Report

Annual Technical Report: EL 5062

18/10/2012 to 17/10/2013
100-AN-EX-1290

Fortescue
The New Force in Iron Ore

Report Title	Annual Technical Report for the Period 18/10/2012to 17/10/2013, EL 5062
Project Name	Lady Bay Area
Tenement Number	EL 5062
Tenement Operator	Fortescue Metals Group Ltd
Tenement Holder	FMG Resources Pty Ltd
Report Type	Annual Technical Report
Report Period	18/10/2012 to 17/10/2013
Author	Scott Ferguson
Date of Report	15 December 2013
Report Number	100-AN-EX-1290
Target Commodity	Copper, Gold, Uranium and Iron Ore

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1. SUMMARY

1.1 Location

Yankalilla Project includes a part of northern the Fleurieu Peninsula including the Lady Bay area and Carrickalinga. The region is well serviced by the main Adelaide to Cape Jervis road and a network of minor roads. There are port facilities at Rapid Bay (limestone workings). The region is covered by numerous small holdings, including freehold land Zone (Figure 1).

1.2 Geology

The regional geology of the Yankalilla project includes the Palaeoproterozoic Barossa Complex (possibly components of the Gawler Craton, Curnamona Province or both), thinly overlain by Adelaidean and also Cambrian of the Stansbury Basin. The Barossa Complex rocks are located on the margin of the currently preserved Gawler Craton and Curnamona Province. The complex is overlain by the Neoproterozoic to Cambrian rift complex forming a basement to this rift fill sequence which is typically metamorphosed with a strong retrograde overprint. It is possible to find a minor intrusive granitic component along with pegmatitic and amphibolitic dykes. Within the complex there is a strong banding parallel to the gneissic foliation. The metamorphic age of the Barossa Complex is thought to be in the vicinity of 1590Ma. Lithologies of the Barossa Complex include quartzofeldspathic, pelitic and calcsilicate gneisses. The Yankalilla project is influenced by a fold-thrust slice with the Barossa Complex of the Myponga Inlier forming the core. It is possible that the main northerly directed footwall thrust zone approximates the coast. Calcsilicate metasediments exposed along the rocky beach near Little Gorge are reminiscent of parts of the Wallaroo Group of Yorke Peninsula and further north, alternatively they might represent a unit known as the Houghton Calcsilicate. The gneisses have been intruded post 'Olarian' deformation by red-pink granite and pink feldspar pegmatite, the former being dated at ~1580 Ma (Szpunar et al. 2007). The colour of the granites indicates that they are oxidised, and with the determined age, match the Hiltaba Suite of the Gawler Craton (granites of the Ninnerie Supersuite of Curnamona Province, though of similar age, tend to be white in colour).

Tenement	Activity	Holes Drilled	Metres Drilled
EL5062	Historic reviews, Native title negotiations, access reconnaissance and planning geophysical survey.	Nil	Nil

Table 1: Geology Summary

1.3 Work Carried Out

Exploration completed by FMG during the year being reported on was mainly taken up with logistical preparation and data reviews.

1.4 Results & Conclusions

The project area has been explored periodically by junior and major companies with varying degrees of success. There have been several small scale mining operations in the general area, however deposits of significant scale are yet to be identified. It has been hypothesised by previous explorers and academics that the Palaeoproterozoic basement is related to either the Gawler Craton or Curnamona Province. Interestingly the company indicates that some Yorke Peninsula core was examined, although details are not included. Additionally a relationship is postulated with the visible alteration and mineralisation being a product of Olympic Dam type processes.Exploration for IOCG-style mineralisation is recommended to cover the outcropping and shallowly buried Barossa Complex at the southwestern end of the Myponga Inlier.

FMG's opinion is that the project area overlies a geological interesting terrain with the potential to host mineralisation. The initial assessment of the publically available data has not yielded any new geophysical anomalies in the tenure.

The acquisition of detailed ground gravity data-set is essential. Also, in order to confirm that the area is indeed an IOCG province, an examination of available geochemical data, followed up by geochemical sampling for the relevant suite of elements is recommended. The proposed work programs will be completed in the near future to advance the companies understanding of the geology, structure and the depth of cover. This program will hopefully contribute to generating targets for the next phase of exploration.

2. INTRODUCTION

This report discusses exploration activities of FMG carried out within its Yankalilla Project, EL 5062, for the period 08/10/2012 to 07/10/2013.

3. LOCATION AND ACCESS

Yankalilla Project includes a part of northern the Fleurieu Peninsula including the Lady Bay area and Carrickalinga. The region is well serviced by the main Adelaide to Cape Jervis road and a network of minor roads. There are port facilities at Rapid Bay (limestone workings). The region is covered by numerous small holdings, including freehold land Zone (Figure 1).

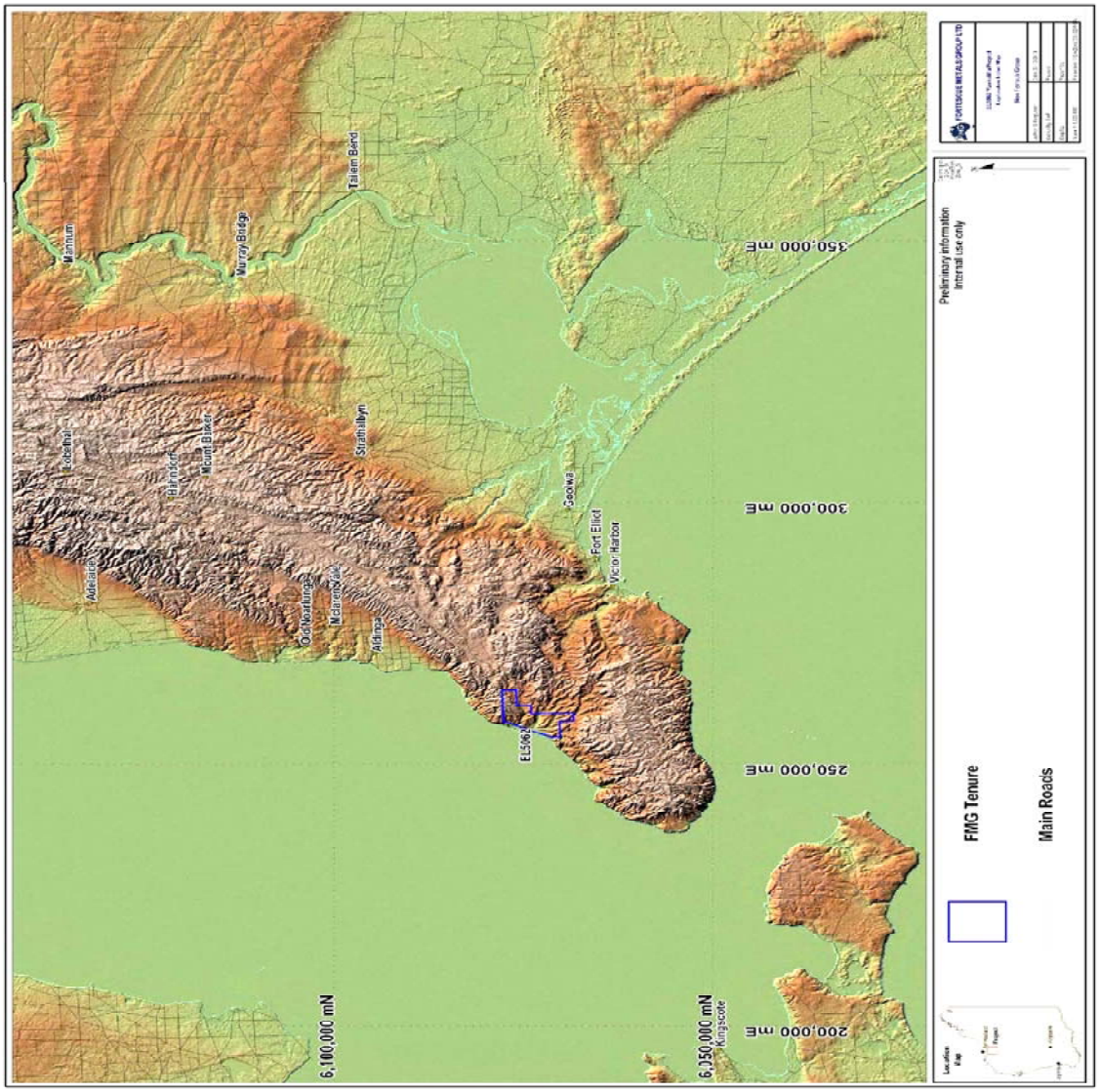

Figure 1: Exploration Index map

4. TENEMENT STATUS

The current tenement status is summarised below in Table 1.

Tenement Name	Number	Area (Km^2)	Grant Date	Expiry Date	Period Reported On
Lady Bay Area	EL 5062	38	18/10/2012	17/10/2014	18/10/2012– 17/10/2013

Table 2: Summary of Tenement

5. REGIONAL GEOLOGY & MINERALISATION

The regional geology of the Yankalilla project includes the Palaeoproterozoic Barossa Complex (possibly components of the Gawler Craton, Curnamona Province or both), thinly overlain by Adelaidean and also Cambrian of the Stansbury Basin. The Barossa Complex rocks are located on the margin of the currently preserved Gawler Craton and Curnamona Province. The complex is overlain by the Neoproterozoic to Cambrian rift complex forming a basement to this rift fill sequence which is typically metamorphosed with a strong retrograde overprint. It is possible to find a minor intrusive granitic component along with pegmatitic and amphibolitic dykes. Within the complex there is a strong banding parallel to the gneissic foliation. The metamorphic age of the Barossa Complex is thought to be in the vicinity of 1590Ma. Lithologies of the Barossa Complex include quartzofeldspathic, pelitic and calcsilicate gneisses. The Yankalilla project is influenced by a fold-thrust slice with the Barossa Complex of the Myponga Inlier forming the core. It is possible that the main northerly directed footwall thrust zone approximates the coast. Calcsilicate metasediments exposed along the rocky beach near Little Gorge are reminiscent of parts of the Wallaroo Group of Yorke Peninsula and further north, alternatively they might represent a unit known as the Houghton Calcsilicate. The gneisses have been intruded post 'Olarian' deformation by red-pink granite and pink feldspar pegmatite, the former being dated at ~1580 Ma (Szpunar et al. 2007). The colour of the granites indicates that they are oxidised, and with the determined age, match the Hiltaba Suite of the Gawler Craton (granites of the Ninnerie Supersuite of Curnamona Province, though of similar age, tend to be white in colour).

Mineralisation is known throughout the region in various forms and in association with different stratigraphic sequences. The Palaeoproterozoic Barossa Complex is thought to have a relationship with either the Gawler Craton or Curnamona Province. Rocks within the Complex are of high metamorphic grade (amphibolite-granulite facies) and show multiple deformation events. Late orogenic sodic alteration was responsible for the formation of albitite with which is associated possible IOCG mineralisation. The Neoproterozoic Adelaidean units are exposed along the flanks of regional anticlines, but elsewhere buried at depth. Although no mineralisation is known locally, elsewhere the Adelaidean rocks are mineralised, thus metalliferous mineralisation cannot be ruled out within this unit. The Cambrian Kanmantoo Group extends over the majority of the southern and western parts of Delamere project but is locally shallowly covered by unconsolidated Permian fluvioglacial material, and also laterite. Mineralisation is extensive in the Cambrian Kanmantoo Group, but mainly within the Silverton Subgroup, especially the Tapanappa Formation.

SYSTEM		GROUP	FORMATION	SYMBOL
Cambrian	Middle	Kanmantoo	Balquhidder	E
			*Tapanappa	Elt
			*Talisker	Ela
			*Backstairs Passage	Eeb
			*Carrickalinga Head	Eec
	Early	Normanville	*Heatherdale Shale	Enh
			*Fork Tree Limestone	Enf
			*Sellicks Hill	Ens
			*Wangkonda	Enw
			*Mount Terrible	Ent
Adelaidean	Ediacaran	Wilpena	*ABC Range Quartzite	Nsa
			unnamed	Nsa3
			*Brachina	Nsb
			Seacliff sandstone	Nss
	Marinoan	Umberatana	Elatina	Nee
			Etina	Nit
			*Angepeena	Nia
			unnamed	Nu2
	Sturtian		*Brighton Limestone	Nni
			*Tapley Hill	Nnt
			*Appila Tillite	Nys
	Torrensian	Burra	*Saddleworth	Nds
			Stonyfell Quarzite	Ndt
			Woolshed Flat Shale	Ndw
			*Aldgate Sandstone	Nd
Palaeoproterozoic			*Barossa Complex	Lb

Copper, gold and uranium mineralisation, to date uneconomic, is known from the Barossa Complex. Significantly intense albite alteration is reported, and it is possible that biotite is a component. Sodic alteration coupled with the presence of Cu-Au-U is consistent with the IOCG system, albeit in this case the rocks being at granulite facies grade. There is late retrogression related to shearing.

A small pitchblende-brannerite deposit is known in the Barossa Complex to the east of the current project area, i.e. the Wild Dog prospect. Copper was investigated at the Gorge Mine, where anomalous uranium has been reported. Sub economic gold is known near the north coast at the Grundy prospect and at Rapid Hill. No Lead-zinc-silver mineralisation of significance has been reported within the project area.

6. PREVIOUS EXPLORATION

Below is a summary table of the 17 licences that cover, partly cover or border the current tenure for which exploration was for gold, base metals or uranium.

