Unconventional resource plays in South Australia are described in Chapter 2. The regulation of unconventional gas projects is covered in detail in Chapter 5. This chapter describes publicly available details of unconventional gas projects in South Australia, and Figure 4.1 shows the petroleum infrastructure to give a context for these projects. Included are descriptions of the following projects:

- Santos operated Cooper Basin JV Unconventional Gas Project (Cooper Basin). Deep coal, shale gas and basin-centred gas targets.
- Beach Energy Nappamerri Trough Project (Cooper Basin). Shale gas and basin-centred gas targets.
- Senex Energy Unconventional Gas Project (Cooper Basin). Deep coal, shale gas and basin-centred gas targets.
- Strike Energy Southern Cooper Coal Seam Gas Project (Cooper Basin). Deep and shallow coal seam gas and shale gas targets.
- Altona Energy and CNOOC Arckaringa Coal-to-Liquids and Power Project.
- Hybrid Energy (Strike Energy) Kingston Coal Project for the production of synthesis gas as feedstock for the manufacture of alternative products including but not limited to: fertiliser, methanol, and synthetic transport fuel.

### 4.1 Unconventional Gas Projects, Cooper and Otway Basins

#### 4.1.1 Cooper Basin JV Unconventional Gas Project

**Licences And Licence Holders**
- PPLs 7, 8, 9, 11, 101, 102, 113
- Santos Ltd (66.6%)*
- Delhi Petroleum Pty Ltd (20.21%)
- Origin Energy Resources Ltd (13.19%)
* Denotes operator

**Location**
- Cooper Basin, South Australia (Figure 4.2)

**Project Summary**
- Santos, as operator of the Cooper Basin JV, commenced Australia’s first shale gas assessment project in 2006, acquiring a 9.4 m Roseneath Shale core in the Moomba 175 gas development well. Since that time shale cores have been acquired in two other gas development wells (Moomba 185, Bob’s Well 2) for shale gas assessment purposes. Santos has stated that results from the Moomba 185 shale core analyses are commensurate with US producing shale gas basins.
- Assessment of the deep coal seam gas potential of the basin commenced with desorption analysis of a 4m Patchawarra coal seam cored in the Dorodillo 2 gas appraisal well in 1998.
- Further assessment of deep coal seam gas was suspended until 2007, when Santos flowed gas to surface at 100,000 scf/day from a fracture stimulated Patchawarra
Formation coal in the Moomba 77 gas development well. Since then additional deep coal seam gas assessment work has been carried out in seven gas development wells in the South Australian part of the Cooper Basin.

In December 2011, Santos drilled the first dedicated vertical shale gas well (Moomba 191), acquiring core from three shale intervals. A three stage fracture stimulation of the Moomba 191 Roseneath-Epsilon-Murteree (REM) section resulted in a stabilised flow rate of 2.6 mmscf/d dry gas during the two week flow-back period. Moomba 191 was completed and connected to the Moomba processing facilities in October 2012. This brought the first shale gas production to eastern Australian gas markets.

Santos is accelerating unconventional gas exploration in 2012-2013, with six vertical wells planned to test the Nappamerri Trough basin-centred gas play (Figures 4.4 and 4.5), a vertical well to test the deep coal seam gas play at Moomba, and a horizontal well to assess the REM shale play at Moomba North (Figures 4.3 and 4.5).

At end 2010 Santos has booked a total 2C (contingent, probable, recoverable, Santos share) unconventional gas resource of 2,345 PJ, independently certified by DeGolyer and MacNaughton (approximately 3,500 PJ for the Cooper Basin JV). Santos has a 2015 2C target of 4,800 PJ (approximately 7,200 PJ for the Cooper Basin JV). Santos estimate a potential range for recoverable raw gas from its licences in the Cooper Basin between a...
Figure 4.2  Project licences, land access and Native Title, Cooper Basin.
Unconventional Hydrocarbon Resource Targeted

- Shale Gas (continuous gas accumulation), PPLs 7, 8, 9, 11
- Basin-centred Gas (continuous gas accumulation), PPLs 101, 102, 113
- Deep Coal Seam Gas (continuous gas accumulation), PPLs 7, 8, 9, 11

Target Formations

- Toolachee Formation (deep CSG and

1 Santos’ equity in the Cooper Basin production licences is 66.6% in South Australia and 60.1% in Queensland. Hence, Santos’ estimate of the potential range for recoverable raw gas from its licences in the Cooper Basin is, in gross terms, at least 22 tcf to a high of more than 200 tcf (raw gas). Santos’ November 2012 estimates of its unconventional resources in the Cooper Basin can be accessed from: www.santos.com/library/121112_EABU_Cooper_Basin_Unconventional_Gas_Opportunities_and_Commercialisation.pdf

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Figure 4.3 Moomba-Big Lake typical unconventional section

Figure 4.4 Nappamerri Trough structural cross-section.
Figure 4.5  Cooper Basin JV Unconventional Gas Project, planned wells for 2012. Langmuir 1, Gaschnitz 1 and Van der Waals 1 are planned vertical wells to test the basin-centred gas play in the Nappamerri Trough. A horizontal well to test the shale gas play at Moomba North, and a vertical well to assess the deep coal seam gas play at Moomba is also planned.

basin-centred gas)
- Roseneath Shale (shale gas)
- Epsilon Formation (shale and basin-centred gas)
- Murteree Shale (shale gas)
- Patchawarra Formation (deep CSG and basin-centred gas)

Target Depths
- Toolachee coals: 2450-3350 m
- REM: 2200-2700 m
- Patchawarra Formation: 2750-3950 m
- Patchawarra Formation coals: 2850-3500 m

Target Thickness
- Toolachee coals: Up to 25 m
- REM: 120 m - >180 m
- Patchawarra Formation: 300 m
- Patchawarra Formation coals: Up to 37 m

Exploration Results To End October 2012
- Moomba 185 shale core analyses are commensurate with US producing shale gas basins.
- Flowed gas to surface at 100,000 scf/day from a fracture stimulated deep Patchawarra Formation coal (2745 m) in Moomba 77.
- A 3 stage fracture stimulation of the Moomba 191 Roseneath-Epsilon-Murteree (REM) section resulted in a stabilised flow rate of 2.6 mmscf/d dry gas. The well has been connected to the Moomba processing facilities. Santos estimate 3-6 bcf recoverable gas per
vertical well.

