

STATEMENT OF ENVIRONMENTAL OBJECTIVES Drilling, Completion and Initial Production Testing PEL 255 OTWAY BASIN SOUTH EAST, SOUTH AUSTRALIA

ADELAIDE ENERGY LTD
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1 INTRODUCTION

1.1 Purpose

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

The intent of this SEO is to outline the environmental objectives that the operator of PEL 255, in South Eastern South Australia, is required to achieve during drilling and well operations, including initial production testing if any, and the criteria upon which these objectives are to be assessed.

The Petroleum Act broadly defines the environment to include natural, social, cultural and economic aspects. The environmental objectives outlined in the SEO incorporate all of these elements.

The SEO details the environmental objectives that need to be demonstrably achieved by the licensee to address the risks associated with this activity as detailed in the Environmental Impact Report (EIR) for drilling, completion and initial production testing in the PEL 255 Region (Otway Basin, South East South Australia).

1.2 Scope

This SEO applies to drilling, completion and initial production testing operations in PEL 255 (Figures 1, 2 and 3) as described in the associated EIR, but may subsequently be extended to other parts of PEL 255 for future exploration. It is intended that if any of the future activities are to be in close proximity to the Penola Conservation Park then further consultation and the appropriate assessment will be carried out at that time.

This will be subject to an assessment in accordance with Petroleum Regulation 20(1)(g).

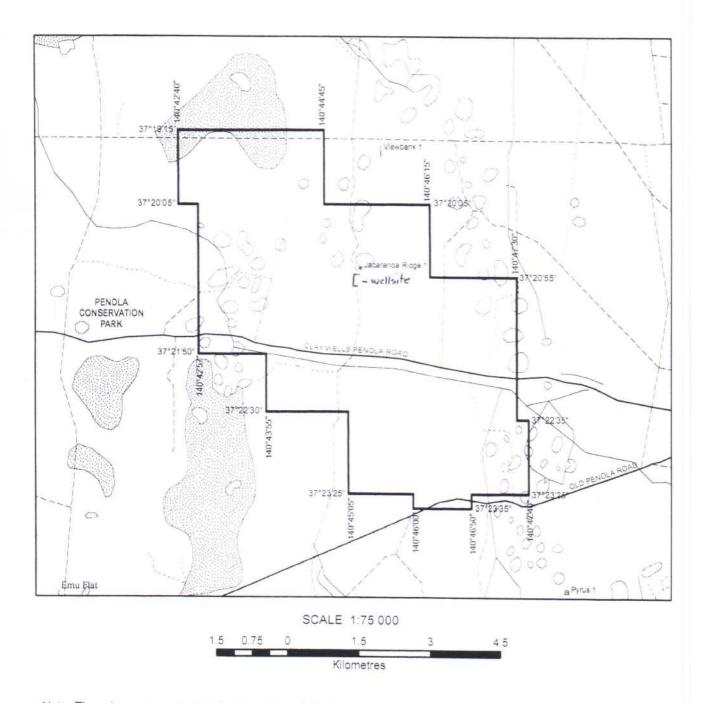
It is planned for the first commitment well, Jacaranda Ridge 2, to be drilled within a few hundred metres of Jacaranda Ridge 1.

Activities covered by this SEO are:

- well site and access track construction
- drilling
- well completions and workovers
- production testing (both drill stem tests and any initial production testing)
- well and zonal abandonment
- site and access abandonment and remediation.

The following operations are not covered by this SEO:

- seismic exploration activities
- production and processing operations beyond initial production testing.



Note: There is no warranty that the boundary of this licence is correct in relation to other features of the map. The boundary is to be ascertained by reference to the Geocentric Datum of Australia (GDA94) and the schedule.

