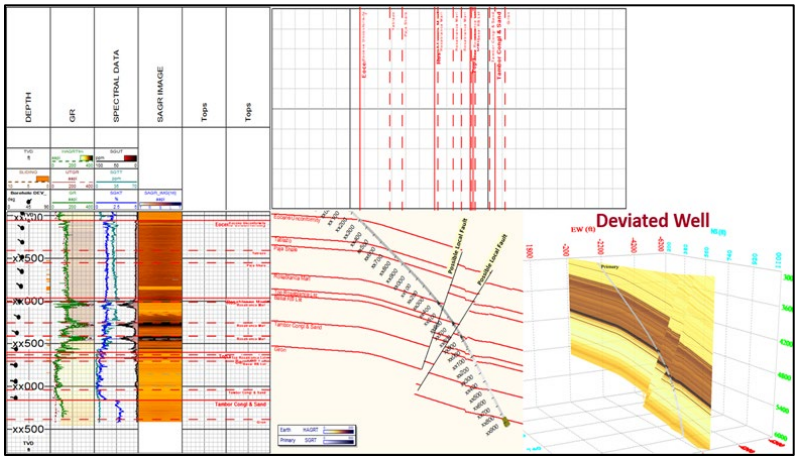
SpectralWave® Sensor, IES Analysis Characterize Reservoir Structure in 4,000-ft Deviated, Exploratory Well With High Geological Uncertainty



Structural model representation, showing non-vertical faults, mapped in the dipping azimuth direction of the beds, crossing the Rosa Blanca formation stratigraphic sequence.

Objectives

- Identify formation tops using LWD from the Eocene Unconformity zone to the natural fracture zone on the Rosa Blanca limestone formation.
- Test if the field's natural fractures are expanding into the exploration zone.
- Determine if the zone presents any potential fluids of interest to increase the productive field area.

Our Approach

- Weatherford drilling and Interpretation and Evaluation Services (IES) experts collaborated with the customer to determine the project execution plans, showing analysis and engineering challenges.
- The team recommended the SpectralWave spectral azimuthal gamma ray sensor that provides real-time spectral gamma ray data, azimuthal gamma ray borehole images, and precise total gamma ray information while drilling.
- Weatherford deployed logging-while-drilling (LWD) systems—including the SpectralWave sensor and the hostile-environment-logging (HEL™) measurement-while-drilling (MWD) system—to obtain the formation data.

LOCATION
Colombia

WELL TYPE
Exploratory well, deviated

FORMATION
Natural fracture limestone reservoir

HOLE SIZE AND ANGLE
6-3/4 in., 20°

TEMPERATURE
139°F (59.4°C)

TOTAL DEPTH
6950 ft (2,118 m)

LOGGING INTERVAL
1,057 to 6,900 ft (322 to 2,103 m) MD

PRODUCTS/SERVICES
- SpectralWave spectral azimuthal gamma ray sensor
- HEL™ hostile environment logging MWD system

Weatherford®

SpectralWave® Sensor, IES Analysis Characterize Reservoir Structure in 4,000-ft Deviated, Exploratory Well With High Geological Uncertainty

Our Approach (continued)

- IES experts interpreted the data received in real time and provided clear geological markers, focusing particularly on the reservoir characterization on the structural model and isotope analysis.
- The team also determined potential fault ranges—something the customer did not expect—but helped complete the drilling program and projected the possible final drill depth according to stratigraphic sequence.

Value to Customer

- The data significantly minimized the geological uncertainty model, especially with the dip analysis using gamma ray borehole images and spectral data (K, U, and Th).
- Spectral gamma ray images clearly defined two possible main faults which have made the structure a repeat stratigraphic sequence with a northwest dipping trend in the fault areas, increasing dip magnitudes over 70°.
- Moving closer to the bottomhole, a significant increase in the potassium values can be appreciated, contributing to determining the boundaries of the Tambor formation because sampling cutting rock does not clearly differentiate the bottom from the limestone zone.
- Based on the preliminary structural analysis, it became possible to accurately reach the Tambor formation at a measured depth (MD) of +/- 50 ft (15.2 m), resulting in the achieved final total depth (TD).
- This accuracy enables the customer to adjust trajectories and better position for future wells, optimizing operative costs and increasing reservoir contact.