

GALILEE ENERGY LIMITED

PESA PRESENTATION

The enclosed presentation on ATP 529P was delivered at the PESA Symposium 2010 by Andrew Parker, Principal Geologist, AGL Energy Limited.

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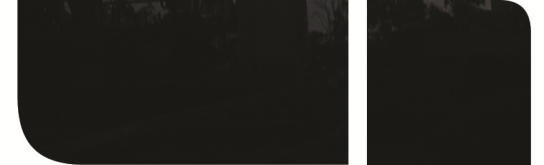
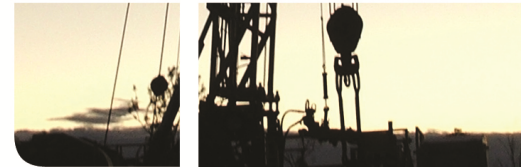
# PESA Symposium 2010

## Galilee Basin CSG Exploration

**6<sup>th</sup> September 2010**

**Andrew Parker – Principal Geologist**

PESA Symposium 2010

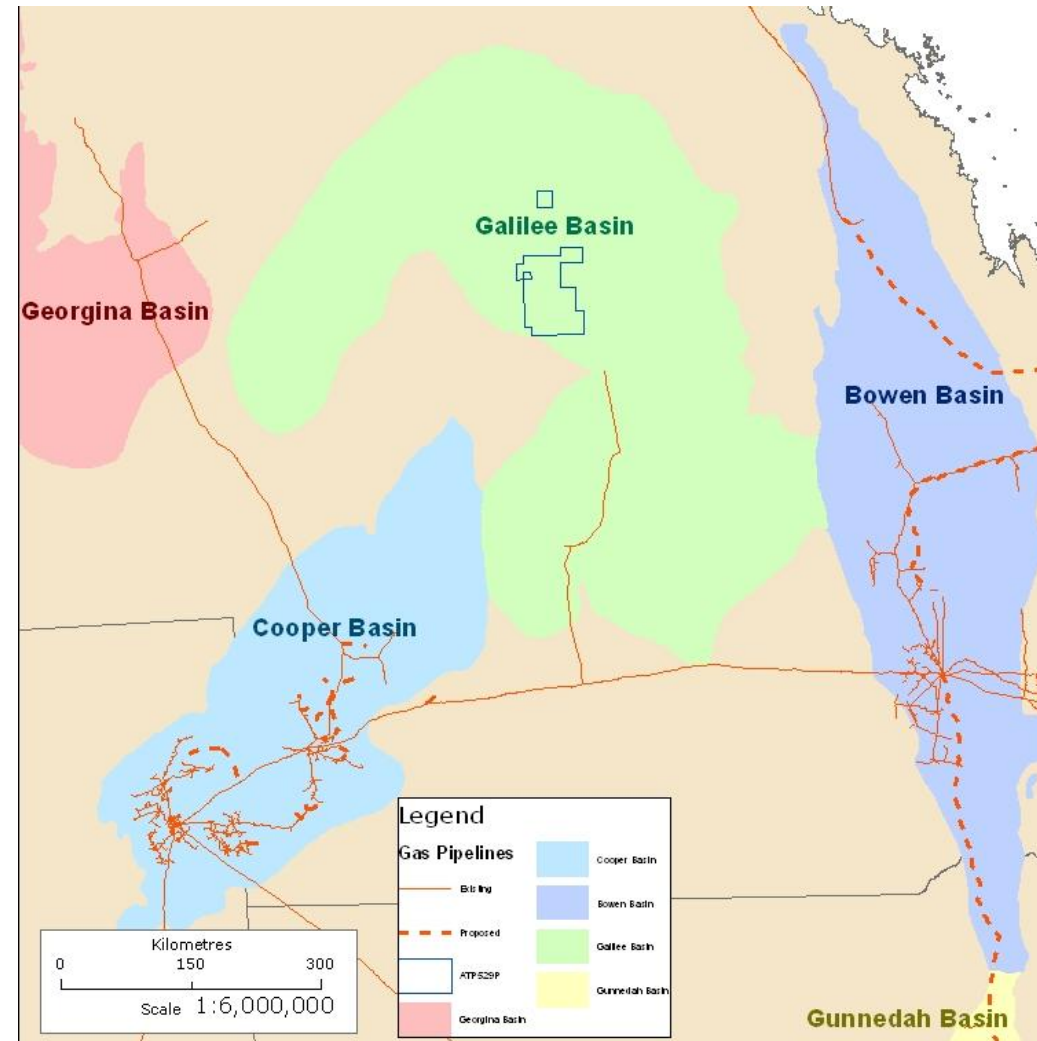


AGL



# Galilee Basin Location

- Galilee Basin is located between the Bowen, Cooper and Georgina Basins
- Unconformably overlain by the Eromanga Basin for most part
- Minimal existing infrastructure

