**Case History**

**Drilling Optimization**

**Optimized Geosteering Solution Delivers Maximized Reservoir Exposure in Geologically-Complicated Environment**

*Location: Gulf of Thailand*

**OPERATOR’S CHALLENGE** – Precisely place two horizontal well bores without exiting the reservoir.

**HALIBURTON’S SOLUTION** – Halliburton’s Sperry Drilling services deployed the InSite ADR™ azimuthal deep resistivity sensor and StrataSteer® 3D geosteering service.

**ECONOMIC VALUE CREATED** – Drilled additional footage with no exits, remaining 100 percent in the reservoir.

**GEOLOGICALLY CHALLENGING ENVIRONMENT** –

A customer operating in the Gulf of Thailand challenged Sperry Drilling services to provide an optimized reservoir solution that would precisely place two horizontal well bores in their field without exiting the reservoir for maximized recovery. The geology in the Gulf of Thailand is complicated with most of the reservoirs composed of small stacked channel sand sequences. From well to well, the reservoirs are difficult to correlate and have a limited lateral extent. Horizontal well placement in such environments is demanding and lateral sections are usually short with reservoir exits common due to the unpredictable nature of the reservoirs.

**GEOSTEERING SOLUTION** – After pre-well modeling suggested that the differing well placement objectives and geological challenges could be met, Sperry Drilling deployed the InSite ADR™ azimuthal deep resistivity sensor and the StrataSteer® 3D geosteering service on the two horizontal wells.

The InSite ADR sensor in combination with the StrataSteer 3D service provides a stratigraphic navigation solution in one package.

The StrataSteer® 3D service application integrates all data into a single window for quick decision making. The display is user configurable. The real-time view includes log tracks for both model and LWD log correlation and a geological cross-section.

The StrataSteer service integrates digital 3D geological earth models, directional well plans, petrophysical models and real-time LWD sensor data into a dynamic, interactive and intuitive geosteering application. It is the heart of Sperry’s wellbore positioning service, crucial to placing a well, especially in smaller targets that often require complex well paths and more accurate wellbore positioning.

The InSite ADR logging-while-drilling (LWD) sensor provides over 2,000 unique measurements for both precise wellbore placement and more accurate petrophysical analysis. Deep reading (up to 18 feet into the formation), and directional and high-resolution images give early warning of approaching bed boundaries, allowing wellbore positioning in the most productive part of the reservoir. As bed dip changes along the course of a long horizontal section, the well trajectory can be corrected to run parallel with bed boundaries at a fixed distance.
It also provides a traditional multi-frequency compensated resistivity measurement.

In Well #1, the deep reading azimuthal geosignals from the InSite ADR sensor correctly assisted in identifying the reservoir top while landing the well. Using traditional average resistivity measurements would have potentially resulted in landing the well above the main reservoir, resulting in the loss of reservoir section. The InSite ADR sensor also successfully tracked the reservoir top for the length of the well and prevented reservoir exits when the formation dip changed.

In Well #2, the initial geological model based on seismic data indicated that the well had the potential to exit out of the reservoir base. Approaching the toe of the well, the InSite ADR sensor was crucial in determining that the reservoir top was in fact coming down to meet the well. Conventional resistivity measurements would not have been able to determine this, resulting in an incorrect geological interpretation. The InSite ADR sensor also gave the operator confidence to drill an additional 250 feet (76 meters) of reservoir section.

Sperry worked with the operator’s subsurface team in Bangkok while running the StrataSteer 3D service, allowing collaborative decision-making while drilling.

**SUCCESS RESULTS IN SEARCH FOR MORE CANDIDATES** – Sperry’s “model, measure, optimize” approach resulted in an additional reservoir section being drilled, reservoir exits were prevented and 100% reservoir exposure was delivered in both wells. The operator is currently looking for more candidate horizontal wells in which they look forward to continuing to use Sperry’s successful geosteering solution.