**2C Resource Estimate (Pj, End 2010)**
- REM shale: ~1026 (Santos share 684)
- Tight sands and mixed lithology: ~1613 (Santos share 1075)
- Deep Coal: ~879 (Santos share 586)
- TOTAL: ~3518 (Santos share 2345)

**Environment And Land Access**
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Copies of EIRs and SEOs prepared by licensees for regulated activities, and Environmental Significance Assessments prepared by the Energy Resources Division can be downloaded via the following link: [www.pir.sa.gov.au/petroleum/environment/register/seo_eir_and_esa_reports](http://www.pir.sa.gov.au/petroleum/environment/register/seo_eir_and_esa_reports)

**Forward Plan**
2012-2013: (See Figure 4.5)
- 6 x vertical exploration wells to test the basin-centred gas play in the Nappamerri Trough
- 1 x dedicated shale horizontal drilling trial at Moomba North
- 1 x vertical well at Moomba to assess the deep coal seam gas play
- Extensive fracturing trials beyond levels currently tested in the Cooper

2013+:
- Multiple horizontal and vertical appraisal wells
- **Targeting initial shale reserve bookings in 2013 and initial production in 2015.** Production now brought forward with connection of moomba 191 to the Moomba processing facilities and first production to sales expected in October 2012.

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### 4.1.2 Nappamerri Trough Project

**Licence And Licence Holders**
PEL 218
Beach Energy (90%)*
Adelaide Energy (10%), subsidiary of Beach Energy
*Denotes operator

**Location**
Cooper Basin, South Australia (Figure 4.6).

**Project Summary**
Beach Energy drilled the first purpose drilled vertical shale gas evaluation wells in PEL 218 the Cooper Basin, South Australia (Figure 4.6). Encounter 1 (2010) and Holdfast 1 (2011) were specifically located off structure, and both wells encountered evidence of extensive gas saturation through the Permian section (see figures 4.7 and 4.8).

Holdfast 1 flowed gas at up to 2 mm/scf/d after a seven stage fracture stimulation of the Early Permian succession. Encounter 1 was fracture stimulated on the Patchawarra interval in April 2012, flowing up to 0.75 mm/scf/d, and on the REM package (5 stages) in June 2012, flowing 1.3 mm/scf/d. Beach has stated that gas desorption from
Figure 4.6 PEL 218 location, land access and Native Title.
the shales cored in the two wells suggests almost 100 tcf of shale gas in place in PEL 218.

**Cooper Basin**

The presence of a basin-centred gas accumulation (BCGA) in the Nappamerri Trough has been suspected for over two decades. Beach has stated that the Encounter and Holdfast wells confirm the presence of gas in sands outside of structural closure and estimate that gas in place potentially exceeds 200 tcf in sands across PEL 218. Beach is accelerating exploration in PEL 218. Recent wells Moonta 1 and Streaky 1 encountered gas saturation in the target Permian section and fracture stimulations commenced in October 2012. These wells are the first two of between 5 and 8 vertical wells planned for PEL 218 in 2012-2013 (Figure 4.9). The first horizontal well in South Australia is expected to be Holdfast 2, currently planned for Q4 2012.

Beach booked an initial gross contingent resource of 2 tcf of sales gas constrained to a 10 x 10 km area around the Encounter 1 and Holdfast 1 shale gas evaluation wells. However Beach has since adopted the new SPE Petroleum Resources Management System guidelines for booking unconventional resource volumes. The new 2C resource estimate for PEL 218 is 1.3 tcf (based on Holdfast 1 and Encounter 1 only, comprising 28 km$^2$ around each well for sandstones and 41 km$^2$ around each well for shales).

**Unconventional Hydrocarbon Resource Targeted**

- **Shale Gas** (continuous gas accumulation)
  - Basin-centred Gas (continuous gas accumulation)
  - Discrete Tight Gas (within closure)

**Target Formations**

- Toolachee Formation (sand)
- Daralingie Formation (sand)
- Roseneath Shale (shale)$^1$
- Epsilon Formation (sand and shale)$^2$
- Murteree Shale (shale)$^1$
- Patchawarra Formation (sand)$^1$

**Target Depths**

2600 – 4000 m

**Target Thickness**

1400 m

**Exploration Results To End October 2012**

- **Encounter 1** drilled late 2010
- **Holdfast 1** drilled early 2011
- Fracture stimulated Holdfast 1 with 7 stages (Patchawarra x 1 stage, Murteree x 1 stage, Epsilon x 3 stages and Roseneath x 2 stages)
- Flow tested Holdfast 1 with maximum rates of 2 mmscf/d
- Gas in place in PEL 218 estimated at up to 300 tcf, comprising almost 100 tcf gas in shales (estimated from gas desorption analyses of shales cored in Encounter 1 and Holdfast 1) and in excess of 200 tcf gas in sands.

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$^2$ Fracture stimulated and flow tested in Holdfast-1 and Encounter 1.
Figure 4.8  Schematic section through the Nappamerri Trough showing the extent of the unconventional gas plays and planned (dashed) and drilled (solid line) unconventional wells.

- Moonta 1 encountered gas saturation over more than 1,000m of the Permian target zone (Toolachee Formation to base of the Patchawarra Formation).
- Fracture stimulation of Moonta 1, focusing primarily on the Patchawarra Formation, has commenced (Patchawarra Formation – nine stages, Murteree Shale – one stage)

Upside Potential
The Encounter 1 and Holdfast 1 wells were terminated in the upper Patchawarra Formation. Potential for a further 400-600m of gas saturation in the Patchawarra Formation is being tested with the current drilling programme.

2C Resource Estimate (August 2012)
Beach has adopted the new SPE Petroleum Resources Management System guidelines for booking unconventional resource volumes. The new 2C resource estimate for PEL 218 is 1.3 tcf (based on Holdfast 1 and Encounter 1 only, comprising 28 km² around each well for sandstones and 41 km² around each well for shales).

The gas-in-place estimate is unchanged at 300+ tcf for PEL 218.

Environment And Land Access
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**Figure 4.9** PEL 218, Nappamerri Trough, South Australia: Existing vertical shale gas evaluation wells are Encounter-1 (2010), Holdfast-1 (2011), Moonta 1 and Streaky 1. Horizontal wells at Encounter and Holdfast are planned to assess gas deliverability from shales.

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Through an open, consultative process and based on information in the EIR, must then be approved for compliance before a regulated activity can proceed. See Chapter 5 for further details of the approval process.

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The Land Access Agreement for PEL 218, pursuant to section 31 of the Native Title Act 1993 (Cth) can be downloaded via the following link: [www.petroleum.dmitre.sa.gov.au/environment/native_title_aboriginal_lands_iluas/current_native_title_agreements](http://www.petroleum.dmitre.sa.gov.au/environment/native_title_aboriginal_lands_iluas/current_native_title_agreements)

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**Forward Plan**

2012 – Delineate basin-centred gas and tight gas concept in PEL 218 with vertical well drilling, stimulation and flow test program. Commence horizontal well program to estimate deliverability from shales.

