

WESTERN AUSTRALIA'S DIGEST OF PETROLEUM EXPLORATION, DEVELOPMENT AND PRODUCTION

# PETROLEUM

IN WESTERN AUSTRALIA

SEPTEMBER 2016



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Aerial view of the Napier Range at Windjana Gorge, forming part of the Devonian “Great Barrier Reef” of the Canning Basin

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Ancient Devonian Reef – Windjana Gorge, Western Australia by Laurie Lehmann-Bybyk, winner of the 2016 DMP photo competition

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# WESTERN AUSTRALIA

## Opportunities to Explore – BIDS INVITED FOR ACREAGE

### PETROLEUM ACREAGE

#### Onshore Canning Basin

There are six onshore release areas in the Canning Basin, ranging in size from 1770 km<sup>2</sup> to 4392 km<sup>2</sup>. There are four release areas situated on platforms and two areas on the Lennard Shelf. There may be targets in sub-salt Ordovician and post-salt sequences for platform areas and Devonian carbonates and Permian-Carboniferous sandstones on the Lennard Shelf.

#### Onshore Officer Basin

There are eight release areas in the onshore Officer Basin. Area size ranges from 5054 km<sup>2</sup> to 8129 km<sup>2</sup>. These areas are

located adjacent to the South Australian border. In this Neoproterozoic basin there may be sub-salt and unconventional hydrocarbons present.

**Bids for the release areas close on 9 March 2017. Applications can only be made online.**

Acreege release information is available on the Department's website. Information provided includes relevant information about the release areas, new bid assessment guidelines, acreage access and how to make a valid application for an Exploration Permit.

[www.dmp.wa.gov.au/acreege\\_release](http://www.dmp.wa.gov.au/acreege_release)

### GEOHERMAL ACREAGE

Application is by a Geothermal Special Prospecting Authority (GSPA) with Acreage Option (AO).

Companies are invited to apply for areas each with size up to 160 5'x5' graticular blocks.

Companies interested in geothermal acreage are allowed to bid for multiple areas and are expected to drill at least one well during the first two years of obtaining a geothermal title.

Geothermal acreage information is available from the DMP website.

[www.dmp.wa.gov.au/acreege\\_release](http://www.dmp.wa.gov.au/acreege_release)

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# Minister's message



**Sean L'Estrange**  
Minister for Mines and Petroleum

This edition of *Petroleum in Western Australia* coincides with the 18<sup>th</sup> Petroleum Open Day and my first as Minister for Mines and Petroleum.

The Petroleum Open Day is an opportunity for the Department of Mines and Petroleum (DMP) to engage directly with government, industry and community stakeholders. DMP will provide presentations on a range of relevant regulatory subjects, safety and environment workshops, a panel discussion as well as the latest petroleum acreage release. The theme for this year's open day is innovation – an approach that DMP has adopted to upgrade its approval processes to provide a more streamlined and timely service to industry.

DMP is committed to delivering online transactions and accessibility for customers as much as possible to benefit both the industry and the people of Western Australia. Digital DMP is part of a much bigger integration initiative focusing on reshaping business practices and implementing strategies that will take full advantage of the digital transformation.

The Integrated DMP initiative presents an opportunity to better meet the needs of the department's customers by transforming service

delivery through integration of business processes and systems. This includes the secure sharing of information (both textual and spatial) across the department. Attendees at the Petroleum Open Day will have an opportunity to learn about these innovations being developed by DMP and industry, along with presentations on innovative solutions to onshore operations and will conclude with a panel discussion.

An integral part of the Petroleum Open Day is the acreage release, gazetted on Tuesday 13 September, for areas within the Canning and Officer Basins. This year there are 14 onshore areas released for bidding, with six in the Canning Basin and eight in the Officer Basin, ranging in size from 1770 square kilometres to more than 8000 square kilometres.

The DMP website will include information including detailed maps of the release areas, prospectivity summaries, data listings and Native Title, environmental and other land access considerations specific to the release areas. Further general information on how to apply for acreage, the new bid assessment guidelines, the royalty regime, online petroleum systems and geological database are included in the package.

Applications for acreage release are exclusively online at [www.dmp.wa.gov.au/acreage\\_release](http://www.dmp.wa.gov.au/acreage_release)

Western Australia continues to rank among the best jurisdictions in the world for new petroleum ventures and exploration success as proven with the Waitsia, Irwin and Red Gully North discoveries in 2014-15. Growth in reserves and future production, particularly in the northern Perth Basin, and the favourable and low risk business environment are key enablers for investment.

I look forward to seeing you at this year's Petroleum Open Day.

# Executive Director's message

**Jeff Haworth**  
Executive Director  
Petroleum Division



2016 has been a tough year for the industry as oil prices have remained sub US\$50 for 18 months now. Companies continue to rationalise their portfolios and small to medium size companies struggle to find capital to progress their exploration programs. Western Australia's gas glut is also a contributing factor to slowing down exploration. However, the forecast decline in gas supply from the offshore North West Shelf still looms over the horizon.

Notwithstanding the possibility of no exploration drilling being conducted in Western Australia this calendar year, activity is not totally stagnant with proposed development drilling of the Waitsia field later this year and continued testing at Asgard and Valhalla, Warro and Whicher Range.

Other discoveries made in 2014 and 2015 are also being appraised at Red Gully North 1 and Theia 1.

For DMP, 2016 saw the end of the transition period for the Petroleum and Geothermal Energy Resources (Resource Management and Administration) Regulations 2015 and the overwhelming industry adoption of Well Management Plans (WMP) with 99 per cent of active wells having had WMPs submitted in time.

The adoption of the principles around WMPs by industry is also heartening

and demonstrated, with over 70 per cent of these WMPs submitted correctly first time by companies.

DMP is also ensuring compliance by companies with their operations, with inspectors from the Environment, Resources Safety and Petroleum Divisions regularly conducting site visits.

2016's APPEA Conference in Brisbane heralded strengthened messages from industry around cooperation, social licence and the future role of gas in the wake of COP21. Industry leaders including Peter Coleman, Peter Botten, Andrew Smith and others made it clear the industry needs to reshape itself in the current constrained environment, as well as ensuring its dealings with communities are open, honest and early to gain the acceptance of the communities in which they work.

As many of you know, I am quite passionate about the need for stakeholder engagement, not only by industry but also by the regulator. For industry, this is a part of its corporate social responsibility in developing the "trust" of the community. Communities are also scrutinizing projects more diligently and require industry to be up front with them about what the project means to them.

DMP and the Department of Water have continued the program of

community engagement in the Mid-West, Kimberley and more recently in the South West. This has enabled us to learn what the local concerns and issues are, as well as discuss the regulatory framework with local residents.

With the future of natural gas, there have been many articles published on the continuing role of gas in the future energy mix, as renewables grow and coal fired power reduces. The International Panel on Climate Change (IPCC), Climate Change Energy Solutions (C2ES) and International Energy Agency (IEA) have all stated that gas is not just a "transitional" energy source but rather a long-term contributor to the future energy mix that realises reductions in greenhouse gas emissions.

While we are currently in a gas glut, most indications point to a growth in demand for gas in the next couple of years as countries move away from coal and towards a sustainable mixture of renewables and natural gas and other green power sources.

DMP will continue to ensure Western Australia is prepared to meet this growth through its bid release program and streamlining of the multi-agency regulatory framework. A first step in this program is the amalgamation of the three State petroleum acts into one Act. This will

combine and streamline the *Petroleum and Geothermal Energy Resources Act 1967*, the *Petroleum Pipelines Act 1969* and the *Petroleum (Submerged Lands) Act 1982* into one, the “*Petroleum Act 2020*”.

The *Petroleum Act 2020* project will reduce duplication within the three acts, modernise the language, provide consistency between the acts and reduce the number of regulations associated with the acts. While this major project is being undertaken, other amendments to the existing regulations will also occur in the interim, where an immediate need is demonstrated.

On a final, sad note, DMP was saddened with the sudden passing of Dr Mike Middleton in June this year. It was a tribute to Mike’s standing in government, academia and industry that so many condolences were received by DMP and Mike’s family from you all. He was a brilliant scientist and a mentor to many within Petroleum Division but more importantly his passion for what is right and his manner when dealing with people will leave us all with fond memories.

## List of petroleum legislation and regulations that fall in the scope of the Petroleum 2020 project

### Legislation governing petroleum titles and related operational and environmental management matters

*Petroleum (Submerged Lands) Act 1982*

Petroleum (Submerged Lands) (Environment) Regulations 2012

Petroleum (Submerged Lands) (Resource Management and Administration) Regulations 2015

Petroleum (Submerged Lands) Regulations 1990

*Petroleum (Submerged Lands) Registration Fees Act 1982*

Petroleum (Submerged Lands) Registration Fees Regulations 1990

*Petroleum and Geothermal Energy Resources (Registration Fees) Act 1967*

Petroleum and Geothermal Energy Resources (Registration Fees) Regulations 1990

*Petroleum and Geothermal Energy Resources Act 1967*

Petroleum and Geothermal Energy Resources (Environment) Regulations 2012

Petroleum and Geothermal Energy Resources (Resource Management and Administration) Regulation 2015

Petroleum and Geothermal Energy Resources Regulations 1987

### Legislation governing petroleum pipelines and related operational and environmental management matters

*Petroleum Pipelines Act 1969*

Petroleum Pipelines (Environment) Regulations 2012

Petroleum Pipelines Regulations 1970



Well test at Warro 5

# Director's message

## Denis Wills

Director Petroleum Operations  
Petroleum Division



This is my third article for *Petroleum in Western Australia*.

The first, September 2015, dealt with the impact the falling oil price would have on the need for operators to continually find more and more operational cost savings and the real temptation to reduce compliance activities as they may not be seen as value adding.

This does not imply that such activities would be stopped, but rather a mindset in industry that “we have been doing too much for compliance and can reduce effort without impacting the risk”. Of course, as I have said to a number of operators, “risk is in the eye of the beholder” and as such, a company’s risk appetite can increase depending on what the perceived benefit is.

The second article was about the absolute necessity for stakeholder engagement by DMP and industry.

A reference made within this article was – “industry needs to reassure the public that its plants are properly designed, maintained and operated – and that people are adequately trained”.

Although the reference was to facilities, it equally applies to all petroleum activities, be it drilling

a well or undertaking a workover. Equally, the article stressed the need for DMP to monitor compliance with the regulatory framework and approved petroleum activities, to ensure such activities result in safe and environmentally acceptable outcomes.

One year on and we still have the same low oil price, the same pressure points within the industry and the same need to engage with a full range of stakeholders to keep ahead of public concern.

In the February 2016 edition of *The Chemical Engineer*, the following statistics on the petroleum industry were derived from a reader’s survey on the key negative effects they have witnessed due to the drop in oil price:

- I have been made redundant – 7%
- My company has made other staff/contractors redundant – 56%
- Projects have been delayed/cancelled – 84%
- Cost-cutting is affecting the safety of operations – 15%
- Training budgets have been cut – 36%
- There is a hiring freeze – 45%

It can be seen that, as expected, there is a trend of reducing the number of people employed and most likely an

implied trend of expecting those left in the organisation to do more. Another, probably not unexpected view is that of the perceived or real impact on safety and training budgets being cut.

Let me for a moment go back to 1990 when psychologist James T. Reason proposed that the common causes of the weaknesses in risk mitigation controls can often be found in the organisation, what is termed ‘latent failures’. An example would be cost and time cutting on maintenance management, which can eventually lead to the deterioration of the integrity of many hardware controls within a system, but there are others.

A further example which may or may not have been considered, is the loss or dilution of experience and knowledge within an organisation caused by the reduction of employees in this economic climate. For background, Reason was also the person who coined the term “Swiss Cheese Model” in relation to system failure.

So, bringing together the quote in my second *Petroleum in WA* article, above, *the Chemical Engineer* survey results and James Reason’s observations, the question is; are latent failures developing within organisations which could affect

industry's ability to attend to compliance and, in turn, put at risk the public's perception of the industry?

The challenge for the oil and gas industry continues to be getting the right balance between potential "latent failures" within an organisation (reduced maintenance spending, time pressures resulting from a reduced workforce and dilution or loss of knowledge and experience) and keeping the business viable.

Part of getting the balance right is to avoid what has been termed cognitive bias in decision making and extreme over confidence in an organisation's ability to manage risk.

For DMP, we will continue to strengthen our focus on compliance to ensure regulatory requirements and approved petroleum activities are undertaken to ensure safe and environmentally acceptable outcomes. We will continue to work with, and as necessary, challenge the industry to ensure a balanced approach to risk management.

On another aspect of compliance, since I am on the subject, are registered holders meeting their work program commitments where this is within their control?

On this subject I will refer to a memo in the 1960's from a Government Geologist to the Under Secretary For Mines, and I do warn you that the language in the 1960s was a lot more direct than today.

"It is recommended that in the future no transfers of Permits to Explore should be approved unless the proposed new permittee is prepared

to guarantee that all commitments of the original permittee will be honoured. The penal provisions of the *Petroleum Act* with regard to cancellation of permits and the forfeiture of bonds should be strictly enforced. Failure to do so leaves the way open for unscrupulous promoters and insincere operators who are a hindrance to effective oil exploration in this State, tying up land which may otherwise be systematically explored."

DMP has also strengthened its focus on this aspect of compliance and I encourage you to read the WA Petroleum and Geothermal Guideline for Exploration Permit Management, especially the section on Force Majeure. From DMP's perspective, we would look to registered holders to demonstrate a bona fide intent to explore.

Lastly, I would like to touch upon the theme of decommissioning.

An article in this edition discusses DMP's development of decommissioning guidelines. This project will be a major work effort for us in the coming months and I expect a variety of views, some converging and others diverging, on the subject within the industry and within the wider community.

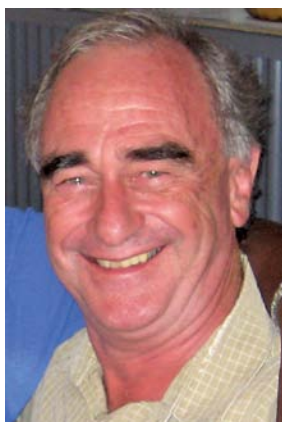
The reason for this diversity is that at most times, decisions on this subject will be about an organisation's or individual's risk appetite and the benefit they perceive from taking the risk. For DMP, our emphasis will naturally be on minimising risk to the State while balancing this risk with potential benefits to the majority of the community.



# Mike Middleton (1950–2016) Obituary

**Karina Jonasson**

Petroleum Resource Geologist  
Petroleum Division



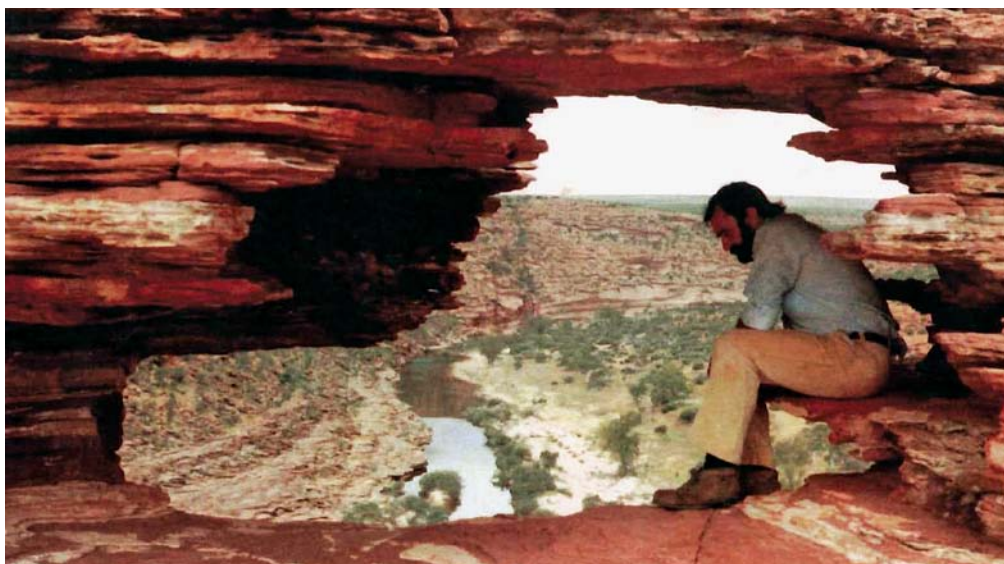
Michael Francis Middleton, known to his family and friends as Mike, was born in Sydney on 10 August 1950 and passed away suddenly on 15 June 2016 in Perth. He was the eldest son of Jim and Betty Middleton, and is survived by his younger brother Gerard, his wife Lynne and their five children, James, Steven, Lara, Martha and John-Paul.

Before joining the Petroleum Division of DMP in 2009, Mike held some prestigious roles in an illustrious career. Mike's interest was in petroleum geology and geophysics, petrophysics and geothermal energy. Mike's fields of expertise were in seismic interpretation, formation evaluation and basin modelling and he published or presented over 200 technical papers or reports on petroleum exploration, development and technology.

Mike earned his PhD from Sydney University in 1979, in geology and geophysics. His first job was in Mt Isa (where he had fond memories of playing rugby on a gravel playing field). He worked for ECL Consulting (Australia) in Perth, after marrying in 1981. A couple of years later he joined the Geological Survey of Western Australia where he published many papers. In 1990, he established his own consultancy in Perth and was appointed to the position of Adjunct Associate Professor at Curtin University in the Department of Exploration Geophysics.

Mike found his "dream job" at the Chalmers University of Technology in Gothenburg, Sweden, where he worked from 1993 to 1998, moving his young family there while he took up the role of Nordic Professor of Petrophysics, which entailed the role of promoting research cooperation in the field of petroleum technology in the Nordic countries. While in Sweden, he was Founding Editor of the *Nordic Petrophysics Journal*.

In 1999, Mike was appointed Professor, and Director of the Centre of Excellence in Petroleum Geology at Curtin University. He carried out research, teaching and supervising numerous MSc and PhD candidates, and worked as a consultant until 2002. His main field of research at Curtin was petrophysics and geophysics.





Mike entered the private sector after a brief period in the Department of Premier and Cabinet and Central TAFE. He was a foundation Director of Merlin Energy, from 2002 until 2004. He was the Vice President of International Exploration – Asia Pacific Region Australia at BPC Limited, a job he held for the next three years. His role was Exploration Manager of the company's Perth Basin offshore leases and he was active in new ventures, worldwide, in petroleum and alternative energies. He was also Exploration Manager of Sentry Petroleum Ltd until March 2009.

a well-earned break on the beaches of Fiji. He will be remembered always for his quirky sense of humour, unusual hobbies, and amazing intellect. He was a good friend, a generous mentor and he pursued excellence. We often heard about his predilection for bonfires and red wine, his love of family and his collection of trilobites, Roman coins, and old swords.

After watching the movie "The Princess Bride" Mike decided he had to take up fencing to imitate his new hero, Inigo Montoya. He joined the Cavaliers fencing club in 2003 and held a number of significant roles within the club, including Treasurer, Head Coach, and Vice President/President. Mike developed an interest in veterans fencing and fencing coaching, especially épée. The success of the beginners' courses is attributed to Mike's patient and encouraging mentoring, passion, and skillful coaching. Mike continued running the beginners' courses even after the condition of his knee prevented him from actively competing. He enjoyed the social interaction on the sidelines with the other veterans.

What he said about himself – from his LinkedIn profile:

"I am a scientist with interest in physics, geology and geophysics.

I have had a long-time amateur interest in ancient Roman history and numismatics. I am currently fooling myself that I am writing two historical novels (one graphic novel) about the life of Titus Flavius and (one regular novel-historical fiction) about Fulvius Aurelius (cf Tacitus). Now I am in the middle of a new novel about Alexandria in the late 4th Century (seem to be making more progress with this than the other two). As I become older, the latter activities assume more interest. Nevertheless, I have a renewed professional interest in geothermal, and have published chapters in e-books on the topic in 2014 and 2015. Might try another in 2016?"

Mike was a great manager because he was a great person. He didn't do things because it would lead to better outcomes or KPIs, but because he cared about people.

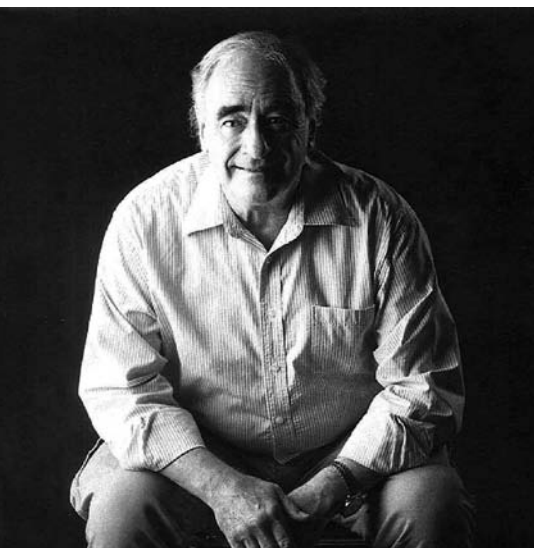


Mike had 35 years of experience in the petroleum industry with such companies as Amoco and ECL (Exploration Consultants Limited) and consulted to Western Mining (Petroleum), Global Petroleum, AMPOLEX, Phillips Petroleum, Central Petroleum and the Western Australian Government. Mike had domestic Australian and international experience throughout the Asia-Pacific and North Sea sectors and had been involved in

mapping several major petroleum discoveries in Western Australia.

