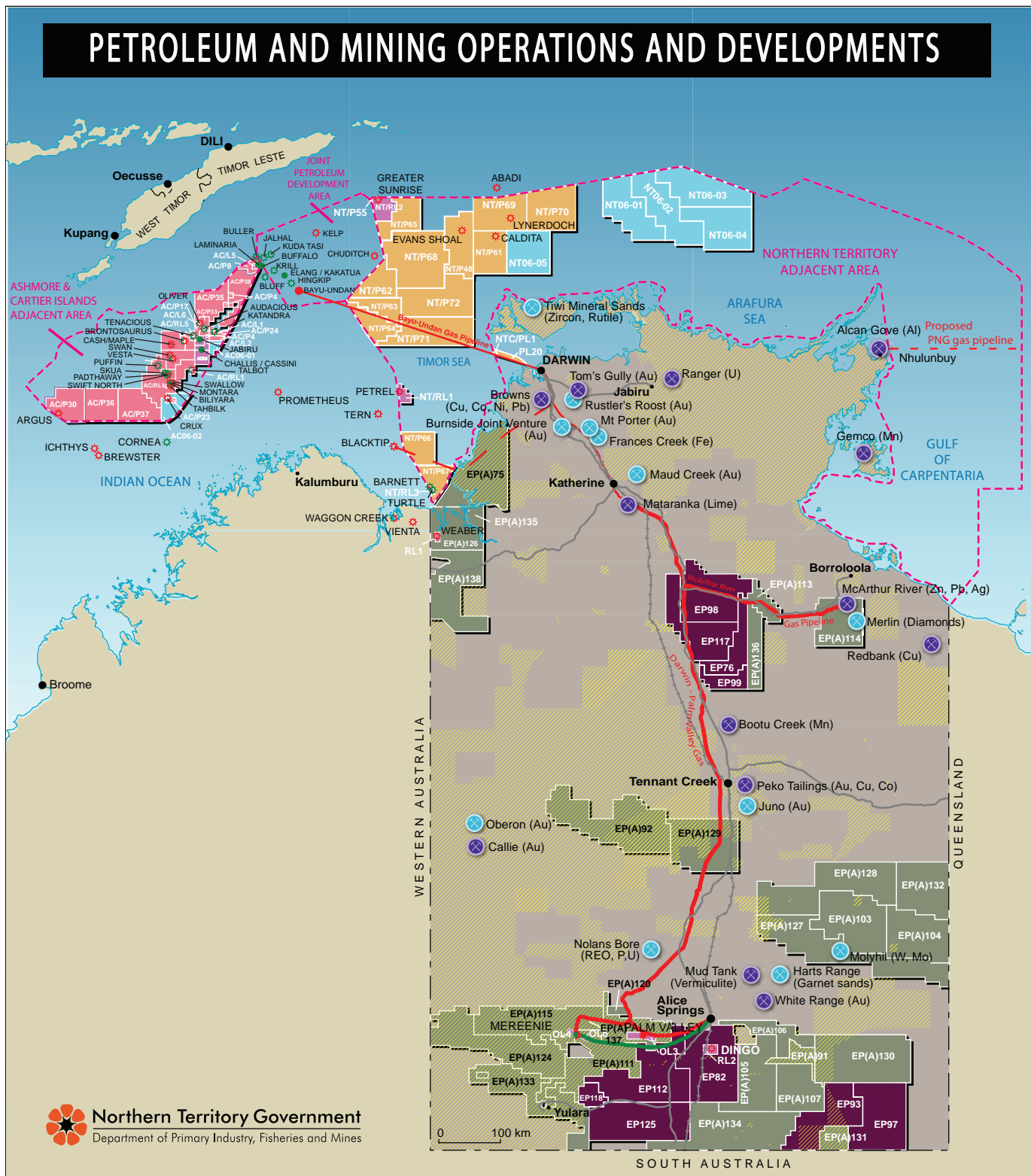


PETROLEUM AND MINING OPERATIONS AND DEVELOPMENTS



Northern Territory Government
Department of Primary Industry, Fisheries and Mines