2013 – Continue vertical and horizontal well drilling, fracture stimulation and flow testing. Drill appraisal wells to test deliverability potential “production pilot concept”.

2014 – Continue appraisal of production potential through drilling, stimulation and flow testing of production pilot wells.

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4.1.3 Senex Energy Southern Cooper Basin Unconventional Gas Project

Licence and Licence Holders

PEL 516
Senex Energy Limited (100%)*

PEL 115
Senex Energy Limited (55%)*
Orca Energy Limited (20%)
Others (25%)

Location
Cooper Basin, South Australia (Figure 4.10).

Project Summary
Senex Energy Limited acquired PEL 516 (Figure 4.10) following the acquisition of Stuart Petroleum in 2011. Assessment of unconventional gas plays in the licence commenced shortly after with the coring of Toolachee Formation coals and Roseneath and Murteree shales in the Vintage Crop oil discovery well. Senex reported that the Toolachee Formation coals and REM (Roseneath – Epsilon– Murteree) shale formations exhibited continuous gas shows, as well as the presence of liquids and heavy gases.

A nine metre core in the Toolachee Formation and two nine metre cores in each of the Roseneath and Murteree shales were cut in Vintage Crop 1 for gas desorption analysis and other tests. Senex has reported that preliminary results confirm the presence of liquids rich gas, favourable mineralogy for fracture stimulation, and properties similar to successful North American shale plays.

Senex has accelerated unconventional gas exploration in PEL 516 in 2012 drilling three vertical wells to end October, with results as follows:

- A multi-zone fracture stimulation of Patchawarra Formation tight sands and the Roseneath and Murteree shales in Sasanof 1 was completed in May 2012. The well produced fracture stimulation fluid and liquids rich gas at a peak rate of >200,000 scf/day.
- High gas readings with evidence of condensate and heavy gases were recorded in the Permian section in Talaq 1.
- Wireline logs and mud logs from Skipton 1 have confirmed material quantities of hydrocarbons outside of structural closure. Skipton 1 intersected more than 75 metres of interpreted net gas pay in the Patchawarra Formation and 164 metres of gas charged Roseneath and Murteree shales.

Senex commenced drilling its fourth operated unconventional gas exploration well, Kingston Rule 1 (PEL 115) in October 2012. A large scale hydraulic fracture stimulation program at Skipton 1, Talaq 1 and Kingston Rule 1 to test gas quality and deliverability is planned to commence in December 2012.

Senex has completed a $155 million equity raising to fund the planned FY2012-2013+ work program. The work includes 10+ vertical wells targeting unconventional gas in Senex’s southern Cooper Basin permits (primarily PEL 516), following the early success at Sasanof 1, Talaq 1 and Skipton 1.

MHA Petroleum Consultants has estimated potential gas-in-place in PEL 516 of over 100 tcf.

Unconventional Hydrocarbon Resource Targeted

- Shale Oil
- Shale Gas (continuous gas accumulation)
- Basin-centred Gas (continuous gas accumulation)
- Deep Coal Seam Gas (continuous gas accumulation)

Target Formations (Figures 4.11 and 4.12)

- Toolachee Formation (deep CSG)
- Roseneath Shale (shale)
- Epsilon Formation (shale)
- Murteree Shale (shale)
- Patchawarra Formation (basin centred gas)
Figure 4.10 PELs 115 and 516 location, land access and Native Title, Cooper Basin.
Target Depths
2800-3200 m

Target Thickness
600-900m (Permian succession)

Exploration Results To End October 2012
Vintage Crop 1 cut a nine metre core in the Toolachee Fm and two nine metre cores in each of the Roseneath and Murteree shales. Wet gas shows were encountered through the coring interval. Senex reported that preliminary results indicate the potential resource in PEL 516 is in the wet gas window, containing liquids and heavy gases with a low carbon dioxide content.

Assessment of the unconventional gas potential of PELs 516 and 115 is progressing with the drilling of the Sasanof 1, Talaq 1 and Skipton 1 vertical wells, and the Kingston Rule 1 well in progress at end October 2012 (Figure 4.13). A multi-zone fracture stimulation of Patchawarra Formation tight sands and the Roseneath and Murteree shales in Sasanof 1 was completed in May 2012. The well has produced fracture stimulation fluid and liquids rich gas at a peak rate of >200,000 scf/day. Talaq 1 encountered high gas readings with evidence of condensate and heavy gases in the Permian section and Skipton 1 intersected more than 75 metres of interpreted net gas pay in the Patchawarra Formation and 164 metres of gas charged Roseneath and Murteree shales.

Resource Potential
>100 tcf gas-in-place

Environment And Land Access
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The land access agreements for PELs 516 and 115, pursuant to section 31 of the Native Title Act 1993 (Cth), can be downloaded via the following link: www.petroleum.dmitre.sa.gov.au/environment/native_title_aboriginal_lands_iluas/current_native_title_agreements

**Forward Plan**

2012-2013+:
- Fracture stimulation of Talaq 1, Skipton 1 and Kingston Rule 1 to test deliverability and gas composition.
- Book material contingent resource
- 10+ vertical wells targeting unconventional gas in Senex’s southern Cooper Basin permits (primarily PEL 516)
- Focus on flow testing (limited coring)
- Pilot program to follow a successful appraisal program

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**Figure 4.12** Regional N-S log correlation across the Cooper Basin, South Australia, highlighting the shallower occurrence of the prospective Permian succession in the Tenappera Trough/Mettika Embayment compared with the Nappamertti Trough. Senex’s planned Skipton-1 and Talaq-1 unconventional wells will test the Mettika Embayment. The relatively shallow depths mean lower temperatures are encountered, and there is no need for specialised casing or drilling materials.
4.14 Beach Energy JV Coal Seam Gas and Shale Gas Project Licence and Licence Holders:

PEL 94
- Beach Energy Limited (50%)*
- Strike Energy Limited (35%)
- Senex Energy Limited (15%)

PEL 95
- Beach Energy Limited (50%)*
- Strike Energy Limited (50%)
*Denotes operator

Location
Cooper Basin, South Australia (Figure 4.14)

Project Summary
PELs 94 and 95 were originally granted to Beach Petroleum NL (50%) and Magellan Petroleum (NT) Pty Ltd (50%) in 2001.

(Figure 4.14). Beach Energy has retained a 50% interest in the licences and is operator of both licences.

Marsden 1 was drilled in the deepest part of Battunga Trough approximately 6 km southeast of the Battunga 1 well (Santos Ltd, 1987) in 2012. A 20 m Patchawarra coal seam with mud gas readings up to 1835 units was intersected in Battunga 1. A 20 m Toolachee coal seam was also intersected in Battunga 1. However the coal is less thermally mature peaking at around 20 units in the main seam and up to 500 units in thin overlying coal seams.

