Inferus Resources Ltd

Annual Report

Licence Year 1, 2009

12 August 2008 – 11 August 2009

GEL 297, 300, 301, 302

of the

Roxby Geothermal Project

Prepared by:
Peter Hill, Southern Gold Ltd (Inferus Resources)
5 October 2009

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1 Introduction

The group of four Geothermal Exploration Licences (GEL's 297, 300, 301, 302) were granted on 12 August 2008. The licence is located in the geological province of the Stuart Shelf and the eastern margin of the Gawler Craton, South Australia. Geographically, they are located along the western side of Lake Torrens.

On 12 August 2009 a further 18 GEL's were granted to Inferus and the work commitment of the first four GELS was amended to synchronise with new GELS.

This report details the work conducted during Licence Year 1 of the licence (12 August 2008 to 11 August 2009 inclusive), in accordance with Regulation 33.

2 Permit Summary

For the duration of the licence year, licensees for Geothermal Exploration Licences were:

GEL 297 Inferus Resources Ltd 100%
GEL 300 Inferus Resources Ltd 100%
GEL 301 Inferus Resources Ltd 100%
GEL 302 Inferus Resources Ltd 100%

Inferus Resources Ltd is a wholly owned subsidiary of Southern Gold Ltd and is managed and operated by Southern Gold.

The current work commitments (including all variations) associated with the group of four GELS is summarised in Table 1.

Table 1 Current work commitments by licence year

Year of Term of Licence	*Minimum Work Requirements*
One	• Geological and geophysical review.
Two	• Geological and Geophysical review. • Temperature probing of historical mineral drill holes. • Thermal conductivity measurements of selected holes. *(to be conducted anywhere within the area covered by GELs 297, 300, 301, 302, 462, 463, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479 and 480)*
Three	• Modelling and interpretation of data. • 100km 2D seismic • Geological and geophysical review. *(to be conducted anywhere within the area covered by GELs 297, 300, 301, 302, 462, 463, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479 and 480)*
Four	• Complete and case 5 fully cored heat flow holes to a depth of 400 – 500m. • Geological and geophysical review. • *(to be conducted anywhere within the area covered by GELs 297, 300, 301, 302, 462, 463, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479 and 480)*
Five	• Temperature probing of core heat flow holes. • Thermal conductivity measurements of core. • Drill 1 well to a depth of 3,000 – 4,000 metres. • Geological and geophysical review. *(to be conducted anywhere within the area covered by GELs 297, 300, 301, 302, 462, 463, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479 and 480)*

Licence Year 1 concluded on 11 August 2009. The following table displays the minimum work program (after all variations) and the actual work completed up until the end of the current licence period.

Table 2 Final work program and work completed (as of end of current reporting period) by licence year

Licence Year	Minimum Work Program	Actual Work
Year 1 2009	Geological and geophysical review.	*Geotechnical analysis (thermal conductivity measurements) on core from the two holes.* *Modelling and interpretation of Geoscience Australia Seismic Traverse.* *Geothermal resource estimation for GEL 302 resulting from temp logging and modelling drill data.* *[Wireline temperature logging of two deep (approx 900m) mineral holes – under Mining Act 1971, EL 3515]*
Year 2 2010	Geological and Geophysical review. Temperature probing of historical mineral drill holes. Thermal conductivity measurements of selected holes.	
Year 3 2011	Modelling and interpretation of data. 100km 2D seismic Geological and geophysical review.	
Year 4 2012	Complete and case 5 fully cored heat flow holes to a depth of 400 – 500m. Geological and geophysical review.	
Year 5 2013	Temperature probing of core heat flow holes. Thermal conductivity measurements of core. Drill 1 well to a depth of 3,000 – 4,000 metres. Geological and geophysical review.	

There were no suspensions for this licence year.

Actual Work completed in Licence Year 1 - Detailed.

Southern Gold (SAU) has undertaken significant preliminary work to locate and characterise its geothermal resource. Geothermal data from precision temperature logs and thermal conductivity data were collected from two deep drill holes, each drilled by SAU to a total depth of approximately 1 km. Recently acquired seismic data by Geoscience Australia has aided the interpretation of localised geological structures and major formation boundaries. In addition, historical mineral exploration activities in and around the project area have produced gravity and magnetic data and other deep drill holes which contribute to the indirect methods available to demonstrate with a reasonable level of certainty that a potentially commercially viable geothermal resource exists in the project area.

In 2007 Southern Gold and Uranium West drilled holes LTDD002A and LTDD003 to explore for iron oxide copper gold mineralisation under Exploration Licence 3515 and data collected from the two holes was used in the Geothermal Resource report for GEL: 302.

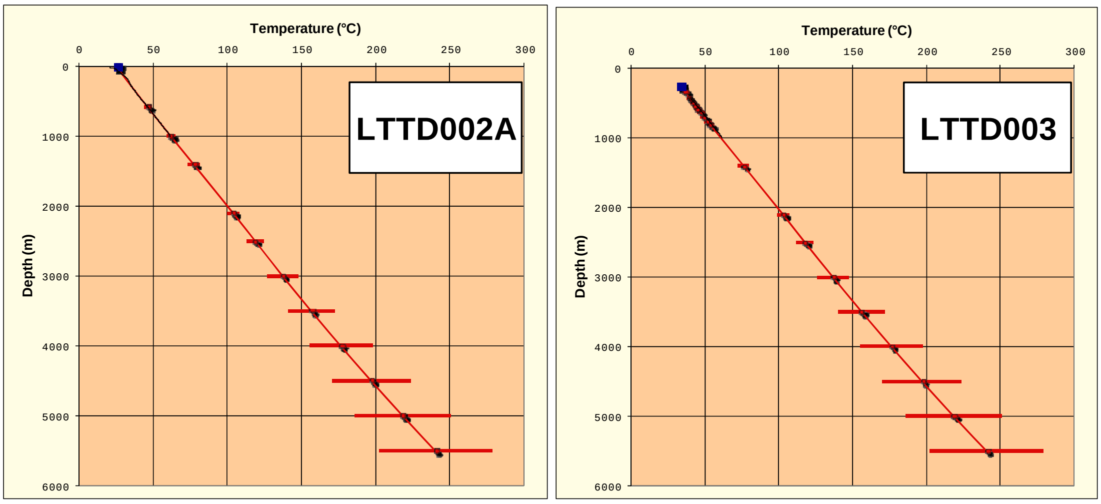
Down hole Wireline Temperature Logging and Heat flow Modelling

The Drill Hole Services of the Department for Water Land Biodiversity and Conservation completed the temperature logging for Southern Gold in both drill holes and, together with measured thermal conductivity values for formations intersected, the geothermal consultants, Hot Dry Rocks Pty Ltd confirmed elevated heat flows using 1D heat flow modelling tools (Table 1 and Figure 1). The reliability of the raw data used to construct the 1D heat flow models is considered to be very good. The precision temperature logs were recorded to a precision of 0.0001°C, and thermal conductivity was measured to ±2%.

Table 1. Heat flow data for LTDD002A and LTDD003 in GEL302. Note that the cited heat flow error margins are smaller than those recorded in the GR report as the models have been refined.

Well Name	Depth (m)	Easting	Northing	1D heat flow (mW/m^2)
LTDD002A	997	752839	6446014	94 ± 6.2
LTDD003	1118.7	755013	6439984	94 ± 6.4

Figure 1. Modelled temperatures at depth for drill holes LTDD002A and LTTD003.



Geothermal Resource GEL 302

Within Licence Year 1 SAU has been able to establish a large Inferred Geothermal Resource of 260,000 PJ on GEL 302 (Table 1), on the eastern margin of the Gawler Craton. GEL 302 represents only ~5% of the company's 10,000km2 Roxby Geothermal Project, implying an enormous scope in this geographically advantageous site

At this stage of development, all stratigraphic layers within the target temperature window are regarded as potential reservoir units however this proof-of-concept project will focus on developing an underground heat exchanger within the thinly bedded metasediments interpreted as belonging to the Palaeoproterozoic Wallaroo Group.

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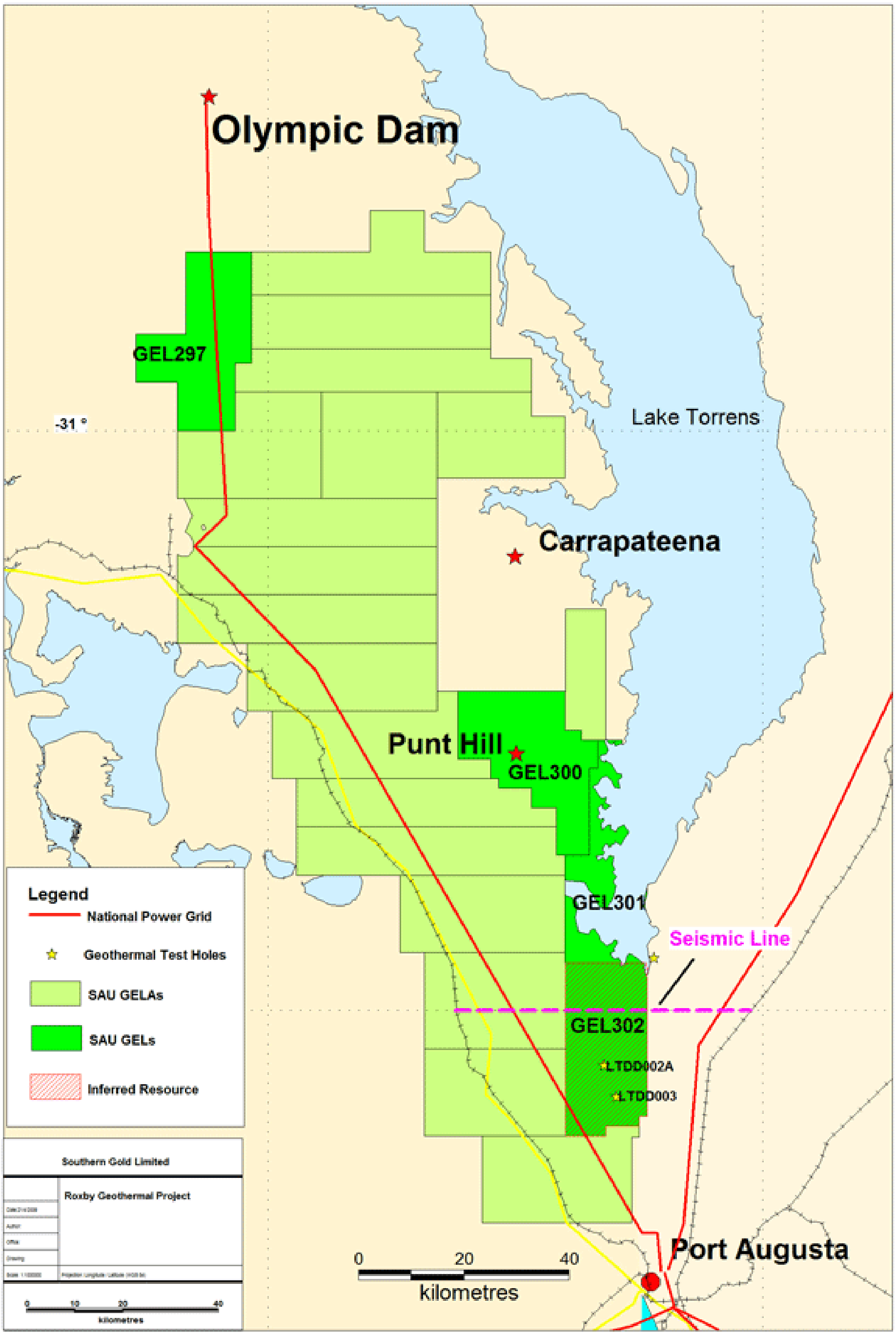
Reservoir Unit	Stored heat (PJ)	Volume (km3)	Inferred Resource (PJ)
Wallaroo Group1	125,722	450	130,000
Basement	129,823	408	130,000
TOTAL	255,545	858	260,000

The interpreted geology and potential engineered geothermal system reservoir targets beneath the Adelaidean sequence within GEL302 is largely based upon evidence derived from interpretation of the Geoscience Australia's regional seismic line 08GA-A1.



3 Regulated Activities

There have been no regulated activities undertaken in the licence reporting period, other than Seismic Data re-processing as part of the GEL 302 Reservoir Characterisation Report.

Seismic Data Processing and Reprocessing

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Seismic data collected by Geoscience Australia was processed by Dayboro Geophysics for the reservoir characteristice report by Hot Dry Rocks Pty Ltd. Dayboro sent Hot Dry Rocks three files, a raw PSTM stack, a filtered/scaled PSTM stack and PSDM stack. Approximately 100 km distance at 8km depth was processed, however HDRPL used only a small portion of this transect for interpretative purposes.

- *survey/project name:* SEG Y seismic data from GA for the 08GA_A01 Transect Route from the Gawler Curnamona Arrowie Seismic Survey.
- *processing contractor:* Dayboro Geophysical Pty Ltd.
- *line length (km):* 100 km.
- *details of integration with other data:* none reported by Dayboro.

4 Compliance Issues

Licence and Regulatory Compliance

Licence Non-Compliance

No licence non-compliance issues to report for the licence reporting period.

Regulatory Non-Compliance

No regulatory non-compliance issues to report for the licence reporting period.

No.	***Date***	***Activity***	***Details of Non-Compliance***	***Rectification of Non-Compliance***
Item. 1	12/04/07	Submission of Geothermal Resource report	Report of Geothermal Resource was submitted to PIRSA 1 month after the due date.	Review of report tracking system initiated. Compliance officer appointed to maintain key dates.

Compliance with Statement of Environmental Objectives

All work completed in the Licence Year 1 were desk top studies and involved no field work and it is considered by Inferus that none of the activities directly affected the environment.

Management System Audits

No Management Systems Audits were conducted during the licence reporting period.

Report and Data Submissions

Reports and Data submitted to PIRSA during the course of the year are as follows:

1. This Annual Report for the first licence year.
2. Interim Report for EL 3515, February 2008. Emma Corndon, Steve Sewell; Hot Dry Rocks Pty Ltd (Submitted to PIRSA under Mining Act 1971, for EL 3515).

3. GEL 302 Geothermal Play. Statement of Estimated Geothermal Resources, 22 May 2009. Dr Graeme Beardsmore; Hot Dry Rocks Pty Ltd.
4. GEL 302 Reservoir Characterisation, July 2009. Luke Mortimer and Gareth Cooper; Hot Dry Rocks Pty Ltd.

Table 3. List of report and data submissions during current licence reporting year

Description of Report/Data	Date Due	Date Submitted	Compliant / Non-Compliant
Annual Report Licence Year 1, ending 11 August 2009.	11 Oct 2009	9 Oct 2009	compliant
Interim Report for EL 3515, February 2008. Emma Corndon, Steve Sewell; Hot Dry Rocks Pty Ltd		9 Oct 2009	Not applicable (submitted to PIRSA with Annual Technical Report for EL 3515 in 2008)
GEL 302 Geothermal Play. Statement of Estimated Geothermal Resources, 22 May 2009. Dr Graeme Beardsmore; Hot Dry Rocks Pty Ltd	22 July 2009	9 Oct 2009	Non-compliant (3 months late)
GEL 302 Reservoir Characterisation, 15 July 2009. Luke Mortimer and Gareth Cooper; Hot Dry Rocks Pty Ltd.	15 September 2009	9 Oct 2009	Non-compliant (1 month late)

Incidents

Licence Year 1 comprised desk top studies, using historical data and data obtained from third parties. There was no on ground activity

There were no reportable incidents.

Threat Prevention

Other than O.H. and S., there have been no other systematic critical analysis of processes that relate directly or indirectly to activities or facilities under the licence.

In the Year 1 of the licence, only desk top studies of historical data or data obtained from third parties (e.g. the GA seismic data) were completed. Desktop studies have never been identified by Southern Gold’s O.H. and S. analysis as requiring any specific risk management procedures.

Future Work Program

It is planned that Licence Year 2 will involve:

- Continued Geological, Geophysical and Geothermal reviews.
- Temperature probing of historical mineral drill holes.
- Thermal conductivity measurements of selected historical mineral holes.

5 <u>Expenditure Statement</u>

Please refer to Appendix 1 for the expenditure statement for the current reporting period.

6 <u>Additional Information for Production Licence Reports</u>

Inferus has no Production Licence to report on.

7 <u>Additional Information for Pipeline Licence Reports</u>

Inferus has no Pipeline Licence to report on.

Inferus Resources Ltd

Final Annual Report

Licence Year 2, 2010

12 August 2009 – 11 August 2010

GEL 297, 300, 301, 302, 462-463, 465-480

of the

Roxby Geothermal Project

Prepared by:
Faith Gerhard, Southern Gold Ltd (Inferus Resources)
30th September 2010

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FIGURE DESCRIPTION

TABLE DESCRIPTION

1 Introduction

1.1 Background

The 22 licences held by Inferus Resources were located in the geological province of the Stuart Shelf and the eastern margin of the Gawler Craton, South Australia. Geographically, they were located along the western side of Lake Torrens. Inferus Resources had undertaken significant preliminary work to locate and characterise a geothermal resource. Geothermal data from precision temperature logs and thermal conductivity data were collected from two deep drill holes, each drilled by SAU to a total depth of approximately 1 km. Seismic data acquired by Geoscience Australia aided the interpretation of localised geological structures and major formation boundaries. In addition, historical mineral exploration activities in and around the project area produced gravity and magnetic data which combined with other deep drill holes contributed to the indirect methods available, demonstrating with a reasonable level of certainty, the potential for a commercially viable geothermal resource in the project area.

1.2 Licence Data

An initial group of four Geothermal Exploration Licences (GEL's 297, 300, 301 & 302) were granted to Inferus Resources on the 12th August 2008. On the 12th August 2009 a further 18 GEL's were granted (GEL's 462-463 and 465-480) and the work commitments of the first four GELS were amended to synchronise with new ones. In total the 22 GEL's covered an area of 10,000km^2.

This is the Final Report for the initial 4 GEL's granted 12th August 2008 and the subsequent group of 18 GEL's granted on the 12th August 2009 with an inclusive expiry date of the 11th October 2010. As of the 2nd of August 2010 these licenses were formally surrendered and the tenements relinquished.

In accordance with Section 33 of the Petroleum Regulations this report details the work conducted during Licence Year 2 of the licences (12th August 2009 to 11th August 2010 inclusive),

2 Permit Summary

For the duration of the licence year, licensees for Geothermal Exploration Licences were:

GEL 297 Inferus Resources Ltd 100%

GEL 300 Inferus Resources Ltd 100%

GEL 301 Inferus Resources Ltd 100%

GEL 302 Inferus Resources Ltd 100%

GEL 462 Inferus Resources Ltd 100%

GEL 463 Inferus Resources Ltd 100%

GEL 465 Inferus Resources Ltd 100%

GEL 466 Inferus Resources Ltd 100%

GEL 467 Inferus Resources Ltd 100%

GEL 468 Inferus Resources Ltd 100%

GEL 469 Inferus Resources Ltd 100%

GEL 470 Inferus Resources Ltd 100%

GEL 471 Inferus Resources Ltd 100%

GEL 472 Inferus Resources Ltd 100%

GEL 473 Inferus Resources Ltd 100%

GEL 474 Inferus Resources Ltd 100%

GEL 475 Inferus Resources Ltd 100%

GEL 476 Inferus Resources Ltd 100%

GEL 477 Inferus Resources Ltd 100%

GEL 478 Inferus Resources Ltd 100%

GEL 479 Inferus Resources Ltd 100%

GEL 480 Inferus Resources Ltd 100%

(Inferus Resources Ltd is a wholly owned subsidiary of Southern Gold Ltd and is managed and operated by Southern Gold.)

Due to difficulties in obtaining necessary financial resources and a shift in company exploration strategies it had been decided to relinquish the entire 22 GEL's

Table 1: *Work commitments by licence year*

Year of Term of Licence	*Minimum Work Requirements*
One	• Geological and geophysical review.
Two	• Geological and Geophysical review. • Temperature probing of historical mineral drill holes. • Thermal conductivity measurements of selected holes. *(to be conducted anywhere within the area covered by GELs 297, 300, 301, 302, 462, 463, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479 and 480)*
Three	• Modelling and interpretation of data. • 100km 2D seismic • Geological and geophysical review. *(to be conducted anywhere within the area covered by GELs 297, 300, 301, 302, 462, 463, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479 and 480)*
Four	• Complete and case 5 fully cored heat flow holes to a depth of 400 – 500m. • Geological and geophysical review. • *(to be conducted anywhere within the area covered by GELs 297, 300, 301, 302, 462, 463, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479 and 480)*
Five	• Temperature probing of core heat flow holes. • Thermal conductivity measurements of core. • Drill 1 well to a depth of 3,000 – 4,000 metres. • Geological and geophysical review. *(to be conducted anywhere within the area covered by GELs 297, 300, 301, 302, 462, 463, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479 and 480)*

Licence Year 2 concluded on 11 August 2010. The following table displays the minimum work program (after all variations) and the actual work completed up until the end of the current licence period.

Licence Year	Minimum Work Program	Actual Work
Year 1 **2009**	*Geological and geophysical review.*	*Geotechnical analysis (thermal conductivity measurements) on core from the two holes* *Modelling and interpretation of Geoscience Australia Seismic Traverse.* *Geothermal resource estimation for GEL 302 resulting from temp logging and modelling drill data.* *[Wireline temperature logging of two deep (approx 900m) mineral holes – under Mining Act 1971, EL 3515]*
Year 2 **2010**	*Geological and geophysical review.*	*Down hole testing for clear historical drill holes throughout geothermal tenements in lieu of further temperature probing.*
	Thermal conductivity measurements of selected holes.	*Wireline temperature logging of 5 Monax exploration holes on GEL 300* *Thermal Conductivity measurements on 65 core specimens.* *Modelling and interpretation of thermal data by HDRPL.*
	Temperature probing of historical mineral drill holes.	*Non Compliant*
Year 3 **2011**	*Modelling and interpretation of data* *100km 2D seismic* *Geological and geophysical review*	
Year 4 **2012**	*Complete and case 5 fully cored heat flow holes to a depth of 400 – 500m.* *Geological and geophysical review*	
Year 5 **2013**	*Temperature probing of core heat flow holes. Thermal conductivity measurements of core.* *Drill 1 well to depth of 3,000 – 4,000metres.* *Geological and geophysical review*	

Table 2: *Final work program and work completed (as of end of current reporting period) of licence year*

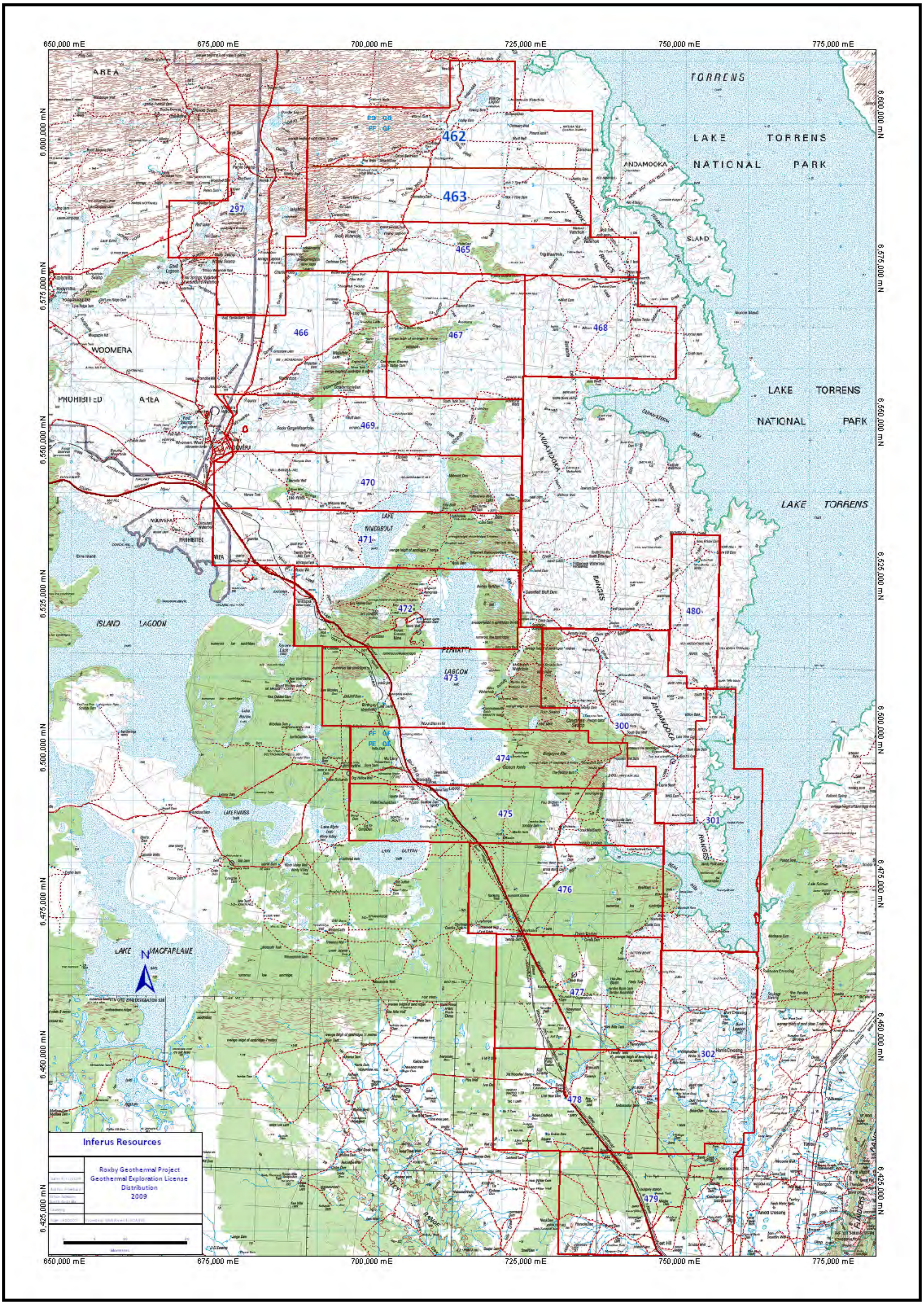


Figure 1: *Location map of GEL's 297, 300, 301, 302 and GEL's 462-463 and 465-480.*

3 Regulated Activities

Drilling and Related Activities

No regulated activities undertaken in the Licence reporting period

Seismic Data Acquisition

No regulated activities undertaken in the Licence reporting period

Seismic Data Processing and Reprocessing

No regulated activities undertaken in the Licence reporting period

Geochemical, Gravity, Magnetic and other Surveys

No regulated activities undertaken in the Licence reporting period

Production and Processing

No regulated activities undertaken in the Licence reporting period

Pipeline/Flowline Construction and Operation

No regulated activities undertaken in the Licence reporting period

Preliminary Survey Activities

In mid May of 2010 a field survey to locate approximately 61 abandoned historical drill holes was undertaken with the objective being to ascertain if any were accessible and unblocked. Those that were could then be precision wireline temperature logged with the resulting data modelled for potential thermal resource enhancement. Of the 61 only 28 were found in the time allocated and of that 28 only 11 were clear to 100m (See Table 7 Appendix 2).

The holes are located within 5 Pastoral Leases distributed along the western margin of Lake Torrens. Consultation with landholders and Mineral Tenement Holders had been carried out in the form of an official notice of entry in accordance with the Petroleum Act.

4 Compliance with the Petroleum Act (Reg. 33)

4.1 Summary of Regulated Activities Conducted in Licence Year 2 - Detailed.

Southern Gold Ltd (SAU parent of Inferus Resources) entered into a geothermal data sharing agreement with Monax Pty Ltd (MOX) whereby SAU would be permitted to temperature log 5-10 of MOX recently drilled mineral exploration holes under the Mining Act at their Punt Hill prospect (GEL 300). This work was undertaken in an attempt to produce a viable a heat-flow anomaly map of the punt hill area and to compare the resultant thermal environment with the existing geothermal heat flow model produced in the first year of tenure (GEL 302).

Inferus Resources commissioned Hot Dry Rocks Pty Ltd (HDRPL) to measure the thermal conductivity of 67 core specimens obtained in October 2009 from MOX. Measurements were made on 65 of the 67 specimens using a steady state divided bar apparatus calibrated for the range 1.4–9.8 W/mK. Up to three samples were prepared from each specimen to investigate variation in thermal conductivity over short distance scales and to determine mean conductivity and uncertainty. All values were measured at a standard temperature of 25°C. (Final HDRPL report may be viewed in Appendix 3)

Further geothermal data was gathered from a precision temperature scoping study undertaken by Hot Dry Rocks (HDRPL) in February 2010. HDRPL focused on GEL 300 since this permit overlaps Monax Mining Ltds (MOX) EL3457 minerals license where they are exploring for Olympic Dam Style Cu-U-Au. HDRPL utilised MOX's recently drilled bore holes to acquire rock thermal conductivity data and downhole precision temperature data. Seismic line 08GA-A1 runs almost east-west through GEL 302 approximately perpendicular to the structural grain of the Olympic Sub-domain. The boreholes drilled by MOX in GEL 300 are located approximately 45 km along strike to the north of GEL 302; the subject of the earlier Geothermal Resource statement by HDRPL. (Beardsmore, 2009 HDRPL Inferred resource Estimate)

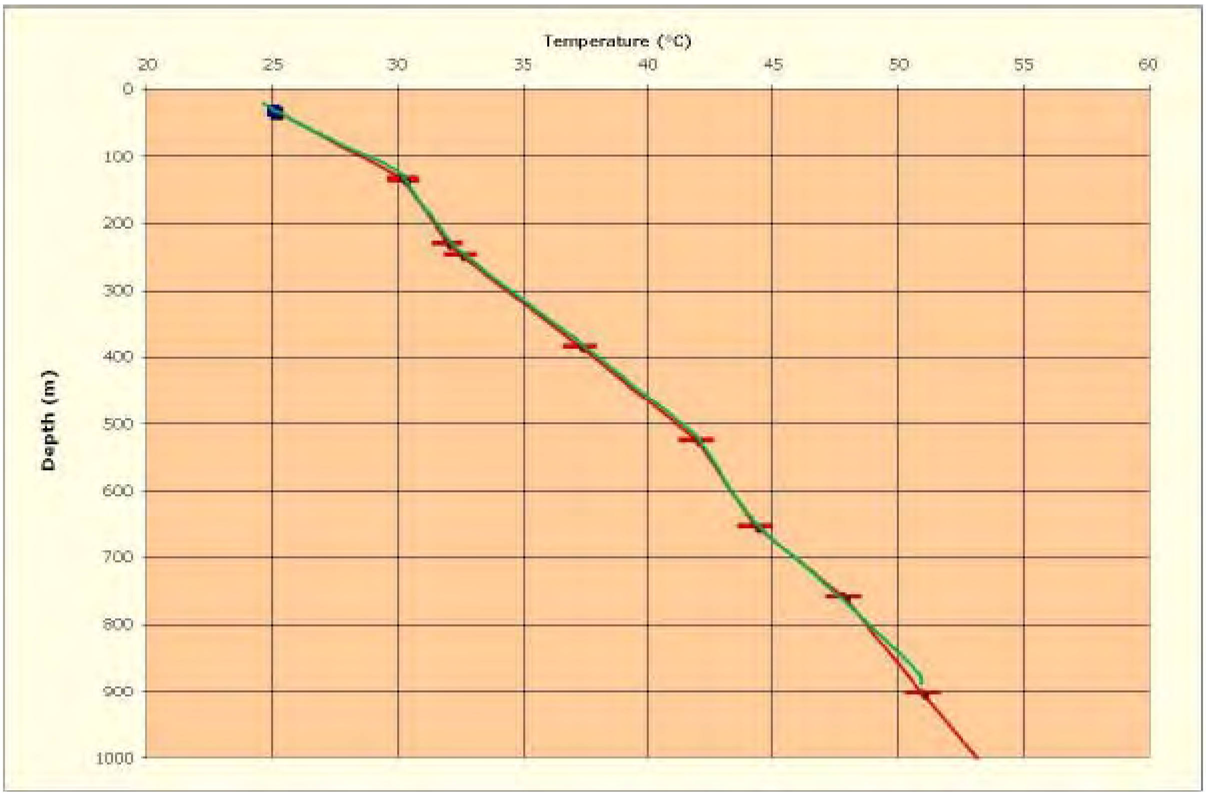
HDRPL conducted two field surveys in November 2009 with intention being to deploy HDRPL's precision temperature logging equipment down each MOX bore holes in GEL 300. The initial survey (2-7 November 2009) was abandoned as the MOX bore holes had been rehabilitated and could not be located by HDRPL. The drill collars had been cut off approximately 45 cm below ground level and had to be uncovered with a backhoe from Pernatty Station.

The second field survey (17-28 November 2009) was more successful. Of the 17 bore holes tested in GEL 300, five remained open to a sufficient depth to undertake precision temperature logging. HDRPL also attempted to gain access to four mineral bores within GEL 301 and GEL 475. However these holes were obstructed within a few metres of ground level.

The heat flows measured in GEL 300 are similar to those recorded in GEL 302 (Beardsmore, 2009). It is therefore possible to draw some preliminary observations. Heat flow in the southern portion of the RGP appears to be elevated relative to the average Australian heat flow in the Global Heat Flow Database. Further work will demonstrate whether this is true. HDRPL incorporated precision temperature data and measured rock thermal conductivity data to construct 1D heat flow models (Figure 2) for each of the five MOX bore holes (Appendix 3 for full report). A summary of the estimated heat flow for each bore hole is shown in Table 3.

HDRPL modelled all thermal data gathered and compared it with that gathered in the 2009 Resource Report at GEL 302 which yielded an energy measurement of 260 K PJ's. By contrast data modelled for GEL 300 in this reporting period produced only 18 K PJ's. The interpreted stratigraphy for this area indicated rock types possessing poor insulative properties. However there appears to be some discrepancy between the interpreted stratigraphy and the established regional nomenclatures. Incorrect stratigraphic identification may have lead to a skewed thermal model; any future geothermal modelling for GEL 300 will require correct stratigraphic confirmation to proceed

Figure 2: *ID heat flow model for WDDD2 bore. The green line represents the precision temperature data; the red line is the predicted temperature for a heat flow of 83±2.o mW/m².*



Bore Hole	Heat Flow (mW/m²)	Uncertainty (mW/m²)
BLDD1	92.0	3.2
MMDD1	87.0	4.8
PDDD2	85.0	3.7
WDDD2	83.0	2.0
WPDD2	85.0	2.4

Table 3: *Heat flow for five MOX bore holes within GEL 300.*

A Notice of Activity was lodged with PIRSA signalling Inferus Resources intention to commence regulated on ground geothermal temperature testing. The Notice of Activity comprised of a two stage approach whereby open drillholes would be initially located and then tested for blockages. Those that were open to at least 100m would be listed for subsequent precision temperature probing by either HDRPL or by Drill Hole Services of the Department of Water, Land, Biodiversity and Conservation. Should any of the surveyed blocked drillholes prove to be ideally placed to improve heat flow data points then a drilling rig would be commissioned to unblock them in a second phase of activity subject to approval.

In mid May of 2010 a field survey was instigated searching for approximately 61 abandoned historical drill holes. The Roxby Geothermal Project comprises GELs 300, 470-474 and 480 on Pernatty, 465-472 and 297 on Arcoona, 465 and 468 on Bosworth/Andamooka Island, 476-479 on Kootaberra/Hesso and 300-301, 474- 476 and 480 on South Gap pastoral stations. Detailed GEL boundaries and drill hole locations may be found in Appendix 3 for the full 61 holes.
The catalogued holes were derived from interrogation of the PIRSA drilling data base for historical diamond drill holes greater than 300m in depth that also had stored core samples. Of the 61 holes identified only 28 were found to be accessible in the time allocated and of that 28 only 11 were clear of blockages to 100m.

The subsequent temperature probing and analysis programs were not carried out due to tenement surrender. Inferus Resources confirms that the full work commitment was not met and a non-compliance has been listed in section 4.2.

4.2 Report for the year on compliance with the Act, these Regulations, the licence and any relevant Statement of Environmental Objectives

Licence Non-Compliance:

1. Inferus Resources did not meet the minimum work program commitment for licence year 2 therefore Inferus Resources lists a non-compliance in this respect

Regulatory Non-Compliance:

Inferus Resources has complied with Section 33 (1) of the Regulations pertaining to the provision of an annual report within two months after the end of the licence year.

2. Failure to submit consultant report data during the year.

4.3 Statement concerning any action to rectify non-compliance with obligations imposed by the Act, these regulations or the license, and to minimise the likelihood of the recurrence of any such non-compliance

1 - This case of non compliance was influenced by the difficulties Inferus Resources faced in obtaining the financial resources necessary for further exploration and development. The resulting shift in company exploration strategies ultimately lead to the relinquishment of the tenements.

2 - Inferus Resources will review its management strategies to ensure that more robust administrative systems are initiated to reduce the likelihood of future oversights.

No.	***Date***	***Activity***	***Details of Non-Compliance***	***Rectification of Non-Compliance***
Item.1		Completion of minimum work program commitments for Year 2	Wireline temperature probing of historical mineral drillholes.	Inferus Resources were unable to obtain the necessary financial resources to continue designated work. The licences were duly relinquished.
Item 2		Submission of consultant report data	Both reports produced by HDRPL were not submitted by the due date	A review of administrative management strategies will be instigated to reduce the likelihood of future oversights

Table 4: *Detailing non-compliance activities and their suggested rectification*

Compliance with Statement of Environmental Objectives

All work completed in the Licence Year 2 involved field work of an extremely low impact and it is considered by Inferus Resources that none of the activities directly affected the environment or infringed on the stated objectives covered in its SEO (Eden Energy, 2006).

Objective	Assessment Criteria	Compliant/Non Compliant (inc. Compliance statement)	Comments
Objective 8 *Avoid or minimise disturbance to stakeholders and/or associated infrastructure*	*No reasonable stakeholder complaints left unresolved*	***Compliant / achieved***	*Landholders and Mineral Tenement Licence Holders were consulted and received formal notification in accordance with Petroleum Act* *Driver speed limits suitable for pastoral conditions were observed.* *All gates were left in the condition in which they were found.*
Objective 7 *Minimise disturbance to native vegetation and native fauna*	*No unnecessary disturbance of native species.* *No unnecessary disturbance of dead plant material.*	***Compliant / achieved***	*Low vehicular speeds were maintained avoiding low visibility and or animal impact.* *All driving was confined to station and old exploration tracks.*

Table 5: *Illustrating compliance to environmental objectives in accordance with nominated SEO (Eden Energy, 2006).*

4.4 Summary of any Management System Audits undertaken during the relevant licence year, including information on any failure or deficiency identified by the audit and any corrective action that has, or will be, taken

Inferus Resources has developed efficient systems and documentation to cover Field Operations, Environmental Management, Health and Safety and compliance issue checklists to ensure the requirements of relevant Acts and Regulations are met.

No Management Systems Audits were conducted during the licence reporting period.

4.5 List of all reports and data relevant to the operation of the Act generated by the license during the relevant licence year

Report and Data Submissions

Reports and Data submitted to PIRSA during the course of the year are as follows:

1. This Annual Report for the second licence year.
2. Thermal conductivity of core samples SAU030-SAU096, May 17 2010, Anson Antriasian; Hot Dry Rocks Pty Ltd
3. Existing State of Knowledge on the Roxby Geothermal Project, South Australia, 16th May 2010, JP Driscoll; Hot Dry Rocks Pty Ltd
4. Lake Torrens Notice of Activity (covered by the SEO developed by Eden Energy, 2006)

Table 6: *List of report and data submissions during current licence reporting period*

Description of Report/Data	Date Due	Submission Date	Compliant / Non-Compliant
Annual Report Licence Year 2, ending 11 August 2010.	11 Oct 2010	9 Oct 2010	compliant
Thermal conductivity of core samples SAU030-SAU096, May 17 2010, Anson Antriasian; Hot Dry Rocks Pty Ltd		9 Oct 2010	Non-Compliant Should have been submitted at time of receipt
Existing State of Knowledge on the Roxby Geothermal Project, South Australia, 16th May 2010, JP Driscoll; Hot Dry Rocks Pty Ltd		9 Oct 2010	Non-Compliant Should have been submitted at time of receipt
Lake Torrens Notice of Activity (covered by the SEO developed by Eden Energy, 2006)		12 April 2010	Compliant

4.6 Report on any Incident reportable tot eh Minister under the Act and Regulations during the relevant Licence Year.

There were no reportable incidents.

4.7 Report on any reasonably foreseeable threats (other than threats previously reported on) that reasonably present, or may present, a hazard to facilities or activities under the licence, and report on any corrective action that has, or will be, taken

Other than O.H. & S., there has been no other systematic critical analysis of processes that relate directly or indirectly to activities or facilities under the licence.

Future Work Program

As Inferus Resources has formally relinquished all 22 GEL's as of the 2nd August 2010, licence year three scheduled work activities will not be realised.

5 Expenditure Statement

Please refer to Appendix 1 for the expenditure statement for the current reporting period.

6 References

Beardsmore, Dr. G. May 2009. GEL 302 Geothermal Play: Statement of Estimated Geothermal Resources. Hot Dry Rocks Pty Ltd.

Eden Energy Ltd, Jan 2006. Statement of Environmental Objectives: Geothermal Exploration Drilling. Eden Energy Ltd.

