Beach Petroleum

Statement of Environmental Objectives

Cooper Basin Petroleum Production Operations

November 2009

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people delivering certainty

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ENV 538 – Production Statement of Environmental Objectives

Reference	Rev	Date	Prepared	Reviewed	Approved	Comment
538-Beach SEO	B	25 Sept 03	SM/SS	SM/SS	SS	Issued to Beach for review
	C	15 Oct 03	Beach			Beach edits to Measure/How
	C1	16 Oct 03	SM			Management measures added
	D	20 Oct 03	Ecos/Beach	Ecos/Beach	Beach	Issued to PIRSA
	E	14 Nov 03	SM/ML	SM	Beach	Incorporation of consultation comments
	F	17 Nov 03	SM	SM	Beach	Incorporation of additional consultation comments Gazetted by PIRSA
	G		Beach			
	H	30 March 04	Beach			Amendment of Assessment Criteria – TPH levels
823-Prodn SEO	I	11Sep08	ZB/SM	SM	ZB	5 year review edits – issued to Beach for review
	J	29Sep08	ZB	SM	Beach	Issued to PIRSA for review
	K	03Apr09	Beach	JO/MB	AL	Issued to PIRSA for Gazettal
	L	23Nov09	ZB	JO	AL	Re-issued to PIRSA for Gazettal
	M	23Dec13	DMITRE	DMITRE	Beach	DMITRE amendment to incident definitions (Table 2)

Contents

Appendices

1 Introduction

This Statement of Environmental Objectives (SEO) has been prepared to meet the requirements of Sections 99 and 100 of the South Australian *Petroleum and Geothermal Energy Act 2000* (the Act) and Regulations 12 and 13 of the *Petroleum and Geothermal Energy Regulations 2000*.

1.1 Purpose

The intent of this SEO is to outline the environmental objectives to which the petroleum production activities will conform.

The objectives of this SEO have been developed on the basis of information and issues identified in the Cooper Basin Petroleum Production Operation Environmental Impact Report (Beach 2003) and are in keeping with the objectives of the *Petroleum and Geothermal Energy Act 2000*, which include:

- To minimise the environmental damage from Beach Petroleum's Petroleum Production Operations
- To establish appropriate consultative processes involving people directly affected by regulated activities and the public generally
- To promote adherence to the Environmental Management System (EMS) and Production Operations Manual (POM) as a primary means of achieving public, environmental and safety objectives
- To protect the public from risks inherent in regulated activities.

This SEO is based on an environmental risk assessment, which is included in the Cooper Basin Petroleum Production Operation Environmental Impact Report (Beach 2003) and a review of relevant existing SEOs, including:

- Epic Energy's SEO for Pipeline Licence 1 (Epic 2003)
- Santos' SEO for Production and Processing Operations in the Cooper and Eromanga Basins (Santos 2003)
- Stuart Petroleum's SEO for Acrasia (Stuart Petroleum 2002).

1.2 Scope

Beach Petroleum has interests in a number of Petroleum Exploration Licence (PEL) and Petroleum Production Licence (PPL) areas in the South Australian Cooper Basin (see Table1). Figure 1 and Figure 2 show the location of Beach's PELs and PPLs (including production facilities) as at September 2008. Further producing wells are likely to be added as a result of Beach's exploration and drilling programmes.

Table 1: Licences Operated by Beach

Licence Type	Number/Location
Petroleum Exploration Licences (PEL)	91, 92, 94, 95, 106, 107 and 110
Petroleum Production Licences (PPLs)	204 (Sellicks) 205 (Christies+Silver Sands) 210 (Aldinga) 212 (Kiana) 220 (Callawonga) 224 (Parsons)

This SEO applies to all Beach Petroleum production operations in the South Australian sector of the Cooper and Eromanga basins. Operations that are covered by this SEO are:

- production facility construction, operation, maintenance and abandonment (including extended production testing facilities)
- produced formation water disposal operations
- flowline/pipeline construction, operation and abandonment
- road construction, maintenance and restoration
- transport of oil, and
- waste management and land treatment.

These operations are described in detail in the Environmental Impact Report (EIR) (Beach 2003).

This SEO and corresponding EIR do not apply to exploration activities, drilling activities and sub-surface well/reservoir infrastructure. These activities are covered by the:

- SEO for Seismic Operations in the Cooper and Eromanga Basins South Australia (PIRSA 1998)
- South Australia Cooper Basin Operators Statement of Environmental Objectives: Drilling and Well Operations (November 2003).

Consequently the following activities are excluded from this EIR and SEO:

- well site and access track construction
- drilling
- well completion
- pre-wellhead production
- artificial lift (including beam pumps, jet pumps and electronic submersible pumps)
- down hole abandonment
- restoration of well sites and access tracks, and
- seismic operations.

