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REVIEW OF LEAD-ZINC MINERALISATION IN SOUTH AUSTRALIA - GAWLER CRATON

GEOLOGICAL SURVEY

compiled by

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ABSTRACT

Information relating to lead-zinc mineralisation on the Gawler Craton has been reviewed and references to anomalous lead and zinc are summarised.

Four main styles of mineralisation have been identified and areas with potential for lead and zinc deposits worthy of further investigation are outlined:

- Broken Hill style: associated with banded iron formation (BIF) and schist of the Early Proterozoic Hutchison Group on eastern Eyre Peninsula;
- Gamsberg (or Balmat-Edwards) style: associated with metamorplhosed calcsilicate and dolomite of the Hutchison Group (northern and central Eyre Peninsula);
- Mount Isa style: Early Proterozoic (1800-1730 Ma) acid volcanics and associated, dominantly fine-grained, sediments;
- McArthur River style: Middle Proterozoic, in black shale, siltstone, dolomite and chert associated with tuffaceous volcanics and major structural features.

A style of mineralisation, not noted for lead and zinc but containing appreciable silver, is Olympic Dam. In the Roopena area mineralisation in underlying altered hematitic breccias suggests affinities with Olympic Dam.

INTRODUCTION

This report is one of a series prepared to assist in the search for lead/zinc deposits to provide feedstock for the Port Pirie smelting and refining facilities of Broken Hill Associated Smelters. Summarised in Appendices A and B are lead-zinc prospects and anomalies on the Gawler Craton.

Open file references were obtained from the SADME bibliographic retrieval system SAMREF (1981-1987) and SADMEB (1953-1983) using the keywords lead and/or zinc. References with no mineralisation or insignificant lead/zinc anomalies have been excluded.

Mineral production from the Gawler Craton commenced in 1862 with the discovery of copper at Moonta and Kadina. The Port Lincoln copper mines were opened in 1863 and other base metal mines including the Lady Franklin, Murninnie, Moonlight, Miltalie, Atkinson, Mt. Miller, Cleve, Davey's, Elson and Poonana Mines opened shortly thereafter. Most of these mines produced small quantities of silver, lead and, to a lesser extent, zinc sometimes in association with copper. Iron-ore mining commenced in the Middleback Ranges late in the nineteenth century in response to a need for ironstone flux at Port Pirie, and gold was produced at Tarcoola and Glenloth at the turn of the century from Middle Proterozoic sediments, volcanics and sheared granites. Copper, uranium, gold, silver and rare earths were discovered at Olympic Dam in 1975.

Lead-zinc occurrences in the Gawler Craton are restricted mainly to Early Proterozoic metasediments of the Hutchison Group (Middleback Subgroup) and Early to Middle Proterozoic low metamorphic grade shales and metasiltstones on northern Yorke Peninsula (Wandearah Metasiltstone).

REGIONAL GEOLOGY

The Gawler Craton covers Eyre Peninsula and Yorke Peninsula and extends to the north under the Stuart Shelf and to the northwest in the Tarcoola region (Fig. 1).

It includes scattered exposures of Archaean and Early Proterozoic gneisses, schists, metasediments, metavolcanics and granites overlain by Middle Proterozoic clastic sediments and volcanics of the Gawler Ranges volcanic province (Parker et al. 1985; Parker, 1987). It was extensively deformed during the Sleafordian and Kimban orogenies dated at about 2500-2300 Ma and 1850-1650 Ma respectively (Webb et al., 1986; Fanning et al., 1988).

The Sleafordian and Kimban orogenies define and separate the three major periods or megacycles in the development of the Gawler Craton:

1. Archaean to earliest Proterozoic (2700-2300 Ma):

   Upper amphibolite to granulite facies gneiss complexes, Mulgathing, Complex in the northwest and Sleaford Complex in the south which contain two main components: Late Archaean gneisses, iron formations and basic granulites of metasedimentary or metavolcanic origin, and earliest Proterozoic intrusive granitoids (Parker, et al, 1981; Daly, 1986).

2. Early Proterozoic - (2000 - 1650 Ma):

Metamorphosed clastic sediments overlie Sleaford Complex in the south and Sleaford Complex and Miltalie Gneiss in the central part of Eyre Peninsula. These sediments belong to the Hutchison Group (Parker and Lemon, 1982) and were deposited ca 1950 - 1850 Ma (Fanning et al 1988). The sequence, in ascending order, is:

- Warrow Quartzite; massive to flaggy feldspathic quartzite with local quartz-pebble conglomerate, dolomitic marble, calc-silicate gneiss and pelitic schist.
- Katunga Dolomite; massive dolomite + calcite + serpentine (after forsterite) marble; with local calc-silicate gneiss and talc schist.
- Lower Middleback Jaspilite; carbonate, silicate, and oxide facies banded iron formation with local sulphide facies iron formation and graphitic chert.
- Cook Gap Schist (also known as Mangalo Schist); quartz + feldspar + mica + sillimanite + garnet schist and gneiss conformable amphibolites and local calc-silicate gneiss.
- Upper Middleback Jaspilite (also known as Mount Shannon Iron Formation); quartz + magnetite + amphibole gneiss, chert and dolomitic marble.
- Yadnarie Schist; a quartz-veined mica schist which may contain deformed rhyolite (Mount Bosanquet Formation; Rankin, Flint and Fanning 1988).

The Hutchison Group was metamorphosed (to upper amphibolite grade) and multiply deformed by the Kimban Orogeny during which time numerous granitoids were emplaced. These granitoids are collectively known as the Lincoln Complex, and are abundant along the eastern coastal region of Eyre Peninsula where they consist of deformed gneissic granites emplaced ca 1850 Ma and relatively undeformed late-tectonic granites emplaced ca 1700-1650 Ma (Webb et al., 1986).

East of the Middleback Ranges, there is a sequence of schists and metavolcanics Broadview Schist and Myola Volcanics, which are stratigraphically younger than the Hutchison Group but which have been subjected to part of the same orogenic cycle. The Myola Volcanics are chronologically (ca 1790 Ma) and geochemically similar to the Argylla and Bottletree formations of the Mount Isa Inlier (Wyborn et al., 1987).

On northern Yorke Peninsula, in the Moonta-Wallaroo area there is a sequence of deformed rhyolites (Moonta Porphyry), schists and hornblende-bearing gneisses (Doora Schist) which are similar to the Myola Volcanics and Broadview Schist in deformational fabric yet similar to the McGregor Volcanics in age (ca 1740 Ma). Further to the east on Yorke Peninsula, and extending north under the Stuart Shelf (Parker, 1987) subsurface rocks include hematitic, and sometimes carbonaceous or dolomitic low grade metasiltstones (Wandearah Metasiltstone) and basic volcanics (Willamulka Volcanics). These are of uncertain age but may correlate to the Moonabie Formation on northeastern Eyre Peninsula.

3. Middle Proterozoic (1600-1400 Ma):

Gently folded and less deformed are clastic sediments, and volcanics of the Tarcoola Formation, Corunna Conglomerate and Gawler Range Volcanics (1592 Ma; Fanning et al., 1988).Both the Tarcoola Formation and Corunna Conglomerate are dominantly conglomeratic and quartzitic, but both contain substantial black shales (Daly, 1985). Anorogenic granite plutons (Hiltaba Suite) which accompanied volcanism are extensive around the margins of the Gawler Range province.

Granite and volcanics at Olympic Dam and Acropolis were contemporaneous with the Gawler Range Volcanics. A thick quartzose sandstone sequence (Pandurra Formation) deposited on the Stuart Shelf (ca 1420+ Ma) is younger than the Gawler Range Volcanics and is capped by Adelaidean sediments; these are discussed by Robertson (1988). They are intruded by the ca 1100 Ma Gairdner Dyke Swarm.

AREAS WITH POTENTIAL FOR LEAD-ZINC

Lead-zinc occurrences in the Gawler Craton are localised predominantly in Early Proterozoic Hutchison Group metasediments associated with dolerites, quartz biotite schists, B.I.F.s amphibolites, calc-silicates, and metamorphosed carbonates. Many small mines with recorded production of only a few tonnes were operated during the late 1800's e.g. 'Calcookara' copper mine 91 tonnes and Poonana lead, silver, and copper (44 tonnes).

I. Menninnie Dam - Ultima Dam (Fig. 1, Appendix B, G70, YARDEA & PORT AUGUSTA).

This area has been held under Exploration Licence since 1980 by Shell Company of Australia, Poseidon Ltd. and Western Mining Corp. Ltd. Diamond Drilling has disclosed up to 13.9% Zn, 9.6% Pb and 0.43 g/t Au, over an 11.0 m interval at a depth of 40 m in one drillhole. In a programme involving 160 drillholes a sub-economic deposit 3.0 km by 6.5 km was outlined with 14 drillholes intersecting >1% Pb and Zn.

The Menninnie Dam prospect occurs in a sequence of dolomitic/ankeritic/calcitic marbles, graphitic schists, BIF's, cherts and amphibolites with bands of massive pyrite + sphalerite + galena (+ chalcopyrite + silver) containing 10-50% Pb + Zn (Higgins & Hellsten, 1986). The strong carbonate association (either Katunga Dolomite or Upper Middleback Jaspilite) is analogous to the Gamsberg (South Africa) and Balmat-Edwards (New York state, USA) deposits.

At Ultima Dam DDH - UD3 intersected 16 m (24 - 40m) of 0.31% Zn, 0.14% Pb. Anomalous concentrations were disclosed in other samples.

G34: Rock chip samples of gossans assayed Zn (3500, 3000, and 1300 ppm) and Pb (1000 and 880 ppm).

G61: Gawler Range Porphyry with Pb (600 ppm) and Zn (390 ppm).

G66: Eurilla: Cu and galena mineralisation
Mitchell: Pb (600 - 1680 ppm over 800 m). Ironstone with 1420 ppm Pb and 1020 ppm Zn.

G6: Cleve Road: Pb (2700 ppm) and Zn (1890 ppm)
Goongoona: 70 -72 m drillhole.
(0.34% Pb, 0.2% Zn and 3.5 g/t Ag).

II ROOPENA AREA (Fig. 1. Appendix B, G33, 63, 64).

Extensive subeconomic Cu - Pb - Zn - Ag mineralisation has been located in:

- conglomerate, siltstone and altered hematitic breccia, and
- unconformably overlying carbonaceous shale and volcanoclastic sandstone.

Diamond drilling disclosed up to 4 m with 49.5 ppm Ag; 1 m at 0.82% Pb and 0.63% Zn.

The association of lead-zinc in carbonaceous shale adjacent to the Roopena Fault is of interest with respect to a McArthur River model, whereas mineralisation in underlying altered hematitic breccias suggests affinities with Olympic Dam style of mineralisation. Mineralisation of apparently different styles in several unconformable units indicates a prolonged mineralising process perhaps related to the Roopena Fault.

Re-appraisal of geophysics is considered warranted in this area, as well as other locations east of the Roopena Fault including G37, 38, 39 and 40.

III Campoona Hill - Cleve - Cowell Area
FIG. 2 KIMBA and WHYALLA
: Rudall, Mangalo and Cowell)

REFERENCES: APPENDIX B. G7, 8, 9, 11, 12, 13, 14, 15, 16, 29, 56, 64, 65, 67, 68.

This area has been reasonably intensely explored and includes many former base metal mines (Johns 1961) which are in Hutchison Group metasediments, principally Mangalo Schist, calcsilicates and marbles at the base of the Warrow Quartzite, the overlying dolomitic marble (Katunga Dolomite), and iron formations (Fig. 2).

Mineralisation is considered by some to be analogous to Broken Hill due to the association with BIF's, calc silicates and carbonates in a multiply deformed, high-grade metamorphic sequence containing abundant mafic (?) volcanics (amphibolites).

Old workings include (see Johns, 1961; G.29, Appendix B & Fig. 2)

	Mine	Recorded Production
1.	Miltalie Mine (Pb, Ag, Cu)- Assay up to 40.8% Pb & 1 oz/t.Ag lode in mica schist and dolomite at the base of the Warrow Quartzite	None recorded
2.	Atkinson's Mine (Ag, Pb) Lodes at contact of mica schist and dolomite/calcsilicate at the base of the Warrow Quartzite.	Sample of 195.5 lb produced 593.4 oz fine Ag.

Mine	Recorded Production
3. Yalpoudnie Mine (Cu, Pb): at sheared contact of schist and mylonitic quartz feldspar gneiss. Assay 21% Cu, 14% Pb, 1 oz. 8dwt Ag/t	4.5 tons
4. Mt. Miller Mine (Pb, Ag) Lode in quartzose gneisses and quartz veined mica schist adjacent to Katunga Dolomite One ton ore-dressed sample assayed 77% Pb & 14 dwt Ag/t.	> 1 ton
5. Cleve Mine (Pb, Ag) Shear in mica schist. Assayed up to 11% Pb and 130 oz Ag/t	8 tons
6. Elson Mine (Pb, Ag) Quartz lodes in mica schist. Assay 34.8% Pb, 4 oz/t Ag.	Minor
7. Poonana Mine (Pb, Ag, Cu) Lode at quartzite/schist interface (? fault zone). Assayed up to 31.6% Cu, up to 54.1% Pb, and 2 oz 6 dwt/t Ag.	43 tons
8. Copper Prospect (Cu, Pb) Lode in mica schist near pegmatite. Assay 7.6% Pb 2.3% Cu 4 dwt/t Ag.	Nil
9. Others Wicklow Hut - galena with 1.5 oz. Ag/t. Yeldulknie Weir - galena in pegmatite. Mangalo - thin galena veins (some Ag) in schist.	No recorded production

Mine	Recorded Production
Darke Peake - Ag/Pb vein 33 oz/t Ag.	
Davey Prospect - Ag/Pb siliceous ironstone.	
Mangalo Creek - Pb/Zn in BIF	
South Morowie - ore from dump assayed 32% Zn, 6.6% Cu & 260 ppm Ag/t.	

10. Miscellaneous Copper mines

Morowie - Cu carbonates	11 tons
Calcookara - Fe, qtz, azurite, malachite. In 1914 a 30 'ton' stock-pile assayed 15-19% Cu.	90 tons
Boards - malachite adjacent to shear on the margin of a pegmatite.	1/2 ton
Hawker - small low grade.	minor
Arno Bay (Windittie) - malachite and azurite in mica schist adjacent Katunga Dolomite.	23 tons 16 cwt of 15% Cu ore
Emu Plain (W.G.) Mine fault zone in mica schist.	minor
Yadnarie - Cu carbonate ore	
Cu Prospect, Miltalie - mica schist and gneiss adjacent to pegmatite dyke.	

Many companies have re-assayed mine dumps and old drillholes, undertaken local rock-chip and stream-sediment sampling and re-interpretted geophysical data, but no drilling has been carried out around areas, such as the Miltalie-Atkinson's region, which have proven pods, albeit relatively small, of high-grade mineralisation. Testing of some geophysical anomalies northwest of Cleve includes:

- C.R.A. Exploration, in joint venture with Shell Co. of Australia (G15), intersected 2m of 1.75% Zn and 0.1% Pb in DDH SS1, near the Silver Monarch Mine grid.

At the Iragie Prospect (Fig 2) the best intersection was 2m at 1.18% Zn and 3040 ppm Pb, in percussion drillhole 1R-1.

- Pacminex, ZN-series of 5 diamond drillholes tested the Mount Shannon South zinc anomaly. The best intersection was 10 m in Zn 1. at 166.4 m which assayed 0.15% Pb, 0.71% Zn and 5 ppm Ag.

- C.R.A./Shell - Cleve West area-local zinc in DDH's.

Reassaying of mine dumps and drillcore has indicated some previously-unknown anomalies including:

- Asarco (Australia) Pty. Ltd., in sampling Kerr-McGee diamond drillhole L505/2 (G64), assayed 6800 ppm Zn from 16 - 24 ft in limonitic dolomite along with anomalous Pb and Zn in many other drillholes.

- C.R.A. Exploration (G56) sampled ore from a dump at the South Morowie Mine which assayed 32% Zn, 6.6% Cu and 260 ppm silver.