In June 2009, Mike returned to DMP, this time to be the Senior Energy Geotechnologist, before becoming the General Manager of the Resources Branch in the Petroleum Division in July 2012. As the GM he managed the branch staff of three teams and 18 people, and provided technical advice to staff and stakeholders on petroleum and geothermal matters. Much of his recent research was carried out on radiogenic heat generation in Western Australia and he published many articles over the years in this magazine on his findings. He was held in high regard by all who worked with and knew him.

Mike was full of life and good will, with smiling eyes and an infectious laugh. Mike was just about to take his long service leave and spend



# An overview of petroleum activities in Western Australia 2016

**Karina Jonasson**

Petroleum Resource Geologist  
Petroleum Division



Photo © Chevron

The first shipment of LNG from the Gorgon Project departed Barrow Island off the North West coast of Western Australia on the Asia Excellence, bound for Japan

This article briefly describes petroleum exploration activity onshore during the period January 2016 to July 2016, as activity in the latter half of 2015 has been reported in the April 2016 issue of *Petroleum in Western Australia*.

Summary tables for the 2015-16 fiscal year for wells, seismic, and the 2014 production and 2015 reserves can be found at the back of the magazine.

## Exploration

Primarily due to the downturn in the price of oil, exploration activity by the petroleum industry has been sparser than in previous years. To illustrate this statement, only one new well was drilled in the State between January and June 2016 in addition to one well spudded at the end of 2015, compared to 15 wells drilled in 2015. No surveys were conducted in the first half of 2016. The industry is now evaluating the results of these wells.

The Ungani Far West 1 well appraising the Ungani oilfield spudded on 28 November 2015. The well reached total depth on 31 January and the rig was released on 9 February 2016. The well is located in Production Licence L 21, 977 km east of Broome and discovered a potential oil column at the top of the Anderson Formation.

The Mondarra 9 well was drilled for APA Group in the Dandaragan Trough of the Northern Perth Basin in

January. The well is located in L1, the production licence for the Mondarra gasfield (in production from 1972-1994), which is now being used as a gas storage facility. The well was completed and tested as part of the Mondarra gas storage project. The expansion of the Mondarra gas storage facility was completed and commissioned in July 2013. The facility has a capacity of 15 PJ of commercial gas storage, with injection capability of 70 TJ/day and withdrawal capability of 150 TJ/day from three wells.

Hydraulic fracture stimulation operations concluded in January 2016 at Warro gasfield. The Warro testing program commenced at the end of January for Warro 5 and 6, with both wells flowing gas and water. Following testing, the wells were shut-in in late March. Warro 4 was re-entered in late June and retesting operations commenced. Warro 4 was previously fracture stimulated in the "B" sand reservoir and in a part of the "C" sand reservoir overlying the zones tested in Warro 5 and 6. Gas flows from the "C" sand in Warro 4 were maintained at rates between 20,000 and 27,000 m<sup>3</sup>/d (0.7 and 0.95 MMcf/d) with associated water rates ranging from 150 to 238 kL (950 to 1500 bbl) of water per day. The testing was completed in early July. Latent Petroleum's plan is to suspend the Warro 4, 5 and 6 wells

pending the recommendations from analysis work. Future field work at Warro could involve fracture stimulation of the untapped, upper "C" sand at Warro 6 or potentially horizontal drilling the "C" reservoir section.

Other activity includes well tests by Empire Oil and Gas on Red Gully North 1 and diagnostic fracture injection tests (DFITs) on Irwin 1 and Waitsia 2. The DFITs are part of Origin's and AWE's appraisal activities in the northern Perth Basin.

Testing at Red Gully North 1 in April 2016 confirmed movable gas from two out of three zones tested. The well is located in EP 389 and is approximately 4 km to the north of the Red Gully Processing Facility.

## Development and Production

Under the new Petroleum and Geothermal Energy (Resource Management and Administration) Regulations 2015 (RMAR 2015) and Petroleum (Submerged Lands) (Resource Management and Administration) Regulations 2015, production data may now be released to the public following a confidentiality period of two years. As such, the tables at the back of this magazine contain previously released production data to December 2014.



Rigging up coiled tubing on a frac tree at Warro 5

### **Waitsia Gas Project**

In January 2016, AWE made the decision to commence 'Stage 1A' of the development of the Waitsia gasfield. This stage involves the installation of two flowlines and a 7 km pipeline to the Xyris Production Facility, which has been in care and maintenance since 2010. Two wells will be connected to the facility, Waitsia 1 and Senecio 3. Both wells were recently flow tested. Up to three appraisal wells will be drilled in the area over the next 12 to 18 months.

### **Gorgon Project Update**

Gorgon is a three-train LNG and domestic gas facility on Barrow Island, about 60 kilometres off the northwest coast of Western Australia. That description masks the sheer size and complexity of the largest single-resource project in Australia's history and one of the biggest natural gas developments in the world.

Chevron started producing LNG and condensate at the Gorgon Project in early March. The first shipment of LNG from the Gorgon Project departed Barrow Island on 21 March 2016. The first cargo was transported by the *Asia Excellence* LNG vessel to one of Chevron Australia's foundation buyers, Chubu Electric Power, for delivery into Japan.

The Gorgon Project is supplied from the Gorgon and Jansz-Io gasfields, located within the Greater Gorgon area, between 130 km and 220 km off the northwest coast of Western Australia. It includes a 15.6 Mt/a LNG plant, a carbon dioxide injection project and a domestic gas plant with the capacity to supply 300 terajoules of gas per day to Western Australia.

Gorgon has made a significant contribution to the Australian economy during its construction

and will continue to do so during its 40-plus years of operations.

Since construction activities commenced in December 2009, the project has spent more than \$34 billion dollars on Australian goods and services, created opportunities for hundreds of local companies and more than 10,000 jobs across the country.

### **Wheatstone Project Update**

The Wheatstone drilling campaign is complete, with all nine development well flowbacks successful. Hook-up and commissioning activities are progressing on the Wheatstone platform. All Train 1 modules are on site, with structural, mechanical and piping works continuing. Delivery of Wheatstone LNG Train 2 modules continue, with 21 of 24 modules now on site. The LNG storage tanks are nearing completion with hydrotesting activities complete.



Satellite image of the Gorgon LNG Plant on Barrow Island



Photo © Chevron

Wheatstone LNG train 1 modules all on site



**Aerial view of the Wheatstone Project LNG Plant at Ashburton North**

The Wheatstone Project includes an onshore facility located at Ashburton North Strategic Industrial Area (ANSIA), 12 kilometres west of Onslow in Western Australia's Pilbara region. The foundation project includes two LNG trains with a combined capacity of 8.9 million tonnes per annum (MTPA) and a domestic gas plant.

Eighty per cent of the Wheatstone Project's foundation capacity will be fed with natural gas from the Wheatstone and Iago fields, which are operated by Chevron Australia in joint venture with Australian subsidiaries of Kuwait Foreign Petroleum Exploration Company (KUFPEC) and Kyushu Electric Power Company, together with PE Wheatstone Pty Ltd (part owned by TEPCO).

The remaining 20 per cent of gas will be supplied from the Julimar and Brunello fields held by Australian subsidiaries of Woodside Petroleum Limited and Kuwait Foreign Petroleum Exploration Company (KUFPEC).

The Wheatstone Project is a joint venture between Australian subsidiaries of Chevron (64.14 per cent), Kuwait Foreign Petroleum Exploration Company (KUFPEC) (13.4 per cent), Woodside Petroleum Limited (13 per cent), and Kyushu Electric Power Company (1.46 per cent), together with PE Wheatstone Pty Ltd, part owned by TEPCO (8 per cent).

### **Decommissioning**

One area that might be described as ever increasing is that of decommissioning. A number of wells on land were decommissioned in the Canning Basin in 2015, including Olympic 1, Theia 1, Senagi 1 and Victory 1. Mondarra 1 in the Perth Basin was decommissioned in January 2016.

The focus now is moving to offshore fields where not only wells at the end of their life need to be decommissioned but also the attached structures and facilities. Between January and July, the following wells were plugged and decommissioned by Quadrant Energy: Harriet C 1, 2, 3 and 4, Gypsy 2H and 4, and Chervil 5 and 6.

### **Regulatory Compliance**

The end of the transition period in the Resource Management and Administration Regulations 2015 (RMAR 2015) on 30 June 2016 has been a significant milestone for the Resources Branch in Petroleum Division.

It is a requirement of the RMAR 2015 that well management plans (WMPs) to cover all non-decommissioned wells be submitted by the end of the transition period. That this has been achieved with only four exceptions is a testament to the effort that has gone into giving guidance to industry by DMP staff and a testament to the effort made by industry to comply with the new regulations.

Similarly, field management plans (FMPs) are required to be submitted for fields in production licence areas. The result here has not been as successful, with some companies still requiring guidance. Online lodgement of FMPs is now available through the Petroleum and Geothermal Register (PGR) online portal. It is anticipated that online submission of revisions to WMPs will become available shortly.

# State areas released for petroleum exploration September 2016

**Richard Bruce**  
Exploration Geologist  
Petroleum Division

The Department of Mines and Petroleum (DMP) continues to provide access to the petroleum potential of Western Australia's vast sedimentary basins using a specific area release system. On 13 September 2016 DMP will gazette a total of fourteen onshore areas or blocks (Fig. 1). This release comprises six blocks in the Canning Basin and eight blocks in the Officer Basin.

## Release information

This information includes prospectivity of release areas and of relevant basins, available data listings, new bid assessment guidelines, land access and environment considerations, schedule of fees and how to make a valid application for an Exploration Permit.

Release information will be available on USBs for distribution at events and meetings. The most current information will be available on the Department's website: [www.dmp.wa.gov.au/acreage\\_release](http://www.dmp.wa.gov.au/acreage_release)

Work program bids for the release areas close 4 pm Australian Western Standard Time on Thursday 9 March 2017. As applications can now only be made online, it is recommended to register at least two business days before bids close.

[www.dmp.wa.gov.au/pgp](http://www.dmp.wa.gov.au/pgp)

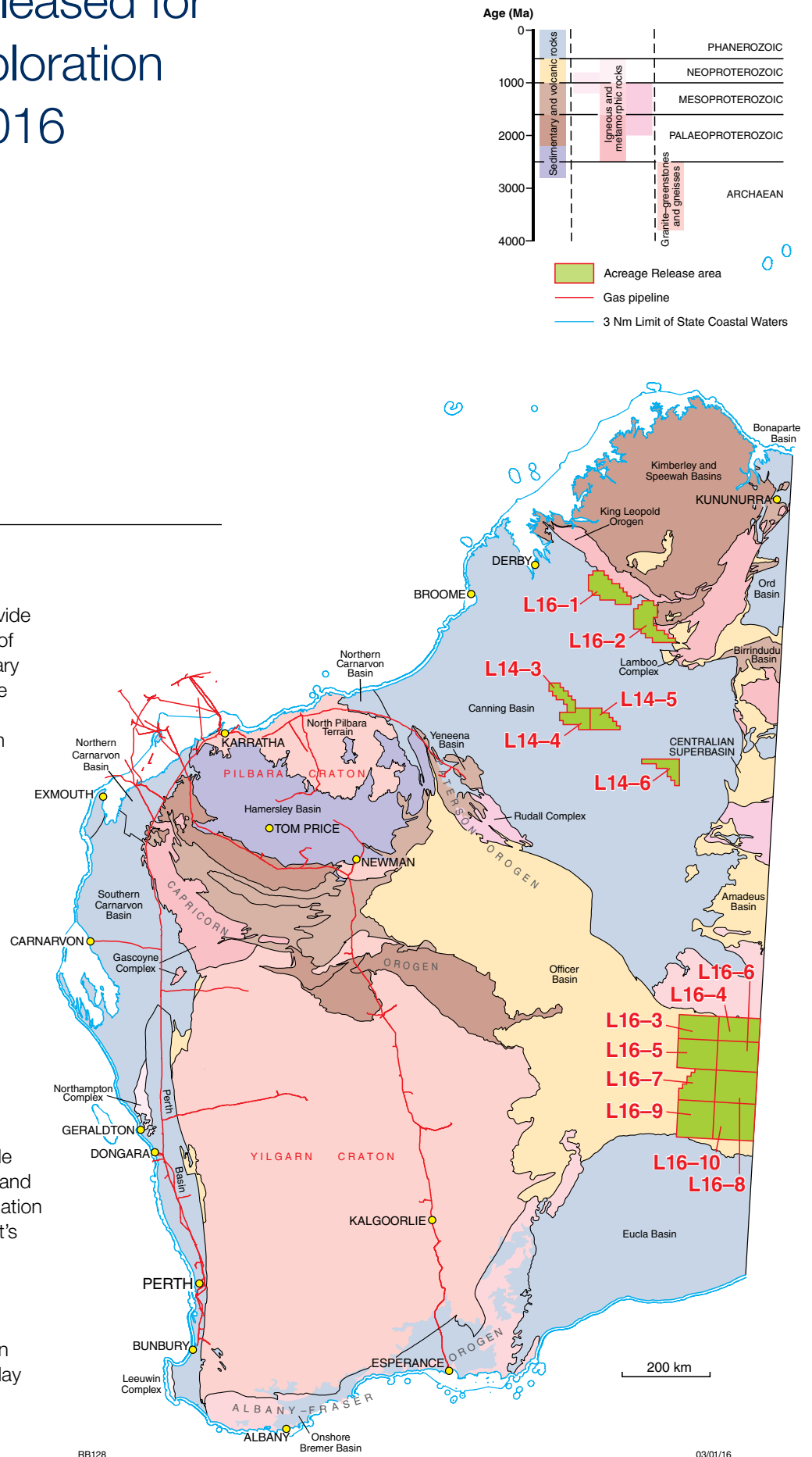


Figure 1. September 2016 State petroleum release areas



## Canning Basin

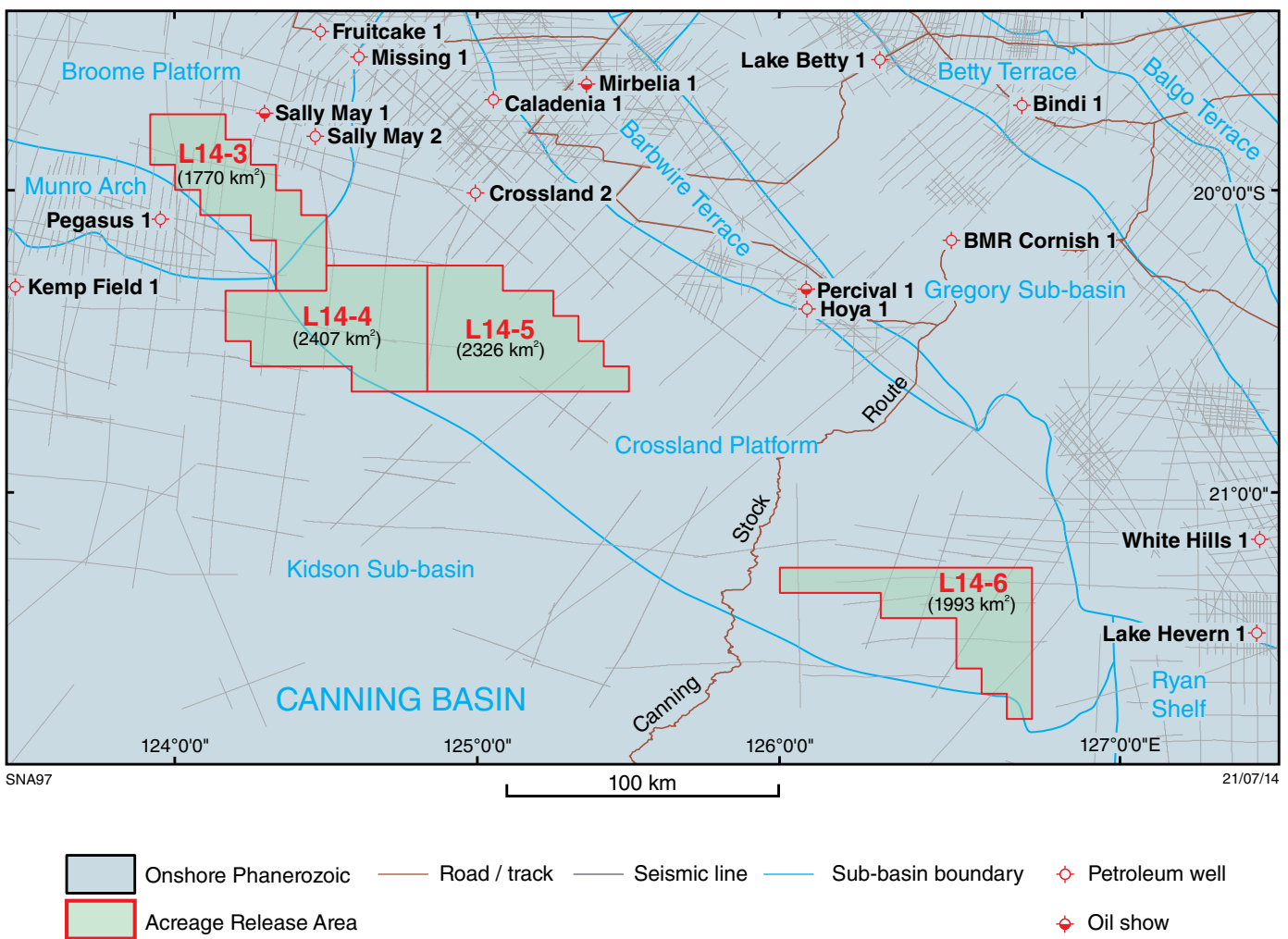
Interest in the Canning Basin has revived significantly in recent years, with new play oil discoveries at Ungani 1 and Ungani Far West 1, and large estimates for shale gas. Canning Basin oil may be trucked to ports in the north of the State for shipment to refineries in southeast Asia or trucked to the Kwinana oil refinery in the south of the State.

There are two release areas on the Lennard Shelf and four release areas in platform areas (Broome and Crossland Platforms), with one area partly in the Kidson Sub-basin. Area size ranges from 1769 km<sup>2</sup> to 4392 km<sup>2</sup>.

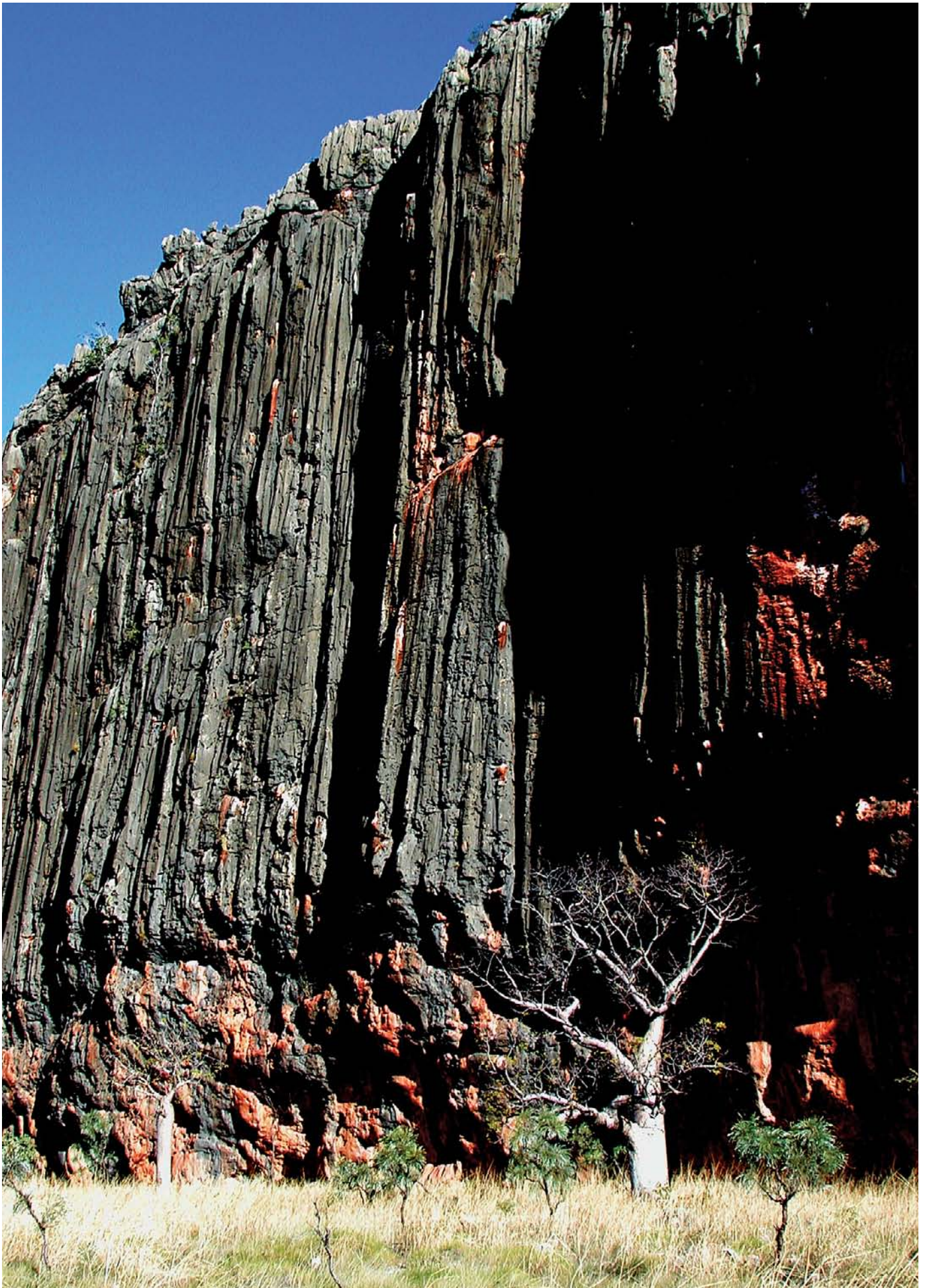
The platform release areas (L14-3 to L14-6) (Fig. 2) became available for gazettal by statutory relinquishment at the end of permit terms from Buru Energy Exploration Permits. These release areas may be prospective for multiple sub-salt Ordovician plays. Such plays include Nita Formation dolomitic or fractured carbonates, Upper Willara Formation cavernous carbonates, Acacia Sandstone Member and Nambeet Formation sandstones. Mature source intervals may either intergrade with or lie adjacent to reservoirs, and thick salt or shale layers are less likely to leak or be damaged by faults and fractures. Minimal post-Devonian

movement has taken place to damage seals. Structural traps may include anticlines, fault blocks and salt-related traps. Stratigraphic traps may include facies or thickness variation and unconformity-related traps. Hydrocarbon shows in Sally May 1 and 2 may indicate that oil and gas has migrated into the release areas.