Figure 1: Beach Petroleum Cooper Basin Operations –PEL 91 & PEL 92

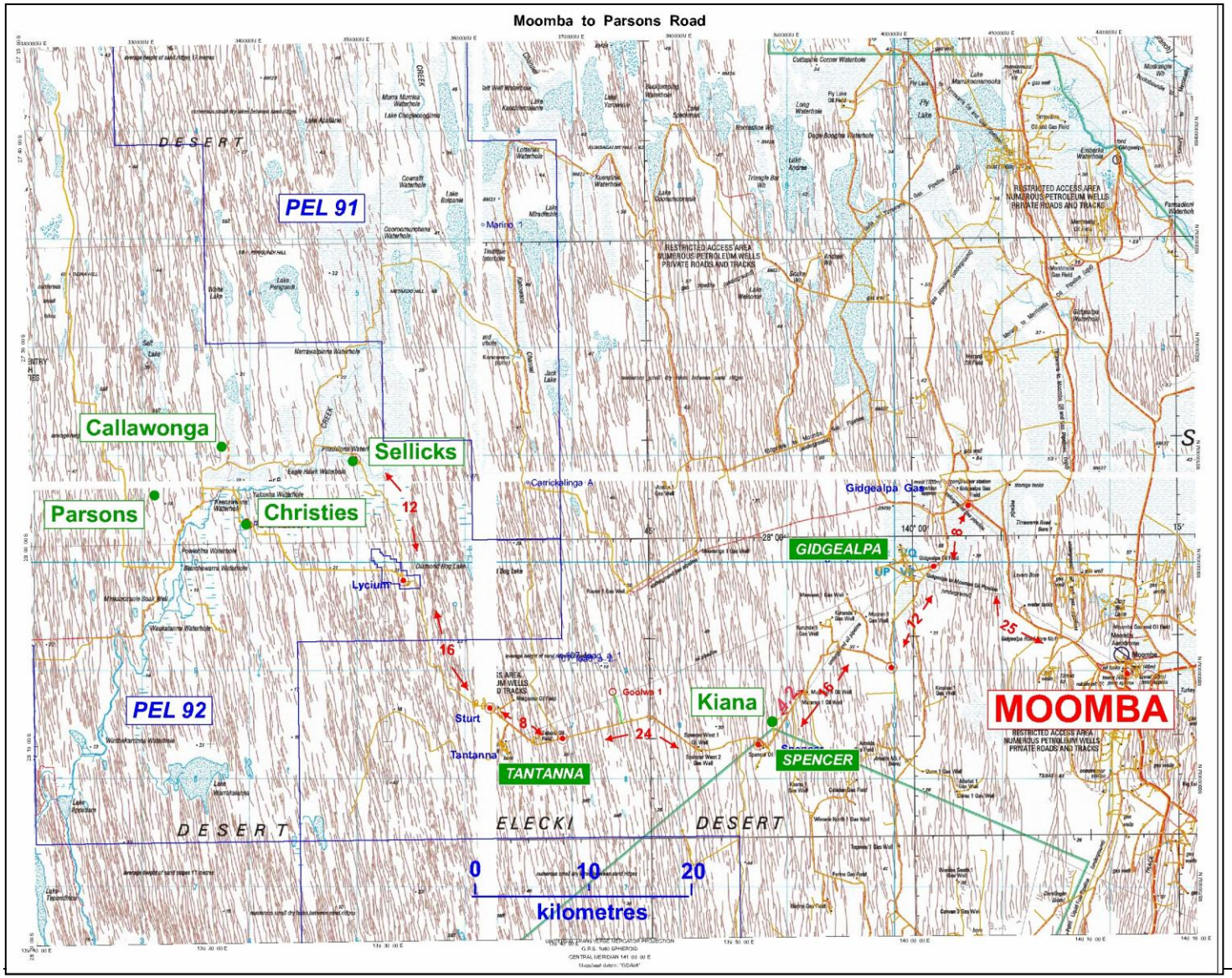
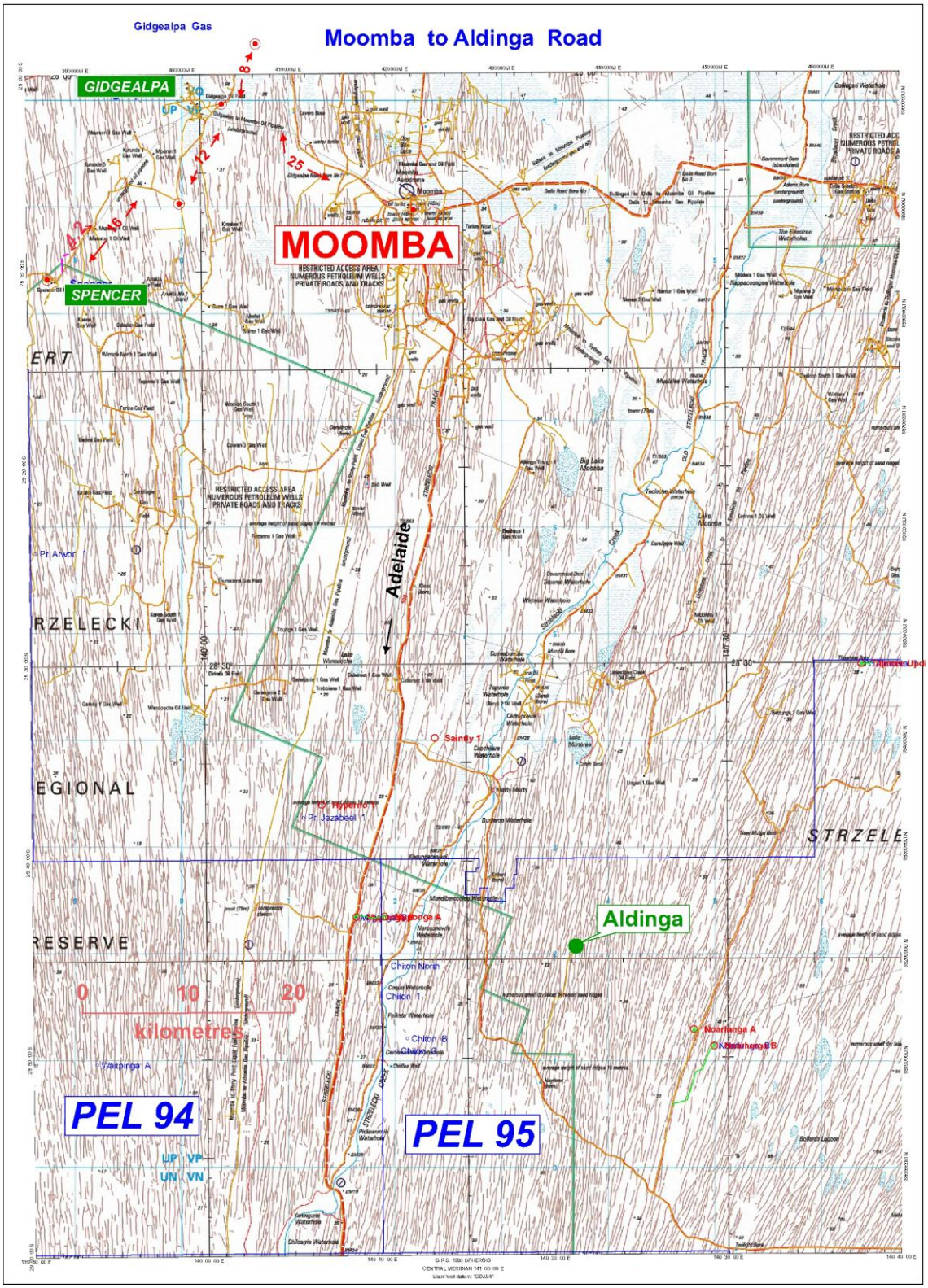


