



**PEL 107
Cooper/Eromanga Basin
South Australia**

**Annual Report
Permit Year 1**

2nd April 2003 to 1st April 2004

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1 Introduction

Petroleum Exploration Licence No. 107 is situated on the southern margin of the Patchawarra Trough, Cooper/Eromanga Basin, South Australia. The first year of the licence covers the period 2nd April 2003 to 1st April 2004.

This report summarises the work performed by the Joint Venture during this first year of the licence, in accordance with the requirements of Section 33 of the Petroleum Regulations 2002.

2 Permit Summary

The working interests in PEL 107 at the end of this reporting period were:

Beach Petroleum Ltd (Operator) 40%
Great Artesian Oil and Gas Ltd 60%

The original work commitments for PEL 107 are summarised as follows:

Licence Year	Minimum Work Program	Actual Work
Year 1 (2/04/03-1/04/04)	Two wells; 50km 2D seismic	Two wells*; 153km 2D; 270km reprocess seismic
Year 2 (2/04/04-1/04/05)	Two wells; 50km 2D seismic	
Year 3 (2/04/05-1/04/06)	Two wells; 50km 2D seismic	
Year 4 (2/04/06-1/04/07)	Two wells	
Year 5 (2/04/07-1/04/08)	Two wells	

* The second of the wells actually spudded on 9/04/04 (eight days after the permit anniversary) due to prior drilling commitments – see Compliance Report)

3 Exploration Activity

1.1 Drilling

One exploration well (Moana-1) was drilled during the permit term, while a second well (Goolwa-1) spudded eight days after the permit term anniversary as a result of testing operations on the previous well (an application to vary the permit terms has been submitted).

Moana-1 spudded on 15/07/03 and drilled to a total depth of 2256metres. This well intersected an Eromanga section overlying a Cooper Basin Early Permian interval. One DST (2054 – 2080m) was conducted in response to weak gas shows within the Patchawarra Formation, but the interval produced only a minor formation water recovery. The well was plugged and abandoned after logging, and the rig released on 31/07/03. A Well Completion Report for Moana-1 was submitted to PIRSA in February 2004.

The result of Moana -1 suggests that hydrocarbons have failed to charge the structure, indicating that migration complexity remains a significant risk along the flanks of the Patchawarra Trough.

Goolwa-1 spudded on 9/04/04 and reached a TD of 2684m after penetrating designated Permian targets. Two DSTs were conducted, the first failing to flow from tight reservoir, and the second producing formation water. The well was subsequently plugged and abandoned, and the rig released on 2/05/04.

1.2 Seismic Data Acquisition

A total of 153km of new 2D seismic data was recorded during Year 1. The final operations report for the Albus seismic survey is currently in preparation.

At the end of Permit Year 1, the total acquired 2D seismic has fulfilled the entire licence commitment.

1.3 Seismic Data Processing/ Reprocessing

A total of 270 km of existing seismic was reprocessed during the permit year.

1.4 Geological and Geophysical Studies.

Technical studies during this second permit term were chiefly directed toward the drilling of the Moana-1 and Goolwa-1 wells, and the Albus seismic acquisition program.

4 Administration

4.1 Regulatory Compliance

A Compliance Report is attached which details the operator's compliance with the 2000 Petroleum Act, its Regulations, the terms and conditions of the Licence, and the agreed Statements of Environmental Objectives governing field operations undertaken during the permit term.

4.2 Data submissions.

A list of the items submitted during the report period is contained in the table below.

Table 1

**PEL 107
Annual Report
Licence Year 1
2nd April 2003 to 1st April 2004**

List of documents submitted

<u>Title</u>	
Environmental Monitoring Report for Albus Seismic Survey PEL 107	16-Feb-04
Moana-1 Well Proposal	11-Apr-03
Moana-1 Drilling Program	11-Apr-03
Moana-1 Well Completion Report	13-Feb-04
Goolwa-1 Well Proposal	25-Mar-04
Goolwa-1 Drilling Program	25-Mar-04

4.3 Planned Exploration Program for Year 2

Two exploration wells are anticipated for Year 2. The locations and targets will be chosen after integration of the Goolwa-1 results.

5 Expenditure statement

A licence expenditure summary for the period 2nd April 2003 to 1st April 2004 is presented as Table 2.

Table 2

**PEL 107
Annual Report
Licence Year 1
2nd April 2003 to 1st April 2004**

Statement of Expenditure

Commercial in confidence

ANNUAL
COMPLIANCE
REPORT

FOR

PEL 107 - YEAR 1

(APRIL 2003 - MARCH 2004)

COOPER BASIN, SOUTH AUSTRALIA



Introduction

Pursuant to Regulation 33 (2) of the 2000 Petroleum Act, Beach Petroleum, as operator of PEL 107 in the Cooper Basin, South Australia, herewith submits its report on compliance with :

- the Petroleum Act,
- its Regulations,
- the PEL License conditions, and
- the various Statements of Environmental Objectives to which Beach Petroleum was committed in conducting its work commitments for Year 1 of the Licence.

A table is attached summarizing the instances during Year 1 of the Permit where Beach Petroleum did not comply with the Regulations or the requirements of the relevant SEO under which it conducted its operations.

Further details of the circumstances surrounding the non-compliances are outlined below.

Petroleum Act and PEL License Conditions

There were no instances of non-compliance with the 2000 Petroleum Act during Year 1 of PEL 107, however there was one instance of non-compliance with the terms of the Licence.

The work commitments for Year 1 of the License called for two wells to be drilled. The rig contracted to drill the second well, Goolwa-1, encountered unexpected delays during its work program just prior to the scheduled commencement for this well.

As a result, the drilling operations did not commence until one week after Year 1 of the permit had expired. Beach Petroleum have applied to PIRSA for a variation in the work program for this permit to accommodate this unexpected change in the schedule.

Regulations of the 2000 Petroleum Act

- **Drilling**

There were no instances of non-compliance with the Regulations in regard to Beach's **drilling operations** in PEL 107.

The Moana-1 well was drilled in July 2003. Digital wireline logging data was submitted to PIRSA before the due date. Beach applied for a short extension to the date for submitting the Well Completion Report, and the Report was submitted prior to the extended deadline.

Drilling of Goolwa-1, the second of the two wells committed for Year 1, commenced on 9th April, 2004, one week after the end of Year 1 of the permit. Accordingly, no data or reports relating to this second well were due for submission during Year 1.

- **Seismic**

There were no instances of non-compliance with the Regulations in regard to Beach's **seismic field operations** in PEL 07.

The 2003 Albus Seismic Survey included the recording of 152 kilometres of survey lines in PEL 107.

Data acquisition for the Albus Survey finished on 3rd October 2003, and the attached Geophysical Reports Checklist shows that the data sets and Reports from the Albus Survey are all due to be submitted to PIRSA during Year 2 of the permit.

Work commitments for Year 1 of PEL 107 also called for the **reprocessing** of archive seismic data. A total of 270 kilometres of archive seismic data from the PEL 107 area were reprocessed.

The archive data was processed simultaneously with the newly acquired data and the combined data set was delivered to Beach on 30th March 2004.



Record of Non - Compliance with Regulations

Permit : PEL 107 Year 1 : 2 April 2004 - 1 April 2004

Drilling			
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SEO Non Compliance	Date	Incident Date & Description	Resolution
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Report Non Compliance	Date Due	Report Name	Resolution
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*Well Completion Report for **Moana-1** was submitted two weeks after due date by agreement with PIRSA.*

*Well Completion Report for **Goolwa-1** is not required to be submitted to PIRSA until after the end of Year 1 of the Licence.*

Data Submission Non Compliance	Date Due	Data Type	Resolution
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Moana-1 Digital Wireline Data	01-Sep-03	Digital log data was submitted 2 weeks early - on 19 / 08 / 03	
Goolwa-1 Digital Wireline Data	02-Jul-04	Digital log data not required to be submitted until Year 2 of the permit.	

Seismic			
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SEO Non Compliance	Date	Incident Date & Description	Resolution
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Report Non Compliance	Date Due	Report Name	Resolution
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Environmental Report for the PEL 107 component of the Albus seismic survey was submitted on 3rd December 2003.
No other Reports from the Albus Survey are required to be submitted to PIRSA until after the end of Year 1 of the Licence.

Data Submission Non Compliance	Date Due	Data Type	Resolution
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No data sets from the Albus Survey are required to be submitted to PIRSA until after the end of Year 1 of the Licence.