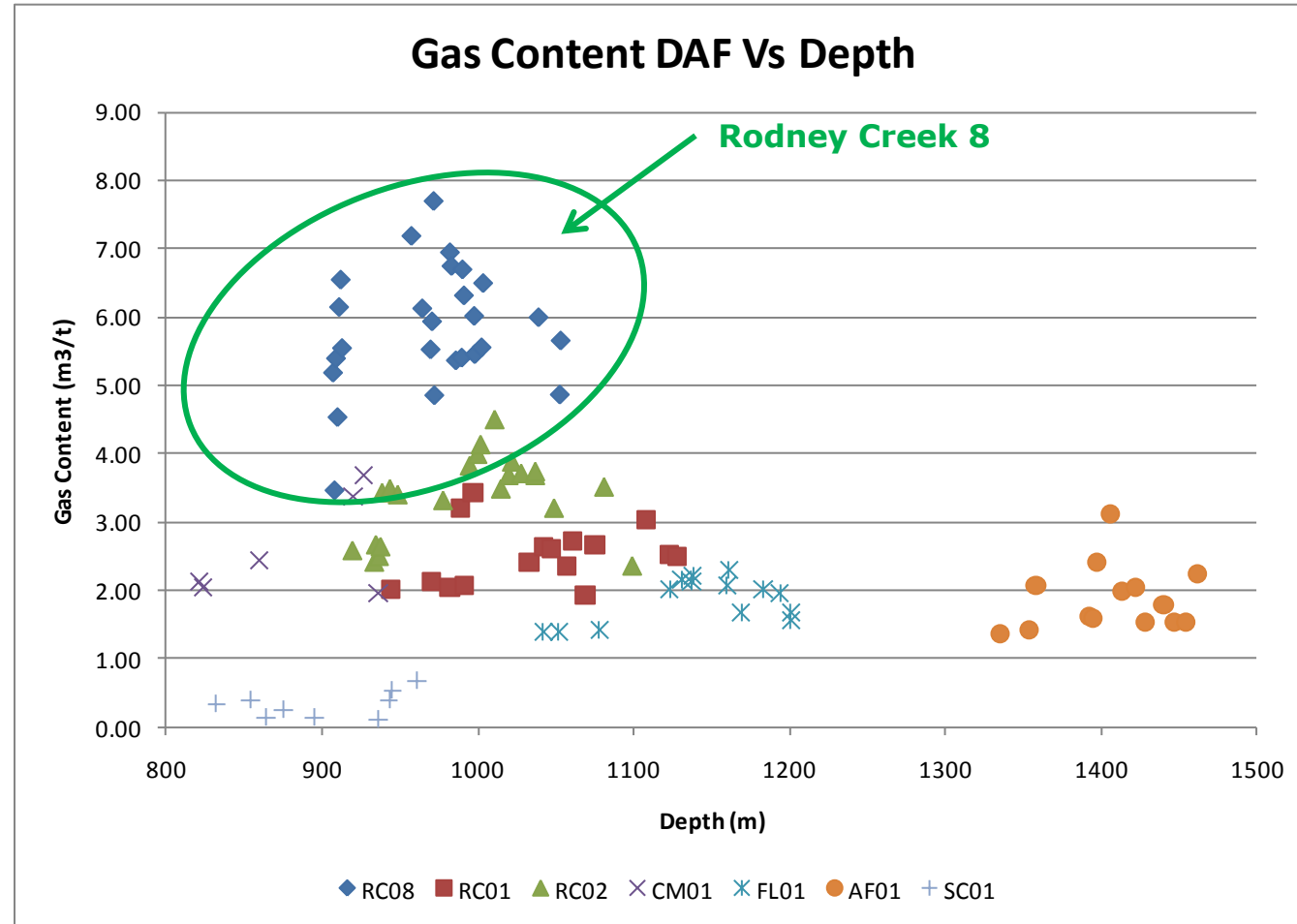


# Previous CSG Exploration

- During the early 1990's Enron as holders of ATP529P drilled several coreholes with the best results located at Rodney Creek and Crossmore
  - 40% to 50% saturation with pipeline quality gas composition
  - Thick coal intervals up to 35m net with good to moderate perm, 5mD to >100mD
- Enron followed up the corehole program with single production wells at Rodney Creek and Crossmore
- ATP529 purchased by Galilee Energy in 2000 and a further 4 production wells were drilled at Rodney Creek and production tested producing large volumes of water with minimal gas
- Rodney Creek 8 corehole drilled by Galilee Energy in a more crestal position on the Glenaras Anticline and completed desorption testing over entire stratigraphic coal interval
  - Gas contents higher than past results
  - Saturation between 50% and 70%
  - Confirmed good to moderate permeability

# Previous Exploration

- Rodney Creek 8 gas contents much higher than previously found
- Difference from Previous Rodney Creek wells thought to be due to testing methodology on older wells
  - Quick crush
  - Discreet sampling
  - Ambient temperature desorption



# AGL Farm In

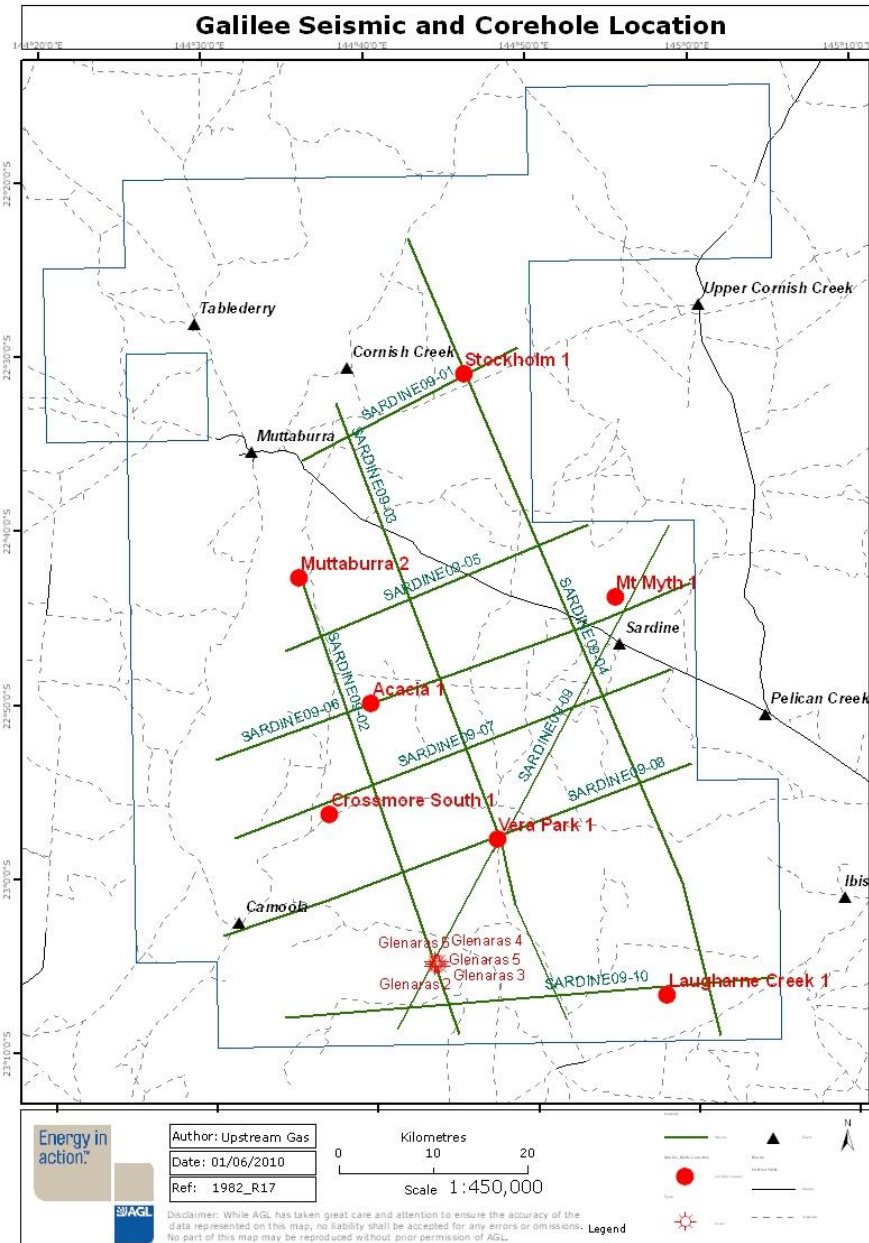
- In July 2008 AGL entered into a Farm In agreement with Galilee Energy for 50% of ATP529P
- The Farm In is in two stages
  - Stage 1:
    - Drill and complete a production pilot
    - Construct water holding facilities and production test wells
  - Stage 2
    - Drill 7 coreholes
    - Acquire 500km 2D seismic
    - Reprocess 2000km 2D seismic

# AGL/Galilee Energy Exploration Program

- Stage 1:
  - Production pilot drilled and completed – 2 under-ream and 3 fraced wells
  - 380 ML produced water holding pond constructed
  - Wells placed on pump, though currently shut in due to pump issues
  - New pumps to be installed over the next month
- Stage 2
  - 5 coreholes drilled, 6<sup>th</sup> currently coring, 7<sup>th</sup> top hole completed
  - Acquired 541km 2D seismic
  - Reprocessed 2231km 2D seismic, mainly 1981 to 1985 data

