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P.O. Box 3524, La Romaine, Trinidad and Tobago, W.I. or UTT Building, Esperanza Road, Brechin Castle, Couva, Trinidad W.I. Website: www.the gstt.org Email: thegstt@gmail.com

Angelin fault seal analysis: A case study on the A Sand hanging- wall trap anomaly in FB4

Author: [1]Kareem James, Nirala Boodoo, Randy Partap
[1]Kareem.James@bp.com -presenter, bpTT, Trinidad and Tobago

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The Columbus Basin can be described as a Pliocene/Pleistocene gravity driven extensional basin that is superimposed on a Mid Miocene foredeep basin. Traps are set up by the juxtaposition of the two main structural elements in the Columbus Basin - the NW-SE trending normal faults and the SW-NE trending anticlinal ridges. Most of the traps are fault-controlled accumulations. A plot of Column height vs Fault throws and SGR by Partap et. Al. 2017 shows an average column height range between 50 to 300 feet.

The Angelin field is in the northern catchment of the Columbus Basin and was discovered in 1971 with first gas in 2019. This talk aims to highlight the Angelin FB4 A Sand, a hanging- wall trap. Extensive fault-seal analyses have been done on the Angelin reservoirs, and the A Sand stands out as having a higher than average column height relative to the Angelin Field as well as the Columbus Basin fault-seal database. Building on earlier work by Gibson and Bentham 2003 and Partap 2017, possible reasons would be discussed in addition to why understanding this anomalous interval can be important to further development in this field.

Allan plane diagrams, triangle diagrams, cross plots (shale gouge ratio vs column height), spectral decomposition and amplitude maps were generated for the A Sand using existing well log and seismic data. The results were then calibrated to the Angelin fault- seal database as well as the wider Columbus Basin database.

It was found that this interval holds back a larger gas column height than expected. In addition, the trap is effective in FB4 but not in the adjacent FB3. These could be due to a combination of the following reasons: the proximity of the fault block to the shelf edge, the top of this sand has different petrophysical properties when compared to the rest of the sand, quality of the sand at the self- juxtaposition points, or there is a stratigraphic change in FB3 which can affect the sealing potential in FB4.