

RHADIANT drilling fluid performed beyond expectations in the challenging ultra-high temperature well in Thailand

“Logging performance is the biggest concern of our client. RHADIANT[†] fluid helped to provide an excellent hole condition which led to a successful logging operation up to 432° F over 90 hours.”

Chakkrawut Promkhote, Project Engineer, Thailand

Well Information

Location	Offshore Thailand
Well TD	March 2012
Interval drilled	6-1/8-in. hole for a total of 3,409 ft – from 12,217 to 15,626 ft
Fluid system	RHADIANT
Mud weight	10.4 ppg
Maximum inclination	51.94°
Maximum bottom hole static temperature (Recorded by wireline logging tools)	432°F

The Situation

The client requested for a drilling fluid formulation to drill an exploration well with expected bottom hole static temperature (BHST) up to 453° F based on temperature gradient in the area. Besides the ultra-high BHST, high CO₂ and H₂S was also expected, which raised a concern of logging operation failure over prolonged period of time.

The Solution

After extensive lab work, M-I SWACO proposed conversion of current conventional non-aqueous fluid (NAF) system into the RHADIANT ultra-high temperature drilling fluid by the addition of new MUL[†] XT high-temperature emulsifier, and ONE-TROL[†] HT and ECOTROL[†] HT fluid loss control agents while drilling high temperature section.

The Results

The RHADIANT fluid, with Sarapar-147 base fluid, confirmed the expected performance, delivered excellent filtration control and filtercake quality with stable rheological properties while drilling the 6-1/8” interval. No drilling or lost circulation problems were encountered and drilling performance was up to the expectations. The trips were smooth and the open hole wireline loggings (seven run in total) were performed with minimal issues for over 90 hrs of static condition comparing with wells with the same temperature range.

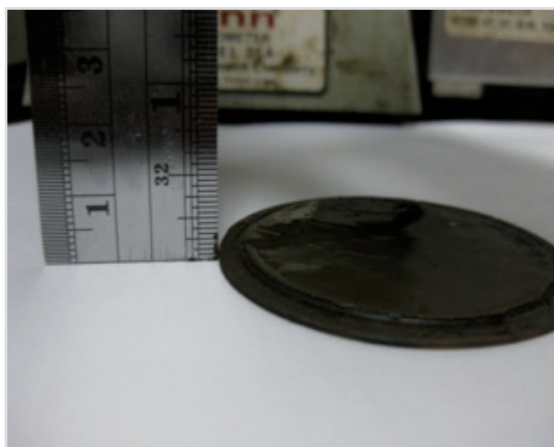
The Details

As reduction in rheological properties were observed after the conversion in the pilot test, it was decided to treat the system with the high temperature chemicals gradually in 3 – 4 batches, along with VERSAGEL[®] HT viscosifier in order to keep the fluid within specification and to avoid any sudden changes in mud behavior. The entire circulating system was converted successfully to RHADIANT fluid approximately 1,320 ft before TD with 7 ppb MUL XT emulsifier, 4 ppb ONE-TROL HT agents, and 2 ppb ECOTROL HT agents. Before trip and logging phase, active system was treated with lime to counteract any CO₂ influx.

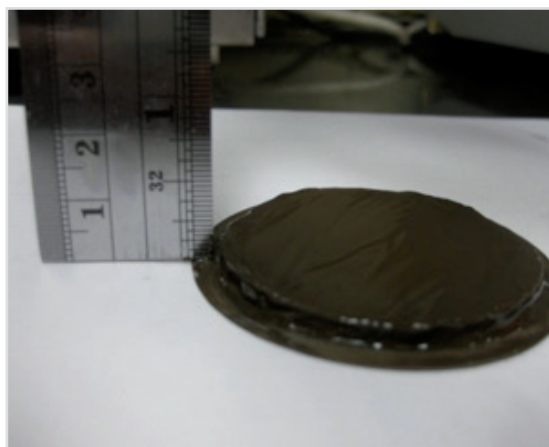
RHADIANT Properties

Depth ft	MW ppg	SWR	PV cP	YP lbs/100ft ²	Gel Strength lbs/100ft ²	6 RPM	CaCl ₂ %	ES volts	HTHP 175°C cc	Excess Lime ppb	% LGS
12,230	10	82/18	15	9	9/14/15	5	26.11	1,031	2.8	2.08	1.9
12,240	10	82/18	15	10	10/14/16	6	26.66	1,015	2.8	2.21	1.9
12,368	10	82/18	15	11	10/15/17	6	25.56	987	2.8	2.34	1.9
12,481	10	82/18	15	11	10/15/17	6	26.11	962	2.8	2.21	2
13,052	10	82/17	16	12	8/14/15	7	26.11	975	2.6	2.21	2.5
13,662	10	83/17	18	12	8/14/15	7	27.42	923	2.6	2.34	3
14,111	10	84/16	19	11	9/15/17	8	27.54	942	2.6	2.34	3.3
14,579	10	84/16	19	12	9/15/17	9	26.95	955	2.2	2.08	3.5
14,817	10	84/16	19	12	9/15/16	9	26.95	910	2.2	2.08	4
15,005	10.3	83/17	24	13	10/16/17	9	27.54	962	2.2	2.47	4.5
15,378	10.3	84/16	24	14	10/16/18	10	28.27	980	2.2	2.21	4.7
15,566	10.3	85/15	26	14	10/16/17	10	30.47	930	1.8	3.12	4.5
15,626	10.4	85/15	26	14	10/16/18	10	30.47	941	1.6	2.86	4.5

Filter Cake Quality



15,626 ft with filter paper at 350° F 1.6 cc



15,626 ft with filter paper at 350° F 1.6 cc

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A Schlumberger Company

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