eReport

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ANLEC R&D Report Summaries

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

Surat Basin

Assessment of Moolayember formation reactivity with CO_2 plume geochemistry

The project investigated the reactivity of the Moolayember Formation's mineralogy and assessed the impact of the groundwater chemistry from a greenhouse gas (GHG) stream. A literature review was completed of the Moolayember Formation with focus on minerology in the Glenhaven area. Modelling of potential dissolution and precipitation processes over time was undertaken with the range of lithologies. Batch reactor experiments validated the reaction path modelling which identified the chemical reactivity of selected samples of the Moolayember. Reaction path modelling was able to reproduce some, but not all of the trends observed in aqueous geochemistry. The project's data also confirmed the Moolayember lithologies immediately beneath the unconformity have sufficient permeability for fluid flow to occur if acted on by dynamic viscous forces. This was reflected in the variable levels of extraction of elements during the two weak acid steps of the bench top sequential extraction experiments.

More information: Groundwater Geochemistry of the Moolayember Formation

Calibrated imaging determines the distribution of minor components in core samples

The project explored the distribution of minor component metals along a Precipice core by using a calibrated imaging method applied to a digitally scanned core. Researchers extracted carbonate cement volumes along the whole 100m core image data. The project was able to quantify the distribution of pyrite/calcite/siderite - the possible source of trace metals. The maximum potential release of trace metals is determined by the abundance of source minerals – principally pyrite and Fe-carbonate. Spot trace metal analyses identified at least two populations of pyrite, and the most abundant of these carried very little trace metals. This project complemented the geochemical investigations undertaken in the precipice sandstone in a prior project, by identifying the location and distribution of minor components in minerals.

More information: Digital rock applications for spatial resolution of mineralogy through the Precipice Sandstone

Gippsland Basin

Marine seismic monitoring network for the Gippsland Basin CO_2 storage site

This project focused on microseismic monitoring protocols within a marine context in the Gippsland Basin. It used natural seismic sources to constrain geomechanics of CO_2-storage reservoirs. The project successfully improved seismograph coverage of the Gippsland Basin area and reduced uncertainties with epicentre location of events in the region. Techniques were developed to allow microearthquake studies in other regions with relatively soft surface sediments, site amplification and surface noise, especially ocean noise. Development of velocity models was limited by a sparsity of recorded offshore events in the region of proposed CCS activities. However, it is expected the developed methods will be applicable to the growing database of events that the deployed network is expected to record in the following years.

More information: Optimisation of Earthquake Monitoring for CCS Applications on Local and Microearthquake Scales

Atmospheric network for detecting sources of CO_2 from a marine injection site in the Gippsland Basin

This project developed monitoring technologies and prediction models to detect and discriminate atmospheric sources of CO_2 in CCS locations. It defined an area-integrated measurement network to detect and triangulate anomalous sources with high probability. Significant development on the open-path lidar based FTIR (fourier-transform infrared spectroscopy) was attained throughout the project, with pathlengths up to 1.5 km (one-way) achieved with measurement precision of better than 0.1% for CO_2. The forward model prediction system uses signals detected by the network to estimate fluxes within the region from contributing sources of CO_2. The research showed the limitations of this onshore

network to detect and attribute anomalous signals from the vicinity of the proposed storage location. This was due to the atmospheric variability combined with distance to the offshore injection site.

More information: An atmospheric assurance system for the Gippsland near-shore environment

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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. Sloss, S (2020) Understanding the role of Coal in the Energy Trilemma
2. Zhu, Q (2020) Historic Efficiency Improvement of the Coal Power Fleet
3. Mill, S (2019) Modularisation for Clean Coal
4. Uddin, M et al (2019) Update on International Finance for Coal-Fired Power Plants

IEAGHG R&D Program Reports

1. IEAGHG (2020) IEAHGHG Summary Hydrogen workshop
2. IEAGHG (2020) Monitoring and Modelling of CO_2 Storage

Global CCS Institute Reports

1. Tamme, E., 2020, The European Green Deal: New opportunities to scale up carbon capture and storage
2. Havercroft, I., 2019, Lessons and Perceptions: Adopting a Commercial Approach to CCS Liability
3. ETC., 2019, Mission Possible: Reaching Net-Zero Carbon Emissions from Harder-to-Abate Sectors by Mid-Century
4. Kearns, D., 2019, Waste-to-Energy with CCS: a pathway to carbon-negative power generation
5. Lee, B., 2019, Carbon capture and storage in the USA: the role of US innovation leadership in climate-technology commercialization, *Clean Energy*