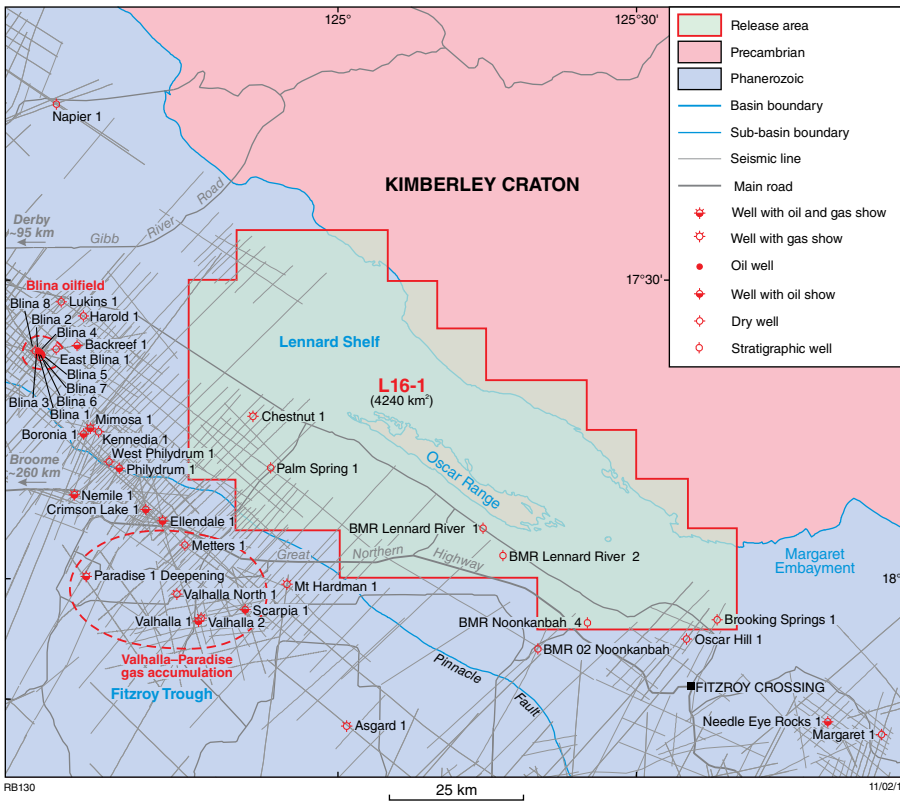
The central Canning Basin is covered by a uniform grid of aeromagnetic and ground gravity data, available for download from the Australian geoscience portal [www.geoscience.gov.au](http://www.geoscience.gov.au). Data processing and modelling may prove useful for planning infill seismic lines.



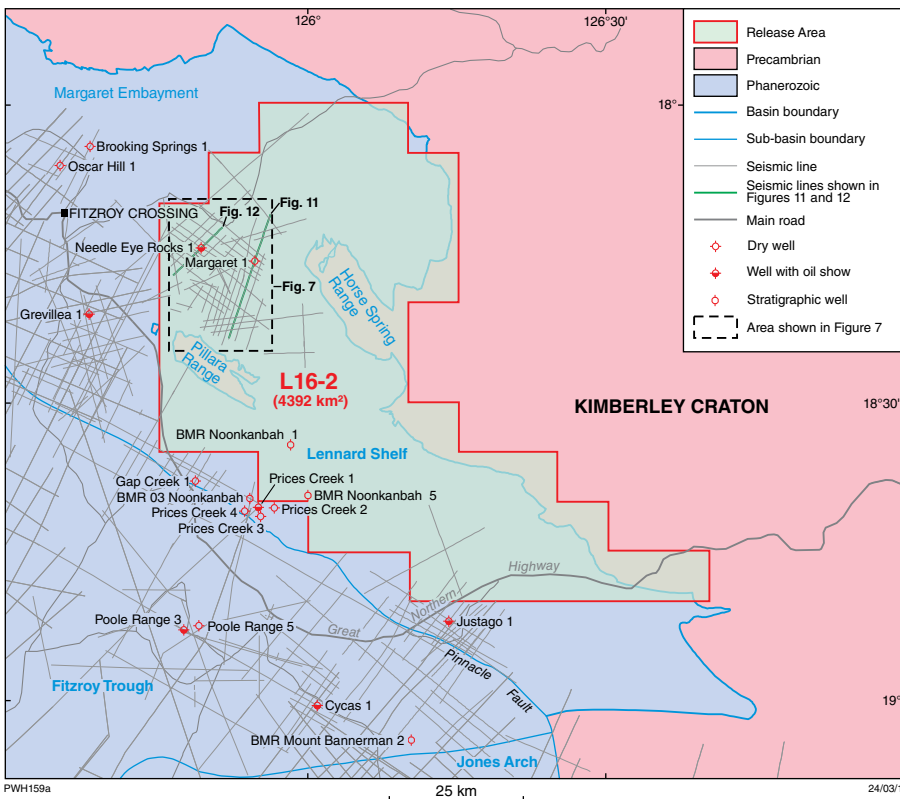
**Figure 2.** Location of release areas L14-3 to L14-6 in the Canning Basin



Upper reefal-slope strata are exposed in the Morown Cliff in the Oscar Range, Canning Basin



**Figure 3.** Location of release area L16-1 on the Lennard Shelf, Canning Basin



**Figure 4.** Location of release area L16-2 on the Lennard Shelf, Canning Basin

Release areas L16-1 and L16-2 (Figs 3 and 4) are situated on the Lennard Shelf. The areas are traversed by the sealed Great Northern Highway and lie close to production facilities of the Blina oilfield.

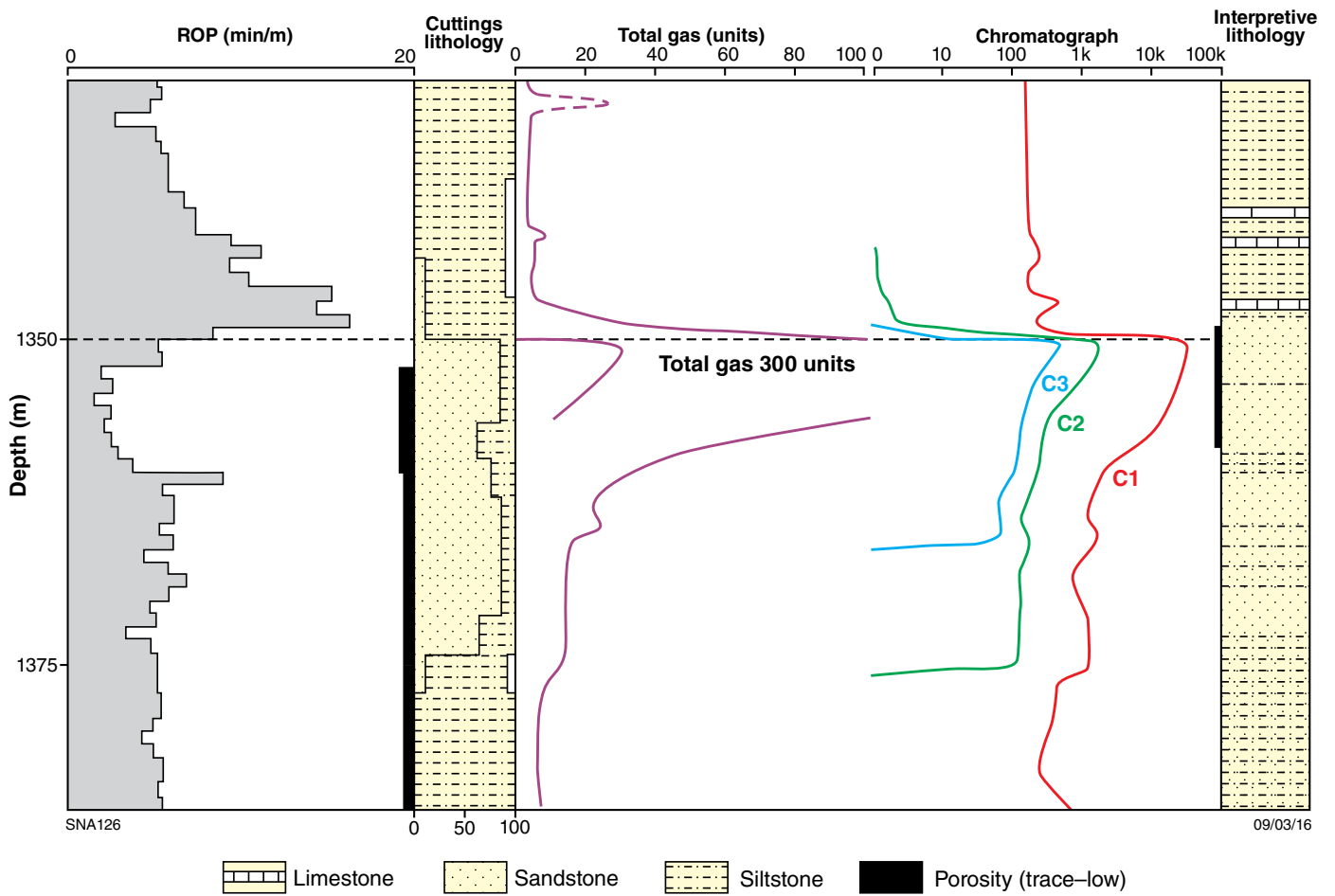
Lennard Shelf fields have had commercial oil production from Devonian carbonates and Permian-Carboniferous sandstones. A gas show was encountered in the Chestnut 1 well in release area L16-1 (Fig. 5).

The prospectivity of the Carboniferous Laurel shale play is considered to be high in L16-1, which is adjacent to the Valhalla-Paradise gas accumulation. The Devonian Gogo and Virgin Hills Formations in inter-reefal channels and fault troughs may be another shale and/or tight gas play within both release areas.

Conventional plays include basinal fan systems and turbidites of the Devonian reef complexes, and associated platform facies. Platform facies may offer the best potential traps. Both structural and stratigraphic traps are expected in platform facies due to horizontal and vertical permeability barriers, faulting and erosional sequence boundaries. Pillara and Nullara reefs and platforms are fairly well imaged in L16-2.

Stratigraphic traps are likely in back-reef subfacies, such as lagoonal and intertidal sequences. Stratigraphic traps are also expected in interfingering, mixed clastics and carbonates on marginal-slopes and basin floors, including fan systems and turbiditic sequences.

Release areas L16-1 and L16-2 are partially covered by fair- to good-quality seismic data and have well control. Potential field data and numerous mineral exploration drillhole data are also available.



**Figure 5.** Section of mudlog from Chestnut 1 in release area L16-1, showing gas show in sandstone of the Lower Carboniferous Fairfield Group

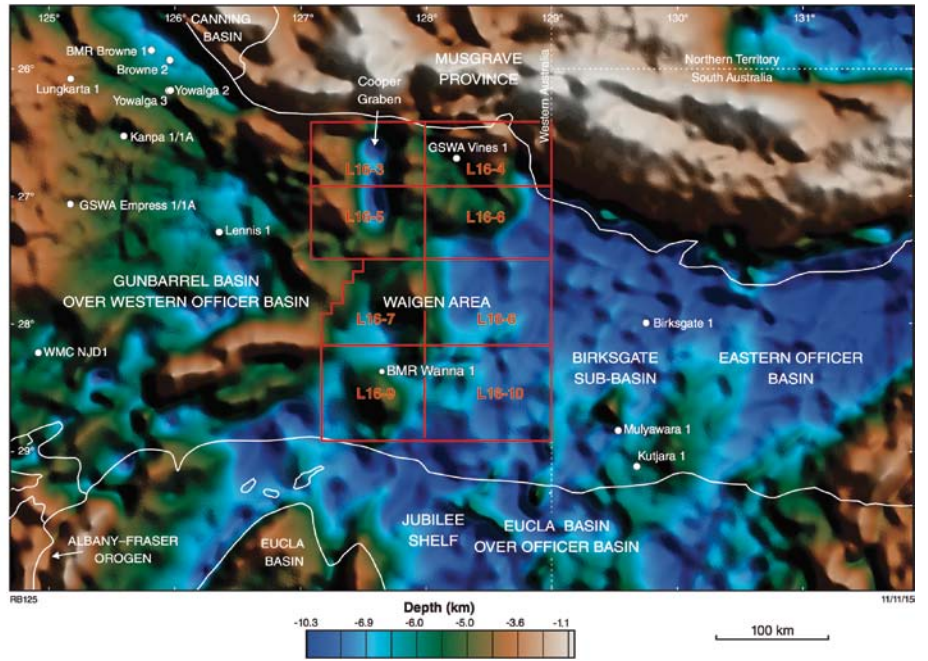


Paleokarst in a Devonian reef complex limestone, Lennard Shelf, Canning Basin

## Officer Basin

The Officer Basin resembles Neoproterozoic successions in Oman and Russia that contain giant oil- and gasfields. Numerous oil shows have been encountered in Western Australian and South Australian mineral, petroleum and stratigraphic drillholes. Gas shows have also been encountered (for example, Vines 1 in L16-4 and Birksgate 1 to the east of the release areas). It appears that all the elements of a petroleum system are present in the basin. Good source beds and proven reservoirs capped by thick sections of salt or shale have been intersected. There may be sub-salt and unconventional hydrocarbons present.

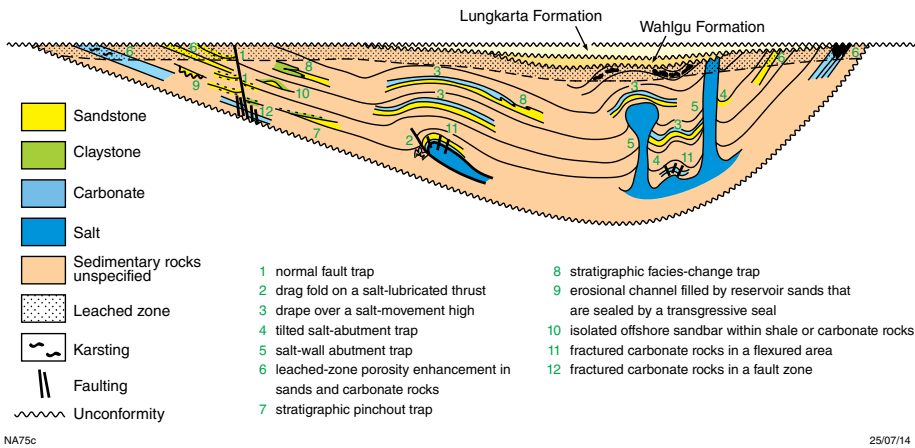
There are eight large release areas (L16-3 to L16-10) (Fig. 6) in the central Officer Basin adjacent to the South Australian border. These release areas range in size from 5054 km<sup>2</sup> to 8129 km<sup>2</sup>. These are frontier areas but there were indications of petroleum migration in Vines 1.



**Figure 6.** Location of release areas L16-3 to L16-10 in the central Officer Basin



Townsend Quartzite, view south across the Waigen area, Officer Basin

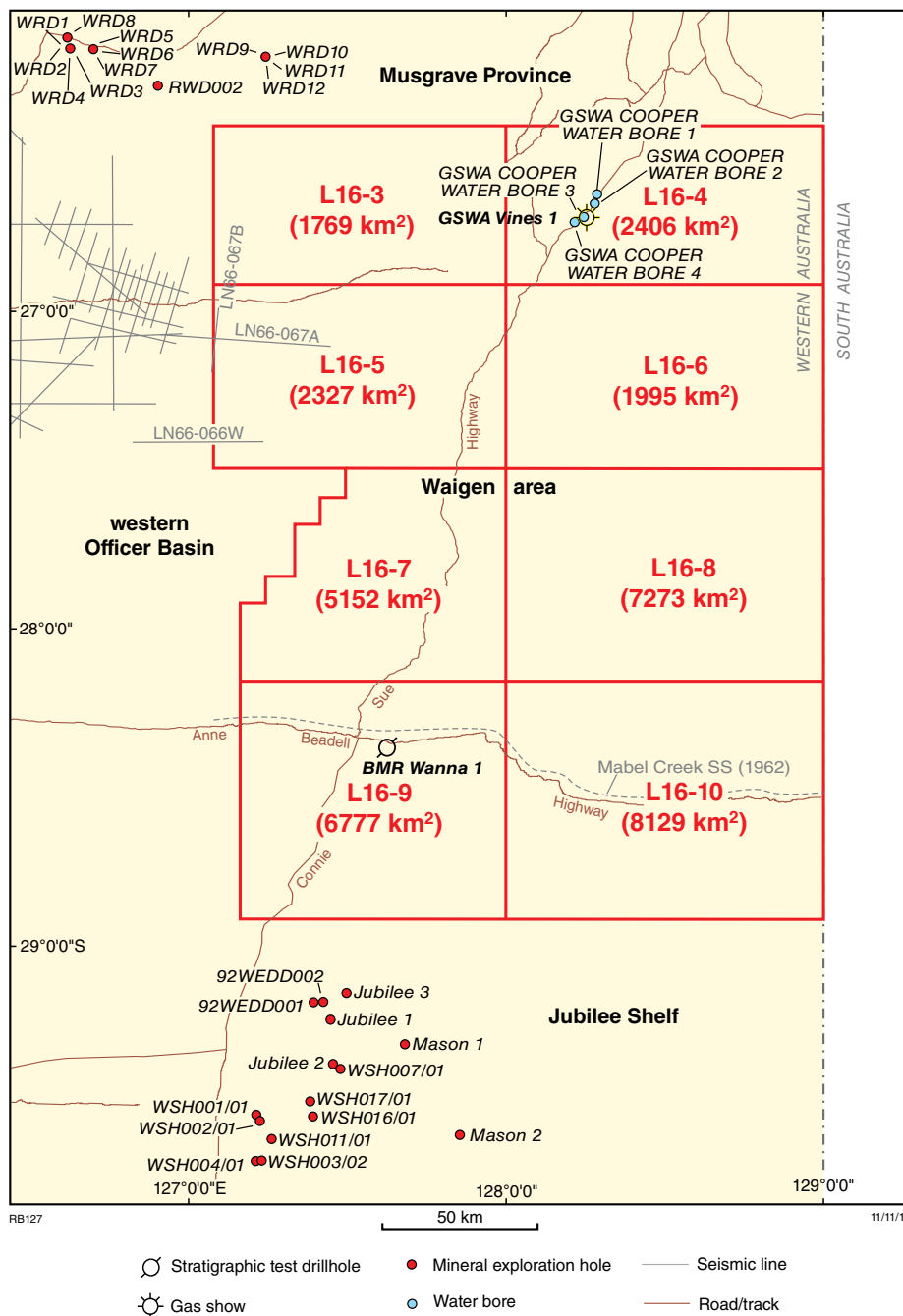


**Figure 7.** Hydrocarbon plays in a schematic SW-NE section through the western Officer Basin

As salt-tectonics have deeply and more widely affected the northern portion of the western Officer Basin, in addition to structural and stratigraphic traps, there is a possibility of salt-related plays (Fig. 7), particularly in the northern release areas (L16-3 to L16-6). If salt has been remobilised during younger tectonic events, secondary migration to shallower traps may have taken place.

