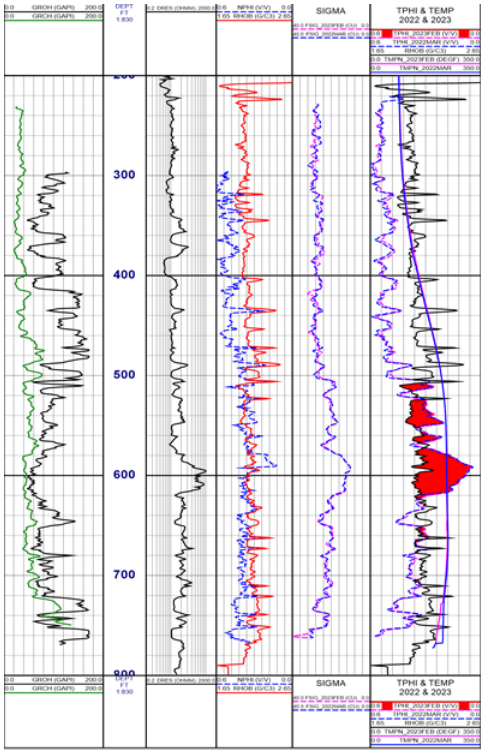
Raptor™ 2.0 Cased-Hole Evaluation System,

Successfully Deployed for Steam Injection Reservoir Monitoring Using Time-Lapse Sigma Log



The Raptor 2.0 system delivered the results comparison between the originally provided GR, Resistivity, Neutron Density logs with the Pulse Neutron Logging completed in 2022 and 2023 with Sigma, Thermal Porosity and Temperature deliverables.

Objectives

- Monitor the steam injection propagation across the heavy oil reservoir in a cased-hole observation well.
- Complete the service as a time-lapse monitoring with previous logs and deliverables of Sigma, thermal neutron porosity match and potential temperature evolution in time.

Our Approach

- Weatherford wireline experts recommended using the Raptor 2.0 cased-hole evaluation system. Raptor 2.0 logs capitalize on industry-leading tool sensitivity and resolution to provide a definitive roadmap to efficiently booking more reserves and increasing production.
- Field personnel deployed the Raptor tools with 15 ft/min (4.5 m/min) to record the Sigma mode and temperature recording up to 245°F (118°C).

LOCATION
Indonesia

WELL TYPE
Observational

HOLE SIZE
8-1/2 in.

CASING SIZE
7 in., 20 ppf

DEPTH
770 ft (234 m)

PRODUCTS/SERVICES
- Raptor 2.0 cased-hole evaluation system
- Wireline services
- Interpretation and Evaluation Services

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Our Approach (continued)

- The result from the logs showed the good neutron porosity overlap across the 0 to 500-ft (0 to 152-m) interval. The results, however, also displayed the decrease in thermal neutron porosity across the 510 to 620-ft (155 to 188-m) interval suggesting the steam growing from original conditions.
- There was a relatively good match between two pulse neutron runs suggesting that the steam was growing only with approximately 5% between 2022 and 2023. The minor variation for the temperature response confirmed the occasional injection across the lowest part of the logging interval.
- The Sigma confirmed the good correlation between two-time lapse and shows a minor change in the steam injection area.

Value to Customer

- Raptor 2.0 system technology in the Sigma mode and temperature proved to be a reliable method to monitor the current steam injection condition and propagation for the heavy oil.
- The time lapse allowed the customer to monitor the effective sweep efficiency and distribution of the slow heavy oil recovery across the entire field keeping the injection target in place.
- When the results show a decrease in oil density, the customer will have the ability to proactively update the strategy to maintain the production while extending the economic life cycle of the well.