Gunnedah Basin

CENTRAL NEW SOUTH WALES, ONSHORE

Reservoir:

Black Jack and Digby formations

Seal:

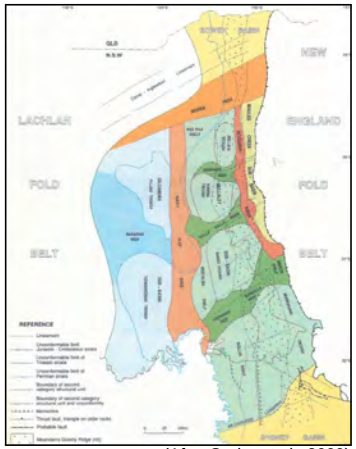
Napperby Formation

HYDROCARBON POTENTIAL

Category 1 (OGRA 2005)

Crude oil	MMBL	0.0
Condensate	MMBL	0.0
LPG	MMBL	0.0
Sales gas	Tcf	0.01

STRUCTURAL ELEMENTS

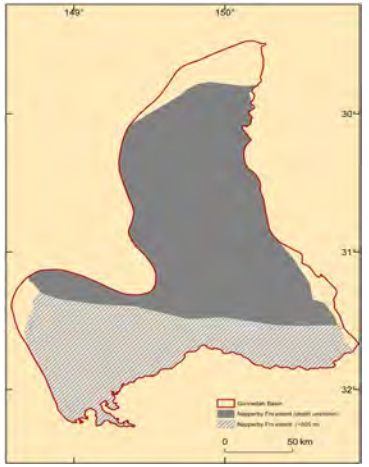


(After Gurba et al., 2009)

