken within the relinquished area comprised an evaluation of previous exploration results followed by detailed stream sediment sampling (24 samples), a geological reconnaissance and rock chip sampling (four samples). Results were generally of low order, with only a single isolated BCL stream sediment anomaly assaying >1ppb Au (2.32ppb Au) from a small tributary of Rocky Creek. This anomaly was not associated with outcropping mineralisation and was thought to represent the influence of the known Powerline Prospect further upstream. Rock chip samples assayed up to 0.031ppm Au.

Seven sub-blocks were relinquished in January 2000. Limited anomalism was reported from eight stream sediment samples from within the relinquished area. By this time, *Resolute Ltd* had gained control of 100% of EPM 11147 from Basin Gold Pty Ltd. Under an agreement signed in April 2002 with Gold Fields Australasia Pty Ltd, *Conquest Mining Ltd* purchased a 40% interest in the tenement as well as three other Permits in the area and was in joint venture to earn another 40% of the tenements through exploration expenditure of \$1.4 million by 30 August 2004.

An additional 25 sub-blocks were relinquished in December 2005. Work carried out within the relinquished area included regional interpretations of aeromagnetics and Landsat imagery, geological mapping, prospecting, and stream sediment and rock chip sampling. No significant prospects were located. Despite an abundance of rock samples collected from near the western shear zone prospect (WSZ3), the gold geochemistry was low.

This Permit is still current and other exploration results are confidential.

EPM 12527 was granted to *Resolute Resources Ltd* in November 2004. The target was epithermal Au-Ag-Cu mineralisation in the Permian Lizzie Creek Volcanics. Exploration comprised regional interpretation of aeromagnetics, Landsat imagery, geological mapping, prospecting, stream sediment, soil and rock chip sampling and reverse circulation drilling. *Conquest Mining Ltd* became a joint venture partner with Gold Fields Australasia Pty Ltd in April 2002 and acquired 100% of tenements (including EPM 12527) through exploration expenditure of \$1.4 million, with Gold Fields retaining a 2.5% NSR on future production. Exploration results are confidential.

EPM 12829 was granted to *Carpentaria Gold Pty Ltd* in March 2000. Exploration was focussed on identifying epithermal gold-silver mineralisation within the Permian Lizzie Creek Volcanics and Permo-Triassic Mount Wickham Rhyolite. Exploration was carried out by Gold Fields Australasia Pty Ltd under an option to joint venture over the Permit. Two of the original four sub-blocks were relinquished in March 2002. Exploration within this area comprised reconnaissance stream sediment sampling and reconnaissance and prospect-scale mapping and interpretation. No prospect sampling was carried out.

Conquest Mining Ltd entered into a joint venture to earn 60% of the tenement and adjoining EPM 10164 through exploration expenditure of \$500 000 by 6 December 2005. Conquest purchased 100% of the tenements from Xstrata in December 2004. The Permit was relinquished in March 2006. Results are confidential.

EPM 13867 was granted to *Conquest Mining Ltd* in April 2003. Five sub-blocks were relinquished in April 2006. Exploration focused on identifying porphyry Cu-Au and epithermal Au-Ag mineralisation within the Permian Lizzie Creek Volcanics and intrusives of the northern Bowen Basin. Exploration comprised a regional study using aerial photography, Aster satellite imagery and geochemical and geological data. No significant discoveries were made in the relinquished area. Exploration results for the remaining sub-blocks are confidential.

EPM 14171 was granted to *Energy Minerals Pty Ltd* and *Basin Gold Pty Ltd* in January 2005. The Permit was applied for to assess the mineralisation potential of the Lizzie Creek Volcanics to the west and south of Collinsville. Fieldwork was limited to geological mapping along existing public roads. A photo-geological study was also completed.

Interpretation of previous exploration data, airborne geophysics and aerial photographs indicated that much of the area to the south and immediately west of Collinsville is covered by early Permian sediments of the Bowen Basin that are unlikely to host economic mineral resources. Forty-five sub-blocks out of a total of 191 were relinquished in May 2005. An additional 51 sub-blocks were relinquished in February 2007. Exploration results for the remaining sub-blocks are confidential.

Mount Cavana, Mount Challenger, Eden Lassie, and Kelsey Creek Areas

EPM 662 was granted to *Clarke Spur Mining Company Pty Ltd* in October 1969. The target was high-grade gold deposits in the Dittmer area. The surface area around the Lamington mine was inspected. Other old gold workings were examined near a right bank tributary of Five Mile Creek. Samples collected from costeans across the reefs near old shafts returned only traces of gold, suggesting that ore shoots are very short. Bulldozing on a high ridge near the centre of the Permit exposed several, small, discontinuous veins of specularite in a zone of alteration. Samples assayed up to 0.11% Ni. Rock chip samples from across a large outcrop of pyritised andesite at the old Commonwealth mine showed traces only of gold.

Dumps at the Mixer and Golden Gusher mines at Longford Creek were inspected. Eighteen costeans were excavated in this area to expose the shear zone along the whole length of the lease. Significant gold grades were found in a costean south-east of the Golden Gusher main shaft, in the first five costeans north-west of the shaft, and in the last costean. The highest assay result was 34.5g/t Au. This exploration indicated that there may be an auriferous shoot about 60m long in the region of the main shaft. The higher grade ore was heavily mineralised.

The Permit was relinquished in August 1971.

EPM 2132 was granted to *Buddha Gold Mines NL* in May 1979. The primary target was gold mineralisation.

A Joint Venture Agreement was signed with *Homestake Gold Ltd* in 1984 to continue exploration in EPMs 2132 and 3285. Work carried out by Homestake included a literature review, orientation pan concentrate sampling, rock chip sampling of known and potential prospect areas, and 1:100 000 scale geological mapping accompanied by regional reconnaissance and petrographic studies of mineralisation and alteration. Aerial magnetic and radiometric surveys were flown over the Permits. The Dittmer (Duffer) mine was dewatered in preparation for re-sampling. It was estimated that there was 27 000t of ore available for mining. The White Hill and the Moon Prospects were deemed to warrant further exploration.

Numerous prospects were inspected and/or found from the literature review. No deposits were being worked at the time of the field inspection. The Dittmer mine was by far the most important. The vein containing the gold mineralisation can be traced on the surface for 550m, and the structure is still open at both ends. The old workings occupy a strike length of about 270m, so least 280m remains unworked. In addition to underground sampling, surface dumps were surveyed and sampled. Many of the known gold-bearing prospects were examined in the initial stages of the evaluation of Buddha's tenements. Preliminary sketch maps were made of some of the prospects. This initial examination revealed that evidence of gold mineralisation can be found wherever quartz occurs.

Surface samples collected during the brief preliminary prospect examination varied greatly in their gold and silver contents, with a trace to 89.3g/t Au. Significant gold and silver assay results were reported for grab samples from the dumps of both veins at the Lady Valerie prospect, with 89.3g/t Au and 20.0g/t Ag from one dump and 24.3g/t Au and 118g/t Ag from the other. A sample from the Lamington mine returned 43.5g/t Au and 60g/t Ag. Three out of four samples from the Red Ridge prospect averaged 21.0g/t Au and 14.0g/t Ag; samples from the nearby Walsh Shaft assayed 11.1g/t Au and 4.0g/t Ag. Some good grades of up to 39.8g/t Au with 10.0g/t Ag were recorded for grab samples from dumps on the Golden Gusher and Crazy Cat extensions. Samples collected from the larger quartz bodies were generally lower in gold and silver. The White Hill samples included one with 3.4g/t Au and 43.0g/t Ag.

A soil sampling program and a drainage sediment orientation survey were carried out. Stream sediment and pan concentrate samples were then collected. The Golden Gusher soil survey covered known veins that had been partially worked. Resampling of selected dump material returned markedly high gold grades. Soil samples (-80# fraction) generally assayed below the detection limit (0.02ppm Au), but did give distinct indications of the Golden Gusher vein and, less markedly, the Crazy Cat vein. Soil sampling at the White Hill prospect delineated an anomalous area on the eastern rim of the quartz float area. Soil anomalies were narrow and reflected the veins. There was a close correlation between high grades of Au, Ag, Cu, Pb, Zn and As suggesting a sulphide association.

Detailed mapping was carried out in the hills to the north of the Dittmer mine to Devils Creek. Costeans were excavated on old pits and prospects and all were sampled. Two types of fissure filling gold occurrences were distinguished — gold mineralisation hosted by volcanic flows (e.g. Dittmer) and mineralisation hosted by mafic dykes and their contacts. Gold mineralisation occurs mainly as very fine particles in the sulphides.

Detailed stream sediment and pan concentrate surveys were carried out in the Gold Creek – Silver Creek area. Numerous gold anomalous sites were delineated. Alteration zones are widespread and mainly comprise quartz-sericite assemblages. Strong faulting occurs along east-north-east and north-north-west trends. In many cases, fractures are filled with narrow quartz-pyrite-chalcopyrite-gold mineralisation. Detailed geological work was carried out on the excavations and backhoe trenches at Dittmer Hill. All the known gold prospects in the Five Mile Creek area were located and some new finds recorded.

Sampling was carried out at numerous prospects. Assay results included 2.32–71.7ppm Au, up to 3.43% Pb and up to 1900ppm Ag at Four X, 1.58–82.0ppm Au at Cyril Walters, 5.45–25.1ppm Au at Pannikan, 0.293–48.9ppm Au, up to 1.33% Cu and up to 132ppm Ag at Lady Valerie, 0.174–70.4ppm Au, up to 7100ppm As and 1180ppm Zn at Iron Duke and 0.039–15.0ppm Au at Orient/Dray. The Four X vein was consistently highly mineralised in all elements.

In 1982, a soil survey around the Dittmer Hill delineated anomalous gold areas, particularly around the Unicorn Reef. Detailed geological mapping was carried out over the upper portions of Kelsey Creek above the Dittmer Mine. Gold occurrences were located at Jim's Prospect (where an old alluvial deposit was worked), the Ridge Prospect (where gossanous material was encountered) and Mick's Prospect (which comprised three test pits, one of which contained gold mineralisation). The Lady Denise Prospect was also inspected. Some panning for gold colours was also carried out in the creeks. Gossanous float near an old excavation at Jim's Prospect assayed 48ppm Au. Samples from a trench at the Ridge Prospect assayed up to 0.98ppm Au. Gossan float found in the western gully assayed 22ppm Au. Grab samples of mineralised material taken from dumps at Mick's Prospect assayed up to 22ppm Au. Samples from an old shaft at the Lady Denise Prospect assayed 12g/t Au and 1g/t Ag.

Exploratory costeaning was carried out at the Cyril Walters, Lady Valerie, Anita and Iron Duke prospects in the Happy Valley (Five Mile Creek) area. The Permit was relinquished in February 1986.

EPM 2391 was granted to *Ithahira Pty Ltd*, a wholly owned subsidiary of Buddha Gold Mines NL in June 1980. Exploration was centred on the Moon and Red Barron Prospects. An orientation soil sampling survey was carried out along a line through Moon 2 and Moon 3. Subtle anomalies were detected for Au, As, Cu, Zn and Pb. Three follow-up percussion holes did not give encouraging results for Au or Ag.

The Red Barron Prospect was initially grab sampled and then systematically rock chip sampled. Samples were also collected at the Red Barron Extension, Quartz Ridge and smaller occurrences. Later results were not as high as those obtained from the initial grab samples. A pan concentrate survey showed up some anomalous locations in some of the creeks, and these were generally confirmed by observations of visible gold in the concentrates. An orientation soil line was sampled across the Red Baron. The best result from rock chip sampling at Red Baron was 100ppm Au and 81ppm Ag. The best result from pan concentrate sampling was 9.95ppm Au and soil sampling returned a best assay result of 0.53ppm Au.

High resolution magnetic traverses were conducted over various prospects, including Moon and Red Baron. No appreciable response was detected over the Moon Prospect. A more detailed survey was carried out over the Red Baron. The Permit was relinquished in December 1981.

EPM 3149 was granted to *Buddha Gold Mines NL* in November 1981. The tenement was taken out to explore for gold, silver and associated minerals. Initial exploration comprised a regional pan concentrate survey, which outlined a number of gold anomalous drainages worthy of follow-up exploration. The best result from pan concentrate sampling was 0.919ppm Au. The Red Baron, Ward Creek and Birthday Gift areas are in the Hecate Granite Complex. The remainder of the anomalies were located in the Carmila beds and expressed some subtle base metal association that became more apparent in normal stream sediment sampling results.

Except for the Birthday Gift, Greta, and Bell Creeks, the detected gold anomalies were regarded as indicating new exploration targets. Gold anomalies were found in the drainage of Pipe Case Creek and Grass Tree Creek. The exploration of the Red Baron anomaly was further advanced. A single anomalous sample was collected in the lower section of Major Creek, downstream from the Red Baron anomalous area. Gold anomalies in Spring and Charley Creeks were regarded as being due to a system of gold-bearing veins that were being explored near Dittmer. Intense gold anomalies near the Proserpine River could not be related to any reported old prospects.

Detailed investigations were carried out at the Stuart Prospect on Pipe Case Creek, including a semi-detailed pan concentrate survey and geological mapping, aided by aerial photographic interpretation. Samples of gossanous quartz material collected from three parallel quartz veins assayed 0.653ppm, 0.132ppm and 0.680ppm Au. No significant gold occurrence was found in the main Pipe Case Creek.

Proposed work for the Grass Tree Creek area was abandoned when the Permit was cancelled in November 1983.

EPM 3285 was granted to *Buddha Gold Mines NL* in May 1982. The target was gold and silver mineralisation. A detailed pan concentrate survey was carried out and three anomalous gold areas were recognised at Major Creek (Red Baron), Greta Creek and Bell Creek. There are As, Cu and Zn anomalies in Greta Creek,

and an As anomaly in Bell Creek. Lead anomalies occur near the Bell Creek Au anomaly. The best result of pan concentrate sampling was 9.95ppm Au from a tributary of Major Creek, east of the Red Baron prospect.

Geological mapping was carried out and an ironstone deposit called Iron Knob was located cropping out in the left bank of Greta Creek. In earlier days it was proposed to use this deposit for ochre. Secondary gypsum was reported to occur beneath the Iron Knob prospect. Gold assay results from here were very low. There were no other indications of gold mineralisation in the area east of Mount McGuire (Bell Creek and Greta Creek). The pan concentrate gold anomalies in Greta Creek were 0.09ppm and 0.39ppm and in Bell Creek, 0.16ppm.

Rock chip sampling was carried out over significant prospect areas in an attempt to classify elemental associations with the different types of mineralisation found within the Permit. Geological mapping, broad-based rock sampling, selected prospect sampling and airborne geophysical surveying were also carried out.

Pan concentrate results showed that the drainages surrounding the Red Baron and the Red Baron Extension were anomalous in gold. Orientation hand auger soil sampling was carried out along a line bearing 060 degrees across the Red Baron prospect. Samples were anomalous in gold in the western border of the quartz float area of Red Baron and immediately outside it. A few detectable grades of silver were all on the western side of the traverse and corresponded with gold peaks. The best assay result from rock chip sampling was 10.1ppm Au. Sample 10109 from the pan concentrate sampling program assayed 9.95ppm Au.

A joint venture agreement was signed with Homestake Gold Ltd in 1984 to continue exploration on EPMs 3285 and 2132. Work carried out by Homestake included a literature review, orientation pan concentrate sampling, rock chip sampling of known and potential prospect areas, and 1:100 000 scale geological mapping accompanied by regional reconnaissance and petrographic studies of mineralisation and alteration. Aerial radiometric and magnetic surveys were flown over the Permits. Anomalies delineated by airborne magnetics were located using ground magnetic surveys. A total of 492 rock chip samples were collected within EPM 3285.

It was concluded that the lode deposits did not offer the tonnage potential sought by the company and the large systems, despite comprehensive sampling, appeared to be barren with respect to Au. The Permit was relinquished in February 1986.

EPM 4646 was granted to *Salamander Gold NL* in March 1987. The target was intrusive/porphyry-related gold mineralisation, as well as higher level epithermal gold deposits hosted by the Carmila beds. Exploration was carried out by *Cyprus Minerals Australia Company* as joint venture partner.

Costeaming and airtrac drilling in the Happy Valley area did not intersect any significant gold mineralisation. The best intersection was 22m at 1.46g/t Au (including 4m at 2.13g/t Au within a magnetite-quartz vein) from the Commonwealth mine. Regional stream sediment sampling indicated that the headwaters of Charleys Creek are anomalous in gold.

Cyprus Minerals Australia Company withdrew from the joint venture and a new agreement was made with *Chalstar Pty Ltd*. The main focus of exploration was initially on known areas of mineralisation at Happy Valley and the Dittmer mine. An aerial magnetic survey indicated only two target zones around the edge of the Permit area. It was decided that the western edge and southern portion should be relinquished. Exploration indicated that there are four medium-sized and many minor gold deposits. The main deposits conform to the four major east-flowing creeks in the area — Kelsey Creek (Dittmer mine), La Di Dah Creek (Lamington mine), Three Mile Creek (Coppo mine) and Five Mile Creek (Golden Tunnel and Iron Duke/Commonwealth mines).

An outcrop of micaceous hematite (the Specular Iron deposit) was located on the spur between Three Mile and One Mile Creeks. Costeaming revealed that the mineralised zone has dimensions of some 400m east-west by some 100m north south and is immediately north of a major diorite boss. The zone is open in all directions. Mineralisation occurs predominantly as infill gangue in highly brecciated vein structures that strike east-west, dip 70° south and range in width from 0.5–3m. Core drilling indicated that mineralisation persists to depths of 30m or more. Drill core did not contain any sulphide mineralisation.

It was recommended that a lease be applied for over the Specular Iron deposit. The Permit was relinquished in April 1993.

EPM 4679 was granted to *Keela-Wee Exploration Ltd* in April 1987. All previous exploration results were reviewed and all known workings and prospects were inspected. An area of intense hydrothermal alteration was located west of the Birthday Gift workings. However, samples from here did not return any anomalous assay results. It was concluded that the major north-east-trending shear zone along which Ward Creek developed, and most of the gold workings are concentrated, held some potential for mineralisation.

Julia Gold Pty Ltd entered into a joint venture agreement with Keela-Wee in September 1987. A regional BCL stream sediment sampling survey was carried out to search for previously unidentified prospects and to assist in prospecting rugged topography considered difficult to access. Thirty-three BCL samples were collected from the eastern part of the Permit. Two higher assay results of 6.75ppb and 6.55ppb Au came from near the Golden Gusher workings and in the south-western part of the Permit, respectively. BCL samples from the western part of the Permit were generally low-grade, with only two samples assaying >1ppb Au.

Known prospects on which further work was carried out included the Golden Gusher, Eden Lassie, White Hills, Crazy Cat, Red Ridge, Birthday Gift, Walsh's, Moon and Lucky Strike. Rock chip sampling was carried out, followed by a trenching program. Costeams were excavated at the White Hills, Crazy Cat, Red Ridge and Golden Gusher prospects. Quartz veining was located 4km south of Mount Cavana during reconnaissance in the eastern part of the Permit. One sample assayed 11.4g/t Au. Rock chip sampling was carried out over the White Hills prospect and one sample returned 3.6g/t Au from the north-western end of the prospect. Samples from the south-eastern end (the Donkey Prospect) assayed

0.2–0.5g/t Au. Six trenches were excavated and sampled at White Hills. An additional three trenches were excavated to investigate geological controls on the veining but were not sampled. Two trenches were excavated at the Donkey prospect. The best grades came from trench WHOO1, with 0.5m at 2.43g/t Au.

Random grab samples were collected from dumps at the Golden Gusher mine. Results were anomalous with three samples assaying 6.21g/t, 37.8g/t and 5.40g/t Au. Costeans were excavated through areas of workings at Crazy Cat-Red Ridge and Golden Gusher, particularly where rock chip samples had returned >5g/t Au. Trench RR003 returned 2m at 19.8g/t Au. Trench CC002 averaged 2m at 23.6g/t Au.

Three reverse circulation percussion holes were drilled at the Red Ridge prospect and four holes were drilled at the White Hills prospect. Two of the holes at Red Ridge intersected a quartz-veined and sericite altered zone near the surface. The best intersection in drillhole RRP002 was 2m at 1.29g/t Au from 12m. Drillhole RRP003 intersected 2m at 0.46g/t Au from 12m. Drillhole WHP002 at White Hills intersected 2m at 0.18g/t Au from 8m. It was concluded that the veins had little depth penetration and that near-surface oxidation effects were responsible for enhanced grades in surface veins. Four samples were collected at the Eden Lassie prospect. Two samples had elevated gold contents of 0.31g/t and 0.48g/t.

The company concluded that there was little potential for small open-pitiable deposits. Julia Gold NL withdrew from the joint venture in November 1988. Keela Wee subsequently carried out gridded soil sampling over two separate large areas of the Permit. Results were disappointing and the Permit was unconditionally surrendered in October 1989.

EPM 5657 was granted to *Western Mining Corporation Ltd* in December 1988. Exploration mainly comprised reconnaissance prospecting and stream sediment sampling. The Permit was relinquished in September 1989 after only minor exploration was carried out.

EPM 8718 was granted to *Noel Alexander Adam* in March 1992. Prospecting activities were directed towards the location of alluvial gold deposits to supplement an existing alluvial mining operation on Five Mile Creek. The main technique used was pan testing of creeks, and limited excavator pitting and trenching with pan sampling. Efforts were concentrated on Five Mile Creek downstream of ML 1077, La-Di-Da Creek and Kelsey Creek. A trench that had been excavated for a water pipeline from the Proserpine River to ML 70008 was also prospected for gold, with negative results. The Permit was relinquished in September 1993.

EPM 8872 was granted *CRA Exploration Pty Ltd* in July 1992. The tenement was obtained to investigate an extensive alteration system brought to CRA's attention by an independent geologist. Following a field investigation, this alteration was attributed to weathering of pyritic volcanics and lateritisation. No further work was recommended and the Permit was relinquished in August 1992.

EPM 9662 was granted to *Burrum Exploration Pty Ltd* in December 1993. *Diamond Resources NL*, a wholly owned subsidiary of Peregrine Resources NL, acquired the whole of the capital of Burrum Exploration Pty Ltd in February 1994. Exploration comprised a comprehensive literature review and some interpretation of Landsat and geophysical imagery of the area. The company was unable to obtain any ground surrounding EPM 9662 and considered the Permit to have limited exploration potential on a stand alone basis. The Permit was relinquished in January 1995.

EPM 9735 was granted to *Artadze Pty Ltd* in March 1994. The targets were epithermal breccia pipe mineralisation and massive porphyry deposits. Exploration comprised a literature review, collation and review of aerial photography and Landsat imagery, collation of geological and structural interpretive data and target generation.

The target area identified was a significant magnetic high in the Longford Creek area in the eastern part of the Permit. Four other magnetic lows were identified within the Permit. Each of these had a diatreme-like response or was intersected by a regional north-west structure. It was concluded that each area might represent a target for gold mineralisation. The western portion of the Permit contained the Mount Dangar shear, which transects two other well defined magnetic highs. The Armistice workings were another target. A number of magnetic highs and lows in the Bodes Range area were identified as potential mineralisation targets. The Permit was relinquished in March 1996.

EPM 14409 was granted to *Ozmin Resources Pty Ltd* in August 2005. The target is known auriferous quartz veins in the Longford Creek – Eden Lassie area. Exploration results are confidential.

Mount Crompton to Bloomsbury Area

EPM 4625 was granted to *Battle Mountain (Australia) Incorporated* in March 1987. The target was vein-related gold deposits in the Urannah Complex and the Permian Carmila beds.

Exploration involved reconnaissance traversing, rock chip, rock float and bulk cyanide stream sediment sampling. Detailed exploration was carried out in the Moolooloo area to refine a bulk cyanide leach sample anomaly of 1250ppt Au. The follow-up work comprised geological traversing and rock chip, rock float and BCL stream sediment sampling. No stream sediment samples yielded assay results above 1.0ppb Au. The highest result was 650ppt Au. Resampling of the original Moolooloo anomaly at the same point with the same method did not produce a consistent result. As a result, it was concluded that no obvious economic potential existed for a significant gold deposit. The Permit was relinquished in October 1987.

Mount Glenroy to Burdekin River Area

EPM 3220 was granted to *Pennzoil of Australia Ltd* (later Duval Mining (Australia) Ltd) in February 1982. The target was porphyry style gold

mineralisation within intrusive, subvolcanic, bonanza lode or fumarolic settings. Secondary targets included tungsten and molybdenum mineralisation. Exploration consisted of a literature review, geologic studies from air photo interpretation, and stream sediment, heavy mineral concentrate, soil and rock chip sampling.

Phase one of the exploration program focused on the Mount Glenroy area, with detailed rock chip and soil sampling over Mount Glenroy and regional stream sediment and heavy mineral concentrate sampling. The regional drainage survey did not delineate any previously unknown anomalous locations. The heavy mineral concentrate sampling produced widespread gold and isolated tungsten anomalies, with some samples containing visible gold. The best assay result was 720ppb Au for a sample from the western side of Mount Glenroy. It was concluded that there was little potential for a near-surface gold deposit at Mount Glenroy.

The second exploration phase comprised follow-up rock chip sampling and reconnaissance traverses over the anomalous drainages and their adjacent headwaters and spurs. Assay results for gossan samples from near Glenroy Creek indicated low-order gold and tungsten grades. A sample of quartz float from near Kid Creek assayed 3ppm Au. Follow-up work planned for the Stuart Pocket and Glenroy Creek areas was not completed. The Permit was relinquished in November 1982.

EPM 3563 was granted to *Duval Mining (Australia) Ltd* in August 1983 after a re-evaluation of geochemical sampling results from previously held *EPM 3220* indicated a higher potential for the low-order anomalies than previously thought. The target was gold mineralisation within the Mount Windsor Volcanics. Exploration comprised an orientation soil survey, rock chip sampling, air photo interpretation, stream sediment sampling, limited petrology, geological mapping and pan concentrate sampling.

The focus of exploration was the Stuart Pocket and Kid Creek prospects, where previous sampling had delineated low-order gold anomalies. Mapping and geochemical sampling indicated that the mineralisation at Stuart Pocket is predominantly restricted to sulphide-bearing shears and fractures within the volcanics. Visible gold was detected in pan concentrate samples and stream sediment sampling defined a broad zone of anomalous gold mineralisation in the area. Stream sediment and pan concentrate sampling at Kid Creek detected detrital gold in many of the drainages. The best stream sediment sample assay result was 115ppb Au and 20ppm W. However, soil sampling did not detect any near-surface mineralisation. The Permit was relinquished in February 1984.

EPM 3932 was granted to *CRA Exploration Pty Ltd* in February 1985. The target was base metal sulphide deposits in the Mount Windsor Volcanics and hydrothermal gold mineralisation associated with upper Palaeozoic intrusives. Exploration consisted of a literature review and minor rock chip, soil and stream sediment sampling.

Exploration focused on two previously identified areas — Mount Glenroy and Stones Creek. Seven stream sediment and four rock chip samples were collected

at Stones Creek. One rock chip sample assayed 4.26% Pb, 290ppm Ag and 1.13ppm Au. Twenty-eight samples (two soil, 13 rock chip and 13 stream sediment) were collected at Mount Glenroy. No significant gold was detected in any sample and the prospect was deemed uneconomic. The Permit was relinquished in December.

EPM 4334 was granted to *Kennecott Explorations (Australia) Ltd* in July 1986. The target was hydrothermal precious metal mineralisation. Exploration consisted of a literature review, air photo interpretation, geological mapping, stream sediment, rock chip, soil and heavy mineral sampling, geophysical interpretation, and reverse circulation percussion drilling.

Exploration initially focused on geochemical sampling and geological mapping over prospects previously identified by other companies. During the first year, exploration focused on the Gold Creek and Six Mile Creek areas, where stream sediment, rock chip, heavy mineral and soil samples were collected and geological mapping was completed over the prospects. The best rock chip assay result from near the Gold Creek workings was 0.55ppm Au, 0.97% Cu, 9.60% Pb, 0.22% Zn and 63ppm Ag. Sampling also delineated several low-order gold anomalies to the south-east of Gold Creek that are probably related to small to moderate gold-bearing quartz veins.

Regional stream sediment and rock chip sampling delineated a number of geochemical anomalies. These anomalies were further investigated, with the Gold Creek, Stones Creek, Mount Glenroy and Limey Dam areas showing favourable results. During the last year of tenure, a short drilling program was carried out to explore the mineralisation at depth at the Mount Glenroy prospect. Two RC percussion holes were drilled — one to test a south-east-trending structure and the other to test a base and precious metal-bearing breccia zone. Drilling results were inconclusive as to whether or not Mount Glenroy hosts a gold orebody. Follow up sampling was recommended. The Permit was relinquished in August 1991.

EPM 6620 was granted to *Axis Mining NL* in January 1990. The target was precious metals deposits. Exploration comprised a literature review, air photo interpretation, geological mapping and minor rock chip sampling. Twenty-five rock chip samples were collected. However, no samples were assayed as no mineralised float or quartz float was observed during field trips. Literature research also failed to highlight any anomalous areas within the tenement. The Permit was relinquished in July 1990.

EPM 7175 was granted to *Normandy Exploration Ltd* (formally Poseidon Exploration Ltd) in July 1990. The target was gold mineralisation associated with Permo-Carboniferous intrusive complexes. Initial exploration consisted of a review of previous exploration results, an interpretation of aeromagnetic and radiometric data and photogeological studies.

One hundred and twenty-three rock chip and 336 stream sediment samples were collected during the first year. Follow up work was carried out over the geochemical anomalies and previously identified prospects at McGain's Gossan, Old Rangeview Prospect and Mount Glenroy North and West. Results from

McGain's Gossan were the most promising, with a 200m by 100m elongate zone of Cu-Pb-Zn anomalism delineated by soil sampling and weak gold mineralisation identified rock chip sample assay results of up to 0.02ppm Au.

Exploration during the next year focused on the southern part of the tenement, specifically the Six Mile Bore and Limey Dam North prospects. Results were disappointing.

BHP Minerals Ltd entered into a joint venture with Normandy Exploration Ltd in August 1994 and exploration focused on the McGain's Gossan prospect. Detailed geological mapping, soil and rock chip sampling, ground magnetic and IP surveys, lead isotope dating and reverse circulation drilling were completed over the area. Four holes were drilled to test for the presence of a discrete gold-bearing phase not expressed at the surface. The best drill sample assay result was 0.038ppm Au, indicating that gold mineralisation is weak and does not occur at depth. The Permit was relinquished in May 1995.

EPM 9139 was granted to *Dalrymple Resources NL* in December 1992. The target was intrusive-related gold mineralisation. Exploration consisted of a review of previous exploration results, air photo interpretation, geological mapping, interpretation of magnetic data, rock chip, soil and stream sediment sampling and diamond drilling.

Exploration was carried out by Terra Search Pty Ltd in the first two years of tenure. A review of previous exploration highlighted the potential of the Mount Glenroy area and mapping and geochemical sampling were initially constrained to that area. Thirty-nine stream sediment and 57 rock chip samples were collected. The best rock chip assay result was 4.88ppm Au, with only three other samples assaying >0.1ppm Au. Potential drilling sites were also identified by field checking of structural and magnetic features.

In August 1995, *Dalrymple Resources NL* entered into a joint venture with *Goldfields Exploration* and assumed the role of exploration manager. Four hundred and seventeen soil samples were collected around the Mount Glenroy prospect. The highest gold assay result was 0.552ppm from hydrothermal breccia targets. One core hole was drilled to 392m, the best intersection being 4m at 0.241g/t Au from 274m.

Goldfields Exploration then withdrew from the joint venture and no further work was done. The Permit was relinquished in December 1998.

EPM 9482 was granted to *Dorian Mathew Franco Gottani* in July 1993. The target was alluvial gold around the headwaters of Breakfast Creek. Exploration consisted of a literature review, pan concentrate sampling and costeaning. An application for Mining Lease 10169 was granted during the first year of tenure. The Permit was taken up to expand potential resources for the planned mining operation.

Thirteen pan concentrate samples were collected. The best assay result was 205.7ppm Au, from near the main creek where alluvial mining was proposed.

Traversing across other creeks downgraded the potential of the area, based on the lack of visible gold in the panned samples. The Permit was relinquished in July 1996.

EPMs 10141 and 10153 were granted to *Owen Reginald Wellington and Danamore Pty Ltd* and to Owen Reginald Wellington, respectively, in June 1994. The target was gold mineralisation within the Mount Windsor Volcanics. Exploration consisted of a review of previous exploration results, stream sediment, rock chip and soil sampling, reverse circulation drilling, ground magnetic and radiometric surveys, interpretation of Landsat imagery, costeaning, petrology, and acquisition and interpretation of airborne magnetic survey data.

Initial exploration consisted of a review of previous exploration results and minor rock chip and stream sediment sampling over previously identified prospects. Sampling results were promising and Danamore Pty Ltd entered into a joint venture with *West Australian Metals NL* to further explore these prospects. Twenty-three rock chip, 63 soil and 94 stream sediment samples were collected from the Gold Creek, Pinnacle and Sullivan's Reward prospects. The best rock chip assay result was 6g/t Au from Gold Creek. The best intersection from a 14 hole, shallow reverse circulation drilling program was 1m at 8.21g/t Au from 18m at the Gold Creek prospect.

West Australian Metals NL withdrew from the joint venture and was replaced by *Niugini Mining Ltd* in February 1996. Detailed geochemical sampling was conducted over the Gold Creek and Sullivan's Reward prospects, including grid-based soil and rock chip sampling and costean sampling. Seventeen reverse circulation holes were drilled in the two areas. The best intersection was 2m at 0.87g/t Au, from the Sullivan's Reward prospect. Drilling at Gold Creek did not intersect any anomalous gold mineralisation but did detect anomalous Pb, Cu and Zn mineralisation in three drillholes.

Subsequent exploration focused on an interpretation of airborne magnetic surveys to define new targets for follow-up stream and rock chip sampling. Sampling results indicated that the area did contain anomalous gold mineralisation, but the mineralisation was insufficient to warrant any further work over the area. The Permits were relinquished in October 1999.

EPM 10901 was granted to *Owen Reginald Wellington and Danamore Pty Ltd* in January 1996. In February 1996, a joint venture was entered into for two years with Niugini Mining Australia Ltd. The target was porphyry style or epithermal-mesothermal gold mineralisation. Exploration consisted of a review of previous exploration results, air photo interpretation, a geological reconnaissance, stream sediment sampling, and interpretation of Landsat imagery and aeromagnetic data.

Two stream sediment samples were collected within the tenement and assayed 0.2ppb Au and <0.1ppb Au. Ground traversing over an elliptical magnetic feature interpreted from airborne magnetics indicated that it is related to fracturing and brecciation of the Bulgonunna Volcanics. No intrusive body and only minimal hydrothermal alteration were located. The Permit was relinquished in July 1999.

EPM 10934 was granted to *Goldfields Exploration Ltd* in March 1996. The targets were Mount Leyshon – Mount Wright style breccia pipe gold mineralisation and Thalanga style volcanic-hosted massive sulphide mineralisation. Exploration consisted of geological mapping, rock chip, soil and stream sediment sampling and reverse circulation drilling.

Initial work exploration comprised geological mapping and the collection of 21 rock chip and 44 soil samples. The main targets were the Western Breccia Prospect (a porphyry-breccia zone north-west of Mount Glenroy) and the Hidden Breccia Prospect (a finely brecciated zone of rhyolite north of Mount Glenroy). Assay results were generally disappointing, with most gold assays at or below the detection limit. The best rock chip assay result was 0.141ppm Au, 350ppm Cu, 3050ppm As, 205ppm Zn, 39ppm Mo and 171ppm Cr, from the Western Breccia area. Rock chip samples from the Hidden Breccia area returned no anomalous results.

One reverse circulation hole was drilled to 150m depth at the Western Breccia Prospect in 1997. Composite 2m samples were very low in Au but elevated in As and Pb. The Permit was relinquished in September 1997.

EPM 14596 was granted to *Newcrest Mining Ltd* in February 2005. The target was gold mineralisation within the breccia system at Mount Glenroy and intrusive-related gold in the surrounding areas. Thirty-nine sub-blocks were relinquished in February 2007. Exploration in the relinquished area was limited data compilation and interpretation. Exploration results for the remaining sub-blocks are confidential.

Mount Hector Goldfield

EPM 2126 was granted to *Mineral Resources Development Company Pty Ltd* in May 1979. The target was gold mineralisation in the old Mount Hector Goldfield.

Known mines and prospects were located. Nineteen backhoe trenches and 60 bulldozer costeans were excavated at six prospects. Twenty-four of the costeans were excavated at the Andromache Prospect, where a test leaching plant was set up. Significant gold and ancillary copper grades were evident.

Six backhoe costeans were excavated across the reef at the Ludo Prospect. Aplite samples assayed up to 1.6ppm Au, quartz veins up to 19.6ppm Au and 20ppm Ag and andesite up to 1.9ppm Au and 2ppm Ag. The best assay results from grab samples from the Green Brothers mine were 16.8ppm Au, 10ppm Ag and 154ppm Cu from gossanous quartz with pyrite on the mullock dump. At the Cedar Ridge prospect, six 50t samples of soil and weathered rock were taken to the leaching test plant at the Andromache Prospect. The best assay result was 4.8ppm Au, 3ppm Ag and 91ppm Cu. The leach test result was 4.5ppm Au and 3ppm Ag.

It was concluded that occurrences of gold are invariably associated with andesite dykes. The dykes contain varying amounts of disseminated sulphides and some carry high silver grades (up to 278g/t in the sill on ML 495.) The Permit was relinquished in April 1981.

EPM 3378 was granted to *Anaconda Australia Incorporated* in January 1983. Exploration focused on testing several siliceous gossan zones that contained high-grade silver mineralisation. Exploration involved gridding, mapping, rock chip and soil sampling and costeaning of the main anomalous zone. Exploration within the Permit was subject to a joint venture between Anaconda and Jones Mining NL.

The Andromache River Prospect was discovered by Anaconda during regional reconnaissance. A sample of silicified rhyolite assayed 1.53% Pb, 660ppm Zn, 128ppm Cu, 2340ppm Ag and 75ppb Au. Anaconda applied for two mining leases (MLAs 506 and 507) over the prospect and carried out detailed exploration within the lease areas. This work included gridding, mapping, rock chip and soil sampling, ground magnetics and radiometrics.

Rock chip and soil sampling indicated four anomalous areas within MLAs 506 and 507 worthy of follow-up exploration. Anomaly A consisted of a gossanous stringer zone within rhyolitic and acid volcanics. Scattered gossanous outcrops could be traced for a strike length (east–west) of over 500m. Channel samples across the 2–6m wide gossanous scree zone averaged 400ppm Ag, 0.85% Pb and 1g/t Au. Rock chip sampling over the mineralised zone in the area of some small prospecting pits showed the extremely erratic nature of the high-grade silver mineralisation (up to 7130ppm Ag, 16.0% Pb and 38.5g/t Au). The high silver zone is probably restricted to an 80m long zone. Eight costeans were excavated across the anomalous zone. The best intersection reported was 1m at 0.18% Ag, 2.1g/t Au and 0.58% Pb in AC4. Of the 53 channel samples collected, this was the only highly anomalous silver gossan, with all other samples assaying <41ppm Ag. The highest gold intersection was 2m at 4.2g/t Au in Costean A5, on the margins of a weakly gossanous zone. The gossan zone in Anomaly A was <0.5m wide and only weakly mineralised in most places. The potential of this prospect to contain a small high-grade silver resource was downgraded.

Anaconda noted several other zones of anomalous silver mineralisation within the Permit. Mineralisation at Anomaly B was delineated by 8ppm Ag in soil associated with a dolerite dyke. Volcanic breccia adjacent to this dyke assayed 1600ppm Ag, 1.9% Pb and 0.3ppm Au. Anomaly C is the brecciated margin of a rhyolite-dacite dyke, fragmented volcanic breccia and “cherty” rhyolite. Samples assayed up to 3100ppm Ag, 1.72% Pb and 0.92ppm Au. Excluding the high silver assay of 3100ppm, samples from this area still averaged 67ppm Ag. Anomaly D, near a flow top rhyolitic breccia and volcanic breccia, returned soil grades of 4ppm and 8ppm Ag.

Results of the costeaning program were discouraging. Mineralisation was found to be erratic and generally restricted to a narrow horizon. A detailed review was made of all exploration data and it was determined that exploration had failed to locate any significant targets warranting detailed evaluation. The Permit was relinquished on 8th November 1983.

EPM 4476 was granted to *Mount Isa Mines Ltd* in November 1986. The target was high-grade, narrow silver (and gold) deposits.

Nineteen stream sediment samples were collected. Most assay results were low. One sample assayed 80ppm Pb, 115ppm Zn, 2.7ppm Sb and 10ppb Au. Soil geochemistry returned Ag spot highs of 12ppm and 128ppm. Lead geochemistry delineated the same east–west trend as silver, with assay results of up to 4100ppm Pb. Gold anomalies of 10ppb occur within the generally anomalous area. Rock chip samples assayed up to 3060ppm Ag and 2.33% Pb (from a gossan). Gold geochemistry correlated with silver, lead and arsenic. Mineralisation with more than 1g/t Au occurred over a 200m strike length, and then for a further 50m further west after a 100m gap.

Best results from costeaning were 2m at 1.9ppm Au in costean 4750E, 42m at 16.3ppm Ag in costean 4950E and 20m at 9.3ppm Ag in costean 5150E. Costean sampling delineated a gold mineralised zone that was 550m long by 3m wide and graded up to 0.39ppm Au. A 450m long by 15m wide zone with up to 12.65ppm Ag was also delineated.

Seventy-one sites were sampled during follow-up investigations. Results of BCL stream sediment sampling ranged from below the detection limit of 50ppt Au to a maximum of 14.1ppb Au. A western tributary of Copper Mine Creek returned a value of 11.2ppb Au. Initial anomalies at Albert and Gold Creeks and a tributary of the Andromache River north of Amelia Vale Station were subjected to further detailed sampling. Assay results ranging from 1.1ppb to 14.1ppb Au were reported from the area south and west of Mount Quandong, in the Albert, Gold and Gooraganga Creeks and tributaries west of the Andromache River. A sample of quartz float from a tributary of German Creek assayed 13ppm Ag and 0.376ppm Au.

Twenty-nine rock chip samples were collected from sites within the Permit area. Assay results ranged from <0.005–3.14ppm Au, <1–75ppm Ag, <5–5800ppm Pb, 13–478ppm Cu, <2–870ppm Zn and <2–1200ppm As. The 3.14ppm Au sample was ferruginous quartz float from a BCL site that returned 5.45ppb Au. A suite of seven samples was submitted for petrological examination.

Two hundred and thirteen soil samples were collected during a helicopter-supported survey. Samples were collected from ridges surrounding the anomalous drainages of the Gooranaga and Albert Creeks. Only four samples assayed above the detection limit for gold. Assay results ranged from <10–200ppb Au. A second survey comprising 404 soil samples was then carried out in the same area. Eighty-four samples returned >1ppb Au. Six samples assayed >50ppb Au, with a maximum of 321ppb Au. Sixteen samples assayed >100ppb Ag, up to a maximum of 2280ppb Ag.

Exploration indicated that the veins are too small and far too erratic to be of any economic significance. Follow-up work confirmed that the sources of the anomalous drainages were not of economic interest. Geophysical and geochemical exploration provided no further targets in the area covered by the Permit, which was relinquished in May 1990.

EPM 5543 was granted to *Golden Plateau NL* (40%) and *Forsyth NL* (60%) in October 1988. Initial exploration was directed towards the discovery of precious

metal mineralisation and involved a literature review, air photo interpretation, geological reconnaissance and stream sediment sampling. Forty-nine stream sediment samples were analysed for gold. Results were generally low, with few significant anomalies. Nineteen rock chips gave generally low assay results. Samples from the old Southern Cross workings on the margin of the permit area returned detectable gold (up to 0.3ppb) and anomalous Bi and Ag. Several reconnaissance soil lines yielded no major anomalies and did not detect any continuation of known lode structures. Two samples had marginally anomalous base metal contents, with up to 13ppm Cu and 22ppm Zn. Inter-element correlation was generally poor, as was correlation with gold contents. The Permit was relinquished in August 1990.

EPM 6910 was granted to *Civil and Marine Engineers Pty Ltd* in January 1990. Following initial appraisal via airphoto interpretation, reconnaissance geological mapping and rock chip sampling, exploration concentrated on the Plane Jane prospect, where a program of shallow drilling was carried out. This program was designed to test the potential for mineable open-pit gold from stacked vein systems adjacent to basic dykes, and mineralisation within these dykes, to a maximum depth of 33m.

Seventeen percussion holes totalling 411m were drilled. Assay results were generally low or below the detection limit of 0.01g/t Au. The best result (2m at 1.0ppm Au) was obtained from a low angle quartz-limonite vein. Three 2m deep costeans were excavated and sampled. Channel samples generally supported previous surface sample results, with the best assay result being 5.50ppm Au from a low angle, 0.2m wide quartz-limonite vein.

The prospects comprise narrow, discontinuous, low- to high-grade fissure-fill quartz veins. These are associated with faults and fractures in the Hecate Granite that are filled in places by late-stage mafic dykes. Drilling results indicated that the area had limited potential for a high tonnage, open-pitable resource or a high-grade underground resource. The Permit was relinquished in January 1991.

EPM 7567 was granted to *Civil and Marine Engineers Pty Ltd* in August 1990. The tenement covered part of the old Mount Hector Goldfield, including six previously worked gold prospects. A literature review was completed and was followed up with a preliminary field inspection of the Ludo, Tiger Rose, Cedar Ridge, Last Try, Gumoller and Southern Cross prospects. The mineralisation appeared to have limited tonnage and grade potential. The Permit was relinquished in July 1991.

EPM 9827 was granted to *Battle Mountain (Australia) Incorporated* in December 1993. The target was bulk tonnage gold mineralisation. Exploration comprised a literature review, data compilation, reconnaissance and rock chip sampling (28 samples) and stream sediment sampling (143 samples). Costeaning was carried out at the Last Try Prospect and soil sampling at the Twin Peaks and Godkin Prospects.

A total of 250m of costeans were excavated and sampled over 2m intervals (137 samples). Representative costean samples produced a best assay result of 2m at

1.37g/t Au from a narrow zone of silicified sericitised granite. Selected samples of dump material returned up to 12.7g/t Au and a sample of a 0.15m wide quartz vein in a costean returned 13.05g/t Au. The costeaning and sampling programs downgraded the potential for the prospects.

Rock chip samples returned up to 3.19g/t Au, 0.89% Cu, 6.87% Pb and 620g/t Ag from the Godkin mine and soil samples assayed up to 43ppb Au and 489ppb Ag. Up to 1.21g/t Au was obtained from two samples collected south-west of the Twin Peaks prospect.

Limited reconnaissance of the Andromache Prospect failed to identify a source for the gold previously found in stream sediment and soil samples by Carpentaria Gold. However, several areas of anomalous gold in stream sediments warranted further investigation. Follow-up work on stream sediment anomalies, comprising rock chip, soil and stream sediment sampling, tended to downgrade all areas.

Reconnaissance and rock chip sampling were also carried out in the Gooraganga and Albert Creek regions for a peak assay result of 0.012ppm Au. The potential of this area for economic mineralisation was downgraded. Follow-up soil sampling returned up to 26ppb Au adjacent to gold-bearing quartz-sulphide veining (as float) upstream from a 12.1ppb Au stream sediment anomaly. Follow-up rock chip sampling returned 8.1ppm Au from one sample and 21.9ppm Au, 3490ppm Cu, 1320ppm Pb, 844ppm Zn, 148ppm Ag and 318ppm Bi from another. Anomalous samples were related to “patchy” gold mineralisation within thin silica-pyrite alteration zones in sheared quartz porphyries, aplites and tuffs.

The Permit was relinquished in December 1995.

EPM 11267 was granted to *Gold Exploration Pty Ltd* in August 1996. The exploration target was low-grade disseminated gold mineralisation in granites. Exploration included a literature review and rock chip, stream sediment and soil sampling. Areas considered to be non-prospective were relinquished in March 1997. Extensive gold mineralisation in the area to the north of Cedar Ridge warranted further evaluation as did the Andromache Prospect and Albert Creek area. Pyritised silicified float from the Fish Creek area assayed 0.66ppm Au. Stockpiled material at the Gap mine assayed 12.8, 2.6, 0.005, 2.65, 3.7, 0.31 and 2.17ppm Au. A-B horizon soil samples (-2mm mesh) from the vicinity of old workings stretching north of Cedar Ridge indicated widespread anomalous gold, potentially related to a source in the underlying rocks and not simply shedding from the existing workings.

Potential for economic gold mineralisation was evident in four areas:

- an east–north-east-trending zone of gold anomalism from the upper reaches of Emu Creek, through Fish, German and Coppermine Creeks
 - a large area of granite peppered with old mine workings from Cedar Ridge north
 - the Andromache Prospect
-

- extensive gold anomalies in volcanics in the upper reaches of Albert and Gold Creeks.

Loaming and dolly pot sampling of rock samples indicated good gold grades in the Tiger Rose area and at workings in the Gold Creek area. High rock chip assay results of up to 55.3ppm Au were accompanied by extensive gold anomalism in soils in broad areas with numerous small workings. However, it was concluded that the local geology and assay results negated any need for follow-up exploration. The Permit was relinquished in August 1999.

Mount Leslie Area

EPM 4767 was granted to *Denison Resources NL* in May 1987. Most of the Permit was in the Collinsville 1:100 000 Sheet area. The target was sediment-host gold mineralisation. Initial exploration comprised regional stream sediment sampling. Results were encouraging and areas of anomalous gold (>10ppb) were delineated for follow-up work.

A total of 295 stream sediment samples were collected and delineated two anomalous areas, both in the Collinsville 1:100 000 Sheet area. The potential for sediment-hosted mineralisation was supported by exploration. The Permit was relinquished in August 1991.

EPM 7455 was granted to *ACM Gold Operations Pty Ltd* in August 1990. The target was sediment-hosted, basinal brine-related gold deposits. Ninety percent of the tenement was located in the Collinsville 1:100 000 Sheet area.

The whole of the tenement was covered by a helicopter-supported bulk stream sediment sampling program. One hundred and six samples were collected. Gold assay results were generally low, with the highest being 0.65ppb Au. Bulk sieved samples were collected at an additional 17 sites and analysed for Ag and Cu. A -80 mesh fraction from each sample was analysed for Au, Ag, As, Sb and Hg. Follow-up sampling did not reveal any areas of interest for further work. The Permit was relinquished in August 1991.

EPM 7456 was granted to *ACM Gold Operations Pty Ltd* in August 1990. The target was sediment-hosted, basinal brine-related gold deposits. Ninety percent of the Permit was located in the Collinsville 1:100 000 Sheet area.

The whole of the tenement was covered by a helicopter-supported bulk stream sediment sampling program. A total of 105 samples were collected. The highest assay result was 3.81ppb Au from a short stream flowing into Rosetta Creek near its confluence with the Bowen River. Elsewhere, BLEG sampling results were <0.47ppb Au, with no discrete areas being defined as Au-enriched by multi-sample anomalies. The 3.81ppb Au assay result could not be repeated during follow-up exploration. None of the -80 mesh assay results were of interest. The Permit was relinquished in August 1991.

EPM 8552 was granted to Hugh Keith Herbert and Robert Peter John Lewis in December 1991. Exploration focussed on stream sediment surveying, supported

by relevant primary dispersion sampling. Geological observations were supported by petrographic assessments and whole rock analyses. The results were inconclusive. The Permit was relinquished in May 1993.

Mount Poole Area

EPM 4862 was granted to *Ross Mining NL* in August 1987. The Permit was held in joint venture with *Aberfoyle Resources Ltd*. The area was selected for its potential to host epithermal gold, mesothermal gold and porphyry-copper mineralisation associated with high-level intrusives. Initial exploration comprised stream sediment sampling and the collection of 12 rock chip samples from the Mount Poole area. An area hosting limonitic quartz veins, which had previously been worked, contained anomalous gold with assay results of up to 13.1ppm. Three gold anomalous drainages were defined by the stream sediment sampling.

Due to the low gold assay results and the general lack of prospectivity, the Permit was relinquished in November 1988.

Mount Proserpine Area

EPM 5346 was granted to *CRA Exploration Pty Ltd* in April 1988. The targets were epithermal and porphyry style precious metal deposits. Exploration included a review of previous results, an analysis of BMR regional aeromagnetic data, a regional stream sediment sampling program (including 27 -6 mm bulk cyanide leach sand samples for gold and 15 -80 mesh and seven -200 mesh stream samples for Au, Ag, Cu, Zn, Pb, Sb, Mn and Fe) and float and outcrop examination. Fifteen rock chip samples were collected.

No drainages with anomalous gold values were delineated and no rock chip samples were anomalous in gold. The better stream sediment assay results ranged from 73–100ppm Zn. Gold contents ranged from 1–4ppb Au. The highest rock chip assay result was 20ppb Au. The Permit was relinquished in August 1989.

Normanby Goldfield

EPM 2005 was granted to *Mineral Resources Development Company Pty Ltd* in September 1978. Exploration concentrated on gold mineralisation. Dolly pot and pan prospecting was carried out at 76 locations. The highest assay result was 0.90ppm Au.

Ten backhoe trenches and 16 bulldozer costeans were excavated in the Billy Hughes mine, Venture mine and Brown Reef areas. The best assay result (39ppm Ag, 128ppm Au and 145ppm Cu) came from a costean on the Billy Hughes line of lode. The Permit was relinquished in August 1980.

EPM 3012 was granted to *Mineral Resources Development Pty Ltd* in May 1981. Initial exploration comprised the upgrading of known tracks. Large scale base maps were produced for photointerpreted structural geology and detailed soil and stream geochemical surveys were planned. A pilot stream sediment survey was

carried out over the Normanby Township area. The best assay result was 13.2ppm Au (visible gold in the pan concentrate sample).

The Permit was relinquished in October 1983.

EPM 3923 was granted to *Roxtel Pty Ltd* and *Tamlar Pty Ltd* in December 1984. Initial exploration was restricted to the geological inspection of a number of old mine sites, including the Perseverance, Mount Flat Top, Wild Scotsman, Albion, Venture and Highland Mary. A comprehensive literature survey was completed prior to fieldwork. As a result of this work, it was determined that only the Grace Darling and Albion deposits had sufficient mineralised widths to be of immediate interest.

A suite of thirteen rock chip samples was collected from mullock material considered to be representative of the lodes. Gold grades ranged from below detection limit to a high of 175g/t Au. Check analyses confirmed the results. Silver grades were generally low, with the highest being 60ppm Ag. Base metal grades were generally low, with only one sample returning highly anomalous Cu, Pb and Bi.

Of the deposits visited, only the Grace Darling Line and possibly the Albion appeared to have any potential to yield economic tonnages of ore. The Grace Darling was inferred to have potential for some 160 000t between the 120m level and the 250m level along a strike length of 2500m, and containing grades of 20–30g/t Au. It was determined that there was potential for the delineation of eluvial and alluvial gold resources, particularly at the Grace Darling deposit.

During the second period of fieldwork, the only deposits warranting further investigation were the Mount Flat Top, Eureka and Billy Hughes group of mines. In addition to a suite of nineteen rock chip samples collected from mine dumps, a number of dished alluvial samples were taken in the Grace Darling drainage. Rock chip sampling indicated a close association of gold with sulphide content. It was concluded that potential existed in the Mount Flat Top and Dam Prospect areas for large tonnage low-grade deposits.

Panned heavy mineral concentrate and -200 mesh stream sediment samples were collected. Visible gold was reported from seven pan concentrate samples, but only three of these and three others returned significant gold assay results. The highest result of 1050ppm Au came from a sample from drainage off Mount High.

It was concluded that the Permit area offered very limited potential for the discovery of bulk tonnage, low-grade, open-pitabile resources. However, a number of prospects were considered worthy of some follow-up work, particularly the Andromache Prospect and Mount Flat Top. The Grace Darling reef system and Venture prospects offered potential for high-grade, low tonnage resources. However, given the understanding of the nature of these prospects, it was considered unlikely that any of them could be mined profitably. The Permit was relinquished in May 1989.

