GEOTHERMAL RESOURCES LIMITED

ABN 45 115 281 144

Annual Report

Licence Year 3

For the Period:

1 Nov. 2008 to 31 Oct. 2009

GELs 214, 215, 216 & 217

23rd December 2009

CONTENTS **Page No.**

1 INTRODUCTION 3
2 PERMIT SUMMARY 4
3 REGULATED ACTIVITIES 10
4 COMPLIANCE ISSUES 11
5 EXPENDITURE STATEMENT 13

APPENDIX 1 EXPENDITURE STATEMENT 14

LIST of TABLES

Table 1. Current work commitments by Licence year 4
Table 2. Final work program and work completed 5
Table 3. List of reports and data submission 12

LIST of FIGURES

Figure 1. Barrel for temperature probing 7
Figure 2. Temperature probe 7
Figure 3. Spool for temperature probing 8
Figure 4. Temperature probing setup 8
Figure 5. Camelback 1 8
Figure 6. Logging in the Otway basin 9
Figure 7. Sawpit 1 9
Figure 8. East Avenue 1 9

1 Introduction

Geothermal Exploration Licences (GELs) 214, 215, 216 and 217 were granted on 12th July, 2006. The licences are located in the Otway Basin, South Australia. The licence history is:

- Year 1: 12th July 2006 to 11th July 2007
- Year 2: 12th July 2007 to 11th July 2008
  - Suspension: 11th July 2007 to 30th October 2008 (to achieve alignment with GELs 249 and 250)
- Year 3: 1st November 2008 to 31st October 2009.
  - 9th December 2008: Variation of licence conditions involving changed work program.

This report details the work conducted during Licence Year 3 of the licences (1/11/2008 – 31/10/2009 inclusive), in accordance with Regulation 33 of the Petroleum Act 2000.

2 Permit Summary

For the duration of the licence year, the licensee for the Geothermal Exploration Licences (GELs) 214 - 217 was:

- Geothermal Resources Limited 100%

The current work commitments (including all variations) associated with GELs 214 - 217 can be seen in Table 1.

Table 1 Current work commitments by licence year

Licence Year	Licence dates	Minimum Work Program
Year 1	12/07/2006 – 11/07/2007	• Review of existing geophysical and drilling data to obtain accurate cover depth and bedrock lithology information; and • 3D modelling to determine subsurface geology and location of buried granite bodies.
Year 2	12/07/2007 – 11/07/2008	• Thermal resource modelling and rock fracture studies; and • Interpretation of all data to determine optimum drill site locations.
Suspended	11/07/2008 – 30/10/2008	**Suspended**
Year 3	1/11/2008 – 31/10/2009	• Five shallow drill holes to an aggregate depth of at least 1500m (subject to ground conditions) to obtain accurate bottom of hole temperature measurements; and • 3D modelling of variations in regional temperature gradients based on drilling results.
Year 4	1/11/2009 – 31/10/2010	• Assessment of Year 3 shallow drilling results and decision on whether to drill further shallow holes or a deeper pilot hole to 1500m depth.
Year 5	1/11/2010 – 31/10/2011	• Review of pilot hole results (if drilled) and decision on drilling production wells.

Licence Year 3 concluded on 31/10/2009. 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	• Review of existing geophysical and drilling data to obtain accurate cover depth and bedrock lithology information; and • 3D modelling to determine subsurface geology and location of buried granite bodies.	• Cover depth, stratigraphy and bedrock lithology obtained from open file geophysical and drilling data. • Location of basement mapped via 3D modelling.
Year 2	• Thermal resource modelling and rock fracture studies; and • Interpretation of all data to determine optimum drill site locations.	• Temperature data from Well Completion Reports (WCRs) used to model thermal resource in 3D. • 5 sites located for shallow wells (largely based on 3D thermal resource model).
Year 3	• Five shallow drill holes to an aggregate depth of at least 1500m (subject to ground conditions) to obtain accurate bottom of hole temperature measurements; and • 3D modelling of variations in regional temperature gradients based on drilling results.	• Ground conditions, namely potable water aquifers and casing issues, prevented drilling of shallow wells. • Drilling replaced by temperature logging most existing wells with depth of ~300m. • Temperature data from newly logged wells combined with WCR data to refine regional temperature gradients. • Seismic software written to reprocess and enhance existing seismic data. • Reinterpretation of stratigraphy on seismic survey lines commenced.