Figure 2: Beach Petroleum Cooper Basin Operations – PEL 94 & PEL 95



2 Environmental Objectives

Potential environmental hazards and consequences associated with production operations in the Cooper and Eromanga Basins have been identified in the Cooper Basin Petroleum Production Operations Environmental Impact Report (Beach 2003). Beach Petroleum is committed to achieving a range of environmental objectives in regard to these potential hazards.

The Objectives for the environmental management of petroleum production operations are provided in Appendix A.

3 Assessment Criteria

The environmental objectives identified above are subject to an assessment to measure the level of achievement. The assessment criteria for each objective will be one of the following:

- Defined conditions - objectives for operational activities that can only be managed through the prevention of unacceptable actions (eg no remnant vegetation shall be cleared), and

- Defined requirements - the achievement of an objective can be assessed against the implementation of specific procedures or actions required for an activity (eg the design and construction of the pipeline must meet the requirements of AS 2885.1—1997 Pipelines—Gas and liquid petroleum).

- Goal Attainment Scaling (GAS) criteria – Environmental objectives requiring visual assessment are likely to be prone to uncertainties of subjective judgement. To minimise this occurring, GAS is used to measure such objectives against a series of criteria described by a written description and/or photographically. GAS is applicable to measuring objectives related to minimisation of disturbances in relation to the construction and rehabilitation of borrow pits (Appendix B).

Appendix A tabulates the objectives and management measures required to meet those objectives and the appropriate assessment criteria to determine if compliance with the objectives has been achieved.

The management measures provide a high level overview of systems, activities and/or procedures that Beach have implemented (or are in the process of developing) to achieve the environmental objectives. Detailed operational procedures (including environmental controls) for the following are contained in the Beach Petroleum *Health, Safety and Environmental Procedures Manual* or other management system documentation:

- Production facilities
- Load-out facilities
- Produced formation water
- Contaminated soil treatment
- Flowlines / pipelines
- Camp facilities
- Power generation
- Fuel and chemical handling, transport and disposal
- Borrow pits
- Road networks
- Transport
- Heritage management
- Waste management
- Emergency Response.

4 Reporting

It is a requirement under Section 85 of the *Petroleum and Geothermal Energy Act 2000* that any incidents that are determined to be 'serious' or 'reportable' incidents must be reported to the Minister.

Serious Incidents must be reported to the PIRSA Minister as soon as practicable after the occurrence, as per Section 85 of the *Petroleum and Geothermal Energy Act 2000* and Section 32 of the *Petroleum and Geothermal Energy Regulations 2000*.

Reportable Incidents must be reported to PIRSA on a quarterly basis within 1 month of the end of the quarter, as per Section 32 of the *Petroleum and Geothermal Energy Regulations 2000*.

4.1 Incident Definitions

Regulation 12 (2) requires an SEO to identify events that could cause a serious incident or a reportable incident within the meaning of Section 85 of the Act.

PIRSA has developed the following set of incident definitions, provided in Table 2, relative to operation activities (facility and pipeline). These definitions are intended to expand on definitions provided in Section 85(1) of the Act and Regulation 32(1), and provide consistency for Licensee reporting.

In accordance with Section 85 of the Act and Regulation 32(1):

Serious incident means an incident arising from activities conducted under the licence in which:

a) a person is seriously injured or killed; or

b) an imminent risk to public health or safety arises; or

c) serious environmental damage occurs or an imminent risk of serious environmental damage arises; or

d) security of natural gas supply is prejudiced or an imminent risk of prejudice to security of natural gas supply arises.

Reportable incident means:

a) an unintended escape of petroleum, a processed substance, a chemical or a fuel that affects an area that has not been specifically designed to contain such an escape; and

b) an incident identified as a reportable incident under the relevant Statement of Environmental Objectives (SEO).

