

Trap and Seal Analysis — Concepts and Mexican Examples

Marco A. Arreguín-López¹, Raymundo Sánchez-Rivera²,
Edmundo Heredia-Cervantes³, and Susan Hippler⁴

¹Pemex Exploración y Producción, Activo Integral Veracruz

²Pemex Exploración y Producción, Activo Regional de Exploración Región Sur

³Pemex Exploración y Producción, Activo Regional de Exploración Marina

⁴ExxonMobil Exploration Co.

ABSTRACT

Results of the application of a methodology of trap and seal analysis to pre- and post-drill cases are presented. The methodology is applied to risk exploratory prospects and to evaluate the trap and seal elements. Furthermore, this methodology is used in the post-drilling analysis to determine the controls affecting the distribution of the fluid columns in the well-tested traps.

The methodology covers four steps in general: 1) quality control of maps that describe the traps, 2) juxtaposition analysis, 3) capillary seal capacity analysis and 4) mechanical seal capacity analysis.

Two post-drilling examples are presented. The first one is an onshore oil field located in the Salina del Istmo Basin, which consists of a fault-dependent trap; the element controlling the trap fill will be shown to be a sand-on-sand juxtaposition (cross-fault leak) between two blocks. The second one is an offshore light-oil producing well in the Catemaco thrust and fold belt; two untested seismic amplitude anomalies were analyzed with the methodology, and the possible hydrocarbon columns would be controlled by cross-fault leak with minor participation of the capillary seal capacity.

Likewise, two offshore pre-drilling examples are presented, both of them are located in the Catemaco fold bend belt. The first one is a faulted anticline with a conformable seismic amplitude anomaly. The methodology shows that it has not reached the top seal capacity and the trap should be filled to its spill-point. The second example is a fault-dependent trap, with a conformable seismic amplitude. This trap is limited by two faults, both of them might have cross-fault leak controlling the possible hydrocarbon column.