In the southern release areas (L16-7 to L16-10), Mabel Creek seismic data indicates that broad, gentle folds are present. Gravity data also indicate that basement highs are present. The basement highs may have been draped, possibly with four-way closure (Fig. 8).

The unsealed Connie Sue and Ann Beadell Highways provide access to the area. Side roads and tracks extend into the release areas. The Trans-Australian Railway passes about 200 km to the south. The Goldfields Natural Gas Transmission Pipeline lies about 300 km west of the basin.



**Figure 8.** Map of modeled depth to basement, interpreted from gravity data, showing Officer Basin release areas L16-3 to L16-10

# Eastern Goldfields Gas Pipeline – a DMP Lead Agency project

## Walter Law

Manager Petroleum Facilities  
Petroleum Division



Aerial view of the newly constructed Eastern Goldfields Gas Pipeline

The determination by AngloGold Ashanti Australia (AGA) to replace diesel and LNG with piped natural gas as its main source of energy for on-site power generation at its Tropicana Gold Mine and Sunrise Dam Gold Mine has resulted in a reduction in its power generation operating costs, lowering of its environmental emissions from the power stations, a large reduction in the number of road train loads of diesel delivered to each mine site and enhanced security of gas supply and price for the long term.

Industry collaboration and a commercial agreement between AGA and APA Group (APA), wherein AGA is the foundation customer of the gas pipeline, has enabled APA to initiate and complete the design, construction, commission and operation of the Eastern Goldfields Gas Pipeline. Delivery of first gas to Tropicana Gold Mine power station occurred in late December 2015, following the completion of the pipeline and its associated facilities one month ahead of the pipeline project schedule of 12 months.

DMP took on the Lead Agency role for the Eastern Goldfields Gas Pipeline project as it recognised the complexities in securing approvals on land access and tenure, on-ground environmental challenges, limited established infrastructure and

scarce water supplies on a pipeline project stretching over a distance of 293 km in remote areas southeast of Laverton.

It was not all smooth sailing. There were challenges along the way with some bottlenecks in approvals in key stakeholder agencies, cultural heritage negotiations, communication issues and some very tight timelines (measured in days and hours) for several key approvals. Where problems were identified DMP staff found solutions to overcome these, allowing the project to begin on time, which gave the construction contractor the best possible start.

The dry weather conditions during most of the construction phase, particularly during the trenching and pipe laydown process, also contributed to APA's construction contractors achieving an average of 5 km of pipe laid per day.

The operation of the Eastern Goldfields Gas Pipeline will provide lower power generating costs to existing mine sites, has diversified energy supply in the region and will bolster the development of new mining projects in one of the State's most promising minerals resources regions.

This high pressure gas pipeline opens up gas use opportunities for

other potential projects in the area (Fig. 1) including:

- The **Granny Smith Gold Mine** operated by Gold Fields about 20 km south of Laverton, near Mount Weld, is very close to the pipeline and has a resource of 17.4 million tonnes of ore.
- The **Mt Morgans** project operated by Dacian Gold Ltd about 20 km west of Laverton has a resource of 47 million tonnes of ore and its Jupiter and Westralia deposits are in close proximity to the pipeline.
- Saracen Mineral Holdings Limited's **Red October gold** project has a resource of 10 million tonnes of ore, is about 15 km south of Sunrise Dam and only 16 km from the pipeline.
- Gold Road Resources' **Gruyure/Yamarna North** project 150 km east of Laverton has a resource of 164 million tonnes of ore. The project is 137 km north of the closest point on the gas pipeline, but it may be economic to extend the pipeline to connect because it is such a large resource.
- Vimy Resources' **Mulga Rock** project 240 km east-northeast of Kalgoorlie is the second largest

uranium resource in WA with 59.7 million tonnes of ore that also contains Rare Earth Elements (REE). It is 83 km south of the nearest point on the gas pipeline.

- Lynas Corporation's **Mt Weld** REE mine about 20 km south of Laverton operation is one of the richest major REE deposits in the world and is 21 km north of the pipeline.

The Eastern Goldfields Gas Pipeline is a major milestone infrastructure for the region and now extends the Goldfields Gas Pipeline System to almost 1800 km.

The pipeline may also provide an opportunity to a third party to build a small LNG production facility at or near a mine site to enable LNG to replace diesel as the fuel for onsite heavy haul trucks and other mobile mining equipment.

### Pipeline Key Facts

Pipeline Licence number: PL 108 (granted on 29 January 2015)

Constructed length: 293.2 km

Pipe outside diameter: 219.1 mm (DN200)

Maximum design capacity: 35 TJ/d

Design pressure: 10.2 MPa

Design life: 40 years

Pipe steel specification and grade: API 5L PSL2 X42

Supplied pipe lengths: 18 m each

Number of pipe lengths: 16,700

Total construction hours without an LTI: 400,000 man hours\*

\*Includes the construction of the above ground pipeline facilities

### Project Key Industry Stakeholders

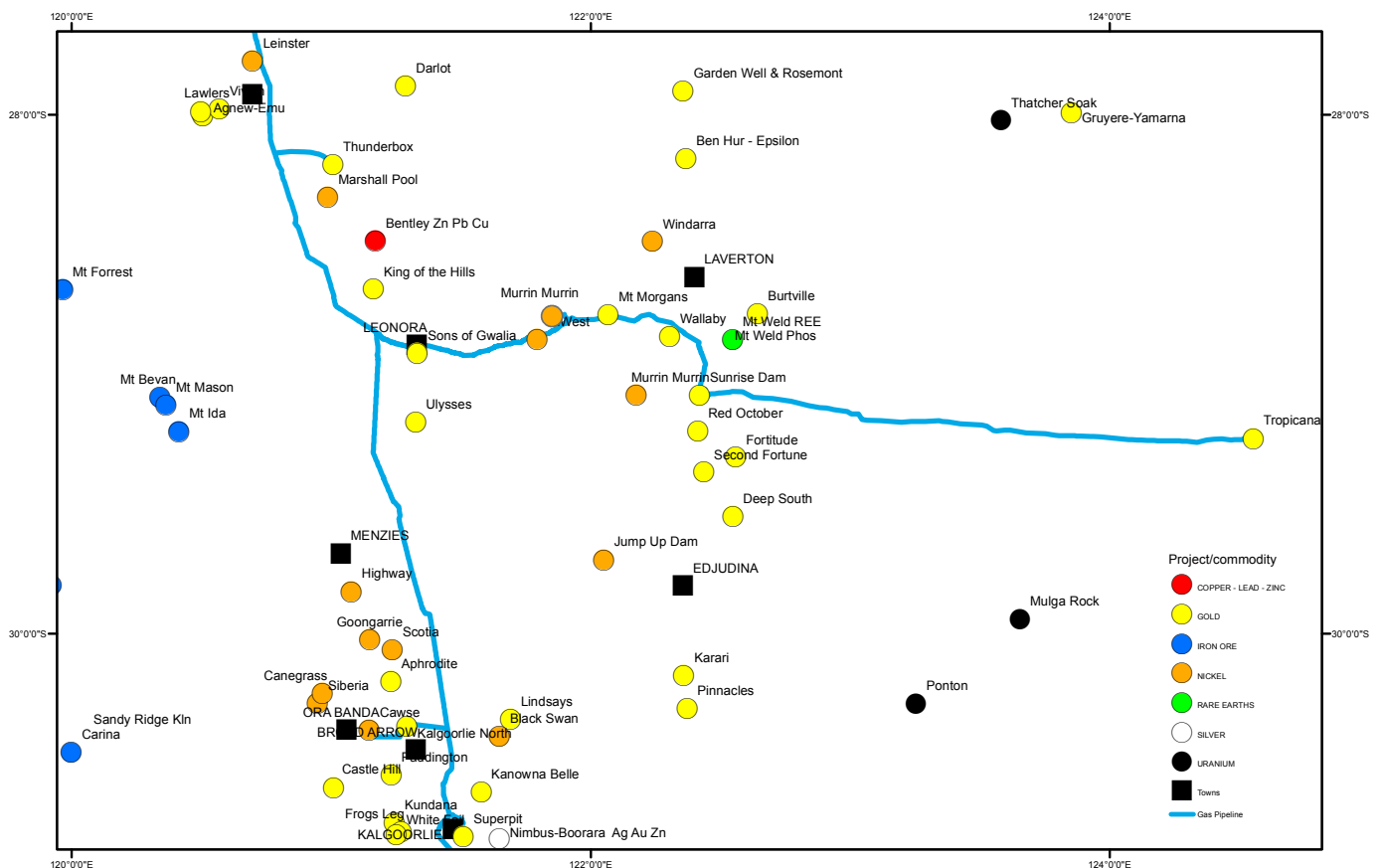
AGA – Gas pipeline foundation customer and registered holder of the

Miscellaneous Licences (granted under the *Mining Act 1978*) for the pipeline authorised route.

APA Group – Pipeline owner, operator and licensee of PL 108.

Spiecapag Lucas (SCL) – Main contractor for construction, installation and testing of the pipeline. SCL employed 480 personnel throughout the project and there were no loss time injuries.

CNC Project Management (CNC) was engaged by SCL during the construction phase to provide on-ground environment management. SCL applied its "front foot package" program to minimise environmental risks during the construction phase and to ensure improved environmental outcomes were achieved. SCL was awarded the APGA 2015 Environment Award for its successful implementation of that program to achieve effective and positive outcomes.



**Figure 1.** Diagram showing the high pressure gas pipelines (shown in blue) and the mining projects and towns in the vicinity of the pipeline



# APA background for Eastern Goldfields Pipeline

**Daniel Wallace**  
EGP Project Manager  
APA Group



Pipe laying for the Eastern Goldfields Pipeline

In July 2014, APA Group (APA) entered into two long-term gas transportation agreements with AngloGold Ashanti Australia Limited (AngloGold) for the transportation of gas from Yarraloola in the northwest of Western Australia to AngloGold's Sunrise Dam and Tropicana gold mining operations in the Eastern Goldfields region.

The agreements underpinned the construction of the new the Eastern Goldfields Pipeline (EGP) to connect AngloGold's mines to APA's existing pipelines – the Goldfields Gas Pipeline and the Murrin Murrin Lateral. The new 293-kilometre, 8-inch (219-millimetre) buried carbon steel pipeline now extends the Goldfields gas system network to almost 1800 kilometres.

The EGP provides access to a continuous supply of natural gas for

local power generation – reducing reliance on diesel fuel and LNG transported by road.

A lot of detailed study went into finding the best route for the pipeline, to minimise disturbance to existing landholders and the environment. Helicopter and land surveys were used to refine the best option and baseline surveys done to determine the preferred pipeline alignment.

The EGP approvals process was managed as part of the DMP Lead Agency framework. Right from the start, APA was connected with a contact from each of the necessary WA government departments for the essential approvals needed for the construction and operation of the pipeline. APA was also provided a

single point of contact – a project coordinator – during the coordinating of approvals. This was of great benefit to APA. When there was a potential hold-up we could simply contact our coordinator and seek advice.

Construction went well and the pipeline and facilities were delivered early. Most importantly, the pipeline was delivered safely. Despite handling 16,700 18-metre lengths of line pipe, expending around 400,000 construction man-hours and driving a collective 1.5 million kilometres, no lost-time injuries were recorded. Everyone was able to return home safely to their loved ones. All of the parties, both onsite and offsite, worked together with the key goal of safety, making the project a great success.



Trench construction and welded pipe



Laying of pipe in the trench

# Online transactions update

DIGITAL  
**DMP** together we

**Click**

**Mark Gabrielson and Hayden Samuels**  
Strategic Business Development  
Petroleum Division

The Department of Mines and Petroleum (DMP) committed to establishing a paperless office at its July 2014 Corporate Executive meeting. This decision was underpinned by the need to increase integration between business processes across divisions to develop efficiencies; improve information accuracy and business intelligence; and enhance stakeholder experiences when transacting with the department. The timeframe for completion of this initiative was targeted at July 2016.

Petroleum Division (PD) has embraced the need to bring their business online and as at 1 July 2016 deadline, established 93 per cent of their transactions online. As a result, significant improvements in processing timelines and reporting timeframes have been made, cutting red tape and

speeding up applications transactions, delivering a faster and more seamless customer experience.

The project also focused on reducing duplication, cutting the amount of documentation required in applications and adding online check points to facilitate filling out an application correctly to streamline approvals.

Other areas of the department have made steady progress with the online initiatives and currently 92 per cent of DMP's annual volumes of transactions are available online. DMP also provides around the clock access to payment and application lodgement systems, giving customers greater flexibility.

Transforming service delivery is now more relevant than ever and is helping staff better conduct their business.

It is an important part of the department's evolution and in conjunction with the department's newly launched website, has boosted stakeholder confidence in transacting online.

Petroleum and geothermal customers transitioning from paper to digital transactions using the Petroleum Geothermal Register (PGR) can now lodge applications and make payments online once they have registered for an online account. An email notification is sent once access to the online lodgement and/or online payments has been approved.

Customers requiring access to PGR for public information about petroleum titles will not need to register.

Along with online lodgement and submissions through PGR, an innovative process has been designed to allow customers to submit applications electronically where no online lodgement process exists. For all low volume transactions (Request for Search of Petroleum Title), 'DMP Submissions' offers a simple way for accepting these transactions digitally and with ease. DMP Submissions is available now and its usage is recommended.



# DID YOU KNOW?



Applications using DMP Submissions can be completed from any computer, tablet or smart phone with an internet connection, providing greater accessibility to customers. This will also be a consistent way for customers to submit applications electronically. A customer only needs to have an email to be able to submit, but registered users will have the added convenience of the submission being pre-populated with relevant personal information. The maximum file size will be limited to 160 MB.

PD forms are also now available to download through PGR. These forms are to be submitted using the PGR online lodgement facility as this is the department's approved and only method of receiving these application types.

Support is available for PGR online by calling +61 08 9222 3106 or emailing [servicedesk@dmp.wa.gov.au](mailto:servicedesk@dmp.wa.gov.au). For further information view the flyer on the DMP website at [http://www.dmp.wa.gov.au/Documents/DMP\\_submissions\\_flyer.pdf](http://www.dmp.wa.gov.au/Documents/DMP_submissions_flyer.pdf)

The future plans for PD is to leverage from the DMP's 'Integrated DMP' initiative, which will focus on reshaping business practices and implementing strategies that will

take full advantage of digital transformation currently underway. Post July 2016, the department's aim is to focus even more of our attention on our stakeholders and ensure a smooth and pleasant user experience each and every time they transact with us.

This has been achieved with the launch of DMP's new payment service, providing DMP customers with a quicker and easier way to pay a single invoice (e.g. petroleum fees).

The introduction of this new system means that customers no longer need to log into PGR to pay single invoices, streamlining the process.

Customers can now simply enter their payment reference number in the Payments QuickLink on the DMP website ([www.dmp.wa.gov.au](http://www.dmp.wa.gov.au)) when paying single invoices. Payments can be made using a credit card, with a maximum individual transaction limit of \$99,999.

The introduction of this new payment system doesn't stop customers from viewing invoices, paying multiple invoices, and communicating with DMP in the PGR system, it just provides a simpler method for paying invoices.

Initially the system will only apply to single title payments by credit card. However, multiple title payments will be available in the future.

For more information about using the new payment system please contact the DMP service desk by calling 9222 0777 or emailing [servicedesk@dmp.wa.gov.au](mailto:servicedesk@dmp.wa.gov.au).

Coming soon to PGR and as part of the Integrated DMP integration initiative, all online submissions for the Western Australian Petroleum and Geothermal Information Management System (WAPIMS) will be done through the PGR system, reducing the need for customers to switch between applications and providing a single Petroleum Portal for all transactions. The department will inform relevant industry sectors when systems that affect them are available online. Helpful tools, training, and dedicated staff will be provided to assist with the introduction of the new systems.

Your feedback is important to us and is crucial to ensuring that our systems are the best they can be. To provide feedback please visit [www.dmp.wa.gov.au](http://www.dmp.wa.gov.au).

# 'New look' WAPIMS

## Felicia Irimies

Manager Petroleum Exploration Information Resources Branch, Geological Survey Division



Acting Deputy Director General, Rick Rogerson (project sponsor) with Felicia Irimies (project business owner), looking at the new WAPIMS database

Western Australian Petroleum and Geothermal Information Management System (WAPIMS) is a petroleum exploration database managing the large volume of petroleum exploration and production data generated in Western Australia including data on titles, wells, geophysical surveys and other related exploration and production data. The system also contains data for the physical petroleum assets held in the Core Libraries in Perth and Kalgoorlie.

After a period of confidentiality under petroleum legislation, WAPIMS provides online access to all information resulting from petroleum exploration activities within Western Australia's State jurisdiction (onshore and State waters) together with Commonwealth area activities with the release date prior to 1 January 2012.

The WAPIMS system is a multi-component, standard operating environment that manages the Department of Mines and Petroleum (DMP's) petroleum and geothermal information including subsurface data, titles data, physical asset management and spatial data essential for the operations of the Geological Survey and Petroleum Division (PD) as well as providing open-file information to the public. It integrates with the Petroleum and Geothermal Register (PGR), PD's reservoir analysis applications, the DMP corporate spatial database (ArcSDE) as

well as the National Electronic Approval Tracking System (NEATS).

The WAPIMS system has five core interoperable components as follows:

1. The data entry component – forms to load metadata on wells, seismic and other petroleum data as well as manage the data release provisions of the *Petroleum and Geothermal Energy Resources Act 1967* and *Petroleum (Submerged Lands) Act 1982* and load digital reports submitted by industry.
2. The data loading component – which allows the system to upload seismic line and polygon locations and subsurface data submitted by the petroleum industry from their activities under Commonwealth and State legislation.
3. The spatial component – showing locations of wells, oil and gas fields, seismic and other relevant geographical data.
4. The physical asset component – which manages all physical data submitted to DMP including reports, CDs and DVDs, tapes, cores, cuttings, maps and seismic sections and other physical data.
5. The web delivery component – which supplies the data stored in the other components via the web to both internal and external clients.

WAPIMS has been designed to reduce data duplication and increase efficiency through the interoperability of its five components, and integration with other DMP applications.

In November 2014, the Information Services Branch of DMP (ISB) identified a number of problems with the original WAPIMS environment, and determined the existing software had to either be replaced or upgraded. One of the main drivers for change was compatibility issues with modern internet browsers and some internal and external customer dissatisfaction and frustration with the administration software and ease of use of the external website.

A business case was developed which explored the following possibilities:

- Upgrade the existing software to a new release of the software which was in the process of being developed by the service provider.
- Purchase an “off the shelf” product to replace the existing product.
- Develop a new solution “in house” using contractors and consultants.

The decision was made to develop a new application within DMP to replace the existing system. Major factors in the decision were:

- Removal of licensing restrictions and significant ongoing licensing cost. (A return on investment is expected within 2 years.)

- Expert local knowledge of the data within the existing database.
- Existing relationships with the business users and knowledge of governance and compliance requirements within ISB.
- A proven track record of success in developing and implementing a similar project by the same core development team within the Geological Survey.
- A move from Oracle to a SQL server environment which can be fully supported in-house.

The project brief was to develop a new system replicating the existing functionality and to migrate the existing data from Oracle into a new SQL environment.

The redevelopment was done in two stages:

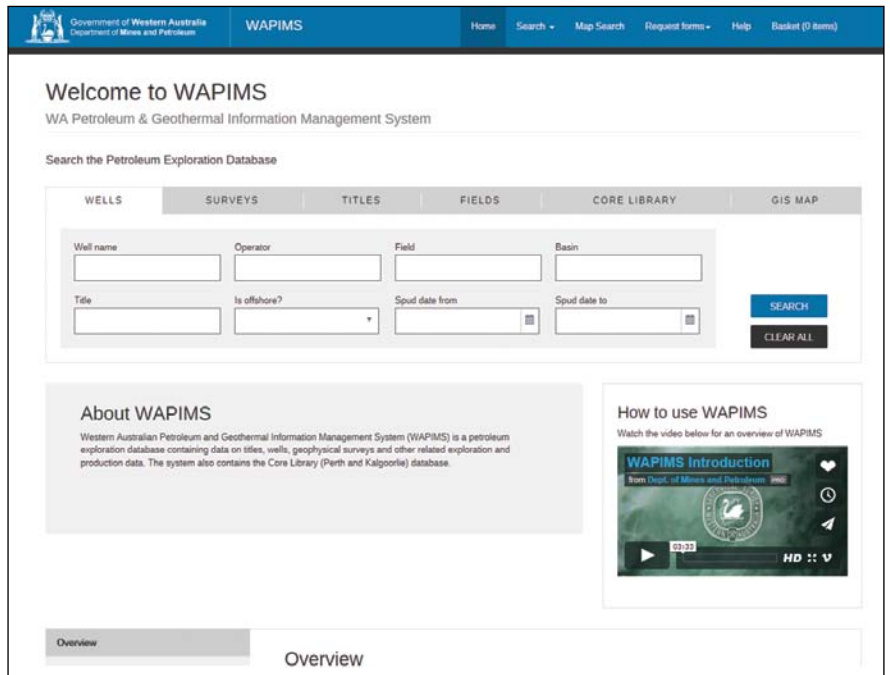
- Stage 1: replace Decision Point (web delivery application) – this went live in September 2015.
- Stage 2: develop internal forms and database tables – replacing eSearch and ProSource interfaces and Seabed database and data migration – this went live on 23 June 2016.

