CASE STUDY

Apache Increases Expected Oil Recovery by 11% with GeoSphere Service Offshore Australia

Subsurface mapping in complex, 15-well project reveals opportunities to lengthen laterals by a total of 3,400 m

CHALLENGE
Maximize oil recovery in a multiwell, multilateral project planned for an offshore field characterized by discontinuous sand bodies with highly faulted sections.

SOLUTION
Map the reservoir boundaries, top, and oil/water contact (OWC) in real time with the GeoSphere* reservoir mapping-while-drilling service; provide expert, real-time interpretation of the data.

RESULTS
- Continuously mapped the unconformable, faulted reservoir sands and the OWC of all wells drilled.
- Provided mapping data at a reservoir scale to update the seismic and reservoir models, resulting in Apache’s geology and geophysics team to increase estimated oil reserve and recoverable oil.
- Consistently mapped OWC, which was as far as 62 ft [19 m] below the wellbore.
- Revealed additional oil reserves, resulting in laterals being extended by 11,155 ft [3,400 m] and increasing expected oil recovery by about 11%.

Maximize exposure of laterals in 15-well campaign in highly faulted field
Apache Energy Limited planned to drill six multilateral wells with a total of 15 laterals in the Coniston field offshore Australia. This 15-well campaign is the most complex campaign conducted by Apache in Australia to date. The Coniston field is characterized by a series of transverse and longitudinal seismic faults that bisect hydrocarbon-bearing sands. Evidence from exploration wells showed a thin column of heavy oil and a gas cap in this fault-bonded reservoir.

Due to the highly faulted nature of the reservoir, only 15–20% of the original oil in place was recoverable. Apache needed to optimize well placement to stay within the reservoir and maximize oil recovery.

Map reservoir to guide real-time steering and update models
Schlumberger recommended using the GeoSphere reservoir mapping-while-drilling service with interpretation support from its experts. Using deep, directional electromagnetic measurements, the GeoSphere service maps reservoirs in real time more than 100 ft [30 m] from the wellbore. Paired with expert interpretation, the GeoSphere service makes it possible to place wells optimally, steer wellbores with precision, and update geological and seismic models.

The GeoSphere service mapped 15 laterals, which run perpendicular to two major sets of transverse and longitudinal faults. Those faults were confirmed by the GeoSphere service and correspond to significant oil reserves where the faults intersect the lateral wells.
CASE STUDY: GeoSphere reservoir mapping-while-drilling service increases expected oil recovery by 11%

The GeoSphere service continuously mapped the faulted reservoir top and the OWC, enabling Apache to correlate and update the geological model across the field.

Increased expected oil recovery by 11% with laterals extended 3,400 m to reach additional oil reserves

The GeoSphere service provided a full subsurface picture of the reservoir, which revealed previously undetected oil reserves. Over the course of the 15-well campaign, Apache extended the TD of its laterals by a total of 11,155 ft [3,400 m]. Initial simulation conducted by Apache shows that the additional reservoir exposure could increase expected recovery by about 11%.

Maps from the GeoSphere service provided subsurface bedding and fluid-contact details, such as consistent mapping of the OWC located at distances up to 62 ft [19 m] from the wellbore. Apache’s geology and geophysics team used the mapping data from the GeoSphere service to update its geological models in real time, increasing confidence in the reservoir model and improving plans for future development wells.

Apache plans to use the GeoSphere service to maximize oil recovery in another multi-lateral well set to be drilled in the nearby Novara field.