

The Impacts of Clays in the Walloon Subgroup: Production and Aquifers

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Abstract

Solids production from coal seam gas wells in the Surat Basin is potentially significant across production licenses and is a leading contributor to suboptimal well availability and operating cost through increased workover frequency. A major control on solids production is the distribution of fresh-water sensitive or swelling clays in the Walloon Subgroup, which include varieties of smectite and mixed layer illite/smectite. The highest concentrations of swelling clays are found in the stratigraphy between coal bands, commonly referred to as ‘interburden’.

The interburden is heterogeneous in terms of lithology comprising variously interbedded sandstones and siltstones. In terms of cumulative thickness, the interburden forms the majority of producing interval in the Walloon Subgroup. This important observation suggests that swelling clays have a potentially widespread distribution in the Surat Basin and could influence the production of solids across the entire zone of interest for coal seam gas. Furthermore, a major consideration is also the impact of clays on rock properties in potential aquifers within the Walloon Subgroup. Consequently, characterising and understanding complicated interburden stratigraphy is vital.

Due to a limited number of cored wells relative to production wells in QGC acreage, the characterisation of the interburden is heavily reliant on petrophysical interpretation, which is able to deliver valuable products including proxies for formation clay content. Such proxies are then used to form an interpretation for the interburden in terms of porosity and permeability. However, a robust calibration of petrophysical models to reality, i.e., core, is fundamental.

To facilitate a calibrated and consistent petrophysical characterisation for the interburden to investigate aquifer potential and the distribution of swelling clays, a focused data acquisition and core study program on 11 cored wells comprising ~4km of Walloon Subgroup was devised. The integration of the extensive sedimentological and routine core analysis data collected shows that while clays are ubiquitous in the interburden, limited potential for aquifers exists in the Walloon Subgroup.