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# **GEL 158 – Ferguson Hill**

## **Annual Report Year 4**

**21 January 2007 – 20 January 2008**

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## 1. Introduction

Ferguson Hill GEL158 was granted to MNGI Pty Ltd, a wholly owned subsidiary of Petratherm Ltd, on 20<sup>th</sup> January 2004. Petratherm Ltd listed on the Australian Stock Exchange on the 27<sup>th</sup> July 2004, following the successful completion of a \$4,000,000 public offering.

Ferguson Hill represents the informally known Radiogenic Iron Oxide (RIO) model for hot rock energy. The measured heat production rates in RIO bodies may be as much as 50 times greater than those from average granite. Under favourable conditions, temperatures as high as 200°C may be generated at depths of around 3km.

## 2. Work Requirements

The work program negotiated for Year 4 by MNGI Pty Ltd with Primary Industries and Resources South Australia (PIRSA) for the Ferguson Hill GEL 158 was as follows.

Year of License	Work Program
4	<ul style="list-style-type: none"><li>• Commercial feasibility and development study</li><li>• Commercial negotiations for further funding</li></ul>

Petratherm recognised that a disconnection had occurred between the proposed work programs for Years 2 and 3 and the timing of on-ground activities undertaken, due in the main to the inability to locate geophysical contractors able to perform the required magneto-telluric survey to the required standard and within the necessary timeframe. This situation constituted a breach in compliance and as a result Petratherm will seek a variation to the GEL 158 Ferguson Hill work program in order to rectify the compliance breach and realign the work program. The renegotiated Year 4 work program, presented in the table below, will be submitted to PIRSA to seek approval for a work program variation, this will be outlined further in the Year 5 annual report. The program is aimed at assessing the depth to basement and delineating potential drilling targets, as per the scheduled Year 3 work program, as well as examining the commercial feasibility of any resource.

Year of License	Work Program
4	<ul style="list-style-type: none"><li>• Magneto-telluric survey</li><li>• Commercial negotiations, feasibility and development study</li></ul>

## 3. Work Conducted

Previous thermal and commercial modelling of data from Ferguson Hill, has shown that the depth of the basement / cover interface is a critical factor in the commercial feasibility of this licence. Thus much of the work conducted in Year 4 of the licence consisted of undertaking a regional magneto-telluric survey to better constrain the depth to the basement / sedimentary cover contact, and investigating the commercial feasibility of the project area based on possible outcomes from these survey results.

### **3.1 Magneto-telluric survey**

A regional magneto-telluric (MT) survey of about 14 km total line length was successfully conducted on GEL158 from the 5<sup>th</sup> to 11<sup>th</sup> November 2007 by Quantec Geoscience. A single linear traverse was recorded in a southwest-northeasterly orientation so as intersect a regional gravity and magnetic feature interpreted to potentially represent a RIO target under a local sedimentary sub-basin. The main objective for the survey was to provide information on the depth to basement, estimated to be at about 2500m, and on the thicknesses of local stratigraphic units.

The start point of the survey was 661085E, 6693373N (GDA94) and the orientation of the line was 029°T. A total of 14km of data were acquired with an average of 7 stations acquired per day, each station having a spacing of 500m, giving a total of 29 stations. A single site setup consisted of an L shaped E field array, with 100m dipoles and Hx, Hy and Hz low frequency coils, remote referenced. Data was collected at an effective bandwidth of 0.005 to 300 Hz.

Data from this survey is currently being interrogated and an Operations and Interpretation Report will be submitted within the regulation timeframe. The decision to drill an exploratory well, and the siting of such a well, will be contingent on the findings of the magneto-telluric survey.

### **3.2 Commercial Negotiations, Feasibility and Development Study**

Petratherm entered into discussions with a number of potential joint venture partners during Year 4 of the license. Discussions with interested parties indicated that commercial conditions were favourable for development of a resource at the site, contingent on a number of technical factors. The foremost of these technical factors were drilling depth and target temperature which are intrinsically linked to the depth of the basement heat source / thickness and conductivity of the sedimentary cover. Further information about these critical factors is required before further negotiations or feasibility assessments can be made.

## **4. Year 4 Expenditure**

Expenditure for Year 4 is attached in Appendix 2.

## **5. Operations Proposed for Year 5**

The work program for Year 5 of Ferguson Hill will be aimed at assessing and drilling potential targets, and examining the commercial feasibility of any resource.

Based on the results of the regional magneto-telluric survey, in Year 5 Petratherm will elect to either relinquish the ground or move forward to target delineation and drilling. In this respect, the renegotiated work program for Year 5 (see table below) represents a condensed program incorporating aspects of the original Year 3 and Year 5 work programs.