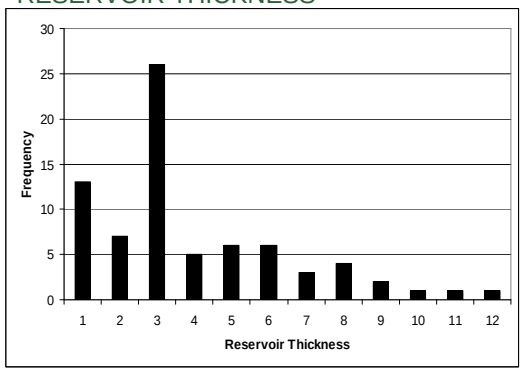
OIL AND GAS FIELDS

WELLS AND SEISMIC COVERAGE

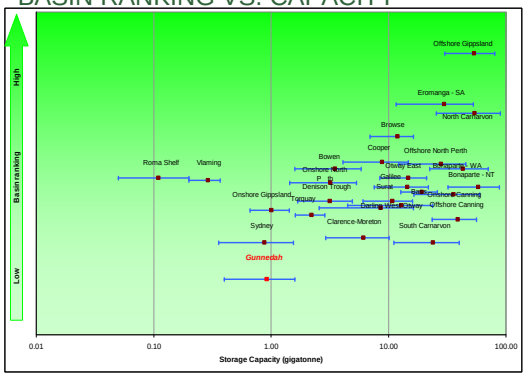
REGIONAL SEAL AREA



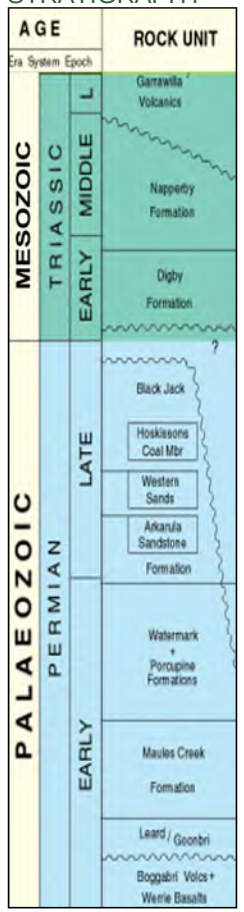
RESERVOIR THICKNESS



BASIN RANKING VS. CAPACITY

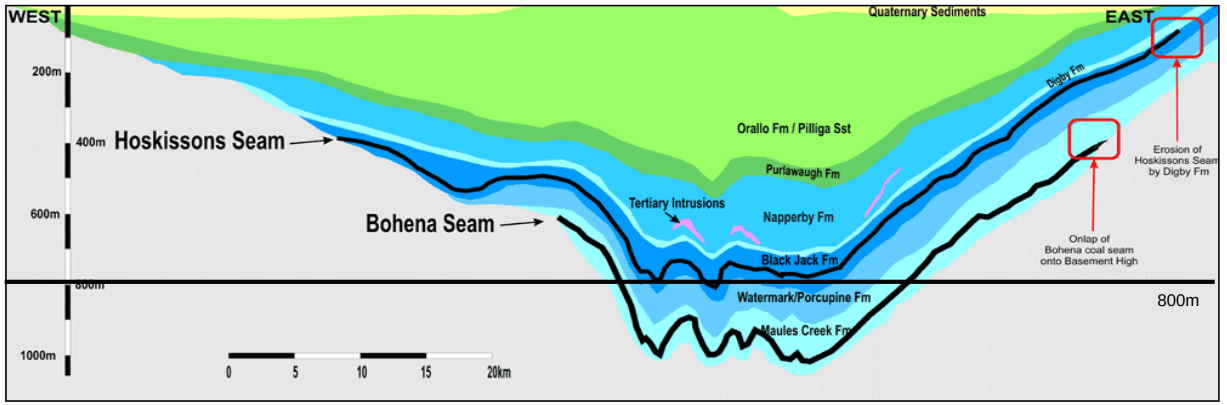


STRATIGRAPHY



(After DPI, NSW)

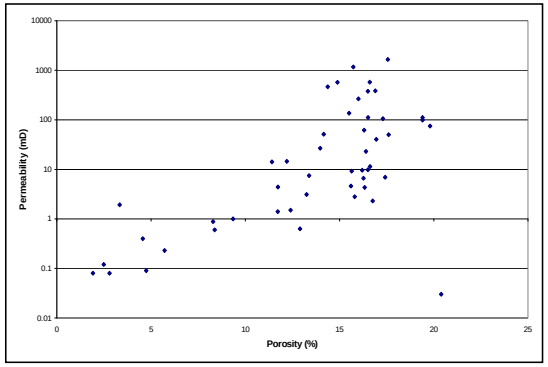
REGIONAL CROSS SECTION (LOCATION IN OIL AND GAS FIELDS MAP)



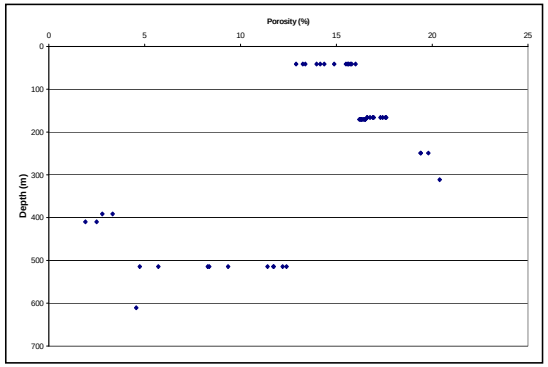
(After http://www.easternstar.com.au/geology.html)

Gunnedah Basin

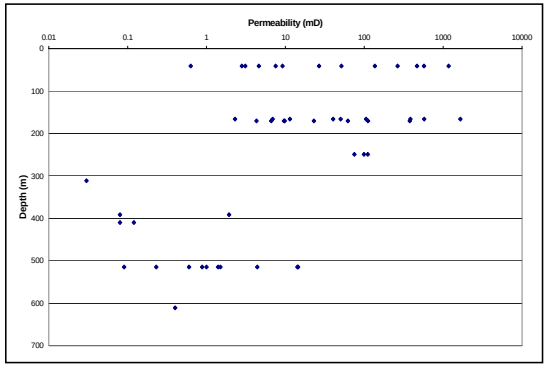
POROSITY VS. PERMEABILITY *Values from basin-wide dataset