CHECKLIST FOR NOTIFICATIONS OF DRILLING OPERATIONS

Permit : PEL 107 Year 1 : 2 April 2003 - 1 April 2004

Well Name : Moana -1

Commenced Drilling Operations : 15 July 2003

Completed Drilling Operations : 1 August 2003

REQUIREMENT	Format	Person / agency to whom Notification is to be provided	Period required for Notification	DUE DATE for Notification	ACTUAL DATE of Notification	Beach officer responsible for compliance	Comments
Notification of proposed drilling activity including demonstration of the suitability of an existing SEO.		PIRSA / Mike Malavazos	35 days prior to proposed start date	10-Jun-03	22-Apr-03	Exploration Manager	PIRSA Approval received on 24 April 2003.
Notification of proposed commencement of earthworks – preparation of access tracks and well leases		PIRSA / Tony Wright	2 days prior to proposed start date		12-May-03	Exploration Manager	
Notification to landowner (s)		Pastoral Lessee;	21 days prior to proposed start date	24-Jun-03	10-Apr-03	Exploration Manager	Mungeranie Station and Murta Station
		National Parks;	21 days prior to proposed start date	24-Jun-03	Not required	Exploration Manager	
		Native Title Claimant(s);	21 days prior to proposed start date	24-Jun-03	27-Feb-03	Exploration Manager	Ngayana Dieri Karna
		Other PEL or PL Licencees as appropriate	21 days prior to proposed start date	24-Jun-03	Not Required		

Well Name : Goolwa -1

Commenced Drilling Operations : 9 April 2004

Completed Drilling Operations : 2 May 2004

REQUIREMENT	Format	Person / agency to whom Notification is to be provided	Period required for Notification	DUE DATE for Notification	ACTUAL DATE of Notification	Beach officer responsible for compliance	Comments
Notification of proposed drilling activity including demonstration of the suitability of an existing SEO.		PIRSA / Mike Malavazos	35 days prior to proposed start date	6-Mar-04	2-Mar-04	Exploration Manager	PIRSA Approval received on 24 April 2003.
Notification of proposed commencement of earthworks – preparation of access tracks and well leases		PIRSA / Tony Wright	2 days prior to proposed start date			Exploration Manager	
Notification to landowner (s)		Pastoral Lessee;	21 days prior to proposed start date	20-Mar-04	6-Feb-04	Exploration Manager	Mungeranie Station and Murta Station
		National Parks;	21 days prior to proposed start date	20-Mar-04	Not required	Exploration Manager	
		Native Title Claimant(s);	21 days prior to proposed start date	20-Mar-04	6-Feb-04	Exploration Manager	Ngayana Dieri Karna
		Other PEL or PL Licencees as appropriate	21 days prior to proposed start date	20-Mar-04	Not Required	Exploration Manager	

CHECKLIST FOR SUBMISSION OF DRILLING REPORTS TO PIRSA

Permit : PEL 107 Year 1 : **2 April 2003 - 1 April 2004**

Well Name : Moana -1

Commenced Drilling Operations : 15 July 2003

Completed Drilling Operations : 1 August 2003

REPORT / DATA SET	Format	Person / agency to whom information is to be provided.	Period allowed for Submitting data.	Date Due	Date Submitted	Beach officer responsible for compliance	Comments
Daily Drilling Reports		PIRSA	Within 12 hrs of report period.	During Drilling Operations	During Drilling Operations	Exploration Manager	
Wireline logs		PIRSA	Within 1 month of acquisition of data.	1-Sep-03	19-Aug-03	Exploration Manager	
Mud logging data		PIRSA	Included with Daily Drilling Reports, then subsequently with the Well Completion Report.	During Drilling Operations	During Drilling Operations	Exploration Manager	
Well samples		PIRSA	Within 6 months of rig release.	1-Feb-04	12-Jan-04	Exploration Manager	
Well Completion Report		PIRSA	Within 6 months of rig release.	1-Feb-04	13-Feb-04	Exploration Manager	
Reportable Incidents.		PIRSA	Serious incidents must be reported immediately (within 24 hrs), with a written report following within 3 months.	No Reportable Incidents		Exploration Manager	
<i>Note : Well Completion Reports contain Borehole Deviation data ; Surveyed Location of well ; and other technical reports associated with the well.</i>							

Well Name : Goolwa -1

Commenced Drilling Operations : 9 April 2004

Completed Drilling Operations : 2 May 2004

REPORT / DATA SET	Format	Person / agency to whom information is to be provided.	Period allowed for Submitting data.	Date Due	Date Submitted	Beach officer responsible for compliance	Comments
Daily Drilling Reports		PIRSA	Within 12 hrs of report period.	During Drilling Operations	During Drilling Operations	Exploration Manager	
Wireline logs		PIRSA	Within 2 months of acquisition of data.	2-Jul-04	Not Required until Permit Year 2	Exploration Manager	
Mud logging data		PIRSA	Included with Daily Drilling Reports, then subsequently with the Well Completion Report.	During Drilling Operations	During Drilling Operations	Exploration Manager	
Well samples		PIRSA	Within 6 months of rig release.	2-Nov-04	Not Required until Permit Year 2	Exploration Manager	
Well Completion Report		PIRSA	Within 6 months of rig release.	2-Nov-04		Exploration Manager	
Reportable Incidents.		PIRSA	Serious incidents must be reported immediately (within 24 hrs), with a written report following within 3 months.	No Reportable Incidents		Exploration Manager	
<i>Note : Well Completion Reports contain Borehole Deviation data ; Surveyed Location of well ; and other technical reports associated with the well.</i>							

CHECKLIST FOR SUBMITTING GEOPHYSICAL DATA AND REPORTS TO PIRSA

Permit : PEL 107 Year 1 : 2 April 2003 - 1 April 2004

Geophysical Data	Specifics	Format	Time Period	Due Date	Comments
Survey Name : 2003 Albus Seismic Survey					
Completed Recording of Albus Survey on 3rd October 2003					
Geophysical Progress Reports		Word or PDF	Periodic basis determined after consultation with Minister		
Geophysical Operations Reports - recording and processing		Hardcopy, PDF	PIRSA have increased the period allowed for submitting Operations Reports. The allowed period is now 12 months after completion of recording of the data.	3-Oct-04	<i>No Data or Reports for the Albus Survey are required to be submitted <u>until after the end of Permit Year 1</u></i>
Geophysical Data - Seismic	Seismic Field Data			3-Oct-04	
Geophysical Data - Seismic	Obs Logs	GDA 94		3-Oct-04	
Geophysical Data - Seismic	Nav data including elevations & bathymetry	GDA 94		3-Oct-04	
Geophysical Data - Seismic	Field statics			3-Oct-04	
Geophysical Data - Seismic	Processed 2D seismic sections			3-Oct-04	
Geophysical Interpretation Reports		Hardcopy, PDF	Within 12 months of completion of processing of data (increased from 6 months)	30-Mar-05	Processing of data recorded in PEL 107 was completed on 30th March 2004 .
Geophysical Data - Seismic	Processed 3D data vols and velocities			N / A	No 3D surveys recorded during Permit Year
Geophysical Data - Seismic	Processed 3D time slices (if they have been produced)			N / A	No 3D surveys recorded during Permit Year
Geophysical Data	Any other field acquisition data!!!!			N / A	
Reprocessing of 270 kms					
Completed Reprocessing of archive data on 30th March 2004					
Geophysical Operations Reports - reprocessing		Hardcopy, PDF	Within 2 months of completion of reprocessing data	30-May-04	Reprocessing of archive seismic data was undertaken simultaneously with the processing of the new data from the Albus survey. The combined data sets were delivered to Beach on 5 Feb 2004 . Details of the techniques used for the reprocessing were included in the Processing Report for the Albus Survey, which was delivered on 30 March 2004.
Geophysical Interpretation Reports		Hardcopy, PDF	Within 12 months of completion of reprocessing data	5-Aug-04	
Geophysical Data - Seismic	Reprocessing - transcribed copy of field data		Same time as associated Operations Reports	30-May-04	
Geophysical Data - Seismic	Reprocessing - field tape transcription log			30-May-04	
Geophysical Data - Seismic	Reprocessing - tape & file listing of field data that has been copied & reprocessed			30-May-04	

Statements of Environmental Objectives.

A) Drilling Operations

Government approval for Beach to drill the Moana-1 and Goolwa-1 wells in PEL 107 was conditional on Beach committing to achieving the objectives defined in the “Statement of Environmental Objectives for Drilling and Well Operations in the Cooper / Eromanga Basins – South Australia “.

No commercial quantities of hydrocarbons were encountered during the drilling of either well, and both wells were plugged and abandoned. Rehabilitation of the well sites will commence when the standing water remaining in the sump pits has fully evaporated. It is anticipated that the Moana-1 site should be ready for rehabilitation in the second quarter of 2004, and Goolwa-1 site in the final quarter of 2004.

Accordingly, it will not be possible to assess Beach’s performance in achieving the SEO objectives relating to site rehabilitation until that time.

Access tracks to the Moana-1 and Goolwa-1 well sites will not be rehabilitated as requested by the landowner.

Beach is satisfied that all the other objectives required by the SEO were met, and the spreadsheet below summarises the strategies that were employed to accomplish this compliance.

**ASSESSMENT OF BEACH PETROLEUM'S PERFORMANCE IN ACHIEVING
THE ENVIRONMENTAL OBJECTIVES DEFINED IN THE COOPER BASIN DRILLING SEO**

WELLNAME : MOANA-1

PEL No. : 107

DATE : JULY 2003

OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
<p>1. Avoid disturbance to known sites of Aboriginal and European heritage significance.</p>	<p>The aim of this objective is to ensure that any sites of Aboriginal and European heritage significance are identified and protected. Sites can be identified during the planning stages of well site and access track construction or can be discovered during construction activities. To ensure the achievement of this objective personnel must be appropriately trained and experienced in identifying and protecting sites of Aboriginal and European heritage significance at both the planning and construction stages.</p>	<ul style="list-style-type: none"> ▪ Proposed well site and access track locations have been scouted by appropriately trained and experienced personnel for sites of Aboriginal and European heritage significance before commencement of construction. ▪ Records of scouting are kept and available for auditing. ▪ The operator has a mechanism in place to appropriately report and respond appropriately to any sites discovered during construction and operation activities. ▪ Any sites identified have been flagged and subsequently avoided. <p><i>Note:</i> Where a negotiated agreement or determination for heritage clearance is in place, compliance to this agreement or determination takes precedence over the above criteria.</p>	<ul style="list-style-type: none"> ▪ Beach have an agreement with the Ngayana Dieri Karna Native Title Claimant group which specifies the requirements for scouting proposed well sites and access tracks to identify and avoid areas of heritage value and archaeological significance. ▪ Joint site visits have been carried out with the Native Title Claimant group. Proposed drilling locations and access routes have been agreed and given heritage clearance.
<p>2. Avoid disturbances which have long term impact on biological or wilderness values of a particular area.</p>	<p>A number of areas which are considered to have high biological or wilderness values are shown in Figure 1. Also included are any activities that are assessed to be of significant risk to the Cooper Creek system.</p>	<ul style="list-style-type: none"> ▪ No activities that are assessed to be located in the regions described in the scope above are to be carried out without the prior specific approval of the Minister. 	<ul style="list-style-type: none"> ▪ The well is not located in or near the areas of high biological or wilderness values shown in Figure 1 of the SEO. The drilling operations presented no danger of long term impact on the biological or wilderness values of this particular area.