Table 2: Incident definitions for operation (facility and pipeline) activities

Serious Incidents	Reportable Incidents
1. A person is seriously injured[1] or killed. 2. An imminent risk to public health or safety arises. 3. Serious environmental damage occurs or an imminent risk of serious environmental damage arises. For example: a) Disturbance to sites of cultural and/or heritage significance without appropriate permits and approvals[2]. b) An escape of petroleum, process substance, a chemical or a fuel to a water body, or to land in a place where it is reasonably likely to enter a water body by seepage or infiltration, or onto land that affects the health of native flora and fauna species. c) Detection of a declared weed, animal/plant pathogen or plant pest species that has been introduced or spread as a direct result of activities. d) Any removal of rare, vulnerable or endangered flora and fauna without appropriate permits and approvals[3]. 4. Security of natural gas supply is prejudiced or an imminent risk of prejudice to security of natural gas supply arises[4]. 5. An event that results in a rupture of a pressure containing asset or facility. 6. A regulated activity[5] being undertaken in manner that involved or will involve a serious risk to the health or safety of a person emanating from an immediate or imminent exposure to a hazard[6]. 7. Activity on a pipeline easement where the pipeline is contacted and repair action is required[7]. 8. An uncontrolled gas release resulting in the activation of emergency response and/or evacuation procedures of an area in or adjacent to the gas release, and/or fire or explosion.	1. An escape of petroleum[8], processed substance, a chemical or a fuel that affects an area that has not been specifically designed to contain such an escape[9] (other than a serious incident). 2. An event that has the potential to compromise the physical integrity of an asset or facility. For example: a) Activity on a pipeline easement with equipment that has been identified7 as exceeding the pipeline's penetration resistance, determined in accordance with Australian Standard (AS) 2885. b) Identification of a through-wall defect on a pipeline[10] or plant component (other than a serious incident). c) Identification[11] of a partial through-wall defect (e.g. through visual inspection, inline inspection, non-destructive testing) that requires repair or replacement action, or a reduction of the Maximum Allowable Operating Pressure, to maintain safe operation (other than a serious incident). d) Activity on a pipeline easement with equipment or vehicles that have been identified7 as exceeding allowable stress limits, determined in accordance with AS2885. e) An unapproved[12] excursion outside of critical design or operating conditions/parameters. f) Failure of a critical procedural control in place to reduce a credible threat to low or as low as reasonably practicable (ALARP).[13] 3. Unauthorised activity on a pipeline easement where the pipeline is contacted but repair action is not required. 4. Malfunction or failure of critical plant or equipment that had (or still has) potential to cause a serious incident. 5. Any non-compliance with SEO objectives.

[1] As per the definition in Section 36 of the *Work Health and Safety Act 2012*.
[2] Pursuant to *Aboriginal Heritage Act 1988* and *Heritage Places Act 1993*
[3] Pursuant to *Native Vegetation Act 1991* (flora) and *National Parks and Wildlife Act 1972* (fauna).
[4] That is, after taking into account relevant factors on a day and rights and obligations under contracts, a significant curtailment of firm service that detrimentally impacts or is likely to impact upon the security of electricity supply to South Australia or to gas supplies to a significant number of commercial and/or domestic gas users in SA
[5] Regulated activity as defined in Section 10 of the *Petroleum and Geothermal Energy Act 2000*.
[6] Resulting in the issuing of a prohibition notice by SafeWork SA pursuant to Section 195 the *Work Health and Safety Act 2012*.
[7] For the case where a detailed assessment is required to determine this, DMITRE recommends the incident be reported initially and amended at a later date if required.
[8] In gaseous, liquid or solid state, as per *Petroleum and Geothermal Energy Act 2000* definition.
[9] An area assigned during a Hazard and Operability Process (HAZOP) study as a hazardous area for the purpose of gas venting, and designed as such, is considered to be an area specifically designed to contain a gas escape.
[10] As per *Petroleum and Geothermal Energy Act 2000* definition, the term 'pipeline' includes tanks, machinery and equipment necessary for, or associated with, operation of the pipeline.
[11] For reporting purposes, the incident is considered to have occurred at the time that a decision is made to repair or replace the defect, or reduce the Maximum Allowable Operating Pressure.
[12] "Approval" as per AS2885 definition. Note that there may be situations where excursions are allowable under AS2885.
[13] As per the Safety Management System process articulated in AS 2885.1-2012, or similar risk assessment process.

5 Definitions

Definitions of the terms used in the SEO are provided below.

Production operations	Any production activity associated with the construction, operation, maintenance and abandonment, including: **Production Facilities** ▪ Product separation and storage ▪ Product load-out ▪ Transport of product (trucking) ▪ Produced formation water ▪ Land treatment units ▪ Temporary product storage pits ▪ Venting ▪ Storage and use of diesels, oils and chemicals ▪ Hazardous waste treatment and disposal ▪ Inspection and Testing **Flowlines / Pipelines** ▪ Vegetation clearance ▪ Earthworks ▪ Welding ▪ Cathodic Protection ▪ Hydrostatic testing ▪ Pigging & integrity testing ▪ Flowline surveys **Ancillary facilities/Activities** ▪ Camp ▪ Road networks ▪ Domestic waste disposal ▪ Erosion Control ▪ Vegetation Control ▪ Weed Control (if required) ▪ Oil spill risk, spill site restoration and emergency response
Aquatic habitats	Includes all wetlands, permanent waterholes and flowing watercourses (e.g. Cooper Creek, Strzelecki Creek, Coongie Lakes)
Area of known Archaeological Sensitivity	A part of the landscape that contains demonstrated occurrences of cultural material. The level of sensitivity depends upon the density and significance of the material
Archaeological Potential	A part of the landscape, generally a physiographic unit or landform, that is likely to contain occurrences of cultural material on the basis of comparative research in similar areas
Consistent with surrounding land/area	A qualitative assessment of land condition on the reinstated area to determine if condition of the area is similar to that of adjacent land (i.e. soil, vegetation, landform)
Controlled atmospheric emissions	Discharge to air that is planned or controlled, including planned releases and maintenance related emissions
Easement	For the purpose of this SEO, an easement is considered to be a corridor for road or flowline construction
Infrastructure	Physical assets which are built on the land (eg: roads, power poles, fences, railway, troughs, gates, dams, other services)
Landholder	Owner or occupier of the land
Landuse	Use of land eg: grazing, cropping, access, industrial, residential, environmentally sensitive area, recreational

