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EL 2963

WALLAROO BAY

ANNUAL REPORTS TO LICENCE EXPIRY FOR THE PERIOD 30/5/2002 TO 29/5/2004

Submitted by
Peter S. and Gillian F. Forwood Pty Ltd
2004

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Government of South Australia
Primary Industries and Resources SA

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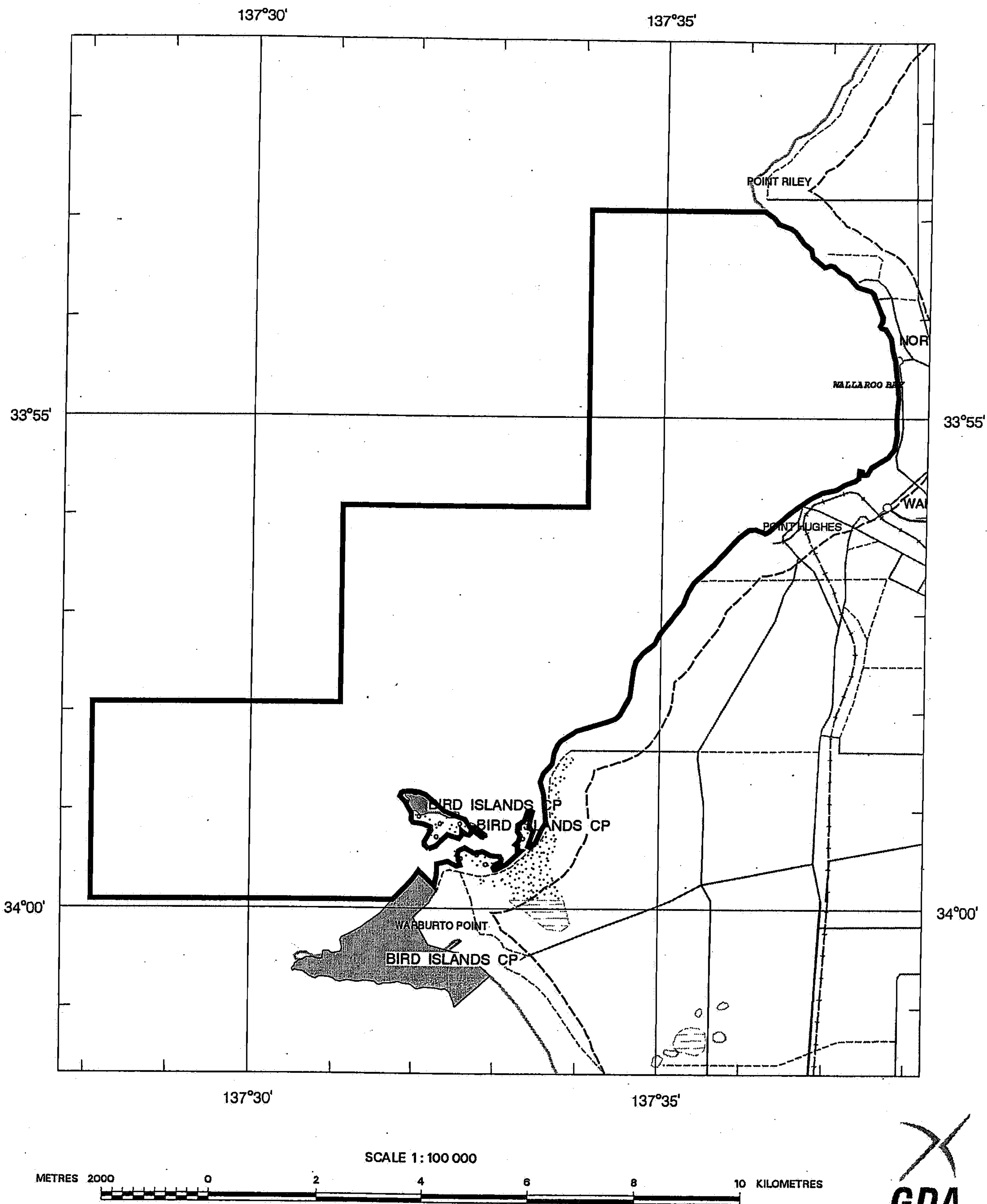

GDA
GEOCENTRIC DATUM OF AUSTRALIA

APPLICANT : **P S AND G F FORWOOD PTY LTD**

FILE REF : **49/01** TYPE : **MINERAL ONLY** AREA : **87** km² (approx.)

1:250000 MAPSHEETS : **WHYALLA**

LOCALITY : **WALLAROO AREA - Immediately west of Wallaroo**

DATE GRANTED : **30 May 2002** DATE EXPIRED : **29 May 2003** EL No : 2963

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Monday, 11 August 2003

The Director-General,
Department of Primary Industries & Resources, South Australia,
(Minerals & Petroleum)
PO Box 1671,
Adelaide, S.A. 5001

Dear Sir,

E.L.2963 (Wallaroo) -- First Annual Report for Period ended 29 May 2003

Please find attached one hard copy plus a disk (digital) copy of my report for the first year of tenure of the above licence, with expenditure from inception to 31 May 2003.

Sent previously to you was the required V3.93 'SUMMARY REPORT ON MINERAL EXPLORATION'.

Yours faithfully,

P.S.Forwood

Director, P S & G F Forwood Pty Ltd

Attachments (1) Printed Report on operations for period for first year of EL 2963 (1 December 2002 – 29 May 2003) (with expenditure 1 December 2002—31 May 2003) by P.S.Forwood (for Licensees)

(2) Disks of the above.

E.L. 2963 WALLAROO S.A.

Report on operations for period for first year of licence (30 May 2002-- 29 May 2003)

(with expenditure Inception-- 31 May 2003)

by P.S. Forwood (for Licensees)

Contents

1.0 Summary & status of project

Activities in the first year of tenure of EL 2963 consisted of data assembly and interpretation, and devising a scheme for exploring this offshore area.
Progress discussions have been held from time to time with PIRSA officers regarding the work performance on this licence, and it is recognised that a joint venture partner is needed to meet the costs of the offshore program.
Accordingly, a review has been prepared summarising the information on the area, defining approximate targets, and extolling the prospectivity of this part of the Gawler Craton.
At the end of the reporting period a particular exploration group expressed interest in the project. They are focussed on copper in Eastern Australia, and undertook to consider this tenement when their negotiations on Kanmantoo were completed.
The CD-ROM of the review is attached to this report as Appendix 1
Expenditure since inception of the licence to 31 May 2003 is $16,345.94.

2.0 Geology

Geological knowledge of the area was expanded by the published work of AGSO. Maps and other information arising from AGSO's studies have been included in the attached review with AGSO's permission.

3.0 Expenditure

The following expenditure has been recorded in the period 1 December 2002 -31 May 2003

Item	Expenditure
Geologist's/supervisor's time	$9,600.00
Wages	$0.00
Lease fees	$658.60
Office rent, equipment hire	$5,381.50
Drafting, maps, phones	$30.00
Travel, mileage	$366.24
Camp/accommodation	$43.50
Stores	$266.10
Assays	$0.00
Contractors	$0.00
Compensation	$0.00
TOTAL	$16345.94

Note (1) in the above, the time of consultant P.S.Forwood has been allowed at $400/day.

4.0 Outlook

EL 2963 has been applied for renewal for a further period (12 months to 29 May 2004), over a the same area. This will allow time to conclude a joint venture and to carry out an airborne survey of the licence area.

5.0 List of appendices

Appendix 1 CD-ROM of "Wallaroo Offshore" project (in folderWallaroo

"Wallaroo Offshore" Project

Moonta-Wallaroo region, South Australia
Australia

A Bulk Copper-Gold Target on the Gawler Craton

P.S. Forwood
Geologist & Geological Consultant
May 2003

WALLAROO OFFSHORE BULK COPPER PROSPECT, AUSTRALIA

By P.S. Forwood, geologist

EXECUTIVE SUMMARY

Since the early days of European settlement in the mid-1800's, South Australia has been recognised as a major copper field.

South Australia joined pre-eminence with the discovery of the huge high grade deposit of Olympic Dam in 1975, one of the grandest of all the world's copper-gold deposits.

The attraction of this region for copper was confirmed in November 2001 when a similar deposit to Olympic Dam was discovered at Prominent Hill, approximately 110km NW of Olympic Dam. It has essential similarities to Olympic Dam, and although smaller, is buried under less than 150m of younger rocks.

Several other vast deposits of the same type have been found in the area, but are sub-economic in grade.

These new discoveries significantly upgrade the prospectivity of South Australia for copper-gold, augmenting the wide-spread and high-grade copper deposits found and worked earlier in South Australia, particularly at Moonta-Wallaroo.

The new discoveries resulted from modern exploration — gravity and magnetic geophysics, lineament studies, and drilling.

Notably the major deposits of Olympic Dam and Prominent Hill occur in Carpentarian age rocks (≈ 1600ma, like Broken Hill and Mt Isa) and more particularly in association with acid igneous rocks.

A similar scenario applies to the old Moonta-Wallaroo copper field, 400 km to the SSE. The Moonta-Wallaroo field has produced 330,000 t of copper metal from high-grade reef systems to date. In addition to these low-tonnage deposits, the existence of large mineralising systems at Moonta was established in 1983 when DDH 224 drilled by WMC Ltd intersected a 244m width of copper mineralisation, albeit sub-economic, on the northern edge of the field — in the Wallaroo-Alford belt — interestingly, in association with granitic rocks and magnetic features.

Numerous drill holes in this belt may have reduced the scope for an economic discovery onshore, but have revealed a huge mineralising system, as well as yielding important data.

This data is relevant, because half of the Moonta-Wallaroo copper field (and more particularly of the Wallaroo-Alford belt) lies close offshore to the west, in the shallow waters of Spencer Gulf.

The combination of uranium with copper and gold, the age and type of host rocks, and the abundance of iron in the Moonta-Wallaroo field, point to similarities with the Olympic Dam and Prominent Hill deposits.

The importance of the Tickera Granite for both the Moonta-Wallaroo copper deposits, and the Pt Broughton mineralisation, now gives focus to company-maker targets in the shallow waters near Wallaroo Harbour.

Recent detailed aeromagnetics show magnetic features within this continuing mineralised belt which are prime copper orebody targets. The first one is about 4 km SW of Wallaroo Bay, about 1000m offshore, in water approximately 4 metres deep. In this situation an orebody would be readily accessible for underground mining from a shore-based decline, or possibly using a causeway to an open cut.

CONTENTS

EL 2963, Offshore from the Moonta-Wallaroo Copper-Gold field, South Australia

1. Abstract

On the northern margin of the Moonta/Wallaroo field of copper lodes, adjacent to the Tickera Granite, drilling has found wide low-grade copper mineralisation associated with argillisation and variable iron enrichment. Shoreline outcrop and aeromagnetic patterns indicate that the zone continues offshore, but the near-shore section is unexplored.

Drilling has revealed geology which in some parts relates to the Olympic Dam setting (granite association and iron enrichment) and in others to porphyry coppers (molybdenite mineralisation and kaolinisation). During the 1980's, hopes were raised for the discovery of a major copper deposit, but none has been found.

Early information released on the Prominent Hill discovery[1] indicates a much closer geological similarity with key parts of Moonta-Wallaroo, in that the host rocks are meta-sediments and meta-volcanics rather than granite.

The near offshore extension of the Moonta-Wallaroo field is untested by drilling, with two key factors adding to the attraction of the seaward projection of the Alford belt: [1] major NW-SE lineaments intersect the altered zone offshore, and [2] a copper deposit in younger formations at the coastline indicates probable 'leakage' from a hidden deposit.

The four proposed offshore targets are between 900 and 1500 metres from shore, and in 4 to 8 metres of water.
The disadvantages of an offshore location are offset by the close proximity to a port, industrial utilities, an educated labour force, and the absence of any indigenous land claim. Add to this a State Government and Bureau which is highly supportive of mineral development.

The recent decision (Dec '01) of Portman Mining to extend their iron-ore mining at Cockatoo Island[2] off the NW coast of Western Australia below sea level, indicates that a near-shore open cut is realistic. It is speculated that the discovery of diamonds on the coast of Flinders Island off the coast of South Australia, 260 km to the west of Wallaroo, will also require offshore mining.

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[1] Report by Minotaur Resources Ltd to the ASX on 27 December 2001, and subsequent reports
[2] Cockatoo Island lies off the NW coast of Western Australia, in a much less benign physical environment

2. Location

Location Plan

The Wallaroo Offshore exploration 'play' takes us to the famous old Moonta-Wallaroo Copper-Gold field on the southern shores of the continent of Australia (see Location Plan)

EL 2963 is in South Australia, immediately adjacent to the Moonta Copper Field, and offshore from the port of Wallaroo. It occupies approximately 82 sq km of the shallow water of Spencer Gulf, which was (with other gulfs etc) proclaimed "mineral land" on 3 July 1972. Geographically, it is about 160 km by road north-west of the state capital, Adelaide (see Gawler Craton illustration below). The three towns in this area — Moonta, Wallaroo, and Kadina — have a population of about 9,000[3].

3. History

The orebodies of the Moonta and the Wallaroo fields were discovered in 1860, and originally mined from 1861 to 1923, during which time approximately 330,000 tonnes of copper metal plus gold[4] were produced from two clusters of relatively narrow structurally controlled 'lodes' grading up to 30% Cu in the supergene zone and down to 2.2% in the poorer parts of the sulphide zone. The first discovery was allegedly made when green malachite-stained rock was observed on the burrows of the native animal, the wombat. Additional lodes were found by hand boring.

After World War 2 the then Mines Department of South Australia initiated exploration at Moonta as part of a mineral development policy thrust. They used magnetics and drilled several anomalies in the Alford area, finding mainly magnetite.

Minor prospecting efforts followed, but in 1961 a consortium led by Western Mining Corporation commenced an onshore program that was to continue for nearly 30 years. Their methodical system consisted of ground magnetics with Induced Polarisation follow-up, then auger geochemistry, and finally diamond drilling. Over 200 diamond drill holes were bored within a radius of 32 km from Moonta. A new lode — West Doora — was discovered adjacent to the Wallaroo lodes, but for its limited size and underground situation the grade of 1.8% Cu was subeconomic. Later the Wallaroo-

[3] The 1996 census put Kadina population at 3589, Moonta at 2898, and Wallaroo at 2516.
[4] Recovered gold grade of the ore mined between 1908 and 1916 was recorded as 4.2 g/t

Alford zone was found. Throughout the district it was rare for any exploration drill hole to be totally barren — most intersected alteration plus at least traces of copper. Late in the program an electro-magnetic geophysical system was employed — ‘Zonge’s Box’ — and the rich small lodes of Poona and Wheal Hughes were discovered within the Moonta system. These were profitably exploited by a junior mining company between 1987 and 1993.

