SLAP-10 SAND JETTING PROVIDES EFFECTIVE DIVERSION FOR STIMULATING HIGHLY HETEROGENEOUS RESERVOIRS

Richard Zabala, Edgar Mora, Natalia Ruiz, Liliana Guarín, Carolina Céspedes, Hector Acuña, Oscar Botero, Ecopetrol, Dubrasky Nava, Carolina González, Marcia Benavides, SLB

INTRODUCTION
Cupiaqua field has been one of the most prolific gas-condensate fields currently producing in Colombia. The majority of wells were completed in Mirador, Barco and Guadalupe formations which are characterized by its low petro-physical properties (average permeability is 10 md and average porosity is 6%). Cupiaqua is a compositional gas-condensate reservoir with initial API gravity at 42°.

The well productivity in Cupiaqua gas-condensate producer wells has been affected by several sources of damage in which mineral scales, organic scales, water blocking, and condensate banking have been recognized as the most important sources of damage.

WELL CANDIDATE
Well B7 is completed in Mirador, Barco and Guadalupe (natural flow). Its base production was 646 bopd, 62.46 MMscfd and 144 bwpd, with a decline rate of 2.9% monthly. Simulation runs shows that the entire Mirador reservoir is affected by the presence of condensate banking, Barco and Guadalupe formations are also affected but it is not present in all layers.

GAS INHIBITED INJECTION
The stimulation gas injection pilot was designed as the best alternative to mitigate condensate banking and its associated problems.

SAND JETTING
Using sand jetting, undamaged flow paths were created at 6 selected depths, allowing effective mechanical diversion for the stimulating fluids (Diesel, HCl, xylene and injection gas).

The tool used consists of a jetting device with 4 nozzles (90° phased, hole diameter of 0.141”, 1.5” of penetration); depth control was achieved with a GP-CCL correlation run to flag the CT; the operation for the abrasive jetting stations was finalized in 2.5 hrs.

Once the holes were done; the stimulation fluids pumping sequence was performed. The immediate response of the well was positive to the stimulation, giving a production of 837 bopd, 66.7 MMscfd and 187 bwpd. After a year of production the decline rate has dropped to 0.3%.

CONCLUSION
The usage of sand for high pressure jetting not only created channels to access new high potential zones but also served as mechanical diversion for chemical stimulations, this technique decreases the operating time by performing a single trip operation.