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ANLEC R&D Report Summaries

The following reports are available from the ANLEC R&D website:

Surat Basin

"Simple yet sensitive" methodology developed for surface signal attribution at Glenhaven, Queensland

This project is the second part of an ANLEC R&D two-part study on methodology for characterising near-surface anomaly above the CO_2 storage site at Glenhaven, Surat Basin. The first (ANLEC Project 7-1116-0291: Optimising a process-based approach for near-surface leakage assessment) investigated a 'process-based' screening method for leakage identification, using simple geochemical ratios among major soil gases (CO_2, O_2, N_2, CH_4). This project characterised the source of any anomalous soil gas indicated by process-based monitoring.

Three sources of gases that may contribute to surface signal were identified: 1) gas dissolved in groundwater of the Springbok Sandstone; 2) CO_2 from oxidised methane related to coal seam gas production; and 3) injected CO_2 from the Millmerran power station. The project was able to distinguish the origin of the CO_2 signal by analysing stable and radiogenic carbon isotopes. $\delta 13_C$ and 14_C of CO_2 and CH_4 proved to be the most useful attribution to determine whether the CO_2 signal anomaly is from the storage reservoir.

Used together with appropriate sensing technology, monitoring via carbon isotope analysis provides fast, accurate and stakeholder-friendly environmental assessment at geologic CO_2 storage sites. This methodology can be put in place pre-project and has potential for wider application to the Surat Basin.

More information: Isotopic characterisation of source CO_2 and naturally occurring CO_2 at Glenhaven

Potential for passive seismic to generate subsurface imaging

More than 10,000 geophones monitored passive seismic data for six days in Queensland's Surat Basin. The project attempted to show that passive seismic data recorded during an active survey can be used to extract useful information on pre-existing faults, fractures, anisotropy and in-situ stress condition. The data was analysed for the seasonal variation of ambient seismic noise from natural processes. Advanced detection and location algorithms were used to search for any local and regional seismic activity.

Regional earthquakes and mining explosions were recorded across the network; however, local seismic activity was not detected. Results indicate the crucial need to accurately constrain the depth inversion and use an accurate velocity model for ambient noise tomography, and for detecting weak body wave signals.

More information: Processing of passive seismic dataset for stress induced events and tomographic imaging

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Southern Perth Basin

Multi-disciplinary integrated analysis for detailed characterisation of a fault and fracture network

The South West Hub Project has been investigating the Lesueur as a potential target injection and storage formation in the Harvey region of Western Australia, for future CCS activities. This study aimed to understand the propensity of faults and fracture network to act as a conduit for injected CO_2. With new data centred around the Harvey-3 well, this project achieved an integrated analysis of subsurface imaging, structural geology, in-situ stress and forecasting of fault behaviour with CO_2 injection.

Researchers acquired a high density 3D seismic data set using surface and wellbore sensors around the Harvey-3 well. Special core sample analysis was also performed, and the new data used for detailed stratigraphic and geomechanical investigations for stress field estimation, anisotropy characterisation and in-depth analysis of the potential for fault reactivation.

Analyses from in-situ stress, rock properties and hydromechanical modelling suggest fault reactivation from CO_2 injection is unlikely. Hydrodynamic simulation results also suggest migration pathways from the base Wonnerup Member

through faults is unlikely – however, there is a possibility of a restricted migration pathway associated with shallower faults at and below the Wonnerup-Yalgorup interface. Overall, the project successfully characterised the subsurface around the well – delineating geological structures and interpreting the structural behaviour of faults and fractures. The project also developed a surface and borehole-based monitoring strategy, which can be adopted by CCS projects faced with strict land access issues.

More information: Potential for preferential flow through faults and fractures

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ANLEC R&D is a member of the following IEA implementing agreements. For access to their reports, please contact admin@anlecrd.com.au.

IEA Clean Coal Centre Reports

1. Baruya, P (2019), 'The economic and strategic value of coal'
2. Barnes, I (2019). 'Water issues for coal-fired power plants'
3. Wiatros-Motyka, M (2019). 'Power plant design and management for unit cycling'
4. Minchener, A (2019). 'Development and deployment of future fuels from coal'

IEAGHG R&D Program Reports

1. IEAGHG (2019) CCS in Energy and Climate Scenarios
2. IEAGHG (2019) 6th CCS Cost Network 2019 Workshop
3. IEAGHG (2019) CCUS in Energy Systems Models
4. IEAGHG (2019) The Shell Quest Carbon Capture and Storage Project
5. IEAGHG (2019) Further Assessment of Emerging CO_2 Capture Technologies for the Power Sector and their Potential to Reduce Costs
6. IEAGHG (2109) Techno-economic evaluation of CO_2 capture in LNG plants Projects