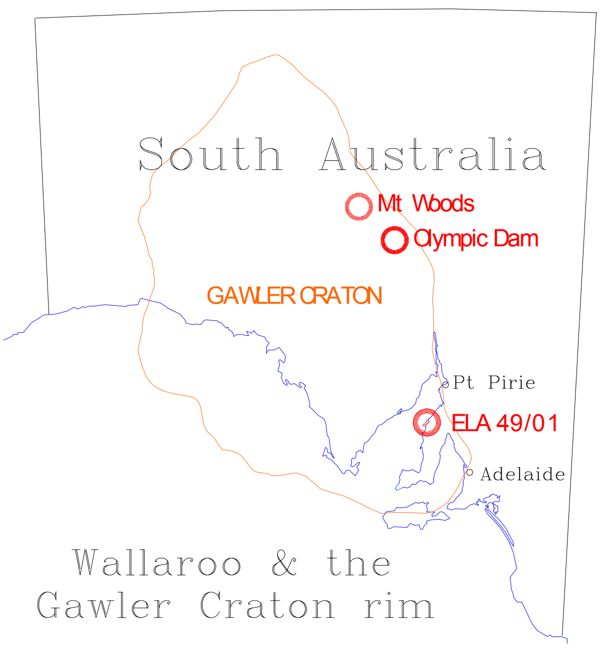
The Moonta onshore area is currently being explored by another junior Australian exploration company, in conjunction with Phelps Dodge.

Meanwhile, in 1975 Western Mining Corporation Ltd discovered the huge Olympic Dam deposit, 400 km to the NNW and in similar age rocks, establishing that this Mesoproterozoic region of South Australia is ‘elephant country’ for copper deposits. The Olympic Dam deposit contains ~30million tonnes of copper metal, 1200 tonnes of gold, 930,000 tonnes of U_3O_8, plus silver and rare earths. The newly discovered deposit at Prominent Hill, 110km to the NW of Olympic Dam, appears to be similar although smaller.

Aeromagnetic surveys in the adjacent Spencer Gulf were flown in 1974 and 1999. Offshore mineral drilling was carried out in the Gulf in 1993, 1997 and 2001.

4. Geology

4.1 Regional geology



The Moonta-Wallaroo copper-gold field sits near the eastern edge of the Gawler Craton — a stable province of Archaean, Paleo- and Mesoproterozoic rocks, most of which are crystalline. An outline of the Craton is shown opposite. The Archaean mainly occupies the western and southern part of the Craton, while the Mesoproterozoic Gawler Range Volcanics (felsic dacite/rhyolite) covers 25,000 square km of the central part. The eastern and north-eastern part features Palaeo- and Mesoproterozoic sediments including acid and basic volcanics and iron formations. This eastern part is the focus of our interest, as it hosts the huge Olympic Dam[5] copper-gold-uranium deposit, the new Prominent Hill discovery, and the Wallaroo offshore prospect.

Bounding the Gawler Craton to the east are the folded Neoproterozoic sediments of the Adelaide Geosyncline.

AGSO Geoscience Australia are currently conducting a 3-year research program called ‘The Gawler Craton Minerals Promotion Project’, and the scope of their work is described in AUSGEO News 61, pages 3-5. Figure 1 of that outline shows the areal extent of AGSO’s project, plus the tectonic domains of the Gawler Craton, from which the importance of the Moonta-Wallaroo area becomes obvious (see Figure 1).

4.2 Semi-regional/district geology

The best picture of the broad Proterozoic geological setting around Moonta and Wallaroo is the interpretation of the 1999 TEISA aeromagnetics by the AGSO Gawler Craton Project team, who have sought out all available information on the area. Their work is continuing. A progress map was presented in AUSGEO News No 61, June/July 2001, pages 3-5. A scan of their interpretation map is appended (Figure 2).

Notable is the complex area of altered rocks which they have interpreted in Wallaroo Bay — the site of 3 of the four drilling targets proposed in this review.

4.3 Local & Property geology

The important rocks of the Moonta-Wallaroo mining field are acid and (lesser) basic volcanics now dated at about 1735 - 1750 Ma. These are associated with the Doora Schist, a formation of dominantly chemical sediments including silicate-facies iron formation, and some (usually fine-grained) terrigenous metasediments, now extensively metasomatised and foliated. All are wedged between the intrusive Tickera granite to the north, and Arthurton granite to the south, the granites being dated at about 1590 Ma (see Figure 3).

[5] The Olympic Dam mine is due to produce in excess of 200,000 tonnes of refined copper, 4,500 tonnes of uranium oxide, and 120,000 ounces of gold in 2001. The proved and probable reserves at 31 December 1998 stood at 560m tonnes @ 2.0%Cu, 0.6kg/t U_3O_8, and 0.7g/t Au. The resource is estimated to be in excess of 2 billion tonnes.

The importance of the granites, particularly the Tickera Granite, becomes evident when the results of nearby drilling to the north — in the Pt Broughton area — are reviewed. Showings of copper (plus minor gold, uranium, and rare earths) were intersected in a broadly similar suite of rocks to those eat of Wallaroo. Alteration and signs of mineralisation in the Port Broughton drilling are widespread, but overall the mineralised zones lies close to the Tickera Granite.

The Tickera Granite, as interpreted by AGSO, takes the shape of a squashed triangle, or is more easily pictured as a ‘vampire’ or ‘bat’ with NE-SW wingspan 60 km and body length 25 km, nose pointing SE.

Alteration intersected in the Port Broughton drilling is mainly K-feldspar, carbonate, and chlorite, and the sulphide occur in narrow veins, as compared with the argillisation and wide zones of sulphide in the Wallaroo-Alford belt. Nevertheless, the Wallaroo-Alford mineralisation hugs the southern boundary of the Tickera Granite, while the Port Broughton (or more specifically ‘Katinka’) mineralised zone is spliced into the northern boundary of the Tickera Granite. This propinquity points to the Tickera Granite having an essential role in the mineralisation of the area.

Thin 'outliers' and very shallow basins of Upper Proterozoic (Adelaidean) and Cambrian occur, as well as occasional Tertiary limestones, but all are hidden beneath a thin veneer of Quaternary sands and clays with subsoil kunkar. Only a thin strip of Mesoproterozoic basement is exposed, along the sea-front north of Wallaroo (mainly granitic variations), and a rare outcrop of calc-silicate metasomatite at Hill's Quarry closely east of Wallaroo.

A great deal of geological effort, by many individuals, has been applied to the Moonta-Wallaroo district; the most comprehensive and up-to-date collation of the findings publicly available is that by C H H Conor (1994) "An interpretation of the geology of the Maitland and Wallaroo 1:100,000 sheet areas"[6].

The work of Conor indicates that a huge ‘engine’ or regime of metasomatism was active in the Moonta-Wallaroo district. From the point of view of comparison with Olympic Dam, it is thought relevant that areas of alteration/metasomatism have been mapped inside both the Tickera and Arthurton Granites.

[6] *Mines and Energy South Australia Envelope DME 588/9*3 (unpublished)

The Bingo fireclay mine on the eastern edge of the Wallaroo Mines at Kadina, and the 'old fireclay mine' mapped on the southern outskirts of Wallaroo township, show the extent of this metasomatic process.

Important in the old mining field is the Moonta Porphyry. This is a fine-grained, foliated, pale grey to orange-pink porphyritic rhyolite (with rhyodacite and dacite) containing relict phenocrysts of plagioclase, perthitic microcline, quartz and pyroxene in an extensively recrystallised matrix of quartz, feldspar, biotite and muscovite, with zircon, fluorite and apatite accessories. A large homogeneous mass of the Moonta Porphyry hosts the Moonta copper lodes, while thin bands of the Porphyry also occur within the schists which host the nearby Wallaroo lodes.[7]

The overall Moonta-Wallaroo "wedge" of volcanically and metasomatically active 'Carpentarian' rocks changes going in an east-north-easterly direction, broadening and becoming less mineralised. Trace –to-subeconomic copper mineralisation continues to occur in this direction, but metasomatism is reduced or absent, and these rocks are interpreted by some as belonging to a different stratigraphy (the Wandearah Metasiltstone).

An interpretation plan showing general geology, lodes, lineaments and targets is appended (Figure 3).

Thirty kilometres ENE of the Wallaroo mines the Bute area is reached, where acid volcanics (and copper) reappear briefly before plunging under the Neoproterozoic rocks of the Adelaide Geosyncline. However, going west, the volcanic-rich, metasomatically active, and highly mineralised 'wedge' of meta-sediments, meta-volcanics, and confining granites disappear under Spencer Gulf.

Spencer Gulf is a shallow generally N-S trending gulf, about 40 km wide and reaching a maximum depth of 31metres at a point 20km offshore at this latitude.

The BMR[8] flew a regional aeromagnetic survey over the region including this area in 1974. The resulting contour plan showed an area of intense and complex magnetics over the Moonta-Wallaroo district, and extending continuously out to sea. These intense magnetics are believed to represent a "red rock" province, that is an area containing old igneous/volcanic rocks with abundant haematite

[7] More details of the Moonta porphyry and Doora Schist may be found in "The Geology of South Australia, Volume 1, The Precambrian" (Mines & Energy Bulletin 54, 1993) pages 63-66

[8] BMR = Australian Government *Bureau of Mineral Resources* — now known as *AGSO*

and magnetite, plus a common fine 'dusting' of iron oxides, particularly hematite, which gives the bulk of the rocks their orange or pink coloration. This geological framework was confirmed and refined by the more detailed aeromagnetic survey conducted by PIRSA[9] in May 1999. The extent of this intense magnetic terrain can be seen on the attached coloured image of the 1999 TEISA aeromagnetics, included here by courtesy of PIRSA; the viewing is from the NE (Figure 4).

From this it is clear that the Moonta-Wallaroo geology continues at least as far west out to sea as it does on-shore, i.e. about 20 km. Whilst similar age rocks occur on land on the west side of the Gulf 75 km away, the exciting volcanic-rich, highly-metasomatised, copper-rich rocks and their confining granites have disappeared. The result of DDH KGD01001 drilled by the BHP-Quantum joint venture 20km west of Port Hughes in 2001, having been sited at the zenith of the gravity and magnetic features and intersecting negligible mineralisation, suggests a westerly limit to copper prospectivity.

Thin selvages of Cambrian occur on the coast immediately south of Wallaroo, and Emeroo quartzite of the Adelaidean (Neoproterozoic) outcrops on Bird Reef. It is possible that up to 30 metres of these combined formations would be encountered in drilling in the adjacent Gulf.

4.4 Structure

The structural features of the area have been studied, and the obvious general direction of stratigraphic continuity confirmed, that is, trending SW-NE. However, the aeromagnetic image of the district shows an equally obvious NW-SE direction (in fact, closer to 122°, which is O'Driscoll's[10] WNW or 2A direction).

The lodes of the area also demonstrate these two structural directions. The Wallaroo lodes near Kadina both strike, and line up, in the WNW-ESE direction (equating to the ‘2A’ lineament direction), while the Moonta lodes strike SW-NE. However, the Moonta lodes tend to "stack" in a NW-SE direction.

The coloured images of the BMR and TEISA regional aeromagnetics show these structural directions well (Figure 4). In particular, the NE images (viewing from the north-east) show the 2A lineament direction as very strong features. The corridors that correspond with the trend of the

[9] PIRSA = Primary Industries and Resources of South Australia (a state government department)
[10] See “Observations of the Lineament-Ore Relation” by Dr T. O’Driscoll, Phil. Trans R. Soc Lond, A317, 195-218

Wallaroo Lodes, and with the "stacking" direction of the Moonta Mines, intersect the important mineralised Alford-Wallaroo zone offshore, defining target areas, and hence yielding the immediate targets described below.

5. Mineralisation

Copper and gold are the major production metals of the Moonta-Wallaroo district. Molybdenum, silver and uranium occur, but in minor amounts. Lead–zinc features east of Kadina, but this is outside the Moonta-Wallaroo field proper, and the host rocks are thought by some to belong to different stratigraphy.

Additionally, tourmaline and fluorite are common adjuncts to the metallic mineralisation.

Copper-gold mineralisation is hosted by a variety of rock-types, but the productive mines occurred in either basic schist, or porphyry (= acid volcanics). However, the common feature is that the lodes were structurally controlled — filling fractures or fissures, with wall-rock alteration. The Poona and Wheal Hughes lodes, worked mainly as open cuts between 1987 and 1993, are still accessible (by arrangement), and reliable descriptions have been recorded by Conor and others.

While more than 20 individual lodes were worked in the district, they were all relatively narrow; Taylor's (Elder's) lode in the porphyry at Moonta varied from 3 to 8 metres in width. Consequently the field has a modest total production of about 400,000 tonnes of copper metal (including the recent production at Poona and Wheal Hughes).

The writer has been associated with exploration in the district for most of the last 37 years, and maintains that if the Quaternary cover had been absent, and the basement rocks had outcropped (as say at Australia’s Broken Hill or Mt Isa) there would be a myriad of small prospector-type copper and gold workings, and possibly 3 or 4 additional productive lodes.

However, with respect to exploration for major deposits, there has been a huge amount of work done, and it is very much a case of diminishing returns. That is, *as far as the onshore part of the field goes*.

The best signs of wide, extensive mineralisation are at Alford/North Kadina. The results of DDH's 129 & 224 stand out. These holes are located 10 km north-east of the town of Wallaroo. Hole no

129 intersected 25m @ 0.17% Mo and separately 33.5m @ 0.21% Mo, while hole no 224 intersected 244m @ 0.126% Cu with scattered Mo values in a more-or-less unfinished section (see Figure 5 for a graph of the copper and molybdenum values on DDH 224). Lesser but nevertheless wide copper mineralisation occurs 5 km nearer Wallaroo in DDH 121A (199m @ .036% Cu) and in DDH 122 (339m @.025% Cu).

Although the grade is far from economic, the width is impressive. These intersections were an extremely important breakthrough in the exploration of the Moonta-Wallaroo copper field, showing the potential for large systems. Follow-up exploration for large economic grade deposits has been limited by the shallow sea cover to the SSW.

This mineralisation occurs with kaolin ± pyrite alteration, and variably in association with small zones of brecciation. Some appreciation of the rock types and alteration may be gathered from the précis petrological descriptions of cores from diamond drill holes 121A and 122 located approximately 5 km NE of Wallaroo (see Appendix 1). The mineralised zone or belt approximates an ENE-WSW stratigraphic direction, although this may be co-incidental as it also parallels the generally ENE-WSW southern contact of the Tickera granite for 12 km. The belt fizzles out to the north-east near Alford, but is seen continuing strongly west on the beach 2½ km north of Wallaroo.

The old copper shows of North Britain, Great Britain, and Kooagnie are situated near the coast in this vicinity.

The Great Britain mine, located on the SW outskirts of the town of Wallaroo, and within 600m of the shore, is of particular interest. As far as can be ascertained it is now completely obliterated. Small outcrops on the adjacent shore about 400m to the north-west have been mapped as Tertiary limestone, while DDH 211 situated 700m to the north-east of the Great Britain mine drilled through 39m thickness of Tertiary and Cambrian rocks before entering the Carpentarian basement[11]. Thus the old Great Britain mine, discovered in the era of the prospector, was almost certainly not a ‘basement’ deposit. It was situated in Tertiary (or less likely in Cambrian) and well above the Mesoproterozoic unconformity. It is most likely that this deposit was formed by ground-water movement through fractures from a nearby hidden basement deposit— a phenomenon otherwise called ‘leakage’. While such evidence may be regarded as ‘circumstantial’, it adds credence to the copper potential of the adjacent area.

[11] Land surface at the collar of DHH 211 is approximately 10m above sea level.

6. Geophysics

The onshore Wallaroo-Alford belt has been surveyed with ground and airborne magnetics, IP geophysics, and gravity. However, offshore information in the area of interest is restricted to aeromagnetics. Gravity may possibly be obtained at a later date, but any sort of electrical geophysics is unlikely.