THE PLAN HEREINBEFORE REFERRED TO

PETROLEUM EXPLORATION LICENCE NO: 255



SR 27/2/418 AREA: 36.9 sq km (approx)

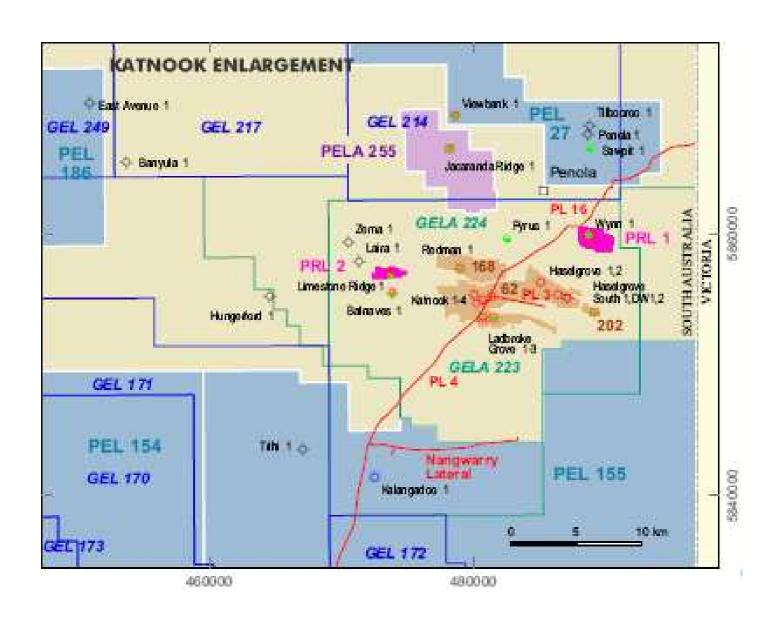


Figure 2. PEL 255 location within Otway Permits



Figure 3. Satellite image of PEL 255 showing cleared state of the local area

2 ENVIRONMENTAL OBJECTIVES

2.1 Objectives

Environmental objectives in the Petroleum Act include:

- to minimise environmental damage from activities involved in exploration for, or the recovery or commercial utilization of, petroleum and other resources
- to minimise environmental damage from activities involved in drilling and well operations.

Environmental hazards and risks of the proposed drilling, completion and initial production testing activities are identified in the PEL 255 Region EIR. The purpose of the SEO is to provide the environmental objectives to which drilling and related activities, including transportation and well testing, must conform, and the criteria upon which achievement of those objectives can be assessed, for consideration under Section 101(1) of the Act. A condition of approval of the activity is that the operator and licence holder is liable for meeting the environmental objectives and assessment criteria.

The relevant environmental objectives for drilling and well operations which must be achieved to address the risks identified in the EIR are:

- 1. Avoid disturbance to sites of Aboriginal and non-indigenous heritage significance.
- 2. Avoid disturbance to rare, vulnerable and endangered flora and fauna species.
- 3. Prevent the introduction and establishment of weed species.
- 4. Minimise impacts to soil.
- 5. Minimise loss of reservoir and aquifer pressures and avoid aquifer contamination.
- Minimise disturbance to drainage patterns and avoid contamination of surface waters and shallow groundwater resources.
- 7. Minimise risks to the safety of the public, employees and other third parties.
- 8. Minimise disturbance to the local community and other land users.
- 9. Minimise visual impact.
- 10. Minimise impact of domestic and industrial waste.
- 11. Remediate and rehabilitate operational areas to agreed standards.

3 INCIDENTS

3.1 Serious incidents

Section 85(1) of the Act defines "serious incident" to mean:

"an incident arising from activities conducted under a 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."

Pursuant to Regulation 12(2) of the Act, the incidents listed below are considered to be those which could arise and, if not properly managed or avoided, cause a serious incident:

- Explosion or fire at the well or loading facility;
- Spills of oil and/or chemicals which enter land off work site or into ground or surface waters;
- Transportation accident involving oil spillage;
- Transportation accident resulting in fire;
- Disturbance to sites of Aboriginal and non-indigenous heritage significance;
- Removal of rare, vulnerable or endangered flora and fauna species;
- Identification of cross flows in aquifers;
- Uncontrolled flows to the surface (i.e. blow out).