# Well and Seismic Locations

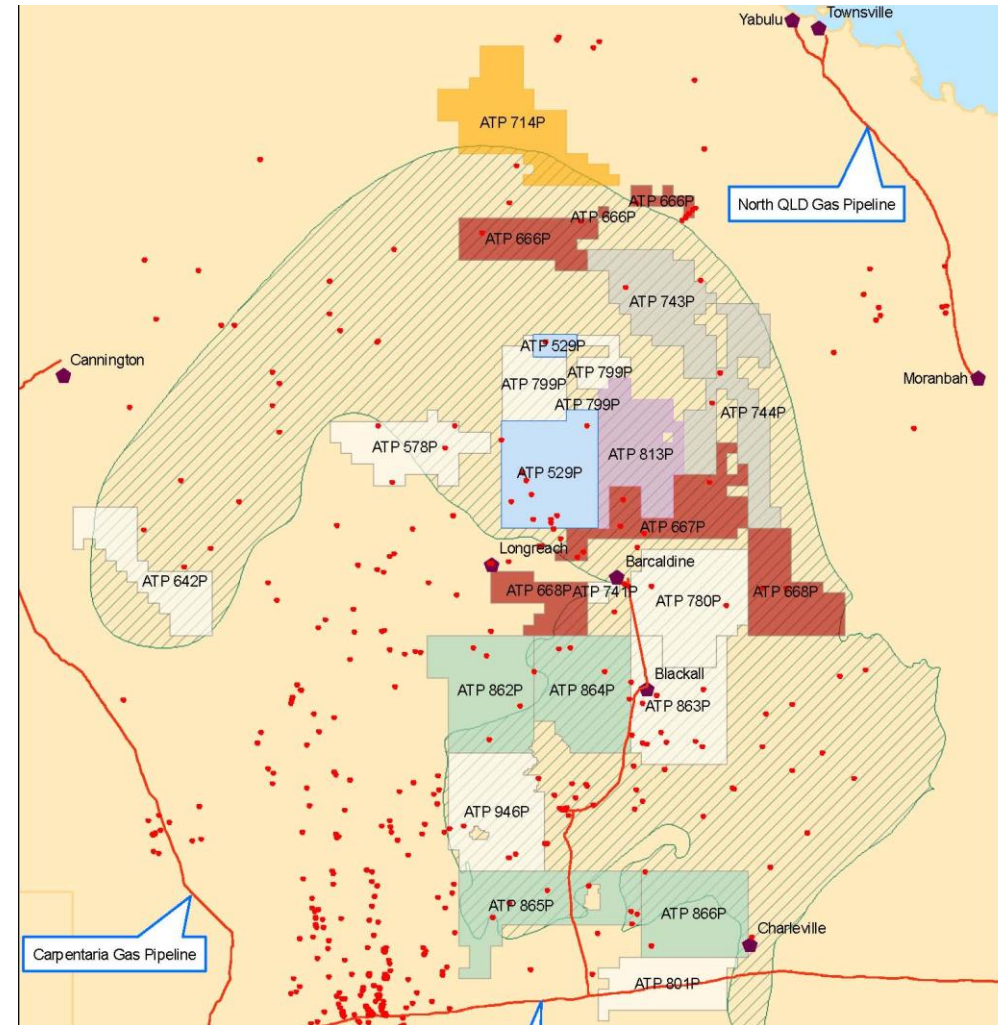
- Exploration program designed to appraise all ATP529P
- Corehole program has targeted several different types of play
  - Glenaras step out wells to assist in field delineation
  - Thick preserved Triassic cover for higher gas saturations
  - Thick Permian coal bearing packages identified from seismic



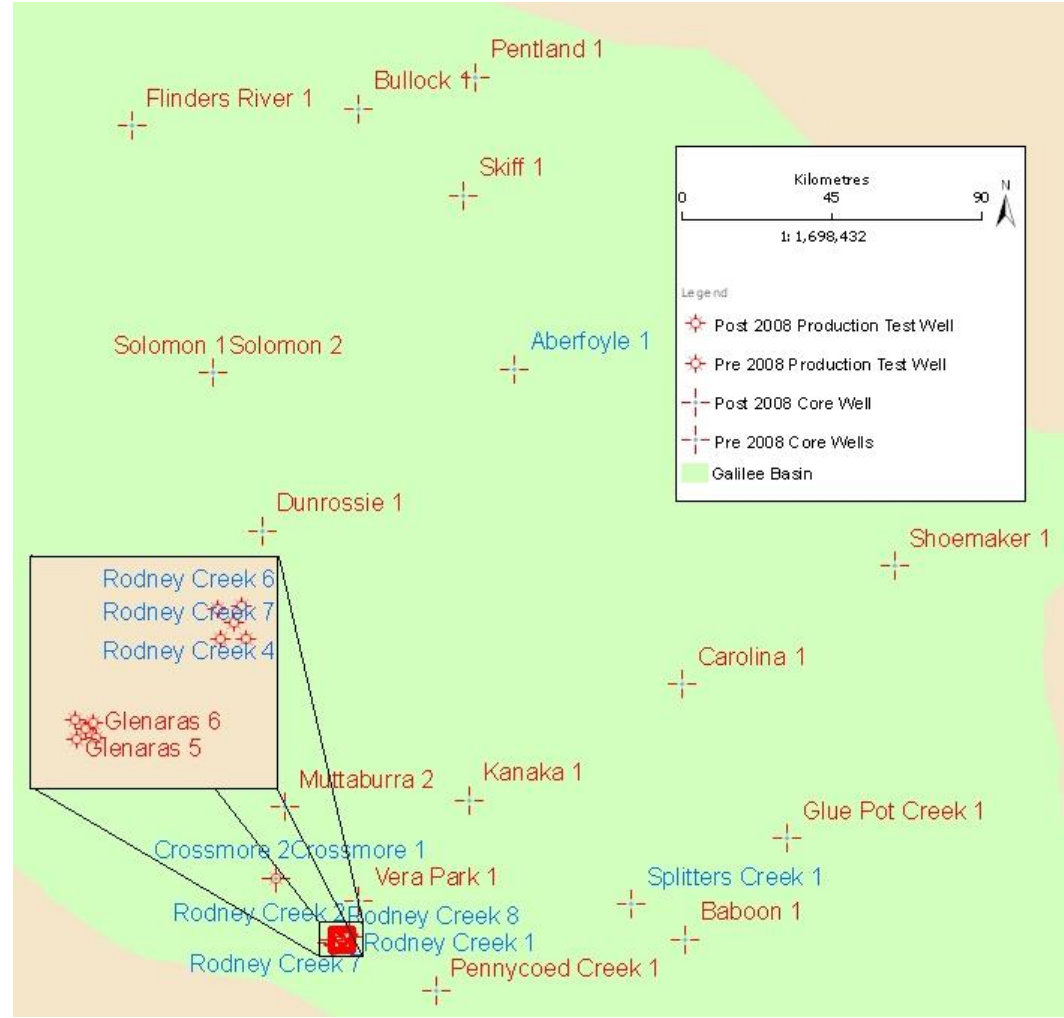
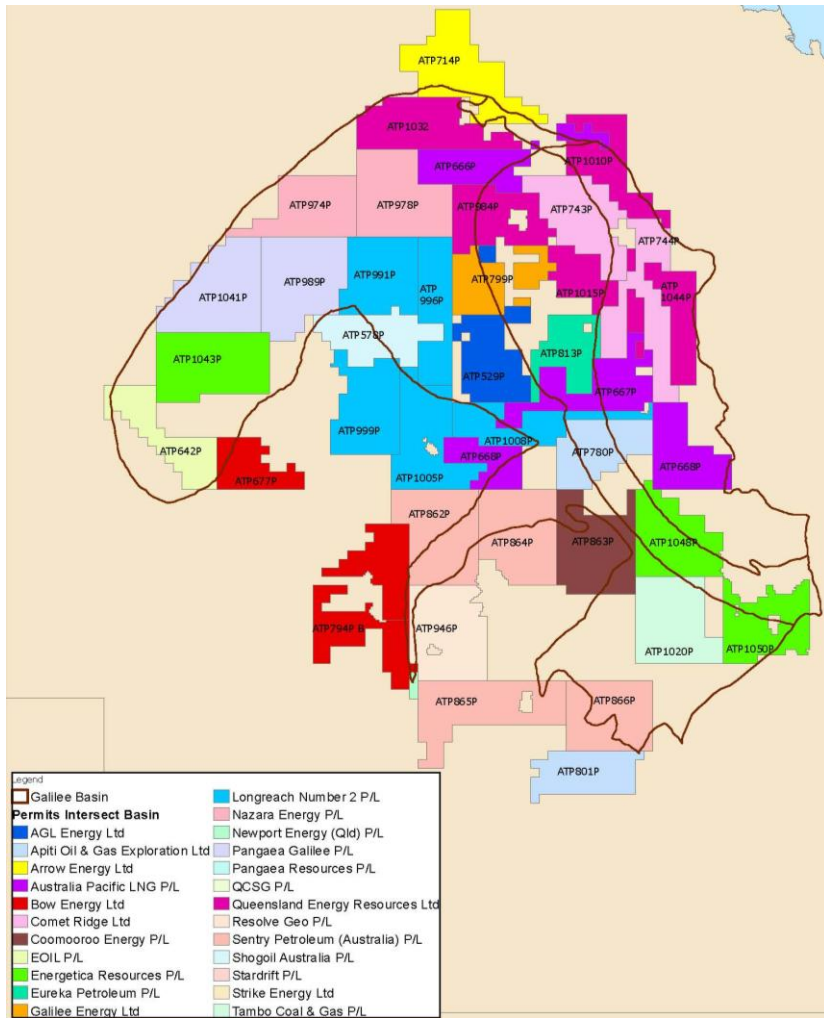