The key data is the TEISA B1 aeromagnetic survey flown in May 1999 at 400m line-spacing and 80m MTC[12]. This data has been made freely available by PIRSA; a contour plan of the survey data in the licence area is appended (Figure 6).

The magnetic character of the copper-bearing zones found by drilling in the Wallaroo-Alford belt has been assessed. The two key areas are in the vicinity of DDH’s 129 & 224 (10 km NE of Wallaroo) and in the vicinity of DDH’s 121A & 122 (5 km NE of Wallaroo).

Both copper zones are in the close vicinity of a magnetic disturbance. However, in both cases the copper mineralisation appears to be best developed adjacent to, rather than co-incident with, the magnetite zone, while the kaolinisation is definitely separate from the magnetite-mineralised zone.

In this regard, the very recent work on the nature of the copper-mineralising fluids in the Olympic Cu-Au Province by Skirrow, Bastrakov, and Raymond of Geoscience Australia is enlightening.[13]

Magnetic disturbances occur in the extension of this ‘corridor’ offshore, and they are highly likely to be associated with copper-gold-uranium mineralisation. If their modest magnetic magnitude is due to haematite with minor magnetite, they represent high tonnage, and high prospectivity.

The Wallaroo offshore copper-gold prospect is of the general Olympic Dam type, and it is now agreed that gravity is an essential tool in exploring for such deposits.

Normal gravity surveys are not possible offshore, and require airborne gravity.

In about 1998, BHP flew 'Falcon' gravity nearby, leading to the drilling of the 'King George' anomaly further out to sea.

[12] The survey was included in the TEISA program following petitions by the author.
[13] See download address http://www.ga.gov.au/pdf/RR0088.pdf

Unfortunately, their survey, conceived as a test of the method, did not cover the near-shore area.

The Falcon system has now been franchised to public company Gravity Corp. That company is essentially locked in to BHP-Billiton's diamond search, and their terms for flying Falcon for others are totally prohibitive, as to date they have had a monopoly on airborne gravity.

However, enquiries and information indicate that this situation is changing (April 2003). There are 2 other systems to be considered, one where development is nearly complete (and will be much more sensitive than Falcon), and one which it is believed is already in existence. The latter has poor accuracy/sensitivity, but by means of very slow flying (i.e. with a helicopter), results similar to Falcon can be obtained.

7. Moonta – Wallaroo and Olympic Dam/Prominent Hill — differences and similarities

When The Olympic Dam orebody was discovered in 1975, WMC geologists involved with the Moonta Joint Venture believed that it was a different type of ore situation to that at Moonta-Wallaroo, i.e. the Olympic Dam model did not apply to Moonta. At that stage hard evidence for any particular theory of origin was lacking, but no doubt the hosting by granite influenced this belief.

With much more information now available, it appears that this early assessment could be misleading. Important similarities must be conceded, and the possibility of an orebody being found in the Moonta-Wallaroo district with certain Olympic Dam characteristics is real.
Little detail of the ‘Carpentarian’ geology surrounding the Olympic Dam deposit is available, mainly because it is unconformably overlain by ~300m of Neoproterozoic-to-Cambrian flat-lying sedimentary rocks, hence a comparison of the immediate surrounding field geology there with the Moonta-Wallaroo field is not possible.

A description of the Olympic Dam deposit by WMC geologist L J. Reynolds was recently published in MESA Journal (October 2001 Vol 23 pp 4-11) and his summary of the formation of the deposit was as follows: “Current consensus among geologists at Olympic Dam is that the deposit is the product of an evolving hydrothermal system in which the hydrothermal fluids and associated metals were both primarily derived from a magmatic source. WMC sulphur isotope data support this interpretation (Eldridge and Danti, 1994). Overall geological relationships within the ODBC[14]

[14] ODBC = Olympic Dam Breccia Complex

indicate that hydrothermal activity, breccia formation and dykes were probably associated with high-level mafic-felsic Hiltaba Suite plutons and co-eval Gawler Range Volcanics extrusive equivalents (Reeve et al., 1990; Johnson and Cross, 1995)."

The key similarities of Olympic Dam/Prominent Hill and Moonta-Wallaroo are:-

- host-rock ages and types — both dominated by Meso-Proterozoic acid and basic igneous rocks
- both situated near the eastern edge of the Gawler Craton
- the major ore minerals of both are —
    - copper
    - gold
    - uranium[15]
- both show evidence of big-scale hydrothermal activity
- both contain abundant hematite and magnetite, i.e. more-than-usual iron abundance.

A significant minor element here is uranium. The combination of copper, gold and uranium is special and relatively uncommon in a world-wide context.

Key differences appear to be in structure. Olympic Dam is a vast breccia complex, and lies at the intersection of the major NNW trending G2 and WNW trending G9C gravity lineaments identified by O'Driscoll. At Moonta we have lineaments, but they are 'second order' to the G2 and G9C, while brecciation found to date is also on a much lesser scale.

It would seem that as well as all the similarities noted for Olympic Dam above, the Prominent Hill discovery features host geology of iron-rich metasediments and volcanics, which are the rocks of the most prospective zones at Moonta-Wallaroo.

The importance of major intersecting lineaments now faces scrutiny, with the discovery of this second Olympic-Dam-type deposit at Prominent Hill. It would seem that Prominent Hill could be associated with lesser lineaments than the major ones at Olympic Dam.

[15] Uranium is not noted in the production statistics of Moonta. However, the writer arranged for regular scintillometer scanning of exploratory drill cores laid out in a core yard at Moonta; while few responses were detected in the cores, a marked rise in background count was noticed each time this scanning was carried out. It was found that the 'anomalism' was due to the Moonta mine tailings which had been used to pave the core yard.

At Moonta-Wallaroo there are signs of extensive brecciation and magnetite ‘flooding’. DDH 122 located 3.5 km north-east of the town of Wallaroo was drilled to 365m on a thumb-print magnetic anomaly. It intersected brecciated aplite, micro-granite, micro-granodiorite, and banded volcanics, with magnetite (and sulphides) scattered throughout the hole. The magnetite occurs in various forms — in bands, in veins, and ‘inundating’ (quote from original log). Given the field geometry — a thumbprint rather than a continuing horizon — a local intrusion or invasion of rupturing and mineralising material is the likely cause, but not as rich or powerful as that which occurred at Olympic Dam or Prominent Hill. At Wallaroo, the latter is still waiting to be found.

8. Targets

Very definitely, the area immediately west of the Moonta-Wallaroo coastline would have been exhaustively explored before today, but for the water.

Although the depths and distances are small, the water of the Gulf places a challenge of enterprise and technology on the exploration phase (which two companies have now shown can be managed in a routine fashion). But it also places a substantial minimum on the target body — the economic size and grade of which will depend on the distance offshore, and the depth of water.

Four targets for very major copper-gold deposits have been interpreted. The general vicinity of these targets are essentially intersections of structures or lineaments with the Alford-Wallaroo mineralised alteration belt, and they are marked by aeromagnetic anomalies[16]. The models of Olympic Dam and Prominent Hill are understood to be gravity targets rather than magnetic targets. Thus the muted magnetic signature of these targets is considered in keeping with bodies in which hematite, pyrite and chalcopyrite predominate.

These four local drilling sites (Targets A, B, C, and D) are shown on the general plan of geology, lodes, lineaments and prospects (Figure 3). In detail, targets A, B, and C may all be part of the one system.

Aeromagnetic profiles over these four targets are shown in Figure 7. Note that these profiles have been produced by the ‘Grid|Slice’ method of the contouring program ‘Winsurf’, hence they are smoother than profiles obtained directly from the flight data.

[16] A fifth target has been identified at AMG 741500E, 6242800N, but it appears to be relatively small

As reasoned earlier, the negative drilling result of the King George Falcon gravity anomaly[17] is interpreted as limiting the copper-mineralised zone to closer proximity to the granites and to the shore. For this reason, as well as economic considerations, the more south-westerly extension of the target zone is not favoured. Summary information on DDH KGD 01001 as recorded by PIRSA, is given in Appendix 4.

Up to three diamond drill holes have been scheduled for each of the four selected targets. The first hole is aimed at the central source of the selected magnetic disturbance. The other two holes allowed are scheduled as possible step-outs, to be drilled where the first hole intersects the right style of brecciation, alteration and copper mineralisation.

An average of 30 metres of 'overburden' drilling (Tertiary, Cambrian or Upper Proterozoic) is allowed in each hole, although this may be absent. If unmineralised basement is then intersected, 20 metres of further (basement) drilling will be sufficient. Where extreme brecciation, alteration, or other signs of mineralisation are encountered in bedrock, 70 metres of basement drilling is allowed. Thus, for budget purposes, an average total hole depth of 70 metres is anticipated.

Details of the proposed holes are as follow:-

	AMG Co-ordinates	Magnetic magnitude	Depth of water	Distance offshore
Target A	741500E, 6244800N	1100nT's	8m	1650m
Target B	742000E, 6243600N	550nT's	6m	850m
Target C	740000E, 6242700N	700nT's	8m	1500m
Target D	736000E, 6240400N	500nT's	4m	900m

See Figure 8 for the positions of these sites in relation to shoreline and depths of water in metres.

9. Offshore drilling technology

Offshore drilling has been successfully conducted in this vicinity on three previous occasions;

- by Australian Consolidated Minerals (MPI) in 1993
- by the Australian Consolidated Minerals (MPI) – Allender Exploration – Fodina Minerals Pty Ltd – Phelps Dodge Australasia Inc consortium, in 1997
- by the BHP – Quantum Resources joint venture in 2001

[17] The King George drill hole DDH KGD01001 was sited approximately 20 km west of Port Hughes, on a large airborne gravity anomaly, but the hole was barren (see MESA Journal Vol 21, April 2001, page 11)

These previous offshore drilling programs have been much more adventurous and much more expensive than the program proposed herein, as shown in the following table.

Hole No	Explorer	Area	Distance offshore	Depth of water	Depth to fresh basement
KD02	MPI	Pt Broughton - Katinka	3km	'seaward side of tidal flats'	114m (oxidised) 143m (fresh)
KD 17	Phelps Dodge	Pt Broughton - Katinka	3km	4m	Neoproterozoic(?) to end-of-hole (190m)
KD 18	Phelps Dodge	Pt Broughton - Katinka	7km	15m	141m
KD 19	Phelps Dodge	Pt Broughton - Katinka	7km	15m	174m
KD 20	Phelps Dodge	Pt Broughton - Katinka	6.5km	10m	160m
KGD01001	Quantum-BHP	Off Port Hughes	20km	Approx 15m	81m
Prop'd WO1	Forwood venture	Wallaroo/Wallaroo Bay	<1500 m	< 8m	Est 30m

Note:

1) Where data is not specific, depths and distances are rounded.
2) There is a discrepancy between the article in MESA JOURNAL 5 (April 1997) "depths of water 3 to 11 metres" for holes KD 17-20, as against the figures in the table, which are taken from the Company's annual report.
3) The entries for "Prop'd WO1" are the worst case estimations, for a series of proposed holes.

Details of the operations and costs of the 1997 drilling by Phelps Dodge are given in their EL 2199 annual report to 19 September 1997 (see Appendix 3).

More current details of the Sideson jack-up platform used for that program can be found in Appendix 5, and in Appendix 6.

It is noted that Avoca Resources have recently (about March 2003) taken up an offshore area on the other side of Spencer Gulf, near Whyalla, and no doubt expect to drill there at some stage.

Major factors in the cost of that program were the distances offshore, and the depth of mud drilling required to reach solid coring basement.

These costs will be much lower in the program now proposed. However, inflation, plus likely escalated insurance costs, suggest that — depending on size of program — the dollar costs will be similar.

10. Ownership and licensing

P.S.& G.F.Forwood Pty Ltd applied for ELA 49/01 of 90 sq km on 4 June 2001, and the area was offered on 26 November 2001. Following new developments on the South Australian exploration scene, the outline of the area was revised in January 2002, and was granted as EL 2963 on 30 May 2002. All land within the licence is "mineral land" under the Mining Act (by proclamation which came into force on 3/7/72); the chief difference between this and an on-shore licence is the requirement of the Minister to be indemnified from any actions resulting from placing a structure on the sea-bed or the escape of deleterious substances into the sea.

11. Mining and tax laws applicable

11.1 Exploration and Mining Laws in Australia

Generally all minerals in Australia belong to the Crown (the State). State governments own and administer the search for and exploitation of any mineral deposits within their boundaries, including proclaimed mineral land offshore. This is done by means of granting licences (exploration) and leases (mining) as set out in an Act of State Parliament — in South Australia under *The Mining Act 1971*[18], as amended. A licence or lease may be granted to an individual or corporation, and that individual or corporation does not have to be Australian, but must have good standing and have the required technical capability and financial resources available for the undertaking.

For exploration, the licence document (which State and Licencee both sign) sets out conditions of conduct, entry to land, care of the environment, expenditure rate, and reporting of work done. Entry to land is provided either by direct agreement with the owner or is facilitated by PIRSA, except in culturally sensitive areas (occupied housing, churches etc).

Explorers are required to watch for, avoid damaging, and report any heritage features within their licences.

For mining on a big-scale, the precedent set in 1982 for the Olympic Dam deposit on Olympic Dam sheep station is likely to be followed. An indenture agreement covering all foreseen aspects of the operation was negotiated between the State Government and the mining company (Western Mining Corporation Limited) and was ratified by an act of parliament. That act — the Olympic Dam (Indenture Ratification) Act 1982, may be viewed at the PIRSA website referred to above.

Certain Australia wide (Commonwealth) legislation overlaps state-administered mining activity, such as the Commonwealth Environment Protection and Biodiversity Act, 1999.

Of great importance to many potential mining operations is the Native title Act 1993 (Cwlth) proclaimed on 22 December 1993, but particularly the ‘Wik’ amendment of 1998. This amendment

[18] The Mining Act 1971 may be viewed at website http://www.pir.sa.gov.au, go to Legislation, then Mineral Resources

introduced a requirement for reaching indigenous land use agreements. In effect this has forced the Australian states to devise ways of satisfying any potential claim to land by indigenous Australians (aboriginal people) before granting access to minerals.

Fortunately no claim exists in the Wallaroo offshore area, and none is likely.

Commonwealth laws apply to the export of any product, to ensure an orderly process. Rarely are any restrictions applied (except say in the case of a proposal to export uranium oxide to a hostile country).

11.2 Taxation relating to mining in Australia

Generally two forms of taxation apply to mining — a royalty on material extracted, and
a tax on profit

Royalty is charged by the state government. In South Australia, the Act states that “the amount of royalty is 2.5% of the value of the minerals as assessed by the Minister”
i.e. Royalty Payable = production/sales (tonnes) x assessed value x 2½%.

The key issue here is the value assessed by the Minister. While the value of any tonne of gold ore is set at Aus$12 per tonne, and hence a royalty of 30 cents (Aus) per tonne, no figure is set for basemetals. Instead, it is stated that “the value of minerals may be assessed on a case by case basis; assessed values my need to be supplied by PIRSA”.

Thus for a big mining operation, royalty would be negotiated as part of an indenture agreement.