CURRENT OFFSHORE RELEASE AREAS

2006

CURRENT OFFSHORE EXPLORATION PERMITS

Ashmore & Cartier Island Adjacent Areas
Northern Territory Adjacent Areas

CURRENT ONSHORE EXPLORATION PERMITS

Applications
Granted
Production / Retention

CURRENT LAND STATUS

Aboriginal land

PRODUCING FIELDS

Oil field
Gas field
Oil and gas field

LAMINARIA includes CORALLINA
ELANG / KAKATUA includes KAKATUA NORTH

Gas pipeline
Possible gas pipeline
Oil pipeline

UNDEVELOPED DISCOVERIES

Oil discovery
Gas discovery
Oil and gas discovery

GREATER SUNRISE includes SUNSET, SUNRISE, LOXTON SHOAL, BARD and TROUBADOUR

CURRENT MINERAL DEVELOPMENTS

Operating mine
Mine under feasibility study

ELEMENT ABBREVIATIONS

Ag	Silver	Ni	Nickel
Al	Bauxite	P	Phosphate
Au	Gold	Pb	Lead
Fe	Iron	RE	Rare Earths
Co	Cobalt	U	Uranium
Cu	Copper	W	Tungsten
Mn	Manganese	Zn	Zinc
Mo	Molybdenum		

September 2006
Northern Territory Geological Survey
A06-080.ai

Strengthening of the onshore/offshore petroleum industry, Northern Territory, Australia

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Introduction

The Northern Territory Government has played a major role encouraging exploration in the Territory's offshore and onshore basins. Major goals have been to build the Territory's pre-competitive databases, streamline the administrative process for onshore and offshore tenements and conduct stratigraphic drilling and promote the prospectivity of the NT's basins. These and other projects resulted from a Government-funded initiative entitled "Building the Territory's Resource Base", which was allocated funding of \$15.2 million over the period 2003–2007. This initiative was built around the compilation of pre-competitive datasets, particularly new airborne magnetics data, which is now available online free of charge.

In particular, the aim of the Northern Territory Geological Survey (NTGS) is to encourage new oil plays in areas of existing production (eg offshore Bonaparte Basin), while also promoting both new and traditional petroleum plays in the NT's underexplored, onshore frontier basins. Two petroleum geoscience symposiums, both underwritten by the Northern Territory Government under the auspices of the NTGS, have enhanced our understanding of the petroleum geoscience of these areas at a time when exploration activity and associated capital raisings are surging. The Timor Sea Petroleum Geoscience proceedings (32 papers) was published in 2004 and the Central Australian Basins Symposium Abstracts volume was published in 2005, with full papers to follow in the first part of 2007. For information relevant to these and other geological studies, particularly the onshore petroleum exploration CD, visit our website at www.minerals.nt.gov.au/ntgs.

The offshore/onshore petroleum industry is a big contributor to the NT economy, as reflected in the following production statistics for 2005:

- Offshore Oil: 24.9 thousand barrels per day
- Onshore Oil: 1 thousand barrels per day
- Onshore gas: 45 million cubic feet per day

Acreage release

Timor Sea release areas for 2006 are outlined in Figure 1 and are located in the Vulcan Sub-basin (AC06-02, AC06-01), in the Northern

Bonaparte Basin (NT 06-05) and in the Arafura Basin (NT06-01, 02, 03, 04, 05). Vacant ground onshore can be applied for at any time, provided the application is for less than 200 graticular blocks. Applications should be directed to the petroleum registrar at DPIMF in Darwin: david.errington@nt.gov.au.

Information regarding offshore releases is provided by Geoscience Australia, where the contact is petroleum.exploration@industry.

The following onshore operators are looking at farm-out opportunities: Central Petroleum, Rawson Petroleum and Northern Territory Oil.

Offshore basins

Since 2004, the application of improved technology and more incisive geoscience has doubled the technical exploration success rate (wells with log pay and/or which have recovered hydrocarbons) in the Timor Sea to over 60%. Some of these discoveries, including six new oil discoveries in the Vulcan Sub-basin, will probably be commercialised in the short term. These will be the first commercial oil projects in the Vulcan Sub-basin since Jabiru-Challis in 1983/84 and they herald a new era of exploration and production in this region. The large Caldita-1 gas discovery in the northern Timor Sea was an important success for ConocoPhillips/Santos and may lead to other gas discoveries in this area to augment existing gas reserves in the Evans Shoal and Abadi fields; the potential of the nearby Lynerdoch 'tight gas' field is also being reassessed. These developments have raised hopes for a second LNG train in Darwin in the near future.

So far in the year to September 2006, the offshore Bonaparte Basin has yielded some exciting drilling successes, as summarised below.

Planned and completed seismic surveys for 2006, in the offshore Bonaparte Basin are summarised in figures 1 and 2.

The future

The future for the offshore industry looks very bright and in the period 2006–2009 inclusive, minimum nominated expenditure in NT administered waters will total over \$500 million including 37 wells, 6100 km of 2D seismic data and 5670 km² of 3D seismic acquisition.

