COILED TUBING JET DRILLING WITH A DOWNHOLE INTENSIFIER

J.J. Kolle, SPE, K. Theimer, and A. Theimer, Tempress, and R. Cox, SPE, and S.R. Schershel, SPE, Trican Well Service Ltd.

ABSTRACT
High-pressure rotary jet drilling holds the promise of increased rate of penetration with reduced weight-on-bit, torque and vibration levels. A high-pressure rotary jet drill, pressure intensifier and gas separator have been developed to allow jet drilling using conventional surface pumping equipment and coiled tubing. High-pressure reaction turbine jet rotors have been developed for drilling holes ranging from 1-1/8” to 3-5/8”. Jet drilling tests have shown that 70 MPa (10,000 psi) jets can effectively drill most conventional oil and gas producing formations. Conventional pumps, swivels and tubing operate at up to 28 MPa (4000 psi). A 2.5:1 pressure intensifier was developed to allow jetting at the pressure required for effective drilling. The intensifier can operate on two-phase flow using a downhole gas separator. In two-phase operation the separated gas is used to power the intensifier and the high-pressure water is provided to the jetting nozzles. The gas exhaust from the intensifier is ported to the drilling head to extend the range of the jets.

Tests have demonstrated that the jet drilling BHA is capable of cement milling but rates of penetration are lower than a motor and mill and the pumping pressures required are higher. The tools could find applications in situations where a motor cannot be used. For example the tools could power a small diameter lance jet drill through an ultra-short radius curve for lateral drilling. Well service applications include removal of hard scale without risk of damage to downhole equipment.

To order the full paper, visit https://doi.org/10.2118/113725-MS