Details on work completed

- 5 wells were sited in the Crower area.
- Arrangements were made with Thompson Drilling to do the drilling.
- Potable water aquifers meant that drilling to 250m would only allow measurements that would result in meaningless geothermal gradients.
- Arrangements were made to change drilling to 500m to avoid the Tertiary aquifers.
- Casing regulations and requirements were investigated:
    - Class 18 PVC could not be used for more than ~ >300m depth (mass of PVC casing is too great for joining system – even if glued, screwed and box threaded).
    - The only appropriately sized Fibreglass Reinforced Plastic (FRP) casing had to be imported with a >6 months lead time. Further, it was only available in 9m lengths which the Thompson rig could not handle (rig limited to 6m rods/lengths).
    - Steel is not ideal through aquifers that provide the Town water supply (finite life, because of corrosion), and Thompsons could not handle steel casing.
- In view of the above mentioned ground conditions and casing issues no shallow wells were drilled.
- The data bases of petroleum wells, water wells, observation wells and mineral holes were re-examined looking for:
    - Wells that were around 300m or greater in depth.
    - Petroleum wells without metal caps/plates and no cement plugs higher than at ~300m.
    - Water and observation wells that were not currently being used for irrigation or drinking purposes.
    - Mineral holes that were not rehabilitated.
- Approximately 30 wells fitted the above criteria (GELs 214-217 and 249&250).
- The most commonly available wells were DWLBC observation wells – typically located on the verges of roads.
- Land holders were visited and access gained to some other wells.
- Many wells were unfortunately permanently capped, blocked, in-use or rehabilitated.
- Most accessible open wells were temperature logged using Geothermal Resources' probing system.
- The greatest depth logged was 279m.
- Near surface water temperatures extrapolated to 15.5 to 16ºC at surface.
- The regional picture was reinforced – geothermal gradients are higher in the northern regions of the northern GELs. In general, the highest geothermal gradients occur at where the depth to basement is low and or near basement highs.
- The highest geothermal gradient was above 43ºC per km.
- The data gathered from these temperature surveys supported our expectations from the planned, but not drilled, shallow wells.
- Many months were spent developing software to enhance the existing SEG-Y seismic data. The data can now be enhanced with reprocessing enabling more accurate interpretation of the stratigraphy and in particular recognition of sandstone units.

- GELs 214 - 217 were active for the full year. (The suspension from 12th July 2008 to 31st October 2008, is part of the Licence Year 2)

