5. CHARACTERISING THE STORAGE SITE

5.1 Introduction

Site characterisation is defined by the CO2CRC as "The collection, analysis, and interpretation of subsurface, surface and atmospheric data (geoscientific, spatial, engineering, social, economic, environmental) and the application of the knowledge to judge, with a degree of confidence, if an identified site will geologically store a specific quantity of CO_2 for a defined period and meet all required health, safety, environmental, and regulatory standards". Depleted petroleum reservoirs, such as the Naylor Field, are regarded as desirable CO_2 storage sites, due to the perception that much of the data gathering and characterisation was done in the exploration and development phase of the field's life and that they are proven traps, having held hydrocarbons in the past (Stevens et al. 2000). However, it cannot be assumed that the extent of site characterisation needed for a depleted petroleum reservoir site will be any less stringent than that needed for any other site when assessing injectivity, capacity and containment of CO_2 (Chadwick et al. 2007; Jenkins et al. 2012). A field or structure that was charged naturally with hydrocarbons over perhaps millions of years may not have the same physico-chemical response when injected with CO_2 at high rates over a short space of time. Similarly, the CO_2 storage capacity of depleted oil or gas fields will not necessarily equate to the original volume of gas produced, particularly in reservoirs with strong aquifer drive. Finally the geochemical reaction potential of CO_2, once it is dissolved in water, may compromise seal integrity at a site where the original gas (e.g. methane in the reservoir) had a relatively low reaction potential.

While the data available for the Naylor depleted gas field were sufficient for CO2CRC to determine the structure had held hydrocarbons within a porous and permeable sandstone, at a depth of about 2000 m overlain by impermeable mud rock and that it might be suitable as a storage site, in many respects the available data could not meet the requirements for a comprehensive CO_2 storage site characterisation. For example, there was no conventional core, or side wall cores from either the reservoir or seal, and there was only a very basic suite of pre-production logs. Although the production pressure data proved useful in the early stages of flow simulation history matching, it only provided half the picture when trying to assess the post-production aquifer recharge potential.