3.2 Reportable incidents

Pursuant to Regulation 12(2) of the Act, the incidents listed below are considered to be reportable incidents under Section 85(1) of the Act.

- Non-compliance with procedures defined or developed to implement environmental objectives
- Spills of oil outside bunded and other defined areas intended to contain spillages
- Failure of the formation water handling/disposal system;
- A complaint from a landowner in regard to operations.
- Any detected unauthorised access to production and processing facilities and associated infrastructure.

4 REFERENCES

Factchen, T.J. and Woodburn, J.A., 1997. Criteria for the Abandonment of Seismic Lines and Wellsites in the South Australian Portion of the Cooper Basin; Identification and Evaluation of the Assessment Criteria. Report to MESA. DME 389/1994.

PIRSA Field Guide 2002. Field Guide for the Environmental Assessment of Abandoned Petroleum Wellsites in the Cooper Basin, South Australia.

PIRSA Drill Pad and Access Road construction on Private Land.

PIRSA website www.pir.sa.gov.au

APPENDIX 1

ENVIRONMENTAL OBJECTIVES AND ASSESSMENT CRITERIA

OBJECTIVE	COMMENT	GUIDE TO HOW OBJECTIVES CAN BE ACHIEVED	ASSESSMENT CRITERIA
1) Avoid disturbance to sites of Aboriginal and non-indigenous heritage significance.	 The aim of this objective is to ensure that any sites of Aboriginal and European heritage significance are identified and protected. There are no current land rights claims over this area. 	 Appropriate earthworks personnel to be reminded of identification of heritage items/objects and remains. Also to be reminded of their obligations to respond appropriately to any sites discovered during construction and operation activities. Compliance with the Aboriginal Heritage Act 1988. The proposed well site and access tracks will be traversed prior to commencement of any activity to ensure any sites of Aboriginal and European heritage are identified. The Kungari Aboriginal Organisation will be consulted and invited for a site visit. 	No disturbance to Aboriginal and non- indigenous heritage sites.
2) Avoid disturbance to rare, vulnerable and endangered flora and fauna species.	 The permit area has predominately been cleared of any native vegetation, and is continually exposed to cropping, burning, fertilizing, spraying and grazing. This also impacts on native fauna. Roadside flora and fauna have been similarly affected. A search of the EPBC site has been conducted. A search of the National Parks and Wildlife Act 1972 is to be carried out to check for species of state significance. 	 Prior to any earthworks the farming land will be checked for native flora and fauna Excavation areas like the sumps, flarepit, grey water and septics will also be checked regularly. Wellsite and these open pits will remain fenced whenever wellsite is vacated. Clearance of remnant vegetation and habitats will be avoided and/or minimised by locating wellsites and access tracks appropriately. Fire prevention is important and dependent on construction, drilling and testing timing, fire breaks may need to be cleared. The local CFS may also be required at any testing. Local CFS will be invited to attend during the initial drilling stage to make themselves familiar with the site, water availability etc. Current daily Fire Danger sign present on site. This will be changed daily if in the fire danger season. Response to fire will be included in the Emergency Response Plan. 	Wellsite and Access Track Construction Any sites of rare, vulnerable and endangered flora and fauna have been identified, flagged and subsequently avoided. Drilling and Production Testing Activities No fires during drilling and production testing activities.

