

8. CONTAINMENT RISK ASSESSMENT

8.1 Introduction

A key objective of the CO2CRC Otway Project was to demonstrate that underground storage of CO₂ is an effective option for reducing greenhouse gas emissions without any adverse effects on community safety and environment. An important part of this objective was to show that containment risk could be assessed through a process of risk and uncertainty analysis that was able to take fully into account the possibility of unlikely events inducing leakage. Due to the technical nature of subsurface leakage, it was decided that a specific risk analysis technique could be applied to containment risk. Any such assessment strongly relies on the characterisation of the subsurface fluid flow and understanding of the changes resulting from the injection. The resulting independent containment risk assessment could then be used to manage stakeholder and public perception that the key CCS risk is associated with leakage. The resulting risk assessment could also be used to determine the optimal risk mitigation and monitoring programme required to assure CO₂ containment.

At the time of the Otway Project development, no CCS-specific commercial tool existed that provided suitably specific risk assessment for subsurface containment of CO₂. The Project therefore utilised its own risk assessment research within the CO2CRC in combination with the generic proprietary risk assessment method RISQUE (Bowden et al. 2001). The Otway Project built on a process developed under the precursor Australian Petroleum Cooperative Research Centre (APCRC), using a technique where specific risk categories were populated with quantitative risk parameters (Bowden and Rigg 2004). While CCS was considered a new application of RISQUE, importantly the tool and methodology still met the industry standard of risk assessment, and was very transparent in its application.

8.2 Methodology

The assessment of storage risk at the Otway site involved an understanding of uncertainty in the subsurface storage complex. At the start of any subsurface project, this uncertainty is quite broad and is not expected to be fully resolved. For the Otway Project, first, the mechanisms that might provide conduits for CO₂ leakage, were characterised; these included the Belfast Mudstone top seal, the bounding faults, the CRC-1 and Naylor-1 wells,