There is no better sign of Darwin's emergence as a global energy centre than the regular arrival of giant LNG tankers at ConocoPhillips' \$1.75 billion LNG Plant at Wickham Point. In the immediate future several other projects are expected to come online:

- In the Bonaparte Gulf, a new offshore gas field, Blacktip, will supply gas to Darwin from 2009. A related new gas-processing plant will be built at Wadeye and a new 275 km pipeline will join the existing north–south pipeline at Adelaide River. These projects are worth a total of \$600 m, and are expected to provide a second landing point for offshore gas in the Territory.
- Offshore construction players have been invited to bid for major contracts on Coogee's \$450 m Montara oil project in the Timor Sea. Coogee intends to use an FPSO as a hub on its Montara field and tie in the Skua, Swift North and Swallow satellite fields. First oil production is planned for the third quarter of 2008.
- Development of the Puffin field by AED Oil is moving towards first oil production in early 2007. AED is now conducting studies, including reprocessing of 3D seismic, to obtain a revised reserves figure for the field.
- The Crux liquids recycle project is a focus for Nexus Energy, having sold the gas rights to Shell. The company has completed acquisition of new seismic data and is expected to announce a farm-in to fund FEED studies and drill an appraisal well.
- Darwin will soon host several related oil and gas manufacturing projects including a \$77 m dollar biodiesel production facility, currently under construction, a proposed \$450 m condensate processing facility, and a \$33 m plant that will extract helium from the LNG plant's vent gas stream.

Onshore basins

Today, the onshore Northern Territory is undergoing an exploration watershed. Whereas only a few years ago, less than 10% of the Territory's prospective onshore basins were under licence or application, that figure is now over 90%. Land access agreements forged with the Land Councils have increased dramatically over the last two years. Nine large tenements have been recently granted and exploration program commitments over the next five years will approach \$55 m; this figure will increase dramatically if petroleum discoveries eventuate. Exploration success hinges on new exploration ideas and the application of the latest technology and best practice, innovative geoscience. As previously mentioned, NTGS contributed to achieving the latter by underwriting the Central Australian Basins Symposium in 2005.

Economic dynamics are leading many small Australian explorers to the onshore US, where they are targeting relatively small gas fields and

Exploration Well	Tenement	Status
Magnolia-1 (Coogee Resources)	AC/P32	Dry Hole (P&A)
Puffin-1 (AED)	AC/P22	AC/P22
Swift North-1 (Coogee Resources)	AC/P34	Oil Discovery (Suspended)
Sales Gas/Ethane	AC/P34	Oil Discovery (Suspended)
Evans Shoal South-1 (Santos) (plugged and abandoned)	NT/P48	Gas Discovery
Barossa-1 (ConocoPhillips)	NT/P69	Drilling (gas appraisal well in the Lynerdoch Field)

Figure 1.

Seismic Survey	Tenement	Survey Size
Crucis Seismic Survey 3D	AC/P32	280 km ² (3D Survey)
Santos Evans Shoal 3D	NT/P48	part complete 3000 km ²
Methanol Aust 3D	NT/P68	Commence Oct (500 km ² , 600 km 2D)
Kurrajong 2D	NT/P 62,63,64	Commence Oct. Nov (2133 km 2D)
Sunshine 2D	NT/P 65	(870 km 2D)
Crocodile 2D	NT/P 70	(700 km 2D)

Figure 2. Seismic Survey

early cash flow. However, in addition to the efforts of local explorers like Central Petroleum, NT Oil and Rawson Petroleum, a contrarian approach is being pursued by North American explorers targeting moderate to large oil fields in onshore Australia, particularly in the Northern Territory. Sweetpea Petroleum (based in Denver), who are acquiring 700 km of seismic data in the Beetaloo Basin, is a good example; this company will begin their exploration drilling program in 2007. In addition, Texalta (based in Calgary) are about to launch an exploration program in the Georgina Basin. Both companies are attracted by the potentially large size of target prospects, compared with those available in the USA and the fact that the application of new technology is more than a generation behind the North American industry.

New Petroleum plays in the Northern Territory's onshore/offshore basins

In the Northern Territory, the total onshore area prospective for hydrocarbons exceeds 365,000 km². Although a lack of drilling (only 70 wells drilled onshore) and sparse seismic coverage enhance the geological risk, it is the large size and variety of potential hydrocarbon plays that have caught industry's attention. In recent years, a number of new petroleum plays have been generated by the Northern Territory Geological Survey to attract exploration investment and some of these are described below. An overview of onshore petroleum geology and new play types is in:

Ambrose, G, 2006. Northern Territory of Australia. Onshore Hydrocarbon Potential 2006. Northern Territory Geological Survey, Record 2006-003.