# Galilee Gold Rush

- At time of AGL Farm In minimal exploration was underway
- Majority of basin was not covered by tenure
- Acreage release by QLD DME in August 2008 combined with AGL Farm In renewed exploration interest
- Currently most of basin covered by tenure
- CSG well density has tripled from 13 to 38 wells<sup>1</sup> and increasing



# Recent Acreage and Drilling

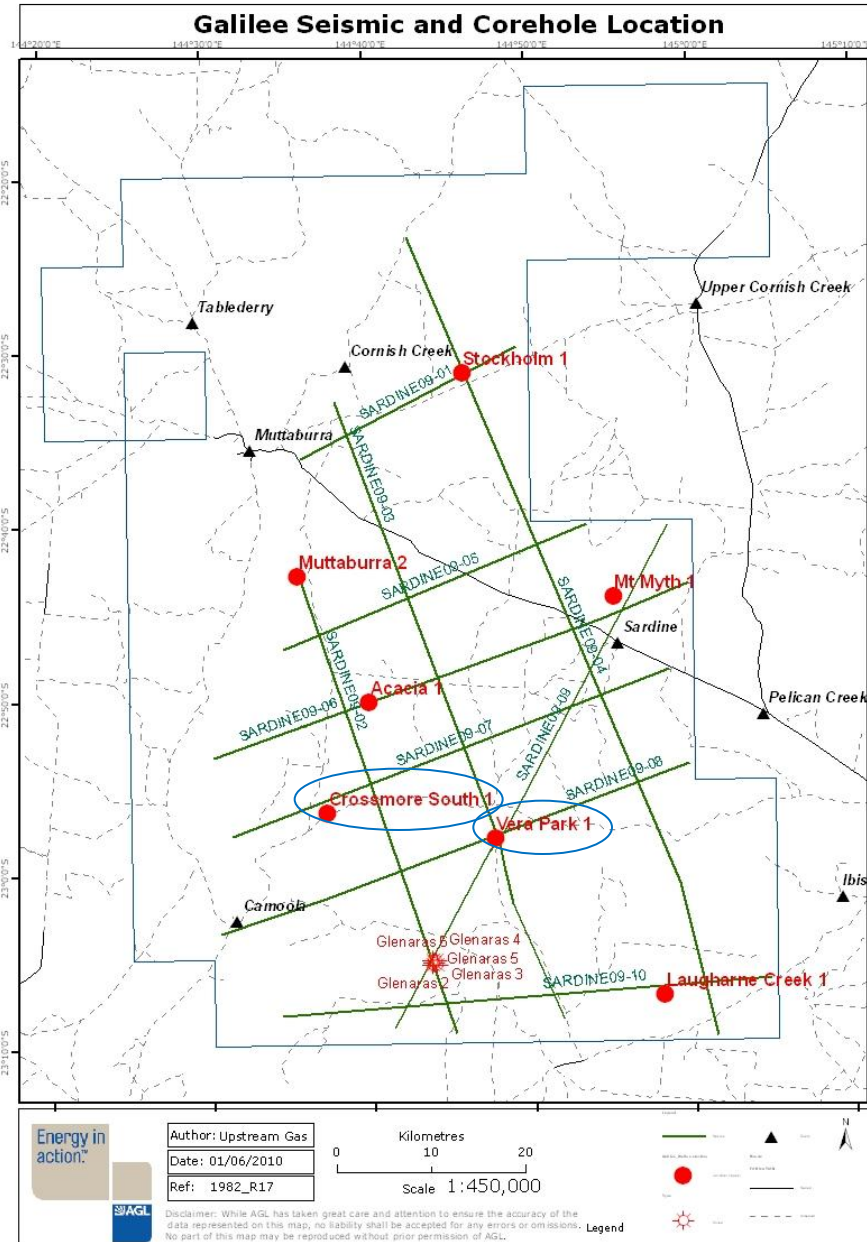


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# AGL/Galilee Energy Results

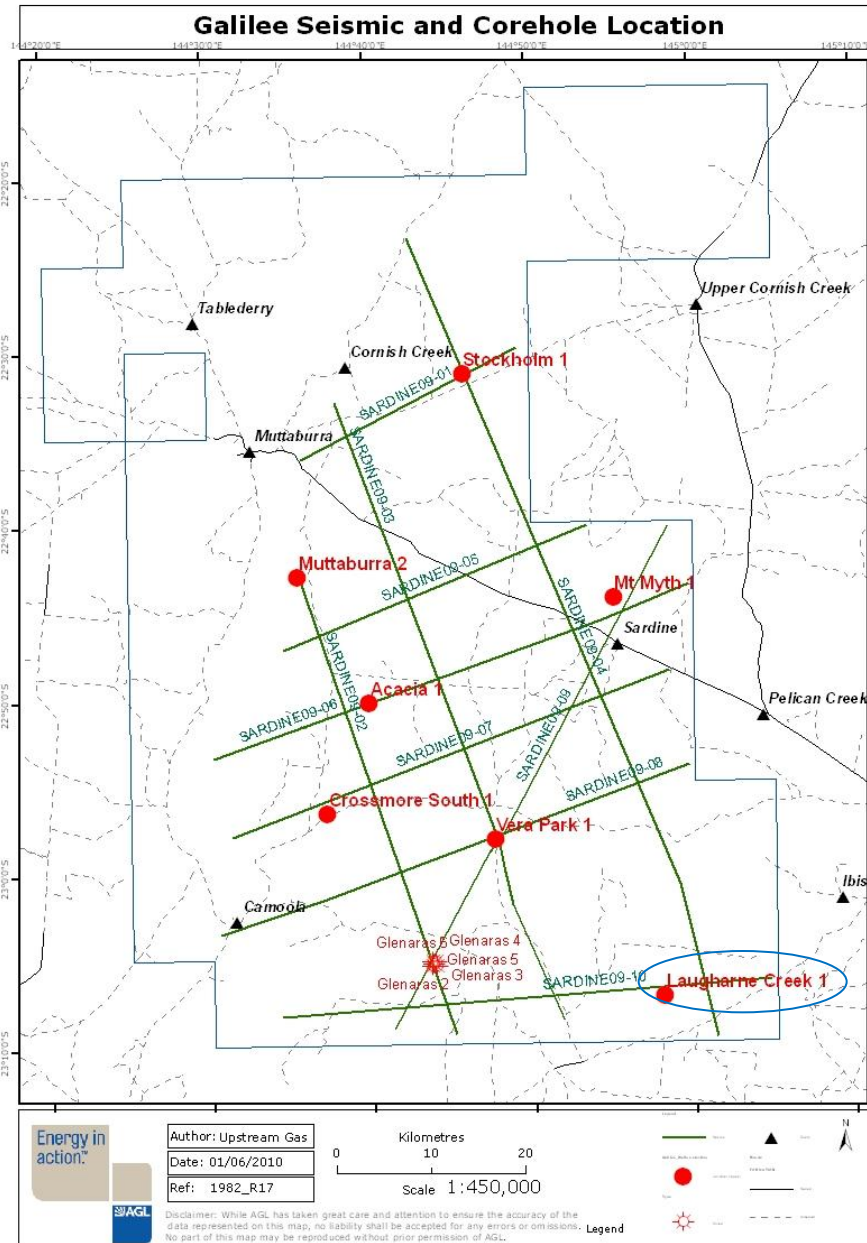
- Crossmore South and Vera Park 1 identified similar coal packages and gas contents as Rodney Creek 8
- Acacia 1 and Mt Myth 1 were drilled in areas where thick Triassic cover was preserved
- Initial gas content results suggest values lower than Glenaras and Rodney Creek, decreasing towards the north-east