Marsden 1 (2012) was drilled specifically to test the coal seam gas potential of the Permian coals and the shale gas potential.
Figure 4.14  PELs 94 and 95 location, land access and Native Title, Cooper Basin.
of the Murtere Shale in PEL 95 (Figures 4.15, 4.16 and 4.17). Marsden 1 intersected a thick coal interval and gas readings were elevated throughout the Permian section. Early core analysis results indicate high gas contents. The well was cased and suspended for further evaluation.

Davenport 1 (2012) was drilled in the deepest part of the Milpera Trough to evaluate the unconventional gas potential of Permian coals and shales in PEL 94 (Figure 4.18). The well was cased and suspended for future evaluation after intersecting 110m of net coal including one seam in the Patchawarra with over 45m of coal. Coal cores are currently being analysed for gas content and other physical parameters.

**Unconventional Hydrocarbon Resource Targeted**

- Shale Gas (continuous gas accumulation)
- Deep Coal Seam Gas (continuous gas accumulation)

**Target Formations**

- Toolachee Formation (deep CSG), PEL 95
- Murtere Shale (shale), PEL 95
- Patchawarra Formation (deep CSG), PELs 94 and 95

**Target Depths**

- PEL 94, Patchawarra Formation: 1990-2175 m
- PEL 95, Toolachee Formation: 1870-1980 m
- PEL 95, Patchawarra Formation: 2450-2550 m
- PEL 95, Murtere Shale: 2160-2225 m

**Target Thickness**

- PEL 94, Patchawarra Formation: 5-25 m
- PEL 95, Toolachee Formation: 15-25 m
- PEL 95, Patchawarra Formation: 15-25 m
- PEL 95, Murtere Shale: 65 m
Figure 4.16 Log correlation showing rapid thinning of the Patchawarra Formation on the margins of the Battunga Trough, Cooper Basin, South Australia. The target Permian coal seams are best developed in the Battunga Trough. In contrast the REM shales are a relatively consistent thickness.

Figure 4.17 Map showing depth to the top of the Patchawarra Formation and the location of Marsden 1 in the deepest part of the Battunga Trough.

**Exploration Results To End July 2012**
See Project Summary

**Resource Potential**
No resource estimation available at this stage.

**Environment and Land Access**
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risks to the environment, and the extent
to which these threats are likely and
manageable. A Statement of Environmental
Objectives (SEO), developed through an
open, consultative process and based
on information in the EIR, must then be
approved for compliance before a
regulated activity can proceed. Please see
Chapter 5 for further details of the approval
process.

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licensees for regulated activities, and
Environmental Significance Assessments
prepared by the Energy Resources Division
can be downloaded via the following link:
register/seo_eir_and_esa_reports

Land access agreements for PELs 94 and
95, pursuant to section 31 of the Native Title
Act 1993 (Cth), can be downloaded via the
following link: www.petroleum.dmitre.sa.gov.
au/environment/native_title_aboriginal_lands_iluas/current_native_title_agreements

Forward Plan
A decision regarding the forward plan will be
made when core analyses are completed.

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4.1.5 Southern Cooper Coal Seam Gas Project

License
PEL 96

Licence Holders
Strike Energy Limited (66.67% and Operator)
AGL (33.33%)

Location
Cooper Basin, South Australia (Figure 4.19)

Project Summary
PEL 96 was granted to Strike Oil Limited (now Strike Energy) and AGL in 2009 (Figure 4.19).

Forge-1, drilled in 2010, was the first exploration well drilled to test the coal seam gas potential of the Permian coals in PEL 96 (Figures 4.20 and 4.21). Drilling achieved a partial test of the proposed drill target. The full 224 m section of Permian coal measures was not drilled due to suspension of drilling for operational reasons. The target Permian coal measures were penetrated immediately beneath the base Eromanga Basin unconformity and were consequently oxidised. Biogenic gas contents in the order of 1.1 m³/t (40 scf/ton) were recorded in the coal cores submitted for gas desorption analysis.

Follow up drilling in PEL 96 is not planned until 2014 (Figure 4.22).

Unconventional Hydrocarbon Resource Targeted
- Shale Gas (continuous gas accumulation)
- Coal Seam Gas (continuous gas accumulation)

Target Formations
- Toolachee Formation (CSG)
- Roseneath Shale (shale)
- Epsilon Formation (shale, CSG)
- Murteree Shale (shale)
- Patchawarra Formation (CSG)

Target Depths
1000-2500 m

Target Thickness
- Coal Seam Gas: 5-75 m net coal thickness
- Shale Gas: 30-60 m net shale thickness

Exploration Results To End 2011
The Forge 1 well penetrated an aggregate thickness of 21 m of coal from 1,281 m in the upper part of the Permian section. The full sequence, including the primary coal target in the Patchawarra Formation, was not drilled due to operational reasons. Biogenic gas contents in the order of 1.1 m³/t (40 scf/ton) were recorded.

Resource Potential
- CSG: Prospective Resource Estimate 3.7 – 9.3 tcf (Gross)
- Shale Gas: Prospective Resource Estimate 0.36 – 0.95 tcf (Gross)

Environment And Land Access
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Figure 4.19 PEL 96 location, land access and Native Title, Cooper Basin.
Copies of EI Rs and SEOs prepared by licensees for regulated activities, and Environmental Significance Assessments prepared by the Energy Resources Division can be downloaded via the following link: [www.pir.sa.gov.au/petroleum/environment/register/seo_eir_and_esa_reports](http://www.pir.sa.gov.au/petroleum/environment/register/seo_eir_and_esa_reports)

The Land Access Agreement for PEL 96, pursuant to section 31 of the *Native Title Act 1993* (Cth), can be downloaded via the following link: [www.petroleum.dmitre.sa.gov.au/environment/native_title_aboriginal_lands_illuas/current_native_title_agreements](http://www.petroleum.dmitre.sa.gov.au/environment/native_title_aboriginal_lands_illuas/current_native_title_agreements)

**Forward Plan**

- 2012: Evaluation of target prospectivity.
- 2013: Seismic survey.
- 2014: Drilling of 1 – 2 deep wells.

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Figure 4.21 Log correlation across the southern Cooper Basin, South Australia. The target Permian coal seams and REM shales are generally shallower than 2000 m in PEL 96.

