

# Controls on Reservoir Quality and Rock Property Trends in the Mungaroo Formation, Carnarvon Basin, Australia

**Saju Menacherry**

Reservoir Geology Consultant

9.29.2020 - 10.1.2020 - AAPG Annual Convention and Exhibition 2020, Online/Virtual

## Abstract

The Triassic fluvio-deltaic Mungaroo Formation is the main reservoir in the multi-TCF gas plays offshore Northern Carnarvon Basin, Western Australia. The Triassic fluvial channel sandstones of various types represent the main exploration and development targets in the Mungaroo Formation. Mungaroo Formation sandstones are mostly subarkose and quartzarenite with sublitharenite and rare arkose, lithic arkose, feldspathic litharenite and litharenite. Sands are typically fine-to coarse-grained and poorly-to well-sorted. Framework grains are dominated by mono crystalline quartz, with minor polycrystalline quartz, feldspar and lithic fragments, mica, heavy minerals, organic matter and detrital clay. The composition, grain size and sorting varies laterally and vertically even within a single depofacies, due to the high complexity of the Mungaroo Formation sediments and environment of depositional setting. Reservoir quality data were compiled from sedimentological descriptions, petrographic analytical data sets (i.e., petrography, QXRD, MICP, and SEM) and routine core analysis data from various fields in the basin. A detailed depofacies and lithofacies analysis was performed on the sampled intervals to provide sedimentological context to the petrology data and to evaluate the compositional variation in diagenesis. Diagenetic modifications involve a complex arrangement of compaction, alteration and dissolution, with abundant authigenic cements. Early, middle and late diagenesis stages are evident through time. The early stage is co-incident with burial of the North Carnarvon Basin sequence of early carbonate cementation and compaction, while the middle stage is related to Jurassic uplift and erosion of deposited rocks and flushing of

meteoric water into the system resulted in kaolinisation. The late stage is the deep burial and high temperature related quartz overgrowth and illitisation. Understanding the influences between diagenesis pattern and rock properties within the reservoir quality of rocks (e.g. geochemical, geomechanical, petrophysical) that directly influencing lower pre-drill risk allocation, resource estimates and optimized recovery strategies.