EPM 7003 was granted to *Nicholas Mather* in August 1990. Exploration was aimed at determining whether some of the old mines in the Normanby Goldfield had potential for open cut mining. Results from a literature review and some rock chip sampling and mine mapping indicated that there was potential for deposits in the 1.25–1.74m at 3–4g/t Au range at Eureka, Albion and Mount Flat Top, with possible contained resources of up to 600 000oz. It was concluded that the best potential for a high tonnage, low-grade gold resource existed at Mount Flat Top. The estimated potential resources were 1.25Mt at 9g/t Au for Mount Flat Top, 65 000t at 3g/t Au for Albion and 300 000t at 20g/t Au for the Grace Darling – Welcome line.

The Permit was relinquished in August 1995.

EPM 11038 was granted to *Acapulco Mining NL* in July 1996. Rock chip sampling (167 samples) at Mount Flat Top outlined an area of gold mineralisation up to 100m in width and extending in a west-north-west direction for ~2200m. Additional traversing and rock chip sampling (197 samples) between the Mount Flat Top mineralisation and the Grace Darling line of reef returned up to 31.0g/t Au from quartz-veined material. Interpretation of all sampling results suggested that there are at least four lines of reef in a radiating pattern. Mineralised widths suggested that there could be a bulk mineable resource of the order of 2–10Mt at ~2g/t Au, depending on continuity of grades at depth. The Permit was relinquished in July 2002.

EPM 11343 was granted to *Acapulco Pty Ltd* in September 1996. Exploration focussed on the location of an economically viable bulk tonnage open-pitiable gold resource in the old Normanby Goldfield.

A succession of modern explorers had confirmed the existence of extensive high grades at surface over >4km of combined strike length. Previous companies did not carry out drilling because the lodes were perceived as being refractory, and narrow, with complex structures. Results of exploration carried out by Acapulco are confidential.

EPM 14153 was granted to *Conquest Mining Ltd* in August 2005. The target was mesothermal and porphyry style precious metal-base metal mineralisation within the Carboniferous Urannah Intrusive Complex in areas south and east of the main Normanby Goldfield.

Exploration within the 55 sub-blocks relinquished in April 2006 included reconnaissance prospecting, prospect scale stream sediment (39 BCL samples) and rock chip sampling (one sample) and geological mapping. A review of regional aeromagnetic data and regional geological mapping were also completed. No significant anomalism was identified by surface sampling. The highest stream sediment sample assay result was 4.48ppb Au; other samples assayed 0.05–1.25ppb Au. The assay result for the rock sample collected was 0.001ppm Au.

An additional 22 sub-blocks were relinquished in August 2007. Exploration within these comprised the collection of 27 rock and 53 BCL stream sediment

samples. No significant anomalism was detected. Exploration results for the remaining sub-blocks are confidential.

Normanby Range Area

EPM 5350 was granted to *Chris Bull* and *Joseph Francis Masterson* in April 1988. Exploration comprised the relogging of 1972 Carpentaria Exploration Company Pty Ltd drill core from a drilling program at Julivon Creek. The core was sampled every 30m and assayed for copper and molybdenum. No gold was found to be associated with the porphyry Cu-Mo system. Although assay results were as high as 2.81% Cu and 1.54% Mo over 1m intervals, these samples were from high-grade ore zones. Bulking these grades over the entire drillhole lengths was expected to return average grades similar to those reported by Carpentaria Exploration Company, namely 0.156 % Cu and 0.011% Mo.

A regional drainage sampling program produced six bulk leach anomalies (>1ppb Au) and two heavy mineral anomalies (>0.1ppm Au). These were followed up with additional stream sediment sampling, geological traversing and rock chip sampling, but no gold sources were found. The Permit was relinquished in April 1989.

EPM 9737 was granted to *Artadze Pty Ltd* in March 1994. *Peregrine Resources (Australia) NL*, through its subsidiary *Diamond Resources NL*, entered into an option agreement with *Artadze Pty Ltd* to assess the tenement for breccia pipe style gold mineralisation. Exploration comprised a literature review, review of aerial photography and Landsat imagery, review of magnetic and other geophysical data, review of geological and structural interpretive data and target generation.

A coincident magnetic low, together with several historic workings in the Kitty Creek area, was considered to represent probable extensions of the Normanby Goldfield. Another area considered to warrant investigation was where the north-west-trending Clarke Range transected the central and south-western parts of the tenement. This area was characterised by several magnetic lows. The north-west corner of the tenement contained multiple local splay structures coming off a regional north-west-trending shear, coincident with four high magnetics bullseyes.

After reviewing the target areas and matching them with recorded geochemistry and limited drilling results from previous exploration, it was evident that nearly all targets had been tested effectively. Sampling results were generally very low and a commercial scale deposit of any realistic size was unlikely to occur. The Permit was relinquished in March 1996.

EPM 10016 was granted to *Dilkera Resources Pty Ltd* in June 1994. The target was breccia pipe style gold mineralisation. Exploration included an interpretation of Landsat TM imagery, geological and topographic maps and regional airborne magnetics. A review of historical production data and previous exploration was carried out, followed by minor field reconnaissance and sampling. The Permit was relinquished in May 1996.

Pretty Bend to Don River Headwaters

EPM 2644 was granted to *Geoffrey James Fuller* in November 1980. The main emphasis of exploration was locating and sampling alluvial gold deposits and upstream gold sources in the Gold Creek, Albert Creek and Goorganga Creek areas, west of Proserpine. Geological mapping and rock outcrop sampling were carried out at Gold Creek. Ten trenches were excavated in alluvium at Gold Creek. Twelve shallow auger holes were drilled.

An option agreement was entered into with *Western Mining Corporation Ltd* over 25 sub-blocks covering the eastern end of the Permit. Field visits were made by Western Mining geologists to inspect base metal occurrences. A geological soil sampling program was completed at Gold Creek. An induced polarisation survey was carried out over geochemically anomalous zones and in creek beds to define the depth and geometry of channels. A ground magnetic survey was also carried out.

Results from soil sampling indicated an area of interest for base metal mineralisation. Anomalous assay results included up to 3000ppm Zn, 2000ppm Pb and 500ppm Cu. However, grades tended to be erratic in distribution and correlation between base metal grades tended to be poor.

Exploration results indicated that there was good potential for an economically mineable gold deposit and good prospects for base metal mineralisation. However, the Permit was relinquished in October 1982.

EPM 3590 was granted to *King Solomon Mining Company Pty Ltd* in October 1983. It was acquired to search for lode and alluvial gold deposits. Exploration comprised a literature review and some aerial photo reconnaissance, followed by satellite image analysis and interpretation of the central eastern part of the Bowen 1:250 000 Sheet area. The Permit was relinquished in December 1984.

EPM 4950 was granted to *Bowen Gold Mines Pty Ltd* in September 1987 and the title transferred to Western Mining Corporation. The main exploration activities were stream sediment sampling, geological compilation and mapping and scanning of Landsat images. Remote sensing surveys were also carried out. Most of the work was of a reconnaissance nature. Two anomalies were investigated within the Permit at Wild Creek and Humbug Creek.

The Wild Creek Anomaly had a peak stream sediment assay result of 330ppb Au and rock chip assays of up to 55g/t Ag, 0.1–2.0ppm Bi and 200–1100ppb Mo. There were no elevated pathfinder element concentrations that might suggest hydrothermal activity. There was a weak response (<14ppb Au) in 50% of streams coincident with the gabbro-granite contact at the Humbug Creek anomaly. The Permit was relinquished in September 1988.

EPM 5018 was granted to *Kennecott Explorations (Australia) Ltd* in October 1987. Initial exploration comprised a study of Landsat imagery and aerial photography, a literature review and a structural interpretation study.

Follow-up exploration comprised reconnaissance pan concentrate (69 samples), BLEG stream sediment, selected rock chip, and follow-up BLEG (94 samples) and silt (68 samples) sampling. The reconnaissance sampling produced several gold anomalies. Follow-up float and rock chip prospecting (23 samples) indicated that the source of the gold was relatively narrow quartz veins in granitoid hosts. Float sampling in creeks identified saccharoidal textured quartz veins that were anomalous in Au (up to 3.77g/t), with some Cu enrichment (up to 925ppm).

An appraisal of the Phar Lap mine included geological mapping, soil sampling and selected rock chip sampling. Rock chip samples returned some high assay results of 192g/t Au and up to 28g/t Au from ore dumps. Soil sampling (35 samples) and geological mapping showed that the main quartz reef has a very limited size. The best soil sampling assay result was 0.37g/t Au. Exploration did not indicate the presence of economic gold mineralisation within the Permit, which was relinquished in October 1988.

EPM 5046 was granted to *Bowen Gold Mines Pty Ltd* in November 1987 and was subsequently transferred to *Western Mining Corporation Ltd*. Exploration was reconnaissance in style and included data compilation, geological reconnaissance and stream sediment (586 samples) sampling. At the Alick Creek Anomaly, the highest stream sediment assay result was 190ppb Au, but this result may have been due to a trap-site effect. Other anomalous areas included Oaky Creek with 14ppb Au, Emu Creek with <14ppb Au and Simon Creek with <14ppb Au. The Permit was relinquished in November 1988.

Rangemore – Strathalbyn – Strathbogie Area

EPM 4502 was granted to *BP Australia Gold Pty Ltd* in November 1986. The target was epithermal or breccia pipe style Au deposits associated with continental acid volcanics of the Permo-Triassic Mount Wickham Rhyolite. Initial exploration comprised scanning of 1:25 000 air photographs, bulk cyanide leach stream sediment sampling (94 samples) and float prospecting (23 rock chip and grab samples). Thirteen follow-up BLEG and rock samples were collected from Upper Teatree Creek. Ground inspection of anomalous airphoto features was also carried out.

Stream sediment sampling returned only one anomalous sample — H3004 from Upper Teatree Creek, which assayed 20ppb Au. All 13 follow-up samples from this area returned background grades and the original high assay result was not repeated. All rock samples returned assay results of <0.05ppm Au. It was concluded that the probability of a gold deposit occurring within the tenement was very low and the Permit was relinquished in December 1986.

EPM 5001 was granted to *Ashton Mining Ltd* in October 1987. The target was gold mineralisation in the Mount Wickham Rhyolite within and adjacent to the Millaroo Fault Zone. Exploration consisted of rock chip and stream sediment sampling, multispectral surveys and geophysical interpretation.

Detailed geochemical sampling focused on the Bonnie Doon and Higgins Hill prospects, identified from sampling by *Carpentaria Exploration Company Pty*

Ltd. Carpentaria entered into a joint venture with Ashton Mining. One hundred and seventy-nine stream sediment, 164 soil and 587 rock chip samples were collected. The best assay results from the Bonnie Doon area were 1.15ppb Au for a stream sediment sample and 75ppb Au for a follow-up soil sample. Follow-up sampling in the Higgins Hill area produced disappointing results. Rock chip samples all assayed below the gold detection limit and soil samples assayed <10ppb Au. The Permit was conditionally surrendered in May 1990 in favour of EPM 7116.

EPM 5002 was granted to *Ashton Mining Ltd* in October 1987. The target was epithermal gold mineralisation associated with the Permo-Triassic Mount Wickham Rhyolite. Exploration included reconnaissance rock chip sampling (148 samples) and an airborne multispectral scanner survey. Of the 67 multispectral scanner anomalies identified within the Permit, 56 were subjected to follow-up exploration, including the collection of 240 rock chip samples. Positive gold grades were found associated with three of the anomalies tested. The best result was 1.05ppm Au from a sample associated with quartz veins and zones of quartz breccias within silicified and chloritised rhyolite with rare malachite. Additional work carried out included a reconnaissance BCL stream sediment and rock chip sampling program. Four out of a total of 185 BCL samples returned >1ppb Au, with a peak result of 7.75ppb Au.

A joint venture was entered into by *Carpentaria Gold Pty Ltd* in August 1989, with Carpentaria Gold as operator. Detailed investigations were carried out over the Fish Creek, Humpty Doo and Teatree Creek prospects. These prospects had been outlined by low-order gold anomalies during regional and follow-up stream sediment sampling. A combination of detailed geological mapping, chain and compass gridding, rock chip and soil sampling were used to assess the potential of the prospects. A ground magnetic survey was carried out at Humpty Doo.

The Teatree Creek prospect was highlighted by a 3.9ppb Au anomaly in regional stream sediment samples and 1.4ppb Au and 2.4ppb Au in follow-up drainage sampling. Two hundred and ninety-seven soil samples were collected. All samples returned low gold assay results, with only two sites recording >100ppb Au (131ppb Au and 293ppb Au). Assay results from selective rock chip sampling were also low, the maximum being 0.82ppb Au from a <0.1m wide quartz vein.

In an area named Higgins Hill, a cluster of low-order Au assay results (1.1ppb Au, 1.15ppb Au and 1.05ppb Au) were returned from follow-up drainage sampling. Seventy-seven ridge and spur soil samples and seven rock chip samples were also collected. No significant results were detected, with all soil samples assaying <10ppb Au and rock chip samples <0.1ppm Au.

At the Bonnie Doon prospect, the original stream sediment anomaly was 1.15ppb Au. Follow-up sampling returned anomalies of 4.5ppb Au, 0.8ppb Au and 0.5ppb Au. One hundred and ten soil samples were collected from ridge and spur traverses. The maximum assay result was only 75ppb Au and no significant results were reported for rock chip samples collected in the area.

At the Fish Creek prospect, there was a cluster of stream sediment anomalies with 7.75ppb Au, 6.0ppb Au, 4.5ppb Au, 14ppb Au, 1.0ppb Au and 1.2ppb Au. One hundred and twenty-three ridge and spur soil samples were collected, returning up to 59ppb Au. Rock chip samples assayed <0.1ppm Au.

At the Humpty Doo prospect, gridded soil sampling returned only moderate gold grades and rock chip sampling results were very low. The ground magnetic survey confirmed lithological boundaries located during detailed mapping of the prospect. An adjacent Geoscan anomaly (Anomaly 8/1), south-west of Humpty Doo was also investigated.

The prospect evaluations indicated little potential for significant economic gold mineralisation. No targets worth drill testing were generated. EPM 5002, along with EPMs 5001 and 5576, was conditionally surrendered in May 1990 in favour of EPM 7116.

EPM 5809 was granted to *Ashton Mining Ltd* in March 1989. Exploration included geological mapping, reconnaissance and follow-up stream sediment (29 BCL samples) and rock chip (26 samples) sampling and gridding accompanied by -80 mesh soil sampling. This reconnaissance program outlined a single gold anomalous drainage to the south of Mount Dillon. One hundred and nineteen soil samples were collected at Mount Dillon. Assay results indicated that the area is anomalous in Au, Ag, Pb, Zn and Sb but low in Cu.

Ground magnetic and IP surveys were completed over the Mount Dillon prospect. Results of the ground magnetic survey suggested that magnetic dykes are the source of the majority of the identified lineaments. The Induced Polarisation survey delineated three anomalous areas, all of which were within the southern part of the grid but not coincident with anomalous geochemistry. The associated resistivity response appeared to outline the pyroclastic cap and suggested a thickening of this cap to the north.

Follow-up investigations included detailed surface geological mapping and the collection of 124 rock chip samples from the poorly exposed western slope of the Mount Dillon prospect. Encouraging results included eleven samples with >0.5ppm Au and a peak result of 3.25ppm Au.

Selected geochemical and IP targets were tested with percussion drilling. Eight reverse circulation holes (491m) were drilled. The best intersection was 24m at 0.36g/t Au (including 8m at 0.49g/t Au) in drillhole PDH 4. Silver assay results were uniformly low. The Permit was relinquished in April 1990.

EPM 6063 was granted to *ACM Operations Ltd* in October 1989. The target was epithermal precious metal deposits similar to those at Wirralie and Pajingo. Exploration included a helicopter-supported bulk stream sediment sampling program comprising the collection of 80 samples. No Au geochemical anomalies were delineated within the Permit. Geological mapping defined one area of significant sulphidisation and alteration. Follow-up rock chip sampling and stream sediment sampling failed to detect any Au mineralisation. In view of these discouraging results, the Permit was relinquished in October 1990.

Rangeview – Millaroo – Dalbeg Area

EPM 2277 was granted to *Otter Exploration NL* and *Allstate Explorations NL* in January 1980. The target was gold mineralisation around the Rangeview Ring Structure, based on Carpentaria Exploration Company Pty Ltd's previous work over the eastern margin of the ring structure. Exploration consisted of stream sediment sampling, surface prospecting and rock chip sampling.

One rock chip sample assayed 0.06ppm Au. Samples from the south-western section of the ring fracture also returned anomalous results. The Permit was relinquished in November 1980.

EPM 4024 was granted to *Ardgold Pty Ltd* in June 1985. The target was economic gold concentrations associated with the old Lionel Diggings and surrounds. Exploration consisted of steam sediment, pan concentrate and rock chip sampling, trenching, geological mapping, remote sensing and air photo interpretation. Initial geochemical results delineated weakly anomalous zones, with all mineralisation related to quartz veins or very small, discontinuous breccia lenses. Gold grades assayed up to 4.7ppm and base metals up to 1200ppm. Detailed rock chip sampling was completed over the Lionel Diggings area, with samples assaying up to 21g/t Au. Regional sampling indicated no other areas of significant mineralisation.

Northpac Resources NL entered into a joint venture agreement in 1987 and completed detailed sampling and mapping to identify prospective areas for future drilling. No further exploration within the Permit was reported. The Permit was relinquished in April 1989.

EPM 4913 was granted to *Pan Australian Mining Ltd* in September 1987. The target was epithermal gold mineralisation or a polymetallic deposit with good gold credits. Aerial photography was flown over the area. One hundred and forty-nine BCL stream sediment samples were collected during the initial sampling program; three samples were anomalous in copper, with up to 1550ppt Au, 2ppm Cu, 20ppm Pb, 35ppm Zn and 2ppm Mo. A small follow-up sampling program over the anomalous areas consisted of 10 rock chip and five stream sediment samples. Assay results were disappointing and failed to reproduce the earlier results. The Permit was relinquished in August.

EPM 5003 was granted to *Carpentaria Exploration Pty Ltd* in October 1987. The target was possible intrusive or epithermal gold mineralisation (as seen to the west around Blue Mountain) causing anomalous BCL results from previous sampling. The Permit was conditionally surrendered in May 1988 in favour of *EPM 5411*, which incorporated *EPMS 5003, 3681, 4230, 4652 and 4981*. Exploration results are confidential.

EPM 5559 was granted to *Union Oil Development Corporation* in October 1988. The target was gold mineralisation within volcanic and intrusive rocks. The Permit was divided into four main blocks, with blocks 1 and 2 in the Strathalbyn 1:100 000 Sheet area and blocks 3 and 4 in the Ravenswood 1:100 000 Sheet area.

Initial exploration consisted of geological mapping and stream sediment sampling over the four main areas. Thirty-eight samples were collected in blocks 1 and 2. Results were disappointing, with only one sample assaying greater than the detection limit. Blocks 1 and 2, totalling 53 sub-blocks, were relinquished in May 1989 because of the lack of gold mineralisation. Forty-two stream sediment samples were collected in blocks 3 and 4. Anomalous gold grades were widespread in these areas.

Follow-up work included the collection of 35 stream sediment samples, 21 rock chip samples and 229 soil samples. Only three rock chip sampling assayed $>0.1\text{ppm Au}$; a sample from the Lulu Prospect assayed 0.4ppm Au . Gridded soil sampling over this prospect did not delineate a source for the mineralisation and it was concluded that the anomalous gold in drainage samples was related to small fractures within the Ravenswood Granodiorite. The Permit was relinquished in February 1991.

EPM 5576 was granted to *Ashton Mining Ltd* in November 1988. *Carpentaria Gold Pty Ltd* entered into a joint venture with Ashton Mining in August 1989. The target was epithermal gold mineralisation in the Lizzie Creek Volcanics and Mount Wickham Rhyolite. Exploration consisted of stream sediment sampling and geophysical interpretation of multispectral surveys. The Permit was conditionally surrendered in favour of *EPM 7116* in May 1990.

EPM 5733 was granted to *Ashton Mining Ltd* in February 1989. The target was to identify any outliers of Mount Wickham Rhyolite, as the unit was considered prospective for epithermal mineralisation. Exploration undertaken consisted of office-based work and minor rock chip and stream sediment sampling.

Base maps were compiled from aerial photos, followed by a geological reconnaissance and BCL stream sediment sampling. Out of a total of 145 samples collected over possible outliers of Mount Wickham Rhyolite, nine samples assayed $>0.5\text{ppb Au}$. Follow-up sampling of the anomalous drainages comprised five rock chip and 24 stream sediment samples. This sampling did not sustain any of the previous gold anomalies. No hydrothermal mineralisation was observed in any of the anomalous areas during geological traversing. The Permit was relinquished in December 1989.

EPMS 5807 and 6914 were granted to *Austwhim Resources NL* (on behalf of the Anakie Joint Venture between *Austwhim Resources NL* and *Austmin Gold NL*) in March 1989 and January 1990, respectively. Exploration was managed by Dominion Mining Ltd and consisted of soil, stream sediment and rock chip sampling and geological traversing.

Seventy-three reconnaissance stream sediment samples were collected. The best assay result was 198ppb Au from a creek draining the Lionel Diggings. The next best results were 25.2ppb Au and 8.5ppb Au from the southern boundary between the two Permits. Follow-up stream sediment sampling was carried out in areas that assayed $>8\text{ppb Au}$ and 3 new anomalous areas were identified. Assay results for 21 rock chip samples were disappointing and soil samples assayed up to 33.6ppb Au . Both Permits were relinquished in December 1990.

EPM 5927 was granted to *Axis Mining NL* in June 1989. The target was gold mineralisation within the Rangeview Ring Fracture structure. Exploration comprised an air photo interpretation and BCL stream sediment and rock float sampling. Three rock chip and float samples and five stream sediment samples were collected. The best rock chip assay result was 0.26ppm Au. Stream sediment sampling assay results were disappointing; the best result was 4ppb Au. The Permit was relinquished in September 1989.

EPM 7458 was granted to *Poseidon Exploration Ltd* in February 1991. The Permit was taken out as part of a regional, aeromagnetism-based search for gold mineralisation within Permo-Carboniferous intrusives. Exploration consisted of a review of previous exploration results, aeromagnetic and radiometric interpretation, air photo interpretation, and stream sediment and rock chip sampling.

The geophysical interpretation highlighted target areas around the northern and eastern margins of the Rangeview Ring Fracture, as well as reversely polarised features. Seventy-nine stream sediment and 14 rock chip samples were collected from the target areas. The best stream sediment assay result was 1.9ppb Au and all rock chip samples assayed <0.01ppm Au. A geological reconnaissance over the area did not identify any hydrothermal mineralisation or alteration. The Permit was relinquished in June 1991.

EPM 7496 was granted to *Poseidon Exploration Ltd* in August 1990. The Permit was taken out as part of a search for gold mineralisation within Permo-Carboniferous intrusives, based on an interpretation of regional aeromagnetism. Exploration consisted of a review of previous exploration results, aeromagnetic and radiometric interpretation, air photo interpretation and stream sediment sampling.

A large reverse polarity feature, similar in nature to the feature at Mount Leyshon, was interpreted as a late-stage intrusive related to porphyry style mineralisation. Reconnaissance traversing located a well-exposed gabbro body, surrounded by Permo-Carboniferous granite and adamellite that coincided with the magnetic feature. Twenty-one stream sediment samples collected within a 2km radius of the reverse polarity feature returned very poor assay results. The Permit was relinquished in June 1991.

EPM 7605 was granted to *Poseidon Exploration Ltd* in January 1991. The Permit was taken out as part of a search for gold mineralisation within Permo-Carboniferous intrusives, based on an interpretation of regional aeromagnetism. Exploration consisted of a review of previous exploration results, aeromagnetic and radiometric interpretation, air photo interpretation and stream sediment sampling.

The interpretation of the aeromagnetic and radiometric surveys highlighted a reverse polarity feature at Expedition Pass (mostly within *EPM 7496*) and a strong positive magnetic feature east of Landers Creek. Geological mapping over the magnetic feature at Expedition Pass located a well-exposed gabbro that showed no mineralisation or alteration. Field checking of the Landers Creek area

located no mineralisation or alteration related to the magnetic features. Twenty-three stream sediment samples were collected; seven samples assayed >1ppb Au, with a highest value of 7.1ppb Au. The anomalous gold was traced in most cases to small, gold-bearing veins in Ordovician–Devonian granite or eroding thick alluvium. The Permit was relinquished in March 1992.

EPM 9801 was granted to *BHP Minerals Pty Ltd* in December 1993. The target was bulk mineable disseminated gold mineralisation, similar to the Mount Leyshon deposit. Exploration consisted of a review of previous exploration results, detailed interpretation of aeromagnetic and radiometric surveys, a geological reconnaissance, and rock chip and stream sediment sampling.

A circular zone of low magnetic contrast was delineated within the Marlborough Pocket Granite. Investigation of this potentially hydrothermal-related feature indicated that it was related to unweathered hornblende adamellite within the Marlborough Pocket Granite. Eighty-one -2mm BLEG and 49 -80 mesh stream sediment samples were collected from the area, with disappointing results. Rock chip sampling was predominantly focused around Paul's Gossan. Assay results did not repeat broader sampling results, indicating that the mineralisation is limited spatially. The Permit was relinquished in July 1995.

EPM 11602 was granted to *Mount Stewart Gold Ltd* in March 2005. The target is gold mineralisation. Exploration results are confidential.

EPM 11982 was granted to *Mount Stewart Gold Ltd* in March 2005. The target is gold mineralisation. Exploration results are confidential.

EPMs 14402 and *14675* were granted to *Lost Sands Pty Ltd* (a wholly-owned subsidiary of Diatrema Resources Ltd) in November 2004 and August 2005, respectively. The Permits were acquired to search for gold mineralisation.

Mineral exploration had previously been carried out in the area by a number of companies using both porphyry and epithermal models. Although many of the prospects had been tested, particularly the epithermal vein prospects, Diatrema Resources considered potential for additional mineralisation to exist within and adjacent to the Carlton Rhyolite.

Exploration included a review of published records, unpublished documents and open file company reports. Processing and imaging of geophysical survey and geochemical data was also completed. A reconnaissance field visit was made to the area. The best developed epithermal system is that at Quartz Hill. The area contains abundant quartz veining and a possible sinter is preserved in the centre of the area.

In August 2006, 50 sub-blocks from both Permits were relinquished, thus halving the size of each tenement. Exploration results are confidential.

Ravenswood Area

EPM 5411 was granted to *Carpentaria Gold Pty Ltd* in May 1988 after the conditional surrender of EPMs 5003, 3681, 4230, 4652 and 4981. The target was mesothermal gold veins and stockworks to provide ore for the Sandy Creek mine at Ravenswood. In 1989, costeaning and percussion and core drilling were carried out to investigate the potential of the Wild Irish Girl, Bristol, Spring Creek Copper, Buck Reef, Buck Reef West, Shelmalier-McIlaneur and Christmas Box lodes. The Permit was conditionally surrendered in favour of EPM 9140 in December 1992. Most exploration results are confidential.

EPM 5670 was granted to *German Mines NL* in December 1988. Exploration comprised an interpretation of air photos and a review of previous exploration results. No field work was carried out before the Permit was conditionally surrendered in June 1989.

EPM 8630 was granted to *Carpentaria Gold Pty Ltd* in January 1992. The target was mesothermal style gold mineralisation within the Lolworth-Ravenswood Block and the Mount Windsor Volcanics. The aim was to define areas of potential gold resources that could be developed as part of Carpentaria Gold's Ravenswood mining operations. The Permit was conditionally surrendered in favour of EPM 9140 in December 1992.

EPM 8920 was granted to *Carpentaria Gold Pty Ltd* in August 1992. The target was mesothermal and epithermal style precious metal mineralisation and associated breccia complex mineralisation.

Exploration in the first year of tenure included a review of previous exploration results, heliborne regional traversing and rock chip sampling, regional stream sediment sampling and reconnaissance mapping.

Twenty-two sub-blocks were relinquished in August 1998. Forty-eight stream sediment and two rock chip samples had been collected in these areas. Two sub-blocks were relinquished in August 1999, nine were relinquished in August 2000, 24 were relinquished in August 2001 and six were relinquished in August 2002. No sampling results from this area warranted follow-up work.

The Permit was conditionally surrendered in favour of EPM 14921 in August 2004. Most exploration results are confidential.

EPM 9140 was granted to *Carpentaria Gold Pty Ltd* in December 1992 after the conditional surrender of EPMs 5411, 6060 and 8630. The target was to define areas of high-grade gold resources and bulk tonnage low-grade gold resources to feed Carpentaria's Ravenswood gold mining operation.

Thirteen sub-blocks were surrendered in December 1994 and 17 sub-blocks were relinquished in 1997. Five sub-blocks were relinquished in December 1999 and December 2000. Exploration comprised a review of previous exploration results and stream sediment and rock chip sampling. No anomalous results were reported for the relinquished areas.

Fifty-five sub-blocks were relinquished in December 2001. This area included the Landers Creek Prospect, where drill pads and tracks were rehabilitated. Fourteen sub-blocks were relinquished in December 2002 and 12 sub-blocks were relinquished in December 2003. Exploration in the relinquished areas had included stream sediment, soil and rock chip sampling and part of a helicopter-borne magnetic survey. The relinquished areas were considered to have minimal potential for economic mineralisation of interest to the company.

The Permit was conditionally surrendered in favour of EPM 15099 in May 2006. Most exploration results are confidential.

Ravenswood – Carse O Gowrie – Rangeview Area

EPM 4101 was granted to *Astrik Resources NL* and *Ranger Exploration NL* in September 1985. The target was bulk tonnage gold mineralisation. Exploration consisted of air photo and Landsat interpretation, a literature review and stream sediment and rock chip sampling.

Exploration during the first six months focused on Mount Canton and the western part of the tenement. A rock chip sample collected from the Mount Canton area during reconnaissance sampling assayed 0.55ppm Au, 34ppm Cu, 130ppm Zn, 30ppm Pb, 1ppm Ag and 150ppm As. A regional BCL stream sediment sampling program was carried out during the next six months, but results were not reported. Sampling around ML 1331 (held by P. Kean over the Three Peaks prospect) only provided one sample with gold (0.05ppm Au). However, it was noted that, due to the leached and high level of the breccias, further exploration was warranted over the area. The Permit was conditionally surrendered in November 1986 in favour of EPM 4503.

EPM 4503 was originally granted to *Astrik Resources NL* and *Ranger Exploration NL* in November 1986 after the conditional surrender of EPM 4101. In the next month, Ranger Exploration NL transferred its interests in the Permit to Orion Resources NL. The target was bulk tonnage gold mineralisation associated with the Ravenswood Granodiorite Complex and later intrusive and volcanic events. Exploration consisted of stream sediment and rock chip sampling, air photo interpretation and the acquisition of multispectral data.

The results of previous stream sediment sampling under EPM 4101 were reported. Only two out of 36 samples assayed >1ppb Au, with one sample from below Mount Canton assaying 3.5ppb Au. Follow up sampling to locate the source of the two anomalous samples indicated that the mineralisation is restricted to small quartz veins in silicified volcanics. The Permit was relinquished in November 1988.

EPM 5145 was granted to *Austwhim Resources NL* in January 1998. The Permit was part of the Anakie Joint Venture with *Conquest Mines NL* and *Western Reefs Ltd*. By December 1988, the joint venture comprised Austwhim Resources NL (66.7%) and *Austmin Gold NL* (33.3%). The target was epithermal gold mineralisation.

Sixty-five stream sediment samples were collected from the tenement. Assay results were disappointing, with up to 2.46ppb Au. First stage follow-up sampling at Landers Creek and Connelly Creek comprised the collection of another 17 stream sediment samples; results were more promising. Although the 2.46ppb Au result from the Connelly Creek area couldn't be repeated, two samples from the upper Landers Creek area assayed 11ppb Au and 47.6ppb Au. Three hundred and fifty-four soil samples were collected at 50m intervals over a gridded area. This sampling identifying three anomalous areas. A ground magnetic survey was also completed over the gridded area.

Follow-up sampling over the three anomalies at upper Landers Creek consisted of 'spot' soil sampling, composite soil sampling and rock chip sampling along three costeans. Results were disappointing, with a best rock chip assay result for channel sampling of 0.11ppm Au and a best 'spot' soil sample assay result of 54.8ppb Au. Surface rock chip sampling also failed to support previous soil sampling results. The Permit was relinquished in December 1989.

EPM 5486 was granted to *Ashton Mining Ltd* in 1988. The target was gold mineralisation. Exploration consisted of a literature review, detailed geological mapping and rock chip sampling. The tenement was divided into six separate sections, with five regions located in the Ravenswood 1:100 000 Sheet area and one region in the Strathalbyn 1:100 000 Sheet area. Twenty-eight rock chip samples were collected over the six areas. One sample assayed 1.6ppm, Au, the only result above the detection limit of 0.05ppm Au. The Permit was relinquished in January 1989.

EPM 5956 was granted to *Porphyry (1939) Gold Mine NL* in June 1989. The targets were base metals mineralisation within the Mount Windsor Volcanics and gold mineralisation associated with Permo-Carboniferous intrusives. Exploration consisted of several reconnaissance trips, minor rock chip sampling and interpretation of previously flown aeromagnetic and radiometric surveys. Interpretation of the geophysical data indicated that the area is devoid of prominent features, aside from two small magnetic lows that are most likely associated with the Three Peaks breccia pipes in the western part of the tenement. Four rock chip samples were collected from around the breccia pipes but all samples assayed below the detection limit for gold. After reviewing previous work in the area, it was concluded that no further work was warranted. The Permit was relinquished in June 1990.

EPM 7059 was granted to *Poseidon Exploration Ltd* in May 1990. The Permit was taken up as part of a regional aeromagnetism-based search for porphyry gold deposits associated with Permo-Carboniferous intrusives. Exploration for the Permit consisted of a literature review and interpretation of aerial magnetic and radiometric data and air photography. No field work was carried out within the Permit. The geophysical interpretation did not generate any targets of interest. The Permit was relinquished in November 1990.

EPM 7469 was granted to *Poseidon Exploration Ltd* in January 1991. The Permit was taken out as part of a search for gold mineralisation within Permo-Carboniferous intrusives, based on an interpretation of regional

aeromagnetics. EPM 7469 was added to Poseidon's Mount Canton Project in May 1991. Exploration consisted of a review of previous exploration results, interpretation of aeromagnetic and radiometric data and air photography, minor petrological studies, and stream sediment and rock chip sampling.

Areas of interest identified from aerial photos and magnetic and radiometric interpretations included north-west-trending ring dyke structures, the Robey Range complex and magnetic lows. Thirty-seven stream sediment samples were collected over the area. Assay results were low, with a highest gold content of only 5.7ppb that could not be repeated with follow-up sampling. Geological traversing and rock chip sampling in anomalous drainages did not detect any significant mineralisation. Weak sericite alteration was observed along ring dykes. The Permit was relinquished in July 1992.

EPM 7728 was granted to *Poseidon Exploration Ltd* in January 1991. The Permit was taken out as part of the Mount Canton Project, with a main target of porphyry style gold mineralisation. Exploration comprised a review of previous exploration results and interpretations of aeromagnetic and radiometric data and air photos. No field work was carried out within the Permit because the geophysical interpretation did not delineate any features of interest. The Permit was relinquished in July 1992.

EPM 8143 was granted to *Poseidon Exploration Ltd* in October 1991. The target was potential porphyry gold mineralisation as part of the Mount Canton Project. Exploration consisted of a review of previous exploration results, a detailed geological interpretation from aerial photographs, Landsat and aeromagnetic and radiometric surveys, and stream sediment, rock chip and soil sampling. Fifteen stream sediment samples and 12 rock chip samples were collected over the parts of the Permit where sampling by previous companies was lacking. Results from two drainage samples were promising, assaying 21.4ppb Au and 21.7ppb Au, but follow-up rock chip sampling produced disappointing results. The geophysical interpretation did not highlight any areas of potential mineralisation. The Permit was relinquished in March 1992.

EPM 9526 was granted to *BHP Minerals Pty Ltd* in July 1993. The target was large tonnage breccia-hosted gold mineralisation of the Mount Leyshon style. Exploration consisted of a review of previous exploration results, air photo interpretation, stream sediment, soil and rock chip sampling, reverse circulation drilling and ground magnetic surveys.

Initially, 218 stream sediment and 12 rock chip samples were collected within the tenement. Exploration then focused on the Three Peaks prospect, with gridding, mapping, soil sampling and a ground magnetic survey. Results from the magnetic survey, along with geological mapping, confirmed the multiple phases and size of the breccia system. However, soil sampling results were disappointing. Six reverse circulation holes were drilled to test for a discrete mineralised gold phase but no anomalous gold or any indicator minerals were identified.

The Permit was transferred to Haoma Mining NL in 1995. Very little exploration was carried out during the following years as Haoma focused on more advanced

projects near Ravenswood. An office-based interpretation of the tenement was carried out using aeromagnetic data and a database of BHP's geochemical and drilling results. Field work recommenced in 2000 when 17 stream sediment samples and six rock chip samples were collected to follow up a 30ppb Au BHP stream sediment sample. Previous results were not reproduced; the best assay result was 18ppb Au. The Permit was relinquished in July 2002.

EPM 10869 was granted to *MIM Exploration Pty Ltd* in January 1996. The target was sub-volcanic breccia style gold mineralisation within the eastern portion of the Ravenswood Batholith in the Kirkton area.

Thirty-three sub-blocks were relinquished in January 1997. Exploration comprised a review of previous exploration results and stream sediment sampling (90 samples). Most stream sediment samples assayed <1ppm Au. Sixteen sub-blocks (including all sub-blocks within the Strathalbyn 1:100 000 Sheet area) were relinquished in January 1999. These sub-blocks also had discouraging stream sediment sampling results. A helicopter-borne magnetic survey was flown over part of the Permit in April 1999. MIM Exploration transferred management of the Permit to Carpentaria Gold Pty Ltd in December 2001.

Nine sub-blocks were relinquished in January 2003. A review of all exploration results indicated minimal potential for these areas. Four sub-blocks were relinquished in January 2004. Minor soil sampling had returned any anomalous results.

Resolute Mining Ltd acquired *Carpentaria Gold Pty Ltd* in March 2004. The Permit was conditionally surrendered in May 2006 in favour of EPM 15098. Most exploration results are confidential.

Strathbowen–Birralelee Area

EPM 4727 was granted to *Ashton Mining Ltd* in April 1987. The Mount Carlton joint venture was formed between Ashton Mining Ltd (39%) and Carpentaria Gold Pty Ltd (61%) in November 1987 and Carpentaria became managers of the joint venture. The target was the gold potential of the Mount Wickham Rhyolite. Exploration comprised rock chip and bulk cyanide leach stream sediment sampling. Most of the Permit was within the Collinsville 1:100 000 Sheet area. Aerial radiometrics and magnetics were flown over the Permit.

The Permit was conditionally surrendered in April 1987. Exploration results are confidential.

SILVER-LEAD-ZINC

Bodes Range, Double Peak Range and Normanby Range

EPM 451 was granted to *St Joseph Phelps Dodge Exploration Pty Ltd* in November 1967. The target was base metals mineralisation. A total of 2200

stream sediment, residual soil and rock chip samples were collected. Exploration also included geological mapping, photogrammetry and petrology.

Only weakly anomalous centres were identified. During the course of field observations, scattered surface copper mineralisation was identified at Bodes Range, where costeans were excavated and twelve rotary percussion holes totalling 301.45m were drilled. Results indicated that there were insufficient mineralised zones to constitute a viable prospect.

The Permit was relinquished in August 1968.

Landers Creek Area

EPM 1853 was granted to *Carpentaria Exploration Company Pty Ltd* in November 1977. The targets were gold mineralisation at Ravenswood and volcanogenic massive sulphide deposits in the Mount Windsor Volcanics. Exploration consisted of geological mapping, stream sediment, rock chip and soil sampling, costeaning, percussion and diamond drilling, petrology, and IP, magnetic and electromagnetic surveys.

One thousand four hundred and eighty-four stream sediment, 434 rock chip and 516 soil samples were collected. Six costeans were excavated and four percussion/core holes were drilled. The main targets of the sampling programs were the Landers Creek prospect and the old Queen of Sheba, Britannia, Tinglelairy, Trieste, New Chum and Standard workings. The best drilling result from the Landers Creek prospect was 0.1m at 1930ppm Cu, 3.39% Pb, 7.09% Zn and 24ppm Ag.

Forty-nine sub-blocks were relinquished in November 1978. By November 1982, the Permit had been reduced to eight sub-blocks. The Permit was conditionally surrendered in favour of EPM 3680 in February 1984.

EPM 3439 was granted to *Mount Isa Mines Ltd* in March 1983. The target was volcanogenic base metal sulphide mineralisation in the Mount Windsor Volcanics. Detailed geological mapping, rock chip and soil sampling, and a time domain electromagnetic survey were carried out at the Queen of Sheba geochemical anomaly. Three targets were identified and percussion drill testing was recommended. The Britannia area was also identified for follow-up investigations. The Permit was conditionally surrendered in favour of EPM 3680 in February 1984.

Mount Carlton

EPM 2418 was granted to *Getty Oil Development Company Ltd* in May 1980. A review of previous exploration carried out by AO (Australia) Pty Ltd indicated that two prospects, the Carlton and Strathmore areas, could be prospective for epithermal precious metal or stockwork Mo deposits. Following an initial reconnaissance, stream sediment sampling and grid evaluation, it was concluded that the Ag and Au mineralisation was localised only within the mining leases at the Carlton Grid. This mineralisation appeared to be controlled by

north-east-trending structures. The host rocks have alteration zoning characteristic of epithermal deposits. Six hundred and fifty-six -80 mesh stream sediment, 234 soil and 177 rock chip samples were collected throughout the Permit area. These geochemical surveys delineated two other areas of anomalous Mo and/or base metals but both areas returned very low precious metal grades.

Known mineralisation within the Carlton area consists of a high-grade, 5m by 0.5m core of secondary copper carbonates in a quartz-kaolinite matrix, surrounded by a zone of fractured and silicified breccia. Mineralisation occurs along 25m long by 4–7m wide north- to north-east-trending structural zones. Representative samples returned grades of several percent Cu and several hundred ppm Ag for high-grade ore, and 10 to 20ppm Ag in the surrounding breccia. The known mineralisation also includes low-grade, disseminated Ag-Pb mineralisation associated with strongly pyritised and silicified intrusive breccias. Representative samples returned grades of 3–22ppm Ag and 400–1600ppm Pb. Both high-grade and low-grade mineralisation occurs in the area of the small workings and pits on ML 231.

Two hundred and five stream sediment, 39 rock chip and >200 soil samples were collected in the Carlton Grid area. Stream sediment assay results delineated a broad anomalous area 3km long by 1.5km wide. Mo results formed a halo to a broad area of anomalous Zn and As. Anomalous Cu and Pb grades were confined to the zone of old workings and reduced to background levels 500m from the pits. The Ag and Au assay results were very low.

In the Strathmore area, altered rhyolitic tuffs have been intruded by several generations of rhyolite plugs and dykes. The rocks are extensively silicified and quartz-sericitic alteration was recognised in the fresher rhyolite. Pyrite was the only sulphide identified. Sixty-nine stream sediment, 28 rock chip and some soil samples were collected. Stream sediment sampling delineated an area of anomalous Cu and Zn concentrations, with a halo of slightly anomalous Mo. Maximum assay results from grid-based soil sampling by AO (Australia) Pty Ltd were 2850ppm Cu, 780ppm Zn and 80ppm Mo. Rock chip sampling returned up to 2ppm Ag, 0.3ppm Au, <300ppm Cu and <60ppm Mo.

A large (6km by 1km) stock of quartz-feldspar porphyry was located in the McGregor area. Thirty-five stream sediment and 11 rock chip samples were collected. Stream sediment sampling delineated a broad area (6km by 2km) of anomalous Zn and Mo concentrations in the south-west corner of the Permit. Maximum assay results included 195ppm Zn and 20ppm Mo. Precious metal, Cu, Pb and As results were low.

The Permit was relinquished in May 1981.

Rangeview and Mount Glenroy Areas

EPM 611 was granted to *J.M. Stephen Pty Ltd* in June 1969. The Permit was subsequently transferred to Laskan Minerals Pty Ltd. Exploration comprised reconnaissance prospecting over part of Area 3 of the Permit, which was within the Strathalbyn 1:100 000 Sheet area. Follow-up work comprising detailed stream

sediment sampling and geological mapping was carried out over that part of Area 3 tested by reconnaissance mapping.

At the end of the first year of tenure, Area No. 3 was reduced by just over one half its original size and renamed Area No.1, such variation being approved on 25 November 1970. As a further variation, the company was able to hold onto the Permit until its eventual expiry date on 1 May 1972. Reconnaissance geological mapping was carried out and two hundred and twelve stream sediment samples were collected. Results indicated that Pb and Zn mineralisation occur in association within at least 20 known ferruginous exposures ranging in width from a few centimetres to 13.7m. Follow-up random rock chip sampling was completed over lode systems that were generally representative of the mineralised area as a whole. Maximum assay results were 825ppm Zn and 268ppm Pb. A sample from the mullock dump of a well on Glenroy Creek assayed 305ppm Pb and 1600ppm Zn. Old scheelite workings at Rangeview were prospected with ultra-violet light surveys and some extensions to the mineralisation were noted.

Due to the company's commitments in nearby areas where more favourable results were obtained, it was decided to abandon the area and the Permit was relinquished in May 1972.

EPM 1728 was granted to *Carpentaria Exploration Company Pty Ltd* in December 1976. The target was volcanogenic massive sulphide mineralisation in the Mount Windsor Volcanics. Initial exploration consisted of a literature review, air photo interpretation, geological mapping and stream sediment, rock chip and soil sampling. One thousand and sixteen stream sediment samples were collected during a regional sampling program over the entire tenement. The main focus of this sampling was to fill in gaps from previous sampling. Sampling density was four samples per square kilometre. Samples were assayed for Cu, Pb and Zn. Four main anomalous areas were delineated from the stream sediment results — the Glenroy Creek, Mount Glenroy, Gold Creek and Six Mile Bore areas.

Exploration over these four areas consisted of detailed geological mapping and rock chip, stream sediment and soil sampling. Sampling at Glenroy Creek revealed that the anomalous results were restricted to a few gossanous outcrops, with only rare concentrations of base metal sulphides. Results from follow-up work at Six Mile Bore were also disappointing, with only weak mineralisation and alteration observed.

Detailed exploration at Mount Glenroy consisted of 1:10 000 scale geological mapping, ridge soil sampling, rock chip sampling and the collection of rocks for petrographic analysis. The geological mapping indicated that the area was more favourable for porphyry style mineralisation than volcanogenic massive sulphides. Geochemical sampling did not detect any significant gold or base metal grades.

Anomalous stream sediment assay results from Gold Creek were up to four times the Zn and six times the Pb background levels and warranted follow-up rock chip and stream sediment sampling. Shallow prospecting pits were found to be the source of the anomaly. The best rock chip assay result was 2.6% Cu, 19.6% Pb,

4.04% Zn, 38ppm Ag, 120ppm Ba and 0.13ppm Au. Geological mapping indicated that the mineralisation is structurally controlled and did not warrant any further work.

The Permit was relinquished in February 1984.

EPMs 1169 and 1170 were granted to *Cormepar Minerals Pty Ltd* in February 1973. The target was copper, lead and zinc mineralisation in the Mount Windsor Volcanics and the Cape River beds. Exploration comprised geological mapping and a regional stream sediment survey over the two permits.

One hundred and eighty-one stream sediment samples were collected by Layton and Associates Pty Ltd, on behalf of Cormepar Minerals Pty Ltd. The -80 mesh samples were analysed using AAS methods. The highest assay results were 53ppm Cu, 76ppm Pb and 127ppm Zn. A group of five anomalous copper results was located on opposite sides of Glenroy Creek, just below the intersection with Six Mile Creek; some samples were anomalous in lead and zinc also. No follow-up work was done due to poor access. Very little visible mineralisation was observed during field inspections of the permits.

The Permits were relinquished in August 1974.

EPM 2276 was granted to *Otter Exploration NL* and *Allstate Explorations NL* in February 1980. The target was volcanogenic base metal sulphide and gold mineralisation.

Initial exploration consisted of a literature review, air photo interpretation and rock chip and stream sediment sampling. Four prospective areas were identified based on previous exploration by Carpentaria Exploration Company Pty Ltd. These were Gold Creek, Stones Creek, Glenroy Creek and Mount Glenroy. Minor stream sediment sampling and rock chip sampling was carried out at the Gold and Stones Creek prospects in the first six months. During the next six months, detailed geological mapping and rock chip sampling were completed at these prospects. Twenty rock chip samples were collected from the Stones Creek area and 37 samples from the Gold Creek area. Both areas were gridded with a 300m baseline, with samples collected approximately every 25m at Gold Creek. The best assay result from Stones Creek was 0.12% Cu, 1.4% Pb, 840ppm Zn, 83ppm Ag, 160ppm As, <10ppm W and 2.8ppm Au. Results from Gold Creek were disappointing, with no anomalous gold grades.

Follow-up work consisted of magnetic surveys at Gold Creek and Stones Creek and minor rock chip sampling at Mount Glenroy. No samples indicated any areas with obvious potential at Mount Glenroy. Results from the magnetic survey at Stones Creek indicated an east-west trend, coinciding with an area of known mineralisation and may represent an inferred east-west fault parallel to the creek.

Mining Lease 230119 was taken out over the Stones Creek prospect. *EPM 2276* was relinquished in May 1981.

COPPER-GOLD-MOLYBDENUM

Beaks Mountain Area

EPM 1021 was granted to *Otter Exploration NL* in April 1972. The target was large tonnage low-grade Cu-Mo deposits.

Exploration included an induced polarisation survey and geological mapping, along with stream sediment, soil and rock chip sampling. A percussion drilling program was carried out and two core holes drilled (DDH1 to 184.4m and DDH2 to 182.9m). The core holes were drilled in an area of anomalous molybdenum indicated by soil sampling. Drilling results were discouraging as no economic mineralisation was intersected. Geological mapping indicated that there is abundant galena, sphalerite, chalcopyrite and molybdenum in two pyritic quartz-carbonate-clay veins.

The Permit was relinquished in April 1974.

Binbee to Exmoor Area

EPM 452 was granted to *Uranium Consolidated NL* in November 1967. The area was taken up because it had potential for silver mineralisation in the eastern half and disseminated copper-gold mineralisation in the western half. Regional geochemistry and inspections of old workings were carried out. This exploration showed that the eastern half of the Permit was generally unprospective. Anomalous copper grades were found in the Devlin Pocket area.

The Permit was relinquished in April 1968.

EPM 1070 was granted to *Dampier Mining Company Ltd* in July 1972. Regional stream sediment (418 samples) and soil sampling (323 samples) were carried out, as well as a detailed assessment of a small area of weak molybdenum mineralisation in MLA 282. Outcropping mineralisation was tested with geological mapping and rock chip and soil sampling.

The regional geochemistry did not delineate any areas worth following up. Soil samples assayed 4–200ppm Cu and 2–65ppm Mo. Only one sample contained gold (0.24, 0.36 and 0.96ppm Au). Detailed work on MLA 282 failed to indicate any potential for economic mineralisation. The Permit was relinquished in January 1973.

EPM 2334 was granted to *Amoco Minerals Australia Company* in March 1980. Two types of mineralisation were targeted — porphyry copper and volcanogenic deposits. The Tent Hill and King Solomon workings were considered to be volcanogenic style deposits and Mount Poole and Mount Devlin porphyry copper style deposits.

Preliminary evaluation of the entire tenement failed to locate any areas of economic potential. Detailed field traverses were carried out and included the

collection of 43 rock chip and 19 stream sediment samples. Only three previously unrecorded areas of interest were discovered. All assay results were low.

The Permit was relinquished in January 1981.

Bloomsbury to Mirani Area

EPM 14992 was granted to *Normanby Gold Pty Ltd* in April 2005. The tenement was then purchased by *Conquest Mining Ltd*. The target was porphyry copper-gold and epithermal gold-silver mineralisation within the Connors Arch and coastal ranges. Out of a total of 318 sub-blocks, 205 were relinquished in October 2005 following a land use study. These sub-blocks were over areas of sugar cane production, urban dwellings and the Calen Coal Measures, which were interpreted as having low mineral prospectivity. Following further review of historical reports and exploration data and a field visit, Conquest Mining relinquished an additional 28 sub-blocks in February 2007.

Exploration results for the remainder of the sub-blocks are confidential.

Brookville to Landers Creek Area

EPM 3680 was granted to *Mount Isa Mines Ltd* in February 1984, following the conditional surrender of EPMs 1853 and 3439. The target was volcanogenic base metal massive sulphide mineralisation in the Mount Windsor Volcanics. Exploration was carried out by *Chevron Exploration Corporation* as part of a joint venture agreement and consisted of a review of previous exploration results, re-logging of core, geological mapping and stream sediment, pan concentrate and rock chip sampling. Chevron withdrew from the joint venture in February 1985.

Twenty-nine rock chip samples and 17 stream sediment samples were collected from the Landers Creek prospect and the Queen of Sheba and Britannia areas. The highest assay result was 0.09ppm Au. The Permit was relinquished in December 1986.

Bowen to Bloomsbury Area

EPM 637 was granted to *Carpentaria Exploration Company Ltd* in August 1969.

Results of a reconnaissance stream sediment sampling program delineated several anomalous areas where follow-up detailed work was carried out. At Euri Creek, soil geochemistry outlined an anomalous area where two core holes were drilled to 91.44m. In the Andromache River area, a detailed geochemical program outlined an anomalous area that was investigated with soil geochemistry. Stream sediment sampling results were not encouraging in the Bodes Range area. In the Longford Creek area, an anomalous area was sampled in greater detail but results were not encouraging.

Geological mapping and hand auger drilling were carried out in the Andromache River area. Induced polarisation and self potential gradient array surveys were carried out. Soil geochemistry delineated a 900m by 350m Cu-Mo anomaly.

Thirty-three random bulk samples were collected at the Julivon Creek Prospect (in a small tributary/gully in the headwaters of the Andromache River). This was followed up by core drilling. Bulk sampling returned assay results of 500–2500ppm Cu and 10–100ppm Mo.

Some drill core assayed >4000ppm Mo, related to molybdenite in quartz veins. However the two >4000ppm Mo assays were disregarded in ore resource calculations as being unrepresentative. An estimation of mineable ore was given as 35 million tonnes at an average grade of 0.156% Cu and 110ppm Mo.

The Permit was relinquished in March 1973.

EPM 4291 was granted to *George Alexander Donaldson, Charles Reginald Hayward, Raymond George Soutter* and *Robert Clarence Walz* in May 1986. The Permit was amalgamated into an adjacent permit with *Bowen Gold Mines Pty Ltd. Western Mining Corporation Ltd* took over the Permit and carried out exploration in the tenement. The Permit was relinquished in February 1988. Exploration results are confidential.

Cape Upstart

EPM 374 was granted to *Australian Selection Pty Ltd* in January 1967. Detailed geochemical surveys and geological mapping were carried out to locate the source of a molybdenum anomaly recorded by Bureau of Mineral Resources mapping in 1965. The source of the molybdenum anomaly proved to be a narrow contact zone between granite and older basic igneous rocks. Mineralisation was patchy and weak. It was considered improbable that the contact zone contained economic mineralisation or that there was economic mineralisation within the intrusive.

Some evidence of sulphide mineralisation was noted during a geological mapping traverse in the Windy Point – South-East Kingfish Bay area. This zone included the original 200ppm Mo sample collected by the BMR and the site of recorded visible molybdenite. Copper grades ranged from 6–120ppm, the higher grades being in pegmatite veinlets and in pyritic shears. Zinc grades ranged from 3–300ppm, the higher grades also being related to shears and veinlets. Molybdenum grades ranged from 1–200ppm and anomalous grades occurred in acid veinlets, gneissic “schlieren” and gossanous shears.

Rock chip sampling delineated six anomalous zones. Only the Windy Point – Kingfish Bay anomaly was considered to have any economic significance. The Permit was relinquished in February 1967.

Eungella Area

EPM 839 was granted to *Swiss Aluminium Mining Australia Pty Ltd* in October 1970. A literature study was initially carried out. Eight hundred stream sediment samples were collected. One group of 15 samples contained the only anomalous metal concentrations with a persistent dispersion train. This area was resampled and ridge and spur soil samples were also collected.

