Recent Petroleum Exploration Results: Central Officer Basin, South Australia

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Abstract

Recent wildcat exploration drilling (2 wells) by Rodinia Oil has found the thickest section of Neoproterozoic aged rocks of any wells in the central and eastern parts of the Officer Basin. Thick sections of Neoproterozoic aged rocks are seen in Officer Basin wells in Western Australia, but these do not appear to have as complete a section as the two most recent wells in South Australia.

The Officer Basin was formed as part of the early Neoproterozoic Centralian Super Basin. An initial basin fill of coarse clastics and evaporites was followed by the deposition of finer mixed clastics and carbonates, glacial sediments and finally carbonates during the Cryogenian period. Latest Neoproterozoic sediments comprise of finer clastics, incised canyon fill and mudstones are overlain in the recent wells by Cambrian clastics and Quaternary aeolian deposits.

The central Officer Basin was deformed by several major tectonic events since the early Neoproterozoic. The oldest of these events is manifested by the major Sturtian angular unconformity at the top of the Burra Group and may be equivalent in age to the Areyonga Movement as reported in Western Australia by Apak and Moors (2001). The second major structure forming event in the Central Officer Basin relates to the latest Neoproterozoic Petermann Ranges Orogeny that involved canyon formation and decollement on a thick salt layer near the base of the section. This major tectonic event was later amplified by similarly oriented movement during a third major event, the Devonian/Carboniferous aged Alice Springs Orogeny. Evidence of these tectonic events can been seen in the recent wells and seismic gathered by Rodinia Oil.

The two recent wells have added considerable knowledge to the understanding of the petroleum potential of the Officer Basin. In the Mulyawara-1 well continuous gas and oil shows were recorded throughout the middle and lower parts of the Neoproterozoic section, particularly in the Burra Group. In the Kutjara-1 well, gas shows with “heavies” were recorded throughout the entire mid Neoproterozoic in similar setting to the Mulyawara-1 well. Although commercial deposits were not encountered in the two recent wells, the presence of an active Neoproterozoic petroleum system has been convincingly demonstrated. Excellent reservoir properties were also established for the Murnaroo, the informally named Mulyawarra and the Pindyin Sandstones, and the predicted continuous thick salt seal within the Callana Group was confirmed.

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