POROSITY VS. DEPTH

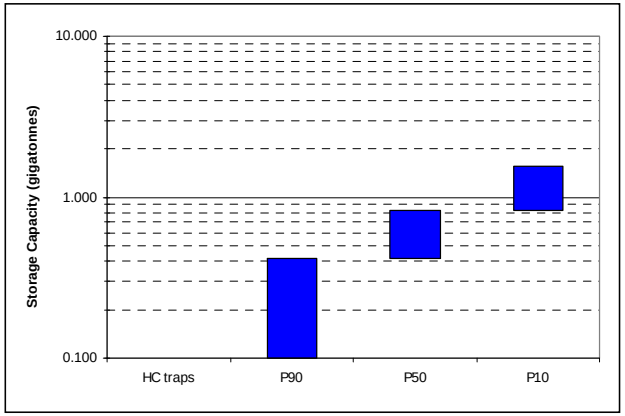


PERMEABILITY VS. DEPTH

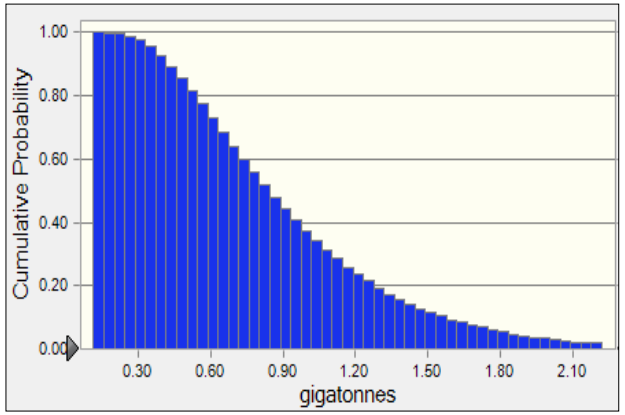


NB. Existing well data is above 800m

STORAGE CAPACITY



STORAGE CAPACITY CURVE



Insufficient data for the following items:
- Fracture Pressure vs. Depth Graph
- Reservoir Pressure vs. Depth Graph
- Top seal Potential Graph

BASIN RANKING

Category	Description	Score	Weighting
Tectonics (Seismicity)	Medium/Low	4	0.00
Size	Small	1	0.06
Depth	Shallow	1	0.10
Type	Non-marine and Marine	2	0.04
Faulting intensity	Limited	3	0.14
Hydrogeology	Good	3	0.04
Geothermal	Moderate	2	0.05
Hydrocarbon potential	Small	2	0.05
Maturity	Exploration	2	0.05
Coal and CBM	Shallow	2	0.00
Reservoir	Potential	2	0.16
Seal	Good	4	0.18
Reservoir/Seal Pairs	Good	3	0.03
Onshore/Offshore	Onshore	3	0.00
Climate	Subtropical	4	0.00
Accessibility	Easy	4	0.00
Infrastructure	Minor	2	0.00
CO_2 sources	Few	2	0.00
Knowledge level	Moderate	2	0.05
Data availability	Moderate	2	0.05
Overall Ranking			**46**

STORAGE CAPACITY ESTIMATE

Parameter	Unit	Score (P90)	Score (P50)	Score (P10)	Distribution
Area of storage region	km^2	5000	8000	25000	Triangular
Gross thickness of saline formation	m	10	30	50	Triangular
Average porosity of saline formation over thickness interval	%	5	10	15	Triangular
Density of CO_2 at average reservoir conditions	$tonne/m^3$	0.5	0.6	0.7	Triangular
E-storage efficiency factor (% of total pore volume)	%	4	4	4	
Calculated storage potential	gigatonnes	0.4	0.8	1.6	

POTENTIAL INJECTION PARAMETERS

Parameter	Unit	Shallow	Mid-Depth	Deep
Depth base seal	m	1900	2125	2230
Formation thickness	m	50	125	200
Injection depth	m	1950	2250	2500
Porosity	%	16.7	15	13
Absolute permeability	mD	446	108	29
Formation pressure **	psia	2860	3300	3665
Fracture pressure **	psia	4670	5390	5985

** No data, estimated from adjacent Cooper Basin

DISCLAIMER

The purpose of these montages is to aid a high level evaluation of the geological storage potential of Australia's sedimentary basins for future CO_2 emissions. The evaluations are based on core analysis and other data derived from Geoscience Australia and other sources. However due to time constraints, it has not been possible to carry out the detailed evaluation of the data, which will be required for the next phase of analysis.

In this exercise, we sought to recognise a range of characteristics within each basin by identifying three sets of parameters at different locations and depths in the basin. The intent is to generate an indication of a range of storage capacity and potential injection rates. These capacities and rates are being used in high level reservoir modelling work to generate injection tariffs* and capacity estimates. All of this work feeds into a process that provides indicative, conceptual transport and storage tariffs for CO_2 emissions captured in various parts of Australia.

This 'top down', simplistic approach seeks to describe the magnitude and range of potential costs for transport and storage in Australia, at a 'conceptual' level of accuracy. Clearly, any final investment decision would call on an increased understanding and level of accuracy through the usual project development process.

* Cost per tonne of CO_2 avoided, calculated using the net present value of cash flows over a 25 year asset life.

REFERENCES

Gurba, L., Golab, A., Jaworska, J., Douglass, J. and Hyland, K., 2009. CO_2 geological storage opportunities in the Gunnedah Basin, and the southern Bowen Basin, NSW. Cooperative Research Centre for Greenhouse Gas Technologies, Canberra, Australia, CO2CRC Publication Number RPT09-1456. 125pp.

http://www.easternstar.com.au/geology.html

Petroleum and Marine Division, Geoscience Australia, 2007. Oil and Gas Resources of Australia 2005. Geoscience Australia, Canberra.