APPENDIX 1 Expenditure Statement

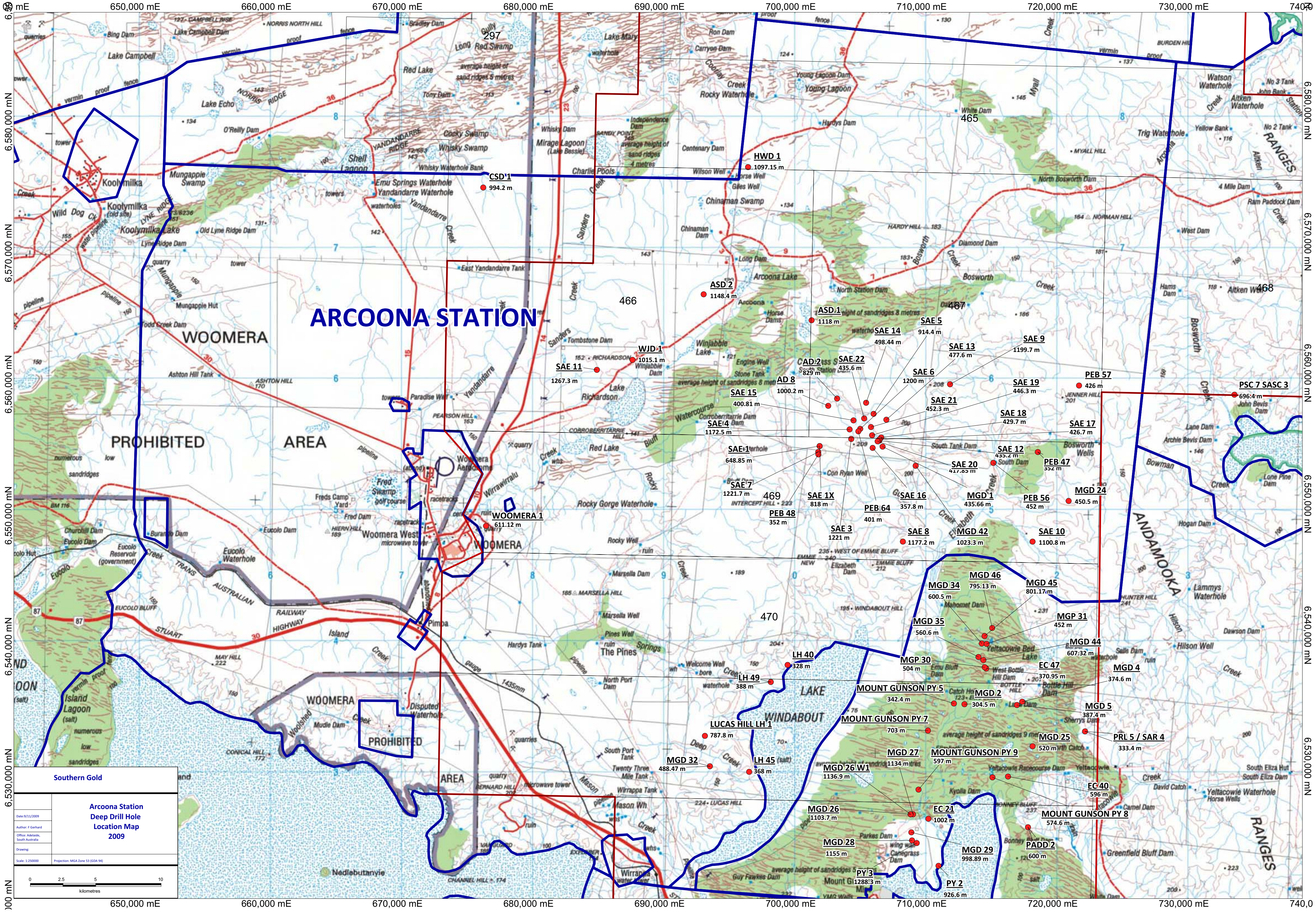
APPENDIX 2 Historical Drill Hole Location Table

DHName	Lease	Map100	Unit No	DHNumber	Map Unit	Final_Easting	Final_Northing	location method	Condition of collar	Tested to (m)	blockage depth (m)	drill hole comments	GIS_Easting
PY 3	EL00951	6335	103	20714	6335-103	708976	6524785	Stand alone GPS SAU May 2010	steel collar, cap removed	4	4		709293
SAE 11	EL01617	6235	80	165125	6235-80	684919	6560727	Stand alone GPS SAU May 2010	steel collar cemented	0	0		684878
SAE 7	EL01617	6335	300	165046	6335-300	701880	6554400	Stand alone GPS SAU May 2010	steel collar cemented	0	0		701778
SAE 3	EL01134	6335	296	165606	6335-296	704266	6555402	Stand alone GPS SAU May 2010	steel casing with steel cap	35	35		704298
SAE 6	EL01617	6335	299	165609	6335-299	704950	6556203	Stand alone GPS SAU May 2010	steel casing with welded cap	n/a	0		704978
SAE 8	EL01617	6335	301	165047	6335-301	708162	6548188	Stand alone GPS SAU May 2010	steel casing	100	n/a	water in hole	708228
HWD 1	EL01316	6336	42	20770	6336-42	695920	6575633	Stand alone GPS SAU May 2010	lock on collar		20	2nd hole 15m NW	696416
WJD 1	EL01316	6235	78	18093	6235-78	687856	6561516	Stand alone GPS SAU May 2010	steel casing	1	1		687597
AD 2	EL01316	6335	115	20726	6335-115	702700	6558680	Stand alone GPS SAU May 2010	steel collar open	39	39	no water	703212
MGD 34	EL03264	6335	341	212208	6335-341	714254	6539800	Stand alone GPS SAU May 2010	steel casing to 50 m then poly			not tested	714250
MGD 35	EL03264	6335	342	212209	6335-342	714000	6538775	Stand alone GPS SAU May 2010	no casing			buried	714000
PN-06-04	EL02979	6334	242	220555	6334-242	724379	6508050	Stand alone GPS SAU May 2010	pvc collar for PN-06-03	100	n/a	water in hole	724379
SAE 21	EL01808	6335	315	165529	6335-315	705836	6556302	Stand alone GPS SAU May 2010	pvc collar with cap	45	45		705798
SAE 12	EL01617	6335	306	165157	6335-306	705891	6555748	Stand alone GPS SAU May 2010	pvc collar with cap	n/a	n/a	not tested-cap glued or	705878
SAE 17	EL01808	6335	317	165448	6335-317	706501	6555314	Stand alone GPS SAU May 2010	pvc casing and cap	115	n/a		706428
SAE 19	EL01808	6335	313	165488	6335-313	706540	6555550	Stand alone GPS SAU May 2010	steel casing and pvc cap	240	n/a		706578
PEB 64	EL01808	6335	310	165444	6335-310	704754	6555970	Stand alone GPS SAU May 2010	pvc collar with cap	100	n/a		704838
LH 40	EL00951	6335	224	139842	6335-224	699483	6538025	Stand alone GPS SAU May 2010	steel collar no cap	100	n/a		699432
MGD 1						706668	6554826	Stand alone GPS SAU May 2010	steel casing	100	n/a	1998 Stuart metals	
no name1						705417	6556645	Stand alone GPS SAU May 2010	steel casing welded colar	n/a	n/a		
PEB 48						701890	6554245	Stand alone GPS SAU May 2010	steel casing welded colar		n/a		
no name2						708120	6548200	Stand alone GPS SAU May 2010	steel casing welded colar		n/a		
ADG 19						714480	6537995	Stand alone GPS SAU May 2010	steel casing open	100	n/a	water in hole	
MGD 48						714400	6539080	Stand alone GPS SAU May 2010	steel casing open	100	n/a	water in hole	
MGD 47						714067	6539446	Stand alone GPS SAU May 2010	steel casing open	20	20		
MGD 45						714460	6540381	Stand alone GPS SAU May 2010	steel casing open	100		angled hole	
PY 7						710174	6533136	Stand alone GPS SAU May 2010	steel casing open	20	20		
MGD 32						693500	6530450	Stand alone GPS SAU May 2010	PVC	100	n/a	angled hole	
ASD 2	EL01316	6335	112	20723	6335-112	693034	6566427	PIRSA GIS dataset				hole not found	693034
AD 8	EL01316	6335	113	20724	6335-113	702535	6557921	PIRSA GIS dataset				hole not found	702535
SAE 1	EL00424	6335	293	165603	6335-293	701878	6554851	PIRSA GIS dataset				hole not found	701878
SAE 1X	EL00424	6335	294	165604	6335-294	701878	6554851	PIRSA GIS dataset				hole not found	701878
LH 45	EL00951	6335	229	139847	6335-229	696499	6530025	PIRSA GIS dataset				hole not found	696499
BEDA BORE		6334	29	20580	6334-29	731389	6458916	PIRSA GIS dataset				hole not found	731389
LH 1												hole not found	

DHName	GIS_Northing	Zone	Elevation	Dip	Azimuth	MaxDepth	Method1	Method2	Core_Lib	Operator	CompDate	Target	Ref_Type1	Reference1
PY 3	6524586	53	0	-80	0	1288.3	Diamond Bit - Coring	Rotary - Percussion	Y	CSR Ltd.	3-Oct-81	Copper	MASTER	ENV06962
SAE 11	6560671	53	0	0	0	1267.3	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	30-Jun-90	Gold; Base Metals; Copper	MASTER	ENV08216
SAE 7	6554401	53	181.9	-90	0	1221.7	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	23-Apr-90	Gold; Base Metals; Copper	MASTER	ENV08216
SAE 3	6555401	53	0	-90	0	1221	Diamond Bit - Coring	Rotary - Percussion	Y	Carpentaria Exploration Co Pty Ltd.	20-Jul-84	Gold; Copper; Uranium	MASTER	ENV06735
SAE 6	6556171	53	176.06	-90	0	1200	Diamond Bit - Coring	Rotary - Percussion	Y	Carpentaria Exploration Co Pty Ltd.	31-Aug-89	Gold; Copper	MASTER	ENV06735
SAE 8	6547571	53	101.43	-90	0	1177.2	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	8-May-90	Gold; Base Metals; Copper	MASTER	ENV08216
HWD 1	6576119	53	0	-90	0	1097.15	Diamond Bit - Coring	Rotary - Percussion	Y	Western Mining Corporation Ltd.	16-Jun-82	Gold; Copper; Uranium	MASTER	ENV06562
WJD 1	6561435	53	0	-90	0	1015.1	Diamond Bit - Coring	Rotary - Percussion	Y	Western Mining Corporation Ltd.	28-May-80	Gold; Copper; Uranium	MASTER	ENV06562
AD 2	6558475	53	0	-90	0	829	Diamond Bit - Coring	Rotary - Percussion	Y	Western Mining Corporation Ltd.	18-Jul-77	Gold; Copper; Uranium	MASTER	ENV06562
MGD 34	6539800	53	89.58	-90	0	600.5	Diamond Bit - Coring		Y	Gunson Resources Ltd.	7-Jan-06	Gold; Copper	MASTER	ENV11206
MGD 35	6538775	53	95	-90	0	560.6	Diamond Bit - Coring		Y	Gunson Resources Ltd.	16-Jan-06	Gold; Copper	MASTER	ENV11206
PN-06-04	6508050	53	71	-90	0	544	Diamond Bit - Coring	Rotary	Y	Red Metal Ltd.	23-Jun-06	Gold; Copper	MASTER	ENV11223
SAE 21	6556301	53	154.61	-90	0	452.3	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	31-May-95	Gold; Base Metals; Copper	MASTER	ENV08216
SAE 12	6555681	53	0	0	0	446.3	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	31-Jul-91	Gold; Base Metals; Copper	MASTER	ENV08216
SAE 17	6555271	53	0	0	0	435.2	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	3-Dec-92	Gold; Base Metals; Copper	MASTER	ENV08216
SAE 19	6555511	53	160.6	-90	0	429.7	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	31-Aug-93	Gold; Base Metals; Copper	MASTER	ENV08216
PEB 64	6555981	53	0	0	0	401	Rotary - Percussion		N	MIM Exploration Pty Ltd.	22-Nov-92	Gold; Base Metals; Copper	MASTER	ENV08216
LH 40	6538171	53	0	0	0	328	Rotary - Percussion		Y	Pacminex Pty Ltd.	31-Mar-84	Copper	MASTER	ENV06962
MGD 1														
no name1														
PEB 48														
no name2														
ADG 19														
MGD 48														
MGD 47														
MGD 45														
PY 7														
MGD 32														
ASD 2	6566427	53	0	-90	0	1148.4	Diamond Bit - Coring	Rotary - Percussion	Y	Western Mining Corporation Ltd.	4-Mar-84	Gold; Copper; Uranium	MASTER	ENV06562
AD 8	6557921	53	159.87	-90	0	1000.2	Diamond Bit - Coring	Rotary - Percussion	Y	Western Mining Corporation Ltd.	14-Oct-85	Gold; Copper; Uranium	MASTER	ENV06562
SAE 1	6554851	53	0	0	0	818	Diamond Bit - Coring	Rotary - Percussion	Y	Australian Selection Pty Ltd.	29-Jul-78	Copper	MASTER	ENV03411
SAE 1X	6554851	53	177.08	-80	0	648.85	Diamond Bit - Coring		Y	Australian Selection Pty Ltd.	5-Aug-78	Copper	MASTER	ENV03411
LH 45	6530025	53	0	-90	0	368	Rotary - Percussion		Y	Pacminex Pty Ltd.	6-Apr-84	Copper	MASTER	ENV06962
BEDA BORE	6458916	53	0	0	0	335.13			Y		16-Jan-13	Water		
LH 1														

DHName	Ref_Type2	Reference2	Purpose	HQ From_To	NQ From_To	NQ2 From_To	BQ From_To	77/8" Blade	5" Hammer	61/8" Hammer
PY 3	GEOLOG	ENV06962	Mineral Exploration	493.2-781.5m	781.5-1141.5m		1141.5-1288.3m			
SAE 11	GEOLOG	ENV08216	Mineral Exploration		342.2-1263.3m					
SAE 7	GEOLOG	ENV08216	Mineral Exploration		469-1221.7m					
SAE 3	GEOLOG	ENV06735	Mineral Exploration		404-842m		842-1221m			
SAE 6	GEOLOG	ENV06735	Mineral Exploration		309-1200m					
SAE 8	GEOLOG	ENV08216	Mineral Exploration		489-1177.2m					
HWD 1	GEOLOG	ENV06562	Mineral Exploration		280-376m		376-1186.2m			
WJD 1	GEOLOG	ENV06562	Mineral Exploration		300-396.2m		396.2-1015.1m			
AD 2	GEOLOG	ENV06562	Mineral Exploration	341-829m	93-253.2m		236-401m			
MGD 34	GEOLOG	ENV11206	Mineral Exploration			3-600.50m				
MGD 35	GEOLOG	ENV11206	Mineral Exploration			2.80-580.60m				
PN-06-04			Mineral Exploration		300-544m					
SAE 21	GEOLOG	ENV08216	Mineral Exploration	309.65-417.85m						
SAE 12	GEOLOG	ENV08216	Mineral Exploration	318-446.3m						
SAE 17	GEOLOG	ENV08216	Mineral Exploration	315-435.2m						
SAE 19	GEOLOG	ENV08216	Mineral Exploration	312.7-429.7m						
PEB 64	GEOLOG	ENV08216	Mineral Exploration							0-401m
LH 40	GEOLOG	ENV06962	Mineral Exploration					0-18m	0-313.90m	18-328m
MGD 1										
no name1										
PEB 48										
no name2										
ADG 19										
MGD 48										
MGD 47										
MGD 45										
PY 7										
MGD 32										
ASD 2	GEOLOG	ENV06562	Mineral Exploration		250-727.6m		697.90-1148.40m			
AD 8	GEOLOG	ENV06562	Mineral Exploration		304-844m		840-1000.2m			
SAE 1	GEOLOG	ENV02803	Mineral Exploration		222-262.5m		262.5-818m			
SAE 1X	GEOLOG	ENV03411	Mineral Exploration		534-648.85					
LH 45	GEOLOG	ENV06962	Mineral Exploration					0-18m		18-368m
BEDA BORE			Water Well							
LH 1										

APPENDIX 3 Original Historical Drill Hole Location Table & Associated Maps



ARCOONA STATION
Southern Gold
Arcoona Station
Deep Drill Hole
Location Map
2009
WOOMERA
PROHIBITED AREA
ANDAMOOKA
RANGES
LAKE WINDABOUT
HWD 1 1097.15 m
CSD 1 994.2 m
ASD 2 1148.4 m
ASD 1 1118 m
WJD 1 1015.1 m
SAE 11 1267.3 m
AD 2 829 m
AD 8 1000.2 m
SAE 22 435.6 m
SAE 14 498.44 m
SAE 5 914.4 m
SAE 13 477.6 m
SAE 9 1199.7 m
SAE 6 1200 m
SAE 19 446.3 m
SAE 21 452.3 m
PEB 57 426 m
PSC 7 SASC 3 696.4 m
SAE 15 400.81 m
SAE 4 1172.5 m
SAE 18 429.7 m
SAE 17 426.7 m
SAE 1 648.85 m
SAE 12 435.2 m
PEB 47 352 m
SAE 20 417.85 m
SAE 7 1221.7 m
SAE 1X 818 m
PEB 48 352 m
PEB 64 401 m
SAE 16 357.8 m
MGD 1 435.66 m
PEB 56 452 m
MGD 24 450.5 m
WOOMERA 1 611.12 m
SAE 3 1221 m
SAE 8 1177.2 m
MGD 42 1023.3 m
SAE 10 1100.8 m
MGD 34 600.5 m
MGD 46 795.13 m
MGD 45 801.17 m
MGD 35 560.6 m
MGP 31 452 m
MGD 44 607.32 m
MGP 30 504 m
EC 47 370.95 m
MGD 4 374.6 m
LH 40 328 m
LH 49 388 m
MOUNT GUNSON PY 5 342.4 m
MGD 2 304.5 m
MGD 5 387.4 m
LUCAS HILL LH 1 787.8 m
MOUNT GUNSON PY 7 703 m
PRL 5 / SAR 4 333.4 m
MGD 25 520 m
MGD 27 1134 m
MOUNT GUNSON PY 9 597 m
MGD 32 488.47 m
LH 45 368 m
MGD 26 W1 1136.9 m
EC 40 596 m
MGD 26 1103.7 m
EC 21 1002 m
MOUNT GUNSON PY 8 574.6 m
MGD 28 1155 m
MGD 29 998.89 m
PADD 2 600 m
PY 3 1288.3 m
PY 2 926.6 m

720,000 mE
730,000 mE
740,000 mE
750,000 mE
760,000 mE
6,610,000 mN
6,600,000 mN
6,590,000 mN
6,580,000 mN
6,570,000 mN
6,560,000 mN
6,550,000 mN
TORRENS
LAKE
NATIONAL
ANDAMOOKA ISLAND
BOSWORTH
ANDAMOOKA
ISLAND
WLD 1
445.5 m
SAE 9
1199.7 m
PEB 57
426 m
SAE 19
446.3 m
PSC 7 SASC 3
696.4 m
SAE 17
426.7 m
PEB 47
Southern Gold
Bosworth
Andamooka Island
Deep Drill Hole
Location Map
2009
Date:9/11/2009
Author: F Gerhard
Office: Adelaide, South Australia
Drawing:
Scale: 1:175000
Projection: MGA Zone 53 (GDA 94)
kilometres


KOOTABERRA
HESSO
476
478
479
302
BDH 2
553.1 m
BDH 1
313.9 m
SLT 107
1099 m
SLT 102
644 m
BDH 3
1200 m
SLT 104
836 m
BEDA BORE
335.13 m
LTDD02A
569.6 m
PBD 1
803.2 m
TR 4
401.25 m
720,000 mE
725,000 mE
730,000 mE
735,000 mE
740,000 mE
745,000 mE
750,000 mE
755,000 mE
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6,475,000 mN
6,470,000 mN
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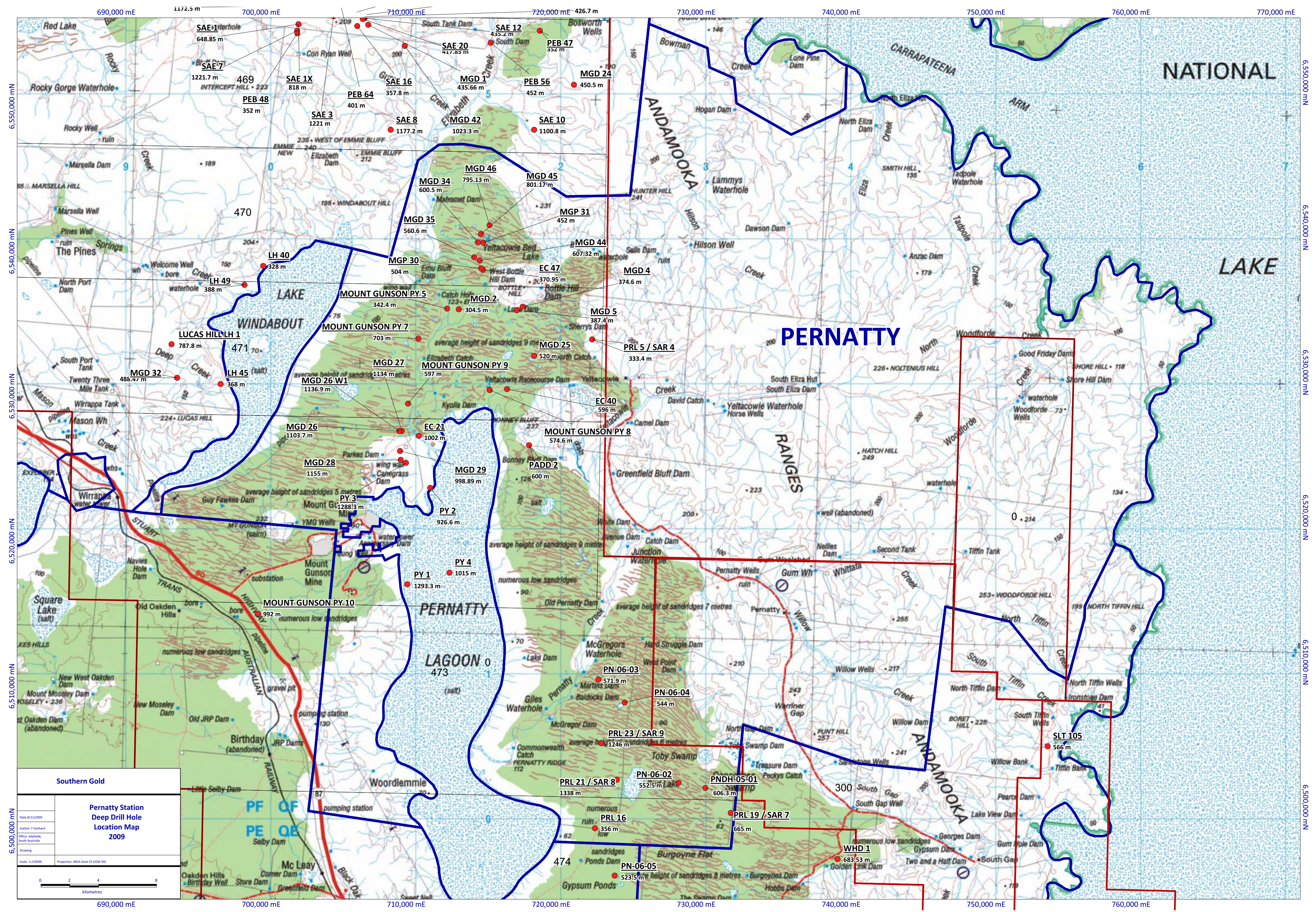
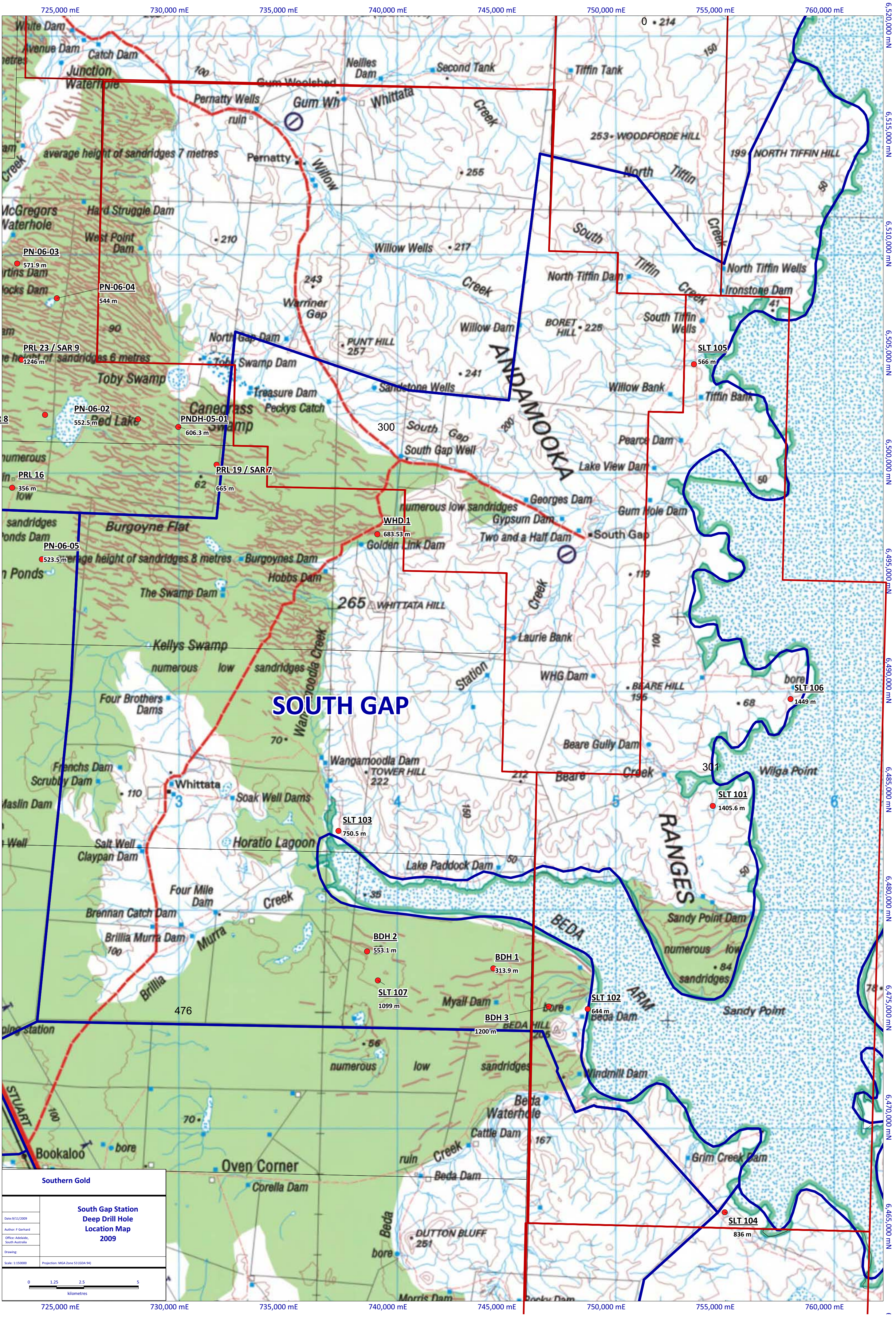
6,455,000 mN
6,450,000 mN
6,445,000 mN
6,440,000 mN
6,435,000 mN
6,430,000 mN
6,425,000 mN
Southern Gold
Kootaberra & Hesso Stations
Deep Drill Hole
Location Map
2009
Date: 9/11/2009
Author: F Gerhard
Office: Adelaide, South Australia
Drawing:
Scale: 1:150000
Projection: MGA Zone 53 (GDA 94)
kilometres


Southern Gold
Pernatty Station
Deep Drill Hole
Location Map
2009
Date:9/11/2009
Author: F Garhard
Office: Adelaide, South Australia
Drawing:
Scale: 1:225000
Projection: MGA Zone 53 (GDA 94)
kilometres
690,000 mE
700,000 mE
710,000 mE
720,000 mE
730,000 mE
740,000 mE
750,000 mE
760,000 mE
770,000 mE
6,550,000 mN
6,540,000 mN
6,530,000 mN
6,520,000 mN
6,510,000 mN
6,500,000 mN
NATIONAL
LAKE
PERNATTY
ANDAMOOKA
RANGES
LAKE WINDABOUT
PERNATTY LAGOON
SAE 1
648.85 m
SAE 7
1221.7 m
SAE 1X
818 m
PEB 48
352 m
SAE 3
1221 m
PEB 64
401 m
SAE 16
357.8 m
SAE 8
1177.2 m
MGD 42
1023.3 m
MGD 1
435.66 m
SAE 20
417.85 m
SAE 12
435.2 m
PEB 47
352 m
PEB 56
452 m
MGD 24
450.5 m
SAE 10
1100.8 m
MGD 46
795.13 m
MGD 45
801.17 m
MGD 34
600.5 m
MGP 31
452 m
MGD 35
560.6 m
MGD 44
607.32 m
MGP 30
504 m
EC 47
370.95 m
MGD 4
374.6 m
LH 40
328 m
LH 49
388 m
MOUNT GUNSON PY 5
342.4 m
MGD 2
304.5 m
MGD 5
387.4 m
MOUNT GUNSON PY 7
703 m
LUCAS HILL LH 1
787.8 m
MGD 25
520 m
PRL 5 / SAR 4
333.4 m
MGD 27
1134 m
MOUNT GUNSON PY 9
597 m
MGD 32
488.47 m
LH 45
368 m
MGD 26 W1
1136.9 m
EC 40
596 m
MGD 26
1103.7 m
EC 21
1002 m
MOUNT GUNSON PY 8
574.6 m
MGD 28
1155 m
MGD 29
998.89 m
PADD 2
600 m
PY 3
1288.3 m
PY 2
926.6 m
PY 4
1015 m
PY 1
1293.3 m
MOUNT GUNSON PY 10
992 m
PN-06-03
571.9 m
PN-06-04
544 m
PRL 23 / SAR 9
1246 m
SLT 105
566 m
PN-06-02
552.5 m
PNDH-05-01
606.3 m
PRL 21 / SAR 8
1338 m
PRL 19 / SAR 7
665 m
PRL 16
356 m
WHD 1
683.53 m
PN-06-05
523.5 m
469
470
471
473
474
300

DHName	Lease	Map10	Unit	DHNumber	Map Unit	Easting	Northing	Zone	Eleva	Dip	Azi	MaxDepth	Method1	Method2	Core_Lib	Operator	CompDate	Purpose	Casing	From_To	HQ From_To	NQ From_To	NQ2 From_To	BQ From_To	77/8" Blade	5" Hammer	61/8" Hammer
SLT 106	EL00582	6434	38	25363	6434-38	757985	6489694	53	0	-90	0	1449	Diamond Bit - Coring		Y	Aquitaine Australia Minerals Pty Ltd.	1-Mar-81	Mineral Exploration	NW	0-7m		7-109.5m		109.5-1449m			
SLT 101	EL00582	6434	35	25360	6434-35	754424	6484800	53	0	-90	0	1405.6	Diamond Bit - Coring	Rotary - Percussion	Y	Aquitaine Australia Minerals Pty Ltd.	14-Dec-77	Mineral Exploration	6" steel	0-23.8m		106.7-145m		145-1199m			
PRL 21 / SAR 8	EL00389	6334	59	20610	6334-59	723834	6502711	53	0	0	0	1338	Diamond Bit - Coring	Rotary - Percussion	Y	Australian Selection Pty Ltd.	29-May-81	Mineral Exploration	6" steel	0-52m		364-770m		770-1338m			
PY 1	EL00543	6335	101	20712	6335-101	709374	6516207	53	0	-90	0	1293.3	Diamond Bit - Coring		Y	CSR Ltd.	20-Mar-81	Mineral Exploration			3.3-78m	78-1293m					
PY 3	EL00951	6335	103	20714	6335-103	709293	6524586	53	0	-80	0	1288.3	Diamond Bit - Coring	Rotary - Percussion	Y	CSR Ltd.	3-Oct-81	Mineral Exploration			493.2-781.5m	781.5-1141.5m		1141.5-1288.3m			
SAE 11	EL01617	6235	80	165125	6235-80	684878	6560671	53	0	0	0	1267.3	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	30-Jun-90	Mineral Exploration				342.2-1263.3m					
PRL 23 / SAR 9	EL00389	6334	60	20611	6334-60	722765	6505235	53	0	-90	0	1246	Diamond Bit - Coring	Rotary - Percussion	Y	Australian Selection Pty Ltd.	1-Mar-82	Mineral Exploration				303-1246m					
SAE 7	EL01617	6335	300	165046	6335-300	701778	6554401	53	182	-90	0	1221.7	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	23-Apr-90	Mineral Exploration				469-1221.7m					
SAE 3	EL01134	6335	296	165606	6335-296	704298	6555401	53	0	-90	0	1221	Diamond Bit - Coring	Rotary - Percussion	Y	Carpentaria Exploration Co Pty Ltd.	20-Jul-84	Mineral Exploration				404-842m		842-1221m			
BDH 3	EL00206	6434	31	25356	6434-31	746905	6475615	53	0	0	0	1200	Diamond Bit - Coring	Rotary - Percussion	Y	Delhi International Oil Corporation.	1-Dec-80	Mineral Exploration	6"	0-32.3m	126-297.3m	297-525m		525-1200m			
SAE 6	EL01617	6335	299	165609	6335-299	704978	6556171	53	176	-90	0	1200	Diamond Bit - Coring	Rotary - Percussion	Y	Carpentaria Exploration Co Pty Ltd.	31-Aug-89	Mineral Exploration				309-1200m					
SAE 9	EL01617	6335	302	165070	6335-302	711828	6559571	53	149	-90	0	1199.7	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	19-May-90	Mineral Exploration				600.5-1199.7m					
DRD 1	EL01316	6336	41	20769	6336-41	708078	6592271	53	0	-90	0	1192	Diamond Bit - Coring	Rotary - Percussion	Y	Western Mining Corporation Ltd.	1-Jun-80	Mineral Exploration				322.7-677.1m		677.1-1192m			
SAE 8	EL01617	6335	301	165047	6335-301	708228	6547571	53	101	-90	0	1177.2	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	8-May-90	Mineral Exploration				489-1177.2m					
SAE 4	EL01393	6335	297	165607	6335-297	704168	6556131	53	178	-90	0	1172.5	Diamond Bit - Coring	Rotary - Percussion	Y	Carpentaria Exploration Co Pty Ltd.	7-Dec-87	Mineral Exploration			242-250m	250-1172.5m					
ASD 2	EL01316	6335	112	20723	6335-112	693034	6566427	53	0	-90	0	1148.4	Diamond Bit - Coring	Rotary - Percussion	Y	Western Mining Corporation Ltd.	4-Mar-84	Mineral Exploration				250-727.6m		697.90-1148.40m			
ASD 1	EL01316	6335	111	20722	6335-111	701269	6564443	53	0	0	0	1118	Diamond Bit - Coring	Rotary - Percussion	Y	Western Mining Corporation Ltd.	7-Jul-81	Mineral Exploration				110.2-712m		712-1116.8m			
SAE 10	EL01617	6335	303	165071	6335-303	718128	6547571	53	0	0	0	1100.8	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	30-Jun-90	Mineral Exploration				552.6-1100.18					
SLT 107	EL00582	6434	32	25357	6434-32	739082	6476809	53	0	-90	0	1099	Diamond Bit - Coring	Rotary	Y	Delhi Petroleum Pty Ltd.	23-Jan-81	Mineral Exploration	HQ Steel	0-20m		20.2-45m		45-1099m			
HWD 1	EL01316	6336	42	20770	6336-42	696416	6576119	53	0	-90	0	1097.15	Diamond Bit - Coring	Rotary - Percussion	Y	Western Mining Corporation Ltd.	16-Jun-82	Mineral Exploration				280-376m		376-1186.2m			
WJD 1	EL01316	6235	78	18093	6235-78	687597	6561435	53	0	-90	0	1015.1	Diamond Bit - Coring	Rotary - Percussion	Y	Western Mining Corporation Ltd.	28-May-80	Mineral Exploration				300-396.2m		396.2-1015.1m			
PY 4	EL00951	6335	104	20715	6335-104	712291	6517007	53	0	0	0	1015	Diamond Bit - Coring	Rotary - Percussion	Y	CSR Ltd.	17-Jan-83	Mineral Exploration	HW	0-9m	9-174m	174-1015m					
AD 8	EL01316	6335	113	20724	6335-113	702535	6557921	53	160	-90	0	1000.2	Diamond Bit - Coring	Rotary - Percussion	Y	Western Mining Corporation Ltd.	14-Oct-85	Mineral Exploration				304-844m		840-1000.2m			
CSD 1	EL01316	6236	66	18159	6236-66	676204	6574572	53	0	-90	0	994.2	Diamond Bit - Coring	Rotary - Percussion	Y	Western Mining Corporation Ltd.	21-Aug-80	Mineral Exploration				217.2-733m		733-994.2m			
PY 2	EL00543	6335	102	20713	6335-102	710953	6522859	53	0	0	0	926.6	Diamond Bit - Coring		Y	CSR Ltd.	7-Jun-81	Mineral Exploration			0-87m	87-785.88m		785.88-926.6m			
SAE 5	EL01393	6335	298	165608	6335-298	705998	6557311	53	157	-90	0	914.4	Diamond Bit - Coring	Rotary - Percussion	Y	Carpentaria Exploration Co Pty Ltd.	21-Jul-88	Mineral Exploration				341.3-914.4m					
AD 2	EL01316	6335	115	20726	6335-115	703212	6558475	53	0	-90	0	829	Diamond Bit - Coring	Rotary - Percussion	Y	Western Mining Corporation Ltd.	18-Jul-77	Mineral Exploration			341-829m	93-253.2m		236-401m			
SAE 1	EL00424	6335	293	165603	6335-293	701878	6554851	53	0	0	0	818	Diamond Bit - Coring	Rotary - Percussion	Y	Australian Selection Pty Ltd.	29-Jul-78	Mineral Exploration				222-262.5m		262.5-818m			
PBD 1 / SABD 1	EL01174	6433	463	147219	6433-463	754879	6439521	53	0	-90	0	803.2	Diamond Bit - Coring	Rotary - Percussion	Y	Carpentaria Exploration Co Pty Ltd.	20-Jul-85	Mineral Exploration				302-803.2m					
PSC 7 SASC 3	EL00261	6335	135	139595	6335-135	733528	6558771	53	0	0	0	696.4	Diamond Bit - Coring	Rotary - Percussion	Y	Australian Selection Pty Ltd.	15-Oct-77	Mineral Exploration						125-437m			
WHD 1	EL01316	6434	34	25359	6434-34	739059	6497242	53	0	-90	0	683.53	Diamond Bit - Coring	Rotary - Percussion	Y	Western Mining Corporation Ltd.	8-May-78	Mineral Exploration				103.5-192m		192-683.5m			
PRL 19 / SAR 7	EL00389	6334	58	20609	6334-58	731696	6500425	53	0	-90	0	665	Diamond Bit - Coring	Rotary - Percussion	Y	Australian Selection Pty Ltd.	3-Jun-79	Mineral Exploration				388-665m					
SAE 1X	EL00424	6335	294	165604	6335-294	701878	6554851	53	177	-80	0	648.85	Diamond Bit - Coring		Y	Australian Selection Pty Ltd.	5-Aug-78	Mineral Exploration				534-648.85					
MGD 34	EL03264	6335	341	212208	6335-341	714250	6539800	53	89.6	-90	0	600.5	Diamond Bit - Coring		Y	Gunson Resources Ltd.	7-Jan-06	Mineral Exploration					3-600.50m				
PN-06-03	EL02979	6334	241	220554	6334-241	722560	6509640	53	83	-90	0	571.9	Diamond Bit - Coring	Rotary	Y	Red Metal Ltd.	18-Jun-06	Mineral Exploration				276-571.90m					
MGD 35	EL03264	6335	342	212209	6335-342	714000	6538775	53	95	-90	0	560.6	Diamond Bit - Coring		Y	Gunson Resources Ltd.	16-Jan-06	Mineral Exploration					2.80-580.60m				
BDH 2	EL00206	6434	30	25355	6434-30	738588	6478140	53	0	-90	0	553.1	Diamond Bit - Coring	Rotary - Percussion	Y	Delhi International Oil Corporation.	4-Jul-77	Mineral Exploration	6"	24m	190.25-553.10m						
PN-06-02	EL02979	6334	240	220553	6334-240	728089	6502513	53	87	-90	0	552.5	Diamond Bit - Coring	Rotary	Y	Red Metal Ltd.	8-Jun-06	Mineral Exploration				282-552.5m					
PN-06-04	EL02979	6334	242	220555	6334-242	724379	6508050	53	71	-90	0	544	Diamond Bit - Coring	Rotary	Y	Red Metal Ltd.	23-Jun-06	Mineral Exploration				300-544m					
PN-06-05	EL02979	6334	243	220556	6334-243	723692	6496098	53	60	-90	0	523.5	Diamond Bit - Coring	Rotary	Y	Red Metal Ltd.	29-Jun-06	Mineral Exploration				354-523.5m					
MGD 25	EL02639	6335	319	183610	6335-319	718128	6531971	53	0	-90	0	520			Y	Gunson Resources Ltd.	12-Jun-00	Mineral Exploration				237-520m					
SAE 14	EL01617	6335	308	165370	6335-308	705428	6558161	53	0	0	0	498.44	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	30-Sep-91	Mineral Exploration			289.3-498.44m						
SAE 13	EL01617	6335	307	165368	6335-307	706968	6556871	53	0	0	0	477.6	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	31-Aug-91	Mineral Exploration			322-477.6m						
SAE 21	EL01808	6335	315	165529	6335-315	705798	6556301	53	155	-90	0	452.3	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	31-May-95	Mineral Exploration			309.65-417.85m						
PEB 56	EL01617	6335	304	165155	6335-304	715128	6553571	53	0	0	0	452	Rotary - Percussion		Y	MIM Exploration Pty Ltd.	30-May-90	Mineral Exploration									0-452m
MGD 24	EL02516	6335	318	183609	6335-318	720878	6550672	53	0	-90	0	450.5			Y	Gunson Resources Ltd.	30-May-00	Mineral Exploration				198-450.50m					
SAE 12	EL01617	6335	306	165157	6335-306	705878	6555681	53	0	0	0	446.3	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	31-Jul-91	Mineral Exploration			318-446.3m						
SAE 22	EL01808	6335	316	165530	6335-316	705278	6556961	53	151	-90	0	435.6	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	31-May-95	Mineral Exploration			306-435.6m						
SAE 17	EL01808	6335	317	165448	6335-317	706428	6555271	53	0	0	0	435.2	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	3-Dec-92	Mineral Exploration			315-435.2m						
SAE 19	EL01808	6335	313	165488	6335-313	706578	6555511	53	161	-90	0	429.7	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	31-Aug-93	Mineral Exploration			312.7-429.7m						
SAE 18	EL01808	6335	312	165487	6335-312	706438	6555361	53	0	0	0	426.7	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	31-Aug-93	Mineral Exploration			317.85-416.85m						
PEB 57	EL01617	6335	305	165156	6335-305	721678	6559471	53	179	-90	0	426	Rotary - Percussion		Y	MIM Exploration Pty Ltd.	6-Jun-90	Mineral Exploration									0-426m
SAE 20	EL01808	6335	314	165489	6335-314	706308	6555211	53	162	-90	0	417.85	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	31-Aug-93	Mineral Exploration			302.65-417.85m						
TR 4	EL00654	6333	278	136944	6333-278	733549	6424771	53	0	0	0	401.25	Diamond Bit - Coring		Y	Dampier Mining Co Ltd.	26-Apr-81	Mineral Exploration				45-132m		132-401m			
PEB 64	EL01808	6335	310	165444	6335-310	704838	6555981	53	0	0	0	401	Rotary - Percussion		N	MIM Exploration Pty Ltd.	22-Nov-92	Mineral Exploration									0-401m
SAE 15	EL01617	6335	309	165372	6335-309	704458	6556811	53	0	0	0	400.81	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	30-Sep-91	Mineral Exploration			311.25-400.81m						
LH 49	EL00951	6335	233	139851	6335-233	698155	6536868	53	0	0	0	388	Rotary - Percussion		N	Pacminex Pty Ltd.	11-Apr-84	Mineral Exploration							0-18m		18-388m
LH 45	EL00951	6335	229	139847	6335-229	696499	6530025	53	0	-90	0	368	Rotary - Percussion		Y	Pacminex Pty Ltd.	6-Apr-84	Mineral Exploration							0-18m		18-368m
SAE 16	EL01808	6335	311	165447	6335-311	705928	6554721	53	0	0	0	357.8	Diamond Bit - Coring	Rotary - Percussion	Y	MIM Exploration Pty Ltd.	27-Nov-92	Mineral Exploration			342.7-357.80m						
LH 40	EL00951	6335	224	139842	6335-224	699432	6538171	53	0	0	0	328	Rotary - Percussion		Y	Pacminex Pty Ltd.	31-Mar-84	Mineral Exploration							0-18m	0-313.90m	18-328m
BDH 1	EL00206	6434	29	25354	6434-29	744369	6477362	53	0	0	0	313.9	Rotary - Percussion		Y	Delhi International Oil Corporation.	5-Jun-77	Mineral Exploration;Strat	6"	0-90.8m							



SOUTH GAP
SLT 101
1405.6 m
SLT 102
644 m
SLT 103
750.5 m
SLT 104
836 m
SLT 105
566 m
SLT 106
1449 m
SLT 107
1099 m
BDH 1
313.9 m
BDH 2
553.1 m
BDH 3
1200 m
WHD 1
683.53 m
PN-06-02
552.5 m
PN-06-03
571.9 m
PN-06-04
544 m
PN-06-05
523.5 m
PNDH-05-01
606.3 m
PRL 16
356 m
PRL 19 / SAR 7
665 m
PRL 23 / SAR 9
1246 m
SAR 8
ANDAMOOKA
RANGES
BEDA ARM
300
301
476
Southern Gold
South Gap Station
Deep Drill Hole
Location Map
2009
Date:9/11/2009
Author: F Gerhard
Office: Adelaide, South Australia
Drawing:
Scale: 1:150000
Projection: MGA Zone 53 (GDA 94)
kilometres

APPENDIX 4 Consultant Reports /Activity Notification

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INTERIM REPORT FOR EL3515

Report prepared for Southern Gold Limited

February, 2008

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EXECUTIVE SUMMARY

Southern Gold Limited (SAU) requested Hot Dry Rocks Pty Ltd (HDRPL) to provide an interim report of work carried out to date in Exploration Licence 3515 towards assessing the viability of geothermal development beneath Exploration Licence 3515. To assist in this assessment SAU provided the following information to HDRPL:

- Downhole temperature and gamma log data for LTDD002A;
- Downhole temperature, gamma log and resistivity log data for LTDD003;
- Summary drill logs for both the above mentioned wells;
- Geological cross sections and specific gravities of major formations for both wells;
- Location map

Available temperature data and conductivity measurements carried out on samples from the two drill holes suggest that heat flow is high enough to be prospective for an engineered geothermal system (EGS) geothermal development. However, it is HDRPL's interpretation from this preliminary assessment that water availability and sufficient evidence of a suitable reservoir represent the greatest uncertainty, and therefore the greatest risk, with respect to geothermal resource development in EL3515.

Specific recommendations include:

- Assess water availability in local area,
- Model gravity and magnetics in association with seismic reflection profiles to investigate the nature of the basement when investigating the viability of EGS,
- Investigate local stress field

Disclaimer
The information and opinions in this report have been generated to the best ability of the author, and Hot Dry Rocks Pty Ltd hope they may be of assistance to you. However, neither the author nor any other employee of Hot Dry Rocks Pty Ltd guarantees that the report is without flaw or is wholly appropriate for your particular purposes, and therefore we disclaim all liability for any error, loss or other consequence which may arise from you relying on any information in this publication. The data are assumed to be an accurate transcription from original documents but Hot Dry Rocks makes no guarantee that this is truly the case.

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1.0 Background

Southern Gold Limited (SAU) commissioned Hot Dry Rocks Pty Ltd (HDRPL) to investigate the geothermal prospectivity of Exploration Licence (EL) 3515 based on heat flow within the two wells LTDD002A and LTDD003 in South Australia (MGA94_53: 752839, 6446014 and 755015, 6439984 respectively). Information supplied to HDRPL for this task included:

- Downhole temperature and gamma log data for LTDD002A;
- Downhole temperature, gamma and resistivity log data for LTDD003;
- Summary drill logs for both the above mentioned wells;
- Geological cross sections and specific gravities of major formations for both wells;
- Location map (see Figure 1)

The average heat flow in the top few kilometres controls the average thermal gradient over the same depth range. Surface heat flow is the sum of the heat generated in the crust combined with that conducted out of the mantle. Heat flow can be calculated from the product of the average thermal gradient and the average thermal conductivity of the intervening layers.

To complete heat flow calculations for the drill holes LTDD02A and LTDD003, representative thermal conductivities were required for major lithological formations. A sampling programme was carried out to ascertain conductivities for major formations in both drill holes. A total of ten samples from each drill hole were identified to coincide with zones of relatively consistent thermal gradient.

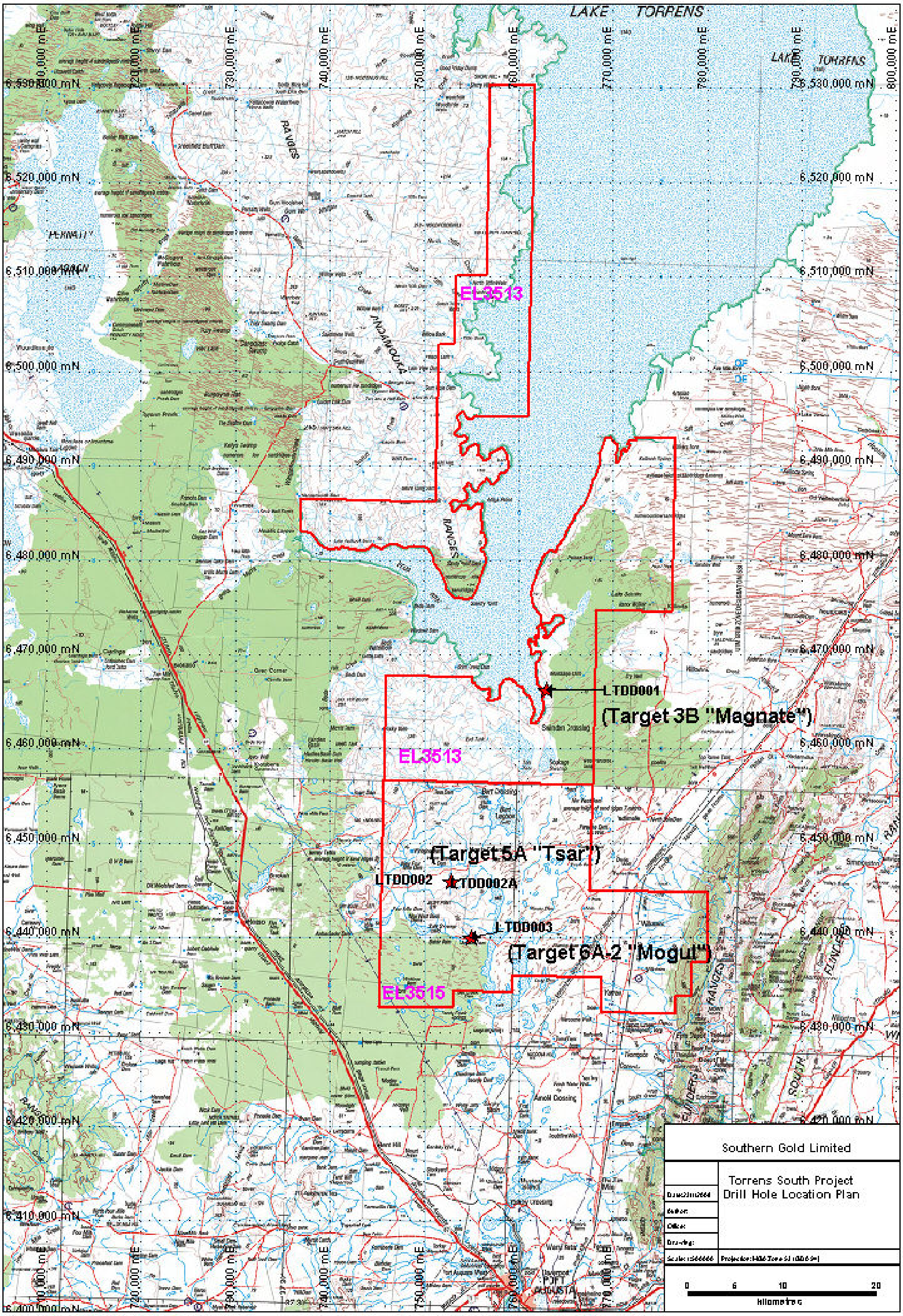

Figure 1. *Location of drill holes LTDD002A and LTDD003 in Exploration License (EL) 3515 north of Port Augusta, South Australia.*

2.0 Preliminary Geothermal Systems Assessment

A geothermal system has three main elements: a heat source, a reservoir, and a fluid to transfer the heat. The heat source can be a shallow magmatic intrusion, an internally heated radiogenic pluton, or just the normal heat from the Earth's mantle. The reservoir is a volume of space (e.g. fractures, pores or pipes) within the rock through which fluid can circulate and extract heat. Recharge is vital to replace or partly replace fluid extracted from the reservoir. The fluid is almost always water in liquid or vapour phase, depending on its temperature and pressure.

For the purposes of geothermal energy utilisation, only the heat source needs to occur naturally. Given favourable conditions, the reservoir and fluid can be artificially introduced. For example, geothermal fluids extracted to drive a turbine in a geothermal power plant can be re-injected into the reservoir after use. In this way the natural recharge of the reservoir is augmented by an artificial recharge. Re-injection is also used in various parts of the world to reduce the impact of geothermal plant operations on the environment (such as ground subsidence).

An assessment of the geothermal potential of a site can be broken down into an assessment of the likelihood of each of the components of a geothermal system being present. That is: the availability of water; the likelihood of *in situ* permeable aquifers or a rock unit susceptible to artificial permeability enhancement; and the likelihood of elevated temperatures at drillable depth.

2.1 Water

The medium by which heat is brought to the surface in a geothermal operation is almost always water. For a hot dry rock type geothermal development, therefore, the system will need to be charged with enough water to fill the reservoir volume.

An assessment of water availability in the local area is required and should also include any special permission requirements for its extraction in the local area.

2.2 Reservoir

In combination with a heat source, a viable geothermal system also requires a suitable reservoir. That is, a volume of space (eg. fractures, pores or pipes) within the rock through which the fluid can circulate and extract heat. An assessment of the geothermal potential of a site therefore includes the likelihood of *in situ* permeable aquifers or a rock unit susceptible to artificial permeability enhancement (for an engineered geothermal system or 'EGS').