Tenement type	Tenement No	Licensee	Envelope	Target
SML	75	Australian Development Ltd	651	
SML	101	Australian Development Ltd	651	
SML	239	CRA Exploration Pty Ltd	1011	
SML	182	Noranda Aust Ltd	933	
SML	305	Electrolytic Zinc Co A/asia Ltd	1158	
SML	405	Noranda Aust Ltd	1404	
SML	542	Comestock Minerlas	1642	
SML	578	Eastern Prospectors Pty Ltd	000	
EL	418	Uranerz	3367	-
EL	838	RH Oster	0000	-
EL	1428	Thomdrill	6949	-
EL	2731	Olliver Geol Services	0000	Dolomite; Limestone
EL	2862	Eden Creek	9919	Platinum
EL	3194	Landmark Stone	10803	Dimension Stone - Marble
EL	3524	Matsa Resources	0000	Uranium; Gold; Copper
EL	3582	Marathon Resources	0000	Zinc; Lead
EL	3992	International Metals	0000	Uranium; Copper

Exploration has been ongoing since the early 60's with multiple commodities and mineralisation models being targeted. The area has been explored by junior and major companies however exploration success has been minimal to data with only several small deposits being located.

Exploration was completed by Paladin Resources Ltd over the northeastern portion of the project near Lady Bay. This included a small area of ground covered by EL 2862, which covered the western part of the Myponga Inlier. The principal target was the precious minerals platinum, palladium and gold. Albite-dominated alteration is well described as it is considered to relate to uranium and weak platinum mineralisation.

It is hypothesised that the Palaeoproterozoic basement relates either to the Gawler Craton or Curnamona Province. Interestingly the company indicates that some Yorke Peninsula core was

examined, although details are not included. Additionally a relationship is postulated with the visible alteration and mineralisation being a product of Olympic Dam type processes.

7. FMG EXPLORATION 2012-2013

Exploration completed by FMG during the year being reported on was mainly taken up with logistical preparation and data reviews.

- The historical data review process of the project area was commenced and will be ongoing for some time. It is hoped that through the data review FMG geologists will build up a reasonable understanding of the previous work completed and therefore the geology in the project area, which will enable the company to make informed decisions regarding the future exploration in the area.

- In addition to the ongoing data review FMG has planned and subsequently committed to flying and airborne gravity program over the project area. This new information will be used in conjunction with the historic data to generate and better define any possible targets.

- A very basic field reconnaissance trip was undertaken in the general area to identify the major public access routes that could possibly be used in any future exploration programs.

- FMG is also in the very early stages of engaging with the traditional land owners to negotiate and finalise a land access agreement.

Although the project area is predominantly made up of Cambrian metasediments overlying a thick Neoproterozoic Adelaidean succession, it includes a part of the northern coastal strip of the Fleurieu Peninsula that exposes an ENE-trending elongate up-fold-thrusted inlier of Barossa Complex. Thus the main reason given for targeting the northern Fleurieu Peninsula was the possibility that it contained the southernmost exposures of the Gawler Craton, therefore having the potential for IOCG mineralisation. This idea was supported from observations of lithologies similar to the Wallaroo Group of the eastern Gawler Craton, and intruded by pink pegmatites, being exposed along the beach near Little Gorge. Additionally boulders of undeformed red Hiltaba-like granite are scattered nearby at Great Gorge, and upstream, pink granite returned a date of ~1580 Ma. This supported the previous work in the area that obtained a radiometric date of 1587+/-22 Ma from a pegmatite. Subsequent studies suggest depositional ages of the host metamorphics in the range 1740-1710 Ma, which are in accord with the lower Willyama Supergroup and perhaps the Wallaroo Group of the eastern Gawler Craton, or even represent an intervening succession. These early Mesoproterozoic dates are consistent with the granitic rocks representing either the Hiltaba Suite of the Gawler Craton or the Ninnerie Supersuite of the Curnamona Province, however the red colouration supports the former.

Cover over the Barossa Complex in the project area comprises thick Adelaidean and Cambrian metasediments bordering the Palaeoproterozoic inliers. All have partial cover of thin unconsolidated fluvioglacial Permian sands and conglomerates.

Using the information gained from the interpretation of the historic information it would appear that the tenure is located within an interesting structural zone. A follow up ground gravity

program and soil sampling program will be completed in the near future to advance the companies understanding of the geology and hopefully contribute to generating targets for the next phase of exploration.

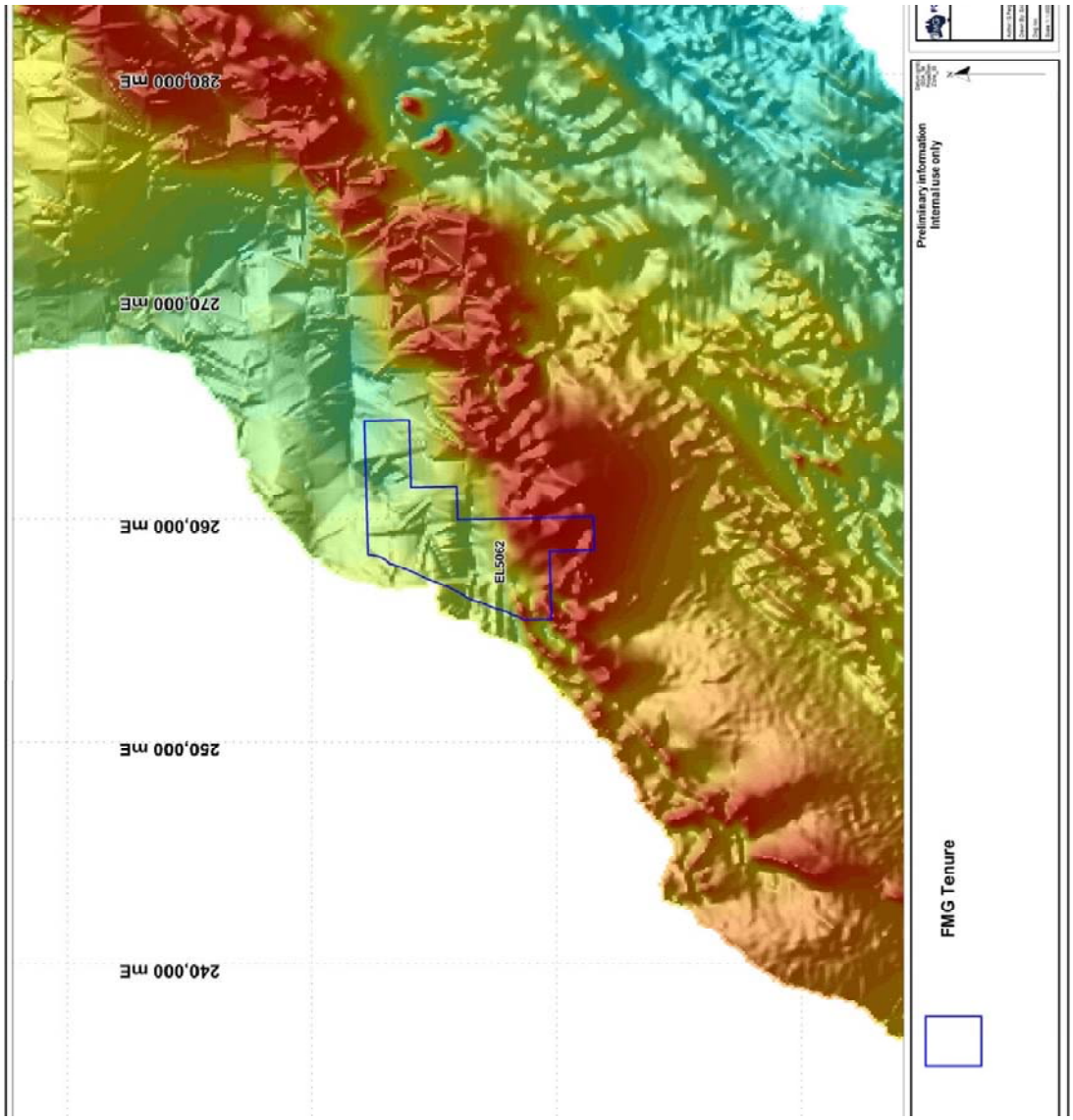

Figure 2: Regional magnetics within EL5062

8. CONCLUSIONS

The project area has been explored periodically by junior and major companies with varying degrees of success. There have been several small scale mining operations in the general area, however deposits of significant scale are yet to be identified. It has been hypothesised by previous explorers and academics that the Palaeoproterozoic basement is related to either the Gawler Craton or Curnamona Province. Interestingly the company indicates that some Yorke Peninsula core was examined, although details are not included. Additionally a relationship is postulated with the visible alteration and mineralisation being a product of Olympic Dam type

processes.Exploration for IOCG-style mineralisation is recommended to cover the outcropping and shallowly buried Barossa Complex at the southwestern end of the Myponga Inlier.

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The acquisition of detailed ground gravity data-set is essential. Also, in order to confirm that the area is indeed an IOCG province, an examination of available geochemical data, followed up by geochemical sampling for the relevant suite of elements is recommended. The proposed work programs will be completed in the near future to advance the companies understanding of the geology, structure and the depth of cover. This program will hopefully contribute to generating targets for the next phase of exploration.

REFERENCES

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9. ATTACHMENTS

Work	File Name	Format
Annual Report	EL5062	PDF
Regional Magnetics	EL5062_Regional_Magnetics	PDF
Exploration Index Map	EL5062_Exploration_Index_Map	PDF
Historic Data Review on EL5062	Draft_FMG ELA Fleurieu_2012_38	PDF

Table 3: Files Submitted in Digital Format

6,090,000 mN

6,080,000 mN

6,070,000 mN

6,060,000 mN

230,000 mE

240,000 mE

250,000 mE

260,000 mE

270,000 mE

280,000 mE

EL5062

Location Map

Port Hedland Project

Kalgoorlie

PERTH

FMG Tenure

Preliminary information
Internal use only

Datum (grid) GDA_94 Projection Zone_53

N

FORTESCUE METALS GROUP LTD

EL5062 Yankalilla Project
Regional Magneics

Non Ferrous Group

Author: S.Ferguson	Date:20/12/2013
Drawn By: SAF	Revision:
Dwg No:	Report No:
Scale: 1:1,000,000	Projection: MGA Zone 53 (GDA 94)

Lobethal
Mannum
Adelaide
Hahndorf
Mount Barker
Murray Bridge
6,100,000 mN
Old Noarlunga
Mclaren Vale
Tailem Bend
Strathalbyn
Aldinga
EL5062
Goolwa
Port Elliot
Victor Harbor
6,050,000 mN
Kingscote
200,000 mE
250,000 mE
300,000 mE
350,000 mE

Location Map

Port Hedland
Project
Kalgoorlie
PERTH

FMG Tenure

Main Roads

Preliminary information
Internal use only

Datum (grid) GDA_94
Projection Zone_53

N

FORTESCUE METALS GROUP LTD

EL5062 Yankalilla Project
Exploraton Index Map

Non Ferrous Group

Author: S.Ferguson	Date:20/12/2013
Drawn By: SAF	Revision:
Dwg No:	Report No:
Scale: 1:1,000,000	Projection: MGA Zone 53 (GDA 94)

EXPLORATION LICENCE APPLICATION REPORT
FORTESCUE METALS GROUP
Cu-Au MINERALISATION ON ELA 2012/39 DELAMERE AREA, SOUTH AUSTRALIA

C.H.H. Conor
March 2012

ELA 2012/0003 EXPLORATION SUMMARY AND PERCEIVED PROSPECTIVITY

POSITIVES
There is good reason to consider the Barossa Complex in the northeastern part of ELA 2012/38 to be a part of the IOCG-bearing Gawler Craton.

Hiltaba Suite type granites are known, there is locally intense sodic alteration, and there is known copper-gold-uranium mineralisation, albeit subeconomic. Thus there is justification for this area having prospectivity for IOCG-type mineralisation.

The area has been under-explored not only because until recently IOCG-targeting was not considered, but also detailed gravity data is not available, this being a critical data-set required for detecting buried IOCG mineralisation.

NEGATIVES
Much of the Myponga Inlier is exposed or only shallowly covered, but only one small uranium deposit has been discovered in spite of a moderate degree of surface exploration.

The Neoproterozoic and Adelaidean cover succession, although having minor potential for mineralisation, are generally excessively thick.

Access is likely to be problematic, firstly due to the region being covered by numerous small freehold farm blocks. Local pressure forced the State Government to put a hold on mineral exploration over the bulk of the Myponga Inlier. Secondly some of the interesting ground falls within the 800m coastal exclusion zone.

INTRODUCTION
Fortescue Metals Group (FMG) made application for licence to explore for copper, silver, gold and base metals over the western part of Fleurieu Peninsula on 13 February 2012, this report concentrates upon copper and gold. The application area was registered as ELA 2012/00038.

LOCATION
ELA 2012/00038 includes a part of northern the Fleurieu Peninsula including the Lady Bay area and Carrickalinga.

ACCESS & SERVICES

The region is well serviced by the main Adelaide to Cape Jervis road and a network of minor roads. There are port facilities at Rapid Bay (limestone workings). The region is covered by numerous small holdings, including freehold land.

GEOLOGY

GEOLOGICAL DOMAIN
Fleurieu Peninsula; included are the Palaeoproterozoic Barossa Complex, overlain by Adelaidean and also Cambrian of the Stansbury Basin.

