

**Environmental Impact Classification**  
**Pursuant to Section 98 of the *Petroleum Act 2000***

**Limestone Ridge-1 Drilling & Well Operations, Otway Basin – South  
Australia**

**15<sup>th</sup> June 2001**

**INTRODUCTION**

Pursuant to section 98 of the *Petroleum Act 2000* (the Act) the Minister must classify the regulated activities covered by a prepared Environmental Impact Report (EIR) as either low, medium or high impact.

The classification must be made on the basis of:

- The prepared Environmental Impact Report (EIR);
- Criteria established for classifying the level of environmental impact of regulated activities, a copy of which is found on the PIRSA Petroleum Group web page:  
<http://www.pir.sa.gov.au/dhtml/ss/section.php?sectID=437&tempID=8>;  
and
- Comment received from Planning SA, Department of Environment and Heritage (DEH) and Department for Water Resources (DWR) in accord with established administrative arrangements between these respective departments and PIRSA.

This document summarises the classification made by PIRSA on Limestone Ridge-1 Drilling & Well Operations in the Otway Basin in South Australia. This classification is based on the information provided in the EIR and draft Statement of Environmental Objectives (SEO) both dated May 2001 as submitted to PIRSA by Origin Energy Ltd on the 11 May 2001.

This classification and the above EIR and SEO documents do not cover the construction of the drilling pad and access road of this well. These activities are covered by the May 2001 SEO for the construction of drilling pad and access roads on private land in the Otway Basin, approved on the 14<sup>th</sup> May 2001 and gazetted on the 17<sup>th</sup> May 2001. This classification relates specifically to the activities associated with:

- Mobilisation and setting up of drilling equipment at the well site;
- Drilling of well and down hole construction;
- Management of down hole risks;
- Management of risks associated with surface spills and blowouts.

**SUMMARY OF CLASSIFICATION**

- 1) From an analysis of the environmental significance of the various potential impacts associated with this operation – summarised in attachment #1 against the classification criteria – this regulated activity has been

classified as **low impact**.

- 2) Comments received from DWR support this classification.
- 3) The most significant threat associated with any drilling in this region remains the potential for contamination of the Gambier Limestone and Dilwyn Formation aquifers.

The major source of risk for this threat stems from the potential for fluid crossflow from saline aquifers and/or hydrocarbon bearing formations into these key freshwater aquifers. The risk of such crossflow results mainly from poor cement integrity behind casing and/or incorrect setting of cement plugs to isolate the different formations within the well bore on abandonment.

In the case of this well, the precautions and measures, outlined in the EIR in Table 2 on pages 30 to 33 and in the SEO under objectives 6 and 7, that will be taken have been assessed to be sufficient to ensure a very low chance of contamination of aquifers by drilling fluids and through poor cement integrity resulting in poor isolation of the fresh water aquifers. Furthermore, as detailed in the assessment criteria under objective 6 in the SEO, in cases where the precautions taken to ensure adequate cement integrity behind the casing fail, cement will be squeezed into the relevant zone behind the casing fail, cement will be squeezed into the relevant zone behind the casing to achieve adequate integrity and zonal isolation.

- 4) Therefore pursuant to delegated powers dated 25 September 2000, gazetted 28 September 2000, I hereby classify this regulated act as low impact.

T AUST  
**Acting Director Petroleum Group**  
**Office of Minerals and Energy Resources**  
**Delegate of the Minister for Minerals and Energy**

