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## ASX ANNOUNCEMENT

ASX CODE: CTP

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TO: The Manager, Company Announcements ASX Limited

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### CENTRAL'S NEW LANDER TROUGH OIL PLAY

Central Petroleum Limited (ASX:CTP) ("Central" or the "Company") has pleasure in releasing a report by Greg Ambrose, Manager Geology, and John Heugh, Managing Director, "Maturation Modelling of the Lander Trough, Wiso Basin" based on maturation modelling by Dr Natt Arian, a Melbourne based consultant.

The report concludes that :

- Results of maturation studies encourage further the search for both conventional and unconventionally reservoired oil in Central's Lander Trough acreage with up to c.11 million acres in Central's permits and applications which may be in the early to late oil window with some deeper sections just into the early gas window.
- studies have confirmed that *stratigraphic* equivalents of Middle Cambrian source rocks from the Georgina Basin (the Arthur Creek Shale and the Middle Thornton Limestone) occur in the Lander Trough of the Wiso Basin within Central's permit applications.
- In the Lander Trough, the dominant oil generation rate occurred in the Ordovician as is the case for analogous source rocks to the east in the Georgina Basin. A second pulse of oil generation occurred during the early Alice Springs Orogeny (Siluro/Devonian).
- These models greatly enhance the petroleum exploration potential of the Lander Trough and Green Swamp Shelf in general. The modelling has reduced the perceived risk pertaining to oil generation and migration which is encouraging given CTP has "whole of basin" coverage over the Lander Trough.

Centrals exposure to frontier acreage in the southern Wiso Basin , and in particular the Lander Trough, is consistent with its strategy of taking "whole of basin" positions over sparsely explored Palaeozoic basins (Amadeus Basin, Toko Syncline, Bradley Shelf, Warburton Basin, Pedirka Basin) containing thick Palaeozoic source rock sequences which have passed through or into the peak oil generation window.

The Company's acreage in the Lander Trough consists of EPAs 92,129 and 160. Negotiations continue with Central Land Council concerning the granting of the three permits concerned.

John Heugh

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**NOTICE:** The participating interests of the relevant parties in the respective permits and permit applications which may be applicable to this announcement are:

- EP-82 (excluding the Central subsidiary Helium Australia Pty Ltd ("HEA") and Oil & Gas Exploration Limited ("OGE") (previously He Nuclear Ltd) Magee Prospect Block) - HEA 100%
- Magee Prospect Block, portion of EP 82 – HEA 84.66% and OGE 15.34%.
- EP-93, EP-105, EP-106, EP-107, EPA-92, EPA-129, EPA 130, EPA-131, EPA-132, EPA-133, EPA-137, EPA-147, EPA-149, EPA-152, EPA-160, ATP-909, ATP-911, ATP-912 and PELA-77 - Central subsidiary Merlin Energy Pty Ltd 100% ("MEE").
- The Simpson, Bejah, Dune and Pellinor Prospect Block portions within EP-97 – MEE 80% and Rawson Resources Ltd 20%.
- EP-125 (excluding the Central subsidiary Ordiv Petroleum Pty Ltd ("ORP") and OGE Mt Kitty Prospect Block) and EPA-124 – ORP 100%.
- Mt Kitty Prospect Block, portion of EP 125 - ORP 75.41% and OGE 24.59%.
- EP-112, EP-115, EP-118, EPA-111 and EPA-120 - Central subsidiary Frontier Oil & Gas Pty Ltd 100%.
- PEPA 18/08-9, PEPA 17/08-9 and PEPA 16/08-9 - Central subsidiary Merlin West Pty Ltd 100%.

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Potential volumetrics of gas or oil may be categorised as Undiscovered Gas or Oil Initially In Place (UGIIP or UOIIP) or Prospective Recoverable Oil or Gas in accordance with AAPG/SPE guidelines. Since oil via Gas to Liquids Processes (GTL) volumetrics may be derived from gas estimates the corresponding categorisation applies. Unless otherwise annotated any potential oil, gas or helium UGIIP or UOIIP figures are at "high" estimate in accordance with the guidelines of the Society of Petroleum Engineers (SPE) as preferred by the ASX Limited but the ASX Limited takes no responsibility for such quoted figures.