**ASSESSMENT OF BEACH PETROLEUM'S PERFORMANCE IN ACHIEVING
THE ENVIRONMENTAL OBJECTIVES DEFINED IN THE COOPER BASIN DRILLING SEO**

WELLNAME : MOANA-1

PEL No. : 107

DATE : JULY 2003

OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
<p>3. Minimise disturbance to native vegetation and wildlife habitat.</p>	<p>Well site and access track construction has been shown to have an insignificant impact on native vegetation and wildlife habitat by a number of studies¹. This is due to the small and confined area impacted on by the well site and access track. Nevertheless, due to the significance of native vegetation and fauna it is important to monitor the achievement of this objective.</p> <p>The aim of this objective is to also maximise the potential for revegetation success.</p>	<ul style="list-style-type: none"> ▪ Proposed well site and access track locations have been scouted by appropriately trained and experienced personnel for native vegetation and wildlife habitats. ▪ Vegetation clearance has been minimised and has taken into account the conservation needs of particular species. ▪ Records of vegetation clearance are kept and available for auditing. ▪ The attainment of either 0, +1 or +2 GAS criteria for "Re-establish natural vegetation on abandoned wellsites and access tracks" objective listed in Appendix 2. ▪ Hazardous material stored, used and disposed of in accordance with relevant 	<ul style="list-style-type: none"> ▪ The access track to Moana had previously been cleared (and then subsequently rehabilitated) by Santos. Consequently, very minimal clearing of vegetation was required to reopen the track. ▪ Vegetation at the well site consisted of sparse low vegetation, and minimal clearance was required. ▪ The well site will be rehabilitated and restored in accordance with the guidelines set down in PIRSA's <i>Field Guide for the Environmental Assessment of Abandoned Petroleum Wellsites in the Cooper Basin, South Australia</i>, to attain the highest feasible GAS rating. Rehabilitation is scheduled for the second quarter of 2004.

¹ Leigh, J.H. and Briggs, J.D (Eds), 1994. *Threatened Australian Plants: Overview and Case Studies*. Australian National Parks and Wildlife Service, Canberra;
 Garnett, S., 1992a. *The Action Plan for Australian Birds of Australia*, Australian National Parks and Wildlife Service. Endangered Species Program, Project 121.
 Garnett, S. (Ed.), 1992b. *Threatened and Extinct Birds of Australia*. Royal Australian Ornithologists Union. Report, 82.
 Wager, R. and Jackson, P., 1993. *The Action Plan for Australian Fresh Water Fishes*. Australian Nature Conservation Agency. Endangered Species Program, Project 147.
 Lee, A.K., 1995. *The Action Plan for Australian Rodents*. Australian Nature Conservation Agency. Endangered Species Program, Project 130.
 Kennedy, M., 1992. *Australian Endangered Marsupials and Monotremes: An Action Plan for their Conservation*. IVCN, Gland, Switzerland.

**ASSESSMENT OF BEACH PETROLEUM'S PERFORMANCE IN ACHIEVING
THE ENVIRONMENTAL OBJECTIVES DEFINED IN THE COOPER BASIN DRILLING SEO**

WELLNAME : MOANA-1

PEL No. : 107

DATE : JULY 2003

OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
		legislation on dangerous substances.	<ul style="list-style-type: none"> ▪ The landowner has requested that no rehabilitation be carried out on the access track to Moana. The track will be beneficial to his pastoral activities. ▪ Beach's Drilling Operations Manual sets out the company's policy in relation to storage, use and disposal of hazardous material. ▪ Topsoil was stockpiled for subsequent respreading when restoration activities are conducted.
4. Avoid disturbance to rare, vulnerable and endangered flora and fauna species.	Rare, vulnerable and endangered flora and fauna species are defined by Schedule 7, 8 and 9 of the <i>National Parks and Wildlife Act, 1972</i>	<ul style="list-style-type: none"> ▪ Proposed well site and access track locations have been scouted for rare, vulnerable and endangered flora and fauna species by appropriately trained and experienced personnel before the commencement of construction. ▪ Any sites of rare, vulnerable and endangered flora and fauna have been identified, flagged and subsequently avoided. ▪ Records of such scouting are kept and available for auditing. 	<ul style="list-style-type: none"> ▪ National Parks and Wildlife flora / fauna databases contain no records of vulnerable or endangered species within 20km of the (database search March 2003).
5. Prevent the introduction and establishment of exotic weed species.	The major potential source of weed introduction is from vehicles and equipment brought in from other regions of the state or interstate for the various well activities. The most effective way of preventing weed introduction is by thoroughly cleaning vehicles and equipment prior to entering the Cooper–Eromanga Basins.	<ul style="list-style-type: none"> ▪ All vehicles and equipment appropriately cleaned prior to entering the Cooper–Eromanga Basins. ▪ Cleaning carried out in accordance with specified company procedures and accepted practices. ▪ Records of vehicle and equipment cleaning are kept and available for 	<ul style="list-style-type: none"> ▪ All vehicles involved with the drilling operation were already in service in the Cooper Basin prior to commencing work at the Moana-1 well.

**ASSESSMENT OF BEACH PETROLEUM'S PERFORMANCE IN ACHIEVING
THE ENVIRONMENTAL OBJECTIVES DEFINED IN THE COOPER BASIN DRILLING SEO**

WELLNAME : MOANA-1

PEL No. : 107

DATE : JULY 2003

OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
		auditing. <ul style="list-style-type: none"> ▪ Detection of exotic weed species as a consequence of industry activities. 	
6. Minimise impacts to soil.	<p>The main impact to soil is caused by the removal of existing soil and / or the importation of foreign material for the construction of the well sites and access tracks. This creates a visual impact and can also alter the soil characteristics which can, in turn, impact on the effective re-establishment of native species.</p> <p>Another potential impact to soil is soil contamination from accidental spillages of chemicals or hazardous during construction and operation.</p>	<ul style="list-style-type: none"> ▪ The attainment of 0, +1 or +2 GAS Criteria for "Minimise Visual Impact of Abandoned Wellsites" objective listed in Appendix 2. ▪ The attainment of 0, +1 or +2 GAS Criteria for "Minimise Visual Impact of Abandoned Access Tracks" objective listed in Appendix 2. ▪ The attainment of either 0, +1 or +2 GAS criteria for "Re-establish natural vegetation on abandoned wellsites and access tracks" objective listed in Appendix 2. ▪ Hazardous material stored, used and disposed of in accordance with relevant legislation on dangerous substances. 	<ul style="list-style-type: none"> ▪ Clay topping of the well pad and the access track minimised disturbance to the soil beneath. The clay material was extracted from a number of borrow pits alongside the access track. ▪ When the standing water in the sump pit has fully evaporated, the well site will be rehabilitated and restored in accordance with the guidelines set down in PIRSA's <i>Field Guide for the Environmental Assessment of Abandoned Petroleum Wellsites in the Cooper Basin, South Australia</i>, to attain the highest feasible GAS rating. ▪ The landowner has requested that no rehabilitation be carried out on the access track to Moana. The track will be beneficial to his pastoral activities.
7. Avoid initiating erosion on gibber pavements.	It is recognised that the removal of the overlying gibber mantle inevitably leads to severe gully erosion on the gibber plains with a	<ul style="list-style-type: none"> ▪ The attainment of 0, +1 or +2 GAS Criteria for "Minimise Visual Impact of Abandoned Wellsites" objective listed in Appendix 2. 	<ul style="list-style-type: none"> ▪ There were no gibber pavements along the proposed access track or at the Moana well site.