Line of sight clearance	Clearing of large vegetation between survey markers to maintain a clear line of site between each survey marker (e.g. for flowline or road construction). Where large trees cannot be retained, vegetation trimmed to height of 1m over flowline and to 3m either side of centreline. This is to satisfy the operational obligations to ensure pipeline integrity and personnel safety cannot be compromised (i.e. any objective is subservient to these requirements)
Minimise	To reduce as far as reasonable practical, considering all other factors e.g. requirements for safe operations and accessibility
Spill	Uncontrolled or unplanned release or discharge of a hydrocarbon, chemical or hazardous substance
Timely manner	Timeframe agreeable to Beach and impacted third party, that considers all external factors e.g. weather constraints and accessibility
Uncontrolled emission	Discharge to air that is not planned or part of any routine operation or routine maintenance (e.g. maintenance or checks of valves and equipment)

6 Glossary

AS 2885	Australian Standard AS 2885.3-1997 Pipelines – Gas and liquid petroleum – Operation and maintenance
CP	Cathodic Protection
DEH	Department for Environment and Heritage (South Australia)
DWLBC	Department of Water, Land & Biodiversity Conservation (South Australia)
EPA	Environment Protection Agency (South Australia)
EIR	Environmental Impact Report prepared in accordance with Section 97 of the *Petroleum and Geothermal Energy Act 2000* and Regulation 10
EMS	Environmental Management System
ERP	Emergency Response Plan
GIS	Geographic Information Systems
LTU	Land Treatment Units
PEL	Pipeline Exploration Licence
Pig	Device inserted into a pipe to clean the internal sections of a pipe or to detect damage or metal loss within the pipe
PIRSA	Primary Industries and Resources, South Australia
POM	Production Operations Manual
PPL	Petroleum Production Licence
SACBJV	South Australia Cooper Basin Joint Venture
SEO	Statement of Environmental Objectives prepared in accordance with Section 99 and 100 of the *Petroleum and Geothermal Energy Act 2000* and Regulations 12 and 13
TPH	Total Petroleum Hydrocarbons

7 References

Beach Petroleum (2003). *Environmental Impact Report: Cooper Basin Petroleum Production Operations*. Beach Petroleum, Adelaide.

Beach Petroleum (2008) *Addendum to the Environmental Impact Report: Cooper Basin Petroleum Production Operations. Five Year Review of the Statement of Environmental Objectives.* Beach Petroleum, Adelaide. September 2008

Epic Energy (2001). *Moomba to Adelaide Pipeline Statement of Environmental Objectives*. Epic Energy, Perth.

PIRSA (2000). *Statement of Environmental Objectives for Drilling and Well Operations in the Cooper and Eromanga Basins South Australia.* Department of Primary Industries and Resources South Australia, Adelaide.

PIRSA (2000). *Criteria for Classifying the Level of Environmental Impact of Regulated Activities: Requirements under Part 12 Petroleum and Geothermal Energy Act 2000*. Primary Industries and Resources of South Australia, Adelaide. http://www.pir.sa.gov.au

SACBJV (2003). *Production and Processing Operations in the Cooper and Eromanga Basins, Draft Statement of Environmental Objectives*. Santos Ltd, Adelaide

Santos (2003). *Statement of Environmental Objectives: Drilling and Well Operations*. Prepared for South Australian Cooper Basin Operators by Santos Ltd, Adelaide. October 2003

Stuart Petroleum (2003). *Statement of Environmental Objectives Petroleum Production at Acrasia Field, Cooper Basin, South Australia*. Stuart Petroleum Ltd, Adelaide. November 2003.

Appendix A:
Objectives and Assessment Criteria

Objectives and Assessment Criteria[11]

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
1. To avoid unnecessary disturbance to 3rd party infrastructure, landholders or land use	1.1 To minimise disturbance or damage to infrastructure / land use and remediate where disturbance cannot be avoided	Timely notification to adjacent landholders / 3rd party prior to & during new or significant works. Procedures in the POM, EMS and PIRSA guidelines address removal of waste products, re-instatement of soil profiles and rehabilitation. Incident reports	Where disturbance is unavoidable or accidental, infrastructure or land use is restored to as is reasonably appropriate to the original undisturbed condition or as agreed with the landholder
	1.2 To minimise disturbance to landholders	Records of communications with adjacent landholders / 3rd parties Record of disturbance management through appropriate documentation	No unresolved reasonable landholder/3rd party complaints Landholder activities not restricted or disturbed as a result of activities unless by prior arrangement
2. To maintain soil stability / integrity	2.1 To remediate erosion as a result of production operations in a timely manner	Inspections undertaken as part of regular operations or following specific works or following significant storm events to look at evidence of erosion, subsidence, vegetation loss & compare to adjacent land Incidents or environmental issues (e.g. erosion, weeds, spills, vegetation death) reported/actioned via the Incident Register, Environmental Checklists or the Action Item Register Preventative measures implemented and monitored in susceptible areas (eg. monitor for salinisation/erosion effects)	The extent of soil erosion is consistent or less than surrounding land

[11] Assessment criteria have been developed to be “black and white”. Professional judgement is required to assess whether non-compliance is minor or major. It is necessary to ensure that adequate information is available to enable this judgement to be made.

