Seismic Imaging at Conger: Lessons Learned in Gulf of Mexico Subsalt Imaging

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Abstract

The Conger Field is a significant subsalt discovery located in the northeastern portion of Garden Banks (Bergeon, 2004). The field is operated by Amerada Hess, with a 37.5% working interest. Other partners are Shell 37.5% and Kerr McGee 25%. Production from four subsea wells has been steady and is very prolific. Conger was discovered in late 1997, with first production in November 2000. Conger is situated partially beneath salt. Reservoirs consist of multiple, geopressured, high-quality turbidite sandstones at depths ranging from 19,500 to 21,000 feet. The geologic model derived from well control consists of ponded turbidite sands. These ponded reservoirs are mostly laterally continuous, grading upwards from amalgamated sheets to amalgamated sheets and channels, and grading back into amalgamated sheets in the two upper reservoirs. These reservoir sandstones exhibit acoustic impedance contrasts that give rise to distinct seismic amplitude anomalies when hydrocarbon filled. However, despite the strong impedance contrasts, the seismic image is significantly distorted by overlying salt, and the subsurface evaluation relied predominantly on the well data and geologic analogs.

One of the critical elements in developing the Conger Field was the lateral continuity and stratigraphic variations in the reservoir sands. Seismic imaging issues below salt as well as seismic mis-positioning (Walker et al., 1999) complicated the stratigraphic reservoir prediction. The original time migrations at Conger appeared to have a major seismic offset originally interpreted as a fault separating the reservoirs along the salt edge. Multiple salt bag iterations have resolved most of the pull-up effects and the pre-stack depth-migration data suggest a nearly continuous set of subsalt reflectors with no evidence of offset along the salt edge. This imaging matches the unfaulted geologic model for the Conger Field developed from well control. Pre-stack offset points data and illumination studies have been used to help further balance the subsalt reflector amplitudes for stratigraphic reservoir studies. To date, production at Conger has been excellent confirming the geologic model for the field, which most likely consists of laterally continuous sandstone reservoirs with minimal faulting.

References

Bergeon, Thomas, 2004, Seismic Imaging at Conger: Lessons Learned in Subsalt Imaging: 24th Annual GCSSEPM Research Conference: Salt-Sediment Interactions and Hydrocarbon Prospectivity: Concepts, Applications, and Case Studies for the 21st Century. (The complete paper with figures is available through GCSSEPM).

Walker, D.B., R.R. Pressler, S.N. Checkles, 1999, Garden Banks 260 Field: Dynamic Application of Seismic Migration in a Major Field Development: Proceedings from the 27th annual Offshore Technology Conference.