Exploration then focused on detailed investigation and evaluation of prospects located during the reconnaissance work. This culminated in an orientation percussion drilling program. Ground magnetics were carried out at the same time as geological mapping of the prospects. Magnetic contours did not indicate any extensions to the known lode occurrence at the Coral Tree line of lode. One rotary percussion hole was drilled at the western end of the Highland Mary vein. The presence of water in the hole at 37.03m prevented further penetration.

Molybdenum (up to 55ppm) was the only element that appeared to be associated with limonitic gossans at Water's prospect. Numerous samples contained >100ppm Cu but no pattern could be deduced from the scattered results that were not related to the gossan. Four holes were drilled at Water's prospect. Only one intersected mineralisation from 24.38m to 79.48m, but no economic concentrations of Cu, Mo, Pb or Zn were present.

The Permit was relinquished in July 1972.

Eungella, Nebo and Proserpine Areas

EPM 205 was granted to *Enterprise Exploration Company Pty Ltd* in August 1962. Reconnaissance stream sediment sampling indicated the presence of anomalous copper in drainages in the general vicinity of Eungella township. Soil sampling was not carried out in sufficient detail. The old Buttercup mine workings were inspected.

Seven vertical core holes and one inclined core hole were drilled. Results of this drilling confirmed the presence of narrow quartz-pyrite-chalcopyrite veins and chalcopyrite-pyrite veins along joints and fractures.

The Permit was relinquished in June 1964.

Euri Creek to Mount Mackenzie Area

EPM 1057 was granted to *Otter Exploration NL* in May 1972. The target was bulk tonnage low-grade "porphyry" type ore deposits. Exploration comprised reconnaissance geological mapping and closely spaced stream sediment sampling. Samples collected were analysed for Cu, Mo and Zn; some were also assayed for Pb. Samples collected from basic-ultrabasic areas were also analysed for Ni and Co. Three anomalous areas delineated by this method were investigated in detail with soil sampling and detailed geological mapping. Two of these areas were further investigated with an induced polarisation survey and a percussion/core drilling program. A total of 994 stream sediment samples, 483 soil samples and 110 rock samples were collected. A total of 7.3 line km IP was conducted along five traverses.

The most significant anomalies (Cu-Mo-Zn) delineated by the stream sediment sampling were 2km north and 2km north-east of Mount Mackenzie, respectively, within a 1000m by 3000m discrete granodiorite mass. The highest assay results at Anomaly 1 were 640ppm Cu and 38ppm Mo. Anomalous Ni and Co were recorded from the Knobbies prospect in the north-east corner of the Permit area

and were derived from a small area containing a complex intrusive of slightly weathered, serpentinised peridotite and diorite. The highest assay results for fresh rock samples were 870ppm Ni and 140ppm Co.

Three holes with a total length of 335.49m were drilled at Anomaly 1. No economic mineralisation was intersected in DDH1, but the hole averaged 1–2% pyrite in the form of disseminations and quartz-sulphide veins. In drillhole DDH2, pyrite content ranged from 1–4% but no economic mineralisation was intersected. In DDH3, pyrite content averaged 3%. The granodiorite-microgranodiorite-adamellite intrusive complex at Anomaly 1 was calculated to average 148ppm Cu, 21ppm Mo and 33ppm Zn. The Anomaly 1 area displayed many features associated with “porphyry” type deposits. Soil sampling revealed high molybdenum grades in a core surrounded by high copper grades, which are enveloped by high zinc grades.

Two core drillholes totalling 331.63m were drilled at Anomaly 2. DDH4 averaged 4% pyrite but contained no economic mineralisation. A section between 49.7m and 54.4m intersected quartz-sericite rock with about 10% pyrite. Drillhole DDH5 contained 1–2% pyrite but no economic mineralisation. Using the weighted averages from the two holes, the rocks at Anomaly 2 were calculated to average 259ppm Cu, 5ppm Mo and 30ppm Zn.

The Permit was relinquished in February 1974.

EPM 1451 was granted to *Esso Exploration & Production Incorporated* in November 1974. An induced polarisation survey was carried out over an area previously identified as having a 500m by 60–300m copper anomaly ranging from 200–5900ppm Cu. A review of previous exploration indicated that two core holes had been drilled near an old abandoned copper working at Euri Creek. The best intersection was 10.97m at 0.93% Cu from 69.80m depth. The IP survey did not produce any worthwhile responses indicative of significant sulphide mineralisation. The Permit was relinquished in January 1975.

EPM 1646 was granted to *AOG Minerals Pty Ltd* in July 1976. Exploration comprised geological mapping and magnetometer and scintillometer surveys. It was concluded that earlier assessments by Carpentaria Exploration Company Pty Ltd and Esso Exploration and Production Pty Ltd of the inadequate size and grades of the Euri Creek Cu-Mo deposit were correct. The potential size of the deposit was assessed to be <19 000t per vertical metre at <0.2% Cu, with traces of Mo. The only surface mineralisation was malachite on the dumps surrounding two small pits near the centre of the exploration grid. The mineralisation lies within a soil copper anomaly and a magnetic anomaly. Copper mineralisation over a wider area was confirmed in the drilling by Carpentaria. Mineralisation occurs as sulphide veins and as disseminated chalcopyrite within the host rocks and within older gneissic granite at its contact with the host rocks. The Permit was relinquished in January 1977.

EPM 3289 was granted to *Magnum Exploration Ltd* in May 1982. Exploration focussed on the potential of the Euri Creek Prospect as a small Cu-Au deposit; other occurrences of the same type were also targeted. Stream sediment

geochemistry (131 samples) was carried out over most of the Permit area. The area surrounding the Euri Creek prospect was mapped at air-photo scale (1:25 000). Orientation rock chip geochemistry at the Euri Creek prospect indicated that surface gold grades are associated with copper mineralisation. Five costeans were excavated and one core hole drilled in the mineralised area. The prospect was mapped and a limited soil sampling survey for mercury was carried out.

Thirty-four rock chip samples were collected and limonitic material from old prospecting pits and from moderately sparse outcrops gave moderately to highly anomalous Cu, Zn, Ag and Au assay results of up to 2% Cu, 240ppm Zn, 124g/t Ag and 12.8g/t Au. The highest assay results from outside the main prospect came from "hybrid" rock in Euri Creek (1920ppm Cu, 125ppm Zn and 0.07g/t Au).

Drilling and costeaning indicated that the prospect corresponds to a small, concealed body of hornfels. Five costeans were excavated to bedrock across the mineralised zone. The mineralised hornfels body was shown to have maximum dimensions of about 180m by 120m. The core hole was drilled to 99m. A shear zone was intersected between 79m and 85m. The best intersection was 9.5m at 1.6% Cu, 0.2g/t Au and 15g/t Ag from 27.5m. Neither the higher grade section nor the overall grade was considered to be economic. The Permit was relinquished in January 1983.

EPM 15485 was granted to *Energy Minerals Pty Ltd* in September 2006. A total of 162 sub-blocks was granted. After a review of the available geoscience data sets, 62 sub-blocks were identified as having diminished prospectivity and were relinquished in October 2006. No field work was carried out within the relinquished area. Results for the remaining sub-blocks are confidential.

Kelly's Mountain

EPM 325 was granted to *Australian Selection Pty Ltd* in June 1966. The Permit was acquired to investigate molybdenum mineralisation within a greisen zone around Kelly's Mountain. Exploration comprised rock chip sampling, percussion drilling, geological mapping, geochemical exploration and drill cutting sampling. Nineteen shallow percussion holes were drilled. The best intersection was in drillhole QKP 19, with 5m at 0.42% MoS₂ and 1100ppm Cu. Drillholes around QKP 10 outlined a zone with 0.08% MoS₂. Rock chip samples assayed up to 1180ppm Mo. These results indicated that the molybdenum grade is very low and therefore not economic. The Permit was relinquished in April 1968.

EPM 2248 was granted to *Pennzoil of Australia Ltd* in November 1979. The target was deeply buried Henderson style molybdenum deposits, based on a review of previous exploration results from Kelly's Mountain. Exploration completed comprised geological mapping, rock chip sampling, diamond drilling and core sampling, and geophysical exploration including IP and EM surveys. Pennzoil also held mining leases over the area but did not undertake any mining.

One hundred and thirty rock chip samples were collected. The best assay result was 1600ppm Mo. Thirty-three 33 samples assayed >250ppm Mo. Four core holes

were drilled. Drillhole KMD-3 averaged up to 138ppm Mo; a breccia intersection assayed up to 300ppm Mo. Because no intersections showed economic mineralisation, the Permit was relinquished in November 1981.

EPM 4704 was granted to *G. King* and *P. Crawford* in April 1987 and was transferred to *Spectrum Resources NL* in June 1987. The target was gold and platinum mineralisation. Exploration comprised rock chip sampling, literature reviews, aerial photo interpretation and ground inspection of the area.

In the first six months, twelve rock chip samples were collected around the Kelly's Mountain prospect and 14 were collected from the Inkerman Shear Zone; 30 additional samples were collected later in the year. Assay results from Kelly's Mountain were disappointing, with up to 0.03ppm Au. Results from the Inkerman Shear Zone highlighted the Bronze Queen Copper Prospect; rock chip samples assayed up to 3.46% Cu and 40ppm Ag. No extensions to the surface mineralisation could be found around the copper show. Vermiculite mineralisation was also inspected within the Permit. Outcropping vermiculite lenses were observed in schists but the mineral content was deemed to be too low.

The Permit was relinquished in June 1989 after the company decided to direct exploration funds to more advanced projects.

Kelsey Creek Area

EPM 1022 was granted to *Mines Administration Pty Ltd* in March 1972. The main regional target in the Permit was the contact zone of the Hecate Granite and the Carmila beds. The area was acquired because it was considered to be prospective for base metal porphyry mineralisation.

A literature review was carried out, followed by an orientation geochemical survey in Five Mile Creek and Kelsey Creek. A prospect at Gold Creek was of primary interest but there were several other prospects that warranted further investigation. Areas where more than one stream sediment sample had anomalous grades were Spring Creek, La-di-dah Creek, Upper Three Mile Creek, Dittmer/Lamington area, Gold Creek, Amelia Vale area, Mares Nest Creek and Coppermine Creek area.

The Permit was relinquished in November 1973.

Leichhardt Range, Mount Cavana and Strathbogie Areas

EPM 535 was granted to *Trans-Australian Exploration Pty Ltd* in October 1968. The target was base metal mineralisation. Exploration consisted of soil sampling, stream sediment sampling, magnetic and IP surveys, rock chip sampling, rotary percussion drilling and geological mapping.

Initially, 422 stream sediment samples were collected within the Permit. Results highlighted one Cu, three Zn, eight W and two Mo anomalies in the Leichhardt Range area. Follow-up rock chip and prospecting sampling over these anomalies

downgraded the potential of all but one Zn-W anomaly, located on Eight Mile Creek.

Detailed soil sampling (500 samples) was carried out at Eight Mile Creek. Results delineated broad zones of mineralisation, with samples assaying up to 190ppm Cu, 170ppm Pb, 1400ppm Zn, 240ppm W and 160ppm Mo. The higher grades tended to be associated with areas of sericite alteration. Nine percussion holes were drilled. The better intersections included 6.1m at 0.03% Cu, 0.06% Zn, 0.06% W and 0.002% Mo and 10.7m at 0.02% Cu, 0.04% Zn, 0.006% W and 0.001% Mo. The drilling results did not indicate an orebody with the company's target grade and size.

Although no base metal mineralisation was detected in the area south of Home Hill as a result of the stream sediment survey, four small copper occurrences were located in the course of prospecting and geological mapping. Samples assayed up to 35ppm Au. These prospects were mapped and sampled but investigations indicated that they did not have sufficient size to be of interest to the company.

The Permit was relinquished in February 1971

Marengo Goldfield

EPM 2738 was granted to *Intek Services Pty Ltd* in December 1980. The main target was gold, although there were also strong indications for copper. Exploration included sampling of drainages for heavy mineral concentrates, rock chip sampling, channel sampling of quartz chips and composite sampling. The main area of interest was the triangle between One Mile Mountain, Mount Marengo and the Three Brothers and an area west of that triangle. Assay results were encouraging, with most samples having values between 2ppm and 17.4ppm Au. Three of the auriferous samples contained >5ppm Ag (up to a maximum of 78ppm) and six others assayed >10ppm Ag. Three of the samples also assayed >1% Cu.

After appraisal of the final results it was determined that maximum resources indicated were ~100 000t at 6ppm Au, with significant Ag grades. As these resources were in mineralised quartz reefs over an area of two square kilometres, it was difficult to determine the feasibility for economic mining without further major outlays on exploration. Attempts to find a joint venture partner were unsuccessful and the Permit was relinquished in October 1983.

EPM 8641 was granted to *Anthony John Fawdon* and *David William Skett* in February 1992. Exploration targeted major shear zones and gold mineralisation within the alteration haloes of intrusives, as well as breccia-related gold mineralisation along a fault and subsidiary shear zones. Exploration comprised geological mapping, rock chip, stream sediment and pan concentrate sampling. Several anomalous zones containing Au, Ag and Cu were delineated. The main anomaly was centred on a 2000m long zone traversing the southern slope of the One Mile Mountain porphyry gold deposit.

Rock chip sampling of quartz-filled shears within the potassic alteration zone around the granodiorite intrusive at One Mile Mountain produced numerous good Au, Ag and Cu assay results. The southern contact of the breccia on the southern lower flank of One Mile Mountain is mineralised. The contact rocks are highly micaceous, slickensided schists with quartz stringer zones that assayed up to 4.5g/t Au. Composite rock chip samples returned 10m at up to 3.36g/t Au. Malachite and minor sulphides are also present. Another breccia zone, 200m long by 50m wide, was located at the southern end of the Permit in an area called the Three Hundred Ounce workings. A soil BLEG sample collected from surface debris in an old alluvial working assayed 260g/t Au. However, sampling of the weathered breccia and quartz stringers returned no detectable gold.

It was concluded that further exploration was not warranted due to the apparent lack of any large mineralised zone. The Permit was relinquished in February 1993.

EPM 9664 was granted to *Strike Exploration Pty Ltd* in November 1993. Exploration comprised geological traversing and rock chip sampling, dolly and loam sampling and geochemical analyses of chip samples. Airphoto interpretation at 1:25 000 scale was used for field navigation and interpretation. Sixty-seven rock chip samples were collected. Channel samples were collected where appropriate. Twenty-eight rock and sand samples were collected for dollying on site.

Rock chip samples from One Mile Mountain assayed up to 0.14ppm Au (from a small vein at the summit), 754ppm Cu and >100ppm Mo. Although One Mile Mountain has a concentration of quartz veins greater than elsewhere in the permit, few of these are significantly mineralised. It was concluded that there was no viable bulk target around One Mile Mountain. A limited number of rock chip samples were collected from around the Lone Hand, Homeward Bound, Frankies, and York mines. Panning of sandy dump material from Lone Hand produced pyrite and 15 small colours of gold for an estimated 1.5g/t Au.

Eight rock chip samples were collected from breccia and veins in several locations in the Three Hundred Ounce Patch area. Only two results of 0.07ppm and 0.06ppm Au were anomalous,. Rock chip sampling of dumps and pit and shaft exposures was completed at the Venture, Caledonia and Seymours groups of mines. Reef samples from the Caledonia (also called Hilltop) assayed 25.2ppm Au. Outcropping reef in pits on the Venture line assayed 5.04ppm and 2.89ppm Au. A sample from an underlie shaft at the western end of the Venture line of workings produced magnetite and minor pyrite but no gold.

Rock chip samples from a gossanous quartz reef at Bee Hill assayed up to 4.04ppm Au. Mineralisation in the Bee Creek area comprises several scattered groups of workings, including the Bee Creek mine, Bee Creek Diggings and Chinese Diggings. The Bee Creek mine and Bee Creek Diggings consist of intensely gossanous quartz with copper staining and some fresh sulphides. Eight rock chip samples were collected from the Bee Creek Diggings and nearby veins. One sample from a dump assayed 4.37ppm Au. Other assay results ranged from below the detection limit to 0.69ppm Au. Copper was anomalous (up to 1505ppm)

in some samples. It was concluded that only shoots of a few tens of thousands of tonnes of ore were present.

At the New Reef prospect, a 5m channel sample was collected from the north wall of the central costean that was excavated by Xenolith Gold Ltd in 1987. All intervals were mineralised, returning grades of 0.36–1.06g/t Au for an average grade of 5m at 0.67g/t Au.

Despite the location of the Marengo Goldfield's location within a belt linking centres of known porphyry-style mineralisation, no major large-scale targets were located on the ground. Smaller scale targets, including vein systems that were either poorly known or exhibited some potential for larger volumes, were considered to indicate low economic potential. The Permit was relinquished in March 1995.

Mount Abbot and Bogie River Areas

EPM 1212 was granted to *Otter Exploration NL* in May 1973 and was explored for large tonnage, low-grade Cu-Mo deposits.

Three angled core holes were drilled for a total of 450m. This drilling effectively tested a microbrecciated geological unit. The potential of the unit as a source for economic mineralisation was determined to be very low. One inclusion of gold in chalcopyrite was observed during core logging. Pyrite was the most abundant sulphide throughout the drillholes. Petrographic studies showed the pyrite comprised about 5% of the rock and contained inclusions of chalcopyrite, pyrrhotite and chalcocite. Molybdenite occurred sporadically in all holes, primarily as fracture coatings associated with chlorite and quartz. All core was split, sampled and assayed. The maximum molybdenum assay result was 2m at 115ppm in DDH3; the average assay result was about 25ppm Mo. Gold was below the detection limit (0.05ppm) and silver assay results were <5g/t for all samples. The best weighted copper assay result was 0.093% in DDH1.

Additional geological, petrological-mineralogical and geochemical investigations suggested ore potential in the quartz-sericite zone adjacent to the area tested by the drilling. Studies of gossans developed in the quartz-sericite zone suggested the presence of extensive zones of cupreous pyrite. Geochemical auger sampling was also carried out to test this zone. The results of this work suggested that this zone is the source area for much of the geochemical anomalism in the microbreccia unit. The Permit was relinquished in May 1977.

EPM 1424 was granted to *Otter Exploration NL* in September 1974. The target was large tonnage, low-grade porphyry Cu-Mo deposits. Initial exploration comprised a photogeological study and reconnaissance geological and geochemical investigations. A number of target areas generated by the photogeological study were inspected in the field.

A small, moderately silicified and sericitised stock was located at the intersection of three lineaments near the centre of the Permit. This stock contains minor Cu and Mo mineralisation. Stream sediment, rock chip and soil sampling were

carried out in the area. "B horizon" soil samples averaged 58ppm Cu, <10ppm Mo, 27ppm Pb, and 71ppm Zn. A rock sample from a 0.05m wide gossan vein assayed 2600ppm Cu, 2000ppm Pb, 2400ppm Zn and 140ppm Mo. It was concluded that the economic potential of the stock was very small and Otter Exploration surrendered the Permit in June 1975.

EPM 2877 was granted to *Gold Fields Exploration Pty Ltd* in February 1981. Initial interest in the area was generated by reports of breccias and gold geochemical grades by previous explorers (Otter Exploration NL and Trans Australia Exploration Pty Ltd). Attention was focused on the Stockyard Creek Cu-Mo prospect, where the geochemically anomalous alteration-breccia zone was considered as the basal unit of the Kurungle Volcanics, and thus prospective for volcanogenic or sub-volcanogenic hydrothermal mineralisation. A regional photogeological interpretation, ground reconnaissance mapping and review of previous work were carried out. One hundred and twenty-four rock chip samples were collected from around the Stockyard Creek prospect.

Discouraging results from stream sediment and rock chip sampling at the Stockyard Creek prospect indicated little potential for development of economic gold mineralisation and the lack of development of stockwork fracturing at Hill 271 was considered to preclude development of an economic Mo-W system. The best assay results from rock chip sampling were 0.36% Cu, 0.30% Mo, 0.56% Pb and 45ppb Au, all from separate samples, and 95ppb Au from Hill 271. The best result from stream sediment sampling was 70ppm Au. Most samples assayed <3ppm Au.

No further work was recommended and the Permit was relinquished in January 1982.

EPM 4083 was granted to *Poseidon Minerals Ltd* in September 1985. Poseidon entered into a joint venture with Burmine Pty Ltd, but subsequently decided to withdraw from exploration in Queensland. The Permit was transferred to Burmine. The target was porphyry-type Cu and Mo systems, as well as precious metals. A review of previous exploration results was carried out.

The selection of targets for reconnaissance field assessment was based on identification of subcircular topographic features (both positive and negative) within mapped areas of the pyroclastic sequence of the Kurungle Volcanics, and on known occurrences of high-level Early Cretaceous intrusives. Field assessments comprised geological mapping, with rock chip sampling where required. Thin-section petrographic work was also carried out. One hundred and thirty-two rock chip samples were collected.

Of the 24 target areas recognised, eight contained favourable geology for epithermal gold mineralisation. Four areas contained discrete quartz-veined chalcedonic chert cores enveloped by a sericitic-argillic alteration halo — the Springs, S.C.10, One Mile Hill and Stockyard Gully. Target BG-1 (Hill 272 of Gold Fields Exploration) had many geological and geochemical features indicative of a concealed Mo-Ag-W orebody.

The Permit was not completely evaluated, because of difficulties in obtaining access through Mountain View Station, before it was relinquished in January 1987.

Mount Glenroy and Rangeview Areas

EPM 1381 was granted to *Esso Exploration & Production Australia Incorporated* in June 1974. The targets were copper and molybdenum mineralisation. Exploration consisted of aerial magnetic surveys and ground checking of anomalies. No evidence of alteration or copper or molybdenum mineralisation was found in the area. The Permit was relinquished in October 1974.

EPM 1728 was granted to *Carpentaria Exploration Company Pty Ltd* in December 1976. The target was volcanogenic massive sulphide mineralisation in the Mount Windsor Volcanics. Initial exploration consisted of a literature review, air photo interpretation, geological mapping and stream sediment, rock chip and soil sampling. One thousand and sixteen stream sediment samples were collected during a regional sampling program over the entire tenement. The main focus of this sampling was to fill in gaps from previous sampling. Sampling density was four samples per square kilometre. Samples were assayed for Cu, Pb and Zn. Four main anomalous areas were delineated from the stream sediment results — the Glenroy Creek, Mount Glenroy, Gold Creek and Six Mile Bore areas.

Exploration over these four areas consisted of detailed geological mapping and rock chip, stream sediment and soil sampling. Sampling at Glenroy Creek revealed that the anomalous results were restricted to a few gossanous outcrops, with only rare concentrations of base metal sulphides. Results from follow-up work at Six Mile Bore were also disappointing, with only weak mineralisation and alteration observed.

Detailed exploration at Mount Glenroy consisted of 1:10 000 scale geological mapping, ridge soil sampling, rock chip sampling and the collection of rocks for petrographic analysis. The geological mapping indicated that the area was more favourable for porphyry style mineralisation than volcanogenic massive sulphides. Geochemical sampling did not detect any significant gold or base metal grades.

Anomalous stream sediment assay results from Gold Creek were up to four times the Zn and six times the Pb background levels and warranted follow-up rock chip and stream sediment sampling. Shallow prospecting pits were found to be the source of the anomaly. The best rock chip assay result was 2.6% Cu, 19.6% Pb, 4.04% Zn, 38ppm Ag, 120ppm Ba and 0.13ppm Au. Geological mapping indicated that the mineralisation is structurally controlled and did not warrant any further work.

The Permit was relinquished in February 1984.

EPM 2276 was granted to *Otter Exploration NL* and *Allstate Explorations NL* in February 1980. The target was volcanogenic base metal sulphide and gold mineralisation.

Initial exploration consisted of a literature review, air photo interpretation and rock chip and stream sediment sampling. Four prospective areas were identified based on previous exploration by Carpentaria Exploration Company Pty Ltd. These were Gold Creek, Stones Creek, Glenroy Creek and Mount Glenroy. Minor stream sediment sampling and rock chip sampling was carried out at the Gold and Stones Creek prospects in the first six months. During the next six months, detailed geological mapping and rock chip sampling were completed at these prospects. Twenty rock chip samples were collected from the Stones Creek area and 37 samples from the Gold Creek area. Both areas were gridded with a 300m baseline, with samples collected approximately every 25m at Gold Creek. The best assay result from Stones Creek was 0.12% Cu, 1.4% Pb, 840ppm Zn, 83ppm Ag, 160ppm As, <10ppm W and 2.8ppm Au. Results from Gold Creek were disappointing, with no anomalous gold grades.

Follow-up work consisted of magnetic surveys at Gold Creek and Stones Creek and minor rock chip sampling at Mount Glenroy. No samples indicated any areas with obvious potential at Mount Glenroy. Results from the magnetic survey at Stones Creek indicated an east-west trend, coinciding with an area of known mineralisation and may represent an inferred east-west fault parallel to the creek.

Mining Lease 230119 was taken out over the Stones Creek prospect. EPM 2276 was relinquished in May 1981.

EPM 3349 was granted to *Utah Development Company Ltd* in December 1982. The target was volcanogenic base metal and gold mineralisation. Exploration consisted of a literature review, air photo interpretation, stream sediment sampling, rock chip sampling, diamond drilling, soil sampling, geological mapping, and IP and magnetic surveys.

Five hundred and seven stream sediment samples and 76 rock chip samples were collected. Results from the initial stream sediment sampling program delineated a number of copper anomalies near Brown Creek; Pb, Zn, Ag, Au, Ba, Sn, W and As returned average grades only. The highest copper assay result was 120ppm, with nearby samples around Brown Creek assaying 85ppm Cu and 105ppm Cu. Follow-up stream sediment sampling supported these results and the area was gridded for detailed sampling.

Four anomalous areas were delineated from the rock chip sampling. Samples from the same area as the stream sediment anomaly near Brown Creek assayed up to 940ppm Cu. The other three areas delineated were 200m west of the south-western part of the Permit, an area near the centre of the Permit, and an area east of Stones Creek. Follow-up rock chip samples were collected over the centre of the Permit, with best assay results of up to 300ppm Cu, 0.13% Pb, 320ppm Zn, 104ppm Ag and 65ppb Au. No other work was done in the other areas.

The anomalous area to the east of Brown Creek was gridded for detailed soil sampling and named Brown's Grid. Two hundred and ten soil samples were collected at 50m intervals. Only Cu and Ba indicated zoned areas of mineralisation. Copper assay results of 2–340ppm highlighted a large anomalous area in the centre of the grid, coinciding with two gossanous alteration zones.

Rock chip sampling and magnetic and IP surveys were carried out over the area, with positive results.

Detailed geological mapping, a magnetic survey and four diamond drillholes were then completed. Drilling results were disappointing, failing to intersect any mineralisation at depth. It was concluded that the mineralisation is disseminated throughout the metasediments. The Permit was relinquished in June 1983.

EPM 3496 was granted to *Utah Development Company Ltd* in 1983. The target was volcanogenic base and precious metal mineralisation in the Mount Windsor Volcanics. Exploration consisted of geological mapping, air photo interpretation, stream sediment sampling, minor petrology and rock chip sampling.

One hundred and sixty stream sediment samples were collected within the tenement. All returned around background grades for all elements. The highest assay results were 2ppm Ag, 20ppm As, 5ppb Au, 35ppm Cu, 80ppm Pb, 100ppm Zn and 760ppm Ba. Ten rock chip and two rock grab samples were collected also. One sample of brecciated granite assayed 105ppb Au; no other samples contained anomalous grades. The Permit was relinquished in September 1983.

Mount Gotthardt Area

EPM 438 was granted to Morgan Mining & Industrial Company Pty Ltd in October 1967. The target was bulk low-grade copper ores in the Mount Gotthardt area. Exploration comprised geological mapping at air photo scale of 1 inch to 2000 feet and stream sediment sampling and assaying. Two samples collected from shallow pits on mineralised weathered and kaolinitic granite rock assayed 1.23ppm and 4.36ppm Cu, 0.02% and 0.02% Zn, 0.31g/t and 0.15g/t Au and 10.87g/t and 4.59g/t Ag. Results from close interval drainage sampling for copper and zinc gave assay results ranging from 9ppm to 2180ppm Cu and 3ppm to 135ppm Zn.

The Permit was relinquished in December 1968.

Mount Leslie Area

EPM 9349 was granted to *Hugh Keith Herbert* and *Robert Peter John Lewis* in May 1993. The majority of the Permit was located in the Collinsville 1:100 000 Sheet area. The Mount Leslie prospect consists of a series of stockwork zones over a 200m by 300m area on the western flank of Mount Leslie.

An option agreement was entered into with Intercontinental Gold and Minerals NL. Exploration focussed on a drilling evaluation of fracture-controlled, sandstone-hosted copper-gold mineralisation in the area of the "Old Copper Workings" on Mount Leslie. The objective was to test for the possible existence of a bulk mineable copper-gold resource which could have led to an early cash flow to facilitate further exploration of the property.

Nine reverse circulation percussion holes totalling 476m were drilled. Assay results were generally disappointing. The highest gold assay result was 0.08ppm

(0.12ppm for a repeat assay). A few samples averaged ~0.03ppm Au. Zinc averaged 150ppm, with occasional highs of 1000ppm. Copper averaged 50ppm, with occasional highs of several hundred ppm. All silver assay results were <2ppm and lead assay results very low.

The drilling results eliminated the potential for a significant near-surface gold-copper resource. The Permit was relinquished in May 1995.

EPM 10765 was granted to *Carpentaria Gold Pty Ltd* in October 1995. The area was selected on the basis of its potential for porphyry copper and copper-gold styles of mineralisation. Detailed reconnaissance was carried out over the porphyry system and areas primarily to the east of the main porphyry in a search for blind or subtle peripheral copper ± gold targets. Work included rock chip sampling and investigative follow-up of stream geochemistry from previous exploration.

No significant mineralisation was observed or anomalous rock chip geochemistry returned. The Permit was relinquished in July 1996.

Pretty Bend Area

EPM 931 was granted to *Carpentaria Exploration Company Ltd* in May 1971.

Only one area of significant mineralisation was identified from preliminary investigations. This was at Wild Creek, where some copper mineralisation in quartz veins occurs in basic dykes over some metres. Follow-up work included auger sampling of several soil lines, but results were disappointing.

An inspection of a small microgranodiorite outcrop at the top of Emu Creek revealed some molybdenum and minor copper mineralisation. This was applied for as ML 312BOWE "Emu Creek". The occurrence comprised two small mineralised intrusives. The best assay result from six bulk samples was <0.1% Cu. The Permit was relinquished in May 1972.

EPM 5177 was granted to *CRA Exploration Pty Ltd* in January 1988. The tenement was considered to be prospective for porphyry gold, copper and molybdenum mineralisation. Initial exploration comprised a regional, reconnaissance -6mm bulk cyanide leach and -80# stream sediment sampling program (38 samples) with associated rock chip sampling (five samples). The BCL sampling was carried out at a sample density of one sample per square kilometre and delineated five discrete catchments with anomalous Au (>1ppb Au). The -80# samples yielded no base metal or indicator (As) anomalies.

All stream sediment geochemical anomalies were followed-up with check/infill stream sediment sampling and detailed ground inspection and rock chip sampling. This work identified several plutonic quartz vein systems south of Roma Peak that contain weak Ag-Au (As) mineralisation. It was concluded that the potential for economic precious and base metal mineralisation within the area was low, and the ground was relinquished in October 1989.

Rangeview Area

EPM 693 was granted to *Planet Minerals Ltd* in November 1969. The target was copper mineralisation within the Ravenswood Granodiorite Complex. The tenement was divided into three main areas.

Area 1 (549km²) was ~19.2km south of Ravenswood. Exploration focused on three areas within this block. Stream sediment sampling did not delineate any large areas of copper mineralisation. Only an altered cylindrical breccia pipe in the Three Peaks area was considered worthy of follow-up work.

Area 2 (728km²) was ~6.4km north-east of Charters Towers. Geological traversing was restricted to main roads, tracks, ridges and spurs due to the topography of the area. Five areas were identified for follow-up work, but soil sampling did not detect any significant copper grades

Area 3 was 57.6km south-east of Charters Towers. No mineralisation other than pyrite was observed in this area and no geochemical sampling was carried out.

The Permit was relinquished in October 1970. Mining Lease 1331 was granted over the Three Peaks prospect in 1973.

Strathbogie Area

EPM 1319 was granted to *Commonwealth Aluminium Corporation Pty Ltd* in November 1973. The target was porphyry Cu mineralisation. A stream sediment sampling survey returned assay results of 2–50ppm Cu, 12–34ppm Pb, 1–2ppm Ag and 14–100ppm Zn with a few scattered results of up to 385ppm Zn. The low copper assay results, combined with the rather dense sampling pattern, indicated that the area is of little interest for porphyry copper mineralisation. The reason for the few scattered high Zn grades was not known and was not considered worthy of follow up exploration. The sample with 50ppm Cu came from a stream draining an area of known mineralisation that was held under lease and option to another company. The Permit was relinquished in October 1974.

EPM 1371 was granted to *AO (Australia) Pty Ltd* in June 1974. The selection of the Permit area was based on the results of a regional helicopter survey to evaluate airphoto anomalies in the Mount Wickham Rhyolite and its equivalents. Two main targets were outlined — a Cu-Mo prospect and a Cu-Pb-Zn prospect. These were subjected to intensive geological, geochemical and petrographic examination by the end of 1974.

Rock chip samples were collected from most of the anomalies visited and several samples were collected from the more promising anomalies. A drilling program was proposed for the Cu-Mo prospect. A joint venture arrangement, including this drilling, was negotiated with *Aquitaine Minerals Pty Ltd* but was cancelled following a last minute withdrawal by *Aquitaine*. *AO (Australia) Pty Ltd* continued in its efforts to attract a Joint Venture partner. No further field investigations were undertaken from the end of 1974 until the Permit was relinquished in June 1977.

EPM 2418 was granted to *Getty Oil Development Company Ltd* in May 1980. A review of previous exploration carried out by AO (Australia) Pty Ltd indicated that two prospects, the Carlton and Strathmore areas, could be prospective for epithermal precious metal or stockwork Mo deposits. Following an initial reconnaissance, stream sediment sampling and grid evaluation, it was concluded that the Ag and Au mineralisation was localised only within the mining leases at the Carlton Grid. This mineralisation appeared to be controlled by north-east-trending structures. The host rocks have alteration zoning characteristic of epithermal deposits. Six hundred and fifty-six -80 mesh stream sediment, 234 soil and 177 rock chip samples were collected throughout the Permit area. These geochemical surveys delineated two other areas of anomalous Mo and/or base metals but both areas returned very low precious metal grades.

Known mineralisation within the Carlton area consists of a high-grade, 5m by 0.5m core of secondary copper carbonates in a quartz-kaolinite matrix, surrounded by a zone of fractured and silicified breccia. Mineralisation occurs along 25m long by 4–7m wide north- to north-east-trending structural zones. Representative samples returned grades of several percent Cu and several hundred ppm Ag for high-grade ore, and 10–20ppm Ag in the surrounding breccia. The known mineralisation also includes low-grade, disseminated Ag-Pb mineralisation associated with strongly pyritised and silicified intrusive breccias. Representative samples returned grades of 3–22ppm Ag and 400–1600ppm Pb. Both high-grade and low-grade mineralisation occurs in the area of the small workings and pits on ML 231.

Two hundred and five stream sediment, 39 rock chip and >200 soil samples were collected in the Carlton Grid area. Stream sediment assay results delineated a broad anomalous area 3km long by 1.5km wide. Molybdenum results formed a halo to a broad area of anomalous Zn and As. Anomalous Cu and Pb grades were confined to the zone of old workings and reduced to background levels 500m from the pits. The Ag and Au assay results were very low.

In the Strathmore area, altered rhyolitic tuffs have been intruded by several generations of rhyolite plugs and dykes. The rocks are extensively silicified and quartz-sericitic alteration was recognised in the fresher rhyolite. Pyrite was the only sulphide identified. Sixty-nine stream sediment, 28 rock chip and some soil samples were collected. Stream sediment sampling delineated an area of anomalous Cu and Zn concentrations, with a halo of slightly anomalous Mo. Maximum assay results from grid-based soil sampling by AO (Australia) Pty Ltd were 2850ppm Cu, 780ppm Zn and 80ppm Mo. Rock chip sampling returned up to 2ppm Ag, 0.3ppm Au, <300ppm Cu and <60ppm Mo.

A large (6km by 1km) stock of quartz-feldspar porphyry was located in the McGregor area. Thirty-five stream sediment and 11 rock chip samples were collected. Stream sediment sampling delineated a broad area (6km by 2km) of anomalous Zn and Mo concentrations in the south-west corner of the Permit. Maximum assay results included 195ppm Zn and 20ppm Mo. Precious metal, Cu, Pb and As results were low.

The Permit was relinquished in May 1981.

Urannah Area

EPM 920 was granted to *Carpentaria Exploration Company Ltd* in March 1971.

Results from stream sediment sampling delineated three weakly anomalous copper zones. These coincided with sections where rare chalcopyrite specks had been observed in basic dykes. The Permit was relinquished in January 1972.

Woodhouse Area

EPM 4830 was granted to *Markwood Pty Ltd* in July 1987. The target was extensions to Cu-Au mineralisation around the Triple Chance mine. During the first year of tenure, stream sediment and pan concentrate sampling were carried out for a total of 132 samples. Stream sediment samples assayed up to 0.14ppm Au and 20ppm Cu and pan concentrate samples assayed up to 7ppm Au (the next highest 0.08ppm) and 14ppm Cu. The extension of the Triple Chance mineralisation could not be traced due to alluvial cover and sub-blocks that were located over poor sampling results were relinquished after the first year. The Permit was relinquished in July 1989.

EPM 10052 was granted to *Sons of Gwalia Ltd* in June 1994. The target was intrusive-related stockwork and/or breccia systems, veins and skarn mineralisation. Sons of Gwalia Ltd had a working relationship with the holders of ML 10119, with the intention of a future buy-out or joint venture over the area. Exploration comprised soil and rock chip sampling and limited prospecting traverses. Sixteen rock chip samples were collected; sample T10448 assayed 11.70ppm Au, 1ppm Ag, 1150ppm Cu, 53ppm Pb, 2590ppm Zn, 291ppm As and 28ppm Mo. However, the overall results were disappointing. Soil sampling assay results were also disappointing, with little evidence to indicate hidden mineralisation in the area. The Permit was relinquished in January 1995 after Sons of Gwalia closed their Queensland office to focus exploration on tenements in Western Australia.

NICKEL, MAGNESITE, CHROMITE, PLATINUM GROUP ELEMENTS

Mount Pring Area

EPM 481 was granted to *St Joseph Phelps Dodge Exploration Pty Ltd* in February 1968.

Geological mapping and geochemical sampling were carried out throughout the area. A total of 1019 stream sediment, residual soil and rock chip samples were collected and analysed. Plotting of the results delineated weakly anomalous nickel grades in the vicinity of an old magnesite quarry near Mount Pring; auger drilling returned no substantial results. Eight rotary holes (322.17m) were drilled. The anomalous nickel grades were associated with a body of serpentinite. Lateritisation of the serpentinite caused some minor enrichment of nickel grades at the surface. Minor magnesite was intersected in all holes but none was of economic significance.

The Permit was relinquished in October 1968.

EPM 4254 was granted to *Christopher James Bull, John Holderness Bull* and *Siegfried E. Tischer* in April 1986. Exploration included a detailed magnetometer survey, soil geochemistry (463 samples) for Cu and Ni over ultramafics, stream sediment geochemistry for Pt and Pd (96 samples) and reconnaissance geological mapping. Geological mapping outlined an area 850m along strike by 500m wide of serpentinised ultramafics with magnesite veining and associated with iron oxide-rich rock. A band of leucogabbros and anorthosites was distinguished to the east of the ultramafics and the contact zone coincided with an area in which chromite float was found.

Magnetometer and geochemistry surveys delineated a series of anomalies coincident with the serpentinised ultramafics. A large magnetic anomaly with a 5500nT amplitude was centred over the ultramafics and a Ni soil anomaly coincided very closely with the boundary between ultramafic and mafic rock. Stream sediment samples with anomalous grades of 0.01–0.05ppm Pt and Pd were collected from a small area with streams draining the area of chromite float. Soil samples from the serpentinised ultramafics showed only patchy anomalous results of up to 23ppb Pt and 18ppb Pd along the margins of the ultramafic rock. Ni assay results delineated a single large anomaly with grades of up to 2720ppm Ni. Results suggested that there was potential for a modest sized deposit only. The results of rock chip sampling are still confidential.

The Permit was relinquished in April 1988.

EPM 5604 was granted to *Ravenswood Resources Ltd* in November 1988. The tenement was considered to have potential for Platinum Group Element sulphides, chromite, and PGE-bearing dunite pipes. Previous exploration had returned assay results of 0.36–0.72g/t Pt and 0.2–0.45g/t Pd for the area. Reconnaissance mapping and sampling failed to repeat the previous assay results and did not indicate any potential for economic mineralisation. A magnesite deposit within the tenement was not of economic size. The Permit was relinquished in July 1989.

TUNGSTEN

Home Hill to Plum Tree Area

EPM 1546 was granted to *AOG Minerals Pty Ltd* in August 1971. The target was skarn-related scheelite mineralisation around the Inkerman Shear Zone. Exploration included a literature review, rock chip sampling, ultraviolet light prospecting, soil sampling, stream sediment sampling, magnetic surveys and geological mapping.

Geological mapping initially identified skarn zones and possible areas of scheelite mineralisation. UV fluorescence testing of rock chip samples indicated only minor scheelite; samples assayed up to 700ppm WO₃. Twenty-eight stream sediment samples and two soil samples were collected to test for eluvial and alluvial accumulations of scheelite in creeks. Twelve samples exhibited minor

yellow UV fluorescence but this was attributed to the occurrence of calcite. It was concluded that the skarns within the Inkerman Shear Zone contained minor scheelite mineralisation only. The Permit was relinquished in February 1976.

EPM 15304 was granted to *Ralph De Lacey* (Australian Industrial Minerals Pty Ltd) in January 2006. The target was potential scheelite deposits in the east-trending Inkerman Shear Zone, where scheelite had been identified along its 12km length. Exploration was confined to the eastern end of the skarn outcrop and consisted of prospecting the area, scanning for scheelite with shortwave UV light and drilling four core holes for 250m.

Nine sub-blocks were relinquished in January 2007. Exploration results for the remaining sub-blocks are confidential.

URANIUM

Mount Abbot to Armuna Area

EPM 2178 was granted to *AGIP Australia Pty Ltd* in September 1979. AGIP had carried out a preliminary literature review of the uranium potential of the Tasman Geosynclinal zone in early 1979. This study suggested potential for locating epigenetic sandstone type, hydrothermal vein type and “porphyry” type uranium mineralisation. Initial exploration comprised reconnaissance geological mapping and a ground radiometric survey. This was followed by a 377 line kilometre heliborne spectrometer survey and ground examination of anomalous radioactive areas. Several rock types were examined petrographically.

The survey failed to locate any significant uranium mineralisation. However, minor thorium-uranium mineralisation was located in pegmatite. The Armistice Gold Prospect was examined and several samples were collected from the old mine dumps for assay. Very fine grains of free gold were observed in several samples. Samples assayed up to 17.3g/t Au and 305ppm Cu. The Permit was relinquished in February 1980.

ANDALUSITE

Mount Cavana Area

A significant occurrence of andalusite was discovered during prospecting by HC Ramsden and SV Foster in the Bowen area. *EPM 4857* was granted to *Henry Clive Ramsden* in August 1987. Otter Exploration NL entered into an option agreement with Ramsden in January 1988 to undertake a project evaluation of the Mount Cavana andalusite deposit. Detailed geological mapping and sampling were carried out over a grid over the prospect area. Outcrop sample assay results indicated that the grade of the main deposit is relatively uniform, averaging 13.2% Al₂O₃ (generally 12 to 15% Al₂O₃). Based on the geological and survey data, it was estimated that the main Mount Cavana deposit had potential to contain some 9.7Mt of andalusite-bearing quartzite.

Initial beneficiation test work on bulk samples was protracted and ultimately proved unsatisfactory. By the end of 1988, more economically oriented beneficiation studies were underway. Two large samples (total 108kg) were shipped overseas for laboratory testing. Test results indicated that the ore did not lend itself to production of andalusite concentrates with the required quality characteristics. Otter Exploration withdrew from its option agreement in June 1989. The Permit was relinquished in July 1989.

EARTHY LIME

Plumtree Creek Area

EPM 10793 was granted to *T.J. Morato* in July 1996 to explore the area around ML 1087 (also owned by Morato) for other occurrences of earthy lime. Exploration was carried out within the Permit and lease by the *Burdekin Lime Company* under a joint venture agreement.

Exploration consisted of rock chip sampling, literature reviews, data acquisition, aerial photo interpretation, assaying, geological mapping and prospecting sampling. Eight rock chip samples were collected from basement rocks around the Plumtree Creek area and assayed for Au, with very poor results. Prospecting and geological investigations discovered outcropping earthy lime mineralisation, similar to that in ML 1087, around densely vegetated swamp 'ponds' around Stockyard Creek.

The Permit was relinquished in July 1998 after MDL 266 was taken up over the Stockyard Creek prospect.

EPM 14074 was granted to *Martin Gerald Mitchell* in January 2004. The tenement was taken out to explore for earthy lime deposits in commercial quantities with grades suitable for agricultural use.

Exploration consisted of geological investigations by the tenement owner to acquaint himself with the area and check for extensions to earthy lime deposits outside a granted Mineral Development Licence. Two sub-blocks were relinquished in October 2006. The Permit was transferred to *M.J., R.J. and R.R. Wilkins* in March 2007. Exploration results for the remaining sub-blocks are confidential.

HEAVY MINERAL SANDS

Bowen Area

EPM 536 was granted to *Murphyores Incorporated Pty Ltd* in October 1968. Scout drilling was carried out at Mount Lance, Abbot Point and Euri Creek. Samples of beach concentrates were collected and tested for percentage of magnetic minerals for coal washing and for zircon. Three scout drilling lines were

drilled at Dingo Beach, 20km north of Bowen. A total of 33.68m was drilled and eight bulk samples collected.

The Permit was relinquished in August 1970.

EPM 981 was granted to *Dillingham Constructions Pty Ltd* in September 1971. The only exploration carried out comprised six scout drilling lines, two of which were in the vicinity of Saltwater Creek and four in the vicinity of the Don River and Euri Creek. Ninety-seven holes were drilled for a total of 239.27m.

Although the drilling returned good heavy mineral contents, the mineralogy of the concentrates did not signify any potential economic deposits of rutile or zircon. Magnetite in the concentrates might be suitable for coal washing. The company decided to surrender the Permit in November 1972.

EPM 1827 was granted to *Murphyores Incorporated Pty Ltd* in September 1977. Exploration indicated substantial quantities of heavy minerals. Rutile, zircon and ilmenite occur in beach sands but grades were not considered sufficient to justify development.

Investigations then commenced to determine the suitability of Bowen magnetite for use as a heavy media. The magnetic and physical properties of the magnetite compared favourably with magnetites in commercial use in Australian coal washeries. Duration and other tests carried out on the magnetite indicated that it was suitable for preparing a coal washing heavy media.

A heavy mineral concentrate grading ~98% heavy minerals was prepared from bulk samples from a site about midway on Dingo Beach, 20km north of Bowen. Approximately 50t of high-grade concentrates were produced and 10t was railed to the Australia Coal Industries Research Laboratory in Rockhampton for evaluation.

Heavy mineral sand deposits were targeted long the coast from Bowen to the Elliot River. An auger drilling program comprising 1072 holes (3739m) was carried out in six areas — the Don River, Euri Creek, Saltwater Creek, Abbott Point, Dingo Beach/Shark Beach and Branch Creek. Three thousand samples were collected and assayed. The proportions of magnetite in the concentrates were assessed and it was clear that other valuable accessory minerals were also present, notably ilmenite in greater and both zircon and monazite in lesser abundance than magnetite. The resources were not quantified.

Further exploration was halted due to an unresolved land use conflict covering a significant portion of the resource. The Permit was relinquished in September 1981.

Burdekin River Delta

EPM 576 was granted to *Hydro Mineral Development Ltd* in March 1969. A scout drilling program to investigate and assess the gold-bearing potential of mineral sands within the Permit was undertaken jointly by Hydro Mineral Development

Ltd and Amad NL. A comprehensive literature review and an air photo interpretation were carried out. Results indicated that free gold was present throughout the 48km of coastline drilled. The average free gold content in sands was ~0.014g/t Au. The assay results indicated that the higher gold grades tended to occur in the more recently deposited material. Rutile did not occur in grades high enough for economic recovery. Although the zircon content averaged only 2%, it was thought that considerable quantities could be recovered from a large capacity plant. Amphiboles constituted the bulk of the heavy minerals (~76%). Hand auger drilling was carried out at two dunes.

No economically extractable gold was found within the Permit area. Drilling and the operation of a dredge and pilot concentrating plant subsequent to a report by Kenneth McMahon & Partners dated 2 July 1969 could not substantiate the figures quoted in that report. It was decided to abandon the project and the Permit was relinquished in June 1970.

EPM 4108 was granted to *Union Oil Development Corporation* in September 1985. The Permit covered a broad coastal strip of the Burdekin River delta from Alva Beach in the north to Beachmount in the south. Earlier exploration was directed towards locating low-grade alluvial gold deposits or evaluating high-grade mineral sands deposits and met with little success. Initial exploration by Union Oil was directed towards the evaluation of high-grade placer deposits. Commodities sought included xenotime, monazite and zircon.

Due to a change in exploration policy, seven coastal and inland dune systems were drilled in an attempt to assess their potential as hosts for large tonnage, low-grade rutile and zircon deposits. Although these systems were anomalous in zircon, grades appeared to be uneconomic. Grades in the underlying fluvial sands were slightly higher than those in the dunes. Fifty-four reverse circulation holes totalling 980m were drilled. The best results for zircon were 0.050% in dune sands and 0.051% in grey sands. The highest zircon contents were at the top of the grey sands.

Prior to relinquishment of the Permit it was decided to examine the heavy mineral suite in more detail. Modal analyses and mineralogical work were completed on samples from the dunes and from several high-grade placer deposits near the coast. Results showed the heavy mineral suite to have abundant amphibole and epidote, with lesser magnetite and ilmenite, but no significant quantities of zircon, rutile or monazite. The Permit was relinquished in November 1986.

Cape Bowling Green and Bowling Green Bay

EPM 961 was granted to *Dillingham Constructions Pty Ltd* in August 1971. The only exploratory work carried out consisted of the auger drilling of three scout lines (20 holes totalling 48.77m) in the vicinity of Alva Beach. Although the holes drilled showed good percentages of heavy minerals, the mineralogy of the heavy mineral suite did not signify any potential economic deposits of rutile or zircon in the area. However, magnetite present in the sands might be suitable for coal washing.

The Permit was relinquished in April 1972.

EPM 1548 was granted to *Union Corporation (Australia) Pty Ltd* and *Minsands Exploration Pty Ltd* in August 1975. Exploration for gold and heavy minerals was carried out in the later half of 1975 and early 1976. The area was selected on the basis of the following observations — the large and favourable catchment of the Burdekin River; favourable ocean currents deduced from the size and configuration of Cape Bowling Green; geomorphological studies suggesting buried channels north of the present Burdekin River delta; previous exploration which indicated the possible occurrence of gold in sand deposits near Ayr; and the comparatively lower mining costs of dredging compared to conventional methods.

A scout auger drilling program comprising 94 holes for a total of 824.8m was completed. The average hole depth was 8.8m. The best results came from Bowling Green Bay, with 2.7ppm Au in a 0.36% heavy mineral fraction and 15.5ppm Au in a 0.47% heavy mineral fraction. The best overall assay result from a recovered sample was 0.84ppm Au. Approximately 6% of the heavy mineral residues were found to contain traces of gold. The best bulk sampling result was 3.02% heavy minerals containing 0.64 non-magnetic minerals, 0.27% rutile and 2.21% zircon,

A mineralogical study of the heavy mineral fraction was disappointing. Bulk samples contained 77% to 82% magnetic minerals. The non-magnetic fraction contained only a trace of rutile; <4% of the heavy mineral fraction was zircon.

The Permit was relinquished in May 1976.

EPM 1549 was granted to *Union Corporation (Australia) Pty Ltd* and *Minsands Exploration Pty Ltd* in August 1975. The area was selected for its gold and heavy mineral potential on the basis of the following observations — the large and favourable catchment of the Burdekin River; favourable ocean currents deduced from the size and configuration of Cape Bowling Green; geomorphological studies suggesting buried channels north of the present Burdekin River delta; previous exploration which indicated the possible occurrence of gold in sand deposits near Ayr; and the comparatively lower mining costs of dredging compared to conventional methods.

A scout auger drilling program comprising 36 holes for a total of 162.5m was carried out. The average hole depth was 4.6m. The best result was 5.36% heavy minerals, with 33.6ppm Au in heavy mineral concentrates. The best result from a recovered sample was 1.80ppm Au. The best bulk sampling result was 7.21% heavy minerals comprising 4.27% non-magnetic minerals, 0.18 % rutile and 0.41% zircon. Gold was only detected in three samples from this Permit area. The only significant result (1.8g/t Au in sand) came from a frontal dune. The results from the bulk samples were discouraging. The rutile content of the heavy mineral fraction (average 0.42%) indicates that it is unlikely that an economic deposit exists on Cape Bowling Green.

The Permit was relinquished in May 1976.

Cape Upstart and Upstart Bay

EPM 962 was granted to *Dillingham Constructions Pty Ltd* in August 1971. Exploratory work consisted of four scout drilling lines, one on the beach west of Molongle Creek and three in the vicinity of Rocky Ponds Creek. Although samples from the holes returned good percentages of heavy minerals, the mineralogy of the concentrates did not signify any potential economic deposits of rutile or zircon in the area. However, they did indicate that the magnetite content could be useful for coal washing.

On line G1, west of Molongle Creek, six holes totalling 9.75m were drilled to an average depth of 1.6m. The average grade of heavy minerals was 8.69%. On line UB1, 3.2km north-west of Rocky Ponds Creek, 19 holes averaging 3.23m were auger drilled. The average heavy mineral grade was 4.30%. On line UB2, about 3.2km west of line UB1, ten holes were drilled to an average depth of 4.42m. The average grade was 3.66% heavy minerals. On line UB3, 3.2km west of line UB2, 14 holes were drilled averaging 3.41m. The average grade of heavy minerals was 3.59%.

A sample of magnetite concentrates was tested to determine its suitability for coal washing. The concentrate contained too much ilmenite and hematite but its other properties (specific gravity, susceptibility, coercive force, etc.) indicated that it would be suitable. After further testing, the company relinquished the Permit in April 1972.

EPM 5140 was granted to *Buffalo Resources Pty Ltd* in January 1988. The area was applied for to assess its potential for magnetite suitable for coal washing, together with ancillary gold, tin and zircon. Eight lines comprising 17 hand auger holes were drilled for a total of 1520m. The average grade was 4.57% heavy minerals and the total ore resource was estimated to be 696 000t. No mineralogical studies of the heavy mineral assemblage were undertaken. The best line drilled was ER1, with a resource of 238 000t averaging 6.64% heavy minerals content.

The Permit was relinquished in January 1990.

Offshore Mackay to Townsville

EPM 345 was granted to *Planet Mining Company Pty Ltd* in August 1966. The heavy mineral potential of a coastal area in central Queensland was investigated. The area under application was located on the continental shelf between Magnetic Island and Hay Point. The major influence on mineral deposition both offshore and on the immediate shoreline is the Barrier Reef. There is evidence that this feature was forming during Miocene times and is considerably older than the probable mineral-bearing structures known to exist offshore in the more southerly sections of the coastline. It seemed clear that the Barrier Reef has protected the present shoreline from the agencies that caused the massive build-up of mineral-bearing sands in the south.

The Permit was relinquished in June 1968.

LIMESTONE

Ben Lomond Hill

EPM 11055 was granted to *Proserpine Lime Pty Ltd* in April 1996. The target was limestone for use as agricultural lime. Fieldwork included borehole sampling and collection of rock samples for quality testing from Ben Lomond Hill. Survey data and other associated information were compiled to estimate limestone resources.

Six boreholes were planned to a maximum depth of 18m, but only five were drilled because reasonable limestone grades were intersected in two holes only. The top of the limestone deposit ranged from just below the topsoil (Borehole No. 6) to 11m below the surface (Borehole No. 5). Drilling results indicated that limestone occurs to at least 18m in depth. Resources were estimated to be in the vicinity of 85 000t. An additional 200 000t was inferred.