ECONOMIC UNITS & DEPTH
Basement: Palaeoproterozoic Barossa Complex - exposed in the cores of regional anticlines, but elsewhere buried to great depth. The Palaeoproterozoic Barossa Complex relates to either the Gawler Craton or Curnamona Province. Rocks of high metamorphic grade (amphibolite-granulite facies) that have been multiply deformed. Late orogenic sodic alteration was responsible for the formation of albitite with which is associated possible IOCG mineralisation.

Neoproterozoic Adelaidean: exposed along the flanks of regional anticlines, but elsewhere buried at depth. Many units of the upper part of the Neoproterozoic succession of the Adelaide Geosyncline are recognised, i.e. Burra, Umberatana and Wilpena Groups. Although no mineralisation is known locally, elsewhere Adelaidean rocks are mineralised, thus metalliferous mineralisation cannot be ruled out. Neoproterozoic metasediments cover much of the area in the region of Yankalilla, Normanville and Carrickalinga, that is the northern part of ELA 2012/38.

Cambrian: Cambrian sediments are restricted to the coast and are possibly not represented in ELA 2012/38.

LITHOSTRATIGRAPHIC SUMMARY – BASEMENT & COVER
The Palaeoproterozoic basement is exposed as inliers in anticlinal cores in the southern Mount Lofty Ranges and Fleurieu Peninsula, e.g. Myponga Inlier. Unconformable upon the inliers is the Neoproterozoic succession of the Adelaide Geosyncline, and unconformable upon both the Palaeoproterozic and Neoproterozoic are the Cambrian metasediments of the Kanmantoo Trough. The various stratigraphic units are tabulated below:

SYSTEM		GROUP	FORMATION	SYMBOL
Cambrian	Middle	Kanmantoo	Balquhidder	E
			*Tapanappa	Elt
			*Talisker	Ela
			*Backstairs Passage	Eeb
			*Carrickalinga Head	Eec
	Early	Normanville	*Heatherdale Shale	Enh
			*Fork Tree Limestone	Enf
			*Sellicks Hill	Ens
			*Wangkonda	Enw

			*Mount Terrible	Ent
Adelaidean	Ediacaran	Wilpena	*ABC Range Quartzite	Nsa
			unnamed	Nsa3
			*Brachina	Nsb
			Seacliff sandstone	Nss
	Marinoan	Umberatana	Elatina	Nee
			Etina	Nit
			*Angepeena	Nia
			unnamed	Nu2
	Sturtian		*Brighton Limestone	Nni
			*Tapley Hill	Nnt
			*Appila Tillite	Nys
	Torrensian	Burra	*Saddleworth	Nds
			Stonyfell Quarzite	Ndt
			Woolshed Flat Shale	Ndw
			*Aldgate Sandstone	Nd
Palaeoproterozoic			*Barossa Complex	Lb

* units shown to crop out within ELA2012/39

Overlying the Palaeoproterozoic-Cambrian rocks is a relatively thin sporadic cover of unconsolidated Permian fluvioglacial sediments.

ALTERATION & MINERALISATION

Copper, gold and uranium mineralisation, to date uneconomic, is known from the Barossa Complex. Significantly intense albite alteration is reported, and it is possible that biotite is a component. Sodic alteration coupled with the presence of Cu-Au-U is consistent with the IOCG system, albeit in this case the rocks being at granulite facies grade. There is late retrogression related to shearing. A small pitchblende-brannerite deposit is known in the Barossa Complex to the east of ELA 2012/38, i.e. the Wild Dog prospect. Copper was investigated at the Gorge Mine, where anomalous uranium has been reported. Non economic gold is known near the north coast at the Grundy prospect and at Rapid Hill.

No Lead-zinc-silver mineralisation of significance has been reported within the ELA area.

STRUCTURE

ELA 2012/38 is predominated by a fold-thrust slice with the Barossa Complex of the Myponga Inlier forming the core. It is possible that the main northerly directed footwall thrust zone approximates the coast. Lithologies along the rocky beach near Little Gorge SW of Normanville appear similar to the Wallaroo Group exposed to the northwest in the Yorke Peninsula. These rocks and those inland have been intruded by red-pink Hiltaba Suite-like granite and pegmatite.

The region is structurally complex having been involved in extensional basin forming events (Adelaidean, and Cambrian) and both the Olarian and Delamerian Orogenies. The Barossa Complex was metamorphosed to granulite facies grade during the Olarian Orogeny before being exhumed to be the basement for the deposition of sediments of the Neoproterozoic Adelaide Geosyncline, this being followed by deposition of Cambrian sandstones and limestones in the Stansbury Basin and Kanmantoo Trough. The Myponga Inlier approximates the transition between the shelf situation of the Stansbury Basin and the rapid deposition into the depocentre of the Kanmantoo Trough (Province). The Myponga Inlier is essentially a fold-trust slice exhumed along a northerly transport direction. The degree of displacement is limited as the Adelaidean and Cambrian successions show normal folded contacts, especially in the southern 'hanging wall'. The northern limb, which parallels the coast, is overturned and disrupted, thus representing the main zone of thrust displacement.

GEOLOGICAL DISCUSSION

The main reason given for targeting the northern Fleurieu Peninsula was the possibility that it contained the southernmost exposures of the Gawler Craton, thus having the potential for IOCG mineralisation. This idea was supported from observations (1998) by the author of lithologies similar to the Wallaroo Group of the eastern Gawler Craton, and intruded by pink pegmatites, being exposed along the beach near Little Gorge. Additionally boulders of undeformed red Hiltaba-like granite are scattered nearby at Great Gorge, and upstream, pink granite returned an date of ~1580 Ma (Szpunar et al. 2006). This supported the work of Crowhurst (1988) who obtained a radiometric date of 1587+/-22 Ma from a pegmatite. The studies of Szpunar et al. (2006) suggest depositional ages of the host metamorphics in the range 1740-1710 Ma, which are in accord with the lower Willyama Supergroup and perhaps the Walleroo Group of the eastern Gawler Craton, or even represent an intervening succession. These early Mesoproterozoic dates are consistent with the granitic rocks representing either the Hiltaba Suite of the Gawler Craton or the Ninnerie Supersuite of the Curnamona Province, however the red colouration supports the former. Ongoing research is being directed towards the relationship of the Barossa Complex with the Gawler Craton and Curnamona Province, e.g. Szpunar et al. (2006).

See appendices for other discussions of geology.

COVER

Cover over the Barossa Complex in ELA2012/38 comprises thick Adelaidean and Cambrian metasediments bordering the Palaeoproterozoic inliers. All have partial cover of thin unconsolidated fluvioglacial Permian sands and conglomerates.

DRILLING

No mineral drilling reported via SARIG on ELA2012/38, drilling that is shown relate to engineering and construction materials.

GEOPHYSICS

AEROMAGNETICS

The state aeromagnetic data available via SARIG shows considerable detail, especially indicating outcropping or shallow Barossa Complex. Linear features are

prominent near and subparallel to the coast, therefore possibly representing major structures.

GRAVITY
The state gravity data available via SARIG is regional, gravity station spacing is sparse and sporadic, generally 2-8 km, but with three closely spaced stations in the vicinity of Little Gorge. It is probably of little value for exploration interpretation.

GEOCHEMISTRY

GEOCHEMICAL SAMPLING
Minor stream & soil sediment sampling in the vicinity of Yankalilla Creek, and the Gorge Mine.

WHOLE ROCK CHEMISTRY

TRACE ELEMENT CHEMISTRY

OTHER DATA, e.g. fluid inclusion

CONCLUSIONS & RECOMMEDATIONS
ELA 2012/38 contains a portion of the southwestern end of the Palaeoproterozoic Myponga Inlier, which is largely buried in the southern half of ELA 2012/38. The rocks of the Barossa Complex are covered by thin unconsolidated Permian fluvioglacial sediment. The northern part of the ELA includes lower Neoproterozoic Adelaidean metasediments. The Barossa Complex – Adelaidean contact is controlled a ENE-trending, southerly dipping fold-thrust zone.

The Eden Creek/Paladin Ltd group (2002-2003, Open File Envelope 9919), exploring for platinum and other precious metals associated with uranium mineralisation, was quite clear in postulating the connection with the Gawler Craton, and even developed an IOCG model for the Barossa Complex of the Myponga Inlier (see Appendix 3). The model was based upon the couple comprising intense albitic alteration combined with pitchblende/brannerite mineralisation. It is likely that Matsa Resources (EL3524), Marathon Resources (EL3682) and International Metals (3992) were thinking along similar lines, but were forced to withdraw when the main body of the Myponga Inlier was put off-limits for mineral exploration (Secton 15 Gazettal; T02499, T02631). The reason given for this decision by the Government of South Australia was the local sensitivity towards uranium mining.

Cu-Au targets have been evaluated elsewhere in the Myponga Inlier, especially at Mount Compass, Mount Monster and Hope Forest, the work included geophysics, geochemical sampling and diamond drilling. Of relevance to FMG, the geology at these prospects is likely to be similar to the Palaeoproterozoic within the FMG ELAs. Although no economic deposits were discovered Cu-Au mineralisation was associated with the iron oxide magnetite. The rocks appear to be high grade gneisses with deformed granite, undeformed granite (Hiltaba Suite or Delamerian) (Australian Development SML 75).

Exploration for IOCG-style mineralisation is recommended to cover the outcropping and shallowly buried Barossa Complex at the southwestern end of the Myponga Inlier. The acquisition of a detailed gravity data-set is essential. Also, in order to confirm that the area is indeed an IOCG province, an examination of available geochemical data, followed up by geochemical sampling for the relevant suite of elements, is recommended.

REFERENCES

Crowhurst PV 1988. The geology, petrology and geochemistry of the Proterozoic inlier, south of Myponga, Fleurieu Peninsula, South Australia. BSc (Hons) thesis, University of Adelaide.

Szpunar, M., Wade, B., Hand, M., Barovich K. 2007. Timing of Proterozoic high-grade metamorphism in the Barossa Complex, southern South Australia: exploring the extent of the 1590 Ma event. MESA Journal 47, pp 21-27.

Szpunar, M. Hand, M., Barovich K., and Jagodzinski, 2006. Tectonic links beteween the Gawler Craton and Curnamona Province. In Korsch, R.J. and Barnes, R.G., compilers, 2006. Broken Hill Exploration Initiative: Abstracts for the September 2006 Conference. Geoscience Australia Record 2006/21, 1-3.

APPENDICES (INCLUDING PREVIOUS WORK)

APPENDIX 1

SUMMARIES OF HISTORIC WORK – SPECIAL MINING LEASES & EXPLORATION LICENCES (CHH Conor)

HISTORIC TENEMENTS COVERING, WHOLLY OR PARTLY, THE ELA 2012/38 AREA

Tenement type	Tenement No	Licensee	Granted	Expiry	Envelope	Commodities
SML	75	Australian Development Ltd	1/12/64	30/11/65	651	
SML	101	Australian Development Ltd	1/02/66	31/01/67	651	
SML	239	CRA Exploration Pty Ltd	23/09/68	22/03/69	1011	
SML	182	Noranda Aust Ltd	15/04/68	14/04/70	933	
SML	305	Electrolytic Zinc Co A/asia Ltd	8/05/69	7/05/70	1158	
SML	405	Noranda Aust Ltd	23/04/70	22/04/71	1404	
SML	542	Comestock Minerlas	11/02/71	10/02/72	1642	
SML	578	Eastern Prospectors Pty Ltd	20/06/71	19/05/72	000	
EL	418	Uranerz	19780915		3367	-
EL	838	RH Oster	19810413		0000	-
EL	1428	Thomdrill	19870826		6949	-
EL	2731	Olliver Geol Services	20000614		0000	Dolomite; Limestone
EL	2862	Eden Creek	20011022		9919	Platinum
EL	3194	Landmark Stone	20040402		10803	Dimension Stone - Marble
EL	3524	Matsa Resources	20060223	22/09/2009	0000	Uranium; Gold; Copper
EL	3582	Marathon Resources	20060621	31/01/2007	0000	Zinc; Lead
EL	3992	International Metals	20071126	10/04/2008	0000	Uranium; Copper

SPECIAL MINING LEASE 75 (& 101) AUSTRALIAN DEVELOPMENT LTD. (ENV. 651)

From 1962 to 1964 Australian Development had a number of SML leases in the vicinity of Adelaide. Work was carried out over the northeastern extension of the Myponga Inlier, especially over Cu-Au targets at Mount Compass, Mount Monster and Hope Forest, the work included geophysics, geochemical sampling and diamond drilling. Of relevance to FMG, the geology is likely to be similar to the Palaeoproterozoic within the FMG ELAs. Although no economic deposits were discovered Cu-Au mineralisation was associated with the iron oxide, magnetite. The rocks appear to be high grade gneisses with deformed granite, undeformed granite (Hiltaba Suite or Delamerian) and phyllonite, the latter possibly representing micaceous retrograde shear zones.

A small soil sample survey was carried out south of Normanville near Lady Bay. Cu, Mo and Pb values were judged to be insufficient for work to continue.

Maximus Resources Ltd currently hold the ground to the east of FMG ELAs as EL4193.

SPECIAL MINING LEASES 182 & 405. NORANDA AUSTRALIA LTD, 1969-1971

Exploration specifically targeted uranium. Although much radiometric anomalism was detected not economic mineralisation was found. (The small pitchblende deposit, Wild Dog had been discovered in 1953).

SPECIAL MINING LEASES 238 & 239. CRA CORPORATION PTY LTD. 1968-1969. (ENV. 1011)

CRA'S target was zinc silicate in the Lower Cambrian limestones. The search was unsuccessful.