As new information comes to hand from data processing and new drilling and seismic information, preliminary results may be modified. Resources estimates, assessments of exploration results and other opinions expressed by CTP in this announcement or report have not been reviewed by relevant Joint Venture partners. Therefore those resource estimates, assessments of exploration results and opinions represent the views of Central only. Exploration programmes which may be referred to in this announcement or report have not been necessarily approved by relevant Joint Venture partners and accordingly constitute a proposal only unless and until approved. All exploration is subject to contingent factors including but not limited to weather, availability of crews and equipment, funding, access rights and joint venture relationships.

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# Maturation Modelling of the western Lander Trough Wiso Basin, Northern Territory

(CTP Technical Note 11.05.16)

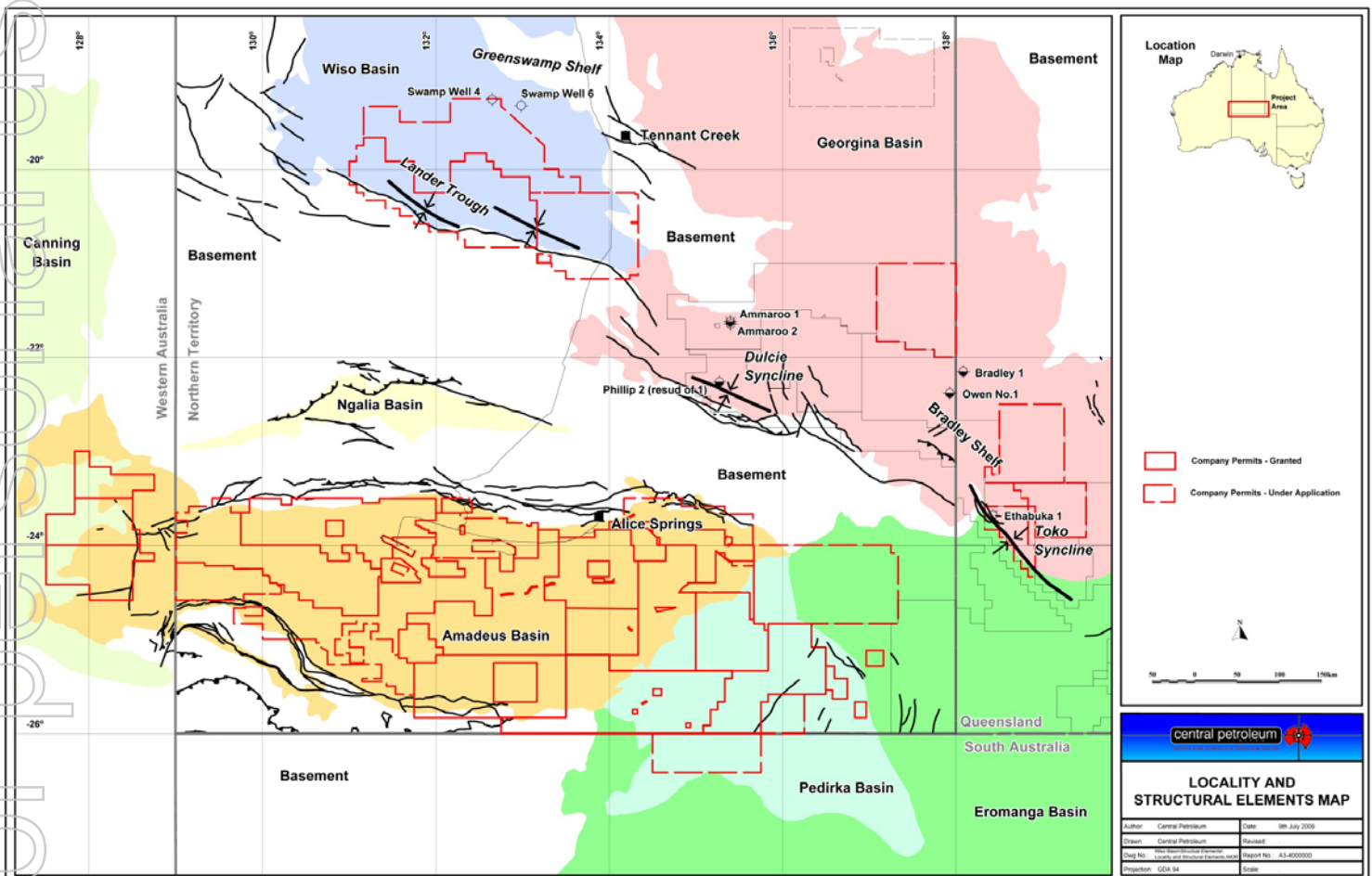
## Executive Summary

- Results of maturation studies encourage further the search for both conventional and unconventionally reservoired oil in Central's Lander Trough acreage with up to c.11 million acres in Central's permits and applications which may be in the early to late oil window with some deeper sections just into the early gas window.
- Regional palaeontological studies have confirmed that *stratigraphic* equivalents of Middle Cambrian source rocks from the Georgina Basin (the Arthur Creek Shale and the Middle Thornton Limestone) occur in the Lander Trough of the Wiso Basin within Central's permit applications. Limited geochemical data suggests the latter includes viable algal/bacterial source rocks but more basinwards drill hole data is required to provide confirmation.
- Maturation modelling of the key source interval in the Wiso Basin, the middle Cambrian Montejinni Limestone, indicates this unit today lies in the late oil to early gas window in the western Lander Trough. The overlying Hooker Formation lies in the main oil window while the overlying sequence is in the early oil window or is immature. In the eastern Lander Trough the Montejinni Limestone could lie in the middle-late oil window or more likely in the early-middle oil window.
- In the Lander Trough the dominant oil generation rate occurred in the Ordovician as is the case for analogous source rocks to the east in the Georgina Basin. A second pulse of oil generation occurred during the early Alice Springs Orogeny (Devonian).
