



ASX:EEG

Oil & Gas from the McArthur - Beetaloo Basins



Alex Underwood, MD Empire Energy Group, SEAOC Darwin, September 2019



Small, agile
and ready to
move...

Katherine Times

YOUR TOWN & COUNTRY WEEKLY

SEPTEMBER 2, 2019 - 2:17PM

The race is on - third company wants to drill for gas



Chris McLennan



Corporate Snapshot



Pro-Forma Capital Structure

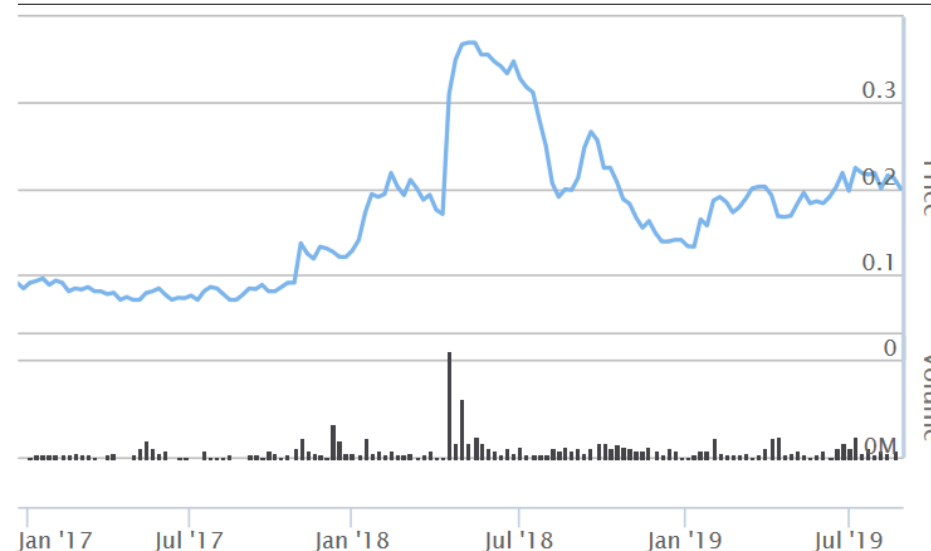
Shares on issue	231m
Share price	A\$0.20
Market cap	A\$46m
Net debt	A\$31m
Enterprise value	A\$77m
Cash at bank	A\$6m

Pro-Forma Net Debt Post Kansas Sale A\$6m

Corporate Structure



ASX Share Price

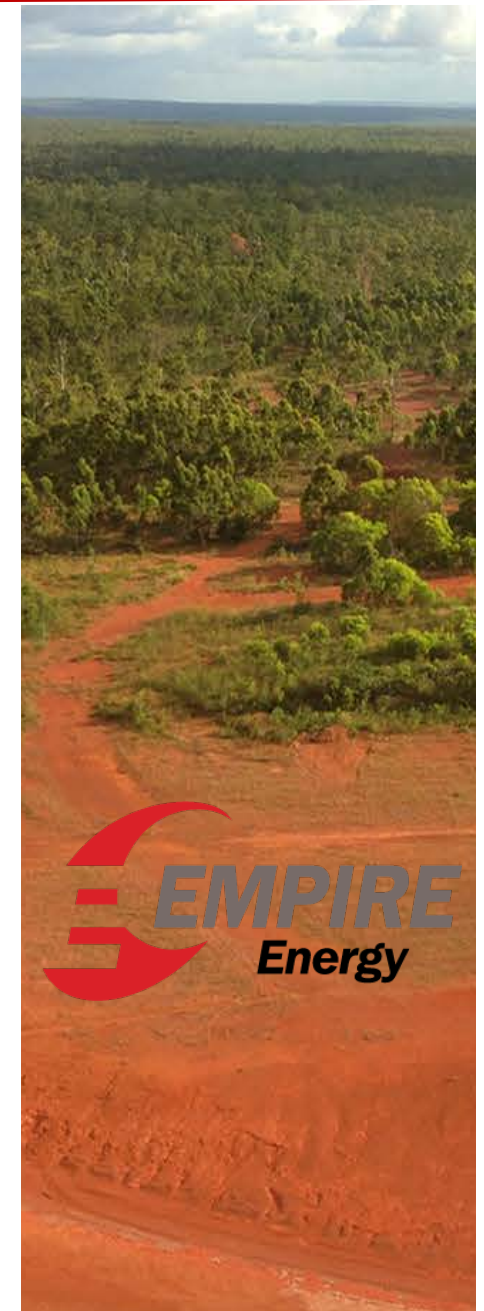


Top Shareholders

Macquarie Bank Limited	14.7%
Global Energy and Resources Development Limited	10.7%
Liangrove Media Pty Limited	5.3%
Elphinstone Holdings Pty Limited	3.0%
Board & Management	7.0% ↑

Empire Energy – new board, new focus

- Company recapitalisation in August 2018 and 1 for 10 consolidation
- Board renewal with Alex Underwood, Paul Espie, John Warburton and John Gerahty joining
- USA asset sale process commenced in late 2018 to reduce debt and focus on Beetaloo and McArthur
- Sale of Kansas assets for US\$19.1 million announced reducing net debt from A\$31m presently to ~A\$6m, with pro-forma cash at bank of ~A\$5m
- Empire will retain its cash flow positive New York / Pennsylvania gas production assets



Directors of Empire Energy Group



Alex Underwood

Chief Executive Officer and Managing Director

- Associate Director Energy Markets Division of Macquarie Bank Limited (Sydney and Singapore)
- Director Natural Resources Division of Commonwealth Bank of Australia (Singapore)
- Financial Analyst BHP Billiton Petroleum (Perth)
- Extensive experience investing debt and equity in the upstream oil and gas sector and the identification of value creation opportunities for upstream oil and gas development / production assets

Prof John Warburton

Non-Executive Director

- Highly regarded petroleum geoscientist experienced in big fields
- 30 years technical & leadership experience in leading E&P companies including BP, LASMO-Eni and Oil Search
- Previously Chief of Geoscience & Exploration Excellence for Oil Search
- Non-Executive Director of Senex Energy



Paul Espie AO

Chairman / Non-Executive Director

- Founding principal of Pacific Road Capital, a manager of private equity funds investing in the resources sector internationally
- Former Chairman of Oxiana Ltd during the development of the Sepon copper/gold project in Laos
- Former Chairman of Cobar Mines Pty Limited after a management buyout
- Former Head of Bank of America operations in Australia, New Zealand and PNG
- Non-Executive Director of Aurelia Metals Limited



John Gerahty

Non-Executive Director

- Founding Director of Macquarie Bank
- Former investment banker with wide experience in commerce and business
- Former director of numerous public companies including Chairman of AFP Group PLC and MPI Mines Ltd
- Chairman of Hardie Grant Pty Limited, its major shareholder Associated Media Investments Pty Limited and AMI Advertising Media Pty Limited

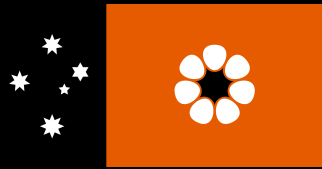
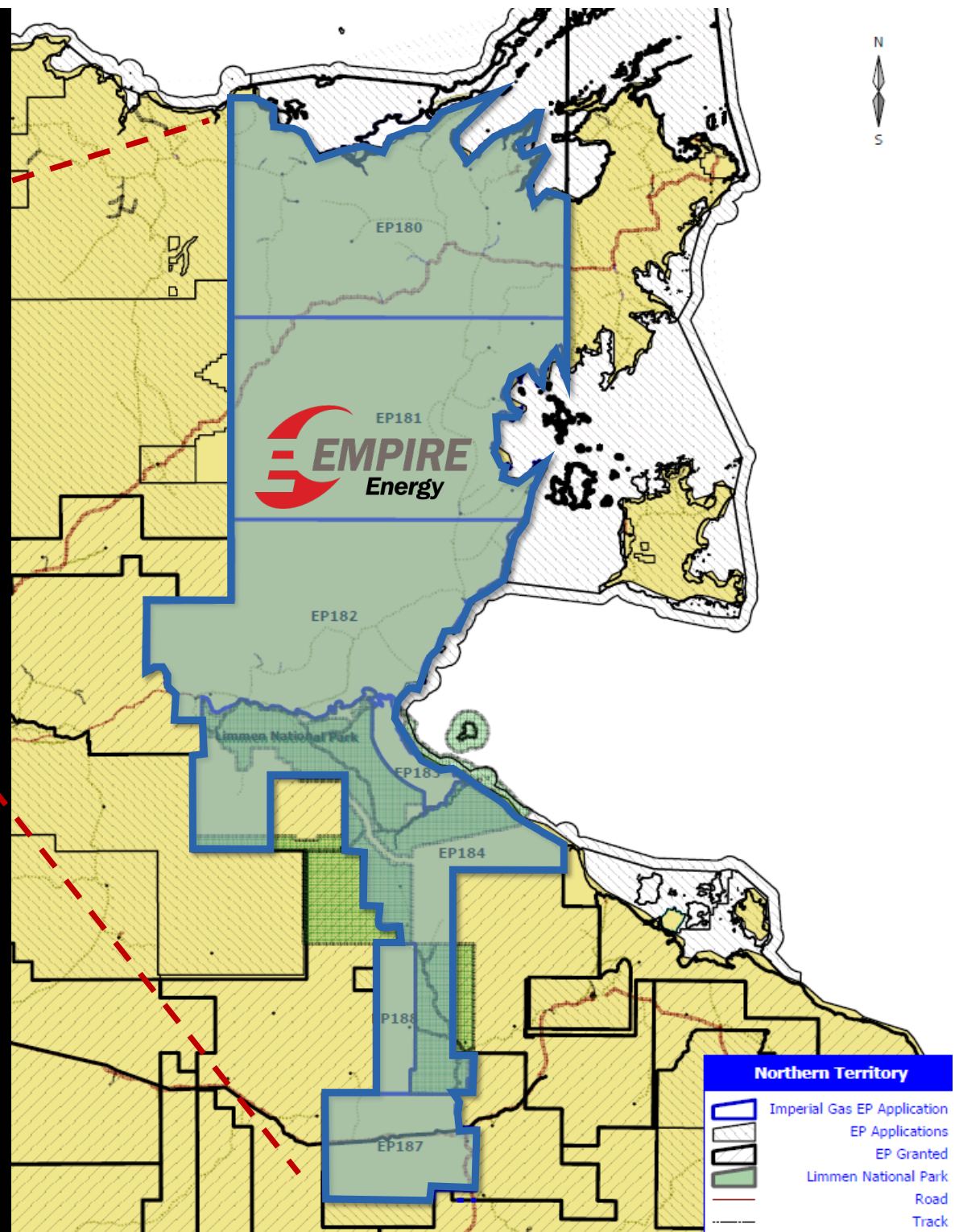
Corporate transformation, accelerating in the field