Of significance to FMG CRA carried out detailed stream sediment sampling over SML 238, which includes the western portion of ELA39/2012. The main metals targeted were Cu, Pb, Zn, none of which returned significant anomalies. Analyses included Pb, Zn, Cu, Ni, Co, Mn, Ag, Mo, As.

The negative results of the CRA survey downgrades the NE-trending geophysical feature.

SML542 COMSTOCK MINERALS LTD. SOUTHERN FLEURIEU PENINSULA 1971-1972 (ENV. 1642)
The target metals were Cu, Pb, Zn, and Comstock sampled creeks at fairly wide spacing to the east of the area covered by CRA(SML 238). Values were low, thus the lease was dropped.

EXPLORATION LICENCE EL 418. MYPONGA. URANERZ (AUSTRALIA) PTY LTD. 1978-1979. (ENV. 3367)
See Appendix 1 for map and DIMTRE exploration summary.

The NE corner of ELA 2012/39 includes a small portion of the ground covered by EL 418. Uranerz was exploring for 'veinlike-type' uranium deposits, but analysing for thorium and yttrium also. A petrographic study indicates that the rock samples from the Barossa Complex were of granulite facies grade, however a set is characterised by the dominance of albite, hence Na-metasomatism was suggested. Accessory altered uranitite and pitchblende, as well as monazite and zircon were recorded.

The majority of work concentrated to the east of ELA 2012/39 in the vicinity of the Wild Dog prospect, 'albitites' appear to have been of interest. However the Little Gorge area, which adjoins the ELA was geologically examined, see following clip:
"

Mapping commenced around the Little Gorge area south of Yankalilla where a thick sequence of chlorite schists dipping steeply east, becomes gneissic upward with thin interbeds of amphibolites, granite-gneiss and quartzite. The whole sequence is overturned. The Lower Proterozoic/Adelaidean unconformity is exposed on a wavecut platform, south of Little Gorge.

Further mapping revealed an overturned anticlinorium of pre-Permian sediments which has been denuded exposing greenschist facies metasediments of Cambrian and Adelaidean age, unconformably overlying amphibolite facies, schists and gneisses of Lower Proterozoic age.

Detailed mapping of the Barossa Complex outcroping in this tenement continued during the later part of the quarter. The delineation of the albitite units and the basement-cover contact was concentrated upon, and several anomalies were detected. The uranium anomaly on Yankalilla River was revisited but detailed traversing failed to find extensions to the albitite or the radiometric anomaly.

"

Sampling and drilling in the Wild Dog area failed to provide sufficient interest for retention of the lease.

EXPLORATION LICENCE EL 1428, FLEURIEU PENINSULA. THOMDRILL PTY LTD. 1987-1988. (ENV. 6949)
See Appendix 1 for map and DIMTRE exploration summary.

Much of the ELA 2012/39 area was included in the ground covered by EL 1428, a large NNE orientated licence area. Thomdrill targeted gold in laterite, i.e. Boddington-type, and quartz vein gold in the Barossa Complex and Kanmantoo Group. Samples were analysed for Au, Cu. Pb, Zn, Bi, Ag, As.

Distant from ELA 2012/38 but of interest to the company were the historic gold diggings at Callawonga, Gaba Tepe and Bullaparatta (?Bullaparada, ?Boolparudda Creek), which appear to be in the vicinity of the Wolfram-gold mineralisation previously investigated by WMC (EL 1348). Sampling of the laterite profile failed to give encouraging results, and additionally repeat analysis of drill core from the Mount Monster Mine that had shown significant gold values indicated that these values were false, therefore and the lease was relinquished.

EXPLORATION LICENCE EL 2862, YANKALILLA. EDEN CREEK PTY LTD (PALADIN RESOURCES LTD). 2001-2003. (ENV. 9919)
See Appendix 1 for map and DIMTRE exploration summary.

The northeastern portion of the ELA 2012/39 near Lady Bay includes a small area of ground covered by EL 2862, which covered the western part of the Myponga Inlier. The principal target was the precious minerals platinum, palladium and gold.

A good general description of the geology of the inlier is given in Open File Envelope 9919. Albite-dominated alteration is well described as it is considered to relate to uranium and weak platinum mineralisation. It is hypothesised that the Palaeoproterozoic basement relates either to the Gawler Craton or Curnamona Province. Interestingly the company indicates that some Yorke Peninsula core was examined, although details are not included. Additionally a relationship is postulated with the visible alteration and mineralisation being a product of Olympic Dam type processes.

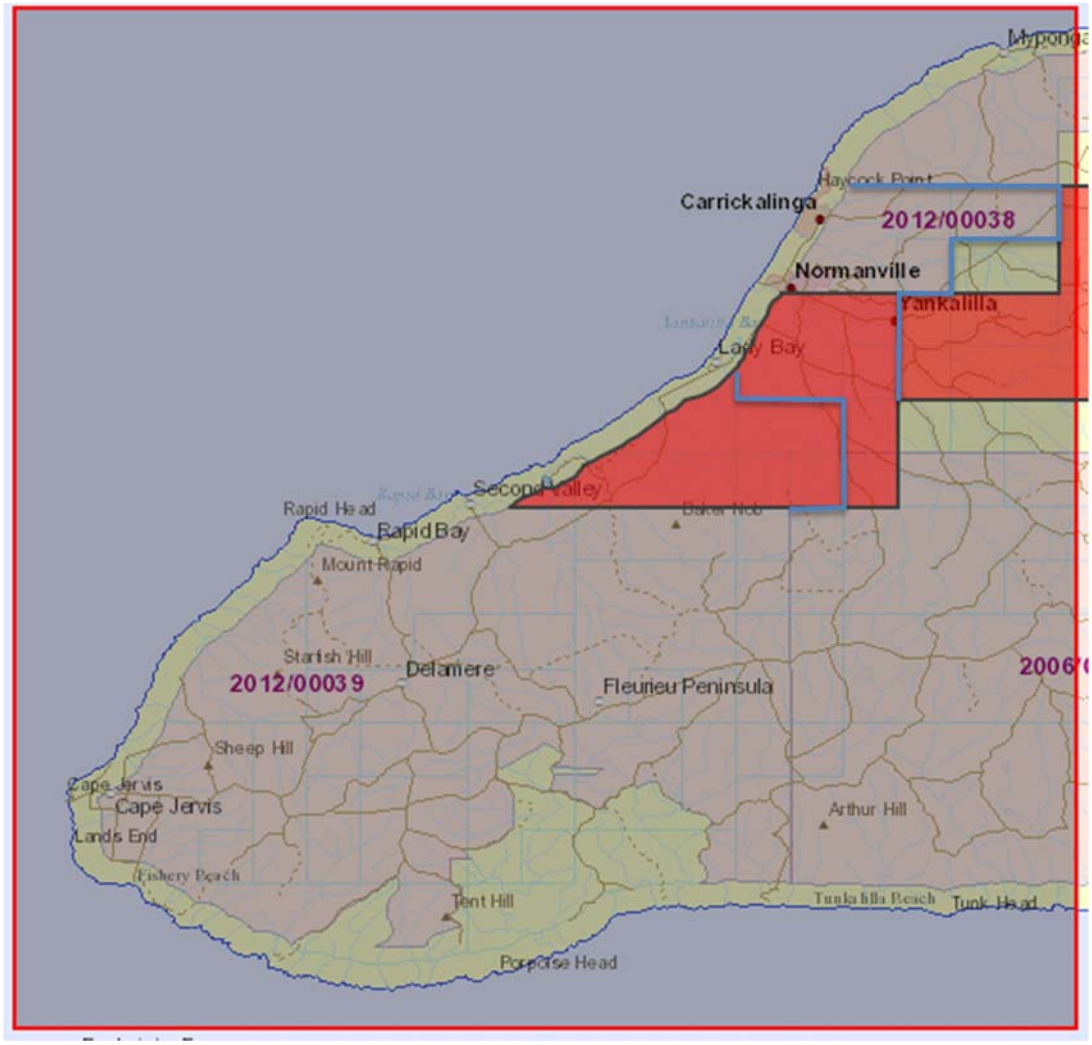
Soil sampling was carried out in the Great Gorge Mine area near Lady Bay with results returned as high as 7ppb Au.

The following EL holders provided no report, and presumably did little or no work, due often to access difficulties:

R.H. Oster; EL 838
Olliver Geological Services; EL 2731
Eyre Dimension Stone: EL3139
Matsa Resources; EL 3524
Marathon Resources; EL 3582
International Metals; 3992.

APPENDIX 2.
DMITRE SUMMARIES OF HISTORIC WORK – EXPLORATION LICENCES.