**ASSESSMENT OF BEACH PETROLEUM'S PERFORMANCE IN ACHIEVING
THE ENVIRONMENTAL OBJECTIVES DEFINED IN THE COOPER BASIN DRILLING SEO**

WELLNAME : **MOANA-1**

PEL No. : **107**

DATE : **JULY 2003**

OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
	<p>slope greater than 2 degrees in the Cooper Basin². It is therefore important to avoid removal of gibber stones in the construction of well sites and access tracks.</p>	<ul style="list-style-type: none"> ▪ The attainment of 0, +1 or +2 GAS Criteria for "Minimise Visual Impact of Abandoned Access Tracks" objective listed in Appendix 2. ▪ Gibber mantle on access tracks has not been removed, only rolled to allow vehicle and equipment access. ▪ Gibber mantle removal on well sites confined to the mud pit, cellar and turkey's nest areas. ▪ Gibber mantle removed from such areas is respread and rolled over the disturbed area during restoration. 	
<p>8. Minimise loss of reservoir and aquifer pressures and contamination of freshwater aquifers.</p>	<p>This objective seeks to protect the water quality and water pressure of aquifers that may potentially be useful as water supplies, and to maintain pressure in sands that may host petroleum accumulations elsewhere.</p> <p>To address this objective, the risks of crossflow between formations known to be permeable and in natural hydraulic isolation from each other, or where there is insufficient information to determine that they are permeable or in hydraulic communication, must be assessed on a case by case basis and procedures implemented to isolate these formations.</p> <p>The following geological formations in the Cooper-Eromanga Basins may contain</p>	<p><u>Drilling & Completion Activities</u></p> <ul style="list-style-type: none"> ▪ Casing design (including setting depths) have been carried out in accordance with company defined procedures which satisfy worst case expected loads and environmental conditions determined for the particular well. ▪ Casing set in accord with design parameters and company approved procedures. ▪ Sufficient isolation between any of the formations listed in the adjacent column – where present – is substantiated (eg through well logs, pressure measurements or casing integrity measurements). 	<ul style="list-style-type: none"> ▪ Cement plugs were placed to isolate any aquifers penetrated below surface casing, and any zones of pressure differential, to ensure no likelihood of crossflow of groundwaters .

² Refer to Fatchen and Woodburn in the references section of this Statement of Environmental Objectives.

**ASSESSMENT OF BEACH PETROLEUM'S PERFORMANCE IN ACHIEVING
THE ENVIRONMENTAL OBJECTIVES DEFINED IN THE COOPER BASIN DRILLING SEO**

WELLNAME : MOANA-1

PEL No. : 107

DATE : JULY 2003

OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
	<p>permeable sands (aquifers) which may be in natural hydraulic isolation from each other (from shallowest to deepest):</p> <ul style="list-style-type: none"> ▪ Eyre formation; ▪ Winton formation; ▪ Mackunda formation; ▪ Coorikiana sandstone; ▪ Cadna-owie formation; ▪ Namur sandstone; ▪ Adori sandstone; ▪ Hutton sandstone; ▪ Poolowanna formation; ▪ Cuddapan formation; ▪ Nappamerri Group formations, Walkandi and Peera Peera formations (multiple sands); ▪ Toolachee formation (multiple sands); ▪ Daralingie formation (multiple sands); ▪ Epsilon formation (multiple sands); ▪ Patchawarra, Mt Toodna or Purni formations (multiple sands); ▪ Tirrawarra sandstone or Sturat Range formation; ▪ Merrimelia Boorthanna and Crown Point formations (multiple sands); ▪ Basement reservoirs. 	<ul style="list-style-type: none"> ▪ For cases where isolation of these formations is not established, sufficient evidence is available to demonstrate that they are in natural hydraulic communication. <p><u>Producing Wells</u></p> <ul style="list-style-type: none"> ▪ Monitoring programs, carried out in accord with company approved procedure(s), demonstrate no crossflow or fluid migration occurring behind casing. ▪ Casing integrity and corrosion monitoring programs, carried out in accordance with company approved procedure(s), show adequate casing condition to satisfy the objective. <p><u>Inactive Wells</u></p> <p>In the case where a well is suspended for a prolonged period of time:</p> <ul style="list-style-type: none"> ▪ Monitoring methods for detecting fluid migration, carried out in accord with company approved procedures for this purpose, are in place and show no fluid migration. <p><u>Well Abandonment Activities</u></p> <ul style="list-style-type: none"> ▪ Plugs set to isolate aquifers through the well bore, designed and set in accord with defined procedures to satisfy worst case expected loads and downhole 	

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THE ENVIRONMENTAL OBJECTIVES DEFINED IN THE COOPER BASIN DRILLING SEO**

WELLNAME : MOANA-1

PEL No. : 107

DATE : JULY 2003

OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
		<p>environmental conditions.</p> <ul style="list-style-type: none"> ▪ Plugs have been set to isolate all aquifers which are present which are not in natural hydraulic communication nor have been isolated by cement behind casing. 	
<p>9. Minimise Impact on Surface Water and Drainage Patterns.</p>	<p>Due to the small and confined area impacted on well sites, there should be minimal impact to surface water drainage patterns in the region. The only foreseeable threat to drainage patterns could arise from long and wide access tracks which could divert a portion of the natural water flow. The main threat to the surface water is contamination from spills during times of major flooding. Potential spills can originate from the well while the well is producing or from the mud pits during drilling.</p>	<ul style="list-style-type: none"> ▪ Oil well producing operations shut in during periods of flood inundation. ▪ Upon completion of drilling, mud pits allowed to dry out and then backfilled level with the surrounding landscape. ▪ Access tracks have been designed and located to avoid any diversion of water during flood inundation. 	<ul style="list-style-type: none"> ▪ Moana well site is located in an interdunal corridor. ▪ The access track does not cross any significant watercourses or drainage features. ▪ There was no rainfall during the period of the drilling operations.
<p>10. Minimise visual impacts on the natural landscape.</p>	<p>The major impact of well sites and access tracks is their visual impact³. Location, construction and restoration practices can significantly reduce the visual impact of well sites and access tracks.</p>	<ul style="list-style-type: none"> ▪ The attainment of 0, +1 or +2 GAS criteria for "Minimise Visual Impact of Abandoned Wellsites" objective listed in Appendix 2. ▪ The attainment of 0, +1 or +2 GAS criteria for "Minimise Visual Impact of Abandoned Access Tracks" objective listed in Appendix 2. 	<ul style="list-style-type: none"> ▪ The six - kilometre access track to Moana commences from the haul road to the Sellicks facility, which is not a public road. The wellsite was located in an interdunal corridor in flat country, some 80 kms from the nearest public main road. ▪ The landowner has requested that no rehabilitation be carried out on the access track to Moana. The track will be beneficial to his pastoral activities. ▪ PIRSA's <i>Field Guide for the Environmental</i>

³ Refer to Fatchen and Woodburn in the references section of this Statement of Environmental Objectives.

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DATE : JULY 2003

OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
			<i>Assessment of Abandoned Petroleum Wellsites in the Cooper Basin, South Australia</i>
<p>11. Minimise risks to the safety of the public and other third parties.</p>	<p>The criteria for assessing the achievement of this objective have been developed on the basis of the current understanding of the risks of wells to third party safety.</p> <p>The key to achieving the third party safety objective in relation to both downhole abandonment and surface well site restoration is to ensure that the visual prominence of the abandoned well site and its access track(s) is minimised to the extent where it is difficult for third parties to detect and therefore access these sites. Also, in the case where a third party encounters an abandoned well site, adequate signage of the well location needs to be displayed to hinder any third party interference with the abandoned well bore. Similarly, the backfilling of the well cellar and the removal of rubbish from the restored well site needs to be carried out to further facilitate third party safety.</p>	<p><u>Drilling & Completion Activities</u></p> <ul style="list-style-type: none"> ▪ Casing design (including setting depths) carried out in accordance with company approved procedures to satisfy worst case expected loads and environmental conditions determined for the specific geology intercepted by the well. ▪ Casing set in accord with design parameters and company approved procedures. ▪ Blow out prevention precautions in place and operational in accordance with defined procedures and appropriate to the expected loads and downhole environmental conditions. <p><u>Producing Wells</u></p> <ul style="list-style-type: none"> ▪ Adequate signage and precautions taken for warning third parties of the potential danger and to keep away from producing or suspended wells. ▪ Casing integrity and corrosion monitoring programs, carried out in accord with the company approved procedure(s), show adequate casing condition to satisfy the objective. ▪ Effective emergency response plan and procedures are in place in the event of a 	<ul style="list-style-type: none"> ▪ There were no incidents during the drilling operations where the safety of the public or third parties was in question. ▪ The Moana-1 well has been plugged and abandoned in accordance with the requirements of the Cooper Basin Drilling Operations SEO. Plugs were positioned so as to isolate potential aquifers penetrated below surface casing as required by the SEO for downhole abandonment. ▪ The well site will also be rehabilitated and restored in accordance with the guidelines set down in PIRSA's <i>Field Guide for the Environmental Assessment of Abandoned Petroleum Wellsites in the Cooper Basin, South Australia</i>, to attain the highest feasible GAS rating.