Feasibility studies were carried out on the mining and crushing costs of a potential mining operation. The limestone lenses are intruded by granite in places and selective mining would be required. It was recommended that a Mineral Development Licence be applied for and a bulk sample of 200t be trucked to Whitsunday Crushers for trials. The Permit was relinquished in April 2000.

OIL SHALE

Debella Area

EPM 2245 was granted to *Central Pacific Minerals NL* and *Southern Pacific Petroleum NL* in June 1980. Gravity stations were established within the tenement. Two core holes were drilled. PDD 1 reached 509.35m and PDD 2 was drilled to a total depth of 151.05m. Both holes intersected silty oil shale below a surface cover of unconsolidated sands. The sequence has similarities to the nearby Condor deposit. However, the oil shale unit at Pluto is coarser grained than Condor and the grades are correspondingly lower. The oil shale sequence in PDD 1 between 21m and 437m contained a net 26m of oil shale that yielded >40L/t on a moisture free basis. A weak gas show was noticed in the drilling mud when 509.35m was reached. This gas was believed to originate from coal in the basal unit and analysis of the gas showed it to be essentially methane.

The Permit was relinquished in December 1981.

EPM 2444 was granted to *Central Pacific Minerals NL* and *Southern Pacific Petroleum NL* in June 1980. The target was the Pluto oil shale deposit. A gravity survey defined a negative Bouguer anomaly centred on the southern edge of the tenement. Three core holes, totalling 781.80m were drilled. Only PDD 3 was drilled within EPM 2444; holes PDD 1 and PPD 2 were drilled in EPM 2445. The oil shale core was split in 2m intervals and assayed for oil content. The maximum result was 64L/t oil at zero percent moisture.

The low shale oil yields, coupled with generally unprospective stratigraphy within the Pluto Prospect, did not justify further exploration and the Permit was relinquished in December 1981.

Lethebrook Area

EPM 1900 was granted to *Central Pacific Minerals NL* and *Southern Pacific Petroleum NL* in March 1978. The target was the Condor oil shale deposit in the Hillsborough Basin. Initial exploration comprised a literature review. The Hillsborough Basin had been the subject of petroleum exploration and open file reports on geological surveys and stratigraphic drilling were investigated. Following a geological reconnaissance, 49 sub-blocks out of the original 98 were selected for relinquishment at the end of the first year.

Core from GSQ stratigraphic drillhole Proserpine 1 was sampled and studied petrographically for organic matter. CSR Ltd carried out a comparative feasibility study of the Condor, Julia Creek and Rundle oil shales in Queensland and the Colony oil shale in Colorado, USA. CSR also carried out a comparison of the major environmental issues at Condor, Rundle and Julia Creek.

The Permit was conditionally surrendered in June 1983 in favour of EPM 3520. Exploration results are confidential.

EPM 2246 was granted to *Central Pacific Minerals NL* and *Southern Pacific Petroleum NL* in November 1979. Exploration targeted the Condor Oil Shale deposit. Results are confidential. The Permit was conditionally surrendered in May 1980 in favour of EPM 2445.

EPM 2445 was granted to *Central Pacific Minerals NL* and *Southern Pacific Petroleum NL* in May 1980. The target was the Condor oil shale deposit. The Permit was conditionally surrendered in favour of EPM 2961 in March 1981. Exploration results are confidential.

EPM 2961 was granted to *Central Pacific Minerals NL* and *Southern Pacific Petroleum NL* in May 1981.

Exploration focused on the Condor oil shale deposit. A joint feasibility study by Southern Pacific Petroleum NL, Central Pacific Minerals NL and the Japan Australia Oil Shale Corporation commenced at the beginning of March 1982. The Permit was relinquished in October 1983 in favour of EPM 3520, which covered much the same area. Results are confidential.

EPM 3520 was granted to *Southern Pacific Petroleum NL* and *Central Pacific Minerals NL* in June 1983. The target was the Condor Oil Shale deposit, which contained an *in situ* resource of 9.65 billion barrels of shale oil. At the request of the Japan Oil Shale Engineering Company Ltd, a bulk sample (40 000t) of oil shale was extracted from a previous bulk sample site, crushed and screened and shipped to Japan.

Seven of the original 133 sub-blocks were relinquished on 9 May 1988. Geological mapping was used to identify the limits to the prospective Tertiary sediments, of the Hillsborough Basin, to which resource drilling was confined. Ten sub-blocks were relinquished on 26 July 1990. Stream sediment sampling over areas of Palaeozoic rocks did not produce any results considered worthy of follow-up. Samples were assayed for Au, Cu, Pb, Zn, As and Mo.

The Permit was reduced from 116 to 97 sub blocks in 1993. Initial results of stream sediment sampling within the relinquished area included four samples that assayed >20ppb Au (up to 460ppb Au.) Resampling and assaying failed the repeat these grades and none of the repeat samples assayed >4ppb Au. An application for MDL 202 was lodged in June 1995 to cover the main Condor oil shale deposit.

Six sub-blocks were relinquished in June 2001. No exploration had been carried out within these sub-blocks. Southern Pacific Petroleum NL was put into receivership in December 2003. Queensland Energy Resources Ltd was the successful buyer of Southern Pacific Petroleum's assets, including the Condor tenements.

Twelve sub-blocks were relinquished in June 2005. No surface exploration had been carried out within them. Results of exploration within the remaining sub-blocks are confidential.

Townsville Area

EPM 2517 was granted to *Dampier Mining Company Ltd* in August 1980. The Permit was applied for as a potential oil shale prospect due to its low lying, coastal nature. Gravity surveys delineated a weakly defined gravity 'low' centred on the Townsville urban area. Follow up exploration within this area was considered impractical and the Permit was relinquished in July 1981.

BIBLIOGRAPHY

- ADAMS, D.P. & HESPE, A.M., 1990: MLA 638, 639, 640, 641 (Bowen), Rocky Creek, final report for the period ending 30/11/89. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 21700.
- AGIP AUSTRALIA PTY LTD, 1980: Final report, A-P 2178M, Mount Abbot Queensland. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 8042.
- ALLEN, C.M. & CHAPPELL, B.W., 1996: The petrogenesis of the Mesozoic rocks, Bowen region, Queensland, and changes of tectonic setting from 145–100Ma. *In*, Mesozoic 96. *Geological Society of Australia, Abstracts*, **43**, 16–17.
- ALLEN, C.M., WILLIAMS, I.S., STEPHENS, C.J. & FIELDING, C.R., 1998: Granite genesis and basin formation in an extensional setting: the magmatic history of the northernmost New England Orogen. *Australian Journal of Earth Sciences*, **45**, 875–888.
-

-
- ANONYMOUS, 1935: Some mining operations in the Proserpine and Happy Valley districts. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-59B.
- APPLEYARD, G.R., 1967: Authority to Prospect 374M, Cape Upstart, Final report, December 1967. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 2301.
- ASHTON MINING LIMITED, 1989: A-P 5809M, Mount Dillon, report for the period ended on 19/9/89 and final report. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 21370.
- AUREX PTY LTD, 1985: A-P 3923M, Normanby Goldfield, six monthly report for the period ending 16/6/85. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 15591.
- AUSTRALIAN EXPLORERS (PETROLEUM AND MINERALS) PTY LTD, 1991: A-P 4646M, Proserpine, review of exploration works — annual report for period ending 16/3/91. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 25143.
- AUSTRALIAN MINING ENGINEERING CONSULTANTS, 1996: EPM 11055, Bowen Limestone, feasibility study report. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 27810.
- AUSTRALIAN SELECTION PTY LTD, 1967: Report on prospecting up to 31.12.66. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 2101.
- BALL, L.C., 1934: Cover note: Mount Mcguire, Bowen C.C.M. 15/8/34. Memorandum to the Under Secretary for Mines, Brisbane. Geological Survey of Queensland Commodity File 4-4-24.
- BALL, L.C., 1937a: The Albion, Longford Creek. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-24.
- BALL, L.C., 1937b: Re: road Normanby Township to Venture mine, Grant River workings. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-157.
- BALL, L.C., 1937c: Cedar Ridge mine. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-170.
- BALL, L.C., 1941: Young Crusader. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-59A.
- BALL, L.C., 1945: Cover note, Duffer, C.C.M. 2-10-45. Memorandum to the Under Secretary for Mines, Brisbane. Geological Survey of Queensland Commodity File 4-4-59A.
- BARKER, T.R. & RICHARD, A.N., 1981: A-P 2276M, Mount Glenroy, final report. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 9373.
- BARR, M.J., 1996: EPM 10141, 10153, Rangeview area, combined annual and partial relinquishment report for the periods ended 9/6/96 and 24/6/96. Held by the
-

Queensland Department of Employment, Economic Development and Innovation as Report 28276.

- BARR, M., LEE, R. & NETHERY, J.E., 1997: EPM 10141, 10153, Rangeview area, combined annual report for period ended 9/6/97 and 24/6/97. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 29433.
- BENNETT, E.M., 1972: A-P 931M, Pretty Bend, final report. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 4112.
- BOYD, B.R., 1976: Report for A-P 1646M for 3 months to 30-9-76. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 5825.
- BROOKS, J.H., 1957: Marquis gold mine, Normanby Gold Field. Geological Survey of Queensland Commodity File 4-4-157.
- BRYAN, S.E., HOLCOMBE, R.J. & FIELDING, C.R., 2003: Yarrol terrane of the northern New England Fold Belt: forearc or backarc? *Australian Journal of Earth Sciences*, **48**, 293–316.
- BURBAN, B., 1974: Final report on exploration activity for A-P 1057M. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 4920.
- CAMERON, W.E., 1902: Report on the silver-lead deposits of the Bowen River. Geological Survey of Queensland Commodity File 4-5-8.
- CAMERON, W.E., 1903: Mackay and Bowen districts. No. II. *Queensland Government Mining Journal*, **4**, 137.
- CARMAN, G., 1988: A-P 5018M, Monte Christo, six monthly report for the period ending 26.10.88 and final report. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 19314.
- CARPENTARIA EXPLORATION COMPANY PTY LTD, 1980: A-P 1853M, Black Pinnacle, report for six months ended 10.11.79. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 7674.
- CARRUTHERS, D.S., 1954: Vermiculite and asbestos occurrences, Home Hill district. *Queensland Government Mining Journal*, **55**, 64–65.
- CHERRY, K.C., 1988: First six monthly report on A-P 4938M, Urannah, Queensland, to March 1988. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 19954.
- CHERRY, K.C., 1993: EPM 7644, Urannah, first annual report to 19/2/93. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 24689.
- CLAYTON, W.F. & BICHARD, A.N., 1988: A-P 4857M, Mount Cavana, report for the period 11.02.88-10.08-88. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 18858.
-

-
- CONNAH, T.H., 1953: Limestone, Ben Lomond, Bowen district. Memorandum to the Chief Government Geologist. Geological Survey of Queensland Commodity File 4-34-3.
- CONNAH, T.H., 1958: Summary report — limestone resources of Queensland. *Queensland Government Mining Journal*, **59**, 739–755.
- CONOLLY, H., 1947: Report to Chairman, Dittmer Gold Mines Pty Ltd — Duffer mine exploration. Geological Survey of Queensland Commodity File 4-4-59B.
- CONQUEST MINING LIMITED, 2006: 2006 Annual Report. Conquest Mining Limited, Perth.
- CONQUEST MINING LIMITED, 2007: Resource upgrade at Mt Carlton. Announcement to the Australian Securities Exchange, 12 September 2007. Conquest Mining Limited, Perth.
- CONQUEST MINING LIMITED, 2008: Resource upgrade to measured status. Announcement to the Australian Securities Exchange, 13 November 2008. Conquest Mining Limited, Perth.
- CRIBB, H.G.S., 1954: The Mixer (Godkin) mine — Bloomsbury. *Queensland Government Mining Journal*, **55**, 401–403.
- DE HAVELLAND, D.W., 1987: *Gold and Ghosts, Volume 3. Queensland Central and Southern Districts*. Hesperian Press, Carlisle, Western Australia.
- DENARO, T.J. & DHNARAM, C.R., 2009: *Queensland Minerals 2009*. Department of Employment, Economic Development and Innovation, Brisbane.
- DENARO, T.J., KYRIAZIS, Z., FITZELL, M.J., MORWOOD, D.A. & BURROWS, P.E., 2004: Mines, mineralisation and mineral exploration in the northern Drummond Basin, central Queensland. *Queensland Geological Record* **2004/06**.
- DENMEAD, A.K., 1946a: Dittmer gold mine. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-59A.
- DENMEAD, A.K., 1946b: Lady Denise prospecting area, Dittmer. Memorandum to the Acting Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-59A.
- DENMEAD, A.K., 1946c: Young Crusader mine, Dittmer. Memorandum to the Acting Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-59A.
- DENMEAD, A.K., 1946d: Young Crusader mine — Dittmer. Memorandum to the Acting Chief Geologist, Geological Survey Office, Brisbane. Geological Survey of Queensland Commodity File 4-4-59B.
- DENMEAD, A.K., 1947a: Dittmer Gold Mines Pty Ltd. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-59B.
- DENMEAD, A.K., 1947b: Young Crusader mine - Dittmer. Memorandum to the Acting Chief Geologist, Geological Survey Office, Brisbane. Geological Survey of Queensland Commodity File 4-4-59B.
-

- DENMEAD, A.K., 1962: Re: Armistice prospect, Mount Dangar, Bowen. Memorandum to the Under Secretary, Department of Development and Mines. Geological Survey of Queensland Commodity File 4-4-24.
- DRAPER, J.J. & LANG, S.C. (Editors), 1994: Geology of the Devonian to Carboniferous Burdekin Basin. *Queensland Geological Record* **1994/09**.
- DUNSTAN, B., 1926: Queensland industrial minerals Part I: a review of occurrences, uses, values and production with special reference to Queensland resources in salt, asbestos, mica, molybdenite, platinum, nickel, graphite, managanese, and arsenic. *Geological Survey of Queensland, Publication* **268**.
- EAST, J.D., 1946a: Gumoller Claim No. 310, Mount Hector, Proserpine. *Queensland Government Mining Journal*, **47**, 209–210.
- EAST, J.D., 1946b: Claim No. 310 Bowen. Old Gumoller 2 workings Mount Hector, Proserpine. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-170.
- ENGLISH, P.W., 1995: EPM 10141, 10153, report for the twelve months ended 10/6/95. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 26999.
- EWART, A., SCHON, R.W. & CHAPPELL, B.W., 1992: The Cretaceous volcanic-plutonic province of central Queensland (Australia) coast — a rift-related ‘calc-alkaline’ province. *Transactions of the Royal Society of Edinburgh: Earth Sciences* **83**, 327–345.
- FIELDING, C.R., FALKNER, A.H.J., KASSAN, J. & DRAPER, J.J., 1990: Permian and Triassic depositional systems in the Bowen Basin. In, Beeston, J.W. (Compiler): *Proceedings of the Bowen Basin Symposium 1990*. Geological Society of Australia, Queensland Division, 21–25.
- FIELDING, C.R., STEPHENS, C.J. & HOLCOMBE, R.J., 1997: Permian stratigraphy and palaeogeography of the eastern Bowen Basin, Gogango Overfolded Zone and Strathmuir Synclinorium in the Rockhampton-Mackay region, central Queensland. *Geological Society of Australia Special Publication*, **19**, 80–95.
- FIELDING, C.R., SLIWA, R., HOLCOMBE, R.J. & KASSAN, J., 2000: A new palaeogeographic synthesis of the Bowen Basin of central Queensland. In, Beeston, J.W. (Editor): *Bowen Basin Symposium 2000 — the New Millenium — Geology*. Geological Society of Australia, 287–302.
- FRASER, M., 1999: Crush Creek high on Resolute's list. *Gold Mining Journal*, **November 1999**, 7.
- FULLER, G.J. & HOSKINGS, R., 1981: Exploration progress report for six month period ended 12.3.81, A-P 2644M. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 8773.
- GEOLOGICAL SURVEY OF QUEENSLAND, 1978: Mineral resources of the Bowen region. *Queensland Government Mining Journal*, **79**, 187–208.
- GIBBS, A.D., 1985: ML 195, 197, 198, 235, 236 (Georgetown), Flagstone, Silver Orchid, 1985 data. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 14914.
-

- GREEN, P.W., 1982: Final report for A-P 2444M, NW of Proserpine (oil shale) (Q228). Held by the Queensland Department of Employment, Economic Development and Innovation as Report 10146.
- GREEN, P.W. & BATEMAN, R.J., 1981: The geology of the Condor oil shale deposits — onshore Hillsborough Basin. *APEA Journal*, **21**(1), 23–32.
- GREEN, P.W. & LINDNER, A.W., 1981: Final report, A-P 2245M. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 8580.
- GREGORY, C.M., 1969: Ayr (Sheet SE/55-15). *Queensland 1:250 000 Geological Series — Explanatory Notes*. Bureau of Mineral Resources, Geology and Geophysics, Australia.
- HALL, D.H., 1994: EPM 9664, Marengo, annual report for the period 9/11/93 to 8/11/94. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 26614.
- HARRINGTON, H.J. & KORSCH, R.J., 1985: Late Permian to Cainozoic tectonics of the New England Orogen. *Australian Journal of Earth Sciences*, **32**, 181–203.
- HARRIS, M., 1999: EPM 9139, Mount Glenroy Project, final report for period ended 13/12/98. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 30648.
- HOLCOMBE, R.J., STEPHENS, C.J. & FIELDING, C.R., 1994: Tectonic evolution of the central and northern New England Fold Belt, Queensland. *In*, Geoscience Australia, 1994 and Beyond: 12th Australian Geological Convention, the University of Western Australia, Perth. *Geological Society of Australia, Abstracts*, **37**, 185–186.
- HORTON, D.J., 1976: Re: Inspection of the Binbee amethyst deposit, Bowen-Collinsville Road. Geological Survey of Queensland Commodity File 4-28-0.
- HORTON, D.J., 1978: Porphyry-type copper-molybdenum mineralisation belts in eastern Queensland. *Queensland Government Mining Journal*, **79**, 474–489.
- HORTON, D.J., 1982: Porphyry-type copper and molybdenum mineralisation in eastern Queensland. *Geological Survey of Queensland Publication* **378**.
- HOUSTON, B.R., 1967: Resources of ceramic clay materials in Queensland. *Geological Survey of Queensland, Report* **20**.
- HUGHES, A.R., 1985: Glenroy, A-P 3932M, Charters Towers area, report first six months ended 13.07.85 and final report. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 15049.
- HUNTER, M.J., 1988: A-P 4334M, Mount Glenroy, annual report for period ending 23.07.88. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 18222.
- HUTTON, L.J., DRAPER, J.J., RIENKS, I.P., WITHNALL, I.W. & KNUTSON, J., 1997: Charters Towers region. *In*, Bain, J.H.C. & Draper, J.J. (Compilers):
-

- North Queensland Geology. *AGSO Bulletin* **240/Queensland Geology** **9**, 165–203.
- HUTTON, L.J., GRIMES, K.G., LAW, S.R. & McLENNAN, T.P.T., 1998: Mount Coolon, second edition. *Queensland 1:250 000 Geological Series — Explanatory Notes*. Department of Mines and Energy, Queensland.
- HUTTON, L.J., WITHNALL, I.W., BULTITUDE, R.J., von GNIELINSKI, F.A. & LAM, J.S., 1999: South Connors-Auburn-Gogango Project: progress report on investigations during 1998. *Queensland Geological Record* **1999/07**.
- JACK, R.L., 1879: Report to the Honourable the Minister for Mines on the Normanby and Marengo Goldfields. *Geological Survey of Queensland, Publication* **5**.
- JACK, R.L., 1893: The Normanby Goldfield. *Geological Survey of Queensland, Publication* **88**.
- JOHN, T.U., HIRST, R.J. & PETERS, R., 1981: A-P 2391M, final report on activities to June 1981. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 9583.
- JOHN, J.U. & LUNA, D.E., 1983: A-P 3285M, report on area relinquished at 4.04.83. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 12958.
- JONES, B.H., 1995: EPM 9827, Mount Hector, first annual report to December 1994. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 26555.
- KALNEJALS, J., 1970: Final report 1970, A-P 693M, Burdekin, Qld. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 3933.
- KINNANE, N.R. & SYVRET, N.J., 1988: Annual report, A-P 3923M, Normanby Goldfield, north Queensland. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 18030.
- LAUN, S.J., 1930: Re: Financial assistance sinking P.A. No. 10, Ayr. Geological Survey of Queensland Commodity File 4-5-3.
- LEAH, P.A., 1990: A-P 5005M, Clarke Range, exploration report on areas relinquished after second year of tenure 15/10/88 to 14/10/89. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 21339.
- LEAH, P.A. & MUTTON, A.J., 1988: Blue Valley, A-P 5070M, exploration report for second six months of tenure, 18.05.88-17.11.88. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 19619.
- LEAH, P.A. & MUTTON, A.J., 1989: Blue Valley, A-P 5396M, Herbert Range, exploration report for the first year of tenure 24/5/88 to 23/5/89. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 20539.
- LEITCH, D.M. & FLETCHER, R.J., 1972: A-P 637M, west of Proserpine, final report, Julivon Creek anomaly – Andromache River, December 1972. Held by
-

- the Queensland Department of Employment, Economic Development and Innovation as Report 4538.
- LEVINGSTON, K.R., 1962: Armistice gold prospect, Mount Dangar, Bowen. *Queensland Government Mining Journal*, **63**, 412–413.
- LEVINGSTON, K.R., 1966a: Albion mine, Normanby Goldfield. *Queensland Government Mining Journal*, **67**, 375–376.
- LEVINGSTON, K.R., 1966b: Albion mine, Normanby Goldfield. Memorandum to the Chief Government Geologist. Geological Survey of Queensland Commodity File 4-4-157.
- LEVINGSTON, K.R., 1969a: Duffer mine, Dittmer. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-59B.
- LEVINGSTON, K.R., 1969b: Golden Gem mine, Dittmer. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-59B.
- LEY, M. & GLOYN, R., 1981: A-P 2418M - Strathbogie - Qld. Six monthly and final report. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 8515.
- MAITLAND, A.G., 1889: Geological features and mineral resources of the Mackay district. *Geological Survey of Queensland Publication* **53**, 5–6.
- MARSHALL, H., 1918: Brandy Creek gold and silver lode. Memorandum for E.C. Saint-Smith, Geological Survey Office, Brisbane. Geological Survey of Queensland Commodity File 4-4-170.
- McDOUGALL, I. & SLESSAR, G.C., 1972: Tertiary volcanism in the Cape Hillsborough area, north Queensland. *Australian Journal of Earth Sciences*, **18**, 401–408.
- McINTOSH, D., 1989: A-P 4476M, Middle Andromache No.2, six month report, period ended 10.11.88. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 19635.
- MORELY, I.W., 1948: Application for assistance — Albion mine, Normanby Goldfield — L.Breen and party. Memorandum to the Under Secretary for Mines. Geological Survey of Queensland Commodity File 4-4-157.
- MORTON, C.C., 1920: The Normanby Goldfield — report on southern portion. *Queensland Government Mining Journal*, **21**, 268–275, 319–323.
- MORTON, C.C., 1921a: Recent notes on the Normanby Goldfield. *Queensland Government Mining Journal*, **22**, 271–274.
- MORTON, C.C., 1921b: Notes on Marengo Goldfield. *Queensland Government Mining Journal*, **22**, 299.
- MORTON, C.C., 1921c: Recent notes on the Normanby Goldfield. *Queensland Government Mining Journal*, **22**, 316–320.
-

- MORTON, C.C., 1923a: Reported occurrence of limestone, near Bowen. Memorandum to the Chief Government Geologist. Geological Survey of Queensland Commodity File 4-34-3.
- MORTON, C.C., 1923b: Re: Subsidy application, Billy Hughes Gold Mining Company. Memorandum to the Chief Government Geologist. Geological Survey of Queensland Commodity File 4-4-157.
- MORTON, C.C., 1923c: Application for assistance — J. Gorvin & R. Young, Normanby Goldfield. Memorandum to the Chief Government Geologist. Geological Survey of Queensland Commodity File 4-4-157.
- MORTON, C.C., 1924: The Marquis mine — Normanby Goldfield. Memorandum to the Chief Government Geologist. Geological Survey of Queensland Commodity File 4-4-157.
- MORTON, C.C., 1926: The Marquis mine — Normanby Goldfield. Memorandum to the Chief Government Geologist. Geological Survey of Queensland Commodity File 4-4-157.
- MORTON, C.C., 1927: Kuhlmann's gold prospecting area — application for assistance. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-170.
- MORTON, C.C., 1932a: The Birthday Gift deposit, Ward Creek, Bowen. *Queensland Government Mining Journal*, **33**, 45–46.
- MORTON, C.C., 1932b: Assistance - Edwards and party - Ward Creek, Bowen. Memorandum to the Acting Chief Government Geologist. Geological Survey of Queensland Commodity File 4-4-24.
- MORTON, C.C., 1934: The Elusive. Memorandum to the Chief Government Geologist. Geological Survey of Queensland Commodity File 4-4-24.
- MORTON, C.C., 1941a: Re: Subsidy application, F.H. Hockings and A.C. Watts, Bootooloo. Memorandum to the Chief Government Geologist. Geological Survey of Queensland Commodity File 4-4-20.
- MORTON, C.C., 1941b: Loch Neigh — Kelsey Creek. Memorandum to the Chief Government Geologist. Geological Survey of Queensland Commodity File 4-4-59A.
- MORTON, C.C., 1946: Duffer Mine, Dittmer, via Proserpine. *Queensland Government Mining Journal*, **47**, 15–20.
- MORTON, C.C., 1948: Albion Mine — Normanby Goldfield. Memorandum to the Under Secretary for Mines. Geological Survey of Queensland Commodity File 4-4-157.
- MUGGERIDGE, G.D. & MUTTON, A.J., 1991: EPM 7254, Ten Mile, exploration report for period of tenure 17/8/90 to 16/8/91. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 23159.
- MUGGERIDGE, G.D. & PROMNITZ, S.C., 1990: EPM 5490, Rocky Mount, exploration report for period of tenure 13/7/89 to 17/8/90 and final report. Held
-

by the Queensland Department of Employment, Economic Development and Innovation as Report 22797.

- MUNN, H.E., 1950: Report on mine by H.E Munn to the shareholders, Dittmer Gold Mines Limited. Geological Survey of Queensland Commodity File 4-4-59B.
- MUNOZ, R.L., 1974: Final report, A-P 1021M. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 4925.
- MURRAY, C.G., 1990a: Tasman Fold Belt in Queensland. *In*, Hughes, F.E. (Editor): Geology of the mineral deposits of Australia and Papua New Guinea. *Australasian Institute of Mining and Metallurgy Monograph Series*, **14**, 1431–1450.
- MURRAY, C.G., 1990b: Tectonic evolution and metallogenesis of the Bowen Basin, *In*, Bowen Basin Coal Symposium. *Geological Society of Australia, Abstracts*, **17**, 201–212.
- MURRAY, C.G., 1994: Yarrol Project 1993–2000 — a review of available information, data requirements and mapping priorities. *Queensland Geological Record* **1994/18**.
- MURRAY, C.G., 2003: Granites of the northern New England Orogen. *In*, The Ishihara Symposium: Granites and Associated Metallogenesis. *Geoscience Australia Record* **2003/14**.
- NETHERY, J.E., FRENCH, D. & KELLY, G., 1976: Inkerman area, A-P 1546M, final report on exploration. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 5578.
- OVERSBY, B.S., MACKENZIE, D.E., McPHIE, J. & LAW, S.R., 1994: Geology of Palaeozoic volcanic and associated rocks in the Burdekin Falls Dam — Conway area, north-eastern Queensland. *AGSO Record* **1994/21**.
- PAINE, A.G.L., 1972: Proserpine (Sheet SE/55-4). *Queensland 1:250 000 Geological Series — Explanatory Notes*. Bureau of Mineral Resources, Geology and Geophysics, Australia.
- PAINE, A.G.L. & CAMERON, R.L., 1972: Bowen (Sheet SE/55-3). *Queensland 1:250 000 Geological Series — Explanatory Notes*. Bureau of Mineral Resources, Geology and Geophysics, Australia.
- PAINE, A.G.L., CAMERON, R.L. & SWEET, I.P., 1980: *Burdekin River Region, Queensland, 1:500 000 geological map. First Edition*. Bureau of Mineral Resources, Australia and Geological Survey of Queensland.
- PAINE, A.G.L., CLARKE, D.E. & GREGORY, C.M., 1974: Geology of the northern half of the Bowen 1:250 000 Sheet area, Queensland (with additions to the geology of the southern half). *Bureau of Mineral Resources, Geology and Geophysics, Australia, Report* **145**.
- PETERS, S.G., WEBB, M. & HAYWARD, S., 1989: A-P 5259M (Knobbies), 5288M (Duck Creek), 5620M (Mount Mackenzie, 5657M (Mount Challenger), final report on exploration for the period ending 21/10/89 and A-P 5354M (Mount Williams), final report on exploration for the period ending 24/4/89. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 20839.
-

- PETERS, S.G., WEBB, M. & KELLY, G., 1988: First six monthly combined report on exploration of A-P 5259M, Knobbies, 5288M, Duck Creek, and 5354M, Mount Williams to 22.08.88. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 19397.
- PORTER, R.G., 1994: EPM 10052, Benjonney, final annual report to 15/5/95. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 27278.
- PORTER, R.G. & SEED, M., 1982: Kelly's Mountain project (Mo), A-P 2248M, final report on exploration. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 10670.
- PURVIS, A.H., 1978: Stuart Pocket, Charters Towers Mining District, final report, A-P 1728M. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 6706.
- REID, J.H., 1924: Permo-Carboniferous geology of Queensland — additional notes. *Queensland Government Mining Journal*, **25**, 48.
- REID, J.H., 1931a: The Pharlap. Memorandum to the Acting Chief Government Geologist. Geological Survey of Queensland Commodity File 4-4-24.
- REID, J.H., 1931b: Marengo Gold Field. Memorandum to the Acting Chief Government Geologist. Geological Survey of Queensland Commodity File 4-4-157.
- REID, J.H., 1935a: Mount Hector field, near Proserpine. *Queensland Government Mining Journal*, **36**, 239–240.
- REID, J.H., 1935b: The Duffer, Kelsey Creek, Proserpine. *Queensland Government Mining Journal*, **36**, 240.
- REID, J.H., 1935c: Marengo Goldfield. *Queensland Government Mining Journal*, **36**, 414.
- REID, J.H., 1935d: Butterfly, Urannah (B.S. Nolan). Geological Survey of Queensland Commodity File 4-4-195.
- REID, J.H., 1935e: Happy Valley, Proserpine. Memorandum to the Chief Government Geologist. Geological Survey of Queensland Commodity File 4-4-170.
- REID, J.H., 1935f: Longford Creek area. Memorandum to the Chief Government Geologist. Geological Survey of Queensland Commodity File 4-4-24.
- REID, J.H., 1935g: Cedar Ridge mine. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-170.
- REID, J.H., 1935h: Cedar Ridge, the Last Try, prospectors R. Mee, A. Thomas and the Gap mines. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-59B.
- REID, J.H., 1936: Duffer Mine, Kelsey Creek, Proserpine. *Queensland Government Mining Journal*, **37**, 229.
-

-
- REID, J.H., 1937a: Duffer Mine, Kelsey Creek, Proserpine. *Queensland Government Mining Journal*, **38**, 311.
- REID, J.H., 1937b: Longford Creek area. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-24.
- REID, J.H., 1937c: The Albion – Longford Creek. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-24.
- REID, J.H., 1937d: Cedar Ridge mine, Mount Hector (Proserpine) field. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-170.
- REID, J.H., 1938a: Last Try mine, Mount Hector, Proserpine. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-170.
- REID, J.H., 1938b: Cedar Ridge mine, Proserpine. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-170.
- REID, J.H., 1939: Cedar Ridge, Proserpine. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-170.
- REID, J.H., 1940: The Duffer lode, Kelsey Creek Gold Mines Proprietary Limited. *Queensland Government Mining Journal*, **41**, 287–288.
- REID, J.H., 1941: Proserpine. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-170.
- REID, J.H., 1944a: Holbourne Island phosphate deposits. *Queensland Government Mining Journal*, **45**, 153–154.
- REID, J.H., 1944b: Seaforth limestone. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-34-17.
- RIDGWAY, J.E., 1935a: Cedar Ridge and Ludo prospecting areas, Mount Hector, Proserpine. *Queensland Government Mining Journal*, **36**, 166–168.
- RIDGWAY, J.E., 1935b: The Ludo prospecting area. *Queensland Government Mining Journal*, **36**, 168.
- RIDGWAY, J.E., 1935c: Some mining operations in Proserpine and Happy Valley districts. *Queensland Government Mining Journal*, **36**, 203–204.
- RIDGWAY, J.E., 1935d: Last Try mining lease, Proserpine. *Queensland Government Mining Journal*, **36**, 204–205.
- RIDGWAY, J.E., 1935e: Marengo Goldfield. *Queensland Government Mining Journal*, **36**, 237–238.
- RIDGWAY, J.E., 1935f: Re: Application for subsidy by T.B. Edwards and party, Birthday Gift mine, near Bowen. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-24.
-

- RIDGWAY, J.E., 1935g: The Last Try mining leases, Proserpine. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-170.
- RIDGWAY, J.E., 1935h: Cedar Ridge and Ludo prospecting areas, Mount Hector, Proserpine. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-170.
- RIDGWAY, J.E., 1935i: Application for subsidy to sink shaft on the Welcome reef. Geological Survey of Queensland Commodity File 4-4-20.
- RIDGWAY, J.E., 1937a: Normanby Goldfield. Lady Phillips. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-157.
- RIDGWAY, J.E., 1937b: Normanby Goldfield. The Second Try. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-157.
- RIDGWAY, J.E., 1937c: Re: Assistance, Westwood Hill reef, Marengo. J. Barry. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-157.
- RIDGWAY, J.E., 1938: Golden Fleece P.A. Happy Valley - Carlo Silvano & party. Geological Survey of Queensland Commodity File 4-4-170.
- RIDGWAY, J.E., 1939: Duffer Mine, Kelsey Creek Gold Mines Pty. Ltd. *Queensland Government Mining Journal*, **40**, 260.
- RIDGWAY, J.E., 1940a: Last Try reef — A. Stevenson and J. Parkes. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-170.
- RIDGWAY, J.E., 1940b: Cedar Ridge reef, Proserpine. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-170.
- RIDGWAY, J.E., 1940c: Golden Hill reef. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-59A.
- RIDGWAY, J.E., 1941a: Hill Top workings — A. Thoroughgood & party G.M.L. 192. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-24.
- RIDGWAY, J.E., 1941b: Lady Linden reef — P.A. 511. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-170.
- RIDGWAY, J.E., 1941c: Young Crusader Mine - Dittmer - Proserpine. Mining Syndicate. Geological Survey of Queensland Commodity File 4-4-59A.
- RIDGWAY, J.E., 1941d: Loch Neigh - J. Smith and party - G.M.L. 250. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-59A.
- RIDGWAY, J.E., 1941e: Silver Wattle mine - Mount Quondong, near Dittmer - J. Britt & party. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-59A.
-

- RIDGWAY, J.E., 1941f: Subsidy to drive adit - Lady Denise reef - Alan Ridell and party (Dittmer). Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-59A.
- RIDGWAY, J.E., 1942: Duffer mine, Kelsey Creek. Memorandum to the District Geologist, Rockhampton. Geological Survey of Queensland Commodity File 4-4-59A.
- RIDGWAY, J.E., 1947: Rangeview scheelite. *Queensland Government Mining Journal*, **48**, 401.
- SAINT-SMITH, E.C., 1918a: Limestone at Ben Lomond, Bowen district. *Queensland Government Mining Journal*, **19**, 559–560.
- SAINT-SMITH, E.C., 1918b: Supposed gold lode at Brandy Creek, Proserpine. Memorandum to the Chief Government Geologist, Brisbane. Geological Survey of Queensland Commodity File 4-4-170.
- SAINT-SMITH, E.C., 1919a: Copper lode at Euri Creek, Bowen district. *Queensland Government Mining Journal*, **20**, 12–13.
- SAINT-SMITH, E.C., 1919b: Magnesite, chromite, and fireclay at Mount Pring, Bowen. *Queensland Government Mining Journal*, **20**, 57–58.
- SAINT-SMITH, E.C., 1919c: Rock phosphate deposit on Holbourne Island, near Bowen. *Queensland Government Mining Journal*, **20**, 122–124.
- SAINT-SMITH, E.C., 1920: White and Moon's coal mine, near Hampden, Mackay district. *Queensland Government Mining Journal*, **21**, 502.
- SANDFORD, C., 2000: Queensland mineral commodity outlook — silver. *Queensland Government Mining Journal*, **101**(1185), 12–18.
- SAWERS, J.D. & COOPER, W., 1985: Some Queensland industrial minerals. *Queensland Government Mining Journal*, **86**, 188–195.
- SAWERS, J.D. & SIEMON, J.E., 1969: Limestone resources, Mackay district. *Queensland Government Mining Journal*, **70**, 489–495.
- SHATWELL, D., 1982: A-P 3289M, report for six months ending 6.10.82 (final report). Held by the Queensland Department of Employment, Economic Development and Innovation as Report 11632.
- SHEPHERD, A., JONES, G., DAVIS, G. & ROWLEY, D., 1997: EPM 9139, 10934, 10996, Mount Glenroy Joint Venture Project, annual report for the period 14/12/95-12/12/96. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 28513.
- SHEPHERD, S.R.L., 1947: Limestone at Seaforth near Mackay. Memorandum to the Acting Chief Government Geologist. Geological Survey of Queensland Commodity File 4-34-17.
- SIEMON, J.E., 1981: Ceramic resources of the Mackay region. *Queensland Government Mining Journal*, **82**, 223–228.
- SIMMONDS, N.A.H. & TUCKER, R.M., 1960: Limestone inspection — Repulse Islands. *Queensland Government Mining Journal*, **61**, 23–25.
-

- SMITH, D., 1990: A-P 5474M, Gooranga Creek, final report. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 21054.
- SOUTHERN PACIFIC PETROLEUM NL, 2002: Annual Report 2002. Southern Pacific Petroleum NL.
- SPECTRUM RESOURCES NL, 1988a: A-P 4704M, report on exploration for six month period ending 09.10.87. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 17192.
- SPECTRUM RESOURCES NL, 1988b: A-P 4704M, relinquishment report. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 18460.
- TWITCHEL, C.L., 1969: Report on reconnaissance evaluation of the Conway project. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 2803.
- WALKER, M.D., 1985: BP Australia Gold Pty Ltd, A-P 4051M, McGregor, first six monthly relinquishment and final report combined to Qld Mines Dept, 19.07.85-29.09.85. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 15356.
- WASHBURN, C., 1996: EPM 7175, Rangeview Ring, final report for the period 4/7/90 to 18/5/95. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 27871.
- WATTERS, R.A., 1988: A-P 4830M, Ayr, annual report for period ended 29.07.88. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 18593.
- WEBB, A.W. & McDOUGALL, I., 1968: The geochronology of the igneous rocks of eastern Queensland. *Journal of the Geological Society of Australia*, **15**, 313–346.
- WILDE, A., 1996: EPM 9526 (Lulu Creek), 9802 (Robe Range), 9873 (Bell Creek East), 10408 (Carse O'Gowrie), 10542 (Dregorn), combined annual report to February 1996. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 27651.
- WINTER, T., 1999: Resolute seeks Vera Nancy lookalike at Crush Creek. *Gold Gazette Australia*, **5**(4), 33.
- WITHNALL, I.W., DRAPER, J.J., MACKENZIE, D.E., KNUTSON, J., BLEWETT, R.S., HUTTON, L.J., BULTITUDE, R.J., WELLMAN, P., McCONACHIE, B.A., BAIN, J.H.C., DONCHAK, P.J.T., LANG, S.C., DOMAGALA, J., SYMONDS, P.A. & RIENKS, I.P., 1997: Review of geological provinces and basins of north Queensland. In, Bain, J.H.C. & Draper, J.J. (Compilers): North Queensland Geology. *AGSO Bulletin 240/Queensland Geology* **9**, 449–528.
- WYATT, D.H., 1962a: Lucky Strike gold prospect, Mount McGuire via Proserpine. Geological Survey of Queensland Commodity File 4-4-24.
- WYATT, D.H., 1962b: Armistice gold prospect, Mount Dangar, Bowen. Geological Survey of Queensland Commodity File 4-4-24.
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- YOUNG, C.P., 1944: Report on Queensland phosphate deposits, Holbourne Island. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 2519.
- ZERWICK, J.K., 1973: Otter Exploration NL, diamond drilling report, A-P 1021M, Beaks Mountain, Queensland. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 4592.
- ZERWICK, J.K., 1974: Authority to Prospect 1424M, annual report to 31-12-1974. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 5336.
- ZERWICK, J.K., 1975a: A-P 1212M, WSW of Bowen, annual report to 31.12.74. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 5301.
- ZERWICK, J.K., 1975b: Progress Report No.8, A-P 1212M, April-June 1975. Held by the Queensland Department of Employment, Economic Development and Innovation as Report 13266.
- ZIMMERMAN, D. & BRANCH, C.D., 1961: Report on inspection of a gold prospect in the Dittmer area, Shire of Proserpine. Geological Survey of Queensland Commodity File 4-4-59B.
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APPENDIX 1

**EXPLORATION PERMITS FOR MINERALS,
NORTH CONNORS PROJECT AREA**

Table 1: Mineral exploration under Exploration Permits, North Connors Project area

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
205	ENTERPRISE EXPLORATION COMPANY PTY LTD	21/08/1962	CU, AU	EUNGELLA, NEBO AND PROSERPINE AREAS	GEOL, GEOLMA		GEOCHE, SOIL, STRSED, ASSAY/Unknown	DDRILL		1092/O, 1169/O, 1543/O
325	AUSTRALIAN SELECTION PTY LTD	28/06/1966	MO	KELLY'S MOUNTAIN	GEOLMA		GEOCHE, CUTSAM, ROCK, ASSAY/Unknown	PDRILL		2101/O, 2565/O
345	PLANET MINING COMPANY PTY LTD	25/08/1966	ILMENITE, MAGNETITE, RUTILE, ZIRCON	OFFSHORE MACKAY TO TOWNSVILLE	GEOL				LITREV	1974/O
374	AUSTRALIAN SELECTION PTY LTD	11/01/1967	CU, MO, ZN	CAPE UPSTART	GEOL, GEOLMA		GEOCHE, ROCK, ASSAY/Unknown		LITREV	2301/O
438	MORGAN MINING & INDUSTRIAL COMPANY PTY LTD	25/10/1967	AG, AU, CU, ZN	MOUNT GOTTHARDT AREA	GEOL, GEOLMA		STRSED, ASSAY/Unknown			2491/O
451	ST JOSEPH PHELPS DODGE EXPLORATION PTY LTD	17/11/1967	CU, PB, ZN	ROMA PEAK AREA	GEOL, GEOLMA, PHOGR, PET		GEOCHE, SOIL, STRSED, ASSAY/Unknown	RPERC		2722/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
452	URANIUM CONSOLIDATED NL	17/11/1967	AG, AU, CU, PB, ZN	FLAGSTONE CREEK AREA	GEOL, GEOLMA, PET	AEREM	CUTSAM, ROCK, SOIL, STRSED, ASSAY/>200	RCDRIL		2753/O, 2659/O
481	ST JOSEPH PHELPS DODGE EXPLORATION PTY LTD	9/02/1968	NI, MAGNESITE	MOUNT PRING AREA	GEOL, GEOLMA		GEOCHE, CUTSAM, ROCK, SOIL, STRSED, ASSAY/>200	RDRILL		2643/O
535	TRANS-AUSTRALIAN EXPLORATION PTY LTD	23/10/1968	CU, PB, ZN, W, MO	LEICHHARDT RANGE, MOUNT CAVANA AND STRATHBOGIE AREAS	GEOL, GEOLMA, PET	GEOP, IPSURV, GRDMAG	GEOCHE, ROCK, SOIL, STRSED, ASSAY/>200	RPERC		3183/O, 3336/O, 3342/O, 3476/O
536	MURPHYORES INCORPORATED PTY LTD	23/10/1968	ILMENITE, MONAZITE, RUTILE, ZIRCON, MAGNETITE	BOWEN AREA			BULK, ASSAY/Unknown	DRILL	FEAS, METURG	3514/O
576	HYDRO MINERAL DEVELOPMENT PTY LTD	21/03/1969	AU, RUTILE, ZIRCON	BURDEKIN RIVER DELTA	GEOL, PHOGR, PET		CORE, CUTSAM, ASSAY/Unknown	DRILL, ADRILL	LITREV, MINEDE, ORERES	2852/O, 3019/O, 3184/O
611	J.M. STEPHEN PTY LTD, LASKAN MINERALS LTD	15/06/1969	CU, PB, ZN, NI, CO	CRAMOISIE, MOUNT GLENROY, MOUNT LANDBOROUGH AND MOUNT DEVLIN AREA	GEOL, GEOLMA		GEOCHE, ROCK, SOIL, STRSED, ASSAY/>200		LITREV	4053/O, 4054/O, 4199/O, 4200/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
637	CARPENTARIA EXPLORATION COMPANY PTY LTD	20/08/1969	CU, MO, NI, PB, ZN	BOWEN TO BLOOMSBURY AREA	GEOL, GEOLMA		GEOCHE, SOIL, STRSED, ASSAY/Unknown	DDRILL		4023/O, 4024/O, 4538/O
662	CLARKE SPUR MINING COMPANY PTY LTD	23/10/1969	AU	KELSEY CREEK AREA	GEOL, GEOLMA		GRABSP, ASSAY/Unknown	COST		5211/O
693	PLANET MINERALS LTD	1/11/1969	CU	MOUNT CANTON AREA	GEOL, GEOLMA		SOIL, STRSED, /Unknown			3088/O, 3933/O
839	SWISS ALUMINIUM MINING AUSTRALIA PTY LTD	30/10/1970	CU, PB, ZN, MO	EUNGELLA AREA	GEOLMA, PET	GRDMAG	ROCK, SOIL, STRSED, ASSAY/>200	PDRILL	LITREV	3882/O
920	CARPENTARIA EXPLORATION COMPANY PTY LTD	24/03/2001	CU	MOUNT CAULEY – MOUNT CROMPTON AREA	GEOL		GEOCHE, STRSED, ASSAY/Unknown			4014/O
931	CARPENTARIA EXPLORATION COMPANY PTY LTD	28/05/1971	CU, MO	PRETTY BEND AREA	GEOL		BULK, SOIL, STRSED, ASSAY/Unknown	ADRILL		4112/O
961	DILLINGHAM CONSTRUCTIONS PTY LTD	24/08/1971	MAGNETITE	CAPE BOWLING GREEN	PET		GEOCHE, BULK, CUTSAM, /Unknown	ADRILL		4009/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
962	DILLINGHAM CONSTRUCTIONS PTY LTD	24/08/1971	ILMENITE, MAGNETITE, RUTILE, ZIRCON	UPSTART BAY			CUTSAM, HMSAMP, ASSAY/Unknown	DRILL		4027/O
981	DILLINGHAM CONSTRUCTIONS PTY LTD	13/09/1971	ILMENITE, MAGNETITE, RUTILE, ZIRCON	BOWEN AREA			HMSAMP, /Unknown	DRILL		4276/O
1021	OTTER EXPLORATION NL	18/04/1972	AG, AU, CU, PB, ZN, MO	BEAKS MOUNTAIN AREA	GEOL, GEOLMA	IPSURV	CORE, ROCK, SOIL, STRSED, ASSAY/>200	DDRILL, PDRILL		4592/O, 4593/O, 4744/O, 4925/O
1022	MINES ADMINISTRATION PTY LTD	26/04/1972	CU, PB, ZN	KELSEY CREEK AREA	GEOL, GEOLMA, PET		GEOCHE, ROCK, SOIL, STRSED, ASSAY/Unknown	PDRILL	LITREV	4498/O, 4586/O, 4808/O
1057	OTTER EXPLORATION NL	30/05/1972	CU, PB, ZN	MOUNT MACKENZIE AREA	GEOL, GEOLMA, PET	GEOP, IPSURV	GEOCHE, CORE, ROCK, SOIL, STRSED, ASSAY/>200	DDRILL, PDRILL		4632/O, 4777/O, 4920/O
1070	DAMPIER MINING COMPANY LTD	6/07/1972	CU, MO, W	FLAGSTONE CREEK – BOGIE RIVER AREA	GEOLMA		ROCK, SOIL, STRSED, ASSAY/>200			4416/O
1169, 1170	CORMEPAR MINERALS PTY LTD	15/02/1973, 15/02/1973	CU, PB, ZN	RANGEVIEW AREA	GEOL, GEOLMA, PHOGR		STRSED, /101–200			4975/O, 4976/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
1212	OTTER EXPLORATION NL	9/05/1973	CU, MO, PB, ZN	MOUNT ABBOT AREA	GEOL, GEOLMA, PET		GEOCHE, CORE, CUTSAM, STRSED, ASSAY/Unknown	DDRILL, ADRILL		4904/O, 5301/O, 13266/O, 20392/O, 20393/O, 20395/O, 20397/O
1319	COMMONWEALTH ALUMINIUM CORPORATION PTY LTD	23/11/1973	CU, PB, ZN, AG	STRATHBOGIE AREA	GEOL		GEOCHE, STRSED, ASSAY/Unknown			5232/O
1371	AO (AUSTRALIA) PTY LTD	21/06/1974	CU, MO, PB, ZN	STRATHBOGIE AREA	GEOL, GEOLMA, PHOGR		GEOCHE, ROCK, STRSED, ASSAY/Unknown			5282/O
1381	ESSO EXPLORATION & PRODUCTION AUSTRALIA INCORPORATED	21/06/1974	CU, MO	CARSE O GOWRIE TO RANGEVIEW AREA	GEOL	AERMAG			GPYINT	5283/O
1424	OTTER EXPLORATION NL	26/09/1974	CU, PB, ZN, MO	EMU CREEK TO BOGIE RIVER AREA	GEOL, GEOLMA, PHOGR		GEOCHE, ROCK, SOIL, STRSED, ASSAY/Unknown	ADRILL		5336/O, 5408/O, 20403/O, 20404/O
1451	ESSO EXPLORATION & PRODUCTION AUSTRALIA INCORPORATED	8/11/1974	CU	EURI CREEK AREA	GEOLMA	IPSURV			LITREV	5335/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
1546	AOG MINERALS PTY LTD	12/08/1971	W	PLUM TREE AREA	GEOL, GEOLMA	GEOP	ROCK, SOIL, STRSED, /51-100		LITREV	5578/O
1548	UNION CORPORATION (AUSTRALIA) PTY LTD, MINSANDS EXPLORATION PTY LTD	20/08/1975	AU, RUTILE, ZIRCON	BOWLING GREEN BAY			ASSAY/Unknown	DRILL, ADRILL	LITREV	5596/O
1549	UNION CORPORATION (AUSTRALIA) PTY LTD, MINSANDS EXPLORATION PTY LTD	20/08/1975	AU, RUTILE, ZIRCON	CAPE BOWLING GREEN			ASSAY/Unknown	ADRILL	LITREV	5597/O
1646	AOG MINERALS PTY LTD	20/07/1976	CU, MO	EURI CREEK	GEOL, GEOLMA, PET	GRDMAG, GRDRAD	SOIL, ASSAY/Unknown		LITREV	5825/O
1728	CARPENTARIA EXPLORATION COMPANY PTY LTD	30/12/1976	CU, PB, ZN, AU	RANGEVIEW TO MOUNT GLENROY AREA	GEOL, GEOLMA		ROCK, SOIL, STRSED, />200		LITREV, PHOTO	6706/O
1827	MURPHYORES INCORPORATED PTY LTD	7/09/1977	MAGNETITE	BOWEN AREA			BULK, CUTSAM, HMSAMP, ASSAY/>200	ADRILL	MINPRO	6729/O, 8141/O, 8573/O, 9524/O, 9225/C