- These models greatly enhance the petroleum exploration potential of the Lander Trough and Green Swamp Shelf in general. The modelling has reduced the perceived risk pertaining to oil generation and migration which is encouraging given CTP has "whole of basin" coverage over the Lander Trough.
- Central's exposure to frontier acreage in the southern Wiso Basin, and in particular the Lander Trough, is consistent with its strategy of taking "whole of basin" positions over sparsely explored Palaeozoic basins (Amadeus Basin, Toko Syncline, Bradley Shelf, Warburton Basin) containing thick Palaeozoic source rock sequences which have passed through or into the peak oil generation window.

# Maturation Modelling of the Lander Trough Wiso Basin, Northern Territory

## Introduction

In central Australia, three contiguous, enechelon depocentres (ie the Lander Trough, the Dulcie Syncline and Toko Syncline) define the southern margin of the Wiso Basin, and the southern and the southeastern margins of the Georgina Basin respectively . The regional geology of these basins has been revamped over recent years and most recent regional correlations occur in the accompanying stratigraphic table. The Dulcie and Toko Synclines in the Georgina Basin have proven potential to generate oil and gas from carbonaceous Middle Cambrian source rocks at two separate stratigraphic levels (the Thornton Limestone and Arthur Creek Fm), both of which are well documented. Similar sequences occur in the Lander Trough, where CTP has a dominant acreage holding, and this note targets their petroleum potential.



Basin Location Diagram showing CTP Permits and Applications

AGE	WISO BASIN (LANDER TROUGH)	DULCIE SYNCLINE (N.T.)	WESTERN TOKO SYNCLINE (QLD.)	DEFORMATION	OIL / GAS	
TERTIARY	UNDIFFERENTIATED	UNDIFFERENTIATED	UNDIFFERENTIATED	ALICE SPRINGS OROGENY		
LATE JURASSIC CRETACEOUS			UNDIFFERENTIATED			
DEVONIAN	LAKE SURPRISE SANDSTONE	DULCIE SANDSTONE	CRAVENS PEAK BEDS	RODINGAN MOVEMENT		
LATE ORD- SILURIAN						
EARLY - MIDDLE ORDOVICIAN	HANSON RIVER BEDS		ETHABUKA SST. MITHAKA FM. CARLO SST.		☀	
			NORA FM. KELLY CREEK FM.			NORA FM. COOLIBAH FM. KELLY CREEK FM.
			TOMAHAWK BEDS			NINMAROO FM.
LATE CAMBRIAN	RIVER BEDS		ARRINTHRUNGA FM. EUROWIE SST. Mbr. CHABELOWE FM. HAGEN Mbr.	DELAMERIAN OROGENY	☾	
						STEAMBOAT SST. ARTHUR CREEK FM. "HOT SHALE"
			ARTHUR CREEK FM. "HOT SHALE"			ARTHUR CREEK FM. "HOT SHALE"
			LOTHARI HILL SANDSTONE HOOKER CREEK FORMATION MONTEJINNI FORMATION			THORNTONIA LSST. THORNTONIA LSST.
EARLY CAMBRIAN	ANTRIM PLATEAU VOLCANICS		RED HEART DOLOSTONE MOUNT BALDWIN FM.	PETERMANN OROGENY	☾	
			ADAM SHALE			
NEOPROTEROZOIC	UNNAMED NEOPROTEROZOIC	MOPUNGA GP	MOPUNGA GP			