IV. Others

Areas to the north and south of the Campoona Hill-Cleve-Cowell region)Fig. 2) have potential for Menninnie Dam style Pb-Zn mineralisation in Hutchison Group sediments.

a. Northern Eyre Peninsula

Between Menninnie Dam and Campoona Hill

- Cleve Area - G6 (1) and (2) (Appendix B, Fig. 1) Percussion drilling intersected 6m at 0.22% Pb (drillhole CP531) and 6m at 0.15% Zn (drillhole CP559) in Mangalo Schist.
- Darke Peake - G29 (9): A vei.. of Ag/Pb assayed 33 oz/t Ag.

- Sugarloaf Hill (N. of Campoona Hill Area, Fig. 1) G16 (2): Anomalous Pb-Zn values were identified from rock chip sampling and RAB drilling.
- G61: A sample of Gawler Range Porphyry float assayed 600 ppm Pb.
- G69, Profile 7: 2m of 0.14% Pb in RAB hole RBB39.
- Lake Gilles G34: Rock chip sampling by Asarco (Australia) Pty. Ltd., assayed 3500 ppm Zn and 1000 ppm Pb

  Mitchell Trend G66: Ironstone float produced 1420 ppm Pb and 1020 ppm Zn.
- <u>Middleback Ranges Area</u>

  The Upper and Lower Middleback Jaspilites, Katunga Dolomite and Cook Gap Schist have been targets for exploration for base metals associated with iron enrichment. Native silver has been encountered in Katunga Dolomite from a drillhole near Iron Baron (Parker, pers. comm.), concentrations of zinc as high as 0.4% have presented metallurgical problems refining iron ores from Iron Monarch (Lower Middleback Jaspilite), and assays up to 0.5% Zn have been recorded from manganiferous iron ore from Iron Knight. Surprisingly, sulphide-facies iron formation (Parker & Lemon, 1982), which can contain up to 45% pyrite + pyrrhotite, does not generally assay anomalous lead or zinc (although copper is sometimes high). However, the "Older" intrusives of the Middleback Range do generally have background zinc assays ca 150 - 500 ppm.
- <u>Corunna Area</u>

  Up to 0.19% Pb and 0.15% Zn were intersected in Corunna No. 1 drillhole in mauve siltstones of the Corunna Conglomerate (G41). Triumph Prospect (G32): Minor lead-zinc mineralisation in dolerite was intersected at 78-80 m in PDH HB2 and assayed 0.26% Pb and 0.6% Zn.

b. Southern Eyre Peninsula

A number of small mines worked deposits of base metals similar to those in the Campoona- Cleve-Cowell area during the late 1860's to early 1900's.

- Lady Franklin and Moonlight Mines (Ag - Pb - Au):
  Located in Cook Gap Schist (with amphibolite); One smelted parcel yielded 22% Pb, 1.5 g/t Ag and 12 grains per ton of Au.
- Tumby Bay Copper Mine:
  Approximately 25 tons of ore (19% Cu) was extracted to 1910.
- Burrawing Copper Mine (G24 Fig. 1):
  Ore assayed up to 37% copper and 1.5% bismuth in micaceous quartzites and schists (Hutchison Group). Minor lead-zinc anomalies are associated with this mine.
- Koppio Graphite Mine (G21, G25 (3), G26):
  Anomalous zinc wasdetected in graphitic schist in sheared metasediments and in an epidote quartzite where values up to 1430 ppm Zn were obtained (G25). A sample from Waterfall Gully showed 3380 ppm Zn.
- Sunny Brae - Butler Tanks Area (G27, G28, G10):
  Minor lead-zinc values were returned in sampling near Sunny Brae; where 5600 ppm Zn was disclosed in stream sediment sampling.

V. Tarcoola Area

In the Tarcoola area and west to Mt. Christie (Fig. 1), local mineralisation occurs in sheared Archaean granites and gneisses of the Mulgathing Complex. Interlayered basic gneiss and BIF at Blackfellow Hill contains anomalous base metal values and interlayered calcsilicates and schists near Kenella also have anomalous zinc. The best values from rock chip sampling and drilling are 2.1% Zn (G45) and 8000 ppm Pb (G49). Lead-zinc anomalies from drilling at Glenloth yielded 1450 ppm Zn and 710 ppm Pb in probably Mulgathing Complex (G5). Nickel and minor base metal concentrations are associated with metamorphosed ultramafics adjacent to BIF at Skuse Hill (G46b) and gabbros south of Glenloth (G2).

Mineralisation is also associated with the Middle Proterozoic Tarcoola Formation, Carnding Rhyodacite and Hiltaba Suite granite /adamellite In the vicinity of Tarcoola (Fig. 1), location G43 yielded 1350 ppm Pb and 1900 ppm Zn suggesting some potential for mineralization in sheared and brecciated Gawler Range Volcanics. Tarcoola Hill mine dump (G48) yielded 8.0% Zn in quartzite and 39% Pb in brecciated quartzite from Tarcoola Formation and minor anomalies (< 1840 ppm Zn) were also indicated in black tuffaceous shales in Wilgena No. 1 drillhole (G52).

VI Miscellaneous Drillhole Data

Channel sampling by ASARCO (Aust.) Pty. Ltd. (G64) of core from drillholes widely spread throughout South Australia gave anomalous lead-zinc values. This work identified six drillholes, from the Gawler Craton, with anomalous lead-zinc assays, including the following:

- Birthday Bore - 4400 ppm Pb, 9280 ppm Cu (?Adelaidean)
- Kerr-McGee L505/2 - 6800 ppm Zn at 16-24 ft. in Katunga Dolomite
- Lake Phillipson - 5500 ppm Zn at 310 - 312 ft. in pyritic shale/coal (Permian).
- Roopena DDH1 - 5500 ppm Pb at 360-370 ft. in Roopena Volcanics.
- Tarcoola TD3 - 1400 ppm Pb at 101-111 ft. in basal Tarcoola Formation.
- Woomera Bore - 2300 ppm Zn in Woocalla Dolomite. (Adelaidean).

VII Wallaroo-Moonta Area

The great copper mines of Northern Yorke Peninsula have given stimulus to exploration for base metals in that region. At Poona 5 km NNE of Moonta, an in-situ, undiluted ore reserve of 180 000 tonnes averaging 7.1% Cu and 2.0 g/t gold has been delineated.

Although generally regarded as Cu mines, Moonta and Wallaroo Mines produced significant silver (and gold) averaging 0.996 g/tonne fine silver (Flint, 1983). Sphalerite has been recorded in both the Moonta and Wallaroo orebodies and Jack (1917) notes that both sphalerite and galena formed late in the mineralizing process, particularly in the Wallaroo lode.

0.56 g/t Ag at .996 fine

East of Kadina, the Smithams Prospect (G71) disclosed anomalous lead-zinc mineralisation with values up to 1% in pyritic shale, tuff, dolomite, chert and volcanics of the Wandearah Metasiltstone

SUMMARY

Appendix A presents an alphabetical listing of most known mines or prospects on the Gawler Craton, host rock type and age, and includes numeric references to assist in locating prospects and occurrences on Figures 1 and 2.

All company envelopes with references to significant anomalous lead or zinc in the Gawler Craton Area have been summarised and are listed in Appendix B (G1-G71) (alphabetically by 1:250 000 sheet).

CONCLUSIONS

The review of open file envelopes in the Gawler Craton outlined a number of lead-zinc anomalies in a variety of different rock types.

Beginning with the oldest host rocks, the anomalies and prospects include:

- Mulgathing Complex: anomalous lead-zinc, sometimes with associated copper and nickel, occurs in granulite-facies metasedimentary and metabasic gneisses of probable late-Archaean ancestry. The Mulgathing Complex is poorly exposed but there are large areas of only thin superficial cover with exploration potential.

- Hutchison Group metasediments contain most of the known lead-zinc mineralization on the Gawler Craton. They are restricted to Eyre Peninsula where there are many small silver, silver-lead and silver-lead-zinc mines of high grade but limited extent. Menninnie Dam is the most significant prospect outlined to date; it is a blind prospect with a best drilling intersection being 11m of 13.9% zinc and 9.6% lead (with 0.43 g/t Au) at a depth of 40 m.

  The Hutchison Group has been metamorphosed to upper amphibolite grade and also multiply deformed. It is an Early Proterozoic sequence very similar to those of Gamsberg (South Africa) and Broken Hill (NSW) and the association of mineralisation with carbonate facies of the Hutchison Group are best preserved on central Eyre Peninsula in a belt extending from Menninnie Dam south through Cleve and on towards the Cummins - Tumby Bay region offering potential for the discovery of carbonate-hosted lead-zinc orebodies of Gamsberg (or Balmat-Edwards, New York state) style.

  Further east (e.g. the Middleback Ranges) carbonates appear to give way to silicate and oxide facies iron formations (with locally-thick sulphide facies) with potential for Broken Hill style mineralisation related to deeper-water sediments.

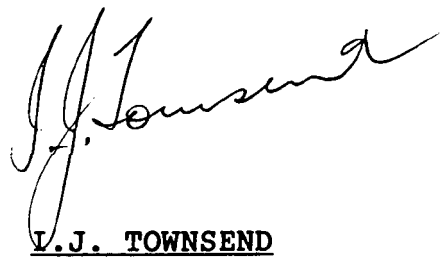
- Shear zones in rocks of the Archaean Mulgathing Complex, Hutchison Group and Lincoln Complex intrusives contain local precious and base metal mineralisation. However, many of these shear zones are small or narrow and are unlikely to host substantial deposits.

- Early Proterozoic hematitic metasiltstone, black shale and volcanics contain 1% lead/zinc at the east Kadina-Smithams Prospect on Yorke Peninsula indicating a possible volcanogenic style of mineralisation in a depositional environment possibly analogous to Mount Isa in time and tectonic setting. Given the extent of the Wandearah Metasiltstone in the subsurface and also of the slightly older Myola Volcanics and related schists, potential exists for the discovery of Mount Isa style mineralisation.

- Gawler Range Volcanics at Roopena prospect and in the Tarcoola-Glenloth area have provided encouraging but sub-economic lead-zinc contents.

- Middle Proterozoic Tarcoola Formation and Corunna Conglomerate have produced gold and contain lead and zinc mineralisation. Black shales, particularly tuffaceous shales, may offer potential for McArthur River lead-zinc deposits. Attention should be given to structural control.

It is clear that the Gawler Craton offers scope for lead-zinc exploration in a variety of sequences with demonstrable local concentrations of base metals. This report has attempted to establish that presence and to establish the craton as a province with potential for lead-zinc as well as other base metals. There has been no attempt to identify the structural control of mineralisation nor to examine, in detail, mineralising processes.



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A P P E N D I X A

SUMMARY OF GAWLER CRATON PROSPECTS (LISTED ALPHABETICALLY)

	Rock Type	Age	Reference
Atkinsons Mine	Hutchison Gp.	E. Proterozoic	G29, 65, 68
Birthday Bore			G64(2)
Birthday Ballast Quarry	Carnding Rhyolite	M. Prot.	G43
Bon Bon	Tarcoola Fm. (GRV)	M. Prot.	G17
Bossom Gully	BIF Hutchison Gp.	E. Prot.	G25(2)
Buckleboo, profile 7	BIF Hutchison Gp.	E. Prot.	G69
Burrows Dam	Hutchison Gp.	E. Prot.	G70(4)
Bute Drilling	Dolomite	Cambrian	G54, 55
Butler Tanks	Hutchison Gp.	E. Prot.	G10, 27, 28
Calcookara	Hutchison Gp.	E. Prot.	G7, 13, 68
Campoona Grid	Hutchison Gp.	E. Prot.	G11, 12, 15, 16
Chitanilga Hill	Granite/Rhyolite	M. Prot.	G2
Cleve	Hutchison Gp.	E. Prot.	G6, 29, 65(3)
Cock Hill	Hutchison Gp.	E. Prot.	G68
Copper Prospect	Carbonate/pegmatite	E. Prot.	G8, 29
Corunna No. 1	G.R.V.	M. Prot.	G41
Cultana	Tapley Hill Fm.	Late Prot.	G38
Darke Peake	Hutchison Gp.	E. Prot.	G29(9)
Eba	Pandurra Fm.	M.Prot.	G18
Elson Mine	Hutchison Gp.	E. Prot.	G9, 15(4), 29(6) 65(4)
Emu Plain	Hutchison Gp.	E. Prot.	G15(3)
Eurilla Trend	Hutchison Gp.	E. Prot.	G66(1)
Ferns Quarry	Hutchison Gp.	E. Prot.	G68
Goonana	Hutchison Gp.	E. Prot.	G6(2)
Iragie	Hutchison Gp.	E. Prot.	G15(2)
Iron Knob (SAV9)	Hutchison Gp.	E. Prot.	G63(1)
Iron Chieftan	BIF Hutchison Gp.	E. Prot.	G59
Iron Baron	BIF Hutchison Gp.	E. Prot.	G58
Jungle	Hutchison Gp.	E. Prot.	G63(3)
Kadina (Smithams)	Wandearah M/siltst.	E. Prot.	G71
Kanani Fault Area	Mulgathing Complex	Archaean	G42
Katunga	Hutchison Gp.	E. Prot.	G31
Kenella Rock	Kenella/Christie Gneiss	Archaean	G44, 45
Kerr McGee	Hutchison Gp.	E. Prot.	G64(4)
Koppio	BIF Hutchison Gp.	E. Prot.	G21, 25, 26
Lady Franklin Mine	Hutchison Gp.	E. Prot.	G22, 23, 26(5) 29(10), 65
Lake Dutton	Whyalla S.S. Pandurra Fm	M. Prot.	G36
Lake Gilles	BIF Gossans (Hutchison Gp.)	E. Prot.	G33, 53 G64(5)
Lake Phillipson	Hutchison Gp.	E. Prot.	G11, 12 13(1) G64(6)
Mangalo	GRV Cleve M/M	E.-M. Prot.	G35
Maralinga Bore	Hutchison Gp.	E. Prot.	G70(1)
Mangoon Dam			
Menninnie Dam			

Miltalie	Hutchison Gp.	E. Prot.	G29, 65, 67
Mitchell Trend	Hutchison Gp.	E. Prot.	G66(2)
Morowie	Hutchison Gp.	E. Prot.	G68
Mt. Christie	Mulgathing Complex	Archaean	G46. 49(2)
Mt. Hill	Hutchison Gp.	E. Prot.	G10, 20
Mt. Miller	Hutchison Gp.	E. Prot.	G7(3), 29, 68(4)
Mt. Olinthus	Hutchison Gp.	E. Prot.	G68
Mt. Shannan South	Hutchison Gp.	E. Prot.	G14
Mt. Woods	Gabbro	M. Prot.	G1
Pier Dam	Hutchison Gp.	E. Prot.	G66(3)
Pillaworta	Hutchison Gp.	E. Prot.	G26(2)
Pinding Rocks	Mulgathing C. Tarcoola Fm.	Arch/M.Prot.	G47
Poonana	Hutchison Gp.	E. Prot.	G15, 29(7)
Pt. Pirie South	Tapley Hill Fm.	L. Prot.	G60
Reckits Mine	Hutchison Gp.	E. Prot.	G68
Reedy Lagoon	Pandurra Fm.	M. Prot.	G19
Rifle Range (& M-2)	Hutchison Gp.	E. Prot.	G30
Roopena	Fresh Well Fm. GRV	E. & M. Prot.	G33
Roopena DDH1	Hutchison Gp.	E. Prot.	G64(7)
" 6	Hutchison Gp.	E. Prot.	G63
SAV9 (Iron Knob)	BIF Hutchison Gp.	E. Prot.	G63(1)
Silver Monarch Mine	Hutchison Gp.	E. Prot.	G15(1)
Sims & Bradleys Mine	Hutchison Gp.	E. Prot.	G15(7)
Smithams (Kadina)	Wandearah/ Metasiltsone	E. Prot.	G71
Sugarload Hill	Hutchison Gp.	E. Prot.	G16, 40
Sunny Brae	Hutchison Gp.	E. Prot.	G27, 28
Tarcoola	Mulgathing C./ Tarcoola Fm.	Arch/M. Prot.	G48
Triumph	Hutchison Gp.	E. Prot.	G32
Ultima Dam	Hutchison Gp.	E. Prot.	G70(2)
Uro Bluff	Pandurra/Tapley Hill	M/L Prot.	G37, 39
Victory Dams	Rhyolite	E. Prot.	G3, 4
Wangaraleednie	Hutchison Gp.	E. Prot.	G7
Wilgena No. 1 DDH	Tarcoola Fm.	M. Prot.	G52
Wilklow Hut	Hutchison Gp.	E. Prot.	G29(9) 68
Woomera Bore			G64(9)
Yadnarie	Hutchison	E. Prot.	G9, 29
Yalpoudnie	Hutchison	E. Prot.	G13, 29(3), 56, 68(3)
Yeldulknie	Hutchison	E. Prot.	G7, 9, 14, 29(9)

APPENDIX B

SUMMARY SHEETS - GAWLER CRATON (G1-G71)

No.	1:250 000 Sheet/General Area
G1	Billakalina
G2-5	Gairdner
G6-16	Kimba
G17-19	Kingoonya
G20-30	Lincoln-Kimba
G31-41	Pt. Augusta
G42	Tallaringa
G43-52	Tarcoola
G53-60	Whyalla
G61	Yardea
G62-65	State, Gawler Craton, General
G66-71	Confidential Envelopes, Pt. Augusta, Whyalla, Yardea

COMPANY	Australian Selection Pty Ltd.
TENEMENT	E.L. 524
ENVELOPE	3636
1:250 000	BILLAKALINA
TARGET	Olympic Dam type mineralisation in gravity highs.
AGE/ROCK UNITS	Early and mid Proterozoic rocks of the Gawler Craton - Mt. Woods Inlier.
EXPLORATION SUMMARY	9 Percussion drillholes, total depth 670 metres (PMW 8-16). On 3 gravity anomalies.