EL418 MYPONGA. URANERZ (AUST) LTD



EL418

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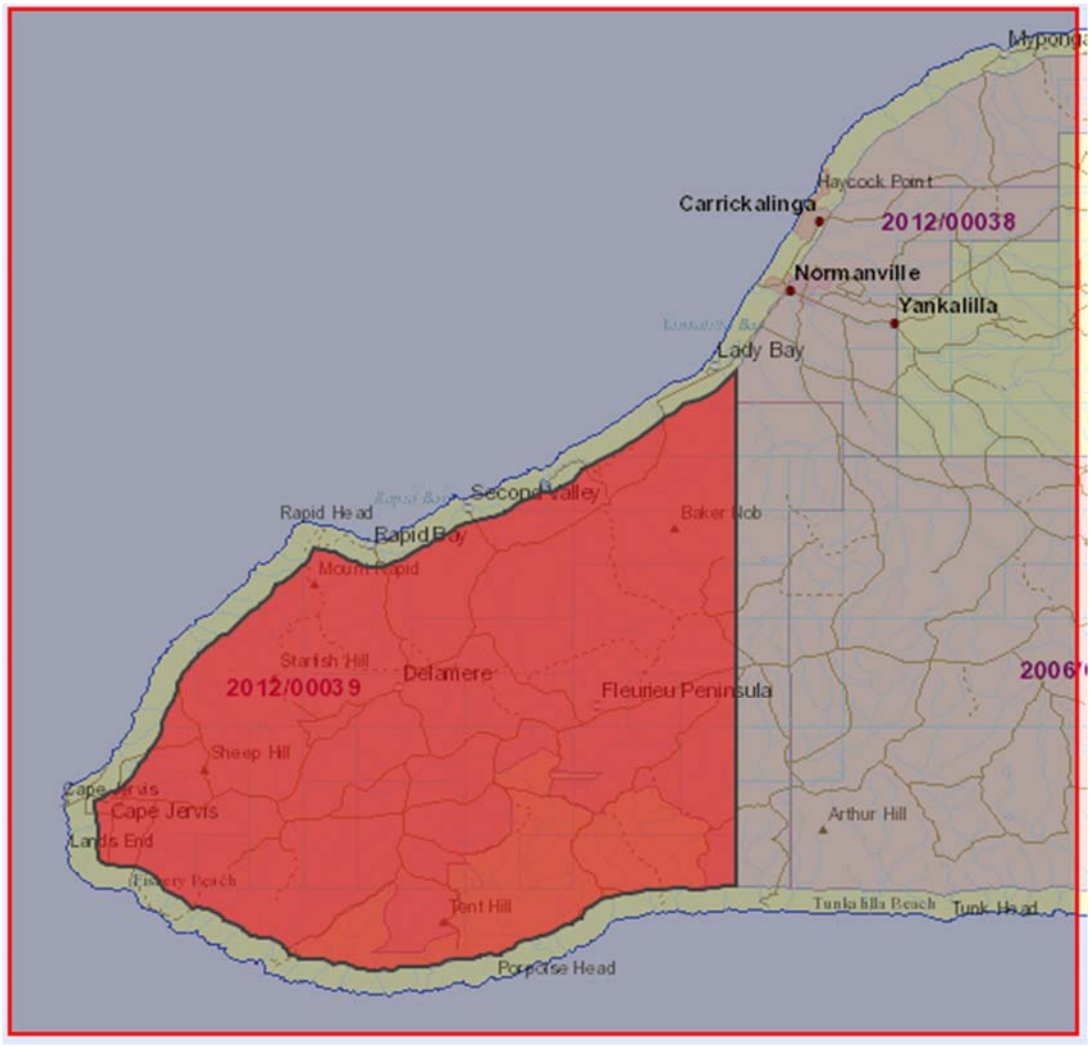
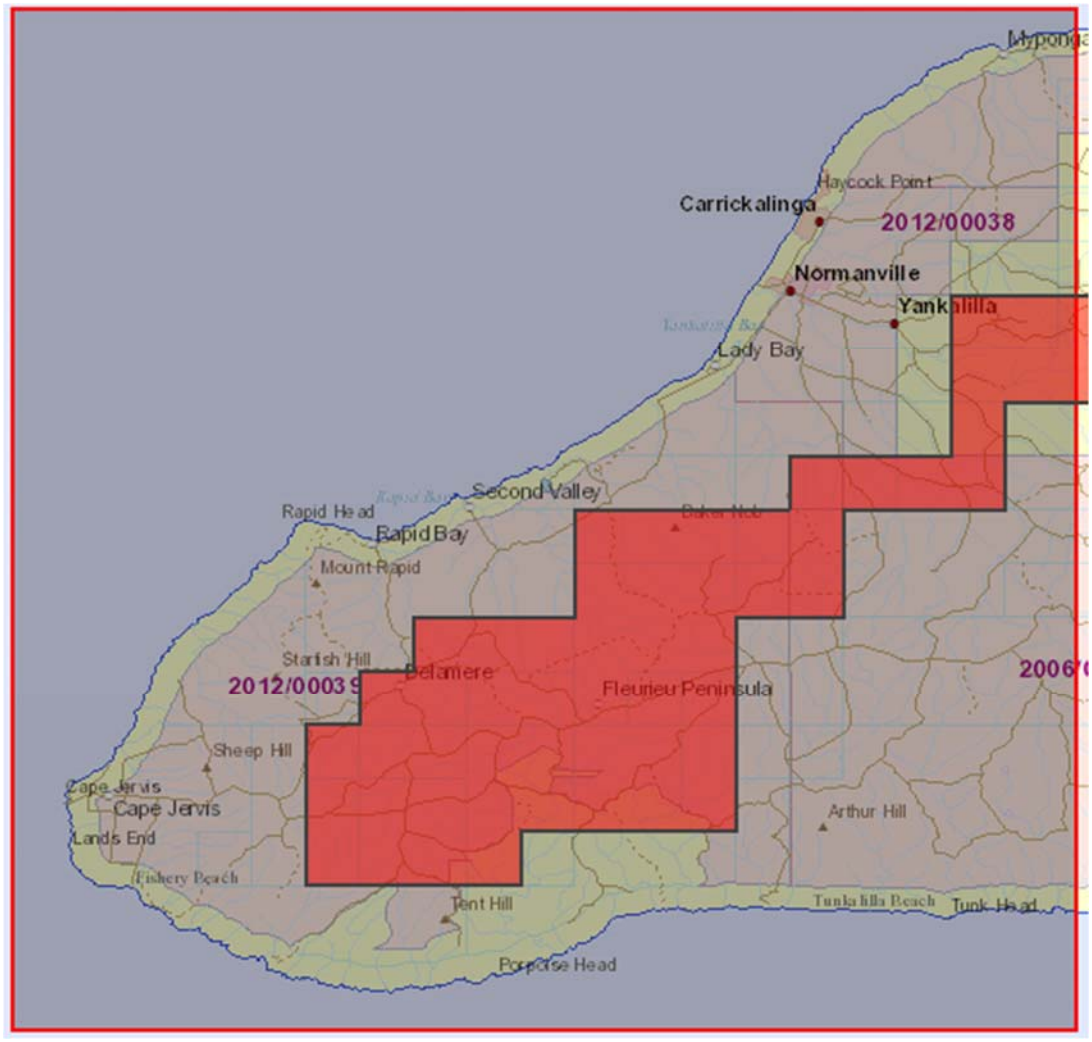
Reference:	Env 03367 Download Document
Category:	Mineral exploration licence reports
Title:	Myponga. Progress and final reports to licence surrender for the period 15/9/1978 to 7/5/1979.
Date:	31Jul1979
Tenement:	EL00418
Licensee:	Uranerz (Aust.) Pty Ltd
Pers. Author:	Pontifex, I.R.; Jones, W.R.; Adamek, P.; Vels, B.; Morete, S.
Corp. Author:	Pontifex and Associates Pty Ltd
Source:	South Australia. Department of Primary Industries and Resources. Open file Envelope, 03367
Collation:	Total fiche: 6, Total pages: 141, 20 plans, 2 appx, 8 fig, 8 plates, tables, 4 reps
Format:	Digital Hard Copy
Client:	Uranerz (Aust.) Pty Ltd
Broad Subject:	Mineral exploration - SA; Regional geology; Petrology; Geochemistry; Geophysics; Drilling; Economic geology
Subject Terms:	Uranium exploration; Hydrothermal deposits; Vein deposits; Inliers; Precambrian; Abandoned mines; Prospect evaluation; Exploration licences; Progress reports; Tenement maps; Geological mapping; Basement; Proterozoic, Early; Schist; Gneiss; Amphibolite facies; Metasediments; Adelaidean; Cambrian; Greenschist facies; Geological structures; Overturned folds; Interpretative maps; Radioactivity surveys; Scintillometers; Radiometric anomalies; Stream sediment sampling; Assay value; Geochemical maps; Geochemical anomalies; Mineral occurrence; Uraninite; Vein deposits; Shear zone; Lodes; Host rock; Lithologic unit; Granulite; Pegmatite; Albitite; Diamond drilling; Drillhole location maps; Drill core; Geological logs; Core sampling; Metamorphic petrology; Thin sections; Photomicrography; Mineral identification; Metasomatism
Abstract:	Exploration for hydrothermally emplaced, vein-type uranium ore deposits within Proterozoic basement of the Myponga Inlier and within overlying metasedimentary and lateritic detrital cover rocks, in an area located 60 km south-southwest of Adelaide, has comprised detailed geological mapping at 1:10,000 scale (with most work done locally on a 1:1000 scale grid over the abandoned Wild Dog Creek U-Th workings), plus ground radiometric surveying, stream sediment sampling, diamond drilling (3 inclined holes, total 201 m), and subsequent sample logging/geochemical/radiographic/petrological evaluation of new cores and of stored previous drillhole core samples. Few radiometric, mineralogical or geochemical anomalies of economic significance were found, although uranium, thorium and yttrium-bearing finely dispersed primary mineralisation is prevalent in the area.
Mine Name:	Wild Dog prospect
Map Sheet:	BARKER; 6526I; 6626IV; 6627III
Locality:	Fleurieu Peninsula; Myponga; West Scrub Hill; Wild Dog Creek; Willunga Hill; Carrickalinga Creek; Yankalilla Hill; Yankalilla River; Little Gorge
Geol. Province:	Adelaide Geosyncline; Myponga Inlier
Drillhole:	SADM DDH 1 - DDH 22; MD1 - MD3
Assays:	U; Th; Y; Mo; Cu; Pb; Zn; Co; Ni; Fe; Mn; P
Stratigraphy:	Barossa Complex
Date Added:	1999-08-09
Last Changed:	2008-02-20
Date Indexed:	2002-01-25
Image Size (Kb):	6400
Cat No:	2021238
Document URL:	https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/ENV03367.pdf

EL838 CAPE JERVIS. R.H. OSTER & CO PTY LTD



EL838
No work reported.

EL1428 MT COMPASS. THOMDRILL PTY LTD.


Carrickalinga
Haycock Point
2012/00038
Normanville
Yankalilla
Lady Bay
Second Valley
Rapid Head
Rapid Bay
Mount Rapid
Starfish Hill
2012/0003
Delamere
Fleurieu Peninsula
Sheep Hill
Cape Jervis
Lands End
Fishery Beach
Arthur Hill
Tent Hill
Tunkalilla Beach
Tunk Head
Porpoise Head
EL1428

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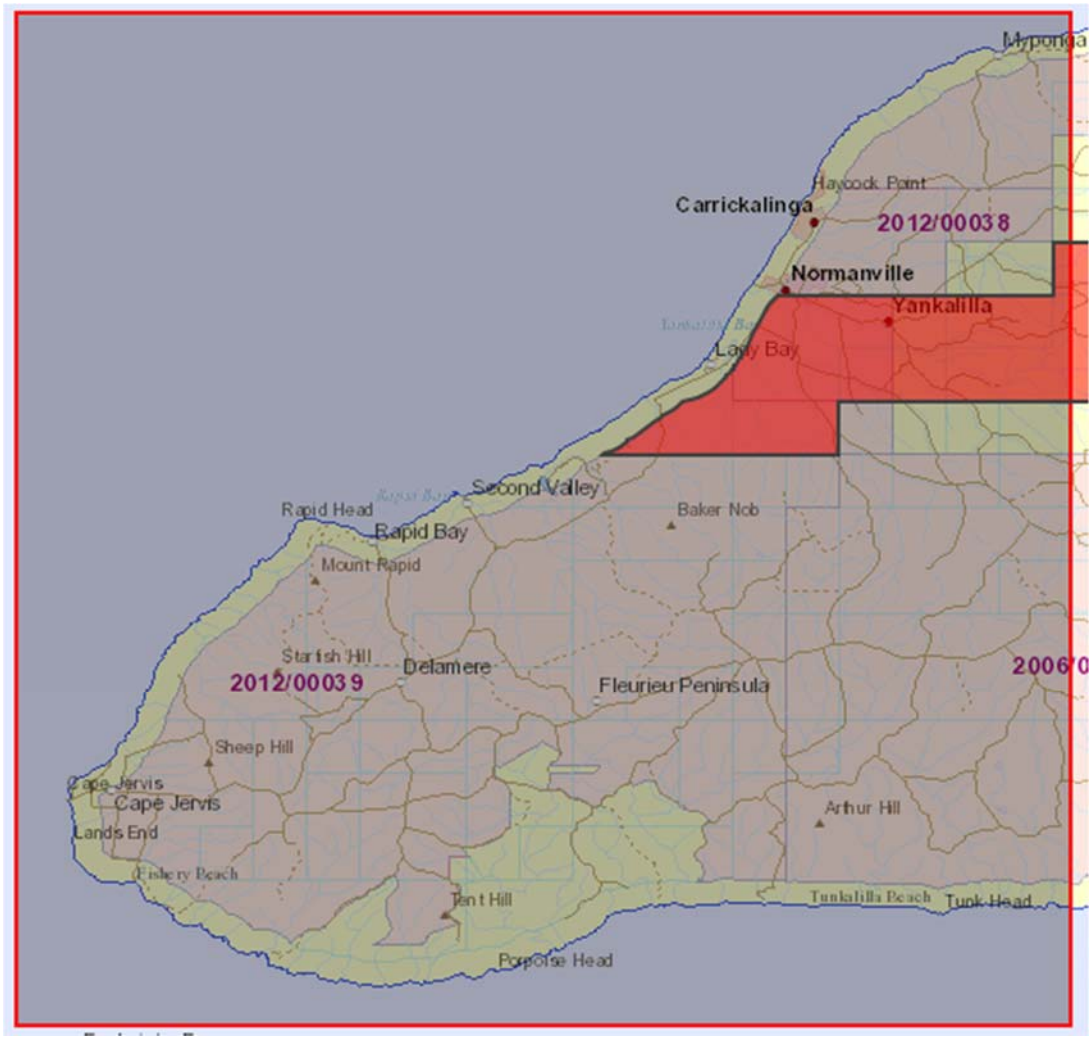
Reference:	Env 06949 Download Document
Category:	Mineral exploration licence reports
Title:	Fleurieu Peninsula. Progress and final reports from 26/8/87 to February 1988.
Date:	1988
Tenement:	EL01428
Licensee:	Thomdrill Pty Ltd
Pers. Author:	Wilson, D.A.; Tonkin, D.G.
Source:	South Australia. Department of Primary Industries and Resources. Open file Envelope, 06949
Collation:	Total fiche: 2, Total pages: 53, 1 plans, 5 appx, 2 fig, 2 reps
Format:	Digital Hard Copy
Broad Subject:	Mineral exploration - SA; Geochemistry
Subject Terms:	Gold exploration; Laterites; Petrology; Assay value
Abstract:	TARGET: Gold mineralization of the Boddington type in Pliocene laterites. EXPLORATION: Data review, drill core inspection, rock chip sampling and orientation sampling at Callawonga mine. RESULTS: 2 of 46 laterite samples gave anomalous results.
Mine Name:	Callawonga Gold Mine
Map Sheet:	BARKER; 6527; 6627; 6526
Locality:	Fleurieu Peninsula
Geol. Province:	Kanmantoo Trough
Assays:	Cu; Pb; Zn; Bi; Ag; As; Au; Ba; Ce; Cs; Ga; Ge; Hf; La; Mo; Nb; Nd; Rb; Sb; Se; Sn; Sr; Ta; Te; Th; Tl; U; W; Y; Zr; Co; Fe; Mn
Date Added:	1988-07-01
Last Changed:	2005-06-17
Image Size (Kb):	1821
Cat No:	3444
Document URL:	https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/ENV06949.pdf

EL2862 YANKALILLA AREA. EDEN CREEK PTY LTD.