Profit tax is levied by the Australian Federal (Commonwealth) Government. Most relevant here are the deductions from profit allowed, and particularly (for a large mining operation), the deduction for Depreciation of Plant.

In year 2000 Depreciation rules were changed, and depreciation will now take place over the effective life of any plant, which is less favourable than the previous accelerated depreciation allowable (taxpayers can self-assess the effective life of plant, but most use the ‘safe harbour’ rates supplied by the Australian Taxation Office).

Offsetting this, the overall tax rate for corporations was reduced from 34% to 30% on 1 July 2001.

A new “VAT” type of tax was introduced into Australia on 1 July 2000, called the “Goods and Services Tax” or “GST”. The rate is 10%. A mining company will pay 10% GST on most goods and services which it acquires. It will be required to charge 10% GST on the product which it sells, and pay this amount to the Australian Taxation Office AFTER deducting the amount of GST paid out on acquisitions. However, if the product is exported, no GST is added to the sale price, but the GST paid out is still recoverable from the Australian Taxation Office. Thus an operation exporting its entire production is free of the cost of GST.

There are sundry other lesser taxes, such as on payroll, and rates charged by local authorities on serviced land.

12. Environmental issues

For the explorer, environmental requirements focus on avoiding pollution, and on restoration of any disturbance. In the case of the Wallaroo offshore area, the licencee will be required to indemnify the Minister from the cost of clean-up of any pollution of the sea, and from the cost of recovery of any equipment structure or vessel placed in the area. Various permits are also required, and the best way to obtain these is to use the consultants who made these arrangements for the drilling of the ‘King George’ target near the middle of the Gulf by the Quantum-BHP joint venture in January 2001.

For mining an offshore orebody, sea pollution and interference with marine life will be important issues. The effect on shipping into the port of Wallaroo is also an issue (perhaps operational rather than environmental). However, an onshore establishment will be necessary, including marine facilities, administration facilities, ore processing, tailings disposal, workshops, and mining of one sort or another — a decline portal, and/or a rock quarry for construction of a seawall and/or causeway.

The requirements for these parameters would be expected to be tailored to the particular mining proposal in the negotiation of an indenture agreement.

13. Infrastructure

Onshore are the three towns of the ‘Copper Triangle’ — Moonta, Wallaroo and Kadina within a radius of about 15 km, where approximately 5,000 people live. Adjacent is farming land, mainly cultivated for wheat and barley. The area is serviced with electricity and water, schools, hospitals, recreation facilities. There are no major industries, stevedoring at the port of Wallaroo and home-building being perhaps the biggest activities apart from the farming. Fishing is mainly recreational.

Appreciation of mining in the community is significant. A number of residents are descendants of the Cornish miners who came to Moonta when mining commenced in 1861, and the recent mining of the Poona and Wheal Hughes orebodies was happily accepted. The huge lead smelter at Port Pirie, 90 km to the NNE, has been part of the living memory of the area, and with the expected closure in about year 2006 of the Broken Hill mines which supply most of the concentrate to that smelter, some new mineral activity in the area would be welcomed.

EL 2963 extends 10 km offshore, into water 15 metres deep, and the 4 proposed targets are within 1.5 km of shore and in less than 8 metres of water.

As described above, similar shallow offshore drilling to that proposed has been successfully achieved along the same coastline, 40 km to the north-east, aimed at an Olympic Dam type target. Those holes were drilled at sites of similar distance from the shore, but some in deeper water (max 15m) and were drilled to much greater hole depth (as deep as 465m). The article on page 24 of MESA JOURNAL Volume 5, April 1997, describes that operation (copy attached as Appendix 2).

The port of Wallaroo lies within the area, being 4.5 km from the furthest target.

14. Budget Proposal

A straight-forward program of interpretation of detailed low-level aeromagnetics, and offshore drilling is proposed. The major cost is provision of the platform for drilling, and insurance for towing it from site to site.

Included in the Administration etc item of the budget is provision for the hire of agents to negotiate the required permits with the port and maritime authorities.

Twelve holes are budgeted for four targets. This provides 3 holes on each target, and allows the operator to immediately follow up any interesting but inconclusive hole.

Twelve vertical diamond drill holes bored from a movable offshore platform, averaging 70m depth @ all-inclusive Aus$50,000 each	Aus$600,000
Cost of obtaining permits etc	Aus$25,000
Admin, geology & interpretation, assays, onshore logistics, insurance	Aus$75,000
Total	Aus$700,000

15. Summary

'Big System' copper mineralisation has found at the northern edge of the historical Moonta-Wallaroo copper-gold field. The offshore area in the shallow water adjacent to Wallaroo Bay is highly potential for an Olympic Dam or Prominent Hill Cu-Au-U-Fe breccia diatreme-like massive high grade deposit — particularly so now with the 'host-rock' geology registering close similarities to that of Prominent Hill.

16. Acknowledgements

The permission of PIRSA Publishing Services to include photograph no 44504 and TEISA aeromagnetic data in this review is gratefully acknowledged, as is the permission of AGSO Geoscience Australia to include copies of their progress geological maps of the Gawler Craton Project.

Figures & Appendices

Appendix 1	Summary petrological descriptions by Dr A W G Whittle
Appendix 2	MESA JOURNAL Volume 5, April 1997 page 24; article on offshore drilling in Spencer Gulf, SA (with photo)
Appendix 3	Details of offshore drilling operations in EL1299 – Pt Broughton) extracted from the annual report to 19 September 1997
Appendix 4	Summary information on PIRSA open file records envelope 09781 (Drilling of the King George gravity anomaly)
Appendix 5	'Road transportable jack-up barges' described on the website of Sides Engineering (www.sides.com)
Appendix 6	Technical details of barges Sideson I and Sideson II, taken from the EL 2199 Phelps Dodge annual report to 19 September 1997

Figure 1

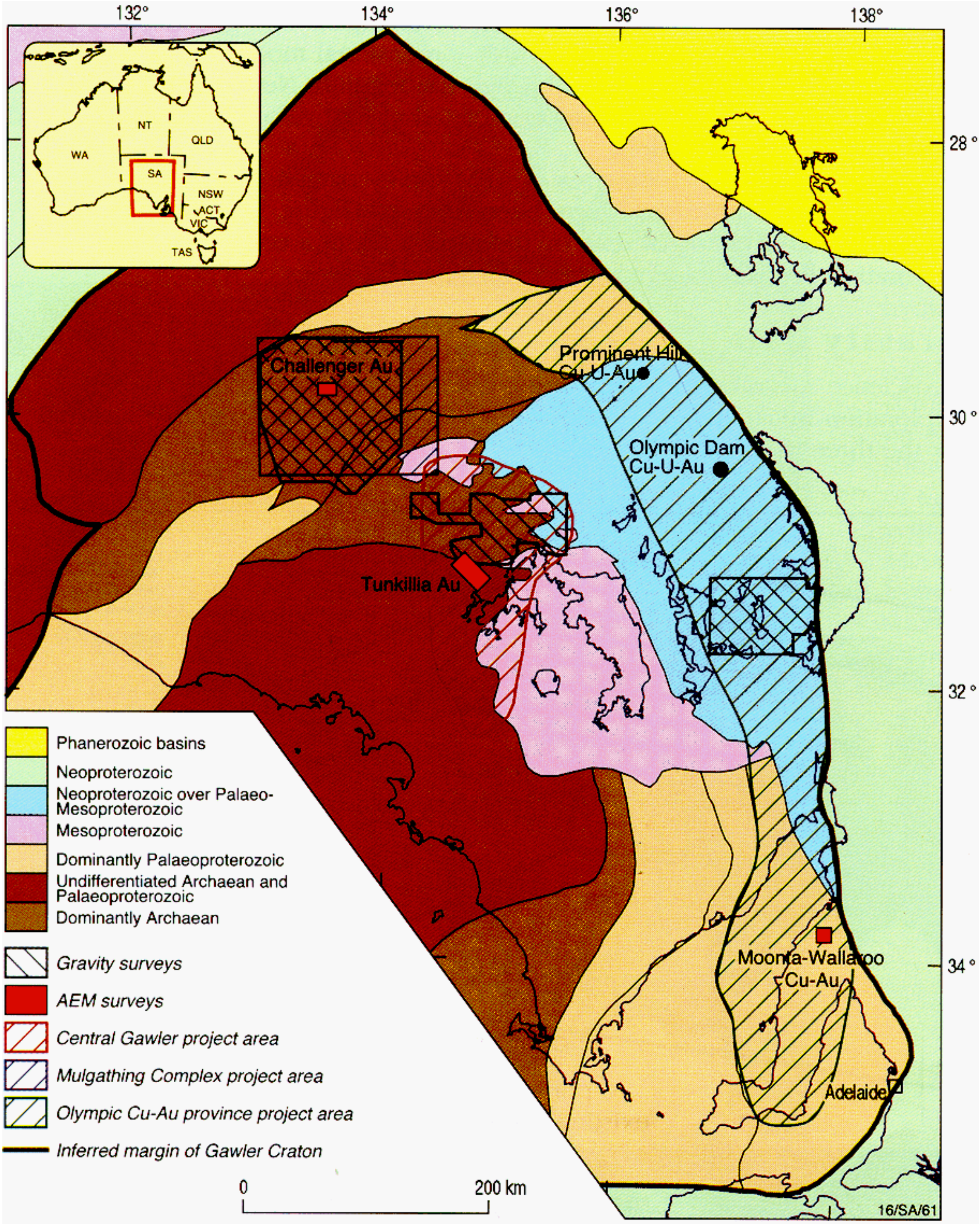
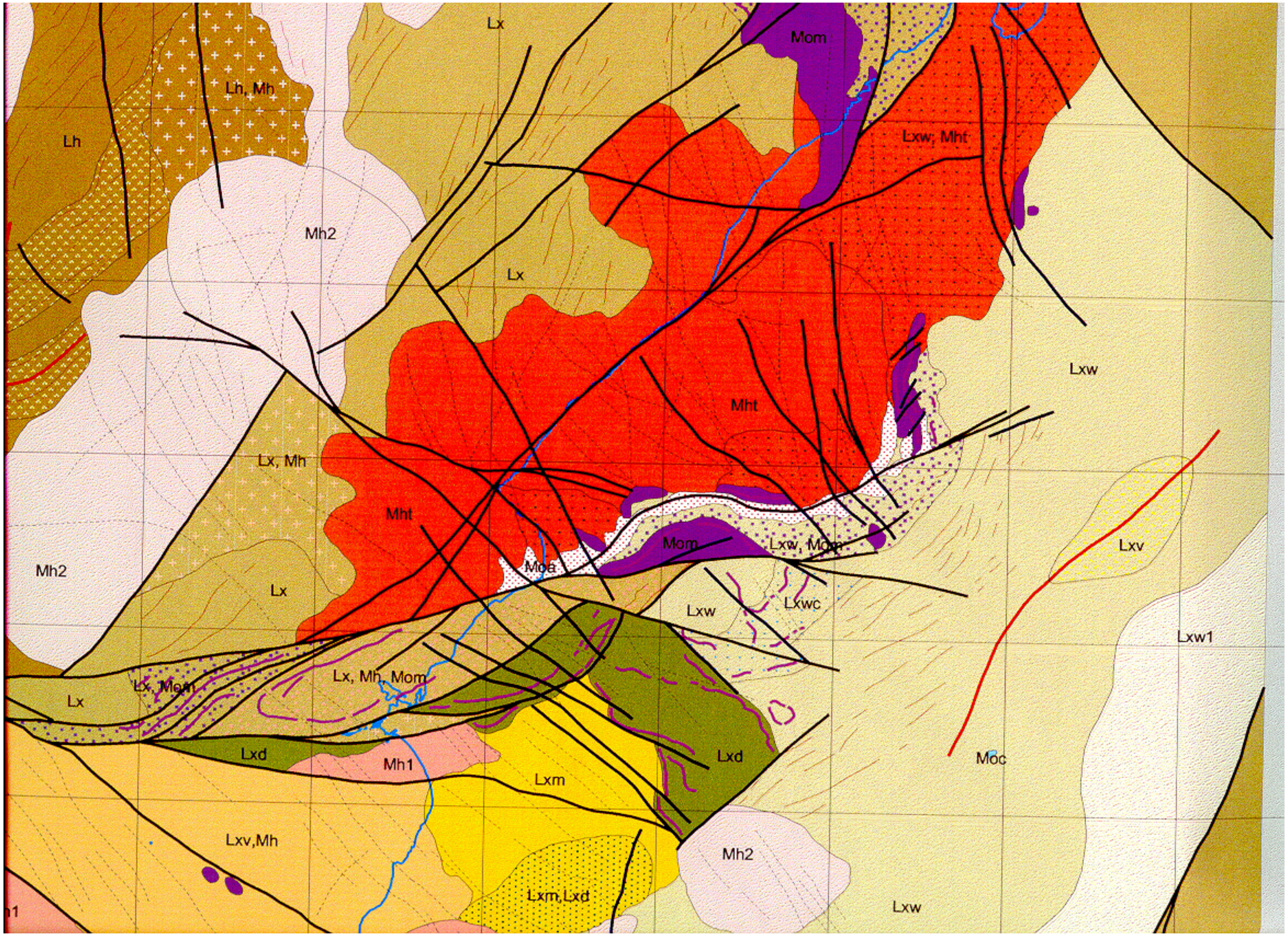


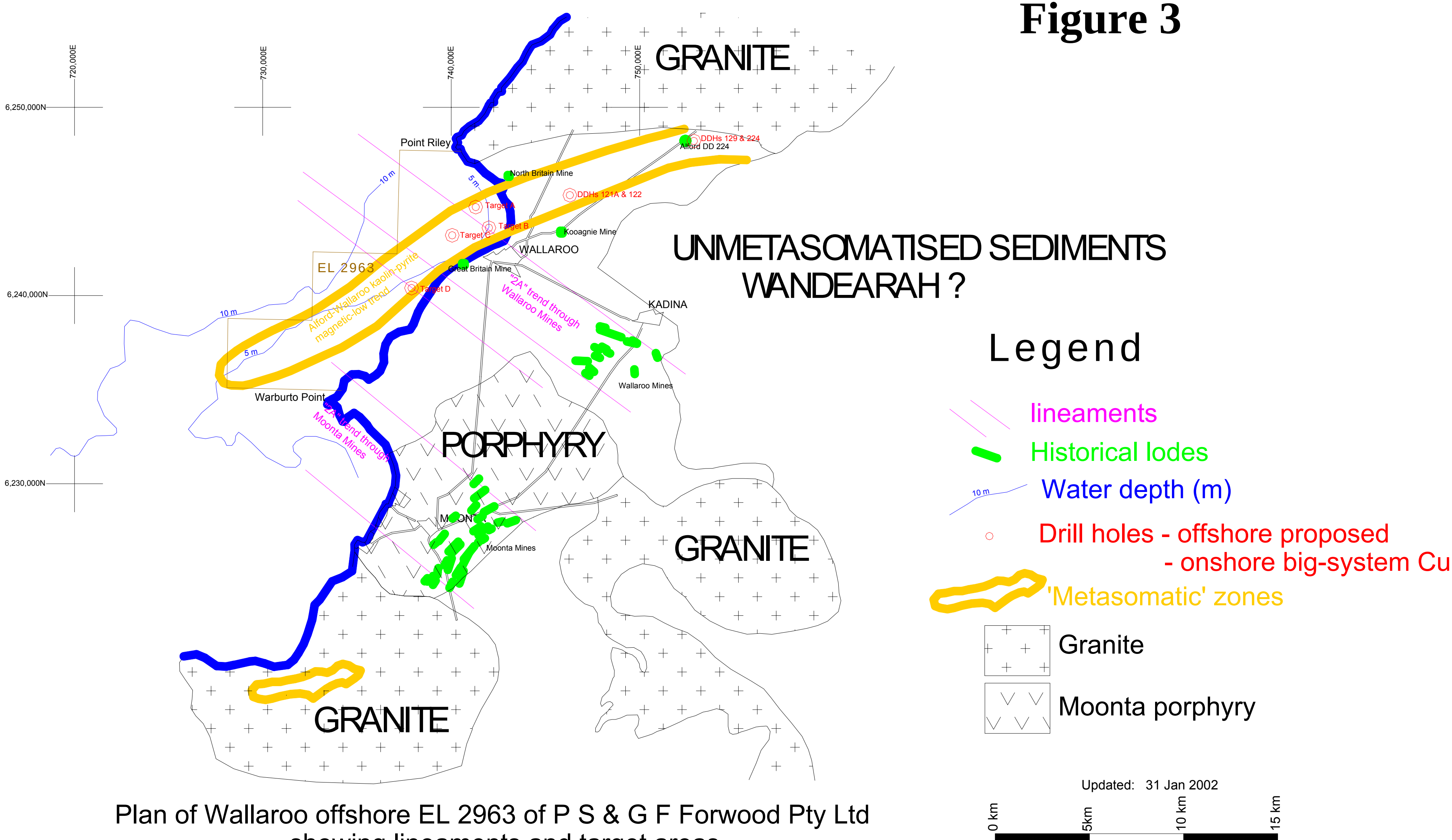
Figure 1. Tectonic domains of the Gawler Craton, showing project areas, AEM surveys, and recent gravity surveys (geology courtesy of MER and J. Teasdale)
Reproduced from **AUSGEO *news* 61** June/July 2001, page 3, courtesy of AGSO Geoscience Australia. The subsequent Prominent Hill Cu-Au-U discovery has been added.

