STATEMENT OF ENVIRONMENTAL OBJECTIVES

ACRASIA #1 WELL

DRILLING OPERATION

July 2000

INTRODUCTION

The following Statement of Environmental Objectives (SEO) has been prepared and approved in accordance with the requirements of the *Petroleum Act 2000*. This SEO covers the drilling operation of Acrasia #1 located in block CO98-E within the Cooper Basin of South Australia. It has been prepared on the basis of the information provided by Stuart Petroleum NL – the Operator of this well – in its Environmental Impact Report (EIR) dated June 2000 and on the basis of comments received from the South Australian Department of Environment and Heritage.

This SEO covers the following operations:

- drilling of the well;
- downhole abandonment of the well; and
- construction and restoration of access track and well pad.

The purpose of this SEO is to detail the environmental objectives that these operations will need to conform to and the criteria upon which the achievement of these objectives will be assessed. The EIR and SEO have been prepared in accordance with the requirements under Part 12 of the *Petroleum Act 2000*.

A condition of approval of this well is that Stuart Petroleum NL are liable for meeting the environmental objectives and assessment criteria as detailed in this SEO.

In the case where this well proves to be successful and makes a commercial discovery and is subsequently granted a Petroleum Production Licence (PPL), a separate SEO will be required.

ENVIRONMENTAL OBJECTIVES

On the basis of the risks to the environment identified for this activity, as detailed in the EIR, the following environmental objectives are considered relevant to this activity.

Environmental Objectives

1) Avoid disturbance to sites of Aboriginal heritage significance.
2) Minimise aquifer contamination and crossflow.
3) Minimise impact of waste handling and disposal.
4) Avoid spills.

5) In the event of a spill, minimise the impacts on fauna, flora, soil, gibber and surface and ground water.
6) Minimise disturbance to native vegetation and disturbance to wildlife habitat.
7) Minimise impacts on soil.
8) Minimise disturbance to gibber surfaces.
9) Avoid the introduction of non local plant species (weeds).
10) Minimise visual impacts to the natural landscape.
11) Minimise safety hazards to third parties (including public).

Assessment Criteria

The criteria for measuring the achievement of these environmental objectives are detailed in Appendix #1 and take one or more of the following forms:

1) *Defined conditions* – in some cases the achievement of an objective can be assessed through ensuring defined conditions are met or carried out. Such conditions include:

    - prohibitions to undertake a specific action. For example, to achieve the objective 'Avoid disturbance to sites of Aboriginal and European heritage significance', the assessment criteria may be that no European heritage sites are to be disturbed and there is to be compliance with the Aboriginal Heritage Act 1988 and any determination or agreement under the Native Title Act 1993 in respect of Aboriginal Heritage matters.

    - requirements to carry out certain actions in accordance with approved procedures or industry accepted standards. For example the design and setting of well casing shall be undertaken in accordance with approved company well design procedures and systems.

2) *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 either by a written description and/or photographically. As will be shown in this SEO, GAS is useful in measuring objectives relating to the minimisation of disturbances to natural vegetation, soil and rehabilitation of well sites and access tracks.

SERIOUS INCIDENTS

Pursuant to Regulation 12(2) the incidents listed below are considered to be serious incidents under section 85 (1) of the Act as they have the potential to cause serious environmental damage.

- well blow out;
- explosion or fire at well;
- crossflow or fluid migration behind casing;
- detection of insufficient isolation achieved between aquifers which are not in natural hydraulic communication;
- casing failure;

- any disturbance to sites of Aboriginal or European heritage significance;
- removal of rare, vulnerable or endangered flora and fauna species;
- any spill of oil or hazardous material which poses a significant threat to the Cooper Creek system.
- any detection of exotic weed species.

REPORTABLE INCIDENTS

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

- non-compliance to defined procedures in relation to casing design, well bore fluid migration and casing integrity monitoring, and downhole well abandonment programs detected through system audits;
- a well kick during drilling;
- detected unauthorised third party access on well site;
- any spill of oil or hazardous material outside of sumps and bunded areas designed to contain such spills.