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
1853	CARPENTARIA EXPLORATION COMPANY PTY LTD	22/11/1977	AU, CU, PB, ZN	RAVENSWOOD TO LANDERS CREEK AREA	GEOL, GEOLMA, PET	GRDEM, IPSURV, GRDMAG	ROCK, SOIL, STRSED, ASSAY/>200	COST, DDRILL	GPYINT	6538/O, 6845/O, 6997/O, 7196/O, 7674/O, 8238/C, 8445/C, 9077/C, 9908/C, 10223/O, 10888/C, 11592/C, 11593/O, 12180/C, 13138/C
1900	CENTRAL PACIFIC MINERALS NL, SOUTHERN PACIFIC PETROLEUM NL	9/03/1978	OIL SHALE	PROSERPINE – LETHEBROOK AREA	GEOL, PET	GRDEM, GRAVIT, SEISMI	CORE, /Unknown	DRILL, DDRILL	FEAS, LITREV, ORERES, HYDGEO, ARCH	6703/C, 7409/O, 8236/C, 9034/C, 9782/C, 10385/C, 10847/C, 11790/C, 11837/C, 12101/O, 12102/O, 12558/C, 7915/C, 8281/C, 7622/C, 7901/O
2005	MINERAL RESOURCES DEVELOPMENT PTY LTD	4/09/1978	AU	NORMANBY GOLDFIELD	GEOL, GEOLMA		GEOCHE, STRSED, ASSAY/Unknown	COST		6900/O, 8337/O, 8338/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
2126	MINERAL RESOURCES DEVELOPMENT COMPANY PTY LTD	1/05/1979	AU, CU, PB, ZN	MOUNT HECTOR GOLDFIELD	GEOL, GEOLMA	GRAVSU	GEOCHE, BULK, ASSAY/>200	COST, PDRILL		7712/O, 8788/O
2132	BUDDHA GOLD MINES NL	14/05/1979	AU, AG	EDEN LASSIE TO KELSEY CREEK AREA	GEOL, GEOLMA, PHOGR, PET	GEOP, AERMAG, AERRAD, GRDEM, GRDMAG	GEOCHE, GRABSP, DUMPSA, PAN, HMSAMP, ROCK, SOIL, STRSED, ASSAY/Unknown	COST	LITREV	8035/O, 8962/O, 8963/O, 8964/O, 8965/O, 10061/O, 10978/O, 10979/O, 10980/O, 11476/O, 11477/O, 12483/O, 12640/O, 13526/O, 14343/O, 15060/O
2178	AGIP AUSTRALIA PTY LTD	14/09/1979	AU, U	MOUNT ABBOT TO ARMUNA AREA	GEOL, PET	AERRAD, GRDRAD			LITREV	8042/O
2245	CENTRAL PACIFIC MINERALS NL, SOUTHERN PACIFIC PETROLEUM NL	4/06/1980	OIL SHALE	DEBELLA AREA	GEOL	GRAVSU	CORE, ASSAY/Unknown	DDRILL		8580/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
2246	CENTRAL PACIFIC MINERALS NL, SOUTHERN PACIFIC PETROLEUM NL	20/11/1979	OIL SHALE	GUNYARRA – LETHEBROOK AREA			ASSAY/Unknown	DRILL		8459/C
2248	PENNZOIL OF AUSTRALIA LTD	21/11/1979	MO	KELLY'S MOUNTAIN	GEOLMA	GEOP, IPSURV, GRDMAG	GEOCHE, CORE, ROCK, ASSAY/101-200	DDRILL, ADRILL		7931/O, 8578/O, 10670/O
2276	OTTER EXPLORATION NL, ALLSTATE EXPLORATIONS NL	7/02/1980	CU, PB, ZN, AU	MOUNT GLENROY AREA	GEOL, GEOLMA	GRDMAG	ROCK, SOIL, STRSED, /51-100		LITREV, PHOTO	8315/O, 8639/O, 9373/O
2277	OTTER EXPLORATION NL, ALLSTATE EXPLORATIONS NL	22/01/1980	AU	MOUNT RAVENSWOOD AREA	GEOL, GEOLMA		ROCK, STRSED, /Unknown			8405/O
2334	AMOCO MINERALS AUSTRALIA COMPANY	11/03/1980	AG, AU, CU, PB	FLAGSTONE CREEK – EMU PLAINS – EXMOOR AREA	GEOL, GEOLMA		ROCK, STRSED, ASSAY/Unknown		LITREV	8264/O
2391	ITHAHIRA PTY LTD	10/06/1980	AG, AU	MOUNT CAVANA TO EDEN LASSIE AREA	GEOLMA, PET	GEOP, GRDMAG	GRABSP, PAN, ROCK, SOIL, STRSED, ASSAY/Unknown	PDRILL		8469/C, 9583/O
2418	GETTY OIL DEVELOPMENT COMPANY LTD	23/05/1980	AG, AU, CU, MO, PB, ZN	STRATHBOGIE AREA	GEOL, GEOLMA, PET		GEOCHE, ROCK, SOIL, STRSED, ASSAY/>200		LITREV	8515/O, 8991/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
2444	CENTRAL PACIFIC MINERALS NL, SOUTHERN PACIFIC PETROLEUM NL	4/06/1980	OIL SHALE	DEBELLA AREA	GEOL, GEOLMA	GRAVSU	CORE, ASSAY/Unknown	DDRILL		8713/C, 9666/O, 10146/O
2445	CENTRAL PACIFIC MINERALS NL, SOUTHERN PACIFIC PETROLEUM NL	29/05/1980	OIL SHALE	GUNYARRA – LETHEBROOK AREA	GEOL, GEOLMA, PET	GRAVIT	ASSAY/Unknown	DRILL, DDRILL	ENVIRO, FEAS, MINDES, ORERES, HYDGEO, ARCH	8236/C, 8281/C, 9034/C, 9782/C, 12101/O, 12102/O
2517	DAMPIER MINING COMPANY LTD	7/08/1980	OIL SHALE	TOWNSVILLE AREA		GRAVSU, GRAVIT				9941/O
2644	GEOFFREY JAMES FULLER	5/11/1980	AU, CU, PB, SN	MOUNT ROUNDBACK – MOUNT QUANDONG AREA	GEOL, GEOLMA, PHOGR	GRDEM, IPSURV, GRDMAG	GEOCHE, PAN, ROCK, SOIL, STRSED, ASSAY/Unknown	COST, RPERC	LITREV	8773/O, 9650/O, 10879/O, 11667/O, 20410/O
2738	INTEK SERVICES PTY LTD	3/12/1980	AG, AU, CU	MARENGO GOLDFIELD	GEOL, PHOGR		GEOCHE, HMSAMP, ROCK, STRSED, ASSAY/51-100		LITREV, ORERES	8835/O, 9731/O
2877	GOLD FIELDS EXPLORATION PTY LTD	20/02/1981	AU, CU, MO	EMU CREEK AREA	GEOLMA, PET		GEOCHE, ROCK, STRSED, ASSAY/101-200		LITREV	10566/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
2961	CENTRAL PACIFIC MINERALS NL, SOUTHERN PACIFIC PETROLEUM NL	25/05/1981	OIL SHALE	GUNYARRA – LETHEBROOK AREA	GEOL, GEOLMA, PET	GEOP, GRDEM, RESSUR		DDRILL	ENVIRO, FEAS, LITREV, MINDES, ORERES, HYDGEO, ARCHIN	9782/C, 10385/C, 10847/C, 11790/C, 11837/C, 12558/C
3012	MINERAL RESOURCES DEVELOPMENT PTY LTD	25/05/1981	AU	NORMANBY GOLDFIELD	GEOL		STRSED, ASSAY/Unknown			10424/O
3142	ASHTON MINING LTD	6/11/1981	AU	MOUNT CARLTON AREA	GEOL, GEOLMA, PET	GRDMAG	CORE, ROCK, ASSAY/Unknown	DDRILL	LITREV	11492/O
3149	BUDDHA GOLD MINES NL	16/11/1981	AG, AU	MOUNT CAVANA TO KELSEY CREEK AREA	GEOL, PHOGR		GEOCHE, PAN, HMSAMP, ROCK, STRSED, /Unknown		LITREV	10554/O, 11476/O, 11481/O, 11622/O, 12879/O, 12880/O
3220	DUVAL MINING (AUSTRALIA) LTD	22/02/1982	AU	MOUNT GLENROY AREA	GEOL, GEOLMA		GEOCHE, HMSAMP, ROCK, SOIL, STRSED, /101-200		LITREV, PHOTO	11894/O, 12048/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
3285	BUDDHA GOLD MINES NL	11/05/1982	AG, AU	MOUNT CAVANA TO EDEN LASSIE AREA	GEOL, GEOLMA, PHOGR, PET	AERMAG, AERRAD, GRDMAG	GEOCHE, PAN, ROCK, SOIL, ASSAY/>200	ADRILL	LITREV	11681/O, 12958/O, 12959/O, 12960/O, 13526/O, 14343/O, 15060/O
3289	MAGNUM EXPLORATIONS LTD	11/05/1982	AG, AU, CU	EURI CREEK AREA	GEOL, GEOLMA, PET		GEOCHE, CORE, PAN, ROCK, SOIL, STRSED, ASSAY/Unknown	COST, DDRILL	LITREV	11632/O
3349	UTAH DEVELOPMENT COMPANY LTD	10/12/1982	CU, AU	RANGEVIEW AREA	GEOL, GEOLMA, LAND, PHOGR	GEOP, IPSURV, GRDMAG	ROCK, SOIL, STRSED, ASSAY/>200	DDRILL	LITREV	11852/O, 12660/O
3378	ANACONDA AUSTRALIA INCORPORATED, JONES MINING NL	18/01/1983	AG, AU	MOUNT HECTOR GOLDFIELD	GEOL, GEOLMA	GRDMAG, GRDRAD	ROCK, SOIL, ASSAY/Unknown	COST	LITREV	12548/O, 13219/O
3439	MOUNT ISA MINES LTD	13/03/1983	CU, ZN, PB	BROOKVILLE TO LANDERS CREEK AREA	GEOL, GEOLMA	GRDEM	ROCK, SOIL, /Unknown			13216/O
3496	UTAH DEVELOPMENT COMPANY LTD	30/05/1983	CU	RANGEVIEW AREA	GEOL, GEOLMA, PHOGR, PET		GEOCHE, ROCK, STRSED, ASSAY/101-200			12666/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
3520	SOUTHERN PACIFIC PETROLEUM NL, CENTRAL PACIFIC MINERALS NL, QUEENSLAND ENERGY RESOURCES LTD	17/06/1983	OIL SHALE	GUNYARRA TO LETHEBROOK AREA	GEOL, GEOLMA, PET		BULK, CORE, SOIL, STRSED, ASSAY>200	DDRILL	ENVIRO, FEAS, LITREV, MINDES, ORERES, HYDGEO	12320/C, 13844/C, 20467/O, 20647/C, 21742/C, 27728/C, 31944/C, 32164/C
3563	DUVAL MINING (AUSTRALIA) LTD	15/08/1983	AU	MOUNT GLENROY AREA	GEOL, GEOLMA, PHOGR, PET		PAN, ROCK, SOIL, STRSED, /Unknown			13251/O
3590	KING SOLOMON MINING COMPANY PTY LTD	5/10/1983	AU	DON RIVER HEADWATERS					LITREV	12989/O, 13687/O
3680	MOUNT ISA MINES LTD	10/02/1984	CU, AU	BROOKVILLE TO LANDERS CREEK AREA	GEOL, GEOLMA		PAN, ROCK, STRSED, ASSAY/20-50		LITREV	13932/C, 14562/O, 14563/C, 15705/C, 15706/C, 16376/O
3778	POSEIDON MINERALS LTD	19/09/1984	AU	LETHEBROOK TO CATHU AREA	GEOL, PHOGR					14093/O
3889	SELTRUST MINING CORPORATION PTY LTD	19/12/1984	AG, AU, PB	KELSEY CREEK TO MOUNT BEATRICE AREA			GEOCHE, GRABSP, PAN, ROCK, ASSAY/Unknown			14778/O, 14779/O, 14780/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
3891	SELTRUST MINING CORPORATION PTY LTD	19/12/1984	AU	STRATHBOGIE AREA	GEOL, LAND, PHOGR				LITREV	14632/O
3923	ROXTEL PTY LTD, TAMLAR PTY LTD	17/12/1984	AG, AU	NORMANBY GOLDFIELD	GEOL, GEOLMA		PAN, ROCK, STRSED, ASSAY/Unknown		LITREV, ORES	16042/O, 16043/O, 15591/O, 15592/O, 18030/O, 18361/O
3932	CRA EXPLORATION PTY LTD	8/02/1985	AU	MOUNT GLENROY AREA	GEOL		ROCK, SOIL, STRSED, /Unknown		LITREV	15049/O
4024	ARDGOLD PTY LTD	21/06/1985	AU	LIONEL DIGGINGS	GEOLMA, PHOGR	GEOP	PAN, ROCK, STRSED, ASSAY/20-50	COST		16184/O, 16185/O, 16776/O, 16777/O, 18520/O
4051	BP AUSTRALIA GOLD PTY LTD	19/07/1985	AU	STRATHBOGIE AREA	GEOLMA, PHOGR		CUTSAM, ROCK, ASSAY/Unknown	PDRILL, RCDRIL	LITREV	15356/O
4052	A I H GOLD PTY LTD, BP AUSTRALIA PTY LTD	19/07/1985	AU	MOUNT WICKHAM AREA	GEOL, GEOLMA, PHOGR		ROCK, STRSED, ASSAY/Unknown			15313/O
4083	BURMINE PTY LTD, POSEIDON MINERALS LTD	9/09/1985	AG, AU, PB	EMU CREEK – MOUNT ABBOT AREA	GEOL, GEOLMA, PET		GEOCHE, ROCK, ASSAY/101-200		LITREV	16957/O, 16958/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
4101	ASTRIK RESOURCES NL, RANGER EXPLORATION NL	27/09/1985	AU	CARSE O GOWRIE TO RANGEVIEW AREA	GEOL, GEOLMA, LAND, PHOGR		ROCK, STRSED, /Unknown		LITREV	16443/O, 16444/O
4108	UNION OIL DEVELOPMENT CORPORATION	2/09/1985	AU, RUTILE, ZIRCON	BURDEKIN RIVER DELTA			CUTSAM, ASSAY/Unknown	RDRILL, RCDRIL	LITREV, METURG	15778/O, 15779/O
4254	CHRISTOPHER JAMES BULL, JOHN HOLDERNESS BULL, SIGFRIED E. TISCHER	2/04/1986	CU, NI, PB, PT	MOUNT PRING AREA	GEOLMA	GEOP, GRDMAG	GEOCHE, ROCK, SOIL, STRSED, ASSAY/>200			17696/O, 18936/C
4291	GEORGE ALEXANDER DONALDSON, CHARLES REGINALD HAYWARD, RAYMOND GEORGE SOUTTER, ROBERT CLARENCE WALZ	19/05/1986	AU, CU	BOWEN AREA	GEOLMA		GEOCHE, ROCK, ASSAY/Unknown		LITREV	16982/C

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
4310	ASHTON MINING LTD, CARPENTARIA GOLD PTY LTD	19/06/1986	AU	MOUNT CARLTON AREA	GEOL, GEOLMA, MSS, PET	AERMAG, AERRAD, RESSUR	GEOCHE, BULK, CORE, CUTSAM, ROCK, SOIL, STRSED, ASSAY/Unknown	COST, DDRILL, PDRILL	LITREV	16732/C, 16733/C, 16734/O, 19109/C, 19111/C, 19871/C, 21276/C
4334	KENNECOTT EXPLORATIONS (AUSTRALIA) LTD	24/07/1986	AU	MOUNT GLENROY AREA	GEOL, GEOLMA		HMSAMP, ROCK, SOIL, STRSED, /Unknown	RCDRIL	LITREV, GPYINT, PHOTO	17465/O, 17681/O, 18222/O, 18484/O, 20781/O, 22893/O
4413	CARPENTARIA GOLD PTY LTD	15/09/1986	AU	MOUNT DALRYMPLE	GEOL	IPSURV, GRDMAG	ROCK, SOIL, STRSED, />200	RPERC		17085/O, 18144/O, 19142/O, 19151/O, 21443/O, 23322/O
4415	ASHTON MINING LTD, CARPENTARIA GOLD PTY LTD	16/09/1986	AU	MOUNT WICKHAM AREA	GEOLMA, PET		GEOCHE, ROCK, SOIL, STRSED, ASSAY/>200	PDRILL		16366/C, 17476/C, 19871/C, 21276/C, 17799/C
4435	IDAMENEO (NO.126) PTY LTD, XENOLITH GOLD LTD	28/02/1986	AG, AU	MARENGO GOLDFIELD	GEOL, GEOLMA, PHOGR,		GEOCHE, BULK, CUTSAM, ROCK, STRSED, ASSAY/Unknown	COST, RCDRIL	LITREV, METURG	16324/O, 17837/O, 18213/O, 19003/O, 19118/O, 19133/O, 20043/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
4476	CARPENTARIA GOLD PTY LTD, MOUNT ISA MINES LTD	10/11/1986	AU	MOUNT HECTOR GOLDFIELD	GEOL, GEOLMA, PET	AERMAG, AERRAD, GRAVSU, GRDMAG	PAN, ROCK, SOIL, STRSED, ASSAY/>200	COST	LITREV	16272/O, 17587/O, 18184/O, 19635/O, 21035/O, 21718/O
4502	BP AUSTRALIA GOLD PTY LTD	28/11/1986	AU	STRATHBOGIE AREA	PHOGR		BULK, GRABSP, ROCK, ASSAY/101-200		LITREV	16339/O
4503	ASTRIK RESOURCES NL, ORION RESOURCES NL	28/11/1986	AU	CARSE O GOWRIE TO RANGEVIEW AREA	GEOL, GEOLMA, PHOGR		ROCK, STRSED, ASSAY/20-50			16696/O, 19069/O
4625	BATTLE MOUNTAIN (AUSTRALIA) INCORPORATED	12/03/1987	AU, AG	MOUNT CROMPTON TO BLOOMSBURY AREA			GEOCHE, BULK, GRABSP, ROCK, STRSED, ASSAY/Unknown			17074/O
4626	BATTLE MOUNTAIN (AUSTRALIA) INCORPORATED	12/03/1987	AU	EXMOOR TO BROKEN RIVER AREA	GEOL, GEOLMA		GEOCHE, BULK, GRABSP, ROCK, STRSED, />200		LITREV	17596/O, 18664/O, 20386/O
4646	STUART VALENTINE FOSTER, SALAMANDER GOLD MINES NL, VICTORIAN OIL NL, CENTURY UNDERWRITING AGENTS PTY LTD, PORTSIDE PTY LTD	15/03/1987	AU	KELSEY CREEK AREA	GEOL, GEOLMA	GEOP, AERMAG	GEOCHE, CUTSAM, ROCK, STRSED, ASSAY/Unknown	COST, DDRILL, RDRILL	LITREV	18617/O, 20998/O, 23307/O, 25143/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
4648	CSR LTD	18/03/1987	AU	MOUNT ABBOT AREA	GEOL, GEOLMA, PHOGR		GEOCHE, BULK, ROCK, STRSED, ASSAY/101-200		LITREV	17413/O
4679	KEELA-WEE EXPLORATION LTD, JULIA GOLD NL	1/04/1987	AG, AU, CU, PB, SB, ZN	MOUONT CAVANA TO EDEN LASSIE AREA	GEOL, GEOLMA		BULK, CUTSAM, ROCK, SOIL, STRSED, ASSAY/Unknown	COST, PDRILL, RCDRIL	LITREV	17084/O, 18444/O, 19015/O, 19244/O, 20367/O, 21094/O
4704	SPECTRUM RESOURCES NL	9/04/1987	AU, MO, CU	KELLY'S MOUNTAIN	GEOL, GEOLMA		GEOCHE, ROCK, ASSAY/20-50		LITREV	17192/O, 18460/O, 18544/O
1 4727	ASHTON MINING LTD, CARPENTARIA GOLD PTY LTD	29/04/1987	AU	STRATHBOWEN – BIRRALEE AREA	GEOL, PHOGR	AERMAG, AERRAD	GEOCHE, BULK, ROCK, SOIL, STRSED, ASSAY/Unknown	COST, PDRILL		18044/O, 19871/C, 20751/O
4728	ASHTON MINING LTD, CARPENTARIA GOLD PTY LTD	29/04/1987	AU	STRATHBOGIE AREA	GEOLMA, PET		GEOCHE, ROCK, STRSED, ASSAY/>200	DDRILL		18741/O, 19871/C, 21276/C, 19000/O
4767	DENISON RESOURCES NL	22/05/1987	AU	MOUNT LESLIE AREA	GEOL, LAND, MSS		STRSED, ASSAY/>200			18382/O, 18964/O, 19617/O, 22106/O
4817	REGENT MINING LTD	16/07/1987	AU	SANDALWOOD CREEK AREA	GEOL, GEOLMA, PHOGR		ROCK, STRSED, /101-200			18384/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
4830	MARKWOOD PTY LTD	29/07/1987	AU, CU	WOODHOUSE AREA	GEOL		GEOCHE, PAN, STRSED, ASSAY/101-200			18593/O
4832	SALAMANDER RESOURCES PTY LTD	30/07/1987	AU	HILLSBOROUGH TO PLUM TREE AREA	GEOL, GEOLMA		ROCK, STRSED, ASSAY/>200			18229/O, 20183/O
4840	CRA EXPLORATION PTY LTD	4/08/1987	AU	MOUNT CARLTON AREA	GEOL, GEOLMA, LAND, MSS, PET	GEOP, AERMAG, AERRAD	BULK, GRABSP, PAN, ROCK, SOIL, STRSED, ASSAY/>200		LITREV	17675/O, 18109/O, 18438/O, 18861/O, 21589/O, 22134/O, 22186/O, 22360/O, 20982/O
4857	HENRY CLIVE RAMSDEN	11/08/1987	ANDALUSITE	MOUNT CAVANA AREA	GEOLMA, PET		GEOCHE, BULK, ROCK, ASSAY/Unknown		FEAS, LITREV, ORERES	18231/O, 18858/O, 20653/O
4859	BATTLE MOUNTAIN (AUSTRALIA) INCORPORATED	11/08/1987	AG, AU	BLEMHEIM TO BROKEN RIVER AREA	GEOL, GEOLMA		GEOCHE, CUTSAM, GRABSP, PAN, ROCK, SOIL, STRSED, ASSAY/Unknown	RCDRIL	LITREV	18490/O, 18859/O, 20478/O, 20908/O
4862	ROSS MINING NL	13/08/1987	AU, CU	MOUNT POOLE AREA	GEOLMA		BULK, ROCK, SOIL, STRSED, ASSAY/Unknown		LITREV	18318/O, 18461/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
4913	PAN AUSTRALIAN MINING LTD	7/09/1987	AU	RANGEVIEW AREA	GEOL, PHOGR		ROCK, STRSED, /101-200			18120/O, 19538/O, 19708/O, 20731/O
4938	STEVEN JOHN MCDONALD	17/09/1987	AG, AU	GRANT CREEK AREA	GEOLMA, PHOGR		GEOCHE, BULK, PAN, ROCK, SOIL, STRSED, ASSAY/Unknown	COST	LITREV	17954/O, 19257/O, 19342/O, 20065/O
4950	BOWEN GOLD MINES PTY LTD, WESTERN MINING CORPORATION LTD	23/09/1987	AU	DON RIVER HEADWATERS	GEOLMA, LAND, PET		GEOCHE, ROCK, STRSED, ASSAY/Unknown		LITREV	18329/O, 19335/O
4953	BERNARD EXPLORATION NL	24/09/1987	AG, AU, PB	FLAGSTONE CREEK TO EMU PLAINS AREA	LAND	AERMAG, AERRAD	GEOCHE, BULK, ROCK, STRSED, ASSAY/Unknown		LITREV	17588/O, 19933/O, 20035/O, 20857/O
4954	BERNARD EXPLORATION NL	24/09/1987	AU	FLAGSTONE CREEK AREA	GEOLMA		GEOCHE, ROCK, /Unknown		LITREV	19215/O
4969	CSR LTD	25/09/1987	AU	BRIABA AREA	GEOLMA		GEOCHE, BULK, ROCK, STRSED, ASSAY/Unknown			17997/C, 19561/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
4977	BOWEN GOLD MINES PTY LTD, CHARLES REGINALD HAYWARD, RAYMOND GEORGE SOUTTER, ROBERT CLARENCE WALZ, WESTERN MINING CORPORATION LTD	23/09/1987	AU	ARMUNA TO ROMA PEAK AREA	GEOL, GEOLMA, LAND, PET		GEOCHE, ROCK, STRSED, ASSAY/Unknown		LITREV	18348/O, 19335/O
5001	ASHTON MINING LTD	12/10/1987	AU	STRATHALBYN AREA	GEOL, MSS		ROCK, SOIL, STRSED, />200		GPYINT	18350/O, 19650/O, 21749/O, 22086/O
5002	ASHTON MINING LTD	12/10/1987	AU	STRATHBOGIE AREA	GEOL, GEOLMA, MSS	GEOP, GRDMAG	GEOCHE, GRABSP, ROCK, SOIL, STRSED, ASSAY/Unknown			19072/O, 19651/O, 21749/O, 22086/O
5003	CARPENTARIA EXPLORATION COMPANY PTY LTD	15/10/1987	AU	LEICHHARDT RANGE AND LANDERS CREEK AREAS	GEOL		STRSED, /Unknown			18924/C

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
5005	AUSTRALIAN OVERSEAS MINING LTD	15/10/1987	AU	BRIABA AREA	GEOL, GEOLMA, LAND, MSS	AERMAG, AERRAD, GRDMAG	BULK, GRABSP, ROCK, SOIL, STRSED, ASSAY/>200	RAIRB, PDRILL		18568/O, 19446/O, 20034/O, 21339/O, 21423/O, 21562/O
5018	KENNECOTT EXPLORATIONS (AUSTRALIA) LTD	27/10/1987	AU	PRETTY BEND TO MONTE CHRISTO AREA	GEOL, GEOLMA, LAND, PHOGR		BULK, GRABSP, PAN, ROCK, SOIL, STRSED, ASSAY/>200		LITREV	18931/O, 19314/O
5046	BOWEN GOLD MINES PTY LTD, WESTERN MINING CORPORATION LTD	16/11/1987	AU	MONTE CHRISTO AREA	GEOL, GEOLMA, LAND, PET		GEOCHE, ROCK, STRSED, ASSAY/Unknown		LITREV	18337/O, 19335/O
5055	CRA EXPLORATION PTY LTD	17/11/1987	AG, AU, CU, PB, ZN	MOUNT MACKENZIE AREA	GEOL, LAND		GEOCHE, BULK, GRABSP, ROCK, SOIL, STRSED, ASSAY/101-200		LITREV	18953/O, 19319/O, 19832/O, 21294/O, 21424/C, 21618/O
5070	CRA EXPLORATION PTY LTD	18/11/1987	AG, AU, CU, PB, ZN	MOUNT CARLTON AREA	GEOL, GEOLMA, LAND, PET	GEOP, AERMAG, AERRAD, GRDMAG	GEOCHE, BULK, CORE, CUTSAM, ROCK, SOIL, STRSED, ASSAY/Unknown	DDRILL, PDRILL, RCDRIL		18633/O, 19326/O, 19619/O, 21342/O, 22559/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
5121	BATTLE MOUNTAIN (AUSTRALIA) INCORPORATED	5/01/1988	AU	MOUNT BARKER AREA	GEOLMA		GEOCHE, BULK, GRABSP, ROCK, STRSED, ASSAY/101-200		LITREV	18324/O, 20478/O, 20537/O, 20908/O
5140	BUFFALO RESOURCES PTY LTD	12/01/1988	AU, MAGNETITE, SN, ZIRCON	CAPE UPSTART	GEOL			ADRILL	LITREV, ORES	19437/O, 21736/O
5145	AUSTWHIM RESOURCES NL	12/01/1988	AU	RANGEVIEW TO LANDERS CREEK AREA	GEOL, GEOLMA	GRDMAG	GEOCHE, ROCK, SOIL, STRSED, ASSAY/>200		PHOTO	19819/O, 20166/O, 21563/O
5177	CRA EXPLORATION PTY LTD	20/01/1988	AU, CU, MO	ROMA PEAK AREA			GEOCHE, BULK, ROCK, STRSED, ASSAY/Unknown		LITREV	18952/O, 19509/O, 19850/O, 21538/O
5178	CRA EXPLORATION PTY LTD	20/01/1988	AU	MOUNT ABBOT AREA			GEOCHE, GRABSP, ROCK, STRSED, ASSAY/Unknown		LITREV	18317/O
5179	CRA EXPLORATION PTY LTD	20/01/1988	AU	MOUNT BEATRICE AREA			GEOCHE, BULK, STRSED, ASSAY/20-50		LITREV	18424/O
0 5213	CRA EXPLORATION PTY LTD	8/02/1988	AU	MOUNT BELLA VISTA AREA	GEOL, LAND	GEOP, AERMAG	GEOCHE, BULK, GEOBOT, GRABSP, STRSED, ASSAY/101-200		LITREV	18551/C, 19481/O, 19937/O, 20658/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
5244	CRA EXPLORATION PTY LTD	16/02/1988	AU	PINDI PINDI TO MOUNT JUKES AREA	GEOL, GEOLMA	GEOP, AERMAG	GEOCHE, BULK, GRABSP, ROCK, STRSED, ASSAY/51-100		LITREV	18855/O, 19216/O
5259, 5288	BOWEN GOLD MINES PTY LTD, WESTERN MINING CORPORATION LTD	22/02/1988, 18/03/1988	AU	MOUNT MACKENZIE TO LONGFORD CREEK AREA	GEOLMA, PET	IPSURV, GRDMAG, RESSUR	GEOCHE, CUTSAM, GRABSP, ROCK, SOIL, STRSED, ASSAY/Unknown	COST, DDRILL, RCDRIL	LITREV	19397/O, 20839/O
5294	CRA EXPLORATION PTY LTD	21/03/1988	AU	THOOPARA TO MIDGE POINT AREA	GEOL, GEOLMA	GEOP, AERMAG, AERRAD	GEOCHE, BULK, GRABSP, ROCK, SOIL, STRSED, ASSAY/101-200		LITREV	19236/O, 19941/O, 20370/O, 22301/O
5346	CRA EXPLORATION PTY LTD	15/04/1988	AU	MOUNT PROSERPINE AREA		GEOP, AERMAG, AERRAD	GEOCHE, BULK, GRABSP, ROCK, STRSED, ASSAY/51-100		LITREV	20453/O
5350	CHRIS BULL, JOSEPH FRANCIS MASTERSON	18/04/1988	AU	JULIVON CREEK AREA	GEOLMA		BULK, CORE, CUTSAM, PAN, STRSED, ASSAY/101-200		LITREV	18226/C, 20203/O, 20446/O
5354	WESTERN MINING CORPORATION LTD	21/04/1988	AU	BOWEN AREA	GEOL, GEOLMA	IPSURV, GRDMAG	ROCK, SOIL, ASSAY/Unknown	COST	LITREV	19397/O
5379	MILLAROO MINES NL	19/05/1988	AU	CLARE TO DALBEG AREA			/<20			19647/O, 20265/O

Table 1 (continued)

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					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
5396	CRA EXPLORATION PTY LTD	24/05/1988	AU	MOUNT CARLTON AREA	GEOL, GEOLMA, LAND, MSS	GEOP, AERMAG, AERRAD, GRDMAG	GEOCHE, BULK, CUTSAM, GRABSP, ROCK, SOIL, STRSED, ASSAY/>200	RAIRB, PDRILL, RCDRIL	LITREV	20487/O, 20539/O, 21728/O, 21949/O, 22696/O
5411	CARPENTARIA GOLD PTY LTD	30/05/1988	AU, CU, PB, ZN	RAVENSWOOD TO LANDERS CREEK AREA	GEOL, GEOLMA, LAND	AERMAG, AERRAD, GRDEM, IPSURV, GRDMAG	CORE, CUTSAM, ROCK, SOIL, STRSED, ASSAY/Unknown	COST, DDRILL, RPERC, RCDRIL	MINDES, MINEDE, ORERES, GPYINT	19870/C, 20969/O, 21665/C, 23065/C, 23896/C, 24518/C
5474	DONALD SMITH	5/07/1988	AU	GOORGANGA CREEK			PAN, STRSED, ASSAY/Unknown			21054/O
5486	ASHTON MINING LTD	11/07/1988	AU	RAVENSWOOD TO CARSE O GOWRIE AREA	GEOL, GEOLMA		ROCK, ASSAY/51-100		LITREV	19572/O
5490	CRA EXPLORATION PTY LTD	13/07/1988	AU	MIDGE POINT TO PINDI PINDI AREA	GEOL, GEOLMA	AERMAG, AERRAD, IPSURV, GRDMAG, GRDRAD, RESSUR	GEOCHE, BULK, ROCK, SOIL, STRSED, ASSAY/>200		LITREV	18983/O, 21591/O, 22797/O
5510	CRA EXPLORATION PTY LTD	29/08/1988	AU	BLOOMSBURY TO MOUNT CHARLTON AREA	GEOL, GEOLMA	GEOP, AERMAG	GEOCHE, BULK, GRABSP, ROCK, STRSED, ASSAY/51-100		LITREV	20497/O, 21592/O, 21779/O, 22734/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
5542	FORSAYTH NL, GOLDEN PLATEAU NL	10/10/1988	AU	GOORGANGA CREEK AREA	GEOL, PHOGR		GEOCHE, ROCK, STRSED, ASSAY/Unknown		LITREV	20884/O
5543	FORSAYTH NL, GOLDEN PLATEAU NL	10/10/1988	AU, CU, PB, ZN	MOUNT HECTOR GOLDFIELD	PHOGR		GEOCHE, BULK, ROCK, SOIL, STRSED, ASSAY/51-100		LITREV	21624/O, 21887/O, 21888/O
5559	UNION OIL DEVELOPMENT CORPORATION	25/10/1988	AU	RANGEVIEW AREA	GEOL, GEOLMA, PHOGR		PAN, ROCK, SOIL, STRSED, ASSAY/>200		LITREV	20251/O, 21817/O, 22671/O
5576	ASHTON MINING LTD	2/11/1988	AU	STRATHALBYN AREA	GEOL		STRSED, /Unknown			21749/O, 22086/O
5604	RAVENSWOOD RESOURCES LTD	17/11/1988	CR, IR, MAGNESITE, OS, PD, PT	MOUNT PRING AREA					LITREV	20749/O
5620	WESTERN MINING CORPORATION LTD	22/02/1988	AU, CU, PB, ZN	MOUNT MACKENZIE AREA		GEOP, IPSURV, GRDMAG, RESSUR	GEOCHE, CORE, CUTSAM, GRABSP, ROCK, SOIL, STRSED, ASSAY/Unknown	COST, DDRILL, RCDRIL	LITREV	20839/O
5657	WESTERN MINING CORPORATION LTD	6/12/1988	AU, CU, PB, ZN	MOUNT CHALLENGER AREA		RESSUR	GEOCHE, CORE, CUTSAM, GRABSP, ROCK, STRSED, ASSAY/Unknown		GEOSTA	20839/O
5670	GERMAN MINES NL	14/12/1988	AU	KIRK RIVER TO LANDERS CREEK AREA	GEOL, GEOLMA				LITREV, PHOTO	20074/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
5684	ASHTON MINING LTD	20/12/1998	AU	MOUNT LOUISA	GEOLMA		ROCK, STRSED, />200			20438/O, 20757/O
5733	ASHTON MINING LTD	8/02/1989	AU	DALBEG TO MOUNT WICKHAM AREA	GEOL, GEOLMA, PHOGR		ROCK, STRSED, ASSAY/101-200			20824/O, 20923/O
5807, 6914	AUSTWHIM RESOURCES NL	17/03/1989, 5/01/1990	AU	STRATHALBYN AREA	GEOL		ROCK, SOIL, STRSED, /101-200			22562/O
5809	ASHTON MINING LTD	20/03/1989	AU	STRATHBOGIE AREA	GEOL, GEOLMA, PET	GEOP, IPSURV, GRDMAG, RESSUR	CUTSAM, ROCK, SOIL, STRSED, ASSAY/>200			21370/O
5841	CRA EXPLORATION PTY LTD	12/04/1989	AU	SEAFORTH AREA		GEOP, AERMAG	GEOCHE, BULK, GRABSP, STRSED, ASSAY/Unknown		LITREV	20926/O
5927	AXIS MINING NL	16/06/1989	AU	RANGEVIEW AREA	GEOL, PHOGR		ROCK, STRSED, /Unknown			20855/O
5956	PORPHYRY (1939) GOLD MINE NL	6/07/1989	AU	RANGEVIEW AREA	GEOL, GEOLMA		ROCK, /Unknown		LITREV, GPYINT	22191/O
5958	CRA EXPLORATION PTY LTD	6/07/1989	AU	MIDGE POINT	GEOL, GEOLMA	AERMAG, AERRAD	GEOCHE, BULK, CUTSAM, ROCK, SOIL, STRSED, ASSAY/101-200	PDRILL	LITREV	22730/O
6063	ACM OPERATIONS LTD	5/10/1989	AU, AG, CU	STRATHBOGIE AREA	GEOL, GEOLMA		GEOCHE, BULK, ROCK, STRSED, ASSAY/51-100		LITREV	21524/O, 22180/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
6064	ACM GOLD OPERATIONS PTY LTD	5/10/1989	AU	EXMOOR AREA	GEOL, GEOLMA		GEOCHE, BULK, ROCK, STRSED, ASSAY/Unknown		LITREV	21809/O, 22399/O
6074	CRA EXPLORATION PTY LTD	11/10/1989	AU	CONDER HILLS	GEOL	GEOP, AERMAG, AERRAD, GRDMAG	GEOCHE, ROCK, ASSAY/Unknown			22333/O
6620	AXIS MINING NL	8/01/1990	AU	GLENDON AREA	GEOL, GEOLMA, PHOGR		ROCK, /20-50		LITREV	21735/O
6910	CIVIL AND MARINE ENGINEERS PTY LTD	5/01/1990	AU, CU	MOUNT HECTOR GOLDFIELD	GEOL, GEOLMA, PHOGR, PET		GEOCHE, CUTSAM, GRABSP, ROCK, ASSAY/Unknown	COST, PDRILL		21957/O, 23010/O
7003	NICHOLAS MATHER, RAVENSWOOD RESOURCES LTD	10/08/1990	AG, AU, CU, PB, ZN	NORMANBY GOLDFIELD	GEOL		GEOCHE, ROCK, ASSAY/Unknown		LITREV, ORERES	24030/O
7059	POSEIDON EXPLORATION LTD	22/05/1990	AU	RANGEVIEW AREA	GEOL, PHOGR				LITREV, GPYINT	22435/O
7175	NORMANDY EXPLORATION LTD	4/07/1990	AU, CU, PB, ZN	RANGEVIEW AREA	GEOL, GEOLMA, LAND	IPSURV, GRDMAG	GEOCHE, ROCK, SOIL, STRSED, /Unknown	COST, RCDRIL	LITREV, GPYINT, PHOTO	22852/O, 23943/O, 24243/O, 24832/O, 25061/C, 26249/C, 27681/C, 27871/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
7253	POSEIDON EXPLORATION LTD	3/01/1991	AU	MOUNT DALRYMPLE	GEOL		ROCK, STRSED, /Unknown		LITREV, GPYINT	23258/O
7254	CRA EXPLORATION PTY LTD	17/08/1990	AG, AU, CU, PB, ZN	CONDER HILLS AND TONGA RANGE	GEOL, GEOLMA, PET	GEOP, GRDEM, IPSURV, GRDMAG	GEOCHE, BULK, CORE, CUTSAM, ROCK, SOIL, STRSED, ASSAY/Unknown	DDRILL, RDRILL, ADRILL	LITREV	23159/O, 23287/O, 23552/O, 23755/O
7258	ASHTON MINING LTD, CARPENTARIA GOLD PTY LTD	30/05/1990	AG, AU, CU, PB, ZN	MOUNT CARLTON AREA	GEOL, GEOLMA, PHOGR, PET	AERMAG, AERRAD, IPSURV, GRDMAG	GEOCHE, BULK, CORE, CUTSAM, ROCK, SOIL, STRSED, ASSAY/>200	DDRILL, PDRILL, RCDRIL	LITREV, MINDES, ORERES	23066/C, 23812/C, 24614/C, 25809/C, 26218/O
7455	ACM GOLD OPERATIONS PTY LTD	30/08/1990	AG, AU, CU	MOUNT LESLIE AREA	GEOL		GEOCHE, BULK, STRSED, ASSAY/101-200		LITREV	23021/O
7456	ACM GOLD OPERATIONS PTY LTD	30/08/1990	AG, AU, CU	MOUNT LESLIE AREA			GEOCHE, BULK, STRSED, ASSAY/101-200		LITREV	23022/O
7458	POSEIDON EXPLORATION LTD	18/02/1991	AU	RANGEVIEW TO DALBEG AREA	GEOL, GEOLMA, LAND, PHOGR		ROCK, STRSED, /51-100		LITREV, GPYINT	22945/O
7469	POSEIDON EXPLORATION LTD	30/08/1990	AU	RANGEVIEW TO LANDERS CREEK AREA	GEOL, LAND, PHOGR, PET		ROCK, STRSED, ASSAY/51-100		LITREV, GPYINT	22838/O, 24134/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
7496	POSEIDON EXPLORATION LTD	30/08/1990	AU	RANGEVIEW AREA	GEOL, PHOGR		STRSED, /Unknown		GPYINT	23015/O
7544	GRAHAM LAMONT HARVEY	20/02/1991	AG, AU, CU, PB, ZN	GRANT CREEK	GEOL, GEOLMA, PHOGR, PET		PAN, HMSAMP, ROCK, STRSED, ASSAY/51-100	COST, TESTP	LITREV	24689/O
7567	CIVIL AND MARINE ENGINEERS PTY LTD	31/08/1990	AU	MOUNT HECTOR GOLDFIELD	GEOL				LITREV	23005/O
7605	POSEIDON EXPLORATION LTD	24/01/1991	AU	LANDERS CREEK AREA	GEOL, LAND, PHOGR		STRSED, /Unknown		LITREV, GPYINT	23317/O
7728	POSEIDON EXPLORATION LTD	22/01/1991	AU	CARSE O GOWRIE AREA	GEOL, LAND, PHOGR				LITREV, GPYINT	22838/O, 24110/O
7738	POSEIDON EXPLORATION LTD	16/01/1991	AU	LEICHHARDT RANGE-LANDERS CREEK AREA	GEOL		ROCK, SOIL, STRSED, ASSAY/101-200		LITREV, GPYINT	23556/O, 23619/O, 24662/O, 24918/O
7776	CARPENTARIA GOLD PTY LTD	11/07/1991	AG, AU, CU	STRATHBOGIE TO COLLINSVILLE AREA	GEOL, GEOLMA, PHOGR	IPSURV	GEOCHE, ROCK, SOIL, STRSED, ASSAY/Unknown		LITREV	24543/O, 24767/C, 25806/C, 25092/C
8143	POSEIDON EXPLORATION LTD	1/10/1991	AU	RANGEVIEW AREA	GEOL, LAND, PHOGR		ROCK, STRSED, ASSAY/20-50		LITREV, GPYINT	23748/O

Table 1 (continued)

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					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
8552	HUGH KEITH HERBERT, ROBERT PETER JOHN LEWIS	23/12/1991	AU, CU, PB, ZN	MOUNT LESLIE AREA	PET		GEOCHE, STRSED, /Unknown			25617/O
8622	MENZIES GOLD NL, PLUTONIC OPERATIONS LTD	28/02/1992	AU	BROKEN RIVER TO EUNGELLA AREA	GEOL, GEOLMA, PET	IPSURV, GRDMAG, RESSUR	GEOCHE, CUTSAM, ROCK, SOIL, STRSED, ASSAY/51-100	PDRILL, RCDRIL	LITREV	24682/O, 25918/O, 25984/O, 28068/O, 28069/O, 28109/O, 28575/O, 29664/O
8630	CARPENTARIA GOLD PTY LTD	21/01/1992	AU	RAVENSWOOD AREA	GEOL, GEOLMA		ROCK, SOIL, STRSED, ASSAY/Unknown		LITREV, GPYINT	24620/C
8641	ANTHONY JOHN FAWDON, DAVID WILLIAM SKETT	18/02/1992	AG, AU, CU	MARENGO GOLDFIELD	GEOL, GEOLMA, PHOGR		GEOCHE, BULK, GRABSP, HMSAMP, ROCK, SOIL, ASSAY/Unknown	COST	LITREV	24379/O
8718	NOEL ALEXANDER ADAM	18/03/1992	AU	KELSEY CREEK AREA			GEOCHE, PAN, ASSAY/Unknown	COST, TESTP		24738/O
8872	CRA EXPLORATION PTY LTD	6/07/1992	AU	EDEN LASSIE AREA	GEOL, GEOLMA					24118/O

Table 1 (continued)

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					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
8920	CARPENTARIA GOLD PTY LTD	17/08/1992	AU, CU, PB, ZN	KIRK RIVER TO BROOKVILLE AREA	GEOL, MSS	AERMAG, AERRAD, GRAVSU, GRDMAG	ROCK, SOIL, STRSED, ASSAY/Unknown	DDRILL	LITREV	24752/O, 26312/C, 27276/C, 28019/C, 29224/C, 30312/O, 30327/C, 30965/C, 31118/O, 32048/O, 32098/C, 32873/O, 32917/C, 33258/C, 34472/C, 34978/O, 37378/C, 38396/C, 38675/C
9139	DALRYMPLE RESOURCES NL	14/12/1992	AU	MOUNT GLENROY AREA	GEOL, GEOLMA		ROCK, SOIL, STRSED, /Unknown	DDRILL	LITREV, GPYINT, PHOTO	25983/O, 26038/O, 26691/O, 27519/O, 28512/O, 28513/O, 30648/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
9140	CARPENTARIA GOLD PTY LTD	9/12/1992	AU	MOUNT WRIGHT	GEOL, GEOLMA, MSS	AERMAG, AERRAD, GRAVIT, IPSURV	ROCK, SOIL, STRSED, ASSAY/>200	COST, DDRILL, RCDRIL		25193/C, 26454/C, 27530/C, 28367/C, 29337/O, 29588/O, 29625/C, 30965/C, 31341/O, 32098/C, 32353/O, 32917/C, 33215/O, 33258/C, 34415/O, 34472/C, 37380/C, 37441/O, 38675/C, 43534/C, 49482/C
9349	HUGH KEITH HERBERT, ROBERT PETER JOHN LEWIS	20/05/1993	AG, AU, CU, PB, ZN	MOUNT LESLIE AREA	GEOLMA, LAND		GEOCHE, STRSED, ASSAY/Unknown	PDRILL		26492/O, 27157/C
9445	COAL AND ALLIED OPERATIONS PTY LTD	1/07/1993	AU	MOUNT HERBERT TO BIRRALEE AREA	GEOL, GEOLMA	GRAVSU, GRDMAG	GEOCHE, /51-100	DDRILL	GPYINT	25992/O, 27034/O, 27797/O, 28377/O, 28923/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
9482	DORIAN MATHEW FRANCO GOTTANI	5/07/1993	AU	MOUNT GLENROY AREA	GEOL	GRDMAG	PAN, /Unknown	COST	LITREV	26891/O, 28692/O, 28693/O, 28694/O, 28350/O
9526	BHP MINERALS PTY LTD, HAOMA MINING NL	22/07/1993	AU	RANGEVIEW AREA	GEOL, GEOLMA	AERMAG, GRDMAG	CUTSAM, ROCK, SOIL, STRSED, ASSAY>200	RCDRIL	LITREV, PHOTO	26114/O, 26929/O, 27060/O, 27561/C, 28235/O, 29342/O, 30781/O, 30920/O, 31435/O, 32176/O, 32177/O, 32789/O, 33488/O
9662	BURRUM EXPLORATION PTY LTD	2/12/1993	AU	EDEN LASSIE AREA	GEOLMA, LAND				LITREV	27889/O, 27898/O
9664	STRIKE EXPLORATION PTY LTD	9/11/1993	AU, CU, MO	MARENGO GOLDFIELD	GEOL, GEOLMA, PHOGR		PAN, ROCK, SOIL, ASSAY/Unknown		LITREV	26614/O, 26787/O
9734	ARTADZE PTY LTD	4/03/1994	AG, AU, CU	MARENGO GOLDFIELD	GEOL, GEOLMA, LAND, PHOGR	AERMAG			LITREV	27668/O, 27899/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
9735	ARTADZE PTY LTD	4/03/1994	AG, AU, CU	MOUNT CAVANA TO MOUNT CHALLENGER AREA	GEOL, GEOLMA, LAND	AERMAG	GEOCHE, ASSAY/Unknown		LITREV	27668/O, 27900/O
9736	ARTADZE PTY LTD	4/03/1994	AG, AU, CU	FLAGSTONE CREEK TO EXMOOR AREA	GEOL, LAND				LITREV	27901/O, 27668/O
9737	ARTADZE PTY LTD	4/03/1994	AG, AU, CU	NORMANBY RANGE AREA	GEOL, LAND				LITREV	27668/O, 27902/O
9801	BHP MINERALS PTY LTD	8/12/1993	AU	RANGEVIEW AREA	GEOL, GEOLMA		ROCK, STRSED, /101-200		LITREV, GPYINT	26767/O, 27504/O
9827	BATTLE MOUNTAIN (AUSTRALIA) INCORPORATED	8/12/1993	AG, AU, CU, PB, ZN	MOUNT HECTOR GOLDFIELD	GEOL, GEOLMA		GEOCHE, BULK, ROCK, SOIL, STRSED, ASSAY/>200	COST	LITREV	26555/O, 27427/O
9922	ARTADZE PTY LTD	12/04/1994	AG, AU, CU	MARENGO GOLDFIELD	GEOL, GEOLMA, LAND	GEOP, AERMAG	GEOCHE, /Unknown		LITREV	

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
9937	BASIN GOLD PTY LTD, GOLD FIELDS AUSTRALASIA PTY LTD, CONQUEST MINING LTD, RESOLUTE LTD	15/02/1994	AU, AG	CRUSH CREEK	GEOL, GEOLMA, LAND, MSS, PHOGR, PET	GEOP, AERMAG, AERRAD, IPSURV, GRDMAG, RESSUR	GEOCHE, GRABSP, ROCK, SOIL, STRSED, ASSAY/>200	COST, DDRILL, RCDRIL, ADRILL	LITREV, METURG, ORERES	26321/C, 27454/C, 28751/C, 30475/C, 31132/C, 31952/C, 32854/C, 33389/C, 34594/C, 37355/O, 37403/C, 39789/C, 43430/C, 45699/C
10016	DILKERA RESOURCES PTY LTD	10/06/1994	AU, CU	EMU CREEK TO MOUNT MARION AREA	GEOL, GEOLMA, LAND	AERMAG	GEOCHE, /Unknown		LITREV, METURG	27287/C, 27984/O
10017, 10019, 10020	EURELLA RESOURCES PTY LTD	5/12/1992, 5/12/1994, 5/12/1994	AU	DALRYMPLE MOUNTAIN AND LEICHHARDT RANGE AREAS						27678/O
10018	DILKERA RESOURCES PTY LTD	10/06/1994	AU, CU	BOGIE RIVER TO EXMOOR AREA						27288/C, 27984/O
10052	SONS OF GWALIA LTD	16/06/1994	AU, CU	WOODHOUSE AREA	GEOL		GEOCHE, ROCK, SOIL, ASSAY/<20			27278/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
10141, 10153	DANAMORE PTY LTD, OWEN REGINALD WELLINGTON	24/06/1994, 10/06/1994	AU	MOUNT GLENROY AREA	GEOL, GEOLMA, LAND, PET	AERMAG, GRDMAG, GRDRAD	ROCK, SOIL, STRSED, /Unknown	COST, RCDRIL	GPYINT, PHOTO	26999/O, 28276/O, 29433/O, 30803/O, 30804/O, 31193/O
10164	CARPENTARIA GOLD PTY LTD, CONQUEST MINING LTD	28/06/1994	AU	MOUNT CARLTON AREA	GEOL, GEOLMA, LAND, PET	GEOP, AEREM, AERMAG, AERRAD, GRAVSU, IPSURV, GRDMAG	GEOCHE, BULK, CORE, CUTSAM, ROCK, SOIL, STRSED, ASSAY/>200	DRILL, DDRILL, RCDRIL	LITREV, METURG, ORERES	27277/C, 27761/C, 29175/C, 30451/O, 30529/C, 31075/C, 32557/C, 32682/O, 32855/C, 33391/C, 34696/C, 37422/C, 39794/C, 43430/C, 31065/C, 45496/C, 49789/C
10765	CARPENTARIA GOLD PTY LTD	25/10/1995	AU, CU	MOUNT LESLIE AREA	GEOL, GEOLMA		ROCK, STRSED, ASSAY/Unknown		LITREV	27970/O
10793	TERRY JOHN MORATO	3/07/1996	EARTHY LIME	PLUMTREE CREEK AREA	GEOL, GEOLMA		ASSAY/<20		LITREV	29053/O, 30364/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
10869	MIM EXPLORATION PTY LTD, CARPENTARIA GOLD PTY LTD	31/01/1996	AU	KIRKTON AREA	GEOL	AERMAG	ROCK, SOIL, STRSED, ASSAY/Unknown	RCDRIL	LITREV	28705/C, 29885/C, 30230/O, 30965/C, 31179/O, 32098/C, 32917/C, 33258/C, 34417/O, 34472/C, 37380/C, 37442/O, 38675/C, 43534/C, 45905/C
10901	OWEN REGINALD WELLINGTON, DANAMORE PTY LTD	18/01/1996	AU	RANGEVIEW AREA	GEOL, GEOLMA, LAND, PHOGR		STRSED, ASSAY/<20		LITREV, GPYINT	29324/O, 30027/O, 30977/O
10934	GOLDFIELDS EXPLORATION PTY LTD	11/03/1996	AU	MOUNT GLENROY AREA	GEOL, GEOLMA		ROCK, SOIL, STRSED, /51-100	RCDRIL	LITREV	28513/O, 30639/O
11031	PROBE RESOURCES NL	3/07/1996	AU, AG	MARENGO GOLDFIELD	GEOLMA		GEOCHE, PAN, ROCK, ASSAY/Unknown			28325/O
11038	ACAPULCO MINING NL	10/07/1996	AU	NORMANBY GOLDFIELD			GEOCHE, ROCK, ASSAY/>200			31494/O

Table 1 (continued)

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					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
11055	PROSERPINE LIME PTY LTD	29/04/1996	LIMESTONE	BEN LOMOND HILL			GEOCHE, /Unknown	DRILL	FEAS, ORERES	27810/O, 29429/O
11147	BATTLE MOUNTAIN (AUSTRALIA) INCORPORATED, RESOLUTE LTD	3/07/1996	AU	MOUNT CARLTON AREA	GEOL, GEOLMA, LAND, PHOGR	GEOP, AERMAG, AERRAD, IPSURV, GRDMAG, RESSUR	GEOCHE, CORE, CUTSAM, ROCK, SOIL, STRSED, ASSAY/Unknown	RCDRIL	LITREV, METURG, ORERES	28641/O, 29450/C, 31100/C, 31315/C, 31991/C, 32012/O, 32854/C, 33389/C, 34594/C, 37403/C, 39789/C, 39979/O, 43430/C, 45699/C, 49848/C
11267	GOLD EXPLORATION PTY LTD	15/08/1996	AU	MOUNT HECTOR GOLDFIELD	GEOL, GEOLMA, PHOGR, PET		GEOCHE, GRABSP, PAN, HMSAMP, ROCK, SOIL, STRSED, ASSAY/Unknown		LITREV, METURG, ARCHIN	28786/O, 29529/O, 30523/O, 31072/O, 31368/O

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
11343	ACAPULCO PTY LTD	13/09/1996	AG, AU, CU	NORMANBY GOLDFIELD	GEOL, GEOLMA, PET		GEOCHE, GRABSP, ROCK, ASSAY/101-200		LITREV, ORERES	29496/C, 30554/C, 31494/C, 33403/C, 33484/C, 37285/C, 37795/C, 43693/C, 44494/C, 44518/O, 49409/C
11483	GOLD FIELDS AUSTRALASIA PTY LTD, RESOLUTE SAMATHA LTD, RESOLUTE LTD	19/04/2000	AU	BRIABA TO COLLINSVILLE AREA					LITREV	32854/C, 33389/C, 33954/O, 34594/C, 37403/C, 39789/C, 39054/O, 42999/O
11602	MOUNT STEWART GOLD LTD	14/03/2005	AU	RANGEVIEW AREA	GEOL				LITREV, GPYINT	42622/C, 46450/C
11982	MOUNT STEWART GOLD LTD	30/03/2005	AU	RANGEVIEW AREA	GEOL				LITREV, GPYINT	42623/C, 46450/C
12527	RESOLUTE RESOURCES LTD	23/11/2004	AU, AG, CU	MOUNT CARLTON AREA	GEOLMA, LAND, PET	GEOP	ROCK, SOIL, STRSED, ASSAY/Unknown	RCDRIL	LITREV	40067/C, 43430/C, 45782/O, 49789/C

Table 1 (continued)

EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
12829	CARPENTARIA GOLD PTY LTD, CONQUEST MINING LTD	24/03/2000	AG, AU	MOUNT CARLTON AREA	GEOLMA, LAND, PHOGR		ROCK, SOIL, ASSAY/Unknown		LITREV	32855/C, 33300/O, 33391/C, 34696/C, 37422/C, 39794/C, 43430/C, 45496/C, 49789/C
12975	CHALCOPHILE RESOURCES PTY LTD	22/12/2000	AU	TONGA RANGE	GEOL	GRDRAD	GEOCHE, ROCK, SOIL, STRSED, ASSAY/Unknown		LITREV	32979/O
13007	RESOLUTE RESOURCES LTD, CONQUEST MINING LTD	23/11/2004	AU, AG, CU	BRIABA AREA	GEOL, GEOLMA, PET		ROCK, STRSED, ASSAY/>200			40066/C, 43430/C, 45734/O, 49789/C
13059	CONQUEST MINING LTD	23/11/2004	AU	EMU PLAINS AREA	GEOLMA, LAND, PHOGR		ROCK, STRSED, /Unknown		LITREV	40064/O, 44605/O
13867	CONQUEST MINING LTD	10/04/2003	AU	MOUNT CARLTON AREA	GEOL, LAND, PHOGR, PET	GRAVSU, IPSURV, GRDMAG, RESSUR	CORE, CUTSAM, ROCK, SOIL, ASSAY/Unknown	RCDRIL	LITREV, METURG, ORERES	37422/C, 39794/C, 43430/C, 45496/C, 45800/O, 49789/C

Table 1 (continued)