- Balance sheet repaired over 2018 – 2019 to prepare for NT exploration
- USA asset sale process commenced in late 2018 to focus on Beetaloo and McArthur
- The most active junior oiler in these new Northern Territory basins, with the most direct ASX investment exposure

- 231km seismic program to kick off in EP187 in 2019
- Approval Process for drilling underway



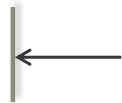
Both basins in NT's new hydrocarbon frontier



Lesser known, but the McArthur Basin may yield more



NW



McArthur Basin Central Trough



SE



Imperial 2014
Exploration Wells

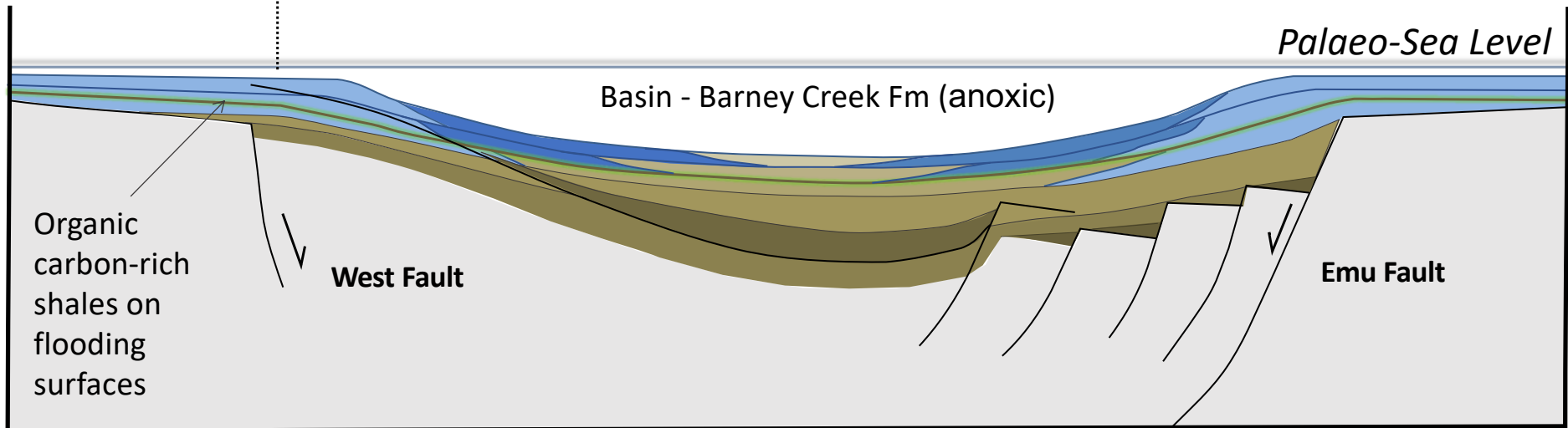
Palaeo-Sea Level

Basin - Barney Creek Fm (anoxic)

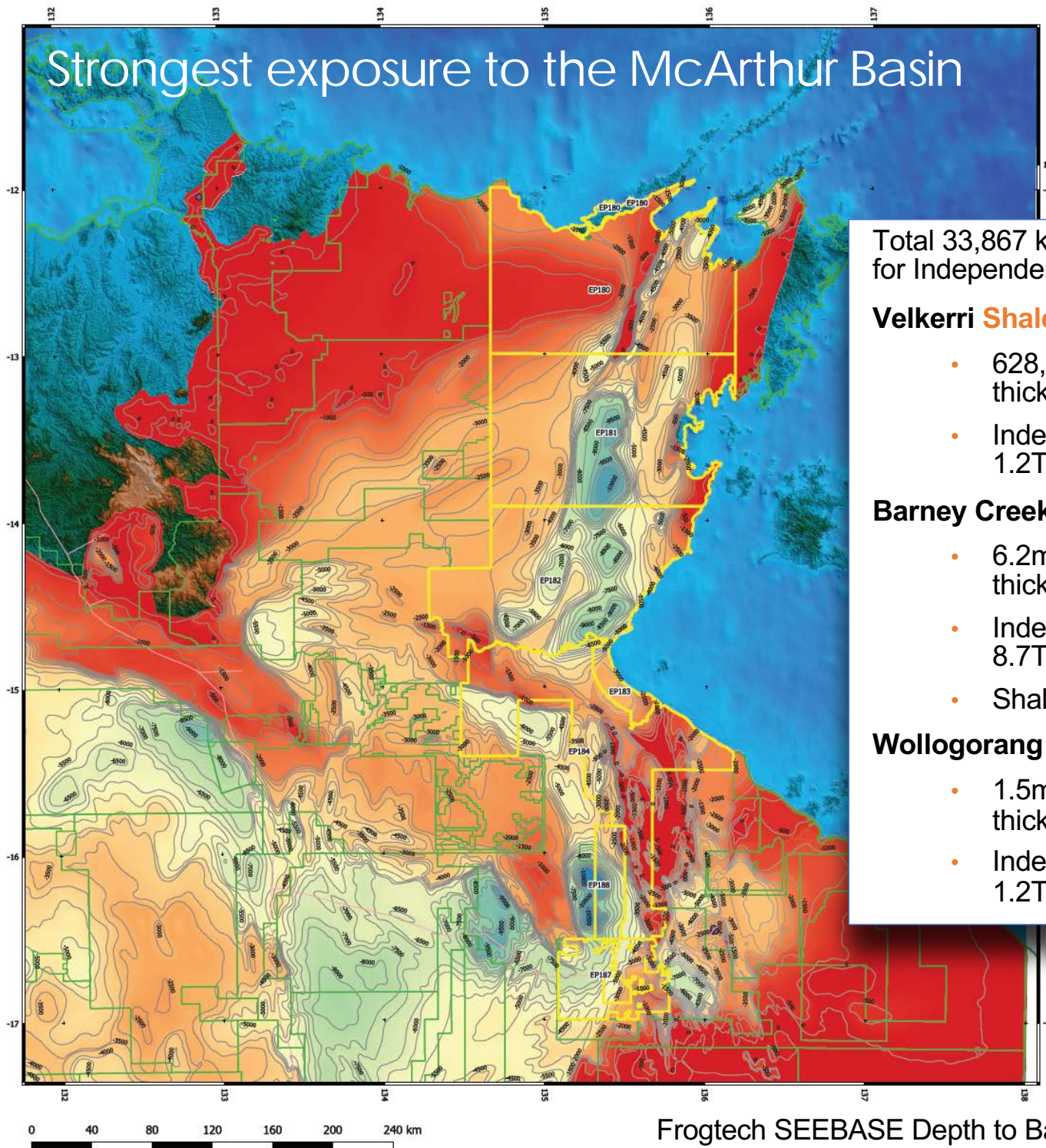
Organic
carbon-rich
shales on
flooding
surfaces

West Fault

Emu Fault



Strongest exposure to the McArthur Basin



Total 33,867 km² (8.4mm acres) of identified shale for Independent Prospective Resource identification

Velkerri Shale / Kyalla (Beetaloo sub-Basin)

- 628,000 acres (>2,500km²), up to 600m thick
- Independent Prospective Resource (P50) 1.2TCF gas + 24 mmbbls oil / condensate