Figure 4.22 Map showing depth to the top of the Permian succession in licences in which Strike Energy has an interest. The top of the Permian succession in PEL 96 is less than 1500 m over the entire licence. No exploration wells are planned for PEL 96 in 2012.
4.1.6 Otway Basin Gas Project

Licences and Licence Holders

PEL 186
Beach Energy (66.67%)
Cooper Energy (33.33%)*

PEL 255
Beach Energy (100%)*

PEL 494
Beach Energy (100%)*

PEL 495
Cooper Energy (60%)*
Beach Energy (35%)
*Denotes operator

Location
Otway Basin, South Australia (Figure 4.23)

Project Summary

Within the South Australian portion of the Otway Basin, the Casterton Formation is considered to have highest prospectivity for unconventional oil and gas plays (Figure 4.24).

The Casterton Formation contains shales that are the source rocks of the commercial gas accumulations in the Penola Trough and has also generated oil, as evidenced by the widespread oil flows/recoveries and shows, particularly on the flanks of the basin. The formation is widespread but has only been penetrated in about ten wells on the northern and eastern flanks of the Basin, where the Casterton is not sufficiently thermally mature to present a viable shale gas play.

The existing well control indicates an average prospective shale sequence in the Casterton of about 85 m. However, the formation is interpreted to reach thicknesses in excess of 300 m in the undrilled troughs, where it is thermally mature to overmature and may be overpressured (the deepest Casterton penetration to date is at approximately 2,500 m).

On a regional basis, the Casterton Formation is generally a moderately rich, gas prone source rock, with total organic carbon (TOC) averaging approximately 2.5%. However, the source richness of the formation can vary widely over relatively short distances and in some portions of the basin it has excellent oil source capacity, with TOCs of up to 20% observed in western Victoria. Although these intervals are thin and not widespread, where they are present and thermally mature they are capable of generating significant volumes of oil.

The Casterton Formation was deposited in a cold climate, lacustrine environment and contains predominately siliceous shales containing minor amounts of siderite. As such they have similar mineralogy to the REM shales in the Nappamerri Trough of the Cooper Basin and some producing shales in North America.

Shales and low permeability sands within the lower Pretty Hill Formation may also present viable unconventional plays, where they are thermally mature and the Casterton Formation may be too deep to present an economic target.

Unconventional Hydrocarbon Resource Targeted

• Shale Gas
• Basin-centred Gas

Target Formations
Casterton Formation and lower Pretty Hill Formation

Target Depths
2,600 – 4,000 m

Target Thickness
Up to 300 m

Exploration Results To End July 2012
Most of the Casterton well penetrations to date have been in western Victoria where it is present at relatively shallow depths. The only definitive Casterton penetration in South Australia to date is at Sawpit 1, which was drilled on the northern flank of the Penola Trough and penetrated 61 m of Casterton Formation at a depth of about 2,500 m.
Figure 4.23 PELs 186, 255, 494 and 495, land access and Native Title, Otway Basin.
Seismic interpretation indicates that the Casterton thickens considerably into the troughs where it is interpreted reaches thicknesses in excess of 300 m and depths in excess of 4,000 m.

**Resource Potential**

The potential Gas In Place in the Casterton play is assessed to be in the range 17 - 58 tcf. Approximately 75% of the play lies within the South Australian portion of the basin.

**Environment And Land Access**

Grant of a petroleum licence does not enable (approve) regulated activities within those tenements. Approval for an activity (e.g. geophysical surveys or drilling) is a separate process that is subject to a separate, rigorous assessment and consultation process, so that operations are planned and regulated to be sound, safe and meet community expectations for outcomes. An Environmental Impact Report (EIR) must be prepared, in consultation with stakeholders and relevant government agencies, addressing potential threats and risks to the environment, and the extent to which these threats are likely and manageable. A Statement of Environmental Objectives (SEO), developed through an open, consultative process and based on information in the EIR, must then be approved for compliance before a regulated activity can proceed. Please see Chapter 5 for further details of the approval process.

Copies of EIRs and SEOs prepared by licensees for regulated activities, and Environmental Significance Assessments prepared by the Energy Resources Division can be downloaded via the following link: [www.pir.sa.gov.au/petroleum/environment/register/seo_eir_and_esa_reports](http://www.pir.sa.gov.au/petroleum/environment/register/seo_eir_and_esa_reports)

**Forward Plan**

The Sawpit-2 exploration well (PEL 495) is expected to commence drilling in Q4 2012. The well will test a conventional oil target and will be deepened to the Casterton Formation to acquire core to obtain further information in relation to its capacity to host unconventional resources.

3D seismic was acquired in April 2012 in PEL 186 (Robe Trough) with the aim of maturing a location for drilling in 2013.

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4.2 COAL GASIFICATION PROJECTS, SOUTH AUSTRALIA

Current as at 11 September 2012

**Mining projects**
- Operating mine
- Mineral development project

**Exploration tenements**
- Mineral Exploration Licence (EL)
- Petroleum Exploration Licence (PEL)
- Coalfield

**Infrastructure**
- Locality
- Port
- Highway
- Major road
- Railway – standard gauge
- Railway – non standard gauge
- Gas pipeline
- Liquids pipeline
- 132 000 volt powerline
- 275 000 volt powerline

**Figure 4.25** Map of South Australia showing oil and gas infrastructure, powerlines, mining projects and the location of coal gasification projects.
4.2.1 Arckaringa CTL and Power Project

Licences and Licence Holders
ELs 4511, 4512, 4513
CNOOC New Energy International (Australia) Pty Ltd (51%)
Arckaringa Energy Pty. Ltd. - fully owned subsidiary of Altona Energy Plc (49%)
*Denotes operator

Location
Arckaringa Basin, South Australia (Figure 4.26)

Project Summary
The Arckaringa Coalfield, comprising four deposits of sub-bituminous coal in the northern Arckaringa Basin (Figure 4.26), was discovered in 1980 by Meekatharra Minerals.

Systematic exploration of the licences was carried out in the early 1980s at which time a resource of 7,850 Mt was declared. Altona Energy Plc (Altona) acquired the coal assets in 2005 and undertook a series of pre-feasibility studies between 2006 and 2008. These studies included a drilling program with associated testing and analyses, pre-feasibility work on CTL and Power Plant options, optimisation work on mine costs, fuel and electricity market studies, and construction of a Project Economic Model.

Completion of the field exploration program in 2008 resulted in a JORC Resource Estimate of 1.287 billion tonnes for part of the Wintinna deposit which is covered by EL 4512 (Figures 4.26, 4.27 and 4.28). The outcome of the pre-feasibility studies was the establishment of a base case scenario comprising a 10 mtpa mine supplying coal to a CTL plant with an output of 10 mmbbls per annum liquid fuels (mainly ultra clean diesel) as well as a co-generation power plant delivering 560 MW per annum to the national power grid.