Limestone Ridge#1 - Environmental Significance Assessment														Attachment #1						
				ABBREVIATIONS: H = High certainty; M = Medium certainty; L = Low certainty																
				PREDICTABILITY						MANAGEABILITY										
EIR REFERENCES	TYPE OF IMPACT	EVENT(S)	POTENTIAL CONSEQUENCES	SIZE	SCOPE	DURATION	FREQUENCY	STAKEHOLDERS	SIGNIFICANCE	AVOIDANCE	PROBABILITY	DURATION	SIZE AND SCOPE	CUMULATIVE EFFECTS	STAKEHOLDERS	SIGNIFICANCE	COMMENTS	Environmental significance		
<b>Natural Environment</b>																				
<b>Soil Impacts</b>																				
2.1.2, 2.6.2, 2.2.2, table 2		Spills of chemicals, diesel fuel and improperly disposed waste material	Contamination of soil, loss of productivity	M	H	H	M	H	2	No	Low					1	The chances of a spill are considered to be quite low, with the biggest risk being where chemicals and diesel are stored and handled. Chemical and fuel handling will occur in designated areas designed to contain such spills, with drains from these areas to lined pits. Any contaminated soil will be removed from the site and replaced with clean-fill or undergo bio-remediation.	Low		
1.3.2, Table 2		Camp site construction	Compaction	H	H	H	H	H	1	No	High	Short	Small	Small	Low	2	A 50 by 50 m camp will be cleared for a 30 person self contained camp during the drilling period. Where compaction has occurred the ground will be ripped to a depth of 500 mm. This will promote rehabilitation.	Low		
<b>Surface Water Impacts</b>																				
2.1.5, 2.2.5, 2.6.5, table 2		Obstruction of natural water channels by access track	Diversion of drainage	H	H	H	H	H	1	Yes						1	The entire area is subject to flooding, and the access road traverses a swamp on the property (under the request of the land owner). Culverts are in place where surface drainage may be impeded or water may be dammed.	Low		
1.3.1, 2.1.5, 2.2.5, 2.6.5, 3.4.3.4, table 2		Spills of chemicals, diesel fuels and improperly disposed of wastes	Contamination of surface water	H	H	H	H	H	1	Yes						1	Measures will be in place to capture any spills, so the risk of surface water contamination can be considered low.	Low		
<b>Groundwater Impacts</b>																				
1.4.2, 2.1.5, 2.2.5, 2.6.4, 3.4.2, Table 2		Well penetration of Gambier Limestone and Dilwyn Formation Aquifers	Contamination of aquifers with drilling fluids	M	M	M	M	M	3	No	High	Short	Small	Low	Low	2	The potential for significant mud fluid loss due to the presence of vuggy cavities and highly permeable sands as the well penetrates the surface aquifers is difficult to predict (section 2.6.4 EIR). However, historically total fluid losses are in the order of 500 bbls through the Gambier Limestone and Dilwyn Formation aquifer sections. This is considered acceptable due to the volume being small relative to the size of the aquifer and the non-toxic nature of the drilling muds. Management strategies, as outlined in Table 2 under "Minimising risk of contamination and cross flow in aquifers", provides assurance that the risk of aquifer contamination is being managed so as to have a low risk to the environment.	Med		
1.4.2, 1.6.1, 2.1.5, 2.2.5, 2.6.4, 3.4.2, Table 2, SEO		Crossflow behind casing	Aquifer contamination from poorer quality aquifer waters and aquifer pressure loss	M	M	M	M	M	3	No	Very Low				Small	Low	1	The major risks associated with drilling wells in this region is the crossflow contamination of the Gambier Limestone and Dilwyn Formation aquifers from poorer quality aquifers, and loss of aquifer pressure resulting from poor cement quality and coverage behind casing. The management measures outlined in Table 2 under "Minimising risk of contamination and cross flow in aquifers" in the EIR and the assessment criteria specified under objective 6 of the SEO provide sufficient assurance that these risks are being adequately managed. It should be noted that as part of the assessment criteria of objective 6, in the unlikely case where a poor cement job is detected behind the casing, the company will perforate the casing at the appropriate depth and cement squeezed to re-cement the poor cement job.	Low	
2.1.5, 2.2.5, 2.6.4, 3.4.3.3, 3.4.3.4, Table 2, SEO		Chemical or fuel spill and loss of fluid from mud sump	Aquifer contamination by spill or drilling mud infiltration	M	H	H	M	H	2	Yes						1	Infiltration of surface spills into the Gambier Limestone and Dilwyn Formations aquifers is not expected, due to most potential spills being captured in lined pits. Where spills occur on unprotected ground, past experience has shown that infiltration of the volumes expected will be contained in the first few metres of the soil. As specified in objective 7 of the SEO, all drilling fluids will be pumped out of the sump upon completion of drilling and disposed of at an EPA approved facility. The remaining drilling solids will then be removed and trucked to an EPA approved facility for disposal.	Low		
<b>Faunal Impacts</b>																				