MINERALISATION/PROSPECTS MT. WOODS

Pyrite, pyrrhotite, magnetite in most holes. Best value, 300 ppm Zn near unconformity; Bulldog Shale overlying gabbroic basement in PMW 8. Chalcopyrite and galena (very minor) in biotite gneiss in PMW 11 but no anomalous accompanying geochemistry.

COMPANY/AUTHOR	Asarco (Aust) Pty. Ltd.
TENEMENT	SML 307
ENVELOPE	1184 OPEN FILE
1:250 000	GAIRDNER
TARGET	Cu-Ni associated with basic bodies and Ag/Pb/Zn mineralisation
AGE/ROCK UNITS	Archaean Mulgathing Complex, Hiltaba Granite, Gawler Range Volcanics
EXPLORATION SUMMARY	Ground magnetic follow-up of airborne magnetic features. Geological mapping. Rock chip sampling. Stream sediment sampling. Rotary drilling 26 holes to bedrock.

MINERALISATION/PROSPECTS

Pb-Zn mineralisation in small pods and veins at granite-rhyolite contact; Cu-Ni associated with a gabbro/hornfels contact intruded by granites. Quartz Pb-Zn bodies are small (largest 6.1 x .6 m) Drilling suggested there was little extension to the mineralised zones beneath alluvial cover.

Best values rock chip samples Pb 8000 ppm
Ag 150 "
Zn 1500 "

COMMENTS:

Suggests possiblities for older Gawler Range Volcanics or Hiltaba Granite

COMPANY/AUTHOR	A.A. Day for K.K. Euler
TENEMENT	SML 529
ENVELOPE	1610 OPEN FILE
1:250 000	GAIRDNER
TARGET	Possible Pb/Zn mineralisation along lineaments in the Gawler Range Volcanics.
AGE/ROCK UNITS	Mid Proterozoic Gawler Range Volcanics. Yardea Rhyodacite, Wheepol Rhyolite.
EXPLORATION SUMMARY	Reconnaissance geological mapping. 52(?) rock samples analysed.

MINERALISATION/PROSPECTS

One sample of rhyolite along lineament contained Pb 3250, Zn 4450 ppm. However re-assay found background values only. Later(?) series of poorly located samples found max. values Cu 1150, Pb 2010 & Zn 2050 in same area(?).

COMPANY/AUTHOR	Utah Development Company
TENEMENT	E.L. 758 Bond Hill
ENVELOPE	4099 OPEN FILE
1:250 000	GAIRDNER
TARGET	Base metals etc
AGE/ROCK UNITS	Mid Proterozoic Gawler Range Volcanics
EXPLORATION SUMMARY	Geochem. sampling. Rock chip samples at 50 m intervals on 13 traverses (total 40.1 km) 34 stream sediment samples.

MINERALISATION/PROSPECTS

Maximum Pb values rock chip samples line

BH 004 -	0850m	410 ppm
"	1300m	130
"	1400m	290
"	1450m	130

COMPANY: SANTOS LTD

TENEMENT: EL 752 MOUNT MITCHELL GLENLOTH GOLDFIELD.

ENVELOPE: 4005 pp 58,59,60

1:250 000 SHEET: GAIRDNER

TARGET: Gold and base metal - Gawler Craton.

AGE/ROCK TYPES:
Gawler Craton, Glenloth Granite, Mulgathing Complex metasediments and Gawler Range Volcanics.

EXPLORATION SUMMARY:
Rock chip sampling, geological mapping, ground magnetic, R.A.B. and diamond drilling.

MINERALISATION: Rock chip samples

Gold R.G.G. 1,2,3,8,25, & 45: > 10 ppm Au
R.G.G. 4: 8.4 ppm Au

Lead: RGG 1,2,3 > 1% Pb.
R.A.B. Drilling: Max. values are Cu 230 ppm; Pb, 710 ppm; Zn, 1450 ppm.

COMPANY: MINES EXPLORATION PTY. LTD.
WESTERN MINING CORPORATION LTD.

TENEMENT: EL 507/895/1181

ENVELOPE: 3583 (Vol. 1 - 12) O P E N F I L E

1 : 250 000 SHEETS: KIMBA, WHYALLA

TARGET: Pb - Zn sulphides associated with banded iron formations and later (target) associated with iron-rich low-energy metasediments, e.g. Broken Hill, Pegmont (Aust.), Aggeneys, Gamsberg (S.Afr.)

AGE/ROCK UNITS: Lower Proterozoic, Hutchison Group, (then later) Mangalo Schist, Gawler Craton.

STRUCTURAL CONTROL: Not stated, possibly anticlinal and synclinal accumulations and associated faulting.

EXPLORATION SUMMARY: Aerial magnetic/radiometric survey, interpretaton, ground magnetic and radiometric traverses and rock chip sampling of selected anomalies, geological mapping, ironstone sampling, gravity survey, extensive Sirotem surveys, percussion drilling for bedrock geochemistry and to test Sirotem anomalies, total 630 holes for 15 500 m.

MINERALISATION/PROSPECTS:

(1) Cleve Road Area: percussion drilling 1983, CP 529 (10 m at 0.1% Pb), CP 531 (6 m at 0.22% Pb), CP 535 (10 m at 0.12% Zn), CP 559 (6 m at 0.15% Zn) with maximum assays of 2700 ppm Pb, 1890 ppm Zn and 3.5 ppm Ag (in different samples).

Values associated with ironstone and graphitic and micaceous horizons.

(2) Goongoona: percussion drill hole on Sirotem anomaly 1985, CP 565 intersected 2m at 0.34% Pb, 0.2% Zn and 3.5 g/t + Ag in a 12 m graphitic schist interval between 64 and 76 m. Sphalerite and galena were identified in polished sections of percussion chips.

DRILL SAMPLE STATUS: CPl - 630

COMMENT: WMC tended away from the analogy with a Broken Hill environment late in the term of the EL, due mainly to a lack of an obvious volcanic-related component in the sequence.

COMPANY: PACMINEX PTY LTD

TENEMENT: SML 383 OPEN FILE

ENVELOPE: 1355

1:250 000 SHEETS KIMBA, WHYALLA

TARGET: Base metal sulphide deposits within Early Proterozoic metasediments.

AGE/ROCK UNITS: Early Proterozoic, Gawler Craton.

EXPLORATION SUMMARY: Geological mapping, stream sediment, rock-chip and soil goechemistry, airborne magnetics and spectrometer survey, auger drilling.

MINERALISATION/PROSPECTS:

1) Wangaraleednie target: soil geochemistry outlined a base metal anomaly - best values Pb 380 ppm, Zn 850 ppm.

2) Calcookara target: soil geochemistry outlined a base metal anomaly - best values Cu 250 ppm, Pb 900 ppm. Stream sediment geochemistry at Calcookara mine - best value Cu 550 ppm. Mineralisation possibly in veins cross-cutting stratigraphy.

3) Mt. Miller mine: Soil geochemistry best values Cu 270 ppm, Pb 490 ppm, Zn 1000 ppm.

4) Yeldulknie target: divided on basis of soil geochemistry into a zinc anomaly to the west and a lead anomaly to the east within Mangalo schist. a) Zinc anomaly - geochemistry of auger samples gives best values of 3000 ppm Pb and 3700 ppm Zn. b) Lead anomaly - 3 linear anomalies defined by soil geochemistry - best value 1800 ppm Pb. Best rock-chip values Cu 1400 ppm, Pb 3800 ppm, Zn 480 ppm.

COMPANY: A.E. WINCKEL and V. GASKILL

TENEMENT: M.C. 2274

REPORT BOOK: 45/55 (MINING REVIEW 107: 100-101)

1:250 000 SHEET: KIMBA

TARGET: Copper carbonates associated with Lincoln Complex pegmatites within Hutchison Group schist.

AGE/ROCK UNITS: Early Proterozoic, Hutchison Group, Lincoln Complex, Gawler Craton.

EXPLORATION SUMMARY: Assay of selected prospect samples.

MINERALISATION/PROSPECTS:

Copper prospect - 6.5 m shaft in pegmatite. Minor malachite + azurite + cerussite (+ carnotite)

Best values: 2.3% Cu
7.6% Pb
0.01% U_3O_8

COMMENT: Mineralisation very sporadic, low grade - no ore marketed.

COMPANY: PACMINEX PTY LTD

TENEMENT: SML 667 OPEN FILE

ENVELOPE: 1966

1:250 000 SHEETS KIMBA, WHYALLA

TARGET: Base metal sulphide deposits in metasediments of the Hutchison Group.

AGE/ROCK UNITS: Early Proterozoic, Hutchison Group, Gawler Craton.

STRUCTURAL CONTROL: Pb/Zn anomalies occur where Pb/Zn - rich metasediments intersected by NW-trending faults.

EXPLORATION SUMMARY: Aeromagnetic survey, IP survey, auger soil geochemistry, 7 diamond drillholes, total 1320 metres.

MINERALISATION/PROSPECTS:

1) Elson Target: auger soil sampling over area of Elson Pb-Ag mine in mica schists. - best values Pb 1200 ppm, Zn 3000 ppm, Cu 75 ppm. 1 diamond drillhole tested anomaly: EL1 - (100m) 8m at 400 ppm Pb 1200 ppm Zn.

2) Poonana mine: auger soil sampling indicated no sigificant base metal anomaly.

3) Miltalie mine: auger soil sampling indicated no significant base metal anomaly.

4) Yeldulknie Zinc trend: auger drilling of 404 holes indicated a base metal anomaly within mica schists. The anomaly is split into a) a zinc anomaly to the west and b) a lead anomaly to the east.

   a) Zn anomaly - 5 diamond drillholes tested geochemical anomaly associated with aeromagnetic trends.

   Zn1 - 166.4 m - stratiform pyrite, sphalerite, galena.
   Best intersection 10 m
   at 0.15% Pb
   0.71% Zn
   5 ppm Ag

Zn2 - 139.74 m - stratiform pyrite, sphalerite, galena.

Best intersection 4m at
1200 ppm Pb
4800 ppm Zn

Zn3 - 119 m - stratiform pyrite, sphalerite, galena.

Best intersection 9 m at
900 ppm Pb
3900 ppm Zn

Zn4 - 396.5 m
Best intersections
7m at 1600 ppm Pb
6200 ppm Zn
6m at 3300 ppm Pb
5900 ppm Zn

Zn5 - 292.7 m - no significant assays.

b) Pb anomaly - 1 diamond drillhole tested geochemical anomaly associated with aeromagnetic trends.

Pb1 - 104.6m
Best intersection 9 m at 800 ppm Pb
1700 ppm Zn

COMMENT: Stratiform mineralisation in Hutchison Group, although low grade, is of interest. Downgrades Miltalie and Poonana Mines?

COMPANY: PACMINEX PTY LTD

TENEMENT: SML 381 OPEN FILE

ENVELOPE: 1353

1:250 000 SHEETS: KIMBA, WHYALLA, LINCOLN

TARGET: Base metal sulphide deposits within Early Proterozoic crystalline basement.

AGE/ROCK UNITS: Early Proterozoic, Gawler Craton.

EXPLORATION SUMMARY: Geological mapping, stream sediment geochemistry, airborne magnetics and gamma radiometrics, ground scintillometer survey, auger drilling and soil geochemistry.

MINERALISATION/PROSPECTS: LINCOLN.

1) Butler Tanks anomaly: Pb stream sediment anomaly (680 ppm) associated with aeromagnetic trend tested by auger drilling. Best values Cu 780 ppm, Pb 580 ppm, Zn 300 ppm.

2) Mt. Hill anomaly: Pb stream sediment anomaly (370 ppm) associated with aeromagnetic trend tested by auger drilling. Best values Cu 140 ppm Pb 260 ppm.

No significant base metal anomaly found.

COMMENT: See also Env. 1856.

COMPANY: CARPENTARIA EXPLORATION CO. PTY LTD

TENEMENT: EL 218 OPEN FILE

ENVELOPE: 2687

1:250 000 SHEETS: KIMBA, WHYALLA

TARGET: Base metal mineralisation within Hutchison Group metasediments, viz. BIF horizons and amphibolites.

AGE/ROCK UNITS: Early Proterozoic, Hutchison Group, Gawler Craton.

EXPLORATION SUMMARY: Geological mapping, rock-chip, water bore, soil and biological geochemistry, aerial and ground magnetic surveys, evaluation of LANDSAT imagery, detailed grids at Campoona and Yadnarie areas, 207 drag holes and 4 percussion drillholes (total 434 m).

MINERALISATION/PROSPECTS:

Campoona grid: soil samples, rock-chip, 207 drag-drill holes and 230 hand auger holes delineated 2 Cu anomalies and 2 Pb anomalies (spot anomaly 7 000 ppm Pb). 4 percussion drillholes were sited to test the geochemical anomalies:

Best values:

PDH/C1	15.3 m	0.46% Pb
	7.6 m	0.35% Pb
	10.6 m	0.32% Pb

within chert-bearing schist - average pyrite values 3-10%.

PDH/C2	6.1 m	0.51% Pb
	18.3 m	0.21% Zn

within chert-bearing schist + metasiltstone - average pyrite values 7 - 15%.

PDH/C3 - abandoned.

PDH/C4	7.5 m	0.19% Cu
	10.5 m	0.38% Cu
	67.1 m	0.22% Pb
	Zn <1 000 ppm	

within chert-bearing schist.

COMMENT: See also G12.

COMPANY: CARPENTARIA EXPLORATION CO. PTY LTD

TENEMENT: EL 67 OPEN FILE

ENVELOPE: 2296

1:250 000 SHEETS: KIMBA, WHYALLA

TARGET: Base-metal deposits, within the Hutchison Group metasediments, viz. BIF horizons.

AGE/ROCK UNITS: Early Proterozoic, Hutchison Group, Gawler Craton.

EXPLORATION SUMMARY: Geological mapping, rock-chip and auger soil sample geochemistry, ground magnetic survey, detailed grids at Campoona, Mangalo and Yadnarie areas, 4 percussion drillholes - 434 m total.

MINERALISATION/PROSPECTS:

1) Campoona C1/C2 grids: 230 auger soil samples collected. Anomalous Pb-Zn values tested with 4 percussion drillholes (total 434 m) within micaceous schists and haematite-bearing quartzite. Best intersections:

PDH/C1 -	7.6 m	0.58% Pb
	7.6 m	0.35% Pb
	10.7 m	0.34% Pb
PDH/C2 -	6.1 m	0.51% Pb
	18.3 m	0.21% Zn
PDH/C3 -	abandoned.	
PDH/C4 -	10.7 m	0.38% Cu
	67.1 m	0.22% Pb

2) Mangalo grid: 182 auger soil samples collected. No significant anomalies: Best values 180 ppm Pb, 250 ppm Cu, 190 ppm Zn.

3) Yadnarie grid: 21 soil samples taken from Simms and Bradley Cu mine area. No significant results.

COMMENT: See also G11.

COMPANY: CARPENTARIA EXPLORATION

TENEMENT: EL 218 OPEN FILE

ENVELOPE: 2732

1:250 000 SHEET: KIMBA, WHYALLA

TARGET: Base metal deposits associated with Hutchison Group metasediments.