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WELLNAME : MOANA-1

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DATE : JULY 2003

OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
		<p>blow out.</p> <ul style="list-style-type: none"> ▪ Hazardous material stored, used and disposed of in accordance with relevant legislation on dangerous substances for occupational, health and safety. <p><u>Well Abandonment Activities</u></p> <ul style="list-style-type: none"> ▪ Downhole abandonment of a well is carried out in accord with company approved procedures to satisfy worst case expected loads and downhole environmental conditions. <p><u>Well Site Restoration Activities</u></p> <ul style="list-style-type: none"> ▪ The attainment of 0, +1 or +2 GAS criteria for "Minimise Visual Impact of Abandoned Wellsites" objective listed in Appendix 2. ▪ The attainment of 0, +1 or +2 GAS criteria for "Minimise Visual Impact of Abandoned Access Tracks" objective listed in Appendix 2. ▪ The attainment of 0 GAS criteria for "Site left in a Clean, Tidy and Safe Condition after Final Cleanup" objective listed in Appendix 2. <p>The undertaking of a risk assessment study to assess the threats to third party safety from drilling, well completion, well production, downhole abandonment and from inactive and abandoned wells.</p>	

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OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
12. Minimise the impact on the environment of waste handling and disposal.	Waste refers to all wastes with the exception of the Listed Wastes in Schedule 1 Part B of the <i>Environment Protection Act 1993</i> .	<ul style="list-style-type: none"> ▪ The attainment of 0 GAS criteria for "Site left in a Clean, Tidy and Safe Condition after Final Cleanup" objective listed in Appendix 2. ▪ All wastes generated on a well site (except sewage) to be disposed at an EPA licensed facility. ▪ Records show that sewage at drilling camps was stored and disposed of in a manner which posed no risk to the human health and hygiene. 	<ul style="list-style-type: none"> ▪ All hard waste was removed from the Moana-1 well site in accordance with Beach's policy set out in the company's Drilling Operations Manual. ▪ Putrescible waste was disposed of in the mud pit prior to backfilling.
13. Avoid adverse impacts on livestock.	The main risk posed to livestock is injury from open drill sumps, open well cellars and moving beam pump oil wells.	<ul style="list-style-type: none"> ▪ In the likely presence of livestock, the mud pits and/or flare pits and moving beam pumps are fenced off. ▪ In the case of a producing well, the well cellar, rat hole and mouse hole are made safe for livestock either through appropriate covering or fencing. ▪ In the case of an abandoned restored well site, the cellar has been backfilled to a level with the surrounding landscape. 	<ul style="list-style-type: none"> ▪ The Moana well site was sufficiently distant from any cattle watering point that any threat to the cattle's safety was insignificant, particularly when combined with the low density of cattle in the area.
14. Avoid spills of oil or hazardous material outside of impermeable sumps or other areas designed to contain such spills.	<p>The main potential for spills to occur is around the well head. Spills that occur around the well head can normally be contained within the cellar and/or confined to the pad area of the well site.</p> <p>As specified under objective 9, any threat to surface waters are avoided as a result of</p>	<ul style="list-style-type: none"> ▪ Cumulative number and volume of spills at any point in time during the year is less than the cumulative spills for the same period from the previous year and a general declining trend in number and volume of spills over the long term. ▪ No spills which pose a significant threat to the Cooper Creek system. 	<ul style="list-style-type: none"> ▪ There were no periods of flood inundation during the drilling operations. ▪ There were no spills of oil or hazardous materials of any significance during the drilling operations. ▪ Only minor drainage systems are present in the region in which the Moana well is located. These systems do not connect

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OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
	<p>ceasing oil production during periods of inundation. Similarly, it has been found that in the Cooper Basin, threats to ground water as a result of surface spills are avoided as a result of a) the depth of the underground aquifers; and b) the entrapment of any contamination in the first 1 to 2 meters of soil. The major threat of spills is the threat to soil and vegetation directly impacted on by the spill. Therefore, the achievement of this objective also consequently contributes to the achievement of objectives 3 and 6 in relation to minimising the impacts on natural vegetation and soil respectively.</p> <p>As spills in the Cooper Basin will tend to be contained by the soil within the area of the spill, any wide scoping environmental threat is considered very unlikely. However, the focus of assessing this objective will primarily be on reducing the number of spills over time. Avoidance of spills will be paramount in areas where the spill can be potentially spread beyond the immediate confines of the spill area into sensitive environments such as creeks and wetlands.</p>		<p>with major watercourses.</p>

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OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
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<p>15. In the event of an oil spill, minimise the impacts on fauna, flora, soil, livestock and surface and ground water.</p>	<p>In the case of an oil spill, it has been shown that in the Cooper Basin active bio-remediation of the contaminated soil is an effective way for remediating the site to an acceptable level which leaves no environmental adverse effect⁴.</p>	<ul style="list-style-type: none"> ▪ In the event of an oil spill, contingency plan implemented after the spill event. ▪ Results of emergency response procedures carried out in accord with Regulation 31 show that oil spill contingency plan in place in the event of a spill is adequate and any necessary remedial action needed to the plan is undertaken promptly by the licensee. ▪ Bio-remediation is undertaken on the affected soil, either on site or offsite. ▪ All oil spill bio-remediation meets end point assessment criteria developed specifically for the relevant environment (eg Santos Oil Spill Remediation End Point Criteria project, to be completed by December 2000). 	<ul style="list-style-type: none"> ▪ There were no spills of oil or hazardous materials of any significance during the drilling operations.
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⁴ Megalos, N.P. 1994, *Bioremediation of Oil Contaminated Soil*, South Australian Department of Mines and Energy, Report Book No. 94/4

**ASSESSMENT OF BEACH PETROLEUM'S PERFORMANCE IN ACHIEVING
THE ENVIRONMENTAL OBJECTIVES DEFINED IN THE COOPER BASIN DRILLING SEO**

WELLNAME : **GOOLWA-1**

PEL No. : **107**

DATE : **APRIL 2004**

OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
<p>1. Avoid disturbance to known sites of Aboriginal and European heritage significance.</p>	<p>The aim of this objective is to ensure that any sites of Aboriginal and European heritage significance are identified and protected. Sites can be identified during the planning stages of well site and access track construction or can be discovered during construction activities. To ensure the achievement of this objective personnel must be appropriately trained and experienced in identifying and protecting sites of Aboriginal and European heritage significance at both the planning and construction stages.</p>	<ul style="list-style-type: none"> ▪ Proposed well site and access track locations have been scouted by appropriately trained and experienced personnel for sites of Aboriginal and European heritage significance before commencement of construction. ▪ Records of scouting are kept and available for auditing. ▪ The operator has a mechanism in place to appropriately report and respond appropriately to any sites discovered during construction and operation activities. ▪ Any sites identified have been flagged and subsequently avoided. <p><i>Note:</i> Where a negotiated agreement or determination for heritage clearance is in place, compliance to this agreement or determination takes precedence over the above criteria.</p>	<ul style="list-style-type: none"> ▪ Beach have an agreement with the Ngayana Dieri Karna Native Title Claimant group which specifies the requirements for scouting proposed well sites and access tracks to identify and avoid areas of heritage value and archaeological significance. ▪ Joint site visits have been carried out with the Native Title Claimant group. Proposed drilling locations and access routes have been agreed and given heritage clearance.
<p>2. Avoid disturbances which have long term impact on biological or wilderness values of a particular area.</p>	<p>A number of areas which are considered to have high biological or wilderness values are shown in Figure 1. Also included are any activities that are assessed to be of significant risk to the Cooper Creek system.</p>	<ul style="list-style-type: none"> ▪ No activities that are assessed to be located in the regions described in the scope above are to be carried out without the prior specific approval of the Minister. 	<ul style="list-style-type: none"> ▪ The well is not located in or near the areas of high biological or wilderness values shown in Figure 1 of the SEO. The drilling operations presented no danger of long term impact on the biological or wilderness values of this particular area.

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WELLNAME : GOOLWA-1

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DATE : APRIL 2004

OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
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<p>3. Minimise disturbance to native vegetation and wildlife habitat.</p>	<p>Well site and access track construction has been shown to have an insignificant impact on native vegetation and wildlife habitat by a number of studies¹. This is due to the small and confined area impacted on by the well site and access track. Nevertheless, due to the significance of native vegetation and fauna it is important to monitor the achievement of this objective.</p> <p>The aim of this objective is to also maximise the potential for revegetation success.</p>	<ul style="list-style-type: none"> ▪ Proposed well site and access track locations have been scouted by appropriately trained and experienced personnel for native vegetation and wildlife habitats. ▪ Vegetation clearance has been minimised and has taken into account the conservation needs of particular species. ▪ Records of vegetation clearance are kept and available for auditing. ▪ The attainment of either 0, +1 or +2 GAS criteria for "Re-establish natural vegetation on abandoned wellsites and access tracks" objective listed in Appendix 2. ▪ Hazardous material stored, used and disposed of in accordance with relevant 	<ul style="list-style-type: none"> ▪ The access track to Goolwa required new clearing of vegetation. However, it was only 3 kms long. ▪ The site contained sparse vegetation, and minimal clearance was required. ▪ The well site will be rehabilitated and restored in accordance with the guidelines set down in PIRSA's <i>Field Guide for the Environmental Assessment of Abandoned Petroleum Wellsites in the Cooper Basin, South Australia</i>, to attain the highest feasible GAS rating. ▪ The level of rehabilitation required for the access track will be determined in consultation with the relevant landowners. ▪ Beach's Drilling Operations Manual sets
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¹ Leigh, J.H. and Briggs, J.D (Eds), 1994. *Threatened Australian Plants: Overview and Case Studies*. Australian National Parks and Wildlife Service, Canberra;
 Garnett, S., 1992a. *The Action Plan for Australian Birds of Australia*, Australian National Parks and Wildlife Service. Endangered Species Program, Project 121.
 Garnett, S. (Ed.), 1992b. *Threatened and Extinct Birds of Australia*. Royal Australian Ornithologists Union. Report, 82.
 Wager, R. and Jackson, P., 1993. *The Action Plan for Australian Fresh Water Fishes*. Australian Nature Conservation Agency. Endangered Species Program, Project 147.
 Lee, A.K., 1995. *The Action Plan for Australian Rodents*. Australian Nature Conservation Agency. Endangered Species Program, Project 130.
 Kennedy, M., 1992. *Australian Endangered Marsupials and Monotremes: An Action Plan for their Conservation*. IVCN, Gland, Switzerland.

