CASE STUDY

HiSide Blender Unit Helps Operator Get the Surface Casing to Depth in an Uncertain Environment

"The use of the HiSide Blender enabled the client to safely and economically get the surface casing to depth in an uncertain environment several days ahead of schedule."

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THE PROBLEM

Shell Oil Co. needed to drill a 12 ¼" pilot hole to a depth of 7,740 ft (2,360 m) prior to actual spud in order to assess the likelihood of shallow water flow and to retrieve pore pressure data.

THE SITUATION

The rig was unable to deliver the required seawater for effective operation of the unit.

THE SOLUTION

A skid-mounted, electrically-driven centrifuge pump was installed in the rig seawater line, increasing the delivery of seawater. The unit was re-tested in January and proven ready for the rig to spud.

The Situation

M-I SWACO* was asked by Shell Oil Co.^ to install, test and operate a HiSide* Mud Blender unit on the Leiv Eiriksson for use on their Gro Prospect.

The Shell Oil Gro Prospect^ is located in 4,590 ft (1,400 m) of water approximately 208 nautical miles off the Norwegian coast. It is in an area that has limited offset data and the use of the HiSide Blender was recommended in order to maximize the chances of getting the surface pipe to depth in such an uncertain environment.

Planning called for the drilling of a 12 ¼" pilot hole to a depth of 7,740 ft (2,360 m) prior to actual spud in order to assess the likelihood of shallow water flow and to retrieve pore pressure data. Once the pilot hole was completed, the rig would be moved approximately 195 ft (60 m) and the 12 ¼" x 36" x 42" conductor hole would be drilled to approximately 4,920 ft (1,500 m). After running the 36" x 30" conductor, drilling would resume with a 26" hole being drilled to 7,740 ft (2,360 m) in preparation for the 20" surface casing.

The Solution

The HiSide Blender unit was installed and tested in December 2008. At that time, it was determined that the rig was unable to deliver the needed amount of seawater for effective operation of the unit. In January 2009, M-I SWACO installed a skid-mounted, electrically-driven centrifuge pump in the rig seawater line. The installation greatly increased the delivery of seawater to the unit. The unit was retested in January and proven ready for the rig to spud.

A total of 12,580 bbl (1,500 m^3) of 1.97 s.g. kill mud was mixed with approximately 3,355 bbl (400 m^3) delivered to the rig, 680 bbl) (725 m^3) held on the M/V Rem Provider and 3,355 bbl (400 m^3) held on the M/V Foula Skandia. Also, approximately 3,355 bbl (400 m^3) each of 1.35 s.g. and 1.45 s.g. KCL/Glycol mud was stored in the pontoon tanks of the rig. This mud was to be used to displace the hole once drilling was completed and the pipe was being pulled to run casing.

THE RESULTS

- The 12 ¼ " pilot hole was drilled to a depth of 7,200 ft (2,195 m) with no shallow water flows.
- The 42" conductor hole was drilled to a TD of 4,970 ft (1,515 m).
- The 26" hole section was drilled with seawater and high viscosity sweeps to a depth of 6,817 ft (2,078 m) and with 1.25 sg diluted killmud to TD of 7,740 ft (2359 m)
- The unit allowed 9,921 bbl (1,183 m^3) of 1.97 s.g. kill mud to be blended with 25,600 bbl (3,053 m^3) of seawater to make 35,525 bbl (4,236 m^3) of 1.25 s.g. mud during the operation.
- The project finished 17 days ahead of schedule.

The Results

The 12 ¼" pilot hole was drilled to a depth of 7,200 ft (2,195 m) using seawater and high viscosity sweeps. No shallow water flows were recorded. The hole was abandoned with 1.25 s.g. blended mud.

The 42" conductor hole was drilled to a TD of 4,970 ft (1,515 m). Seawater and high viscosity sweeps were used to drill all but the last stand of the hole. The last stand was drilled using 1.25 s.g. mud blended from 260 bbl (31 m^3) of 1.85 s.g. kill mud and 705 bbl (84 m^3) of seawater. The hole was displaced with 1.45 s.g. KCL/Glycol mud prior to pulling out of the hole to run the pipe.

Once the 36" x 30" conductor was run, drilling of the 26" hole section commenced with seawater and high viscosity sweeps to a depth of 6,817 ft (2,078 m). From that point to TD at 7,740 ft (2359 m), pump and dump operations using the HiSide Blender unit, were started. The blended mud was also used to work through tight spots encountered while making a short trip to 1,969 ft (600 m). During the return trip, the mud weight was raised to 1.32 s.g. at 7,503 ft (2,287 m) and the pipe was washed to bottom. The hole was then circulated for one and a half circulations with 1.35 s.g. KCL/Glycol mud prior to being displaced with 1.45 s.g. KCL/Glycol mud in preparation for running the casing.

A total of 9,921 bbl (1,183 m^3) of 1.97 s.g. kill mud was blended with 25,600 bbl (3,053 m^3) of seawater to make 35,525 bbl (4,236 m^3) of 1.25 s.g. mud during the operation. Flow rates during the operation ranged from 5,250 lpm for the lighter weight mud to 5,000 lpm for the heavier weight mud. The 20" casing was run to depth with no problems and the foam cement job was also conducted with no problems.

Benefits

The use of the HiSide Blender unit enabled the client to safely and economically get the surface casing to depth in an uncertain environment. The ability to adjust mud weights in a quick and efficient manner allows the client to drill in these areas with a level of confidence that any problems can be dealt with quickly and efficiently. At the end of the running and cementing of the 20" casing, the Gro Prospect was 17 days ahead of schedule. A great deal of that performance was due to the rig crews and the hard work they put in to overcome the problems that were incurred.

Summary

Below is a list of some things that should be considered when installing and operating a HiSide Blender unit:

- The HiSide unit discharge should be in a separate pit from the mud pump suction in order to have a sufficient supply of blended mud to avoid shutdowns and allow for a smoother operation. It also provides for a more homogenous mixture of the mud.
- It is preferable to have the unit and the supply lines mounted in a horizontal position. On the Leiv Eiriksson, the mud supply line and flow meter was mounted vertically and the meter did not work reliably at lower flow rates. The seawater lines were mounted horizontally and worked fine with lower flow rates.
- The mud must be delivered to the unit in sufficient quantity and pressure to overcome the backpressure from the seawater side of the unit. On the Leiv Eiriksson, we were unsuccessful in trying to blend the mud as it was delivered from the boat because of insufficient pressure. Although the volume was fine, the pressure could not overcome the pressure from the seawater side.
- A thorough knowledge of the rig and boat capabilities should be determined before installing and operating the unit. Can mud be taken from the boat and the pontoon tanks at the same time? Can the rig be able to deliver the mud from the pontoons at a sufficient rate to avoid shutdowns? Can the boat do the same? Is their sufficient surface volume to ensure a smooth operation?

Questions? We'll be glad to answer them.
If you'd like to know more about the HiSide Blender unit and how it's performing for our other customers, please call the M-I SWACO office nearest you.

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