

Geothermal Exploration License 98 Annual Report for 2004

Introduction

GEL 98 was granted to Geodynamics Limited on 2nd October 2001. The first years 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 up to 1 October 2003, Habanero 1 was completed along with the ancillary activities such as development of the acoustic monitoring network and provision of water supply. The rig release from Habanero 1 was 14 October 2003. This report is for the period 2 October 2003 to 1 October 2004.

During the 2003-2004 year the main activities were the hydraulic stimulation of the granite fracture system in Habanero 1, location of the Habanero 2 well and drilling of Habanero 2 approximately 500m SW of Habanero 1.

Hydraulic stimulation of Habanero 1

Pumping of water at high pressures into Habanero 1 took place over a period from 5 November 2003 to 22 December 2003. During that time approximately 20,000 cubic metres of water was injected, initially in pulses into the open hole below 4,139m, then continuous injection up to 25 l/second, and finally into perforated casing sections with the open hole section plugged off with salt.

The stimulation water was mostly obtained from pumping from a flood event in Coopers Creek, but about 20% was obtained from two 40m deep water wells drilled close to the Habanero site. One of these wells, Darby's Bore contains potable water pumped at a rate of 4 l/sec, which has subsequently been the main source of water for all following operations including the drilling of Habanero 2.

During the stimulation the microseismic recording network of 8 wells set up during the previous year recorded microseismic events. Up until the end of the stimulation the recording system from Tohoku University, Japan, attached to the microseismic network recorded 32,000 triggers and 11,725 of these were located in 3D space and time on-site. The overall dimensions of the seismic cloud grew to more than 350m (thickness) x 1000m (east-west) x 2000m (north-south) by the end of the stimulation.

Habanero 2 well.

The well was spudded on 10 July 2004 using Century Rig 27. By the end of the reporting period at midnight on 1 October 2004, the 7 inch casing had been set at a depth of 3,921m, and the well was at a depth of 4,166m. The basement granite was intersected at a depth of 3,681m or 13m deeper than in Habanero 1. Up until this time there had been little trouble, and the well had essentially tracked the predicted time depth curve (83 days).

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:

Activity	Site	Timing
Water injection and microseismic monitoring	Habanero 1 and surrounding monitoring network	November-December 2003
Drilling	Habanero 2	July-October 2004
Logging	Habanero 2	September 2004

(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 water injection into Habanero 1 and associated microseismic monitoring was given in the previous reporting period.

Habanero 2 Well Notification was submitted to PIRSA on 16 April 2004. A bridging document adopting Century Resources procedures was submitted on 2 June, and Conditional Approval to drill was granted on 11 June 2004.

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.

Geodynamics has put into effect significant improvements to its management system for undertaking activities under the Petroleum Act. The company has employed a Manager of Logistics and Compliance whose role is to specifically track our activities under the Act and ensure that we comply with all Regulations. Computer based tracking systems are being managed 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.

Report	Date submitted
Habanero 1 Well Completion Report	28 April 2004
Habanero 1 Stimulation Operations Review	15 June 2004
Habanero 2 Activity Notification request for approval to drill Habanero 2, Statement of Environmental Objectives and Environmental Impact Statement	16 April 2004
Habanero 2 Notification to commence drilling and bridging document	2 June 2004
Daily drilling reports Habanero 2	Daily from 10 July to 1 October 2004
Habanero 1 Composite Log	9 September 2004
Wireline logging report Habanero 2 4CAL/DSL/TTRm	23 September 2004

(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.

A wellhead monitoring and maintenance program is being implemented for the longer term. During the flow test due in February 2005 there will be monitoring of gases, radioactivity and possible high levels of chemicals in produced water. A new statement of Environmental Objectives and Environmental Impact Report has been produced to cover these conditions.

(h) Operations proposed for the ensuing year

At the time of writing, Habanero 2 had been completed at a depth of 4,358m. During drilling operations in the fractured granite there were events that included mud losses and formation water influx. Pressure responses were detected at the Habanero 1 well head during these events indicating communication via the fracture network between the two wells. The main operations for the remainder of the year will be a comprehensive flow and circulation testing program. This is divided into three parts:

1/ Diagnostic phase of flow test and short circulation test

- 2/ Enhancement phase where there will be attempts to improve the heat exchanger between the two wells by a number of stimulation techniques.
- 3/ Long term circulation test to determine the economics of the system.

In the latter half of the reporting year there will be considerable effort examining the economic viability of HFR development relating to the Habanero test site. A review of geological conditions and newly acquired hydraulic data around the Habanero test site will be used to determine the viability of a small two-well power station and the possible locations for future wells.

Expenditure for year 3

COMMERCIAL IN CONFIDENCE