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
	2.2 To prevent soil inversion	Inspections undertaken as part of regular operations to look for soil discolouration and the success of vegetation return as an indicator Contractor to indicate top soil/subsoil are stockpiled separately and soil profiles appropriately reinstated following the rehabilitation of earthworks/excavations	Vegetation cover is consistent with surrounding land No evidence of significant subsoil on surface (colour)
	2.3 To minimise and remediate soil disturbance	Restrict activities (including vehicle access) to production areas and associated infrastructure and easements Minimise area required for safely undertaking activities in accordance with procedures Planning and assessment of proposed activities to minimise impact Design and construct road with drainage features (e.g. culverts and off takes) to minimise erosion and sedimentation Rip areas of compacted soil (except on gibber plains and tableland environments Restored borrow pits have topsoil / overburden replaced and pit re-profiled where necessary to prevent erosion Contractor to indicate that soil profiles appropriately reinstated following the rehabilitation of earthworks/excavations	No production activities undertaken on salt lakes, steep tableland land systems or wetlands land systems (as defined in the EIR) Abandoned areas (e.g. borrow pits) are remediated and rehabilitated to be reasonably consistent with the surrounding area 0, +1 or +2 GAS criteria for borrow pit construction and rehabilitation are attained (Appendix B)
3. To minimise disturbance to native vegetation and native fauna	3.1 To maintain regrowth of native vegetation on reinstated areas to be consistent with surrounding area	Disturbance management to facilitate regrowth in rehabilitated areas Follow-up rehabilitation work was undertaken where natural regeneration was inadequate	Species abundance and distribution on the reinstated areas was consistent with the surrounding area Note: assessment of the consistency with surrounding areas will take into account that regrowth is a time and rainfall dependent process 0, +1 or +2 GAS criteria for borrow pit construction and rehabilitation are attained (Appendix B)

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
	3.2 To minimise additional clearing of native vegetation as part of production activities	Planning and assessment of proposed activities to minimise impact which may include consultation with Native Vegetation Council Avoid significant or priority vegetation and ensure proposed routes have been scouted for significant vegetation and wildlife habitats by appropriately trained and experienced personnel Use existing cleared areas for laydowns and turn-arounds Consideration of sensitive vegetation during vegetation trimming and / or clearing activities Vegetation trimmed rather than cleared where possible Minimise area required for safely undertaking activities in accordance with procedures	Vegetation clearing is limited to previously disturbed areas or areas assessed to be of lowest sensitivity No rare, vulnerable or endangered flora removed without appropriate permits No production activities undertaken on salt lakes, steep tableland land systems or wetlands land systems (as defined in the EIR) 0, +1 or +2 GAS criteria for borrow pit construction and rehabilitation are attained (Appendix B)
	3.3 To achieve a significant environmental benefit for native vegetation clearance	Work (or payment to Native Vegetation Fund) undertaken to achieve a significant environmental benefit for native vegetation clearance, as required by Regulation 5(1)(zd) of the *Native Vegetation Regulations 2003* Significant environmental benefit requirement either: ▪ determined using the "Methodology for calculating total SEB requirements" outlined in the Guidelines[12], or ▪ negotiated with the Native Vegetation Council where SEB calculation differs from the standard methodology in the Guidelines. (Note: The Guidelines have provision for case-by-case assessment of significant environmental benefit by the NVC in some circumstances e.g. where SEB capping or additional mitigation measures apply)	Significant environmental benefit for native vegetation clearance approved by PIRSA (where delegated authority applies) or Native Vegetation Council Significant environmental benefit obligation satisfied / implemented

[12] *Guidelines For a Native Vegetation Significant Environmental Benefit Policy For the clearance of native vegetation associated with the minerals and petroleum industry*

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
	3.4 To ensure production activities are planned and conducted in a manner that minimises impacts on native fauna	Planning and assessment of proposed activities to minimise impact In event of earthworks, open trenches are monitored daily Utilise trench plugs and fauna ladders to facilitate movement of fauna out of and across open trenches No feeding of wildlife Positioning of facilities and infrastructure to minimise impacts on fauna habitat	Vegetation clearing is limited to previously disturbed areas or areas assessed to be of lowest sensitivity No rare, vulnerable or endangered fauna removed without appropriate permits 0, +1 or +2 GAS criteria for borrow pit construction and rehabilitation are attained (Appendix B) Native fauna casualties are restricted to as low as reasonably practical
	3.5 To minimise disturbance of aquatic habitats (specifically wetlands, permanent waterholes and flowing water courses)	Obtain regulatory approval prior to undertaking disturbance in aquatic habitat (contact should be initially made with PIRSA during the planning process) Planning and assessment of proposed activities to minimise impact	Works in aquatic habitats (e.g. flowing watercourses) has been approved by PIRSA
4. To prevent the introduction or spread of weeds, pathogens and pest fauna	4.1 To ensure that weeds, pathogens and pest fauna are controlled at a level that is at least consistent with adjacent land	Regular patrols undertaken to look for evidence of weeds on production site and adjacent land (if weeds on production facility or easement but not adjacent land must implement control to prevent spread) Records of outbreaks found, weed control activities and photo-monitoring of significant outbreaks Undertake vehicle and equipment washdown before entering Cooper Basin or after operating in areas of known weed infestations	The presence of weeds and pathogens was consistent with or better than adjacent land No new outbreak or spread of weeds reported
5. To minimise the impact of the production operations on	5.1 To maintain current surface drainage patterns	Regular patrols undertaken to look for evidence of erosion, abnormal vegetation growth or death Observations are also to be undertaken following significant storm events	For excavations, surface drainage profiles restored to as is reasonably consistent with surrounding area For existing easements, drainage is maintained similar to pre-existing conditions

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
water resources	5.2 To minimise impact to aquifers / groundwater volumes and flow patterns	The volume/flow of water extracted is monitored and recorded Water usage is to be reviewed annually and management strategies implemented to reduce overall water usage where practical	Volume of water produced recorded No uncontrolled flow to the surface (i.e. no free flowing bores) Note: the drilling and well operations SEO provides detail on aquifer issues
6. To avoid land or water contamination	6.1 To prevent spills occurring and if they occur minimise their impact	All production facilities and flowlines are designed and constructed in accordance with relevant standards Containment of all hazardous substances including hydrocarbons and liquid waste in appropriate vessels and bunds Tanker load-out in lined area, with appropriate bunding to contain spills Roads and causeways designed to minimise risk of vehicle accident and appropriate safety signage installed (e.g. at access to public roads) Fuel and chemical handling and emergency response procedures included in staff training, implemented and reviewed periodically Transport procedures and restrictions to achieve compliance with POM and EMS (including no transport in wet conditions and no wet wheel fording) Implement POM procedures for temporary product storage pits Prevention program including inspection, maintenance and pigging where appropriate Patrols to look for evidence of soil discolouration, vegetation or fauna death Production operations will cease in event of flood inundation. In floodplain land systems when flooding of the facility is imminent, the following will be undertaken:	No evidence of any spills or leaks to areas not designed to contain spills In the event of a spill, the spill was: ▪ Contained ▪ Reported ▪ Cleaned-up ▪ Cause investigated and corrective and/or preventative action implemented Compliance with the Environment Protection Act, Australian Standard 1940 and the Australian Dangerous Goods Code