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				SIZE	SCOPE	DURATION	FREQUENCY	STAKEHOLDERS	SIGNIFICANCE	AVOIDANCE	PROBABILITY	DURATION	SIZE AND SCOPE	CUMULATIVE EFFECTS	STAKEHOLDERS			SIGNIFICANCE					
2.1.4, 2.2.4, 2.2.6, table 2		Drilling operations	Injury or death of wildlife	M	H	H	M	H	2	No	Low						1	The main risk of well operations would be if the flight paths of some bird species transgresses the well site. The risk will be minimised by a combination of noise, artificial lighting at night and the limited surface area of the derrick. The only other faunal types expected near the site would be scavengers or reptiles.	Low				
	<b>Social Environment</b>																						
	<b>Community Resource Impacts</b>																						
1.4.1, 2.5, 2.7.2, table 2		Mobilisation of equipment and personnel to well site	Degradation of roads	H	H	H	H	H	1	No	High	Short	Small	Low	Low	2	The use of public roads is necessary, but only occurs for short periods of time. All authorities will be notified and the necessary permits obtained. Joint inspections of roads will be undertaken if necessary.	Low					
	<b>Community Health &amp; Safety</b>																						
1.4.1, 2.5, 2.7.2, 3.3.1, 3.4.1, table 2		Mobilisation of equipment and personnel to well site	Heavy vehicle collision with public vehicles putting lives at risk, impact with pedestrians	M	M	M	M	H	2	No	Low					1	Increased traffic due to mobilisation and demobilisation of drilling equipment, despite being over a short period of time, poses an increased risk to public using the road. However, the precautions undertaken as outlined in table 2 of the EIR and under the assessment criteria for objective 16 of the SEO are enough to ensure the risk to road users is minimised to an acceptable level.	Low					
2.6.2, 2.7.2, 3.1, 3.3.3, 3.4.3.1, table 2			Dust creation, reduction of visibility	H	H	H	H	H	1	No	High	Short	Small	None	Low	2	Dust is expected to be generated on unsealed roads during dry periods. The problem will be minimised by watering of roads and the reduction of speed limits for drilling operations vehicles.	Low					
1.4.2, 3.3.1, 3.4.1, table 2		Blow out during drilling	Threat to life	H	H	H	H	H	1	No	Very Low					1	The well site has been located away from buildings to provide protection to local residents. Blow out prevention and casing program to be adopted is outlined in Table 2 under "Well Control/Safety Issues". These strategies, and past application of these, provide sufficient assurance that the risk of a blow out event is reduced to an acceptable level. Any risk of third parties accessing the site, due to its high visibility, is being managed by displaying clear warning signage of the dangers and there is a procedure in place for the reporting and removal of third parties from the vicinity of the rig.	Low					
2.5, 2.7.1, 2.7.2, table 2		Use of welding and grinding equipment, smoking, well testing	Fire	M	M	M	M	H	3	No	Very Low					1	The Country Fire Service will be kept informed of the potential for fire and the level of occupancy of the well site. The site is equipped with fire fighting equipment and personnel are appropriately trained in its use.	Low					
3.3.4, 3.4.3.2, table 2		Noise from well operations	Third party discomfort	H	H	H	H	H	1	Yes						1	Construction and noisy completion activities will take place during daylight hours to prevent impact on local residents. Adjacent landholders' comfort will be monitored during drilling activities and advised of noisy activities.	Low					
	<b>Cultural &amp; Heritage Impacts</b>																						
2.3, 2.7.4, table 2		Excavation work	Damage to items of cultural or heritage significance	M	H	H	M	H	2	No	Low					1	If any cultural heritage material is discovered, activities will be suspended within a radius of 100 m and the relevant authorities will be notified for verification and advice.	Low					