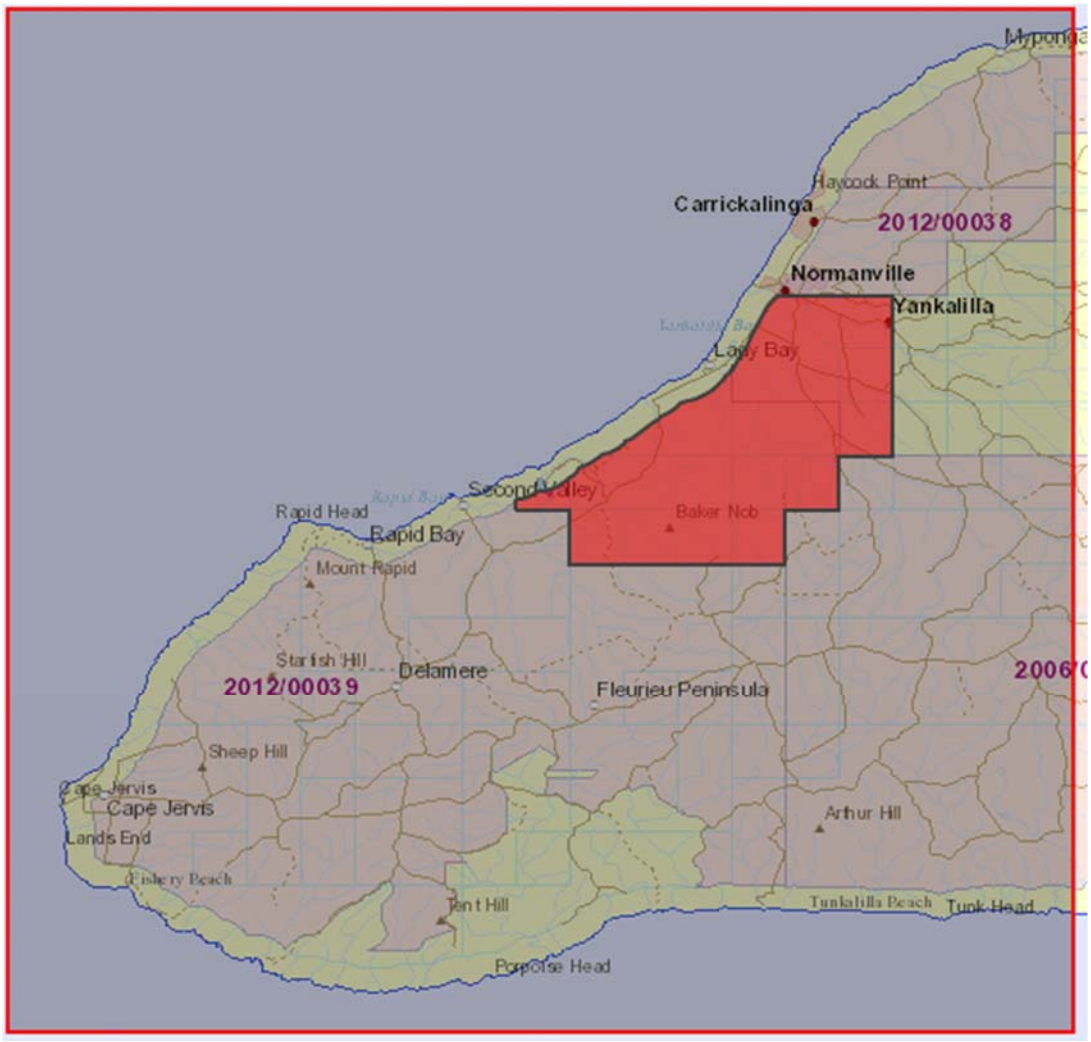

Carrickalinga
Haycock Point
2012/00038
Normanville
Yankalilla
Lady Bay
Second Valley
Rapid Head
Rapid Bay
Baker Nob
Mount Rapid
Starfish Hill
2012/00039
Delamere
Fleurieu Peninsula
Sheep Hill
Cape Jervis
Lands End
Fishery Beach
Arthur Hill
Tent Hill
Tunkalilla Beach
Tunk Head
Porpoise Head
EL2862

Record 1 of 1
First Previous Next Last

To order copies, click **Show Results** and follow the instructions at the top of the page.

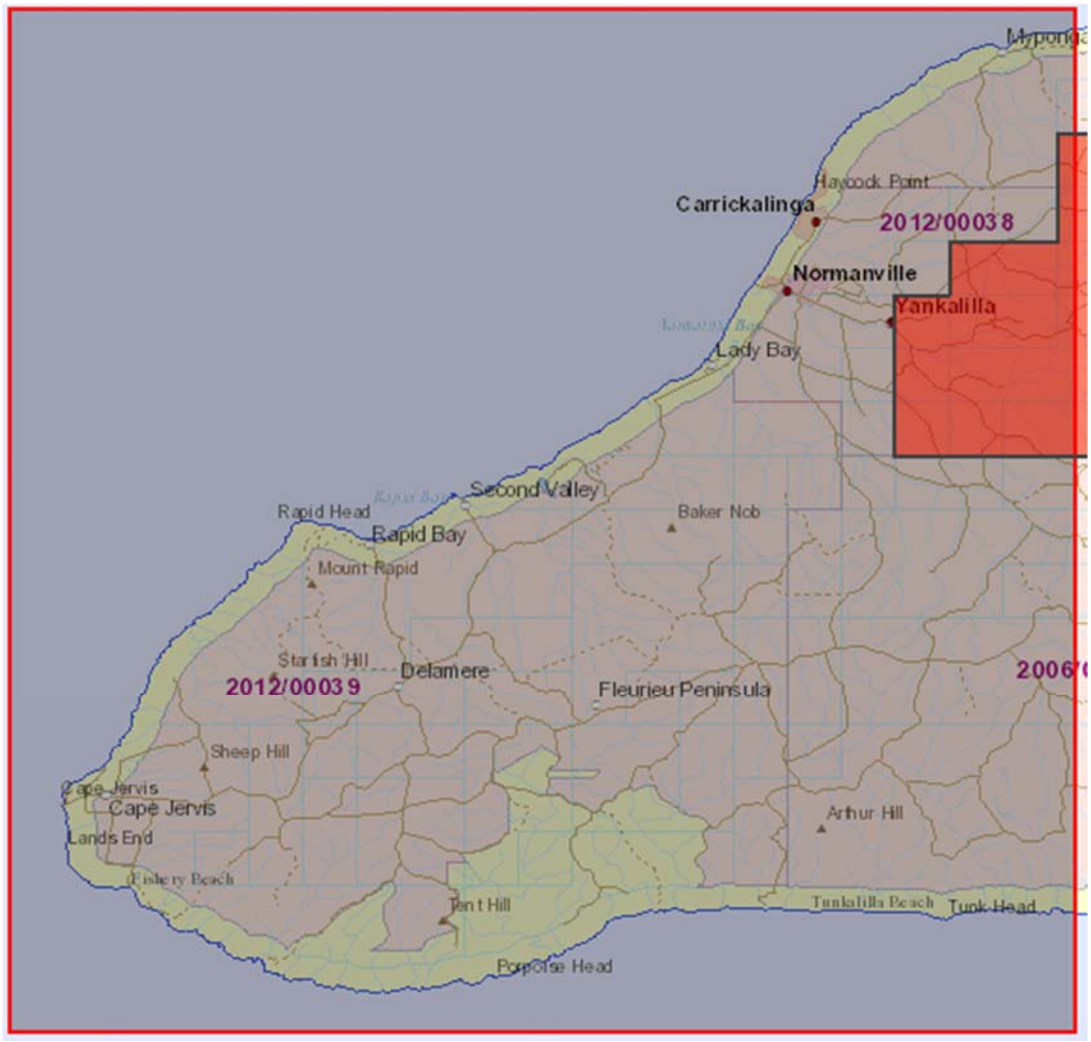
Reference:	Env 09919 Download Document
Category:	Mineral exploration licence reports
Title:	Yankalilla. Annual and final reports to licence expiry for the period 22/10/2001 to 21/10/2003.
Date:	Feb 2004
Tenement:	EL02862
Licensee:	Eden Creek Pty Ltd
Pers. Author:	Hogarth, P.J.; Becker, E.
Source:	South Australia. Department of Primary Industries and Resources. Open file Envelope, 09919
Collation:	Total pages: 72, 13 appx, figures, 1 ref, tables, 2 reps
Format:	Digital Hard Copy
Broad Subject:	Mineral exploration - SA; Geochemistry; Structural geology
Subject Terms:	Precious metals; Inliers; Proterozoic, Early; Magmatic deposits; Metamorphic deposits; Exploration licences; Annual reports; Tenement maps; Mineral occurrence; Uranium minerals; Exploration history; Regional geology; Tectonics; Historical geology; Geological maps; Geochemical anomalies; Platinum; Palladium; Exploration potential; Host rock; Albitite; Orebodies; Ore mineralogy; Geological models; Alteration; Mineral zoning; Rock geochemistry; Ore controls; Prospect evaluation; Field geology; Outcrop; Rock structures; Soil sampling; Rock chip sampling; Sample location maps; Drill core; Sample storage; Geological logs; Core sampling; Chemical analysis; Assay value; Geochemical interpretation
Abstract:	Possible primary gold and platinum - palladium mineralisation in Palaeoproterozoic basic igneous rocks of the Myponga Inlier were the targets of exploration in an area 60 km south of Adelaide. Work undertaken comprised geological mapping, soil and rock chip sampling, and re-logging and sampling of historic drill holes. No significant results were obtained.
Mine Name:	Wild Dog uranium prospect; Great Gorge prospect
Map Sheet:	BARKER; 6527II
Locality:	Southern Mount Lofty Ranges; Fleurieu Peninsula; Yankalilla; Myponga Hill; Lady Bay; Little Gorge
Geol. Province:	Adelaide Geosyncline
Drillhole:	SADM DDW01 - DDW16; SADM MD01 - MD03
Assays:	Pt; Pd; Au; Ag; Ce; Co; Cu; Ge; Te; U; As; Ba; Ga; Mo; Pb; Th; Ti; W; Zn
Stratigraphy:	Barossa Complex
Date Added:	2004-07-13
Last Changed:	2005-06-17
Date Indexed:	2004-07-16
Image Size (Kb):	1715
Cat No:	2023197
Document URL:	https://sarigbasis.pir.sa.gov.au/WebtopEw/ws/samref/sarig1/image/DDD/ENV09919.pdf

EL3524 YANKALILLA AREA. MATSA RESOURCES LTD.



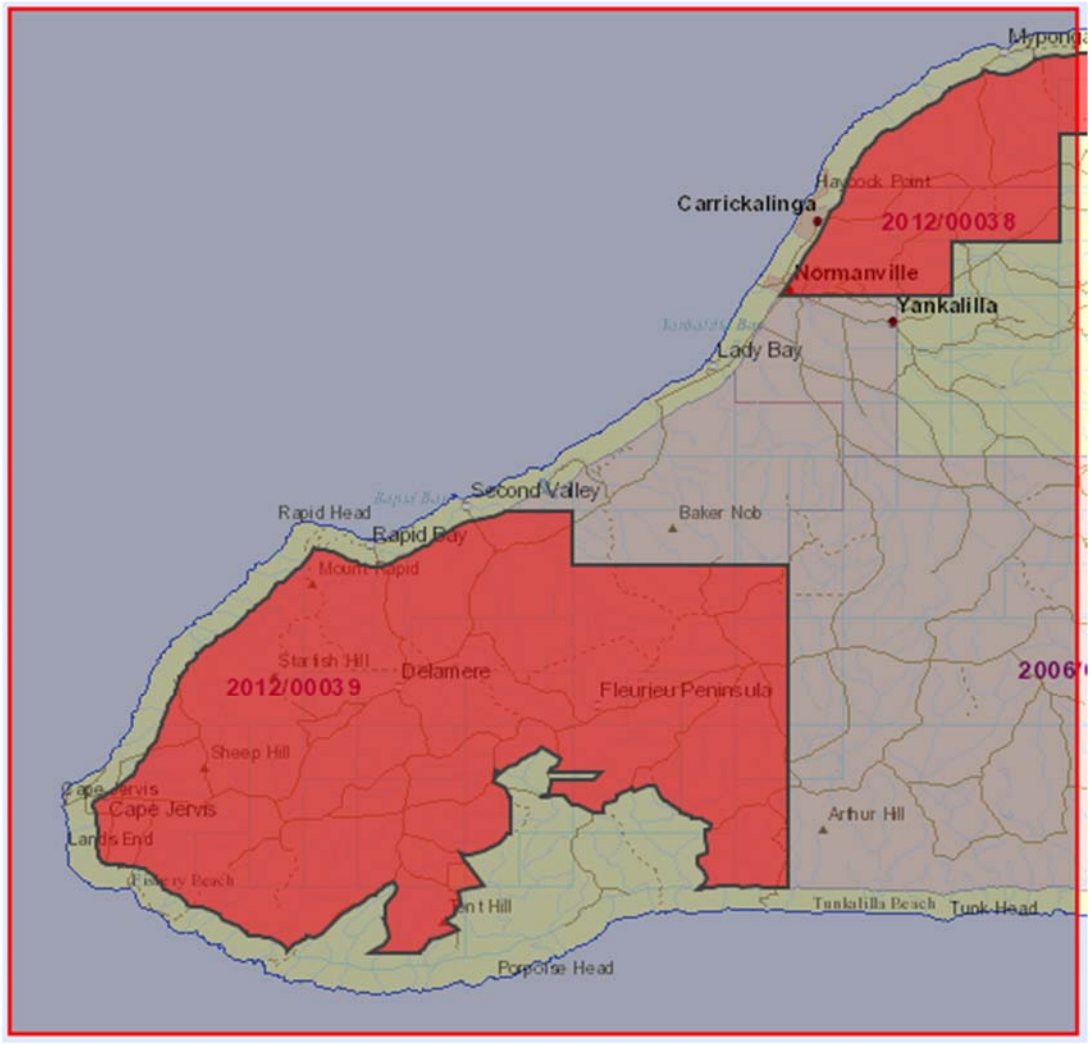
EL3524
No work reported.

EL 3582, MARATHON RESOURCES



EL3582
No work reported.

EL3992 RAPID BAY AREA. INTERNATIONAL METALS PTY LTD.



EL3992

No work reported.

APPENDIX 3

REFERENCE LIST OF EARLY GEOLOGICAL & EXPLORATION ACTIVITIES IN THE ELA 2012/39 REGION (from Preussag Australia, ENV 2607)

2) University of Adelaide investigations

The following table lists the publications of research personnel associated with the University of Adelaide which have been referred to in the compilation of this report.

Table 2

Author	Year	Publication
Skinner, B.O.	1950	Unpublished Thesis, Department of Economic Geology, University of Adelaide (Ref. 25).
Abele, C. Mc.Gowran, B.	1959	Transactions of the Royal Society of South Australia, Vol. 82, (Ref. 1).
Daily, B.	1963	Records of the South Australian Museum Vol. 14, No. 3 (Ref. 11).
"	1969	Geological Excursions Handbook, A.N.Z.A.A.S. 1969 (Ref. 12).
Daily, B. Milnes, A.R.	1971	Transactions of the Royal Society of South Australia, Vol. 95, Pt. 4 (Ref. 13).
"	1972	Journal of the Geological Society of Australia, Vol. 19, Pt. 2 (Ref. 14).
"	1973	Transactions of the Royal Society of South Australia, Vol. 97, Pt. 3 (Ref. 15).
Barry, J.	1973	Unpublished report, Department of Economic Geology, University of Adelaide (Ref. 5).
Daily, B. Twidale, C.R. Milnes, A.R.	1974	Journal of the Geological Society of Australia, Vol. 21, Pt. 4 (Ref. 16).