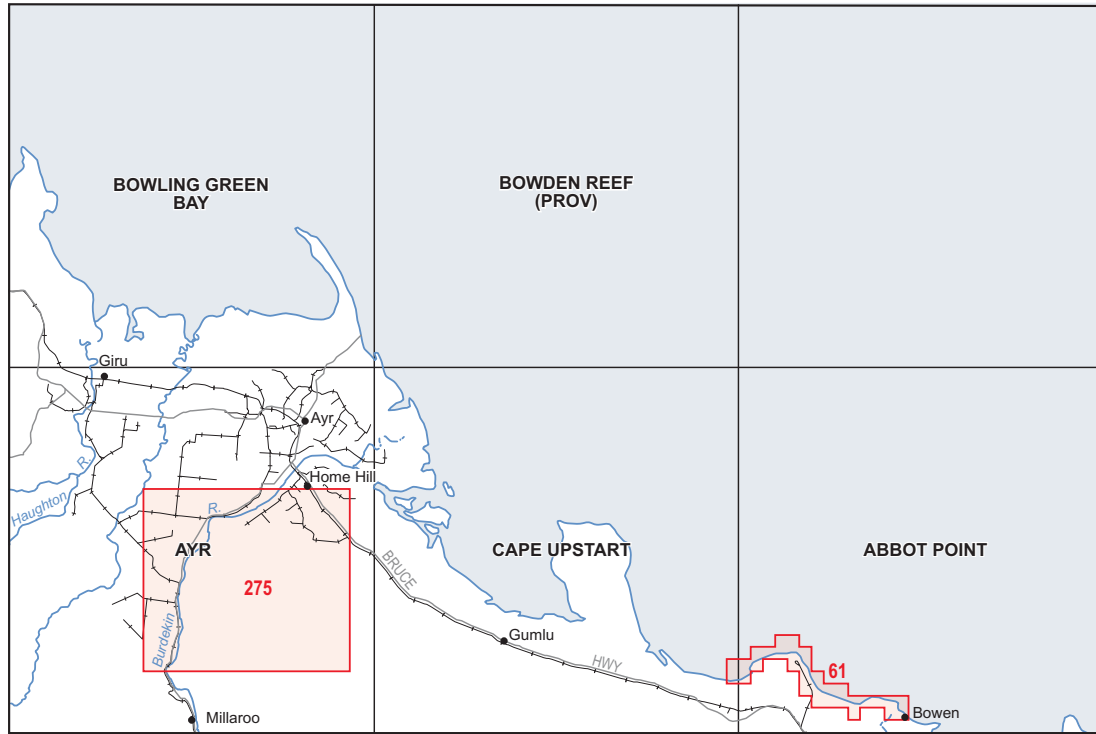
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					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
14074	MARTIN GERALD MITCHELL, MAXWELL JOHN WILKINS	2/01/2004	EARTHY LIME	RANGEMORE AREA	GEOL					39950/C, 44306/O, 44737/C, 50914/C
14153	CONQUEST MINING LTD	10/08/2005	AU	NORMANBY GOLDFIELD	GEOL, GEOLMA	GEOP	ROCK, STRSED, ASSAY/>200		LITREV	42989/O, 44270/C, 47757/C, 49405/O
14154	CONQUEST MINING LTD	25/11/2004	AU	EMU PLAINS TO URANNAH AREA	GEOL, LAND, PHOGR		GEOCHE, /Unknown		LITREV	40063/O, 43334/O
14155	CONQUEST MINING LTD	25/11/2004	AU, AG	BLENHEIM AREA	GEOL, GEOLMA, LAND, PHOGR		GEOCHE, ROCK, STRSED, ASSAY/Unknown		LITREV	40062/C
14171	ENERGY MINERALS PTY LTD, BASIN GOLD PTY LTD	31/01/2005	AU	MOUNT CARLTON – CRUSH CREEK	GEOL, GEOLMA, PHOGR	GEOP			LITREV, METURG	38685/O, 42559/C, 45875/C, 45876/O
14402, 14675	LOST SANDS PTY LTD	23/11/2004, 25/08/2005	AU	MILLAROO AREA	GEOL, GEOLMA				LITREV	40800/O, 45226/C
14409	OZMIN RESOURCES PTY LTD	3/08/2005	AU	EDEN LASSIE AREA		GEOP	GEOCHE, ROCK, ASSAY/Unknown		LITREV	44282/C, 47409/C

Table 1 (continued)

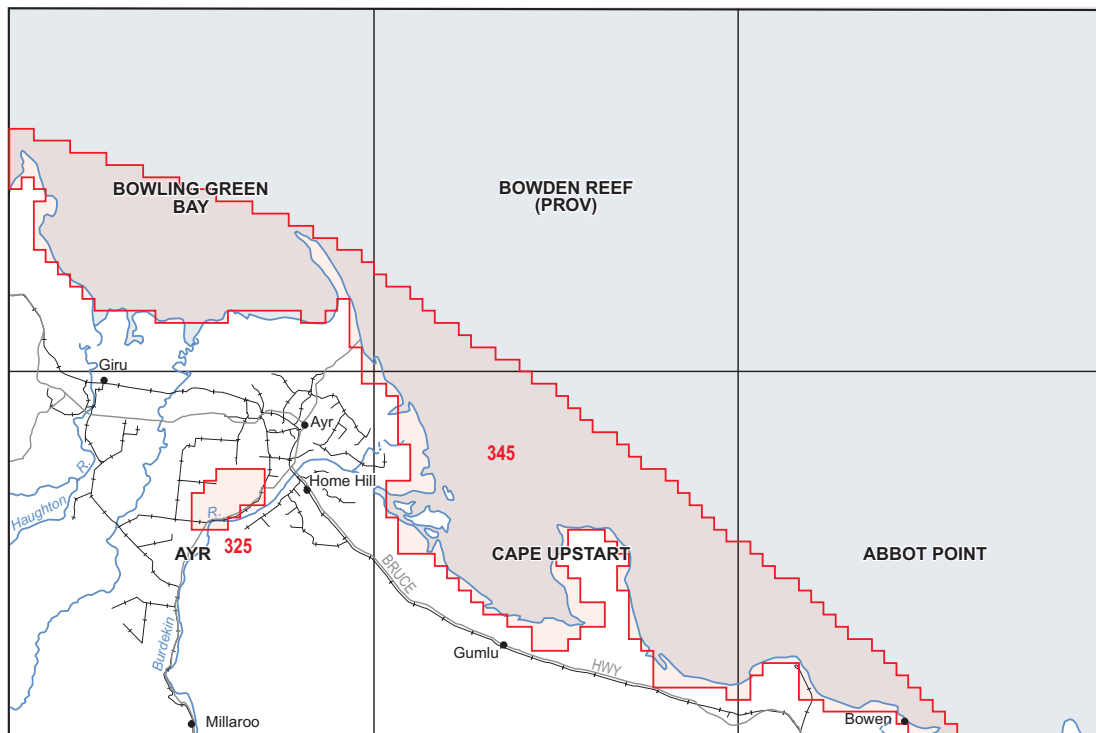
EPM Number	Company	Date Granted	Exploration Targets	Location	EXPLORATION TECHNIQUES					DME Company Report No. (NR = No report submitted; O = Open file report; C = Confidential report)
					GEOLOGY	GEOPHYSICS	GEOCHEMISTRY/ NO. OF SAMPLES	DEVELOPMENTS & DRILLING	RESEARCH & ASSESSMENT	
14596	NEWCREST MINING LTD	25/02/2005	AU	MOUNT GLENROY	GEOL, GEOLMA		ROCK, SOIL, /Unknown		LITREV	42635/C, 45563/O, 45757/C
14992	NORMANBY GOLD PTY LTD, CONQUEST MINING LTD	26/04/2005	AU, CU	BLOOMSBURY TO MARIAN AREA	PHOGR	IPSURV, RESSUR	CUTSAM, /Unknown	RCDRIL	FEAS, LITREV, ORERES	43207/C, 44039/O, 45706/O, 46426/C
15304	RALPH DE LACEY, AUSTRALIAN INDUSTRIAL MINERALS PTY LTD	10/01/2006	W	HOME HILL AREA	GEOL					45759/C, 50983/C, 51003/O
15485	ENERGY MINERALS PTY LTD	6/09/2006	AU, CU, NI	EURI CREEK AREA	GEOL				LITREV	43896/O, 49598/C

KEY TO ABBREVIATIONS

TENURE TYPE		GEOLOGY		GEOPHYSICS		GEOCHEMISTRY			DEVELOPMENTS & DRILLING		RESEARCH & ASSESSMENT		
						(Sampling Type)		(No. of samples)					
EPM	Exploration Permit Mineral	GEOL	Geology	GEOP	Geophysics	GEOCHE	Geochemical Exploration	0	Unknown	COST	Trenching/costeaning	ENVIRO	Environmental Impact Surveys
EPP	Exploration Permit Petroleum	GEOLMA	Geological Mapping	AEREM	Aerial EM Surveys	BULK	Bulk Sampling	1	<20	TESTP	Pitting Tests	FEAS	Feasibility Studies
EPC	Exploration Permit Coal	UGRMAP	Underground Mapping	AERMAG	Aerial Magnetic Surveys	CORE	Core Sampling	2	20–50	UNDMIN	Underground Mining	GEOSTA	Geostatistics
EPS	Exploration Permit Special	LAND	Landsat	AERRAD	Aerial Radioactivity Surveys	CUTSAM	Drill Cuttings Sampling	3	51–100	DRILL	Drilling	LITREV	Literature Reviews
MA	Machine Area	MSS	Multispectral Imagery	GRDEM	Ground EM Surveys	GEOBOT	Geobotanical Exploration	4	101–200	DDRILL	Diamond Drilling	METURG	Metallurgical Studies
MDL	Mineral Development Licence	PHOGR	Photogrammetry	GRAVSU	Gravity Survey Methods	GAS	Gas Sampling	5	>200	RPERC	Rotary Percussion Drilling	MINDES	Mine Design
MFS	Mineral Freehold or Selection	PET	Petrology	GRAVIT	Gravity Data	GRABSP	Grab Sampling			RAIRB	Rotary Air Blast Drilling	MINEDE	Mine Development
MC	Mining Claim			IPSURV	IP Methods	DUMPSA	Dump Sampling			PDRILL	Percussion Drilling	MINPRO	Mineral Processing
ML	Mining Lease			GRDMAG	Ground Magnetic Surveys	TAISAM	Tailing Samples			RDRILL	Rotary Drilling	ORERES	Ore Reserve Estimation
PZ	Prospecting Area			GRDRAD	Ground Radioactivity Surveys	WATER	Water Sampling			RCDRIL	Reverse Circulation Drilling	HYDGEO	Hydrogeology
PP	Prospecting Permit			RADON	Radon Soil Surveys	PAN	Panning/pan concentrates			ADRILL	Auger Drilling	GPYINT	Geophysical Interpretation
RST	Restricted Area			RESSUR	Resistivity Methods	HMSAMP	Heavy Mineral Sampling					ARCH	Archaeology
SGP	State Gas Pipeline			SPSURV	SP Methods	ROCK	Rock Chip Sampling					ARCHIN	Industrial Archaeology
TA	Tailings Area			SEISMI	Seismic Survey	SOIL	Soil Sampling					PHOTO	Photography
				SEREFR	Seismic Refraction Methods	STRSED	Stream Sediment Sampling						
				SEREFLL	Seismic Reflection Methods	ASSAY	Assaying						
				WLLOG	Wire Line Logging								



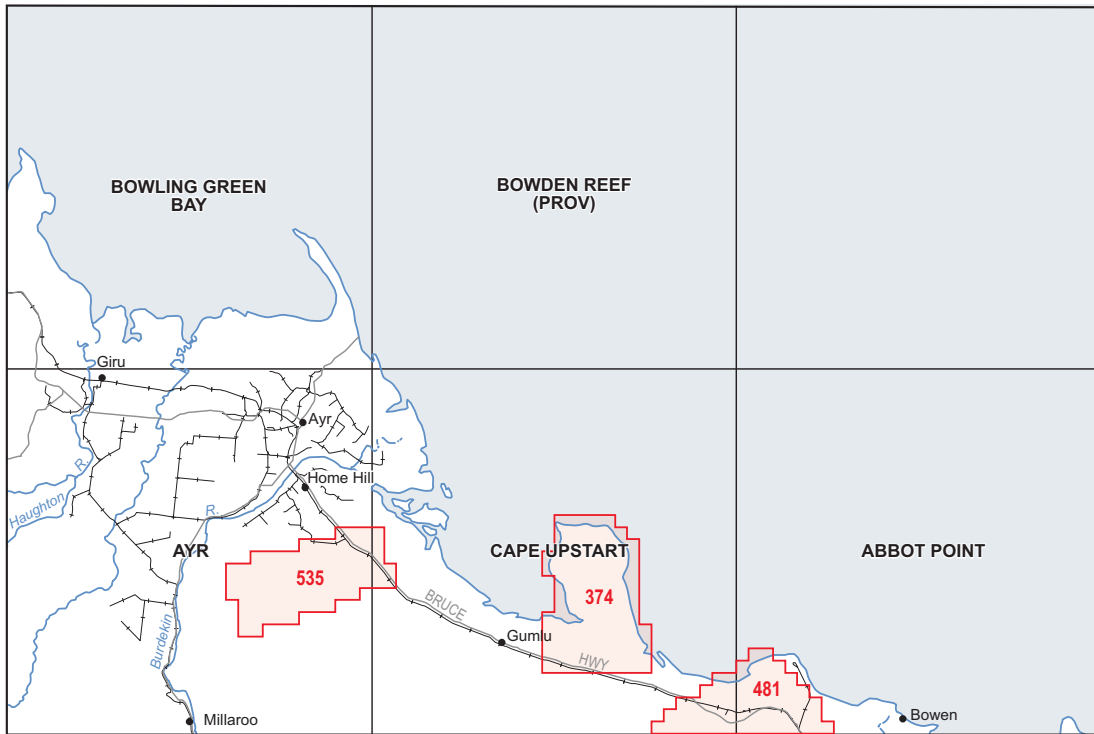
61, 275



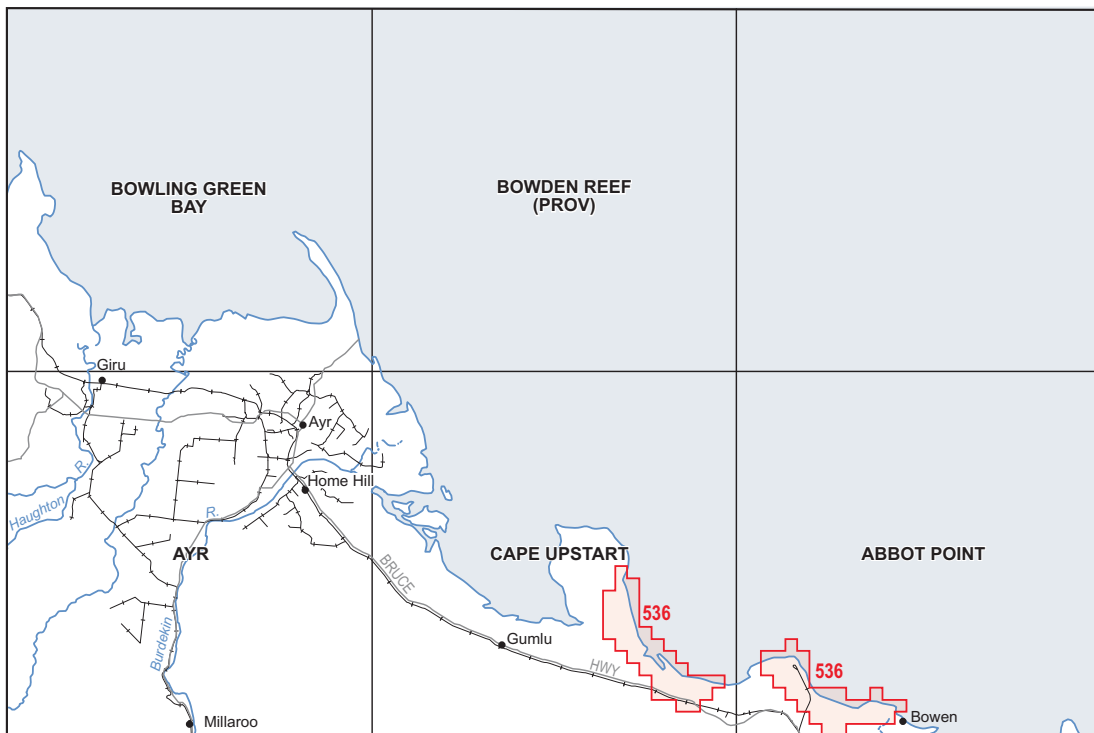
325, 345

088/PB-08-08/epm_ayr_p1.cdr

Figure 1.1. Location of EPMs 61 to 345, Ayr 1:250 000 Sheet area



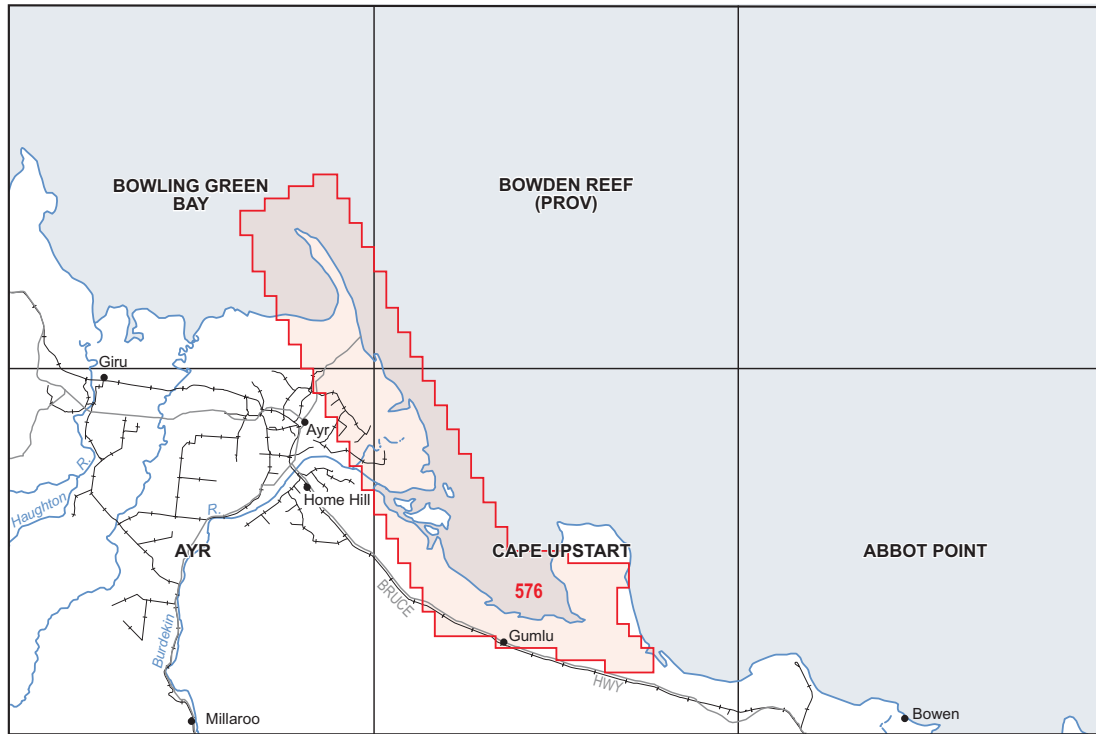
374 - 535



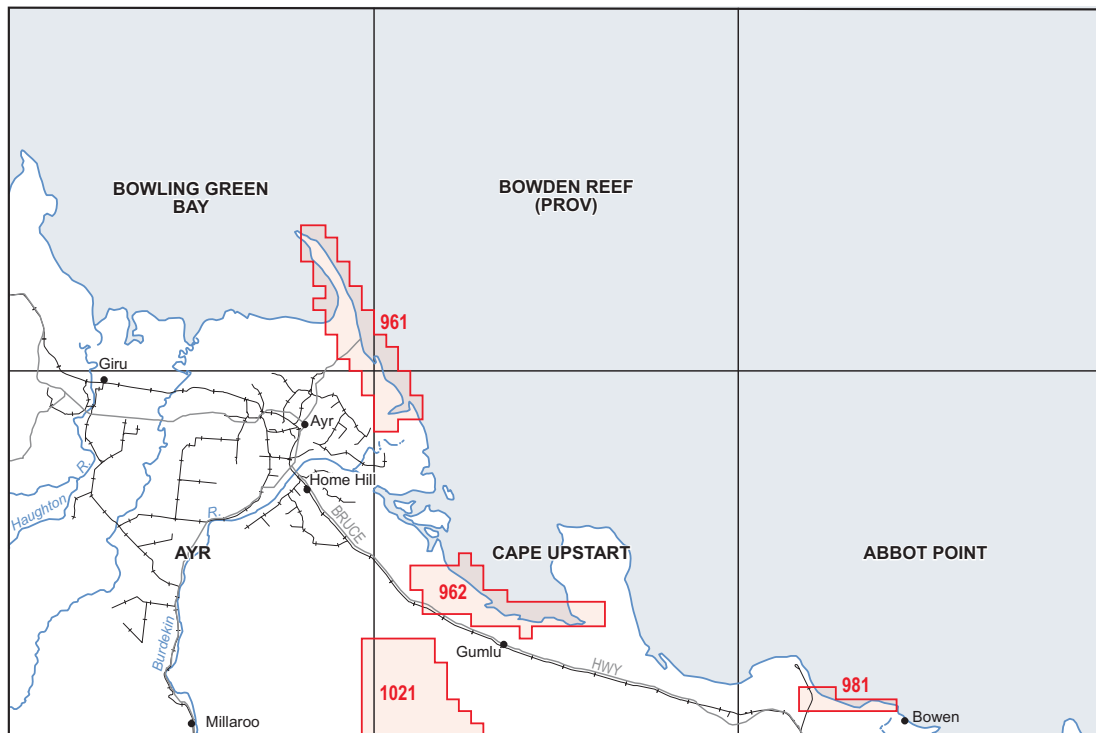
536

086/PB-08-08/epm_ayr_p2.cdr

Figure 1.2: Location of EPMS 374 to 536, Ayr 1:250 000 Sheet area



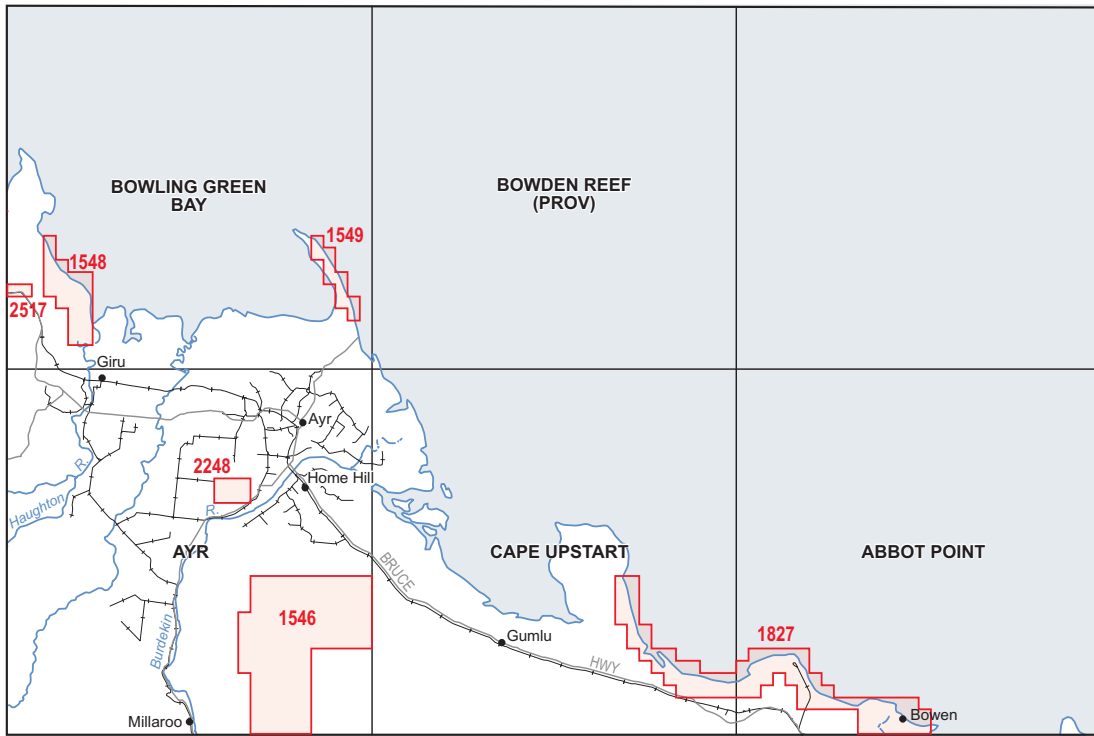
576



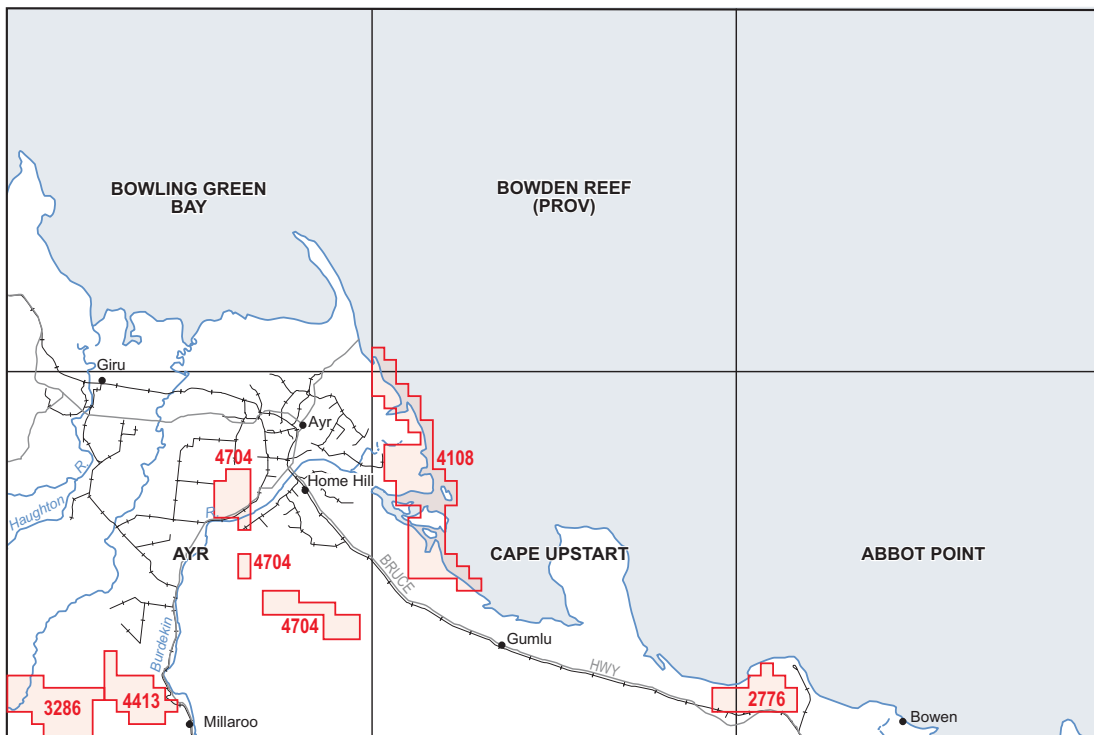
961 - 1021

08B/PB-08-08/epm_ayre_p3.ctb

Figure 1.3: Location of EPMs 576 to 1021, Ayr 1:250 000 Sheet area

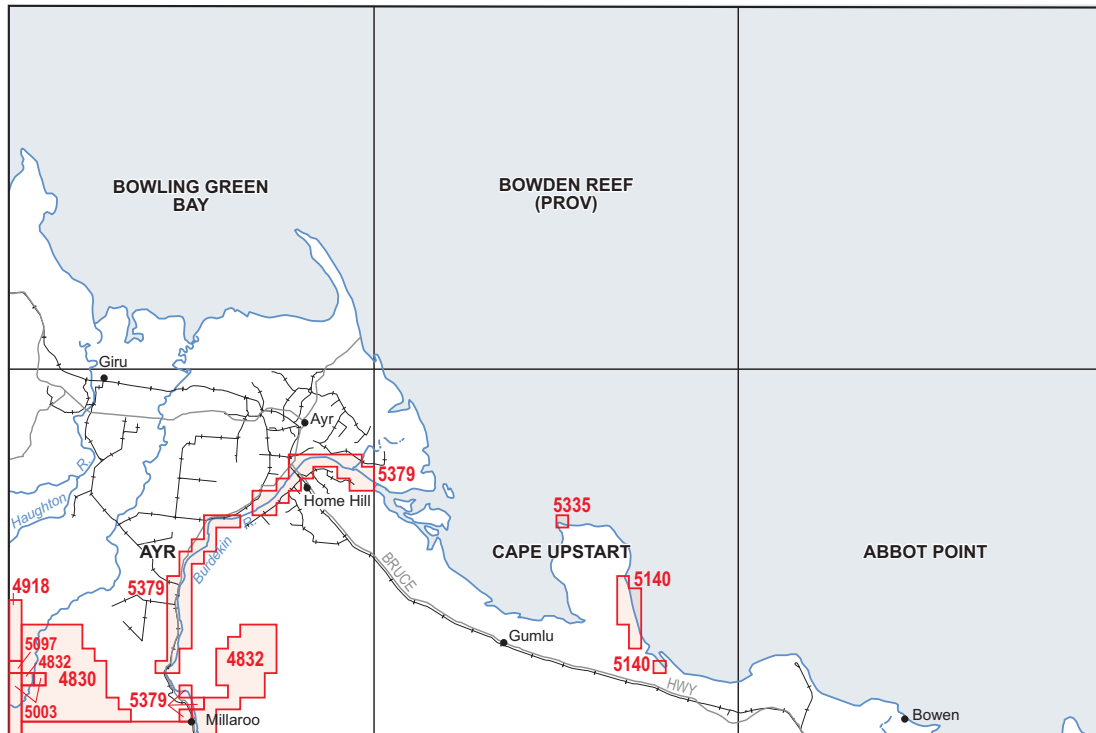


1546 - 2517

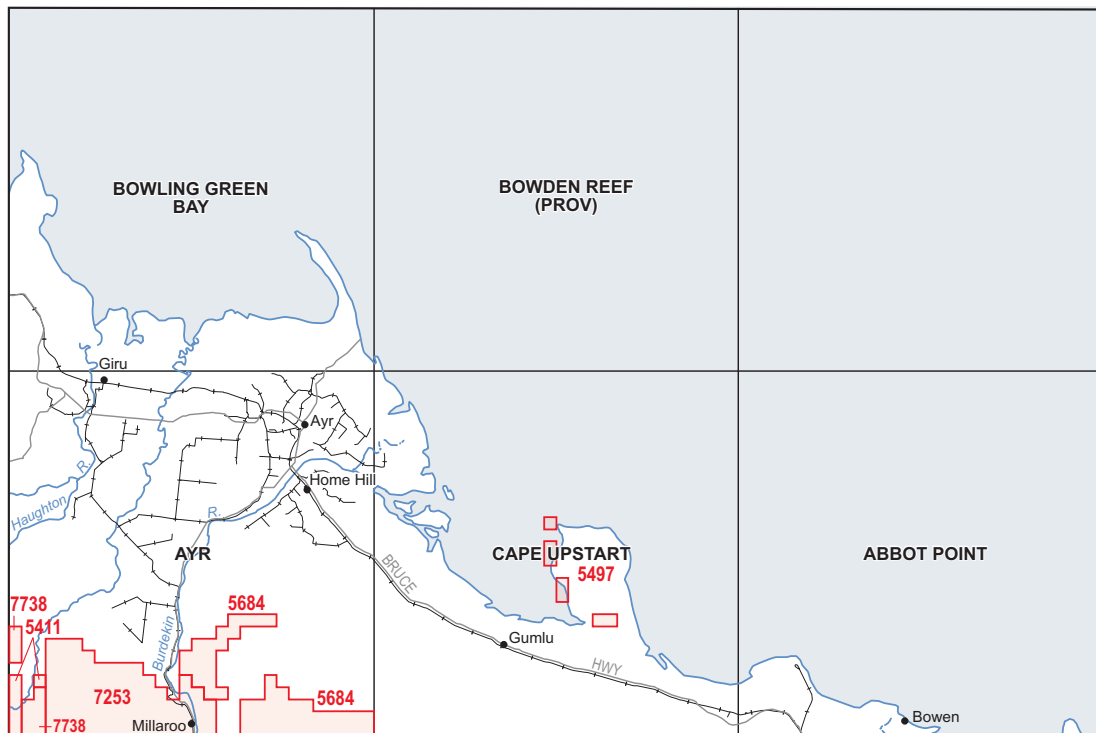


2776 - 4704

Figure 1.4: Location of EPMs 1546 to 4704, Ayr 1:250 000 Sheet area

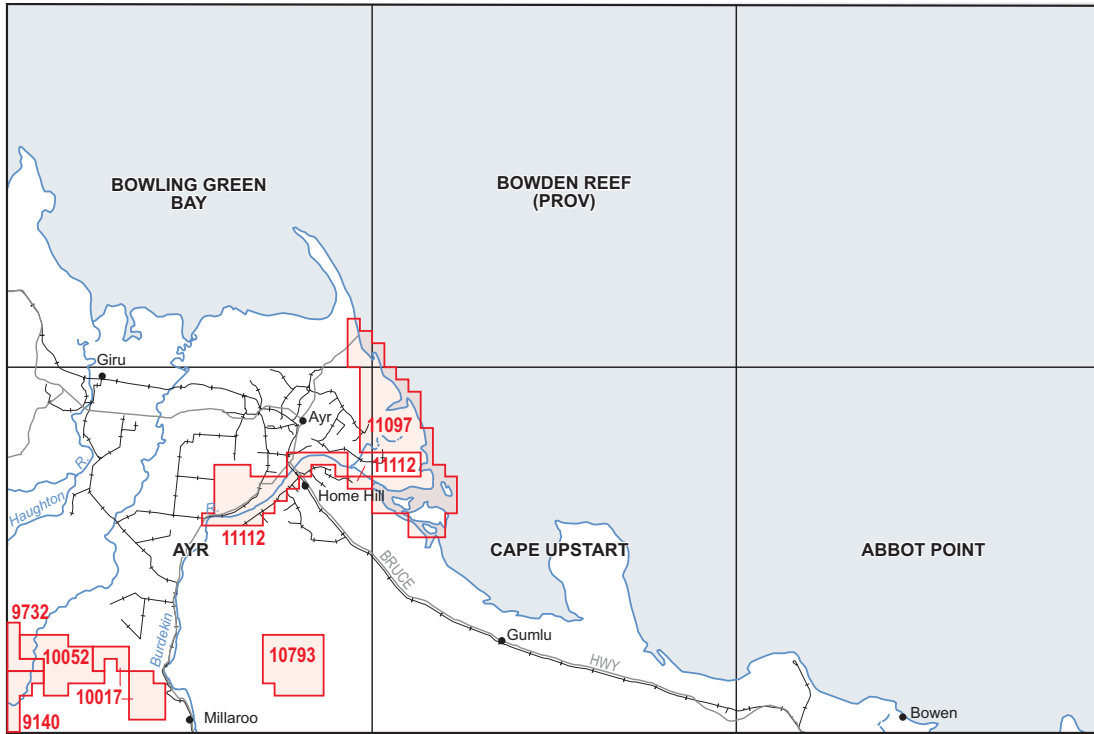


4830 - 5379

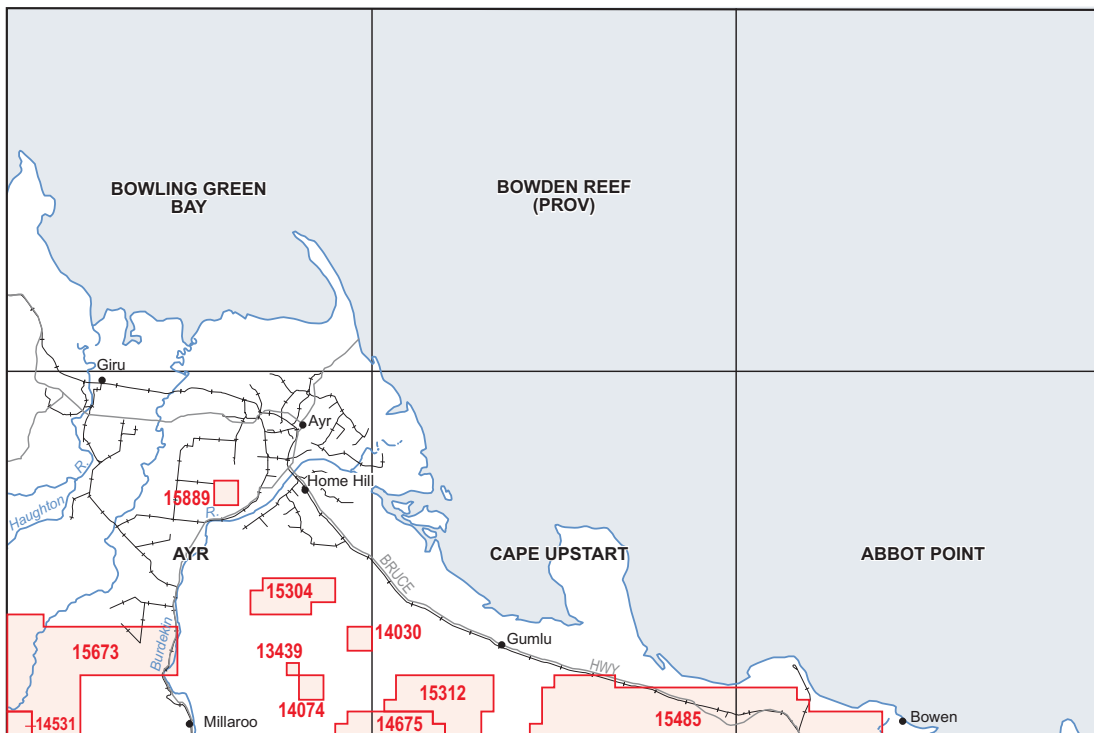


5411 - 7738

Figure 1.5: Location of EPMs 4830 to 7738, Ayr 1:250 000 Sheet area



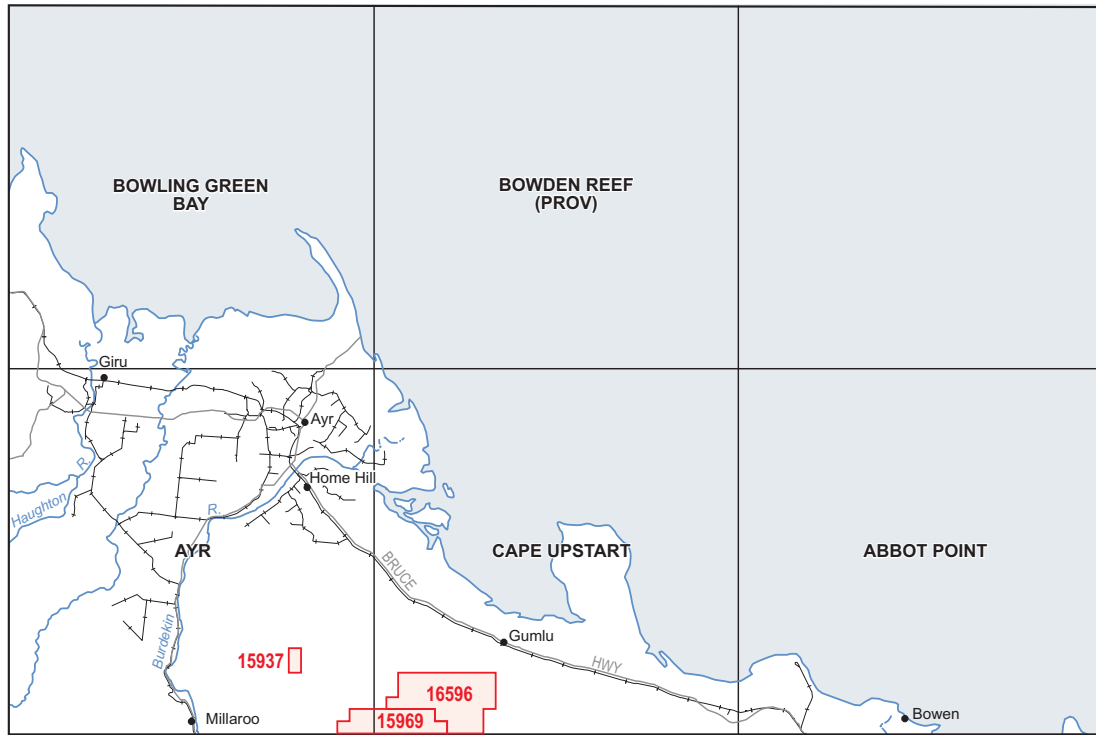
9140 - 11112



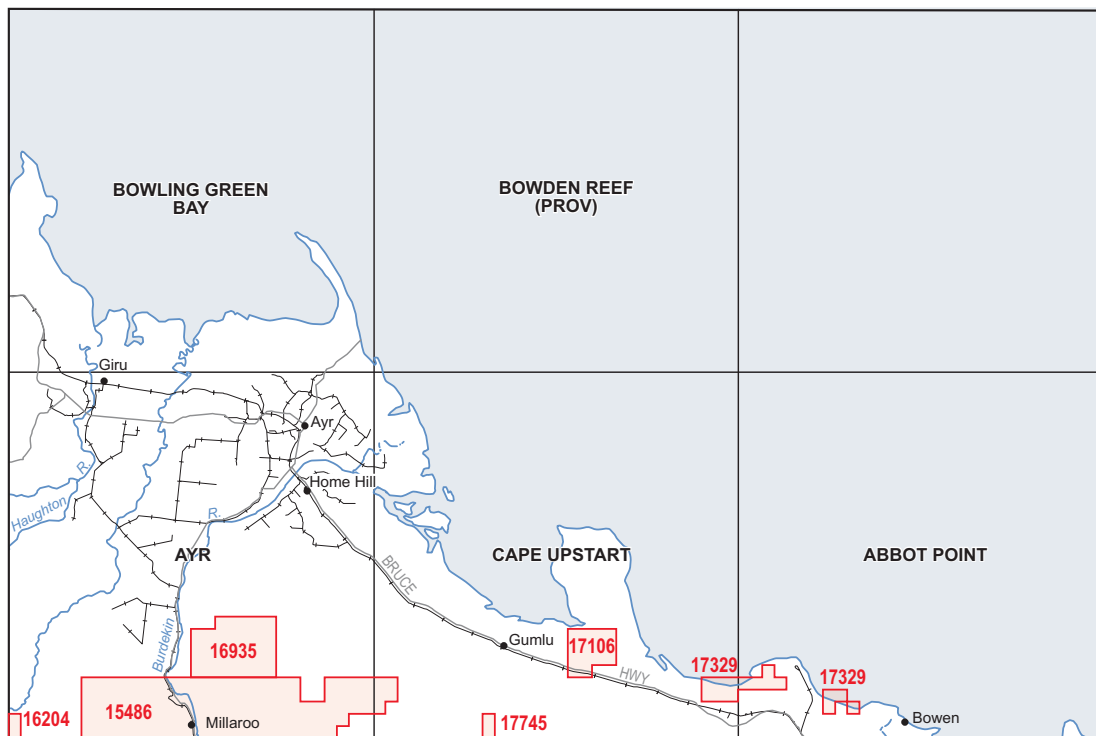
13439 - 15889

Figure 1.6: Location of EPMS 9140 to 15889, Ayr 1:250 000 Sheet area

088/PB-08-08/epm_ayr_pg.cdr



15937 - 16596



Current (Application) 15486 - 17745

Figure 1.7: Location of EPMs 15937 to 17745, Ayr 1:250 000 Sheet area

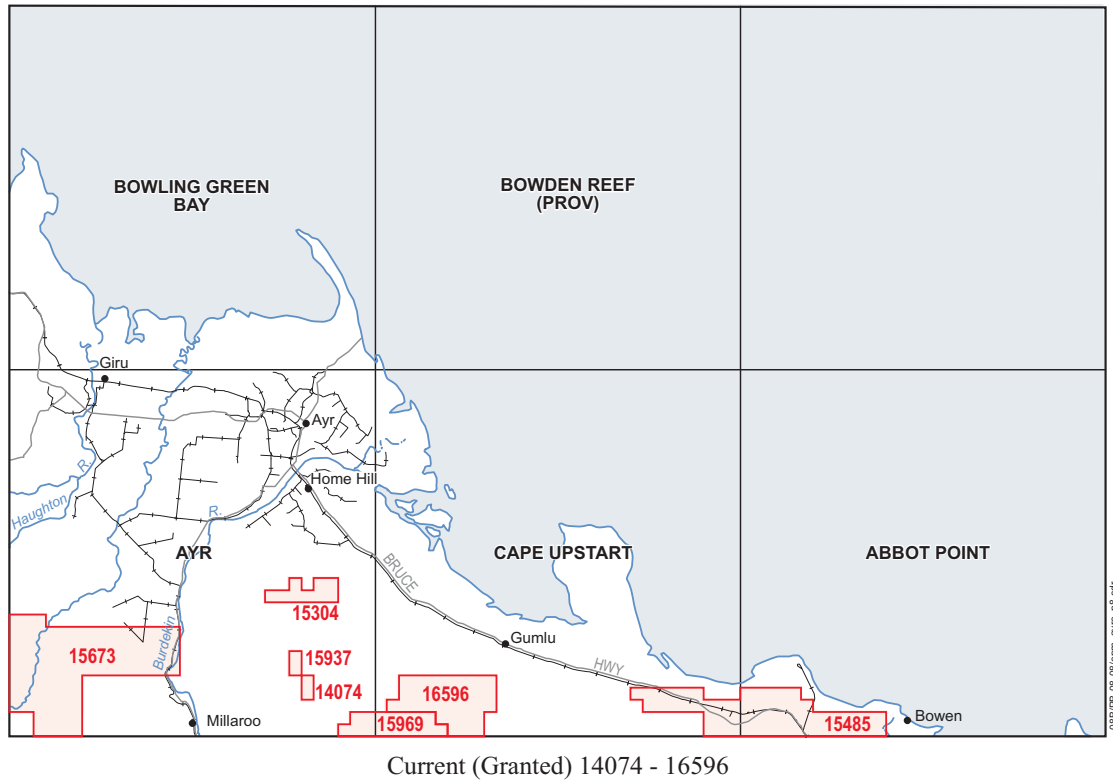
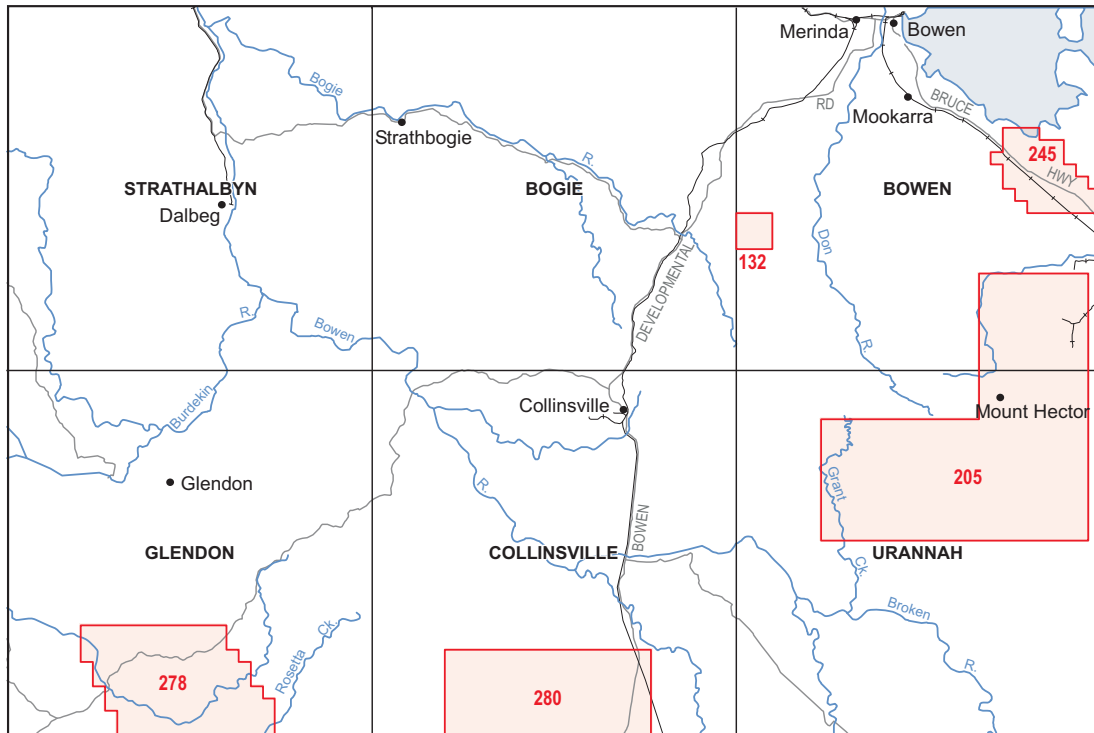
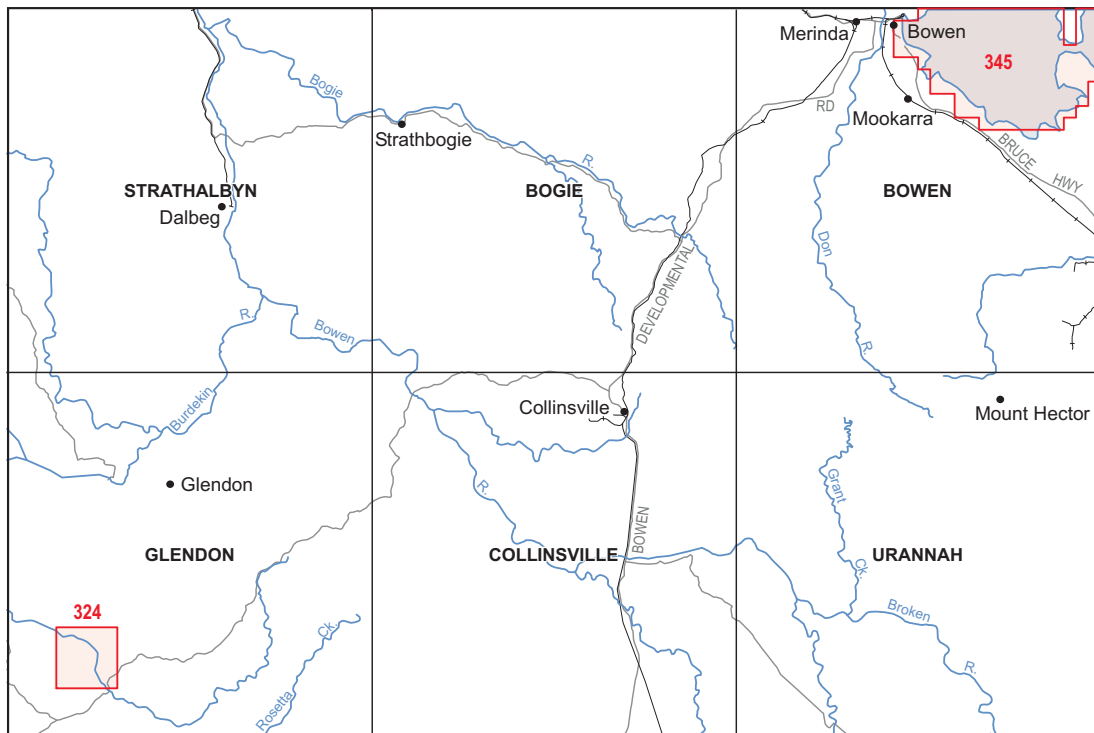