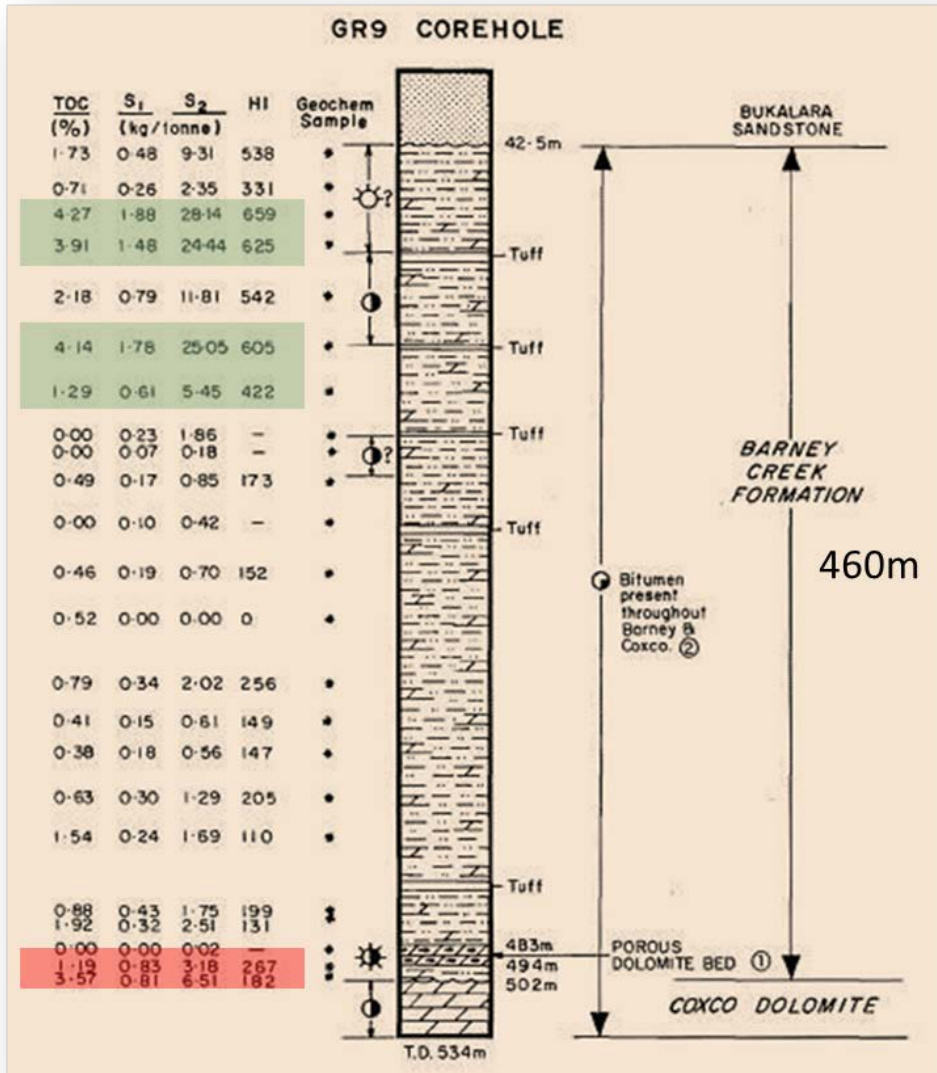
Barney Creek Shale (McArthur Basin)

- 6.2mm acres (>25,000km²), up to 900m thick
- Independent Prospective Resource (P50) 8.7TCF gas + 174 mmbbls oil / condensate
- Shales up to 3km thick

Wollogorang Formation (McArthur Basin)

- 1.5mm acres (>6,000km²), up to 100m thick
- Independent Prospective Resource (P50) 1.2TCF gas + 24 mmbbls oil / condensate

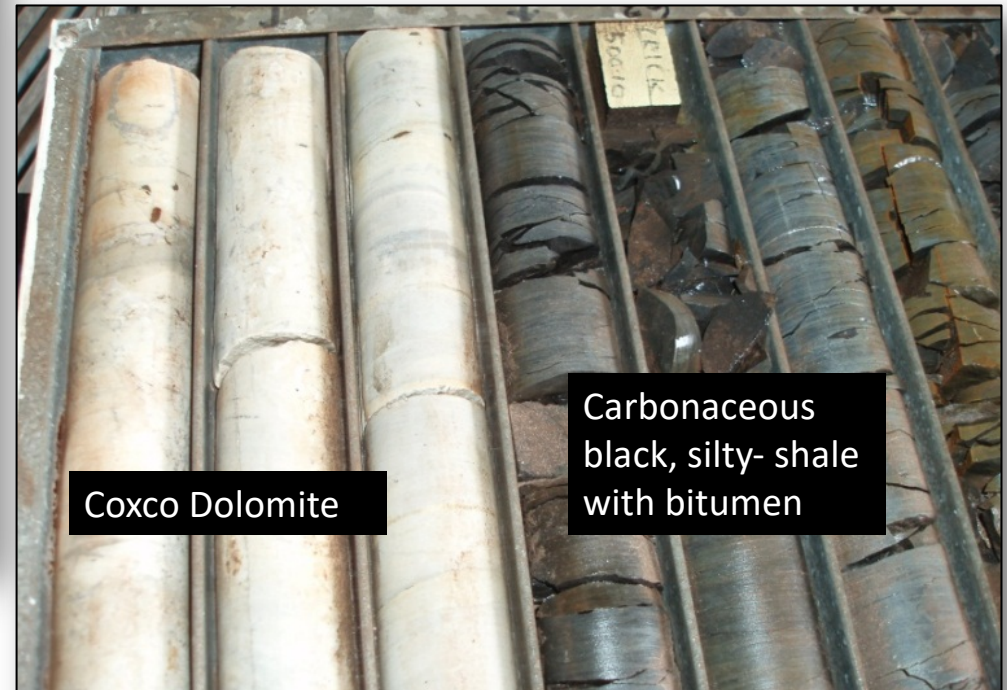
Where the story starts... Gas strike in an April 1980 mineral drillhole

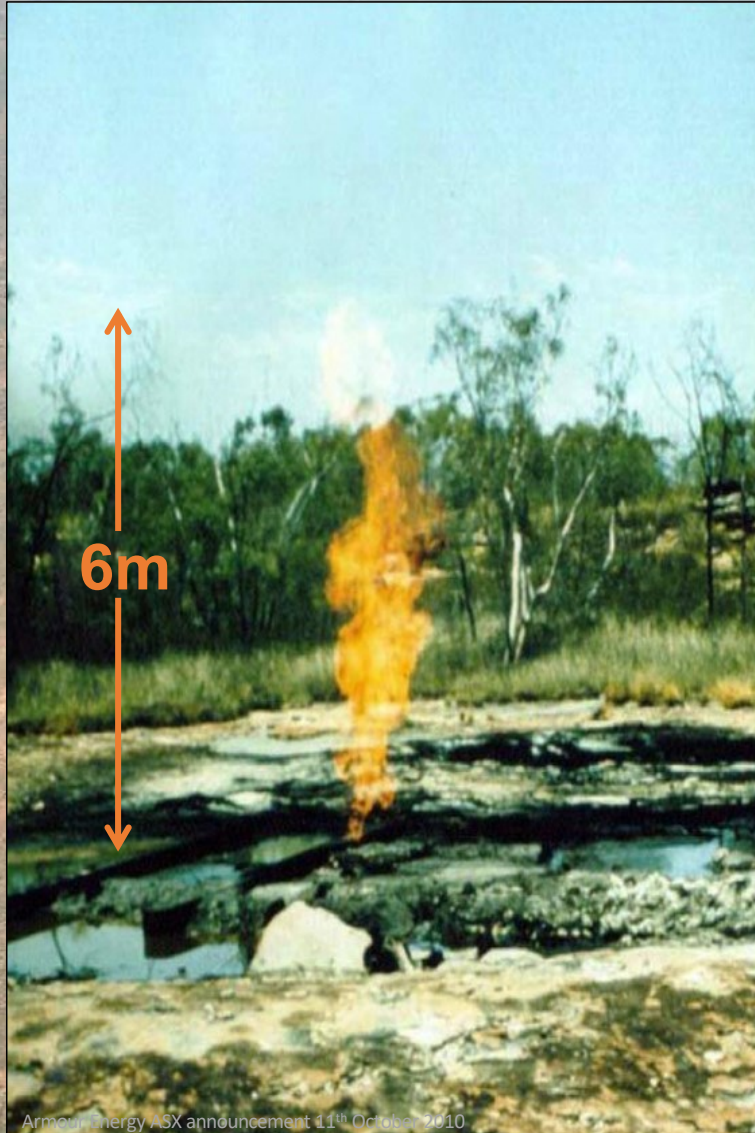


The most spectacular indication of live hydrocarbons encountered to date in the McArthur Group was in the Kennecott-Amoco mineral exploration corehole GR 9, drilled in the Glyde area. A summary log of this drillhole is shown as Figure 5, and the location is shown in Figure 2. Upon unintentional swabbing at the end of drilling (in December 1979), the corehole experienced a gas blow-out which yielded a 5-6m (15-20 ft) long flame. Condensate flow accompanying the gas, was indicated by the bright orange-yellow colour of the flame, and by an accompanying sooty tail. The hole flowed gas for an indeterminate period during the immediately following "Wet" season. By the end of the "Wet" the hole was filled with water and the gas flow had degenerated to a series of gas bubbles percolating through hydrostatic head. A sample of the gas taken at this stage yielded the following analysis:-

Methane	74.25%
Ethane	10.25%
Propane	3.25%
Iso-Butane	0.175%
N-Butane	0.60%
N-Pentane	0.105%
Hexane	0.165%
Heptane	0.08%
Nitrogen	10.75%
Carbon Dioxide	0.20%

The hole was plugged with cement in April 1980.