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OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
		legislation on dangerous substances.	<p>out the company's policy in relation to storage, use and disposal of hazardous material.</p> <ul style="list-style-type: none"> ▪ Topsoil was stockpiled for subsequent respreading when restoration activities are conducted.
4. Avoid disturbance to rare, vulnerable and endangered flora and fauna species.	Rare, vulnerable and endangered flora and fauna species are defined by Schedule 7, 8 and 9 of the <i>National Parks and Wildlife Act, 1972</i>	<ul style="list-style-type: none"> ▪ Proposed well site and access track locations have been scouted for rare, vulnerable and endangered flora and fauna species by appropriately trained and experienced personnel before the commencement of construction. ▪ Any sites of rare, vulnerable and endangered flora and fauna have been identified, flagged and subsequently avoided. ▪ Records of such scouting are kept and available for auditing. 	<ul style="list-style-type: none"> ▪ National Parks and Wildlife flora / fauna databases contain no records of vulnerable or endangered species within 20km of the (database search March 2003).
5. Prevent the introduction and establishment of exotic weed species.	The major potential source of weed introduction is from vehicles and equipment brought in from other regions of the state or interstate for the various well activities. The most effective way of preventing weed introduction is by thoroughly cleaning vehicles and equipment prior to entering the Cooper–Eromanga Basins.	<ul style="list-style-type: none"> ▪ All vehicles and equipment appropriately cleaned prior to entering the Cooper–Eromanga Basins. ▪ Cleaning carried out in accordance with specified company procedures and accepted practices. ▪ Records of vehicle and equipment cleaning are kept and available for auditing. ▪ Detection of exotic weed species as a consequence of industry activities. 	<ul style="list-style-type: none"> ▪ All vehicles involved with the drilling operation were already in service in the Cooper Basin prior to commencing work at the Goolwa-1 well.

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OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
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6. Minimise impacts to soil.	<p>The main impact to soil is caused by the removal of existing soil and / or the importation of foreign material for the construction of the well sites and access tracks. This creates a visual impact and can also alter the soil characteristics which can, in turn, impact on the effective re-establishment of native species.</p> <p>Another potential impact to soil is soil contamination from accidental spillages of chemicals or hazardous during construction and operation.</p>	<ul style="list-style-type: none"> ▪ The attainment of 0, +1 or +2 GAS Criteria for "Minimise Visual Impact of Abandoned Wellsites" objective listed in Appendix 2. ▪ The attainment of 0, +1 or +2 GAS Criteria for "Minimise Visual Impact of Abandoned Access Tracks" objective listed in Appendix 2. ▪ The attainment of either 0, +1 or +2 GAS criteria for "Re-establish natural vegetation on abandoned wellsites and access tracks" objective listed in Appendix 2. ▪ Hazardous material stored, used and disposed of in accordance with relevant legislation on dangerous substances. 	<ul style="list-style-type: none"> ▪ Clay topping of the well pad and the access track minimised disturbance to the soil beneath. The clay material was extracted from a number of borrow pits alongside the access track. ▪ When the standing water in the sump pit has fully evaporated, the well site will be rehabilitated and restored in accordance with the guidelines set down in PIRSA's <i>Field Guide for the Environmental Assessment of Abandoned Petroleum Wellsites in the Cooper Basin, South Australia</i>, to attain the highest feasible GAS rating. Depending on rainfall in the area, rehabilitation of the well site will likely be undertaken in the last quarter of 2004. ▪ The access track straddles the boundary of two stations and rehabilitation will be in accordance with the requirements of the two landowners involved.
7. Avoid initiating erosion on gibber pavements.	<p>It is recognised that the removal of the overlying gibber mantle inevitably leads to severe gully erosion on the gibber plains with a slope greater than 2 degrees in the Cooper Basin². It is therefore important to avoid removal of gibber stones in the construction of</p>	<ul style="list-style-type: none"> ▪ The attainment of 0, +1 or +2 GAS Criteria for "Minimise Visual Impact of Abandoned Wellsites" objective listed in Appendix 2. ▪ The attainment of 0, +1 or +2 GAS Criteria for "Minimise Visual Impact of Abandoned Access Tracks" objective listed in 	<ul style="list-style-type: none"> ▪ There were no gibber pavements along the proposed access track or at the Goolwa well site.

² Refer to Fatchen and Woodburn in the references section of this Statement of Environmental Objectives.

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OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
	well sites and access tracks.	Appendix 2. <ul style="list-style-type: none"> ▪ Gibber mantle on access tracks has not been removed, only rolled to allow vehicle and equipment access. ▪ Gibber mantle removal on well sites confined to the mud pit, cellar and turkey's nest areas. ▪ Gibber mantle removed from such areas is respread and rolled over the disturbed area during restoration. 	
8. Minimise loss of reservoir and aquifer pressures and contamination of freshwater aquifers.	<p>This objective seeks to protect the water quality and water pressure of aquifers that may potentially be useful as water supplies, and to maintain pressure in sands that may host petroleum accumulations elsewhere.</p> <p>To address this objective, the risks of crossflow between formations known to be permeable and in natural hydraulic isolation from each other, or where there is insufficient information to determine that they are permeable or in hydraulic communication, must be assessed on a case by case basis and procedures implemented to isolate these formations.</p> <p>The following geological formations in the Cooper-Eromanga Basins may contain permeable sands (aquifers) which may be in natural hydraulic isolation from each other (from shallowest to deepest):</p> <ul style="list-style-type: none"> ▪ Eyre formation; ▪ Winton formation; ▪ Mackunda formation; 	<p><u>Drilling & Completion Activities</u></p> <ul style="list-style-type: none"> ▪ Casing design (including setting depths) have been carried out in accordance with company defined procedures which satisfy worst case expected loads and environmental conditions determined for the particular well. ▪ Casing set in accord with design parameters and company approved procedures. ▪ Sufficient isolation between any of the formations listed in the adjacent column – where present – is substantiated (eg through well logs, pressure measurements or casing integrity measurements). ▪ For cases where isolation of these formations is not established, sufficient evidence is available to demonstrate that they are in natural hydraulic communication. 	<ul style="list-style-type: none"> ▪ Cement plugs were placed to isolate any aquifers penetrated below surface casing, and any zones of pressure differential, to ensure no likelihood of crossflow of groundwaters .

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OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
	<ul style="list-style-type: none"> ▪ Coorikiana sandstone; ▪ Cadna-owie formation; ▪ Namur sandstone; ▪ Adori sandstone; ▪ Hutton sandstone; ▪ Poolowanna formation; ▪ Cuddapan formation; ▪ Nappamerri Group formations, Walkandi and Peera Peera formations (multiple sands); ▪ Toolachee formation (multiple sands); ▪ Daralingie formation (multiple sands); ▪ Epsilon formation (multiple sands); ▪ Patchawarra, Mt Toodna or Purni formations (multiple sands); ▪ Tirrawarra sandstone or Sturat Range formation; ▪ Merrimelia Boorthanna and Crown Point formations (multiple sands); ▪ Basement reservoirs. 	<p><u>Producing Wells</u></p> <ul style="list-style-type: none"> ▪ Monitoring programs, carried out in accord with company approved procedure(s), demonstrate no crossflow or fluid migration occurring behind casing. ▪ Casing integrity and corrosion monitoring programs, carried out in accordance with company approved procedure(s), show adequate casing condition to satisfy the objective. <p><u>Inactive Wells</u></p> <p>In the case where a well is suspended for a prolonged period of time:</p> <ul style="list-style-type: none"> ▪ Monitoring methods for detecting fluid migration, carried out in accord with company approved procedures for this purpose, are in place and show no fluid migration. <p><u>Well Abandonment Activities</u></p> <ul style="list-style-type: none"> ▪ Plugs set to isolate aquifers through the well bore, designed and set in accord with defined procedures to satisfy worst case expected loads and downhole environmental conditions. ▪ Plugs have been set to isolate all aquifers which are present which are not in natural hydraulic communication nor have been isolated by cement behind casing. 	
9. Minimise Impact on	Due to the small and confined area impacted	<ul style="list-style-type: none"> ▪ Oil well producing operations shut in 	<ul style="list-style-type: none"> ▪ Goolwa well site is located in an inter-

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OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
Surface Water and Drainage Patterns.	on well sites, there should be minimal impact to surface water drainage patterns in the region. The only foreseeable threat to drainage patterns could arise from long and wide access tracks which could divert a portion of the natural water flow. The main threat to the surface water is contamination from spills during times of major flooding. Potential spills can originate from the well while the well is producing or from the mud pits during drilling.	<p>during periods of flood inundation.</p> <ul style="list-style-type: none"> ▪ Upon completion of drilling, mud pits allowed to dry out and then backfilled level with the surrounding landscape. ▪ Access tracks have been designed and located to avoid any diversion of water during flood inundation. 	<p>dunal corridor.</p> <ul style="list-style-type: none"> ▪ The access track does not cross any significant watercourses or drainage features. ▪ There was minor rainfall during the period of the drilling operations, but no significant disruption to natural drainage patterns was observed.
10. Minimise visual impacts on the natural landscape.	The major impact of well sites and access tracks is their visual impact ³ . Location, construction and restoration practices can significantly reduce the visual impact of well sites and access tracks.	<ul style="list-style-type: none"> ▪ The attainment of 0, +1 or +2 GAS criteria for "Minimise Visual Impact of Abandoned Wellsites" objective listed in Appendix 2. ▪ The attainment of 0, +1 or +2 GAS criteria for "Minimise Visual Impact of Abandoned Access Tracks" objective listed in Appendix 2. 	<ul style="list-style-type: none"> ▪ Access to the well was via an existing main Santos haul road (Moomba to Tantanna). The wellsite was located some 3 kms off the main haul road, in an interdunal corridor, in flat country. ▪ If required by the landowners, the access track will be rehabilitated and restored in accordance with the guidelines set down in PIRSA's <i>Field Guide for the Environmental Assessment of Abandoned Petroleum Wellsites in the Cooper Basin, South Australia</i>
11. Minimise risks to the safety of the public and other third parties.	The criteria for assessing the achievement of this objective have been developed on the basis of the current understanding of the risks	<p><u>Drilling & Completion Activities</u></p> <ul style="list-style-type: none"> ▪ Casing design (including setting depths) carried out in accordance with company 	<ul style="list-style-type: none"> ▪ There were no incidents during the drilling operations where the safety of the public or third parties was in question.