1) South Australian Department of Mines investigations:

Regional and detailed geologic mapping has been carried out, together with geochemical, geophysical and drilling programs directed towards the assessment of specific base metal prospects within the area. The following table summarizes relevent publications to which reference has been made in this report.

Table 1

Section A Mapping Data

Author	Year	Publication
Campana, B. Wilson, R.B. Whittle, A.W.G.	1954	Jervis and Yankalilla 1:63,360 geological map sheets plus Report of Investigations No. 3 (Refs. 7, 8 and 9).
Wright, R.G.	1969,1970,1972	Mining Reviews No.'s 126,128, 132 (Refs. 33, 34 and 35).
Thomson, B.P. Horwitz, R.C.	1962	Barker 1:250,000 geological map sheet (Ref. 31).

Section B Mineral Exploration Data

Author	Year	Publication
Austin, J.B.	1863	The Mines of South Australia (Ref. 3).
Brown, H.Y.L.	1908	Record of the Mines of South Australia, 4th ed. (Ref. 6).
Rowley, R.	1955	Mining Review No. 102 (Ref. 24).
Nixon, L.G.B.	1959	Mining Review No. 110 (Ref. 22).
Johnson, J.	1962	Mining Review No. 116 (Ref. 18).
Thomson, B.P.	1962	Quarterly Geological Notes No. 3 (Ref. 27).
"	1962	Department of Mines Plan No. 62-567 (Ref. 26).
Verhofstad, J.	1963	Mining Review No. 118 (Ref. 32).
Taylor, B.J.	1964	(in R.G. Wright, 1969, Mining Review No. 126 - see above, Section A).
Wright, R.G.	1969,1970,1972	Mining Review Nos. 126, 128, 132 (Refs. 33, 34 and 35).
Faulks, I.	1973	Department of Mines Plan No. 73-785 (Ref. 17).
Morris, B.J.	1974	Department of Mines Report Book No. 74/202 (unpublished), (Ref. 20).

APPENDIX 4

THE GEOLOGY OF THE BAROSSA COMPLEX OF THE MYPONGA INLIER
From Open File Envelope 9919 Eden Creek/Paladin Ltd (EL 2862)

Regional Geology (1)

Metamorphic rocks, possibly in part equivalent to those of the Proterozoic Gawler Craton and/or Willyama Inlier, form the basement to Adelaidean and Cambrian cover sequences of the Adelaide Geosyncline. Unlike the Gawler Craton, these metamorphics have been viably affected by the Cambro-Ordovician Delamerian Orogeny, and are exposed as five inliers (Houghton, Warren, Aldgate, Oakbank and Myponga) in partially faulted and mylonitised anticlinal cores in the Mount Lofty Ranges *(Figure 3)*. Known collectively as the Barossa Complex, these rocks were originally of moderately high metamorphic grade (upper amphibolite facies) but have undergone extensive retrograde metamorphism (green-schist facies) and shearing. Limited geochronological data indicate a very early Mesoproterozoic age for the high-grade metamorphism and imply that the protoliths were Palaeo Proterozoic.

Various tectonic models for the setting of the inliers are postulated. They range from simple antilclinal cores to large thrust controlled drag folds and allochthonous thrust sheets emplaced along decollement surfaces in the Adelaidean cover. The inliers are probably best regarded as the cores of strongly asymmetrical anticlines with western limbs sheared out to varying extents. The relative continuity (with some exceptions) of the cover stratigraphy around the inliers, with eastward-younging sequences on the

east limbs and westward-younging on the west limbs, argues against large-scale lateral transport, but small to medium-scale overthrusting is consistent with observed field evidence.

Although small intrusive granitic, pegmatitic and amphibolitic dykes have been recognised throughout the basement inlier, the bulk of the rocks are of metasedimentary origin and are strongly layered or banded, the layering being parallel to the gneissic foliation. The least sheared and retrogressed lithologies mostly have a gneissic fabric. Quartzofeldspathic compositions are dominant, varying from medium-grained rocks resembling meta-arkose to coarse-grained migmatitic and augen gneisses of generally felsic composition. Rare quartzite bands have been reported, but it has not been possible to trace any of them as significant marker beds. Unusual feldspar-diopside gneisses with "granulitic" texture occur persistently in the Houghton and Myponga Inliers. Originally thought to be meta-igneous (the "Houghton Diorite" of Benson, 1909), these distinctive rocks are now interpreted by Government geologists as metamorphosed calcareous and dolomitic sandstones and shales and are referred to as the "Houghton Calcsilicate".

The distribution of rock types in the inliers is subject to considerable uncertainty. Contacts are commonly gradational and structural relationships are poorly understood.

Unconformably overlying the basement are the sedimentary sequences of the Neo Proterozoic which accumulated in the north-south trending Adelaide Geosyncline. The basal sediment consists of the Aldgate Sandstone, a coarse grained hematitic feldspathic sandstone grading up into shallow marine dolomites, argillites, arenites and shales. These sediments belong to the Torrensian of the Adelaidean and grade up into tillites of the Sturtian and Marinoan. In the Mt Lofty Ranges the base of the Adelaidean, i.e. the Willouran clastics and basic volcanics, is absent.

Sedimentation continued into the Early Paleozoic with the deposition during the Cambrian of the Kanmantoo Group, mainly limestones, sandstones and shales. Both the Adelaidean and Kanmantoo were deformed and metamorphosed to greenschist facies during the Cambrian to Ordovician Delamerean Orogeny. Granitoids were also emplaced.

Following the orogeny, denudation of the fold belt took place during the Permian where glaciation over the Fleurieu Peninsula scoured out wide valleys and rounded hilltops, exposing the basement cores to the Adelaide Geosyncline. Deposition of glacial debris blanketed extensive areas of earlier sedimentation.

The tenement covers the southern parts of the Myponga Inlier including the Wild Dog Uranium Prospect.

The Myponga Inlier is less continuously exposed than the Houghton Inlier, large parts being covered by Permain sediments. The southern extension of the Myponga Inlier consists of augen gneiss with a strong superimposed schistosity, accompanied by sillimanite gneiss, migmatitic gneiss, biotite-rich gneiss, amphibolite, metasomatised amphibolite, granitic gneiss, granite and pegmatite. The "Houghton calcsilicate" is reportedly represented by pink and pale green, well-layered microcline-hornblende-diopside-epidote rock with a granoblastic texture. In outcrop only a non-banded fine to medium grained version was observed 2.5km south east of Yankalilla. Assays did not show any Pt/Pd enrichment.

Early intensive tight folding (D1) resulted in a near layer parallel schistosity. Further, these gneisses were deformed into tight isoclinal folds with a high grade axial plane schistosity. This deformation, D2, caused re-crystallisation and resulted in the formation of minerals such as sillimanite, cordierite and garnet. Again, as with D1, intrusion of pegmatites may be related to partial melting.

At the waning stages of the Palaeo Proterozoic orogeny, less intense deformation, i.e. D3, caused upright open folds on a macroscopic scale. The metamorphism associated with this event was retrogressive. It appears at this stage the sodium rich solutions followed major channelways formed by the D3 tectonics and caused extensive albitisation.

Uranium was precipitated as dissemination's in well defined channelways in the more intensely albitised areas. Following the formation of the orebodies, deposition of Upper Proterozoic Adelaidean and Cambrian Kanmantoo Group sediments took place. The Delamerean orogeny in the Ordovician resulted in intense deformation of the cover rocks, but only gentle folding in the basement rocks. This folding caused only local plunge reversals in the Wild Dog area.

Along the western margin of the Inlier, basement is thrust over Adelaidean rocks and has been highly strained and attenuated. At Little Gorge just south of Normanville, mylonite is also extensively developed in basement gneiss immediately adjacent to

Adelaidean cover. A stretching lineation orientated 25-35° towards 140° and deformed quartz augen consistently thrusting of basement towards the north-west.

Some of the overlaying Adelaidean as well as the combined rocks were affected by the Mylonitisation as well. Weekly radioactive samples from east of Little Gorge did not show any Pt/Pd enrichment.

Ground work consisted of roadside reconnaissance in the area. At the time the prospect was visited notices of entry had not been served on owners of freehold land, hence these areas could not be accessed. For this reason the Wild Dog Prospect was not visited. Work concentrated on logging and sampling the Wild Dog drill core. *Figure 4* shows the geology and the drill hole locations at the Wild Dog Prospect area.

At the Wild Dog Prospect the host rocks consist of coarse grained layered amphibole-pyroxene-feldspar, biotite-feldspar and sillimanite-biotite-feldspar gneisses intruded by pegmatite. These have undergone at least four periods of deformation. D1 gave rise to a strong schistosity often parallel to the layering, while D2 is characterised by tight isoclinal folds, again with a strong axial plane schistosity. Both events were accompanied by high grade metamorphism and have related pegmatite intrusions. The high grade mineral assemblage seen is a result of the M2 metamorphism. D3 produced relatively open but overturned macroscopic folds trending northwest-southwest plunging to the northwest. This deformation is most likely a retrogressive event. Both D2 and D3 folds are near coaxial. D4 folds are upright and open with a similar style to the folding in the overlying Neo Proterozoic-Early Paleozoic metasediments.

Albitisation affected all the metamorphic units as well as D2 pegmatites. Its similar trend to the D3 folds indicates alteration was syn or post D3. The influx of sodium-rich solutions has resulted in the alteration of potassic feldspar to albite, biotite to phlogopite or talc, sillimanite and cordierite to muscovite-biotite and magnetite to hematite, as well as the formation of titanhematite from the breakdown of silicates. Accompanying an increase in sodium were increases in calcium, strontium and uranium, while potassium, rubidium, barium and iron decreased.

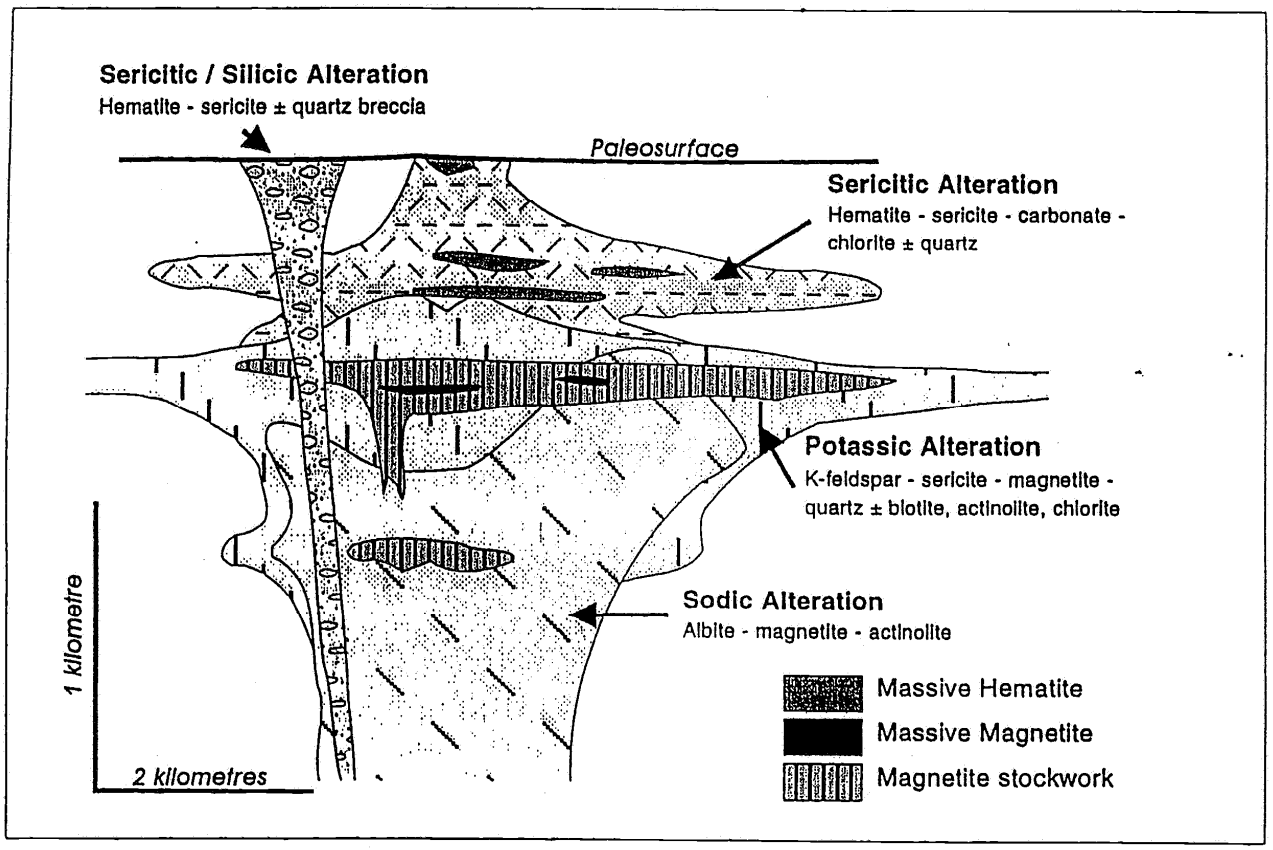
Sodium metasomatism took place in the waning stages of the Proterozoic orogeny. Uranium mineralisation occurs as disseminations in narrow near vertical fractures or veins of a similar trend to the D3. It consists of two stages, an early uranium oxide (uraninite) stage and a later uranium-titanate (brannerite) stage. Mineralisation is found where albitisation is most intense and is intimately associated with the titanhematites forming from the alteration. A structural control for the mineralisation is still not clear.

