Site characterisation at the CO2CRC **Otway Project**

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CAGS Workshop II Wuhan, Hubei province, China 28th October 2010

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China Australia Geological Storage of CO2



CO2CRC Otway Project location & concept



CO2CRC Otway Project facilities



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Integrated geological characterisation





3D layered Earth model





CO2CRC Otway Project: geological model



1005



Onshore drilling rigs CRC-1 Well (Mar 07)

42.9 M Core



Full Suite of Logs

• Gamma ray, neutron, density, resistivity and caliper log

- NMR
- ECS (elemental capture spectroscopy)

CO₂

- FMI (image log)
- Sonic Scanner
- Formation tester
- 3D VSP





Conceptual palaeoenvironment



MODERN DAY ANALOGUE

(Above) Analogue of an incised valley near Hervey Bay, QLD. (Photo by Simon Lang). (Right) Alluvial architecture realted to a simple cycle of base level fluctuation (modified from Shanley and McCabe, 1993)

CONCEPTUAL MODEL **Base level** Isolated channels high low Tidally influence fluvial deposits Time Amalgamated fluvial channel deposits B Valley incision and terrace formation -10s m

Low-sinuosity high gradient rivers

1-10s km

Site characterisation process

- Build detailed reservoir model using current state of the art modelling packages
- History match with actual production data to validate model.
- Predict future trend.



Conceptual reservoir model

Observation well

CO_2 accumulation

Ca

CO₂ Injection well

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Model validation through new data



Monitoring the injected CO₂



SEAL GEOCHEMICAL SAMPLING & SEISMIC MONITORING

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Measuring the temperature and pressure, recording sound waves and detecting chemical changes

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Downhole geochemical monitoring

CRC-1 Injection well Naylor-1 Monitoring well





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Model predictions





3D surface seismic

Objective: to map the migration path of CO_2 plume from injector to producer

Methods: 4D or time-lapse surveys

Repeatability of surveys before, during and after the CO₂ injection is very important for every aspect of acquisition (source and receivers positioning; source signal; hardware; time of year; processing)





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3D surface seismic from 2000 to 2009



Otway Project stage 2: use a saline formation!



2D sensitivity of a simulated CO₂ "leak" into the Paaratte saline formation using a dynamic model



The CO₂ quantities shown in thousand tonnes. CO₂ occupies thin layer, with small areal extent (less then Fresnel radius) - diffracted energy is roughly proportional to CO₂ volume; 30% of background noise (A_f-field) was used in this simulation.



Zone 1 Sequence stratigraphy

Potential for reservoir development

specific zone

of interest



Zone 2 Sequence stratigraphy

Potential for seal development



CRC-2 drilling, coring, logging





Wireline well logging

5 runs including:

•GR, SP, density, magnetic

resonance, porosity,

permeability

- •Comprehensive resistivity suite
- •Elemental Capture
- Spectroscopy (ECS)
- •Resistivity image log (FMI)
- •Formation fluid tests (MDT)



CRC-2 core analysis



Facies				
Distal mouth bar				
Proximal mouth bar	Base cas	se, realis	sation a	#1:
Distributary channel		Facies mode)	
Cement section				
Delta front				
				_
5734000		5733900		659000
658900				00866
/ /				

Acknowledgement

The authors would like to acknowledge the funding provided by the Australian Commonwealth through the CRC Program, and by both industry and state government partners to support CO2CRC research.

Thank you

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CO2CRC Participants