Altona has since forged a Joint Venture with CNOOC New Energy Investment Co., Ltd. (CNOOC-NEI), a subsidiary of the China National Offshore Oil Corporation (CNOOC), to complete the Project Bankable Feasibility Study (BFS) and expedite the project’s development. CNOOC-NEI owns 51% of the Arckaringa Unincorporated Evaluation Joint Venture (AUEJV) and Altona 49%. Under the terms of the AUEJV, the Australian subsidiary of CNOOC-NEI (CNOOC New Energy International (Australia) Pty Ltd or CNOOC-NEIA) will fund the BFS for the Arckaringa Project and will act as the operator, not only to carry out the staged evaluation work under the BFS, but also to take responsibility for assessing the full potential of the coal resource and bring projects to development.

Permits and approvals are now in place for a drilling programme that will proceed when drilling contractors and other service providers have been selected. The key objectives of the programme are:

- to extract bulk samples of coal to test and extend the coal quality profile
- to complete in-fill coal and coal geotechnical boreholes to facilitate open cut mine design (especially in an area covering the potential initial box cut)
- to complete hydro-geological test wells to enable the refinement of the existing hydro-geological model and underpin a groundwater management plan.

Attaining these objectives is essential to the progress of the Bankable Feasibility Study (BFS) for the Arckaringa CTL and Power Project.

Unconventional Hydrocarbon Resource Targeted
Mined coal to liquids (Figure 4.29)

Coal Deposits
Westfield - EL 4511 (England Hill Area)
Wintinna - EL 4512 (Arckaringa Area)
Murloocoppie - EL 4513 (Copper Hill Area)

Target Formation
Upper Mount Toondina Formation (Wintinna Deposit)
Figure 4.26  ELs 4511, 4512 and 4513, land access and Native Title.
Coal Type
Sub-bituminous

Seam Description
Wintinna Open Cut Mine Target Area: 8 main seams (Figures 4.27 and 4.28) with combined 20-30 m thickness within 40-50 m vertical interval. Seams are un-weathered and generally flat lying with no structural complexities.

Overburden Thickness
145-210 m

Coal Quality Data
Wintinna Deposit Typical Raw Coal Quality (average all seams)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Moisture (as received)</td>
<td>36.6%</td>
</tr>
<tr>
<td>Inherent Moisture (air dried basis)</td>
<td>13.2%</td>
</tr>
<tr>
<td>Ash (air dried basis)</td>
<td>10.5%</td>
</tr>
<tr>
<td>Volatile Matter (air dried basis)</td>
<td>32.5%</td>
</tr>
<tr>
<td>Total Sulphur (air dried basis)</td>
<td>1.64%</td>
</tr>
<tr>
<td>Chlorine (dry, ash free basis)</td>
<td>0.05%</td>
</tr>
<tr>
<td>Specific Energy (air dried basis)</td>
<td>23.6 Mj/kg</td>
</tr>
<tr>
<td>Relative Density</td>
<td>1.25 (g/cc)</td>
</tr>
</tbody>
</table>

The Wintinna Deposit coal resource statement prepared by McElroy Bryan Geological Services in 2008 incorporates the results of Altona’s 2007/08 drilling programme. The report shows a JORC compliant resource estimate of 1,287 Mt, of which 837 Mt is in the Measured and Indicated categories. The resource estimate covers only about 25% of the known area of the Wintinna deposit.

One tonne of Wintinna coal yields one barrel of liquids plus power and industrial products. The JORC compliant coal resource is therefore equivalent to approximately 1.2 billion barrels of liquid hydrocarbons.

Conversion Process
The Coal-to-Liquids (CTL) process consists of three main steps (Figure 4.29) in which run of mine solid coal feedstock is converted to higher value product using Gasification and Fischer-Tropsch (FT) processes. These are:

- Synthesis Gas Generation
- Liquid Synthesis using FT process
- Products Upgrade

Large parts of the gasification and FT processes are exothermic. The Arckaringa Project will capture this heat to generate electricity and export it to the national grid. The nearest point of the SA electricity grid is some 350 km to the south at Roxby Downs/Olympic Dam.

The Arckaringa Project is best summarized as a conventional open cut coal mine followed by processing and an oil refinery/petrochemicals plant with efficient integrated combined cycle electricity generation which captures and uses waste heat.
Input
Coal feedstock: 10 Million Tonnes pa

Products
Fischer Tropsch Liquids:
• 10 Million Barrels pa (approx 80 % FT diesel, 20% Naptha)

Power (Steam and Gas Turbines in Combined Cycle Gas Turbine configuration):
• 1,140 MW (Gross)
• 562 MW (Net Export)

Environment And Land Access

Mining Act 1971 - Exploration
Amendments to the Mining Act that came into force on 1 July 2011 require the holder of an exploration licence (EL) to have an approved program for environment protection and rehabilitation (PEPR) in place prior to the commencement of any exploration activities on an EL (Mining Act 1971 Part 10A, and Mining Regulation 114) (http://minerals.pir.sa.gov.au/licensing_and_regulation/mining_operations).

A PEPR should identify all relevant environmental, social and economic impact events that may result from the proposed exploration activities and how each of the identified impacts will be managed or avoided.

DMITRE has developed a generic program for environment protection and rehabilitation for low impact mineral exploration in South Australia which must be adhered to unless an alternative low impact exploration PEPR has been developed and approved by the Minister. For all other activities (not within the scope of the generic PEPR) a PEPR in accordance with Part 10A of the Act is required. Under Regulation 114 (Transitionary Provisions) an exploration work approval (EWA) for drilling/use of declared equipment, or a declaration of environmental factors (DEF) for exploration in sensitive areas (in accordance with EL conditions) are deemed to be a PEPR until 1 July 2014 unless otherwise required by the Minister.

It is intended that over the next 3 years a PEPR as required under the Act will eventually replace the current EWA and DEF formats. Guidelines and determinations for the development of this PEPR are currently being developed by DMITRE.

Exploration Compliance Reports (ECRs) are required as a condition of PEPR approval.

The Water Affecting Activity (WAA) permit - required to cover the hydro-geological test and other drill holes currently planned, pursuant to the terms of the PEPR - was recently granted by the South Australian Arid Lands Natural Resources Management Board under the newly expanded and strengthened regulations governing water affecting activities in the Arid Lands regions of South Australia.

Following discussions with the Native Title claimant group Antakarinji Matu-Yankunytjatjara Aboriginal Corporation (AMYAC) and its representatives, the Work Area Clearance (WAC) process has also been formally completed. The discussions have been ongoing since October 2011 and led to a formal acceptance by AMYAC on 12 July 2012 that the drilling programme design and drill hole locations meet the terms of the WAC (as required under the PEPR granted by DMITRE). As a result, all drill hole locations are now cleared for drilling.

