

## **Impact of Compaction and Diagenesis on Strength, Stiffness and Anisotropy in the Goldwyer and Bongabinni Formations, Canning Basin, Western Australia**

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### **ABSTRACT**

Following the recent advent of shale gas and shale oil, especially in the USA, the production of hydrocarbons has increased dramatically. These successes led to evaluation of unconventional shale potential in basins worldwide in the hunt for hydrocarbons previously thought unrecoverable. Several basins were identified in Australia as having hydrocarbons potentially recoverable from shales of which the Canning Basin in the north of Western Australia has the greatest potential. This large basin had been a minor hydrocarbon producer long before the unconventional shale revolution, although wells are generally sparse and widely separated.

Interest in the onshore Canning Basin has focused on the sub-salt Ordovician Bongabinni and Goldwyer Formations due to demonstrated hydrocarbon potential from these units. The upper Ordovician Bongabinni Formation is supratidal in origin with oxidized red evaporate-bearing mudstones, carbonates and sandstones indicating recurring hypersaline conditions. In deeper parts of the basin, the mid-Ordovician Goldwyer Formation is mudstone dominated, although in shallower platforms it becomes limestone dominated. It has been interpreted to be of open marine to inter-tidal origin (Haines, 2004). The Canning Basin has been through multiple phases of uplift, erosion and deposition from the early Ordovician through to the Cainozoic, with maximum burial for these sediments of -2500m and temperatures of -100° C. This contribution looks at the contrasting microstructure, mineralogy and geochemistry of these two shale formations in order to elucidate the mechanical and diagenetic processes that have affected them and how the fabric development through time links with petrophysical, geomechanical and rock physics response in these rocks.