# AGL/Galilee Energy Results

- Wells targeting thick coal package yielded positive results
- Laugharne Creek 1 targeted a thick Permian section approximately 180ms thick compared to an average of 100ms at Glenaras
- Multiple clean seams encountered over a 340m interval
- Aramac Coal Measures much thicker than previously encountered



# Glenaras Step Out

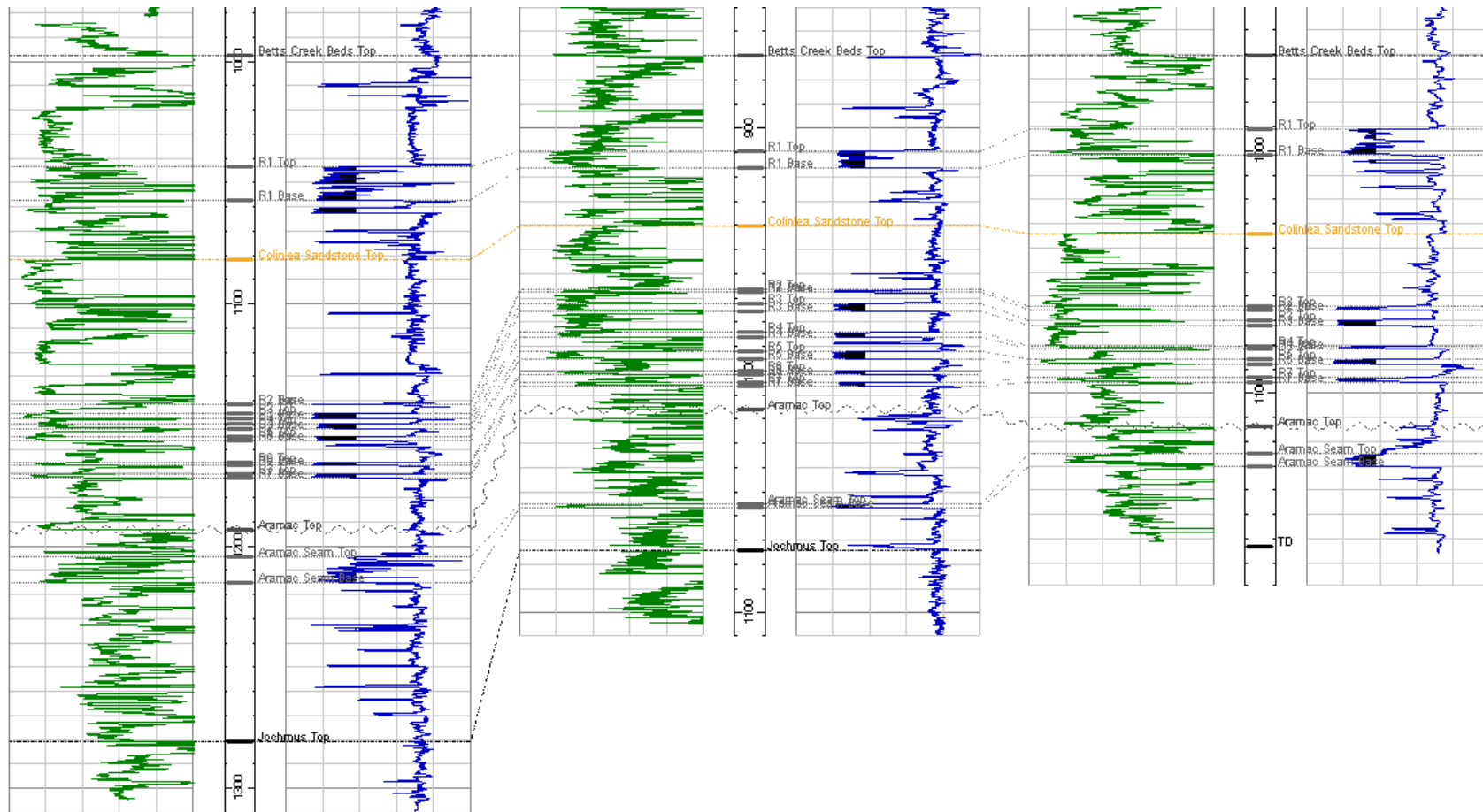
Crossmore South 1



Rodney Creek 8

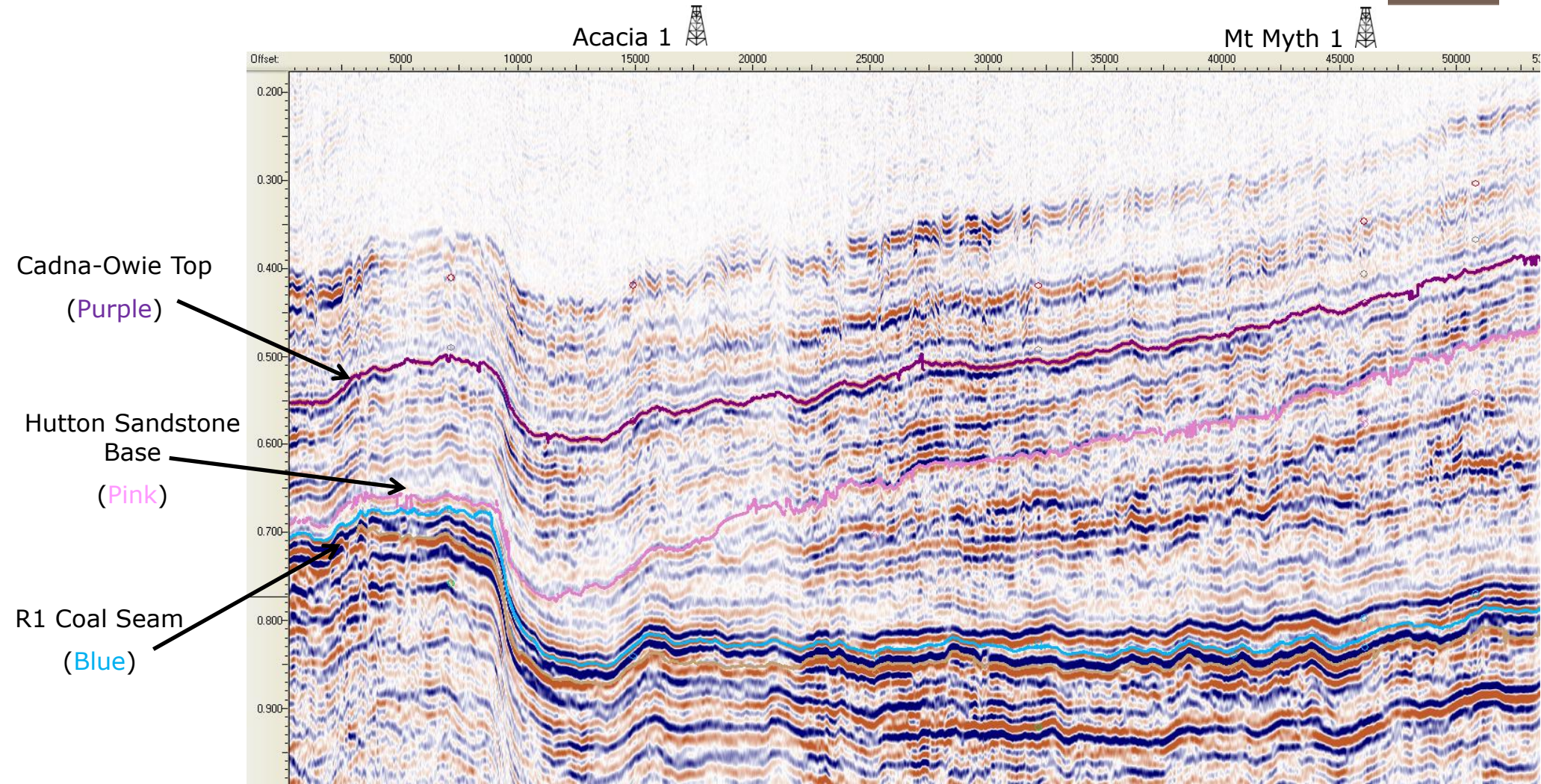


Vera Park 1





# Thick Triassic Cover

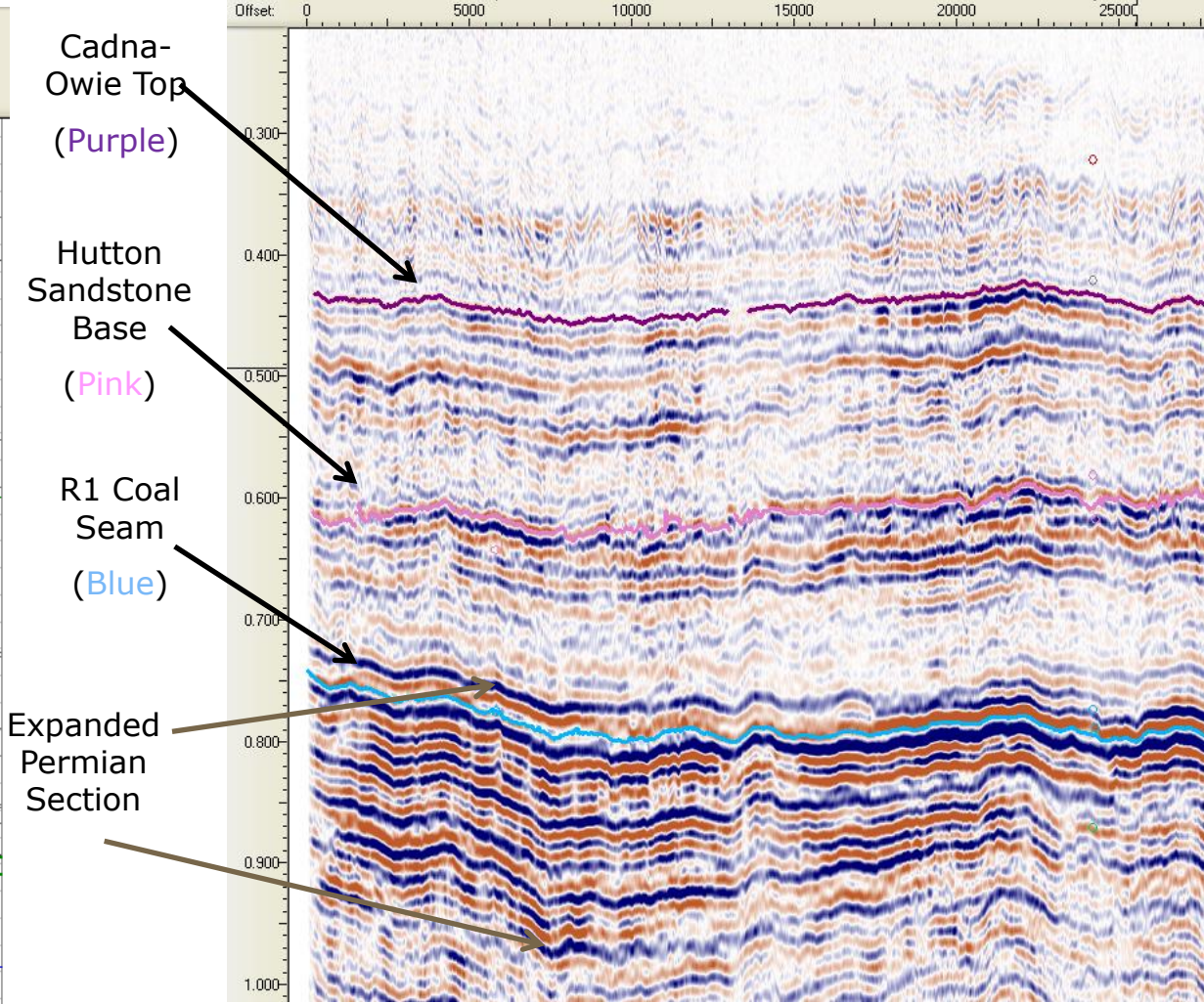
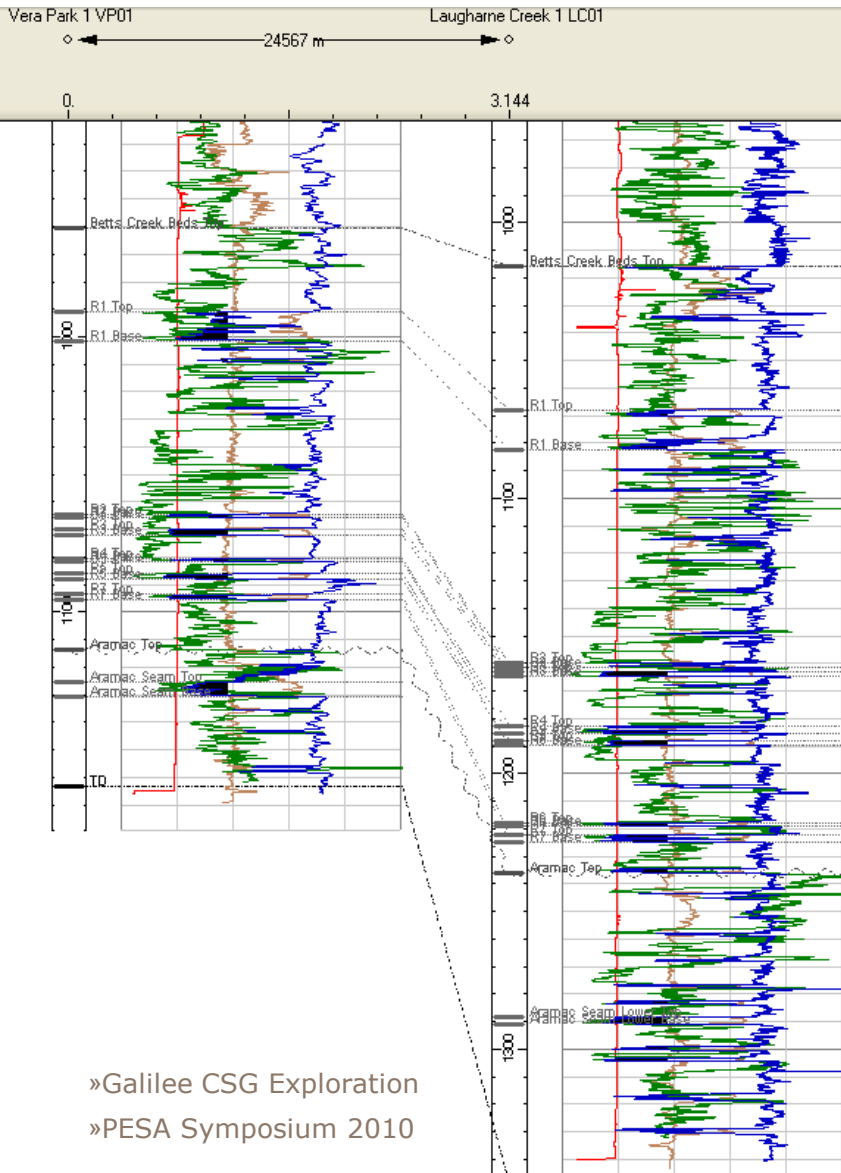