APPENDIX #1: OBJECTIVES AND ASSESSMENT CRITERIA		
OBJECTIVE	**ASSESSMENT CRITERIA**	**COMMENT**
1. Avoid disturbance to sites of Aboriginal heritage significance.	• Well site and access track locations have been scouted before the commencement of construction in accord with Native Title agreement in place. • Any sites identified, have been flagged and subsequently avoided. • Records of such scouting are kept and available for auditing.	
2. Minimise aquifer contamination and crossflow.	• All aquifers in the Winton formation isolated behind surface casing cemented to surface from the Mackunda formation as detailed in section 3.3 of the approved drilling program. • Casing set in accord with section 3.3 of the approved drilling program. • In the case where the well is abandoned, Jurassic aquifers have been isolated through the setting of plugs in accord with section 3.7 of the approved drilling program. • The non-toxic drilling muds as detailed in section 4 of the approved drilling program have been used.	
3. Minimise impact of waste handling and disposal.	• The attainment of the GAS criteria listed in Appendix #2 for rubbish removal under the clean, tidy and safe site after final cleanup objective. • Sewage at drilling camps disposed of in short-term earthen pits which are buried after completion of drilling operation. • Non-toxic drilling muds and putrescible wastes disposed of in drilling sump. • Toxic and hard waste removed from well site after completion of drilling (and disposed of eventually at EPA-licenced waste disposal facility).	The attainment of this objective is assessed at the completion of drilling of the well to ensure that no rubbish is left on the well site and is also assessed during the drilling of the well to ensure that sewage at the drilling camp is disposed of in accordance to good practice.
4. Avoid spills.	• All refuelling of vehicles and plant undertaken in clay floored and bunded designated areas. • Drilling sumps bunded.	

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5. In the event of a spill, minimise the impacts on fauna, flora, soil, gibber and surface and ground water.	• In the event of any diesel spill in designated refuelling areas, the spill was contained within the bunded area. • The stained soil allowed to naturally rehabilitate. • In the event of a spill on gibber surfaces, spill was left to self-clean rather than risking potentially serious consequences by disturbing the gibbers (Table 1, (DEF).	The main risk of an oil spill at this site relates to the diesel fuel stored and used in the drilling operation. The risk of such a spill is considered low. However, in the case of an oil spill on soil in this environment it has been shown that bioremediation of the contaminated soil is an effective way for remediating the site to an acceptable level which leaves no environmental adverse effect. The bioremediation process can be affective through natural processes, in particular for light oils such as diesel fuel, or through active remediation, where water and fertiliser is added to speed the bioremediation process up[1]. In the case of a spill on a gibber plain, the severity of the potential erosion consequences associated with disturbing the gibbers to actively bioremediate the contaminated soil is considered too great to justify such active remediation. Instead, in this case, where diesel is the potential spill, it is best to leave the spill to bioremediate naturally.
6. Minimise disturbance to native vegetation and wildlife habitat.	• Existing access track used, with new track rolled and not scraped, other where some large gibbers may have been moved where it is not practical to avoid. • Well pad rolled, only scraping of gibber occurred on sump area. • The attainment of either the 0, +1 or +2 GAS criteria listed in Appendix	Petroleum activities such as well site construction have been shown to have an insignificant impact on wildlife habitat by a number of studies[2], mainly as a result of the small and confined land affected by such activities.

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

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

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OBJECTIVE	**ASSESSMENT CRITERIA**	**COMMENT**
	#2 for the re-establishment of natural vegetation on abandoned well sites and access tracks objective.	
7. Minimise impacts on soil.	• Soil disturbance only confined to sump area on the well pad. • Where fill has been required, it has been acquired from drilling sump, and no foreign material has been brought in. • In the event of any diesel spill in designated refuelling areas, the spill was contained within the bunded area. • The stained soil allowed to naturally rehabilitate. • Existing access track used, with new track rolled and not scraped.	The main impact on soil in relation to wells, is the impact caused by the removal of existing soil and/or the importation of foreign material in the construction of the well sites and their associated access tracks. The major impact of this is its impediment to the long term effective re-establishment with local plant species brought about by changes to the soil characteristics.
8. Minimise disturbance to gibber surfaces.	• Existing access track used, with new track rolled and not scraped, other than where some large gibbers may have been moved where it is not practical to avoid. • Well pad rolled, only scraping of gibber occurred on sump area. • During construction of access track, PIRSA officer was present in monitoring route selection and practices.	
9. Avoid the introduction of weed species.	• All vehicles and equipment thoroughly cleaned prior to entering the region. • Records of vehicle and equipment weed cleaning are kept and available for auditing.	The major potential source of weed introduction in relation to well activities is vehicles and equipment brought in from other regions of the state or interstate. In the case of this well, any such incremental risk is considered as very low due to the use of other vehicles (eg tourism) on the nearby Innamincka-Cordillo Downs road. The most effective cure for weed introduction is prevention, and this can be best achieved through thorough cleaning of vehicles and equipment prior to entering the region.