Conclusions and Recommendations

At the Wild Dog Prospect only weak Pt/Pd mineralisation was located, confined to the northern end of the uranium mineralisation. The very limited roadside prospecting, although identifying week radiometric anomalism, failed to locate any Pt/Pd occurrences away from the known uranium prospects.

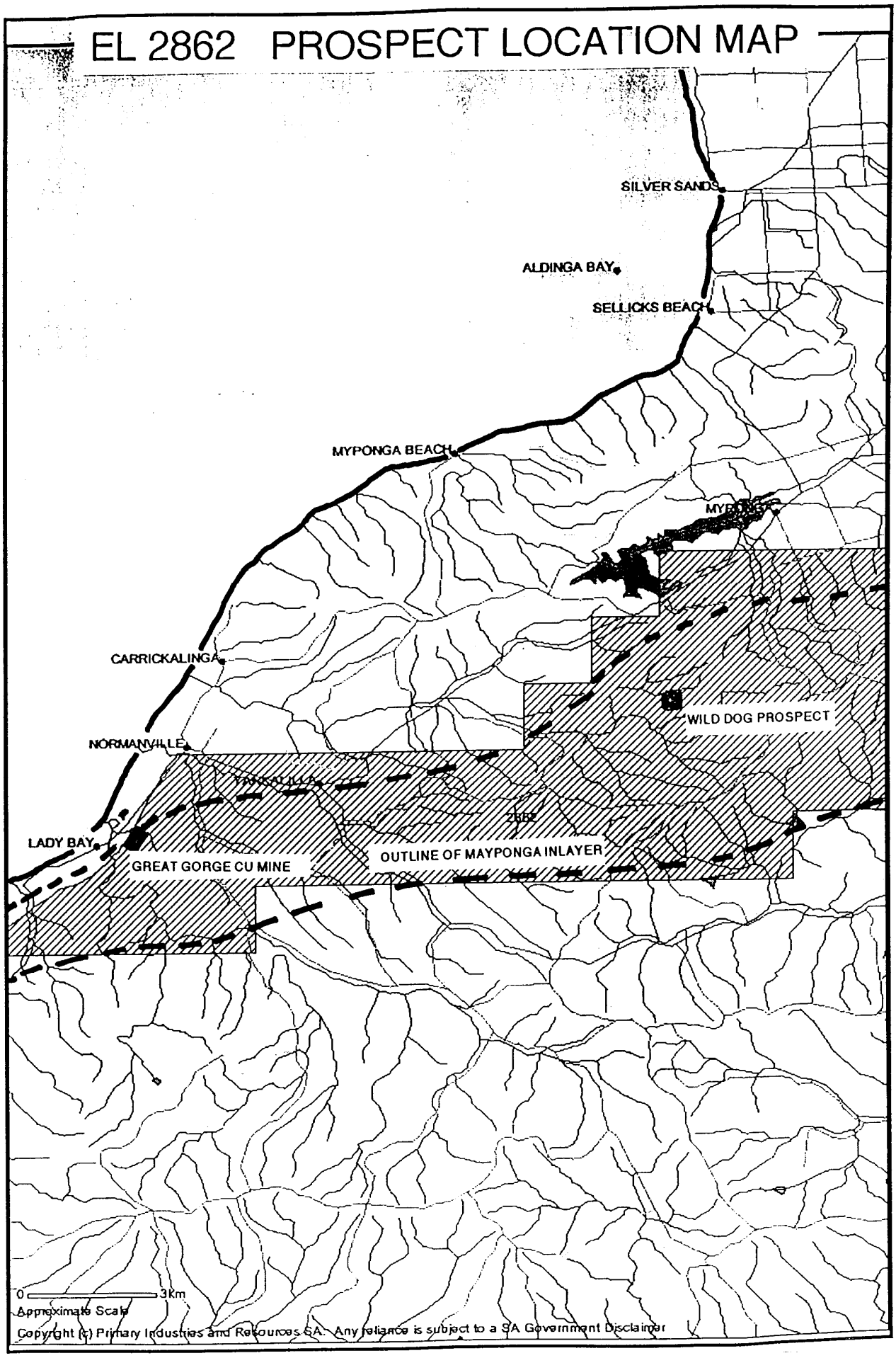
Mineralogically the uranium as well as the Pt/Pd mineralisation is clearly associated with the albitisation. However the presence of actinolite, diopside, scapolite, hematite and magnetite in addition to the albite indicate the possibility that the mineralised system can be interpreted as the deeper root zone of a larger "low sulphur iron oxide Cu-Au system" as defined by research in the last 10 to 15 years into deposits like Roxby Downs or Ernest Henry. *Figure 5* illustrates the alteration zoning of such iron oxide mineral system showing sodic alteration at depth of more than 1km to 2km.

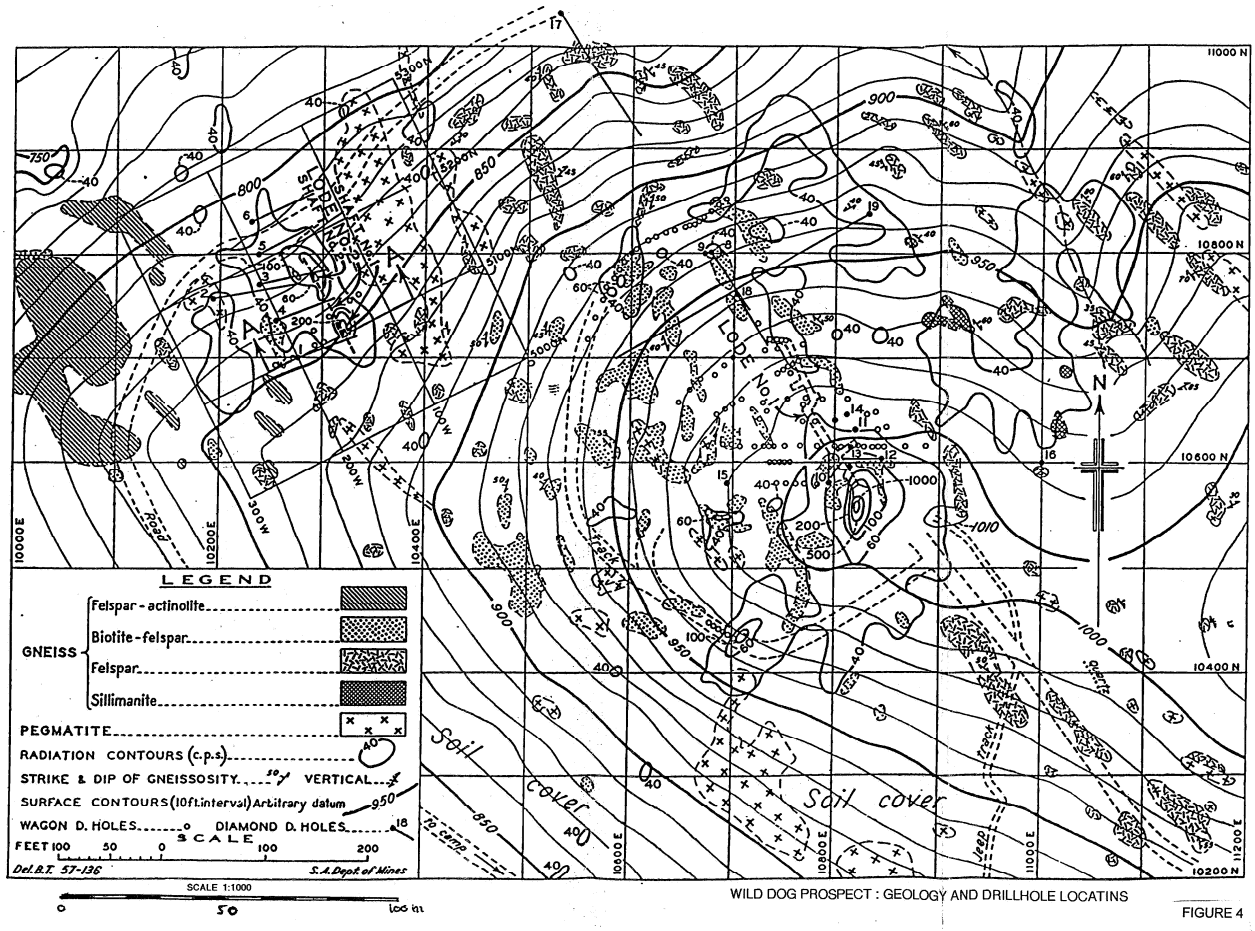
To further evaluate the applicability of this model airborne magnetic data of the basement inlier should be obtained and evaluated. The drill and rock chip samples should be analysed for U, Th, Cu, Ag, Pb, Zn, Co, Mo, REE, Ba and F which are commonly enriched in the iron oxide mineral systems.



Schematic cross section illustrating alteration zoning in iron oxide (Cu-U-REE-Au) deposits. The section extends from the near-surface to several kilometres below surface (from Hitzman et al., 1992)

EL 2862 PROSPECT LOCATION MAP





WILD DOG PROSPECT : GEOLOGY AND DRILLHOLE LOCATINS

FIGURE 4

APPENDIX 5

GEOLOGY OF THE CAMBRIAN COVER

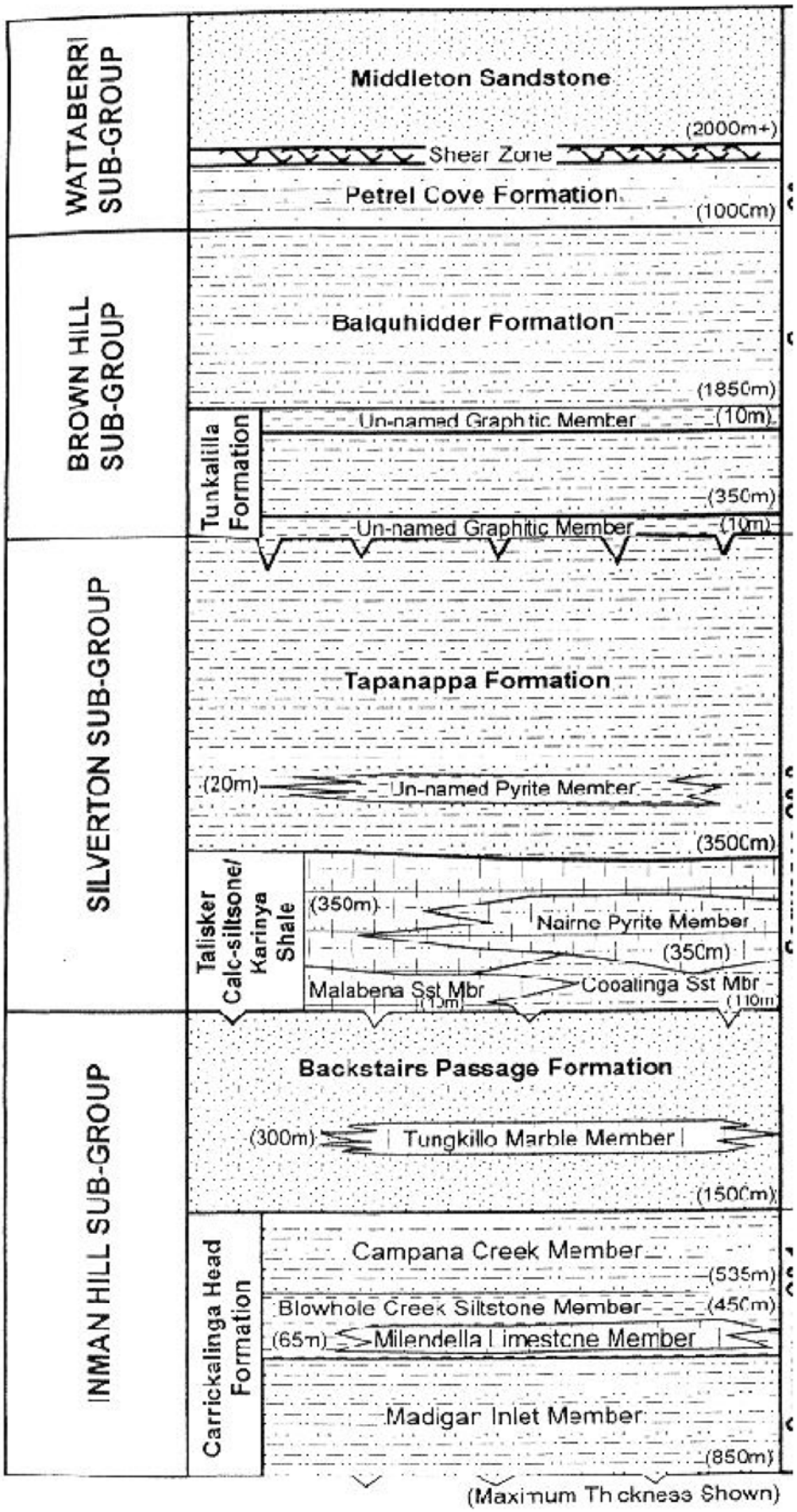


Figure 4.2 Stratigraphy of the Kanmantoo Group
(after Gum, 1998)