Figure 2



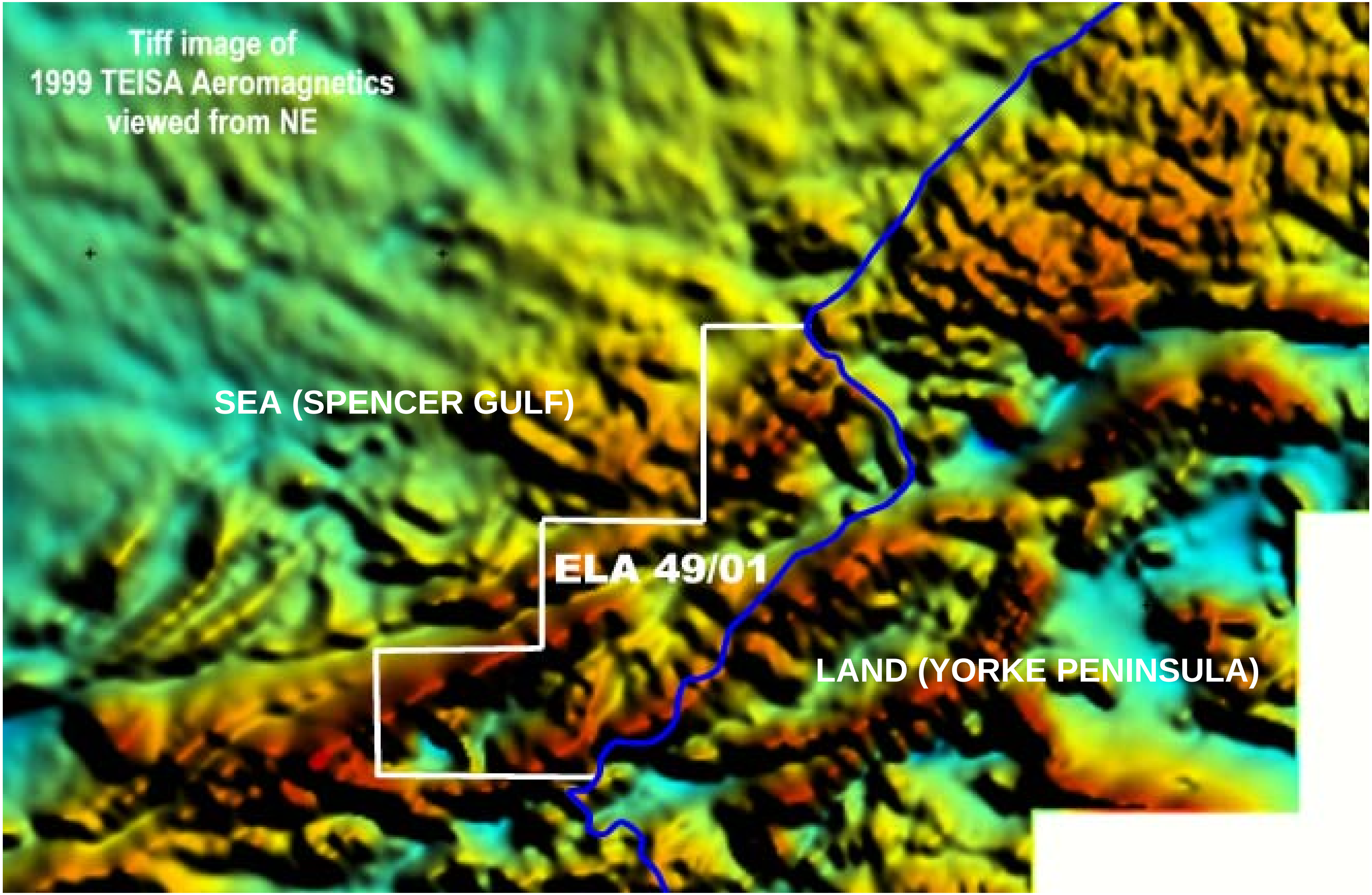
AGSO interpretation of 1999 TEISA aeromagnetics in the WALLAROO OFFSHORE area (reproduced from AUSGEO News No 61 June/July 2001, page 5, with the kind permission of AGSO Geoscience Australia)
The coastline appears as a light blue line, and Wallaroo Bay is in the centre of the map.
Pinks and reds are granites, and the mustard yellow is the Moonta Porphyry, while browns and greens are metasediments.
The important rocks for mineralisation are the purple areas (strongly magnetic feldspar-magnetite±actinolite±biotite±carbonate metasomatic bodies) and the area finely stippled with pink dots is a late argillic alteration zone, magnetite destructive.

Figure 3



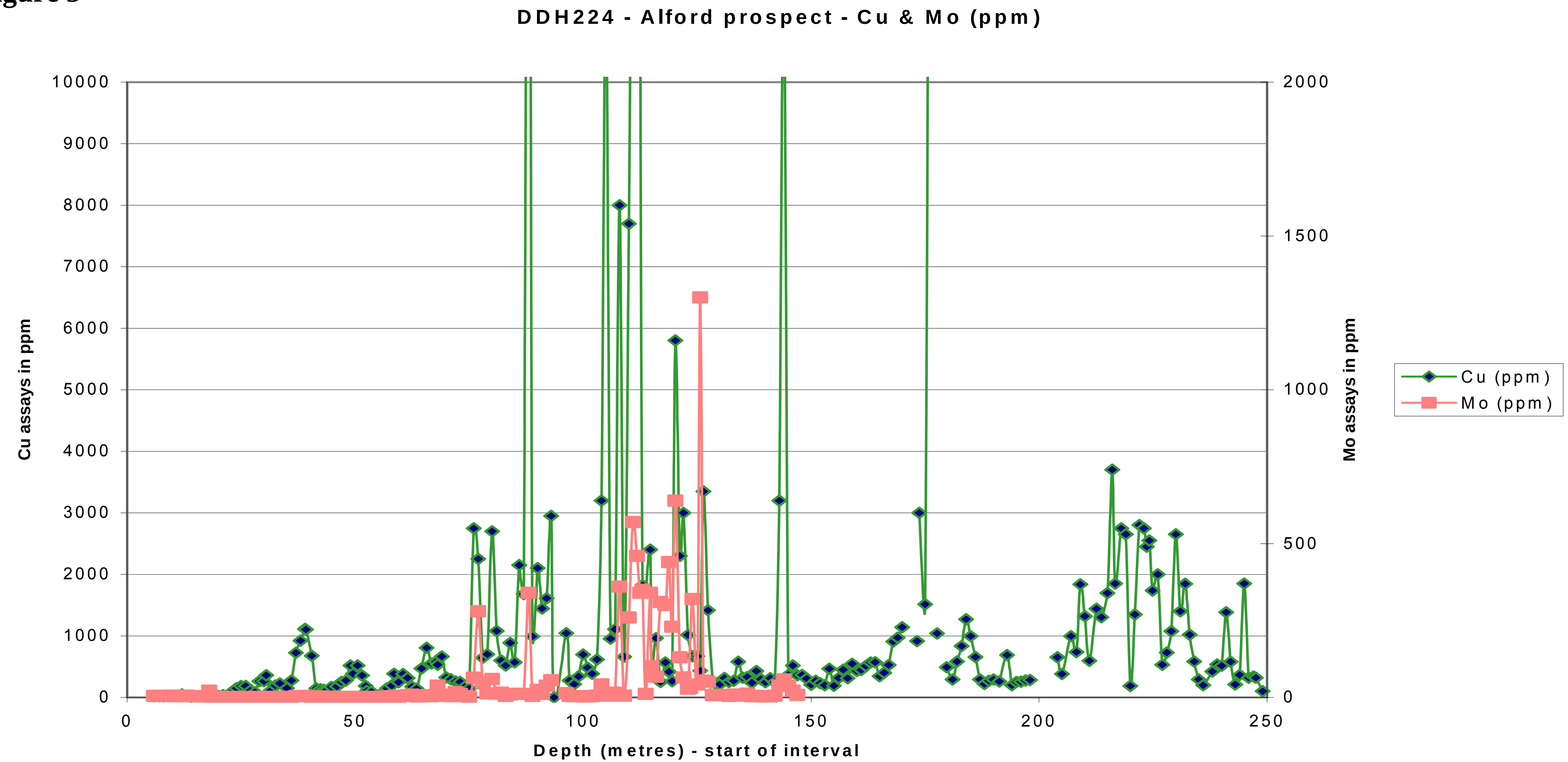
Plan of Wallaroo offshore EL 2963 of P S & G F Forwood Pty Ltd
showing lineaments and target areas

Figure 4



Tiff image of
1999 TEISA Aeromagnetics
viewed from NE
SEA (SPENCER GULF)
ELA 49/01
LAND (YORKE PENINSULA)

Figure 5



DDH224 - Alford prospect - Cu & Mo (ppm)
Cu assays in ppm
Mo assays in ppm
Depth (metres) - start of interval
Cu (ppm)
Mo (ppm)
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
0
500
1000
1500
2000
0
50
100
150
200
250