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10. Minimise visual impacts on the natural landscape.	• The attainment of 0, +1 or +2 GAS criteria listed in Appendix #2 for the minimisation of visual impact objective for well sites and access tracks.	The major impact of well sites and their access tracks is their visual impact[3], therefore considerable effort has gone into improving construction and restoration practices to minimise these impacts to as low as practicable. It is for this type of objective, where its assessment can become quite subjective, that the use of Goal Attainment Scaling forms an effective assessment tool.
11. Minimise safety hazards to third parties (including public).	• Casing set in accord with the approved drilling program. • Blow out prevention precautions in place and operational in accord with the approved drilling program. • Toxic and hard waste removed and disposed of off-site (eventually at EPA-licenced waste disposal facility). • During drilling operation – signage on rig road and public road intersection erected prohibiting public access and warning of regular truck movements.	

[3] *Criteria for the Abandonment of Seismic Lines and Well Sites in the South Australian Portion of the Cooper Basin*. 4 Stage Research Project, Stages 1, 2 & 3 completed.

APPENDIX #2
Criteria for assessing the restoration of abandoned wellsites

Objectives	**Minimise Visual Impact of Abandoned Wellsites** See April 1998 PIRSA guidelines for photographic examples of the following outcomes		**Minimise Visual Impact of Abandoned Access Tracks** See guideline for photographic examples	**Re-establish natural vegetation on abandoned wellsites and access tracks** See guideline for photographic examples of the following outcomes		**Site to be left in a Clean, Tidy and Safe Condition** **after final cleanup**	
	Interdune and floodplain Wellsites	Wellsites located on dunes	Access tracks assessed from the main track	For wellsites where it has been less than 5 years since restoration	For wellsites where it has been more than 5 years since restoration	Well marked and cellar backfilled.	Rubbish Removed
-2	The site remains as a prominent consolidated surface with a distinct edge.	Extensive gully erosion down the face of the dune and/or a steep site edge are prominent.	The track is prominent because of a scraped surface , windrows along its edges or gully erosion.	The site remains as a consolidated surface.	No revegetation evident.	Cellar not backfilled completely.	Large items of litter present, e.g. drums, pieces of casing and cables etc.
-1	The site surface and edge have been contoured into the surrounding landscape, but the colour of foreign material contrasts with the surroundings.	The edge of the site has been restored into the natural contour of the dune; but the colour of foreign material contrasts with the surroundings.	The track surface has been contoured into the surrounding landscape; but the colour of foreign material contrasts with the surroundings.	The colour of foreign material contrasts with the surroundings.	The revegetation mostly consists of annuals and biennials; in contrast to the surroundings there are few perennials.	Cellar backfilled but no marker erected.	Small items of litter, spread over more than 50% of the site, e.g. tin cans, nuts and bolts, rags, small pieces of cable and wood etc.
0	The site contours and colour blend with the surroundings; but earthwork disturbance (eg ripping or respreading of original material) is still prominent.	The edge and colour of the site blend with the surroundings. The site contours are visible only when viewed from the top of the dune, they cannot be seen from the base. Erosion gullies down the face of the dune but they are not extensive or prominent.	The track contours and colour blend with the surroundings; but the earthwork disturbance (e.g. ripping, rolling or respreading of original material) is still prominent.	The site surface has been appropriately restored to facilitate revegetation (eg. ripping or respreading of original material).	The revegetation consists of annuals, biennials and perennials; but there are some bare patches which are inconsistent with the surroundings.	Cellar backfilled and marker erected.	No evidence of litter anywhere.
+1	The site contours and colour blend with the surroundings and the earthwork disturbance is beginning to blend also.	The edge and colour of the site blend with the surroundings. The site contours are visible only when viewed from the top of the dune; they cannot be seen from the base. There are no erosion gullies down the face of the dune.	The track contours and colour blend with the surroundings and the earthwork disturbance is beginning to blend also.	The revegetation is extensive and consists of annuals and biennials, in contrast to the surroundings there are no perennials.	The revegetation, mostly perennials, is consistent with the surroundings; but there is contrast in maturity between them.		
+2	The site contours and colour blend with the surroundings and the earthwork disturbance is indistinguishable.	The edge and colour of the site blend with the surroundings. The site contours are indistinguishable whether viewed from the top or base of the dune.	The track contours and colour blend with the surroundings and the earthwork disturbance is indistinguishable.	The revegetation is extensive and mostly consists of annuals and biennials; perennials beginning to establish which is consistent with the surroundings.	The revegetation type, density and maturity is indistinguishable from the surroundings.		