

# Oil Tracers allow reservoir-discretized continuous monitoring

## Challenge

To drain as much oil as possible at the lowest cost possible in an oilfield development, placing injectors and producers at the right locations is essential. Reservoir understanding is uncertain and need constant updating, as production of an asset progresses.

It is therefore common practice to history-match the reservoir model to continuously gathered production data. For horizontal wells drilled through several distinct reservoir layers, understanding each layer is important, while most metering is downstream of production and represents the total of the well rather than individual zones.

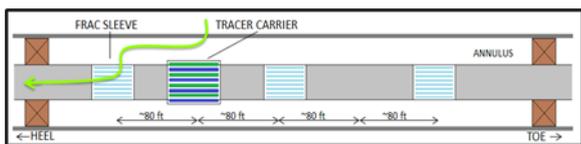
## Solution

RESMAN tracer systems, RES-OIL, were placed at multiple locations in a long horizontal well, to monitor the multiple reservoir segments over time.

## Application

The tracer systems were placed inside a perforated jacket on top of a blank pipe. Fig. 1 shows how this placed in one compartment of the multi-stage frac completion in the well. The green flowline in the figures suggests how produced oil would pass the tracer system, hence pull tracer into the base-pipe and then to topside where it would be sampled.

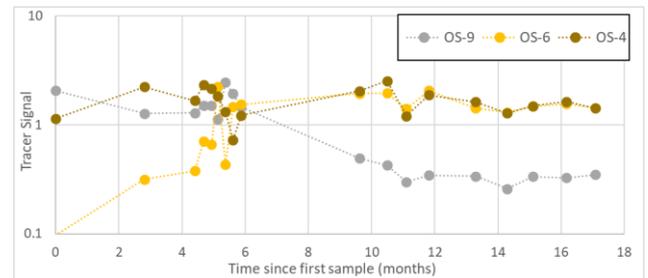
Fig. 2 shows the tracer signals of three of the total twelve tracers, normalized to the sample-averaged concentration. OS-4 keeps a consistently high amplitude, while OS-6 is low for



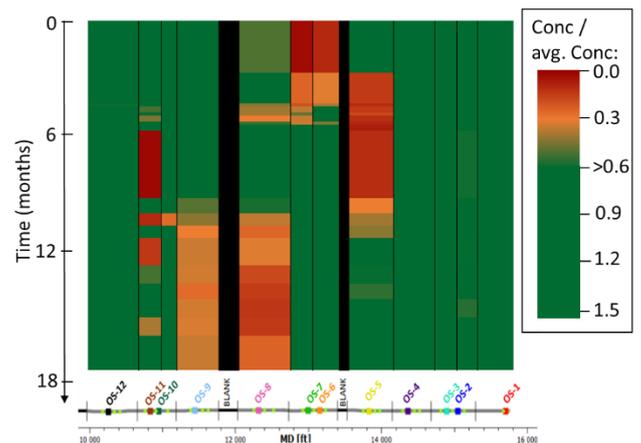
**Fig 1: Tracer carrier placed in a compartment in a multi-stage frac completion**

the first four months, and OS-9 has a low amplitude starting after 10 months.

Fig. 3 shows tracer signatures over time as a heat-map for every tracer, mapped against the well on the bottom.



**Fig 2: Tracer signals for three zones, plotted against time**



**Fig. 3 – Oil tracer signals as a heat map. The horizontal axis refers to tracer system location along the well (individual systems depicted in unique colors) and the vertical axis is time.**

## Results

Fig. 3 reveals several periods where zones were unproductive. To update the reservoir model to this data, a correlation to the overall reservoir and well knowledge is required. For example,

- A low signal could mean that the reservoir segment is not connected to any online injector well
- Low signal could also mean that a nearby production well is draining the pressure from a zone.

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