AGE/ROCK UNIT: Early Proterozoic, Hutchison Group, Gawler Craton.

EXPLORATION SUMMARY: Geological mapping, rock-chip, soil and bore water geochemistry, evaluation of aeromagnetic data, detailed grid at Mangalo area, with auger drilling and ground magnetic surveys.

MINERALISATION/PROSPECTS:

No significant mineralisation in Mangalo grid area. Best values Zn 550 ppm, Pb 1200 ppm, Cu 840 ppm.

Old workings, including Calcookara and Yalpoudnie mines - Cu, Pb, Ag within minor veins and lenses.

COMPANY: CRA EXPLORATION PTY LTD

TENEMENT: EL 286 OPEN FILE

ENVELOPE: 2966

1:250 000 SHEETS: KIMBA, WHYALLA

TARGET: Base metal, sulphide deposits within Hutchison Group metasediments, particularly Mr. Shannan Iron Formation.

AGE/ROCK UNITS: Early Proterozoic, Hutchison Group Gawler Craton.

EXPLORATION SUMMARY: Review of previous exploration by Pacminex at Yeldulknie. Bedrock sampled by RAB and auger drilling and rock-chip sampling (1496 samples), 7 costeans total 533m in Mt. Shannan South prospect, stream sediment sampling.

MINERALISATION/PROSPECT:

1) Mt. Shannan South prospect: 400 x 300m zinc anomaly delineated by 7 costeans in Mangalo Creek mine area, within micaceous and amphibolitic Mangalo Schist, best value Zn <1000 ppm.

2) Yeldulknie area: stream sediment sampling delineated 2 anomalies, a zinc anomaly to the west and a lead anomaly to the east of the Mangalo Road. Pacminex tested the anomalies with six diamond drillholes; ZN1-5 and PB-1. Best Zn intersection in ZN-1, 10 metres at 0.15% Pb, 0.7% Zn and 5 ppm Ag. No significant mineralisation in PB-1 (best values 800 ppm Pb).

COMMENT: See also G9.

COMPANY: CRA EXPLORATION PTY LTD / SHELL CO. OF AUSTRALIA LTD (Joint Venture).

TENEMENT: ELs 485 (876/1182), 877 OPEN FILE

ENVELOPE: 3541

1:250 000 SHEETS: KIMBA, WHYALLA

TARGET: Broken Hill - Aggeneys - style stratiform base-metal sulphide deposits within Hutchison Group metasediments and Au mineralisation in chemical sediments.

AGE/ROCK UNITS: Early Proterozoic, Hutchison Group, Gawler Craton.

EXPLORATION SUMMARY: Soil, stream sediment and rock-chip geochemistry, airborne EM input and magnetic surveys, geological mapping, SIROTEM survey, 40 RAB holes total 441 m detailed grids at Silver Monarch, Iragie and Campoona areas.

MINERALISATION/PROSPECT:

1) Silver Monarch grid: old workings ("Silver Monarch mine"), geochemically anomalous Mangalo Schist and amphibolite tested by diamond drilling (DDH SS1) - minor sulphides in schist and amphibolite - best intersection 2m at 1.75% Zn, 0.1% Pb. Mine pits - best rock-chip analysis 1.45% Zn, 5400 ppm Pb, 1 g/t Ag.

   Sirotem anomaly tested with percussion drilling (PDH SM1) - abandoned at 96m.

2) Iragie Prospect: test Sirotem anomaly with percussion drilling (PDH IR-1) - 238m :- Mangalo schist with <2% pyrite. Best intersection: 2m at 1.18% Zn, 3040 ppm Pb.

3) Campoona grid: detailed mapping and auger drilling of Zn-Mn-Ba-Cu anomaly - best value 1080 ppm Zn.

OLD WORKINGS:

Elson mine	- Ag, Pb
Poonana mine	- Pb, Ag, Cu
Silver Monarch mine	- Pb, Zn, Ag
Yadnarie mine	- Cu
Sims and Bradley mine	- Cu
Emu Plain mine	- Cu

COMPANY: CRA EXPLORATION PTY LTD

TENEMENT: EL 285 OPEN FILE

ENVELOPE: 2965

1:250 000 SHEET: KIMBA

TARGET: Base metal sulphide deposits in Hutchison Group metasediments, viz. BIF horizons.

AGE/ROCK UNITS: Early Proterozoic, Hutchison Group, Gawler Craton.

EXPLORATION SUMMARY: Geological mapping, costeaning, rock-chip sampling, aeromagnetic and radiometric surveys, SIROTEM survey, 1242 RAB drillholes - total 8733 m, detailed grids at Campoona and Sugarloaf Hill areas.

MINERALISATION/PROSPECTS:

1) Campoona grid: RAB drilling targeted over haematitic quartzite + schist + amphibolite horizons delineated by rock-chip samples. Best values

Pb 9080 ppm)
Zn 3100 ppm) between 123 & 140 m
Cu 2470 ppm)

Previous percussion hole by Carpentaria

123.4 m - best intersections

15.3 m at 0.46% Pb)
7.6 m at 0.35% Pb) between 123 &140m
10.6 m at 0.32% Pb)

best zinc value 2000 ppm.

2) Sugarloaf Hill: Rock-chip sampling and RAB drilling: best values

430 ppm Pb
860 ppm Zn
1020 ppm Cu

COMPANY: Carpentaria Exploration Co. Pty Ltd.

TENEMENT: EL 458

ENVELOPE: 3509 OPEN FILE

1:250 000 SHEET: KINGOONYA

TARGET: Base of Pandurra Formation where onlaps Tarcoola Formation or Gawler Craton crysalline basement.

AGE/ROCK UNITS: Middle Proterozoic Tarcoola Formation, Gawler Range Volcanics. (Pandurra Formation not intersected).

EXPLORATION SUMMARY:

1) Four percussion drillholes, totalling 878 m (BB1-4). Near Bon Bon Homestead
2) All holes radiometrically logged.
3) Analysis for Cu, Pb, Zn every metre
4) Petrology, BB2
5) Rock chip sampling for Au.

MINERALISATION/PROSPECTS

Maximum values in cuttings (ppm): 120 Cu, BB4; 410 Pb, BB4; 340 Zn, BB2.

DRILL SAMPLE STATUS: BB1 - BB4

COMPANY: Carpentaria Exploration Co. Pty Ltd

TENEMENT: EL 390

ENVELOPE: 3236 OPEN FILE

1:250 000 SHEET: KINGOONYA

TARGET: Presumably uplifted basement in "domal uplift" zones.

AGE/ROCK UNITS: Eromanga Basin: Cretaceous Bulldog Shale, Cadna-owie Formation
Arckaringa Basin: undifferentiated Permian
Stuart Shelf: Late Proterozoic Tregolana Shale, Middle Proterozoic Pandurra Formation.

EXPLORATION SUMMARY:

1) Analysis of cuttings from 5 wells and bores for Cu, Pb, Zn, Ag.
2) Geomorphological study using LANDSAT imagery and aerial photographs: identification of possible domal uplift areas.
3) Ground magnetic/gravity traverses over "domal uplifts"
4) Three rotary-percussion holes (PDH Eba 1 - 3).
5) Analysis of cuttings for Cu, Pb, Zn. Downhole gamma logs.
6) Palynological examination of Permian shale in Eba 3 (Early Permian).
7) Salinity analysis of groundwater in drillholes.

MINERALISATION/PROSPECTS:

Maximum values in cuttings (ppm): 170 Cu, Eba 1; 90 Pb, Eba 2; 320 Zn, Eba 3 (except for ?spurious values of 1450 and 2250 Zn, Eba 2).

DRILL SAMPLE STATUS Eba 1 - Eba 3

COMPANY: Shell Company of Australia Ltd.

TENEMENT: EL 774

ENVELOPE: 4113 OPEN FILE

1:250 000 SHEET: KINGOONYA

TARGET: Olympic Dam Cu-U-Au in pre Adelaidean basement.

AGE/ROCK UNITS: Cambrian: Andamooka Limestone
Late Proterozoic (Adelaidean) :
Woomera Shale
Nuccaleena Formation

Pre-Adelaidean: Pandurra Formation
Dyke/sill (feeders to Beda Volcanics)

EXPLORATION SUMMARY:

1) Semi-regional gravity survey, computer modelling of gravity data.
2) Reconnaissance ground magnetic traverses.
3) One diamond drill hole to test gravity anomaly (DDH RL-1) to depth of 674.4m.
4) Downhole geophysical logging; S.G., spectrometer and magnetic susceptibility measurements on core.
5) Core analysed for Cu, Pb, Zn, Ag, Au, U.
6) Bulked sample of Beda Volcanics ?sill analysed for 36 elements.
7) Heavy mineral separation of precollar sediments.
8) Petrology of basic dyke.
9) Further modelling suggests magnetic/gravity anomaly due to thickening of dyke or several dykes.

MINERALIZATION/PROSPECTS Reedy Lagoon Area

Maximum values in core (ppm): 180 Cu; 55 Pb; 370 Zn; 2 Ag; <0.05 Au; 20 U.

DRILL SAMPLE STATUS:

DDH RL-1

COMPANY: PACMINEX PTY LTD

TENEMENT: S.M.L. 666

ENVELOPE: 1959 OPEN FILE

1:250 000 SHEET: LINCOLN

TARGET: Pb, Zn, Cu mineralisation in schists 1500 m stratigraphically below iron formations.

AGE/ROCK UNIT: Cook Gap Schist in Hutchison Group, Early Proterozoic, Gawler Craton.

EXPLORATION SUMMARY: Soil Geochemistry & Auger Sampling.

MINERALIZATION/PROSPECTS:

1) 3.2 km south of Mt Hill Railway Siding. Auger sampling detected a Pb (1800ppm) Zn (710ppm) and Cu (640ppm) geochem. anomaly. No further work was carried out.

COMPANY: C.R.A. EXPLORATION PTY LTD.

TENEMENT: E.L. 276 (Pillawarta Hill)

ENVELOPE: 3206 OPEN FILE

1:250 000 SHEET: LINCOLN

TARGET: Base metal sulphide associated with BIF's.

AGE/ROCK UNIT: BIF within Hutchison Group, Early Prot, Gawler Craton.

EXPLORATION SUMMARY: Rock chip sampling, one DDH 57 m.

MINERALISATION/PROSPECTS:

1) Koppio Graphite Mine: Anomalous Zn (sample 636956, 1430ppm) in graphitic schist in DDH1 at 57 m. no other anomalous results.

COMPANY: R.D. & A.C. Drayton - P.J. Baille

TENEMENT: S.M.L. 72

ENVELOPE: 2786 OPEN FILE

1:250 000 SHEET: LINCOLN

TARGET: Pb, Ag & Zn at Lady Fanklin Pb-Zn mine.

AGE/ROCK UNITS: Early Proterozoic Hutchison Group, Gawler Craton.

EXPLORATION SUMMARY: Ground magnetics, geochemical survey.

MINERALISATION/PROSPECTS:

LADY FRANKLIN MINE surface geochem sampling a small anomaly Pb (250 ppm) & Zn (500 ppm) over the area of the mine.

COMPANY	C.R.A. Exploration Pty. Ltd.
TENEMENT	E.L. 1154
ENVELOPE	5247 OPEN FILE
1:250 000 SHEET	LINCOLN
TARGET	Base metals in Gawler Craton.
AGE/ROCK UNITS	Early Proterozoic. Warrow Quartzite-Hutchison Group.
EXPLORATION SUMMARY	Stream sediment sampling, ground magnetics, gravity, I.P., percussion, R.A.B. drilling, diamond drilling.

MINERALISATION/PROSPECTS

Lady Franklin Mine Disseminated galena, chalcopyrite, sphalerite, pyrite mineralisation at contact of dolomitic marble and dolomitic phyllite overlying quartzite. 140 RAB holes and 8 percussion holes. Best intersection 83WP3 - 14 m with Pb 1614 ppm, Zn 882 ppm, Ag 3.7 ppm. Overall geochem. values disappointing.

COMMENT: Drilling of other magnetic and I.P. anomalies in stratigraphically similar positions found no significant geochemical values.

COMPANY: AUSTRALIAN ANGLO AMERICAN LTD.

TENEMENT: E.L. 106

ENVELOPE: 2378 OPEN FILE

1:250 000 SHEET: LINCOLN

TARGET: Base metal sulphides associated with airborne EM anomalies.

AGE/ROCK UNITS: Early Proterozoic Hutchison Group, Gawler Craton.

EXPLORATION SUMMARY: Airborne EM survey to delineate anomalies, Auger soil sampling, limited rock chip sampling, 17 shallow percussion holes.

MINERALISATION/PROSPECTS:

1) BURRAWING MINE Small copper mine in probable Cook Gap Schist & Quartzite bounded to the east by chert & brecciated dolomite - probably hydrothermal deposit. Low Zn (max 180ppm) and Pb (max 40ppm).

2) ANOMALY HH slightly anomalous Zn (max. 410 ppm) in BIF with interbedded graphitic schist & carbonaceous shales.

3) ANOMALY XX Slightly anomalous Pb (max 260ppm), Zn (max 390ppm) in a well defined iron formation horizon at the contact with a possible rhyolitic tuff and meta-arkose.

COMPANY: C.R.A. EXPLORATION PTY LTD.

TENEMENT: E.L. 276

ENVELOPE: 2926 OPEN FILE

1:250 000 SHEET: LINCOLN

TARGET: Base metal sulphides associated with quartz-haematite and magnetite BIF horizons.

AGE/ROCK UNITS: BIF's within the Early Proterozoic Hutchison Group, Gawler Craton.

EXPLORATION SUMMARY: Rock chip sampling of BIF's and surrounding units, 3 Percussion holes total 320.5 m, 4 RAB holes total 94 m, re-examination of previously drilled diamond holes.

MINERALIZATION/PROSPECT:

1) WATERFALL GULLY Anomalous Zn associated with a cellular gossanous horizon within a dolomite unit. Zn up to 3380 ppm, Pb <50ppm. Anomalous Zn associated with anomalous Mn values up to 9000ppm. One sample of vughy epidote quartzite adjacent to an iron formation contained 1940 ppm Pb, Ag<1ppm.

2) BOSSOM GULLY 550 ppm Pb, 510 ppm Zn in a ferruginous laterized capping, representing the iron formation.

3) KOPPIO GRAPHITE MINE. 2430 ppm Zn from diamond drillhole sample of graphitic schist, Pb <50 ppm at depth of 57 m. (Sample 636956).

COMPANY: AFMECO PTY LTD

TENEMENT: E.L. 578

ENVELOPE: 3776 OPEN FILE

1:250 000 SHEET: LINCOLN

TARGET: Base metal sulphides and uranium.

AGE/ROCK UNITS: Hutchison Group metasediments, Early Proterozoic, Gawler Craton.

EXPLORATION SUMMARY: Airborne magnetic and radiometric survey with follow up ground magnetics and radiometrics, soil sampling. 153 RAB drill holes totalling 4007.5 metres over 6 prospective areas at Koppio, Pillawarta Hill, Marble Range and White Flat.

MINERALIZATION/PROSPECTS:

1) AREA 1 - Koppio 1 RAB holes KA1-KA36

KA4 - 290 ppm Zn
KA32 - 190 ppm Zn

2) AREA 2 - Koppio 2 RAB holes KB1-KB18

KB3 - 215 ppm Zn
KB9 - 190 ppm Zn

3) AREA 3 - Pillawarta Hill PIL1-PIL40

PIL 18 - 275 ppm Zn 130 ppm Pb
PIL 22 - 435 ppm Zn 20 ppm Pb

4) AREA 4 - White Flat WHF1 - WHF24

WHF 2 - 300 ppm Zn
WHF 8 - 380 ppm Zn
WHF 9 - 350 ppm Zn
WHF18 - 515 ppm Zn

COMPANY: PACMINEX PTY LTD & PECHINEY (AUST.) EXPLORATION PTY LTD

TENEMENT: S.M.L. 354

ENVELOPE: 1264 OPEN FILE

1:250 000 SHEET: LINCOLN

TARGET: Base metal sulphides

AGE/ROCK UNITS: Hutchison Group metasediments, Early Prot, Gawler Craton.

EXPLORATION SUMMARY: Stream sediment sampling, rock chip sampling auger soil sampling, airborne magnetometer & spectrometer survey, ground magnetics, E.M., ground radiometrics, self potential.