³ Refer to Fatchen and Woodburn in the references section of this Statement of Environmental Objectives.

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THE ENVIRONMENTAL OBJECTIVES DEFINED IN THE COOPER BASIN DRILLING SEO**

WELLNAME : GOOLWA-1

PEL No. : 107

DATE : APRIL 2004

OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
	<p>of wells to third party safety.</p> <p>The key to achieving the third party safety objective in relation to both downhole abandonment and surface well site restoration is to ensure that the visual prominence of the abandoned well site and its access track(s) is minimised to the extent where it is difficult for third parties to detect and therefore access these sites. Also, in the case where a third party encounters an abandoned well site, adequate signage of the well location needs to be displayed to hinder any third party interference with the abandoned well bore. Similarly, the backfilling of the well cellar and the removal of rubbish from the restored well site needs to be carried out to further facilitate third party safety.</p>	<p>approved procedures to satisfy worst case expected loads and environmental conditions determined for the specific geology intercepted by the well.</p> <ul style="list-style-type: none"> ▪ Casing set in accord with design parameters and company approved procedures. ▪ Blow out prevention precautions in place and operational in accordance with defined procedures and appropriate to the expected loads and downhole environmental conditions. <p><u>Producing Wells</u></p> <ul style="list-style-type: none"> ▪ Adequate signage and precautions taken for warning third parties of the potential danger and to keep away from producing or suspended wells. ▪ Casing integrity and corrosion monitoring programs, carried out in accord with the company approved procedure(s), show adequate casing condition to satisfy the objective. ▪ Effective emergency response plan and procedures are in place in the event of a blow out. ▪ Hazardous material stored, used and disposed of in accordance with relevant legislation on dangerous substances for occupational, health and safety. 	<ul style="list-style-type: none"> ▪ The Goolwa-1 well has been plugged and abandoned in accordance with the requirements of the Cooper Basin Drilling Operations SEO. Plugs were positioned so as to isolate potential aquifers penetrated below surface casing as required by the SEO for downhole abandonment. ▪ The well site will also be rehabilitated and restored in accordance with the guidelines set down in PIRSA's <i>Field Guide for the Environmental Assessment of Abandoned Petroleum Wellsites in the Cooper Basin, South Australia</i>, to attain the highest feasible GAS rating.

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OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
		<p><u>Well Abandonment Activities</u></p> <ul style="list-style-type: none"> ▪ Downhole abandonment of a well is carried out in accord with company approved procedures to satisfy worst case expected loads and downhole environmental conditions. <p><u>Well Site Restoration Activities</u></p> <ul style="list-style-type: none"> ▪ The attainment of 0, +1 or +2 GAS criteria for "Minimise Visual Impact of Abandoned Wellsites" objective listed in Appendix 2. ▪ The attainment of 0, +1 or +2 GAS criteria for "Minimise Visual Impact of Abandoned Access Tracks" objective listed in Appendix 2. ▪ The attainment of 0 GAS criteria for "Site left in a Clean, Tidy and Safe Condition after Final Cleanup" objective listed in Appendix 2. <p>The undertaking of a risk assessment study to assess the threats to third party safety from drilling, well completion, well production, downhole abandonment and from inactive and abandoned wells.</p>	
12. Minimise the impact on the environment of waste handling and disposal.	Waste refers to all wastes with the exception of the Listed Wastes in Schedule 1 Part B of the <i>Environment Protection Act 1993</i> .	<ul style="list-style-type: none"> ▪ The attainment of 0 GAS criteria for "Site left in a Clean, Tidy and Safe Condition after Final Cleanup" objective listed in Appendix 2. ▪ All wastes generated on a well site (except 	<ul style="list-style-type: none"> ▪ All hard waste was removed from the Goolwa-1 well site in accordance with Beach's policy set out in the company's Drilling Operations Manual. ▪ Putrescible waste was disposed of in the

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		sewage) to be disposed at an EPA licensed facility. <ul style="list-style-type: none"> ▪ Records show that sewage at drilling camps was stored and disposed of in a manner which posed no risk to the human health and hygiene. 	mud pit prior to backfilling.
13. Avoid adverse impacts on livestock.	The main risk posed to livestock is injury from open drill sumps, open well cellars and moving beam pump oil wells.	<ul style="list-style-type: none"> ▪ In the likely presence of livestock, the mud pits and/or flare pits and moving beam pumps are fenced off. ▪ In the case of a producing well, the well cellar, rat hole and mouse hole are made safe for livestock either through appropriate covering or fencing. ▪ In the case of an abandoned restored well site, the cellar has been backfilled to a level with the surrounding landscape. 	<ul style="list-style-type: none"> ▪ The Goolwa well site was sufficiently distant from any cattle watering point that any threat to the cattle's safety was insignificant, particularly when combined with the low density of cattle in the area.
14. Avoid spills of oil or hazardous material outside of impermeable sumps or other areas designed to contain such spills.	The main potential for spills to occur is around the well head. Spills that occur around the well head can normally be contained within the cellar and/or confined to the pad area of the well site. As specified under objective 9, any threat to surface waters are avoided as a result of ceasing oil production during periods of inundation. Similarly, it has been found that in the Cooper Basin, threats to ground water as a result of surface spills are avoided as a result of a) the depth of the underground aquifers; and b) the entrapment of any contamination in the first 1 to 2 meters of soil. The major threat	<ul style="list-style-type: none"> ▪ Cumulative number and volume of spills at any point in time during the year is less than the cumulative spills for the same period from the previous year and a general declining trend in number and volume of spills over the long term. ▪ No spills which pose a significant threat to the Cooper Creek system. 	<ul style="list-style-type: none"> ▪ There were no periods of flood inundation during the drilling operations. ▪ There were no spills of oil or hazardous materials of any significance during the drilling operations. ▪ Only minor drainage systems are present in the region in which the Goolwa well is located. These systems do not connect with major watercourses.

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OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
	<p>of spills is the threat to soil and vegetation directly impacted on by the spill. Therefore, the achievement of this objective also consequently contributes to the achievement of objectives 3 and 6 in relation to minimising the impacts on natural vegetation and soil respectively.</p> <p>As spills in the Cooper Basin will tend to be contained by the soil within the area of the spill, any wide scoping environmental threat is considered very unlikely. However, the focus of assessing this objective will primarily be on reducing the number of spills over time. Avoidance of spills will be paramount in areas where the spill can be potentially spread beyond the immediate confines of the spill area into sensitive environments such as creeks and wetlands.</p>		
<p>15. In the event of an oil spill, minimise the impacts on fauna, flora, soil, livestock and surface and ground water.</p>	<p>In the case of an oil spill, it has been shown that in the Cooper Basin active bio-remediation of the contaminated soil is an effective way for remediating the site to an acceptable level which leaves no environmental adverse effect⁴.</p>	<ul style="list-style-type: none"> ▪ In the event of an oil spill, contingency plan implemented after the spill event. ▪ Results of emergency response procedures carried out in accord with Regulation 31 show that oil spill contingency plan in place in the event of a spill is adequate and any necessary remedial action needed to the plan is undertaken promptly by the licensee. ▪ Bio-remediation is undertaken on the 	<ul style="list-style-type: none"> ▪ There were no spills of oil or hazardous materials of any significance during the drilling operations.

⁴ Megalos, N.P. 1994, *Bioremediation of Oil Contaminated Soil*, South Australian Department of Mines and Energy, Report Book No. 94/4

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OBJECTIVE	COMMENT	ASSESSMENT CRITERIA	PERFORMANCE IN ACHIEVING OBJECTIVE
		<p>affected soil, either on site or offsite.</p> <ul style="list-style-type: none"> ▪ All oil spill bio-remediation meets end point assessment criteria developed specifically for the relevant environment (eg Santos Oil Spill Remediation End Point Criteria project, to be completed by December 2000). 	

B) Seismic Operations

Government approval for Beach to undertake its Seismic Operations in PEL 107 was conditional on Beach committing to the objectives defined in the “Statement of Environmental Objectives for Seismic Operations in the Cooper / Eromanga Basins – South Australia “.

Beach’s strategies for achieving each of the SEO objectives for the 2003 Albus 2D Survey are outlined below.

The SEO requires an Environmental Report to be submitted at the completion of each seismic survey. The Environmental Report for the portion of the Albus Survey that was recorded in PEL 107 was submitted on 16th February 2003.