Limited information regarding the nature of the basement in this area increases the risk associated with EGS reservoirs. Detailed gravity and magnetic modelling constrained by seismic reflection profiles or drilling will be required to further investigate the nature and extent of the basement when investigating the viability of EGS. An understanding of tectonic stress within the local area is also required as it controls the orientation of fractures preferentially opened during reservoir engineering.

SAU should be aware, however, that the economic viability of EGS is yet to be demonstrated anywhere in the world. Notwithstanding the recent results of flow tests in Geodynamic Limited's Habenero project in the Cooper Basin and Petratherm Limited's project at Paralana, EGS must achieve a 2-fold to 4-fold increase in water flow rate over what has been demonstrated in overseas trials before they will be economically viable. While there are reasons to be optimistic that this goal will be achieved, HDRPL makes no guarantee that pre-existing permeability within any granite or other basement rock can be enhanced to the point where economic rates of water flow can be achieved through an underground heat exchanger.

2.3 Temperature

The primary aim of geothermal exploration is to locate relatively high temperatures at relatively shallow depth. For the purposes of this initial assessment, HDRPL assumes that the thermal regime in the project area is dominantly conductive; that is, negligible heat is transported laterally or vertically by fluid advection. This is a common assumption for a preliminary assessment of a region, but *should the assumption prove incorrect, the conclusions below may be incorrect.*

Temperatures were measured in LTDD002A and LTDD003 at 5 cm intervals. The average thermal gradient for the depth interval z to z + Δz is ΔT/Δz, where ΔT = T(z + Δz) – T(z) is obtained from the temperature log. An estimated average thermal gradient of 40°C/km has been calculated over the full extent of LTDD002A and 38°C/km for LTDD003.

2.4 Heat Flow

The average heat flow in the top few kilometres controls the average thermal gradient over the same depth range and can be used to predict temperatures at greater depth. Surface heat flow is the sum of heat generated in the crust combined with that conducted out of the mantle. Heat flow can be calculated from the product of the average thermal gradient and the average thermal conductivity over any depth interval.

To complete heat flow calculations for the two drill holes, representative thermal conductivities were required for major lithological formations. SAU commissioned HDRPL to measure the conductivity of 20 core specimens (ten from each hole) from intervals identified as zones of relatively consistent thermal gradient. Measurements were made on the 20 samples using a steady state divided bar apparatus calibrated for the range 1.4–9.8 W/mK.

Up to three samples were prepared from each specimen to investigate variation in thermal conductivity over short distance scales and to determine mean conductivity and uncertainty. All values were measured at a standard temperature of 30°C. The uncertainty for individual samples is approximately ±5% for consolidate samples (based on the instrument precision of the divided bar apparatus). Table 1 display the thermal conductivity for each sample, and the harmonic mean conductivity and standard deviation for each specimen

Table 1. *Thermal conductivity of samples taken from LTDD002A at 30°C, and harmonic mean and uncertainty [1] for each specimen.*

Well Name	Depth From (m)	Depth To (m)	Sample		Conductivity (W/mK)	
LTDD002A	448.29	448.58	SAU001	A	2.338	2.43 ± 0.10
				B	2.537	
				C	2.426	
LTDD002A	483.24	483.43	SAU002	A	2.373	2.44 ± 0.10
				B	2.392	
				C	2.561	
LTDD002A	550.56	550.72	SAU003	A	2.619	2.24 ± 0.39
				B	1.835	
				C	2.251	
LTDD002A	517	517.18	SAU004	A	2.988	3.03 ± 0.25
				B	2.813	
				C	3.307	
LTDD002A	704.43	704.58	SAU005	A	2.547	2.48 ± 0.13
				B	2.330	
				C	2.564	
LTDD002A	657.28	657.4	SAU006	A+B	5.101	*4.86 ± 0.34
				B+C	4.624	
LTDD002A	775.58	775.73	SAU007	A	2.262	2.30 ± 0.09
				B	2.410	
				C	2.243	
LTDD002A	786.8	786.96	SAU008	A	2.547	2.41 ± 0.14
				B	2.274	
				C	2.431	

*Refer to Conductivity Report in Appendix.

[1] Uncertainty of the thermal conductivity for each specimen was derived from the uncertainty of the individual measurements for each sample.

Table 1 (continued) Thermal conductivity of samples taken from LTDD003 at 30°C, and harmonic mean and uncertainty for each specimen

LTDD003	647.29	647.5	SAU009	A	2.649	2.89 ± 0.26
				B	3.173	
				C	2.881	
LTDD003	462.7	462.91	SAU010	A	3.122	2.73 ± 0.38
				B	2.367	
				C	2.805	
LTDD003	520.9	521.19	SAU011	A	3.138	3.26 ± 0.24
				B	3.545	
				C	3.114	
LTDD003	614.6	614.83	SAU012	A	2.662	2.53 ± 0.13
				B	2.412	
				C	2.532	
LTDD003	433.74	434.17	SAU013	A	3.687	3.80 ± 0.28
				B	4.131	
				C	3.601	
LTDD002A	449.94	450.13	SAU014	A	2.473	2.45 ± 0.13
				B	2.577	
				C	2.322	
LTDD003	853.3	853.5	SAU015	A	2.766	2.50 ± 0.26
				B	2.249	
				C	2.595	
LTDD003	779.52	779.67	SAU016	A	2.335	2.39 ± 0.22
				B	2.666	
				C	2.250	
LTDD002A	555.25	555.4	SAU017	A	2.473	2.66 ± 0.27
				B	2.992	
				C	2.577	
LTDD003	246.22	246.47	SAU018	A	3.189	3.04 ± 0.14
				B	2.900	
				C	3.038	
LTDD003	406.83	407.1	SAU019	A	1.674*	2.80 ± 0.48
				B	3.174	
				C	2.498	
* Sample A was cracked horizontally so this result was disregarded						
LTDD003	749.18	749.34	SAU020	A	2.734	2.69 ± 0.12
				B	2.801	
				C	2.569	

The available data suggest that heat flow is **94.1 ± 12.3 mW/m^2** within LTDD002A and **94.7 ± 9.2 mW/m^2** within LTDD003. Thermal conductivity data were combined with thermal gradient data (average gradient from 2m above and below the sampled conductivity depth) at each sampled depth to obtain individual heat flow estimates. This allows a number of independent estimates of heat flow can be statistically assessed for mean and standard deviation (Figure 2 and Figure 3). Some scatter is shown with depth but heat flow estimates fall within the reasonably narrow band.

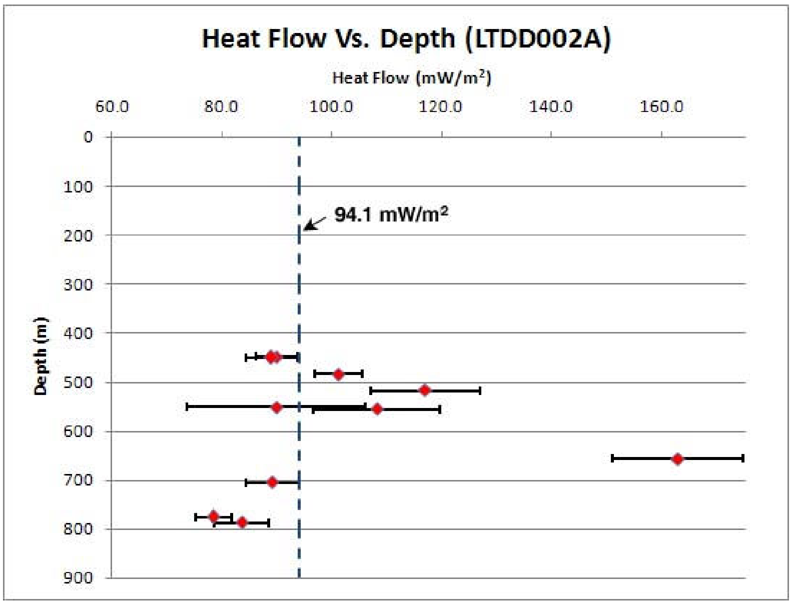

__Figure 2__. Heat flow vs. depth for LTDD002A. Some variation is shown however most values are in the range 80 – 100 mW/m2. The extremely high value at 647m is likely due to a thermal conductivity sampling error (see Appendix). Hence this value has been excluded when calculating the final average heat flow.

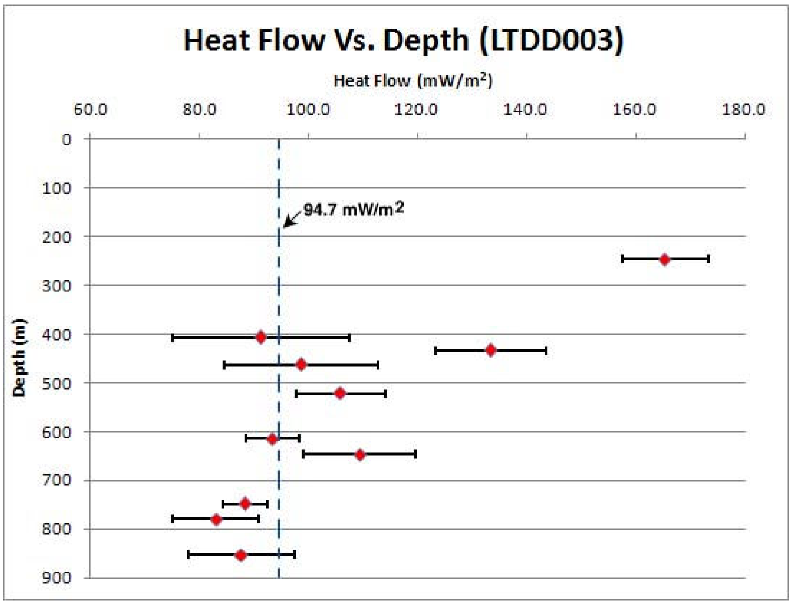

__Figure 3__. Heat flow vs. depth for LTDD003. Again some variation is shown but values are close to the average of 94.7 mW/m2. Two high values at 246m and 434m are most likely due to thermal conductivity errors (see Appendix) and were hence excluded from average heat flow calculation.

For comparison, surface heat flow in the Cooper Basin is typically greater than 100 m/W/m^2, and heat flow at Petratherm's Paralana project has been reported as 129 m/W/m^2 [[2]]. Torrens Energy has stated a target heat flow of 90 mW/m^2 for prospectivity to the east of Lake Torrens.

3.0 Conclusion and Recommendations

A preliminary geothermal systems assessment was carried out for EL3515 based on data provided from drill holes LTDD002A and LTDD003. This exercise identified the risks associated with the three main elements of a geothermal system and highlighted areas requiring further investigation. Available data suggest that heat flow in the area is high enough to be prospective for geothermal development, but it is HDRPL's opinion from this preliminary assessment that water availability and sufficient evidence of a suitable reservoir represent the greatest uncertainty, and therefore the greatest risk.

An assessment of water availability for geothermal development is required, including any special permission that may be required for its extraction in the local area.

There is not enough data to identify a suitable reservoir host formation in the area at this stage. Detailed gravity and magnetic modelling constrained by seismic reflection profiles or drilling may be required to further investigate the nature of the basement and the viability of an EGS development. An understanding of tectonic stress within the local area is also required as it controls the orientation of fractures preferentially opened during reservoir engineering.

The two exploration holes drilled in EL3515 provide a good level of information about the temperature conditions beneath the central southern portion of the permit. An estimated average thermal gradient of 40°C/km has been calculated for LTDD002A and 38°C/km for LTDD003. The thermal gradient beneath the holes, however, depends on the thermal conductivity of the deeper units.

With the knowledge of thermal gradient and measured thermal conductivity calculations suggest that heat flow is **94.1 ± 12.3 mW/m^2**within LTDD002A and **94.7 ± 9.2 mW/m^2**within LTDD003. Heat flow appears attractive for further investigation towards EGS geothermal development.

[2] Petratherm Limited press report, Monday 11th December 2006.

APPENDIX – Thermal Conductivity of Core Samples

THERMAL CONDUCTIVITY OF CORE SAMPLES

Report prepared for Southern Gold Limited

March, 2008

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EXECUTIVE SUMMARY

Southern Gold Ltd. commissioned Hot Dry Rocks Pty Ltd (HDRPL) to measure the thermal conductivity of 20 core specimens. HDRPL took delivery of the specimens in February 2008. Measurements were made on the 20 specimens using a steady state divided bar apparatus calibrated for the range 1.4–9.8 W/mK. Up to three samples were prepared from each specimen to investigate variation in thermal conductivity over short distance scales and to determine mean conductivity and uncertainty. All values were measured at a standard temperature of 30°C. The uncertainty for individual samples is approximately ±5%.

HDRPL considers the following points to be important:

- Results are generally typical of sand / silt / shale sedimentary material, falling mainly in the range 2.0–3.0 W/mK, although some samples had conductivities higher than 3.0 W/mK. One sample (SAU006) was largely composed of a vein and had a particularly high conductivity (4.86 W/mK). Values this high are not unusual for some minerals such as salt and quartz.
- While the specimens were chosen to represent the cored geological sections from which they came, there is no guarantee that the sections themselves are typical of the overall geological formations.
- It is to be expected that the thermal conductivity of a given formation will vary from place to place if the porosity of the formation varies.
- Thermal conductivity of rocks is sensitive to temperature. This should be kept in mind when developing models of *in situ* thermal conductivity.

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Disclaimer
This document was prepared by Hot Dry Rocks Pty Ltd for Southern Gold Ltd. HDRPL used our best endeavours to ensure accuracy but do not guarantee that the document is without flaw of any kind or is wholly appropriate for Southern Gold's particular purposes, and therefore disclaim all liability for any error, loss or other consequence which may arise from reliance on any information in this document. Where this document contains data extracted from third party sources, HDRPL make no representations or warranties, express or implied, regarding the completeness, quality or accuracy of that information.

1. INTRODUCTION

Thermal conductivity is the physical property that controls the rate at which heat energy flows through a material in a given thermal gradient. In the S.I. system of units, it is measured in watts per metre-kelvin (W/mK). In the earth, thermal conductivity controls the rate at which temperature increases with depth for a given heat flow. The thermal conductivity distribution within a section of crust must be known in order to calculate crustal heat flow from temperature gradient data, or to predict temperature distribution from a given heat flow. This report describes the results of laboratory thermal conductivity measurements on a series of drill core samples from Southern Gold Ltd.

Southern Gold Ltd commissioned Hot Dry Rocks Pty Ltd (HDRPL) to undertake this study. HDRPL took delivery of 20 core specimens[3] in February 2008 (Table 1). Thermal conductivity measurements were made on all of these specimens using a steady state divided bar apparatus calibrated for the range 1.4–9.8 W/mK.

Thermal conductivity is sensitive to temperature (e.g. Vosteen and Schellschmidt, 2003[4]), in general decreasing as temperature increases. The measurements contained in this report were made within ±2°C of 30°C.

[3] In this report the word "specimen" refers to a raw piece of rock delivered to HDRPL, while "sample" refers to part of a specimen prepared for conductivity measurement. In general, three samples are prepared from each specimen.
[4] **Vosteen, H.-D. and Schellschmidt, R.** (2003). Influence of temperature on thermal conductivity, thermal capacity and thermal diffusivity for different types of rock. *Physics and Chemistry of the Earth*, 28, 499–509.

Table 1. Specimens presented for thermal conductivity measurement.

Specimen	Well Name	Depth From	Depth To
SAU001	LTDD002A	448.29	448.58
SAU002	LTDD002A	483.24	483.43
SAU003	LTDD002A	550.56	550.72
SAU004	LTDD002A	517	517.18
SAU005	LTDD002A	704.43	704.58
SAU006	LTDD002A	657.28	657.4
SAU007	LTDD002A	775.58	775.73
SAU008	LTDD002A	786.8	786.96
SAU009	LTDD003	647.29	647.5
SAU010	LTDD003	462.7	462.91
SAU011	LTDD003	520.9	521.19
SAU012	LTDD003	614.6	614.83
SAU013	LTDD003	433.74	434.17
SAU014	LTDD002A	449.94	450.13
SAU015	LTDD003	853.3	853.5
SAU016	LTDD003	779.52	779.67
SAU017	LTDD002A	555.25	555.4
SAU018	LTDD003	246.22	246.47
SAU019	LTDD003	406.83	407.1
SAU020	LTDD003	749.18	749.34

2. METHODOLOGY

Hot Dry Rocks Pty Ltd selected samples of rock from each of the 20 cores, based on them being visually representative of the average lithological composition of the formation being sampled. The specimens were labelled, bagged and shipped to HDRPL's laboratory in South Yarra, Victoria.

Each specimen was prepared for thermal conductivity measurement in a divided bar apparatus[5]. Three discs, each approximately 1–2 cm thick, were cut from each consolidated core to investigate variation in thermal conductivity over short distance scales and to determine mean conductivity (Figure 4) and uncertainty. Values were measured at a standard temperature of 30°C (±2°C). Harmonic mean conductivity and uncertainty were calculated for each specimen. Results are presented in the next section.

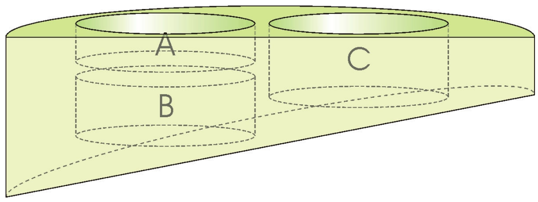

Figure 4. ***The average conductivity of samples in series (e.g. A and B) is found using the harmonic mean. The average conductivity of samples in parallel (e.g. A and C) is found using the arithmetic mean.***

In the case of SAU006, the thermal resistance (thickness divided by conductivity) of the individual samples as prepared fell below the reliable measurement range of the instrument. Measurements were therefore made on two samples in series to increase the thermal resistance (by increasing the total thickness). Hence, the final harmonic mean conductivity for SAU006 is based on measurements made on (SAU006A+B) and (SAU006B+C). HDRPL considers that this method may slightly underestimate conductivity due to the added thermal resistance of the interface between the two samples, and that the conductivity value for SAU006 should be considered as a conservative estimate. In addition, the sample was composed largely from vein material, and may not reliably represent the bulk of the formation from which it was extracted.

[5] **Divided bar apparatus**: An instrument that places an unknown sample in series with a standard of known thermal conductivity, then imposes a constant thermal gradient across the combination in order to derive the conductivity of the unknown sample.

3. RESULTS

Table 2 displays the thermal conductivity for each individual sample, and the harmonic mean conductivity and standard deviation for each specimen. **All values are for a standard temperature of 30°C**. The uncertainty for individual samples is approximately ±5% for consolidated samples (based on the instrument precision of the divided bar apparatus).

Table 2. Thermal conductivity of samples at 30°C, and harmonic mean and uncertainty[6] for each specimen.

Well Name	Depth From (m)	Depth To (m)	Sample		Conductivity (W/mK)	
LTDD002A	448.29	448.58	SAU001	A	2.338	2.43 ± 0.10
				B	2.537	
				C	2.426	
LTDD002A	483.24	483.43	SAU002	A	2.373	2.44 ± 0.10
				B	2.392	
				C	2.561	
LTDD002A	550.56	550.72	SAU003	A	2.619	2.24 ± 0.39
				B	1.835	
				C	2.251	
LTDD002A	517	517.18	SAU004	A	2.988	3.03 ± 0.25
				B	2.813	
				C	3.307	
LTDD002A	704.43	704.58	SAU005	A	2.547	2.48 ± 0.13
				B	2.330	
				C	2.564	
LTDD002A	657.28	657.4	SAU006	A	5.323	4.86 ± 0.34
				B	6.900	
				C	5.373	
				A+B	5.101	
				B+C	4.624	
LTDD002A	775.58	775.73	SAU007	A	2.262	2.30 ± 0.09
				B	2.410	
				C	2.243	
LTDD002A	786.8	786.96	SAU008	A	2.547	2.41 ± 0.14
				B	2.274	
				C	2.431	

[6] Uncertainty of the thermal conductivity for each specimen was derived from the uncertainty of the individual measurements for each sample.

LTDD003	647.29	647.5	SAU009	A	2.649	2.89 ± 0.26
				B	3.173	
				C	2.881	
LTDD003	462.7	462.91	SAU010	A	3.122	2.73 ± 0.38
				B	2.367	
				C	2.805	
LTDD003	520.9	521.19	SAU011	A	3.138	3.26 ± 0.24
				B	3.545	
				C	3.114	
LTDD003	614.6	614.83	SAU012	A	2.662	2.53 ± 0.13
				B	2.412	
				C	2.532	
LTDD003	433.74	434.17	SAU013	A	3.687	3.80 ± 0.28
				B	4.131	
				C	3.601	
LTDD002A	449.94	450.13	SAU014	A	2.473	2.45 ± 0.13
				B	2.577	
				C	2.322	
LTDD003	853.3	853.5	SAU015	A	2.766	2.50 ± 0.26
				B	2.249	
				C	2.595	
LTDD003	779.52	779.67	SAU016	A	2.335	2.39 ± 0.22
				B	2.666	
				C	2.250	
LTDD002A	555.25	555.4	SAU017	A	2.473	2.66 ± 0.27
				B	2.992	
				C	2.577	
LTDD003	246.22	246.47	SAU018	A	3.189	3.04 ± 0.14
				B	2.900	
				C	3.038	
LTDD003	406.83	407.1	SAU019	A	1.674*	2.80 ± 0.48
				B	3.174	
				C	2.498	
* Sample A was cracked horizontally so this result was disregarded						
LTDD003	749.18	749.34	SAU020	A	2.734	2.69 ± 0.12
				B	2.801	
				C	2.569	

4. DISCUSSION AND CONCLUSIONS

In most cases the measured values agree closely for samples taken from the same specimen. This implies that variation in thermal conductivity is not significant over the scale of centimetres for the specimens examined.

The range of conductivities recorded from these specimens is mostly typical of sedimentary sequences. SAU006 had a particularly high conductivity but was composed predominantly of a single mineral and may not be representative of the formation from which it was extracted. HDRPL did not have stratigraphic unit information at hand for the specimens while making the measurements, but the results suggest that average values for specific formations could start to be assigned from this data set. Remaining gaps in the current data set will be identified when these results are correlated against stratigraphic information.

The following additional points must be considered when extrapolating the results in this report to *in situ* formations:

1. The samples upon which the thermal conductivity measurements were made are only several square centimetres in surface area and generally around two centimetres long. While the specimens were chosen to represent the geological sections from which they came, there is no guarantee that the sections themselves are typical of the overall geological formations. This is especially true for heterogeneous formations. This introduces an unquantifiable random error into the results.

2. Porosity exerts a primary influence on the thermal conductivity of a rock. Water is substantially less conductive than typical mineral grains[7], and water saturated pores act to reduce the bulk thermal conductivity of the rock. Gas-filled pores reduce the bulk conductivity even more dramatically. Results reported in this document are whole-rock measurements. No adjustments were made for porosity. It is to be expected that the thermal conductivity of a given formation will vary from place to place if the porosity of the formation varies (conductivity decreases with increasing porosity).

3. Thermal conductivity of rocks is sensitive to temperature[2], typically decreasing at a rate of around 0.16%/°C. This should be kept in mind when developing models of *in situ* thermal conductivity.

[7] **Beardsmore, G.R. and Cull, J.P.** (2001). *Crustal heat flow: A guide to measurement and modelling*. Cambridge University Press, Cambridge. 324pp.

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GEL 302 Geothermal Play

Statement of Estimated Geothermal Resources

Prepared for Southern Gold Limited

22 May 2009

Dr Graeme Beardsmore

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***Note**: This report has been prepared in accordance with the 'Australian Code for Reporting of Exploration Results, Geothermal Resources and Geothermal Reserves (2008 Edition)'. Neither Graeme Beardsmore nor Hot Dry Rocks Pty Ltd takes any responsibility for selective quotation of the report or if quotations are made out of context.*

1.0 Introduction

Southern Gold Limited [SAU] is a resource company with a portfolio of gold and base metals exploration projects predominantly in Australia and Cambodia. In parallel, SAU also has a growing interest in geothermal resource exploration, holding geothermal exploration acreage and pending geothermal exploration licence applications in South Australia.

SAU holds geothermal exploration licences (GELs) 297, 300, 301 and 302 which cover approximately 1,990 km^2 and constitute the *Roxby Geothermal Project Area*. The GELs were granted to Inferus Resources Pty Ltd (a wholly owned subsidiary of SAU) as the sole licensee on 8 August 2008 (Figure 1).

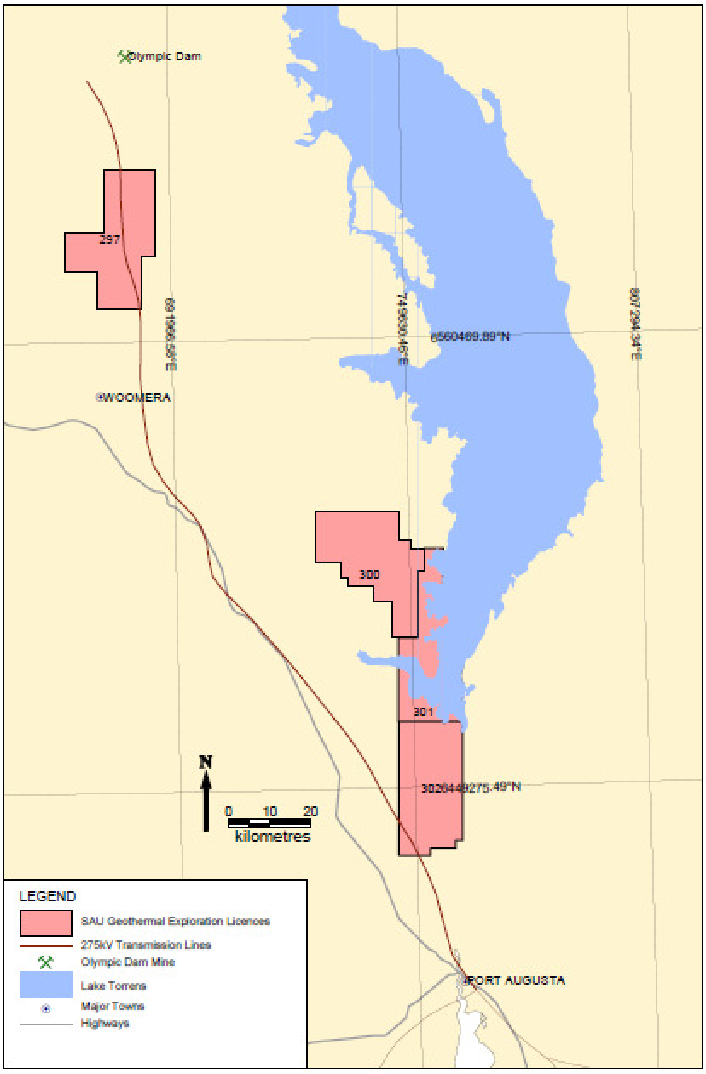

Figure 1. Location map of the SAU Roxby Geothermal Project Area in South Australia, showing proximity to infrastructure and industry [GDA94 Zone 53].

This Geothermal Resource assessment focussed only on GEL 302. GEL 302 (499 km^2) lies at the southern end of Lake Torrens, approximately 40 kilometres north of Port Augusta in South Australia. The geothermal play is an Engineered Geothermal System (EGS) within sedimentary target reservoirs. GEL 302 is located within 10 kilometres of the existing 275 kV power lines that service Olympic Dam and Leigh Creek from Port Augusta

In 2007, two deep holes (LTDD002A and LTDD003), each to a total depth of approximately one kilometre, were drilled on GEL 302. Precision temperature logs were collected from both drill holes and Hot Dry Rocks (HDRPL) appraised drill hole temperature and thermal conductivity data to reveal elevated heat flow values. Seismic line 08GA-A1, recently acquired by Geoscience Australia, has aided the interpretation of localised geological structures and major formation boundaries. Gravity data provide constraints on deeper structures away from the seismic line.

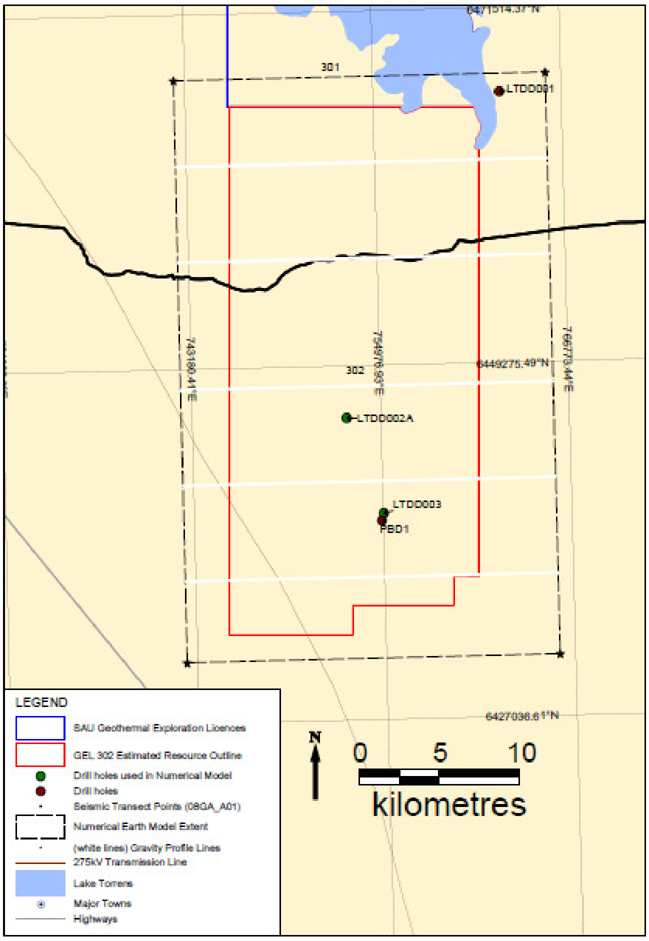

Figure 2. Location map of GEL 302 South Australia [GDA94 Zone 53] showing the locations of drill holes, seismic traverse 08GA-A1 (black line), gravity profile lines (white lines) used in 3D earth model and the geographical extent of earth model (Section 4).

2.0 Geological Setting

The first order controls on temperature and geothermal resource distribution within GEL 302 are the structure and thermal properties of the geological formations. These must be understood in order to model heat flow and the temperature away from the bore hole control points. GEL 302 is located on the eastern margin of the Gawler Craton, unconformably overlain by the Proterozoic to Cambrian age flat-lying sedimentary rocks of the Stuart Shelf (Figure 3). It lies approximately 30 km west of the NNW trending 'Torrens Hinge Zone'.

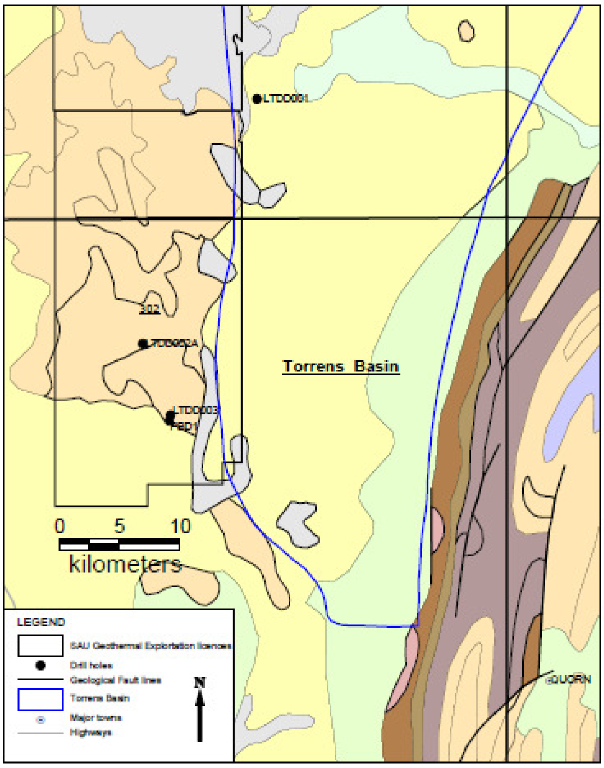

Figure 3. Location of GEL 302 in relation to surface geology. Shows surface aeolian sands (yellow), Adelaidean-aged Wilpena Group sediments (beige), Lake Torrens and associated gypsum flats (lilac) and the Torrens Basin (blue line) [GDA94 Zone 53].

The Gawler Craton is an ancient crystalline shield area comprising metasediments, volcanic and igneous intrusive rocks ranging in age from Archaean to Mesoproterozoic. The oldest basement rocks in the province are meta-sedimentary rocks and deformed granites correlated with the Early Proterozoic Hutchison Group and Lincoln Complex granitoids. These rocks are intruded by Middle Proterozoic Hiltaba Suite granitoids and locally overlain by similar aged bimodal extrusive rocks correlated with the Gawler Range Volcanics. The extensive Hiltaba Suite (1600-1585 Ma) is comagmatic with the Gawler Range Volcanics and is dominated by felsic plutons.

GEL 302 lies within the Port Augusta and Torrens sheets of the Australian 1:250,000 geological map series. These maps were published in 1968 and 1986, respectively. Surface outcrop is limited to minor sandstone ridges in the central and northern areas of the broader *Roxby Geothermal Project Area*, and is otherwise covered by aeolian sand. Below the depth of existing drilling (approximately one kilometre), structure and stratigraphy are inferred from regional geology and seismic characterisation.

2.1 Structure

Seismic Line 08GA-A1 traverses the northern section of GEL 302 (Figure 2). An interpretation of this line by HDRPL suggests that the Adelaidean-Cambrian succession thickens towards the east, controlled by a major west-dipping extensional fault (Figure 4). This fault controls a regional, hanging-wall, rollover structure that HDRPL believes dominates much of the structural development of GEL 302 and surrounding areas. The axis of the half-graben defined by this fault forms the 'Pirie-Torrens Basin', with the eastern footwall probably representing a transition to the 'Torrens Hinge-line'.

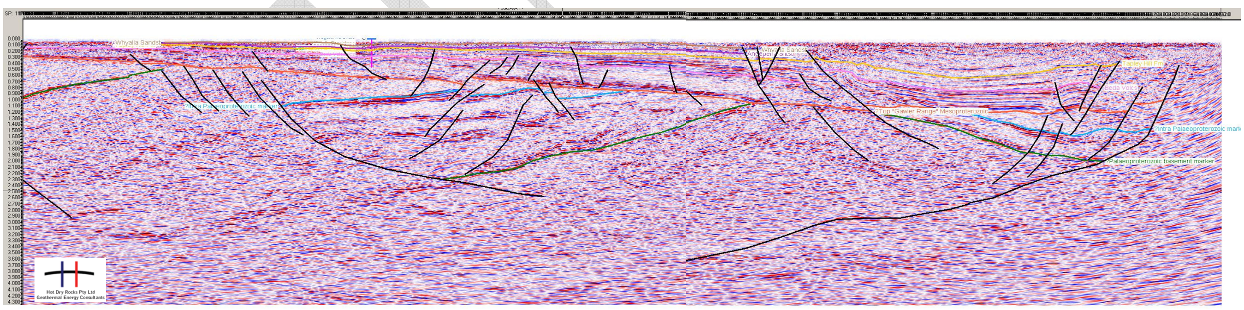

Figure 4. Interpretation of seismic line 08GA-A1 (whole of line) showing thickening of Adelaidean succession towards a basin bounding fault in the east. Orange horizon marks a major erosional surface (probable top of Gawler Range Craton succession) with inversion and erosion of the hangingwall roll-over anticline. A possible older Palaeoproterozoic rift basin (blue and green horizons) may exist at depth.

A marked angular unconformity denotes the probable top of the Gawler Range Craton succession. This unconformity suggests kilometre-scale inversion and erosion along the eastern boundary fault sometime prior to the Adelaidean. Although of unknown provenance, these reflections may represent an earlier rift succession with the change in dip representing the eastern and western limbs of a roll-over anticline.

It is possible that this older rift succession was controlled by a fault identified on the western margin of GEL 302 and that basin extension ‘flipped’ polarity to the eastern fault during the later Adelaidean extensional event.

The lithological explanation of seismic reflections deeper than one kilometre is currently unproven by drilling. The basement of this region is classically referred to as ’Gawler Range Volcanics‘, and it is possible that some of these deeper reflections may represent layered volcanics. However, the seismic character seems to be more characteristic of rocks of a sedimentary origin. It is possible that the deeper rift succession may represent the Palaeoproterozoic Hutchison Group – interbedded metasediments, basalts and volcanics. Reflections beneath this package are more chaotic and may reflect crystalline basement.

2.2 Stratigraphy

Diamond drill holes LTDD002A and LTDD003 intersected sedimentary rocks of Adelaidean age followed by amygdaloidal basalt (Beda Volcanics) and flaser red beds (Backy Point Formation). Tables 1 and 2 contain descriptions of the formations penetrated – and those formations predicted to lie at depths below the bottom of the drilled holes - taken from Drexel *et al*. (1993) [1] and the Department of Primary Industries and Resources of South Australia (PIRSA) website.

For the purpose of this Resource estimation, the stratigraphy of GEL 302 has been simplified into five (5) units, namely:

- Adelaidean Sediments
- Beda Volcanics
- Gawler Range Volcanics
- Hutchison Group
- Basement

[1] **Drexel, J.F., Priess, W.V. and Parker, A.J.,** (1993). The Geology of South Australia. Vol. 1, The Precambrian. South Australia, Geological Survey Bulletin, 54, pp. 171-193.

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Table 1. Formations intersected by LTDD002A.

Formation	Age	Top (mGL)	Thickness (m)
Corraberra Sandstone Member	Late Proterozoic (Marinoan)	0 (surface)	4
Tregolana Shale Member	Marinoan	4	175
Whyalla Sandstone	Marinoan	179	38
Reynella Sandstone Member	Marinoan	217	21
Whyalla Sandstone	Marinoan	238	30
Angapena Sandstone	Marinoan	268	87
Upper Tapley Hill Formation	Sturtian	355	4
Tapley Hill Formation	Sturtian	359	222
Beda Volcanics	Mid Proterozoic (Willouran)	581	>416

Table 2. Formations intersected by LTDD003.

Formation	Age	Top (mGL)	Thickness (m)
Corraberra Sandstone Member	Late Proterozoic (Marinoan)	0 (surface)	40
Tregolana Shale Member	Marinoan	40	249
Whyalla Sandstone	Marinoan	289	55
Reynella Sandstone Member	Marinoan	344	20
Whyalla Sandstone	Marinoan	364	31
Angapena Sandstone	Marinoan	395	96
Upper Tapley Hill Formation	Sturtian	491	221
Tindeplina Shale Member	Sturtian	712	7
Backy Point Formation	Mid Proterozoic (Willouran)	719	36
Beda Volcanics	Willouran	755	100
Backy Point Formation	Willouran	855	30
Beda Volcanics	Willouran	885	27
Backy Point Formation	Willouran	912	48
Beda Volcanics	Willouran	960	>159

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2.2.1 Adelaidean Sediments

The Adelaidean sediments can be subdivided into two main geological groups: the Wilpena Group and the Umberatana Group for GEL 302.

Wilpena Group

The Wilpena Group lies at the top of the stratigraphic column in GEL 302. It is the youngest subdivision of the Adelaidean succession and records two major transgressive-regressive cycles. The Wilpena Group is composed of the Nuccaleena Formation (basal unit) and the Tent Hill Formation.

The Tent Hill Formation can be subdivided into several member units; Simmens (or Arcoona) Quartzite Member, Corraberra Sandstone Member and the Tregolana (or Woomera) Shale Member, described as follows:

Simmens (Arcoona) Quartzite Member

The Simmens (Arcoona) Quartzite Member is characterised as a dense white quartzite and gradationally overlies the Corraberra Sandstone Member.

Corraberra Sandstone Member

The Corraberra Sandstone Member is dominated by red-brown silty sandstones and flaggy, micaceous siltstones.

Tregolana Shale

In the Stuart Shelf area, the Tregolana Shale is predominantly purple and brown sandy siltstones and shales deposited under very low energy conditions.

Umberatana Group

The Umberatana Group is of Sturtian to early Marinoan age and records a gradual transgression of the Stuart Shelf platform during a phase of regional subsidence after early Adelaidean rifting. Melting of major icesheets led to extensive marine transgression after the end of the Sturtian glaciations. The western margin of deposition of Sturtian glacial successions is near the Torrens Hinge Zone. In this area is found the Apilla Tillite – dominantly diamictite with clasts derived from the Gawler Craton and eroded underlying lower, Adelaidean rocks.

In the Stuart Shelf province, the Umberatana Group is comprised of a number of formations including the Whyalla Sandstone, Reynella Siltstone Member, Angepena

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Formation, Upper Tapley Hill Formation, Tapley Hill Formation and the Tindelpina Shale Member. They are described as follows:

Whyalla Sandstone

The Whyalla Sandstone is a coarse-grained and bimodal with well-rounded quartz grains.

Reynella Siltstone Member

The Reynella Siltstone Member of the Elatina Formation may be partly glacigenic. It is a red-brown massively to poorly bedded gritty siltstone. The Elatina Formation is also part of the Willochra Subgroup interpreted to have been deposited under glacially influenced conditions.

Angapena Formation

The Angapena Formation is the basal unit of the Willochra Subgroup comprising red tidal mudflat sediments (silt, sand and shale with mud cracks and ripple marks).

Upper Tapley Hill Formation

The Upper Tapley Hill Formation indicates shoaling conditions, with an increase in carbonate content and high-energy features such as cross-bedding and scouring.

Tapley Hill Formation

The Tapley Hill Formation represents the first transgression onto the Stuart Shelf, and is subsequently one of the most widespread units in the Adelaide Geosyncline. It is dominantly a very thinly laminated carbonaceous, partly calcareous siltstone.

Tindelpina Shale Member

The basal Tindelpina Shale Member is pyritic and carbonaceous, with thinly laminated grey dolomite interbeds and lenses.

2.2.2 Beda Volcanics

The possible correlation of the Beda Volcanics with Willouran lavas in the Flinders Ranges has not been resolved. Beda Volcanics are interlayered with clastics related to the Backy Point Beds that disconformably overlie the Pandurra Formation.

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There are only limited exposures of these oldest (Willouran age) rocks of the Adelaide Geosyncline, which have been subdivided into the Arkaroola and Curdimurka Subgroups.

Beda Volcanics

The Neoproterozoic-aged Beda Volcanics are observed as amygdaloidal basalts, with interbedded conglomerates of the Backy Point Beds.

Backy Point Formation

Backy Point Beds are described as red flaser beds.

2.2.3 Gawler Range Volcanics

The Gawler Range Volcanics (1590 Ma) form a huge felsic province in the central Gawler Craton. Core taken from wells drilled in GEL 302 shows the Gawler Range Volcanics to be porphyritic dacite comprising plagioclase phenocrysts set within a fine grained, red-brown, microangular haematite-chlorite-felsic matrix.

2.2.4 Hutchison Group

The Hutchison Group has not been intersected by drill holes anywhere within the *Roxby Geothermal Project Area*, but is interpreted from the seismic line traversing GEL 302 to lie below the Gawler Range Volcanics. In the southern Gawler Craton, the Palaeoproterozoic-aged Hutchison Group overlies the Sleaford Complex. Its high grade metamorphic rocks are derived mainly from clastic shallow marine sediments, iron formations, carbonates and mafic, and to a lesser extent, acid volcanics.

2.2.5 Basement

Basement is classically referred to as the Gawler Range Volcanics in this region. However, the seismic reflections seen beneath the Hutchison Group have been interpreted as potential crystalline basement.

Several major rock groups were formed during the Archaean. These include the Sleaford Complex, exposed in the southern Gawler Craton, and the Mulgathing Complex, exposed in the western northern Gawler Craton. Both consist of ortho- and paragenesis variably metamorphosed to granulite facies.

The Sleaford Complex comprises the Carnot Gneisses and Wangary Gneiss. The Carnot Gneisses are composed of garnet-quartz-feldspar ± cordierite paragenesis,

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banded iron formation, calcsilicalastic, quartz – feldsparorthogneiss, hypersthene gneiss and tholeiitic, meta-basalt/meta-gabbro. High crustal level granitoids of the Dutton Suite were intruded into Wangary Gneiss, a lower grade equivalent of the Carnot Gneisses.

The Mulgathing Complex contains banded iron formation, chert, carbonate, calcsilicate, quartzite and aluminous metasediments and meta-igneous units.

3.0 Target reservoir(s)

Units below about one kilometre have not yet been penetrated in GEL 302 or in the broader *Roxby Geothermal Project Area*. The physical-mechanical properties are presently untested for units at the depths predicted for target temperatures. At this stage of exploration, all stratigraphic layers within the target temperature window are, therefore, regarded as potential reservoir units.

4.0 3D 'earth model'

A numerical 'earth model' is a simplified representation of the geological structure of a portion of the earth, including information about relevant physical properties. Such a model necessarily summarises complex geology into a finite number of homogeneous units. This simplification of the rock volume introduces a degree of approximation into the model. The reliability of predicted outcomes from the model depends on the degree to which the modelled rock properties represent the true conditions within the earth.

4.1 Earth model constraints

SAU provided gravity, magnetics, 2D reflection seismic and well stratigraphic data. These data provided the basis for an interpretation of the 3D geology of GEL 302. A numerical earth model was constructed to cover an area of 23 km x 36 km (765800 – 742500 E, 6467400 – 6430900 N, AMG 94, Zone 53) to a depth of 7,000 m.
The model consisted of five (5) units representing stratigraphic groupings within the top 7000 m of crust.

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Table 3 defines each of these units. The 3D distribution of these units beneath GEL 302 was constrained by the following process.

1) HDRPL interpreted seismic line 08GA-A1 as described in Section 2.1.

2) HDRPL modelled the gravity data along a profile coincident with the seismic line. The geological structure from the seismic interpretation was mirrored on the gravity profile and used to constrain density estimates of the modelled units.

3) Those density values were used to model four additional east-west gravity profiles away from the seismic line (Figure 2), additionally constrained by well intersections where available.

4) Formation boundaries were interpolated between gravity model profiles to produce surfaces across the full extent of the earth model.

Table 3. Summary of the formations within each unit of the Earth model.

Earth Model Units	Formations	Age
Unit 1 - Adelaidean	Simmens Quartzite Member	Marinoan
	Corraberra Sandstone Formation	Marinoan
	Tregolana Shale	Marinoan
	Whyalla Sandstone	Marinoan
	Reynella Siltstone Member	Marinoan
	Angapena Formation	Marinoan
	Upper Tapley Hill Formation	Marinoan
	Tapley Hill Formation	Marinoan
	Tindelpina Shale Member	Sturtian
Unit 2 - Beda Volcanics	Beda Volcanics	Willouran
	Backy Point Formation	Willouran
Unit 3 - Gawler Range Volcanics	GRV	Mid-Proterozoic
Unit 4 - Hutchison Group	Hutchison Group	Paleoproterozoic
Unit 5 - Basement	Sleaford/Mulgathing Complex	Archaean

4.2 Populating the earth model with rock properties

The 3D voxelated volume of the earth model is shown graphically in Figure 5. HDRPL assigned average thermal conductivity values and other rock properties to each unit in Table 3 based on the proportions and values of each constituent formation. Resulting mean values for each unit are given in Table 4. Conductivity values for individual shallow rock formations were determined from measurements on core from wells LTDD002A and LTDD003[2]. Where no measured values existed, an appropriate value was assumed based on public reports or published values for similar formations.