MINERALIZATION/PROSPECTS:

1) Sunny-Brae: 2 km north of Salt Creek. Anomalous stream sediment samples Cu 1100, ppm, Zn 5600 ppm & Pb 135 ppm; this was followed up by ground mag, self potential, E.M. & radiometrics to delineate possible targets but no further work carried out.

COMMENT: See also G28.

COMPANY: PECHINEY (AUST) EXPLORATION PTY LTD

TENEMENT: S.M.L. 651

ENVELOPE: 1856 OPEN FILE (continued from Env 1264)

1:250 000 SHEET: LINCOLN

TARGET: Base metal sulphides

AGE/ROCK UNITS: Hutchison Group metasediments, Early Proterozoic, Gawler Craton.

EXPLORATION SUMMARY: Auger sampling, one diamond drillhole (SB1) to 103 m depth.

MINERALIZATION/PROSPECTS:

1) Sunny-Brae: Analysis of DDH SB1 showed no anomalous Pb or Zn.

2) Butler Tanks magnetic trend: Auger soil sampling produced one anomalous Pb (540 ppm) sample.

COMMENT: See also G27.

COMPANY: SADME

AUTHOR: R.K. JOHNS

BULLETIN: No. 37

1:250 000 SHEETS: LINCOLN, WHYALLA, KIMBA

SUMMARY: Reports on metallic deposits in the Cleve and Lincoln Uplands.

AGE/ROCK UNITS: All deposits are within Hutchison Group metasediments, Early Proterozoic, Gawler Craton.

MINERALISATION/PROSPECTS:

CLEVE UPLANDS

1) Miltalie Mine (Pb, Ag, Cu)

Lode in schist near contact with dolomite. Assays up to 40.8% Pb and 1 oz Ag/ton. Three diamond holes failed to intersect continuation of ore lode below the mine (120 ft).

2) Atkinson's Mine (Ag, Pb)

Lode at interface between mica schist and dolomite. Assays up to 2228 oz Ag/ton; 58.3% Pb; and 3.4% Cu.

3) Yalpoudnie Mine (Cu, Pb)

Lode at interface between schist (graphitic in part) and quartz-feldspar gneiss.

Assays up to 21% Cu; 14% Pb and 1 oz 8dwt Ag/ton.

4) Mt. Miller Mine (Ag, Pb)

Lode in quartzose gneisses and quartz veined mica schist adjacent to the nose of a domed anticline which is occupied by a thick bed of dolomite. Assays of ore 77% Pb and 14 dwt Ag/ton.

5) Cleve Mine (Pb, Ag)

Mineralized shear in mica schist with dolomite beds stratigraphically above and below. Assays up to 11% Pb and 130 oz Ag/ton.

6) Elson Mine (Ag, Pb)

Mica schists dipping steeply south are hosts to siliceous lode formation up to 3 ft in width which carries thin veins of galena. Assay 34.8% Pb and 4 oz Ag/ton.

7) Poonana Mine (Pb, Ag, Cu)

Lode at interface of quartzite (footwall) and schist. Assays 0-31.6% Cu, 11.1-54.1% Pb and 1 oz 6 dwt - 2oz 6 dwt Ag/ton.

8) Copper Prospect - Hundred of Campoona (Cu, Pb).

Lode in mica schist near interface with pegmatite. Assay 7.6% Pb, 2.3% Cu, and 4 dwt Ag/ton.

9) Otner reported deposits.

Wicklow Hut - veins of galena with 1.5 oz Ag/ton.
Yeldulknie Weir - reports of galena veins in pegmatite
Mangalo Ck. - thin veins of galena (little Ag) in mica schist.
Darke Peak - Ag/Pb vein containing 33 oz Ag/ton.

LINCOLN UPLANDS

10) Lady Franklin Mine and Moonlight Mine (Pb, Ag, Au). Lode in phyllitic slates and schists. Assays 22% Pb, 1.5 oz Ag/ton and 12 g Au/ton and traces of copper and zinc.

COMPANY: CRA Exploration Pty. Ltd.

TENEMENT: EL 1062

ENVELOPE: 4979 OPEN FILE

1 : 250 000 SHEET: LINCOLN

TARGET: BIF associated lead-zinc sulphides.

AGE/ROCK UNITS: Lower Proterozoic, Hutchison Group, Gawler Craton.

STRUCTURAL CONTROL: Unknown

EXPLORATION SUMMARY: Compilation of basement geology and Tertiary thickness from water bore data, study of regional magnetic data, ground magnetic and SP surveys, 6 reverse circulation drill holes total 364 m.

MINERALISATION/PROSPECTS:

(1) Rifle Range grid: Elevated zinc (24 m at 233 ppm) and copper (44 m at 190 ppm) values intersected in drill hole 83MURC2 associated with iron-rich and manganiferous sediments overlying Hutchison Group rocks. 'May represent a secondary dispersion halo from a base metal accumulation.' Followup recommended but not undertaken.

(2) M-2 prospect: Magnetic anomaly not followed up. Access for drilling was denied by Engineering and Water Supply Department.

DRILL SAMPLE STATUS: 83 MUR C 1-6.

COMPANY: ABERFOYLE EXPLORATION PTY. LTD.

TENEMENT: EL 1193

ENVELOPE: 5249 (Vol. 1-2)

1 : 250 000 SHEET: PORT AUGUSTA, WHYALLA

TARGET: Both shale-hosted and B.I.F. - amphibolite lead-zinc ore environments.

AGE/ROCK UNITS: Lower Proterozoic, Hutchison Group, Gawler Craton.

STRUCTURAL CONTROL: Major faulting (inferred NW and NNW trending faults/lineaments), euxinic "black shale" sub-basins.

EXPLORATION SUMMARY: Review of past exploration data, regional geological mapping and sampling. Detailed work over the Iron Queen and Katunga Hills grids which included geological mapping (1 : 5 000 scale), rock chip sampling, ground magnetic, UTEM and CSAMT surveys and 3 drill holes (aggregate 538 m).

MINERALISATION/PROSPECTS:

(1) Katunga Prospect. Remains uncertain whether the target Lower Middleback Jaspilite - Katunga Dolomite transition zone was effectively drill tested. Previous SADME holes at Katunga Hill (DDH 1 & 2) intersected massive iron sulphides.

DRILL SAMPLE STATUS: KH PD 1
1Q PD 1-2

COMPANY: The Shell Company of Australia Ltd.

TENEMENT: EL 1031

ENVELOPE: 4994 (Vol. 1 - 4)

1 : 250 000 SHEET: PORT AUGUSTA

TARGET: Base metal sulphide deposits in meta-sediments, viz. magnetic chert, BIF and amphibolite associations e.g. Broken Hill (N.S.W.) Aggeneys - Gamsberg (S. Afr.)

AGE/ROCK UNITS: Lower Proterozoic, Hutchison Group Gawler Cratron.

STRUCTURAL CONTROL: Anticlinal and synclinal accumulations possible associated faulting.

EXPLORATION SUMMARY: Evaluation of aerial magnetic data, geochemical sampling, geological mapping, ground magnetic traverses, Sirotem surveys, 76 RAB holes total 1670 m, 2 percussion holes total 800m, detailed grids at Triumph, Wartaka and Morgan areas.

MINERALISATION/PROSPECTS:

(Triumph Prospect: old working ('Twin Pits'), geochemically anomalous BIF lithologies, Sirotem anomalies tested by percussion drilling (PDH HB1 and HB2), mainly pyritic black shales with minor lead-zinc mineralisation encountered in dolerite, best intersection PDH HB2: 78-80 m, 2 m at 0.26% Pb and 0.6% Zn. Magnetic host sediments occur either side of a major GRV dyke and may represent magnetic BIF units within Hutchison Group metasediments or magnetic-bearing hybrid or contact developed lithologies.

DRILL SAMPLE STATUS: RHB 1 - 69
RTP 1 - 7
PDH HB 1 - 2

COMPANY	SAMEDAN Oil Corporation; Esso Australia Ltd.
TENEMENT	EL 1041, 398, 692
ENVELOPE	3292 OPEN FILE
1:250 000	PORT AUGUSTA
TARGET	Olympic Dam type Cu/U mineralisation associated with igneous activity around the Roopena Fault.
AGE/ROCK UNITS	Mid Proterozoic 'Fresh Well formation' (Gawler Range Volcanics/Corunna Conglomerate equivalent? Early Proterozoic (?) 'Mt Laura formation' & Moonabie Formation.
EXPLORATION SUMMARY	Ground magnetics, gravity, I.P. surveys. Soil, stream sediment, rock chip sampling. Diamond drilling (14 holes), percussion drilling (19 holes), RAB drilling (1433 holes).

MINERALISATION/PROSPECTS

'Fresh Well Prospect' & '1050 Prospect'. Chalcopyrite and galena mineralisation first found in area in SADME Roopena diamond drillholes. Company exploration began with RAB drilling of magnetic anomalies. Diamond and percussion holes found stratabound Pb/Zn/Ag and Cu/Pb/Ag/Co in flatlying carbonaceous shale and volcanoclastic sandstone ('Fresh Well formation') and Cu/Ag in 'Mt Laura Formation' sediments and altered (hematite, silica, chlorite, carbonate) breccia at contact with Moonabie Formation(?) Mineralisation is both disseminated and associated with quartz/carbonate veining. 'Fresh Well formation' deposited unconformably on 'Mt Laura formation' and Moonabie Formation in grabens east of the Roopena Fault.

Best intersections: DDH ROD2 4 m at 49.5 ppm Ag
ROD3 1 m at .82% Pb, .63% Zn
ROD4 0.4m at 8.8% Cu, 2.8% Zn, 4 ppm Ag
PH FW1 4 m at 2.2% Cu, 51 ppm Ag

COMMENTS: Although mineralisation located is uneconomic, the styles of mineralisation present and the association with the Roopena Fault and graben development (?) is of particular interest. Reappraisal of geophysics required.

COMPANY: ASARCO (AUSTRALIA) PTY LTD

TENEMENT: SML NO. 306 LAKE GILLES (GAWLER CRATON)

ENVELOPE: 1163

1:250 000 SHEET: PORT AUGUSTA

GE/ROCKTYPES: 4 Gossans in SML 306 of L. Proterozoic Age.

EXPLORATION SUMMARY:
Aerial reconnaissance, photo interpretation followed by field mapping, trenching, magnetic and electromagnetic surveys and geochemical rock samples of iron rich outcrops. Drilling.

MINERALISATION:
Rock chip samples -
Max. Zn 3500, 3000, 1300 ppm - Gossans. Rest were below 400 ppm Zn.
Max Pb, 1000, 880 ppm.

Drilling-Zn : 700 ppm Max
Pb : 600 ppm "

COMPANY: ASARCO (AUS)

TENEMENT: SML 340

1:250 000 SHEET: PT. AUGUSTA (Gawler Craton) Margoon Dam 50 km W of Iron Knob.

ENVELOPE: 1199

TARGET: Metals in an alteration zone interpreted from aerial photographs.

ROCKTYPES/AGE:
Cleve Metamorphics, Corunna Conglomerate and Gawler Range Volcanics-Middle Proterozoic (Carpentarian).

EXPLORATION SUMMARY:
Base metal mineralisation. Geochemical sampling (111 samples) from fieldwork based on aerial photography and mapping. Plus 114 Rock chip samples.

MINERALISATION:
Anomaly B Resampling produced
Cu : 150 ppm
Pb : 3500 ppm
Zn : 460 in the Fe rich part of the iron
Metaquartzites much lower in quartzite.

Anomaly C.
75 ppm Cu
4400 ppm Pb
7000 ppm Zn

COMMENT: Mineralisation occurs in metaquartzites altered hydrothermally but appears to be of limited size.

COMPANY: NORANDA AUSTRALIA LTD.

TENEMENT: SML 499 (Lake Dutton)

ENVELOPE: 1541

1:250 000 SHEET: PT. AUGUSTA, TORRENS

TARGET: Base metal mineralisation close to Pernatty Culmination; 7 drillholes.

ROCKTYPES: Dolomitic Shale (Whyalla Sandstone) above Pandurra Formation contact.

EXPLORATION SUMMARY:
Seven drillholes based on an earlier exploration program to test for base metal mineralisation near Pernatty Culmination on fault zones looking for hydrothermal deposits.

MINERALISATION:
Hole LD3 south of Lake Blyth up to 1% zinc over a 8 ft zone at approx. 600 ft. Disseminated ZnS and microscopic PbS.

Hole LD3

Highest Zn	.9%	593'4" - 593'10"
	1%	613'2" - 613' 5"
	1%	616'8" - 617'0"

Other holes showed mineralisation to a lesser extent.

COMPANY: AUSTRALIAN SELECTION PTY LTD

TENEMENT: EL 187, EL 329 (URO BLUFF)

ENVELOPE: 2585 see also 3072

1:250 000 SHEET: PT AUGUSTA

TARGET: Base metal mineralisation, emphasis on Cu

EXPLORATION: Geological Mapping, Percussion Drilling and Diamond Drilling and Assay.
Percussion : 16 drillholes
Diamond : 5 "

AGE/ROCK TYPES:
Adelaidean sediments, Tapley Hill Formation.

MINERALISATION:
Several holes showed base metal mineralisation the best Pb/Zn being in PUB-6

Sample (PUB-6)	Pb	Zn in (ppm)	Depth
-	600	1850	68m (2 m)
-	1000	670	70m (2 m)
-	2000	1050	76m (2 m)

Mineralisation is confined to base of Tapley Hill Formation.

The SAO series of diamond drillholes show anomalous lead and zinc as listed in the following table.

Hole No.	From (metres)	To	Thickness (m)	Cu %	Zn %	Pb %	Co %	Ag ppm
SAU-24	145.30	145.60	0.26	-	0.02	0.45	-	2
	145.60	147.58	2.02	0.43	0.02	-	-	5
	147.58	147.91	0.33	0.29	0.04	-	-	9
SAU-25	118.46	118.88	0.42	0.03	0.15	1.53	-	-
	118.88	119.57	0.69	0.10	0.03	0.12	-	-
	119.57	120.58	1.01	0.21	0.02	0.03	-	-
SAU-26	214.11	214.82	0.71	-	0.01	0.82	-	6
	214.82	215.20	0.38	0.15	0.05	0.41	-	10
	215.20	216.64	1.44	0.29	-	-	-	7
	216.64	217.08	0.44	0.40	0.06	0.04	-	9
	217.08	217.57	0.49	0.76	0.07	-	-	15
	217.57	217.98	0.41	0.36	0.01	-	0.05	7
SAU-28	154.30	155.03	0.73	0.43	-	-	-	2
	155.03	155.48	0.45	0.95	0.23	0.05	-	11
	155.48	155.80	0.32	0.26	0.67	0.15	-	9

COMPANY: AUSTRALIAN SELECTION PTY LTD

TENEMENT: EL 212 (Also EL 374)

ENVELOPE: 2658, CULTANA (also 3201)

1:250 000 SHEET: PT AUGUSTA

TARGET: Base metals - Cu, Pb, Zn.

AGE/ROCKTYPE: Adelaidean; Tapley Hill Fm.

EXPLORATION: Geological Mapping, Percussion Drilling (3) and Diamond Drilling (1) and percussion holes levelled.

MINERALISATION:

Cu 400 ppm and Zn 200 ppm in PFB 1 & 2.
SAC-1 Pb up to 1180 ppm)
Zn 900 ppm)184-196 m
900 ppm

Cu 1.05% in one sample. Base of Tapley Hill Fm at 29 m in SAC-1 (same location as PFB-1)

COMMENT: mineralisation significant. Has some potential.

COMPANY: AUSTRALIAN SELECTION PTY. LTD.

TENEMENT: EL 329 URO BLUFF

ENVELOPE: 3072

1:250 000 SHEET: PT. AUGUSTA

TARGET: Base metal mineralisation

ROCK/AGE: Basal Tapley Hill Fm and Pandurra Fm

EXPLORATION: Mapping, Magnetics, Gravity and drilling

DRILLING: a. PUB-52 Cu 390 Zn 105 Pb 105
(50-56m) Cu 4200 Zn 150 Pb 105
Cu 7000 Zn 5300 Pb 1350

b. PUB 54

	Cu	Zn	Pb (ppm)
140-146 m	55	2070	780
146-148 m	90	6700	2330
148-154 m	400	1200	2370
154-158 m	2420	1000	550
158-164 m	950	2900	550

Low grade Cu mineralisation at Myall Ck

COMPANY: AUSTRALIAN SELECTION PTY. LTD.