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<b>Economic Environment</b> <i>Existing Land Use Impacts</i>																				
2.5, 2.7.1, table 2		Importation of weeds or diseases by vehicles	Loss of productivity	M	M	M	M	H	3	No	Low					1	As the rig and ancillary equipment are coming from unaffected areas, the risk is seen as minimal. All vehicles will be moved along sealed roads to protect against collecting weeds or pathogens during vehicle movement. Any weed or pathogen discovered on site will be reported to the landholder and action sought from the relevant regulatory authority.	Low		
2.1.1.1, 2.2.1, 2.6.3, table 2		Injury to livestock from drilling operations	Loss of income	H	H	H	H	H	1	Yes						1	The land use in the wells location is devoted solely to livestock grazing. Mud and flare pits will be fenced off in the presence of livestock and the land owner will be fully aware of the activities. The well site will be fenced denying access to livestock.	Low		

## Resource Assessment

Our Ref: DWR0311/01

7 June 2001

Michael Malavazos  
Manager Petroleum Engineering Regulation  
Office of Minerals and Energy Resources SA  
Department of Primary Industries and Resources SA  
GPO Box 1671  
ADELAIDE SA 5001

Dear Sir

**RE Limestone Ridge #1 Well Proposal, Otway Basin**

I refer to your email request, dated 30 May 2001, seeking comment on the 'Limestone Ridge #1 Well Proposal (Otway Basin), Environmental Impact Classification and Statement of Environmental objectives (SEO)', which were forwarded to this Department for consideration and comment, along with the Environmental Impact Report (EIR) for the well proposal.

### Background

The drilling of this well has been classified by PIRSA as being one of low impact, a position that is supported by this agency.

The proponent, Origin Energy Resources Limited proposes to drill the hydrocarbon exploration well, Limestone Ridge #1, in PEL 32 in the South-East of the State. In the event that the well is successful it will be completed for future petroleum production. The EIR identifies the environmental issues, the response to which is stated in the SEO.

### The EIR and SEO

The surface water contamination issues are adequately dealt with. The major risks, from the water resource perspective, relate to groundwater contamination that may result from:

- Drilling activities, especially the possibility of total fluid losses.

Level 6  
101 Grenfell Street  
ADELAIDE SA 5000

GPO Box 1671 Adelaide  
South Australia 5001  
DX 667

Telephone (08) 8463 3142  
Facsimile (08) 8463 3380

FILE: 27/4/7846
PROJECT 76
TASK: 7846
DATE: 15/6/01
INITIALS: AC

RECEIVED  
14 JUN 2001

BY:.....



Government  
of South Australia

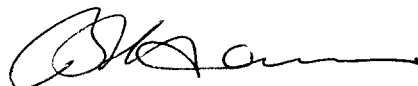
- Inadequate casing and cementing which may result in inter-aquifer flow between aquifers with different salinity and pressure, and possibly cross-flow from the gas producing zone into the aquifers.

Aquifers in the Gambier Limestone and Dilwyn Formation will be isolated from the hydrocarbon bearing formations by casing bonded to the formation with cement. In the event that geophysical logging indicates zones of inadequate cementing, the casing in these intervals will be perforated, and cement squeezed and circulated to achieve a satisfactory bond. If the well is abandoned, cement plugs will be placed between permeable zones to ensure permanent isolation of aquifers.

It should be noted the water supply well, to be completed in the unconfined aquifer, will require a well construction permit from this agency. Authorisation, under section 11 of the *Water Resources Act 1997*, is required to take water from the unconfined aquifer, which is a prescribed resource. This agency will seek an authorisation from the Minister for Water Resources to cover this activity.

Please contact Stephen Howles on 8204 9814 if you have any queries concerning this matter.

Yours sincerely



Bryan Harris  
**DIRECTOR RESOURCE ASSESSMENT**