SEO Objective 1 :	Ensure that the potential impacts of the proposed seismic operations on biological diversity and cultural requirements of the environment are assessed within a planning process and incorporated into field management procedures.
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Goal 1.1 : *Identify important or sensitive environmental and cultural components.*

Beach has an Agreement with the Ngayana Dieri Karna Claimant Group, whose Claim Area covers PEL 107. Prior to the commencement of line preparation, a Work Area Clearance was undertaken by representatives of the Ngayana Dieri Karna under the terms of the Agreement. The scouting party inspected a representative sample of the proposed lines.

A report was prepared by the accompanying anthropologist, documenting the locations where deviations would be required to the proposed seismic lines to avoid sites of cultural significance. The report further documented general guidelines to assist the line preparation crew on appropriate deviation procedures where further sites of cultural significance were identified along the proposed lines that had not been inspected by the scouting team.

All field crews associated with the seismic program had attended an induction on cultural heritage issues for this area, with particular emphasis on identification and avoidance of significant cultural material.

Goal 1.2 : *Identify threatening processes and activities*

No processes or activities associated with the survey operations were considered to be threatening to the subject environment.

Goal 1.3 : *Assess any adverse impact on biological diversity likely to arise from the proposed operation on a regional basis.*

The lines from the 2003 Albus Seismic Survey that were recorded in PEL 107 were all located in a predominantly dunefield land system. GAS criteria for assessing adverse impacts on biodiversity for a dunefield land system are provided in the Statement of Environmental Objectives (Tables A2.2. and A2.3).

The impacts of the Albus Seismic Survey have been audited against these criteria and the results are presented in the attached table.

Goal 1.4 : *Ensure that issues raised in the planning process are incorporated into field management procedures.*

All personnel involved in the field operations had been briefed prior to the commencement of the survey operations as to appropriate procedures for environmental management and protection of cultural heritage.

A company representative was present with the line clearing and recording crews throughout the field operations to ensure adherence to the planned field management procedures.

SEO Objective 2 :	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, and facilitate rehabilitation so as to minimize such impacts if they occur.
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As defined in the SEO, the goals of this objective are to minimize :

- clearing of native vegetation,
- disturbance to native fauna,
- impacts on soil, surface drainage , visual ambience and other land users,
- the potential for third parties to use survey tracks and sites following completion of operations.

Two sets of GAS criteria are defined in the SEO for assessing the extent of these impacts. One set of criteria relates to assessment carried out **at the completion** of the field operations. The second set relates to assessment carried out when the lines have **been left to rehabilitate** for some period.

At the completion of field operations for the Albus survey, an assessment of the impacts from the survey was undertaken on five of the lines recorded in PEL 107. The results of this GAS audit are presented in the attached table. All GAS scores were in the range of 0 to +2.

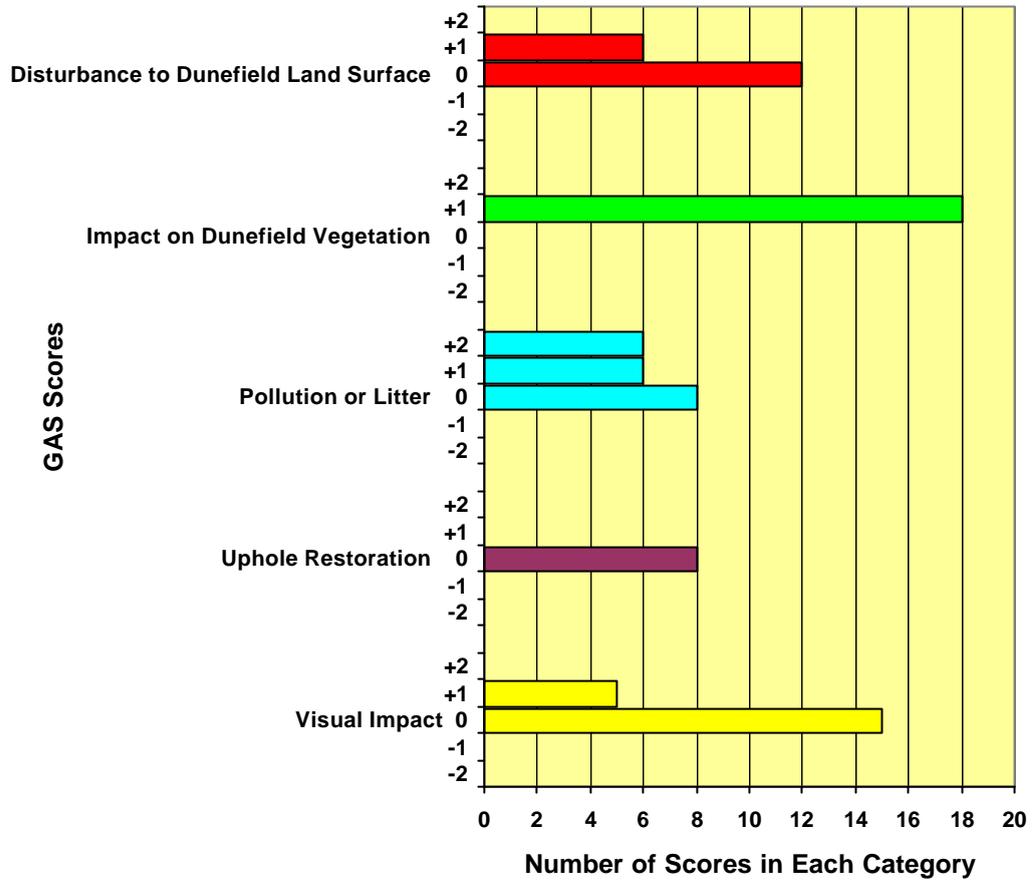
Two Environmental Monitoring Points (EMPs) : BC03-EMP-02 and EMP-03, were established in PEL 107, both of which are located in a dunefield environment. Photographs were taken at these two locations immediately after field operations had finished, and further photographs will be taken at various times over the next few years to record the natural rehabilitation.

SEO Objective 3 :	Avoid undertaking any activities which have, or are likely to have, long-term significant adverse impact(s) on biological diversity, cultural components of the environment, groundwater, or other land uses
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The line clearing crews used environmentally appropriate techniques that will enable the combination of wind action and occasional rainfall to revegetate the lines to the point they will be indiscernible within a few years.

The technique of weaving the routes of the seismic lines was practiced extensively, allowing significant tress to be left standing, and minimizing the visual impact from the operations while natural rehabilitation proceeds.

Fig. #1; GAS Audit: 2003 PEL 107 (& PEL 91) Albus Seismic Survey



GAS scores for assessing seismic lines on completion of survey in the Cooper Basin, South Australia

Beach Petroleum Limited: 2003 PEL 107 Albus 2D Seismic Survey: Recorded September 2003: Audited by: Bruce Beer

LAND SYSTEM (Locations)	MEASURE (Associated goals) ^(a)	SCORE				
		+2 ^(b, c)	+1 ^(b, c)	0 ^(b, c)	-1	-2 ^(d)
Non land system specific 1) BC03-EMP-02; Line BC03-28 # 525 2) BC03-EMP-03; Line BC03-30 # 219 Note: GAS scores refer to the area 500m either side of the EMP location	Impact on infrastructure 2.6			• N/A	•	•
	Visual impact 2.5, 2.7	•	•	1)2)	•	•
	Uphole site restoration 2.3, 2.5 ^(e)	•	•	1)2)	•	•
	Pollution or litter 2.1, 2.2, 2.3, 2.5		•	1)2)	•	•
Dunefield	Impact on vegetation 2.1, 2.2 ^(f)	•	1)2)		•	•
	Disturbance to land surface 2.2, 2.3 ^(e)	•		1)2)	•	•

(.../cont.)

(Table A2.2 cont.)

LAND SYSTEM	MEASURE (Associated goals) ^(a)	SCORE				
		+2 ^(b, c)	+1 ^(b, c)	0 ^(b, c)	-1	-2 ^(d)
Floodplain and wetlands	Impact on vegetation 2.1, 2.2 ^(f)	•		• N/A	•	•
	Disturbance to land surface 2.2, 2.3, 2.4, 2.5 ^(e)	•		• N/A	•	•
Gibber plain and tableland	Impact on vegetation 2.1, 2.2	•	•	• N/A	•	•
	Disturbance to land surface 2.2, 2.3, 2.5 ^(e)	•	•	• N/A	•	•
Salt lake	Disturbance to land surface 2.3, 2.5 ^(e)	•	•	• N/A	•	•

(a) Goals under Objective 2:

- 2.1 Clearing or other impacts on native vegetation are minimised.
- 2.2 Disturbance or other impacts on native fauna and their habitats are minimised.
- 2.3 Impact on soil is minimised.
- 2.4 Impact on surface drainage is minimised
- 2.5 Visual impact of operations (including litter) is minimised.
- 2.6 Impact on other land users is minimised.
- 2.7 Third party use of sites, following the completion of operations, is discouraged.

(b) If any criterion (dot point) within a -1 or -2 cell occurs, then a score of -1 or -2 will be allocated.

(c) For 0,+1 and +2 cells, all relevant criteria (dot point) within the cell must be satisfied to score at that level.

(d) Some criteria at -2 level may also be subject to defined conditions, but are included in this table to ensure that they are clearly identified.

(e) All vertical measurements to be measured from normal ground surface.

(f) Priority classification refers to Wiltshire and Schmidt (1977).

(g) 'Windrows' in this context means mounding of gibbers through the action of wheel trafficking and associated dispersal of gibbers away from wheel tracks.