



Weatherford®

REAL RESULTS

Air Drilling in Geothermal Well Saves over \$800,000 in Drilling Costs, Reduces Mud Expenses up to 13%

Objectives

- Drill a well in a hard-rock volcanic formation to reach a TD of 6,729 ft (2,051 m) MD or 6,598 ft (2,011 m) TVD.
- Reduce costs by increasing the rate of penetration (ROP), minimizing lost circulation, and preventing or reducing pipe sticking.

Results

- Weatherford combined several air drilling products to achieve all of the client's goals.
- A total of 3,900 ft (1,189 m) was drilled with the resulting air drilling system. The average ROP for the job was 78 ft/hr (24 m/hr), which was considerably higher than the 15 ft/hr (5 m/hr) the client had estimated. As a result, the well reached TD 5 days ahead of schedule.
- Hole cleaning also showed a significant improvement, with mud returns averaging 13% in the well's lost-circulation zone.
- No pipe sticking problems occurred, and there were no accidents, incidents, or equipment failures.

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Three Sullair® 1150/350 air compressors were used to provide feed air. These two-stage, rotary-screw compressors are capable of delivering 1,150 scfm of air at a maximum pressure of 350 psi (2.4 MPa) at sea level. Two Ariel® JGJ2 primary boosters increased the feed-air pressure from 350 psi to a maximum of 2,000 psi (13.8 MPa) continuous pressure with a maximum volume of 3,000 scfm. A Williams Model 9200 RCD was placed on top of the blowout preventer stack. DataPro data-acquisition hardware and software were used to monitor air injection.

During the job, gas injection rates ranged from 300 to 3,000 scfm. The liquid injection rate ranged from 500 to 1,320 gpm. The minimum bottomhole circulating pressure was 120 psi (0.8 MPa), and the maximum was 3,000 psi (20.7 MPa). The maximum reservoir temperature was 450°F (232°C).

Location

West Java, Indonesia

Formation

Awibengkok

Well Type

Deviated

Depth

3,900 ft (1,189 m) air-drilled

Well Type

Deviated

Hole Sizes

12-1/4 and 17-1/2 in.

Pore Pressure

0.33 psi/ft (1.1 psi/m)

Products/Services

- Controlled Pressure Drilling® (CPD®) services
- Williams® Model 9200 rotating control device (RCD)
- DataPro™ data-acquisition hardware and software

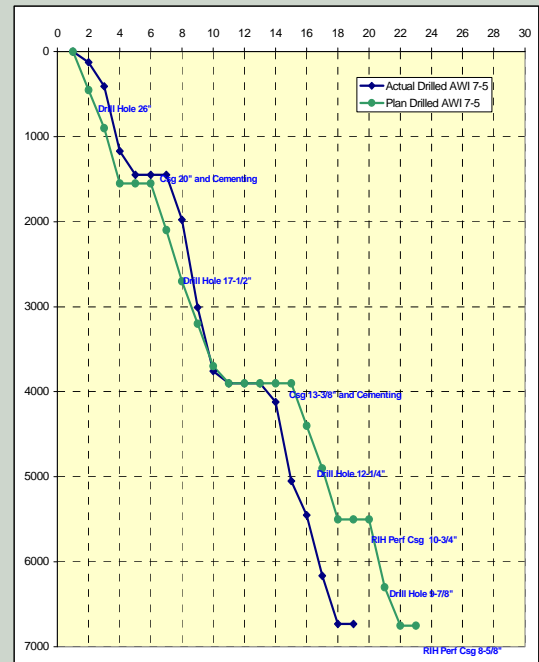


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Value to Client

- By completing the job 5 days ahead of schedule, the client saved more than US\$800,000 in drilling costs.
- Improved hole cleaning gave the client an additional saving of as much as 13% on mud cleaning costs.



Drilling was completed in just 19 days versus the 23 days originally estimated by the client, with no pipe-sticking problems, accidents, incidents, or equipment failures.