Both phases of the project were delivered on time and below budget. Additional functionality was introduced that was not originally part of the planned scope which has improved functionality to the user.

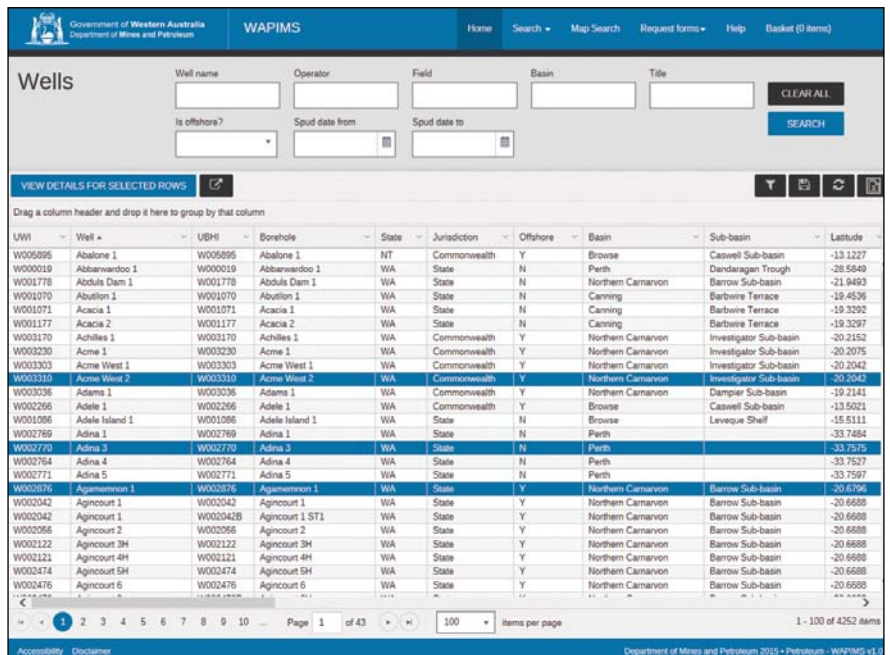
The final result was a new web and database solution as a replacement for the WAPIMS legacy system.

Key features and improvements in the new WAPIMS include:

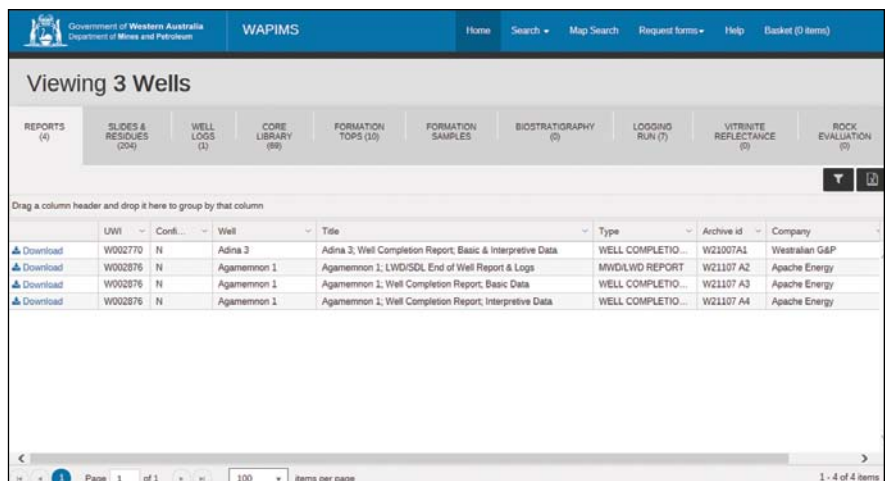
- A new website running on the latest .Net framework using MVC with a fresh new design. It has an easier to use search interface.
- The website is compatible across all five major browsers (IE 9+, Chrome, Firefox, Safari and Edge).
- New mapping tool uses HTML 5 means the map can be now viewed on all platforms including a tablet.
- An external website delivering data and files to users with no longer a requirement for registration to the system.



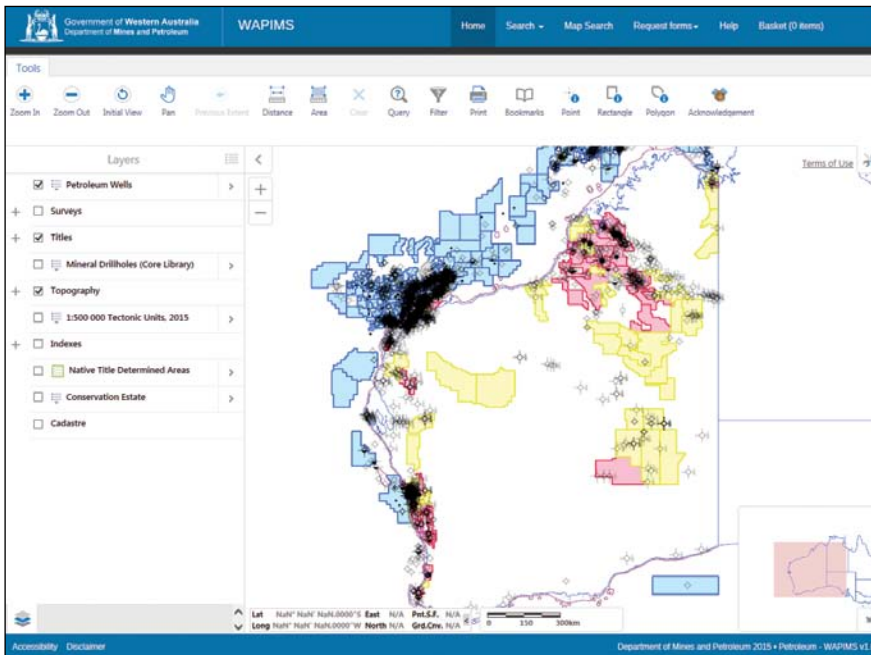
WAPIMS External website – Homepage



WAPIMS External website – Search results

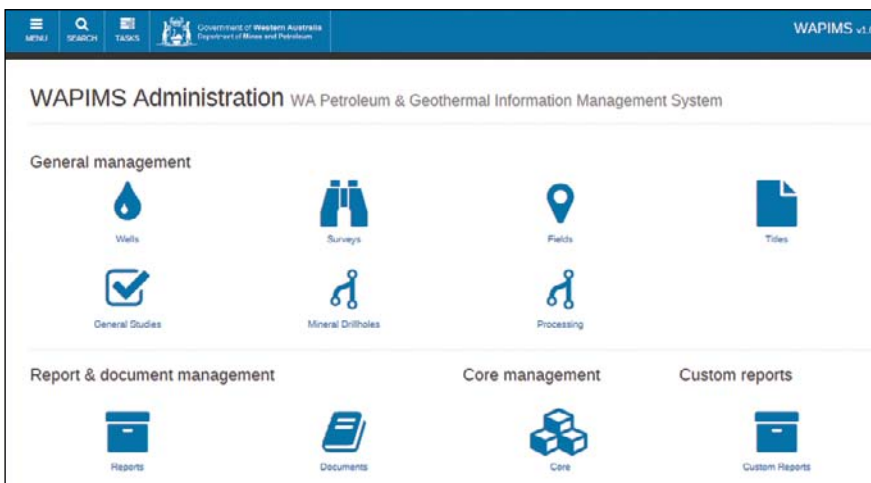


WAPIMS External website – Download metadata and reports



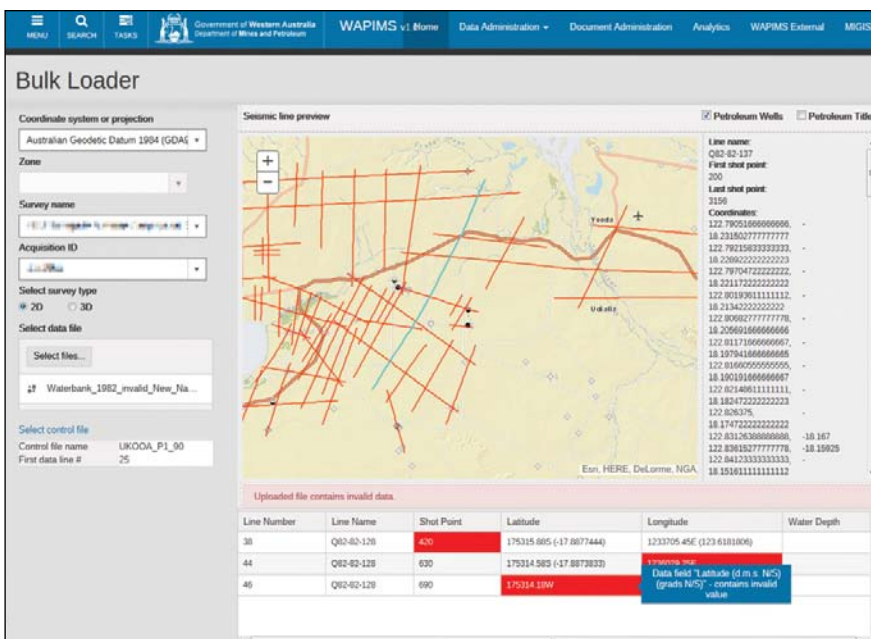
WAPIMS External website – Download metadata and reports

- The new website introduced a marked improvement in speed within the system. The same query that took up to 60 seconds to run on the legacy system now takes milliseconds to run.
- An easy to use internal administration website for adding and updating data within the application as well as a custom Document Management component.
- Specialist tools developed for data validation. The spatial bulk load tool allows 2D and 3D seismic line/area files to be validated in various different formats before loading into the system e.g. UKO, SHP files.
- Request forms and data lodgement for external users to submit their data electronically (in line with DMP’s “Digital DMP” initiative).



WAPIMS Internal website – Administration Dashboard

- A shopping basket for requesting files that are unavailable electronically.
- Core Library data has become available publicly for the first time. This allows users to see what core is being stored at the Perth and Kalgoorlie core libraries.
- A new fully relational database design running on a Microsoft SQL server.
- Introduction of a “no licence” model. Any user within DMP can have access to the system using Windows Authentication and an in built role based security within the system. There is no restriction on licences/users to the system.



WAPIMS Internal website – Bulk Load data validation tool

The feedback from customers and users has been overwhelmingly positive. The ease of use and speed of the system have been the biggest benefit that users have noted.

A significant reduction in cost is the largest tangible benefit the department has seen. The department has also been able to reduce the risk of failure now that the system aligns with internal ICT security and governance.

This new application has significantly improved the day to day work of internal users within the WAPIMS team. The new system is much faster and more user friendly.

Opposite are screenshots of the Internal and External application.

**External website:**  
<https://wapims.dmp.wa.gov.au/WAPIMS/>

# Cape Lambert Gas Pipeline

## Wal Terlecki

Area Manager Petroleum Pipelines – Iron Ore Projects  
Rio Tinto



Photos © Rio Tinto

Clearing along the construction right of way

In February 2016, Rio Tinto successfully completed the Cape Lambert Petroleum Pipeline and Station (CLPPL) project – PL 106 without any recordable injuries or environmental incidents.

The pipeline extension connects to the existing PL 8 Robe River gas pipeline to supply gas to a new power station under construction at Cape Lambert.

The CLPPL was designed and constructed, and PL 8 recommissioned by the KT-OSD Joint Venture, a joint venture between Monadelphous KT Pipelines and OSD Pipelines.

Various elements contributed to the project's complexity including:

- The consideration of numerous creek, rail and road crossings, with the longest section comprising a lengthy 395 metres of straight pipeline

- Telecommunications and belowground power
- Working under 132 and 220 kilo volts of overhead power lines
- Monitoring and testing for acid sulphate soils, along with the required treatment
- Construction of a delivery station to filter, heat and reduce the pressure of the gas supply
- Change of operator for PL 8 as a result of the commissioning of PL 106.

PL 8 recommenced operations on 4 February 2016 and PL 106 successfully transitioned from commissioning to operation on 29 February 2016, with APT Goldfields reappointed as operator for PL 8 and appointed for PL 106.

Mahesh Kalra, Project Manager Rio Tinto Growth and Technology said, "Not only was the project a success from a construction and commissioning perspective, but we also achieved a great safety and environmental outcome.

"The pipeline and station were successfully delivered without any recordable injuries or environmental incidents. This was a direct result of performing thorough risk assessments, completing in-depth environmental and safety documentation, and effective engagement and teamwork."

Rio Tinto acknowledges the contribution of KT-OSD Joint Venture, APA Group, OSD Pipelines, OSD Asset Services, Rio Tinto Iron Ore Core Services and the Department of Mine and Petroleum teams who were involved.



Photos © Rio Tinto

The delivery station at the Cape Lambert Power Station

# Successful completion of gas pipelines PL 8 and PL 106

**Walter Law**  
Manager Petroleum Facilities  
Petroleum Division



Lowering in the pipeline

Rio Tinto, on behalf of Robe River Mining Pty Ltd (Robe), managed the expansion of the iron ore stockpile area at Cape Lambert Port Facility.

This required the removal of a section of the existing gas pipeline (pipeline licence PL 8 – the Robe River Gas Pipeline, built in 1984) to allow construction of the new Cape Lambert gas fired power station located near Wickham.

The project required amendments to the Robe River State Agreement, a partial surrender of the pipeline licence PL 8 area for the section of the pipeline to be removed, and a variation to PL 8 for the new section of pipe to connect to the new pipeline (pipeline licence PL 106 – Cape Lambert Gas Pipeline).

The construction activities occurred over 46,500 hours with no Loss

Time Injuries. The construction works included removal of residual gas from some 50 km of the existing pipeline PL 8, cut and remove up to 7.9 km of the existing buried pipeline that transverse the stockpile expansion area, weld on a new section of pipe to PL 8 to connect to the newly constructed pipeline PL 106, and construction of a new gas delivery station at the new Cape Lambert Power Station.



False trench for the 188 m rail crossing



# Grant of titles

**Justin Donnelly**  
Senior Titles Officer  
Petroleum Division



**Farmland onshore Perth Basin**

## State Awards

From February 2016 to August 2016 the following titles were awarded in State areas.

### *Petroleum Exploration Permit*

Petroleum exploration permit EP 495 (released as L12-7) was granted to Black Rock Mining Limited on 15 May 2016 for a six year term from application STP-EPA-0090. EP 495 is made up of four graticular blocks within the Perth Basin with a total area of 297 km<sup>2</sup>.

EP 495's work program for the firm two year period includes 250 km<sup>2</sup> 3D seismic survey and one exploration well with an estimated expenditure of \$13,000,000. The early work program is intended demonstrate the presence of a commercial gas accumulation in the Ocean Hill area. The secondary period includes geotechnical studies and the drilling of two exploration wells with an estimated expenditure of \$16,200,000.

### *Petroleum Exploration Permit (Renewal)*

#### **EP 129**

The sixth renewal of petroleum exploration permit EP 129 was granted to Buru Energy Limited for a further five years effective 18 March 2016. EP 129 covers eight graticular blocks in the Canning Basin with a total area of 653 km<sup>2</sup>.

The work program for the firm two year period includes geological and geophysical studies and one exploration well with an estimated expenditure of \$3,300,000. The secondary period includes geological and geophysical studies, a 150 km 2D seismic survey and seismic interpretation with an estimated expenditure of \$2,150,000.

#### **EP 432**

The first renewal of petroleum exploration permit EP 432 was granted to Empire Oil Company (WA) Limited for a further five years effective 26 May 2016. EP 432 covers 16 graticular blocks in the Perth Basin with a total area of 1183 km<sup>2</sup>.

The work program for the firm two year period includes geological and geophysical studies and one exploration well with an estimated expenditure of \$4,200,000. The secondary period includes geological and geophysical studies, a 100 km 2D seismic survey and seismic interpretation with an estimated expenditure of \$1,400,000.

#### **EP 426**

The first renewal of petroleum exploration permit EP 426 was granted to Empire Oil Company (WA) Limited and Westranch Holdings Pty Ltd for a further five years effective from 21 June 2016. EP 426 covers

16 graticular blocks in the Perth Basin with a total area of 1197 km<sup>2</sup>.

The work program for the firm two year period includes geological and geophysical studies and a 100 km 2D seismic survey with an estimated expenditure of \$1,200,000. The secondary period includes seismic processing and interpretation, geological and geophysical studies and one exploration well with an estimated expenditure of \$2,400,000.

#### **EP 454**

The first renewal of petroleum exploration permit EP 454 was granted to Empire Oil Company (WA) Limited for a further five years effective 13 May 2016. EP 454 covers 13 graticular blocks in the Perth Basin with a total area of 965.6 km<sup>2</sup>.

The work program for the firm two year period includes geological and geophysical studies and a 50 km 2D seismic survey with an estimated expenditure of \$1,200,000. The secondary period includes seismic interpretation, geological and geophysical studies and one exploration well with an estimated expenditure of \$4,400,000.

#### **EP 307**

The sixth renewal of petroleum exploration permit EP 307 was granted to Quadrant Northwest Pty Ltd, Kufpec Australia Pty Ltd, and Harriet

(ONYX) Pty Ltd for a further five years effective 26 May 2016. EP 307 covers four graticular blocks in the Northern Carnarvon Basin with a total area of 320 km.

The work program for the firm two year period includes geotechnical studies with an estimated expenditure of \$2,000. The secondary period also includes geotechnical studies with an estimated expenditure of \$3,000.

### **Commonwealth Joint Authority Awards**

#### *Petroleum Exploration Permit*

Petroleum exploration permit WA-521-P (released as W15-5) located within the Roebuck Basin off the northwestern coast of Western Australia was granted to Carnarvon Petroleum Limited on 29 March 2016.

Petroleum exploration permit WA-522-P (released as W14-1) located within the Bonaparte Basin off the northern coast of Western Australia was granted to Woodside Energy Ltd on 4 April 2016.

Petroleum exploration permit WA-523-P (released as W15-2) located within the Bonaparte Basin off the northern coast of Western Australia was granted to Carnarvon Petroleum Limited on 27 May 2016.

#### *Retention Lease*

Petroleum retention lease WA-70-R (WA-390-P) located within the Carnarvon Basin off the northwestern coast of Western Australia was granted to Hess Exploration Australia Pty Limited over the Equus gasfield on 30 March 2016.

Petroleum retention lease WA-71-R (WA-335-P) located within the Carnarvon Basin off the northwestern coast of Western Australia was granted to BHP Billiton Petroleum (North West Shelf) Pty Ltd, Kufpec (Perth) Pty Ltd and Quadrant Northwest Pty Ltd over the Bunyip gasfield on 11 April 2016.

Petroleum retention lease WA-72-R (WA-331-P) located within the Carnarvon Basin off the northwestern coast of Western Australia was granted

to BHP Billiton Petroleum (North West Shelf) Pty Ltd, Quadrant Northwest Pty Ltd and Tap (SCB) Pty Ltd over the Tallaganda gasfield on 11 April 2016.

Petroleum retention lease WA-73-R (WA-374-P) located within the Carnarvon Basin off the northwestern coast of Western Australia was granted to Chevron Australia (WA-374-P) Pty Ltd, Shell Australia Pty Ltd and Mobil Australia Resources Company Pty Limited over the Achilles/Satyr gasfield on 25 July 2016.

#### *Petroleum Production Licence*

Petroleum production licence WA-59-L was granted to Woodside Energy Ltd and Mitsui E & P Australia Pty Ltd on 10 June 2016. WA-59-L contains the Laverda oilfield within the Carnarvon Basin off the northwestern coast of Western Australia.



Permian Poole Sandstone exposed in the gentle Poole Range anticline, Fitzroy Trough, Canning Basin

# South West Hub – Data Collection and Modelling leads to optimism for Carbon Storage

**Dominique Van Gent**  
Coordinator Carbon Strategy  
Strategic Policy



Geological Survey's Senior Geologist Sarah Martin compares core against logging data

Carbon Capture and Storage (CCS) involves capturing carbon dioxide (CO<sub>2</sub>) that would otherwise be emitted to the atmosphere, and injecting into deep geological formations to maintain energy security whilst reducing the carbon footprint of Australia's energy sources. CCS is the only technology available to make deep cuts in greenhouse gas emissions while still using the fossil fuels that power much of today's industry and energy infrastructure. At a State level, the Western Australian (WA) Greenhouse Strategy incorporates CCS and is helping to address the need for a long-term commitment to climate change and cleaner energy.

