

Managed Pressure Drilling Averts Well-Control Incident, Circulates Influx Out in 4 Hours, Enables Operator To Achieve TD in Montney Formation



The MPD system detects minute fluid influxes or losses with a degree of precision that is unattainable using conventional drilling methods.

Objectives

- Reach total depth (TD) of 15,102 ft (4,603 m) by using managed pressure drilling (MPD) to drill through abnormally pressured zones in the Montney formation. The planned drilling zone in Western Canada had a high likelihood of kicks, gas or water influxes, hydrogen sulfide, and lost circulation.
- Improve drilling performance, reduce the risk of formation damage, and enhance control of influxes by using a lighter-density drilling mud.

Our Approach

- Weatherford deployed the MPD control system to detect and control unexpected kicks and influxes. The operator expected abnormal pressure zones from the kickoff point at 6,535 ft (1,992 m) measured depth (MD) to total depth at approximately 15,731 ft (4,795 m) MD.
- The operator drilled the well to a bit depth of 8,005 ft (2,440 m) MD using a mud weight of 77 lb/ft³ (1,230 kg/m³) and a constant bottomhole equivalent circulating density (ECD) of 82 lb/ft³ (1,320 kg/m³) when the MPD control system detected a kick.
- Within 20 seconds the choke started to close, and the control system automatically calculated and began increasing the surface backpressure from 537 to 580 psi (3,700 to 4,000 kPa) to control the kick.
- The well only gained 64 gal (244 L) of drilling fluid, which was safely circulated out in 4 hours.

LOCATION

British Columbia, Canada

WELL TYPE

Onshore, horizontal, production

DRILLING DEPTH

1,657 to 15,102 ft (505 to 4,603 m)

HOLE SIZE

8-3/4 to 6-1/4 in. (222 to 159 mm)

FLOW RATES

180 to 264 gal/min (683 to 1,000 L/min)

INFLUX VOLUME

64 gal (244 L)

TIME FOR MPD SYSTEM TO REACT

20 seconds

TIME TO RESUME DRILLING

4 hours

PRODUCTS/SERVICES

- Managed pressure drilling
- MPD control system
- Rotating control device



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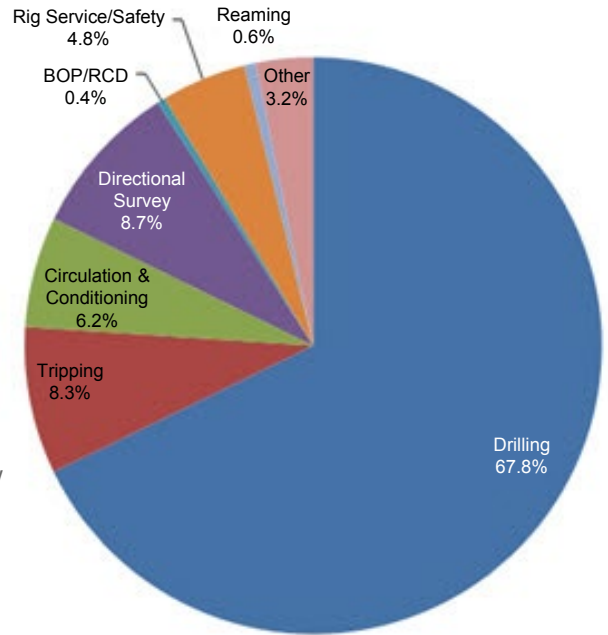
Our Approach (continued)

- The operator resumed drilling and reached TD with no spills or other incidents, which enhanced personnel and environmental safety.

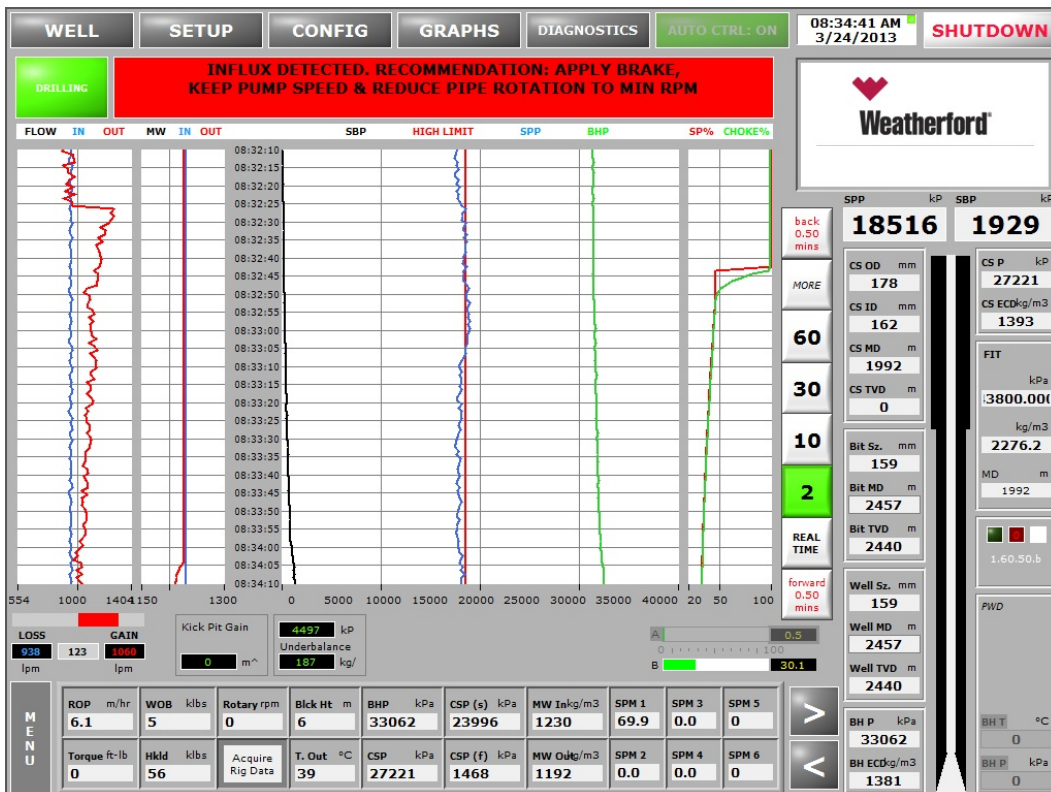
Value to Customer

- The MPD control system enabled the operator to safely reach TD by providing early detection and precise control of unexpected gas influxes.
- Unlike conventional well-control methods, the MPD system eliminated the need to shut in the well and circulated the potentially catastrophic kick out in only 4 hours.
- Using a lighter-density drilling mud with the MPD system enabled the operator to increase the rate of penetration, protect against formation damage, enhance control of influxes, and reduce costs of required drilling fluids.

Time Distribution For the Entire Drilling Operation



The pie chart above shows that drilling accounted for approximately 70% of operational time, which is significantly more than conventional operations. Tripping accounted for only 8.3% of the time because of the lighter-density mud used.



The screen shot to the left shows the first 2 minutes after the MPD system detected the influx. The outflow increased from 264 to 328 gal (1,000 to 1,244 L), the choke started to close, and the system gradually increased the surface backpressure until the outflow returned to normal levels. The system circulated the influx out in driller's mode and maintained well control throughout the remainder of the operation.