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3) Prevent the introduction and establishment of exotic weed species and other pathogens.	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.	 All vehicles, equipment and personnel entering the region to be assessed for risk of transporting weeds and plant pathogens. Paving materials will be sourced from sites free of weeds. The site and access will be monitored on a regular basis for new weed species and treated as necessary in accordance with the landowner's wishes. 	No introduced exotic weed species as a consequence of activities.
4) Minimise impacts to soil.	 The main impact to soil is caused by the stripping off of topsoil, the importation of foreign material for the construction of the site, and the compaction of this material and the remaining soil below this fill. Whilst every endeavour will be made to keep vehicle movement to the access track and gravelled areas sometimes wheel ruts do occur on the undisturbed soil within the lease area. Earthworks to be undertaken in timely fashion and in due consideration of SE weather conditions. Contamination from accidental spillages of chemicals or hazardous substances during well operations is another potential risk to the soil. Precautions will be taken to prevent and contain spills at all sites where fuels are used or transferred (generators, vehicle re-fuelling). Bunded areas will be constructed to collect any oil and grease at the campsite and drill rig generators and initial production storage tanks. Cleanup and rehab need to be done close to the break of season to minimise wind erosion and blowing away of reseeded pasture or crop areas. 	 Wellsite and Access Track Construction and Restoration Consult "Wellsite and Access Track Construction and Restoration" (PIRSA) as a guideline. Place wellsite to minimise amount of cut and fill. Soil removed in construction to be stored on site and returned to its original stratigraphic level upon restoration of the drill site. Restoration of the drill site to be approved by the landowner or in accordance with landowner's wishes should retention of specific parts of the site be requested (e.g. pad). Landowner to be consulted about earthworks required, location of access tracks and general information to minimise surface damage and to facilitate rehabilitation. Separate storage of topsoil, subsoil and clays or marls to assist rehabilitation will be undertaken to assist in regeneration of pasture or crops. During rehabilitation the soil beneath the tracks, camp and pad will be ripped after removal of imported fill but before the returning of topsoil. Drilling and Production Testing Any oil contamination of sump from drill cuttings to be controlled by an absorbent barrier and pumped out to a disposal tank. All bunded areas will be in accordance with EPA guideline 080/04 "Bunding and Spill Management". 	Wellsite and Access Track Construction and Restoration No disturbance to soil profiles as a result of construction activities. No significant increase of surface limestone on surface following restoration. Drilling and Production Testing Activities No soil contamination as a result of drilling and production testing activities. Fuel and Chemical Storage and Handling Areas affected by any spill are removed and/or bio-remediated. No soil contamination as a result of fuel and chemical storage and handling

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		 Camp and drill rig generators to be located in polyethylene lined bunded areas to contain any spills. Production storage tanks, fuels, oils and chemicals to be stored in polyethylene lined bunded areas Initial production lines and tanks to be inspected prior to use. MSDS info readily available on the wellsite. Fuel and Chemical Storage and Handling 	
		 Fuel tanks and delivery systems are to be inspected by Adelaide Energy Drilling Supervisor for any potential leaks and refused entry to the site if found to be unsuitable. Hazardous material stored, used and disposed of in accordance with relevant legislation on dangerous substances. All hazardous materials stored in approved containers in polyethylene lined bunded area. Contaminated soil will be removed and replaced with clean fill or will undergo bio-remediation. "Sokerol" (or similar) absorbent material will be stored at the rig for use in the event of a spill. Any contaminated soil removed from the site will be treated / disposed of at an EPA approved facility. All wastes generated on wellsite (except grey water) recycled or disposed of at an EPA licensed facility. Septic tanks will be used at camp and drill rig ablutions. Septic tanks will be pumped out on an "as required basis" by a licensed septic waste removal contractor and disposed of at a licensed facility. All wastewater disposed in accordance with the <i>Public and Environmental Health (Waste Control) Regulations1995</i>. 	

