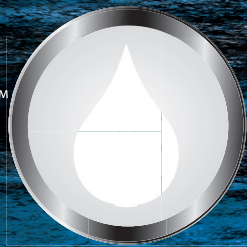


**FLOW
PROFILER
OIL**



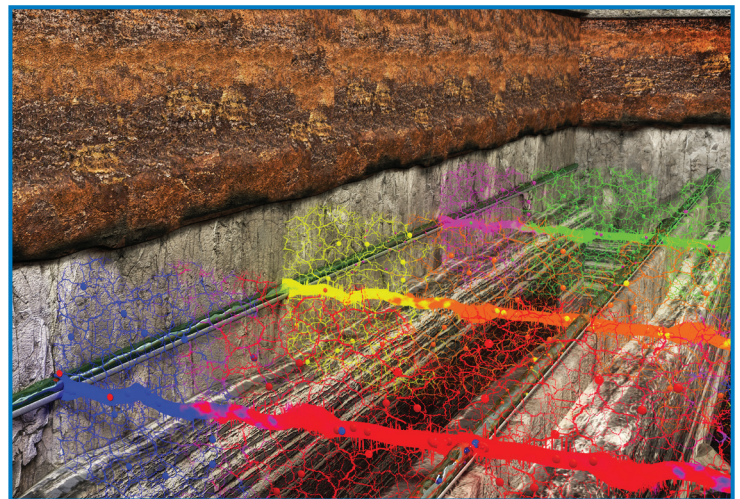
FLOWPROFILER™ Oil is the industry's first comprehensive after frac flow profile technology that simultaneously evaluates both frac fluid clean-up and hydrocarbon production over time.

Engineered with a comprehensive array of water and oil tracers, FLOWPROFILER™ Oil is specifically designed for multiple stage completions in both vertical and horizontal well applications, providing critical information such as:

- **Simultaneous Zonal Flowback**
 - Quantify Frac Fluid Clean-Up
 - Quantify Hydrocarbon Contribution
 - Correlate to Production Log Analysis
- **Indexing Hydrocarbon Production to Geologic Horizons**
- **Evaluating Production Over Time**
- **Well Spacing Issues**
 - Frac Interference with Offset Wells
 - Production Interference with Offset Wells

The FLOWPROFILER Oil service involves injecting both a unique Chemical Frac Tracer (CFT) in the fluid phase of each frac stage and a unique Oil Frac Tracer (OFT) at the beginning of the proppant segment of each frac stage. Flowback water samples are collected in accordance with a predetermined sample schedule. Once first oil is experienced, both water and oil phase samples are collected simultaneously and sent to ProTechnics' Chemical Tracer Laboratory for detailed analysis to ensure the most accurate and timely results and reports.

The combined knowledge of both the zonal water and oil profiles provide unique datasets to accurately understand the total after frac flow profile for evaluating individual well production and making critical next well decisions.



Multi-well cutaway depicting fluid diagnostic tracers

ProTechnics' Research and Development Engineers have instituted stringent tracer requirements to address the most common downhole reservoir conditions.

FLOWPROFILER Oil tracers are:

- **Not Naturally Occurring In Reservoir**
- **Chemically Inert in Reservoir Environments**
- **Thermally Stable at Reservoir Temperature**
- **Oil Soluble and Hydrophobic**
- **Not a Food Source for Microbes and Other Organisms**
- **Predictable and Repeatable Analytical Detection**
- **Detectable at Low Concentrations**(low parts per billion, ppb)

Oil Frac Tracer % Contribution

Stages	30-25	24-21	20-17	16-13	12-9	8-5	4-1	
Sample Date	OFT 5000	OFT 5100	OFT 5200	OFT 5300	OFT 5400	OFT 5500	OFT 5600	OFT Total ppb
5/21/13	60.5	12.2	8.3	6.7	11.8	0.4	0.0	6,697
5/21/13	11.1	14.7	19.6	11.1	18.8	12.1	12.6	8,403
5/22/13	28.0	16.5	15.0	12.0	14.0	7.8	6.7	4,563
5/23/13	27.1	19.8	14.5	11.0	11.9	9.6	6.0	4,454
5/23/13	26.0	19.9	14.4	11.2	12.3	10.0	6.2	4,074
5/24/13	15.7	11.1	13.2	14.4	14.5	18.3	12.8	4,853
5/26/13	6.8	4.4	10.4	20.1	17.5	24.1	16.6	2,905
5/27/13	12.1	6.3	11.5	18.8	17.5	20.5	13.2	2,176
5/28/13	11.8	5.6	10.8	18.2	15.5	22.8	15.3	1,939
5/29/13	11.3	5.2	10.2	18.5	15.6	23.7	15.5	1,507
5/31/13	12.3	5.3	10.9	18.2	15.6	22.6	15.1	1,316
6/2/13	13.0	5.7	11.3	18.4	15.4	21.6	14.6	1,092
6/4/13	13.9	5.9	12.3	18.5	15.2	20.2	14.0	1,048
7/3/13	16.6	5.4	12.7	20.7	14.6	18.2	11.7	656
7/11/13	17.2	6.1	13.2	19.8	14.9	16.7	12.0	500
7/26/13	18.4	5.0	12.9	21.2	14.4	16.7	11.4	470
8/7/13	19.6	5.3	13.5	20.9	14.0	16.2	10.5	342
8/27/13	19.5	6.2	14.4	20.6	14.1	15.4	9.8	260
Average	18.9	8.9	12.7	16.7	15.0	16.5	11.3	2,625
Trend								
SHR	10	6.2	8.9	10	10	10		

The average of 18.9 in the red shaded box shows the largest % hydrocarbon is coming from this traced segment

The average of 8.9 in the blue shaded box shows the smallest % hydro-carbon is coming from this segment

Segment hydrocarbon recovery (SHR) is a score of 0-10 based on overall average % contribution. Stages 21-24 have the lowest score because it has the poorest % contribution

Water Frac Tracer % Contribution

Stages	30-25	24-21	20-17	16-13	12-9	8-5	4-1		
	CFT 1000 & 1600	CFT 1100 & 1700	CFT 1200 & 1900	CFT 1300 & 2000	CFT 1400 & 2100	CFT 1500 & 2200	CFT 1600 & 2400	CFT Total ppb	Total Chlorides
Average	18.5	13.7	19.0	15.5	12.4	16.6	18.4	133	100,328
Trend									
SLR	10	10	8.9	10	6.8	7.5	10		

Segment load recovery (SLR) is a score of 0-10 based on how effectively a traced interval is unloading frac fluid. Stages 9-12 have the poorest recovery of load fluid and a score of 6.8

The FLOWPROFILER Oil log shows the cumulative % hydrocarbon contribution (green shading) versus load fluid contribution (blue shading) in the middle of the log. The upper and lower sections of the image documents the actual ppb recoveries over time for both the oil and water tracers.