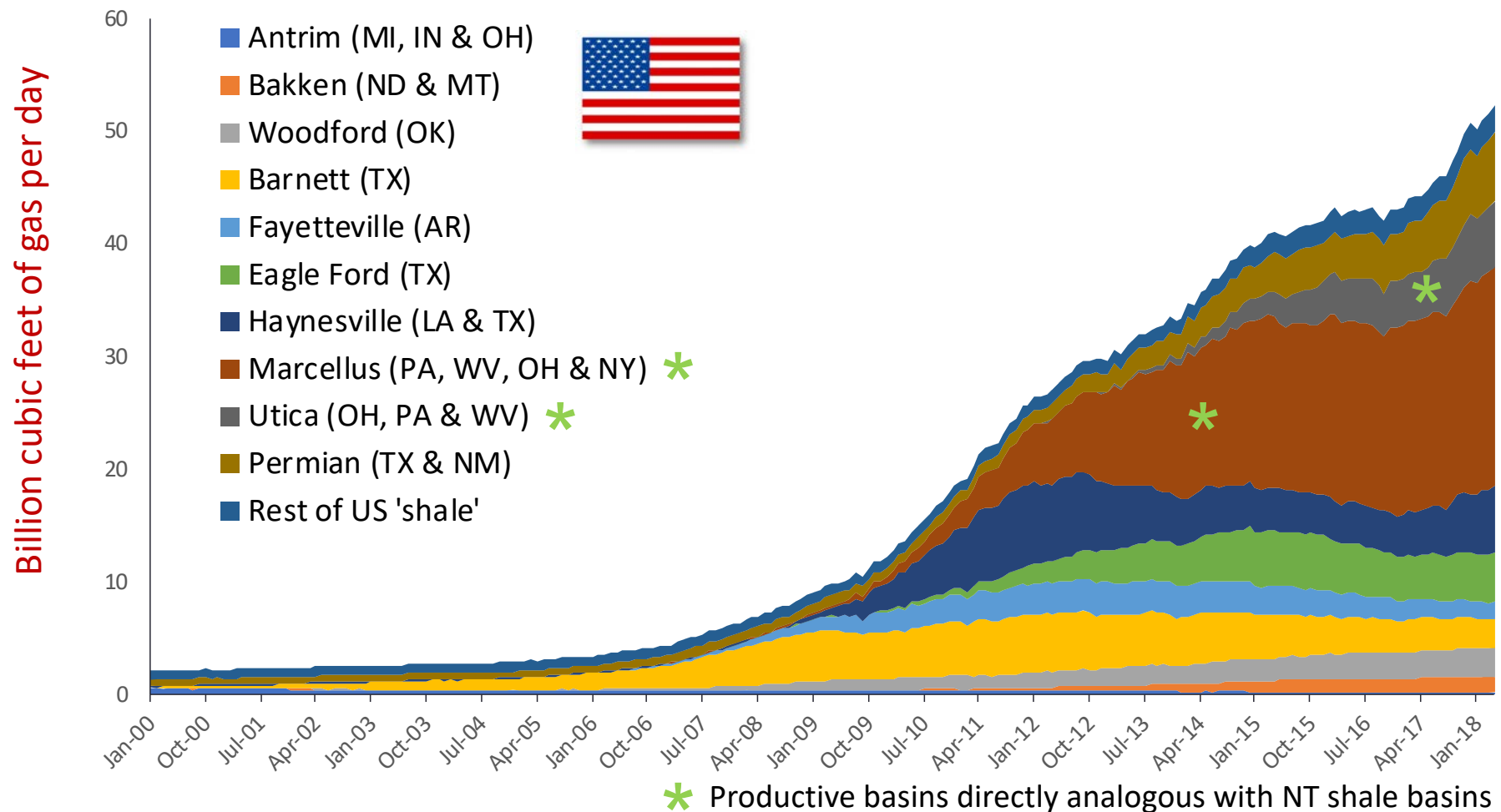
Armen Energy ASX announcement 11th October 2010

- GRNT-09 Mineral Well flowed gas & condensates at 140psi for 6 months at ~ 6 mmcfpd, for ~2 Bcf/yr
- Over 30 hydrocarbon wells have been drilled since
- And over \$800m committed to exploring this new hydrocarbon province

Horizontal drilling and fracking shale gas transformed the US energy market, and its geopolitics



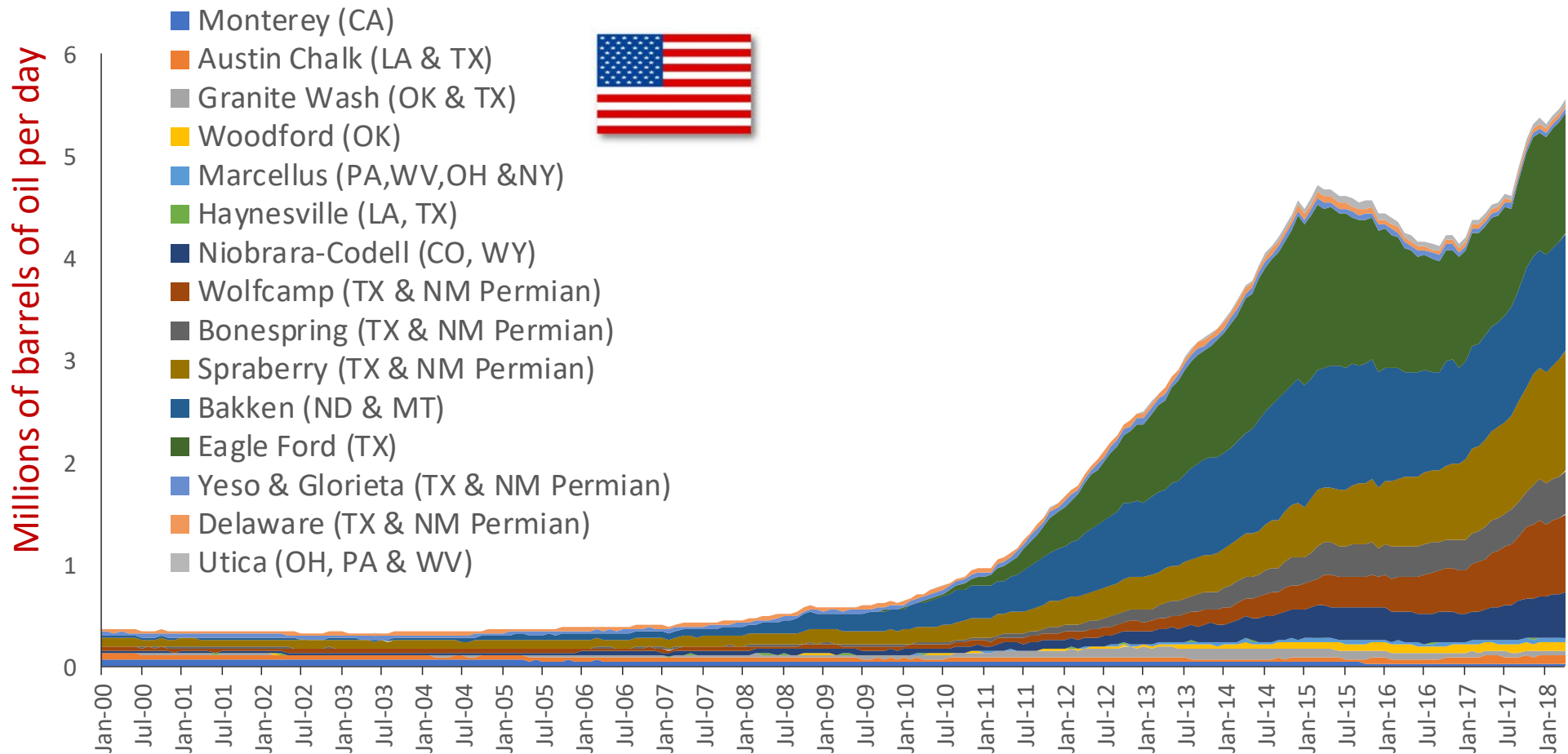
Monthly US shale gas production figures since 2000 coloured by shale formation