OBJECTIVE	COMMENT	GUIDE TO HOW OBJECTIVES CAN BE ACHIEVED	ASSESSMENT CRITERIA
5) Minimise loss of reservoir and aquifer pressures and avoid aquifer contamination.	This objective seeks to protect the water quality and pressure of any aquifers and to maintain pressure in potential petroleum aquifers. The following geological formations in the Otway Basin may contain permeable sands (aquifers) which may be in natural hydraulic isolation from each other: Gambier Limestone; Dilwyn Formation; Pebble Point Formation; Sherbrook Group Eumeralla Formation Crayfish Unconformity Laira Formation Pretty Hill Formation. Unless a suitable stock/domestic bore is available nearby, a new water bore will be required to supply water for drilling and camp water.	 Drilling and Completion Activities Observed volumes of cement return to surface match calculations. Where there is evidence of insufficient isolation, remedial action such as cement squeeze to be conducted. Casing will be centred with centralisers to ensure full radial cement coverage, mud cake will be removed to maximize cement bond to formation and excess cement volumes will be pumped to cater for unforeseen cavities and overgauge hole. Casing seating depths will be designed to cover formations at risk and the cementing programme will allow for sufficient cement returns at surface to ensure bond to the Formation. Water bore to be drilled by local licensed driller with knowledge of telltale signs of seal above Dilwyn formation. The seal to this aquifer is not to be penetrated. Water bore license to be restricted to stock/domestic to ensure future use by landowner is not for irrigation Well Abandonment Activities Well abandonment program to be submitted to PIRSA with wireline logs for prior approval. Plugs set to isolate potential aquifers through the well bore. Records of plug depths and intervals are kept. 	 No aquifer contamination as a result of drilling, completion or production testing activities. Drilling and Completion Activities No uncontrolled flow to surface (i.e. blow out). Sufficient barriers exist in casing annulus to prevent crossflow between separate aquifers or hydrocarbon reservoirs. Dilwyn is not penetrated in any water bore. Production Testing and Well Abandonment Activities No cross-flow behind casing between aquifers, and between aquifers and hydrocarbon reservoirs unless approved by the Department of Water, Land and Biodiversity Conservation.
6) Minimise disturbance to drainage patterns and avoid contamination of surface waters and shallow groundwater resources.	 Near-well bore invasion by mud filtrate is an accepted process during drilling. Fresh water mud is used in the top hole and has no impact. Saline mud is used in the mid to bottom hole section but its impact is minimised because of the following factors: (a) deeper aquifers are saline and are not used for agriculture; (b) shallow aquifers are behind cemented casing; 	Wellsite and Access Track Construction and Restoration Any soil removed during the construction of the drill pad will be respread over the disturbed area during restoration. Any area artificially elevated via pad or access track construction will be lowered to original ground level by removal of paving material unless otherwise instructed by the landowner.	 No disruption to drainage patterns as a result of construction activities. No contamination of surface waters and shallow groundwater resources.

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	 (c) the volume of filtrate is insignificant relative to the volume of the aquifer. Potential spills can originate from the well while the well is producing or from the mud pits during drilling. 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 main threat to the surface water is contamination from spills during times of heavy rainfall and localised flooding. Rainfall data show that on average most rain falls during the mid year period but some exceptions occur (e.g. March 1983, 121mm). The sump can handle a significant volume of fluid and has sufficient excess volume to accommodate intermittent periods of high rainfall and associated run-off. A two stage sump is generally used so that water / drilling mud can be recycled back into the mud system keeping sufficient freeboard. 	 Temporary drainage depressions / culverts may be required to maintain surface runoff Original drainage patterns will be restored. Restoration will be completed by ripping, cultivating and sowing a pasture or crop depending on landowner requests Drilling and Production Testing Activities Information on muds and chemicals to be readily available on the rig. The sump will be lined with a 20 micron HPDE impermeable plastic membrane to prevent percolation into the soil. If. required the sump may be pumped and excess fluid disposed of as appropriate. On completion of drilling the drill cuttings and sump water will be tested to analyse their suitability for industrial recycle, fill or contaminated fill and will be disposed of accordingly, along with the sump liner. Fluid losses will be controlled during drilling. Any oil contamination of sump from contaminated drill cuttings will be controlled and pumped out to a disposal tank. Camp and drill rig generators will be located in polyethylene lined bunded areas. Production storage tanks, fuels, oils and chemicals will be stored in polyethylene lined bunded areas. Initial production lines and tanks will be inspected prior to use. No spills/leaks outside areas designed to contain them. Fuel and Chemical Storage and Handling Fuel tanks and delivery systems are to be inspected by Adelaide Energy Drilling Supervisor for any potential leaks and refused entry to the site if found to be unsuitable. 	

