



OVERVIEW:

In August 2014, an oil and gas operator with assets in the Duvernay play requested STEP's engineering team analyze the feasibility of milling out composite bridge plugs using 60.3mm (2-3/8") outer diameter coiled tubing (CT) 7,400m (24,278ft) in length. Using CT strings of this length is extremely challenging due to both surface equipment requirements and extremely high CT circulating pressures. To achieve operational success, STEP used a relatively new and untested CT material grade with 130,000psi yield strength with an aggressive taper design. In 2015, STEP ordered the first CT strings of this design and began operations on an eight-well pad.

Project Scope: Milling out composite bridge plugs

Location: Duvernay

String Size: 60.3mm (2-3/8")

No. of Wells: 8 well pad

Total Measured Depth: Deepest well approx. 7,200m (23,622ft)

Project Date: August 2014-Present

EXECUTION:

Prior to finalizing the CT design, STEP's engineering team ran several tubing force, hydraulic, and fatigue simulations to ensure operational success. Several equipment considerations had to be made including reel capacity, the ability for the CT trailer to handle the total string weight, injector capability, and fluid pumper capability. Other considerations included achieving sufficient annular velocity for cleaning out plug debris, applying sufficient set-down force at the bottomhole assembly, and maximizing fatigue life. When the first operation commenced in October 2015, wellhead pressures were as anticipated, greater than 40MPa on average, while CT circulating pressures were on average greater than 60MPa. Initial milling operations were extremely successful with minimal wiper trips resulting in reduced overall time per well.

In October 2015, STEP set a new CT depth record reaching 7,069m (23,192ft). From October 2015 to February 2016 STEP has run over 750,000 running meters exclusively for the same client. STEP continued to shatter CT depth records, including 7,110m (23,326ft) in February 2017, to most recently the depth of 7,200m (23,622ft) in March 2017.

To improve operations, STEP experimented with a real-time, electro-magnetic induction (EMI) inspection tool that detects CT external mechanical damage directly on location; a technology that STEP plans to explore in greater detail in the future. Additionally, STEP has performed fatigue bend testing using retired CT samples to better understand the CT fatigue life for future operations. As of April 2017, STEP continues to perform the same extended reach CT operations for this client and several others in the area. This case study is another example of how STEP continues to lead the industry in high profile CT operations while continuously providing the Exceptional Client Experience.

HEAD OFFICE

Calgary, AB

TECHNICAL CENTER

Calgary, AB

SERVICE CENTERS

Blackfalds, AB

Red Deer, AB

Clairmont, AB

Fort St. John, BC

Floresville, TX

Midland, TX