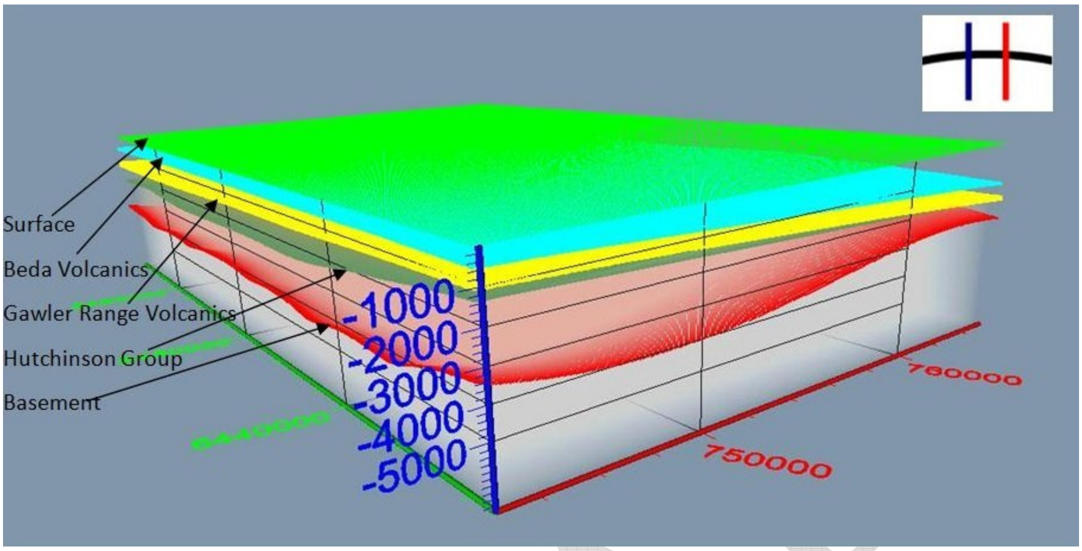

Figure 5. 3D earth model of GEL 302 looking NE. Different colours represent the tops of different units in Table 3. Green numbers are northings, red numbers are eastings, blue numbers shows depth below surface in metres.

Table 4. 3D earth model layers and rock property values.

Earth Model Units	Thermal Conductivity (W/mK)	Heat Production (µW/m³)	Density (kg/m³)
Unit 1 - Adelaidean	2.66	0	2670
Unit 2 - Beda Volcanics	2.63	1.57	2820
Unit 3 - Gawler Range Volcanics	2.76	0	2600
Unit 4 - Hutchison Group	3.00	0	2820
Unit 5 - Basement	4.50	0	2770

5.0 Thermal data

Average surface temperature was assumed to be 25.5°C across the extent of the modelled area, based on that stated by Torrens Energy for its Parachilna Geothermal Play approximately 100 km to the NE of GEL 302.

Heat flow was constrained at two locations within GEL 302. Measured temperature data from wells LTDD002A and LTDD003, and measured thermal conductivity values for formations intersected by those wells, were used to estimate heat flow.

[2] **HDRPL,** 2008. Thermal Conductivity of Core Samples SAU001 to SAU020. Confidential report to SAU by HDRPL, March 2008.

The heat flow modelling was completed by HDRPL as a separate report, included as an appendix to this statement.

The results of these models provided two heat flow constraints for subsequent 3D temperature modelling. The depths of the wells, locations and heat flow values are presented in Table 5.

Table 5. Heat flow constraints on the 3D temperature inversion. Eastings and Northings are in projection GDA94 Zone 53.

Well Name	Depth (m)	Easting	Northing	1D heat flow (mW/m²)
LTDD002A	997	752839	6446014	94.1 ± 12.3
LTDD003	1118.7	755013	6439984	94.7 ± 9.2

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6.0 Resource estimation methodology

6.1 Stored heat assessment

Hot Dry Rocks Pty Ltd used a 'stored heat' method to estimate the Geothermal Resource in the potential target reservoir(s) that together make up GEL 302. This is a technique for estimating the total heat energy contained within a target volume, for which a realistic chance exists for economic extraction. The method requires the estimation of the **volume**, **density**, **specific heat capacity** and **temperature** of the target reservoir formations, a consideration of the realistic lowest economically extractable temperature ('**cut-off temperature**') and the amount of thermal energy that might be extracted from the resource fluids (related to the '**base temperature**').

6.2 Cut-off and base temperature

For the purposes of this stored heat assessment, HDRPL defines the cut-off temperature as *the minimum economic reservoir fluid temperature for commercial energy extraction*. The cut-off isotherm is an essential input to the volumetric Resource estimations as it defines the upper surface of the Resource volume. Similarly, for the purpose of this stored heat assessment, HDRPL defines the base temperature as *the temperature of the geothermal fluid once it has passed through a power conversion process, prior to reinjection*. It puts an upper limit on the amount of thermal energy that can be extracted from a Geothermal Resource of any given temperature. Both of these values depend strongly on the technology used to convert thermal energy into electrical energy.

It is technically feasible to generate power from geothermal fluid down to 100℃ or lower (e.g. a geothermal plant at Birdsville in Queensland generates power from 98℃ water), but the efficiency of power conversion at low temperatures makes it economically unviable in most situations. HDRPL assumed that a temperature of 150℃ is the minimum required for power generation from an EGS reservoir. The specific depths of reservoir that may contribute to the total fluid extraction rate are as-yet unknown, so it is not possible to predict the eventual average extraction temperature for the Geothermal Resource stated below. HDRPL has therefore assumed **a cut-off temperature of 150℃.**

A **base temperature of 70℃** is the average temperature at which an air-cooled binary cycle geothermal plant rejects the geothermal fluid (e.g. Bombarda and Macchi, 2000)[3]. HDRPL has assumed this value in estimating the Geothermal Resource stated below.

HDRPL believes the cut-off and base temperatures above are appropriate for organic rankine cycle (ORC) technology that SAU may use for future power generation. Should technological advances decrease the base temperature, the estimated Resource may increase over time.

6.3 Reservoir volume

The Geothermal Resource volume is estimated only within the boundaries of GEL 302 – an area of approximately 499 km². The vertical extent of the potential reservoir is constrained by top and bottom surfaces. The top surface is the 150℃ isotherm for reasons explained in Section 6.2. The base of the reservoir is 5000 m (judged by HDRPL to be the maximum practical depth for drilling and fracturing programs). Note that all stratigraphic layers within the target window are, regarded as potential reservoir units.

The total reservoir volume lying within GEL 302, below the 150℃ cut-off isotherm and above 5000 m, is **858 km³.**

[3] **Bombarda, P. and Macchi, E.** (2000). Optimum cycles for geothermal power plants. *Proceedings World Geothermal Congress 2000, Kyushu–Tohoku, Japan, May 28–June 10, 2000*. 3133–3138.

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6.4 Reservoir density and specific heat

Specific heat is temperature dependent and typically increases with temperature. While specific heat has not been measured for the projected reservoir rocks, HDRPL has estimated a relationship based on Equations 18 and 19 of Waples and Waples (2004)[4], assuming a reference temperature of 25°C and a surface Cp = 750 J/kgK:

$$CpT = (8.859\times10^{-7} \times T^3) - (2.108\times10^{-3} \times T^2) + (1.703 \times T) + 708.7$$

where CpT is the specific heat at temperature T(°C).

SAU derived representative averaged, specific gravity measurements for major lithologies intersected in LTDD002A and LTDD003. For lithologies likely to be intersected at deeper levels density measurements were made on core samples retrieved from Monax Mineral drill holes (EL 3457 Punt Hill).

6.5 Reservoir temperature

Hot Dry Rocks Pty Ltd utilized a numerical three-dimensional temperature inversion algorithm to estimate the stored heat within the reservoir(s). The methodology incorporated the three-dimensional numerical earth model described in Section 4, constrained by the thermal data presented in Section 5.

The algorithm operated on the principle of 'inversion'. Known information about surface temperature and surface heat flow was entered into a software module. The algorithm 'voxelated' the earth model; that is, divided it into discrete rectangular prismatic cells, with the thermal properties of each cell determined by the model layer (from Table 4) within which the cell lay. The dimensions of the individual cells were 300 m (N-S) by 300 m (E-W) by 50 m (vertical). A numerical iterative process then computed in three dimensions the simplest distribution of temperature that fit the observations, while respecting the laws of conductive heat transfer and the thermal properties of the geological strata. The temperature dependence of thermal conductivity was also taken into account, using a formula published by Sekiguchi (1984)[5].

[4] **Waples, D.W. and Waples, J.S.** (2004). A review and evaluation of specific heat capacities of rocks, minerals, and subsurface fluids. Part 1: Minerals and nonporous rocks. *Natural Resources Research*, 13(2), 97–122.
[5] **Sekiguchi, K.** (1984). A method for determining terrestrial heat flow in oil basinal areas. *Tectonophysics*, 103, 67–79.

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The solution to the model suggests the 150℃ cut-off isotherm (Section 6.2) lies at about 3,000 m, in the Hutchison Group and Basement units. Figure 6 presents a view of the 3D earth model displaying the 150℃ isotherm.

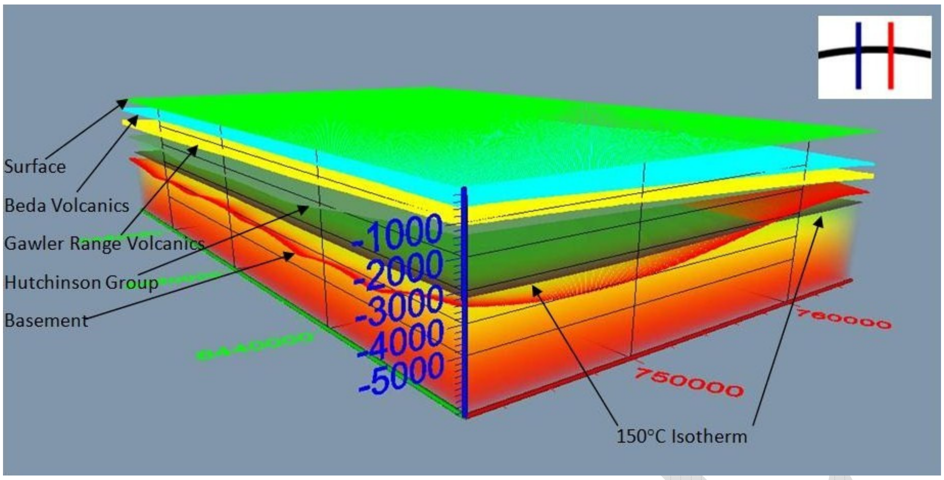

Figure 6. Predicted 150ºC isotherm within Hutchison Group and Basement units in 3D view looking NE. Isotherm is shown as relatively flat lying, brown layer. Green numbers are northings, red numbers are eastings, blue numbers show depth below surface in metres.

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7.0 Geothermal Resource

7.1 Total resource

The numerical algorithm revealed the simplest temperature distribution to explain the observed surface heat flow values. For each discrete cell lying within the 'reservoir volume' (Section 6.3) the stored heat was calculated from the volume, density, specific heat and temperature of the cell. The total stored heat in all individual cells was 255,500 PJ (or 8,100,000 MW_t.yrs) within a volume of 858 km^3.

7.2 Classification of Resource

The Australian Code for Reporting of Exploration Results, Geothermal Resources and Geothermal Reserves, 2008 Edition ('The Code') defines an 'Inferred Geothermal Resource' as "*that part of a Geothermal Resource for which thermal energy in place can be estimated only with a low level of confidence…This category of Geothermal Resource is inferred from geological, geochemical and geophysical evidence and is assumed but not verified as to its extent or capacity to deliver geothermal energy. There must be a sound basis for assuming that a Geothermal Play exists, estimating the temperature and having some indication of its extent.*"

HDRPL judges that **the stored heat estimated in Section 7.1 is best classified as an Inferred Resource**. In reaching this decision, HDRPL took into account the following points:

- Units below the Beda Volcanics have not yet been penetrated in GEL 302 or the broader *Roxby Geothermal Project Area*.
- The lithological explanation of seismic reflections deeper than one kilometre is currently unproven by drilling.
- Gravity, 2D reflection seismic and well stratigraphic data provided the basis of an interpretation of the 3D geology of GEL 302 which defined the extent and thickness of the Hutchison Group and Basement units.

7.3 Tabulated Resource estimate

Table 6 states the Geothermal Resource for the GEL 302 Geothermal Play as classified by the criteria in Section 7.2.

Table 6. Stored heat and estimated Geothermal Resource within the Hutchison Group and Basement for GEL 302. Resource estimates rounded to two significant figures.

Reservoir Unit	**Stored heat (PJ)**	**Volume (km^3)**	**Inferred Resource (PJ)**
Hutchison Group	*125,722*	*450*	130,000
Basement	*129,823*	*408*	130,000
TOTALS	255,545	858	**260,000**

8.0 Key Assumptions and Geological Constraints

Apart from the parameters described above, the following key assumptions underpin this Geothermal Resource estimate.

- The proposed product to be generated from the Geothermal Resource is electricity most likely via an air-cooled Organic Rankine Cycle binary plant.
- The Geothermal Resource does not include any additional heat that might conduct into the reservoir volume during production.

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- The Geothermal Resource assumes that no significant heat is transferred by advective or convective processes within the Geothermal Play. The probability of such processes is almost impossible to quantify prior to drilling, but represents a risk because such processes tend to suppress geothermal gradients and lower the stored heat resource.

- The heat is contained entirely within the matrix of the reservoir rock and there is little expectation for significant in situ water.

- This work is based on a numerical model of a section of the Earth's crust. A model necessarily simplifies the true complexity of the Earth and as such is inherently prone to error. The results of modelling stated within this report have been generated using the best available estimates of critical parameters, but future work may yield new information that modifies or falsifies some of these assumptions. All modelling results should be treated as provisional.

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9.0 Recoverable energy

Hot Dry Rocks Pty Ltd is unaware of any geotechnical, access, environmental or land use issues that could affect future drilling locations or sterilise potential geothermal resource sectors within GEL 302.

No geothermal reservoir rock has yet been intersected or sampled in GEL 302. The existence of an economically extractable Geothermal Energy Resource remains speculative until deep drilling and testing is completed at target reservoir depth. Likewise, there is no good basis yet for determining the proportion of thermal energy that might be recovered and converted to electrical energy.

10.0 Future Work

The Code defines an 'Indicated Geothermal Resource' as "*that part of a Geothermal Resource which has been demonstrated to exist through direct measurements that indicate temperature and dimensions so that the thermal energy in place can be estimated with a reasonable level of confidence...It is based on direct measurements and assessments of volumes of hot rock and possibly fluid, with sufficient indicators* *to characterise the temperature and chemistry. Direct measurements are sufficiently spaced so as to indicate the extent of the Geothermal Resource".*

The Code defines a 'Measured Geothermal Resource' as "*that part of a Geothermal Resource for which thermal energy in place can be estimated with a high level of confidence...It is based on direct measurements and assessments of drilled and tested volumes of rock and/or fluid within which well deliverabilty has been demonstrated, and which have sufficient indicators to characterise the temperature and chemistry. Direct measurements are sufficiently spaced to confirm continuity".*

Reclassification of any portion of the Inferred Geothermal Resource stated in this report to an Indicated or Measured Resource will require drilling and testing of the target reservoir to directly determine temperature and reservoir properties.

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11.0 Competent Person

This report has been prepared under the direction of Dr Graeme Beardsmore, an employee of Hot Dry Rocks Pty Ltd. Hot Dry Rocks Pty Ltd provides consulting services to Southern Gold Ltd, but has no financial interest in the GEL 302 Geothermal Play or in Southern Gold Limited. Dr Beardsmore was assisted by other employees within Hot Dry Rocks Pty Ltd but takes sole responsibility and is accountable for the report as a Competent Person as defined by the Australian Code for Reporting of Exploration Results, Geothermal Resources and Geothermal Reserves (2008 Edition).

Dr Beardsmore is a member of the Australian Society of Exploration Geophysicists and abides by the Code of Ethics of that organization. Dr Beardsmore consents to the public release of this report in its entirety.

Signed:

G. R. B

22 May 2009

Graeme Beardsmore

Date

The following is provided for illustrative purposes only and **does not comprise part of the Resource estimation**.

In general, the temperature (T) of the geothermal fluid dictates the conversion efficiency (ec) of thermal power to electrical power. Tester *et al*. (2006)[6] found that this relationship can be expressed approximately as:

Equation 2 $ec(\%) = 0.09345T(^{\circ}C) - 2.2657$

If the average temperature of the reservoir is 170°C, the rejection temperature is as stated in Section 6.2, and the following assumptions apply:

- Thermal to electrical energy conversion efficiency = 13.62%
- Parasitic power loss (pumps, fans etc) = 20%
- Nominal net electrical power output = 50 MW
- Nominal plant life = 30 years

then the minimum thermal energy required is 434 PJ, (or 0.2% of the Inferred Geothermal Resource)**.**

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[6] **Tester, J.W. et al.** 2006. *The Future of Geothermal Energy: Impact of Enhanced Geothermal Systems (EGS) on the United States in the 21st Century* (Cambridge, MA: Massachusetts Institute of Technology)

APPENDIX: Interim Report for EL 3515

FINAL

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SERVICES
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GEL302 Reservoir Characterisation

Prepared for Southern Gold Ltd [SAU]

15 July 2009

Luke Mortimer and Gareth Cooper

Executive Summary

Hot Dry Rocks Pty Ltd (HDRPL) was commissioned by Southern Gold Ltd (SAU) to review and assess the potential Engineered Geothermal System (EGS) reservoir targets that may occur within GEL302. This report summarises the key findings of this study which was focussed on the interpreted deep (>3 km) geological successions and their estimated reservoir characteristics as determined from several data sources including the regional east-west seismic traverse through the central portion of GEL302, logs of representative regional drill holes as well as various published geological reports. The principle findings of this report are:

1. It is inferred that at depths >3 km there exists within GEL302 three broad geological successions including (1) Late Palaeoproterozoic Wallaroo Group equivalent metasediments and intercalated mafic and felsic volcanics; (2) Early Mesoproterozoic Hiltaba Suite equivalent granitoids; and (3) unknown crystalline basement which is probably comprised of equivalents of the Early Palaeoproterozoic Donington Granitoid Suite and Hutchison Group.

2. From regional stress field indicators the contemporary, far-field stress field is inferred to be a reverse oblique-slip to transitional strike-slip fault stress regime. This interpretation does not resolve the issue of predicted reservoir growth direction (horizontal versus vertical, respectively) requiring that the local stress field be determined at individual well locations.

3. Based largely on a contextual interpretation of the seismic data it is inferred that the reservoir host rock sequence is most likely to be layered metasediments and intercalated mafic and felsic volcanics belonging to the late Palaeoproterozoic Wallaroo Group.

4. The Wallaroo Group sequence is a layered, inhomogeneous rock mass of varying composition and geomechanical properties, which presents an unconventional and untested EGS reservoir target type.

5. Although the reservoir characteristics of the Wallaroo Group poses a technical challenge it is currently believed that these types of heterogeneous, less competent, rock sequences can be successfully hydraulically stimulated based upon recent experience and advances in the development of unconventional oil and gas reserves such as tight gas deposits.

6. The location of the proposed first GDP drill hole ("Ferveo-1") on the regional seismic traverse is considered appropriate as it provides the highest level of geological control and confidence.

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Disclaimer
The information and opinions in this report have been generated to the best ability of the author, and Hot Dry Rocks Pty Ltd hope they may be of assistance to you. However, neither the author nor any other employee of Hot Dry Rocks Pty Ltd guarantees that the report is without flaw or is wholly appropriate for your particular purposes, and therefore we disclaim all liability for any error, loss or other consequence which may arise from you relying on any information in this publication. SAU provided some data presented in this report. The data are assumed to be an accurate transcription from original documents but Hot Dry Rocks makes no guarantee that this is truly the case.

Table of Contents

1.0 Basement Geology

Within GEL302 and at depths >3 km, HDRPL has identified three major rock units, which may be suitable for EGS reservoir development, subject to further analyses:

1. Late Palaeoproterozoic Wallaroo Group equivalent metasediments and intercalated mafic and felsic volcanics.
2. Early Mesoproterozoic Hiltaba Suite equivalent granitoids.
3. Crystalline basement possibly including equivalents of the Early Palaeoproterozoic Donington Granitoid Suite and Hutchison Group.

1.1 Evidence of the Basement Geology

The interpreted basement geology and potential EGS reservoir targets within GEL302 are largely based upon evidence derived from Geoscience Australia's regional seismic line 08GA-A1 (Figure 1). This 2D seismic line transects the central portion of the tenement, which includes from east to west the Neoproterozoic- to Cambrian-age Adelaidean sequence within the Torrens Hinge Zone (THZ) and the Archaean- to Mesoproterozoic-age southeastern margin of the Gawler Craton (Figures 2 and 3). From this seismic data, it is inferred that the succession underlying the Adelaidean sequence in GEL302 is the Late Palaeoproterozoic-age Wallaroo Group. The key features of the seismic interpretation include the following (Figures 1 and 2):

1. The entire seismic line shows the Adelaidean sequence consistently thickening eastwards controlled by a major west-dipping extensional fault.
2. This major west-dipping extensional fault controls a regional hangingwall roll-over anticline which dominates the structural development of GEL302 and surrounding areas. The axis of the half-graben defined by this fault forms the "Pirie-Torrens Basin" with the eastern footwall probably representing the transition to the THZ.
3. A marked angular unconformity denotes the probable top of the Gawler Craton succession (orange horizon of Figure 1), which suggests regional scale

inversion and erosion along the eastern boundary fault prior to deposition of the Adelaidean sequence.

4. Underlying this unconformity is a package of alternating high and low amplitude layered reflections, which dip east in the eastern section of the line but change to west-dipping beneath GEL302. The overall character of these seismic reflections suggests sedimentary material with the changes in dip representing the eastern and western limbs of the partially eroded roll-over anticline. This type of structural feature has not been observed within the Gawler Range Volcanics.

5. The above interpretation suggests the presence of an earlier rift succession within a Palaeoproterozoic-age metasedimentary sequence on the eastern margin of the Gawler Craton.

6. There is no evidence of any significant intrusive bodies within the seismic data, which suggests that there are no Hiltaba Suite granitoids beneath the seismic traverse although they are known to be ubiquitous throughout the eastern Gawler Craton margin.

7. The seismic character also suggests the presence of a crystalline(?) basement sequence below the Wallaroo Group that is inferred from elsewhere to be older Early Palaeoproterozoic Hutchison Group and/or Donington Suite granitoids (Figure 4).

8. The interpretation of the uppermost (younger) seismic sequences are defined and well constrained from several deep (>700 m) drillholes located within a 40 km radius of GEL302 as well as abundant outcrop exposures throughout the region belonging to Palaeoproterozoic-age Gawler Craton and Neoproterozoic- to Cambrian-age Adelaide Geosyncline sequences.

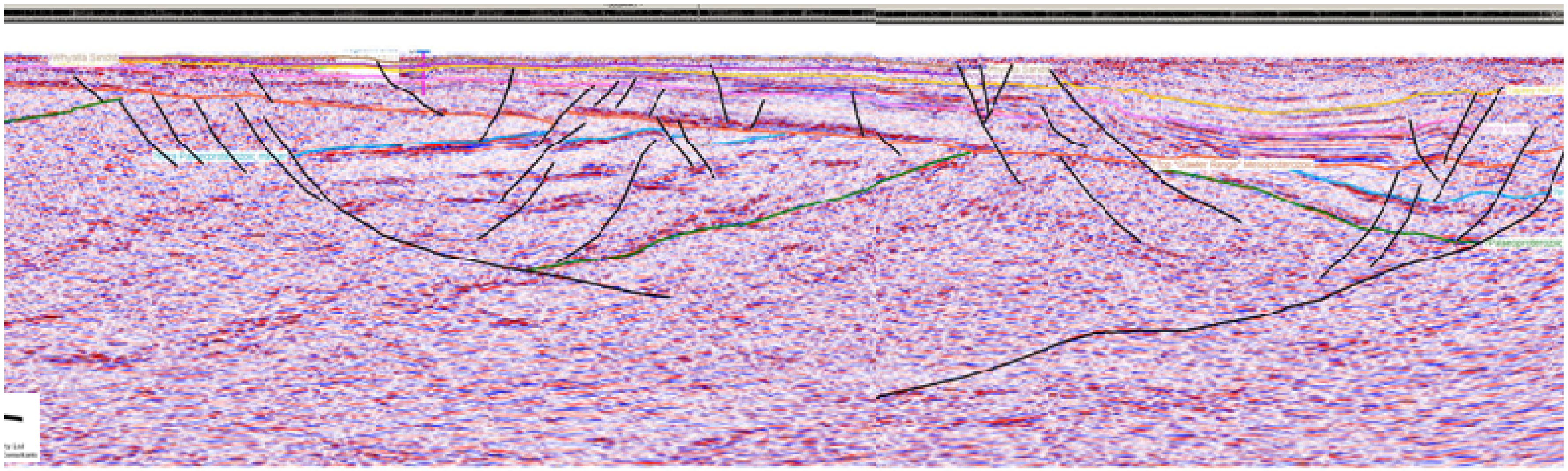

Figure 1. Interpretation of seismic line 08GA-A1 (entire line) showing thickening of Adelaidean succession towards a basin bounding fault (THZ) in the east. Orange horizon marks a major erosional surface (probable top Gawler Craton succession) with inversion and erosion of the hangingwall roll-over anticline. A possible older Palaeoproterozoic rift basin (blue and green horizons) may exist at depth.

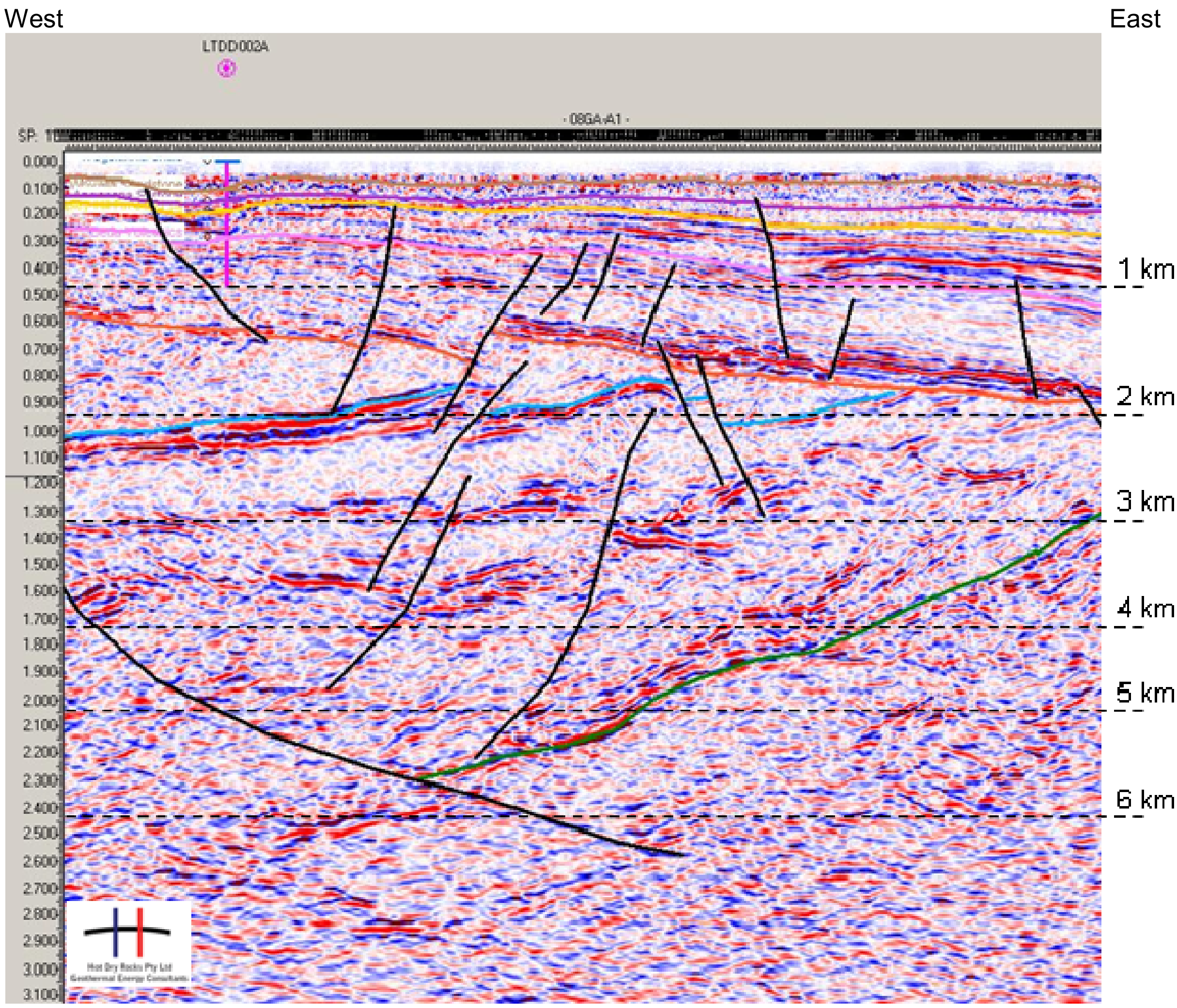

Figure 2. Central portion of seismic line 08GA-A1 representing the approximate coverage within the east-west boundaries of GEL302. Depth scale is seconds TWT. Depth (km) contours are from stacking velocity profiles and are approximate only. From top to base, formation tops are:- Whyalla Sandstone (brown); Angepena Siltstone (bright pink); Tapley Hill Formation (yellow); Beda Volcanics (pale pink); ?Gawler Range Craton succession (orange); ?Intra-Palaeoproterozoic marker (blue) and ?Palaeoproterozoic rift basement (green).

A Late Palaeoproterozoic Wallaroo Group basement succession is further supported by the following evidence:

1. GEL302 is located within the Moonta-Olympic Dam subdomain that follows the eastern margin of the Gawler Craton, which is known to be dominated by the Wallaroo Group geological succession (Figure 3).

2. Units of the Wallaroo Group outcrop to the south in the northern Yorke Peninsula (Figure 4) and intersected in deep drill holes located approximately 45-50 km along strike to the NNW at Punt Hill.

3. The Wallaroo Group is recognised as a sedimentary and bimodal volcanic rift basin complex that formed along the eastern and southeastern Gawler Craton margin from approximately 1770-1740 Ma. This rift basin setting is consistent with the structural features interpreted within the regional seismic line 08GA-A1.
4. The Chief Geologist of the SA Geological Survey, Wolfgang Preiss, has reviewed this data and concurs with this interpretation.

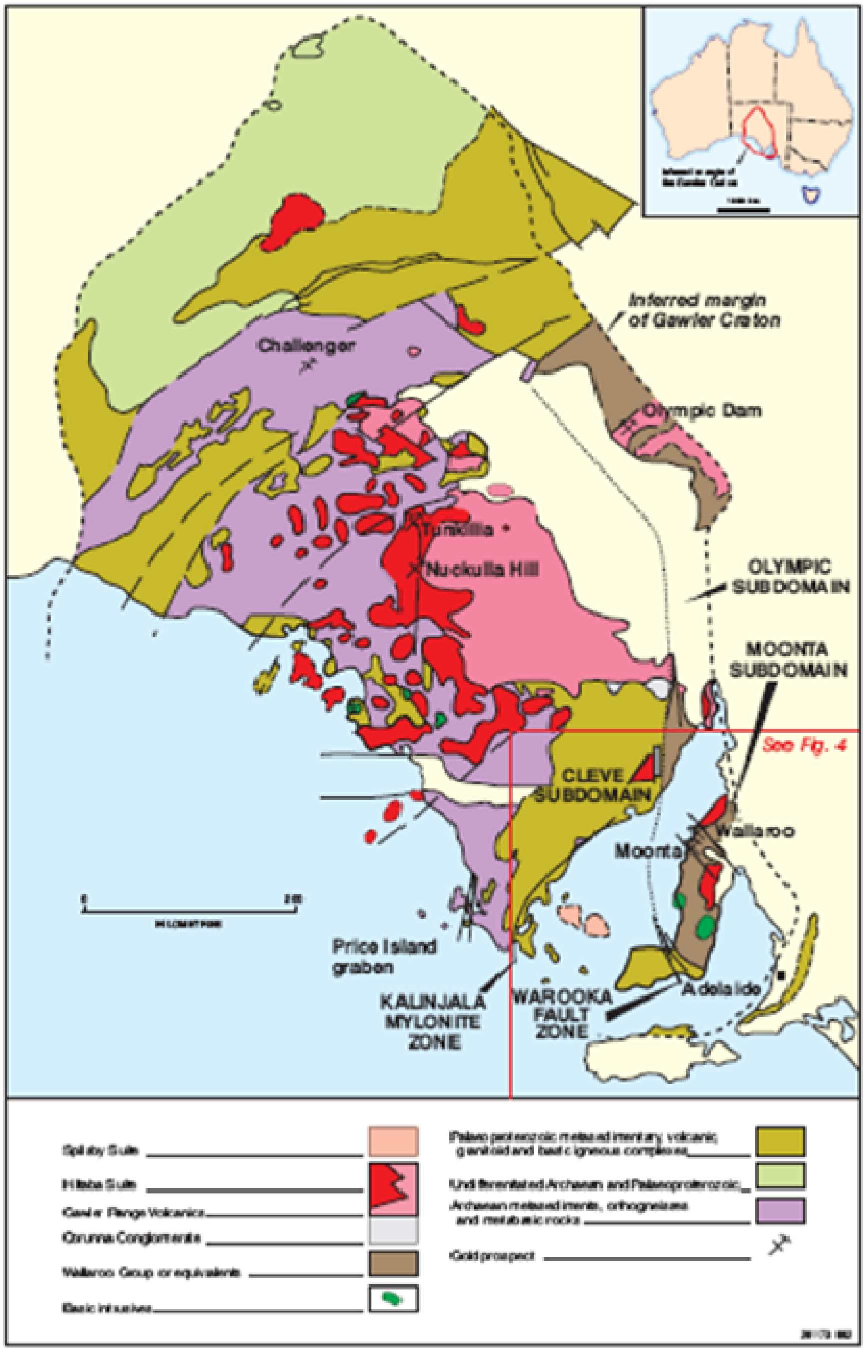

Figure 3. Solid geology interpretation of the Gawler Craton and the location of the Cleve, Olympic and Moonta subdomains (from Zang, 2002).

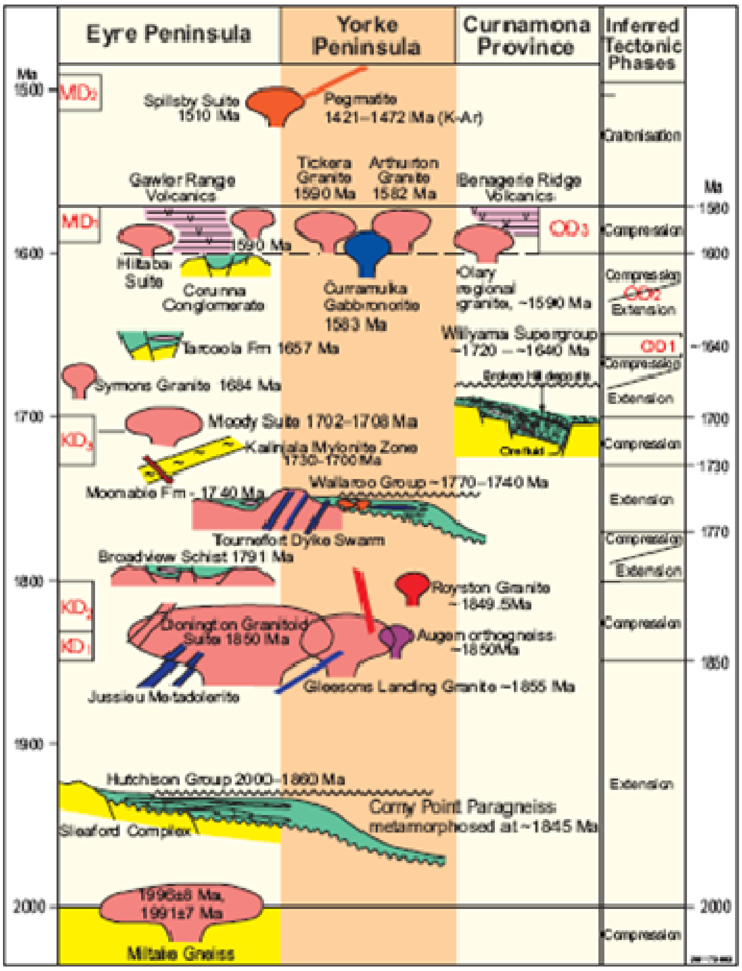

Figure 4. Palaeoproterozoic and Early Mesoproterozoic tectono-stratigraphic correlations between the Eyre and Yorke Peninsulas of the SE margin of the Gawler Craton and the Curnamona Craton. The geology of the Yorke Peninsula is inferred to extend along strike into GEL302 (from Zang, 2002).

1.2 Wallaroo Group Geology

The Wallaroo Group is a sedimentary and bimodal volcanic basin rift succession that formed along the eastern and southeastern margin of the Gawler Craton from approximately 1770-1740 Ma. The Wallaroo Group is dominated by metasediments of the Wandearah Formation and intercalated with felsic and mafic volcanics of the Weeltulta and Matta Formations, respectively, and has been subjected to three generations of deformation and metamorphism (Tables 1 & 2; Figure 5). The Wallaroo Group is extensively intruded by Early Mesoproterozoic-age Hiltaba Suite granitoids and locally overlain by its coeval Gawler Range Volcanics (see Figures 3 and 4).

Table 1. Subdivisions of the Wallaroo Group (from Zang, 2002).

Wallaroo Group		
Formation	**Member**	**Description**
Wandearah Formation (metasediments)	Aagot Member	Mainly sandstone and argillite
	Doora Member	Mainly biotite schist, minor calc-silicate
	New Cornwall Member	Carbonate, graphitic siltstone and calc-silicate
	Wokurna Member	Red-brown siltstone, calc-silicate and albitic rocks
	Ninnes Member	Interlayered albitite, siltstone, sandstone, carbonate
Weetulta Formation (A-type felsic volcanics)	Moonta Porphyry Member	Porphyritic rhyolite to rhyodacite
	Wardang Volcanics Member	Rhyolite, rhyodacite dacite
	Mona Volcanics Member	Felsics in the Bute area
Matta Formation (mafic volcanics, tholeiites)	Willamulka Volcanics Member	Amygdaloidal mafics
	Renowden Metabasalt Member	Fine-grained extrusive and shallow intrusive

Table 2. Summary Wallaroo Group geotectonic history based upon the nearest outcrop exposures in the northern Yorke Peninsula, ~200 km SSE of GEL302 (from Zang, 2002).

Tectonic Event	**Rift**	**D1**	**D2**	**D3**
Age	~1770-1740 Ma	~1730-1710 Ma	~1580 Ma	~1500 Ma
Structural Style	Extensional	Ductile, dextral, prominent NE-SW trending biotite-amphibole fabrics and shear zones with NW dip. Related NE-SW isoclinal to open F1 folds.	Brittle, sinistral, Major NW-SE compression, NE-SW en echelon shear zones with SW dip.	Only locally observed. Compression, brittle conjugate coupled faulting and shearing.
Volcanism – Plutonism	Bimodal: mafic and felsic volcanics.		Hiltaba Suite granitoids and Gawler Range Volcanics, Curramulka Gabbronorite.	Spilsby Suite
Metamorphic facies		Low-mid amphibolite (~650-450^{0}C); amphiboles-biotite-garnet.	Greenschist (~480-265^{0}C); chlorite-epidote.	Sub-greenschist (retrograde, ~250-110^{0}C); sericite.
Foliation Planes	Sedimentary bedding	S1: 050 / 40^0-50^{0}NW	S2: 310 / 40^0-75^{0}SW	
Mineralisation & Hydrothermal Alteration	Local SEDEX – VMS Cu, Pb, Zn.	Remobilising SEDEX into foliation or axial planes.	Major hydrothermal albite-calcsilicate-scapolite-FeOx-carbonate-chlorite-sericite-biotite-argillic alteration and Cu-Au event.	Minor, late remobilisation.

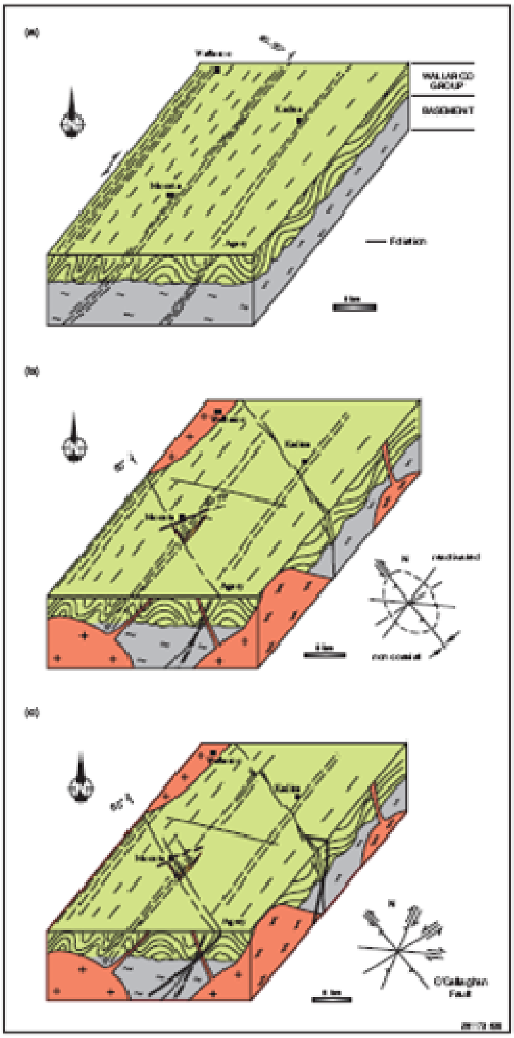

Figure 5. Simplified schematic block diagrams showing the deformation and intrusive history affecting the Wallaroo Group in the Moonta-Wallaroo area located ~200-250 km SSE along strike of GEL302 (from Zang, 2002).

2.0 *In situ* Stress Field

Knowledge of both the local- and regional-scale stress regime is important in order to understand the effects of stress-dependent fracture permeability and, in EGS operations, potential reservoir growth and flooding directions under hydraulic stimulation. In general, stress fields are anisotropic and inhomogeneous. They are defined in simplified terms by three mutually orthogonal principal axes of stress, being the maximum (S_1), intermediate (S_2) and minimum (S_3) stress axes. In practice, the classification of far-field stress regimes is based upon the Andersonian scheme, which relates the three major styles of faulting in the crust to the three major arrangements of the principal axes of stress i.e. the vertical principal stress (S_V) and the maximum and minimum horizontal principal stresses (S_{Hmax} and S_{hmin}, respectively) (Anderson, 1951). These three major stress regimes are: (a) the normal faulting stress regime where $S_V > S_{Hmax} > S_{hmin}$; (b) the strike-slip faulting stress regime where $S_{Hmax} > S_V > S_{hmin}$; and (c) the reverse (or thrust) faulting stress regime where $S_{Hmax} > S_{hmin} > S_V$ (Figure 6). The determination of the local stress field is important as the theory of stress-dependent fracture permeability predicts enhanced permeability associated with critically stressed faults or fractures that are either undergoing dilation (~parallel to S_1) or shear reactivation (<45° to S_1) under the influence of the contemporary stress field.

GEL302 is located adjacent to the THZ and the Flinders Ranges of the Adelaide Geosyncline, which are currently seismically active and experiencing hundreds of earthquakes annually (Figures 7 and 8). This present-day seismic activity was initiated by coupling and/or convergence between the Pacific and Australian plates during the late Miocene period (<6 Ma) (Hillis and Reynolds, 2000; Sandiford et al., 2004). Evidence from earthquake focal mechanisms and fault kinematic analyses suggest that the regional far-field stress field within the Adelaide Geosyncline ranges from reverse fault, strike-slip fault and transitional stress regimes with an ~E-W compression direction (S_{Hmax}) of 083° ± 30° (see classifications TF, SS and TS of Figure 6; Hillis and Reynolds, 2000; Quigley, 2006). The closest stress field indicator is the Wilkatana Fault, which is a reactivated major range bounding fault of the Adelaide Geosyncline located ~35 km to the east of GEL302 (Figure 7). Fault kinematic analyses along the Wilkatana Fault show contemporary reverse oblique-slip (transitional strike-slip?) fault displacements related to the present-day stress regime (Quigley, 2006). A compilation of the 2008 World Stress Map (WSM) data release for all quality ranked *in situ* stress field data for the eastern Gawler Craton/Adelaide Geosyncline region is shown in Figure 8.

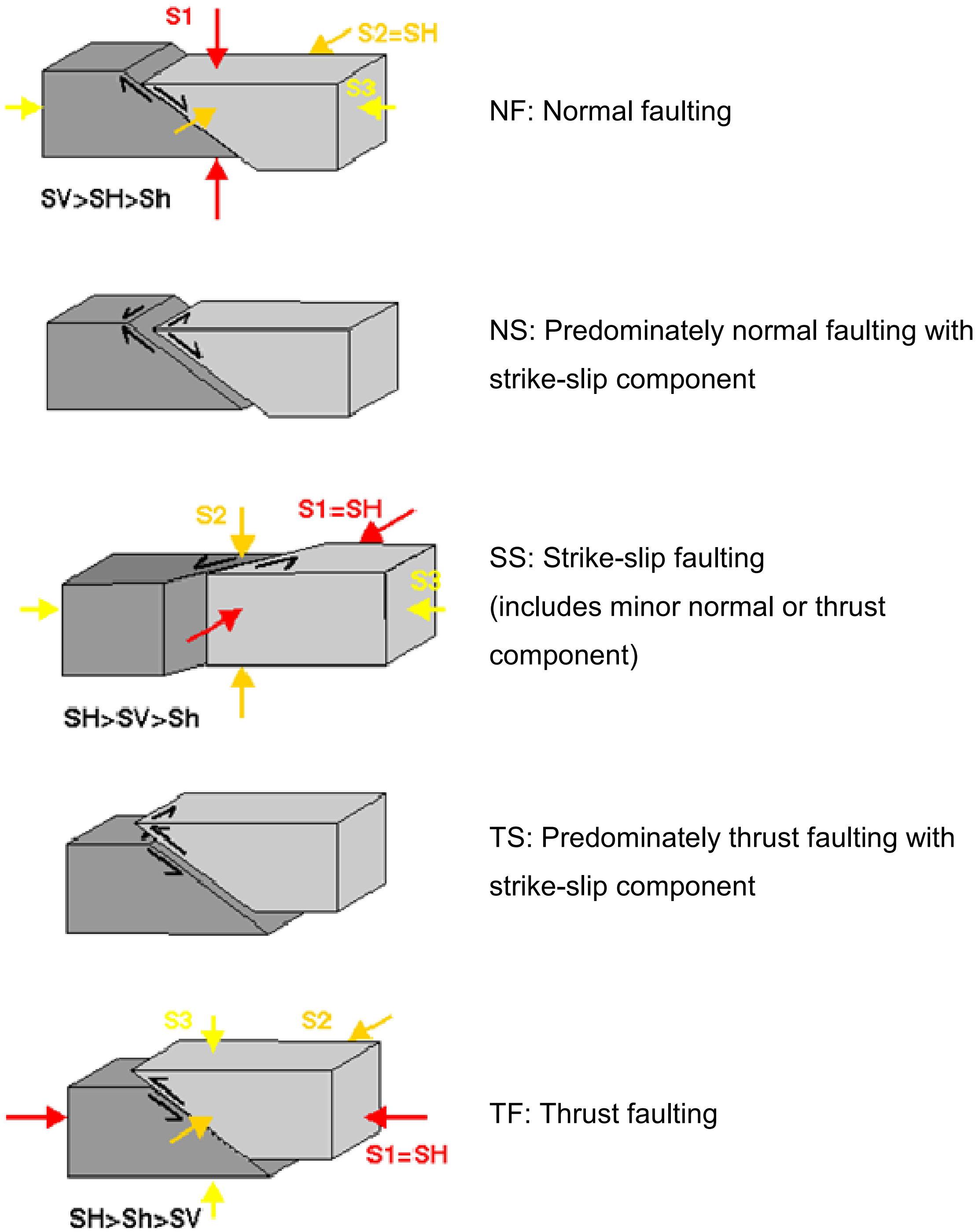

Figure 6. The World Stress Map stress regime classifications (NF, NS, SS, TS, TF) and their associated styles of faulting (from Heidbach et al., 2008).

