

Intelligent tracers quantify zonal inflow contribution from a multi-lateral well

Operator improves well placement and design

Challenge

An operator wanted to determine the inflow contribution across the reservoir interval from each branch of a dual-lateral well without performing a coil tubing production log intervention.

Solution

RESMAN intelligent tracers (RES•OIL) with uniquely identifiable signatures were installed in the wells. The systems were placed in three locations in each 5,000-foot lateral (Fig. 1).

Application

The RES•OIL systems were installed in purpose-built carriers that hold the tracer material against the inside wall of the production tubing. The carriers were run in-hole without deviating from normal procedures and without additional rig time or extra personnel at the site.

RESMAN used its patented Arrival Time model* to assess the inflow distribution from the two laterals. The well was completed, shut in for a few days, and then restarted. Several samples of the production fluid were taken at the surface to capture the arrival of each tracer shot. The samples were analyzed, and the results were plotted (Fig. 2).

Finally, software simulations were run to determine the inflow distribution across the dual laterals. The simulator assumes values of inflow distribution and predicts the arrival time of the tracer shots. Numerous iterations are performed until there is agreement between the predicted arrivals and actual arrival of the tracer shots.

Fig. 2 shows the best fit between the predicted (dashed lines) and actual arrivals (peaks). Fig. 3 shows the corresponding inflow distribution percentages that provided this best fit.

Fig. 1 - Location of six RES•OIL systems in multi-lateral well

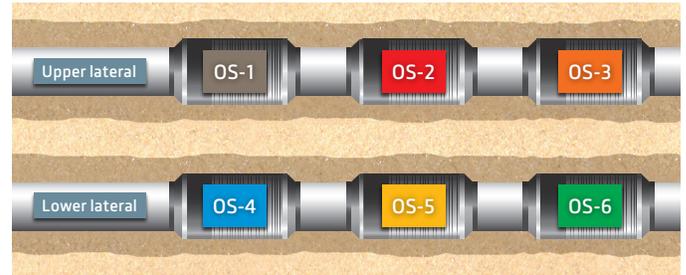


Fig. 2 - Best simulation fit between predicted (dashed lines) and actual arrivals (peaks).

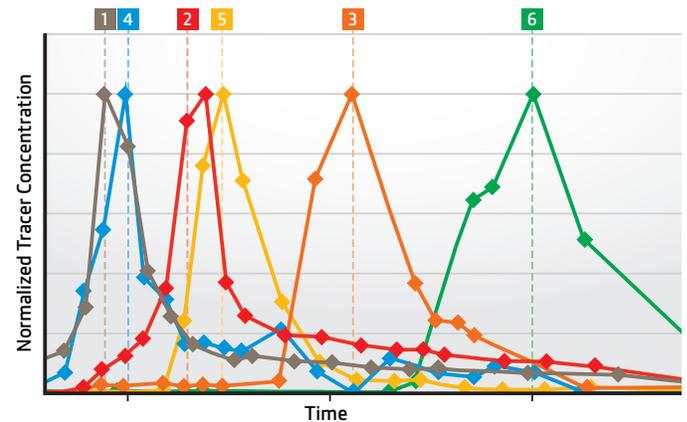


Fig. 3 - Inflow distribution results per zone

OS-1	16%	OS-2	1%	OS-3	44%
OS-4	10%	OS-5	13%	OS-6	16%

Results

Inflow distribution results revealed that production along each lateral varied significantly. The toe of the upper lateral (OS-3) contributed 44% of production, while the entire lower lateral contributed 39%.

By using RESMAN, the operator avoided high-risk intervention operations and gained valuable understanding about zonal inflow contribution, which will enable better well placement and completion design for future wells.

* Refer to Technical Bulletin 3 for more information about RESMAN's Arrival Time model.

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