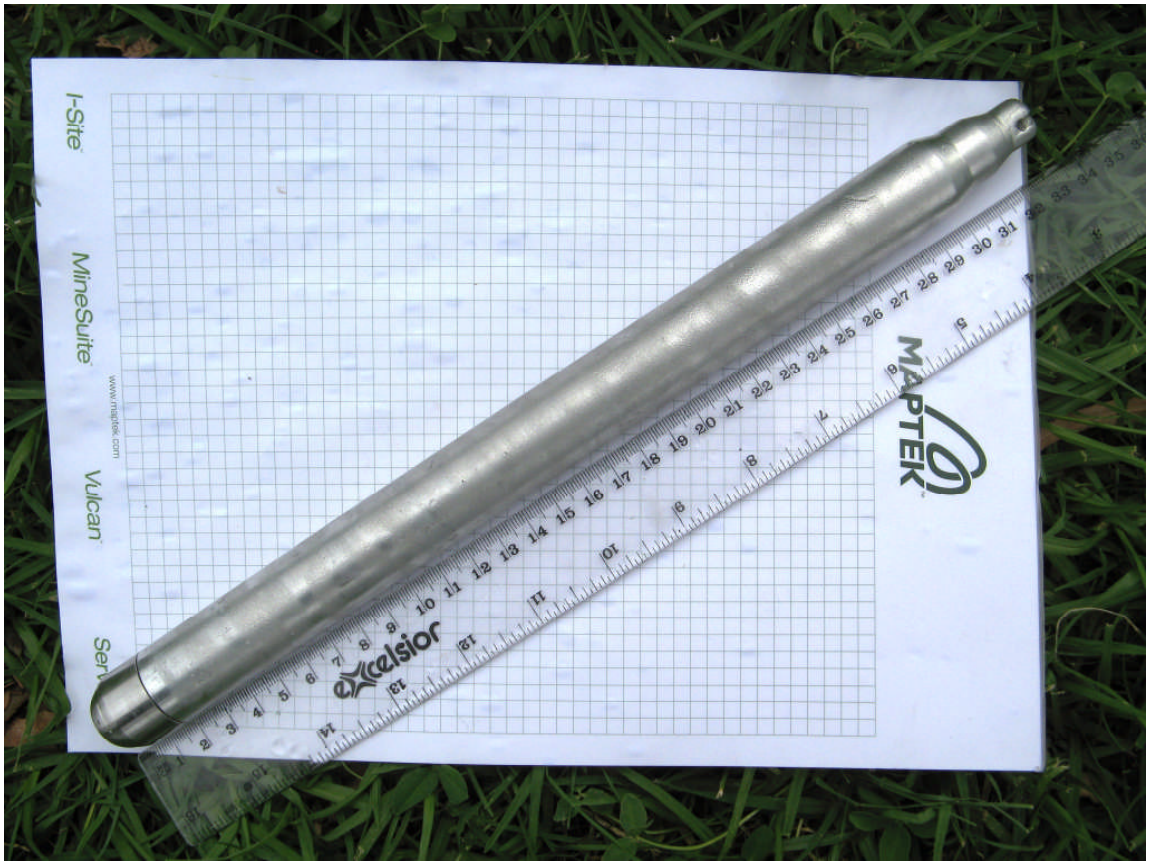

Figure 1. Geothermal Resources barrel for temperature probing

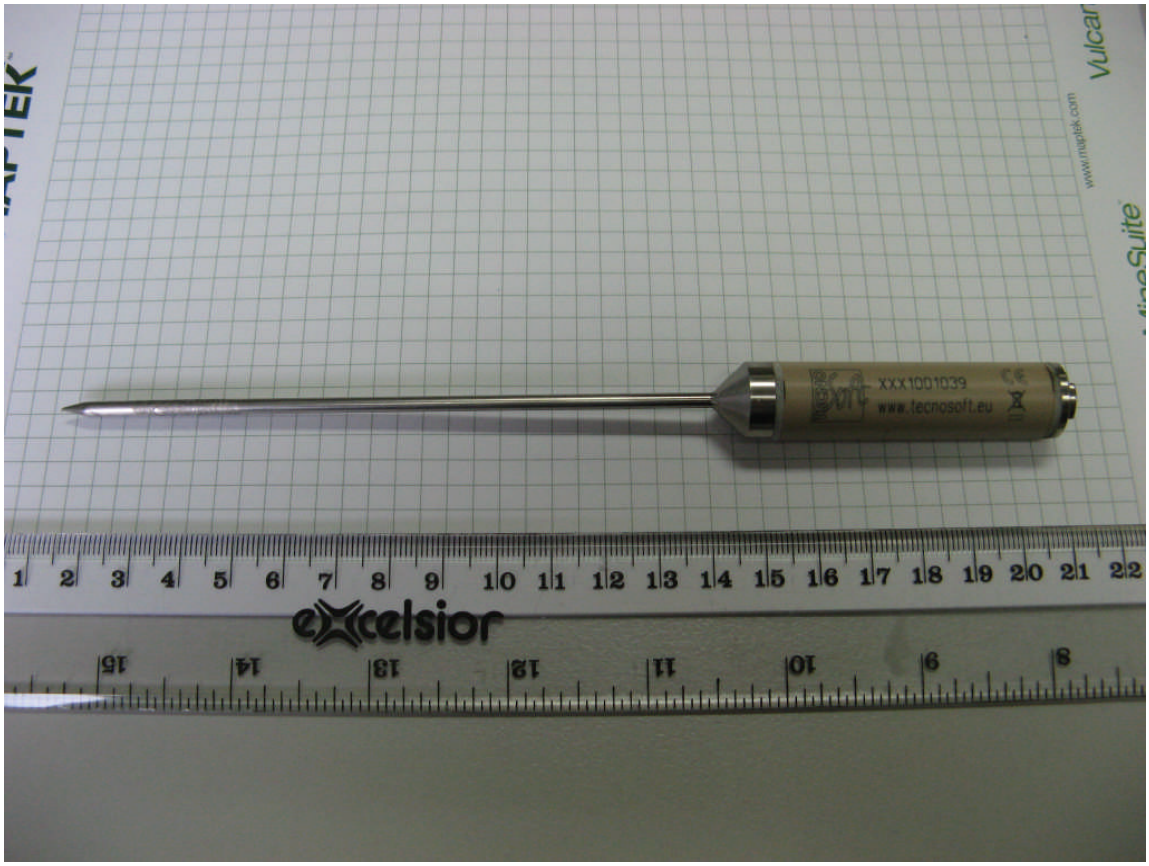

Figure 2. Geothermal Resources temperature probe

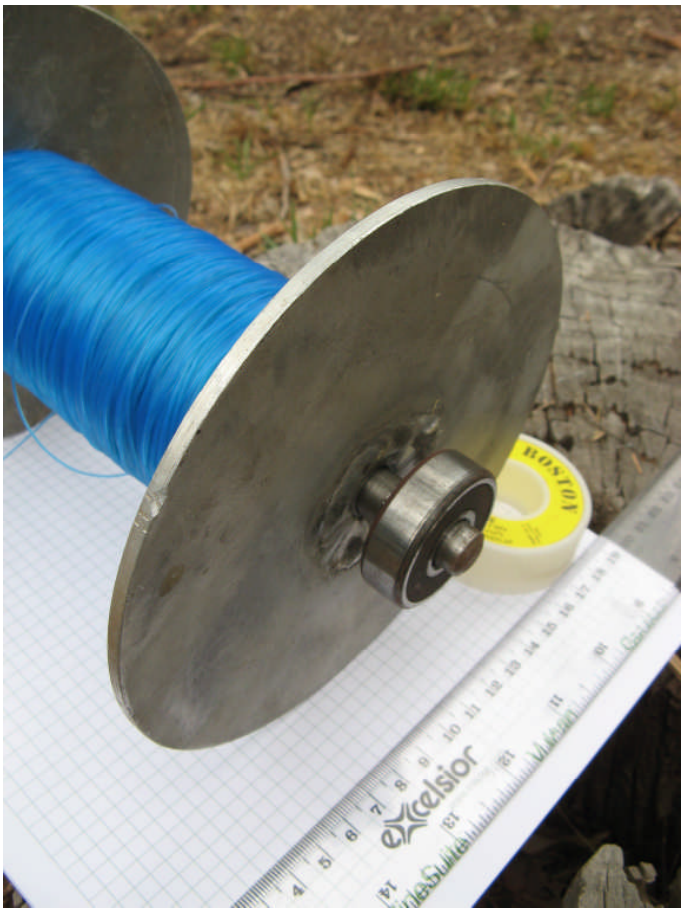

Figure 3. Spool (note bearing support)

Figure 4. Temperature probing setup

Figure 5. Camelback 1 – Note removable steel cap enabled logging

Figure 6. Logging in the Otway basin

Figure 7. Sawpit 1 – welded steel cap

Figure 8. East Avenue 1 (Mud/cement plug prohibits well entry)

3 Regulated Activities

Pursuant to Regulation 33(2)(a) under the Act, the following regulated activity was undertaken:

Temperature probing of some existing, accessible and open wells was undertaken.
In all cases this consisted of a bottom of hole (BoH) temperature measurement.
In selected cases, near surface water temperatures were also recorded.

