Petroleum geology and prospectivity of the onshore Northern Territory, 2014: A new report from NTGS
Report 22

Report 22 is a new NTGS volume that aims to provide a snapshot (as of March 2014) of publicly available information, compiled from industry, government and academic sources, on the petroleum geology of onshore Northern Territory basins, including:

- **the NT’s more prospective sedimentary basins**
  Amadeus, McArthur, onshore Bonaparte and Georgina basins;

- **other Proterozoic basins**
  eg Lawn Hill Platform, Birrindudu and South Nicholson basins;

- **other Phanerozoic basins**
  eg Warburton, Pedirka, Eromanga, Ngalia, Wiso basins;

- **and all the rest**
  including the Cenozoic basins.
NT geological regions

Tenements (March 2014)
Structure of chapters

- Summary of stratigraphic successions, major structures and tectonic history for all of the NT’s onshore basins.
- History of petroleum exploration within each basin.
- Petrophysical and geochemical properties of source rocks, reservoirs and seals.
- Maturation and migration of hydrocarbons.
- Petroleum systems.
- Commercial fields and technical discoveries.
- Resource estimates.
- Prospectivity.
Resource tables

Unconventional oil / condensate resources for NT as of March 2014

Unconventional gas resources for NT as of March 2014
McArthur Basin

Walker Fault Zone

Urapunga Fault Zone

Beetaloo Sub-basin

Batten Fault Zone

Sources: background map – Oz SEEBASE™ depth-to-basement map (2005)
faults – Rawlings (1999)
Barney Creek Fm – cyclic unit  
[source: Richard Keele (CODES)]

Barney Creek Fm – Lamont Pass-3 core;  
(source: Armour Energy Ltd, 2013)
Batten Fault Zone prospects

Glyde-1 prospect
(source: Armour Energy Ltd, 2012)

Batten Fault Zone conventional and unconventional prospects
Roper Group

Middle Velkerri Fm (left) and Moroak Sst; Altree-2 (source Silverman and Ahlbrandt 2011)
more Roper Group

Prospective areas for BCGAs for Bessie Creek and Moroak sandstones (slightly modified after RPS 2013).

Formation tops in Shenandoah-1 (slightly modified after Hoyer et al 2012)
Amadeus Basin

Generalised hydrocarbon lithofacies variation for HVS (modified after Gorter 1984).

Gillen Member shale (source: Ambrose 2011)
New Amadeus Basin oil field: Surprise

Depth structure map of Stairway Sandstone reservoir (after Central Petroleum Ltd 2013)

West–east cross-section through Surprise structure (after Central Petroleum Ltd 2013)

Ordovician unconventional petroleum

Diagrammatic cross-section showing assessment units (AUs) of Lower Larapinta Total Petroleum System (after Warner 2012).
Middle–late Cambrian lithostratigraphic succession of southern portion of Georgina Basin in NT (modified after Ambrose and Putnam 2006)

Time–space diagram for Georgina Basin in NT (modified after Dunster et al 2007)
Thorntonia Limestone and Arthur Creek Formation

Isopach map showing thickness of lower Arthur Creek Formation ‘hot shale’ in southern Georgina Basin (redrawn after PetroFrontier Corp 2013).

Interpretation of regional thermal maturity (modified after Dunster et al 2007)

Arthur Creek Fm over Thorntonia Lst in Elkedra-7 core (after Dunster et al 2007)

Oil shows in Owen-3 core (Petrofrontier Corp website)
onshore Bonaparte Basin

Generalised Devonian–Middle Triassic stratigraphic succession of onshore Bonaparte Basin in NT (modified after Geoscience Australia 2011)

Area of lower Milligans Formation prospective for shale gas (redrawn after Advent Energy 2012)

Weaber gas field: depth–structure map to top of gas-bearing ‘1400 m sand’ in Enga Sandstone (redrawn from Warris 2004)
Other basins: Wiso

Schematic north–south cross-section across Lander Trough, showing structure and possible petroleum plays (modified after Ambrose and Heugh 2011)

Vuggy dolostone of Montejinni Limestone
(source D Karp, Water Resources Branch, NRETAS)
Other basins: Birrindudu Basin

Oil stains in core from 99VRNTGSDD1 (after Dunster and Cutovinos 2002).

(a) Natural light
(b) Oil fluoresces blue-white under UV light

Typical exposure of Timber Creek Formation (after Beier et al. 2002b)

Stratigraphic column for Birrindudu Basin (modified after Dunster et al. 2000)
Other basins: Fitzmaurice Basin

Lithostratigraphic succession of Fitzmaurice Group and possible correlation with Carr Boyd Group in WA, partly after Thorne et al (1999). This is only one of several possible correlations.

Moyle River Formation: cobble conglomerate eroding underlying cross-bedded sandstone (after Dunster 2013)

Structure of Fitzmaurice Basin showing major faults
Other basins: Cenozoic Hale Basin

- Oil yield from two lignite samples of Eocene Ulgnamba Lignite Member: 103 l/t and 74 l/t at zero moisture content (Truswell in Wyche 1983)

Distribution of major Cenozoic basins and palaeovalleys in central and southern NT (redrawn and modified from Bell et al 2012 and Magee 2009)

Interpretative stratigraphic column for of Hale Basin (modified and redrawn after Senior et al 1995)
Acknowledgements
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Availability
Report 22 is available free of charge from the NTGS booth or via download from:

Disclaimer
The aim of Report 22 is to provide a snapshot of publicly available information on the petroleum geology of the onshore NT as of March 2014.
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