The WA Department of Mines and Petroleum (DMP) started investigating the Lesueur site in the Harvey and Waroona Shires in 2007. This site is adjacent to large CO<sub>2</sub> emission sources (the industrial centres of Kwinana and Collie in the South West of Western Australia). The South West Hub (SW Hub) project concept was developed in 2010 with the support of local industrial partners. The project was designated an "Australian Flagship" project in 2011 and has received substantial funding and support from the Federal Government, the WA State Government and industry.

The challenge for major processing industries is that, unlike the oil and gas industry, there is very little embedded corporate knowledge of the deep sub-surface. Even so, that knowledge is plentiful in Western Australia with the Chevron project to commence CO<sub>2</sub> sequestration in 2017 and the expertise available in research institutions such as the CSIRO, Curtin University and University of Western Australia. All of these organisations have provided valuable input to the Project.

The technology of carbon storage is proven, but the local sub-surface is the critical element. The SW Hub Project has progressed data acquisition and analysis aimed at establishing confidence in storage associated with migration assisted trapping in unconfined saline aquifers. The target injection reservoir (Lower Lesueur or the Wonnerup Member) is a heterogeneous sandstone formation with varying permeability layers that should support residual and solubility trapping. The Upper Lesueur (Yalgorup Member), with its numerous paleosol baffles, is an important confining layer and the basal shale part of the Eneabba Formation forms the upper confining layer.

From the very onset, the SW Hub Project has followed a rigorous stage gated decision making program. The

Project has been divided into phases and each phase involves targeted data acquisition plans to address technical gaps. "Decision Gates" ensure that, only on increased confidence of success, and no show stoppers being identified, would the project move to the next phase. The SW Hub reservoir characterisation activities follow the workflow defined in the European Commission Implementation of Directive 2009/31/EC on the Geological Storage of Carbon Dioxide.

Under the first phase of the new data acquisition program (2011-12), new geological data was gathered through 100 km of targeted 2D lines and one deep exploration well to 2945 metres. Multiple modeling scenarios with differing assumptions on the geological properties supported the storage concept and identified no show stoppers. Notwithstanding, uncertainty planning required additional data to address the gaps identified. Under the next phase of the development program (2013-15), 3D seismic was acquired over 115 km<sup>2</sup> and three wells drilled to reduce geologic uncertainty. The area of interest is dominated by farming activity and not all landowners provided consent to acquire the seismic data. As such, while high fold data has been acquired over the deeper Wonnerup

Member reservoir sections, the shallower Yalgorup Member was not as well illuminated.

Drilling was conducted in the early part of 2015 and the drilling strategy was adapted to maximise geological coverage and information particularly across the shallower reservoirs. There were wells drilled using a combination of mineral and water well drilling rigs.

Significant technical work has also been done to support this development through a range of research projects launched under the auspices of the Australian National Low Emissions Coal Research and Development program (ANLEC R&D). These projects are focused on reservoir characterisation and either

consider more fundamental physics based questions or delve significantly deeper into specific geology and geophysics domains using laboratory and modelling efforts.

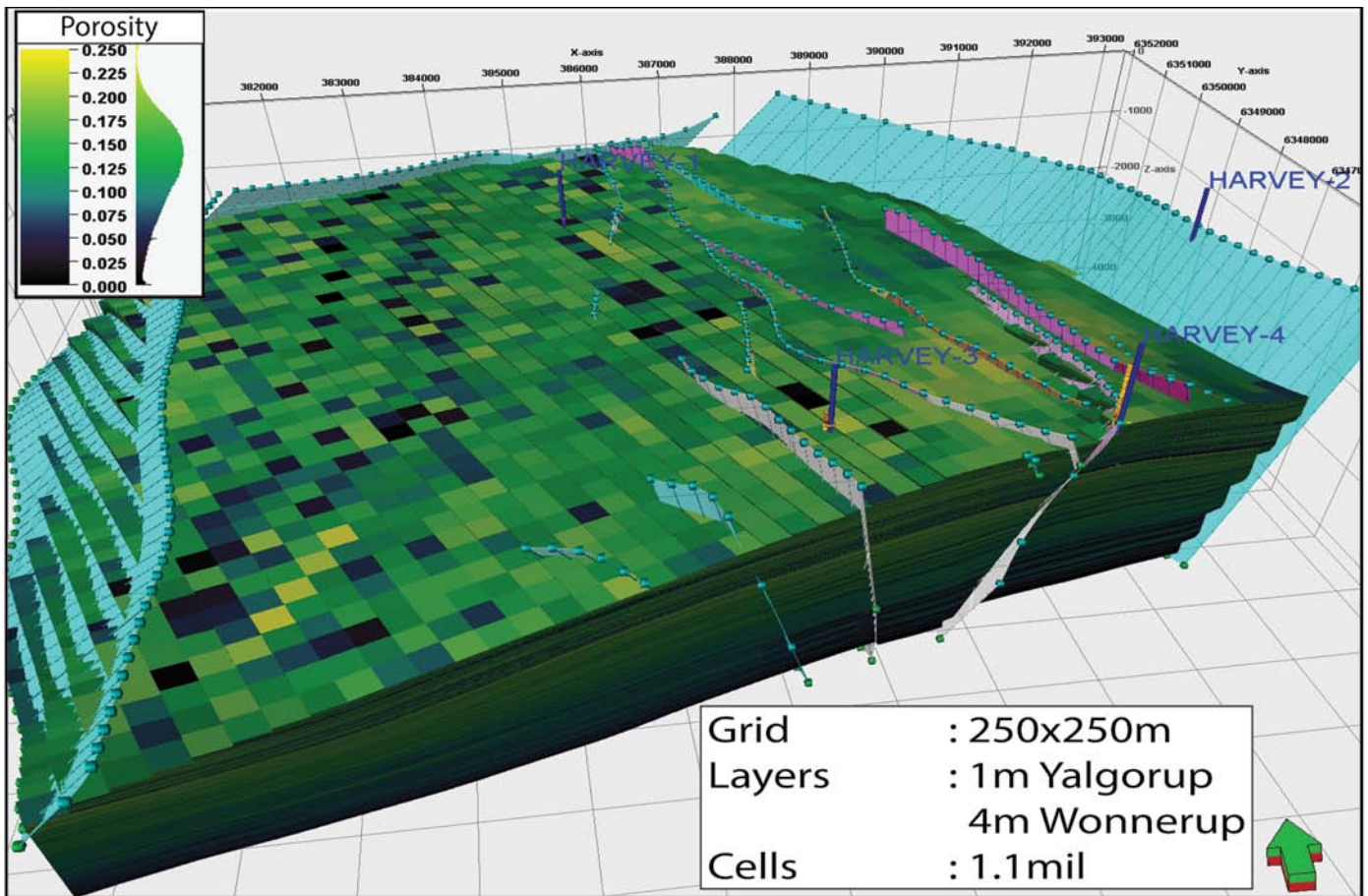
Following the acquisition of the data and core from the seismic and drilling programs, a detailed geological model was developed. In order to build this model, the following evaluations were undertaken:

- detailed petrophysics studies for the four available wells, with integration of core data;
- geomechanical rock property analyses and considered the rock properties, the stress field and fault orientations. Results

were used to define injection pressure constraints for the Dynamic Models;

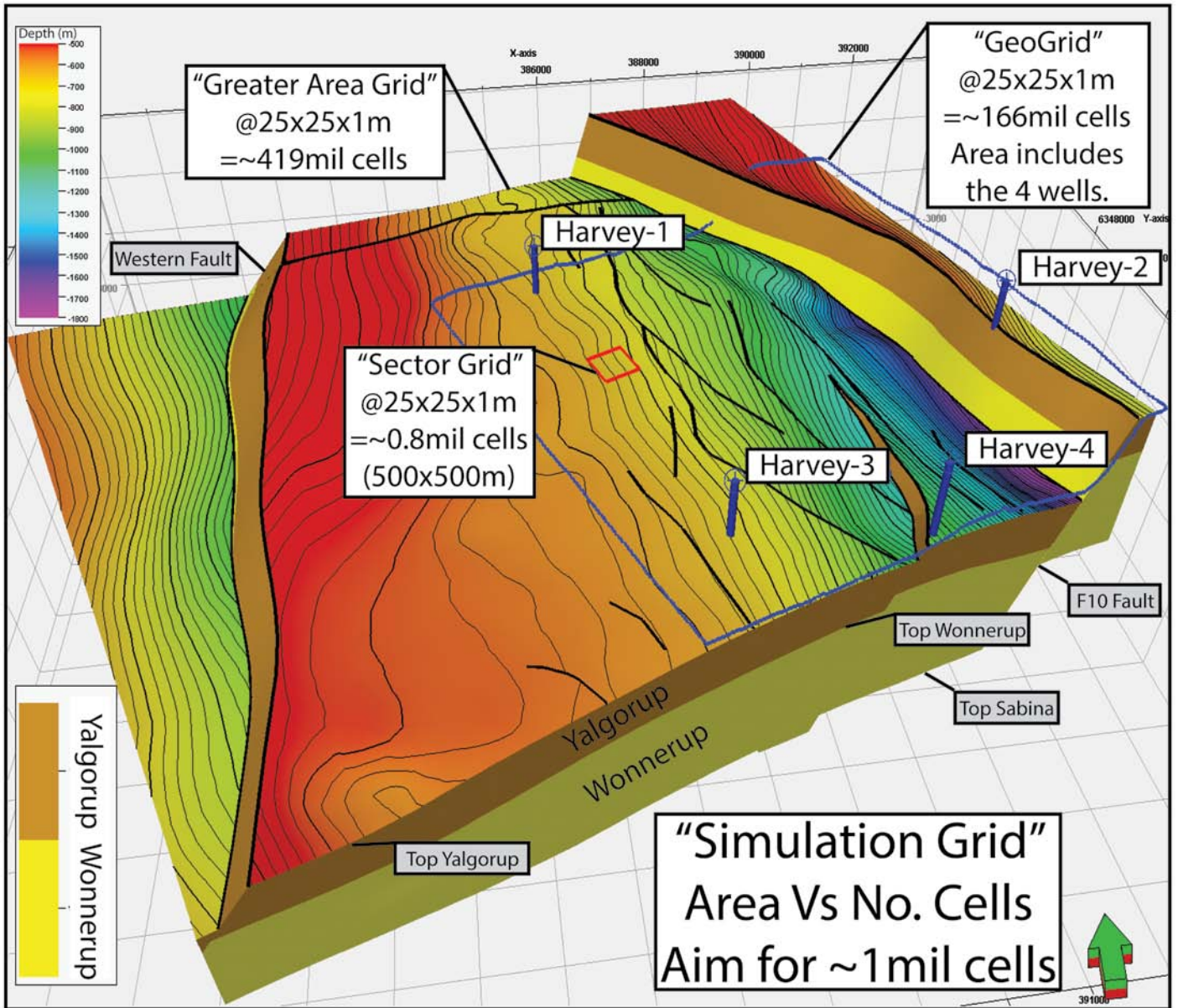
- an image log interpretation for determining the facies or geobody orientation that was used in the Static Model;
- well correlation panels were prepared for facies, porosity and permeability.

The static model construction resulted in various realisations guided by known uncertainty (paleosol continuity, fault definition, reservoir connectivity and reservoir quality). As an integral part of the above, ODIN Reservoir Consultants Pty Ltd conducted reservoir simulation studies on behalf of DMP to assess the suitability of



Coarse scale model showing porosity distribution

Source: Odin Reservoir Consultants Pty Ltd



Construction of a modelling grid

Source: Odin Reservoir Consultants Pty Ltd

the Lesueur Sandstone in the Lower Lesueur Region of Western Australia as a potential carbon dioxide geological sequestration site.

The objective of the simulation study is to provide a suite of full field simulation models which cover a range of subsurface uncertainties that provides confidence that the CO<sub>2</sub> plume stays below 800 m and within the storage complex for 1000 years.

The results of the conservative modelling approach modelling show

that it could be feasible to inject 800,000 t/a of CO<sub>2</sub> over 30 years in the Yalgorup and Wonnerup formations in the Harvey area. The modelling studies show that all of the injected CO<sub>2</sub> remains in the Wonnerup and that the main factors controlling CO<sub>2</sub> plume migration are trapped gas saturation and the solubility of CO<sub>2</sub> in brine.

The Project recognises that further work needs to be undertaken but has gained confidence from the work to date.

Validation of the SW Hub storage concept will substantially increase the number of geologic sites that can be considered for safe storage around the world. There is significant international interest in the project field and research activities.

Please visit the Department's website at [www.dmp.wa.gov.au/ccs](http://www.dmp.wa.gov.au/ccs) or [www.dmp.wa.gov.au/wapims](http://www.dmp.wa.gov.au/wapims) for more detailed information.

# Stakeholder engagement

**Daniel Hearn**  
Policy Officer  
Petroleum Division



DMP's booth at the Mingenew Midwest Expo

DMP is committed to carrying out stakeholder engagement activities in Western Australia, fostering the community's confidence in its ability to regulate and manage the responsible development of petroleum resources throughout the State.

Regular engagement is essential to build community knowledge of DMP's regulatory role. The community needs assurance that there are appropriate regulations and processes in place to protect Western Australian communities and the environment. DMP requires industry to demonstrate use of world's best practice in exploration and production of petroleum.

However, stakeholder engagement is not a one-way conversation. Community concerns about the potential risks associated with petroleum activities can inform regulators and industry, and drive change in how DMP and other government agencies regulate and operate.

Recently, DMP's Petroleum Division participated in community events in Capel and Mingenew. The need to deliver factual information to the community was highlighted at these events. Many concerned community members who approached DMP representatives were those with little exposure to

onshore petroleum operations and those who had not attended previous DMP information sessions.

## Capel Gas Exploration in the South West Expo

The recent Shire of Capel Gas Exploration in the South West Expo provided community members with an opportunity to learn about the onshore petroleum industry in Western Australia and ask questions on a range of issues to DMP representatives present.

A number of government, industry, and non-government organisations, including groups opposed to onshore gas development in the Southwest, attended. A diverse range of information was on offer during the event, providing the community with the opportunity to ask questions and discuss their concerns.

This event attracted more than 200 people from the South West region, approximately double that of other recent community events DMP has participated in. Attendees at the Capel Expo included local farmers, families, and business owners.

In general, participants were interested in learning more about Western Australia's multiagency regulatory framework, groundwater and environmental protection, well integrity, and the chemicals used in hydraulic fracture stimulation. DMP will soon

publish an overview of the Guide to the Regulatory Framework for Shale and Tight Gas in Western Australia for the public.

DMP's presence at this event was an important step in building stakeholder confidence in the industry. It is an ongoing priority of DMP to continue to provide the South West community with factual information related to onshore petroleum and any proposed or ongoing petroleum activities in the region.

## Mingenew Midwest Expo

On 10 and 11 August, DMP attended the Mingenew Midwest Expo through an information stand at the annual event. The Midwest Expo is the region's largest agricultural field day and showcases a range of industries operating throughout the area.

This event attracts thousands of local residents from the Midwest, of which more than a hundred stopped at the DMP's booth to talk with DMP staff. Visitors to DMP's booth included farmers, other local workers and families.

Visitors to the booth were generally supportive of the petroleum industry, which was largely attributed to their familiarisation due to the local petroleum industry being present for decades. Many community members have experienced,



Member of the public in discussion with a DMP representative at the Mingenew Midwest Expo

first-hand, how this industry has successfully operated without causing significant impacts to groundwater, the environment and the livelihood of farmers. Generally, attendees appreciated that there was a strong additional industry in the region, providing jobs for locals and stimulating their economy.

However, some community members expressed concern over recent noise and odour associated with flaring, management of produced water from petroleum wells and the management of fluids contained in evaporation ponds.

It was also apparent that DMP needs to continue to address inaccurate information about the petroleum industry that is available to communities. In particular these inaccuracies have given rise to the unfavourable view of hydraulic fracture stimulation held by some individuals in the community. DMP provides factual and impartial information to give assurance that the petroleum industry is well regulated and that risks are managed to safeguard water resources.

Feedback provided to DMP at the booth indicated that many farmers

who have petroleum companies operating on their land had a good working relationship with the companies and were satisfied with compensation and 'make good' arrangements they had in place.

Many visitors to the booth were pleased with DMP's ongoing attendance at the Mingenew Midwest Expo which highlights the importance of events such as these, in providing the opportunity to engage and query DMP officials on issues that are important to them.

# Land Access Working Group to be established following Parliamentary Inquiry



**Jason Medd**  
Principal Policy Officer  
Petroleum Division

The Mines and Petroleum Minister, Sean L'Estrange, has recently announced the establishment of a Land Access Working Group in response to a recommendation of the Standing Committee on Environment and Public Affairs report on 'Implications for Western Australia of Hydraulic Fracturing for Unconventional Gas'.

The Parliamentary report recommended the establishment of a working group to review and make recommendations to government regarding the statutory framework for land access by the resources industry. This recommendation has provided the basis for the establishment of the Land Access Working Group, which will consider land access issues across the resources sector, primarily for onshore petroleum.

It is anticipated that the working group would consider other jurisdictions' land access arrangements, both legislative and non-legislative, where necessary and appropriate, and identify and make recommendations for any further changes to the Australian Petroleum Production and Exploration Association (APPEA's) 'Farming Land Access Agreement' template. The Farming Land Access Agreement template was developed by a joint committee chaired by former WA Deputy Premier and Nationals Leader, Hendy Cowan. It has been endorsed by APPEA, WAFarmers, Pastoralists and Graziers Association of WA, and vegetablesWA.

The Land Access Working Group will consider and make recommendations in relation to the need for a statutory body to act as an independent arbiter for land owners and resource

companies in land access negotiations. The working group will also review existing provisions in both the WA mining and petroleum legislation in relation to land access and make any recommendations for change. Following a wide-ranging consultation process with stakeholders, the group will provide a report and recommendations for consideration by the Western Australian Government in relation to resources land access issues before 30 June 2018.

The Land Access Working Group will invite representatives from industry and farmer bodies, local government (WALGA), the Conservation Council of WA and various State Government agencies and will be chaired by the Director General of the Department of Mines and Petroleum (DMP).

The working group's advice and recommendations, which will be presented to the State Government, will be made by consensus. If a consensus cannot be reached, the dissenting views of the member or members will be recorded and those views will also be presented to the Minister for Mines and Petroleum by DMP's Director General.

It is planned that the working group will meet at least once per quarter, unless agreed otherwise and executive and administrative support will be provided by DMP.





# Petroleum Decommissioning Guideline

**Jason Medd**  
Principal Policy Officer  
Petroleum Division



The Noble Tom Prosser jackup rig being utilised for decommissioning at the Harriet Charlie platform by Quadrant Energy

There is a steadily growing realisation by industry and regulators, domestically and internationally, of the scope and subsequent significance of upcoming activities relating to decommissioning of oil and gas fields and facilities. DMP considers there is a need for a clear commitment from industry and the regulators to cooperate, to produce positive decommissioning outcomes consistent with relevant regulations and the observance of industry best practices.

Subsequently, DMP has identified the need for clear guidance to industry of DMP expectations and requirements for decommissioning activities. To this end, DMP is in the process of developing a Petroleum Decommissioning Guideline that will provide a risked based approach to decommissioning. The Petroleum Decommissioning Guideline will describe the State legislative requirements around decommissioning and involvement of other Government agencies.

DMP considers that the central outcomes from a decommissioning project are that all wells are properly and permanently decommissioned, in accordance with good oilfield practices, and that the production licence areas will be safely cleared of all material and property that has been produced or used in the recovery of petroleum from decommissioned fields contained in the relevant titles. The cleared sites will be returned to an agreed benchmark condition (typically as close to its original state as is practicable) and be subject to a specified period of monitoring to ensure full integrity and compliance before the licence or lease is surrendered.



Decommissioning a well – removing the Christmas tree

It is critical that any decommissioning program be performed in such a way that there are no issues that might increase operational risk of the industry at large. Hence, there is the need for the interaction with multiple agencies and authorities, within Australian State and Commonwealth governments, that may have an involvement in the regulatory administrative and management processes. There is a strong focus on the safety and environmental impacts of decommissioning activities. Key objectives require that all risks of any activity are reduced to 'As Low As Reasonably Practicable' (ALARP). This means that a company has to show, through a reasoned and supported

case, that there are no other practical measures that could reasonably be taken to reduce risks further. (Note that a risk that is reduced to ALARP may still be unacceptable.)

The aim of the Petroleum Decommissioning Guideline is to provide an objective based, risk managed, guidance as to the regulatory obligations of companies preparing to engage in decommissioning activities. The Guideline will also assist registered holders in the process of fulfilling

their field management plan (FMP) obligations to reflect the progressive development and updating of planning provisions for decommissioning a field and its associated facilities and wells (provided for under revisions to the well management plans (WMPs)).

