

Dirty Versus Clean Salt: Their Impact on the Subsalt Wilcox Deep Water Exploration Plays

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This study explores the possibility that risks in the sub-salt Wilcox Deep Water frontier at the Sigsbee Escarpment in the Gulf of Mexico exploration play can be attributed to the salt type. Drilling through and below the salt can be costly and lead to the abandonment of the whole project.

As the salt mass toe creeps down-dip near the mud line, it creates potential traps formed as thrust folds and faults of the older underlying sediments. A clean salt mass is usually driven down-dip by gravity/ buoyancy. On the other hand, dirty salt is pushed down-dip by the sediment influx, in addition to buoyancy. Occasionally, sediments intrude into the salt body and are carried within as rafted blocks. This causes a challenge in testing the subsalt traps in this deep water frontier play. Moreover, in both dirty and clean salt cases, plowing the older sediment underneath the salt creates subsalt gouges which represent a substantial drilling hazard.

The Jack prospect (Walker Ridge block 759) is a part of the emerging Wilcox-equivalent salt toe belt. The rafted sediment blocks and the subsalt gouges made this prospect very expensive to test. The borehole experienced multiple losses of circulation and had to be sidetracked several times. This was due to the narrow drilling window created by the pressure kicks released from the imbedded sediments throughout the salt section. On the contrary, St. Malo (Walker Ridge block 678) is an adjacent prospect on the same trend, but was drilled through clean salt. It was tested with a minimum of difficulties, compared to the Jack prospect.

Tracking the mechanism of the salt movements and their history as dirty or clean type can predict the risk of testing a prospect along this new exploration fairway.