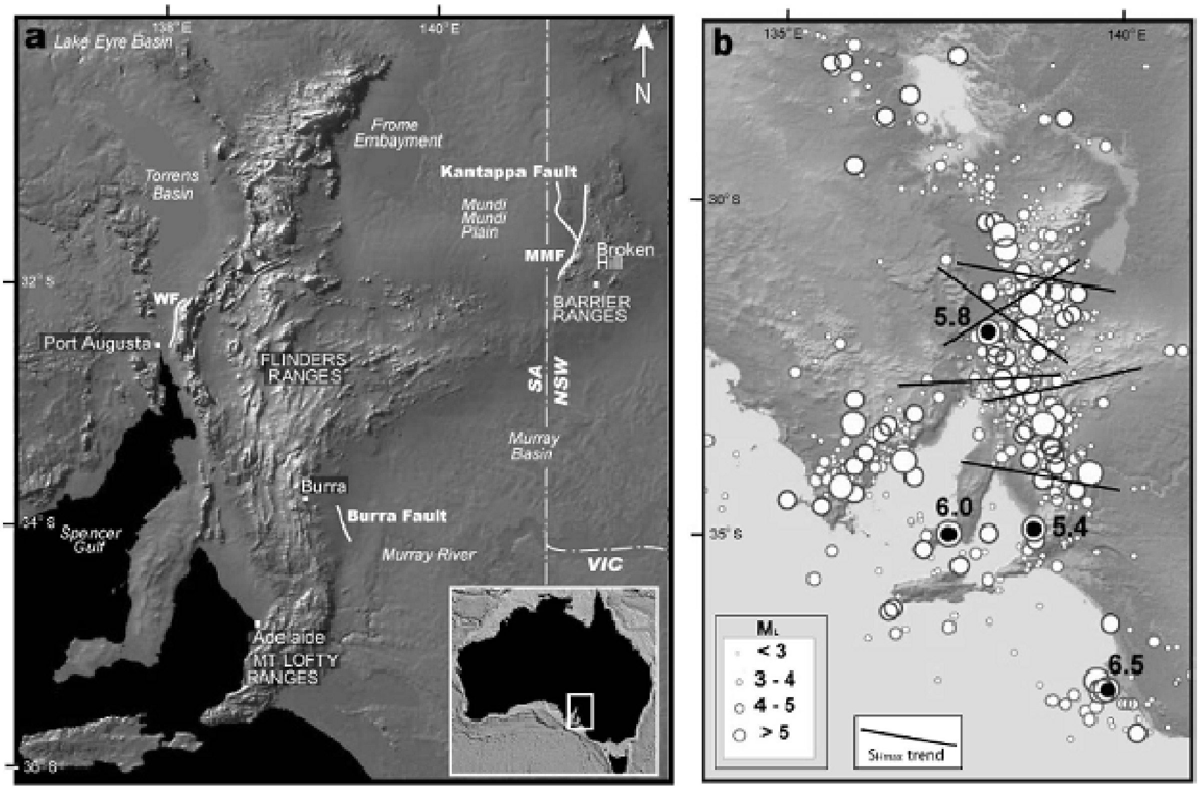

Figure 7. (a) Major physiographic features of south-central Australia. Note the position of the Wilkatana Fault (WF), which is located to the NE of Port Augusta and provides the closest stress field indicator to GEL302. (b) Distribution of historical seismic activity, earthquake magnitudes and S_{Hmax} azimuth estimates in southern South Australia (from Quigley, 2006).

As a consequence of this variability, the local stress field is best determined at individual well locations. With respect to EGS-style developments, in either a reverse or strike-slip fault stress regime S_1 is horizontally compressive. In a reverse fault stress regime hydraulic stimulation generally results in approximately horizontal fracture growth (considered optimal for EGS reservoirs). In contrast, hydrofracs in a strike-slip stress regime will form steep to vertical dipping fractures that strike <45° (commonly 30°) to the direction S_1. An additional implication of the potential transitional reverse/strike-slip stress regime is that if the magnitude of S_{hmin} does approach that of S_V then greater injection pressures may be required for hydraulic stimulation.

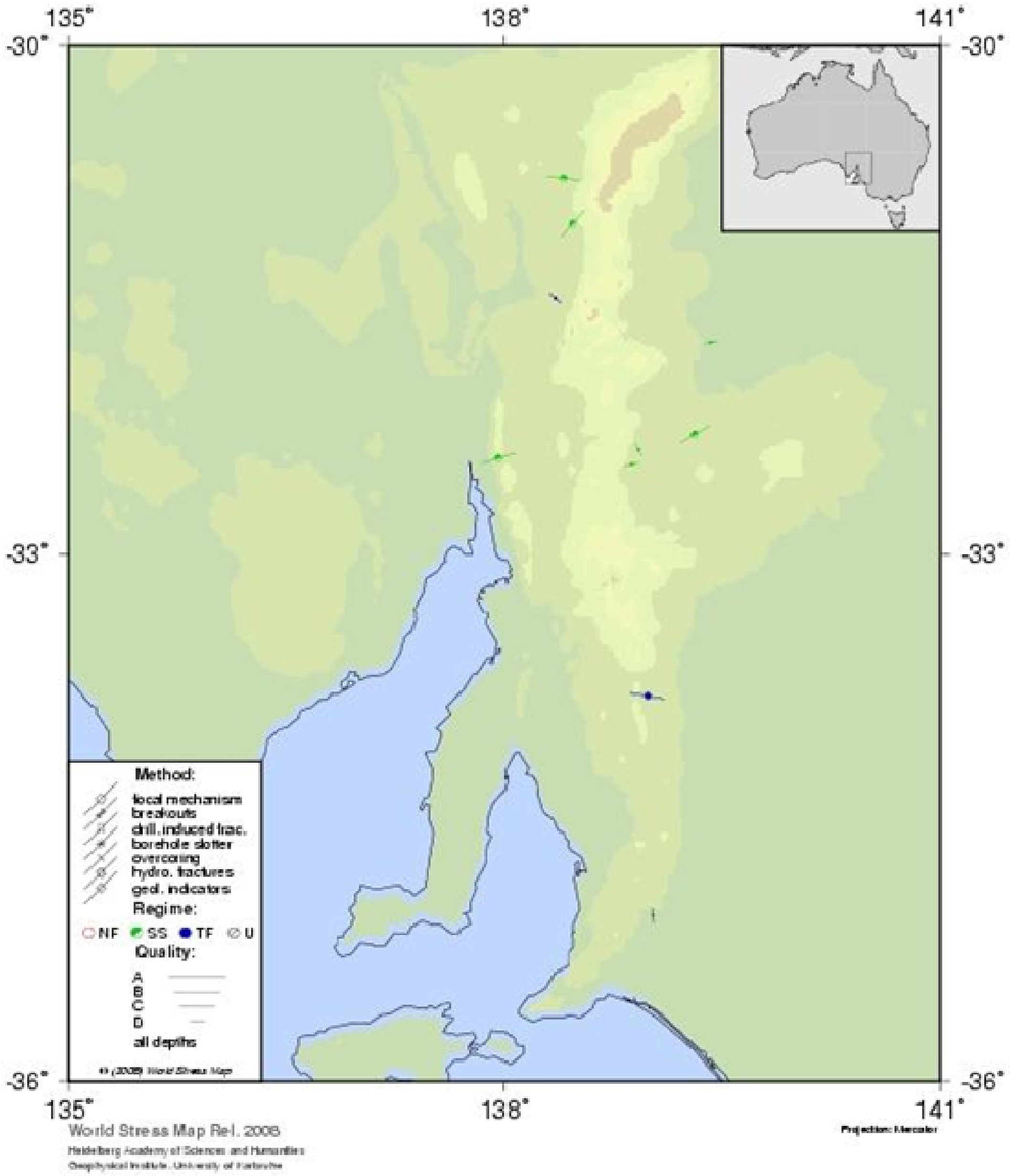

Figure 8. ***In situ*** **stress field indicators within the Adelaide Geosyncline, including the method, quality ranking, stress regime and orientations of the principle horizontal stress axis (S_{Hmax}) (from Heidbach et al., 2008).**

3.0 Reservoir Characteristics

A summary of the inferred reservoir characteristics of the basement Wallaroo Group in GEL302 is based upon lithological descriptions in the literature together with a brief inspection of drill core intersections. The drill holes selected for inspection included:

- Bute DDH5 – Located ~205 km SSE and along strike from GEL302. This hole is described as a Wandearah Formation type section with intercalated basalt of the Matta Formation.
- HODD3, WPDD1 and WPDD2 – Located ~45-50 km NNW along strike of GEL302 and consisting of local skarn and regional hydrothermally altered Wandearah and Matta Formation(?) units.

It is important to note that the reservoir characteristics for the Wallaroo Group described below are inferred from only a minimal amount of data. A more thorough investigation involving geomechanical testing and/or numerical modelling would provide a more definitive characterisation.

The key features of the Wallaroo Group relevant to the development of an EGS reservoir are as follows:

1. As a whole, the Wallaroo Group is an inhomogeneous rock mass of varying composition and geomechanical properties. It consists of thinly bedded metasediments intercalated with felsic and mafic volcanic units and possibly intruded by Hiltaba Suite granitoids. For example, core from Bute DDH5 contained Wandearah Formation metasiltstones of varying composition intercalated with Matta Formation basalt over thicknesses of tens of metres (Appendix 1). These rock units are expected to have no to negligible matrix porosity and permeability. Hydraulic stimulation of these types of layered sedimentary sequences requires careful planning to lower the risk of unconstrained reservoir growth, development of isolated flow paths and flow short-circuiting, variable fluid residence times and fluid losses.
2. The varying composition and degree of metamorphism and alteration of these rock units decreases overall rock mass strength. For example, the Wandearah Formation contains a large proportion of thin and relatively low competency

siltstones, argillites, schists and calc-silicates and locally, these are strongly metamorphosed and/or hydrothermally altered, particularly near Hiltaba Suite granitoids. Core inspections suggested that strong metamorphic (e.g. chlorite, biotite) and hydrothermal alteration (hematite, carbonate, chlorite) significantly decreased the strength of individual rock units. These alteration assemblages are somewhat problematic in that they vary locally in intensity throughout the Wallaroo sequence and may form local, narrow zones of weakening within the rock mass. To lessen the risk of intersecting such zones, it is recommended that any proposed EGS drill site avoid areas in the vicinity of any known granitoid bodies.

3. In comparison to massive, competent, crystalline rock masses such as granite, the Wallaroo Group is likely to contain a relatively higher natural *in situ* permeability due to the relatively high density of bedding planes and jointing. Potentially, this is a favourable characteristic, which may result in relatively easier reservoir development and exploitation. However, reservoir development may also prove more difficult to constrain, with a higher risk of fluid losses.

4. The seismic reflection images suggest that bedding fabrics within the Wallaroo Group are broadly shallow dipping (Figures 1 & 2). Shallow dipping structures within the reverse oblique-slip fault stress field inferred for this location are considered a positive indicator of enhanced *in situ* permeability, ~horizontal reservoir growth direction and relative ease of hydraulic stimulation.

5. The seismic data contains evidence of major fault structures that may act as relatively more permeable fluid conduits. It is recommended that all major fault structures at depth be avoided to lessen the risk of opening up a preferential fluid pathway that may short-circuit the reservoir. Relatively high permeability faults can dominate a flow system and may achieve higher production flow rates but the decreased fluid residence and wall rock contact time results in lower temperature fluids at the production well head. Ideally, the reservoir should consist of a large volume of high density, interconnected, small fractures that allow the fluid to achieve a sufficient fluid-rock contact time to heat up.

6. In addition to the Palaeoproterozoic synthetic and antithetic rift structures shown in the seismic image, structural interpretations elsewhere along the eastern and southeastern margin of the Gawler Craton apparently show major NE-trending (D1) and NW-trending (D2) fault and shear zones structures ubiquitous throughout the basement sequence (Figure 5). D1 also resulted in the formation of the predominant NE-trending, moderate NW-dipping foliation fabric (Figure 5). These structural features may also be amenable to hydraulic stimulation under the contemporary stress field and again it is recommended that the major fault or shear zones be avoided.

7. The Cooper Basin granite-hosted EGS reservoir recently developed by Geodynamics has the approximate dimensions of 3 km (long) x 3 km (wide) x 1 km (thick). It is estimated that a commercial electricity operation in GEL302 will require at least a similar sized development within the Wallaroo Group sequence, which is likely to capture multiple different rock units and several fault structures as described above. Furthermore, the reservoir will require a significant enhancement of permeability to be able to sustainably deliver at least 75 l/s fluid flow rates at each production well head.

8. Although the Wallaroo Group represents a relatively inhomogeneous, low permeability and low competency rock mass, recent innovations and experience with developing “tight gas” reservoirs in similar rock sequences by the oil and gas industry indicates that reservoir stimulation and development within this succession is possible. If successful, this will not only open up large areas along strike of GEL302 for future EGS development but will also make a great technical advance in the potential to develop EGS over a greater range of rock types.

9. To ensure the highest degree of geological control it is recommended that the first proposed GDP drill site (Ferveo-1) be constrained to the general area of the regional seismic line with the target depth horizon located within the Wallaroo Group (i.e. not “unknown” basement) and away from major fault structures. The current proposed drill site location (748736mE, 6454700mN) meets those criteria (Figure 9).

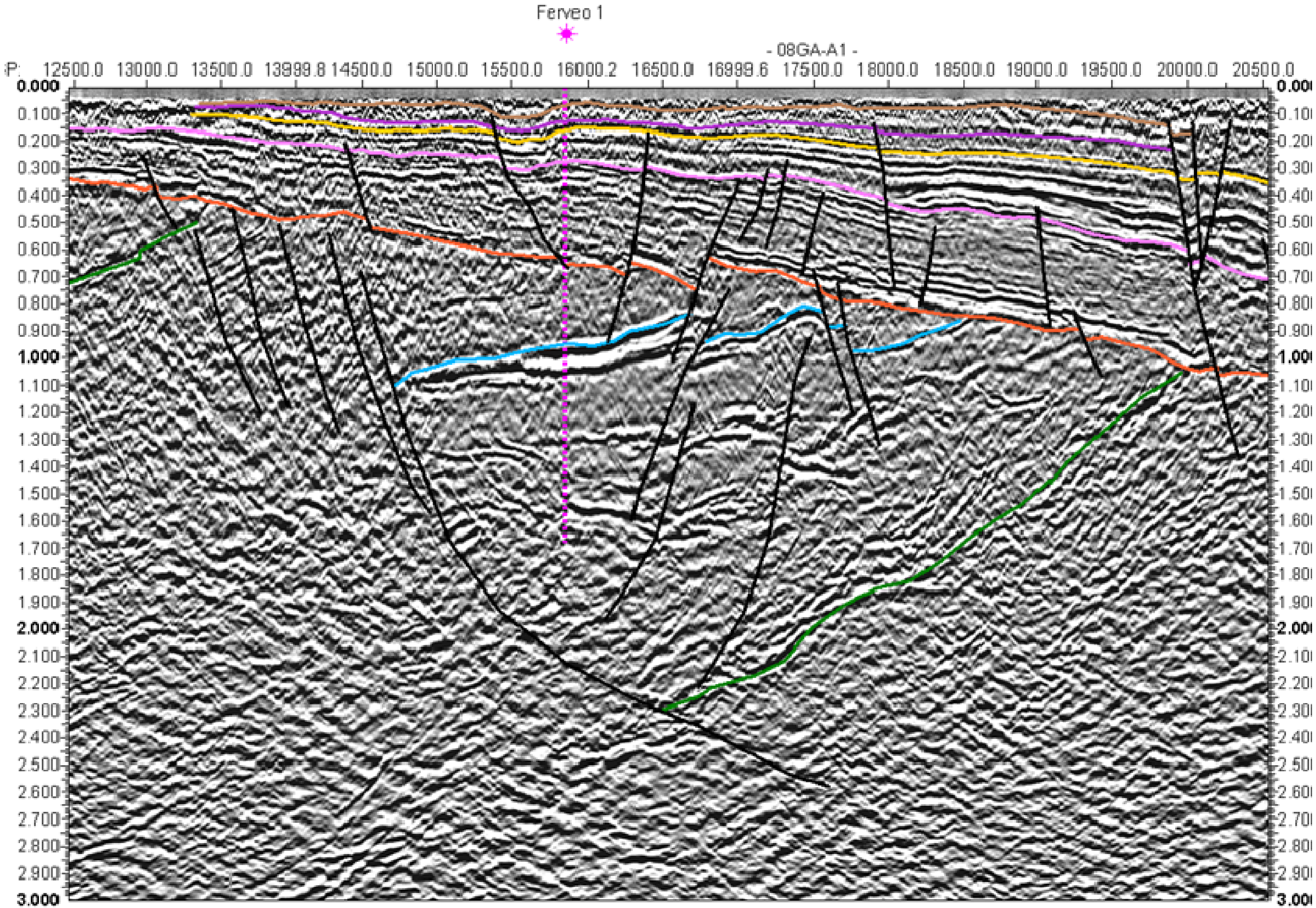

Figure 9. Seismic section detailing location of Ferveo 1. Refer to Figures 1 and 2 for the colour scheme legend.

4.0 Conclusion

Based on seismic character, outcrop maps, drill hole data etc, HDRPL is relatively confident that the succession beneath the Adelaidean in GEL302 is an equivalent of the Wallaroo Group. As such, this report has focussed on the properties of the Wallaroo Group with respect to EGS development.

In summary, the geomechanical reservoir characteristics of the Wallaroo Group presented above do not present a typical EGS-style target. EGS experience elsewhere in the world has demonstrated that hydraulic stimulation and reservoir development can be successfully achieved in large volume, ~homogeneous, competent, brittle rock types such as granite. There are no known examples of successful EGS development within a layered sedimentary sequence of varying hydromechanical properties such as the Wallaroo Group. Although sedimentary rock hosted EGS Plays are being promoted by other Australian geothermal companies these remain untested.

However, recent innovations and experience with developing tight gas reserves in the oil and gas industry indicate that this is indeed achievable and this presents an opportunity to make a significant technological advance in EGS developments. In regards to this issue, HDRPL recently sought the technical advice of Schlumberger, who are a world leader in the development of unconventional reservoirs, and based upon their experience they have confirmed that although the Wallaroo Group poses a technical challenge it is possible to successfully to develop an EGS reservoir within it. In addition, more traditional EGS-style targets may exist elsewhere within the larger Roxby Geothermal Project area, which may include large Hiltaba Suite granites and crystalline Gawler Craton basement below the Wallaroo Group.

HDRPL stresses that the above assessment is only preliminary and based on minimal information and a lack of deep (>1 km) drilling information.

5.0 References

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6.0 Appendix 1 – Bute DDH5 Stratigraphic Log

*Note that the Wallaroo Group succession commences from 36.28 m.

SA_GEODATA

Stratigraphic Log

Drillhole Name BUTE DDH 5 **Drillhole Number** 23250

Depth From	To	Map Symbol	Major Lithology	Minor Lithology	Description
0.00	21.00 M	nd	-	-	
Strat Unit Name			Unnamed GIS Unit - see description		
Strat Unit Description			No description or log available (sample may or may not have been recovered)		
GIS Code			------nd		
21.00	36.28 M	Eok	DOLOMITE ROCK	CONGLOMERATE	grey stylolitic dolomite /conglomerate at base
Strat Unit Name			Kulpara Formation		
Strat Unit Description			Limestone, stromatolitic and fenestral, micritic; ooid grainstone		
GIS Code			E-o--k		
36.28	41.70 M	Lxtw	BASALT	-	coarse, concordant base
Strat Unit Name			Willamulka Metabasalt Member		
Strat Unit Description			Massive and amygdaloidal basalt with relict textures, fine to medium grained, green to grey.		
GIS Code			L--x-tw		
41.70	82.60 M	Lxw	METASILTSTONE	-	green to grey, fine bedded, chloritic (tuffaceous?), ?siliceous downhole
Strat Unit Name			Wandearah Formation		
Strat Unit Description			Argillite, muscovite; quartz siltstone; metasediments, alkali-feldspar, carbonate, calcsilicate, iron-rich, carbonaceous; metasandstone.		
GIS Code			L--x-w		
82.60	132.05 M	Lxtw	BASALT	-	coarse, even texture, concordant base
Strat Unit Name			Willamulka Metabasalt Member		
Strat Unit Description			Massive and amygdaloidal basalt with relict textures, fine to medium grained, green to grey.		
GIS Code			L--x-tw		
132.05	163.05 M	Lxw	METASILTSTONE	-	green, chloritic, fine bedded, some harder, abrupt gradation at base
Strat Unit Name			Wandearah Formation		
Strat Unit Description			Argillite, muscovite; quartz siltstone; metasediments, alkali-feldspar, carbonate, calcsilicate, iron-rich, carbonaceous; metasandstone.		
			L--x-w		

GIS Code

163.05 186.30 M Lxtw BASALT - coarse, chilled top and base

Strat Unit Name Willamulka Metabasalt Member

Strat Unit Description Massive and amygdaloidal basalt with relict textures, fine to medium grained, green to grey.

GIS Code `L--x-tw`

186.30 186.55 M Lxw METASILTSTONE - green, chloritic, fine bedded

Strat Unit Name Wandearah Formation

Strat Unit Description Argillite, muscovite; quartz siltstone; metasediments, alkali-feldspar, carbonate, calcsilicate, iron-rich, carbonaceous; metasandstone.

GIS Code `L--x-w`

186.55 209.80 M Lxtw BASALT - coarse, chilled top, metased inclusions, small amygdales, abrupt transitional conformable base

Strat Unit Name Willamulka Metabasalt Member

Strat Unit Description Massive and amygdaloidal basalt with relict textures, fine to medium grained, green to grey.

GIS Code `L--x-tw`

209.80 213.60 M Lxw METASILTSTONE - green to grey, fine bedded to massive, chloritic

Strat Unit Name Wandearah Formation

Strat Unit Description Argillite, muscovite; quartz siltstone; metasediments, alkali-feldspar, carbonate, calcsilicate, iron-rich, carbonaceous; metasandstone.

GIS Code `L--x-w`

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Existing State of Knowledge on the Roxby Geothermal Project, South Australia

J.P. Driscoll

16 May 2010

Executive summary

Hot Dry Rocks Pty Ltd (HDRPL) has undertaken a review of all available data in Southern Gold's Roxby Geothermal Project (RGP). The RGP is sited within an increasingly strategic mining and infrastructure corridor due to significant expansion of the Olympic Dam mine, and development of the Prominent Hill and Carrapateena deposits.

The RGP comprises 22 contiguous geothermal exploration licences, covers an area of approximately 10,000 km^2, and is located north of Port Augusta and west of Lake Torrens in central South Australia.

An initial scoping study demonstrated sparse geological and geophysical datasets over the RGP. HDRPL thus focused attention to GEL 300 since this permit overlaps a minerals licence—held by Monax Mining Pty Ltd (MOX)—which is currently the focus of an ongoing exploration program (MOX has drilled a total of 21 minerals bores since 2006).

HDRPL was able to acquire precision temperature data in five MOX bores, and measured thermal conductivity values of drill core from each intersected formation. Using these data, HDRPL has confirmed heat flow in GEL 300 appears to be elevated relative to the average Australian heat flow in the Global Heat Flow Database.

HDRPL has made a series of recommendations which should be used to define the forward RGP exploration work program.

PIRSAs regional 3D model of the Gawler Craton indicates Hiltaba Suite Granite underlies the northernmost RGP geothermal licenses. Given the published high heat generation values associated with the Hiltaba Suite, HDRPL suggests this area be a priority for future work.

Recommendations for technical work include targeting existing bore holes for precision temperature logging. This data, in conjunction with further thermal conductivity and geochemical work (focusing on the Donington and Hiltaba Suite granites, and the Wallaroo Group), will result in 1D heat flow models being

constructed. This will indicate areas of high heat flow and thus focus future seismic and drilling activities.

HDRPL recommends that minerals exploration licensees with permits overlapping the RGP be contacted to establish collaborative agreements (the MOX model should be adopted with these minerals operators). Temperature data can be collected during the next phase of their minerals exploration work.

Stress data is sparse and the question as to whether the RGP possess a favourable stress regime for reservoir development is unresolved. HDRPL recommends that stress tests be conducted on bore holes drilled within the RGP that have depths greater than 700 m.

HDRPL recommends a water allocation plan be developed in accordance with the South Australian and Federal regulations.

Disclaimer

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Table of Contents

1. Introduction

Southern Gold Ltd (SAU), through its wholly owned subsidiary Inferus Resources Pty Ltd, is the holder of 22 contiguous Geothermal Exploration Licences (GELs) in South Australia, collectively referred to as the Roxby Geothermal Project (RGP). SAU also has a portfolio of gold and base metals exploration projects predominantly in Australia and Cambodia. The RGP covers an area of approximately 10,000 km^2 and is located north of Port Augusta and west of Lake Torrens (Figure 1). The GELs were granted to Inferus Resources as the sole licensee on 8 August 2008 (GEL 297, GEL 300–GEL 302) and 6 July 2009 (the remaining 18 GELs). GEL 302, shown in red on Figure 1, was the subject of a Geothermal Resource report by Hot Dry Rocks Pty Ltd (HDRPL) on 2 June 2009 (Beardsmore, 2009).

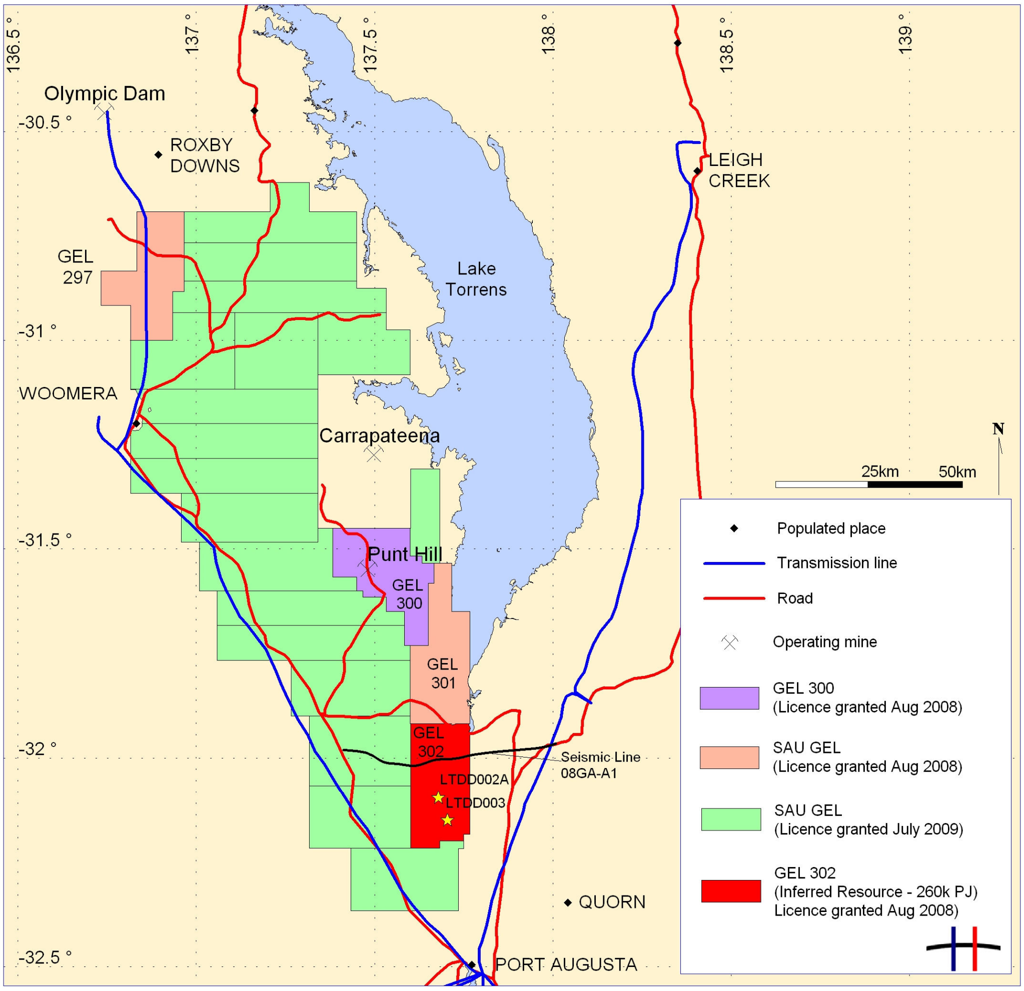


Figure 1: Location of the RGP area. The high voltage electricity transmission lines are shown in blue; and the Olympic Dam mine, and the Carrapateena and Punt Hill deposits are shown. Seismic line 08GA-A1, coloured black, runs approximately east-west through GEL 302 (shown in red).

The RGP overlaps the South Australian Heat Flow Anomaly of Neumann *et al.*, 2000, which a number of geothermal companies are assessing for potential to produce geothermal power. The RGP also overlaps the Olympic Dam iron oxide copper-gold (IOCG) province, which hosts the world class Olympic Dam Cu–U–Au–Ag resource, as well as the Prominent Hill Cu–Au and Carrapateena Cu–Au deposits.

The area west of Lake Torrens is becoming an increasingly strategic mining and infrastructure corridor due to development of these IOCG deposits. The proposed Olympic Dam expansion is forecast to consume close to half of South Australia's current power supply, thus the region should experience an expanding energy market in the medium term. The RGP straddles the existing 275 kV and 132 kV power lines that connect Olympic Dam and Prominent Hill mines to the national power grid at Port Augusta.

HDRPL completed a Geothermal Resource statement for GEL 302 on 2 June 2009, estimating 260,000 PJ of stored heat inferred geothermal resource for an Engineered Geothermal System (EGS) play within the Palaeoproterozoic metasedimentary sequence and Archaean Basement complexes (Beardsmore, 2009).

An initial scoping study by HDRPL (Driscoll, 2009) demonstrated geological and geophysical datasets were virtually nonexistent over most of the RGP with just three temperature data within the RGP (two within GEL 302 and one in GEL 473), and seismic data are sparse with nearly all lines being acquired prior to 1983.

HDRPL thus focused on GEL 300 (shown in purple in Figure 1) since this permit overlaps Monax Mining Ltd's (MOX) EL3457 minerals license (MOX is exploring for Olympic Dam style Cu–U–Au in an area referred to as the Punt Hill Prospect). HDRPL was able to utilise a series of recently drilled bore holes to acquire rock thermal conductivity data and precision temperature data. These data reduce exploration risk in GEL 300 and provide the focus for much of the rest of this document. The drill program for EL3457 is ongoing and HDRPL recommends SAU collaborate further with MOX in order to gather further geological datasets.

Seismic line 08GA-A1 runs almost east-west through GEL 302 approximately perpendicular to the structural grain of the Olympic Subdomain. The boreholes drilled by MOX in GEL 300 lie are located approximately 45 km along strike to the north of

GEL 302, the subject of the earlier Geothermal Resource statement by HDRPL (Beardsmore, 2009).

The following information has been collated and assessed as part of this investigation:

- Pertinent published literature on the geology of the Stuart Shelf.
- Heat flow and conductivity data from the Global Heat Flow Database and Geoscience Australia database.
- Measurements of rock thermal conductivity of representative samples of key formations in the RGP.
- Mineral drilling data from GEL 300; supplied by MOX.
- Precision temperature logging of five bore holes within GEL 300.
- Whole Rock Fusion geochemical analyses of four formations (twelve samples) penetrated in GEL 300.
- 1D modelling of surface heat flow of five bore holes within GEL 300.
- Collation of published stress data for the RGP and surrounding geographical area, including a qualitative assessment of stress and fault data.
- Water information including access issues and pertinent legislation issued by the South Australian government.
- Synthesis of all data.

2. Geological Setting

2.1. Introduction

The RGP is sited on the eastern margin of the Gawler Craton (Figure 2), an extensive region of Archaean to Mesoproterozoic crystalline basement, comprising metasediments, volcanic and igneous intrusive rocks, that underlies approximately 440,000 km^2 of central South Australia. The Gawler Craton is subdivided into a number of tectonic subdomains with the RGP restricted to the Olympic Subdomain, a north-south orientated feature.

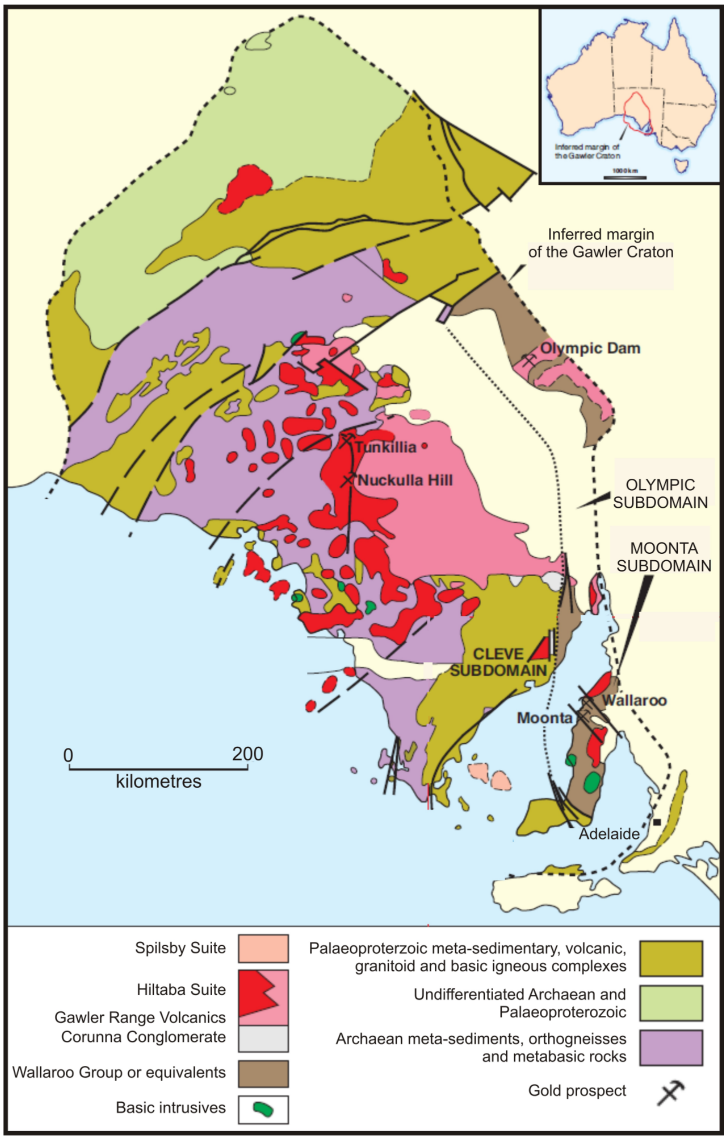


Figure 2: Solid geology interpretation of the Gawler Craton; from Zang, 2002. The RGP lies within the Olympic Subdomain on the eastern margin of the Gawler Craton.

The first order controls on temperature and geothermal resource distribution within the RGP are the structure and thermal properties of the geological formations. These must be understood in order to model heat flow and the temperature away from bore hole control points.

The oldest basement rocks in the Olympic Subdomain are the Palaeoproterozoic Hutchison Group metasediments and Donington Granitoid Suite, and the Late Palaeoproterozoic Wallaroo Group metasediments and volcanics. These rocks are intruded by early Mesoproterozoic Hiltaba Suite felsic granitoids and locally overlain by the comagmatic extrusive Gawler Range Volcanics. Arenaceous Mesoproterozoic redbed sediments of the Pandurra Formation unconformably overlie these volcanics, and are in turn both intruded and overlain by the Gairdner Dolerite dyke swarm and its extrusive equivalent, the Beda Volcanics. Proterozoic to Cambrian flat-lying sedimentary rocks of the Stuart Shelf—the Umberatana and Wilpena groups—unconformably overlie the Beda Volcanics. The youngest deposits are a thin veneer of Recent to Quaternary sediments (Figure 3).

The RGP lies across three of the Australian 1:250,000 geological map series: Andamooka (published in 1966), Port Augusta (published in 1968) and Torrens (published in 1981. Much of the RGP is covered by aeolian sands and gravels or Adelaidean-aged quartzite and sandstone with limited exposures of Cambrian limestone in the northern parts.

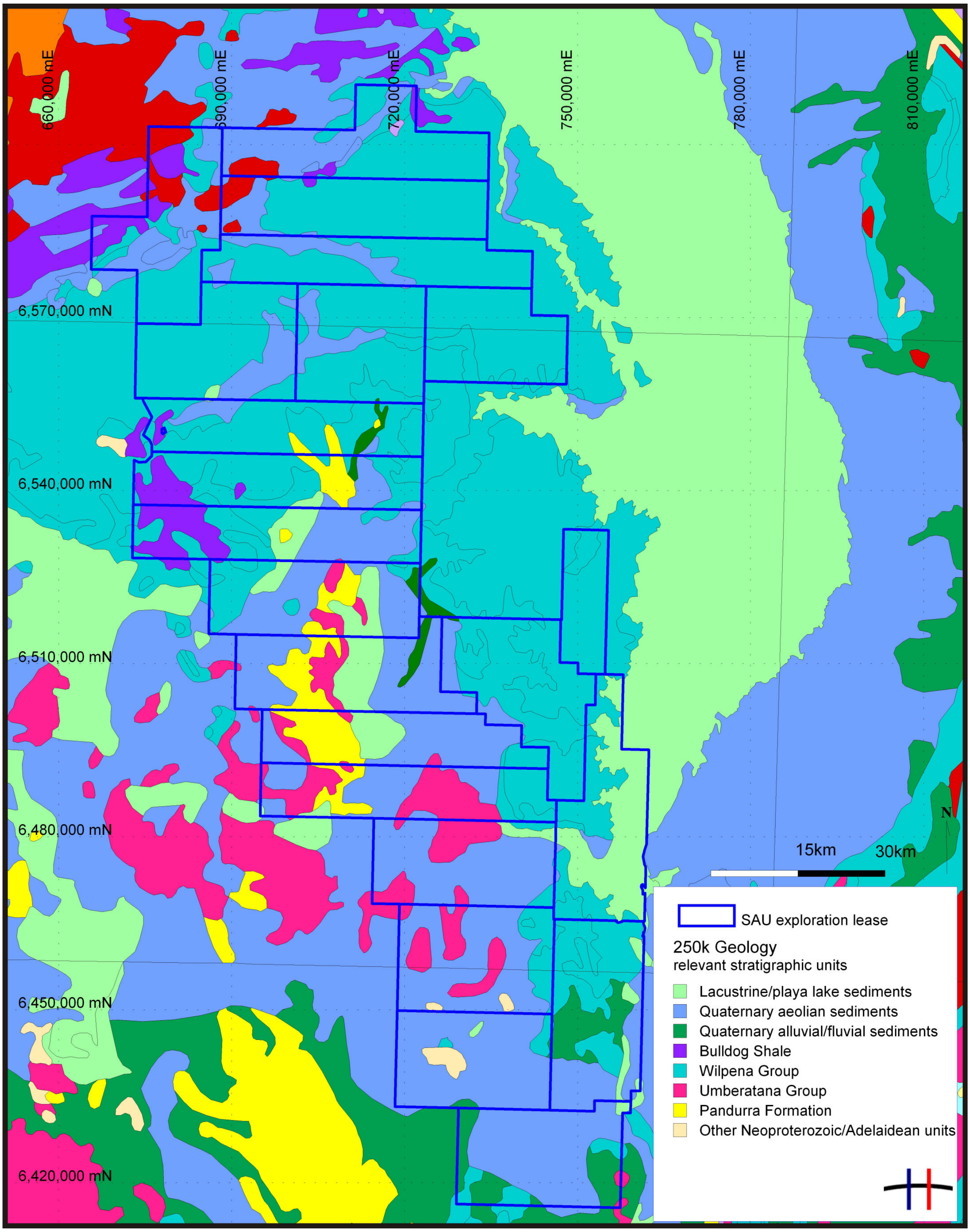


Figure 3: Location of the RGP in relation to surface geology [GDA94 Zone 53].

GEL 300

GEL 300 lies within the Torrens sheet of the Australian 1:250,000 geological map series. Surface outcrop is predominantly Simmens Quartzite Member with the remainder covered by aeolian sand and gravels (Figure 4). Below the depth of existing drilling (approximately one kilometre), structure and stratigraphy are inferred from regional geology and seismic characterisation.

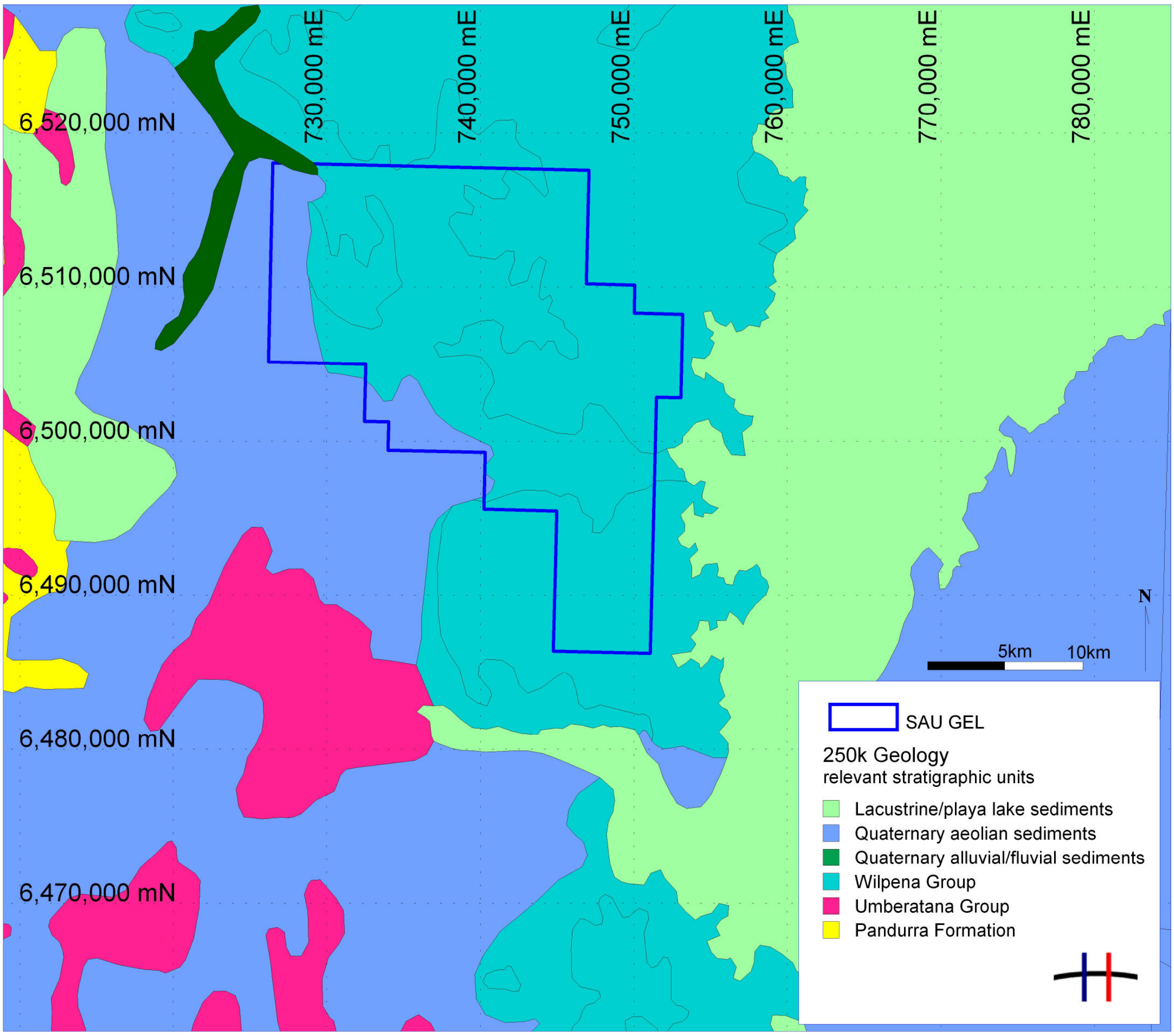


Figure 4: Location of GEL 300 in relation to surface geology [GDA94 Zone 53].

GEL 300 is characterised by rocky scarps and sloping tablelands of the Andamooka Ranges (Figure 5).

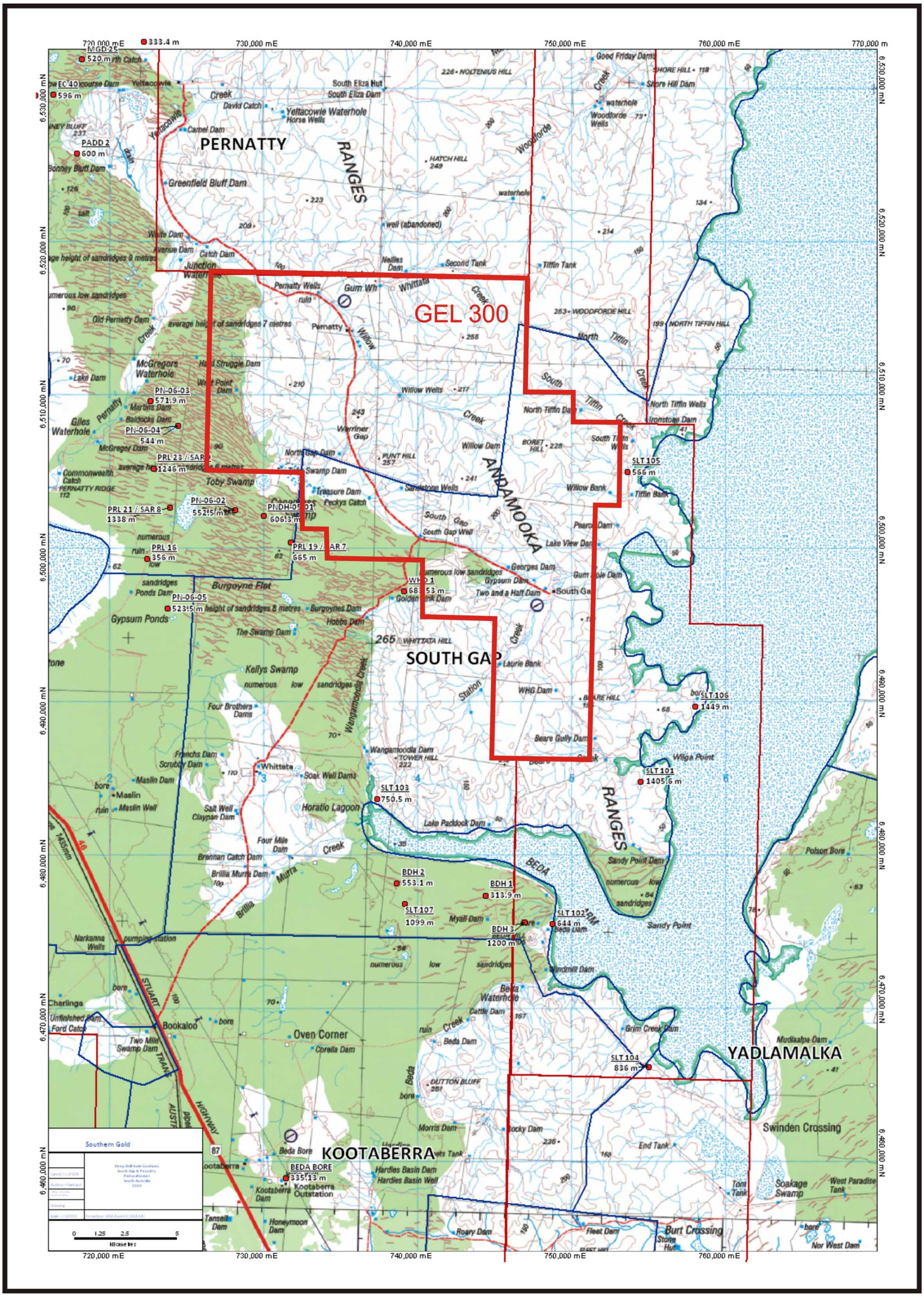


Figure 5: Topography of GEL 300.

2.2. *Structure*

HDRPL has interrogated PIRSA's online mapping database, SARIG, and collated all seismic data in the RGP. Results indicate that nearly all lines were acquired some years ago (Attachment A).