The equipment used was portable, typically designed by Geothermal Resources, and specifically produced for the company. The equipment consisted of:

- an aluminium spool,
- a battery operated drive for the spool,
- a support for the spool and drive,
- quality fishing line,
- a weighted aluminium barrel to hold the temperature probe, and
- a Technosoft SterilCyl temperature probe.

It should be clarified that no wireline logging was undertaken. Rather, a 'bottom' of hole temperature was obtained in the logged holes ('bottom' in quotations as most holes were either blocked at relatively shallow depths and or plugged). The collection of this data:

- involved a single 'bottom' of hole measurement (no log was obtained) for each open hole,
- involved the use of nylon fishing line to lower the probe,
- did not involve any electrical connection to the probe,
- did not involve the use of any wire, and
- did not produce any form of continuous log.

As no wireline logs were taken, no such data was submitted.

4 Compliance Issues

Licence and Regulatory Compliance

Licence Non-Compliance

Geothermal Resources appears to be non-compliant with respect to the Work Program requirements. As the Year 3 Work Program states: ' Five shallow drill holes to an aggregate depth of at least 1500m ... ' and as Geothermal Resources drilled no wells, it would appear that Geothermal Resources was non-compliant with respect to its licence conditions. However, the only reason why the drilling did not occur was that the ground conditions made it impossible for the drilling company to case any well to the depth required (see Section 2: details on work completed). This scenario was covered in the Year 3 Work Program which in full reads: 'Five shallow drill holes to an aggregate depth of at least 1500m (**subject to ground conditions**) to obtain accurate bottom of hole temperature measurements;'. As the ground conditions made meaningful drilling impossible Geothermal Resources' believes that it was compliant with the licence requirements.

Regulatory Non-Compliance

Geothermal Resources was non-compliant with some regulatory requirements.

Geothermal Resources aims to speak personally to every land holder before sending Notification of Entry (NoE) notices. Following on from personal visits to land holders some wells were temperature logged. The company did not interpret the portable, 'bottom' of hole (BoH), temperature measurements to be a Regulated Activity. With this incorrect interpretation the company did not submit an Activity Notification nor did it post NoE notices.

In view of the company's incorrect interpretation the company is non-compliant in:

- not submitting an Activity Notification for its temperature logging, and
- not posting Notification of Entry notices to relevant land holders.

Report and Data Submissions

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 GELs 214 – 217 (Year 2)	10/09/2008	August 2008	Compliant
Activity Notification (for temperature probing)	Sept. 2009	Not submitted	Non-compliant
Notification of Entry (prior to temperature probing)	Sept. 2009	Not submitted	Non-compliant
Annual Report GELs 214 – 217 (Year 3)	31/12/2009	23/12/2009	Compliant

Incidents

Pursuant to Regulation 33(2) (f), as no regulated activities were undertaken no incidents occurred.

Threat Prevention

Pursuant to Regulation 33(2) (g), no foreseeable threats identified.

Future Work Program

Pursuant to Regulation 33(2) (h) under the Act, an outline of the planned operations and activities is listed below:

- Further assessment of the temperature logging of shallow wells.
- Further 3D temperature modelling combining shallow data with petroleum well data.
- Interpretation of digital data associated with Well Completion Reports eg. gamma logs and drill stem tests.
- Continued interpretation of the seismic data in order to more accurately recognise and delineate porous / permeable sandstones eg. within the Pretty Hill Formation.
- Decision on whether to proceed with a well to 1500m.