Figure 1.8: Location of current EPMs 14074 to 16596, Ayr 1:250 000 Sheet area



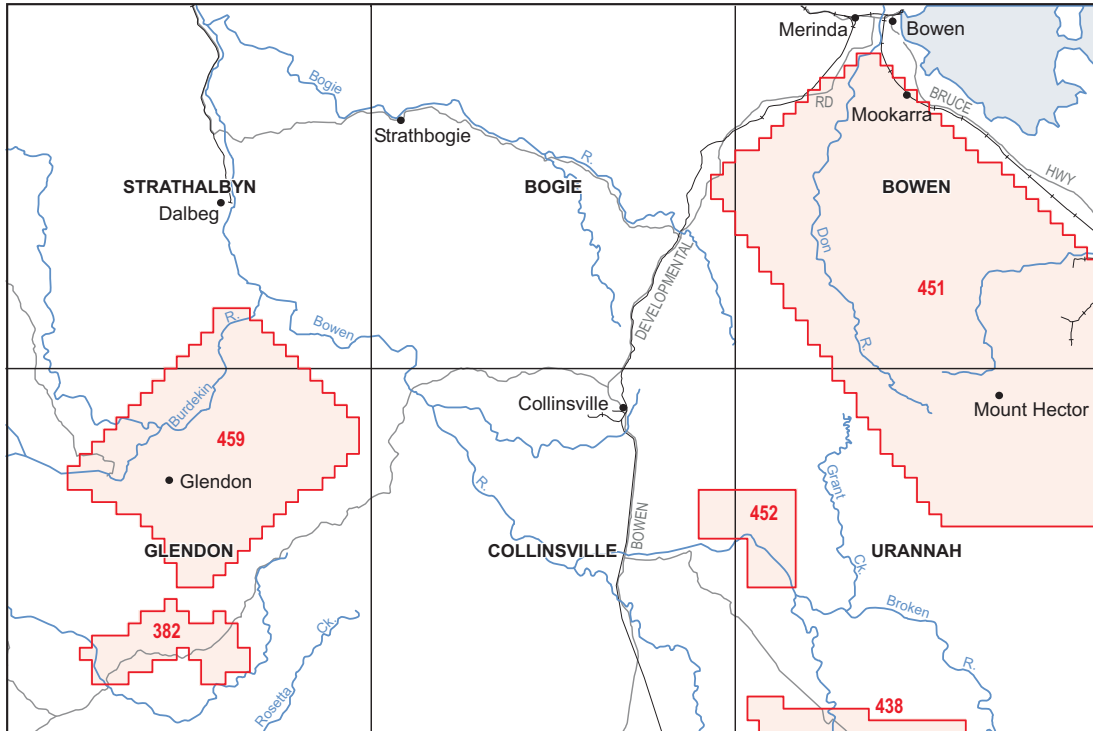
132 - 287



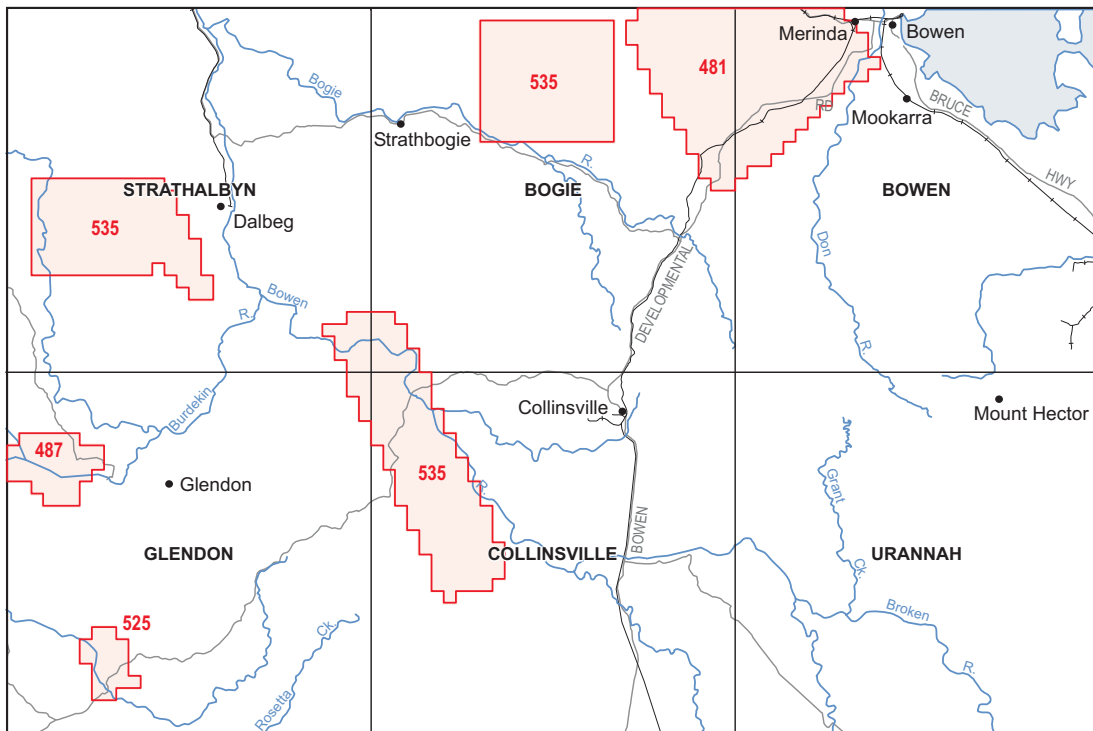
324, 345

08BFPB-08-08wpm_bowen_p1.cdr

Figure 1.9: Location of EPMS 132 to 345, Bowen 1:250 000 Sheet area

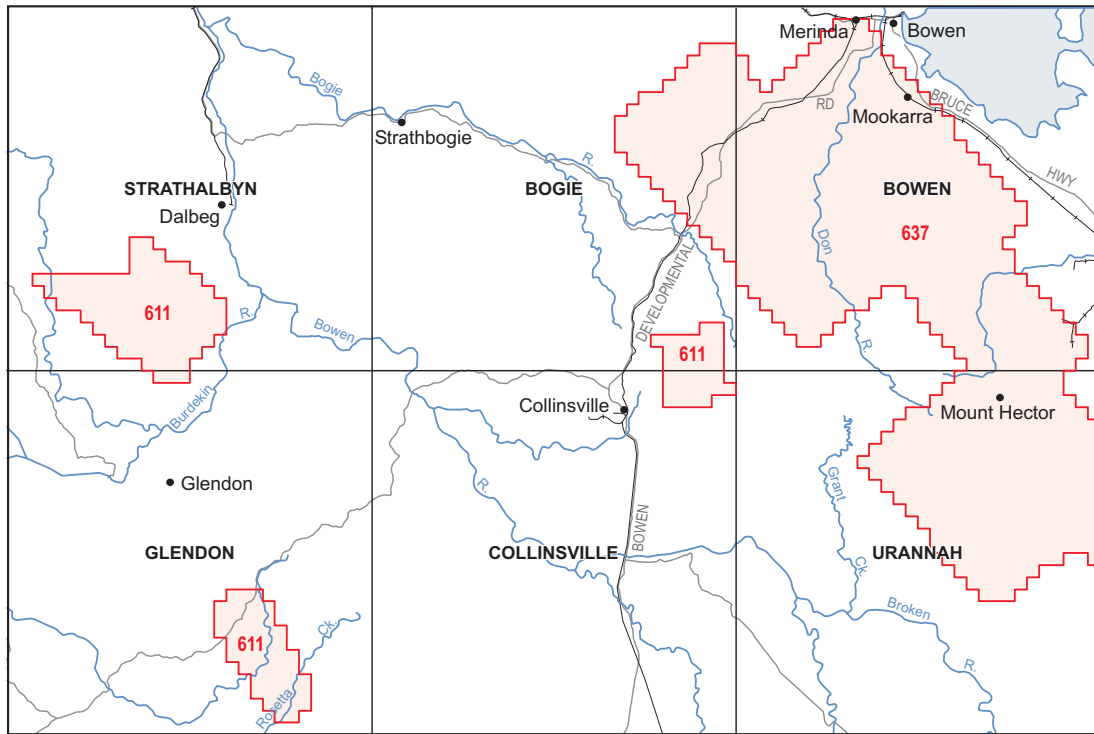


382 - 459

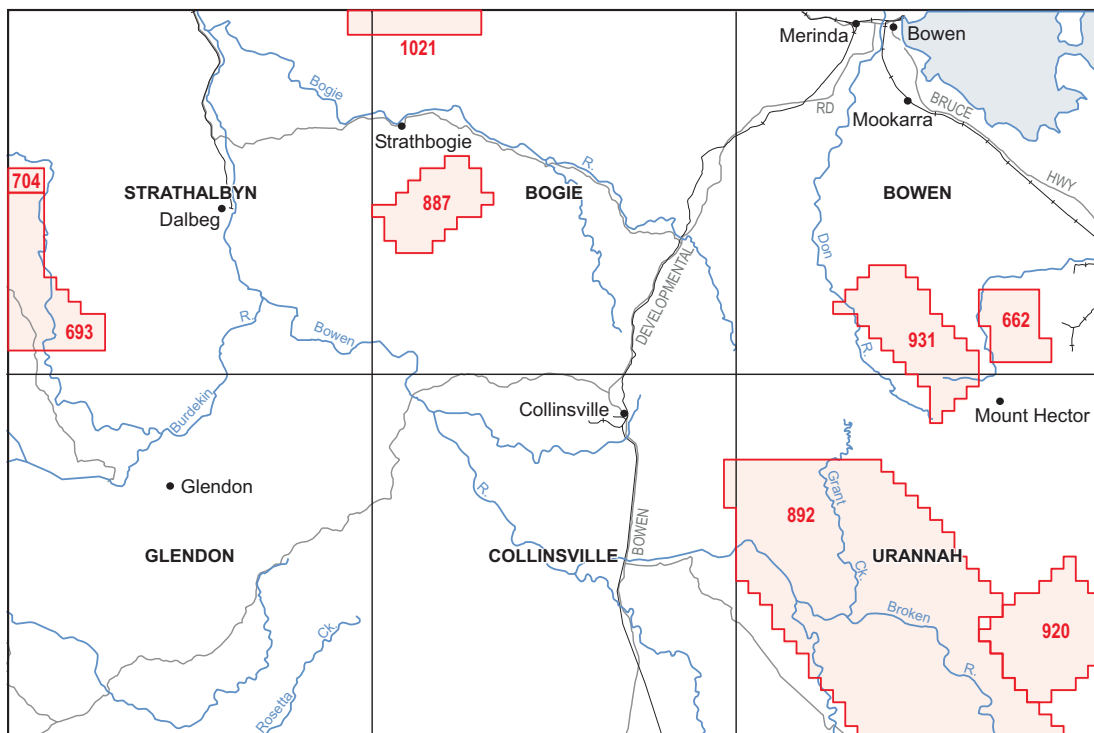


481, 535

Figure 1.10: Location of EPMS 382 to 535, Bowen 1:250 000 Sheet area

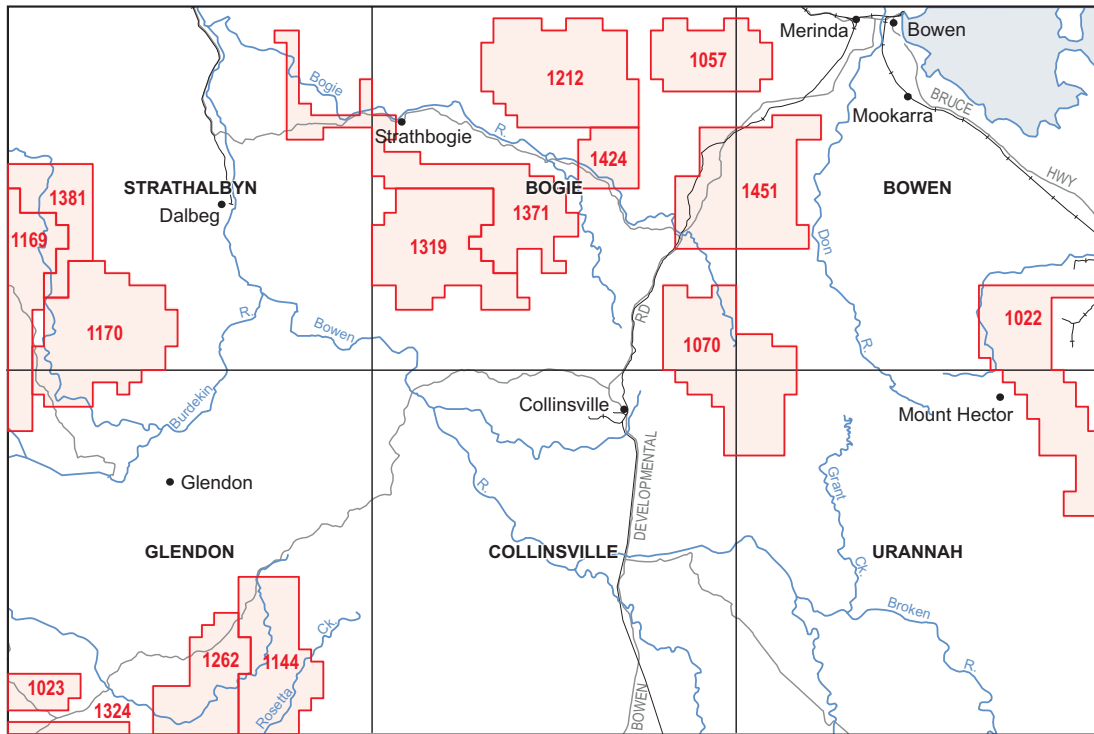


611, 637

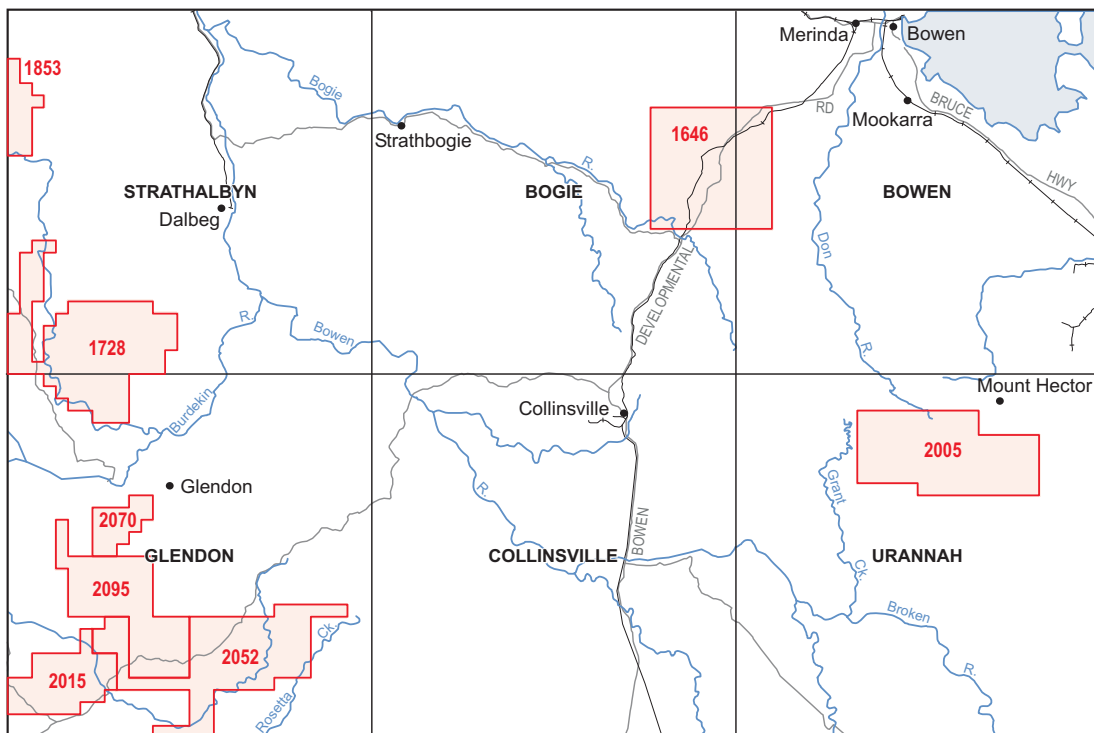


662 - 1021

Figure 1.11: Location of EPMS 611 to 1021, Bowen 1:250 000 Sheet area



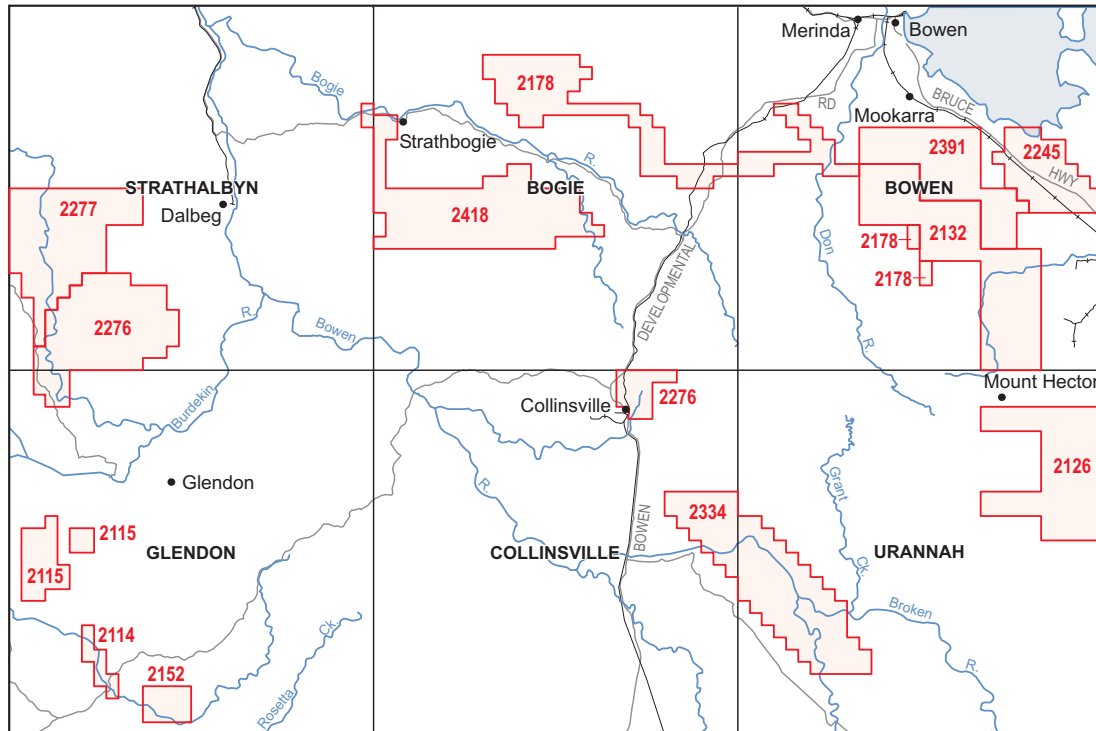
1022 - 1451



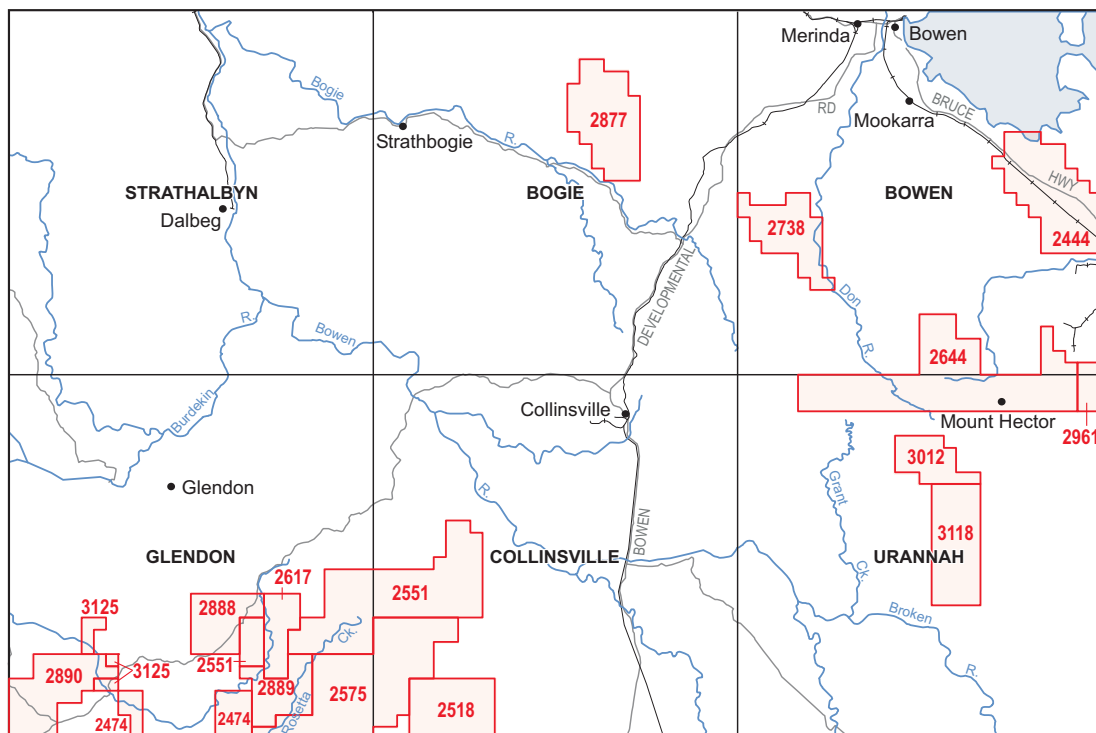
1646 - 2095

Figure 1.12: Location of EPMS 1022 to 2095, Bowen 1:250 000 Sheet area

08B/PB-08-08/epm_Bowen_14.cdr



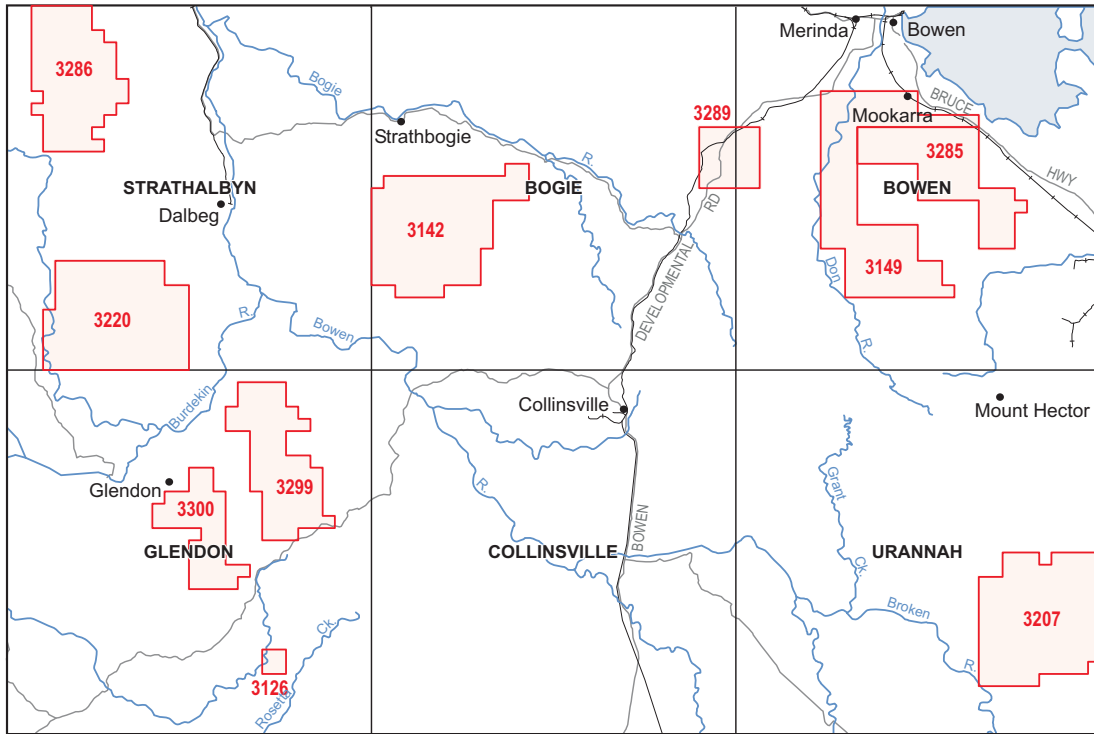
2114 - 2418



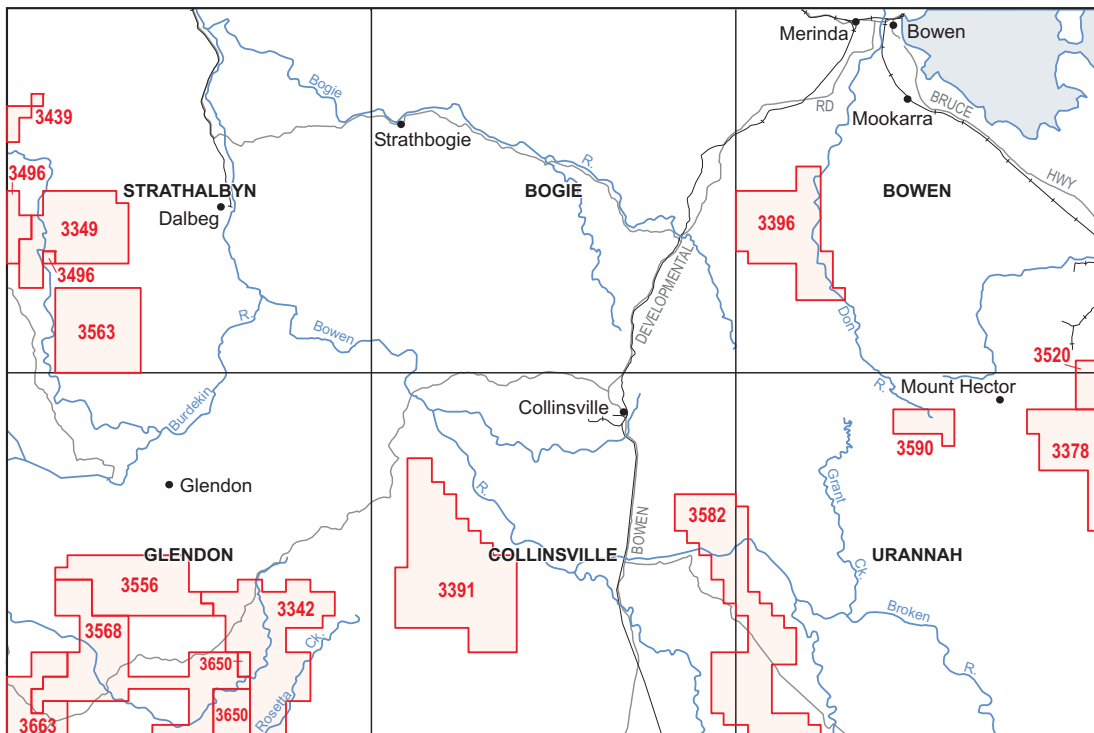
2444 - 3125

Figure 1.13: Location of EPMS 2114 to 3125, Bowen 1:250 000 Sheet area

08B/PB-08-08/epm_bowen_pg.cdr



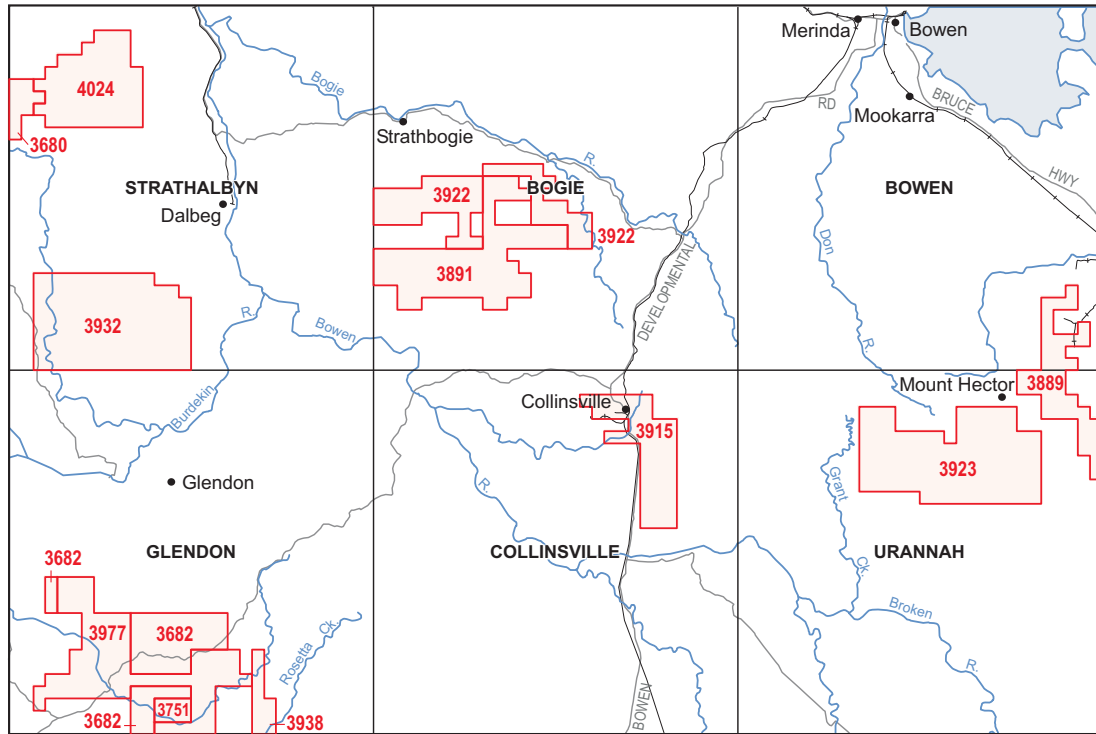
3126 - 3300



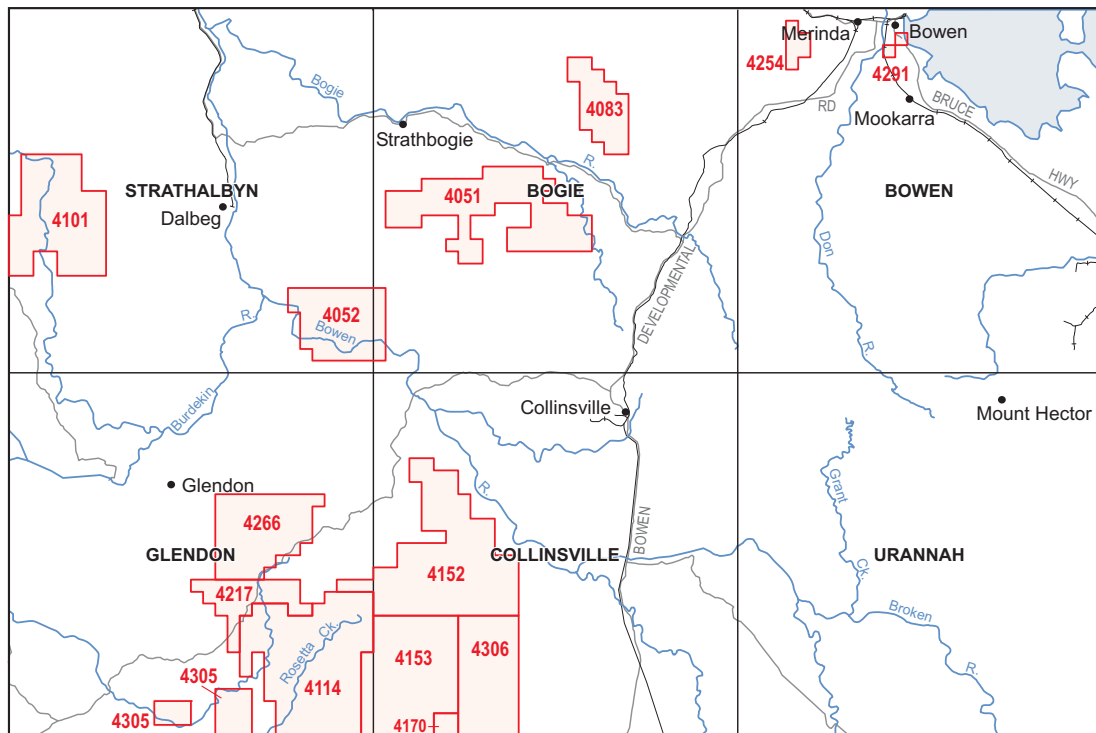
3342 - 3663

Figure 1.14: Location of EPMS 3126 to 3663, Bowen 1:250 000 Sheet area

08B/PB-08-08/epm_bowen_j6.cdr



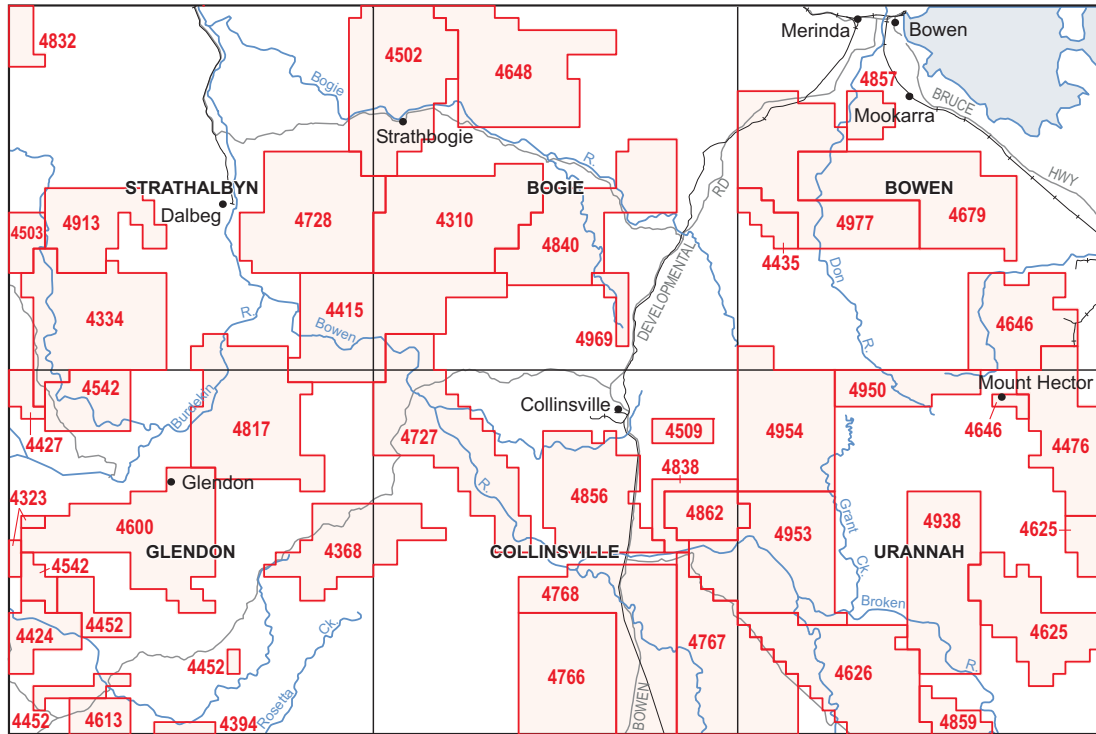
3680 - 4024



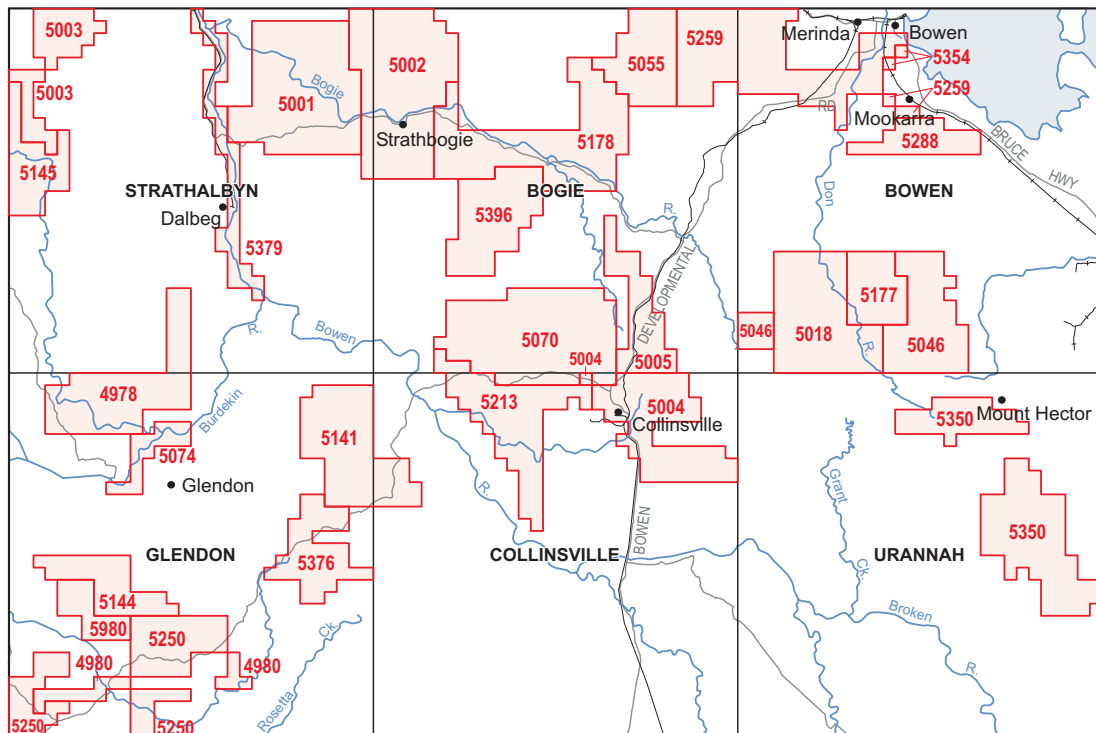
4051 - 4306

Figure 1.15: Location of EPMS 3680 to 4306, Bowen 1:250 000 Sheet area

08B/PB-08-08/epm_bowen_p7.cdr

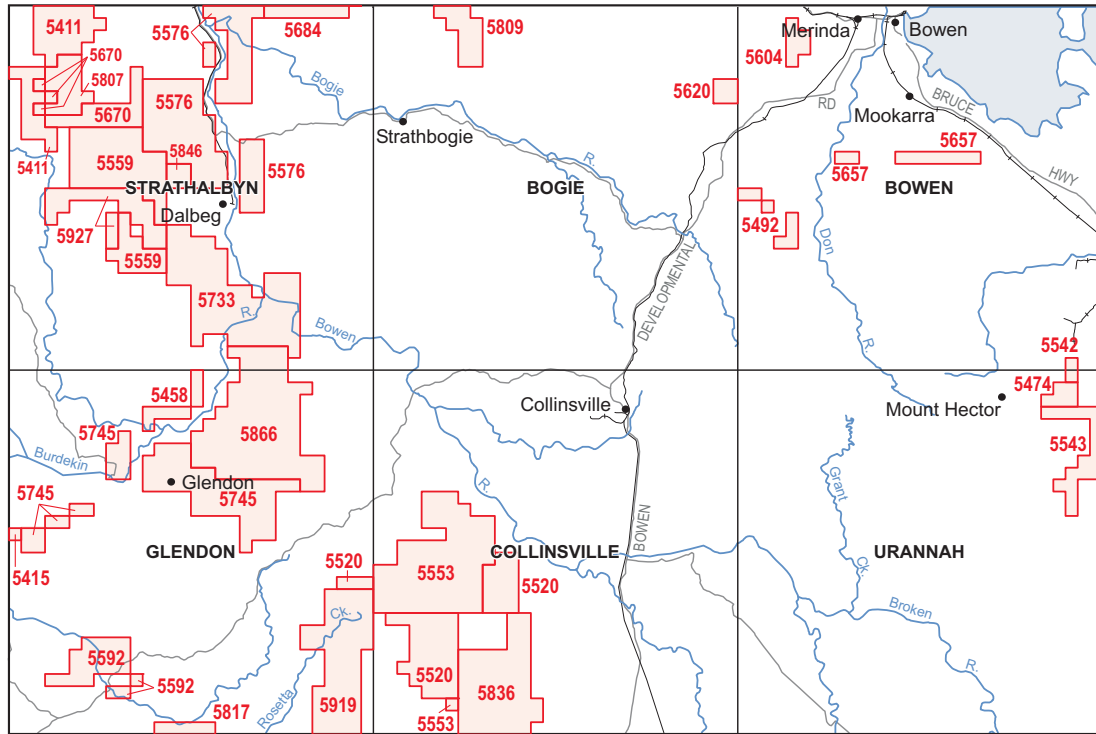


4310 - 4977

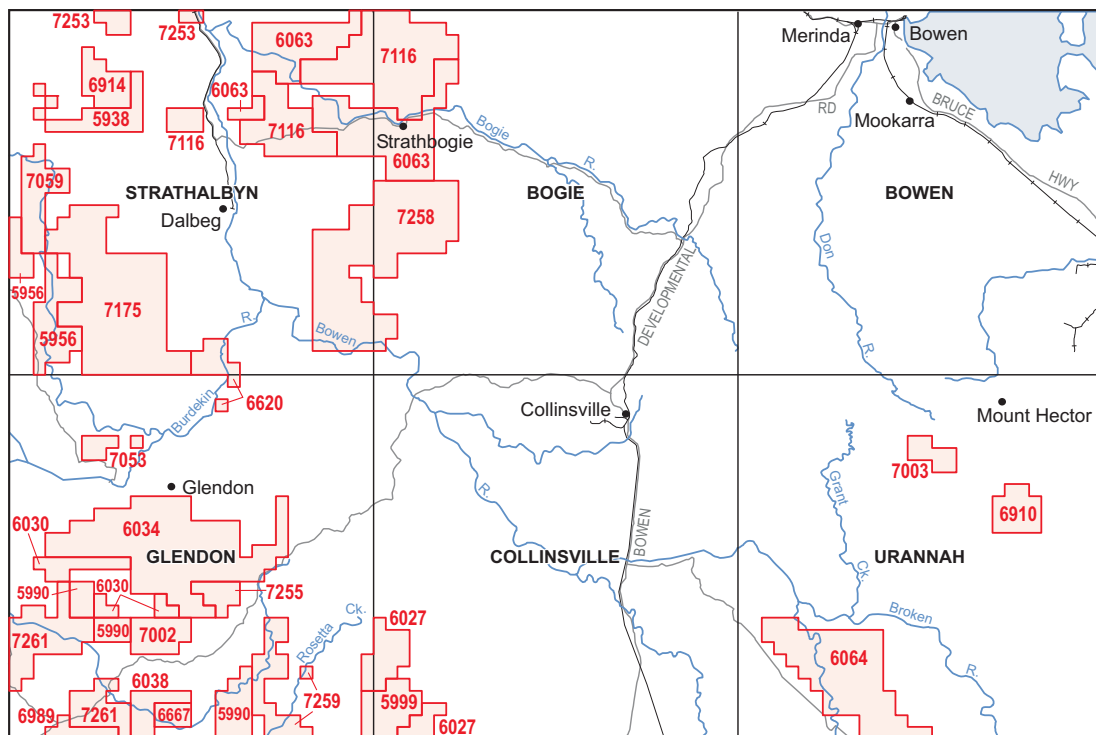


4978 - 5396

Figure 1.16: Location of EPMS 4310 to 5396, Bowen 1:250 000 Sheet area

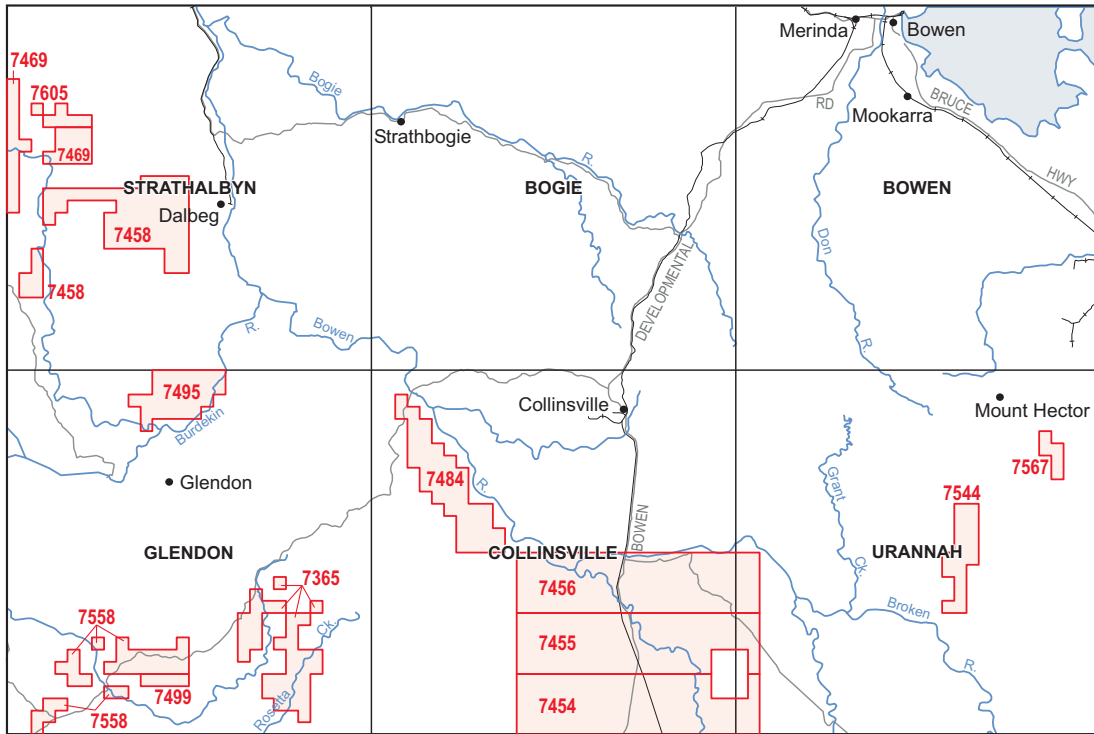


5411 - 5927

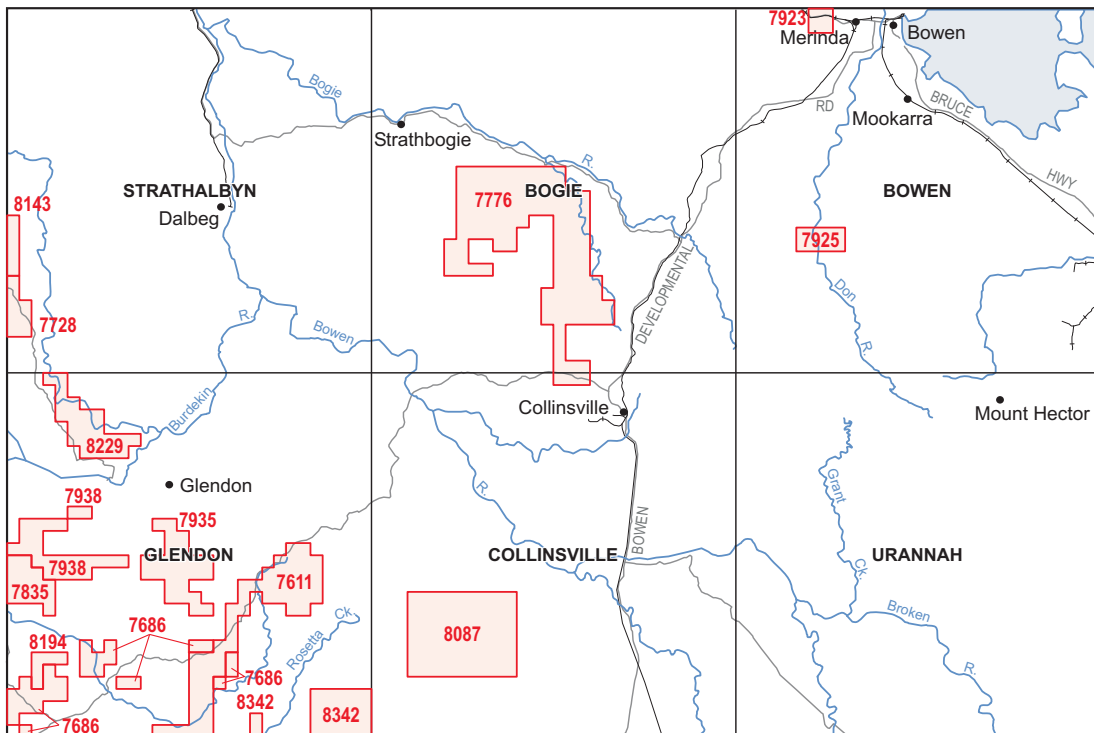


5938 - 7261

Figure 1.17: Location of EPMS 5411 to 7261, Bowen 1:250 000 Sheet area

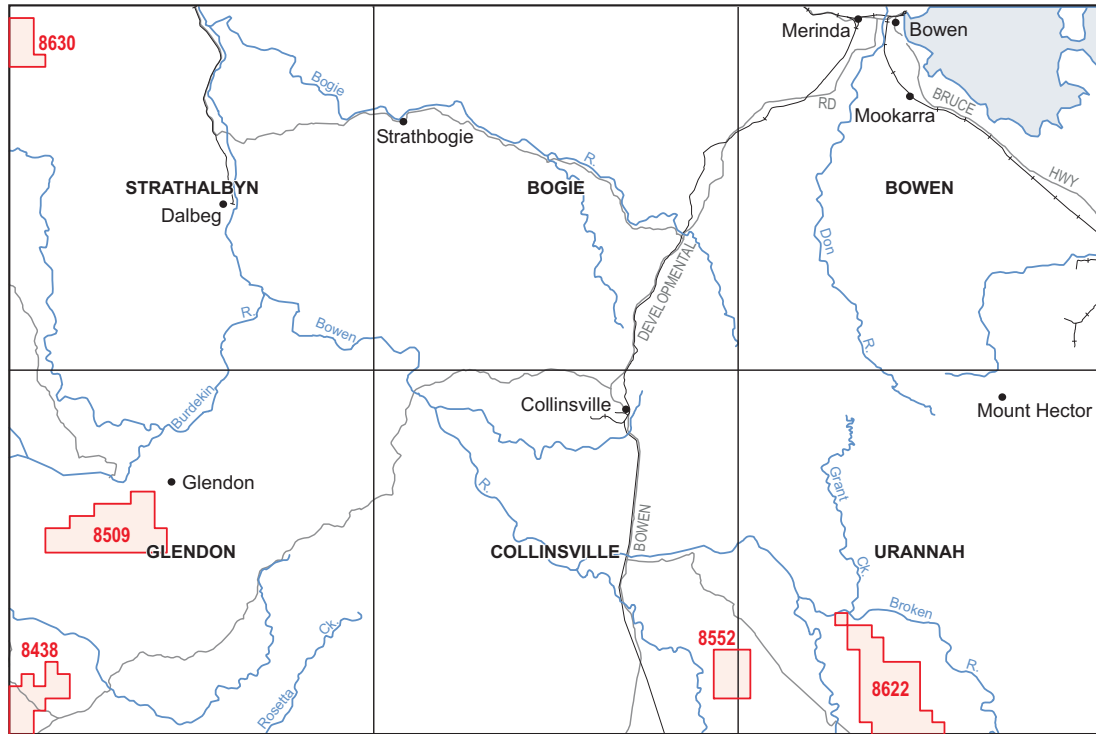


7365 - 7605

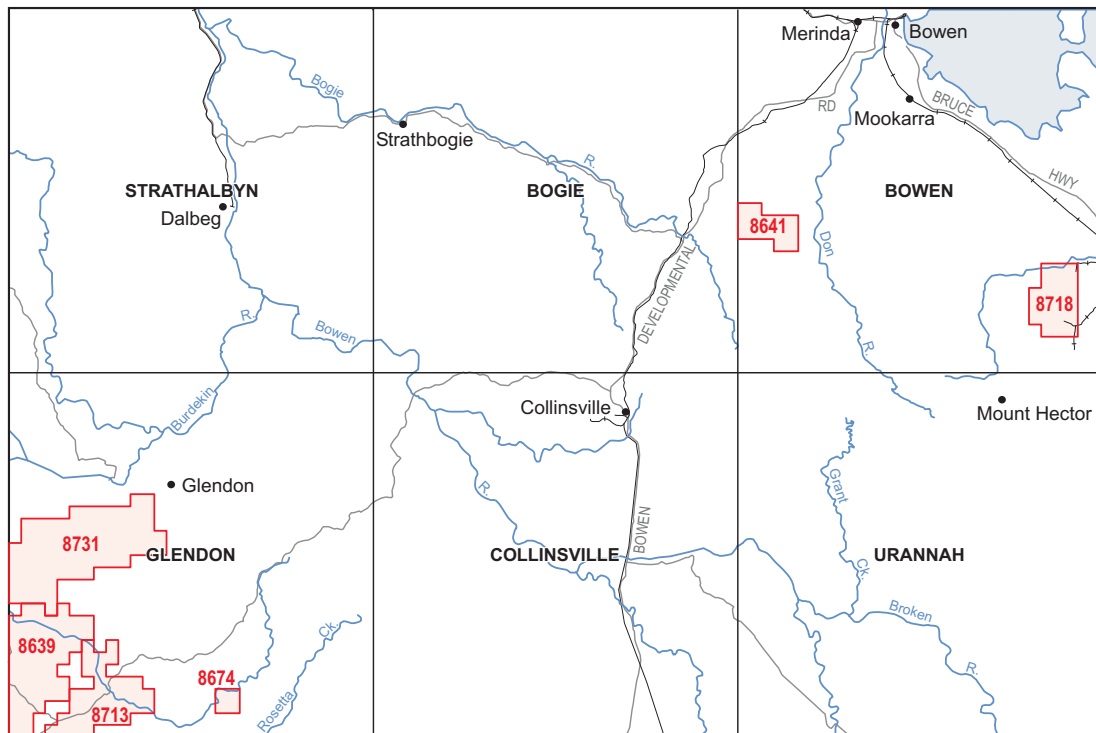


7611 - 8342

Figure 1.18: Location of EPMS 7365 to 8342, Bowen 1:250 000 Sheet area



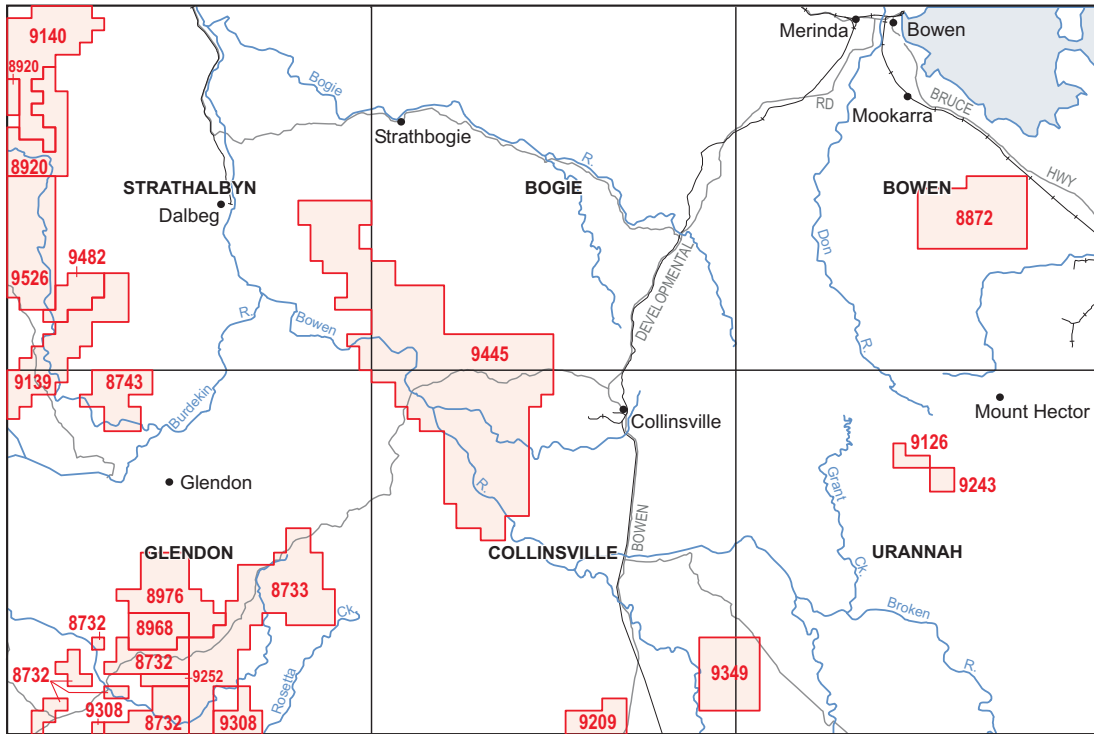
8438 - 8630



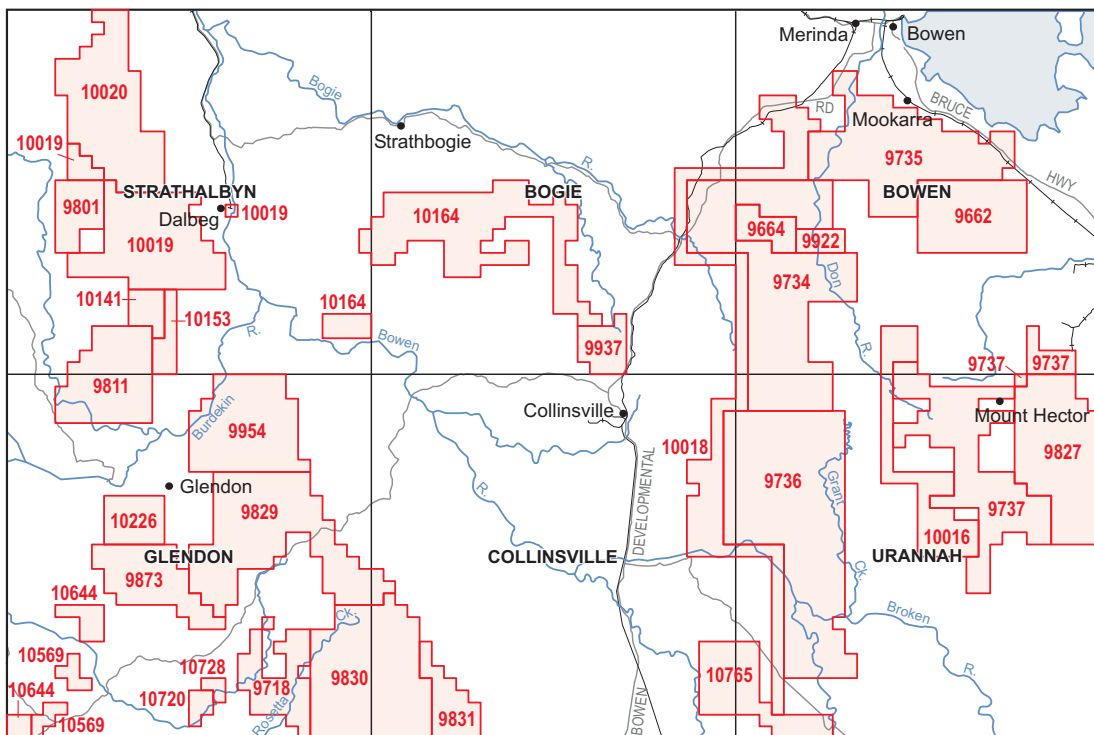
8639 - 8731

08B/PB-08-08/epm_bowen_p11.cdr

Figure 1.19: Location of EPMS 8438 to 8731, Bowen 1:250 000 Sheet area

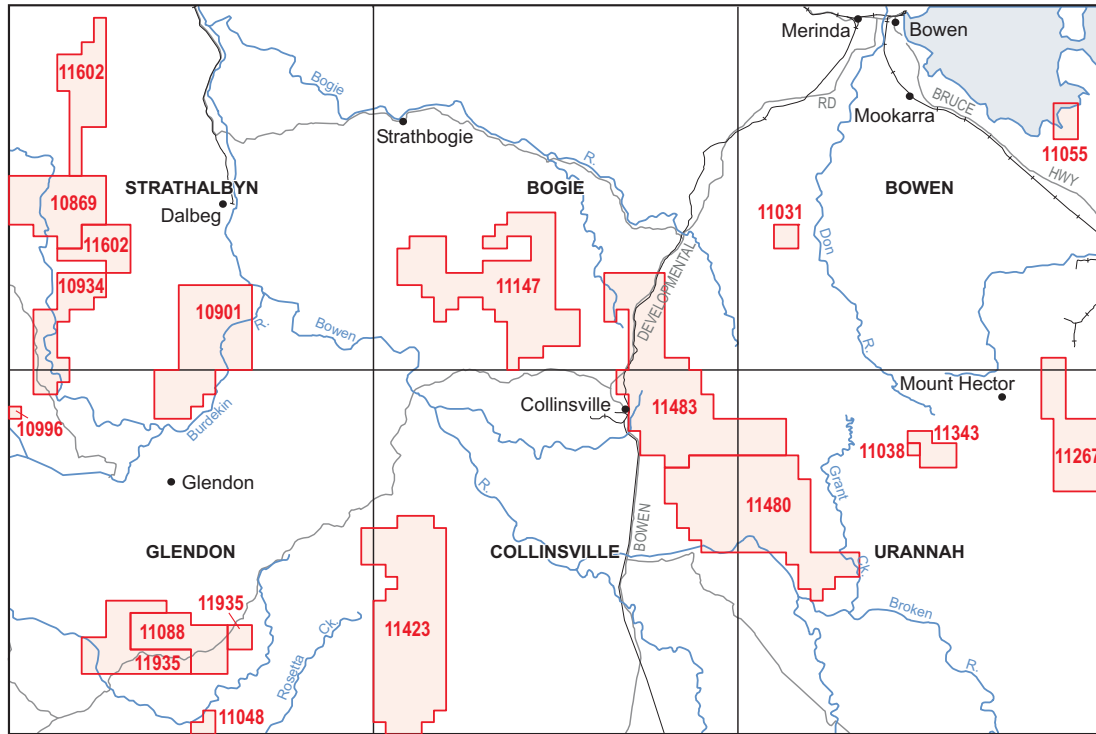


8732 - 9526

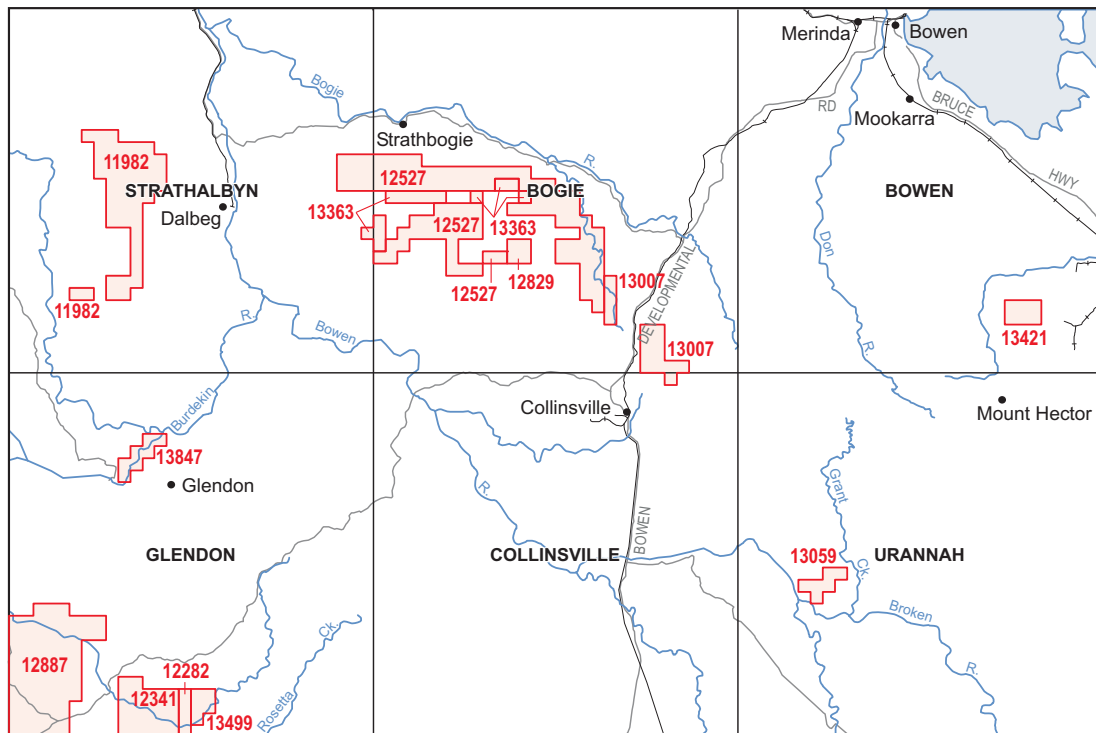