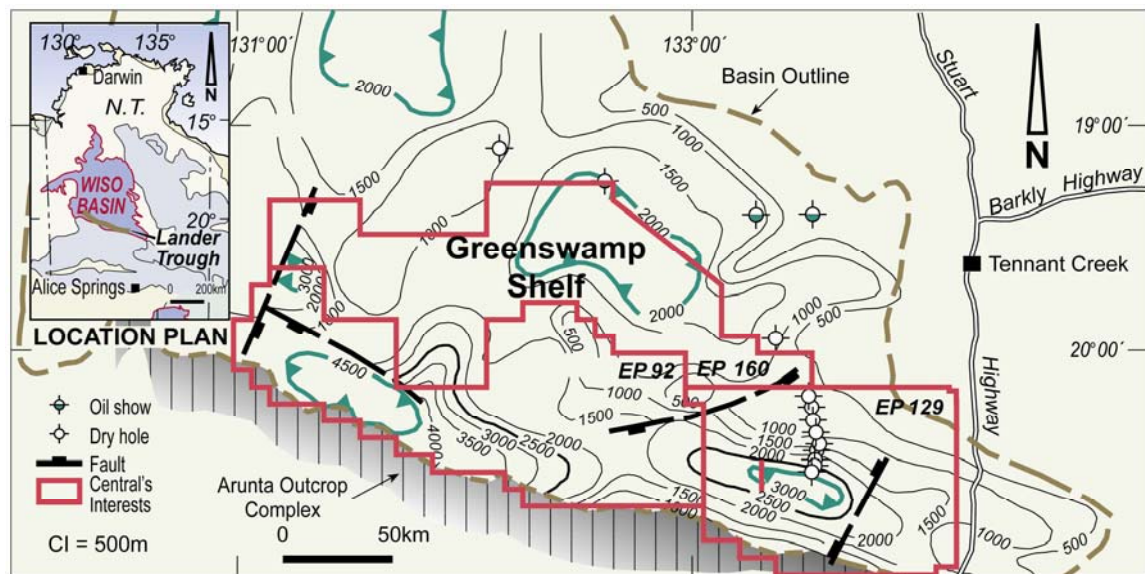
**Stratigraphical table of the Lander Trough and Correlatives in the Southern Georgina Basin**

The lack of deep drilling in the Wiso Basin, particularly in the Lander Trough, has hindered stratigraphic and source rock studies including burial history and thermal modelling which form the basis of source rock maturation modelling. However, new gravity and aeromagnetic interpretations indicate about 2000m and 3000m of Palaeozoic sediments (ie post Pre-Cambrian sediments) are present in the eastern and western Lander Trough depocentres respectively : this note details maturation modelling of the

western depocentre and assesses the implications for maturation in the eastern depocentre.