The WAC process involved the relocation and/or redesign of six of the proposed maximum 31 drill holes to protect aboriginal heritage concerns during, and as a result of, the drill programme. During discussions, AMYAC and the Arckaringa JV partners have agreed to work together to achieve and implement a framework or Memorandum of Understanding (MOU) that can lead to a Native Title Agreement to cover respective rights, responsibilities and economic opportunities during any future mining and development project at Wintinna.

Mining Act 1971 - Mining
There is a two-stage authorisation process for mining in South Australia. (http://minerals.pir.sa.gov.au/licensing_and_regulation/mining_operations)
Applications for a Mining Lease (Mineral (ML) or Extractive Mineral Lease (EML)), Retention Lease (RL) or Miscellaneous Purposes Licence (MPL) must be supported by a 'Mining Lease Proposal'.

Once a tenement is granted, a Program for Environment Protection and Rehabilitation (PEPR) is required to be approved before mining may commence.

Appropriate documentation is required to be prepared and submitted to DMITRE for approval. The purpose of the documentation is to provide a comprehensive and detailed description of environmental, social and economic risks and benefits of the proposed operation so that stakeholders and DMITRE can make an informed, risk-based and balanced judgment about the proposed operation.

The Mining Regulation and Rehabilitation Branch of DMITRE regulates all operating mine and quarry sites. Each mining operation has a DMITRE Mining Compliance officer who is responsible for ensuring the site is operated in compliance with Lease conditions and it’s Program for Environment Protection and Rehabilitation (PEPR). The provision for a PEPR under the amended Mining Act commenced on 1 July 2011. This replaced the regulation under the Mining Act relating to the requirement for a Mining and Rehabilitation Program (MARP).

Publically available documents relating to all mines in South Australia are available from the South Australian Resources Information Geoserver (SARIG). Go to the top left widget, select Databases, then Publications and Reports from the drop down list.

Environmental Protection, Biodiversity and Conservation Act 1999
Potential impacts on water resources from coal mining are a focus of the Commonwealth Government’s Independent Expert Scientific Committee and the National Partnership for Coal Seam Gas and Large Coal Mines agreed between the South Australian State Government and the Commonwealth Government in 2012. Pursuant to this partnership plans are already in place for:

- regional studies of aquifers of the Arckaringa Basin and overlying younger basins; and
- the South Australian State Government to be accredited as a one-stop-shop for the State and Federal governments’ environmental assessments pursuant to the Commonwealth Government’s Environmental Protection, Biodiversity and Conservation Act 1999; and
- referring the environmental assessment of coal mining in the Arckaringa Basin to the Commonwealth Government’s Independent Expert Scientific Committee, to underpin informed regulation.

Forward Plan (Indicative Only)
2012 - Bankable Feasibility Study
2013 - Bankable Feasibility Study
2014 - Approvals and Financing
2015 – 2018 - Construction

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4.2.2 Walloway UCG Project

Licence and Licence Holder

PEL 120
SAPEX Ltd* (100%)
Wholly owned subsidiary of Linc Energy
*Denotes operator

Location
Walloway Basin, South Australia (Figure 4.30).

Project Summary
Linc Energy, as operator of PEL 120 in the Walloway Basin located approximately 90 km south east of Port Augusta, completed a 15 well drilling program near Orroroo (Figure 4.31) between August 2009 and March 2010 to assess the underground Coal Gasification (UCG) of Tertiary lignites (Figure 4.32).

The first 5 wells intersected coal at depths of between 200 and 293 m with coal seam thicknesses of up to 23 m. On completion of these wells Linc Energy commissioned Xenith Consulting Pty Ltd who determined that, in accordance with the JORC Code, a significant coal mineralisation target of 1.0 to 1.3 billion metric tonnes is indicated.

Unconventional Hydrocarbon Resource Targeted

- Underground Coal Gasification
  (Figure 4.33)

Target Formations

- Walloway Rider coal seam (UCG)
- Walloway coal seam (UCG)

Target Depths

- Walloway Rider coal seam: ~240 m
- Walloway coal seam: 200-293 m

Target Thickness

- Walloway Rider coal seam: ~3 m
- Walloway coal seam: 8-23 m

Exploration Results To End 2011

- Completed 15 wells in the Orroroo area (Orroroo 1 to 15 wells)

Environment and Land Access

Grant of a petroleum licence does not enable (approve) regulated activities within those tenements. Approval for an activity (e.g. geophysical surveys or drilling) is a separate process that is subject to a separate, rigorous assessment and consultation process, so that operations are planned and regulated to be sound, safe and meet community expectations for outcomes. An Environmental Impact Report (EIR) must be prepared, in consultation with stakeholders and relevant government agencies, addressing potential threats and risks to the environment, and the extent to which these threats are likely and manageable. A Statement of Environmental Objectives (SEO), developed through an open, consultative process and based on information in the EIR, must then be approved for compliance before a regulated activity can proceed. Please see Chapter 5 for further details of the approval process.

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Forward Plan

2012 - 2013: To be supplied

Contact Details

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Website: www.lincenergy.com
Native Title Claims
- SC96/4, Barngarla Native Title Claim
- SC96/5, Nukunu Native Title Claim
- SC99/1, Adnyamathanha No.1
- SC00/1, Kaurna Peoples Native Title Claim
- SC10/2, Ngadjiri Nation
- SC10/3, Ramindjeri
- SC11/1, Adnyamathanha No 4 Native Title Claim
- SC11/2, Ngadjiri Nation #2
- SC12/1, Wilyakali
- SN94/1, R J Howard Investments

Restricted areas
- Aboriginal Lands
- Commonwealth land
- Prescribed Wells Areas (PRESWA)
- Parks with petroleum exploration access
- Parks with no petroleum exploration access

Pipeline Licence (PL)
- Gas
- Liquids

Highway
- Roads
- Railway

Figure 4.30  PEL 120, land access and Native Title.
Figure 4.31 Location of drillholes, PEL 120 Walloway Basin.
**Figure 4.32** Stratigraphic section, Orroroo 2, Walloway Basin.
4.2.3 Kingston Project

**Licences And Licence Holders**
PEL 127, EL 4576
Hybrid Energy Australia Pty. Ltd. - fully owned subsidiary of Strike Energy Limited* (100%)
*Denotes operator

**Location**
Otway Basin South Australia (Figure 4.34).

**Project Summary**
In 1979, Western Mining Corporation Holdings Limited (WMC) discovered lignite in the Tertiary Dilwyn Formation on the northern margin of the Otway Basin (Figures 4.35 and 4.36). An extensive drilling programme comprising 950 holes (92 cored) followed over the next seven years, and a 985 million tonne deposit was delineated. The Kingston lignite was considered a feedstock for a proposed State power generation plant and comprehensive geological, geotechnical, hydrological, environmental and mining feasibility studies were undertaken. Pilot combustion tests were conducted on bulk samples of the lignite extracted by 1 m diameter coring.

