

## **Geothermal Exploration License 98 Annual Report for 2005**

### **Summary of Years Activities**

GEL 98 was granted to Geodynamics Limited on 2nd October 2001. The first year's work program resulted in fixing the location of Habanero 1, the first deep geothermal well to be drilled in Australia. In the second year's program Habanero 1 was completed along with the deployment of an acoustic monitoring network.

During the 2003-2004 year (year 3) the main activities were the hydraulic stimulation of the granite fracture system from Habanero 1 and the completion of a significant part of the drilling of Habanero 2 approximately 500m SW of Habanero 1.

This report (year 4) is for the period 2 October 2004 to 1 October 2005. In this period Habanero 2 was completed including a side track around a section of lost drill pipe.

The side track was completed on 28 December 2004 at a depth of 4,358m. Further trouble in the well resulted in the dropping of a bridge plug which still remains at an unknown depth. Following completion of the side track a complex series of flows and injections took place in both Habanero 1 and Habanero 2. Flow from Habanero 2 was driven by the natural artesian pressures of 34.6MPa (5,020 psi) at surface.

The first flow was achieved on 31 March 2005 with Habanero 2 open for 30 minutes. Over the period 24 May to 8 June 2005 Habanero 2 was flowed continuously, but productivity declined because of obstruction either in the well or close to the well in the fracture system. Maximum production was in excess of 20 l/ sec with a maximum surface flowing temperature of 210°C. Temperature logging down hole confirmed flow from the fracture system at 250°C. In late July 2005 the well was injected with acid to try to remove calcium carbonate lost circulation material that may have been part of the obstruction. The injection was not successful, and it was determined that the main fracture system was effectively blocked off at a depth of more than 4,270m. However a number of higher fractures independent of the main fracture system were active.

During August and September 2005 hydraulic stimulation was carried out first from Habanero 2 in the accessible upper fracture system, and then from Habanero 1 in the main lower fracture system. These stimulations were highly successful with the upper fracture system behaving as an independent stimulated reservoir, and the lower system being extended by more than 50% compared to the stimulated region previously developed in 2003. The upper system is not connected at Habanero 1 because it intersects the well behind casing.

## Reporting Against Requirements of the Petroleum Act 2000

### ***(a) Summary of the regulated activities conducted under the licence during the year***

The regulated activities for the year are set out below:

<b>Activity</b>	<b>Site</b>	<b>Timing</b>
Drilling and fishing for bridge plug	Habanero 2 and Habanero 2 ST1	October 2004 - January 2005
Diagnostic Testing, Enhancement & Circulation	Habanero 2 and Habanero 1	February 2005 – October 2005
Cooper Creek Water Pumping	Cooper Creek to Habanero 2	April 2005 and July – October 2005
Microseismic monitoring	Surrounding monitoring network	Whole of year

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

Approval to carry out diagnostic testing, enhancement and circulation between Habanero 1 and Habanero 2 was submitted to PIRSA on 13 November 2004.

A request to pump water from Cooper Creek whilst it was in flood was submitted to PIRSA on 21 February 2005. After approval, water was pumped from the river at approximately 6 l/sec for the period 2 April 2005 to 30 April 2005 and again from 16 July 2005. The rate of abstraction was increased to 10 l/sec on 5 September 2005 by adding an in-line boost pump.

Geodynamics, as a new and junior operator, has been classified as high supervision by the Department. There were no Notices of non-compliance with the Petroleum Act 2000 received during the period.

### ***(c) Actions to rectify non-compliance with obligations imposed by the Act, these regulations or the licence, and to minimise the likelihood of the recurrence of any such non-compliance; and (d) a 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.***

Manager, Logistics and Compliance continues to track activities under the Act and ensure that we comply with all Regulations. Computer based tracking

systems are in operation including monthly safety reports and compliance reports.

***(e) List all reports and data relevant to the operation of the Act during the relevant licence year.***

<b>Report</b>	<b>Date submitted</b>
Operator Classification & Activity Notification for Diagnostic Testing, Enhancement & Circulation Statement of Environmental Objectives and Environmental Impact Report	13 November 2004
Habanero 2 PFC/Gamma Ray log	6 January 2005
Cuttings samples for Habanero 2 10ft intervals from 12,010ft to 14,245 ft	13 January 2005
Cuttings samples for Habanero 2 ST1 10ft intervals from 12,720ft to 14,297 ft	13 January 2005
Operator Classification & Activity Notification for Cooper Creek Water Harvesting	21 February 2005
Habanero 2 Well Completion Report	3 September 2005
Daily drilling and circulation test reports	Daily as required

***(f) Report of incidents reportable to the Minister under the Act and regulations***

There were no reportable incidents during the period.

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

During the flow test of Habanero 2 there was monitoring of gases and radon emissions into the air, and samples of water and steam were collected for chemical analysis. Radon was shown to be well below levels of concern and only slightly above the low background of the area, and there were no other special safety concerns from water and steam production.

The water produced was collected in a clay lined pond and returned down the well after operating a flocculation system to remove silica that had precipitated in the pond water. More than 80% of the produced water was returned to the granite fracture network.

***(h) Operations proposed for the ensuing year***

Operations in September 2005 showed that the proposed long term circulation and tracer testing of the Habanero 1 and 2 doublet would not be possible at this time because of blockage from the main fracture system at Habanero 2. The most likely cause is plugging of flow by material around the dropped bridge plug. To overcome this problem a well intervention will be required.

At the time of writing the intervention type had been decided upon, and preparations for using a snubbing unit to carry out a second side track were in full swing. Following the successful re-establishment of connection between Habanero 2 and the main fracture system, the program of long term circulation and tracer testing will take place. This will result in a bankable geothermal reserve that would allow construction of a two-well geothermal power station of the order of 2-3 megawatts net.

During the year there would be considerable activity on the design of the power station and on design, location and preparation of scale-up wells.

#### **Expenditure for year 4**

*Commercial in Confidence*

A handwritten signature in black ink, appearing to read 'D Wyborn', with a stylized, cursive script.

Doone Wyborn

22-12-2005