## Petroleum Geology of the Lander Trough / Greenswamp Shelf

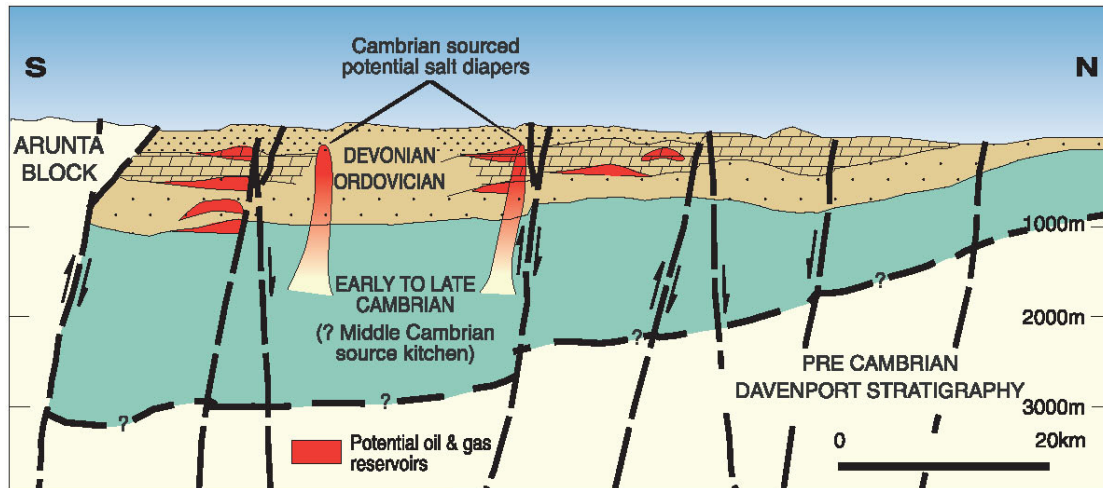
The Lander Trough comprises two enechelon depocentres separated by a mid-basin high. The fault pattern in the area comprises conjugate strike slip faults and normal extensional faults probably reflecting right lateral wrenching orientated along primary north-northwest trending steep reverse fault(s) juxtaposing Palaeozoic sediments against Arunta Block basement (Russell, 1998).



## Lander Trough and Green Swamp Shelf-areomagnetic depth to basement (BMR, now Geoscience Australia)

The two dominant source rocks in a sister basin to the east (the Georgina Basin) are the Middle Cambrian Thornton Limestone and Arthur Creek Formation. Stratigraphically equivalent source rocks in the Lander Trough reside in the Montejinni Limestone and the Point Wakefield Beds-Hanson River Beds respectively. The stratigraphy is well constrained by palaeontology but the only well data comes from the Greenswamp Shelf.

The complete absence of well control data in the Lander Trough is a major constraint on the burial history and maturation models but by applying geothermal gradient data from the Dulcie Syncline in the western Georgina Basin and drawing on limited maturation data from the Green Swamp Shelf, reasonable conclusions can be drawn regarding the type of hydrocarbons generated and the timing of migration.



**Southern Wiso Basin – Lander Trough**

Samples of oil prone Montejinni carbonaceous carbonates from the Greenswamp wells on the northern flank of the Lander Trough (Greenswamp Shelf) yielded some TOC's over 1% and a corrected hydrogen indice of 539 mg/g. Significantly, Tmax values in overlying carbonaceous rocks of the Hooker Fm suggest an insitu vitrinite relectance of Vr0 0.50 – 0.65 (Tmax 435-440 deg.c) which is in the early oil window. Tarry residues and interpreted residual hydrocarbons were reported in Green Swamp 1 and 6 respectively. (Gorter et al,1998).The current shallow depth of burial (~ 200-300m) coupled with the insitu maturation of Vr0 0.6 average of GS-1 and GS-6 suggests major basin unroofing on the shelf and possibly the sediments in the deeper trough as well - certainly this sequence would have generated and expelled oil from the western Lander Trough where the sequence is estimated to be 3000 m deeper than that intersected on the Greenswamp Shelf. Additional evidence comes from the western Georgina Basin where an equivalent sequence, the Thornton Limestone, is 100+ m thick and comprises black bituminous limestone and shale which have excellent source rock characteristics (TOC's of up to 2.75%- Dunster et al, 2007).

### Maturation Modelling – Lander Trough

The Lander Trough comprises two enechelon depocentres where depth to magnetic basement is modelled, from west to east, to be 4500 m and 3000 m respectively. The former is modelled here (undertaken by consultant Dr. Natt Arian) with input parameters related to the predicted stratigraphic section, and tectonic and geothermal histories, provided by CTP. The applied temperature gradient for the period of the Alice Springs Orogeny (ie 54 Deg. C/km) was derived from data in the Dulcie Syncline in the western Georgina Basin which is published in Gibson et al (2007).

Detailed maturation modelling of the deeper western axis of the Lander Trough is summarised in the following three diagrams. The main uncertainties pertain to the thickness and lithology of the Palaeozoic section. Depth to magnetic basement is estimated at 4500 m (Kennewell et al,1977 and Questa Australia Pty Ltd, 1989) . If this is accurate, and other modelled parameters are reasonable, then the onset of oil generation from Middle Cambrian source rocks would have commenced in the Ordovician. However, if indeed the interpreted depth to basement is in fact depth to Early Cambrian volcanics, which occur to the north, then there are two major implications:

- 1) The depth of the probable source horizons in the western depocentre would be over 1000 m deeper than in the proposed model (ie 4000 m versus 3000 m, to the Montejinni Limestone). This would dictate the Montejinni Limestone in the west would have almost certainly have entered the gas window during the Alice Springs Orogeny.