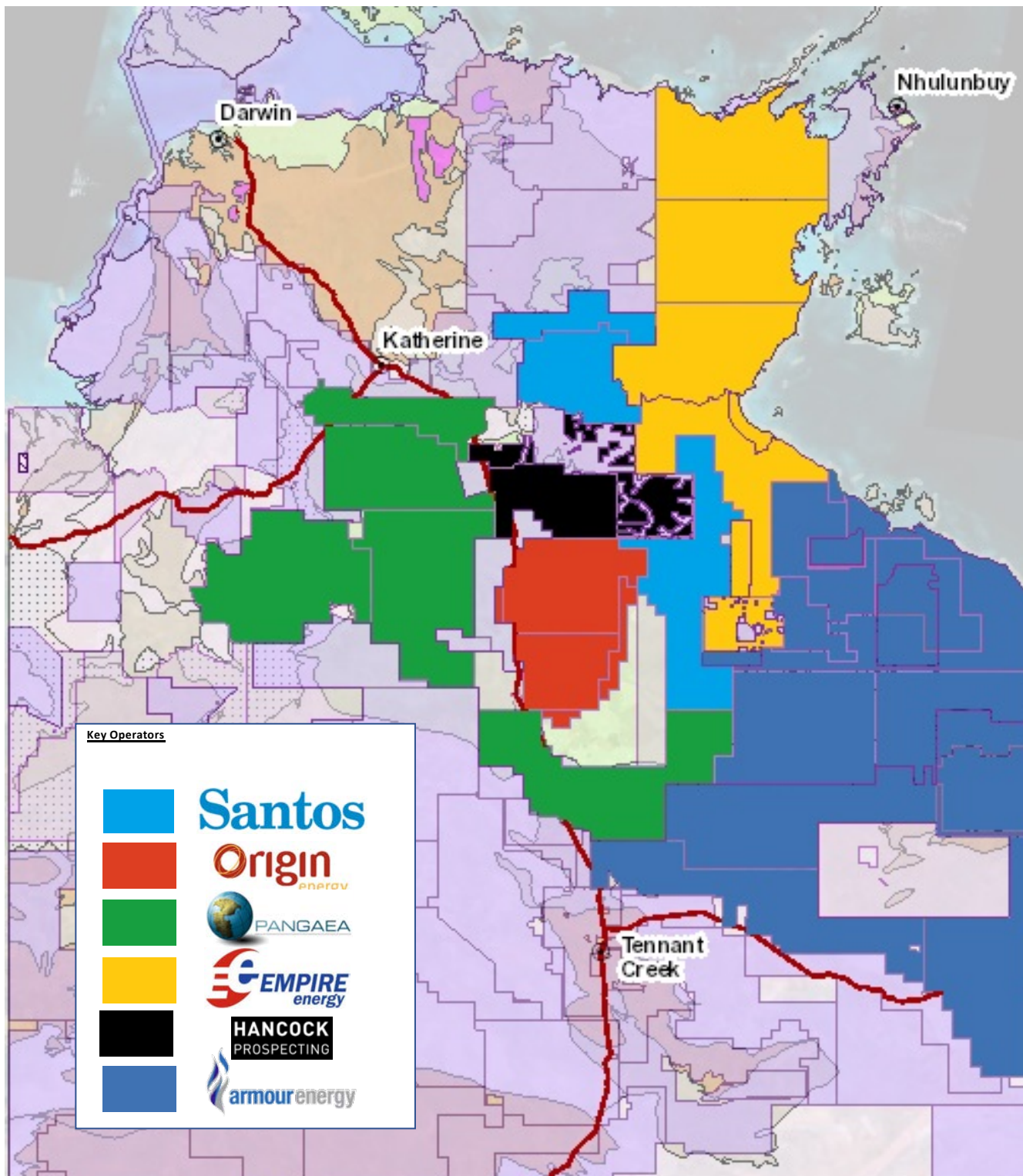


Horizontal drilling and fracking shale oil transformed the US energy market, and its geopolitics



Monthly US shale oil production figures since 2000 coloured by shale formation





2019 the watershed moment – drilling ramping up

- Numerous large independent oil and gas companies hold substantial acreage positions in the Greater McArthur Basin
- Origin drilling 2 fracked horizontal wells in 2019 / 20 testing Velkerri Shale and Kyalla Formation
- Santos to drill 2 fracked horizontal wells in 2020 testing Velkerri Shale
- Hancock Prospecting has indicated it may invest A\$150m - A\$200m in exploration

McArthur Basin, a Vast & Proven Petroleum System



Shales of the Barney Creek at Glencore's McArthur River lead-zinc-silver mine host syngenetic hydrocarbons and base metals



Compare Amungee with the breakout well in the US

S.H. Griffin #4 Initial Production average **1.3MMscfd over 90 days**



Amungee's Initial Production averaged **1.1MMscfd over 57 days**



The S.H. Griffin #4 produced 1.3 million cubic feet of natural gas per day for the first 90 days, an unbelievable amount for the time.³⁶ Steinsberger, in an interview with The Atlantic, said,

*“This was the ‘aha moment’ for us, it was our best well ever in the Barnett, and it was a slick water frack. And it was my baby!”*³⁷

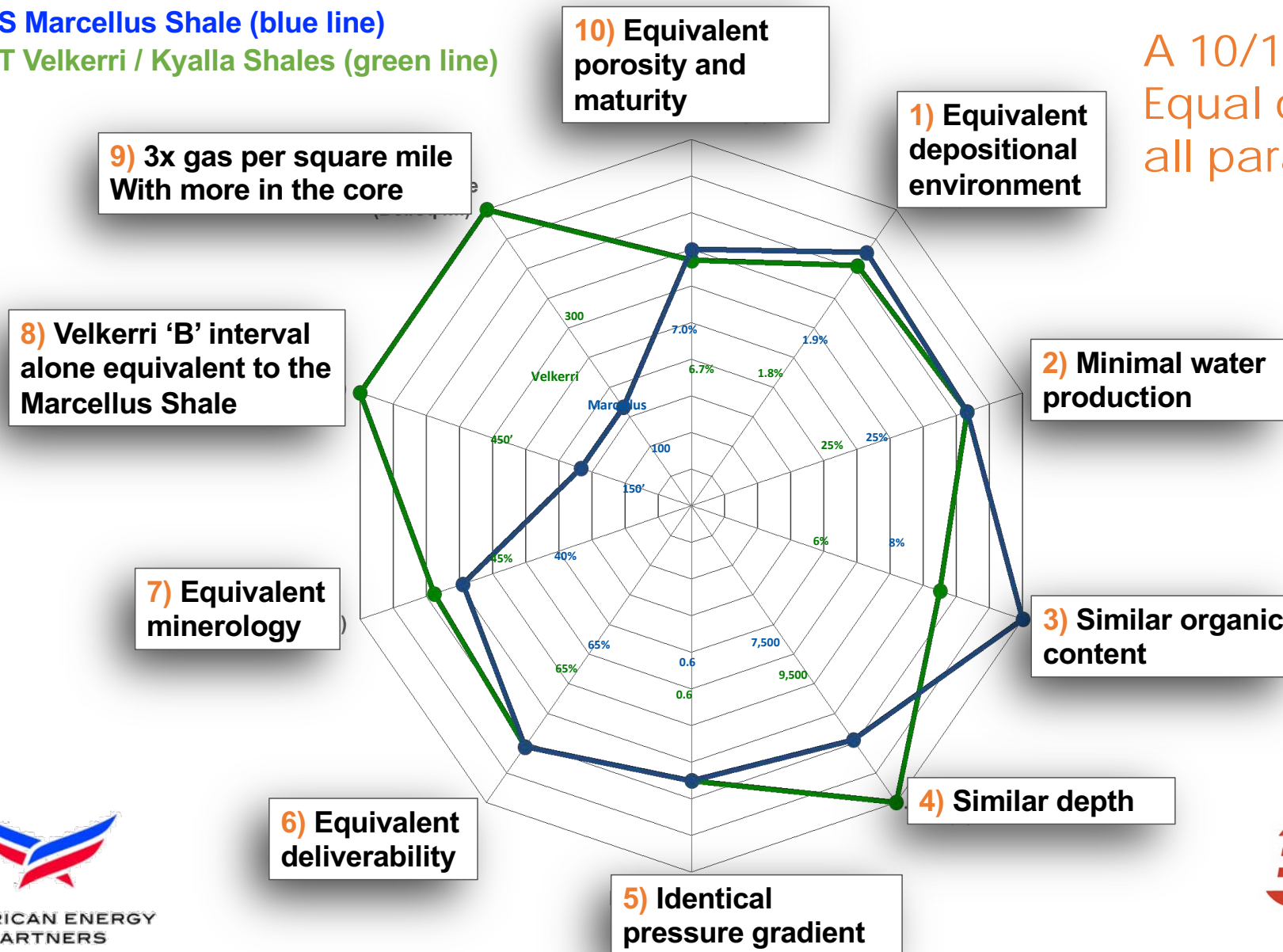
This was a revolutionary moment, marking the beginning of modern-day fracking in shale as we know it. Since the S.H. Griffin, more than a hundred thousand wells have been fracked in the United States, and most of them use a technique similar to what was first done in the Barnett Shale.³⁸ Steinsberger had finally figured out how to get shale rock formations to give up their natural gas and do so in an economical way.