In consideration of the proposed variation to the Year 4 and 5 work programs, and in particular the condensed Year 5 program, much of the shortfall in expenditure which has occurred on the tenement during Years 3 and 4 will be carried over into Year 5 since the forecasted costs will be borne in that year.

Year of License	Work Program
5	<ul style="list-style-type: none"> <li>• Drill 1 test well or re-enter existing well</li> <li>• Down hole thermal analysis</li> <li>• Drill injection well / convert test well</li> <li>• Down hole stress analysis</li> <li>• Reservoir development &amp; modelling</li> <li>• Drill trial production well</li> <li>• Fracture, circulation and recovery tests.</li> </ul>

## **6. Compliance with the Petroleum Act 2000 (Reg. 33)**

### **a) Summary of the regulated activities conducted during the license year**

Petratherm performed a regional magneto-telluric survey across the Ferguson Hill tenement, followed up by an environmental audit of these operations. An activity application submitted for the operation was approved by PIRSA and the work conducted under the SEO for ground based geophysical operations (non-seismic) in South Australia.

### **b) Report for the year on compliance with the Act, these regulations, the license and any relevant statement of environmental objectives.**

As discussed above, Petratherm recognises it has been non-compliant with respect to fulfilling the Year 2 and 3 work programs for GEL 158. In order to rectify this situation, an application for variation to the work program for the tenement has been submitted to PIRSA.

An Environmental Assessment for magneto-telluric operations at Ferguson Hill, indicated that the existing SEO for ground based geophysical operations (non-seismic) in South Australia were applicable and sufficient to guide operations at the Ferguson Hill survey. The regional magneto-telluric survey performed at Ferguson Hill during Year 4 was undertaken with the approval of PIRSA. No breaches of the SEO occurred and an assessment of SEO compliance is attached as Appendix 1.

An environmental audit of the survey area was undertaken early in the 2008. A copy of the audit report is in preparation and will be submitted to PIRSA shortly. In general, the condition of the site was good. Minor rains had aided in reducing the visual impact of vehicle tracks locally, but the area has been in drought for a number of years, and the

overall level of vegetation remains sparse. As presented in the summary table in Appendix 1 below, objectives assessed as ‘defined conditions’ were all achieved and those assessed under the GAS technique achieved +1 or +2 scores.

**c) Actions taken to rectify non-compliance with obligations imposed by the Act, these regulations or the license, and to minimise the likelihood of recurrence of any such non-compliance; and d) summarise any management system audits undertaken during the relevant license year including and information on any failure or deficiency identified by the audit and any corrective actions that has, or will be, taken**

To rectify the work program non-compliance noted previously, an application for variation to the GEL 158 licence work program has been made to PIRSA.

Petratherm recognises the importance of achieving regulatory compliance as part of Petratherm’s commitment to applying best practice, and is in the process of reviewing and updating its Environment and OH&S Management System with assistance from Business SA.

**e) List all reports and data relevant to the operation of the Act generated by the licensee during the license year**

The work undertaken in Year 4 of the work program has been focused on gathering geophysical data in order to better constrain local stratigraphy and depth to basement estimates. This information has direct bearing on the prospectivity of the tenement and commercial viability of the project.

<b>Author</b>	<b>Title</b>	<b>Date</b>	<b>Activity</b>	<b>GEL</b>	<b>Submitted</b>
Petratherm	Year 3 Annual Report for Ferguson Hill	Mar 2007	Annual Report	GEL 158	13/3/07
Petratherm	2007 Ferguson Hill MT survey Activity Application	Sept 2007	MT survey	GEL158	Sept 2007
Petratherm	2007 Ferguson Hill MT survey Notice of Intended Entry	Sept 2007	MT Survey NOIE	GEL158	Sept 2007
Petratherm	2007 Ferguson Hill MT survey weekly progress report (1 of)	Nov 2007	MT progress rpt	GEL158	Nov 2007
Petratherm	Quarterly incident and cased hole activity reports 4th quarter 2007	Oct-Dec 2007		GEL158	Jan 2008

**f) Report on any incidents reportable to the Minister under the Act and regulations during the relevant license year**

No reportable incidents occurred during this licence year.

**g) Report on any reasonably foreseeable threats that reasonably present, or may present, a hazard to facilities or activities under the license, and report on any corrective action that has, or will be, taken**

No threats have been identified.

**h) Operations imposed for the ensuing year**

A discussion of the proposed work program for Year 5 of Ferguson Hill is presented in Section 5 above.