PIRSA has confirmed that the majority of the seismic lines within the RGP were acquired over a six year period (1977-1983) as part of a seismic experiment on the Stuart Shelf. The main objective of the study was to record seismic lines using 'high resolution principles', basically using small charge sizes, high frequency, high sample rates, single geophones and downhole dynamite. Unfortunately the recording unit deployed by PIRSA only had 24 channels. The depth of penetration of the small charge sizes and limited offsets meant that PIRSA were restricted to the near surface only, and did not image the basement. Five areas were covered by this seismic project:

- Red Lake [RL prefix lines part of seismic survey 79SS02]
- Wilga Point [WP prefix lines part of seismic survey 79SS08]
- Oak Dam [WMC and OD prefix lines part of seismic surveys 81SS01 and 81SS03]
- Mount Gunson [MG prefix lines part of a number of seismic surveys]
- Beda Arm [BA prefix lines part of a number of seismic surveys]

The lines only imaged the shallow surface and are of vintage quality; many of the lines listed were simply noise analysis. PIRSA released a brief paper regarding these activities (Nelson, 1979—Appendix 1) and has supplied all available images (Appendix 2).

GEL300

No seismic data have been collected within GEL 300. However, HDRPL independently interpreted Seismic Line 08GA-A1 approximately 45 km to the south of GEL 300 in 2009 as part of the GEL 302 Geothermal Resource statement (Beardsmore, 2009). This seismic line trends almost east-west and is approximately perpendicular to the structural grain of the Olympic Subdomain. HDRPL feels that in the absence of local seismic data, Line 08GA-A1 might be used as a proxy for structural relationships in GEL 300. HDRPL undertook some basic cross sectional work based on the MOX bore hole intersections to corroborate this.

For ease of reference the following section has been reproduced from the 2009 GEL 302 Geothermal Resource statement. Note that since that statement was issued, the underlying meta-sedimentary unit has been interpreted as the Wallaroo Group rather than the Hutchison Group.

Seismic Line 08GA-A1 traverses the northern section of GEL 302 (Figure 1). An interpretation of this line by HDRPL suggests that the Adelaidean-Cambrian succession thickens towards the east, controlled by a major west-dipping extensional fault (Figure 6). This fault controls a regional, hanging-wall, rollover structure that HDRPL believes dominates much of the structural development of GEL 302 and surrounding areas. The axis of the half-graben defined by this fault forms the ‘Pirie-Torrens Basin’, with the eastern footwall probably representing a transition to the ‘Torrens Hinge-line’.

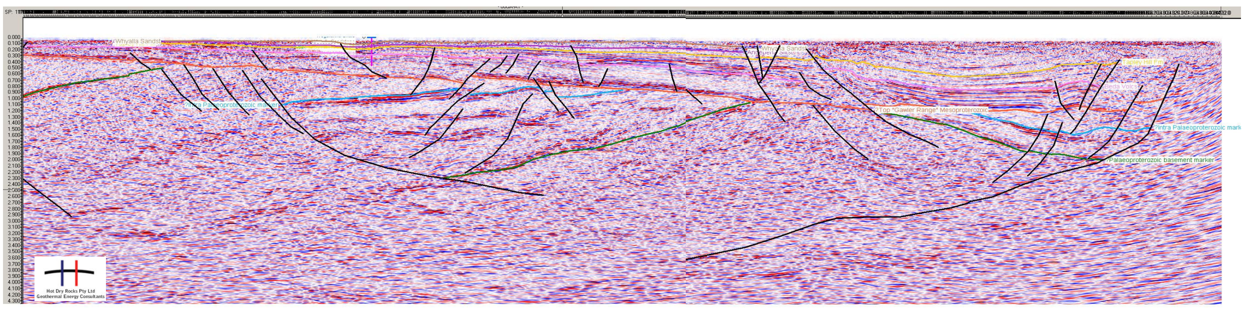


Figure 6: Interpretation of seismic line 08GA-A1 (whole of line) showing thickening of Adelaidean succession towards a basin bounding fault in the east. Orange horizon marks a major erosional surface (probable top of Gawler Range Craton succession) with inversion and erosion of the hangingwall roll-over anticline. A possible older Palaeoproterozoic rift basin (blue and green horizons) may exist at depth.

A marked angular unconformity denotes the probable top of the Gawler Range Craton succession. This unconformity suggests kilometre-scale inversion and erosion along the eastern boundary fault sometime prior to the Adelaidean. Although of unknown provenance, these reflections may represent an earlier rift succession with the change in dip representing the eastern and western limbs of a roll-over anticline.

It is possible that this older rift succession was controlled by a fault identified on the western margin of GEL 302 and that basin extension 'flipped' polarity to the eastern fault during the later Adelaidean extensional event.

The lithological explanation of seismic reflections deeper than one kilometre is currently unproven by drilling. The basement of this region is classically referred to as 'Gawler Range Volcanics', and it is possible that some of these deeper reflections may represent layered volcanics. However, the seismic character seems to be more characteristic of rocks of a sedimentary origin. It is possible that the deeper rift succession may represent the Palaeoproterozoic Wallaroo Group – interbedded metasediments. Reflections beneath this package are more chaotic and may reflect crystalline basement.

2.3. Stratigraphy

Few deep bore holes penetrate the RGP. However, MOX has drilled 21 minerals bore holes within GEL 300 since 2006 (Attachment B) and these are used to indicate the stratigraphic intervals likely over the wider RGP. An earlier four bore holes were drilled by other operators between 1977 and 1980 immediately east and south of the permit (Attachment C), thus providing good control of the subsurface stratigraphic succession to a depth of approximately 1,000 m.

The formation tops and thicknesses are detailed in Attachments D, E, F and G, and a generalised stratigraphic column is shown in Figure 7.

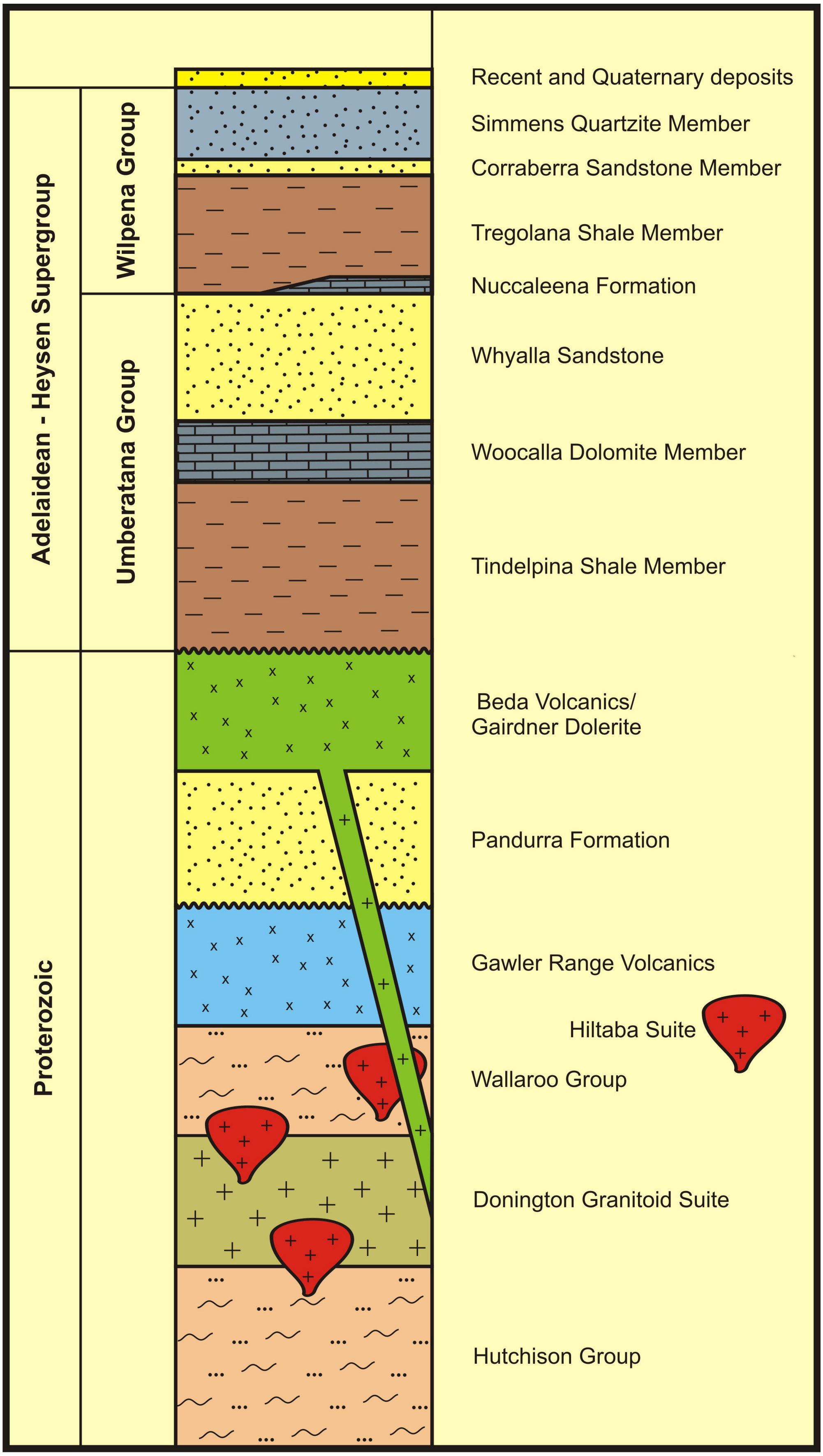


Figure 7: Stratigraphic column for GEL 300 (modified from Swain and Grant, 2009).

The shallowest succession comprises a Neoproterozoic- to Cambrian-age Adelaidean sequence (the Umberatana Group and Wilpena Group).

Underlying this is the sequence actively being targeted by MOX for Olympic Dam style Cu–U–Au mineralisation. The main lithological successions are detailed in Figure 8. The Palaeoproterozoic units include the Hutchison Group metasediments (Orosirian); Donington Granitoid Suite (Orosirian); and the Late Palaeoproterozoic (Statherian) Wallaroo Group metasediments and volcanics. These units underwent deformation during the 1730–1700 Ma Kimban Orogeny, and were intruded by Early Mesoproterozoic (Calymmian) Hiltaba Suite granitoids and comagmatic Gawler Range Volcanics. The Palaeoproterozoic and Early Mesoproterozoic rocks are unconformably overlain by arenaceous redbed sediments of the Mesoproterozoic Pandurra Formation.

The regional stratigraphic framework of GEL 300 is almost entirely derived from subsurface minerals datasets as most of the area is covered by a thin Cainozoic veneer.

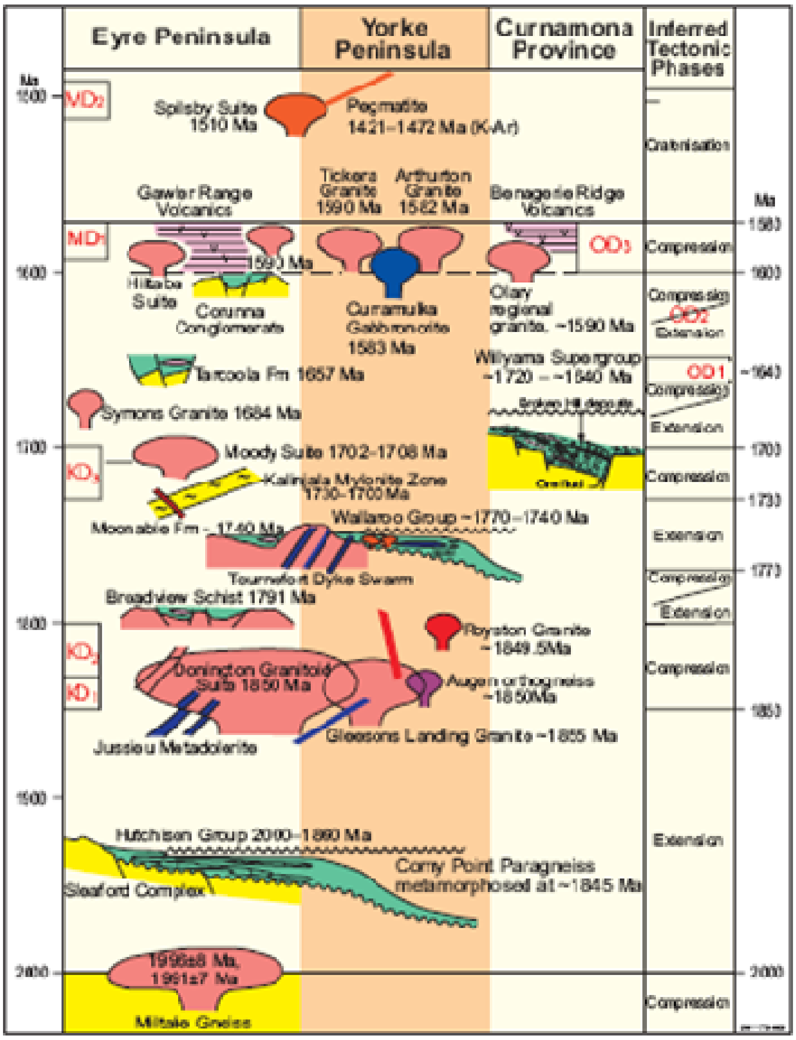


Figure 8: Palaeoproterozoic and Early Mesoproterozoic tectono-stratigraphic correlations between the Eyre and Yorke Peninsulas of the SE margin of the Gawler Craton and the Curnamona Craton. The geology of the Yorke Peninsula is inferred to extend along strike into GEL 300 (from Zang, 2002).

2.3.1 Wilpena Group

Simmens Quartzite Member

The quartzites of the Simmens Quartzite Member are described by Forbes & Preiss (1987) as flaggy, fine- to medium-grained, medium bedded with a partly clayey component, and common thin reddish and reworked layers of shale. In addition, Crawford (1964) refers to the unit as dense current-bedded massive white and pale brown quartzites with occasional thin bedded quartzite and intraformational breccias.

Corraberra Sandstone Member

The Corraberra Sandstone Member is a micaceous and shaley sandstone with common interbedded bands of chocolate brown shale (Miles, 1955). The sandstone is flaggy, well laminated, displays common sedimentary structures (cross beds and ripples), with a few massive blocky units towards the top of the sequence.

Tregolana Shale Member

Forbes & Preiss (1987) report that a specific type section has yet to be established for the Tregolana Shale Member. The best outcrop totals 55 m of section comprising a 18 m lower section of chocolate shale and siltstone with green shale laminations and rare red sandstone laminae, overlain by 37 m of chocolate siltstone and shale with 10% fine-grained red sandstone laminae. The Tregolana Shale Member is synonymous with the Woomera Shale Member.

Nuccaleena Formation

The Nuccaleena Formation is a thin pinkish or yellowish laminated dolomite, deposited in a very shallow marine environment (Forbes & Preiss, 1987).

2.3.2 Umberatana Group

Whyalla Sandstone

The Whyalla Sandstone is dominantly a coarse-grained, poorly cemented sandstone with extremely well rounded, spherical, frosted quartz grains commonly 1-2 mm in size (Coats & Preiss, 1987a). A minor component of finer, more angular interstitial quartz sand with minor feldspar and lithic fragments is also described. Core from the MOX drill holes indicates a deep pink-purple colouration, low angle stratification and pin stripe laminations. Williams (1998) identifies a number of periglacial features within the Whyalla Sandstone. These sedimentological characteristics suggest the succession was deposited in a cold, arid, aeolian environment.

Woocalla Dolomite Member

The Woocalla Dolomite Member penetrated in the MOX bores comprises two distinct lithologies. The first is a purple brown to grey finely laminated silty shale sequence. The laminations are commonly convoluted and often discontinuous, deformed and wavy (slumps?), an indication of soft sediment deformation. In some sections there are partially healed fractures filled with carbonate.

Tindelpina Shale Member

Coats and Preiss (1987a) describe the Tindelpina Shale as dark grey to black, very finely laminated, carbonaceous, dolomitic or calcareous silty shale. The shale has up to 1.11% total organic content (McKirdy *et al*., 1975).

2.3.3 Proterozoic units

Beda Volcanics and Gairdner Dolerite

The Beda Volcanics and Gairdner Dolerite form part of a large Late Proterozoic mantle plume event which resulted in the onset of flood basalt volcanism (Zhao *et al*., 1994) and is thought to be associated with the break-up of Rodinia (Powell *et al*., 1994). The subsequent thermal sag stage initiated the formation of a series of intracratonic basins including the Adelaide Geosyncline, part of the Centralian Superbasin (Walter *et al*., 1992).

The Beda Volcanics are a series of dominantly spilitic pyroxene basalts (Mason *et al*., 1978) composed of albite-oligoclase, clinopyroxene, chlorite, haematite and carbonate (Coats and Preiss, 1987b). The Beda Volcanics penetrated by the MOX drill holes are composed of grey-green-purple amygdaloidal basalt (the amygdules are cream to white coloured). Multiple volcanic flows have been recognised.

The Gairdner Dolerite comprises a mafic dyke swarm that intrudes the underlying units, and is regarded as the intrusive equivalent of the Beda Volcanics. The dykes typically register as long, sub-parallel linear magnetic anomalies. Ages recorded including Sm–Nd 867 ± 47 Ma and 802 ± 35 Ma; U–Pb 827 ± 6 Ma.

Pandurra Formation

Preiss (1987) describes the Pandurra Formation (~1,424 ± 51 Ma) as a widespread dominantly arenaceous red bed sequence which unconformably overlies Mesoproterozoic metasediments and volcanics. The formation is cross-bedded, poorly sorted, dominantly medium- to coarse-grained, lithic and feldspathic with abundant haematitic and kaolinitic matrix. Sedimentary features are common and include pebble imbrication, ripple marks, mudcracks and grit bands with reverse grading.

Hiltaba Suite and Gawler Range Volcanics

The Hiltaba Suite and coeval Gawler Range Volcanics (~1,595–1,585 Ma) are the result of a large mantle plume that developed in the early Mesoproterozoic (Flint, 1993). The Hiltaba Suite granitoids intrude the underlying sequences and comprise a bimodal magmatic suite. The Gawler Range Volcanics are a regionally extensive diverse suite of mafic and felsic extrusives including rhyodacite, rhyolite, dacite, basalt, tuff, siltstone, sandstone, mudstone, granitic and volcanic breccia.

Wallaroo Group

The Wallaroo Group (~1,790–1,738 Ma) is a sedimentary and bimodal volcanic basin rift succession that formed along the eastern and southeastern margin of the Gawler Craton; described by Wang (2002) and Cowley *et al*. (2003). The sedimentary basin has a general east-deepening depositional regime with shallow water arenaceous and arkosic successions in the south and southwest whilst the east and northeast is dominated by relatively deep water laminated argillites, carbonates and chemical sediments. The Wallaroo Group is dominated by metasediments of the Wandearah Formation, intercalated with felsic and mafic volcanics of the Weeltulta and Matta formations, respectively, and is extensively intruded by Early Mesoproterozoic-age Hiltaba Suite granitoids (Table 1).

Table 1: Subdivisions of the Wallaroo Group (from Zang, 2002).

Wallaroo Group		
Formation	Member	Description
Wandearah Formation (metasediments)	Aagot Member	Mainly sandstone and argillite
	Doora Member	Mainly biotite schist, minor calc-silicate
	New Cornwall Member	Carbonate, graphitic siltstone and calc-silicate
	Wokurna Member	Red-brown siltstone, calc-silicate and albitic rocks
	Ninnes Member	Interlayered albitite, siltstone, sand-stone, carbonate
Weetulta Formation (A-type felsic volcanics)	Moona Porphyry Member	Porphyritic rhyolite to rhyodacite
	Wardang Volcanics Member	Rhyolite, rhyodacite, dacite
	Mona Volcanics Member	Felsics in the Bute area
Matta Formation (mafic volcanics, tholeiites)	Willamulka Volcanics Member	Amygdaloidal mafics
	Renowden Metabasalt Member	Fine-grained extrusive and shallow intrusive

Donington Granitoid Suite

The Donington Granitoid Suite (~1,855–1,846 Ma) is described by Reid and Hand (2008) as a linear batholith approximately 60 km wide and up to 600 km in the north-south orientation, emplaced during the Cornian Orogeny. The unit forms the basement to the Olympic Dam mine (Drummond et al., 2006) and the Carrapateena deposit (Jagodzinski et al. 2007). The Donington Suite is dominated by granodiorite gneiss, but includes a wide range of other lithologies such as pyroxene-bearing charnockite, megacrystic alkali-feldspar granite and gabbronorite along with co-magmatic mafic units (Mortimer *et al*., 1988).

Hutchison Group

The Hutchison Group (~1,964–1,850 Ma) comprises a diverse sequence of quartzitic, pelitic and calcsilicate metasediments with occasional iron formations, marble, dolomite and amphibolite units (*cf.* Parker & Lemon, 1982; Vassallo & Wilson, 2001).

3. Precision Temperature Logging

Precision temperature logs are a powerful tool for understanding the true thermal state of a bore hole and its geothermal potential. Precision temperature logging requires a thermistor to descend a bore hole in a controlled manner so that changes in electrical resistance across the thermistor can be monitored and recorded at sub-metre intervals. A properly calibrated thermistor is capable of measuring temperature to a precision of 0.001°C.

Petroleum explorers routinely record temperature data during their drilling and logging procedures, however this is not the case for minerals explorers.

PIRSA supplied HDRPL with a full listing of all temperatures recorded in the South Australia Department of Water, Land and Biodiversity Conservation database. This yielded just three bore holes with depths greater than 100 m that have temperature data within the RGP, as detailed in Table 2 and Figure 9.

Table 2: Bore holes within RGP that yielded temperature data prior to HDRPL conducting precision temperature logging in GEL 300 (source South Australia Department of Water, Land and Biodiversity Conservation; location coordinates for SAR 8 taken from PIRSA records).

Bore Hole	Year Drilled	Operator	Permit	BHT (°C)	BHT Depth (m)	Precision Temp Log	Eastings (mE)	Northings (mN)	Zone
SAR 8	1981	SEL-TRUST	GEL 473	58.50	1340.00	no	723550	6502906	53
LTDD002A	2007	Southern Gold	GEL 302	61.52	996.45	yes	752841	6446012	53
LTDD003	2007	Southern Gold	GEL 302	60.04	1034.30	yes	755015	6439978	53

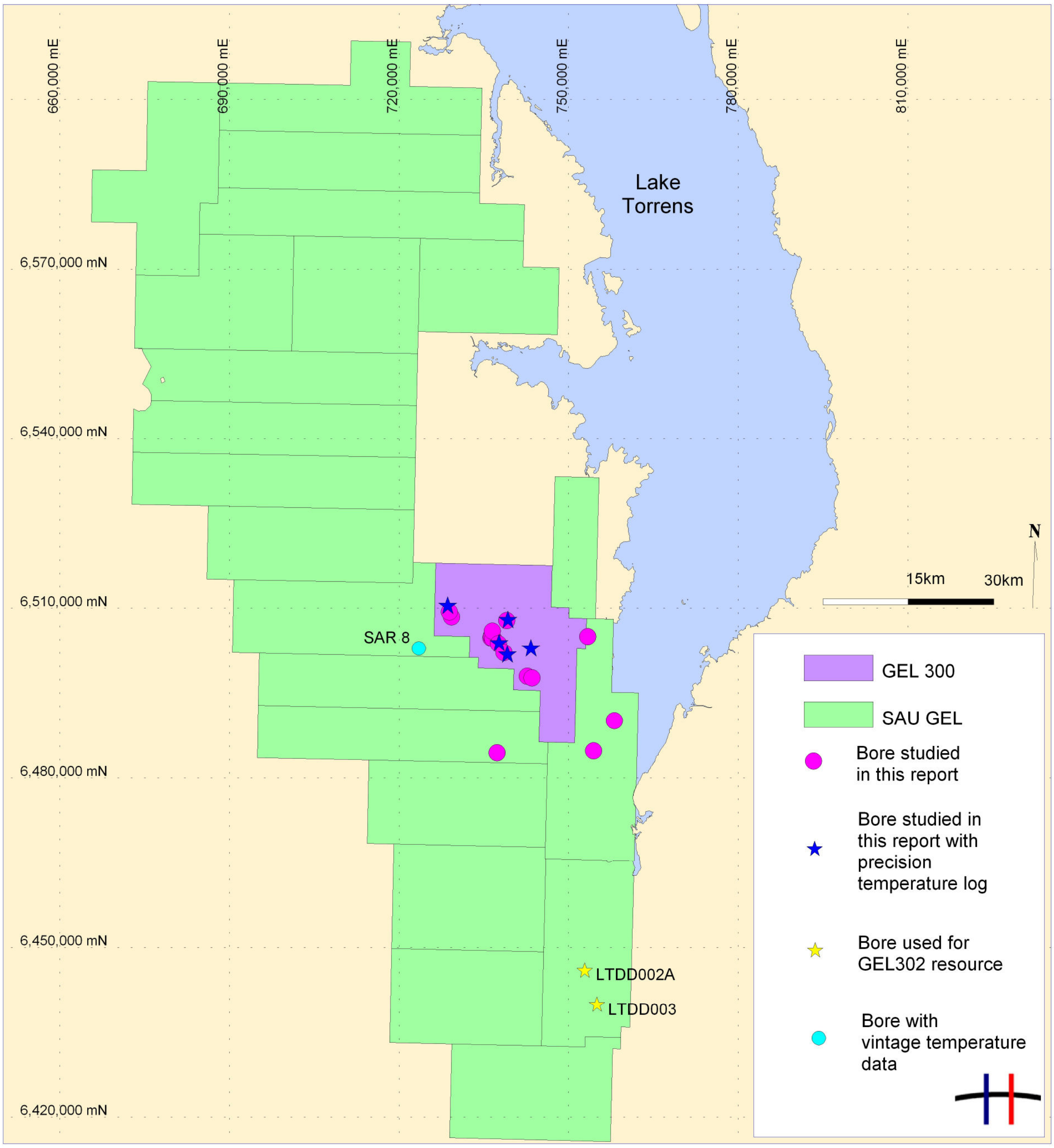


Figure 9: Bore holes within the RGP that have temperature data (SAR 8 data retrieved from the South Australia Department of Water, Land and Biodiversity Conservation and PIRSA records).

Both LTDD002A and LTDD003 in GEL 302 had precision temperature logs recorded. These were instrumental in constraining the heat flow in these bore holes and formed the basis for the HDRPL inferred resource estimate for GEL 302 (Beardsmore, 2009).

Only one petroleum well has been drilled in the RGP (Woomera 1 in GEL 469). The well was completed in 1958 and did not record any temperature data. It is not usual practise for the minerals industry to run casing down bore holes. As a result, the bore often collapses on itself. Blockages are common in all older bores. Numerous minerals bore holes have been drilled on the RGP, but most of these are of an age where it is unlikely that they remain open and accessible for logging.

It was therefore necessary to attempt precision temperature logging of bores recently drilled in GEL 300 by MOX as part of its minerals exploration program. SAU has a data sharing agreement with MOX.

HDRPL conducted two field surveys in November 2009. The aim was to deploy HDRPL's precision temperature logging equipment down each MOX bore hole in GEL 300. The initial survey (2-7 November 2009) was abandoned as the MOX bore holes had been rehabilitated to such an excellent extent that there was no longer any surface expression of the drill holes. MOX had recorded the GPS position to within approximately 3 m of the bore, however, the drill collars had been cut off approximately 45 cm below ground level. A backhoe from Pernatty Station subsequently uncovered several of the bore holes.

The second field survey (17-28 November 2009) was more successful. Of the 17 bore holes tested in GEL 300, five remained open to a sufficient depth to undertake precision temperature logging (Figure 10); the resulting temperature data are included in Appendix 3. HDRPL also attempted to gain access to four minerals bores within GEL 301 and GEL 475, but these all proved to be obstructed within a few metres of ground level. See Attachment H for information on blockages.

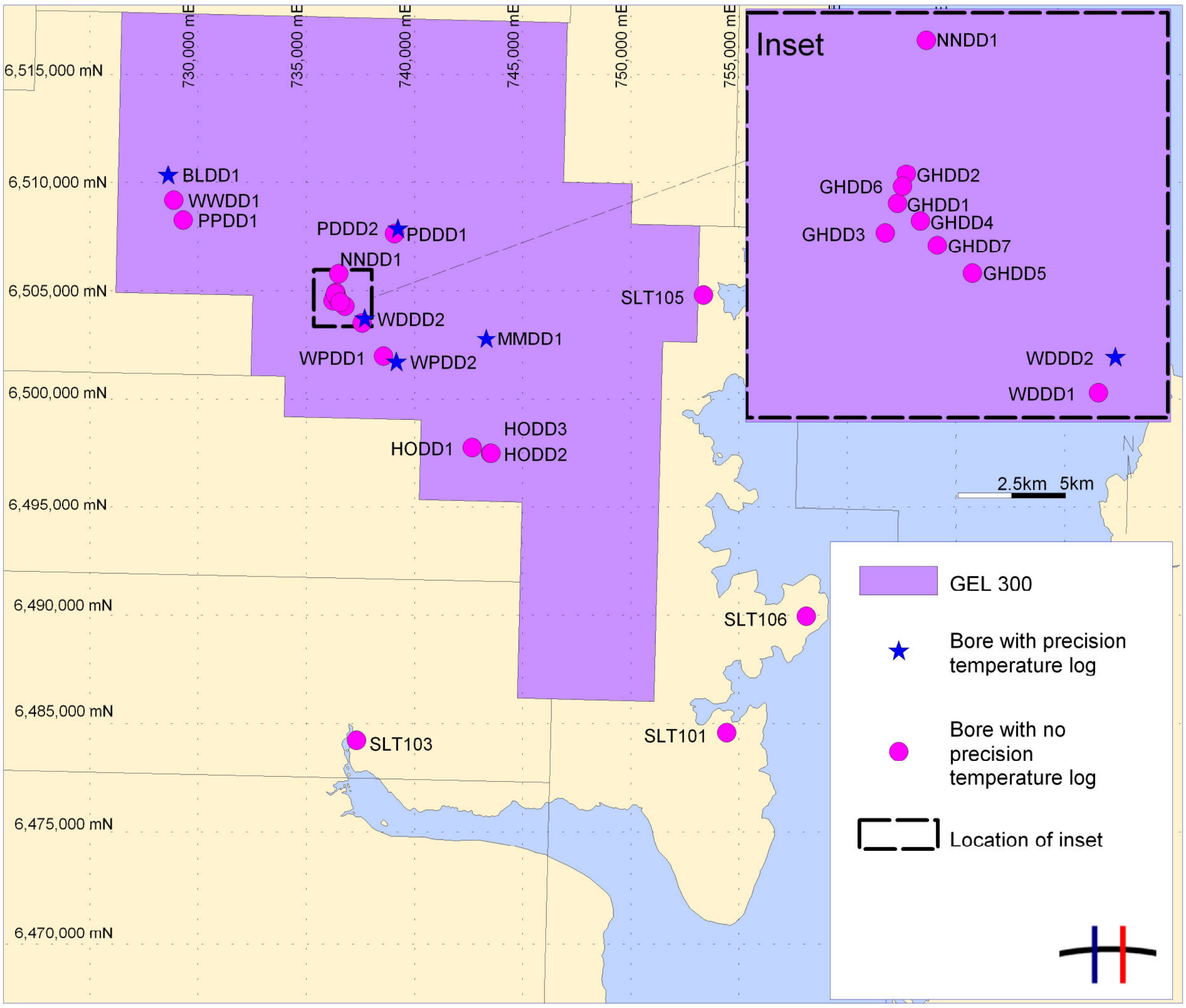


Figure 10: Location of bore holes that HDRPL attempted to access for precision temperature logging. Those delineated by a blue star were successfully logged by HDRPL in late 2009.

HDRPL recommends further temperature data is collected during the next phase of MOX's minerals exploration work. Approximately six weeks should be allowed between the end of drilling operations and the deployment of the HDRPL precision temperature logging unit, as the subsurface thermal regime needs to re-equilibrate to its undisturbed state. Minerals bores are prone to caving and blockage due to casing not being run. SAU should, therefore, liaise with the drillers to determine which zone(s) are susceptible to caving during drilling. Casing might then be run over these zones to ensure the bore remains unblocked.

HDRPL also recommends that minerals exploration licensees with permits overlapping the RGP be contacted to establish collaborative agreements. The MOX model should be adopted with all minerals operators. HDRPL has identified all minerals operators whose permits overlap with the RGP; Figure 11 and Attachment I. Benefits to the minerals operators include a greater geological understanding of their tenement, sharing of costs for future drill holes; and any geothermal resource identified could be utilised to supply power to any mines that may be discovered (*cf*. Beverley Uranium mine and Petratherm's Paralana Project).

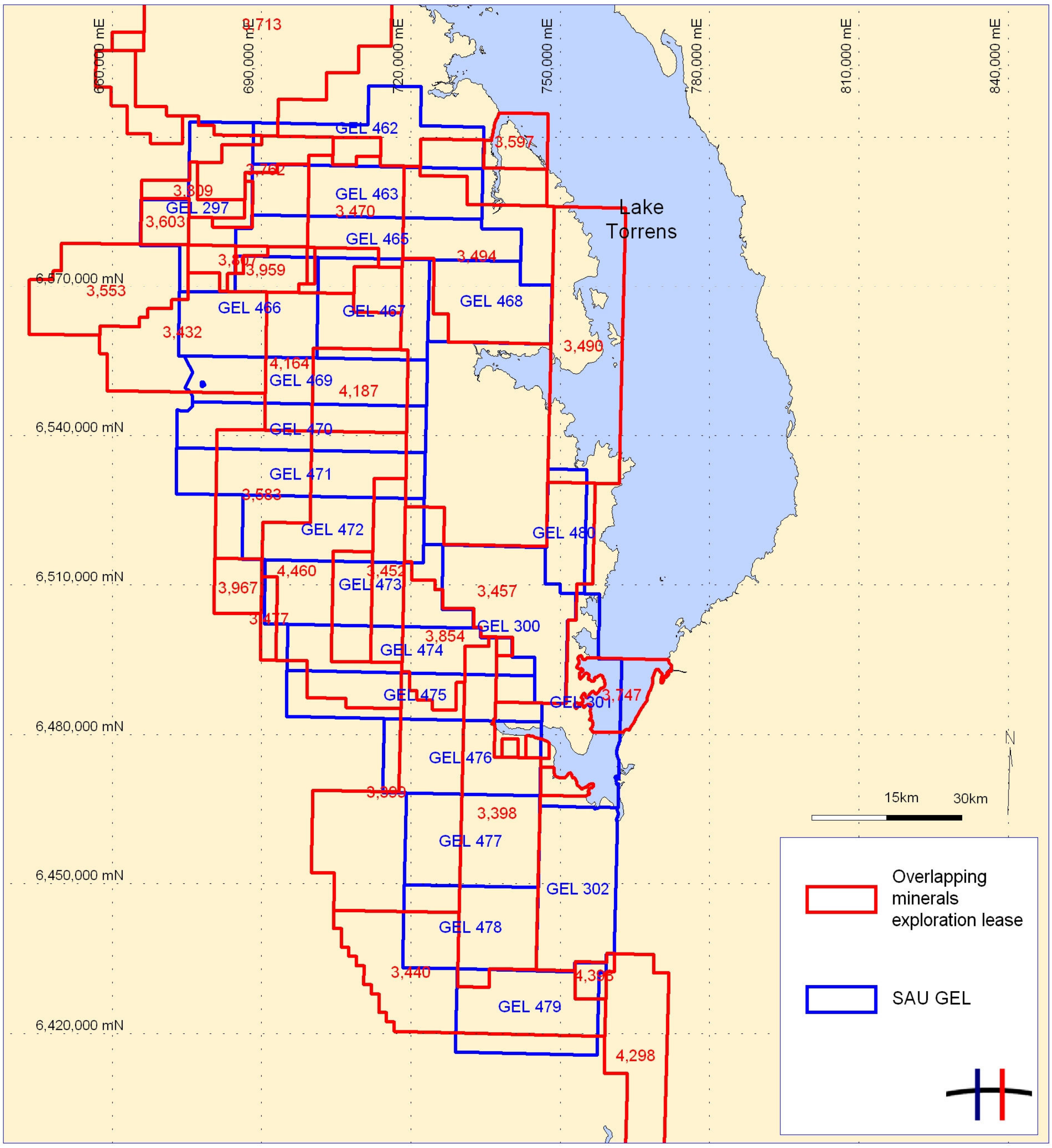


Figure 41: Minerals licenses that overlap the RGP area. Full details presented in Attachment I.

HDRPL suggests identifying open minerals bore holes with core, greater than 100 m in depth. HDRPL can then collect temperature data using the precision temperature logging unit to determine heat flow values. The resultant data might then be used to focus geothermal exploration. It should be noted that minerals bore holes are not cased and access may therefore be limited.

4. Heat flow modelling constraints

4.1. Introduction

Heat flow modelling provides a firm basis for accurate extrapolation of temperatures to depth, as it takes the thermodynamic principles of heat transfer into account.

HDRPL was commissioned to estimate thermal conditions for the five bore holes successfully temperature logged in GEL 300 (BLDD1, MMDD1, PDDD2, WDDD2 and WPDD2). HDRPL used its proprietary 1D Heat Flow Modelling Software to build heat flow models for each of these bore holes. Required input data include the precision temperature data and thermal conductivity data of the various formations penetrated. Lithological data were provided by MOX

4.2. Heat flow and limitations of 1D modelling

Heat flow at the Earth's surface is a power unit and is a function of heat generated within the crust plus heat conducted from the mantle.

The principle aim of geothermal exploration is to locate anomalously high temperatures at an economically and technically viable drilling depth. The thermal state of the crust can be expressed at the surface in the form of heat flow units (mW/m^2) and it is generally assumed that heat is transported to the surface by conductive means. In a conductive heat regime the temperature **T**, at depth **z** is equal to the surface temperature $\mathbf{T_0}$ plus the product of heat flow **Q** and thermal resistance **R**, such that:

$\mathbf{T=T_0+QR}$, where **R**=**z**/ (average thermal conductivity between the surface and **z**).

Consequently the most prospective regions for geothermal exploration are those that have geological units of sufficiently low conductivity (high thermal resistance) in the cover sequence combined with high heat flow.

Heat flow is a product of temperature gradient and rock thermal conductivity and is therefore a modelled value (not directly measured). The modelling of heat flow is a precision skill that requires a detailed understanding of physical conditions in the bore hole and the physical properties of the rocks; including advective processes that may influence bore temperature (such as ground water flow) and the temperature dependence of conductivity.

Heat flow estimates are only as accurate as the data that have been used to generate them. It is therefore important that the temperature and conductivity data used to model heat flow represent as closely as possible the actual thermal conditions.

HDRPL's 1D Heat Flow Modelling Software accounts for the temperature dependence of conductivity. However, the results of 1D heat flow modelling should be treated with caution when extrapolating data spatially over considerable distance.

4.3. Surface temperatures

Ground surface temperature is an important constraint for bore hole heat flow models if only deep temperature data are available for a bore hole. In many cases, HDRPL utilise data from the Australian Bureau of Meteorology (www.bom.gov.au) to estimate surface temperature. Woomera Aerodrome (Latitude 31.16°; Longitude 136.81°) is the closest site with continuous records since 1949 to the present day; and the average annual air temperature is 19.15°C.

HDRPL was able to utilise the precision temperature data in the 1D heat flow models to extrapolate the surface temperature. In all cases it was about 23°C, or 4°C above air temperature. This is consistent with the findings of Howard and Sass, 1964.

4.4. Temperature data issues

Apart from the logistical issues discussed in Section 3, HDRPL had no issues with the data collected during the precision temperature logging. It was noted during temperature logging of WPDD2 that there was a strong smell of H_2S emanating from the bore hole. When the temperature gradient plot is viewed, the signature is very noisy compared to the other bore holes. It is possible this is due to minor disruption of the temperature profile in the bore hole by bubbles of H_2S emanating from an oxidising sulphide layer at depth.

4.5. Rock thermal conductivity measurement

Thermal conductivity is the physical property that controls the rate at which heat energy flows through a material in a given thermal gradient. In the S.I. system of units, it is measured in watts per metre-Kelvin (W/mK). In the earth, thermal conductivity controls the rate at which temperature increases with depth for a given heat flow. The thermal conductivity distribution within a section of crust must be known in order to calculate crustal heat flow from temperature gradient data, or to predict temperature distribution from a given heat flow.

Sixty-five (65) steady-state thermal conductivity measurements were completed by HDRPL for representative samples from lithologies of the RGP using HDRPL's portable divided bar apparatus. The full conductivity report is provided in Appendix 4 and a summary of measurements is provided in Attachment J. Some of the shallower sections in the bore holes were not cored. HDRPL has therefore collated all open file thermal conductivity data in the vicinity of the Stuart Shelf to incorporate as much data as possible into our 1D heat flow modelling (Attachment K).

As rock thermal conductivity is highly dependent upon lithology, some statistical processing of the measured data was required to ensure that conductivity values utilised in the 1D heat flow models best represented the typical lithologies found within the basin. The 65 measurements of thermal conductivity included a number of measurements on 'pure' lithological samples such as 'shale', 'sandstone', etc. Where formation descriptions in bore hole logs indicated mixed lithologies, a conductivity value for these formations was estimated from the weighted harmonic mean of the conductivities of the 'pure' lithological components. This process is described in Beardsmore and Cull (2001) and a summary of the derived thermal conductivity values for each RGP formation is detailed in Attachment L.

4.6. Estimating basement heat generation

Heat generation is best determined from the analytical measurement of uranium, thorium and potassium within rock samples. Mining companies routinely perform detailed analysis of uranium (U) and thorium (Th), and often potassium (K); and these data can be used on the regional scale to delineate areas of high heat producing lithologies.

Unfortunately MOX only record U and Th values in its geochemical assay reports. HDRPL thus undertook Whole Rock Fusion (WRF) analyses on twelve samples to determine the radioactive isotopic abundance of four key formations. Heat generation ($\mu W/m^3$) for each sample was estimated using measured rock density and the isotopic abundance method as described in Beardsmore and Cull (2001). Values were then incorporated into the 1D heat flow models of the five precision temperature logged bore holes.

The results of the heat generation program are listed in Attachment M.

5. Heat flow modelling results

5.1. Estimated heat flow

HDRPL has compiled all heat flow data published to date in the central portion of South Australia (Figure 12 and Attachment N). At present there are just two heat flow data points within the RGP (LTDD002 and LTDD003A). Many of the heat flow data have been generated by Torrens Energy, which drilled a series of shallow heat flow wells on the east side of Lake Torrens. A similar approach might be appropriate within the RGP.

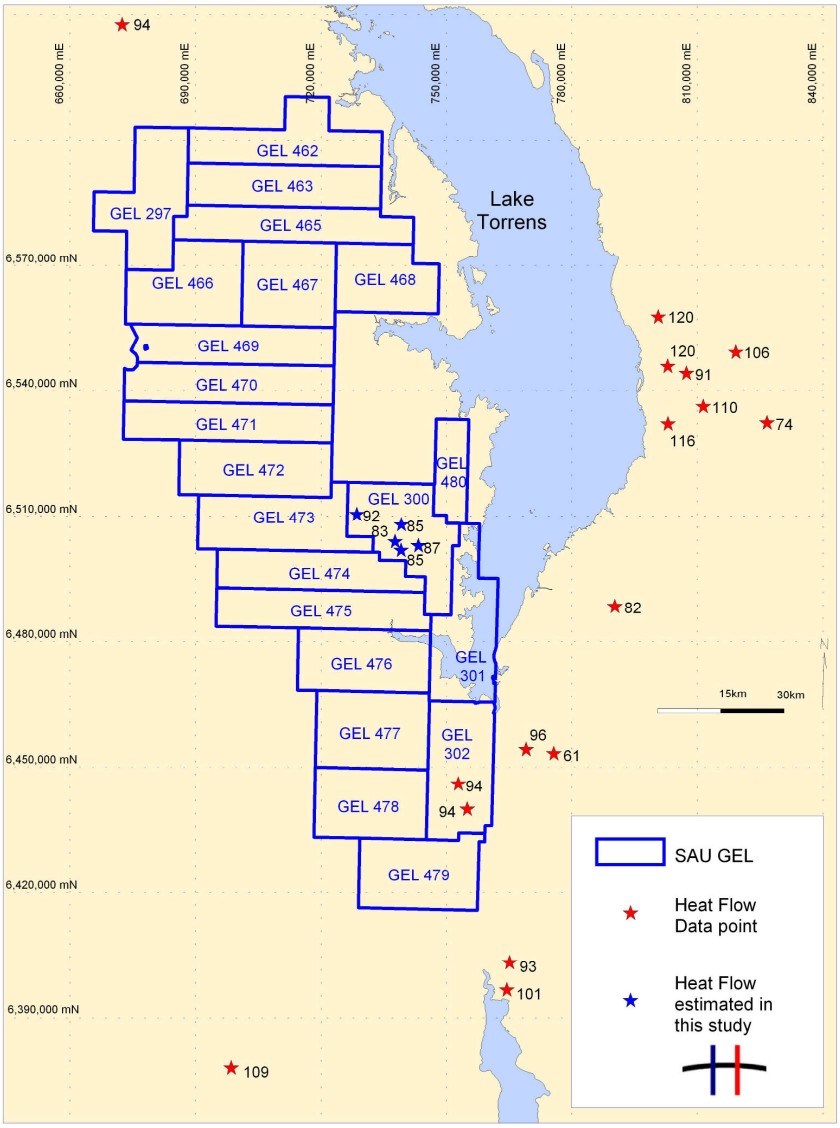


Figure 52: Heat flow data for the RGP and surrounding areas (for source of data see Attachment N and Table 3).

HDRPL incorporated precision temperature data and measured rock thermal conductivity data to construct 1D heat flow models (e.g. Figure 13) for each of the five MOX bore holes (Appendix 5). A summary of the estimated heat flow for each bore hole is shown in Table 3.

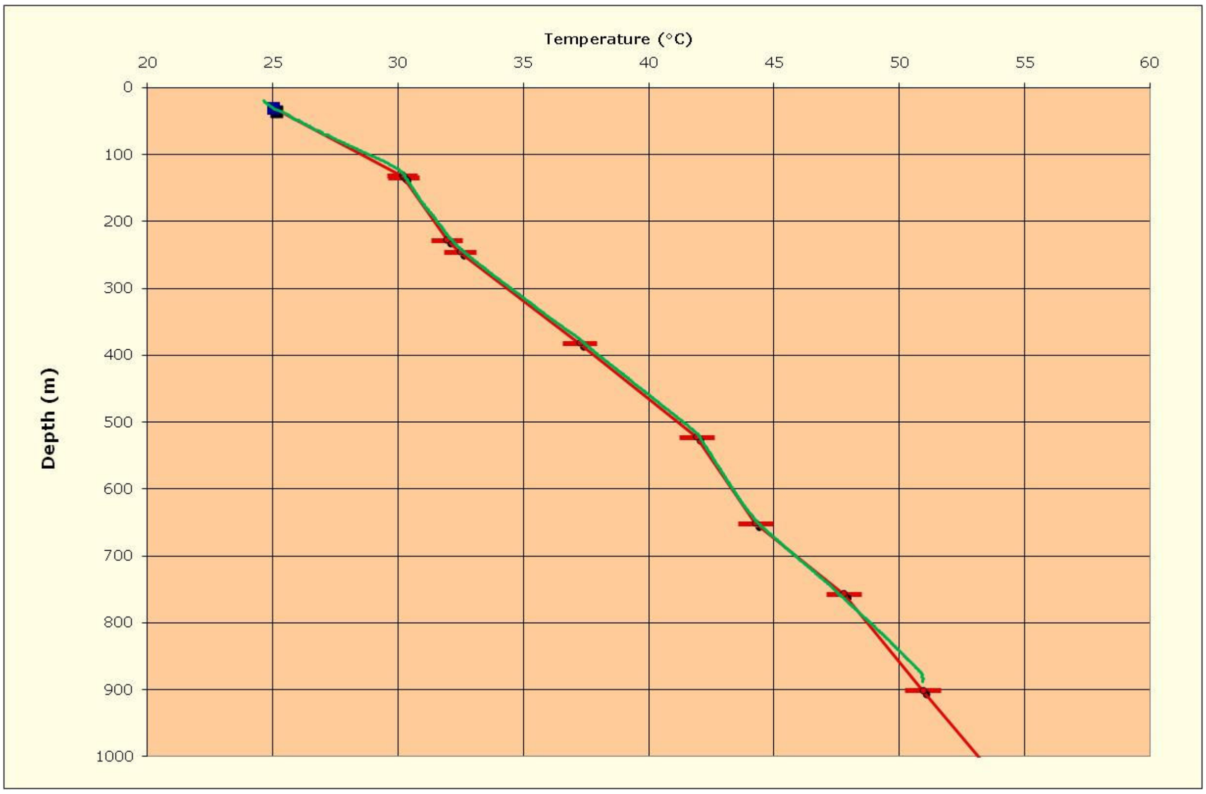


Figure 63: 1D heat flow model for WDDD2 bore. The green line represents the precision temperature data; the red line is the predicted temperature profile for a heat flow of 83 ± 2.0 mW/m^2.