Strike Energy acquired the Kingston lignite asset in 2005, and commenced an investigation of the resource for combustion and gasification potential.

The WMC drilling was sufficient for a JORC compliant resource estimate of 578 Mt (measured and indicated), determined in 2007. Preliminary mining scope and groundwater studies followed in 2008/2009, with combustion and gasification test work on the coals completed in 2011. The intensive gasification test work undertaken by the University of Adelaide confirmed that the Kingston lignite can be successfully gasified using fluid bed gasification technology to deliver good quality syngas that is high in hydrogen (Figure 4.37). Bench scale testing was undertaken to determine the optimal bed material and temperature operating...
window, and semi-industrial scale testing was undertaken to prove that a continuous operation can be maintained and also demonstrate the range of gas compositions produced.

The project work completed by Strike Energy has confirmed that the Kingston Lignite Deposit can be mined, combusted, and gasified to produce syngas with the potential to manufacture high value products such as liquid fuel, urea, ammonia and methanol. Strike is currently seeking a partner for the advancement of the project.

**Unconventional Hydrocarbon Resource**

**Targeted**

Mined coal to synthesis gas (Figure 4.38)

**Coal Deposits**

Kingston Lignite Deposit

**Target Formation**

Dilwyn Formation

**Coal Type**

Lignite

---

**Figure 4.34** PEL 127 and EL 4576, land access and Native Title.
Seam Description
The lignite deposit occurs in a NE trending elongate depression 27 km long and up to 5 km wide. The lignite lies predominantly in one horizon, occurring as a single seam in the south of the deposit and with partings in the north (Figure 4.36). Maximum seam thickness is 9 m. In the north of the deposit a thickness of 12 m is attained where the main seam coalesces with an overlying less well developed lignite horizon.

Overburden Thickness
20-80 m

Coal Quality Data
Kingston Lignite Deposit typical raw coal quality:
- Moisture (as received): 53.3%
- Ash (dry basis): 14.9%
- Volatile Matter (dry basis): 46.9%
- Sulphur (dry basis): 2.9%
- Sodium (dry basis): 0.85%
- Chlorine (dry basis): 0.15%
- Specific Energy (dry basis): 22.7 MJ/kg
- Relative Density: 1.2

Coal Resource

<table>
<thead>
<tr>
<th>Kingston Deposit Strip Ratio</th>
<th>Million Tonnes (JORC compliant)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Measured</td>
</tr>
<tr>
<td>&lt; 5:1</td>
<td>217.1</td>
</tr>
<tr>
<td>5 to 10:1</td>
<td>229.9</td>
</tr>
<tr>
<td>&gt; 10:1</td>
<td>76.5</td>
</tr>
<tr>
<td>Total</td>
<td>523.5</td>
</tr>
</tbody>
</table>

Input
Lignite from conventional open cut mining

Processing
Fluid bed gasification technology.

Product
Hydrogen rich synthesis gas, suitable for the manufacture of a range of products such as urea, ammonia, methanol or liquid fuel.

Environment And Land Access
Petroleum and Geothermal Act 2000

Figure 4.35 Lignite seams in the Tertiary Dilwyn Formation, Kingston deposit.
Grant of a petroleum licence does not enable (approve) regulated activities within those tenements. Approval for an activity (e.g. geophysical surveys or drilling) is a separate process that is subject to a separate, rigorous assessment and consultation process, so that operations are planned and regulated to be sound, safe and meet community expectations for outcomes. An Environmental Impact Report (EIR) must be prepared, in consultation with stakeholders and relevant government agencies, addressing potential threats and risks to the environment, and the extent to which these threats are likely and manageable. A Statement of Environmental Objectives (SEO), developed through an open, consultative process and based on information in the EIR, must then be approved for compliance before a regulated activity can proceed. Please see Chapter 5 for further details of the approval process.

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**Mining Act 1971 - Exploration**

Amendments to the Mining Act that came into force on 1 July 2011 require the holder of an exploration licence (EL) to have an approved program for environment

A PEPR should identify all relevant environmental, social and economic impact events that may result from the proposed exploration activities and how each of the identified impacts will be managed or avoided.

DMITRE has developed a generic program for environment protection and rehabilitation for low impact mineral exploration in South Australia which must be adhered to unless an alternative low impact exploration PEPR has been developed and approved by the Minister. For all other activities (not within the scope of the generic PEPR) a PEPR in accordance with Part 10A of the Act is required. Under Regulation 114 (Transitory Provisions) an exploration work approval (EWA) for drilling/use of declared equipment, or a declaration of environmental factors (DEF) for exploration in sensitive areas (in accordance with EL conditions) are deemed to be a PEPR until 1 July 2014 unless otherwise required by the Minister.

It is intended that over the next 3 years a PEPR as required under the Act will eventually replace the current EWA and DEF formats. Guidelines and determinations for the development of this PEPR are currently being developed by DMITRE.

Exploration Compliance Reports (ECRs) are required as a condition of PEPR approval.

**Mining Act 1971 - Mining**

There is a two-stage authorisation process for mining in South Australia. (http://minerals.pir.sa.gov.au/licensing_and_regulation/mining_operations)

Applications for a Mining Lease (Mineral (ML) or Extractive Mineral Lease (EML)), Retention Lease (RL) or Miscellaneous Purposes Licence (MPL) must be supported by a ‘Mining Lease Proposal’.

Once a tenement is granted, a Program for Environment Protection and Rehabilitation (PEPR) is required to be approved before mining may commence.

Appropriate documentation is required to be prepared and submitted to DMITRE for approval. The purpose of the documentation is to provide a comprehensive and detailed
description of environmental, social and economic risks and benefits of the proposed operation so that stakeholders and DMITRE can make an informed, risk-based and balanced judgment about the proposed operation.

The Mining Regulation and Rehabilitation Branch of DMITRE regulates all operating mine and quarry sites. Each mining operation has a DMITRE Mining Compliance officer who is responsible for ensuring the site is operated in compliance with Lease conditions and its Program for Environment Protection and Rehabilitation (PEPR). The provision for a PEPR under the amended Mining Act commenced on 1 July 2011. This replaced the regulation under the Mining Act relating to the requirement for a Mining and Rehabilitation Program (MARP).

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The original Western Mining Corporation Kingston lignite project environmental assessment reports include:


Twenty six public and eight government submissions were received in response to the Draft EIS (1983a). Issues raised in each submission are either summarised by the proponent or included in full as appendices in the Supplement (1983b). Hard copies of the reports and submissions held in various libraries across the country can be located through the National Library of Australia - go to http://trove.nla.gov.au/

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