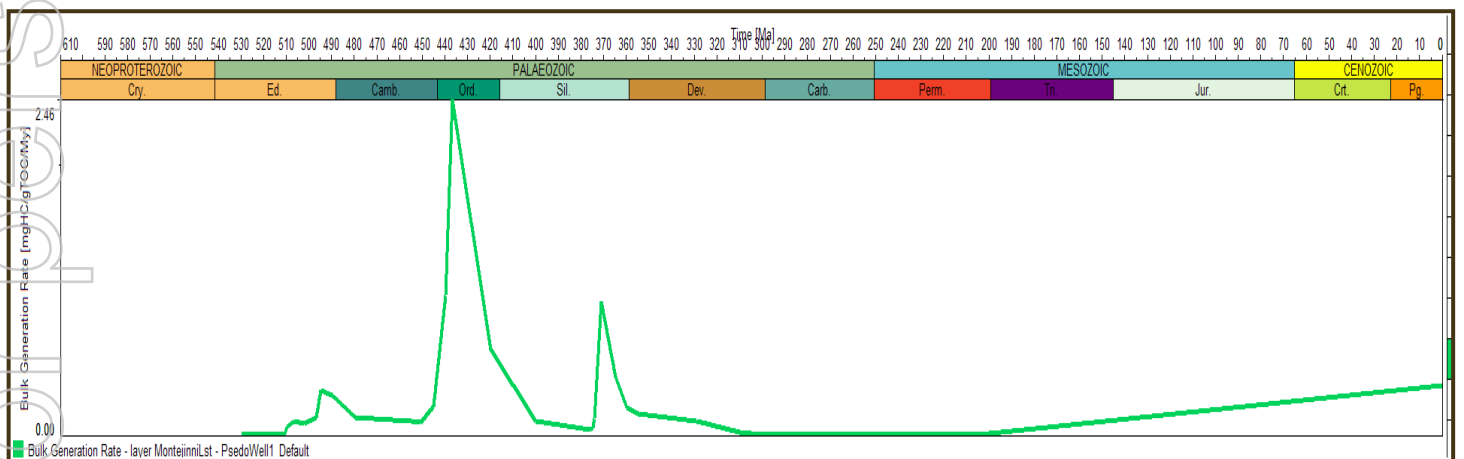
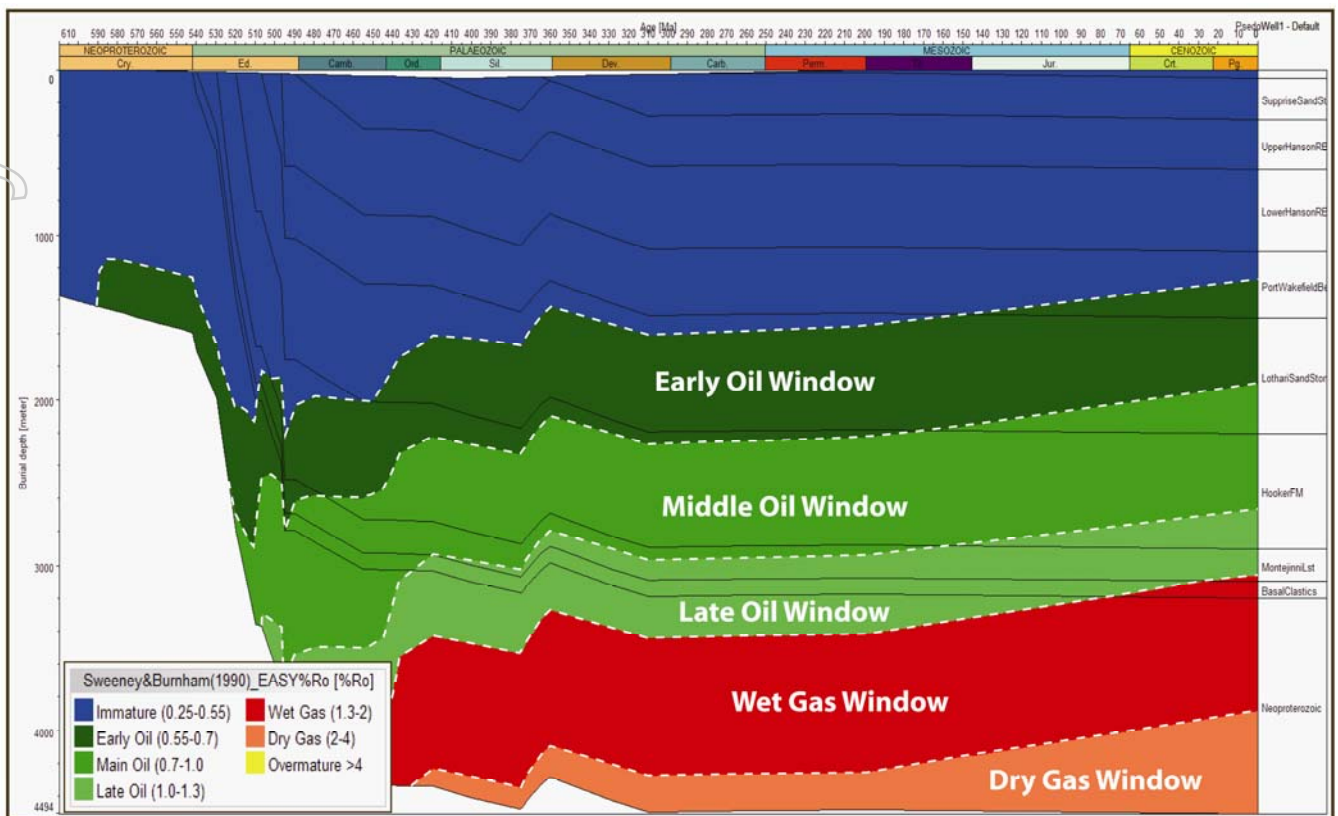
- 2) The depth of the probable source horizons in the shallower eastern Lander Trough would be about 2800 – 3000 which, based on the same thermal model applied for the western depocentre, would suggest proposed Middle Cambrian source rocks entered the oil window in the Ordovician and today reside in the mid-late oil window.