Clear USA shale analog with **Velkerri / Kyalla Shales** with original gas in place equal to three stacked **Marcellus Shale** plays

US Marcellus Shale (blue line)
NT Velkerri / Kyalla Shales (green line)

A 10/10 Match
 Equal or better in
 all parameters

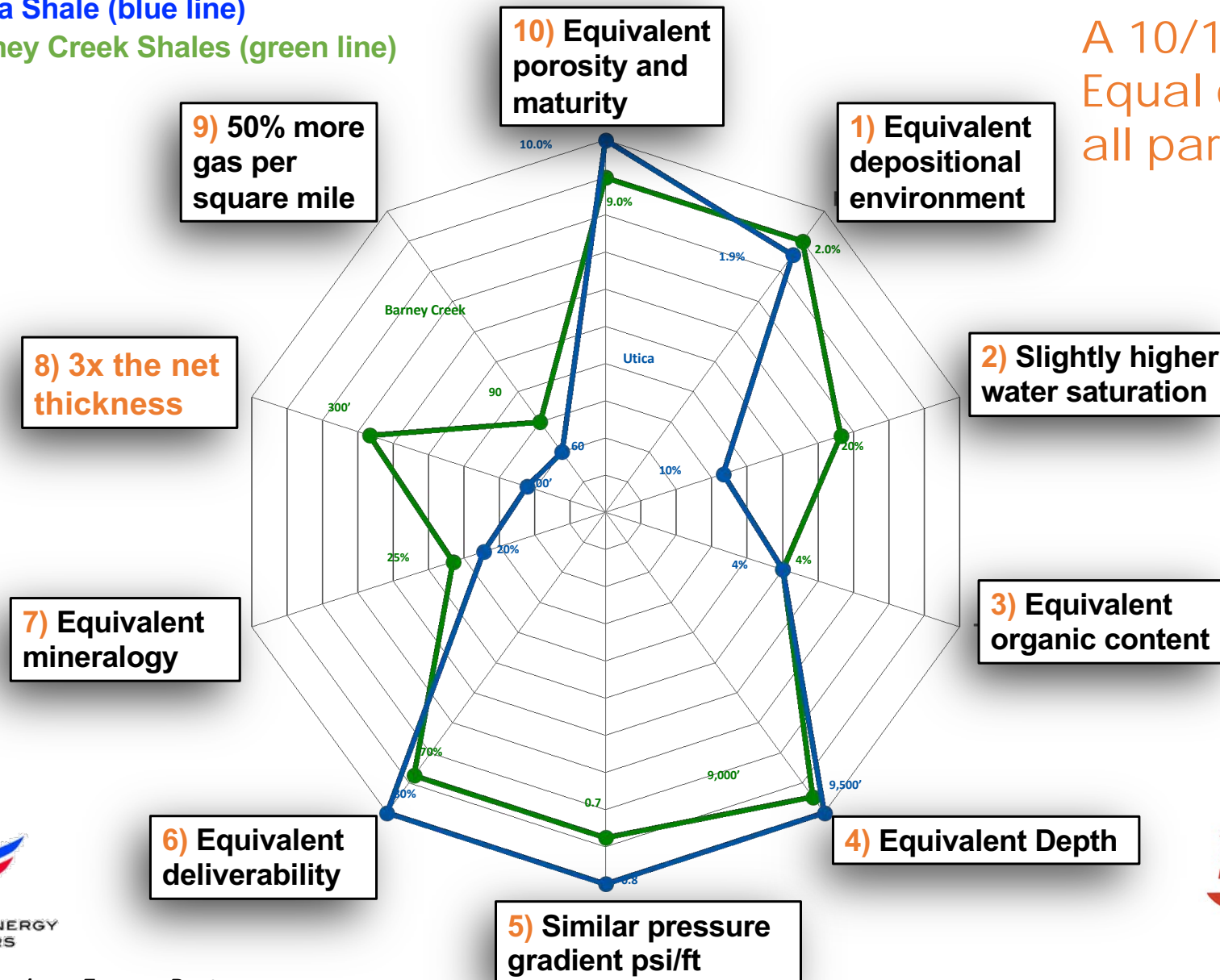


Clear USA shale analog of **Utica Shale** identified in the NT's **Barney Creek Shale** - with 50% more gas equivalent

US Utica Shale (blue line)

NT Barney Creek Shales (green line)

A 10/10 Match
Equal or better in
all parameters



The McArthur and Beetaloo Basins could make Australia **self-sufficient in liquid fuels**



Northern Territory Government

MINERALS & ENERGY GROUP
FARRELL CRESCENT COMPLEX

- Geology Field Services Equipment Store
- Geology Core Library
- Mines Division Technical Support

ALL VISITORS TO REPORT TO OFFICE



Darker shiney bands in this Barney Creek Formation core are oil-rich

Empire's independently certified NT Prospective Resource Estimate – on Empire acreage alone

Formation	Permits	Geological factor discount	Area in acres	Units	P90	P50	PV10
Barney Creek	EP 184, EPA180, 181, 182, 183, 188	50-90%	3,559	Bcf	3,304	8,699	20,172
		50-90%		MMBO	66	174	403
Velkerri	EP184, 187, EPA 188	50%	315	Bcf	383	1,192	3,086
		50%		MMBO	8	24	62
Wollogorang	EP 184, 187, EPA 188	90%	1,384	Bcf	524	1,185	2,371
		90%		MMBO	10	24	47
Total				MMBOe	851	2,238	5,183

Empire's P50 resource 13,000PJ, how big is that ?

Conversion Factor: 5.485 Mcf : 1 Bbl

Northern Territory Resources by: Muir & Associates P/L and Fluid Energy Consultants

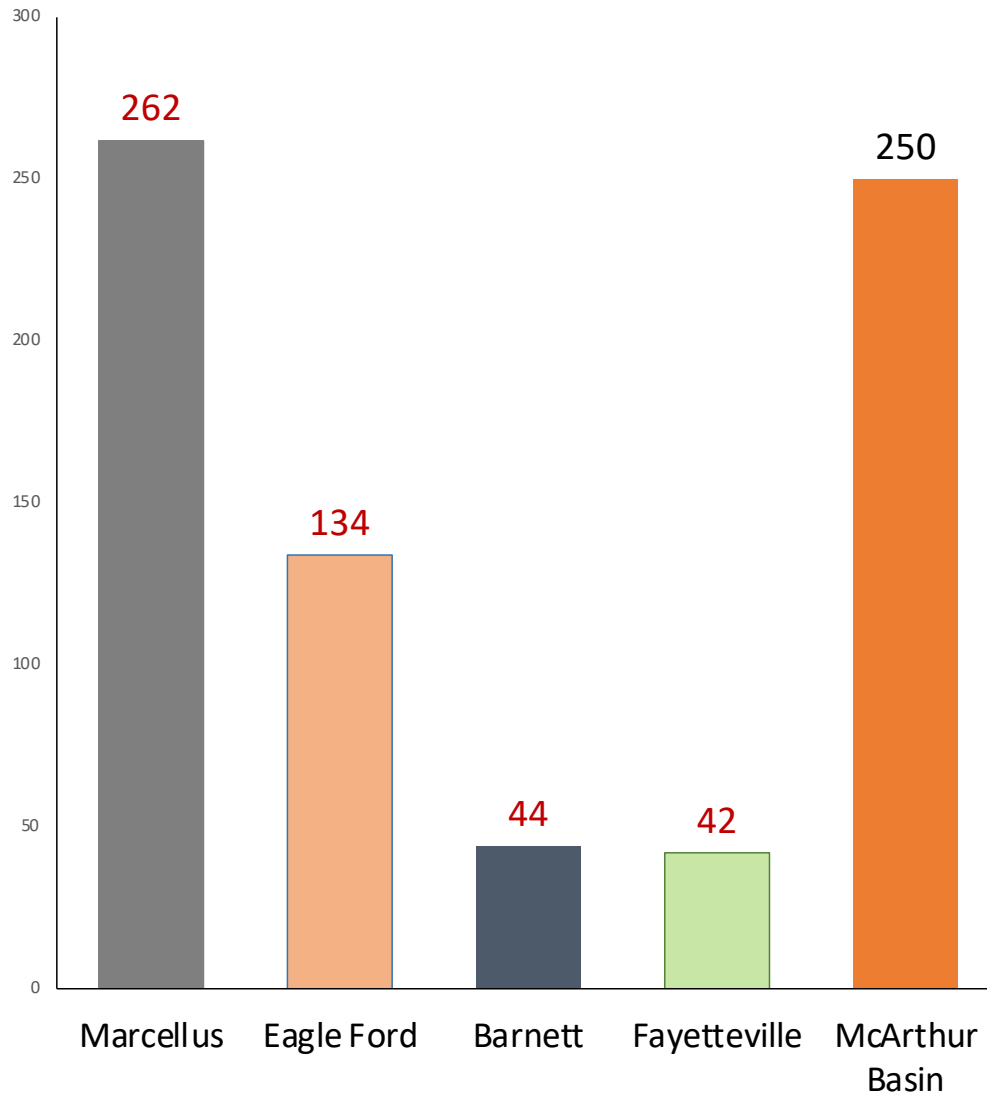


Empire's P50 resource 13,000PJ, how big is that ?