Table 3: Heat flow for five MOX bore holes within GEL 300.

Bore Hole	Heat Flow (mW/m^2)	Uncertainty (mW/m^2)
BLDD1	92.0	3.2
MMDD1	87.0	4.8
PDDD2	85.0	3.7
WDDD2	83.0	2.0
WPDD2	85.0	2.4

5.2. Reliability of heat flow data

Modelled heat flow is highly dependent upon the quality and quantity of temperature data. Four of the MOX bores had excellent quality temperature data covering between 250 m and 850 m. The fifth bore, BLDD1, had just 35 m of temperature data however this was deemed sufficient to give a reliable estimation of heat flow. Heat flow models were constructed so that predicted temperature profiles mirrored as close as possible to the acquired temperature data (Figure 13 demonstrates an example of this methodology when applied to the WDDD2 bore).

5.3. Spatial and magnitude distribution of heat flow data

The heat flows measured in GEL 300 are similar to those recorded in GEL 302. It is therefore possible to draw some preliminary observations. Heat flow in the southern portion of the RGP appears to be elevated relative to the average Australian heat flow in the Global Heat Flow Database. Further work will demonstrate whether this is true.

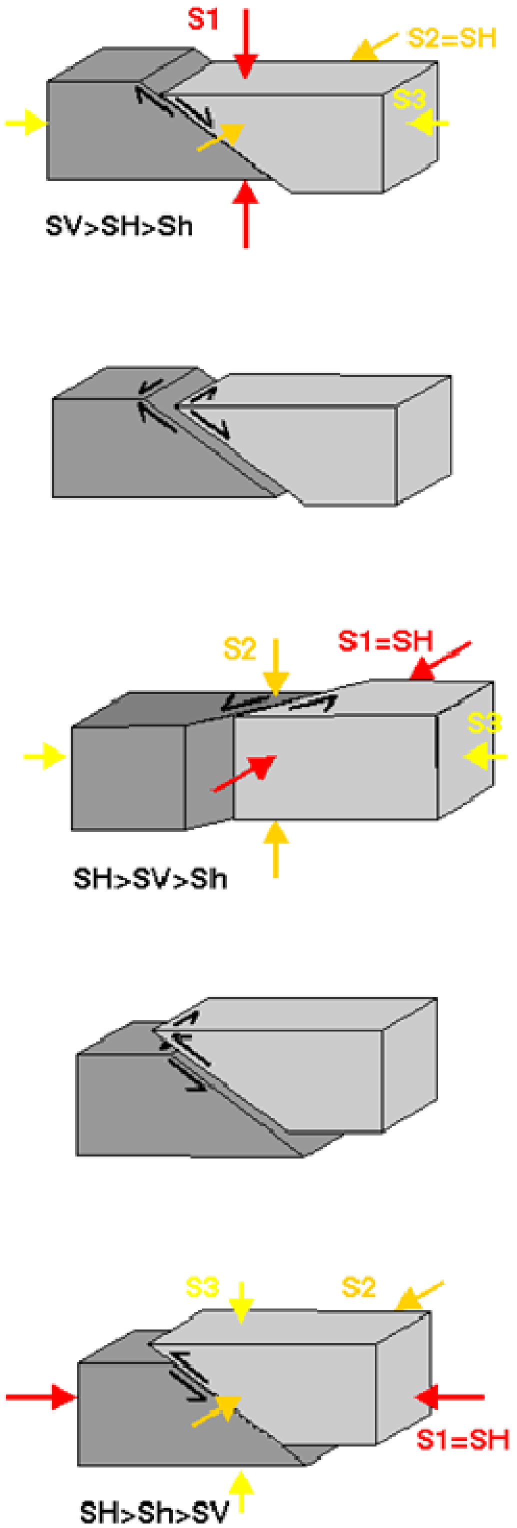
As mentioned previously, there is a paucity of relevant data in the RGP that can be utilised for geothermal prospectivity assessment. By undertaking further precision temperature logging, further 1D heat flow models can be constructed and 3D modelling can be employed.

6. Stress field in the RGP

The successful development of an EGS is dependent upon several factors, but one of the most critical factors is the response of the fractured rock mass to the influence of the *in-situ* stress field. Stress-dependant permeability of deep-seated, fractured rocks is well documented in studies relating to both hydrocarbon and geothermal reservoirs as well as nuclear repositories (e.g. Gentier *et al*., 2000; Hillis *et al*., 1997; Hudson *et al*., 2005). In particular, *in-situ* stress fields are known to exert a significant control on fluid flow patterns in fractured rocks with a low matrix permeability. For example, in a key study of deep (>1.7 km) bore holes, Barton *et al*. (1995) found that permeability manifests itself as fluid flow focussed along fractures favourably aligned within the *in-situ* stress field, and that if fractures are critically stressed this can impart a significant anisotropy to the permeability of a fractured rock mass. Preferential flow occurs along fractures that are oriented orthogonal to the minimum principal stress direction (due to low normal stress), or inclined ~30° to the maximum principal stress direction (due to dilation).

Knowledge of both the local- and regional-scale stress regime is important in order to understand the effects of stress-dependent fracture permeability and, in EGS operations, potential reservoir growth and flooding directions under hydraulic stimulation. In general, stress fields are anisotropic and inhomogeneous. They are defined in simplified terms by three mutually orthogonal principal axes of stress, being the maximum (S_1), intermediate (S_2) and minimum (S_3) stress axes. In practice, the classification of far-field stress regimes is based upon the Andersonian scheme, which relates the three major styles of faulting in the crust to the three major arrangements of the principal axes of stress i.e. the vertical principal stress (S_V) and the maximum and minimum horizontal principal stresses (S_H and S_h, respectively) (Anderson, 1951). These three major stress regimes are: (a) the normal faulting stress regime where $S_V > S_H > S_h$; (b) the strike-slip faulting stress regime where $S_H > S_V > S_h$; and (c) the reverse (or thrust) faulting stress regime where $S_H > S_h > S_V$ (Figure 14). The determination of the local stress field is important as the theory of stress-dependent fracture permeability predicts enhanced permeability associated with critically stressed faults or fractures that are either undergoing dilation (~parallel to S_1) or shear reactivation (<45° to S_1) under the influence of the contemporary stress field.

The RGP is located proximal to the Flinders Ranges of the Adelaide Geosyncline, which are currently seismically active and experiencing hundreds of earthquakes annually (Figures 15 and 16). This present-day seismic activity was initiated by coupling and/or convergence between the Pacific and Australian plates during the late Miocene period (<6 Ma) (Hillis and Reynolds, 2000; Sandiford *et al*., 2004). Evidence from earthquake focal mechanisms and fault kinematic analyses suggest that the regional far-field stress field within the Adelaide Geosyncline ranges from reverse fault, strike-slip fault and transitional stress regimes with an ~E-W compression direction (S_H) of 083° ± 30° (see classifications TF, SS and TS of Figure 14; Hillis and Reynolds, 2000; Quigley *et al*., 2006). The closest stress field indicator in the southern portion of the RGP is the Wilkatana Fault, which is a reactivated major range bounding fault of the Adelaide Geosyncline located ~35 km to the east of GEL 300 (Figure 15). Fault kinematic analyses along the Wilkatana Fault show contemporary reverse oblique-slip (transitional strike-slip?) fault displacements related to the present-day stress regime (Quigley *et al*., 2006). Directly north of the RGP near the Olympic Dam mine site, Green Rock Energy have conducted an *in situ* bore hole stress test in their Blanche 1 well. In their March 2008 quarterly report, Green Rock Energy confirmed that the results of the Blanche 1 stress data indicated a reverse fault stress regime (Green Rock Energy, 2008). In comparison, a compilation of the 2008 World Stress Map (WSM) data release for all quality ranked *in situ* stress field data for the eastern Gawler Craton/Adelaide Geosyncline region is shown in Figure 16. This particular WSM dataset consists entirely of earthquake focal mechanism data, which shows a mixture of strike-slip and reverse fault stress regime indicators.



NF: Normal faulting

NS: Predominately normal faulting with strike-slip component

SS: Strike-slip faulting (includes minor normal or thrust component)

TS: Predominately thrust faulting with strike-slip component

TF: Thrust faulting

Figure 74: The World Stress Map stress regime classifications (NF, NS, SS, TS, TF) and their associated styles of faulting (from Heidbach *et al*., 2008).

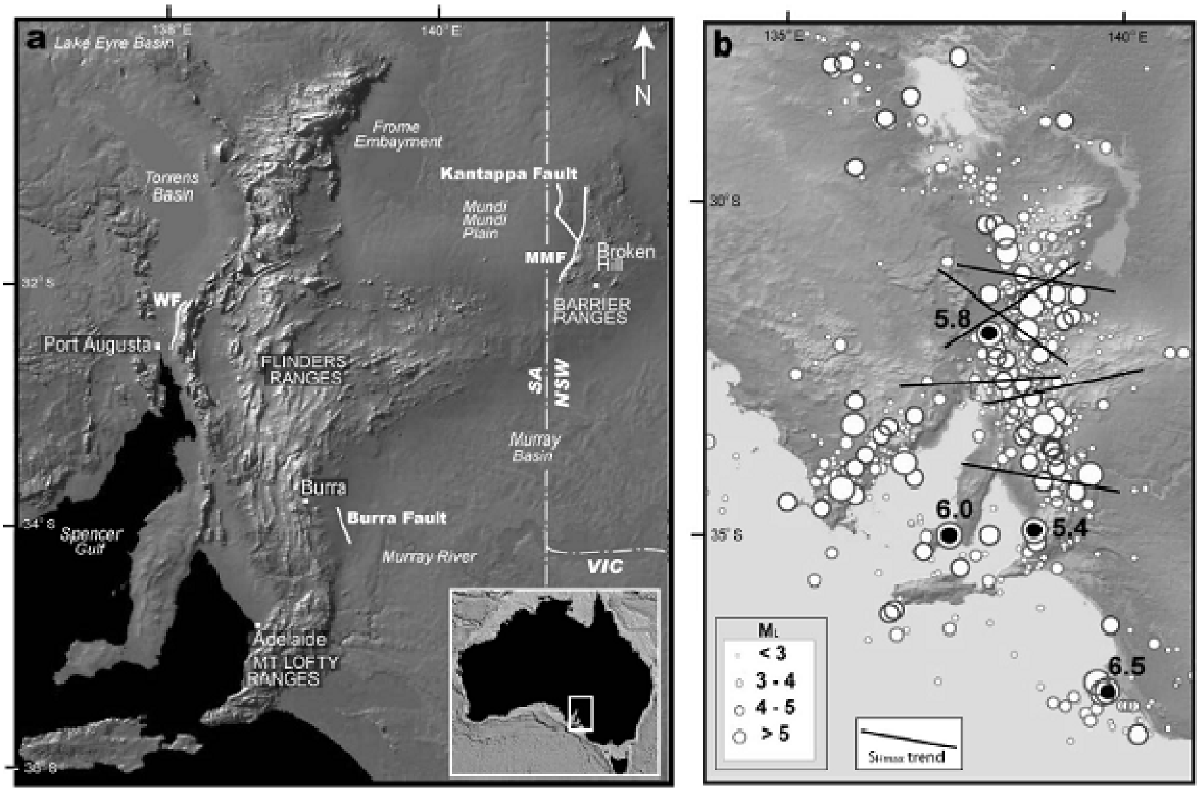


Figure 85: (a) Major physiographic features of south-central Australia. Note the position of the Wilkatana Fault (WF), which is located to the NE of Port Augusta and provides the closest stress field indicator to GEL 302. (b) Distribution of historical seismic activity, earthquake magnitudes and S_H azimuth estimates in southern South Australia (from Quigley *et al*., 2006).

As a consequence of this variability, the local stress field is best determined at individual well locations. However, it is notable that the two closest stress field indicators to the RGP both record the more favourable reverse fault stress regime. With respect to EGS-style developments, in either a reverse or strike-slip fault stress regime S_1 is horizontally compressive. In a reverse fault stress regime hydraulic stimulation generally results in approximately horizontal fracture growth (considered optimal for EGS reservoirs). In contrast, hydrofracs in a strike-slip stress regime will form steep to vertical dipping fractures that strike <45° (commonly 30°) to the direction of S_1. An additional implication of the potential transitional reverse/strike-slip stress regime is that if the magnitude of S_h does approach that of S_V then greater injection pressures may be required for hydraulic stimulation.

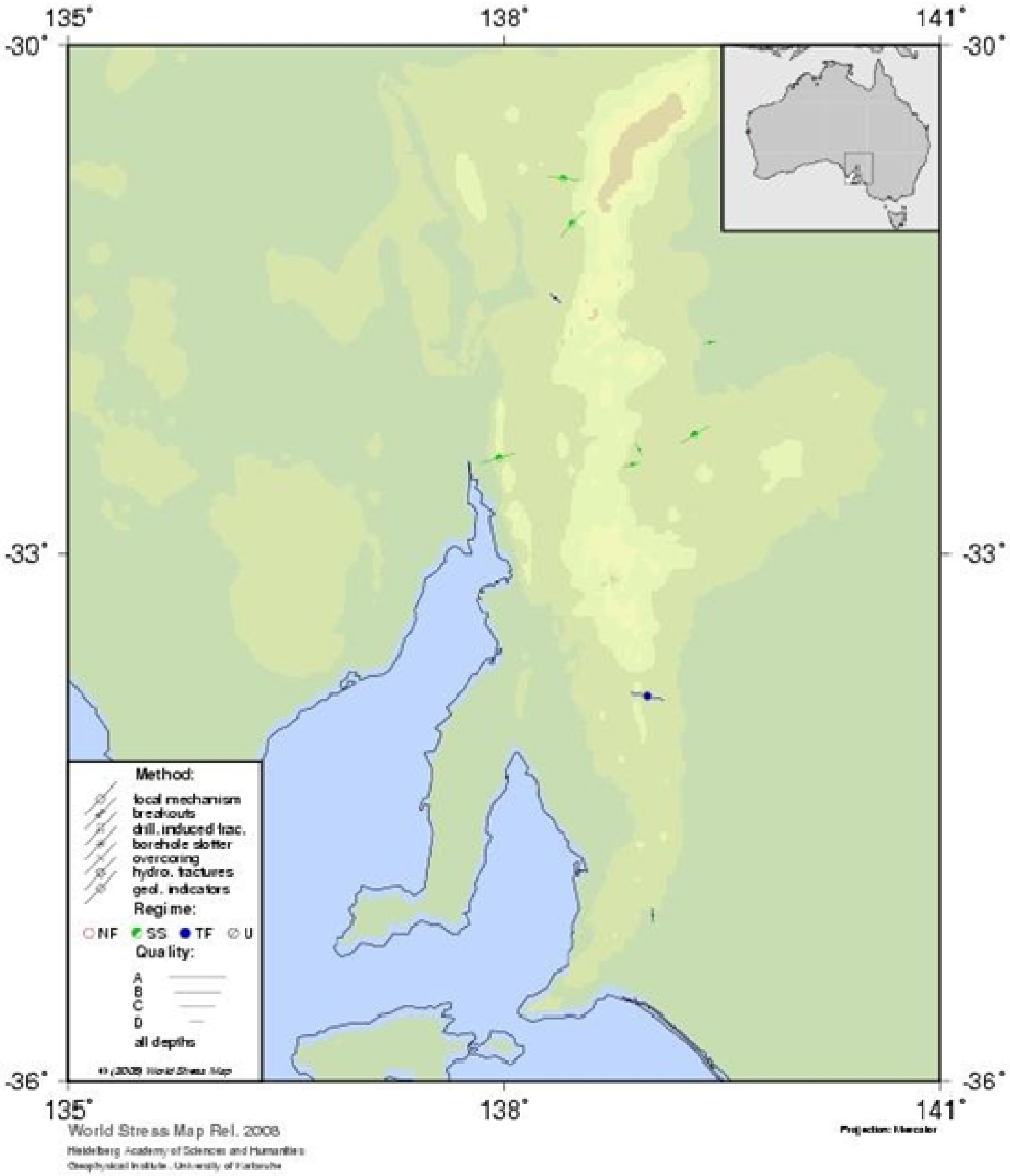


Figure 96: *In situ* stress field indicators within the Adelaide Geosyncline, including the method, quality ranking, stress regime and orientations of the principle horizontal stress axis (S_{Hmax}) (from Heidbach *et al*., 2008).

HDRPL notes the stress data are sparse and the question as to whether the RGP possess a favourable stress regime for reservoir development is unresolved. HDRPL recommends that stress tests be conducted on bores drilled within the RGP to depths greater than 700 m. Unlike the petroleum industry, minerals drilling rigs do not usually have the capability of undertaking stress

measurements whilst drilling. It would therefore be necessary to undertake these tests once drilling has completed. It is also possible to undertake these tests on minerals bores drilled previously provided the bore is open to accommodate the testing equipment

7. Working Fluid Issues

7.1. Introduction

Access to a working fluid is a key requirement in any geothermal project, and a potential risk given both public concerns about water security and water-use being subject to increasingly stringent regulatory frameworks. Operators should thus address working fluid access rights during the initial exploration stage of a geothermal project rather than just considering it during the developmental and production phase.

The working fluid is the medium through which heat is extracted from the sub-surface and brought to surface, otherwise referred to as a heat transmission fluid. Whilst most geothermal operators consider water to be the optimal working fluid, there is ongoing research into other fluids such as super-critical CO_2 (Brown, 2000; Pruess, 2006). Whilst CO_2 has many benefits including being a non-polar fluid, low viscosity at temperatures and pressures within the reservoir, and a large buoyancy effect; there are several drawbacks such as a lower heat capacity and large frictional losses (due to gas-phase flows in the production well-bore) which leads to lower thermodynamic performance within the system (Atrens et al., 2009).

In order to commercially exploit an EGS resource, both the volume required to initially charge the system, and volumes required to sustain the system once water losses are accounted for need to be addressed. Cordon & Driscoll (2008) quantified the volumes, rates and quality of water required at successive stages of exploration, development and production of geothermal resources.

7.2. Regulatory Framework

In recent years, the South Australian government identified water resources as being subjected to increasing use pressures, partly as a result of drought, and instigated the *Water Resources Act 1997*. Where state water resources have been identified as being subject to increasing use pressures, or their environmental values are degrading, the *Natural Resources Management Act 2004* (which superseded the *Water Resources Act 1997*) allows the area to be ‘proclaimed’. This means users must be licensed, and water allocation plans are implemented to help regulate future development. The water allocation plans may also allow water rights or entitlements to be traded.

On a national level, the National Water Commission (NWC) is an independent statutory authority within the Federal Department of the Environment, Water, Heritage and the Arts. It is the result of an intergovernmental agreement signed by all Australian, state and territory governments at the June 2004 Council of Australian Governments (CoAG) meeting (with the exception of Tasmania, which signed the Agreement on 3 June 2005, and Western Australia, which signed the Agreement on 6 April 2006).

The NWC was established under the *National Water Commission Act 2004*, and is responsible for driving progress towards the sustainable management and use of Australia's water resources under the National Water Initiative (NWI). In addition, the NWC advises CoAG and the Federal Australian Government on national water issues and the progress of the NWI.

The NWI signifies the Australian, State and Territory governments' shared commitment to water reform. It places an emphasis on greater national compatibility in the way Australia measures, plans for, prices, and trades water, and a greater level of cooperation between governments. It builds upon the previous CoAG framework for water reform, which was signed by all governments in 1994. A major activity to support the NWI has been the preparation of the Australian Water Resources 2005 (AWR 2005).

AWR 2005 is the baseline assessment of water resources taken at the beginning of the National Water Initiative—against which future data, and the success of NWI reform processes, can be measured.

A series of regional water resource assessments were undertaken throughout Australia as part of AWR 2005. These assessments were for specific water management areas/units in Australia. They included surface water management areas, groundwater management units, capital city water supply areas, and interjurisdictional and combined water management areas.

7.3. RGP

The RGP lies the southern interior portion of South Australia with the mean annual rainfall described as arid (annual rainfall <250 mm). Four BOM weather recording stations are located within or proximal to the RGP; Yudnapinna (the southernmost) with a mean annual rainfall of 209.8 mm (123 years of data), Woomera 184 mm (61 years of data), Tarcoola 174 mm (92 years of data) and Andamooka 190.6 mm (45 years of data).

The RGP straddles the Gawler Craton and Lake Torrens Groundwater Management Units (GMUs), and the Gawler Craton and Lake Torrens Surface Water Management Areas (SWMAs). The summary reports for each of these GMUs and SWMAs are included as Appendices 6–9. The RGP falls under the Gawler Range Groundwater Province, described as shallow unconsolidated sedimentary aquifers and fractured rock aquifers.

A search of PIRSA GIS datasets indicates only limited numbers of water bores within the southern portions of the RGP. The central and northern areas have a greater concentration, mainly located to the south and east of Mount Gunson (GEL 472 and 473), east of Woomera (GEL 469), in the vicinity of Arcoona (GEL 466) and Andamooka/The Knob (GEL 462 and 463), and within GEL 297.

HDRPL recommends a water allocation plan be developed in accordance with the South Australian and Federal regulations.

8. Conclusions and Recommendations

The RGP data review has concluded that there is a lack of good quality datasets in the area. HDRPL has a set of recommends that can be implemented as part of an ongoing work program.

SARIG has been interrogated to identify a number of bore holes drilled by minerals explorers within the RGP. Those bores which are vertical and in excess of 100 m have been noted. Considering HDRPL only had a 25% success rate in GEL 300 (note these were MOX bores that had been drilled within the last few years) it is important to identify the most recent bores drilled and to treat these as a priority. Unfortunately, SARIG does not include details of bores drilled under current mineral licences. To that end HDRPL has checked ASX releases, annual reports and websites of the mineral tenement licensees which overlap the RGP. The next stage is to contact the companies and confirm well coordinates and condition, and where core (if any) currently resides.

Checks will need to be made by SAU to ascertain whether previously drilled bores are open and able to be temperature logged (it should be noted that minerals bore holes are not cased and access may therefore be limited). HDRPL can then collect temperature data using the precision temperature logging unit. This temperature data will be used in conjunction with thermal conductivity data (sourced from the PIRSA core shed) to determine heat flow values. The resultant datasets can then be used to focus geothermal exploration.

Minerals companies should also be approached to determine the locality of future bores so that further temperature data is collected during the next phase of their minerals exploration work. Minerals bores are prone to caving and blockage due to casing not being run. SAU should, therefore, liaise with the drillers to determine which zone(s) are susceptible to caving during drilling. Casing might then be run over these zones to ensure the bore remains unblocked (SAU may be able to offer some financial assistance to ensure casing is run). Approximately six weeks should be allowed between the end of drilling operations and the deployment of the HDRPL precision temperature logging unit, as the subsurface thermal regime needs to re-equilibrate to its undisturbed state.

HDRPL also recommends that minerals exploration licensees with permits overlapping the RGP be contacted to establish collaborative agreements. The MOX model should be adopted with all minerals operators. HDRPL has identified all minerals operators whose permits overlap with the RGP; Figure 11 and Attachment I. Benefits to the minerals operators include a greater geological understanding of their tenement, sharing of costs for future drill holes; and any geothermal resource identified could be utilised to supply power to any mines that may be discovered (*cf.* Beverley Uranium mine and Petratherm's Paralana Project).

PIRSAs regional 3D model of the Gawler Craton indicates Hiltaba Suite Granite underlies the northernmost geothermal licenses (GEL 297, GEL 462, GEL 463); Figure 17. Given the published high heat generation values associated with the Hiltaba Suite, HDRPL suggests this area be a priority for future work. Preliminary investigations by SAU (Peter Hill) also suggests that based on well penetrations, there may be a thicker Adelaidean-aged cover sequence in the northern permits (up to 1,000 m) compared to the southernmost permits (the sequence in GEL 300 is in the order 350-650 m).

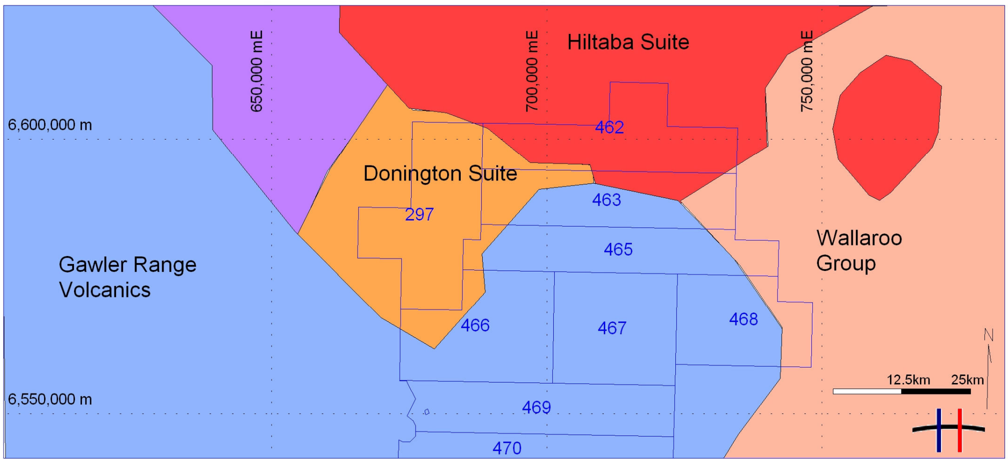


Figure 107: RGP GELs superimposed on PIRSAs 3D Gawler Craton model (note the 3D model is very coarse and thus the GEL locations in relationship to the geological units in approximate).

HDRPL undertook WRF analysis of twelve samples from MOX drill holes. This has yielded important information regarding the heat generation potential of four previously untested formations. HDRPL recommends further WRF analysis is conducted on both the Donington Suite Granitoids and Wallaroo Group metasediments; with an emphasis on regional distribution. Likewise, knowledge on the thermal conductivity of these units away from GEL 300 is nonexistent, and HDRPL recommends further testing be commissioned There does not appear to be any surface outcrop of the Wallaroo Group or Donington Suite granites in the 1:25,000 geological map sheets surrounding the RGP (Andamooka, Torrens and Port Augusta). HDRPL would therefore need to identify other bore holes in the RGP that intersect these units.

Once a fuller picture is known of the heat flow distribution of the RGP, HDRPL recommends the acquisition of 2D seismic over areas of high heat flow. A ball park figure of costs is $10k per line kilometre.

The results from the heat flow mapping and seismic will dictate where SAU should focus their drilling activities. Two options are available.

- Shallow bore (500 m) using slimline technology (to measure heat flow): $300 per m
- Deep bore (3,000 m] using slimline technology (to measure heat flow and reservoir properties): ~$1.5-2 m per bore

Stress data is sparse and the question as to whether the RGP possess a favourable stress regime for reservoir development is unresolved. HDRPL recommends that stress tests, similar to those performed on the Blanche 1 well, be conducted on bores drilled within the RGP that have depths greater than 700 m. Unlike the petroleum industry, minerals drilling rigs do not usually have the capability of undertaking stress measurements whilst drilling. It would therefore be necessary to undertake these tests once drilling has completed. It is also possible to undertake these tests on minerals bores drilled previously provided the bore is open to accommodate the testing equipment.

HDRPL recommends a water allocation plan be developed in accordance with the South Australian and Federal regulations.

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Attachment A: Listing of all seismic lines acquired within the RGP

Line	Survey	Year record	SPVPPTS	Name	Province	Tenement	Line Km	Comment	Geothermal tenement
WMC81-004	81SS01	1981	1-100	Oak Dam	Stuart Shelf	EL 784	2.46		GEL 467
OD81-007	81SS03	1981	Jan-98	Oak Dam 81/07	Stuart Shelf	EL 784	2.33		GEL 467
03GA-OD1	03GC01	2003	1000-5834	L163 Gawler Seismic Survey SA 2003	Gawler Craton		250.8		GEL 469, 466, 297
MG80-EC5	80SS02	1980	0-1250	Mt Gunson 80/07	Stuart Shelf		12.45		GEL 471
RL791A-3	79SS02	1979	30-100	Stuart Shelf	Stuart Shelf	EL 226	2.91	580m Of 600% And 710m Of 1200% Rl79-04-1A Side By Side Comp	GEL 474
RL791A-5	79SS02	1979	30-100	Stuart Shelf	Stuart Shelf	EL 226	2.91	580m Of 600% And 710m Of 1200% Rl79-04-1A Side By Side Comp	GEL 474
RL791A-6	79SS02	1979	30-100	Stuart Shelf	Stuart Shelf	EL 226	2.91	580m Of 600% And 710m Of 1200% Rl79-04-1A Side By Side Comp	GEL 474
RL791A-7	79SS02	1979	20-100	Stuart Shelf	Stuart Shelf	EL 226	2.91	580m Of 600% And 710m Of 1200% Rl79-04-1A Side By Side Comp	GEL 474
WH77-006	77SS04	1977	-29	Whittata 77/06	Stuart Shelf	EL 226	1.69	Expanded Spread	GEL 475
WP79-014B	79SS08	1979	Jan-69	Wilga Point 79/14	Stuart Shelf	EL 390	6.73		GEL 301
WP79-EXP	79SS08	1979	-13	Wilga Point 79/14	Stuart Shelf	EL 390	6.73		GEL 301
WP79-014A	79SS08	1979	1-128	Wilga Point 79/14	Stuart Shelf	EL 390	6.73		GEL 301
MG77-005-1	77SS03	1977	Jan-52	Mt Gunson 77/05	Stuart Shelf		3.48		GEL 472
MG77-005-2	77SS03	1977	Jan-25	Mt Gunson 77/05	Stuart Shelf		3.48		GEL 472
MG80-006	80SS01	1980	0-213	Mt Gunson 80/06	Stuart Shelf		8.32		GEL 472
MG80-006W	80SS01	1980	0-1500	Mt Gunson 80/06	Stuart Shelf		8.32		GEL 472
MG83-004-2	83SS01	1983	90-172	Mt Gunson 83-004	Stuart Shelf		15.77		GEL 472
MG80-39	80SS02	1980	0-1500	Mt Gunson 80/07	Stuart Shelf		12.45		GEL 472
MG80-004	80SS02	1980	0-1500	Mt Gunson 80/07	Stuart Shelf		12.45		GEL 472
MG79-011	79SS11	1979	0-17	Mt Gunson MG79-11	Stuart Shelf		2.13		GEL 472
MG83-004-1	83SS01	1983	90-250	Mt Gunson 83-004	Stuart Shelf		15.77		GEL 472
MG79-005	79SS03	1979	0-1250	Mt Gunson 79/05	Stuart Shelf		1.23	Expanding Spread	GEL 472
MG80-500	80SS02	1980	0-1500	Mt Gunson 80/07	Stuart Shelf		12.45		GEL 472
MG79-013-1	79SS07	1979	25-200	Mt Gunson 79/13	Stuart Shelf		4.37	Shot Between S/P 6/7 Then 18/19 And Then Move Up Two Positions	GEL 472
MG80-2400	80SS02	1980	0-1500	Mt Gunson 80/07	Stuart Shelf		12.45		GEL 472
MG80-007	80SS02	1980	1-115	Mt Gunson 80/07	Stuart Shelf		12.45		GEL 472
MG80-EC21	80SS02	1980	0-1500	Mt Gunson 80/07	Stuart Shelf		12.45		GEL 472
MG80-EC2	80SS02	1980	0-1500	Mt Gunson 80/07	Stuart Shelf		12.45		GEL 472
BA77-007	77SS05	1977	Jan-88	Beda Arm 77/07	Stuart Shelf	EL 206	10.47		GEL 476, 301
BA77-A	77SS02	1977	Jan-39	Beda Arm 77/04	Stuart Shelf	EL 206	4	Side By Side Comp On Same Line	GEL 476
BA77-B	77SS02	1977	Jan-22	Beda Arm 77/04	Stuart Shelf	EL 206	4	Side By Side Comp On Same Line	GEL 476
BA79-3A	79SS01	1979	96-206	Beda Arm 79/03	Stuart Shelf		3.03		GEL 476
BA79-2A	79SS01	1979	130-206	Beda Arm 79/03	Stuart Shelf		3.03		GEL 476
BA79-1A	79SS01	1979	88-206	Beda Arm 79/03	Stuart Shelf		3.03		GEL 476
BA78-1B	78SS02	1978	Jan-23	Beda Arm 78/07	Stuart Shelf	EL 206	1.67	230M Of 600% And 530m Of 1200%	GEL 476
BA78-2	78SS02	1978	Jan-76	Beda Arm 78/07	Stuart Shelf	EL 206	1.67	230M Of 600% And 530m Of 1200%	GEL 476
08GA-A1	08AG01	2008		2008 Adelaide Geosyncline Seismic Traverse	Adelaide Geosyncline		60.38	This line traverses the Torrens hinge Zone and is part of of a State-wide GA Survey L189	GEL 477, 302
65-WILK	65PT02	1965	100-123	Wilkatana Seismic Survey 1965	Pirie-Torrens Basin	OEL 20, OEL 21	27.1	8 Km Refraction, 18 Km Reflection	GEL 302

Attachment B: Minerals bore holes drilled by MOX in GEL 300.

Bore Hole	Prospect	Permit	Operator	Drill Date	Eastings (mE)	Northings (mN)	± [m]	Datum	Zone	RL (m)	Status	Total Depth (m)
BLDD1	Beauregard Lee	GEL 300	Monax Mining	2006	728620	6510574	4	WGA84	53	115	vertical	822.2
GHDD1	Ground Hog	GEL 300	Monax Mining	2006	736315	6504944	4	WGA84	53	89	vertical	972.1
GHDD2	Ground Hog	GEL 300	Monax Mining	2007/08	736372	6505132	5	WGA84	53	96	vertical	900.2
GHDD3	Ground Hog	GEL 300	Monax Mining	2007	736237	6504757	7	WGA84	53	91	vertical	913.8
GHDD4	Ground Hog	GEL 300	Monax Mining	2007	736462	6504832	3	WGA84	53	91	vertical	994.5
GHDD5	Ground Hog	GEL 300	Monax Mining	2007	736793	6504499	3	WGA84	53	98	vertical	913.7
GHDD6	Ground Hog	GEL 300	Monax Mining	2008	736348	6505052	4	WGA84	53	96	vertical	1023.0
GHDD7	Ground Hog	GEL 300	Monax Mining	2008	736570	6504676	4	WGA84	53	97	vertical	897.7
HODD1	Hoary	GEL 300	Monax Mining	2007	742668	6497965	4	WGA84	53	233	vertical	972.3
HODD2	Hoary	GEL 300	Monax Mining	2007	743526	6497694	3	WGA84	53	133	deviated	346.2
HODD3	Hoary	GEL 300	Monax Mining	2007	743534	6497692	3	WGA84	53	133	deviated	1142.8
MMDD1	Marmot	GEL 300	Monax Mining	2007	743328	6503022	3	WGA84	53	211	vertical	906.3
NNDD1	Needlenose	GEL 300	Monax Mining	2006	736500	6505984	4	WGA84	53	109	vertical	900.2
PDDD1	Prairie Dog	GEL 300	Monax Mining	2007	739075	6507847	3	WGA84	53	133	vertical	998.9
PDDD2	Prairie Dog	GEL 300	Monax Mining	2007	739236	6508108	4	WGA84	53	130	vertical	1014.2
PPDD1	Punxsutawney Phil	GEL 300	Monax Mining	2006	729313	6508465	4	WGA84	53	102	vertical	750.2
WDDD1	Woodchuck	GEL 300	Monax Mining	2006	737595	6503741	4	WGA84	53	95	vertical	975.3
WDDD2	Woodchuck	GEL 300	Monax Mining	2007	737703	6503971	7	WGA84	53	99	vertical	901.2
WPDD1	Whistle Pig	GEL 300	Monax Mining	2006	738577	6502180	3	WGA84	53	111	vertical	966.3
WPDD2	Whistle Pig	GEL 300	Monax Mining	2006	739172	6501952	3	WGA84	53	118	vertical	891.3
WWDD1	Wiarton Willy	GEL 300	Monax Mining	2006	728892	6509385	4	WGA84	53	110	vertical	846.3

Attachment C: Minerals bore holes immediately east and south of GEL 300.

Bore Hole	Permit	Operator	Drill Date	Eastings (mE)	Northings (mN)	± [m]	Datum	Zone	RL (m)	Status	Total Depth (m)
SLT101	GEL 301	Aquitaine Australia Minerals	1977	754424	6484801	3	WGA84	53	44	vertical	1405.6
SLT103	GEL 475	Delhi International Oil Corp.	1978	737329	6484446	3	WGA84	53	36	vertical	750.5
SLT105	GEL 301	Delhi International Oil Corp.	1978	753358	6505005	3	WGA84	53	38	vertical	566.0
SLT106	GEL 301	Aquitaine Australia Minerals	1980	758112	6490156	3	WGA84	53	56	vertical	1449.0

Attachment D: Formation tops for 21 MOX bore holes in GEL 300 (based on drilling sheet data supplied by MOX).

Hole ID	Total Depth (m)	Colluvium (m)	Wilpena Group				Umberatana Group			Beda Volcanics (m)	Gairdner Dolerite (m)	Pandurra Formation (m)	Gawler Range Volcanics (m)	Wallaroo Group (m)	Hiltaba Granite (m)
			Tent Hill Formation					Tapley Hill Formation							
			Simmens (Arcoona) Quartzite Member (m)	Cooraberra Sandstone Member (m)	Tregolana Shale Member (m)	Nuccaleena Formation (m)	Whyalla Sandstone (m)	Woocalla Dolomite Member (m)	Tindelpina Shale Member (m)						
BLDD1	822.2	0			6		168	222	246		599-636.65	461.9	540.5		573.4
GHDD1	972.1	0			1	110	112	199	214	356.85		503.85	713.85	735.05	960.15
GHDD2	900.2	0			4	108	110	204	216	354		499.3	684.5	820.5	
GHDD2 ext.	1069													820.5	1048.25
GHDD3	913.8	0			2	114	116	194	214	348		470.45	710.2	725.3	902.2
GHDD4	994.5	0			6	122	124	210	226	365.75		515.15	675	807	971.55
GHDD5	913.7	0			12	133	134	222	246	402		489.9	673.3	833.9	
GHDD6	1023	0			2		109	204.7	243.5	357.83		497.7	701.6	790.5	1005.8
GHDD7	897.7	0			2		122	204.7	243.5	368.97		469.7	670.1	870	
HODD1	972.3	0	1	66	102		305.1	440.65	460.4	650.9			876.7		
HODD2	346.2	0			66		224.15	334.4							
HODD3	1142.8	0			66		253.5	334.4	346.2	711.66	039.8-1047.25		961.34		1002.1
MMDD1	906.3	0	2	24	54	290	292	369.5	414.75	606.65					
NNDD1	900.2	0			12	140	144	234	266	401.2		502.8			809
PDDD1	998.9	0			18	210	216	304.15	330.3	467.37	732.3-736.6	651.83	749	753.4	
PDDD2	1014.2	0			18	222	228	303.5	330.5	463.9		740.5	832.3	860	
PPDD1	750.2	0			12		162	216	246			470	559.4	631.3	691
WDDD1	975.3	0			6		114	222	240	384.4		487.6	589.3	840	
WDDD2	901.2	0			6	132	134	228	246	382.1		522.45	651.4	757.1	
WPDD1	966.3	0			20		144	260	276	412.6		638.25	720.55		
WPDD2	891.3	0			9		156	276	294	440.58				661.51	
WWDD1	846.3	0			2	156	158	222	301.8		558.5-567.4	421.85	597.1		

Attachment E: Formation thicknesses for 21 MOX bore holes in GEL 300 (based on drilling sheet data supplied by MOX).

Hole ID	Total Depth (m)	Colluvium (m)	Wilpena Group				Umberatana Group			Beda Volcanics (m)	Gairdner Dolerite (m)	Pandurra Formation (m)	Gawler Range Volcanics (m)	Wallaroo Group (m)	Hiltaba Granite (m)
			Tent Hill Formation			Nuccaleena Formation (m)	Whyalla Sandstone (m)	Tapley Hill Formation							
			Simmens (Arcoona) Quartzite Member (m)	Cooraberra Sandstone Member (m)	Tregolana Shale Member (m)			Woocalla Dolomite Member (m)	Tindelpina Shale Member (m)						
BLDD1	822.2	6			162		54	24	215.9		37.65	78.6	32.9		211.15+
GHDD1	972.1	1			109	2	87	15	142.85	147		210	21.2	225.1	11.95+
GHDD2	900.2	4			104	2	94	12	138	145.3		185.2	136	79.7+	
GHDD2 ext.	1069													227.75	20.75+
GHDD3	913.8	2			112	2	78	20	134	122.45		239.75	15.1	176.9	11.6+
GHDD4	994.5	6			116	2	86	16	139.75	149.4		159.85	132	164.55	22.95+
GHDD5	913.7	12			121	1	88	24	156	87.9		183.4	160.6	79.8+	
GHDD6	1023	2			107		95.7	38.8	114.33	139.87		203.9	88.9	215.3	17.2+
GHDD7	897.7	2			120		82.7	38.8	125.47	100.73		200.4	199.9	27.7+	
HODD1	972.3	1	65	36	203.1		135.55	19.75	190.5	225.8			95.6+		
HODD2	346.2	66			158.15		110.25	11.8+							
HODD3	1142.8	66			187.5		80.9	11.8	365.46	249.68	7.45		40.76		133.25+
MMDD1	906.3	2	22	30	236	2	77.5	45.25	191.9	299.65+					
NNDD1	900.2	12			128	4	90	32	135.2	101.6		306.2			91.2+
PDDD1	998.9	18			192	6	88.15	26.15	137.07	184.46	4.3	92.87	4.4	245.5+	
PDDD2	1014.2	18			204	6	75.5	27	133.4	276.6		91.8	27.7	154.2+	
PPDD1	750.2	12			150		54	30	224			89.4	71.9	59.7	59.2+
WDDD1	975.3	6			108		108	18	144.4	103.2		101.7	250.7	135.3+	
WDDD2	901.2	6			126	2	94	18	136.1	140.35		128.95	105.7	144.1+	
WPDD1	966.3	20			124		116	16	136.6	225.65		82.3	245.75+		
WPDD2	891.3	9			147		120	18	146.58	220.93				229.79+	
WWDD1	846.3	2			154	2	64	79.8	120.05		8.9	166.35	249.2+		

Attachment F: Formation tops for four bore holes immediately east and south of GEL 302 (based on data supplied by PIRSA).

Hole ID	Total Depth (m)	Colluvium (m)	Wilpena Group			Umberatana Group					Beda Volcanics (m)	Pandurra Formation (m)	Gawler Range Volcanics (m)
			Tent Hill Formation						Tapley Hill Formation				
			Simmens (Arcoona) Quartzite Member (m)	Cooraberra Sandstone Member (m)	Tregolana Shale Member (m)	Whyalla Sandstone (m)	Willochra Subgroup (m)	Brighton Limestone (m)	Woocalla Dolomite Member (m)	Tindelpina Shale Member (m)			
SLT101	1405.6	0	2	67	102.1	307	413.4	584.5	605	828	914.3		1398
SLT103	750.5	0				21		139.4	164.7		298.8	606.1	616.4
SLT105	566	0	4	198.2	242.5	450.2	552.6						
SLT106	1449	0	7	274.8	336.6	467.2	574.2	718.6	744.7	863.9	899.1		1371

Attachment G: Formation thicknesses for four bore holes immediately east and south of GEL 302 (based on data supplied by PIRSA).

Hole ID	Total Depth (m)	Colluvium (m)	Wilpena Group			Umberatana Group					Beda Volcanics (m)	Pandurra Formation (m)	Gawler Range Volcanics (m)
			Tent Hill Formation						Tapley Hill Formation				
			Simmens (Arcoona) Quartzite Member (m)	Cooraberra Sandstone Member (m)	Tregolana Shale Member (m)	Whyalla Sandstone (m)	Willochra Subgroup (m)	Brighton Limestone (m)	Woocalla Dolomite Member (m)	Tindelpina Shale Member (m)			
SLT101	1405.6	2	65	35.1	204.9	106.4	171.1	20.5	223	86.3	483.7		7.6+
SLT103	750.5	21				118.4		25.3	134.1		307.3	10.3	134.1+
SLT105	566	4	194.2	44.3	207.7	102.4	13.4						
SLT106	1449	7	267.8	61.8	130.6	107	144.4	26.1	119.2	35.2	471.9		78+

Attachment H: GEL 300 precision temperature logging logistics.

Drill Hole ID	Drill site visited by HDRPL?	Collar buried?	Collar located?	Blockage details	Date(s) logged	Depth logged (m)	Pre-dug by Peter Harris, Trent Coleman, and Leslie?	Does site require rehabilitation?	Comment
BLDD1	yes	yes	yes	Blocked at 70 m, below water table; water table ~31 m from ground level	19-Nov-09, 20-Nov-09	70	yes, then back -filled with surficial marker	no	
GHDD1	yes	yes	no	--	-	-	no	no	
GHDD2	yes	yes	yes	Blocked at 16.74 m from top of casing; 17.14 m from ground level; dry (depth measured via tape)	-	-	no	yes	
GHDD3	yes	yes	no	-	-	-	no	no	
GHDD4	yes	yes	no	-	-	-	no	no	
GHDD5	yes	yes	no	-	-	-	no	no	
GHDD6	yes	yes	yes	Poly casing filled to surface with soil; removed top 1 m of soil from casing, could not dig deeper; casing remained plugged	-	-	yes	yes	
GHDD7	yes	yes	no	-	-	-	no	no	
HODD1	yes	yes	yes	Blocked at 59.96 m below top of casing; 60.09 m below ground level; dry (depth measured via tape)	-	-	yes	yes	
HODD2	no	yes	no	-	-	-	?	no	Deviated bore
HODD3	no	yes	no	-	-	-	?	no	Deviated bore
MMDD1	yes	yes	yes	Blocked at 417.54 m; casing neck-down	6-Nov-09	417.54	no	yes	
NNDD1	yes	yes	yes	Blocked at 25.7 m below ground level	-	-	yes	yes	
PDDD1	yes	yes	yes	Blocked at 50.1 m below top of casing; 50.38 m below ground level, slight mud on end of measuring tape (depth measured via tape)	-	-	yes	yes	
PDDD2	yes	yes	yes	Blocked at 300.02 m; casing neck-down	20-Nov-09, 23-Nov-09	300.02	yes	yes	
PPDD1	yes	yes	yes	Blocked at 8.85 m below top of casing; 9.28 m below ground level (depth measured via tape)	-	-	yes, then back-filled with surficial marker	no	
WDDD1	yes	yes	no	-	-	-	no	no	
WDDD2	yes	yes	yes	Blocked at 877.21 m below ground level	18-Nov-09, 19-Nov-09	877.21	yes	no	
WPDD1	yes	yes	yes	Blocked at 11.14 m below ground level; dry (depth measured via tape)	-	-	no	yes	
WPDD2	yes	yes	yes	Blocked at 433.7 m from ground level; groundwater measured via tape at 40.2 m from top of casing; 40.4 m from ground level	23-Nov-09	433.7	no	no	
WWDD1	yes	yes	yes	Blocked at 9.84 m below top of casing; 10.27 m below ground level, dry (depth measured via tape)	-	-	yes, then back -filled with surficial marker	yes	
SLT101	yes	no	yes	Blocked at 1.81 m below ground level, dry (tape)	-	-	-	no	
SLT103	yes	no	yes	Blocked at 1.7 m from top of casing; 1.27 m from ground level; dry (depth measured via tape)	-	-	-	no	
SLT105	yes	no	yes	Blocked at 3.71 m from top of casing; 3.61 m from ground level; dry (depth measured via tape)	-	-	-	no	
SLT106	yes	no	yes	Blocked at 1.58 m from top of casing; 1.48 m from ground level; dry (depth measured via tape)	-	-	-	no	

Attachment I: Listing or minerals licenses that overlap with the RGP area.