# Thickened Permian Section



Laugharne Creek1



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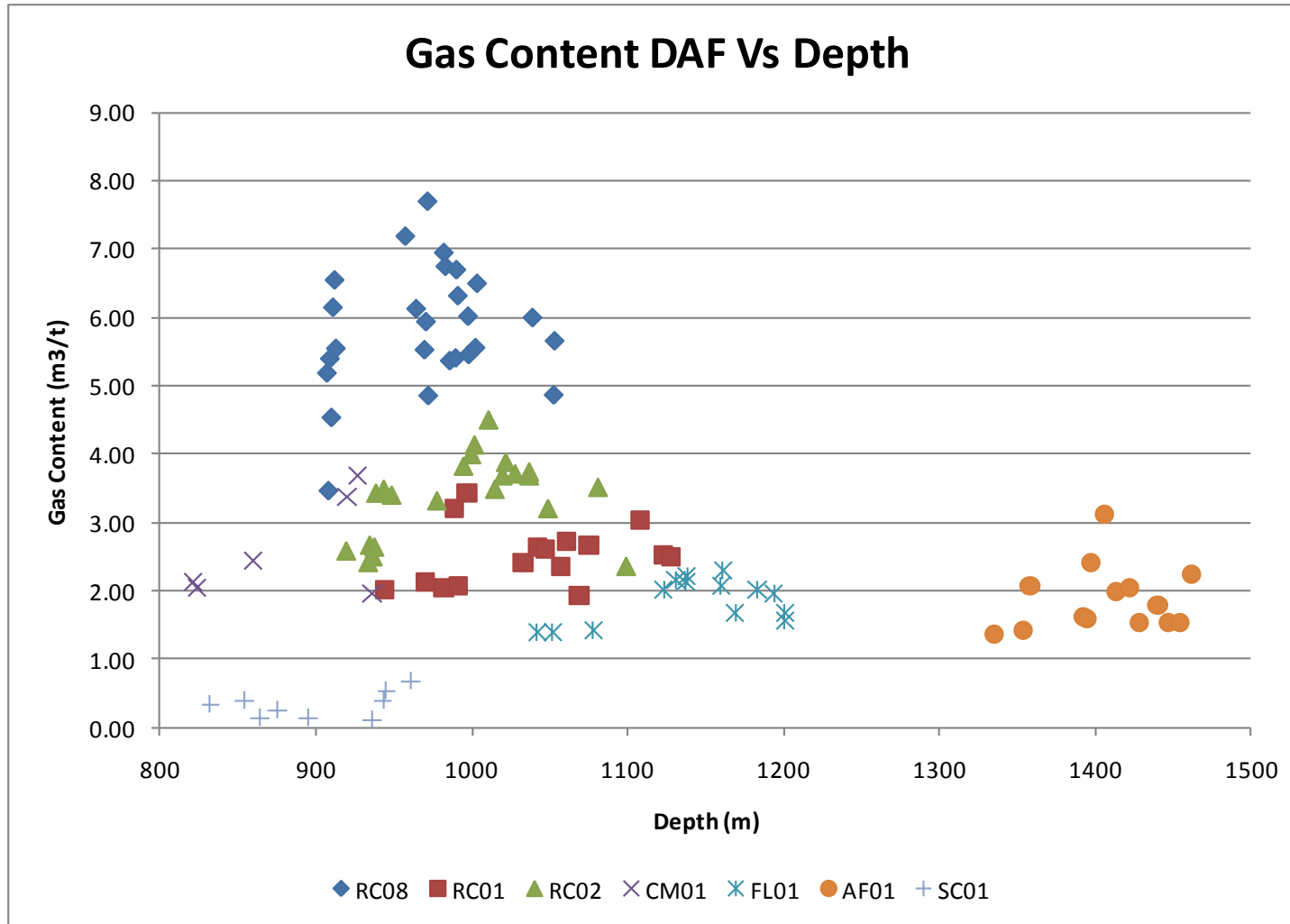


# Gas Content Trends

- Gas content for the Galilee Basin is generally low
- Previous results range from  $<1\text{m}^3/\text{t}$  at Splitters Creek up to  $>7\text{m}^3/\text{t}$  at Rodney Creek 8 giving saturations of 52% to 67% at Rodney Creek 8
- Rodney Creek 8 has the highest gas contents and saturations identified to date
- Results by depth show no particular trend, however when viewed by area a trend is apparent