- 2015 Total Australia 2P gas reserves ~ 130,000 PJ
 - **2018 Total Queensland CSG 2P reserves** ~ **35,000 PJ**
 - Ichthys LNG Darwin 1P gas reserves ~ 13,000 PJ
 - **Shell Prelude FLNG estimated gas reserves** ~ **3,000 PJ**
 - Aggregate Browse Basin 2P gas reserves ~ 16,500 PJ
-



Un-risked Prospective/Technically Recoverable Resource



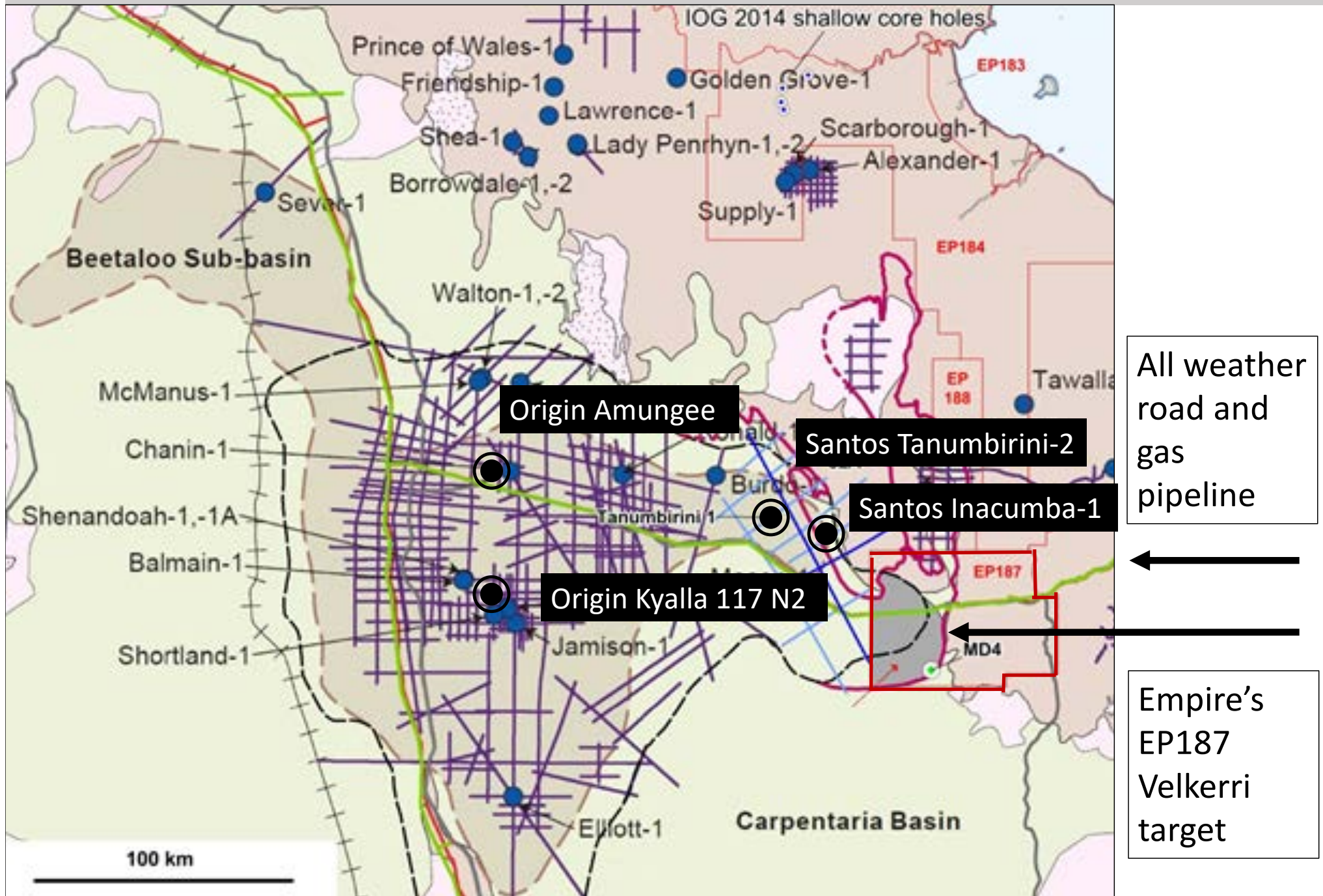
McArthur Basin rivals the Resource Potential of the US Marcellus Shale (Tcf)

“Prospective Resource” is the estimated quantities of petroleum that may potentially be recovered by the application of a future development project(s) relate to undiscovered accumulations. These estimates have both an associated risk of discovery and a risk of development. Further exploration appraisal and evaluation is required to determine the existence of a significant quantity of potentially moveable hydrocarbons.

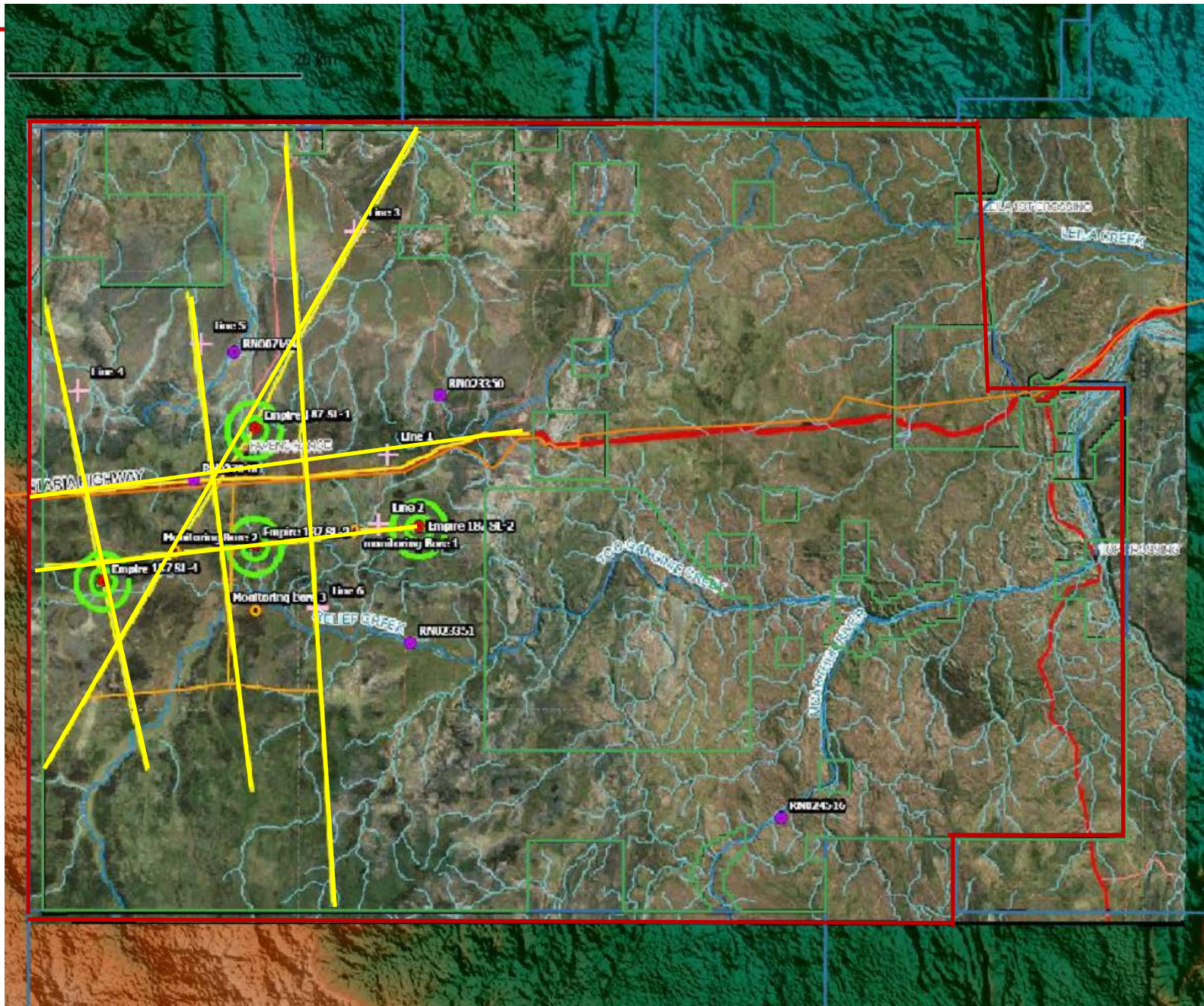
Shales of the Velkerri Formation in outcrop at Roper River