TENEMENT: EL 421 Tregolana - Sugarloaf Hill

ENVELOPE: 3410

1:250 000 SHEET: PT AUGUSTA

TARGET: Base Metal Mineralisation

ROCKS/AGE: Basal Tapley Hill Fm (Adelaidean)

DRILLING: PSH 2 (percussion)

	Cu	Zn	Pb (ppm)
174-176 m	100	1360	1020
176-178 m	100	1400	1040
178-180 m	730	230	310

PSH 3 no mineralisation

COMPANY: WYOMING MINERALS CORP/ESSO EXPLORATION

TENEMENT: E.L. 391,637. 'AROHA' GAWLER CRATON, LAKE GILLES, CORUNNA.

ENVELOPE: 3279 Vols I - VII

1:250 000 SHEET: PT AUGUSTA

TARGET: Uranium and Base Metals in carbonaceous pelitic and carbonate rock of Cleve Metamorphics near unconformity.

ROCKS/AGE: Cleve Metamorphics and Corunna Conglomerate

STRUCTURE: Unconformably overlying Cleve M/M are sandstone, conglomerate and rhyolite of Carpentarian Age. A granite with high uranium content is exposed. Analogy with Alligator River.

EXPLORATION SUMMARY:
Extensive Airborne Radiometre Survey - Spectrometer Survey, Geological Mapping - Geochem sampling of G.R.V. and Burkitt Granite, Percussion and Diamond Drilling

MINERALISATION: S.A.D.M.E. Corunna Drillhole, DDH 1

Depth	Pb	Zn
95 m	.19%	.15%
104 m	.15%	.15%
133 m	.17%	680 ppm

COMMENT: None of the anomalies in the granite or volcanics, although containing uranium values up to 50 ppm, showed potential for economic mineralisation.

COMPANY	BP Mining Development Aust. Pty. ltd.
TENEMENT	E.L. 413
ENVELOPE	3339 OPEN FILE
1:250 000 SHEET:	TALLARINGA, BARTON
TARGET	Company: Mainly U mineralisation in Tertiary sediments in Palaeochannels. This study: Mineralisation in basement rocks along Karari Fault.
AGE/ROCK UNITS	Archaean-Early Proterozoic Mulgathing Complex.
EXPLORATION SUMMARY	48 Rotary drillholes, total depth 3213 m. Holes logged for gamma radiation, self potential and resistivity. 59 samples from 30 drillholes that intersected basement analysed for Cu, Pb, Zn, Ni. Carborne radiometric survey.

MINERALISATION/PROSPECTS

WLR-35
Anomalous Pb (max. 260 ppm) and Zn (max 450 ppm) in gneiss, granite and chlorite schist. In vicinity of Karari Fault.

COMPANY	PNC Exploration (Aust.) Pty. Ltd.
TENEMENT	EL 1223
ENVELOPE	5528 OPEN FILE
1:250 000	TARCOOLA
AGE/ROCK UNITS	Mid Proterozoic. Gawler Range Volcanics - Carnding Rhyodacite.
EXPLORATION SUMMARY	Gravity survey. Airborne radiometric and magnetic survey. I.P., geological mapping and rock chip sampling of grid areas. Stream sediment sampling. One percussion drillhole.

MINERALISATION/PROSPECTS

Minor Pb/Zn/Ag/Ba mineralisation in siliceous and chloritic shear zone in Carnding Rhyodacite. Surface rock sample of brecciated, garnetiferous and pyritic rock contained 1 350 ppm Pb, 1 900 ppm Zn, 10 ppm Ag, 3 000 ppm Ba. Nearby percussion drillhole B1 to 56 m - best intersections: 2 m at 660 ppm Pb, 395 ppm Zn, 5 ppm Ag; at 12m and 2 m at 720 ppm Zn, 2 ppm Ag at 20m depth.

COMMENT: Mineralisation very minor but suggests some potential for shear zones in Gawler Range Volcanics.

COMPANY: ABADON HOLDINGS N.L.

TENEMENT: SML 436

ENVELOPE: 1409, 2071

1:250,000 SHEET: TARCOOLA

TARGET: Cu, Pb, Zn, Au, Sn.

AGE/ROCK UNITS: Archaean, Kenella gneiss, Christie Gneiss, metabasalt.

EXPLORATION SUMMARY:

Reconnaissance mapping, regional mapping of SML area. Detailed geological mapping, ground magnetics, rock chip sampling and electromagnetic surveys of Kenella Rock area. Detailed geological mapping, ground magnetics and rock chip sampling of the Hopeful Hill area (refer also to Env 2071). Reconnaissance mapping and rock chip sampling of East Lake and Mt. Mitchell area.

MINERALISATION/PROSPECTS

Kenella area, 908 rock chip samples, best values:

Pb 1100 ppm, (background 20 ppm)
Cu 650 pm (background 40 ppm)
Zn 2000 ppm (background 30 ppm)

Glenloth area 531 rock chip samples; contain no anomolous values

Hopeful Hill area 531 rock chips samples; no data given - see Envelope 2071

COMPANY: Abadon Holdings N.L.

TENEMENT: EL56

ENVELOPE: 2276

1:250 000 sheet TARCOOLA

TARGET: Cu Pb Zn sulphides and gold associated with banded iron formation and interbanded gneisses.

AGE/ROCK UNITS: Archaean Kenella Gneiss, Christie Gneiss

STRUCTURAL CONTROL:
Mineralisation believed to be in fault zone.

EXPLORATION SUMMARY:
Detailed geological mapping; geophysical surveys - induced polarization, resistivity spontaneous potential; rotary/percussion and diamond drilling - 9 holes totalling 934 m; geochemistry (AAS).

MINERALISATION/PROSPECTS:
Best intersection - diamond drill hole DH 1A

	Pb ppm	Zn ppm	Cu ppm
140.1 - 143.1 m	600	1.8%	250
143.1 - 146.2 m	350	2.1	150
146.2 - 149.2 m	1100	1.0%	400

Best gold value 0.12 ppm (background value .02 ppm)

DRILL SAMPLE STATUS:

Core of DH1A - 9A stored at Glenside

COMPANY: KENNECOTT EXPLORATIONS (AUST.) PTY. LTD.

TENEMENT: SML 491

ENVELOPE 1510 OPEN FILE

1:250 000 SHEETS: TARCOOLA, BARTON

TARGET: Base metal deposits associated with quartz veining and u/mafics within Mulgathing Complex. Emphasis on Ni,Cr.

AGE/ROCK UNITS: Archaean, Mulgathing Complex,

EXPLORATION SUMMARY:

Geological mapping, detailed gridding, auger sampling, percussion drilling, aeromagnetics survey, geochemical analysis.

MINERALISATION/PROSPECTS:

a) Blackfellow Hill grid - auger drilling - best values Cu 220 ppm, Zn 360 ppm.
b) 9200 Ni Anomaly (North eastern end of Skuse Hill)- ultrabasic with best values Cu 110 ppm, Pb 2250 ppm, Zn 50 ppm.
c) 4 Mile Paddock (Durkin Prospect) - auger drilling of aeromagnetic anomaly; best values Cu 150 pm, Pb 70 ppm, Zn 40 ppm.
d) Aristarchus Paddock - auger drilling of weathered ultramafic. Best values, Cu 300 ppm, Zn 500 ppm. No significant base-metal anomalies were found.

COMPANY: ARCHAEAN EXPLORATIONS PTY. LTD.

TENEMENT: SML 505

ENVELOPE: 1557 OPEN FILE

1:250 000 SHEET: TARCOOLA

TARGET: Ag/Au/base metal deposits associated with quartz veining within basement gneisses.

AGE/ROCK UNITS: Mulgathing Complex, (Archean) Tarcoola Formation, Gawler Range Volcanics, (Middle Proterozoic).

EXPLORATION SUMMARY:
Geological mapping, rock-chip and soil-sample geochemistry, VLF - EM geophysical surveys.

MINERALISATION/PROSPECTS:
No significant base metal anomalies were found:
Pinding Rocks: Best values in quartz veins: Cu 1000 ppm, Pb 1200 pm, Zn 5000 ppm.

COMPANY: KENNECOTT EXPLORATIONS (AUST) PTY. LTD.

TENEMENT: SML 261

ENVELOPE: 1131

1:250 000 SHEETS: TARCOOLA, BARTON

TARGET: Base metal deposits in Archaean metasediments and/or intrusive andesites - ultramafics.

AGE/ROCK UNITS: Archaean, Mulgathing Complex. Middle Proterozoic, Tarcoola Formation.

EXPLORATION SUMMARY:
Hand auger drilling, soil sampling, ground magnetics, geochemical analysis.

MINERALISATION/PROSPECTS:
1) Tarcoola Hill mine dump:
Best assays Cu 2900 ppm. - in quartzite
Zn 8.0% - " "
Pb 39% in brecciated quartzite

2) SML 261 - Best values
Cu 350 ppm, Pb 15 ppm, Zn 60 ppm.

COMMENT: Significant base metal concentrations within Tarcoola gold mine area.

COMPANY: SADME

AREA: TARCOOLA 1:250 000 SHEET

Rpt. Bk.: 72/180 MRR 137:112-122

TARGET: Base metals, Ag, Bi, Mo, As - regional survey

AGE/ROCK UNITS: Archaean, Mulgathing Complex, Middle Proterozoic granite.

EXPLORATION SUMMARY:

Geological mapping, outcrop and soil sampling, borehole sampling, geochemical analysis.

MINERALISATION/PROSPECTS:

a) Pinding Rocks prospect: quartz-limonite veins in sheared granites. Best rock-chip values: Cu 800 ppm Pb 8000 ppm, Ag 500 ppm Bi 1500 ppm, W 500 ppm.

b) Mt. Christie - Coates Hill: Anomalous Cu within altered granitic gneiss: Max. 350 ppm.

c) Mulgathing Prospect: Quartz + limonite veins with boxworks in gneissic granite. Best values Cu 350 ppm, Pb 200 ppm, Zn 300 ppm.

d) Muckanippie Gold Prospect: quartz veins within granitic gneiss. Cu 1200 ppm, Pb 20 ppm, Zn 60 ppm.

COMPANY: KENNECOTT EXPLORATIONS (AUST.) Pty. Ltd.

TENEMENT: SML 333

ENVELOPE: 1375 OPEN FILE

1:250 000 SHEETS: TARCOOLA, BARTON

TARGET: Base metal and Ni deposits associated with metamorhposed ultramafic bodies intruding adjacent to BIF.

AGE/ROCK UNITS: Archaean

EXPLORATION SUMMARY:

Geological mapping, ground and aeromagnetics, detailed gridding over aeromagnetic anomalies and high Ni anomalies, with auger drilling and soil geochemistry.

MINERALISATION/PROSPECTS:

a) Blackfellow Hill grid: anomalous Ni associated with ultramafic. Max. values:
Cu 150 ppm
Pb 25 ppm
Zn 100 ppm
Ni 1400 ppm
Cr 300 ppm

b) Skuse Hill grid: anomalous Ni associated with ultramafic. Max. values:
Cu 220 ppm
Pb 2250 ppm
Ni 3000 ppm

c) Contact zone near Skuse Hill grid:
Cu within BIF: 170 ppm.

d) Target Zone 2 (7600 N, 2400W) (Blackfellow Hill Grid)
Cu - 95 ppm
Cr - 2850 ppm

COMPANY: ABADON HOLDINGS N.L.

TENEMENT: SML 680

ENVELOPE: 2071
1:250 000 SHEET: TARCOOLA

TARGET: Four economic targets:- 1) Au in quartz reefs
2) Sn associated with quartz reefs and greissens
3) Cu in Tarcoola Beds
4) Base metals in hydrothermally-altered adamellite

AGE/ROCK UNITS: Archaean to Early Proterozoic, Kenella Gneiss, Glenloth Granite
Middle Proterozoic, Tarcoola Beds

EXPLORATION SUMMARY:
Geological mapping, magnetic and geochemical surveys plus auger drilling on detailed grids at Hopeful Hill and East Lake grid.

MINERALISATION/PROSPECTS:

a) Hopeful Hill Grid: - maximum values from auger drilling Cu 170 ppm, Pb 30 ppm, Zn 190 ppm.

b) East Lake Grid: - maximum values from auger drilling Cu 240 ppm, Pb 270 ppm, Zn 850 ppm.

COMPANY: SADME

AREA: TARCOOLA

REPORT: QGN 91:3 - 9

1:250 000 SHEET: TARCOOLA

TARGET: Stratigraphic drilling of Tarcoola Formation and underlying magnetic anomaly.

AGE/ROCK UNITS: Middle Proterozoic, Tarcoola Formation,

Exploration Summary:
Diamond drilling (Wilgena 1 DDH) - total 973 m. Geochemical analysis of drillcore.

Mineralisation: Base metal contents are low. Highest base metals detected in basaltic/andesitic volcanics. Best values: Cu 495 ppm
Pb 140 ppm
Zn 1840 ppm

COMPANY:	BILLITON (SHELL) AUSTRALIA
TENEMENT:	EL 1230 (Lake Gilles)
ENVELOPE:	5680
1 : 250 000 SHEET:	WHYALLA, PORT AUGUSTA
TARGET	Lead, Zinc, Silver associated with chemical metasediments.
AGE/ROCK TYPES:	Lower Proterozoic, Hutchison Group similar to Willyama Complex which hosts Broken Hill Mineralisation. . BIF suite of rocks . Burkitt granitoid . Dolerite bodies
EXPLORATION:	Geochemical re-sampling of heavy media concentrates supplied by Stockdale, assayed for Cu, Pb, Zn, Ag, As, Mn, Fe and Au. Follow up bulk and soil sampling at Moores Dam. 5 Rotary Air Blast Drillholes.
RESULTS:	At Moores Dam - 4 samples recorded anomalous Cu, Zn, As, Au, Zn. Two with anomalous Zn values 6548 = 1740 ppm Zn, 3920 ppm Cu & 115 ppm Pb 6653 = 680 ppm Zn & 120 ppm Pb Resampling failed to show anomalous Zn in 6653 Drilling: Zn 650 ppm max. Pb 890 ppm max. Soil sampling Zn 58 ppm max. Pb 14 ppm

COMPANY:	SADME
AUTHOR:	B.P. THOMPSON
SOURCE:	Report Book 73/008
TITLE:	TORRENS HINGE ZONE PROJECT, BUTE REGION REPORT NO 1.
1:250 000 SHEETS:	ADELAIDE, BURRA, WHYALLA, MAITLAND.
AGE/ROCK TYPES:	Precambrian Basement/Cambrian Tickera Granite, Moonta Porphyry, Bute Amphibolite. Willamulka Volcanics dolerites, metasiltstones, altered igneous rocks, dolomites.
GEOCHEMISTRY:	Bute No. 5 D.D. Hole - Groove sample for ASARCO (Australia) Pty Ltd. Cu : 1500 ppm Pb : 260 ppm Depth of 30.3 to 30.8 m Zn : 420 ppm in weathered dolomite (Cambrian)

COMPANY:	DEPT. OF MINES AND ENERGY
TENEMENT	EL 207, 375 (BUTE)
ENVELOPE:	3353, RB 77/142
1 : 250 000 SHEET	WHYALLA, BURRA
TARGET:	Stratigraphic drilling for copper either side of Torrens Hinge Zone.
ROCK TYPES/AGE:	Pre Adelaidean and Adelaidean
EXPLORATION:	Regional aero magnetics and gravity, mapping and stratigraphic drilling. Since 1968, 21 diamond drill holes and 16 rotary drill holes have been drilled in the Port Broughton area.
RESULTS:	Diamond drilling Maximum Zn - 600 ppm Maximum Pb - 200 ppm

COMPANY: CRA EXPLORATION

TENEMENT: EL 287

ENVELOPE: 2967

1:250 000 SHEET: WHYALLA - KIMBA

TARGET: Base metal mineralisation in metasediments, Cowell Area.

AGE/ROCK TYPES:
Cleve metamorphics (Pre-Cambrian) Eyre Peninsula Ironstone in Ulgera Dolomite, Hutchison Group

EXPLORATION SUMMARY:
Detailed mapping and rock chip sampling and assaying for 8 elements and 13 samples for uranium.