Amadeus basin

The Neoproterozoic–Palaeozoic Amadeus basin is the Northern Territory's only producing onshore basin. However, the original discovery of large oil and gas fields was followed up by only 33 poorly constrained exploration wells located on sparse seismic grids acquired over a prospective area of 170,000 km². A number of small gas fields resulted, but exploration virtually ceased in the early 1990s without the application of any modern seismic technology.

New petroleum plays are discussed in:

YOUNG GEOCONSULTANTS Pty Ltd, 2004. Amadeus Basin seismic interpretation

project. Northern Territory Geological Survey, Record 2004-011.

YOUNG I, AMBROSE GJ AND MARSHALL T, in press. Structure and petroleum geology of the SE Amadeus Basin: the ongoing search for sub-salt hydrocarbons: in: Munson TJ and Ambrose GJ (editors). Central Australian Basins Symposium: Petroleum and mineral potential.

DYSON IA AND MARSHALL TR, 2005. The influence of salt tectonics on Neoproterozoic to Early Palaeozoic sedimentation, Amadeus Basin; in Northern Territory Geological Survey, 2005 (editors). Symposium handbook. Central Australian Basins Symposium: Petroleum and minerals potential. Alice Springs, 16–18 August 2005, 25–27.

Georgina Basin

A Middle Cambrian petroleum system in the southern Georgina Basin is highly prospective, but limited exploration for subtle structural traps has been ineffective due to a lack of seismic control; only 750 line km of seismic data exists over a prospective area of 100,000 km².

New play types in this basin are discussed in the following references:

AMBROSE GJ, KRUSE PD AND PUTNAM PE, 2001. The geology and hydrocarbon potential of the Georgina Basin, Northern Territory, Australia. APPEA Journal, 139–163.

AMBROSE GJ AND PUTNAM PE, 2005. Carbonate ramp sedimentation and oil plays in the Middle-Late Cambrian, southern Georgina Basin – a summary. PESA News 75, 14–15.

AMBROSE GJ AND PUTNAM P, 2005. Carbonate ramp facies and oil plays in the Middle/Late Cambrian, southern Georgina Basin, Australia; in Northern Territory Geological Survey, 2005 (editors). Symposium handbook. Central Australian Basins Symposium: Petroleum and minerals potential. Alice Springs, 16–18 August 2005, 10 (full paper in prep).

Pedirka / Simpson Desert / Eromanga basins

The Simpson Desert area of the Northern Territory encompasses four superimposed sedimentary

basins, namely the Palaeozoic Warburton Basin, the Permo–Carboniferous Pedirka Basin, the Triassic Simpson Desert Basin and the Jurassic–Cretaceous Eromanga Basin (Ambrose et al 2002). These basins have been largely underestimated for the last 20 years, with no exploration drilling in the last 15 years, a period when new exploration axioms were evolving in the analogous Cooper/Eromanga basins to the southeast. A new study of Triassic and Early Jurassic petroleum systems will be published by NTGS in 2007.

New play types are discussed in the following references:

AMBROSE GJ, LIU K, DEIGHTON I, EADINGTON PJ AND BOREHAM CJ, 2002. New petroleum models in the Pedirka Basin, Northern Territory, Australia. APPEA Journal 41(1), 139–163.

Offshore Bonaparte Basin

Exploration has been spurred on recently by a string of new oil discoveries in the Vulcan Sub-basin and large gas discoveries in the northern Bonaparte Basin. An important new oil play targets an Intra-Plover (Middle Jurassic) reservoir seal couplet, and this and other plays are discussed in the following references:

AMBROSE GJ, 2004. The ongoing search for oil in the Timor Sea; in Ellis GK, Baillie PW and Munson TJ (editors), 2004. 'Timor Sea Petroleum Geoscience. Proceedings of the Timor Sea Symposium, Darwin, Northern Territory, 19–20 June, 2003'. Northern Territory Geological Survey, Special Publication 1, 1–22.

AMBROSE GJ, 2006. Potential hydrocarbon column in Thornton-1 in the Timor Sea encourages a Plover "deep" oil play. PESA News 80, 31–34.

Conclusions

The future looks bright for exploration in both the onshore and offshore basins of the Northern Territory. Exploration offshore in the Bonaparte Basin is being stimulated by a spate of oil discoveries and significant new gas finds. Onshore Northern Territory basins have re-entered the limelight as new operators, including several from North America, play off geological risk against the relatively large size of leads and prospects available in these long-neglected basins. ■