

Fracking and stimulation performance from tracers

Pumped tracers prove and quantify performance of frack stages

Challenge

The operator wanted to verify stage contribution after a multi-stage fracking operation in a slanted well. Both the initial clean-up efficiency and sustained production over time was relevant.

Solution

RESMAN's frack tracer service was deployed, and unique hydrocarbon and water tracers were added to the frack fluid in each individual frack stage. Stages 1 & 2 were stimulated simultaneously, hence the same tracer was used to stimulate these two stages.

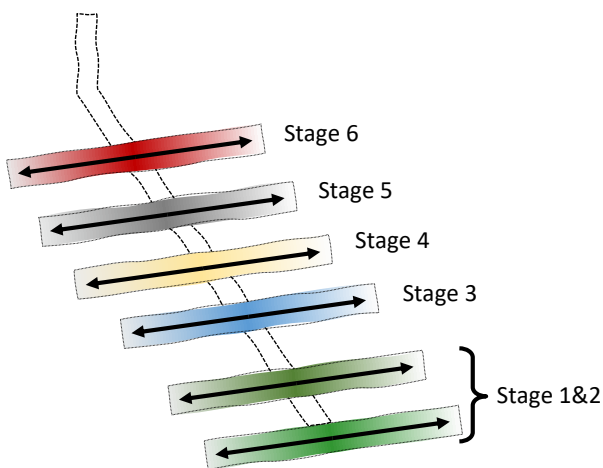


Fig. 1 – Well configuration and frack-stages traced. In total five water tracers and five hydrocarbon tracers were injected, for each of the stages 3-6 and for the combined stage 1&2.

Application

A crew was deployed to the well site and tracer added to each of the frack stages. Initial flow-back samples were collected as well as samples collected over a period of two weeks. The contribution flow back from the stages was calculated from tracer concentrations and fluid production rates. The relative contributions from individual stages are provided in Fig. 2 for water and hydrocarbon.

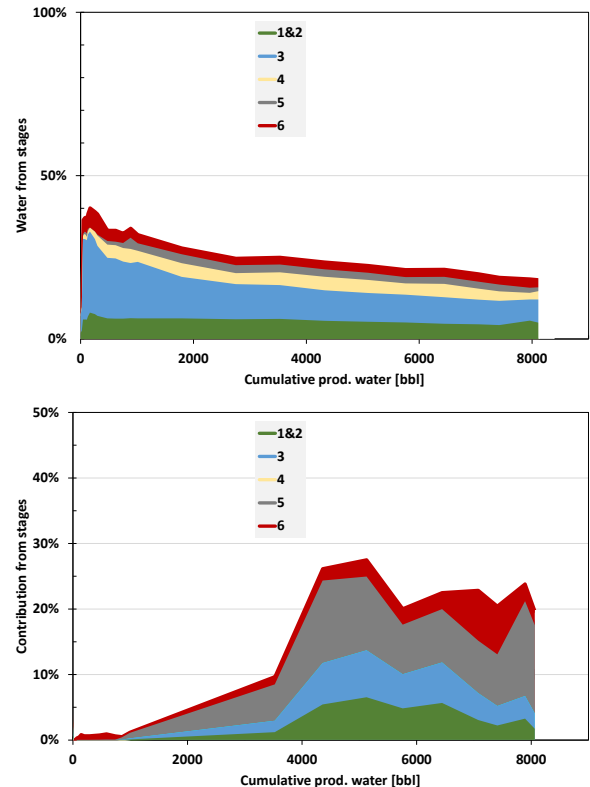


Fig. 2 – Summary of fluid produced from individual stages. The individually colored areas correspond to contribution of the individual stages. This represents the amount of water (top figure) or hydrocarbon (bottom figure) returning from individual stages of the frack-operation. The sum of all areas corresponds to the amount of injected water returning, relative to the total amount of water produced.

Results

The results show that all stages contribute water and that all but one stage produce hydrocarbon. The estimated contribution per stage from tracers compares well to a PLT performed after two weeks. Additionally, tracers provide results over time.

Stage	Water		Stage	Gas/Condensate	
	PLT	Tracer		PLT	Tracer
1&2	32%	22%	1&2	0%	17%
3	43%	46%	3	11%	20%
4	5%	13%	4	8%	0%
5	13%	11%	5	77%	47%
6	7%	5%	6	4%	15%

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