OBJECTIVE	COMMENT	GUIDE TO HOW OBJECTIVES CAN BE ACHIEVED	ASSESSMENT CRITERIA
		 All hazardous materials stored in approved containers in polyethylene lined bunded area. Drilling fluid materials that may contribute to pollution will be clearly identified and stored with MSDS. No spills/leaks outside areas designed to contain them. 	
7) Minimise risks to the safety of the public, employees and other third parties.	 The guide to how to achieve this objective has been developed on the basis of the current understanding of the risks of wells to third party safety. Risks may span in time from immediate (e.g. unauthorised access, abandoned waste), to long term (e.g. breakdown over time of cement integrity around casing allowing cross flow). Rig practices need to be monitored and training / induction programs maintained and upgraded as necessary. The wellsite will be under the control of Drilling Supervisor. All reasonable steps will be taken to prevent unauthorised access to the site and warning signs will be appropriately located. The key to achieving the third party safety objective in relation to both downhole abandonment and surface wellsite restoration is to ensure that the visual prominence of the abandoned wellsite and access track is minimised. Rural areas typically have high vehicle speeds on main roads and intersections with minor roads are hazardous. Dust resulting from drilling activities and supply truck movements may become inconvenient and a road safety issue. 	 Unauthorised Access by Third Parties "No Entry" signs warning of dangers associated with drilling operations placed at the entry to the site access track Site area to be fenced with a gate on the access track. Wellsite office and parking area located within the lease area. Drilling Supervisor and Drilling Contractor Manager given authority to refuse entry of unauthorized third parties. Access gate to wellsite will be closed during testing and appropriate signage will be in place to restrict entry. No access to the site by uninvited third parties. Log kept of Safety induction for all invited visitors Fence around sump and wellhead if no immediate production /cleanup action is to be undertaken. Necessary measures taken to prevent the public accessing the wellhead equipment or waste relating to the well. Wellhead and sump to be individually fenced if delay in cleanup / workover rig operations to occur. Drilling and Completion Activities Drill rig, ancillary and any testing equipment to comply with Regulations, meet relevant industry standards and be "Fit for Purpose". 	No injuries to the public or third parties.

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		 Casing design carried out to meet worst case expected loads and environmental conditions determined for the specific geology intercepted by the well. Details of work to be performed are set out in the Drilling Program. Casing set in accordance with design parameters. Casing cemented to surface with visible return. Blow out prevention precautions in place in accordance with defined procedures and appropriate to the expected downhole conditions. Satisfactory kick tolerance in casing program design. Emergency Response Procedures in place. Confinement of flammable sources, restrictions on certain procedures and ready access to suitable fire fighting equipment. Well Abandonment and Site Restoration Activities Downhole abandonment is carried out to meet worst case expected loads and downhole environmental conditions. Effective isolation maintained between any potential aquifers to prevent crossflow. Abandonment plugs must be set to ensure long term isolation of any potential aquifers intersected to avoid shallow zones becoming overpressured. All minor holes eg septics and grey water to be backfilled soon after rig release. Effective rehabilitation of the wellsite so that potentially dangerous perturbations in ground 	
		Vehicle Movement Control production and dispersion of dust on unsealed roads and drilling lease areas. Roads will be sprayed with water as required to minimise dust generation.	