MINERALISATION:
Old Workings
a. Atkinson Silver Mine
b. Mt Miller Pb prospect
c. Yalpoudnie Copper Mine

Hutchison Group:
Mica schist adjacent to Warrow Quartzite has anomalous zinc (3600 ppm), Cu (1010 ppm), silver (5 ppm) and Pb (96 ppm).
Iron Formation Sample 615482 contained 4000 ppm Zn, 720 ppm Cu, 5 ppm Ag but only 61 ppm Pb

Ore from dump at South Morowie Mine assayed 32% Zn, 6.6% Cu and 260 ppm Ag. Zinc and copper are present as carbonates. Iron formation: Two samples have high Zn (4800 ppm and 1.62%) at Fe workings 7.5 km south of Mt. Olinthus.

COMPANY: CRA EXPLORATION

TENEMENT: EL 282 Salt Creek S.A. (25 km NNW of Cowell).

ENVELOPE: 2962

1:250 000 SHEET: WHYALLA

TARGET: Base Metal and Uranium

EXPLORATION: Field mapping, rock chip sampling and percussion drilling, soil sampling.

AGE/ROCK TYPE:
Cleve metamorphics - Precambrian Hutchison Group

RESULTS

Drilling
Lead 8-43 ppm
Zinc 8-250 ppm
Manganese 30-46%

Rock chip sampling
Lead 56 - 480 ppm

COMPANY: B.H.P. CO.

TENEMENT: EL 266

ENVELOPE: 2869

1 : 250 000
SHEET: WHYALLA

TARGET: High grade iron ore, banded iron formation or low grade iron ore easily beneficiated.

EXPLORATION: Ground magnetics (15 km).
Five drill holes (Rotary/Percussion) totalling 258m
Samples were assayed for Co, Ni, Cu, Zn, Ag, Au, As.
Mapping at 1 : 50 000 scale to determine stratigraphy and structure. Soil sampling, Bedrock drilling MY 1 - 61. Deepest MY 58 was 29m

AGE/ROCK TYPES: Rhyolite, gabbro, trachyte, iron formation.
Precambrian: Granite, Volcanics. Hutchison Group, Myola Volanics, Moonabie sequence.

MINERALISATION: Drilling anomalous copper only in EEP3.

Max Zn 360 ppm)
Pb 28 ppm) 2 m at 26 m.
Trace element assays. Soil samples and Bedrock Drilling.
soil: Zn 325 ppm max
Pb 65 ppm max
Drilling up to 550 ppm Cu at 5 am.

COMPANY: DAMPIER MINING CO LTD (BHP)

TENEMENT: EL 512 Middleback Ranges
Iron Chieftain Area

ENVELOPE: 3694

1:250 000 SHEET: WHYALLA

TARGET: Gold and Base Metal mineralisation Middleback Ranges in sulphide-rich carbonate

AGE/ROCK TYPES:
Lower Proterozoic, iron formation of Middleback Group

EXPLORATION: Mapping, literature search, percussion drilling (16 holes) and sampling of previously drilled diamond cored hole?

MINERALISATION:
Anomalous metal contents are as follows:

	Zn	Pb
CP 4	40-590 ppm	40-580 ppm
CP 10	100-530 ppm	15-650 ppm
CP 12	140-470 ppm	40-675 ppm
CP 13	50-580 ppm	20-355 ppm
CHP11	140-430 ppm	

COMPANY:	NORTH BROKEN HILL LTD.
TENEMENT:	EL 519 (Port Pirie)
ENVELOPE:	3606
1 : 250 000 SHEET:	WHYALLA
TARGET:	Base metal mineralisation in prospective Cambrian and Adelaidean. Roxby Downs type copper or stratiform lead-zinc.
AGE/ ROCK TYPES:	Tapley Hill Formation (Adelaidean). No Cambrian intersected.
STRUCTURE:	Torrens Hinge Zone.
EXPLORATION:	Government aeromagnetics and gravity results were available. Geophysics, ground magnetics and gravity and diamond drilling were the main exploration tools. 20 Diamond Drillholes PP1 - PP20 were drilled during the program.
MINERALISATION:	The only hole to show any lead mineralisation was hole PP4 9.1 m @ 0.2% Pb at the base of Tapley Hill Formation (421.5 - 430.6m)

COMPANY: DEPT. OF MINES

AUTHOR: C.R. DALGARNO

1:250 000 SHEET: YARDEA

ENVELOPE/SOURCE: R.B. 62/45 (Feb. 1966)

PROJECT: RECONNAISSANCE GAWLER RANGE (6 pages)

ROCKTYPE: GAWLER RANGE PORPHYRY FLOAT

GEOCHEMISTRY: Semi quantitative analysis by emission spectroscopy.

Pb : 600 maximum.
Zn : 30 ppm maximum.

Note Cr : 400-700 ppm

COMPANY: SADME 1982

TENEMENT: N.A.

ENVELOPE: RB82/12

1 : 250 000: All

AGE/ROCK UNIT: All

STRUCTURAL CONTROL: N.A.

EXPLORATION SUMMARY: State wide sampling of groundwater via water bores. Samples assayed for, pH, Ca, Mg, Na, K. Cl, HCO_3, SO_4, NO_3 TDS, Fe, F, PO_4, B. SiO_2, Al, Ba, Cd, Cu, Pb, Mn, Hg, Ni, Se, Ag, Zn and As. 194 bore samples analysed for heavy metals.

MINERALIZATION: Possible poly-metallic sulphide mineralization in the following areas.

- Yardea
- Port Augusta
- Tarcoola
- Southern York Peninsula

COMMENT: No locations shown on maps.

COMPANY: DEPT. OF MINES & ENERGY

SUBJECT: CORE LIBRARY - STORED SAMPLES

AREA: Entire State

ENVELOPE: 3859

TARGET: Analysis of stored core caps

VARIOUS REPORTS

1 B.H.P. Drillholes SAV 9 (30 km to E of Ironknob) Pb 1250, Zn 360 ppm Cu 940 ppm.

2 Roopena No. 6. (20km E of Iron Knob). Pb up to 1.73% 15 samples > 1 000 ppm. Pb. Zn up to 1250 ppm.

COMPANY: ASARCO (AUSTRALIA) PTY. LTD.

ENVELOPE: 1880

INVESTIGATION: Drillcore held at SADME

AREAS: GAWLER CRATON, OFFICER BASIN, GAB, EROMANGA BASIN, STUART SHELF

TARGET: Base metal sulphides.

AGE/ROCK UNITS: Various.

EXPLORATION SUMMARY: Analysis of bore hole samples, for sulphides, held at SADME.

MINERALIZATION/PROSPECTS:

Bore Hole	Comments
Birthday Bore (Mt. Eba)	anomalous Pb (4400 ppm) & Cu 9280 ppm) in poorly sorted sand and limonite. Western Stuart Shelf.
Kerr-McGee L505/2	anomalous Zn (6800 ppm) 16-24 ft. in limonitic dolomite. Cleve Uplands ?Katunga Dolomite.
Lake Phillipson Bore	anomalous Zn (5500 ppm) 310-312 ft in pyritic coal, Permian.
Maralinga No. 7 Bore	anomalous Zn (6450ppm) 1443-1708 ft in chocolate shale with minor sand interbeds, ?Cambrian. Note; may be some Zn contamination.
Roopena DDH 1	anomalous Pb (5500 ppm) Zn (440 ppm) 360-370 ft, sulphides in Roopena Volcanics, Low values above and below this depth (30 ft interval).
Tarcoola TD 3	anomalous Pb (1400 ppm) 101-111 ft. in cobble conglomerate which has been silicified & amphibolitized - Peela Conglomerate Member of Tarcoola Fm.
Woomera Bore	anomalous Zn (2300 ppm) & Pb (560 ppm) in grey shale - Woocalla Dolomite equivalent, directly below a disconformity with Pernatty Grit.

COMPANY: DEPT. OF MINES AND ENERGY (COMPILATION)

AREA: GAWLER BLOCK, STUART SHELF

ENVELOPE 4308

1. GEOLOGY: Parker Fanning and Flint
2. Mining and Mineral Resources - R. K. JOHNS
   1 & 2 from Natural History of Eyre Peninsula ROY. SOC. of S. A. Inc. 1985.
3. Mt. Gunson copper deposits - D. Tonkin
4. General geology of the Stuart Shelf - Bren Thompson
5. The Myall Creek prospect Port Augusta region. Malcolm Mason
6. Adelaidean Stratigraphy of Torrens Hinge Zone northern Yorke Peninsula.
7. The GAWLER Craton - Extended Abstracts compiled by A. J. Parker

MINERALISATION:

Silver Lead Deposits (Eyre P.) (PP129) Atkinsons, Miltalie, Cleve, Elson, Poonana. Ore associated with dolomites and calc silicates of the basal Hutchison Group. Also south at Lady Franklin and Moonlight Mines (Johns 1961). BULLETIN 37. See G29.

COMPANY: ABERFOYLE RESOURCES LTD. (JV)

TENEMENT: EL 644/1027

ENVELOPE: 3879 CONFIDENTIAL

1 : 250 000 SHEET: PORT AUGUSTA

TARGET: Stratiform Pb-Zn sulphides possibly associated with magnetic (amphibolitic) iron formation, and hosted by metasediments.

AGE/ROCK UNITS: Lower Proterozoic Hutchison Group, Gawler Craton, magnetic amphibolitic iron formation, graphitic Fe-dolomites and schists.

EXPLORATION SUMMARY: Prior to grant of EL 644 exploration was carried out in the Lake Gilles area by Asarco (SML 306, Env. 1163) and Murumba (SML 471, Env. 1517) for base metals and by Nissho-Iwai (SML 463, Env. 1427; SML 616, Env. 1771; EL 262: Env. 2845) and Pancontinental (EL 432, Env. 3413) for uranium. Esso initially explored EL 644 for uranium between 1980-82 with work including a ground spectrometer survey, an aerial magnetic survey, geological mapping at 1 : 20 000 scale, rock chip sampling and one abandoned (98m) drill hole. Otter-Pegmin commenced the search for base metals in 1983 through 1984 with rock and shallow auger sampling (included check sampling of Sn-Ta anomalies). Exploration for Pb-Zn proper commenced with Aberfoyle in 1986 and has included reprocessing of aerial magnetic data, ground magnetic traverses and RAB drilling traverses (299 holes for 2252 m).

MINERALISATION/PROSPECTS:

(1) Eurilla Trend; contains base metal anomalous ironstone outcrops and metamorphosed carbonate rocks at depth near line A (see plan). A broad Ba anomaly has been defined by the RAB drilling. Some copper and galena? mineralisation observed at Eurilla East Prospect.

(2) Michell Trend; a group of Pb anomalies in the range 600 - 1680 ppm are spread along some 800 m of Line B (see plan). Ironstone float near Line B assayed 1420 ppm Pb and 1020 ppm Zn.

(3) Pier Dam and Jungle/Eurilla Dams iron formations; downgraded by sampling with some elevated Cu, Zn and Ba values recorded at Pier Dam but few base metal values at Jungle/Eurilla Dams.

COMPANY: THE SHELL COMPANY OF AUSTRALIA LTD. (1983)
POSEIDON LTD. 1984 - 1985)
WESTERN MINING CORPORATION LTD. (1987

TENEMENT: EL 1117

ENVELOPE: 5075 (Vol. 1 &2), 5545 (Vol. 1&2)
CONFIDENTIAL

1 : 250 000 SHEET: WHYALLA

TARGET: Lead-zinc-silver deposits associated with magnetite/hematite quartzites and amphibolite. (e.g. Broken Hill N.S.W., Aggeneys-Gamsberg S. Africa)

AGE/ROCK UNITS: Lower Proterozoic, Hutchison Group, Gawler Craton.

STRUCTURAL CONTROL: Folding, synclinal and anticlinal structures.

EXPLORATION SUMMARIES: Ground magnetic traverses (31) with associated geological mapping and rock chip sample, reprocessing BMR aeromagnetic data (1 : 100 000 scale), airphoto interpretation (1 : 50 000 scale), regional geological mapping (1 : 25 000 scale) and rock chip sampling (483 samples), RAB drilling (65 holes; 1414 m) on 6 magnetic profiles, bulk leach stream sediment sampling (Au target).

MINERALISATION/PROSPECTS:
(1) Miltalie North area. Rock chip sampling has located a base metal anomalous sub-basin with Pb/Zn/Mn ranging from 40-850 ppm/40-530 ppm/ and 200 ppm - greater than 10% respectively. RAB drilling confirmed the anomalous zone. Planned follow-up Sirotem surveys have not yet been undertaken.

DRILL HOLE STATUS: RSH 1 - 63 including 1A and 2A.
All possibly held by WMC.

COMPANY: WESTERN MINING CORPORATION LTD. L(1987-
THE SHELL COMPANY OF AUSTRALIA LTD. (1985-
URANERZ AUSTRALIA PTY. LTD. (1978-
PANCONTINENTAL MINING LTD. (1980-1982)
PNC EXPLORATION (AUSTRALIA) PTY. LTD. (1980-1982)

TENEMENT: EL 415/742/1079.

ENVELOPE: 3338 (Vol. 1-5) (CONFIDENTIAL)

1 : 250 000 SHEET: WHYALLA

TARGET: Pb-Zn mineralisation of Broken Hill (N.S.W.) or Balmat-Edwards (US) style.

AGE/ROCK UNITS: Archean to Lower Proterozoic, Miltalie Gneiss, Hutchison Group, quartz-biotite-schist, calc-silicate, Gawler Craton.

EXPLORATION SUMMARY: A good review of all previous exploration in the area is contained in Env. 3338 Vol. 3, report for the period ended 7 November 1985, while exploration by Shell in 1985 and 1986 is summarised in Env. 3338 Vol. 6 report for the period ended 7 February 1987.

Exploration between 1978 and 1984 was principally for uranium and included geological mapping, rock chip and soil sampling, Sirotem, ground magnetic and ground radiometric surveys, percussion drilling and costeaning and a lead isotope study.

Specific Pb-Zn exploration conducted by Shell in 1985 and 1986 included aerial magnetic and radiometric surveys, 61 ground magnetic and 28 soil sample traverses over aeromagnetic trends, geological mapping (1 : 25 000 scale) and rock chip sampling, Sirotem test surveys, logging and sampling previous drill holes, stream sediment sampling including bulk leach samples for gold and assessment and sampling of the main base metal prospects.

MINERALISATION/PROSPECTS: Note that most of the prospects here listed have shown some anomalous Pb and/or Zn values when sampled.

1. Miltalie mine, Pb-Ag-Cu; 3 diamond drillholes - no ore, Sirotem survey - no anomaly.
2. Atkinsons, Ag-Pb; Fairbanks, Ag-Pb.
3. Yalpoudnie mine, Cu - Pb; 1 diamond drill hole, costeans, magnetic, radiometric, Sirotem surveys.
4. Mount Miller mine, Ag-Pb.
5. Davey's prospect, Ag-Pb.
6. Calcookara, Cu-U; 8 diamond drill holes, 6 percussion holes, costeans, magnetic, radiometric, Sirotem surveys.
7. A 60 area.
8. Boards mine Cu - Ag.
9. Cock Hill, U; 3 percussion holes, costeans, magnetic, radiometric, Sirotem surveys.
10. Cock Hill South; Sirotem surveys.
11. Copper digging/trench, Cu.
12. Copper mine at South Morowie, Cu.6
13. Ferns quarry, Au?
14. Middle Camp.
15. Miltalie graphite deposit; 2 diamond drill holes
16. Miltalie North, Fe; 2 diamond drill holes
17. Morowie mine, Cu.
18. Mount Olinthus, U; 2 diamond drill holes
19. P11 anomaly
20. Reckits mine, Au.
21 Wangaraleednie.
22. Wilklow graphitic chert.
23. Exploration targets: 14 potential Pb-Zn targets were outlined by a magnetic interpretation undertaken by Shell in 1986.

COMPANY: THE SHELL COMPANY OF AUSTRALIA LTD (1983-1984)
POSEIDON LTD. (1984-1985)
WESTERN MINING CORPORATION LTD. (1987-

TENEMENT: EL 1115

ENVELOPE: 5074 (Vol. 1 - 4) CONFIDENTIAL

1 : 250 000 SHEET: YARDEA, PORT AUGUSTA

TARGET: Lead-zinc-silver deposits associated with magnetite/hematite quartzites and amphibolite. (e.g. Broken Hill, N.S.W. Aggeneys-Gamsberg, S. Africa).

