

## *Supplementary Information*

# **The Development of Advanced Fluorescent Tracers Aimed at Drill Cuttings Labelling and Depth Correlation via Injection with Oil-Based Drilling Mud**

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Table S1. Rheological measurements for OBM in the presence of Tracer additives 1-20 wt.%.

		OBM	SAP (Rhodamine)				SiO <sub>2</sub> (fluorescein)			
			1%	5%	10%	20%	1%	5%	10%	20%
Mineral oil	ml	145	145	145	145	145	145	145	145	145
Hydrophobized clay	g	3	3	3	3	3	3	3	3	3
Primary emulsifier	ml	4	4	4	4	4	4	4	4	4
Lime Ca(OH) <sub>2</sub>	g	3	3	3	3	3	3	3	3	3
Hydrophobized agent	ml	1	1	1	1	1	1	1	1	1
Rheology modifier	ml	1	1	1	1	1	1	1	1	1
Filtration reducer	g	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Calcium chloride brine $\rho=1.25$ g/ml	ml	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5	47.5
CaCO <sub>3</sub>	g	70	70	70	70	70	70	70	70	70
Tracers	g		2.4	12	24	48	2.4	12	24	48
<b>Readings</b>	<b>t</b>	<b>49 °C</b>								
$\rho$ , g/cm <sup>3</sup>	g/ml	1.15	1.15	1.17	1.19	1.19	1.16	1.17	1.18	1.21
600 RPM		77	78	80	79	80	81	90	100	145
300 RPM		54	54	57	56	53	56	65	70	99
200 RPM		45	44	48	48	43	45	54	58	80
100 RPM		34	33	36	36	31	34	41	44	59
6 RPM		18	16	19	19	14	17	25	24	28
3 RPM		17	15	17	18	13	16	24	22	26
Gel strength 10 sec.	lbs/100ft <sup>2</sup>	18	15	18	18	13	17	24	22	26
Gel strength 10 min.	lbs/100ft <sup>2</sup>	21	19	21	20	16	22	31	28	32
Plastic viscosity	mPa·sec	23	24	23	23	27	25	25	30	46
Yield point	lbs/100ft <sup>2</sup>	31	30	34	33	26	31	40	40	53
Electrical stability	V	800	650	970	650	880	780	600	430	185

Table S2. Shale-particles and tags disintegration test by hot rolling.

Type of tracers	Sample with no drill cuttings			Sample with drill cuttings (20 g in 350 ml OBM)			
	The mass of the recovered tracers on the sieve, g	The mass of the recovered tracers on the sieve, %	Image of a sieve with recovered tracers	The mass of the recovered tracers with drill cuttings on the sieve, g	The mass of the recovered drill cuttings without the mass of recovered tracers, g	The mass of the recovered drill cuttings without the mass of recovered tracers, %	Image of a sieve with a recovered tracers and drill cuttings.
Without tracers	-	-	-	8.68	8.68	44.93	
5 wt.% SiO <sub>2</sub> -Flu (22.5 g in 350 ml OBM)	0.02	0.09		15.06	15.04	77.85	
5 wt.% SAP-Rh (22.5 g in 350 ml OBM)	22.63	100.00		27.91	5.41	28.00	
5 wt.% SAP-flu (22.5 g in 350 ml OBM)	21.66	96.27		29.08	7.42	38.41	