Abstract

Title	*Impact of faults and fractures on seal integrity for CO_2 storage*
Author/s	*Dr A. Nicol (CO2CRC, GNS), Dr H. Seebeck (GNS), Dr C. Childs (UCD, Dublin), Dr M.J.F. Lawrence (CO2CRC, GNS), Dr E. Tenthorey (CO2CRC, GA) and Prof. J.J.Walsh (UCD, Dublin)*
Abstract for	**Oral**

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It is well accepted that faults and fractures have the potential to reduce seal integrity and thereby the storage of CO_2 reservoirs over thousands of years. It is therefore important to determine how, where and under what circumstances faults (and fractures) in mudstone-seal rocks can contribute to CO_2 leakage. In this study, we present analysis of faulted outcrop and seismic reflection profiles from both Australia and New Zealand, with the aim of better understanding the fluid-flow properties and leakage potential of faults.

Results suggest that: the dimensions and size population of tectonic faults often do not change significantly from reservoir to seal; elevated densities of small-scale faults (and greatest fault zone widths) typically occur at irregularities on fault surfaces (e.g., relays, bends and fault intersections) and may promote migration of CO_2; and polygonal faults developed in association with sediment dewatering are common in mudstone rocks and could reduce seal integrity. To further examine the relationships between fluid flow and faults we use ground water in tunnels and gas chimneys imaged in seismic reflection lines. These data indicate that in low permeability rocks (e.g., seals) fluid flow is almost exclusively contained within fault zones, that flow rates are greatest on larger faults and that flow is focused near fault irregularities. Although potentially an important tool, we recommend that geomechanical analysis be used with caution to predict the likelihood and location of fault leakage. However, we have found 3D seismic coherency cubes useful for locating faults and identifying potential leakage pathways. Further numerical fluid-flow modeling and empirical fluid-flow data will improve understanding of where and how faults (and fractures) are most likely to reduce seal integrity.