Figure 6

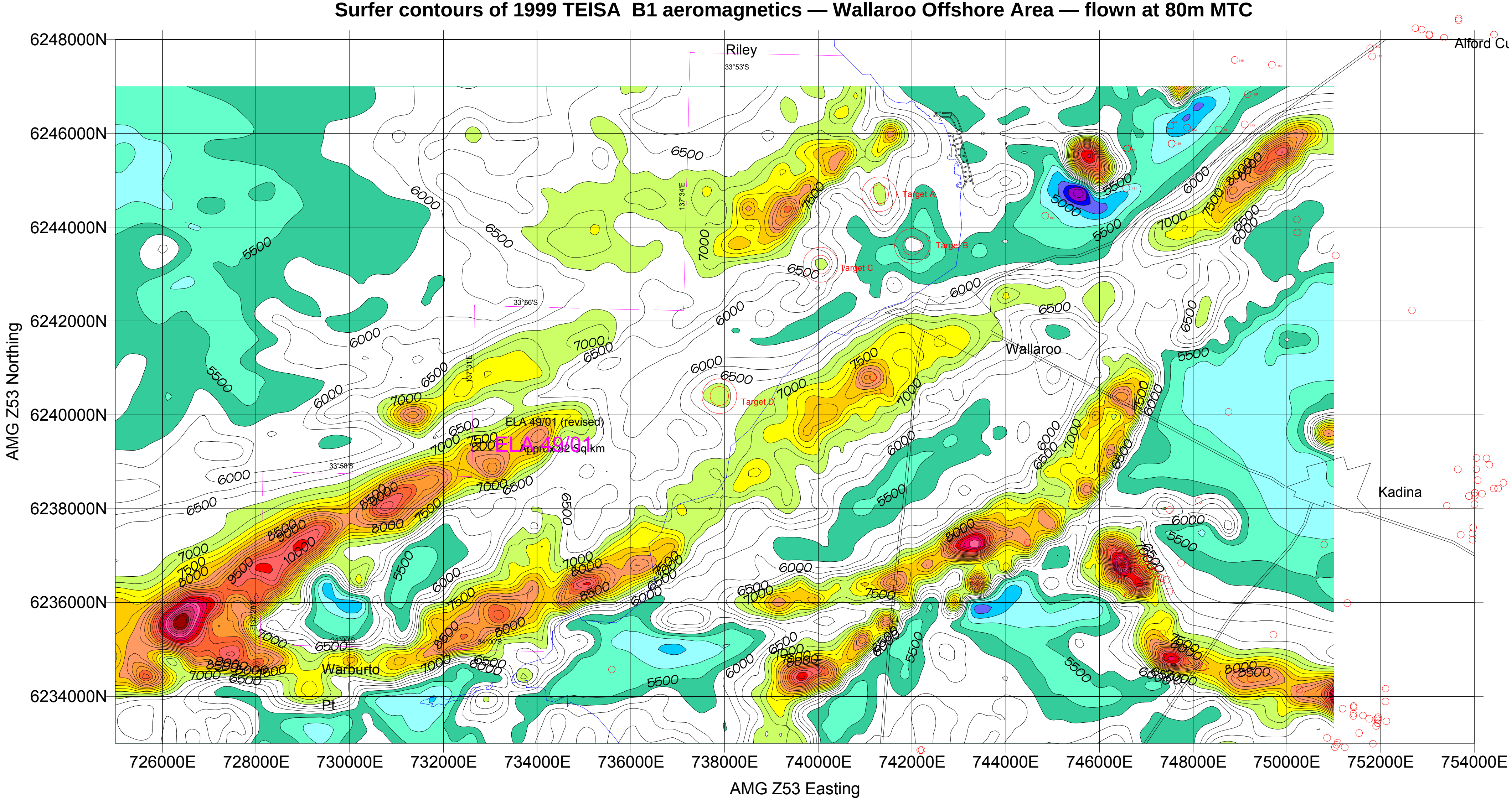
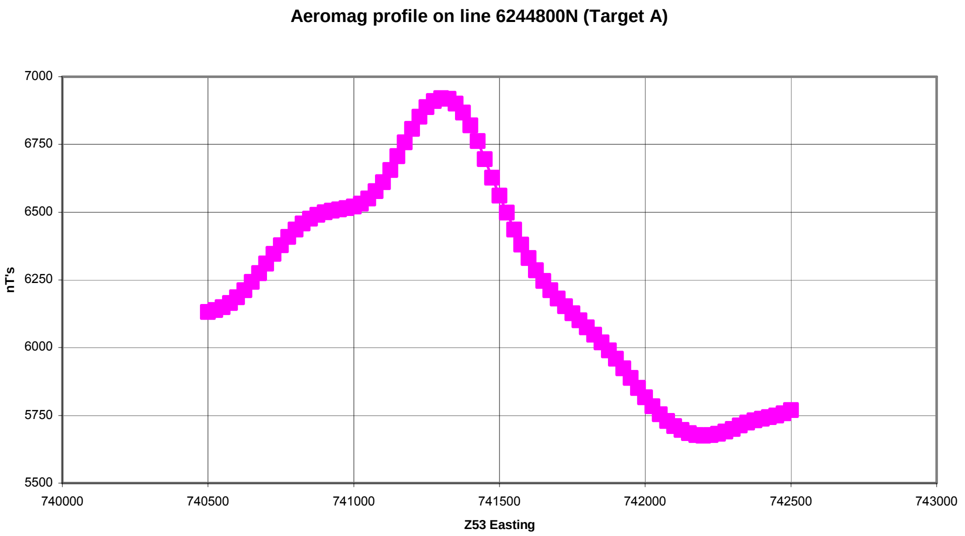
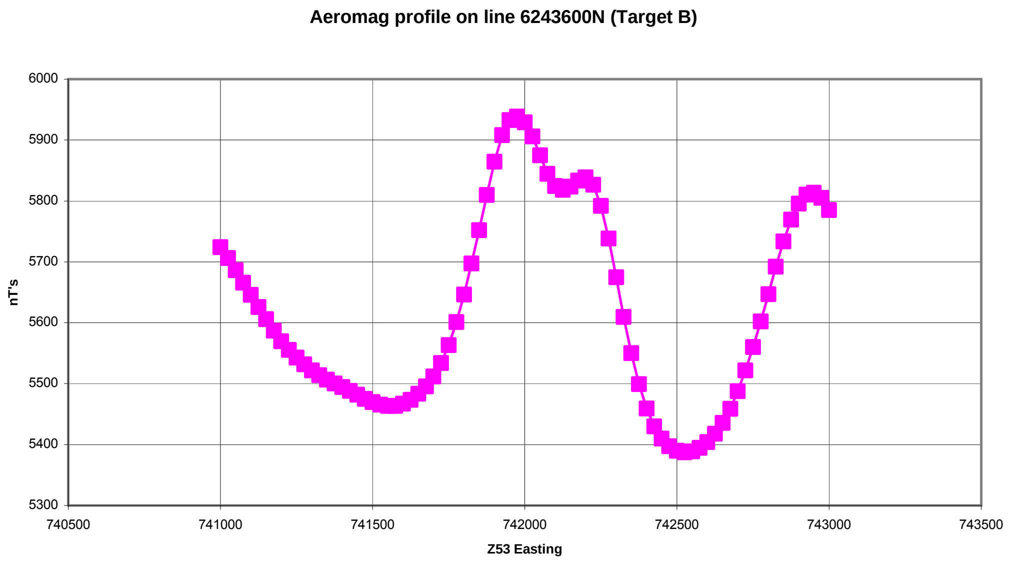
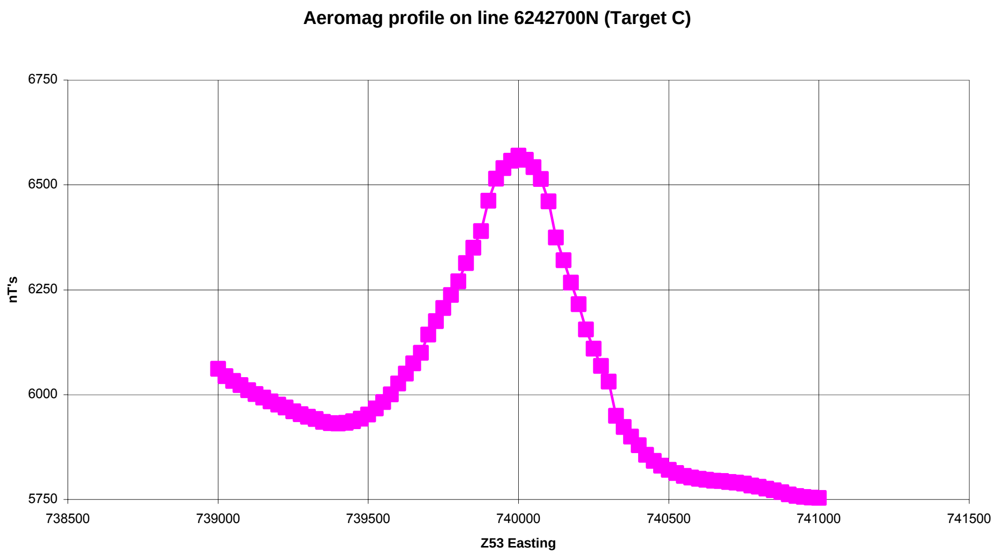

Surfer contours of 1999 TEISA B1 aeromagnetics — Wallaroo Offshore Area — flown at 80m MTC
6248000N
6246000N
6244000N
6242000N
6240000N
6238000N
6236000N
6234000N
AMG Z53 Northing
726000E
728000E
730000E
732000E
734000E
736000E
738000E
740000E
742000E
744000E
746000E
748000E
750000E
752000E
754000E
AMG Z53 Easting
Riley
33°53'S
33°56'S
33°58'S
34°00'S
137°34'E
137°31'E
Alford Cu
Wallaroo
Kadina
Warburto
Pt
Target A
Target B
Target C
Target D
ELA 49/01 (revised)
ELA 49/01
Approx 32 sq km

Figure 7: Aeromagnetic profiles over Targets A, B, C and D







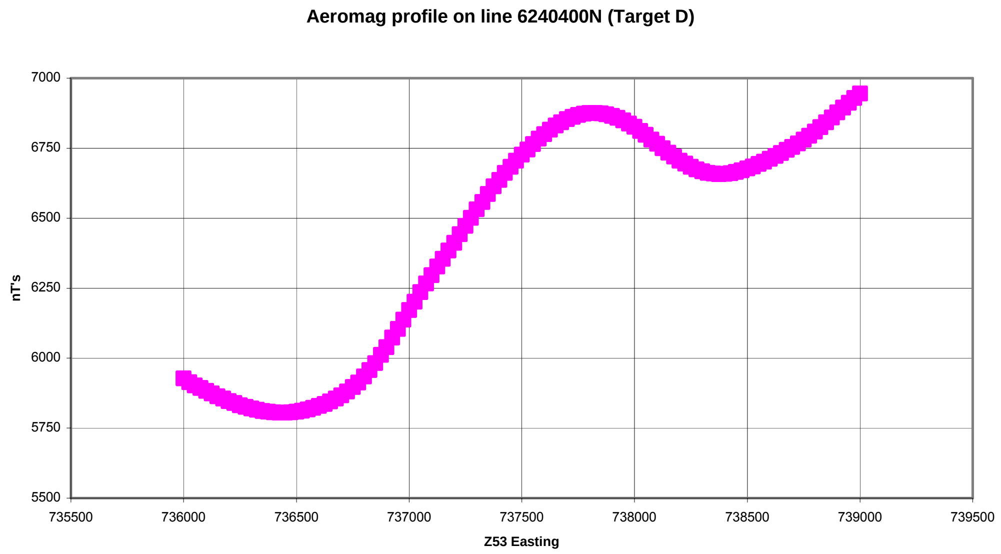
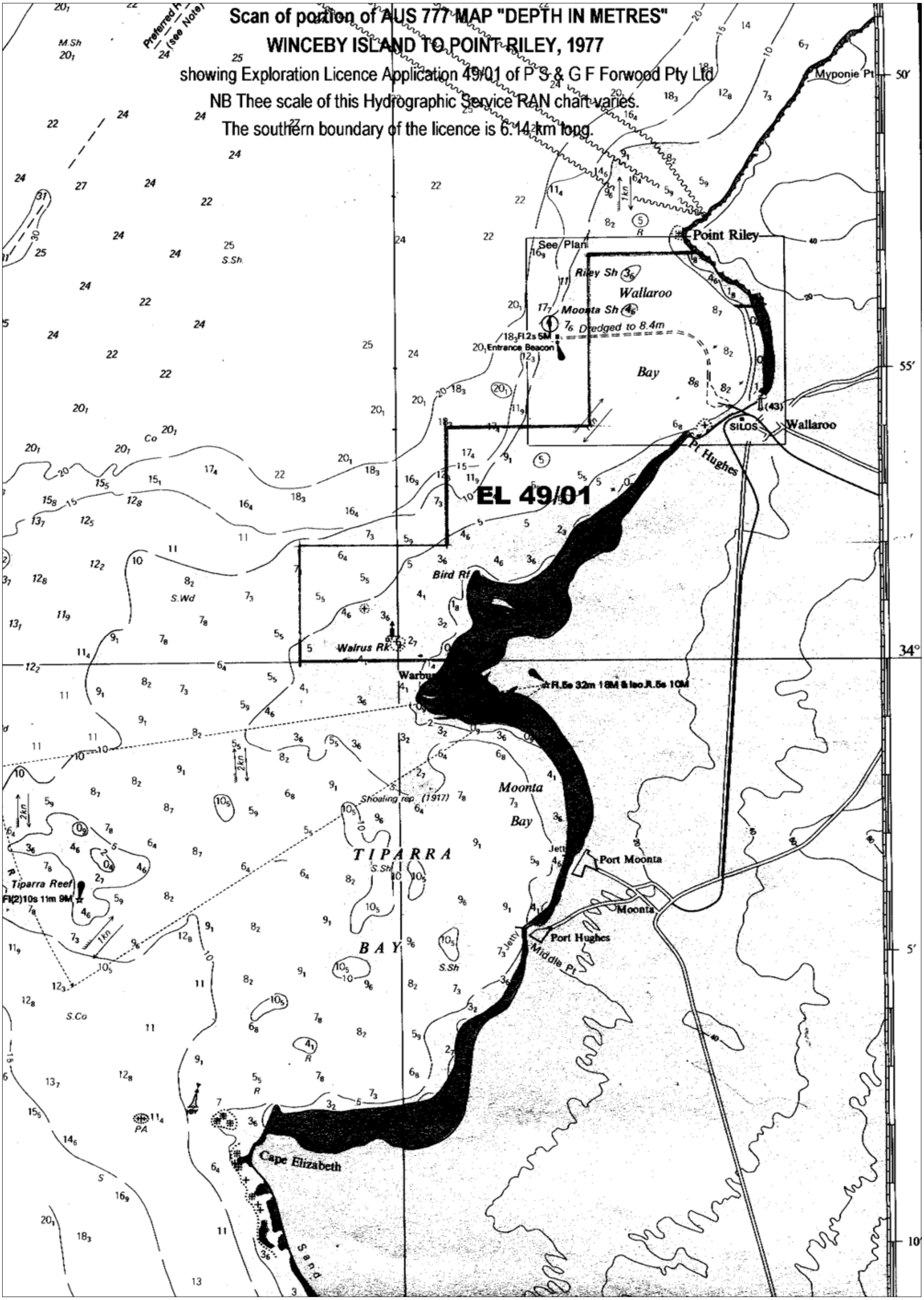


Figure 8



Scan of portion of AUS 777 MAP "DEPTH IN METRES"
WINCEBY ISLAND TO POINT RILEY, 1977
showing Exploration Licence Application 49/01 of P S & G F Forwood Pty Ltd
NB Thee scale of this Hydrographic Service RAN chart varies.
The southern boundary of the licence is 6.14 km long.
EL 49/01
Point Riley
Myponie Pt
Wallaroo
Bay
Riley Sh
Moonta Sh
Dredged to 8.4m
Entrance Beacon
SILOS
Pt Hughes
Bird Rf
Walrus Rk
Moonta
Bay
Port Moonta
Moonta
Port Hughes
Middle Pt
TIPARRA
BAY
Tiparra Reef
Shoaling rep (1917)
Cape Elizabeth
See Plan
50′
55′
34°
5′
10′

APPENDIX 1

Summary petrological descriptions by Dr A.W.G. Whittle

Thin sections of drill cores were examined under the microscope by Adelaide petrologist Dr Alick Whittle. Below is a tabulation of a précis or summary of his resulting descriptions of cores from two altered and mineralised holes in the Wallaroo-Alford alteration corridor, these being the nearest holes to the coast that are significantly mineralised.

DDH 121A

113.39m	Stressed weakly gneissic aplite
172.82m	Completely kaolinised intermediate volcanic or tuff
179.83m	Completely altered lithic tuff
271.27m	Completely altered bedded tuff or volcanic
274.93m	Lamprophyre - slightly altered
278.89m	Scapolitised-tourmalinised microdiorite

DDH 122

52.12m	Carbonatized-chloritized-silicified brecciated aplite
71.32m	Carbonatized intermediate igneous rock — possibly microdiorite.
82.30m	Albite-epidote-amphibolite.
92.35m	Silicified-propylitized-mineralised monzonite.
96.32m	Carbonatized-chloritized microgranodiorite
120.09m	Silicified-carbonatized fragmental volcanic.
128.93m	Chloritized-carbonatized-silicified igneous rock, possible monzonite.
145.39m	Carbonatized quartz monzonite.
147.22m	Carbonatized-sericitized microdiorite.
167.03m	Weakly carbonatized-silicified micro-monzonite.
209.09m	Carbonatized horneblende microgranite.
291.39m	Meta-intercalated acid/intermediate volcanics.
327.96m	Meta-intermediate volcanics.

Appendix 2

Offshore drilling for minerals, Port Broughton area

Phelps Dodge Australasia Inc. completed a program of four offshore drillholes to test aeromagnetic targets for Ernest Henry and Olympic Dam type mineralisation beneath Spencer Gulf in January 1997. The holes followed on from a 1993 drilling program which included one offshore hole (KD 2). and were located between 2 and 7 km offshore from Port Broughton on EL 2199 in water depths ranging from 3 to 11 m. Drilling was undertaken by Budd Drilling using conventional techniques from a floating jack-up platform supplied by Sides Engineering of Melbourne. Holes reached depths of 228 to 465 m.

No ore grade intersections were encountered but results were encouraging and the company is reviewing its program. Consultation with relevant State and Local Government, and industry groups was undertaken. MESA conducted an independent monitoring program to ensure that the risk of marine contamination and disturbance to the seafloor was minimized. The South Australian Research and Development Institute (SARDI) was contracted to assist with seafloor monitoring at the deeper sites. Monitoring showed that drilling activities at each of the sites had negligible impacts on the surrounding environment.

For further information contact George Kwitko (ph. 08 8274 7639).

5.0 WORK PROGRAMME

Onshore drill results and the magnetic imagery suggest the Fe-enriched hydrothermal alteration is centred offshore and focused along a major northwest trending structure (Appendix 2). Two drill holes targeting extreme magnetic-highs along and adjacent to a regional structure (KD18 and KD19) and two holes targeting large areas of possible magnetite destruction within the anomalous magnetic domain (KD17 and KD20) were drilled to test for magnetite-rich and hematite-rich mineralised systems. A total of four holes for 1,523.7metres including 677.4 metres of rotary mud drilling and 846.3 metres of NQ core was drilled.

