Geo-Pilot® Rotary Steerable Systems Help Deliver Extended Reach Well 8.3 Days Ahead of Schedule

Location: Alpine Field, Alaska, USA

**OPERATOR’S CHALLENGE** – Drill an extended reach well targeting a section of reservoir originally designed to be reached from a drilling pad yet to be constructed.

**HALLIBURTON’S SOLUTION** – Geo-Pilot® 7600 and 5200 series rotary steerable systems, a full suite of measurement/logging-while-drilling (M/LWD) sensors (EWR™ PHASE 4™ Electromagnetic Wave Resistivity multiple depth of investigation sensor, ALD™ Azimuthal LithoDensity sensor, CTN™ Compensated Thermal Neutron sensor, Pressure-While-Drilling (PWD) wellbore pressure measurement sensor), GeoTap® formation pressure tester and ADT™ Applied Drilling Technology optimization service.

**ECONOMIC VALUE CREATED** – The horizontal well was precisely positioned entirely in the target zone and delivered 8.3 days ahead of schedule, below planned costs.

**ALPINE FIELD EXTENDED REACH HORIZONTALS** – ConocoPhillips Alaska operates Alpine, a remote field located on the North Slope of Alaska. Recent successes in the drilling program at Alpine enabled ConocoPhillips to consider drilling an extended reach horizontal well targeting a section of reservoir originally designed to be reached from a drilling pad yet to be constructed.

On the North Slope of Alaska, numerous wells are drilled from a single gravel pad on surface in order to help minimize impact to the tundra and the surrounding environment. The strategic placement of each pad is designed to maximize reservoir production with existing technology. The current Alpine development project has four drilling pads and plans to construct additional pads are in the lengthy approval process involving multiple government agencies. Sperry’s track record of success at Alpine gave ConocoPhillips the confidence to extend the reach of an existing pad (CD2) into reservoir targets designed to be reached from a pad undergoing the approval process (CD5). This well was to be the second longest well ever drilled in the Alpine field.

**OPTIMIZED DRILLING SOLUTION** – Halliburton’s Sperry Drilling services’ solution for an optimized drilling performance included the Geo-Pilot 7600 and 5200 series rotary steerable systems along with a full suite of M/LWD sensors and the GeoTap formation pressure tester. The success of the well relied heavily on the performance of the Geo-Pilot systems and their ability to deliver a smooth wellbore precisely placed in the reservoir. The GeoTap tester was selected to define the reservoir pressure in order to minimize the time associated with determining the correct mud weight to drill with. With the GeoTap LWD formation tester, it is possible to obtain real-time direct pore pressure measurements with the accuracy and precision comparable to that of wireline formation testers. The GeoTap service bridges a critical gap in drilling safety and optimization, providing early and reliable measurements of reservoir pressure and mud density.
Sperry’s ADT optimization service also played a critical role in monitoring hole cleaning and optimizing drilling parameters. The ADT service is dedicated to providing improvements in drilling performance and achieving well construction objectives. Experienced personnel deliver analysis and solutions to optimize drilling rates, improve operational efficiency and minimize the impact of unplanned events. Sperry’s “model-measure-optimize” process leverages Halliburton’s specialized software, surface and downhole measurements to achieve these objectives.

The only road access to the location is an ice road in winter, with most of the drilling equipment being flown in from Deadhorse. The remoteness of the Alpine operations requires special attention to accurate planning and preparation. To this end, the Sperry team conducted an internal pre-spud meeting prior to the operator’s pre-spud meeting to discuss lessons learned and best practices from previous wells. Well CD2-74 was planned as an extended reach horizontal and special attention was given to minimize the wellbore tortuosity as well as maximize the pay zone footage while helping to ensure no HSE incidents occurred.

Well CD2-74 was delivered with three hole sections - 13.5” / 9.875” / 6.75”. The intermediate section was completed in one run of 15,644 feet (4,768 meters) with average rate of penetration (ROP) of 196 feet/hour (60 meters/hour). The production section was also completed in one run, delivering 5,872 feet (1,790 meters) with an average ROP 124 feet/hour (38 meters/hour). Total footage was 25,007 feet (7,622 meters) MD/7,303 feet (2,226 meters) TVD.

**AHEAD OF SCHEDULE AND BELOW PLANNED COSTS** – The extended reach horizontal well was delivered 8.3 days ahead of schedule and below planned costs. In addition, a dedicated BHA to drill out the case float equipment and shoe was eliminated by using the Geo-Pilot 5200 series rotary steerable system, saving approximately 18 hours.

Use of the GeoTap tester helped reduce the mud costs by knowing exactly what the mud weight needed to be. Sperry's optimized drilling solution enabled ConocoPhillips to reach targets outside of the original project design and helped bring production on line while the approval process for new pad construction was delayed. This horizontal remained 100% in the zone, setting an Alaskan record of 22,703 feet (6,920 meters) for an ‘unwrapped departure’ (the distance of the wellbore on a horizontal plane as measured from the surface location to a point directly above the bottom hole location following along the turns in the well path), and the second longest measured depth for an Alpine well.

**GEO-PILOT® ROTARY STEERABLE SYSTEM** – Sperry Drilling services’ innovative Geo-Pilot system represents a completely new approach to rotary steerable drilling, delivering unprecedented speed and up to åa 20% reduction in NPT. Using second generation, point-the-bit technology, the Geo-Pilot rotary steerable system precisely steers the wellbore while rotating the drillstring. The tool build rate and direction can be adjusted while on bottom drilling, making the rotary steerable system virtually invisible to the drilling operation. The Geo-Pilot® service provides real-time continuous at-bit steering and formation evaluation to provide an accurate assessment of wellbore position.