It is envisioned that the Petroleum Decommissioning Guideline will be a living document. Through a process of broad consultation and review, feedback from industry and other stakeholders will be invited and will be considered and, if appropriate,

assimilated and used to consolidate and improve the management of decommissioning programs. The Guideline will be periodically revised and updated to reflect the contribution from stakeholders and progressive technical advances and other relevant developments within the industry.

The Western Australian Petroleum Decommissioning Guideline will be released for comment in the second half of September 2016. At this time, DMP plans to finalise the Guideline for implementation by the end of 2016.



The site of the Yulleroo 1 well, drilled in 1967, now decommissioned

# Regulatory reform – Petroleum 2020

**Colin Harvey**

Principal Legislation and Policy Officer  
Petroleum Division



Onshore drilling in Western Australia

The Department of Mines and Petroleum (DMP) has commenced a major legislation reform initiative “Petroleum 2020” to modernise and streamline the State’s petroleum and geothermal legislation.

The amalgamation project will be a significant step in DMP contributing to the government’s plan to reinvigorate Regulatory Reform policy, by reducing

red tape and improving the quality of regulatory outcomes.

The Petroleum 2020 project will be in two stages. Stage 1 will focus on the amalgamation of the three Petroleum Acts into a single Petroleum Act and at the same time look to improve and modernise petroleum legislation and streamline petroleum regulatory processes to better reflect the

developments in the petroleum industry that have occurred since they commenced.

This amalgamation proposal is expected to take between three to four years to complete and during the early stages, DMP will undertake comprehensive stakeholder consultation to identify opportunities to implement efficiencies and reduce compliance costs and duplication. Completion of Stage 1 will allow for further legislative streamlining with the amalgamation of the associated subsidiary regulations which will reduce the number of regulations from eight to three.

The second stage of the Petroleum 2020 Project will be the amalgamation of the two Registration Fees Acts into a single “Petroleum (Registration Fees) Act” and will commence following completion of Stage 1. This amalgamation will also consequently lead to the further reduction in the number of associated regulations from two to one.

## Scoping Paper for Stage 1

The Western Australian (WA) petroleum legislation currently comprises three main acts that cover petroleum and geothermal exploration and development:

- *Petroleum and Geothermal Energy Resources Act 1967;*



Harriet Apha production platform in WA State waters

- *Petroleum (Submerged Lands) Act 1982*; and
- *Petroleum Pipelines Act 1969*.

While the introduction of the three sets of objective-based environment regulations in 2012 and the two sets of resource management regulations in 2015 is acknowledged as national and international best practice, the overarching legislation framework has remained essentially unchanged since 1967.

A Scoping Paper for Stage 1 of the Petroleum 2020 Project will be circulated to key industry representative bodies and Commonwealth and WA Government stakeholders and detailing some suggested reforms under the headings of:

- **Streamlining and Modernising**
- **Recommendations from the Legislative Council Standing Committee on Environment and Public Affairs report No. 42 “Implications for Western Australia of Hydraulic Fracturing for Unconventional Gas”**
- **Commonwealth Amendments since 2008**
- **Miscellaneous Amendments**

The Scoping Paper has been prepared on the basis of the commencement of the proposed *Work Health and Safety (Resources and Major Hazards) Bill* (“Safety Bill”). Passage of the Safety Bill will significantly simplify the amalgamation project by removing the general occupational safety and health provisions from the three acts enabling the focus to be on petroleum and geothermal exploration and development. The passage of the Safety Bill will also subsequently allow for the *Petroleum and Geothermal Energy Safety Levies Act 2011* and the eight safety-related regulations to be removed from the state petroleum legislation.

### Discussion Paper

Feedback received from the Scoping Paper consultation will assist DMP in preparing a detailed discussion paper.

The Discussion Paper will outline the provisions that are to be reviewed and to present suggested amendments and options. In 2017 it will be widely circulated to all petroleum and geothermal titleholders; service companies; industry representative bodies; environmental groups; native title bodies; and WA, Commonwealth and other State and Territory

government agencies as well as advertised on the DMP website and in the West Australian newspaper.

Should you have any enquiries regarding the Petroleum 2020 Project, please contact Colin Harvey, Principal Legislation and Policy Officer on 9222 3315 or at [colin.harvey@dmp.wa.gov.au](mailto:colin.harvey@dmp.wa.gov.au).



An aerial view of the domestic gas pipeline works on the mainland for the Gorgon gasplant

Photos © Chevron

**TABLE 1. 2014 PRODUCTION BY FIELD AND CUMULATIVE PRODUCTION WA ONSHORE AND STATE WATERS AS AT 31 DECEMBER 2014**

Field	Operator	2014 Production by Field			Cumulative Production			Permit
		Oil	Condensate	Gas	Oil	Condensate	Gas	
		kL	kL	10 <sup>3</sup> m <sup>3</sup>	kL	kL	10 <sup>3</sup> m <sup>3</sup>	
Agincourt	Apache	2,831.7	13.0	446.8	562,435.10	4,282.60	42,320.00	TL/1
Albert	Apache	0.0	0.0	0.0	77,419.80	379.80	16,674.10	TL/6
Bambra	Apache	35,741.0	155.1	20,943.9	438,764.10	158,456.30	1,383,553.20	TL/1
Barrow Island	Chevron	280,430.0	0.0	28,969.1	51,485,088.90	0.00	5,436,337.80	L 1H
Beharra Springs	Origin	0.0	90.9	9,364.5	0.00	24,448.40	2,303,273.80	L 11
Beharra Springs N	Origin	0.0	99.4	10,948.6	0.00	2,155.70	221,346.90	L 11
Blina	Buru Energy	0.0	0.0	0.0	298,725.15	0.00	0.00	L 6
Boundary	Buru Energy	0.0	0.0	0.0	21,212.14	0.00	0.00	L 6
Corybas	AWE	0.0	69.7	3,752.9	0.00	412.10	22,299.30	L 2
Crest	Chevron	27.0	0.0	125.0	275,835.00	108.00	65,898.00	L 12, L 13
Dongara	AWE	183.7	0.0	12,783.2	195,796.40	49,681.21	12,956,244.80	L 1, L 2
Double Island	Apache	0.0	0.0	0.0	708,512.10	2,943.10	59,150.70	TL/9
Gingin West	Empire	0.0	1,020.2	4,329.4	0.00	2,031.00	*8,164.00	L 18, L 19
Harriet	Apache	0.0	0.0	0.0	8,232,695.10	61,226.35	1,510,761.58	TL/1
Hovea	AWE	0.0	0.0	62.7	1,170,005.35	251.09	104,918.20	L 1
Lee	Apache	707.9	166.7	4,790.2	1,021.40	119,379.00	793,150.40	TL/1
Linda	Apache	348.8	26.7	2,947.8	348.80	301,480.50	1,208,043.80	TL/1
Little Sandy	Apache	0.0	0.0	0.0	95,352.90	491.64	15,989.80	TL/6
Mohave	Apache	0.0	0.0	0.0	174,510.90	648.50	40,788.10	TL/6
Pedirka	Apache	0.0	0.0	0.0	341,249.50	1,373.10	45,924.50	TL/6
Red Gully	Empire	0.0	15,174.9	53,898.6	0.00	21,751.70	75,046.50	L 18, L 19
Redback	Origin	0.0	201.0	121,559.7	0.00	915.40	582,553.20	L 11
Roller	Chevron	1,367.0	0.0	647.0	7,212,757.00	0.00	793,862.00	TL/7
Rose	Apache	24,152.6	1,865.9	159,591.8	30,536.10	212,012.30	1,211,679.70	TL/1
Saladin	Chevron	8,647.0	0.0	5,281.0	15,653,984.00	0.00	1,816,934.00	TL/4
Simpson	Apache	0.0	0.0	0.0	857,914.57	14,570.99	90,524.45	TL/1
South Plato	Apache	0.0	0.0	0.0	717,546.10	908.60	52,287.00	TL/6
Sundown	Buru Energy	0.0	0.0	0.0	74,207.18	0.00	0.00	L 8
Tarantula	Origin	0.0	120.4	11,310.3	0.00	4,223.20	342,610.70	L 11
Ungani	Buru Energy	51,751.0	0.0	40.1	70,288.00	0.00	55.90	EP 391
Victoria	Apache	0.0	0.0	0.0	62,587.50	481.20	11,790.70	TL/6
West Cycad	Apache	0.0	0.0	0.0	218,676.00	546.80	36,990.60	TL/9
West Terrace	Buru Energy	0.0	0.0	0.0	39,602.35	0.00	0.00	L 8
Wonnich	Apache	0.0	0.0	0.0	0.00	479,450.13	4,856,471.08	TL/8
Yammaderry	Chevron	0.0	0.0	3,753.0	858,332.00	0.00	146,149.00	TL/4
<b>Total</b>		<b>406,187.7</b>	<b>19,003.9</b>	<b>455,545.6</b>	<b>89,875,403.44</b>	<b>1,464,608.72</b>	<b>36,243,629.80</b>	

**TABLE 2A. PETROLEUM RESERVES AND RESOURCES ESTIMATES IN WA JURISDICTIONS  
(SI UNITS, VALID AS OF 31 DECEMBER 2015)**

Basin	Reserves						Contingent Resources*					
	Oil, GL		Gas, Gm <sup>3</sup>		Condensate, GL		Oil, GL		Gas, Gm <sup>3</sup>		Condensate, GL	
	1P	2P	1P	2P	1P	2P	1C	2C	1C	2C	1C	2C
Browse	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.40	24.20	1.30	2.50
Canning	0.00	0.00	0.00	0.00	0.00	0.00	0.59	0.95	1.76	5.54	0.16	0.48
Carnarvon	1.46	7.89	0.15	0.69	0.01	0.03	1.34	2.21	0.38	1.00	0.05	0.13
Perth	0.00	0.00	3.39	6.61	0.01	0.01	0.00	0.00	47.70	58.35	0.33	0.49
<b>WA Total</b>	<b>1.46</b>	<b>7.89</b>	<b>3.54</b>	<b>7.30</b>	<b>0.02</b>	<b>0.04</b>	<b>1.93</b>	<b>3.16</b>	<b>62.24</b>	<b>89.09</b>	<b>1.84</b>	<b>3.60</b>

**TABLE 2B. PETROLEUM RESERVES AND RESOURCES ESTIMATES IN WA JURISDICTIONS  
(IMPERIAL UNITS, VALID AS OF 31 DECEMBER 2015)**

Basin	Reserves						Contingent Resources*					
	Oil, MMstb		Gas, Bscf		Condensate, MMstb		Oil, MMstb		Gas, Bscf		Condensate, MMstb	
	1P	2P	1P	2P	1P	2P	1C	2C	1C	2C	1C	2C
Browse	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	439.00	855.00	8.10	15.80
Canning	0.02	0.02	0.00	0.00	0.00	0.00	3.69	5.97	62.01	195.74	1.01	3.00
Carnarvon	9.17	49.67	5.39	24.37	0.08	0.21	8.42	13.89	13.42	35.47	0.29	0.82
Perth	0.00	0.00	119.99	233.76	0.05	0.09	0.00	0.00	1,684.40	2,060.37	2.08	3.07
<b>WA Total</b>	<b>9.19</b>	<b>49.69</b>	<b>125.38</b>	<b>258.13</b>	<b>0.13</b>	<b>0.30</b>	<b>12.11</b>	<b>19.86</b>	<b>2,198.83</b>	<b>3,146.58</b>	<b>11.48</b>	<b>22.69</b>

**TABLE 3. PETROLEUM WELLS IN WESTERN AUSTRALIA  
– ONSHORE AND STATE WATERS 2015–16 FISCAL YEAR**

Well Name	Class	On Off	Title	Operator	Latitude	Longitude	Spud Date	TD Date	Rig Release Date
<b>CANNING BASIN</b>									
Praslin 1	NFW	On	EP 391	Buru Energy Limited	-17.985	123.020	16/07/2015	26/08/2015	02/09/2015
Senagi 1	NFW	On	EP 458	Buru Energy Limited	-18.590	124.373	15/10/2015	02/11/2015	09/11/2015
Theia 1	NFW	On	EP 493	Finder Exploration Pty Ltd	-18.901	123.294	15/07/2015	24/08/2015	29/08/2015
Victory 1	NFW	On	EP 457	Buru Energy Limited	-18.253	123.927	08/09/2015	02/10/2015	20/11/2015
Ungani Far West 1	NFW	On	L 21	Buru Energy Limited	-18.000	123.134	28/12/2015	31/01/2016	09/02/2016
<b>PERTH BASIN</b>									
Waitsia 2	EXT	On	L 1	AWE Limited	-29.302	115.094	29/06/2015	26/07/2015	04/08/2015
Warro 5 ST1	EXT	On	R 7	Latent Petroleum	-30.207	115.729	16/08/2015	24/09/2015	29/09/2015
Warro 6	EXT	On	R 7	Latent Petroleum	-30.182	115.717	12/10/2015	03/11/2015	09/11/2015
Red Gully North 1	NFW	On	EP 389	Empire Oil & Gas NL	-31.145	115.826	18/11/2015	14/12/2015	29/12/2015
Mondarra 9	STO	On	L1	APA Group	-29.313	115.117	05/01/2016	1/25/2016	04/02/2016

**TABLE 4. SURVEYS IN WESTERN AUSTRALIA – ONSHORE AND STATE WATERS 2015–16 FISCAL YEAR**

Survey name	Class	On Off	Title	Operator	Commenced	Completed	2D/Line km @ 31/12/2015	3D km <sup>2</sup> @ 31/12/2015
<b>CANNING BASIN</b>								
Kurrajong 3D Reflection Seismic Survey	3D	On	EP 436, EP 391 R3	Buru Energy Limited	20/11/2015	11/12/2015		196
Rafael 2D S.S.	2D	On	EP 428, EP 457	Buru Energy Limited	31/10/2015	13/11/2015	163	
Yakka Munga 3D S.S.	3D	On	EP 428, EP 391 R1	Buru Energy Limited	10/10/2015	29/10/2015		190

**Classification**

2D – 2D Reflection Seismic Survey

3D – 3D Reflection Seismic Survey

**TABLE 5. WELL ACTIVITY APPROVALS**

Financial year (July to June)	Well activity applications	Approved	On hold	Refused	Lapsed	Average days to approve	Comment
2012–13	18	18			3	20	New well applications – 18
2013–14	45	44		1		12.9	New well applications – 16; 1 refused
2014–15	109	109				15.6	New well applications – 18; submissions – 91
2015–16	284	228	56			15	New well applications – 8

These statistics are based on data obtained from the Petroleum Geothermal Register (PGR). Post-drilling activity submissions were not approved through PGR until part way through the 2013–14 financial year. Previously, such submissions were approved but the approvals were not recorded in PGR.

On 1 July 2015 the petroleum Resource Management and Administration Regulations came into force. Transition of the regulations ended on 1 July 2016. Wells regulated under the *Petroleum and Geothermal Energy Resources Act 1967* and the *Petroleum (Submerged Lands) Act 1982* are required to have an approved well management plan that covers what is currently occurring on these wells. Subsequent activity on a well requires a separate approval as a revision to the well management plan.

The number of days required to assess and approve an application does not include the ‘on hold’ time waiting for more information before assessment can be completed. The on hold process occurs when either DMP needs more information to assess the application or the registered holder requests for an application to be put on hold and the assessment deferred. 37 on hold requests were for deferrals, the remainder were for well management plans with incomplete information.

**TABLE 6. LIST OF PETROLEUM TITLES AND HOLDERS IN WESTERN AUSTRALIAN JURISDICTIONS AS AT 17 FEBRUARY 2016**

**PETROLEUM (SUBMERGED LANDS) ACT 1982**

**Exploration Permit**

Title	Registered Holder(s)
TP/7 R4	HYDRA ENERGY (WA) PTY LTD QUADRANT OIL AUSTRALIA PTY LIMITED* SANTOS (BOL) PTY LTD TAP (SHELFAL) PTY LTD
TP/8 R4	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*
TP/15 R2	WESTRANCH HOLDINGS PTY LTD
TP/25	FINDER NO 3 PTY LIMITED
TP/26	PERSEVERANCE ENERGY PTY LTD
TP/27	CARNARVON PETROLEUM LIMITED

**PETROLEUM (SUBMERGED LANDS) ACT 1982**

**Pipeline Licence**

Title	Registered Holder(s)
TPL/1 R1	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*
TPL/2 R1	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*
TPL/3 R1	HYDRA ENERGY (WA) PTY LTD QUADRANT OIL AUSTRALIA PTY LIMITED* SANTOS (BOL) PTY LTD TAP (SHELFAL) PTY LTD
TPL/4 R1	HYDRA ENERGY (WA) PTY LTD QUADRANT OIL AUSTRALIA PTY LIMITED* SANTOS (BOL) PTY LTD TAP (SHELFAL) PTY LTD
TPL/5 R1	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*
TPL/6 R1	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD
TPL/7 R2	HYDRA ENERGY (WA) PTY LTD QUADRANT OIL AUSTRALIA PTY LIMITED* SANTOS (BOL) PTY LTD TAP (SHELFAL) PTY LTD
TPL/8	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*
TPL/9 R1	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD
TPL/10	BHP BILLITON PETROLEUM (AUSTRALIA) PTY LTD* INPEX ALPHA LTD MOBIL EXPLORATION & PRODUCING AUSTRALIA PTY LTD
TPL/11	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD

TPL/12	QUADRANT EAST SPAR PTY LIMITED QUADRANT KERSAIL PTY LTD QUADRANT OIL AUSTRALIA PTY LIMITED* SANTOS (BOL) PTY LTD
TPL/13	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT EAST SPAR PTY LIMITED QUADRANT KERSAIL PTY LTD QUADRANT NORTHWEST PTY LTD* QUADRANT OIL AUSTRALIA PTY LIMITED SANTOS (BOL) PTY LTD
TPL/14	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*
TPL/15	BHP BILLITON PETROLEUM (NORTH WEST SHELF) PTY LTD BP DEVELOPMENTS AUSTRALIA PTY LTD CHEVRON AUSTRALIA PTY LTD JAPAN AUSTRALIA LNG (MIMI) PTY LTD SHELL AUSTRALIA PTY LTD WOODSIDE ENERGY LTD*
TPL/16	BHP BILLITON PETROLEUM (NORTH WEST SHELF) PTY LTD BP DEVELOPMENTS AUSTRALIA PTY LTD CHEVRON AUSTRALIA PTY LTD JAPAN AUSTRALIA LNG (MIMI) PTY LTD SHELL AUSTRALIA PTY LTD WOODSIDE ENERGY LTD*
TPL/17	QUADRANT NORTHWEST PTY LTD* SANTOS (BOL) PTY LTD
TPL/18	AWE (OFFSHORE PB) PTY LTD AWE OIL (WESTERN AUSTRALIA) PTY LTD ROC OIL (WA) PTY LIMITED*
TPL/19	KANSAI ELECTRIC POWER AUSTRALIA PTY LTD TOKYO GAS PLUTO PTY LTD WOODSIDE BURRUP PTY LTD*
TPL/20	QUADRANT NORTHWEST PTY LTD* SANTOS OFFSHORE PTY LTD
TPL/21	CHEVRON (TAPL) PTY LTD* JERA GORGON PTY LTD MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED OSAKA GAS GORGON PTY LTD SHELL AUSTRALIA PTY LTD TOKYO GAS GORGON PTY LTD
TPL/22	CHEVRON (TAPL) PTY LTD* JERA GORGON PTY LTD MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED OSAKA GAS GORGON PTY LTD SHELL AUSTRALIA PTY LTD TOKYO GAS GORGON PTY LTD
TPL/23	BHP BILLITON PETROLEUM (AUSTRALIA) PTY LTD* QUADRANT PVG PTY LTD
TPL/24	CHEVRON (TAPL) PTY LTD* JERA GORGON PTY LTD MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED OSAKA GAS GORGON PTY LTD SHELL AUSTRALIA PTY LTD TOKYO GAS GORGON PTY LTD
TPL/25	CHEVRON (TAPL) PTY LTD* KUFPEC AUSTRALIA (JULIMAR) PTY LTD KYUSHU ELECTRIC WHEATSTONE PTY LTD PE WHEATSTONE PTY LTD SHELL AUSTRALIA PTY LTD WOODSIDE ENERGY JULIMAR PTY LTD



**TABLE 6. LIST OF PETROLEUM TITLES AND HOLDERS IN WESTERN AUSTRALIAN JURISDICTIONS AS AT 17 FEBRUARY 2016**

**PETROLEUM (SUBMERGED LANDS) ACT 1982**

**Production Licence**

Title	Registered Holder(s)
TL/1 R1	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*
TL/2 R1	HYDRA ENERGY (WA) PTY LTD QUADRANT OIL AUSTRALIA PTY LIMITED* SANTOS (BOL) PTY LTD TAP (SHELFAL) PTY LTD
TL/3 R1	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD
TL/4 R1	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD
TL/5 R1	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*
TL/6 R1	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*
TL/7	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD
TL/8	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*
TL/9	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*
TL/10	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*