AGE/ROCK UNITS: Lower Proterozoic, Hutchison Group, Gawler Craton.

STRUCTURAL CONTROL: Folding, synclinal and anticlinal structures.

EXPLORATION SUMMARY: Aerial magnetic/radiometric survey (4650 line km), magnetic and radiometric survey interpretatioin, re-assessment of previous stream sediment sampling by Stockdale, geological mapping (1:25 000 scale), 25 ground magnetic profiles, rock chip sampling, RAB drilling on 11 magnetic profiles (87 holes; 25672 m), 1 percussion drill hole (196 m), bulk leach stream sediment sampling (Au target).

MINERALISATION/PROSPECTS: Minor geochemical anomalies from rock chip sampling and RAB drilling as follows:

(1) Ferruginous graphitic tourmaline bearing quartzites 2 km west of Pilepudla Dam assayed 165 ppm Pb, 180 ppm Zn, 4850 ppm Sn, 35 ppm W, 280 ppm As and 35.5% Fe. Resampling failed to replicate the high Sn value.

(2) Profile 7, RAB hole RBB 39 (2m at 0.14% Pb), associated with kaolinitic weathering profile and not substantiated by in-fill drilling.

(3) Profile 14. Patchy elevated base metal results in holes RBB 47, 48 and 49 (best 14 m at 220 ppm Zn, 105 ppm Cu, 17.3% Fe, 190 ppm Mn in RBB 48 and 12 m at 120 ppm Zn in RBB 47) generally in cherts, graphitic cherts and possible ex-carbonates.

(4) Profile 15. Elevated geochemical results in RBB64 (40 m at 205 ppm Zn) in cherts and graphite bedrock.

DRILL HOLE STATUS: RBB 1 - 88
BP 1

COMPANY: THE SHELL COMPANY OF AUSTRALIA LTD. (1980-1983)
POSEIDON LTD. (1984-86)
WESTERN MINING CORPORATION LTD. (1987-

TENEMENT: EL 719/1057

ENVELOPE: 4007 CONFIDENTIAL

1 : 250 000 SHEET: YARDEA, PORT AUGUSTA

TARGET: Base metal sulphide deposits in metasedimnts, with magnetic BIF and amphibolite associations e.g. Broken Hill, N.S.W.; Pegmont, Qld; Aggeneys - Gamsberg, S. Africa.

AGE/ROCK UNITS: Lower Proterozoic, Hutchison Group, Gawler Craton.

STRUCTURAL CONTROL: Anticlinal and synclinal accumulations, possible associated faulting.

EXPLORATION SUMMARY: Regional approach has included an aerial magnetic/radiometric survey, extensive ground magnetic traverses with follow-up RAB drilling on these traverses and 1 : 25 000 scale geological mapping. Gravity was tried but was ineffective. Prospect evaluation has included ground magnetic, Sirotem and IP surveys, limited rock chip sampling, geological mapping, RAB, percussion and diamond drilling and electric geophysical logging. Drilling totals 701 open holes for 2583 m and 19 cored holes for 5968 m.

MINERALISATION/PROSPECTS: (includes some non Pb-Zn targets)

(1) Menninnie Dam Pb-Zn-Ag prospect. Initial RAB traverse included one hole with 11 m at 2.5% Zn and 0.25% Pb. Follow-up RAB/Percussion drilling outlined anomalous Pb-Zn geochemistry over an area 3000 m long by 6500 m wide; out of 160 holes into bedrock 14 recorded greater than 1% Pb or Zn; including RMD 31 with an 11 m intersection between 40-51m at 9.6% Pb, 13.9% Zn, 0.13% Cu, 373 g/t Ag and 0.43 g/t Au. Later diamond drilling intersected narrow high grade zones (e.g. MD6, 266.6-267.23 m (0.63 m) at 25.4% Pb, 7.0% Zn, 178 g/t Ag and 0.3 g/t Au) and broader lower grade zones (e.g. MD8, 223.45-236.3 (12.85 m) at 3.4% Pb, 4.5% Zn and 44.5 g/t Ag including 0.55 m at 13.3% Pb, 38.5% Zn and 18 g/t Ag). The main massive Pb-Zn-Ag sulphide mineralisation is hosted by finely laminated graphitic

ankeritic dolomite,bounded stratigraphically above and below by amphibolitic magnetic-BIF horizons and pyritic graphitic schists.

(2) Ultima Dam Pb-Zn-Cu with Bi-W-Sn associated with massive pyrite ?stratiformly concordant with surrounding iron formation unit and separate W-Sn mineralisation occurring as fine grained scheelite and very fine grained cassiterite enriched along the interface of the weathered bedrock and the kaolin profile. Intersections include 18-36 m (18 m) at 0.37% WO3, 0.13% Sn; 24-40 (16 m) at 0.31% Zn. 0.14% Pb and in DDH UD3, 188-189 m (1m,) at 1.43% W and 193-198 m (5m) at 1.5% Zn and 0.1% Cu.

(3) Golden Gate mineralised zone with percussion drill hole intersection 46-56 m (10 m) at 0.14% Cu, 0.1% Pb, 11.4 g/t Ag and 316 ppm U.

(4) Telephone Dam where RAB drilling has defined a highly basemetal anomalous meta-sedimentary sequence.

(5) South Houlderoo Dam where RAB drilling has defined a highly base metal anomalous metasedimentary sequence (profile 39). Percussion hole DSH1 drilled to test a Pb-Zn and Sirotem anomaly on profile 39 was an ineffective test. Note also consistently high Ti values in the range 5000-10000 ppm were recorded in magnetic dolerite intersected in 1981 RAB traverses on profiles 2, 6 and 7.

(6) Burrows Dam where 1981 RAB drilling intersection on profile 10 (26-28 m at 1.2% Zn, 1600 ppm Cu, 870 ppm W and 280 ppm Sn).

(7) Cunyarie and Weednanna Dam grids where further follow-up of Pb-Zn targets may be required.

(8) Gate Au prospect, minor workings northwest of Ultima Dam apparently the gold (some mionor values recorded) occurs in laterite which overlies biotite schists.

REFERENCE: Higgins, M. L., and Hellsten. 8th A.G.C.

COMPANY: WESTERN MINING CORPORATION LTD.
NORTH BROKEN HILL LTD.
NORGOLD LTD.

TENEMENT: Several SML's, EL32/124/170/249/347/544/962/1394

ENVELOPE: 2235, 2407, 2539, 2745, 3125, 3689
CONFIDENTIAL

1 : 250 000 SHEET: MAITLAND, WHYALLA

TARGET: Shale-hosted and Mississippi Valley type lead-zinc deposits.

AGE/ROCK UNITS: Middle Proterozoic, Wandearah Metasiltstone, Willamulka Volcanics, Gawler Craton, Cambrian, Kulpara Limestone.

STRUCTURAL CONTROL: Folding, synclinal and anticlinal structures.

EXPLORATION SUMMARY: Exploration over a 25 year period has included the following commodity targets: copper, lead-zinc, gold, uranium, tungsten, molybdenum, bauxite, talc, kaolin and mineral sands. Techniques used include aerial magnetics, INPUT ground magnetics (5,800 line km), gravity (100 line km), IP surveys (2,513 line km), EM, rock chip, mine dump, soil, auger drilling (30,000 holes totalling 359,000 m), hydrogeochemistry, percussion drilling (339 holes totalling 17,000 m) and diamond drilling (250 holes totalling 57,000 m).

MINERALISATION/PROSPECTS:

East Kadina - Smitham's prospect: comprises stratabound but locally transgressive Zn-Pb mineralisation within a black tuffaceous shale sequence. The mineralisation occurs within a refolded synform. The lithologic package includes mafic volcanics (Willamulka Volcanics), iron formation, black pyritic shale, and minor tuff, dolomite and chert Wandearah Metasiltstone. Grade of the mineralisation is low (e.g. 1% Zn and Pb). The area is interpreted as a possible distal facies of a deformed regional volcanogenic mineralising system.

DRILL SAMPLE STATUS: All samples stored at either the SADME or WMC storage facilities at Moonta.

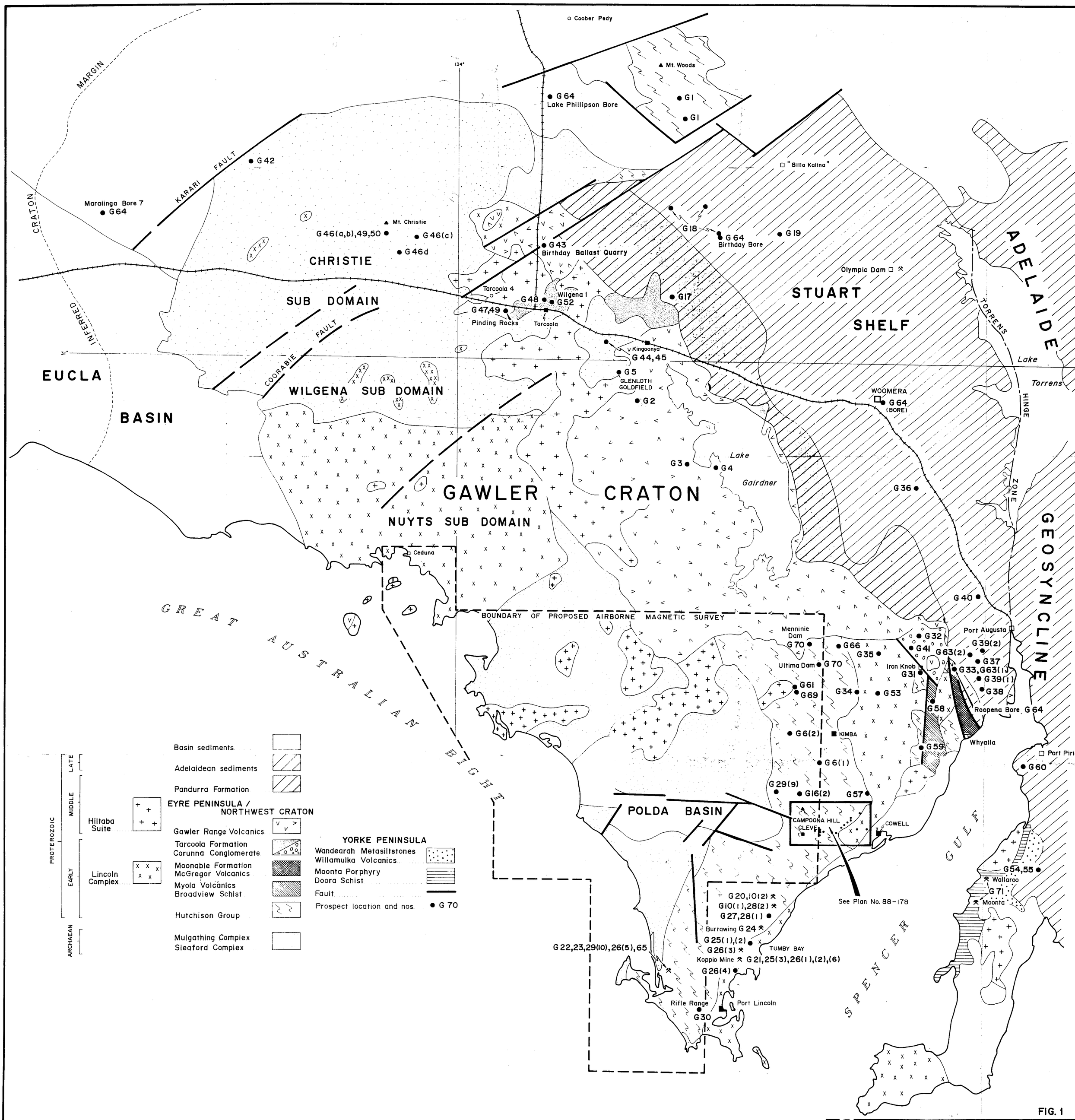


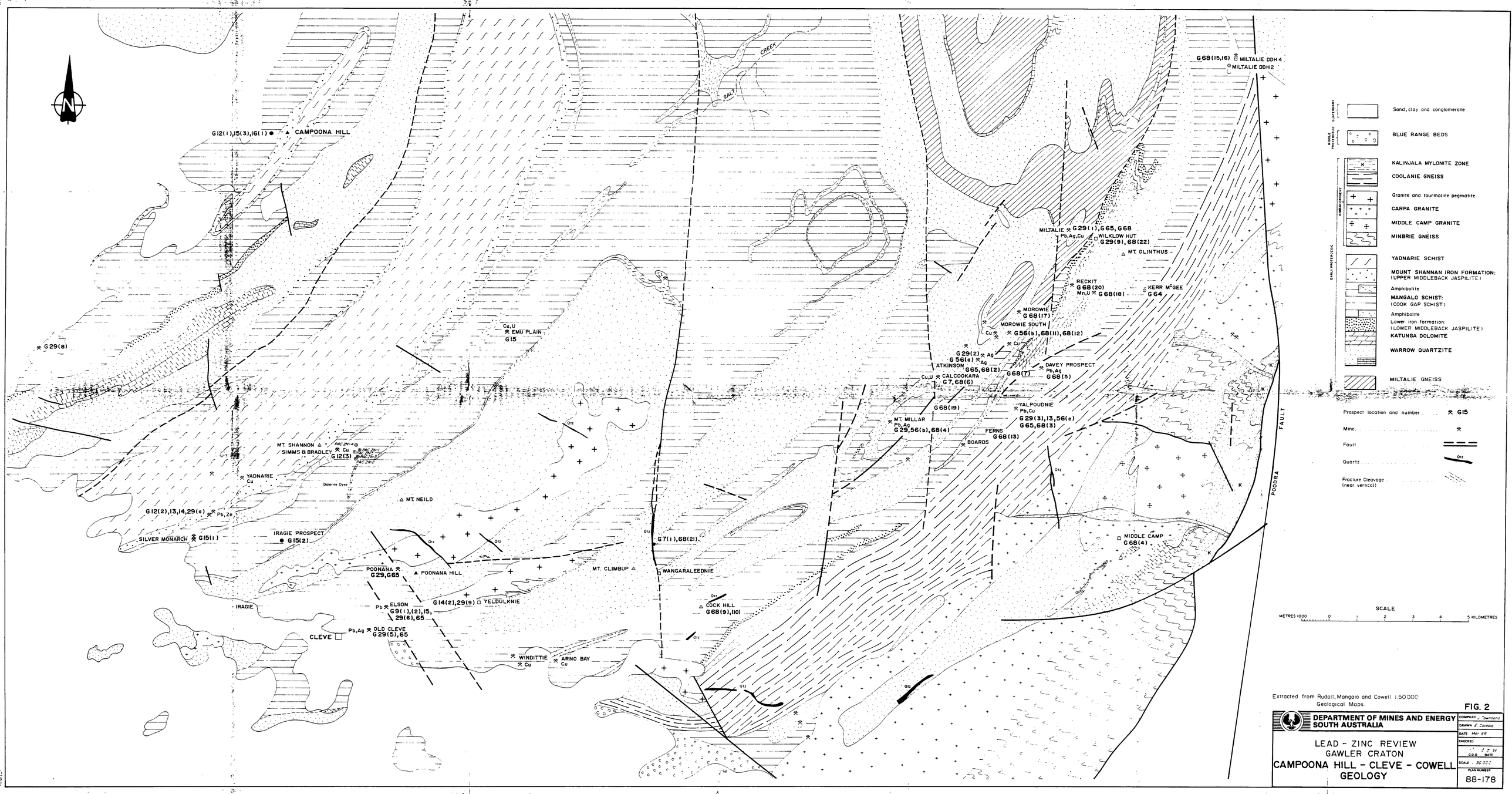
FIG. 1

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

LEAD – ZINC REVIEW
GAWLER CRATON
PROSPECT LOCATION AND GEOLOGY

COMPILED	J. Townsend
DRAWN	E. Calabio
DATE	Mar '88
CHECKED	
C.D.O. DATE	13.9.88
SCALE	1:1 000 000
PLAN NUMBER	88-177

4613



Extracted from Rudall, Mangalo and Cowell 1:50000 Geological Maps.

FIG. 2

DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA

COMPILED J. Townsend
DRAWN E. Calabro
DATE Mar 88
CHECKED
DATE
SCALE 1:50 000
PLAN NUMBER 88-178

LEAD - ZINC REVIEW
GAWLER CRATON
CAMPOONA HILL - CLEVE - COWELL GEOLOGY