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8) Minimise disturbance to the local community and other land users.	 Slow heavy vehicles associated with operations can cause interference to local community vehicular traffic. The cleared open nature of the region minimizes natural attenuation and makes noise moderation difficult. Drilling rigs are inherently noisy and need to operate 24 hours per day. Paddocks within the licence area have limited vegetation barriers. The main risk to livestock is injury from vehicle movements and open sumps and cellars. Spills must invoke a rapid response by drilling personnel to minimise impact on the environment and any stock. Wildfire caused by construction/drilling/rehabilitation activities are of real concern. Plan vehicle movements and schedule activities as best as possible to minimize inconvenience. Vehicle movements on gravel roads, access tracks and lease can cause excessive dust. 	 ACHIEVED Appropriate speed limit on unsealed roads included in all inductions. Speed reduction signs to be positioned on unsealed roads in vicinity of wellsite. Driver behaviour and vehicle speed limits to be included in compulsory induction. Rig mobilization and demobilization to detour around town centres where possible. Major vehicle movements on minor roads to be scheduled so as to not clash with school bus times. Noise limitation to be included as part of induction procedures (e.g. noisy tubular/pipe handling, unnecessary use of horns). Heavy truck drivers to be instructed not to use engine brake near dwellings. Vehicle speed limits observed. Adequate fencing of wellsite area to landholders' satisfaction. In the event of an oil spill, contingency plan to be implemented after the spill event. In the case of an abandoned restored site, the entire area will be restored to original land surface topography with no irregularities likely to cause injury to running stock. Consultation with local CFS during construction/drilling/rehabilitation phases to ensure fire concerns are addressed. Compliance with Part 10 of the Petroleum Act 	 No adverse impact on livestock, cropping and pasture as a result of activities. No complaints from the local community or other land users No fires initiated during construction, drilling or rehabilitation.
	Drilling in winter minimises dust generation.	2000 (notice of entry requirements).	

OBJECTIVE	COMMENT	GUIDE TO HOW OBJECTIVES CAN BE ACHIEVED	ASSESSMENT CRITERIA
9) Minimise visual impact.	Fatchen and Woodburn (1997) study concluded that the major impacts of wellsite and access track construction are predominantly visual and not ecological. On the basis of this study a set of assessment criteria was established for assessing rehabilitation of abandoned and restored wellsites and access tracks (PIRSA Field Guide 2002).	In the case of an abandoned restored site, the entire area will be restored to original land surface topography with no irregularities	The attainment of 0, +1 or +2 GAS criteria (refer to PIRSA Field Guide 2002) for minimising visual impact.
10) Minimise impact of domestic and industrial waste.	Waste refers to all wastes with the exception of the Listed Wastes in Schedule 1 Part B of the Environment Protection Act 1993. Liquid and solid waste will be treated as discussed in the Environmental Impact Report. All waste removal contractors will be licensed and will operate within EPA guidelines.	 All wastes generated on the wellsite (except grey water) recycled or disposed of at an EPA licensed facility. Grey water will be contained in a pit and pumped into the sump or onto the adjoining paddock as appropriate. If required the sump may be pumped and excess fluid disposed at an approved waste facility. Septic tanks will be used at camp and drill rig ablutions. Septic tanks will be pumped out on an "as required basis" by a licensed septic waste removal contractor and disposed of at a licensed facility. All wastewater disposed in accordance with the <i>Public and Environmental Health (Waste Control) Regulations 1995.</i> Wellsite will be kept free of litter/rubbish. 	 No soil or groundwater contamination as a result of waste storage and disposal. No impact on landowner as a result of waste storage and disposal. No uncontained domestic waste on site.

OBJECTIVE	COMMENT	GUIDE TO HOW OBJECTIVES CAN BE ACHIEVED	ASSESSMENT CRITERIA
11) Remediate and rehabilitate operational areas to agreed standards.		Rehabilitation/ abandonment plans for surface activities will be developed in consultation with relevant stakeholders Well Site and Access Track Restoration Compacted soil areas will be ripped and soil profile and contours are reinstated following completion of operations.	No complaints from the local community or other land users Well Site and Access Track Restoration The attainment of 0, +1 or +2 GAS criteria (refer to PIRSA Field Guide 2002) for the revegetation of indigenous species. Note: Remediation of contamination addressed under objective 4. Well abandonment issues addressed under objective 6. Visual impact addressed under objective 9.