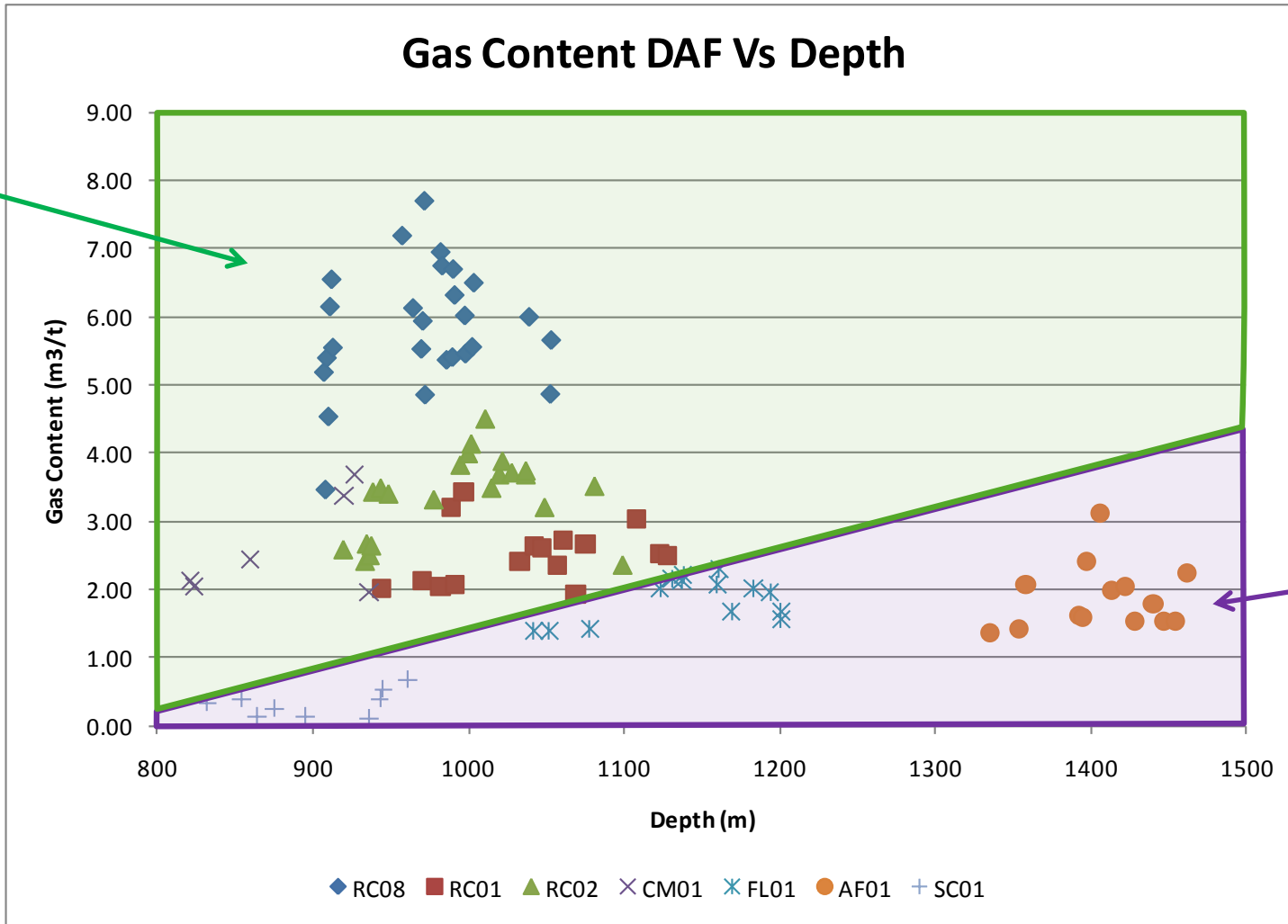


# Gas Content vs Depth



# Gas Content vs Depth – By Location

Western Side of Koburra Trough (ATP529P)



Eastern Side of Koburra Trough

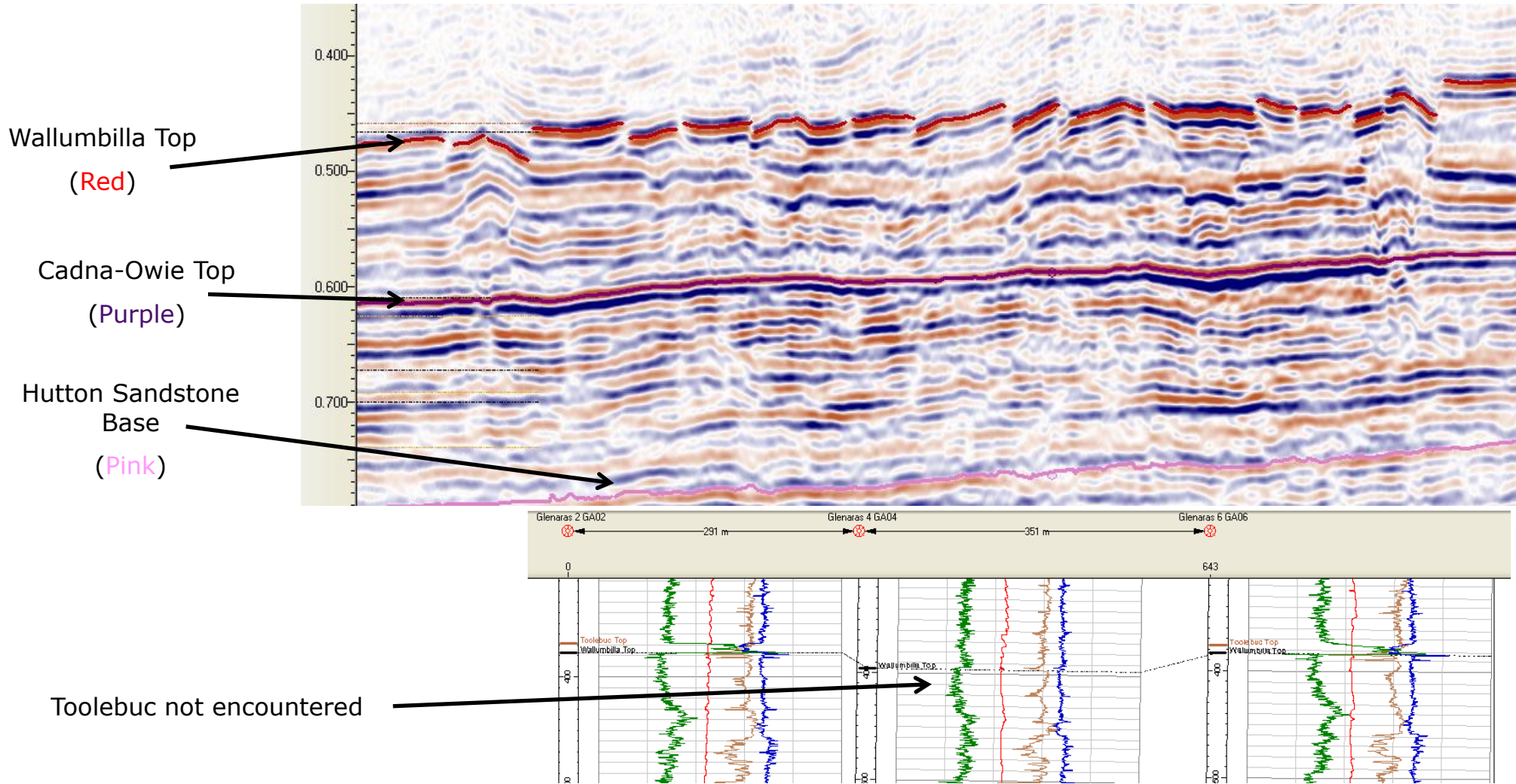
# Gas Content Variation

- Possible causes in variation...
- Gas stripped from coal due to meteoric water flushing of seams?
- Higher heatflow associated with granite emplacement in the Maneroo Platform locally raising temperature increasing gas generation?
  
- However..
- Gas composition and limited isotope values show thermogenically derived gas on the western side of the Koberra Trough, no biogenic addition
- No gas composition, isotope data or coals seam water is open file or exists for eastern wells to confirm water flushing or gas source

# Shale Gas Observations

- The Toolebuc Fm is found throughout the Eromanga Basin with ATP529P being no exception
- All wells drilled to date have encountered the Toolebuc Fm except one
- Glenaras 4 drilled in late 2008 transitioned from Allaru Mudstone into Wallumbilla Fm, Toolebuc Fm absence initially thought to be due to small scale local faulting
- The Sardine seismic survey acquired in late 2009 provided good definition of the Toolebuc Fm across ATP529P
- Apparent frequent faulting throughout the Toolebuc and Wallumbilla formations was observed on all lines with minimal structure seen to propagate through the Cadna-Owie Fm

# Sardine 09 – Line 7 and Glenaras 4



# Shale Gas Observations

- Initially thought to be an issue with the acquisition or processing of the seismic, till the absence of the Toolebuc Fm in Glenaras 4 was applied
- While faulting of this nature would not be a reason shale gas production may not succeed, any development would require dense seismic imaging, most likely 3D, to accurately map out all structure
- Toolebuc Fm has a gross average thickness of 15m within ATP529 further reducing its attractiveness as an exploration target

# So what does this mean for ATP529P

- Historical testing appears to have underestimated gas contents
- Gas thermogenically generated
- Southern portion of permit is more prospective than northern portion
- AGL and Galilee Energy are encouraged with results to date
- Further work based on final DAF gas contents and additional saturation values would assist in better defining trends
- The addition of more eastern and central Koburra Trough Wells would make a more robust interpretation
- Shale gas potential in Toolebuc Fm appears limited due to faulting and thin formation