<b>Formations</b>	<b>Thickness metres</b>	<b>Thermal Conductivity</b>
Cain –Cretaceous	50	2.25
Surprise Sandstone	250	3.62
U. Hanson R. Beds	300	3.46
L. Hanson R. Beds	500	3.45
Point Wakefield Beds	400	3.21
Lothari Sandstone	700	3.95
Hooker Formation	200	1.96
Montejinni Lsst	100	1.87

Thus there is both a conservative (low case) and optimistic (high case) depth model for both depocentres in the Lander Trough. The conservative model puts the Middle Cambrian source sequences in the eastern and western depocentres in the early oil window and mid-late oil window respectively. The optimistic model puts these source rocks in the western and eastern depocentres in the early-middle gas window and the mid-late oil window respectively. Based on the work of Gorter, Nicoll, Purcell and Phillips ( Gorter et al., the wells Green Swamp 1 and Green Swamp 6 showed the Hooker Creek Fm in the mid-early oil window of maturation as indicated by  $T_{max} = 435-440 \text{ deg C}$ . There is thus a case to be put that all of Central's permit applications, which are all well to the south and all considerably deeper than GS-1 and GS-6 host source rocks that range from the early oil window to the early gas window. The area involved is some 43,000 km<sup>2</sup> or c 11 million acres.