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
		▪ Storage tanks and above-ground flowlines drained, purged and filled with water to reduce buoyancy ▪ Interceptor pit skimmed to remove oil ▪ Fuel tanks drained, engines and all hydrocarbons (e.g. fuel and lubricants) removed off-site Fencing of contaminated areas if threat is posed to stock or wildlife Incident record system (preventative and post incident review)	
	6.2 To remediate and monitor areas of known contamination arising from production activities (salinisation, hydrocarbons, other production chemicals)	Active remediation methods implemented where it is determined that contamination is spreading or level of contamination is not decreasing Use of groundwater monitoring bores where there is an identified risk to groundwater. The number and positioning of monitoring bores will be in accordance with relevant industry practice to ensure adequate coverage of any potential underground water contamination and movement. Use of soil farms for remediation where appropriate	Contamination restricted to known areas and remediation strategies investigated and implemented where practical Level of hydrocarbon contamination continually decreasing, ultimately to meet Environment Protection Authority (EPA) guidelines[13]

[13] Soil Health Index (SHI) study is currently being undertaken by Santos, in consultation with PIRSA and EPA. The results of this study will provide a proforma for establishing site-specific bench marks for soil remediation.

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
	6.3 To ensure that rubbish and waste material is disposed of in an appropriate manner	Minimise generation of waste where practicable Provide suitable covered bins for the collection and storage of wastes and collect all waste in one area at each camp site Prevent wildlife accessing refuse materials Design and operation of any domestic waste disposal facility in accordance with EPA licence and guidelines Regular patrols undertaken to look for evidence of rubbish, spills (soil discolouration) Appropriately licensed contractors used for any hazardous waste disposal and records are maintained for all hazardous waste disposal All transported waste is adequately secured to the vehicle	No evidence of rubbish or litter on easements or at facilities No evidence that waste material is not contained and disposed of in accordance with Beach approved procedures Evidence of waste tracking certificates for prescribed wastes Evidence of compliance with any waste disposal licence conditions (e.g. EPA permits)
	6.4 To prevent impacts as a result of hydrotest water and waste water (e.g. washdown water) disposal	Water disposed of in a manner that prevented discharge or runoff to watercourses or environmentally sensitive areas Water discharged onto stable ground, with no evidence of erosion as a result of discharge Records on source of water and discharge method/location Use of biocides and toxic chemicals are kept to a minimum and where practicable UV-degradable biocides (e.g. TPHS) shall be used Appropriate assessment of hydrostatic test water quality to determine disposal method Inspection of water disposal sites for evidence of water entering a watercourse or environmentally sensitive area	No evidence of impacts to soil, water and vegetation as a result of water disposal (i.e. soil erosion, dead vegetation, water discoloration)

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
	6.5 To ensure the safe and appropriate disposal of grey water (sullage, sewage)	Compliance with the relevant local government regulations or relevant health and sanitation regulations Wastewater disposal is governed by the *Public and Environmental Health (Waste Control) Regulations 1995* (which require that the waste water disposal system must either comply with the *Standard for the Construction, Installation and Operation of Septic Tank Systems in SA* or be operated to the satisfaction of the Department of Health) Treated sewage wastewater disposed of onto land in accordance with Department of Health Regulations.	Wastewater disposed of in a manner that minimises risk to the environment and public health Compliance with Environment Protection Act
	6.6 To minimise impacts as a result of produced formation water treatment and disposal and restrict to defined areas	Produced formation water treatment and disposal in accordance with Beach approved procedures in POM and EMS Site ponds appropriately[14] to minimise potential impacts Fence contaminated areas if threat is posed to stock or wildlife Monitor evaporation pond water and sludge annually Target level of TPH for design purposes in lined interceptor ponds should be 50-100 mg/L Monitor ponds for surrounding upwelling of PFW Undertake appropriate water quality monitoring where shallow groundwater exists in the vicinity of PFW ponds Records of volumes of produced formation water maintained and reported annually	Water monitoring results indicated levels of Total Petroleum Hydrocarbons (TPH) below 30mg/L in unlined holding ponds and 10mg/L in freeform disposal/evaporation ponds. No evidence of overflow of product from interceptor pit No evidence of hydrocarbon contamination immediately adjacent to bunded ponds

[14] Appropriately manage means to take into consideration and assess relevant environmental factors (including location of surface water, shallow groundwater, potential flooding, location of vegetation, etc.) and take measures to reduce the potential impact on these factors through the use of best practice.