The Beetaloo and Empire's 1-3 Tcf early production target



EP187 EMP approved for 2019 Seismic Program



All weather road and gas pipeline

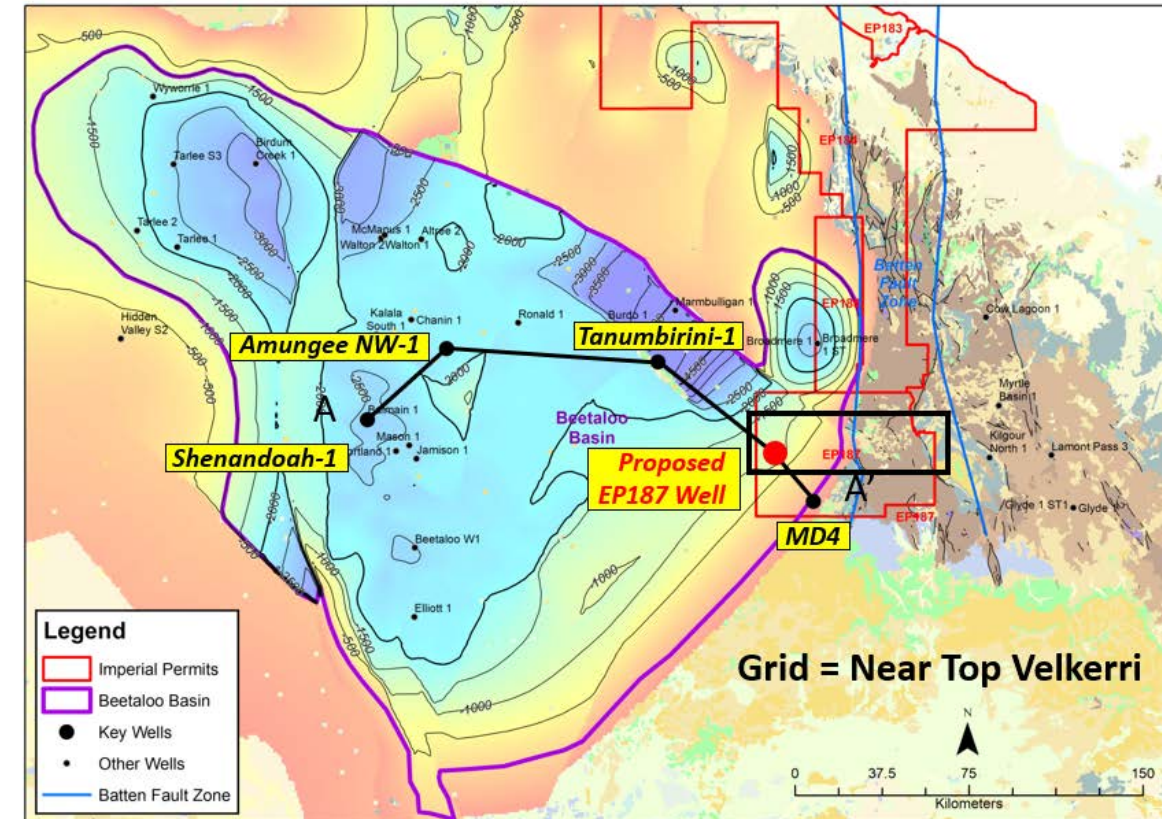
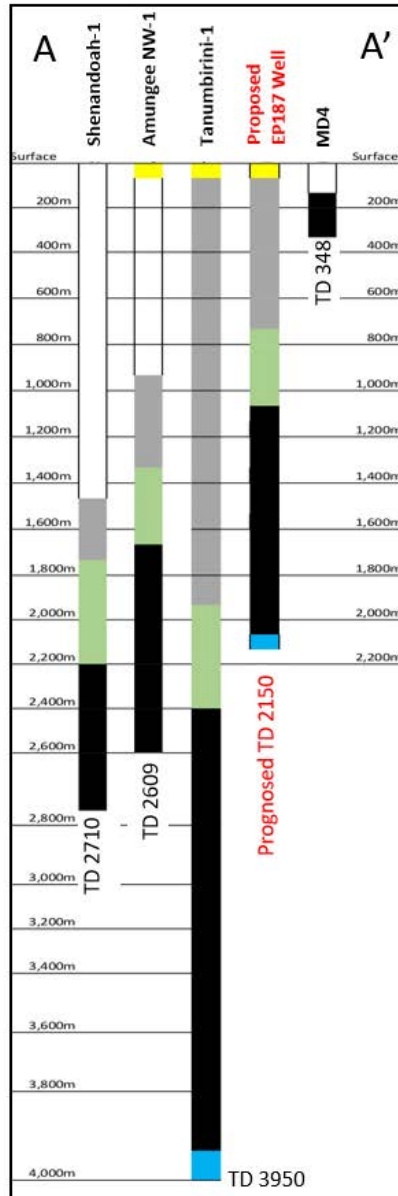


EP187 is contiguous with the Origin and Santos acreage

- Empire ~2,543km² (630,000 acres) in eastern Beetaloo sub-basin
- Adjacent Tanumbirini-1 well confirmed thick Velkerri shale from 2,400m to 3,800m
- Adjacent Santos fracked horizontal development program in adjacent block in 2020
- Velkerri Shale in EP187 is Empire's first priority exploration, appraisal and development target
- In coming months Empire will acquire 231 line km 2D seismic to delineate the shape of the basin, establish continuity with other drilling and pinpoint Empire sweet spots
- First Empire well to confirm hydrocarbon content and rock characteristics
- Thereafter, fracked horizontal production wells along pipeline/road route will be drilled and put into production



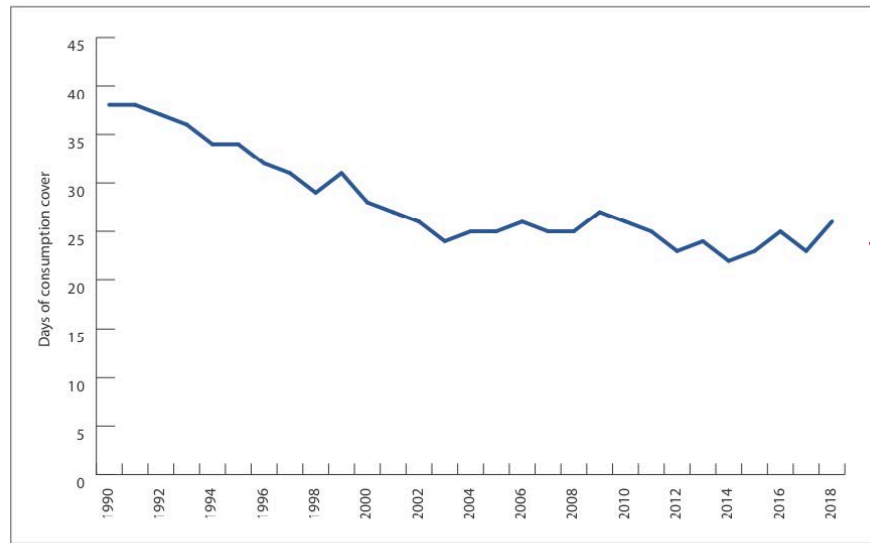
Empire's EP187 Initial Drilling Target



Simplified Geology

Australia looking north for gas, liquid fuel security, defence...

Figure 13: Average consumption days of refined products⁴⁹, 1990–2018



Source: DoEE 2018b.

THE AUSTRALIAN FOR THE INFORMED AUSTRALIAN

Securing our north critical as power in Pacific shifts

The case for Australia building up the ADF is compelling

23 day reserve of liquid fuel on hand to run Australia

forward estimates," he wrote. "While we are very wealthy, we are paying ourselves more than we can afford and promising ourselves more than we can deliver, and neglecting basic defence. Our defence strategy is still simply to rely on the Americans."

Recent confirmation that the US government plans to spend about \$400 million on naval and air force construction in the Northern Territory is an excellent sign of our major ally's commitment to Australia and to the region. Our nation, however, must be equipped to play its part, especially in view of the warning in the US Studies Centre report that America no longer "enjoys military primacy in the Indo-Pacific" region and that its capacity to "uphold a favourable balance of power is increasingly uncertain". The readiness of US forces has been "eroded", the report says, after 20 years of "near-continuous combat and budget instability".

border security agencies to test the nation's capacity to defend its northern borders against sudden threats. Such tests would involve desktop exercises that assess industry, state and territory government, Home Affairs, intelligence and Defence capacity in the north.

The ASPI report, released today, is practical and detailed as opposed to alarmist. It notes a "widening gap", as Geoff Chambers reports, between strategic policy and the nation's military assets in northern Australia. It warns of a shortfall in personnel and strategic deployment, with ADF staff numbers at an 11-year low.



WARNING MILITARY STRENGTH MUST BE BOOSTED IN NORTH AS U.S. 'PRIMACY' FADES
Great: bolster Top End

ASX:EEG

With US asset sales under way, Empire Energy will become a pure Northern Territory hydrocarbon play offering the most direct market exposure to the exciting future of both the McArthur and Beetaloo Basins



Alex Underwood
Chief Executive Officer
aunderwood@empiregp.net
02 9251 1846
www.empireenergygroup.net



Empire's vision is to safely develop the NT's petroleum resources and preserve cultural, heritage, customs & the natural environment



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