To drill in the offshore environment a conventional land based, multipurpose rig (UDR600) was supported on a jack-up platform. Crew and materials were ferried to and from the job using a local charter boat. MPI completed the first offshore mineral exploration drill hole at Katinka (KD02) to 467m for a drill cost including platform hire and mobilisation, support boat charter and towing costs of $272,000 or $585 per metre. Phelps Dodge completed 4 holes for 1523.7 metres at a drill cost including towing, platform and charter boat charges of $333,578 or $218.9 per metre. The total cost of this programme was $437,456.

Major costs areas associated with Phelps Dodge’s offshore programme included:

- legal fees to establish agreements with drill platform, drill and support boat contractors which reduced PD’s exposure to public liability through negligence; extra insurance premium costs;
- platform mobilisation cost, daily hire rates, tug boat charters to tow to and from site;
- generally high drilling costs associated with rotary mud drilling of unconsolidated cover sediment and coring of intermittently fractured and broken basement rocks.

Drill Platform

A jack-up platform, the Sideson II was hired on a daily rate of $1,500 per day, $1,750 per day manned, from Sides Engineering, Melbourne (see appendix 1 for platform specifications). Mobilisation from Exmouth, Western Australia cost $45,000. The platform was assembled in Port Pirie and tugged to the waters off Port Broughton using a local harbour tug supplied by Stannard Tugs (one-way $450 per hour for about 20 hours). Geoff Barnes, a local crab fisherman, towed the platform over short distances between drill sites ($250 per hour). A Sides Engineering representative was present during all site moves and towing of the platform. Hire rates for the platform could be greatly reduced if the platform was required for an extended period. Mobilization could have been cheaper if the platform was berthed closer to Port Pirie. Sideson II platform has a draft of 1.4 metres but could effectively access water about 3 metres deep. An alternative platform would be required for any future targets in shallower waters.

Drilling Contractors

A UDR600 rig was contracted from Budd Drilling to drill four NQ diameter holes. Additional insurances related to drilling in the offshore environment were paid by Phelps Dodge ($8,000). Two 12 hour shifts were drilled per day using experienced mud and diamond drillers.

Support Boat

Gary Barnes, a local snapper fisherman, provided twenty four hour a day support and transport to the platform. Two trips a day to platform cost $250, additional support cost $65 per hour.

Environmental Considerations

The following environmental licences and declarations were required before undertaking the offshore drilling programme:

Licence to disturb the sea floor from the Department of Primary Industries, South Australia;

Licence to dredge from the Environmental Protection Authority, South Australia;

Declaration of environmental factors for the Department of Mines and Energy, South Australia.

Environmental monitoring during and following completion of the programme was undertaken by Ian Hopton from the Department of Mines and Energy, South Australia. See appendix 5 for report.

6.0 DIAMOND DRILL DATA

Locating Drill Holes

Modelling and sighting of drill hole locations from aeromagnetic data was undertaken by Chris Anderson and Associates. Magnetic peaks were located using a differential GPS with an accuracy between 1 and 10 metres.

Geochemical Sampling and Analyses

Core was routinely quartered and sampled for analysis over geologically defined intervals for hole KD17, KD18 and KD19. Grab samples of oxidised bed rock in the pre-collar to KD19 were collected every 3 metres for analysis. KD20 was not sampled for analysis. Rock samples were analysed by Amdel, Adelaide, for Cu, As, Ag, Ni, Co, MO, Pb, Zn, Fe, Mn, P, La, Ce using a total acid digest with a ICP-OES determination (method IC3M), Gold was analysed using Method AA9 which utilises an Aqua-regia digest on a 5Og sample and an AAS determination. Results are presented graphically in Appendix 2 and tabulated in Appendix 5.

Geological Logging

Geological descriptions for each sampled interval and un-sampled, geologically defined intervals were entered into a Husky field logging computer. Graphic geological and geochemical logs were compiled using the Interdex PC-based software for onshore holes KD01 to KD16 and the offshore holes KD 17 to KD20 inclusive (Appendix 2). Summary logs and detailed sample logs are tabulated in Appendix 3.

Petrology

Mineralised veins, unmineralised veins and unaltered wall-rocks from KD17, KDl8, KD19 and KD20 were sampled for petrological descriptions by Dr Jane Barren. One sample of altered granite from KD06 was also sampled for petrological description. See Appendix 4 for a summary and detailed descriptions.

7.0 DISCUSSION OF RESULTS

KD17

KD17 targeted a near shore zone of possible magnetite depletion within the regionally extensive high-magnetic domain in the search for hematite-associated copper mineralisation. A grey, laminated bedded limy siltstone was intersected from 119 metres to the end of hole, The sediment consists of alternating quartz arenite, recrystallised limestone and biotite-sericite- hematite-carbon clay-stone beds which appear to have a gentle to flat dip and shows a bedding parallel foliation. Transposed fold structures and a second cross-cutting foliation are evident. Abundant zones of branching calcite veinlets (up to 60% veining) with accessory sericite, hematite, chlorite, quartz, Kfeldspar cut across the bedding parallel foliation. Late-stage, laminated textured, calcite-quartz-brown hematite veins cut across and appear to stain the earlier calcite veins red.

KD 17 is located about 1300m west of KD02 which was drilled by MPI targeting a magnetic high/gravity high (Figure 3). KD02 failed to hit any significantly magnetic material and appears to have been positioned west of the anomalies peak, as highlighted on the vertical derivative image (Appendix 2.). It is postulated the intense calcite veining in KD17 may be part of a large alteration halo to magnetite-associated copper mineralisation located between KD17 and KD02.

KD02 shows elevated Zn when compared with similar rock-types from other holes in the programme (Figure 2). However, re-sampling of core from KD02 returned consistently lower zinc values when compared with the earlier results (Appendix 5). Challenger Geological Services who undertook the sampling of KD02 for MPI suggested the difference may be caused by contamination from the cheap brick cutting saw blades used by MPI for fillet sampling instead of the more expensive diamond impregnated blades.

KDl8

KD18 targeted the highest magnitude magnetic anomaly in the licence area which is located adjacent to a discordant northwest trending fault structure. Strongly oxidised basement rock were intersected from 114 to 141 metres. A large epithermal textured, complex quartz-Kfeldspar (adularia) vein zone with patchy chlorite-smectite and bladed hematite cut by late-stage iron bearing carbonate with pyrite, marcasite and rare chalcopyrite was intersected from 141 to 242 metres and from 349.9 to 382.6 metres. Veins within the zone are weakly banded, vughy and contain clasts of chlorite-smectite-hematite altered wall rock fragments giving it a breccia texture in places. The vein zone shows Ag, Mn enrichments particularly along the brecciated margins (see graphic log 3, Appendix 2).

Calcsilicate-rich and magnetite-rich hydrothermal breccias were intersected from 242 to 3 10 metres. The calcsilicate-magnetite alteration and breccias are cross-cut by the epithermal veins and overprinted by the associated retrograde chlorite, quartz, calcite, hematite alteration. Graphic logs shows zones of elevated Cu associated with elevated Co, Ni, MO, As, Zn and Mn, minor Au and Ag within the retrograde altered, calcsilicate-magnetite breccias. By comparison with other less retrograde altered calcsilicate-magnetite zones in KD0l (see attached graphic log for KD0l), the calcsilicate-magnetite zone in KD18 shows an unusual high P (apatite), but low La and Ce response (allanite?). Where the calcsilicates and magnetite have undergone intense hematite-chlorite retrograde alteration La and Ce are locally elevated together with Ag and P is depleted. The significance of the low La and Ce but high P contents of some calcsilicate-magnetite rocks and its relationship to known mineralisation needs to be investigated. It may be reflecting the spatial distribution of apatite(P) and allanite (La, Ce) or be an effect of the retrograde alteration. A similar response is seen in KD04.

Unusual banded calcsilicate-quartz-magnetite rocks interpreted as possible iron formation horizons and hematitic shale replaced by metasomatic magnetite were intersected from 342.2 to 349.6 metres and 390.2 to 391.5 metres respectively.

While some zones of calcsilicate-magnetite alteration and possible metasomatically altered iron formation where intersected the true source of the anomaly was obscured by the intrusion of epithermal textured veins. The magnetic anomaly remains unresolved.

KD19

KD 19 targeted the second largest, high-magnitude magnetic anomaly within the licence area located along the discordant, northwest trending fault structure. Weathered magnetite-hematite ironstone and limonitic clays were intersected from 93 to 174 metres during rotary mud drilling of the pre-collar. Fresh to weakly oxidised veins of massive magnetite-hematite were intersected from 174 to1 76.6 metres and from 194 to 200.95 metres (80-100% veining). Similar veins occur as broadly spaced zones or discrete veins (lcm-30cm thick) to the end of hole. The veins are hosted in felsic volcanic rocks from 210.1 to 3 18.8 metres and a fine-grained dolerite textured mafic volcanic or intrusive rock from 200.95 to 210.1 metres and 218.8-320.7 metres. Both host rock types have suffered variable amounts of red Feldspar and albite veining and/or pervasive alteration (Figure 4).

The magnetite-rich veins contain l-15% sulfide with variable allanite, calcite, quartz, minor actinolite selvedges, Kfeldspar outer rims, and patchy accessory, bladed hematite, chlorite replacing biotite, sphene, sericite and apatite. The predominant sulfide is pyrite (90% of total sulfide), chalcopyrite (10%) however rare individual veins contain 50-60% coarse-grained chalcopyrite by volume. Traces of bornite and covellite are described. Hematite is patchy and bladed and appears to occur along micro fractures in magnetite. Chalcopyrite occurs as inclusions in magnetite and encloses pyrite and hematite blades.

The veins show a consist dip angle to core axis of about 70-80 degrees. A flat dipping dilational jog infilled with 40% chalcopyrite, 40% pyrite, 10% magnetite, 5% calcite (some hematite dusted) 5% calcsilicates (by volume) was observed between two steep dipping magnetite-chalcopyrite-pyrite veins containing about 70% magnetite, 5% chalcopyrite and 15% pyrite, 5% Kfeldspar, 5% calcsilicates, trace calcite (238.18 to 238.48m). If this jog is inferred to a larger scale it highlights how drilling magnetic highs (the veins with 90% magnetite) will locate anomalous magnetite but will not directly find ore grade mineralisation (the jog between the veins). Without the added focus provided by detailed gravity, electromagnetic geophysical methods or geochemical vectoring expensive step out drilling and a large amount of luck are required to find ore within the offshore environment at Katinka.

Magnetite-rich veins in KD19 contain anomalous levels of Cu ranging 500-1000 ppm with values up to 1.12% Cu, 0.2ppm Au from 223 to 225.5 metres and 2.61% Cu, 0.37ppm Au from 240.05 to 240.25 metres. Graphic logs show a good visual correlation between Cu values and the chalcophile elements Co, Ni, Au, Mo, Zn, U and a weak-moderate correlation with As and Ag. Enrichment of Cu, Ag, Zn and Pb occurs in saprolite (oxidised rock) located adjacent to the saprolite/fresh rock interface while Au appears to be elevated in the saprolite zone. Hydrothermal, metasomatic magnetite in KD19 contains less La and Ce than similar metasomatic magnetite in KD01.

With the exception of the pegmatite veins in KD05, KD19 is the first hole within the Katinka project area which has shown magnetite-hematite veins in apparent equilibrium with significant chalcopyrite. In almost all other situations the chalcopyrite is associated with retrograde assemblages and appears to replace magnetite or infill fractures in magnetite. This and the abundance of chalcophile elements which correlate with Cu, proximity to a regional scale structure and Kfeldspar dominant red rock alteration and veining indicate close proximity to a zone of mineralisation similar in style to Ernest Henry or Osborne. However, given its distance from the coast line, the practical difficulties applying electrical geophysical methods on the ocean floor, the high cost of step out drilling and the uncertain ore geochemical vectors no further drilling is recommended over this target area at this point in time. A detailed heli-magnetic survey along 50m spaced lines across the structure will enhance the resolution of the magnetic data and may highlight irregular magnetic jogs along the structure which could be potential ore positions.

KD20

KD20 targeted a near shore zone of possible magnetite depletion within the regionally extensive high-magnetic domain in the search for hematite-associated copper mineralisation. Oxidised rock was intersected from 13 1 to 152 metres and a fine-grained dolerite textured mafic intrusive was intersected from 152 to the end of hole at 228.6 metres. The mafic rock appears to have undergone greenschist facies metamorphism and is cut by minor Kfeldspar dominant veins with accessory amphibole, biotite, sericite, quartz and rare magnetite, pyrite and chalcopyrite. A magnetite-rich vein zone, similar to those in KD19, was intersected from 216.4 to 217.1 metres. No significant mineralisation was intersected (Figure 4).

Doc. No.:	Env 09781
Title:	King George area, offshore from Moonta. Final and surrender report for the period 13/11/2000 to 6/7/2001.
Format:	D
Personal Author:	White, M.J.; Rava, B.
Corporate Author:	Geodiscovery Group Pty Ltd; Euro Exploration Services Pty Ltd
Doc Source:	South Australia. Department of Primary Industries and Resources. Open file Envelope
Collation:	Total pages: 91, 6 appx, figures, plates, tables, 1 reps
Date:	Sep 2001
Tenement:	EL02766
XRef:	09781
Licensee:	BHP Minerals Pty Ltd; Quantum Resources Ltd
Operator:	BHP Minerals Pty Ltd
Abstract:	Significant gravity and magnetic anomalies located offshore in Spencer Gulf were the target of novel exploration for base and precious metal mineralisation of possible Olympic Dam style. BHP Minerals has exclusive world-wide use of the proprietary FALCON airborne gravity surveying system until 2005, which enables it to rapidly evaluate geophysical targets in areas otherwise logistically unattractive to explore. To investigate the most intense dual gravity/magnetic anomaly, one diamond hole was drilled from a barge moored 20 km west of Port Hughes, and intersected a (?) Tertiary cover sequence to 81 metres depth, overlying highly magnetic Proterozoic amphibolite facies metasediments to a final depth of 165.7 m. No significant mineralisation was intersected, and the geophysical target was adequately explained.
Broad Subject:	Mineral exploration - SA; Geophysics; Drilling; Environmental protection
Subject Terms:	Cratons; Base metal exploration; Precious metals; Basement; Mesoproterozoic; Magnetic anomalies; Exploration potential; Exploration philosophy; Exploration licences; Progress reports; Tenement maps; Aerial magnetic surveys; Geophysical data; Image interpretation; Gravity survey methods; Innovation; Aerial gravity surveys; Gravity data; Digital data; Gravity profiles; Geophysical models; Geophysical interpretation; Basement depth; Offshore drilling; Diamond drilling; Drilling platforms; Drillhole location maps; Marine environment; Environmental impact; Monitoring; Sea water; Turbidity; Sea floor; Calcrete; Drill core; Metasediments; Geological logs; Core sampling; Assay value; Geochemical logs; Magnetic susceptibility; Nuclear radiation; Density; Metamorphic petrology; Mineragraphy; Core photographs; Mineral assemblage; Alteration; Petrogenesis; Thermodynamics
Geological Province:	Gawler Craton; Moonta Subdomain
Drillhole:	KGD01001
Assays:	Ag; Al; As; Au; Ba; Bi; Ca; Cd; Co; Cr; Cu; Fe; K; La; Mg; Mn; Mo; Na; Ni; P; Pb; Pd; Pt; Rb; Sr; Ti; U; V; Zn
Geographic Locality:	East-central Spencer Gulf; King George Shoal; Moonta Bay
Mine Name:	King George magnetic complex; KG1 anomaly; KG2 anomaly; KG3 anomaly
Map Sheet:	MAITLAND; 6329I; 6329IV
Image:	Click on this icon to view electronic copy of referenced record (or set of records).