<table>
<tr><th>Tenement</th><th>Expiry</th><th>Locality</th><th>Licensee</th><th>Operator</th><th>Contact website</th><th>Notes</th></tr>
<tr><td>EL 3713</td><td>21/02/2011</td><td>Stuart Shelf</td><td colspan="2">BHP Billiton Nickel West Pty Ltd</td><td>www.bhpbilliton.com</td><td></td></tr>
<tr><td>EL 3271</td><td>26/10/2009</td><td>Andamooka Ranges</td><td colspan="2">BHP Billiton Nickel West Pty Ltd</td><td>www.bhpbilliton.com</td><td></td></tr>
<tr><td>EL 3470</td><td>4/12/2010</td><td>Glenside</td><td>Uranium Exploration Australia Ltd, RIL (Australia) Pty Ltd</td><td>Uranium Exploration Australia Ltd</td><td>www.uxa.com.au</td><td></td></tr>
<tr><td>EL 3762</td><td>3/05/2010</td><td>Acropolis South</td><td colspan="2">Minotaur Operations Pty Ltd</td><td>www.minotaurexploration.com.au</td><td></td></tr>
<tr><td>EL 3809</td><td>17/06/2010</td><td>Red Lake</td><td colspan="2">Copper Range (SA) Pty Ltd</td><td>www.copperrange.com.au</td><td></td></tr>
<tr><td>EL 3452</td><td>14/11/2009</td><td>Andamooka Station-Pernatty Lag</td><td>Copper Range (SA) Pty Ltd</td><td>International Base Metals Ltd</td><td>www.copperrange.com.au
www.interbasemetals.com</td><td></td></tr>
<tr><td>EL 3959</td><td>21/10/2009</td><td>Chinaman Swamp</td><td colspan="2">Copper Range (SA) Pty Ltd</td><td>www.copperrange.com.au</td><td></td></tr>
<tr><td>EL 3603</td><td>16/07/2009</td><td>Oakdam</td><td>Southern Uranium Pty Ltd, Uranium West Ltd</td><td>Southern Uranium Pty Ltd</td><td>www.southernuranium.com.au</td><td></td></tr>
<tr><td>EL 3553</td><td>7/05/2009</td><td>Shell Lagoon</td><td colspan="2">Orogenic Exploration Pty Ltd</td><td>www.orogenic.com.au</td><td></td></tr>
<tr><td>EL 3494</td><td>17/01/2010</td><td>Oak Dam NE</td><td colspan="2">Uranium Exploration Australia Ltd</td><td>www.uxa.com.au</td><td></td></tr>
<tr><td>EL 3432</td><td>19/10/2010</td><td>Winjabbie</td><td colspan="2">Uranium Exploration Australia Ltd</td><td>www.uxa.com.au</td><td></td></tr>
<tr><td>EL 3807</td><td>17/06/2010</td><td>Sandy Point</td><td colspan="2">Copper Range (SA) Pty Ltd</td><td>www.copperrange.com.au</td><td></td></tr>
<tr><td>EL 3397</td><td>18/08/2010</td><td>Yeltacowie</td><td colspan="2">Uranium One Australia Pty Ltd</td><td>www.uranium1.com</td><td></td></tr>
<tr><td>EL 4164</td><td>14/07/2010</td><td>Intercept Hill</td><td colspan="2">Athena Mines Pty Ltd</td><td>Justin @ www.argoexploration.com.au?</td><td></td></tr>
<tr><td>EL 4187</td><td>6/10/2009</td><td>Yeltacowie</td><td colspan="2">Gunson Resources Ltd</td><td>www.gunson.com.au</td><td></td></tr>
<tr><td>EL 3264</td><td>17/10/2009</td><td>Mt Gunson</td><td colspan="2">Gunson Resources Ltd</td><td>www.gunson.com.au</td><td></td></tr>
<tr><td>EL 3583</td><td>20/06/2011</td><td>Windabout</td><td colspan="2">Hiltaba Gold Pty Ltd</td><td>www.stellarresources.com.au</td><td>Hiltaba Gold Pty Ltd is a wholly owned subsidiary of Stellar Resources Ltd</td></tr>
<tr><td>EL 3457</td><td>28/11/2009</td><td>Pernatty</td><td colspan="2">Monax Mining Ltd</td><td>www.monaxmining.com.au</td><td></td></tr>
<tr><td>EL 3513</td><td>30/01/2010</td><td>Lake Torrens</td><td>Inferus Resources Pty Ltd</td><td>Southern Uranium Pty Ltd</td><td>www.southerngold.com.au
www.southernuranium.com.au</td><td></td></tr>
<tr><td>EL 3854</td><td>22/07/2010</td><td>Pernatty Lagoon</td><td colspan="2">Red Metal Ltd, Havilah Resources NL</td><td>www.redmetal.com.au
www.havilah-resources.com.au</td><td></td></tr>
</table>

EL 3398	18/08/2010	Hesso	Uranium One Australia Pty Ltd		www.uranium1.com	
EL 3399	18/08/2010	Charlinga	Uranium One Australia Pty Ltd		www.uranium1.com	
EL 3477	7/12/2009	Woocalla	Gunson Resources Ltd		www.gunson.com.au	
EL 3515	30/01/2010	Harris Crossing	Inferus Resources Pty Ltd	Southern Uranium Pty Ltd	www.southerngold.com.au www.southernuranium.com.au	
EL 3440	19/10/2010	North Tent Hill	Afmeco Mining and Exploration Pty Ltd		private company - no website	
EL 3439	19/10/2010	South Tent Hill	Afmeco Mining and Exploration Pty Ltd		private company - no website	
EL 3747	18/04/2010	Lake Torrens South	RMG Services Pty Ltd, Teck Australia Pty Ltd	Teck Australia Pty Ltd	www.teck.com	Spoke to Rodolfo at RMG Services; suggested speak to Teck direct in Perth - Ian Sandel

Attachment J: Thermal conductivity summary for GEL 300.

Bore Hole	Formation	Depth from [m]	Depth to [m]	Lithology	Sample Number	Conductivity (W/mK)	s.d. of 3 samples	Comment	WRF analysis
MMDD1	Whyalla Sand-stone	307.40	307.57	Purple medium-grained sandstone, low-angle stratification, pin stripe laminations, occasional thin dark grey fines	SAU030	5.39	0.13		
MMDD1	Whyalla Sand-stone	328.20	328.36	Purple coarse-grained sandstone to grit, low-angle stratification, pin stripe laminations	SAU031	4.39	0.25		
MMDD1	Whyalla Sand-stone	359.25	359.40	Purple-pink siltstone to fine-grained sandstone, low-angle stratification, pin stripe laminations	SAU032	3.98	0.04		
MMDD1	Woocalla Dolo-mite Member	382.52	382.73	Purple brown to grey fine laminated silty shale sequence; convoluted laminations - discontinuous, deformed and wavy [slumps?]; soft sediment deformation; carbonate partially infilled fractures	SAU033	2.46	0.10		
MMDD1	Woocalla Dolo-mite Member	400.90	401.08	Purple brown to grey fine laminated silty shale sequence; convoluted laminations - partially deformed and wavy [slumps?]	SAU034	2.54	0.41		
MMDD1	Woocalla Dolo-mite Member	409.80	410.00	Purple brown to grey fine laminated silty shale sequence; laminations occasionally deformed and wavy [slumps?]. Some coarser grained intervals; rip-up clasts	SAU035	3.29	0.23		
MMDD1	Woocalla Dolo-mite Member	413.61	413.77	Grey contorted vuggy dolomite	SAU036	3.55	0.28		
MMDD1	Tindelpina Shale Member	424.19	424.38	Light grey-dark grey/black fine laminated carbonaceous silty shale; whispy appearance; concretions and veining?	SAU037	3.86	0.14		
MMDD1	Tindelpina Shale Member	462.91	463.16	Dark grey-black fine laminated carbonaceous silty shale [rhythmite?]	SAU038	2.34	0.10		
MMDD1	Tindelpina Shale Member	527.83	528.01	Light grey-black fine laminated carbonaceous silty shale [bundles of rhythmites?]	SAU039	2.70	0.19		
MMDD1	Tindelpina Shale Member	569.05	569.25	Light grey-black fine laminated carbonaceous silty shale [rhythmite?]	SAU040	3.27	0.33	only use higher value as per GRB	
MMDD1	Tindelpina Shale Member	579.99	580.19	Grey to dark grey pebbly grit [angular clasts], matrix supported, massive	SAU041	3.12	0.09		

MMDD1	Tindelpina Shale Member	596.98	597.22	Light grey-black fine laminated silty shale; some coarser grained intervals; rip-up clasts	SAU042	4.52	0.24		
MMDD1	Beda Volcanics	614.25	614.49	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured]	SAU043	3.08	0.26		
MMDD1	Beda Volcanics	819.79	819.93	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured]	SAU044	2.37	0.01		
MMDD1	Beda Volcanics	911.71	912.10	Grey-green-purple basalt	SAU045	2.43	0.02		
PDDD2	Whyalla Sand-stone	300.97	301.14	Purple medium-grained sandstone, grit lenses	SAU046	4.73	0.04		
PDDD2	Woocalla Dolo-mite Member	305.80	305.90	Purple brown to grey fine laminated silty shale se-quence; convoluted laminations - discontinuous, de-formed and wavy [slumps?]; soft sediment deformation	SAU047	2.50	0.16		
PDDD2	Woocalla Dolo-mite Member	324.29	324.35	Light grey to black fine laminated silty dolomite(?) se-quence; laminations deformed and wavy, some vugs	SAU048	3.57	0.16		
PDDD2	Tindelpina Shale Member	341.11	341.31	Light grey to black silty shale sequence; discontinuous, deformed sausage shaped sedimentary features (rip up clasts?), cemented	SAU049	3.55	0.03		
PDDD2	Tindelpina Shale Member	341.31	341.44	Dark grey to black silty shale. Almost massive - very feint fine laminated?	SAU050	2.78	0.14		
PDDD2	Tindelpina Shale Member	390.26	390.48	Dark grey to black fine laminated silty shale sequence	SAU051	2.25	0.07		
PDDD2	Tindelpina Shale Member	456.80	456.97	Medium grey to black fine to moderate laminated car-bonaceous silty shale [zebra style/rhythmite?], occa-sional convoluted strata	SAU052	2.88	0.08		
PDDD2	Tindelpina Shale Member	428.18	428.32	Dark grey to black silty shale, very feint fine laminated	SAU053	2.15	0.03		
PDDD2	Beda Volcanics	470.89	471.04	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured], healed thin fractures	SAU054	2.93	0.07		
PDDD2	Beda Volcanics	480.04	480.17	Grey-green-purple basalt	SAU055	2.86	0.05		
PDDD2	Beda Volcanics	566.81	566.94	Light grey-green basalt	SAU056	2.37	0.02		
PDDD2	Beda Volcanics	666.71	666.87	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured]	SAU057	2.16	0.01		
PDDD2	Beda Volcanics	735.33	735.50	Grey-green-purple basalt, healed fractures	SAU058	2.49	0.05		

PDDD2	Pandurra Formation	741.32	741.48	Red beds, silty fraction through to grit, convoluted bedding? Grey laminations infrequent	SAU059	5.28	0.14	Transition Beda to Pandurra [740.5-744.8 m]	
PDDD2	Pandurra Formation	750.18	750.38	Purple-red coarse-grained sandstone to grit, massive	SAU060	5.14	0.09		
PDDD2	Pandurra Formation	781.12	781.24	Purple-red coarse-grained sandstone to grit, massive	SAU061	6.29	0.06		
PDDD2	Pandurra Formation	816.54	816.73	Purple-red coarse-grained sandstone to grit, massive	SAU062	5.13	0.06		
PDDD2	Gawler Range Volcanics	841.23	841.51	Blood red to brown/grey rhyolite, haematite	SAU063	1.87	0.08		yes
PDDD2	Gawler Range Volcanics	856.65	856.83	Red-brown rhyolite	SAU064	1.77	0.06		yes
PDDD2	Wallaroo Group	867.50	867.71	Altered sediment, purple-red, carbonate, magnetite, haematite, remnant vesicles?	SAU065	2.40	0.17		
PDDD2	Wallaroo Group	931.80	932.06	Altered sediment, bleached pale pink/cream to grey, fractured, sulphides, carbonate, siderite, chlorite, remnant bedding?	SAU066	2.52	0.07		yes
PDDD2	Wallaroo Group	993.71	993.97	Altered sediment, pale grey-green, blotchy concretions, chlorite, carbonate, haematite	SAU067	2.92	0.08		
WDDD2	Tindelpina Shale Member	314.62	314.78	Light grey to black fine laminated silty shale sequence; laminations occasionally wavy	SAU068	2.49	0.02		
WDDD2	Tindelpina Shale Member	370.74	370.86	Medium grey to black fine laminated silty shale sequence; healed fractures	SAU069	2.32	0.16		
WDDD2	Beda Volcanics	389.60	389.74	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured]	SAU070	2.65	0.06		
WDDD2	Beda Volcanics	501.56	501.74	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured], healed thin fractures	SAU071	2.48	0.03		
WDDD2	Pandurra Formation	530.88	531.05	Purple-red coarse-grained to small pebble sandstone, massive	SAU072	5.03	0.06		
WDDD2	Pandurra Formation	587.09	587.25	Purple-red coarse-grained sandstone to grit, massive	SAU073	5.11	0.02		
WDDD2	Pandurra Formation	646.76	646.94	Purple-red fine-grained sandstone, possibly siltstone, few floating small pebbles?	SAU074	4.17	0.04		

WDDD2	Gawler Range Volcanics	688.86	689.01	Pale pink rhyolite	SAU075	2.56	0.06		yes
WDDD2	Wallaroo Group	797.09	797.20	Altered sediment, grey-green, chlorite, carbonate, haematite, remnant bedding?	SAU076	2.46	0.17		
WDDD2	Wallaroo Group	882.34	882.49	Altered sediment, grey-dark green, chlorite, carbonate, haematite, healed fractures	SAU077	2.12	0.07		yes
WPDD2	Tindelpina Shale Member	304.77	304.90	Dark grey to black silty shale, very feint fine convoluted laminations	SAU078	2.67	0.37		
WPDD2	Tindelpina Shale Member	362.64	362.78	Dark grey to black silty shale, fine convoluted laminations, healed fractures	SAU079	2.25	0.04		
WPDD2	Tindelpina Shale Member	437.49	437.63	Medium grey to black silty shale, fine convoluted laminations	SAU080	2.59	0.22		
WPDD2	Beda Volcanics	449.61	449.75	Grey-green-purple basalt	SAU081	2.54	0.02		
WPDD2	Beda Volcanics	516.13	516.33	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured], healed thick fractures	SAU082	1.77	0.01		
WPDD2	Beda Volcanics	642.05	642.20	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured]	SAU083	2.47	0.03		
WPDD2	Wallaroo Group	678.95	679.13	Altered sediment, dark purple, haematite, highly fractured	SAU084	-	-	not tested - friable	
WPDD2	Wallaroo Group	695.61	695.81	Altered sediment, red, haematite, carbonate	SAU085	3.83	0.14		yes
WPDD2	Wallaroo Group	765.63	765.77	Altered sediment, purple-grey, fluorite, chlorite, haematite, carbonate, ?quartz, remnant bedding	SAU086	3.92	0.05		yes
WPDD2	Wallaroo Group	830.82	830.97	Altered sediment, dark grey, haematite, carbonate, chlorite	SAU087	3.98	0.08		yes
WPDD2	Wallaroo Group	890.80	891.00	Altered sediment, grey-green, chlorite, carbonate, fluorite	SAU088	3.23	0.01		
BLDD1	Tindelpina Shale Member	301.36	301.51	Dark grey to black silty shale, fine convoluted laminations	SAU096	2.18	0.13		
BLDD1	Tindelpina Shale Member	406.13	406.28	Dark grey to black silty shale, fine convoluted laminations, healed fractures	SAU089	2.89	0.06		
BLDD1	Tindelpina Shale Member	459.01	459.15	Cream-pale pink fine- to medium-grained sandstone, massive	SAU090	5.05	0.06		
BLDD1	Pandurra Formation	508.53	508.65	Purple-red coarse-grained to small pebble sandstone, massive	SAU091	3.91	0.09		
BLDD1	Gawler Range Volcanics	540.97	541.11	Red fine-grained basalt, friable	SAU092	-	-	not tested - friable	yes

BLDD1	Gairdner Dyke	618.94	619.08	Dark red fine-grained basalt	SAU093	3.04	0.05		yes
BLDD1	Hiltaba Suite Granite	695.95	696.14	Granite, haematite and chlorite alteration	SAU094	3.89	0.07		yes
BLDD1	Hiltaba Suite Granite	821.43	821.54	Granite, haematite alteration	SAU095	4.16	0.30		yes

Attachment K: Thermal conductivity values from previous studies [note Green Rock Energy–GRK–data are open file].

Company	Bore Hole	Formation	Depth from (m)	Depth to (m)	Lithology	Sample Number	Conductivity (W/mK)	s.d. of 3 samples
SAU	LTDD002A	Tapley Hill Formation	448.29	448.6	Grey-green, very finely laminated interbedded siltstone/mudstone with minor cross bedding and high angle carbonate-filled fractures	SAU001	2.43	0.10
SAU	LTDD002A	Tapley Hill Formation	483.24	483.4	Grey-green, very finely laminated interbedded siltstone/mudstone with minor cross bedding	SAU002	2.44	0.10
SAU	LTDD002A	Tapley Hill Formation	550.56	550.7	Grey-green, very finely laminated interbedded siltstone/mudstone with minor cross bedding and high angle carbonate-filled fractures	SAU003	2.24	0.39
SAU	LTDD002A	Tapley Hill Formation	517	517.2	Grey-green, very finely laminated interbedded siltstone/mudstone	SAU004	3.03	0.25
SAU	LTDD002A	Beda Volcanics	704.43	704.6	Red-green, fine- to medium-grained vesicular basalt. Vesicles infilled with calcite and lesser chlorite	SAU005	2.48	0.13
SAU	LTDD002A	Beda Volcanics	657.28	657.4	Red-green brecciated amygdoidal basalt. Fractured very large and filled with pink/red dolomitic material NOT REPRESENTATIVE OF BEDA VOLCANICS	SAU006	4.86	0.34
SAU	LTDD002A	Beda Volcanics	775.58	775.7	Red-green, fine- to medium-grained vesicular basalt. Vesicles infilled with chlorite and lesser carbonate	SAU007	2.30	0.09
SAU	LTDD002A	Beda Volcanics	786.8	787	Red-green, mainly medium-grained massive basalt with local coarse-grained amygdules	SAU008	2.41	0.14
SAU	LTDD003	Tapley Hill Formation	647.29	647.5	Grey-black, very finely laminated interbedded siltstone/mudstone	SAU009	2.89	0.26
SAU	LTDD003	Angepena Formation	462.7	462.9	Purple-grey, finely laminated siltstone with abundant rip-up clasts, local micro-faulting (mm-scale)	SAU010	2.73	0.38
SAU	LTDD003	Tapley Hill Formation	520.9	521.2	Grey-black, very finely laminated interbedded siltstone/mudstone, rip-up clasts	SAU011	3.26	0.24
SAU	LTDD003	Tapley Hill Formation	614.6	614.8	Grey-black, very finely laminated interbedded siltstone/mudstone	SAU012	2.53	0.13
SAU	LTDD003	Angepena Formation	433.74	434.2	Purple-grey, siltstone to medium-grained sandstone, finely laminated, cross bedded, local micro-faulting (mm-scale), healed fractures	SAU013	3.80	0.28
SAU	LTDD002A	Tapley Hill Formation	449.94	450.1	Grey-black, very finely laminated interbedded siltstone/mudstone	SAU014	2.45	0.13
SAU	LTDD003	Beda Volcanics	853.3	853.5	Purple-grey, fine-grained basalt	SAU015	2.50	0.26
SAU	LTDD003	Beda Volcanics	779.52	779.7	Mainly grey [purple tinge], fine-grained basalt	SAU016	2.39	0.22

SAU	LTDD002A	Tapley Hill Formation	555.25	555.4	Grey-green, very finely laminated interbedded siltstone/mudstone with minor cross bedding and high angle carbonate-filled fractures	SAU017	2.66	0.27
SAU	LTDD003	Tregolana Shale Member	246.22	246.5	Purple to green/grey shale/siltstone, thinly laminated with wavy cross bedding, slump structures	SAU018	3.04	0.14
SAU	LTDD003	Angepena Formation	406.83	407.1	Purple-grey, siltstone to medium-grained sandstone, finely laminated with thicker coarse-grained interbeds [slump features], cross bedded, local micro-faulting (mm-scale)	SAU019	2.80	0.48
SAU	LTDD003	Backy Point Formation	749.18	749.3	Red siltstone to fine-/medium-grained sandstone, flaser bedding, slump structures, rip-up clasts	SAU020	2.69	0.12
SAU	NNDD1	Pandurra Formation	552.88	553.1	Mainly fg-mg grey-red to purple quartz sandstone with mottled bleaching and minor lithic fragments.	SAU021	5.25	0.04
SAU	NNDD1	Pandurra Formation	650.9	651.2	Fg red-brown shale/siltstone with subordinate sandstone, lithic fragment (and shale intraclasts) interbeds. The sandstone beds grade up into siltstone. Strong hematite altered (?) matrix.	SAU022	5.03	0.03
SAU	NNDD1	Pandurra Formation	725.01	725.2	Mainly fg-mg grey-red to purple quartz sandstone with mottled bleaching and minor lithic fragments.	SAU023	2.83	0.13
SAU	NNDD1	Hiltaba Granite	822.2	822.5	Grey-cream/pink, cg feldspar-quartz-hornblende/biotite±plagioclase granite. Local sericite alteration and hematite dusting of feldspars.	SAU024	3.49	0.13
SAU	NNDD1	Hiltaba Granite	855.97	856.3	Grey-cream/pink, cg feldspar-quartz-hornblende/biotite±plagioclase granite. Local sericite alteration and hematite dusting of feldspars.	SAU025	3.24	0.01
SAU	NNDD1	Hiltaba Granite	885.63	885.9	Grey-cream/pink, cg feldspar-quartz-hornblende/biotite±plagioclase granite. Local sericite alteration and hematite dusting of feldspars.	SAU026	3.36	0.12
SAU	WDDD1	Gawler Range Volcanics	604.65	605	Porphyritic dacite comprising plagioclase phenocryts set within a fg red-brown microgranular hematite-chlorite-felsic matrix.	SAU027	2.93	0.11
SAU	WDDD1	Gawler Range Volcanics	677.42	677.7	Porphyritic dacite comprising plagioclase phenocryts set within a fg red-brown microgranular hematite-chlorite-felsic matrix.	SAU028	2.60	0.15
SAU	WDDD1	Gawler Range Volcanics	737	737.2	Porphyritic dacite comprising plagioclase phenocryts set within a fg red-brown microgranular hematite-chlorite-felsic matrix. Minor lithic fragments.	SAU029	2.76	0.11
GRK	Blanche 1	Corraberra Sandstone Member	298.7		finer sandstone, red mudstone, quartz sandstone, medium grained green (chlorite) cross laminations, well laminated	1	3.34	0.08
GRK	Blanche 1	Tregolana Shale Member	335		mudstone-shale, Fe, qtz	2	3.00	0.07

GRK	Blanche 1	Tregolana Shale Member	426.6		shale-mudstone, minor blue-white lenses, green-cream-pale brown blue mudstone-shale, fine grained, well laminated, cross bedding	3	1.85	0.05
GRK	Blanche 1	Tregolana Shale Member	542.8		mudstone, brown shale, minor green layers, not mottled, fine grained, Fe, qtz, well laminated	4	2.46	0.06
GRK	Blanche 1	Tapley Hill Formation	572.3		grey mudstone-shale, well laminated, fine grained, minor shear zone, Fe, qtz, no dolomite, occasional coarse sandy lenses	18	2.31	0.06
GRK	Blanche 1	Pandurra Formation	642		quartzite-sandstone, coarse grained, local congl., horizontal joints, Fe, qtz, coarse, poorly sorted poorly rounded, bedding laminations, x-bedding	5	4.50	0.11
GRK	Blanche 1	Hiltaba Suite Granite	756		granite, pale green feldspar + quartz, mica, minor shears	6	3.53	0.09
GRK	Blanche 1	Hiltaba Suite Granite	894.7		fresh granite, feldspar qtz, minor veins & fractures, red-brown, orange, occasional veins at low angle to core axis, occasional shears at low angle to core axis, only minor mica	7	3.20	0.08
GRK	Blanche 1	Hiltaba Suite Granite	1005.6		fresh granite, feldspar qtz, minor veins & fractures, red-brown, orange, occasional veins at low angle to core axis, occasional shears at low angle to core axis, only minor mica	8	3.36	0.08
GRK	Blanche 1	Hiltaba Suite Granite	1101		fresh granite orange colour, qtz, feldspar, mica, no fabric, few discontonities, iron-rich, with mica, coarse grained	9	3.37	0.08
GRK	Blanche 1	Hiltaba Suite Granite	1207		iron rich, coarse grained siliceous igneous rock, (granite - no mica), no fabric, magnetite	10	3.28	0.08
GRK	Blanche 1	Hiltaba Suite Granite	1322		iron rich, coarse grained siliceous igneous rock, (granite - no mica), no fabric, magnetite	11	3.19	0.08
GRK	Blanche 1	Hiltaba Suite Granite	1460		coarse grained granite, magnetite, biotite, quartz, feldspar	12	2.93	0.07
GRK	Blanche 1	Hiltaba Suite Granite	1500.6		granitoid, feldspar, qtz, magnetite, coarse-grained, no foliation, few fractures	13	3.17	0.08
GRK	Blanche 1	Hiltaba Suite Granite	1601.6		granite ortho, quartz, feldspar, magnetite, abundant subhorizontal fractures	14	3.15	0.08
GRK	Blanche 1	Hiltaba Suite Granite	1701		granite, qtz, feldspar, magnetite, strong subhorizontal fractures, rare quartz veins and fractures at low angle to core axis	15	3.27	0.11
GRK	Blanche 1	Hiltaba Suite Granite	1714.5		granite ortho, quartz, feldspar, magnetite, coarse grained	16	3.42	0.08
GRK	Blanche 1	Hiltaba Suite Granite	1801.14		coarse ortho granite, strong fracturing (discing), Fe, feldspar, qtz, magnetite, minor shallow angled natural joints with chlorite	17	3.11	0.08
GRK	Blanche 1	Hiltaba Suite Granite	1903.3		medium grained red/orange granite qtz, feldspar, biotite (magnetite), natural fractures with chlorite	18	3.46	0.09

Attachment L: Lithology mixing for thermal conductivity values.

Bore Hole	Formation	Depth from [m]	Depth to [m]	Lithology	Sample Number	Conductivity (W/mK)	s.d. of 3 samples	Conductivity (W/mK)	s.d. of 3 samples	Comments
MMDD1	Beda Volcanics	614.25	614.49	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured]	SAU043	3.08	0.26	2.59	0.22	use value only MMDD1
MMDD1	Beda Volcanics	819.79	819.93	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured]	SAU044	2.37	0.01			
MMDD1	Beda Volcanics	911.71	912.10	Grey-green-purple basalt	SAU045	2.43	0.02			
PDDD2	Beda Volcanics	470.89	471.04	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured], healed thin fractures	SAU054	2.93	0.07	2.53	0.08	use value only PDDD2
PDDD2	Beda Volcanics	480.04	480.17	Grey-green-purple basalt	SAU055	2.86	0.05			
PDDD2	Beda Volcanics	566.81	566.94	Light grey-green basalt	SAU056	2.37	0.02			
PDDD2	Beda Volcanics	666.71	666.87	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured]	SAU057	2.16	0.01			
PDDD2	Beda Volcanics	735.33	735.50	Grey-green-purple basalt, healed fractures	SAU058	2.49	0.05			
WDDD2	Beda Volcanics	389.60	389.74	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured]	SAU070	2.65	0.06	2.56	0.06	use value only WDDD2
WDDD2	Beda Volcanics	501.56	501.74	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured], healed thin fractures	SAU071	2.48	0.03			
WPDD2	Beda Volcanics	449.61	449.75	Grey-green-purple basalt	SAU081	2.54	0.02	2.20	0.03	use value only WPDD2
WPDD2	Beda Volcanics	516.13	516.33	Grey-green-purple amygdaloidal basalt [amygdules cream to white coloured], healed thick fractures	SAU082	1.77	0.01			

WPDD2	Beda Volcanics	642.05	642.20	Grey-green-purple amygda-loidal basalt [amygdules cream to white coloured]	SAU083	2.47	0.03			
BLDD1	Gairdner Dyke	618.94	619.08	Dark red fine-grained basalt	SAU093	3.04	0.05	3.04	0.05	use value for all bores
BLDD1	Gawler Range Volcanics	540.97	541.11	Red fine-grained basalt, fri-able	SAU092	not tested - friable				
PDDD2	Gawler Range Volcanics	841.23	841.51	Blood red to brown/grey rhyo-lite, haematite	SAU063	1.87	0.08			
PDDD2	Gawler Range Volcanics	856.65	856.83	Red-brown rhyolite	SAU064	1.77	0.06			
WDDD2	Gawler Range Volcanics	688.86	689.01	Pale pink rhyolite	SAU075	2.56	0.06	2.19	0.12	use value for all bores
BLDD1	Hiltaba Suite Granite	695.95	696.14	Granite, haematite and chlo-rite alteration	SAU094	3.89	0.07	4.02	0.22	use value for all bores
BLDD1	Hiltaba Suite Granite	821.43	821.54	Granite, haematite alteration	SAU095	4.16	0.30			
BLDD1	Pandurra Forma-tion	508.53	508.65	Purple-red coarse-grained to small pebble sandstone, massive	SAU091	3.91	0.09			Low value - unsure as to how representative this sample is; thus use mean of other two bores for BLDD1
PDDD2	Pandurra Forma-tion	741.32	741.48	Red beds, silty fraction through to grit, convoluted bedding? Grey laminations infrequent [transition between Beda and Pandurra 740.5-744.8]	SAU059	5.28	0.14	5.42	0.18	use value only PDDD2
PDDD2	Pandurra Forma-tion	750.18	750.38	Purple-red coarse-grained sandstone to grit, massive	SAU060	5.14	0.09			
PDDD2	Pandurra Forma-tion	781.12	781.24	Purple-red coarse-grained sandstone to grit, massive	SAU061	6.29	0.06			
PDDD2	Pandurra Forma-tion	816.54	816.73	Purple-red coarse-grained sandstone to grit, massive	SAU062	5.13	0.06			

WDDD2	Pandurra Forma-tion	530.88	531.05	Purple-red coarse-grained to small pebble sandstone, massive	SAU072	5.03	0.06	4.73	0.07	use value only WDDD2
WDDD2	Pandurra Forma-tion	587.09	587.25	Purple-red coarse-grained sandstone to grit, massive	SAU073	5.11	0.02			
WDDD2	Pandurra Forma-tion	646.76	646.94	Purple-red fine-grained sand-stone, possibly siltstone, few floating small pebbles?	SAU074	4.17	0.04			
								5.08	0.18	use value only BLDD1
BLDD1	Tindelpina Shale Member	301.36	301.51	Dark grey to black silty shale, fine convoluted laminations	SAU096	2.18	0.13	2.49	0.16	use value only BLDD1 slt section
BLDD1	Tindelpina Shale Member	406.13	406.28	Dark grey to black silty shale, fine convoluted laminations, healed fractures	SAU089	2.89	0.06			
BLDD1	Tindelpina Shale Member	459.01	459.15	Cream-pale pink fine- to me-dium-grained sandstone, massive	SAU090	5.05	0.06	5.05	0.06	use value only BLDD1 sst section
MMDD1	Tindelpina Shale Member	424.19	424.38	Light grey-dark grey/black fine laminated carbonaceous silty shale; whispy appear-ance; concretions and vein-ing?	SAU037	3.86	0.14	3.15	0.44	use value only MMDD1
MMDD1	Tindelpina Shale Member	462.91	463.16	Dark grey-black fine lami-nated carbonaceous silty shale [rhythmite?]	SAU038	2.34	0.10			
MMDD1	Tindelpina Shale Member	527.83	528.01	Light grey-black fine lami-nated carbonaceous silty shale [bundles of rhythmites?]	SAU039	2.70	0.19			
MMDD1	Tindelpina Shale Member	569.05	569.25	Light grey-black fine lami-nated carbonaceous silty shale [rhythmite?]	SAU040	3.27	0.33			
MMDD1	Tindelpina Shale Member	579.99	580.19	Grey to dark grey pebbly grit [angular clasts], matrix sup-ported, massive	SAU041	3.12	0.09			
MMDD1	Tindelpina Shale Member	596.98	597.22	Light grey-black fine lami-nated silty shale; some coarser grained intervals; rip-	SAU042	4.52	0.24			

				up clasts						
PDDD2	Tindelpina Shale Member	341.11	341.31	Light grey to black silty shale sequence; discontinuous, deformed sausage shaped sedimentary features (rip up clasts?), cemented	SAU049	3.55	0.03	2.63	0.17	use value only PDDD2
PDDD2	Tindelpina Shale Member	341.31	341.44	Dark grey to black silty shale. Almost massive - very feint fine laminated?	SAU050	2.78	0.14			
PDDD2	Tindelpina Shale Member	390.26	390.48	Dark grey to black fine laminated silty shale sequence	SAU051	2.25	0.07			
PDDD2	Tindelpina Shale Member	456.80	456.97	Medium grey to black fine to moderate laminated carbonaceous silty shale [zebra style/rhythmite?], occasional convoluted strata	SAU052	2.88	0.08			
PDDD2	Tindelpina Shale Member	428.18	428.32	Dark grey to black silty shale, very feint fine laminated	SAU053	2.15	0.03			
WDDD2	Tindelpina Shale Member	314.62	314.78	Light grey to black fine laminated silty shale sequence; laminations occasionally wavy	SAU068	2.49	0.02	2.40	0.12	use value only WDDD2
WDDD2	Tindelpina Shale Member	370.74	370.86	Medium grey to black fine laminated silty shale sequence; healed fractures	SAU069	2.32	0.16			
WPDD2	Tindelpina Shale Member	304.77	304.90	Dark grey to black silty shale, very feint fine convoluted laminations	SAU078	2.67	0.37	2.49	0.37	use value only WPDD2
WPDD2	Tindelpina Shale Member	362.64	362.78	Dark grey to black silty shale, fine convoluted laminations, healed fractures	SAU079	2.25	0.04			
WPDD2	Tindelpina Shale Member	437.49	437.63	Medium grey to black silty shale, fine convoluted laminations	SAU080	2.59	0.22			

PDDD2	Wallaroo Group	867.50	867.71	Altered sediment, purple-red, carbonate, magnetite, haematite, remnant vesicles?	SAU065	2.40	0.17	2.60	0.20	use value only PDDD2
PDDD2	Wallaroo Group	931.80	932.06	Altered sediment, bleached pale pink/cream to grey, fractured, sulphides, carbonate, siderite, chlorite, remnant bedding?	SAU066	2.52	0.07			
PDDD2	Wallaroo Group	993.71	993.97	Altered sediment, pale grey-green, blotchy concretions, chlorite, carbonate, haematite	SAU067	2.92	0.08			
WDDD2	Wallaroo Group	797.09	797.20	Altered sediment, grey-green, chlorite, carbonate, haematite, remnant bedding?	SAU076	2.46	0.17	2.27	0.16	use value only WDDD2
WDDD2	Wallaroo Group	882.34	882.49	Altered sediment, grey-dark green, chlorite, carbonate, haematite, healed fractures	SAU077	2.12	0.07			
WPDD2	Wallaroo Group	678.95	679.13	Altered sediment, dark purple, haematite, highly fractured	SAU084	not tested - friable				
WPDD2	Wallaroo Group	695.61	695.81	Altered sediment, red, haematite, carbonate	SAU085	3.83	0.14	3.72	0.16	use value only WPDD2
WPDD2	Wallaroo Group	765.63	765.77	Altered sediment, purple-grey, fluorite, chlorite, haematite, carbonate, ?quartz, remnant bedding	SAU086	3.92	0.05			
WPDD2	Wallaroo Group	830.82	830.97	Altered sediment, dark grey, haematite, carbonate, chlorite	SAU087	3.98	0.08			
WPDD2	Wallaroo Group	890.80	891.00	Altered sediment, grey-green, chlorite, carbonate, fluorite	SAU088	3.23	0.01			
MMDD1	Whyalla Sandstone	307.40	307.57	Purple medium-grained sandstone, low-angle stratification, pin stripe laminations, occasional thin dark grey fines	SAU030	5.39	0.13	4.57	0.29	use value for all bores

MMDD1	Whyalla Sandstone	328.20	328.36	Purple coarse-grained sandstone to grit, low-angle stratification, pin stripe laminations	SAU031	4.39	0.25			
MMDD1	Whyalla Sandstone	359.25	359.40	Purple-pink siltstone to fine-grained sandstone, low-angle stratification, pin stripe laminations	SAU032	3.98	0.04			
PDDD2	Whyalla Sandstone	300.97	301.14	Purple medium-grained sandstone, grit lenses	SAU046	4.73	0.04			
MMDD1	Woocalla Dolomite Member	382.52	382.73	Purple brown to grey fine laminated silty shale sequence; convoluted laminations - discontinuous, deformed and wavy [slumps?]; soft sediment deformation; carbonate partially infilled fractures	SAU033	2.46	0.10	2.46	0.10	use value only MMDD1 dolomite section [369-399 m]
MMDD1	Woocalla Dolomite Member	400.90	401.08	Purple brown to grey fine laminated silty shale sequence; convoluted laminations - partially deformed and wavy [slumps?]	SAU034	2.54	0.41	2.54	0.41	use value only MMDD1 dolomite section [399-407 m]
MMDD1	Woocalla Dolomite Member	409.80	410.00	Purple brown to grey fine laminated silty shale sequence; laminations occasionally deformed and wavy [slumps?]. Some coarser grained intervals; rip-up clasts	SAU035	3.29	0.23	3.29	0.23	use value only MMDD1 dolomite section [407-411 m]
MMDD1	Woocalla Dolomite Member	413.61	413.77	Grey contorted vuggy dolomite	SAU036	3.55	0.28	3.55	0.28	use value only MMDD1 vuggy dolomite section [411-415 m]

PDDD2	Woocalla Dolomite Member	305.80	305.90	Purple brown to grey fine laminated silty shale sequence; convoluted laminations - discontinuous, deformed and wavy [slumps?]; soft sediment deformation	SAU047	2.50	0.16	2.50	0.16	use value only PDDD2 dolomite section [303.5-318 m]
PDDD2	Woocalla Dolomite Member	324.29	324.35	Light grey to black fine laminated silty dolomite(?) sequence; laminations deformed and wavy, some vugs	SAU048	3.57	0.16	3.57	0.16	use value only PDDD2 dolomite section [318-330.5 m]
								2.87	0.55	Use for all bores bar MMDD1 and PDDD2
	Colluvium			Guestimate				1.5	0.15	use value for all bores
	Simmens Quartzite Member			Same value as used in GEL 302 IR Report				5	0.80	use value for all bores
	Corraberra Sandstone Member			Same value as used in GEL 302 IR Report				3.3	0.80	use value for all bores
	Tregolana Shale Member			Same value as used in GEL 302 IR Report				2.3	0.80	use value for all bores
	Nuccaleena Formation			Same value as Woocalla Dolomite Member				2.87	0.55	use value for all bores

Attachment M: WRF geochemical data, rock density data and heat generation data from twelve samples.

Sample	Drillhole	Density [g/cm^3]	±	U [ppm]	Th [ppm]	K [%]	Heat generation [μW/m^3]	±[1]	Formation	Lithology
SAU093	BLDD1	2.818	0.01	6.7	5.5	2.87	2.52	0.03	Gairdner Dyke	Dark red fine-grained basalt
SAU063	PDDD2	2.588	0.01	8.4	36.4	10.1	5.49	0.07	Gawler Range Volcanics	Blood red to brown/grey rhyolite, haematite
SAU064	PDDD2	2.519	0.01	14.7	4	5.53	4.33	0.06	Gawler Range Volcanics	Red-brown rhyolite
SAU075	WDDD2	2.438	0.00	1.2	1.7	1.35	0.51	0.01	Gawler Range Volcanics	Pale pink rhyolite
SAU092	BLDD1	2.946	0.01	6.5	3.4	0.04	2.12	0.03	Gawler Range Volcanics	Red fine-grained basalt, friable
SAU094	BLDD1	2.651	0.01	4.28	20.9	5.8	3.09	0.04	Donington Suite Granite	Granite, haematite and chlorite alteration
SAU095	BLDD1	2.665	0.01	3.2	19.3	5.42	2.68	0.03	Donington Suite Granite	Granite, haematite alteration
SAU066	PDDD2	2.861	0.01	5.1	6.9	2.91	2.22	0.03	Wallaroo Group	Altered sediment, bleached pale pink/cream to grey, fractured, sulphides, carbonate, side-rite, chlorite, remnant bedding?
SAU077	WDDD2	2.978	0.01	4.8	17.6	9.05	3.70	0.05	Wallaroo Group	Altered sediment, grey-dark green, chlorite, carbonate, haematite, healed fractures
SAU085	WPDD2	3.181	0.01	5.8	11.9	0.56	2.84	0.04	Wallaroo Group	Altered sediment, red, haematite, carbonate
SAU086	WPDD2	3.189	0.01	26.6	21.7	1.18	10.15	0.14	Wallaroo Group	Altered sediment, purple-grey, fluorite, chlo-rite, haematite, carbonate, ?quartz, remnant bedding
SAU087	WPDD2	3.540	0.02	6.2	3.4	0.04	2.44	0.04	Wallaroo Group	Altered sediment, dark grey, haematite, car-bonate, chlorite

[1] Heat generation uncertainty based on assumed 1% uncertainty in uranium (U), thorium (Th) and potassium (K) values, plus uncertainty in density.

Attachment N: Published Heat flow data recorded for central South Australia.

Site	Project	Lat (°)	Long (°)	Easting (mE)	Northing (mN)	Zone	Depth (m)	Heat Flow (mWm2)	Source	Tenement
Blanche 1	Olympic Dam	-	-	672516	6627749	53	1935	94	Blanche 1 WCR [GRK]	GEL 128
SAP 1 DW1	Olympic Dam	-	-	661222	6614570	53	740	Data release pending [GRK]		GEL 213
Ancalagon 1	Port Pirie	-	-	242292	6278431	54	321	Data release pending [TEY]		GEL 482
Balrog 1	Parachilna	-	-	240075	6537810	54	507	110	TEY ASX Announcement 19Oct09	GEL 278
Falkor 1	Port Pirie	-	-	246004	6263581	54	474	Data release pending [TEY]		GEL 482
Faramir 1	Port Augusta	-	-	774717	6464754	53	443	Data release pending [TEY]		GEL 234
Gandalf 1	Parachilna	-	-	231885	6533218	54	585	116	TEY ASX Announcement 19Oct09	GEL 231
Gollum 1	Parachilna	-	-	247129	6551120	54	501	106	TEY ASX Announcement 19Oct09	GEL 278
Moria 1	Port Augusta	-	-	769299	6438171	53	193	Data release pending [TEY]		GEL 235
Nazgul 1	Parachilna	-	-	228175	6558636	54	600	120	TEY ASX Announcement 19Oct09	GEL 230
Norbert 1	Port Pirie	-	-	227014	6310165	54	413	Data release pending [TEY]		GEL 483
Raitaro 1	Adelaide Plains	-	-	242403	6219680	54	403	75	TEY ASX Announcement 31Mar09	GEL 260
Rinjin 1	Adelaide Plains	-	-	254134	6198986	54	297	72	TEY ASX Announcement 30Jun09	GEL 226
Sauron 1	Parachilna	-	-	231051	6546894	54	375	120	TEY ASX Announcement 19Oct09	GEL 230
Shelob 1	Port Augusta	-	-	775655	6453313	53	321	61	TEY ASX Announcement 30Jun09	GEL 235
Smrgol 1	Port Pirie	-	-	243097	6250456	54	297	Data release pending [TEY]		GEL 481
Theoden 2	Port Augusta	-	-	764480	6396816	53	372	101	TEY ASX Announcement 30Jul09	GEL 285
Thorin 1	Port Augusta	-	-	765133	6403333	53	363	93	TEY ASX Announcement 30Jun09	GEL 285
Treebeard 1A	Parachilna	-	-	235638	6545422	54	1807	91	TEY ASX Announcement 19Oct09	GEL 230
Uwibami 1	Adelaide Plains	-	-	265451	6218932	54	300	77	TEY ASX Announcement 30Jun09	GEL 260
Torrens 1 [TDH001]	Parachilna	-	-	221587	6488843	54	760	82	TEY ASX Announcement 24Nov08	GEL 233 [EL 03081]

Edeowie 1	Parachilna	-	-	255505	6534753	54	759	74	TEY ASX Announcement 19Oct09	GEL 278
TKHD1A	Port Augusta	-	-	769049	6454259	53	1002	96	TEY ASX Announcement 31Mar09	GEL 235
Blanche 2	Olympic Dam	-	-	Planned [GRK]						GEL 161
Ka Riu 1	Adelaide Plains	-	-	Planned [TEY]						GEL 261
Kiyo 1	Adelaide Plains	-	-	Planned [TEY]						GEL 226
Strider 1	Port Augusta	-	-	Planned [TEY]						GEL 235
Theoden 1	Port Augusta	-	-	Planned [TEY]						GEL 285
LTDD002A	Roxby Geothermal Project	-	-	752839	6446014	53	997	94	GDP Round 2 application	GEL 302
LTDD003	Roxby Geothermal Project	-	-	755015	6439984	53	1118.7	94	GDP Round 2 application	GEL 302
BROKEN H	-	31.950	141.467	-	-	-	1175	81	Global Heat Flow Database	-
RADIUM H	-	32.500	140.500	-	-	-	320	75	Global Heat Flow Database	-
KANMANTO	-	35.083	139.250	-	-	-	250	88	Global Heat Flow Database	-
WHYALLA	-	33.167	137.500	-	-	-	185	92	Global Heat Flow Database	-
BENDIGO	-	33.200	139.467	-	-	-	310	64	Global Heat Flow Database	-
CARRIETO	-	32.550	138.469	-	-	-	376	92	Global Heat Flow Database	-
BUTE	-	33.867	138.017	-	-	-	218	88	Global Heat Flow Database	-
EDIACARA	-	30.600	138.117	-	-	-	213	96	Global Heat Flow Database	GEL 461
IRONKNOB	-	32.717	137.119	-	-	-	305	109	Global Heat Flow Database	-
KADINA	-	33.967	137.750	-	-	-	476	101	Global Heat Flow Database	-
MOOTOORO	-	32.250	140.919	-	-	-	589	68	Global Heat Flow Database	-
MT MCTAG	-	30.450	138.300	-	-	-	175	101	Global Heat Flow Database	GEL 461
PARABARA	-	29.969	139.717	-	-	-	320	126	Global Heat Flow Database	-
STOCKYAR	-	34.767	138.800	-	-	-	185	88	Global Heat Flow Database	-
WUDINNA	-	32.969	135.550	-	-	-	303	58	Global Heat Flow Database	-
TARCOOLA	-	30.617	134.500	-	-	-	304	49	Global Heat Flow Database	-
WOKURNA	-	33.717	138.117	-	-	-	300	91	Global Heat Flow Database	-
BUTE	-	33.919	137.967	-	-	-	350	87	Global Heat Flow Database	-
Maralinga	-	30.170	131.600	-	-	-	-	54	Neumann *et al.*, 2000	-