## **Appendix 1**

### **Assessment of SEO compliance**

**A1 ASSESSMENT OF PETRATHERM'S PERFORMANCE IN ACHIEVING ENVIRONMENTAL OBJECTIVES DEFINED IN THE SEO FOR GROUND-BASED GEOPHYSICAL OPERATIONS (NON-SEISMIC) IN SOUTH AUSTRALIA**

**SURVEY NAME: 2007 Ferguson Hill Magneto-telluric Survey**

**GEL No.: 158**

**SURVEY TYPE: Magneto-telluric**

**COMMENCED: 5/11/07**

**COMPLETED: 11/11/07**

Table 1: Environmental Objectives and Performance Assessment of magneto-telluric survey operations conducted at Ferguson Hill. These objectives are designed to monitor and manage those activities that have, or are likely to have, temporary impacts on biological diversity, cultural components of the environment, groundwater or other land users.

Environmental objective	Assessment Criteria	Comments	Performance Assessment
<b>1. Minimise disturbance to other land users</b>	All reasonable landowner complaints are addressed and resolved. Upon completion of the survey and after any rehabilitation or reparation (if determined prior to survey), the level of impacts on other land users is determined by the absence of existing stakeholder complaints.	NOIEs given to all stakeholders. Stakeholders contacted personally prior to and after survey completed. Existing tracks used wherever possible. Crew camped and used facilities at local homestead for duration of survey. No complaints received Magneto-telluric surveys are by nature a low impact activity.	Y
<b>2. Minimise disturbance to native vegetation, fauna and associated wildlife habitats</b>	Vehicle access to survey area is to be via existing access tracks of existing seismic lines, except where they may have been rehabilitated. No off traverse driving. No native vegetation clearance occurs. Appropriate measures to contain and prevent fuel and chemical spillages taken. Spillage response equipment available. Reporting system in place.	Existing tracks and seismic survey lines used for access and survey line wherever possible. No native vegetation clearance occurred. Waste disposal and refuelling undertaken at the base camp at Stuart Creek Station workmen's quarters. No spillages reported. No other chemicals are used during the MT preparation and acquisition process.	Y
<b>3. Avoid disturbance to sites of cultural and</b>	Survey area scouted by appropriate	Cultural and Heritage site registers consulted. Local station manager consulted and survey area toured by appropriate	Y

<b>heritage significance</b>	<p>personnel. Identified sites flagged and avoided. New sites identified reported to appropriate agency.</p>	<p>personnel. No sites were identified. Crew inductions include discussion of responsibilities.</p>	
<b>4. Minimise the risk of introduction and/or spread of introduced species and bio-security threats.</b>	<p>Weeds, feral animals or plant and animal diseases are not introduced to, or spread within South Australia.</p>	<p>All vehicles and equipment were cleaned before arrival and departure from site.  No pets or other animals were brought to site.</p>	Y
<b>5. Minimise the risk of initiation and/or propagation of wildfire.</b>	<p>Appropriate plans in place and equipment available to identify hazards, initiate hazard mitigation and response training, fire-fighting equipment available.</p>	<p>An Emergency Response Plan exists for the area and was explained to crew. Fire-extinguishers present at camp and in vehicles. Emergency contacts made known to crew and alerted to the crew's presence and activities. Local station manager and workmen aware of crew's movements</p>	Y
<b>6. Minimise the visual impacts of geophysical operations</b>	<p>Locate camp and survey traverses to minimise visual impact. Remove all equipment and litter.</p>	<p>Crew camped at established quarters at local homestead. No vegetation removed. Existing tracks used wherever possible. All equipment removed and waste disposed of at the homestead.</p>	Y
<b>7. Minimise generation of dust</b>	<p>Drive at appropriate speed to minimise dust hazard particularly in vicinity of other crews or homesteads.</p>	<p>Included in crew inductions.</p>	Y
<b>8. Minimise soil disturbance and contamination</b>	<p>Locate campsites to minimise disturbance and contamination. Refuel in allocated refuelling areas. Clean up and report all spills and leaks. Dispose of waste appropriately. Only vehicles engaged in data acquisition to traverse survey lines.</p>	<p>Crew camped at established quarters at local homestead. No vegetation removed. Existing tracks used wherever possible. Refuelling performed at homestead. Waste disposed of at homestead. No spills reported. Wherever possible survey lines coincident with existing tracks. Only survey vehicles directly used in data</p>	Y

		acquisition accessed the survey lines.	
<b>9. Optimise waste recovery</b>	Wastes (except sewerage and grey water) to be segregated, burnt or transported to an EPA waste disposal facility.	Crew camped at established quarters at local homestead. All waste disposed of at the homestead.	Y

## **Appendix 2**

**Expenditure for the period 21/01/07 to 20/01/08 (Yr 4)**

**Commercial in Confidence**