Capillary Injection Technology Treated Causes of Liquid Loading, Avoided Workover, Stabilized and Optimized Gas Production Without Killing Wells

Objectives

- Remove downhole liquid and stabilize two gas wells. The hydrostatic column in the tubing proved too heavy for the natural pressure to sufficiently carry the hydrocarbons to the surface.
- Optimize the gas production without killing the wells.

Our Approach

- Weatherford collected the required details from the customer and analyzed the data (fluid, reservoir, and completion details) to construct and evaluate various field rejuvenation solutions.
- The WellFlo® design and analysis software was used to understand the severity of liquid loading and to suggest the best suitable rejuvenation solution.
- After the evaluation results were received, Weatherford experts recommended and performed injection of a foaming agent with a self-contained capillary unit, crane, injector head, spooler, and high-pressure fluid pump for each of the wells.
- Truck-mounted capillary unit technology, with its smaller footprint, was used to run a capillary string with an outside diameter (OD) of 0.25 in. to target depth. The foaming agent was injected to lighten the well's hydrostatic column, resulting in enhanced production.
- The capillary unit was able to rig up quickly on both subject wells and deploy capillary strings in the wells using an overhead injector system and pressure control equipment suited to seal, grip, and shear the capillary string in case of any unforeseen events.
- The defoaming agent was injected on the production line to stabilize foamed production into a liquid state for easier separation at processing terminals.

Value to Customer

- The Weatherford solution optimized well performances, increasing and stabilizing production rates. For Well 1, the weekly production rate before the foam injection ranged from 1.3 to 1.5 MMSCFD. After the injection, the rate increased to 1.7 to 2.3 MMSCFD. For the second well, the rate increased to 0.92 MMSCFD from a range of 0.5 to 0.7 MMSCFD.
- By using a cost-effective and operationally less complicated truck-mounted capillary unit, the customer did not require a rig or workover. The operation also required fewer personnel, minimizing the customer's carbon footprint.
- All operations were performed without killing the wells, eliminating formation damage.

Weatherford's capillary-injection tubing system maximizes production and reduces lift costs by precisely and safely placing chemicals at the production intake or elsewhere within the wellbore.

LOCATION
Pakistan

WELL TYPE
Onshore, gas

HOLE SIZE
2-7/8 and 3-1/2 in. completion

CASING SIZE
9-5/8 in.

DOWNHOLE TEMPERATURE
Well 1: 240°F (115°C)
Well 2: 210°F (98°C)

BOTTOMHOLE PRESSURE
Well 1: 2,557 psi (17.6 MPa)
Well 2: 2,800 psi (19.3 MPa)

DEPTH
Well 1: 9,038 ft (2,755 m)
Well 2: 8,969 ft (2,734 m)

PRODUCTS/SERVICES
- Capillary injection technology
- WellFlo design and analysis software
- Chemical injection valve
- Foamer/defoamer
- Chemical injection pump

Weatherford®