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
	6.7 To minimise impacts as a result of land treatment units and restrict to defined areas	Land treatment areas constructed and operated in accordance with procedures Records of soil added to land treatment areas to be maintained and reported annually (including quantity, location of source) Monitoring of surrounding soil and groundwater for contaminants annually as required by licence Monitoring and reporting of remediation	Periodic reports as required detail quantity, level of contamination and proposed ongoing operation of the LTU
7. To minimise the risk to public health and safety	7.1 To adequately protect public safety during normal production operations	Risk Assessments and inspections of facilities Use of signage, bunting and traffic management practices to identify all potentially hazardous areas Records of regular emergency response training for employees and review of procedures Incident record system (preventative and post incident review) Development, implementation and periodic review of Emergency Response Plan (ERP) All production facilities and flowlines are designed and constructed in accordance with relevant standards Safety, testing, maintenance and inspection procedures are implemented Personnel are trained to supervise and instruct individuals entering area to conduct work Safe work permits must be obtained to ensure only individuals with proper clearance can conduct works	No injuries or incidents involving the public Demonstrated compliance with relevant standards Emergency procedures implemented and personnel trained

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
	7.2 To avoid fires associated with production activities	Incident record system (preventative and post incident review) Regular fire safety and emergency response training for all operations personnel and review of procedures Established procedures for minimising fire risk during operations All production facilities are designed and constructed in accordance with relevant standards Appropriate fire fighting equipment on site	No uncontrolled operations related fires Emergency procedures implemented and personnel trained
	7.3 To prevent unauthorised access to production facilities	Use of signage, bunting to identify all potentially hazardous areas Communications with landholders All reports of unauthorized activity are reported and investigated	No unauthorised activity
8. Minimise impact of emergency situations	8.1 To minimise the impact as a result of an emergency situation or incident	Incident record system (preventative and post incident review) Emergency response trials and associated documentation Records of regular emergency response training for all personnel and review of procedures	Emergency response procedures are effectively implemented in the event of an emergency Emergency response exercises are aligned with credible threats and consequences identified in the risk assessment
	8.2 To restore any damage that may occur as a result of an emergency situation	Refer to previous criteria (Objective 1, 2, 3 & 6)	Refer to previous criteria (Objective 1, 2, 3 & 6)
9. To minimise noise due to operations	9.1 To take reasonable practical measures to comply with noise standards	Incident record system (preventative and post incident review) Monitoring results, where deemed necessary (e.g. frequent complaints)	Operational activities have taken reasonable practical measures to comply with noise regulations, under the *Environment Protection Act 1993* No unresolved reasonable complaints
10. To minimise atmospheric emissions	10.1 To minimise uncontrolled atmospheric emissions	Conduct all production activities in accordance with procedures Identify and implement strategies to minimise volumes if needed	Reasonable practical measures implemented in design and operation to minimise emissions

Objective	Goal	Guide to How Objectives can be Achieved	Assessment Criteria
	10.2 To minimise controlled atmospheric emissions	Conduct all production activities in accordance with procedures Identify and implement strategies to minimise volumes if needed Record and report annual emission volumes	Reasonable practical measures implemented in design and operation to minimise emissions Annual reporting includes atmospheric emissions data
	10.3 To minimise the generation of dust.	Incident record system (preventative and post incident review) Compliance with procedures (vehicle movement, dust suppression, etc.)	No reasonable complaints received No dust related injuries recorded
11. To adequately protect cultural heritage sites and values during operations and maintenance	11.1 To ensure that identified cultural sites are not disturbed	Consultation with relevant heritage groups if operations occurring outside known surveyed areas Surveys / cultural heritage monitoring before excavations Records of site locations within information systems Site examined by relevant aboriginal claimant group for cultural heritage material prior to work on areas not previously cleared	Proposed construction areas and access tracks surveyed by relevant cultural heritage/ Native Title group Any new sites identified are recorded and reported to appropriate authority No impact to identified sites without approval under the *Aboriginal Heritage Act 1998* or the *Heritage Places Act 1993* 0, +1 or +2 GAS criteria are obtained for borrow pit construction and restoration, as listed in Appendix 2

Appendix B:
GAS Criteria for Borrow Pits

Goal Attainment Scaling (GAS) Criteria for Borrow Pits

Objectives	**Goals**	**Goal Exceeded** **+2**	**Goal Exceeded** **+1**	**Goal Attained** **0**	**Minor Shortfall** **- 1**	**Significant Shortfall** **- 2**
CONSTRUCTION						
Minimise impacts on vegetation	**Perennial vegetation clearance minimised**	No trees or vegetation removed	No trees were removed, only vegetation	Trees and vegetation were removed where removal could not have been avoided	Trees with trunk diameters between 20 and 50 cms were removed where removal could have been avoided	Trees with trunk diameters over 50 cms were removed where removal could have been avoided
Protect sites of natural, scientific, or heritage significance	**Avoid sites**	Sites identified, flagged and avoided by 100m	Sites identified, flagged and avoided by 30 m	Sites identified, flagged and avoided		Sites disturbed
Minimise visual impacts	**Site pit appropriately**	Borrow pit not visible from road	Borrow pit shielded from road by utilizing screening vegetation or landform	Borrow pit more than 10m from road Visible from road due to lack of screening vegetation	Borrow pit less than 10m from road	Borrow pit less than 5m from road
REHABILITATION						
Minimise impacts on vegetation	**Acceptable revegetation after rainfall**	Vegetation type and density indistinguishable from surrounding landscape	Vegetation type and density only slightly distinguishable from surrounding landscape	Perennial grasses and shrubs revegetated, type consistent with surroundings. Some bare patches still present Vegetation cover uniform over base and sides of pit	Revegetation localised on the base of the pit but none or very little on the sides of the pit	No revegetation evident
Minimise impact on soil	**Minimise erosion**	No erosion anywhere on the pit	Insignificant erosion along the sides of the pit	Minor erosion along the sides of the pit	Moderate erosion	Severe erosion evident
Minimise visual impacts	**Borrow pit effectively recontoured and ripped**	Pit contours indistinguishable from surrounding landscape. Access ripped	Pit contours blend well into surrounding landscape, although still evident	Pit sides battered and ripped along the contour, but pit outline visible Topsoil and vegetation respread over disturbed area	Pit sides battered but not ripped	No recontouring of pit has occurred – pit sides are very steep Topsoil and vegetation not respread
Site to be left in a clean and tidy condition	**Rubbish removed**			No evidence of litter	Small items of litter present on site	Large items of litter present