ROAD TRANSPORTABLE JACK UP BARGES

"Unique to Sides Engineering!"

- Operate in waters UP to 26 metres depth
- Immune to weather, tide, wind & current
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- Can be left on site unattended
- Ideal drilling, piling, services and workover
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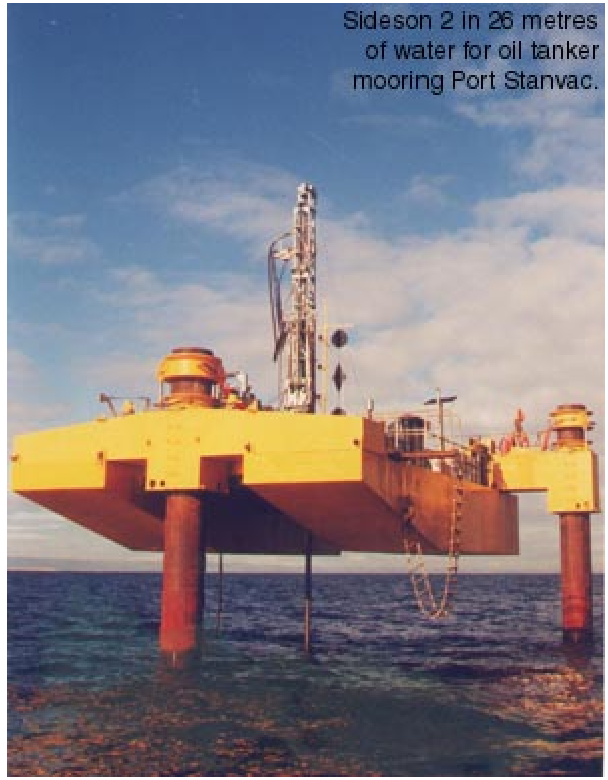
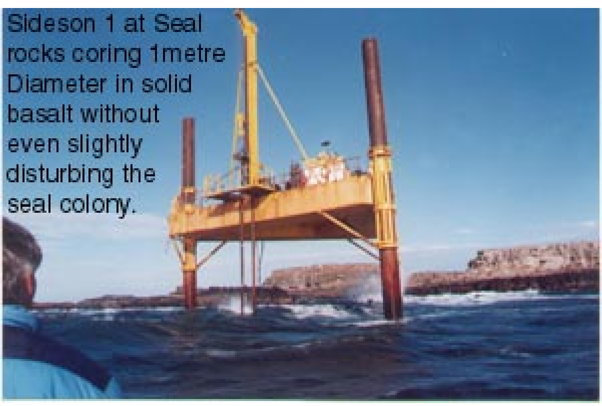
- Perform in hostile environments
- Automatic choice of engineers





Our platforms are used for:

- Geotechnical investigations
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- Dolphin installation and servicing
- Wharf rehabilitation
- Diver Support
- Drilling and Blasting for Dredging
- Offshore Mineral Exploration
- Gas Pipeline installations

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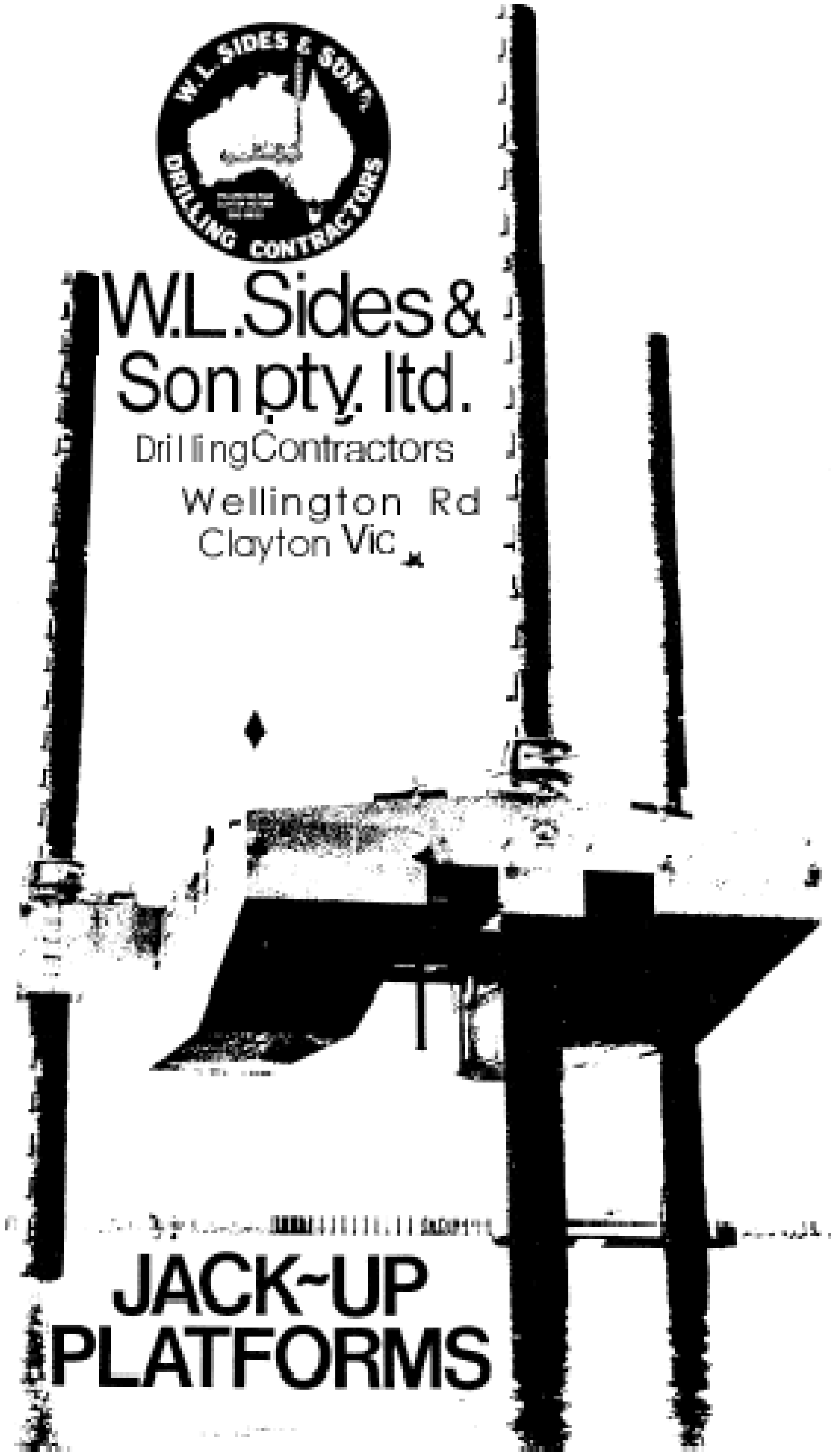
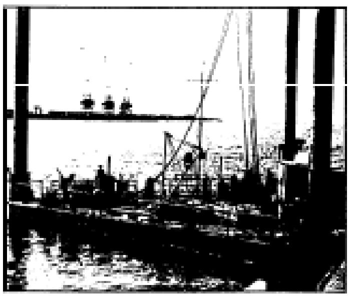


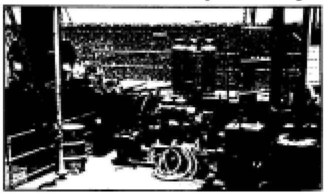
JACK-UP PLATFORMS

Broad specifications
SIDESON I.
HULLS
3 Hulls pinned together in a triangular shape. Centre deck section filled in with removable flooring. Each hull has three watertight compartments, the rear unit contains engines, hydraulic controls and fuel tanks.
Dimet anodic protection.
SPUDS
700mm diameter steel with rack on sides, a splice at the midpoint for easy transport.
26.6m overall length Legs on 15.25m centre
JACKING
Twin hydraulic cylinders per leg
JACKING SPEED
Approximately 30 seconds for 1.8m lift.
POWER
2 radiator cooled 6/71 GM diesels 150HP each mounted above deck with direct driven air compressors and hydraulic pumps.
DISPLACEMENT
Approximately 75 tonnes bare.
DRAUGHT
4.5m legs fully retracted
DECK LOADING
Approximately 20 tonne capacity
TRANSPORT
5 semi trailer loads or by open sea towing
DECK AREA
Triangular clear area approximately 14m x 14m x 15m
WATER DEPTH
Nominal 21m depending on local tides
SIDESON II
HULLS
Twin hulls pinned together separately apart in a catamaran style by twin above deck transverse beams. These beams also act as spud guides for the single leg at the front and one at each end of the beam at the rear. The rear beam contains all engines, hydraulics and controls. Hulls are each 15.9m x 3m each with water tight compartments and dimet anodic protection.
SPUDS
1 m diameter with jacking lugs on both sides and a splice mid way for transport. Each spud 33m long with a 2m diameter foot, which is ball joint mounted on the bottom end. Three legs on 15m centres.
JACKING
Twin hydraulic cylinders per leg. 2m stroke, rotating lock rings, air actuated.
JACKING SPEED
Approximately 30 seconds for 2m lift to minimise jarring on seabed at commencement of lift,
POWER
Two radiator cooled 6/71 GM 150HP each, mounted above deck each with direct driven air compressors and hydraulic pumps.



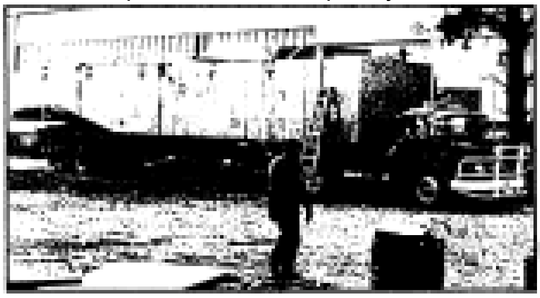
DISPLACEMENT
Approximately 120 tonnes bare
DRAUGHT

Approximately 1.4m
DECK LOADING
Approximately 30 tonne capacity
TRANSPORT
6 semi trailers or by open sea tow
DECK AREA
Clear deck area between beams approximately 1Om x 11 m. Removable floor between pontoons.
WATER DEPTH
Nominal 26m depending on local tides

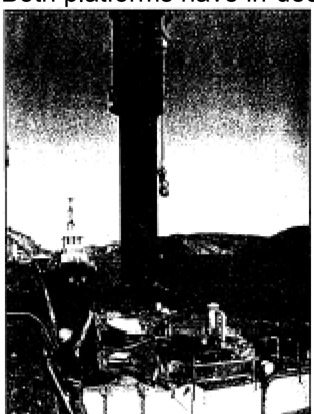


Jack-up platforms

The only proven way of successful drilling in coastal waters.
Sideson 1 was originally built for a major drilling project at Newcastle Harbour, which was very successfully completed on time, despite severe currents and the Hunter River flooding.
W.L. Sides have drilled off a great variety of barges in many areas of Australia but we felt the quality of the samples and test results were not sufficiently good for the expense and lost time.
We can now give results comparable with that achieved on land and with relative immunity to weather conditions. It is possible to leave the platforms on site in all but cyclonic conditions and to operate in up to 2m swell or wave conditions, the limitation being the ability to safely board and disembark from the platforms to the work boat.
Almost any rig from our catalogue can be mounted on either platform and operated normally. In addition pile drivers, cranes or blast hole machines can be mounted on deck. One man can operate the platform completely from a central point, all power etc. being supplied by twin above deck 6/71 GM diesels. They provide independent power for all hydraulic and air systems for jacking. Under some conditions they can provide propulsion if required for safety and maneuvering on site. There is an hydraulically operated anchor winch above deck.
Large sealed hatches are in the pontoons so consumables, etc. can be stored safely. Both platforms are held together by drive pins and all accessories are so organised so there is little need to disturb wires and hoses during erection. The hulls have been designed to conform to road transport regulations with the result that either platform can be quickly and economically moved interstate by road.



For short distance moves, both platforms carry seaworthiness certificates, which allow movement around the coast by tug. Assembly is normally carried out adjacent to a wharf in the water with land based cranes lowering the parts into place. Around 30-40 tonne cranes are most suited for this operation.
On site the platforms are normally moved to a surveyed position and then jacked up to a height chosen lo be clear of the highest wave at the highest tide. It can be then left in safety indefinitely while drilling operations proceed. A work boat is required to service the platforms and aid in maneuvering between sites. Boats normally used are around 200 B.H.P.
Each platform has on board raclios on the local Harbour-masters and distress frequencies plus radios communicate with on shore surveyors or work boats. Marine navigation lighting, signals, and safety equipment are always on board.
When being towecl long distances in rough or open seas, the legs are lowered somewhat to increase stability, increasing the draught to 12m.
Both platforms have in-deck mud storage and drilling water storage tanks.



At the time of writing major projects have been successfully completed at Port Kembla, Newcastle, Gladstone (3 tours), Hay Point (2 construction stages), Abbot Point, Bowen, Darwin, Cockatoo Island, North West Shelf, Cape Lambert, Stoney Point.

Many of these projects were attempted by conventional means by others and provided little meaningful results. The quick mobilisation and accurate results made possible by the use of our platforms has been of immense value to the developers of these projects, their written testimonies substantiate this.
W.L. Sides are proud of these unique platforms and their performances have meant that they are now the automatic choice for coastal test drilling.

E.L. 2963 WALLAROO S.A.

held by P S & G F FORWOOD Pty Ltd

Report on operations for period for final year of licence (30 May 2003– 29 May 2004)

(with expenditure Inception– 31 May 2004)

by P.S. Forwood (for Licensees)

Contents

1.0 Summary & status (termination) of project

Activities in the final year of tenure of EL 2963 consisted only of revision of data and interpretation, and seeking a farm-in partner.
Progress discussions were held from time to time with PIRSA officers regarding the work performance on this licence, and it was recognised that a joint venture partner was needed to meet the costs of the offshore program.
A CD-ROM featuring a review of the area was attached to the first annual report for EL2963 as Appendix 1
Total expenditure for the licence, from inception to 31 May 2004, was $19,401.94.

2.0 Geology

Geological knowledge of the area is chiefly that arising from AGSO/Geoscience Australia's studies, supplemented by the interpretations of the licencee.

3.0 Expenditure

The following expenditure has been recorded in the period Inception -31 May 2004

Item	Expenditure
Geologist's/supervisor's time	$10,200.00
Wages	$0.00
Lease fees	$658.60
Office rent, equipment hire	$7,781.50
Drafting, maps, phones	$30.00
Travel, mileage	$422.24
Camp/accommodation	$43.50
Stores	$266.10
Assays	$0.00
Contractors	$0.00
Compensation	$0.00
TOTAL	$19,401.94

Note (1) in the above, the time of consultant P.S.Forwood has been allowed at $400/day.

4.0 Outlook

EL 2963 was not renewed at the end of the second year of tenure.

5.0 List of appendices

Appendix CD ROM with this report (in pocket inside back cover of report)