Paper 6

Shale Chaser - A Seismic Inversion method to determine the presence of shale barriers for reserves computation considerations.

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The audited volumetric calculations associated with the field in question were based on two scenarios; a one-pressure system, and a two-pressure system having a difference of about 0.4 TSCF between either scenario.

The tank scenario depends on the critical lateral continuity of an intra-formational shale baffle which, if present everywhere within the field, separates it into the lower volume two-pressure system, otherwise it would be a one-pressure system.

The field is covered by 3D seismic data, with near and far angle sub-stacks available. The normal full-stack seismic data, in the form of either the reflectivity or the compressional (P) acoustic impedance were unable to separate the sands and shales at the target depth because of the overlapping acoustic properties of these lithologies at this particular zone of interest. Hence, the AVO Inversion approach was required, making use of multiple computed rock properties attributes to capture the desired lithology by means of cross-plot isolation.

The angle sub-stacks were calibrated with the log curves of the wells within the field and processed into P-Impedance and S-Impedance data cubes in the AVO Inversion procedure. The resultant data cubes were analyzed with the discrimination of this intra-formational shale being performed on the cross-plot space of a number of parameters derived from the P and S impedance data cubes. In order to assess the robustness of the methodology. a number of sensitivity analyses were employed in the course of the shale isolation process, with converging results from these tests enhancing our confidence.

The project has concluded that the critical intra-formational shale does not form a continuous baffle over the field and hence the higher volumetrics for a combined single-system is supported.