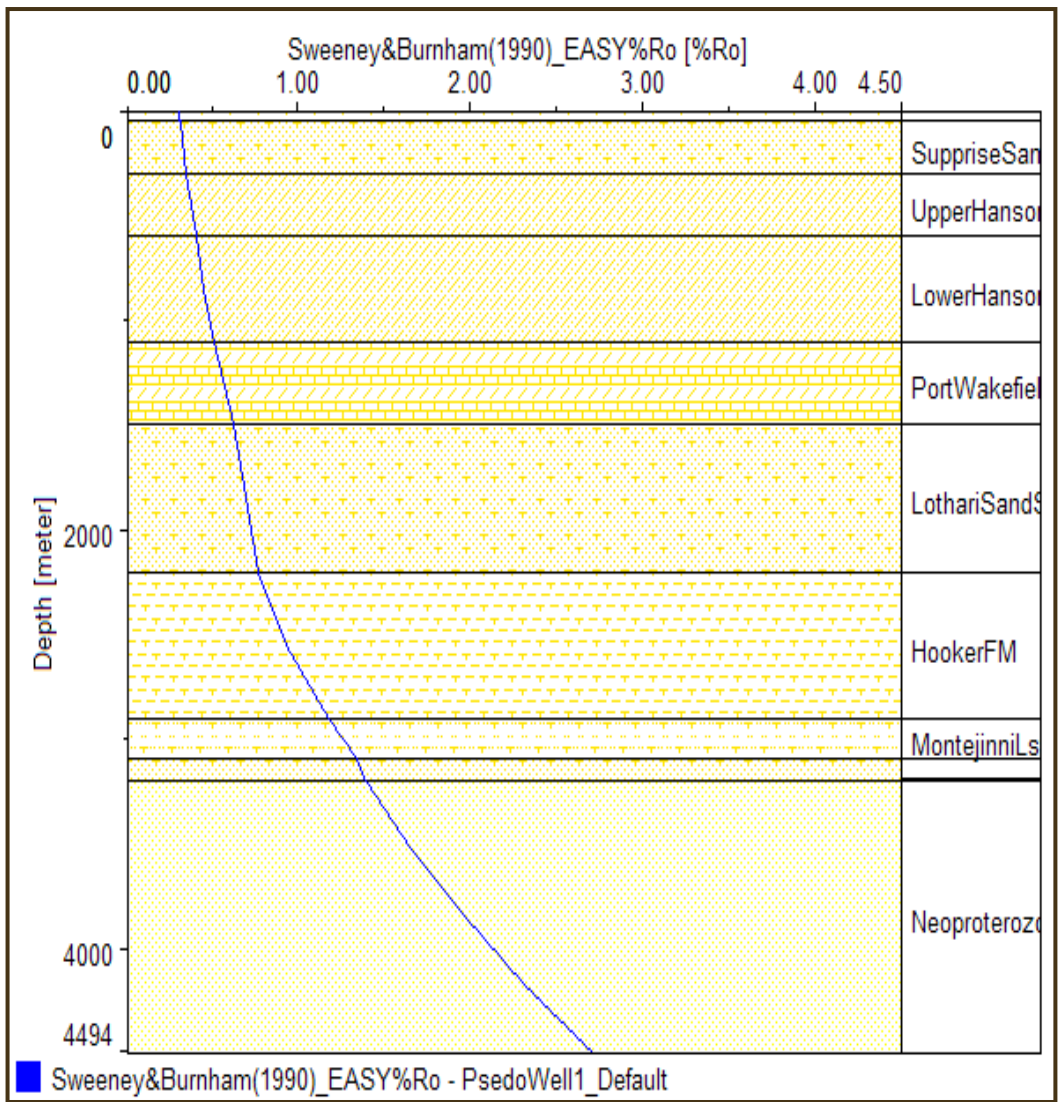


## Maturation Model For the Western Lander Trough



**Oil Generation Rates for the Montejinni Limestone in the Western Lander Trough.**

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Predicted Maturity for the western Lander Trough

## Conclusions

- Interpretations of maturation history in the Lander Trough, plus analogies with chronostratigraphic formation equivalents in adjacent depocentres to the east in the Georgina Basin (particularly the Toko Syncline), support the notion that hydrocarbon generation from Middle Cambrian source rocks in Central's permit applications in the Lander Trough commenced in the Ordovician and that a second pulse of generation occurred at some stage during the Devonian – Carboniferous Alice Springs Orogeny. The productive “kitchen” could have covered as much as about 43,000 km<sup>2</sup> or c.11 million acres in Central's permit application areas with hydrocarbons migrating northwards to the shallower Greenswamp Shelf. Both structural and stratigraphic components would have contributed to entrapment and in addition basin centred gas and oil plays (unconventional) may be present over large areas.
- Assuming similar geothermal gradients applied to the eastern Lander Trough, the maturation model suggests early oil to late oil maturation of source rocks depending on the actual depth of burial.
- By analogy with the southern Georgina Basin, the Lander Trough and Green Swamp Shelf are considered highly prospective and any success coming from upcoming drilling in the former ( eg PetroFrontiers drilling program) will greatly enhance the exploration profile of the Lander Trough (Wisio Basin) and the Toko Syncline ( southern Georgina Basin).

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Managing Director

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**May 2011**

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