

Viscos Energy

Lukoil increases well production three-fold in the Usinsk area

Challenge

Lukoil had fields in the Usinsk area (Russia) that are mature and its wells were not designed for secondary or tertiary recovery. The field was reaching the end of its lifecycle with some wells already out of production.

Solution

Apply Viscos Energy's binary mixture technology to restart secondary recovery.

Results

- Eliminated need for well cleaning chemicals or solvents
- Realized a production increase between 120% and 480% at six test wells (measured 2 months after stimulation to eliminate initial spike)
- Increased production by an average of 200% one year after the stimulation

Lukoil increased the well production by a factor four by applying Viscos Energy's binary mixture technology. The production only declined by 30% over the following twelve months following the treatment, leaving Lukoil with a production of two times in excess of the pre-stimulation exploration.

Mature oil fields require stimulation or plugging

Petroleum was discovered in the Usinsk area in the mid 1960ies and remains one of the major oil producing regions of Russia ever since. After over 30 years of production, some of the fields reach their maturity and require stimulation to counterbalance the natural production decline. Given the remoteness of area, stimulation methods were considered that don't put a high burden on the infrastructure in place. Viscos Energy's binary mixture technology was hence a natural choice, as all chemicals can be transported in solid form and be mixed on site. The stimulations have been performed together with the Institute of Biochemical Physics of the Russian Academy of Sciences.

Field characteristics

The six test wells are in a limestone formation at a depth of approximately 1500 meters (4500 ft). They have a highly developed system of fractures and have a water cut of approximately 45%. The porosity is 10%-25%. The viscosity is around 400 centipoise.

Stimulation

A well has been selected as a test well to reconfirm the reservoir characteristics and verify the treatment plan for the stimulation wells. This first

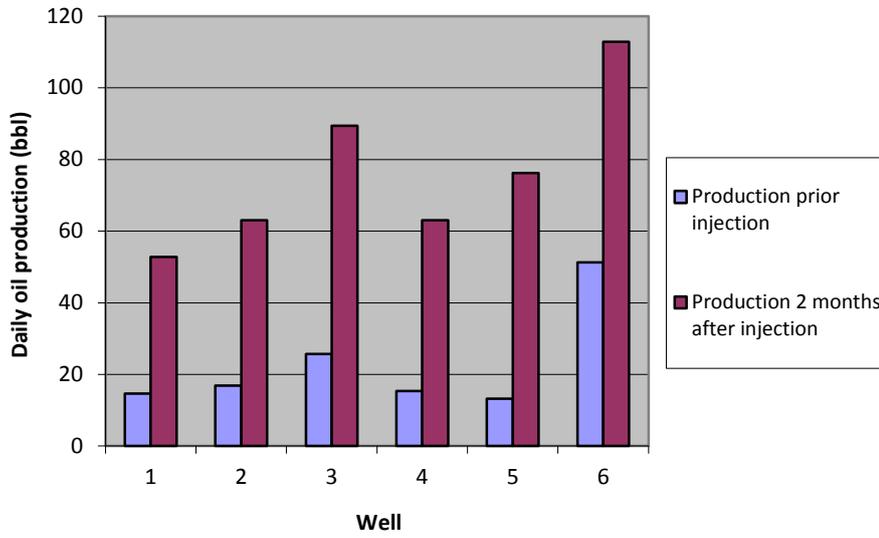
well was treated with 6 tons of chemicals (mostly ammonium nitrate and sodium nitrite) as well as catalysts. The treatment time itself was only a few hours, after which the well was shut in and the reaction monitored. Following the small scale verification, another five production wells were stimulated. Each well was stimulated for about six hours.

During the treatment the formation was heated to a temperature of up to 300°C, while the original reservoir pressure was restored. The high temperatures improved the oil's viscosity around the well head and in the formation. CO₂ produced as a result of the chemical reaction helped to sweep the oil out of the formation.

Results

The wells stayed shut in between one and three days before production was restarted. Temperature and pressure in the formation were constantly monitored during the soaking stage. When moving to the production stage, all wells showed an initial production peak that is in line with other thermal stimulations, e.g., cyclic steam injection. This short term peak is primarily a result of the thinning of the oil generated by the increased formation temperature.

For more information about Viscos Energy's binary mixture technology: www.viscos-energy.com



Outlook

One year after the stimulation, the production dropped by around 30% from the values charted above. Each well that was previously effectively shut down produced 15,000 barrels of oil in average during the first year after the treatment.

The long term effect is a major difference to the classical cyclic steam stimulation, which requires much more frequent treatment than the binary mixture technology.

The success of these initial stimulations led Lukoil to use the pilot wells as a template for future treatment in the Usinsk area.