9662 - 10765

Figure 1.20: Location of EPMS 8732 to 10765, Bowen 1:250 000 Sheet area

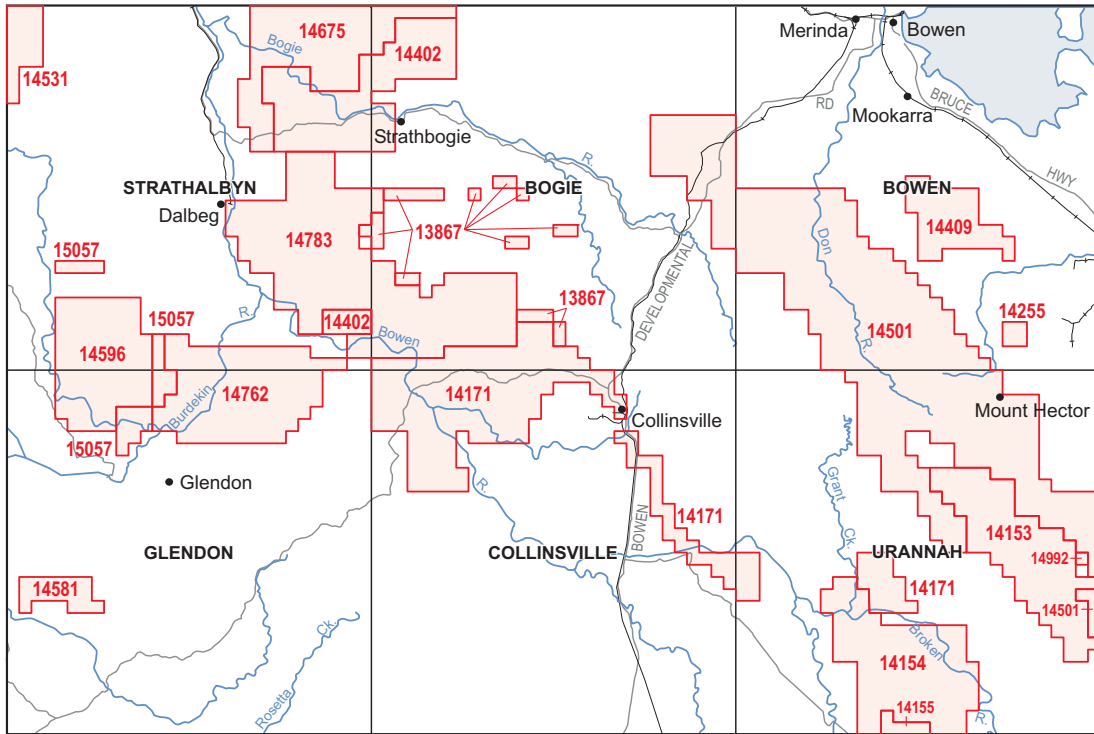


10869 - 11935

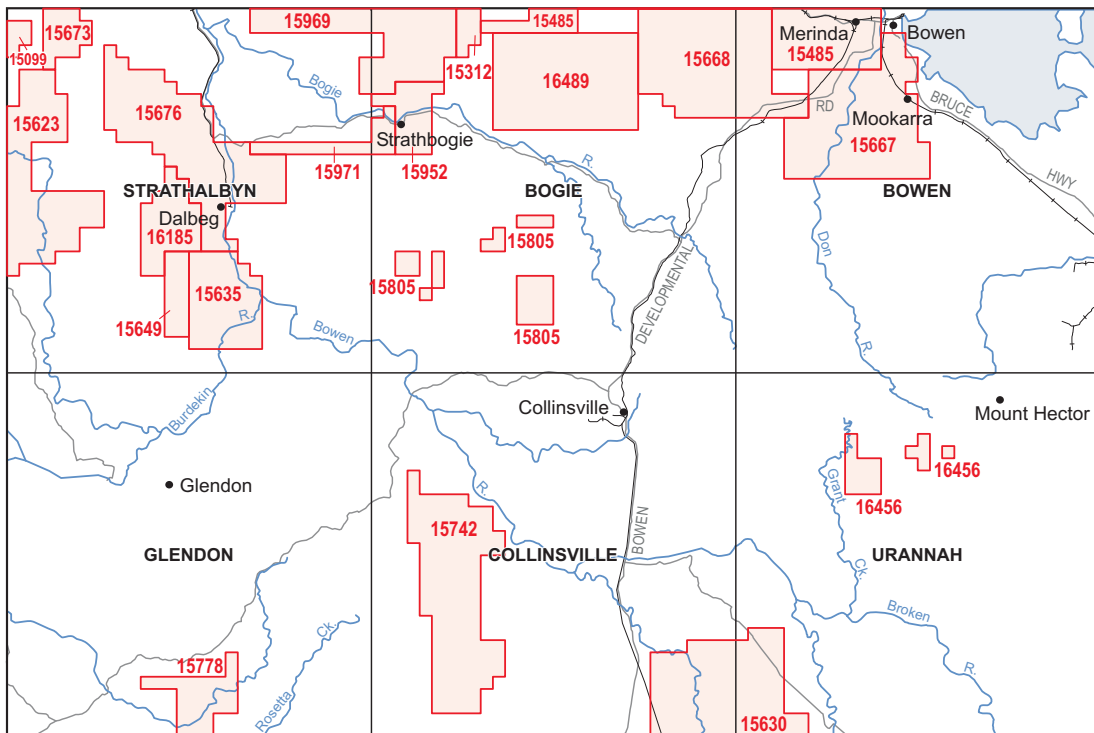


11982 - 13847

Figure 1.21: Location of EPMs 10869 to 13847, Bowen 1:250 000 Sheet area



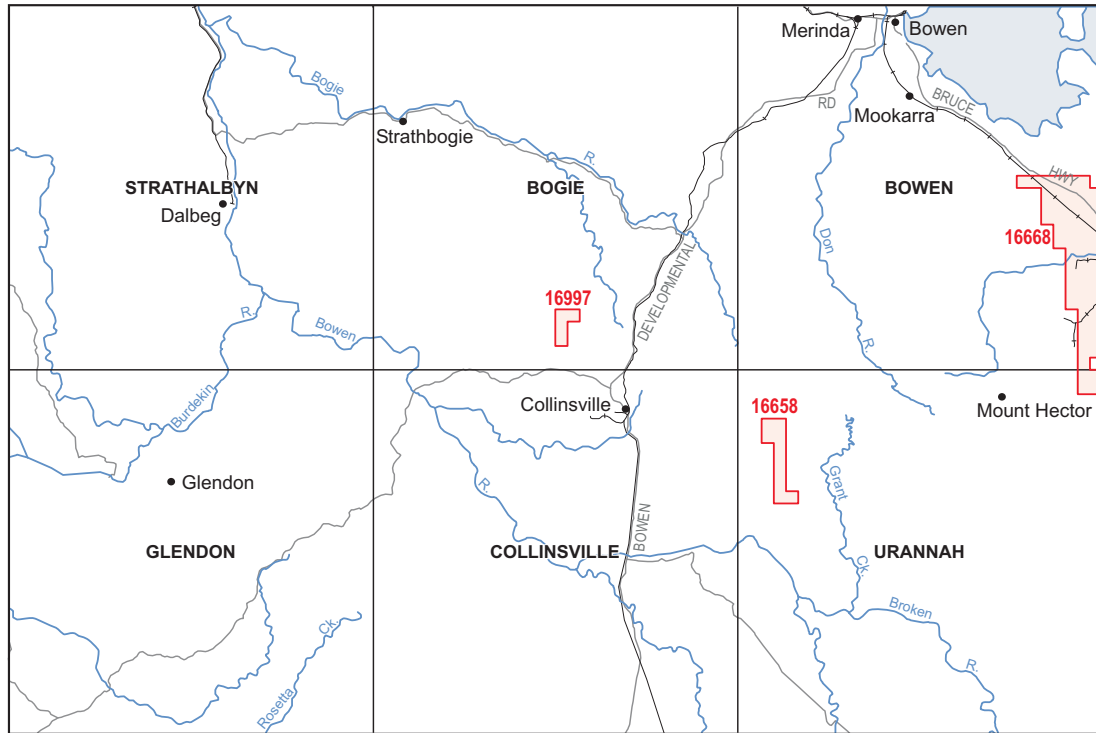
13867 - 15057



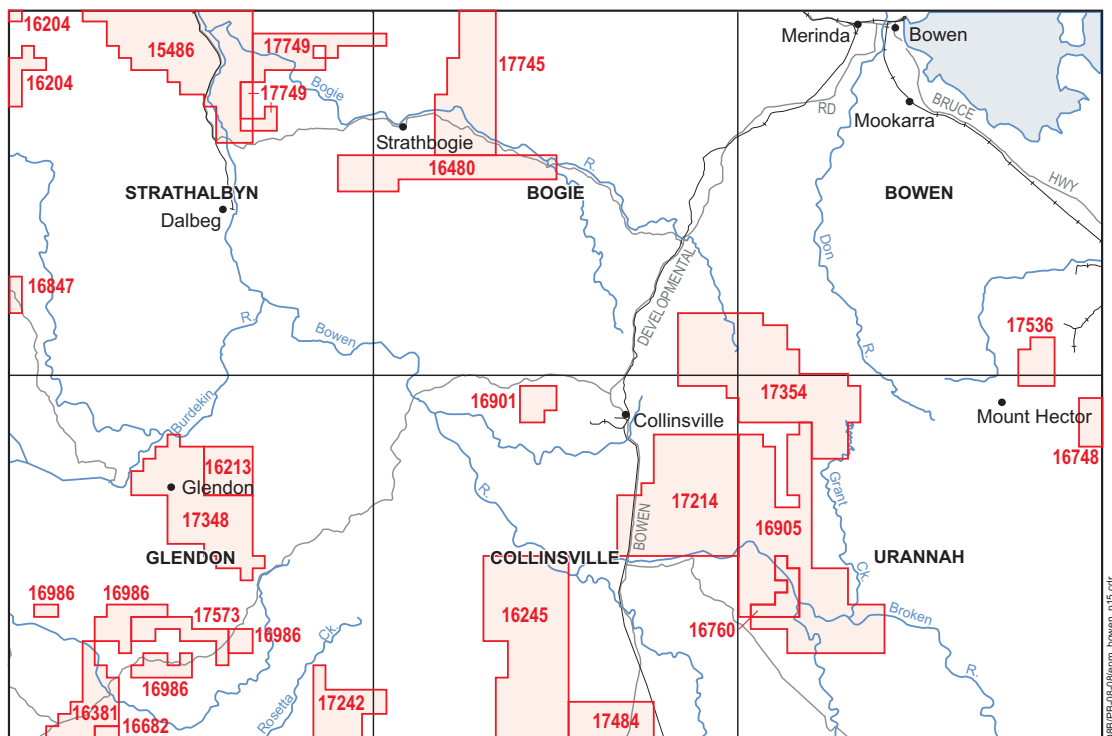
15099 - 16489

Figure 1.22: Location of EPMS 13867 to 16489, Bowen 1:250 000 Sheet area

08B/PB-08-08/epm_bowen_p14.cdr

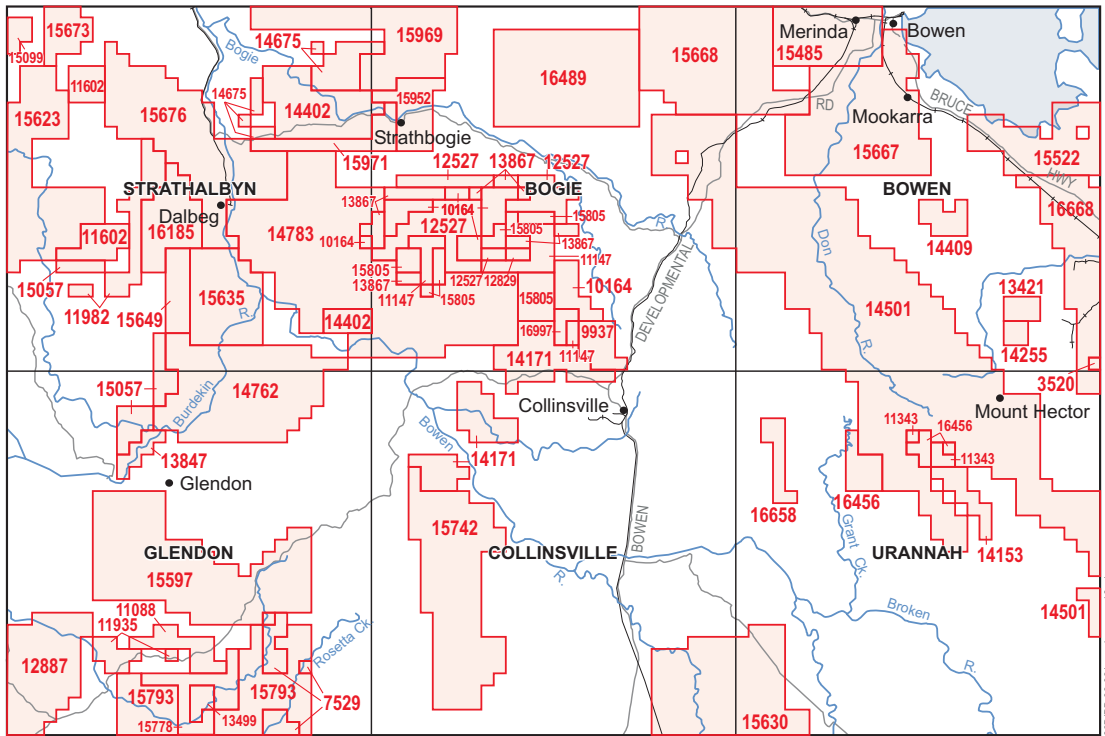


16658 - 16997



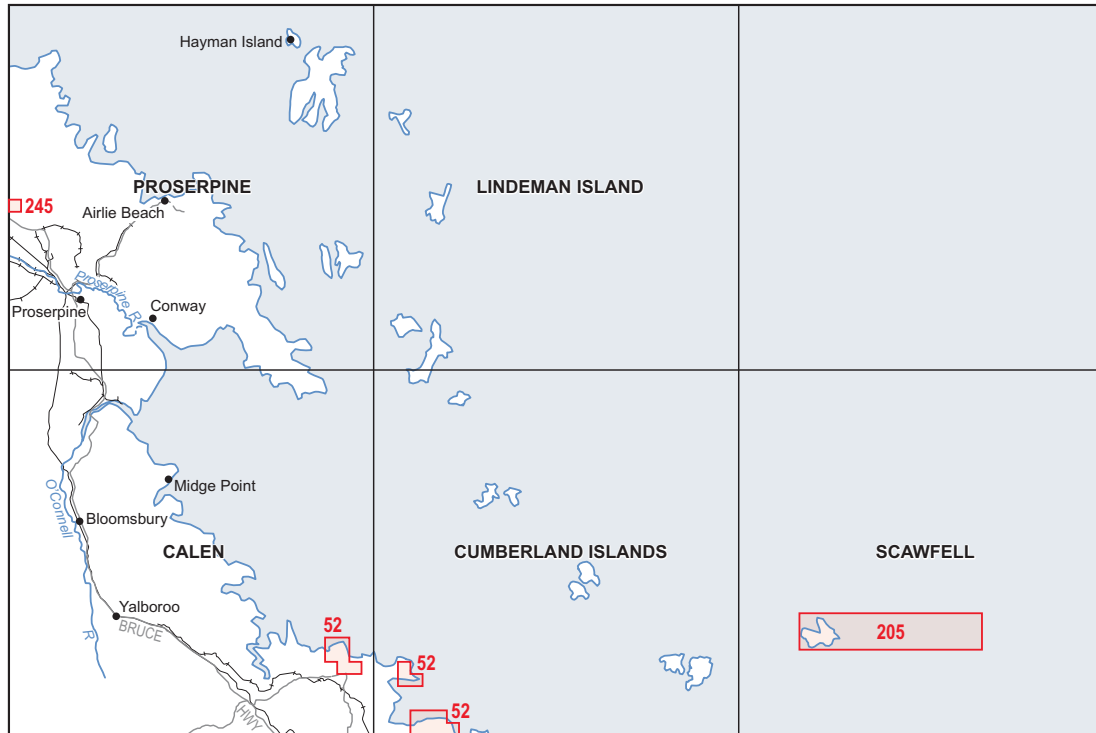
Current (Application) 15486 - 17749

Figure 1.23: Location of EPMS 16658 to 17749, Bowen 1:250 000 Sheet area

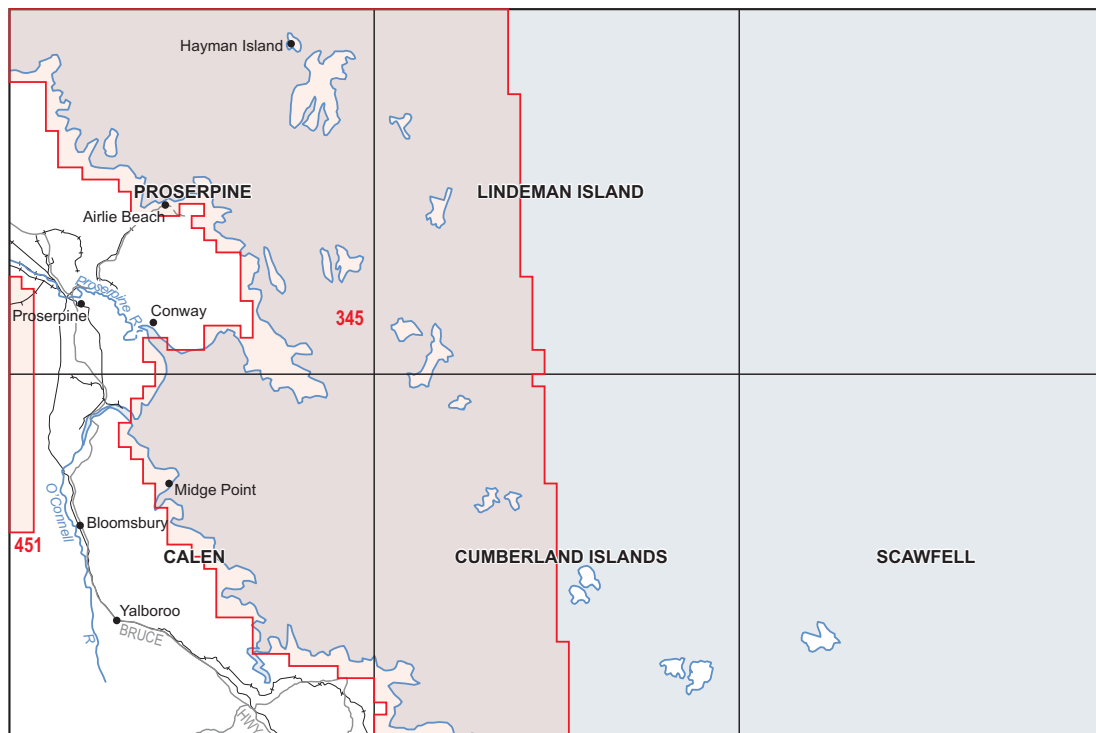


Current (Granted) 3520 - 16997

Figure 1.24: Location of current EPMS 3520 to 16997, Bowen 1:250 000 Sheet area

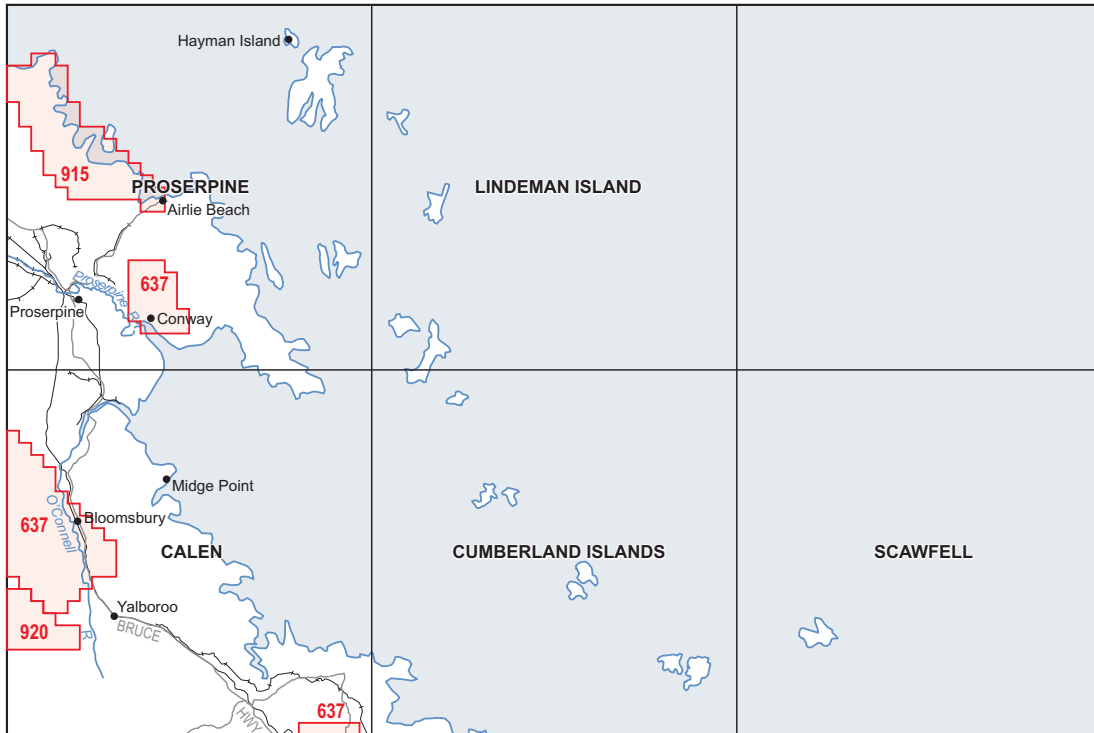


52 - 245

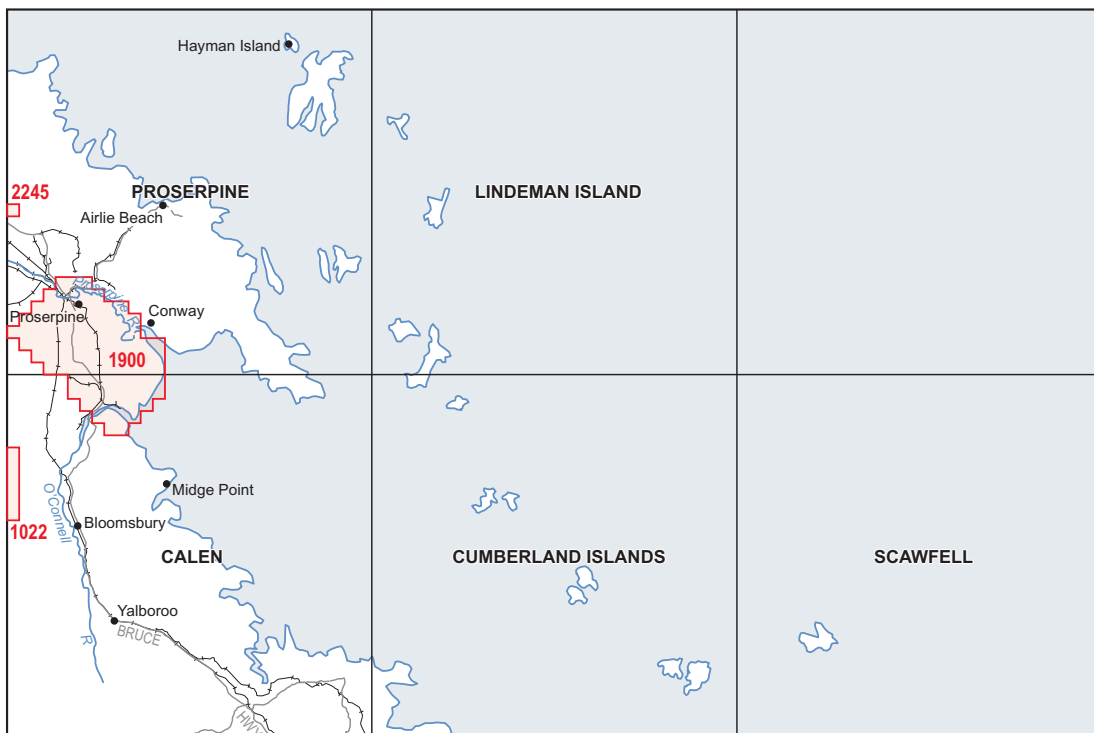


345, 451

Figure 1.25: Location of EPMS 52 to 451, Proserpine 1:250 000 Sheet area

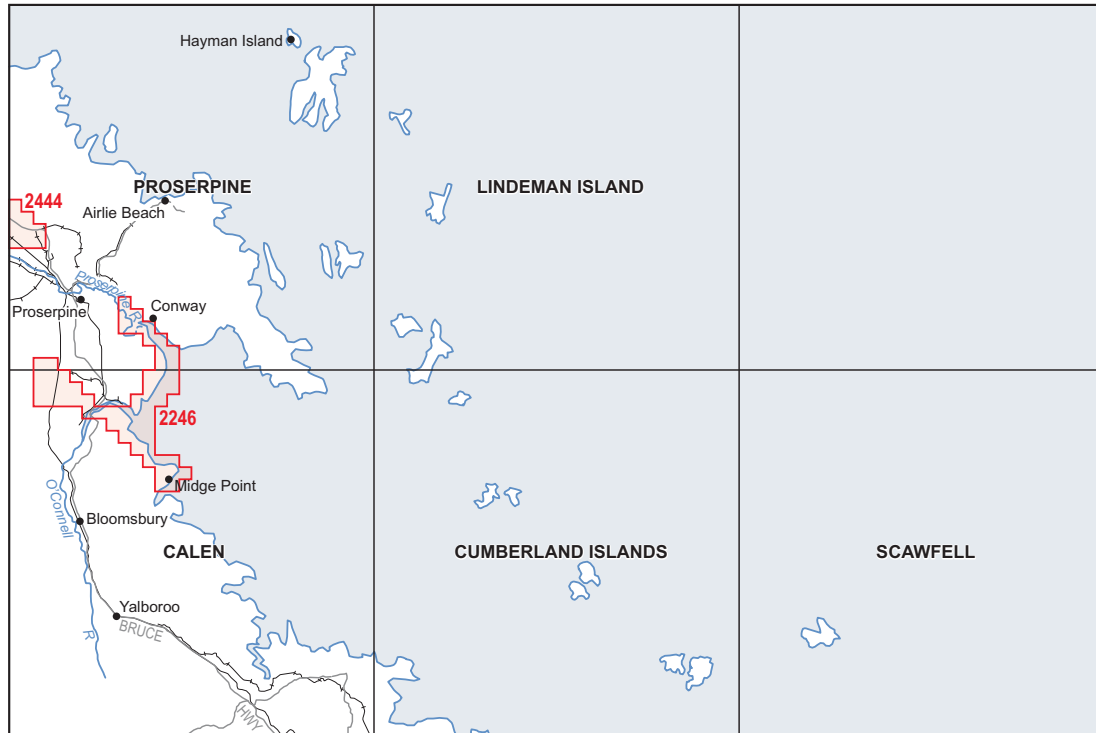


637 - 920

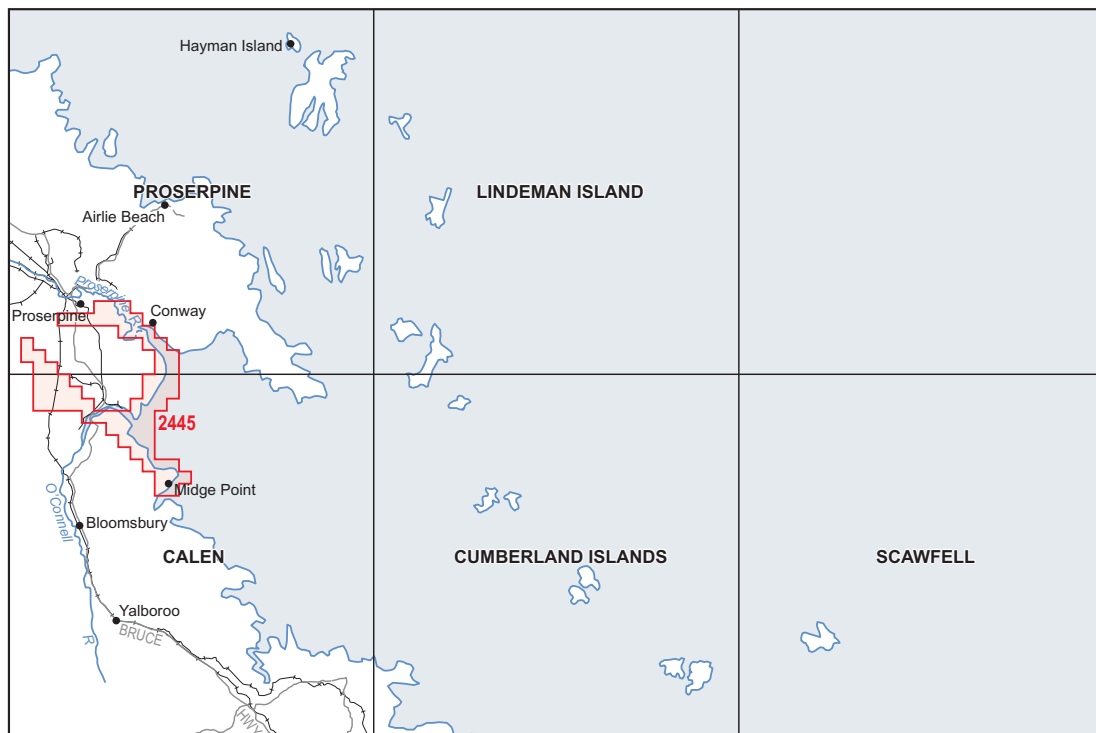


1022, 2245

Figure 1.26: Location of EPMS 637 to 2245, Proserpine 1:250 000 Sheet area

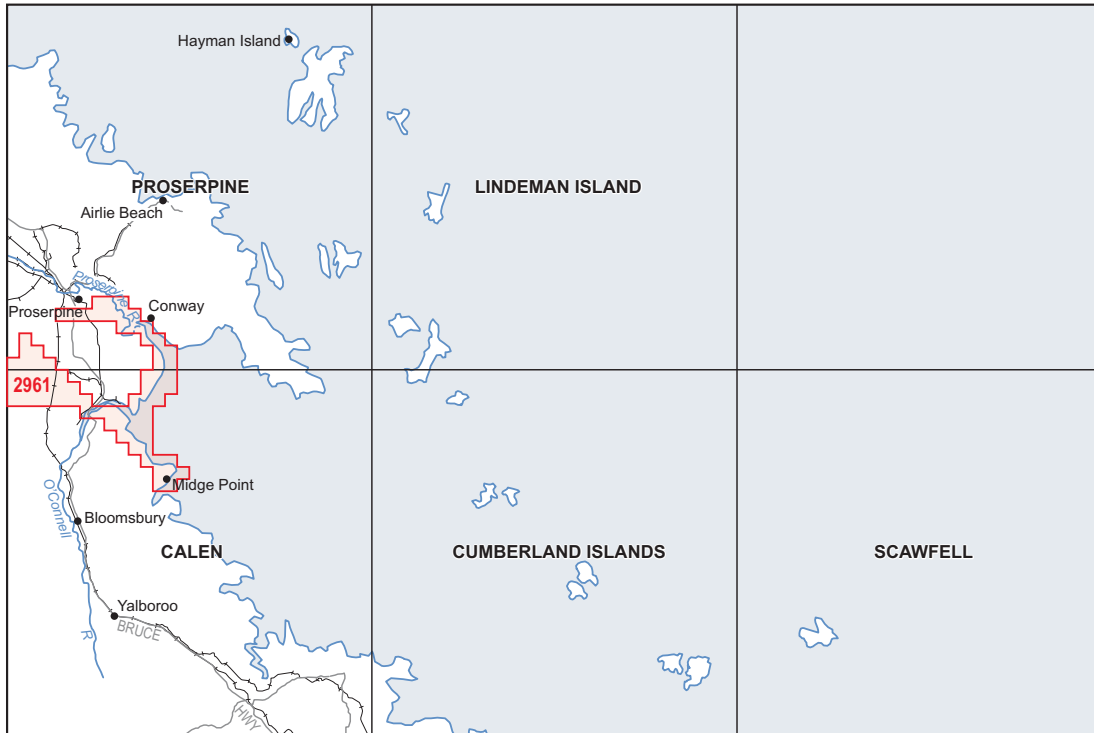


2244, 2446

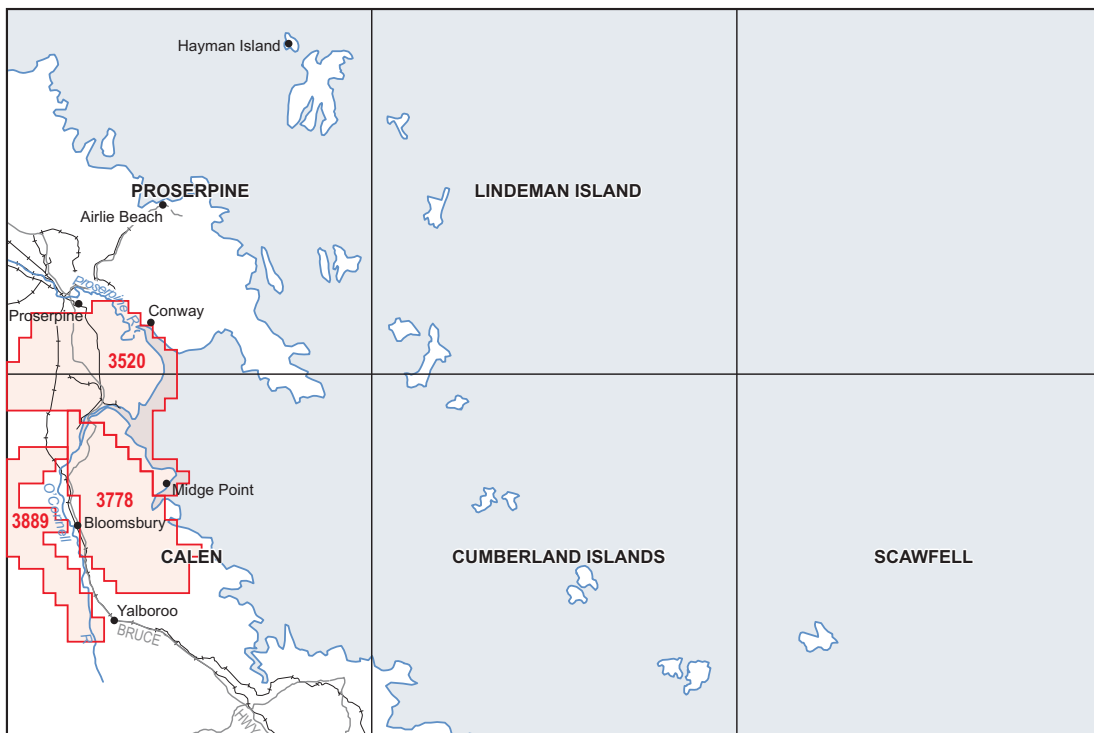


2445

Figure 1.27: Location of EPMs 2244 to 2445, Proserpine 1:250 000 Sheet area



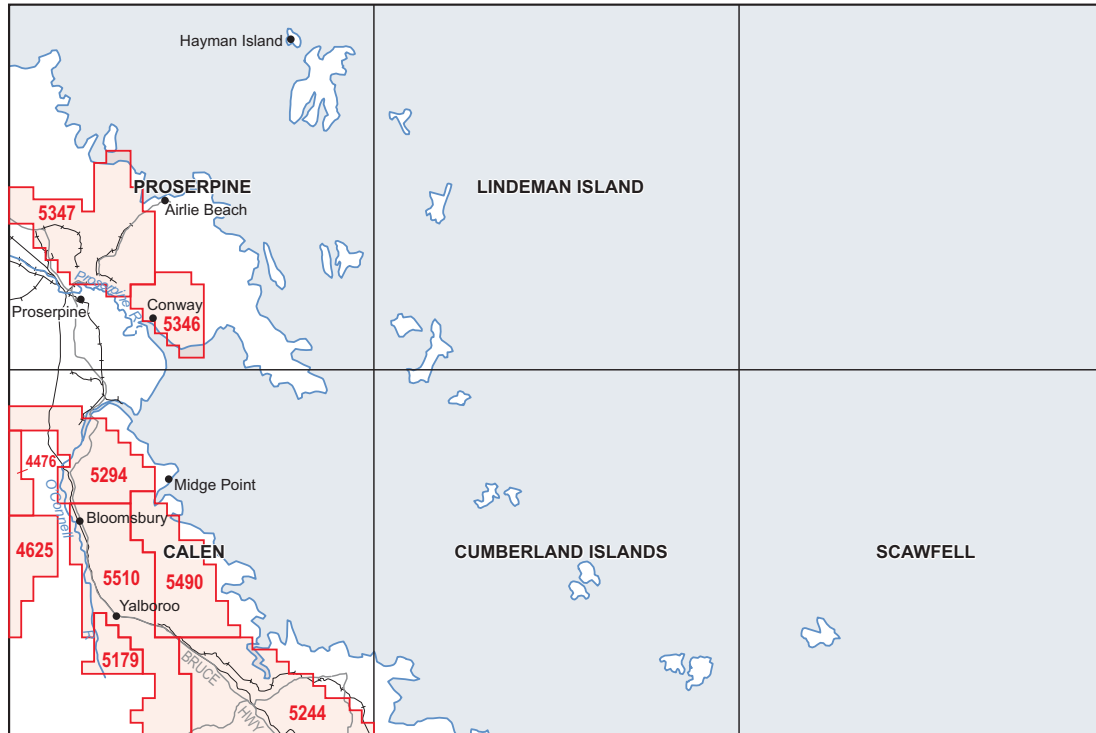
2961



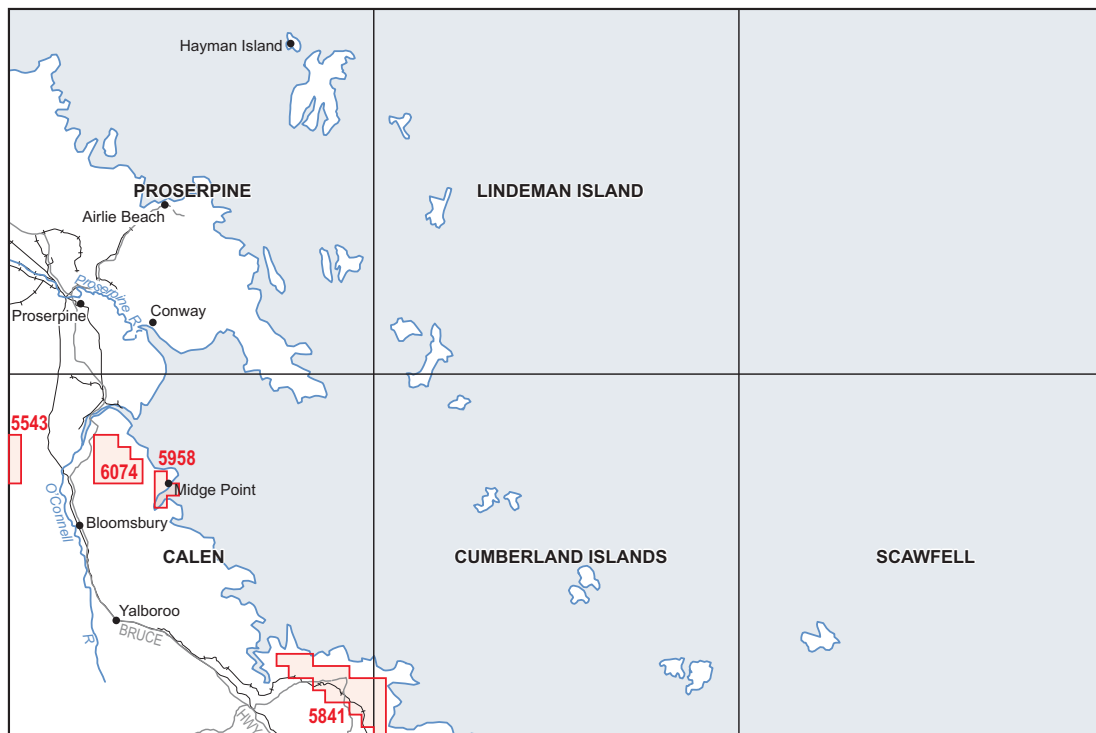
3520 - 3889

086/PB-08-08/epm_ppine_p4.cdr

Figure 1.28: Location of EPMs 2961 to 3889, Proserpine 1:250 000 Sheet area



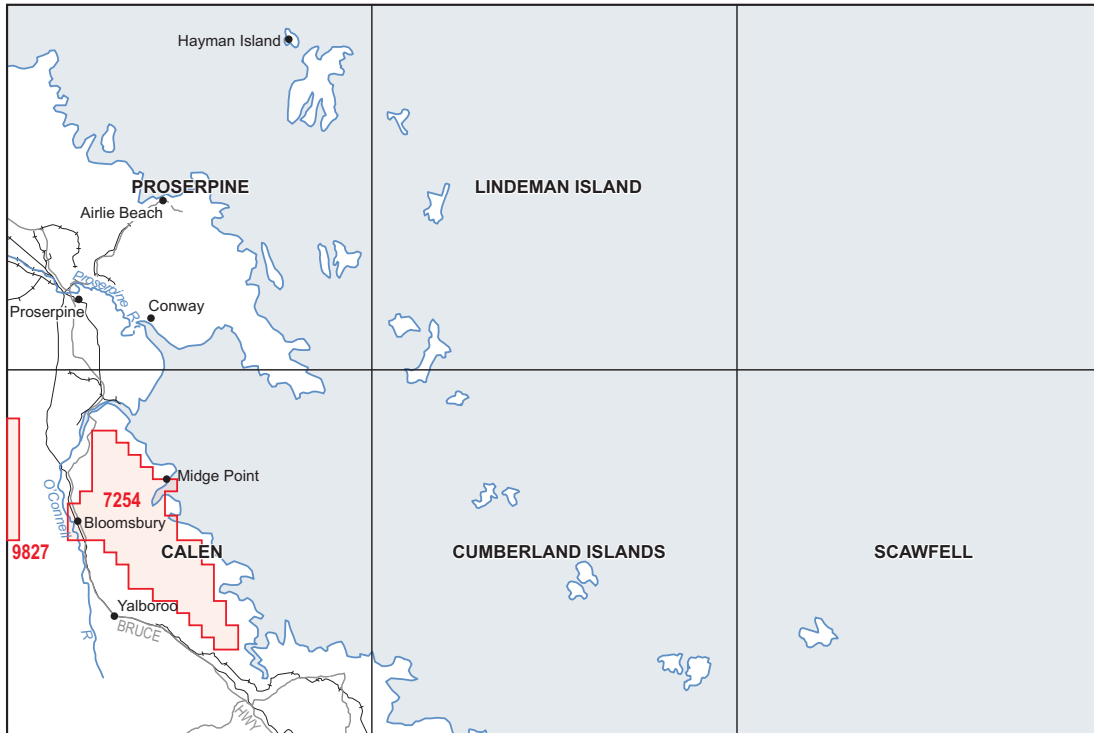
4476 - 5510



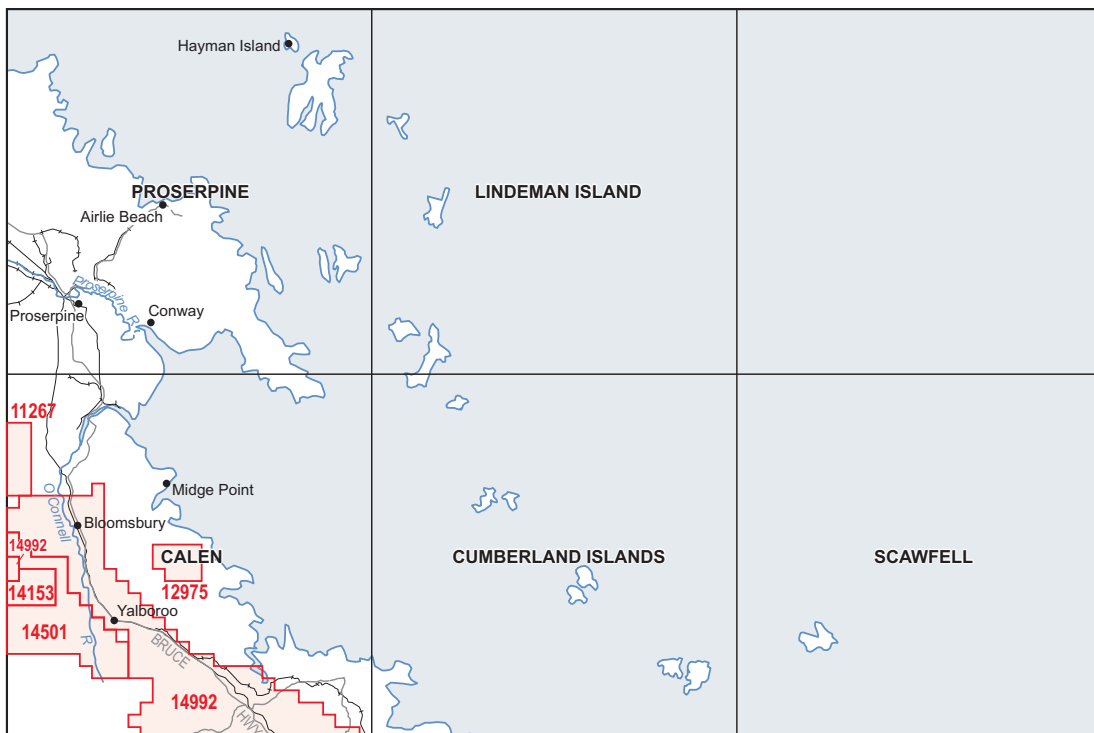
5543 - 6074

Figure 1.29: Location of EPMS 4476 to 6074, Proserpine 1:250 000 Sheet area

036/FPB-03-08/epm_ppma_p5.cdr

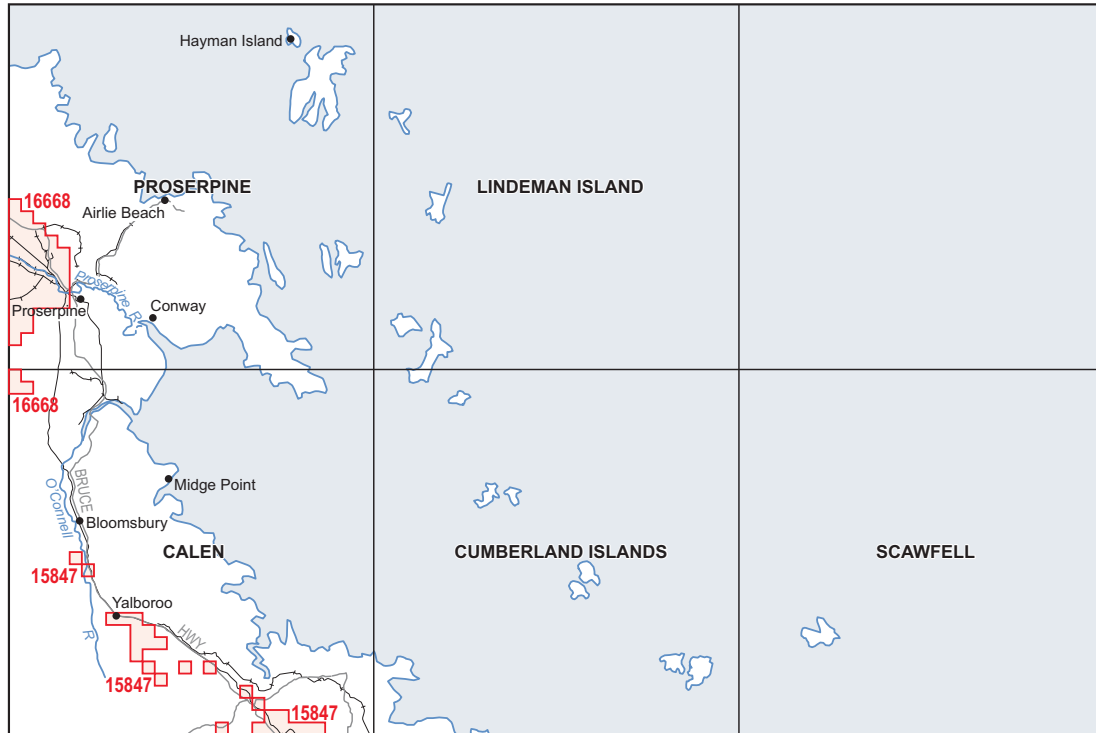


7254 - 9827

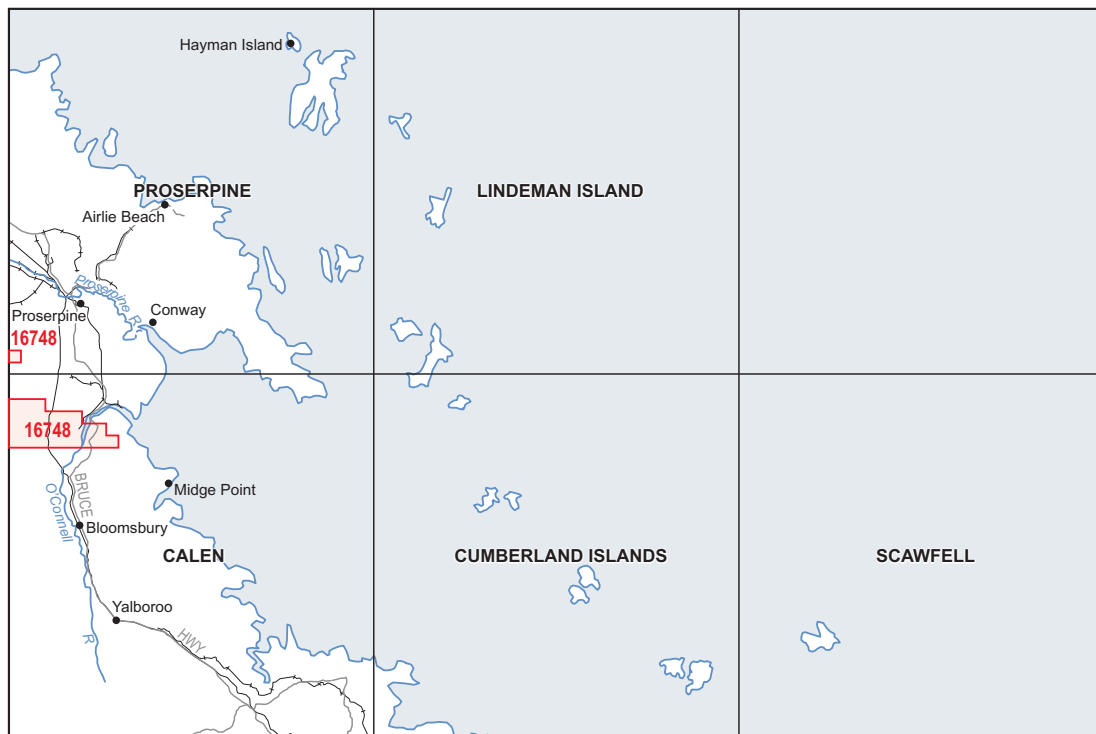


11267 - 14992

Figure 1.30: Location of EPMS 7254 to 14992, Proserpine 1:250 000 Sheet area

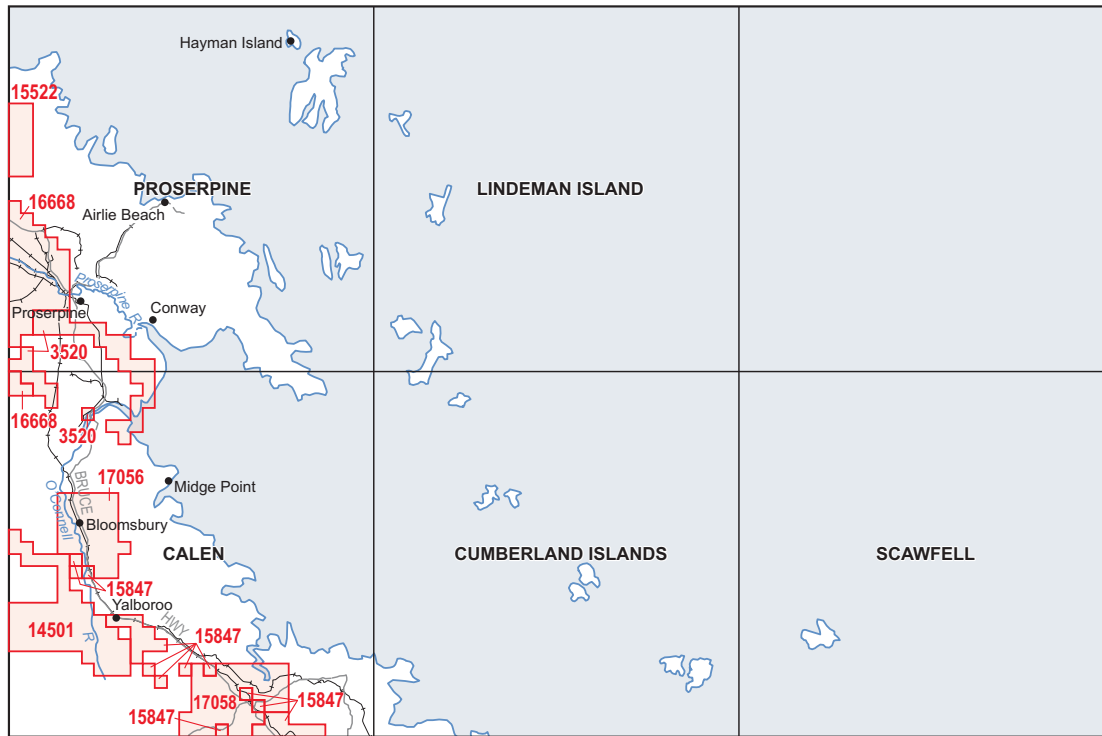


15847 - 16668



Current (Application) 16748

Figure 1.31: Location of EPMs 15847 to 16748, Proserpine 1:250 000 Sheet area



Current (Granted) 3520 - 17058

Figure 1.32: Location of current EPMS 3520 to 17058, Proserpine 1:250 000 Sheet area