**PETROLEUM (SUBMERGED LANDS) ACT 1982**

**Retention Lease**

Title	Registered Holder(s)
TR/3 R2	QUADRANT NORTHWEST PTY LTD
TR/4 R1	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD
TR/5 R2	BP DEVELOPMENTS AUSTRALIA PTY LTD JAPAN AUSTRALIA LNG (MIMI BROWSE) PTY LTD PETROCHINA INTERNATIONAL INVESTMENT (AUSTRALIA) PTY LTD SHELL AUSTRALIA PTY LTD WOODSIDE BROWSE PTY LTD*
TR/6 R1	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD

**PETROLEUM AND GEOTHERMAL ENERGY RESOURCES ACT 1967**

**Access Authority**

Title	Registered Holder(s)
AA 5	FINDER NO 5 PTY LIMITED

**PETROLEUM AND GEOTHERMAL ENERGY RESOURCES ACT 1967**

**Exploration Permit**

Title	Registered Holder(s)
EP 61 R7	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD
EP 62 R7	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD
EP 104 R6	GULLIVER PRODUCTIONS PTY LTD* INDIGO OIL PTY LTD
EP 129 R6	BURU ENERGY LIMITED
EP 307 R6	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*
EP 320 R4	AWE (BEHARRA SPRINGS) PTY LTD ORIGIN ENERGY DEVELOPMENTS PTY LIMITED*
EP 321 R4	ALCOA OF AUSTRALIA LIMITED LATENT PETROLEUM PTY LTD*
EP 358 R3	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*
EP 359 R3	BOUNTY OIL & GAS NL LANSVALE OIL & GAS PTY LTD PACE PETROLEUM PTY LTD PHOENIX RESOURCES LTD ROUGH RANGE OIL PTY LTD
EP 368 R4	EMPIRE OIL COMPANY (WA) LIMITED* WESTRANCH HOLDINGS PTY LTD
EP 371 R2	BURU ENERGY LIMITED DIAMOND RESOURCES (CANNING) PTY LTD
EP 381 R3	WHICHER RANGE ENERGY PTY LTD
EP 386 R3	ONSHORE ENERGY PTY LTD
EP 389 R2	EMPIRE OIL COMPANY (WA) LIMITED
EP 391 R3	BURU ENERGY LIMITED* DIAMOND RESOURCES (FITZROY) PTY LTD
EP 408 R2	CALENERGY RESOURCES (AUSTRALIA) LIMITED* WHICHER RANGE ENERGY PTY LTD
EP 412 R2	BOUNTY OIL & GAS NL ROUGH RANGE OIL PTY LTD*
EP 413 R3	AWE PERTH PTY LTD BHARAT PETRORESOURCES LIMITED NORWEST ENERGY NL*
EP 416 R1	EMPIRE OIL COMPANY (WA) LIMITED PILOT ENERGY LIMITED*
EP 426 R1	EMPIRE OIL COMPANY (WA) LIMITED* WESTRANCH HOLDINGS PTY LTD
EP 428 R1	BURU ENERGY LIMITED DIAMOND RESOURCES (CANNING) PTY LTD

**TABLE 6. LIST OF PETROLEUM TITLES AND HOLDERS IN WESTERN AUSTRALIAN JURISDICTIONS AS AT 17 FEBRUARY 2016**

EP 430 R1	EMPIRE OIL COMPANY (WA) LIMITED
EP 431 R1	BURU ENERGY LIMITED* DIAMOND RESOURCES (FITZROY) PTY LTD
EP 432 R1	EMPIRE OIL COMPANY (WA) LIMITED*
EP 435 R1	AUSTRALIAN OIL COMPANY NO 3 PTY LIMITED BLACK FIRE MINERALS LIMITED BOUNTY OIL & GAS NL PHOENIX RESOURCES LTD ROUGH RANGE OIL PTY LTD
EP 436 R1	BURU ENERGY LIMITED* DIAMOND RESOURCES (FITZROY) PTY LTD
EP 437 R1	CARACAL EXPLORATION PTY LTD KEY PETROLEUM (AUSTRALIA) PTY LTD REY OIL AND GAS PERTH PTY LTD
EP 438 R1	BURU ENERGY LIMITED* DIAMOND RESOURCES (CANNING) PTY LTD QUADRANT ONSHORE HOLDINGS PTY LTD
EP 440 R1	EMPIRE OIL COMPANY (WA) LIMITED
EP 447 R1	GCC METHANE PTY LTD UIL ENERGY LTD*
EP 448	GULLIVER PRODUCTIONS PTY LTD* INDIGO OIL PTY LTD
EP 451	NEW STANDARD ONSHORE PTY LTD*
EP 454 R1	EMPIRE OIL COMPANY (WA) LIMITED*
EP 455 R1	AWE PERTH PTY LTD* TITAN ENERGY LTD
EP 456	NEW STANDARD ONSHORE PTY LTD*
EP 457	BURU FITZROY PTY LTD* DIAMOND RESOURCES (FITZROY) PTY LTD REY OIL AND GAS PTY LTD
EP 458	BURU FITZROY PTY LTD* DIAMOND RESOURCES (FITZROY) PTY LTD REY OIL AND GAS PTY LTD
EP 468	OFFICER PETROLEUM PTY LTD
EP 469	WARREGO ENERGY PTY LTD*
EP 471	BURU ENERGY LIMITED* DIAMOND RESOURCES (CANNING) PTY LTD QUADRANT ONSHORE HOLDINGS PTY LTD
EP 472	BURU ENERGY LIMITED* DIAMOND RESOURCES (CANNING) PTY LTD
EP 473	BURU ENERGY LIMITED* DIAMOND RESOURCES (CANNING) PTY LTD QUADRANT ONSHORE HOLDINGS PTY LTD
EP 475	CARNARVON PETROLEUM LIMITED
EP 476	BURU ENERGY LIMITED* DIAMOND RESOURCES (CANNING) PTY LTD
EP 477	BURU ENERGY (ACACIA) PTY LTD* DIAMOND RESOURCES (CANNING) PTY LTD
EP 478	BURU ENERGY (ACACIA) PTY LTD BURU ENERGY LIMITED*
EP 480	EMPIRE OIL COMPANY (WA) LIMITED PILOT ENERGY LIMITED*
EP 481	NEW STANDARD ONSHORE PTY LTD
EP 482	NEW STANDARD ONSHORE PTY LTD
EP 483	FINDER NO 3 PTY LIMITED
EP 487	OIL BASINS LIMITED REY LENNARD SHELF PTY LTD*

EP 488	UIL ENERGY LTD
EP 489	UIL ENERGY LTD
EP 490	CARNARVON PETROLEUM LIMITED
EP 491	CARNARVON PETROLEUM LIMITED
EP 492	WESTRANCH HOLDINGS PTY LTD
EP 493	FINDER SHALE PTY LIMITED
EP 494	MACALLUM GROUP LTD* SOUTHERN SKY ENERGY PTY LTD
EP 495	BLACK ROCK MINING LIMITED

**PETROLEUM AND GEOTHERMAL ENERGY RESOURCES ACT 1967  
Petroleum Lease**

Title	Registered Holder(s)
L 1H R2	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD

**PETROLEUM AND GEOTHERMAL ENERGY RESOURCES ACT 1967  
Production Licence**

Title	Registered Holder(s)
L 1 R1	APT PARMELIA PTY LTD AWE PERTH PTY LTD* ORIGIN ENERGY DEVELOPMENTS PTY LIMITED
L 2 R1	AWE PERTH PTY LTD* ORIGIN ENERGY DEVELOPMENTS PTY LIMITED
L 4 R1	AWE PERTH PTY LTD
L 5 R1	AWE PERTH PTY LTD
L 6 R1	BURU ENERGY LIMITED
L 7 R1	AWE PERTH PTY LTD
L 8 R1	BURU ENERGY LIMITED
L 9 R1	DBP DEVELOPMENT GROUP NOMINEES PTY LIMITED
L 10 R1	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD
L 11	AWE (BEHARRA SPRINGS) PTY LTD ORIGIN ENERGY DEVELOPMENTS PTY LIMITED*
L 12	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD
L 13	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD
L 14	AWE PERTH PTY LTD GEARY, JOHN KEVIN NORWEST ENERGY NL ORIGIN ENERGY RESOURCES LIMITED ROC OIL (WA) PTY LIMITED
L 15	GULLIVER PRODUCTIONS PTY LTD* INDIGO OIL PTY LTD
L 16	AUSTRALIAN OIL COMPANY NO 3 PTY LIMITED BOUNTY OIL & GAS NL ROUGH RANGE OIL PTY LTD
L 17	BURU ENERGY LIMITED

**TABLE 6. LIST OF PETROLEUM TITLES AND HOLDERS IN WESTERN AUSTRALIAN JURISDICTIONS AS AT 17 FEBRUARY 2016**

L 18	EMPIRE OIL COMPANY (WA) LIMITED*
L 19	EMPIRE OIL COMPANY (WA) LIMITED*
L 20	BURU ENERGY LIMITED* DIAMOND RESOURCES (FITZROY) PTY LTD
L 21	BURU ENERGY LIMITED* DIAMOND RESOURCES (FITZROY) PTY LTD

**PETROLEUM AND GEOTHERMAL ENERGY RESOURCES ACT 1967**  
**Retention Lease**

Title	Registered Holder(s)
R 1 R1	GULLIVER PRODUCTIONS PTY LTD* INDIGO OIL PTY LTD
R 2 R2	BP DEVELOPMENTS AUSTRALIA PTY LTD JAPAN AUSTRALIA LNG (MIMI BROWSE) PTY LTD PETROCHINA INTERNATIONAL INVESTMENT (AUSTRALIA) PTY LTD SHELL AUSTRALIA PTY LTD WOODSIDE BROWSE PTY LTD*
R 3 R1	OIL BASINS LIMITED
R 4 R1	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD
R 6	ALCOA OF AUSTRALIA LIMITED LATENT PETROLEUM PTY LTD*
R 7	ALCOA OF AUSTRALIA LIMITED LATENT PETROLEUM PTY LTD*

**PETROLEUM PIPELINE ACT 1969**  
**Pipeline Licence**

Title	Registered Holder(s)
PL 1 R1	APT PARMELIA PTY LTD
PL 2 R1	APT PARMELIA PTY LTD
PL 3 R1	APT PARMELIA PTY LTD
PL 5 R1	APT PARMELIA PTY LTD
PL 6 R3	AWE PERTH PTY LTD
PL 7 R1	BURU ENERGY LIMITED
PL 8 R1	mitsui iron ore development PTY LTD NIPPON STEEL & SUMIKIN RESOURCES AUSTRALIA PTY LTD NIPPON STEEL & SUMITOMO METAL AUSTRALIA PTY LTD NORTH MINING LIMITED ROBE RIVER MINING CO. PTY LTD*
PL 12 R1	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*
PL 14 R1	HYDRA ENERGY (WA) PTY LTD QUADRANT OIL AUSTRALIA PTY LIMITED* SANTOS (BOL) PTY LTD TAP (SHELFAL) PTY LTD
PL 15 R1	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD
PL 16	DBP DEVELOPMENT GROUP NOMINEES PTY LIMITED
PL 17	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*

PL 18	AWE (BEHARRA SPRINGS) PTY LTD ORIGIN ENERGY DEVELOPMENTS PTY LIMITED*
PL 19	DBP DEVELOPMENT GROUP NOMINEES PTY LIMITED
PL 20	DBP DEVELOPMENT GROUP NOMINEES PTY LIMITED
PL 21	CHEVRON (TAPL) PTY LTD CHEVRON AUSTRALIA PTY LTD* MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED SANTOS OFFSHORE PTY LTD
PL 22	APA (PILBARA PIPELINE) PTY LTD
PL 24	ALINTA ENERGY GGT PTY LIMITED SOUTHERN CROSS PIPELINES (NPL) AUSTRALIA PTY LTD SOUTHERN CROSS PIPELINES AUSTRALIA PTY LIMITED*
PL 25	SOUTHERN CROSS PIPELINES AUSTRALIA PTY LIMITED
PL 26	SOUTHERN CROSS PIPELINES AUSTRALIA PTY LIMITED
PL 27	SOUTHERN CROSS PIPELINES AUSTRALIA PTY LIMITED
PL 28	SOUTHERN CROSS PIPELINES (NPL) AUSTRALIA PTY LTD
PL 29	QUADRANT EAST SPAR PTY LIMITED QUADRANT KERSAIL PTY LTD QUADRANT OIL AUSTRALIA PTY LIMITED* SANTOS (BOL) PTY LTD
PL 30	QUADRANT EAST SPAR PTY LIMITED QUADRANT KERSAIL PTY LTD QUADRANT OIL AUSTRALIA PTY LIMITED* SANTOS (BOL) PTY LTD
PL 31	APA (PILBARA PIPELINE) PTY LTD
PL 32	APT PIPELINES (WA) PTY LIMITED
PL 33	APT PIPELINES (WA) PTY LIMITED
PL 34	NORTHERN STAR RESOURCES LTD
PL 35	NORTHERN STAR RESOURCES LTD
PL 36	AUSTRALIAN PIPELINE LIMITED
PL 37	NORILSK NICKEL CAWSE PTY LTD
PL 38	APA (PILBARA PIPELINE) PTY LTD
PL 39	ORIGIN ENERGY PIPELINES PTY LIMITED
PL 40	DBNGP (WA) NOMINEES PTY LIMITED
PL 41	DBNGP (WA) TRANSMISSION PTY LIMITED
PL 42	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT EAST SPAR PTY LIMITED QUADRANT KERSAIL PTY LTD QUADRANT NORTHWEST PTY LTD* QUADRANT OIL AUSTRALIA PTY LIMITED SANTOS (BOL) PTY LTD
PL 43	APT PIPELINES (WA) PTY LIMITED* REGIONAL POWER CORPORATION
PL 44	APT PARMELIA PTY LTD
PL 46	APT PARMELIA PTY LTD
PL 47	DBNGP (WA) TRANSMISSION PTY LIMITED
PL 48	ENERGY GENERATION PTY LTD
PL 52	APT PARMELIA PTY LTD
PL 53	APT PARMELIA PTY LTD
PL 54	APT PIPELINES (WA) PTY LIMITED* REGIONAL POWER CORPORATION
PL 55	GLOBAL ADVANCED METALS WODGINA PTY LTD
PL 56	GLOBAL ADVANCED METALS WODGINA PTY LTD

**TABLE 6. LIST OF PETROLEUM TITLES AND HOLDERS IN WESTERN AUSTRALIAN JURISDICTIONS AS AT 17 FEBRUARY 2016**

PL 57	AUSTRALIAN GOLD REAGENTS PTY LTD	PL 87	BHP BILLITON PETROLEUM (AUSTRALIA) PTY LTD* QUADRANT PVG PTY LTD
PL 58	BHP BILLITON PETROLEUM (NORTH WEST SHELF) PTY LTD BP DEVELOPMENTS AUSTRALIA PTY LTD CHEVRON AUSTRALIA PTY LTD JAPAN AUSTRALIA LNG (MIMI) PTY LTD SHELL AUSTRALIA PTY LTD WOODSIDE ENERGY LTD*	PL 88	BHP BILLITON PETROLEUM (AUSTRALIA) PTY LTD* QUADRANT PVG PTY LTD
PL 59	ESPERANCE PIPELINE CO. PTY LIMITED	PL 89	CROSSLANDS RESOURCES PTY LTD
PL 60	EII GAS TRANSMISSION SERVICES WA (OPERATIONS) PTY LIMITED	PL 90	BHP BILLITON PETROLEUM (AUSTRALIA) PTY LTD* QUADRANT PVG PTY LTD
PL 61	APT PARMELIA PTY LTD	PL 91	DBNGP (WA) NOMINEES PTY LIMITED
PL 62	HARRIET (ONYX) PTY LTD KUFPEC AUSTRALIA PTY LTD QUADRANT NORTHWEST PTY LTD*	PL 92	CHEVRON (TAPL) PTY LTD* JERA GORGON PTY LTD MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED OSAKA GAS AUSTRALIA PTY LTD SHELL AUSTRALIA PTY LTD TOKYO GAS GORGON PTY LTD
PL 63	EII GAS TRANSMISSION SERVICES WA (OPERATIONS) PTY LIMITED	PL 93	CHEVRON (TAPL) PTY LTD* JERA GORGON PTY LTD MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED OSAKA GAS GORGON PTY LTD SHELL AUSTRALIA PTY LTD TOKYO GAS GORGON PTY LTD
PL 64	AWE PERTH PTY LTD* ORIGIN ENERGY DEVELOPMENTS PTY LIMITED	PL 94	DBNGP (WA) NOMINEES PTY LIMITED
PL 65	SARACEN METALS PTY LIMITED	PL 95	DBNGP (WA) NOMINEES PTY LIMITED
PL 67	HAMERSLEY IRON PTY LIMITED	PL 96	EMPIRE OIL COMPANY (WA) LIMITED
PL 68	EII GAS TRANSMISSION SERVICES WA (OPERATIONS) PTY LIMITED	PL 97	MINISUI IRON ORE DEVELOPMENT PTY LTD NIPPON STEEL & SUMIKIN RESOURCES AUSTRALIA PTY LTD NIPPON STEEL & SUMITOMO METAL AUSTRALIA PTY LTD NORTH MINING LIMITED ROBE RIVER MINING CO. PTY LTD*
PL 69	DBNGP (WA) NOMINEES PTY LIMITED	PL 98	ESPERANCE PIPELINE CO. PTY LIMITED
PL 70	AWE (OFFSHORE PB) PTY LTD AWE OIL (WESTERN AUSTRALIA) PTY LTD ROC OIL (WA) PTY LIMITED*	PL 99	CHEVRON (TAPL) PTY LTD* KUFPEC AUSTRALIA (JULIMAR) PTY LTD KYUSHU ELECTRIC WHEATSTONE PTY LTD PE WHEATSTONE PTY LTD SHELL AUSTRALIA PTY LTD WOODSIDE ENERGY JULIMAR PTY LTD
PL 72	EDL NGD (WA) PTY LTD	PL 100	DBNGP (WA) NOMINEES PTY LIMITED
PL 73	REDBACK PIPELINES PTY LTD	PL 101	DBNGP (WA) NOMINEES PTY LIMITED
PL 74	EDL LNG (WA) PTY LTD	PL 102	SUB161 PTY LTD
PL 75	EIT NEERABUP POWER PTY LTD ERM NEERABUP PTY LTD*	PL 103	DBP DEVELOPMENT GROUP NOMINEES PTY LIMITED
PL 76	SOUTHERN CROSS PIPELINES AUSTRALIA PTY LIMITED	PL 104	APA (PILBARA PIPELINE) PTY LTD
PL 77	SINO IRON PTY LTD	PL 105	DDG FORTESCUE RIVER PTY LTD* TEC PILBARA PTY LTD
PL 78	HAMERSLEY IRON PTY LIMITED	PL 106	MINISUI IRON ORE DEVELOPMENT PTY LTD NIPPON STEEL & SUMIKIN RESOURCES AUSTRALIA PTY LTD NIPPON STEEL & SUMITOMO METAL AUSTRALIA PTY LTD NORTH MINING LIMITED ROBE RIVER MINING CO. PTY LTD*
PL 80	ALCOA OF AUSTRALIA LIMITED LATENT PETROLEUM PTY LTD*	PL 108	APA OPERATIONS PTY LIMITED
PL 81	QUADRANT NORTHWEST PTY LTD SANTOS OFFSHORE PTY LTD	PL 109	BURU ENERGY LIMITED
PL 82	APA (PILBARA PIPELINE) PTY LTD	PL 110	DDG ASHBURTON PTY LTD*
PL 83	ATCO GAS AUSTRALIA PTY LTD	PL 111	AWE PERTH PTY LTD* ORIGIN ENERGY DEVELOPMENTS PTY LIMITED
PL 84	CHEVRON (TAPL) PTY LTD* JERA GORGON PTY LTD MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED OSAKA GAS GORGON PTY LTD SHELL AUSTRALIA PTY LTD TOKYO GAS GORGON PTY LTD		
PL 85	CHEVRON (TAPL) PTY LTD* JERA GORGON PTY LTD MOBIL AUSTRALIA RESOURCES COMPANY PTY LIMITED OSAKA GAS GORGON PTY LTD SHELL AUSTRALIA PTY LTD TOKYO GAS GORGON PTY LTD		
PL 86	QUADRANT NORTHWEST PTY LTD* SANTOS OFFSHORE PTY LTD		

\* denotes Nominee

Please consult DMP's online Petroleum and Geothermal Register for the most current information on Titles and Holdings.

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Government of **Western Australia**  
Department of **Mines and Petroleum**

