

**JM B48 Re-Abandonment Variance
ACW-2021-IMP-B-48-WID0448**

The JM B48 Re-Abandonment was reamed-drilled to 514 m and no sign of cement was observed in the sample returns at the cement plug #1 (top of plug @ 501m per well records). There has been no gas pressure or flow encountered during the re-abandonment operations. Since the cement plug #1 was not encountered, it indicates that the wellbore was sidetracked from original wellbore – depth uncertain. The operational parameters and sample characterization were the primary method for reaming open hole and these parameters were relatively constant. There was no indication of sidetracking away from the original wellbore based on those operational parameters.

With no gas present, Imperial is recommending that the 139.7 mm casing be run to the current ream depth of 514 m and cemented in place from 514m to surface. A cement bond log will run, and the casing will be cut and capped.

Imperial is requesting the removal of the open hole logs, step 29, in the Drilling Execution Plan. Since no gas and no wellbore pressure-flow has been encountered, detecting the presence of gas with the open-hole (OH) logging program is unlikely. Consequently, the value of the open-hole logging program is significantly reduced.

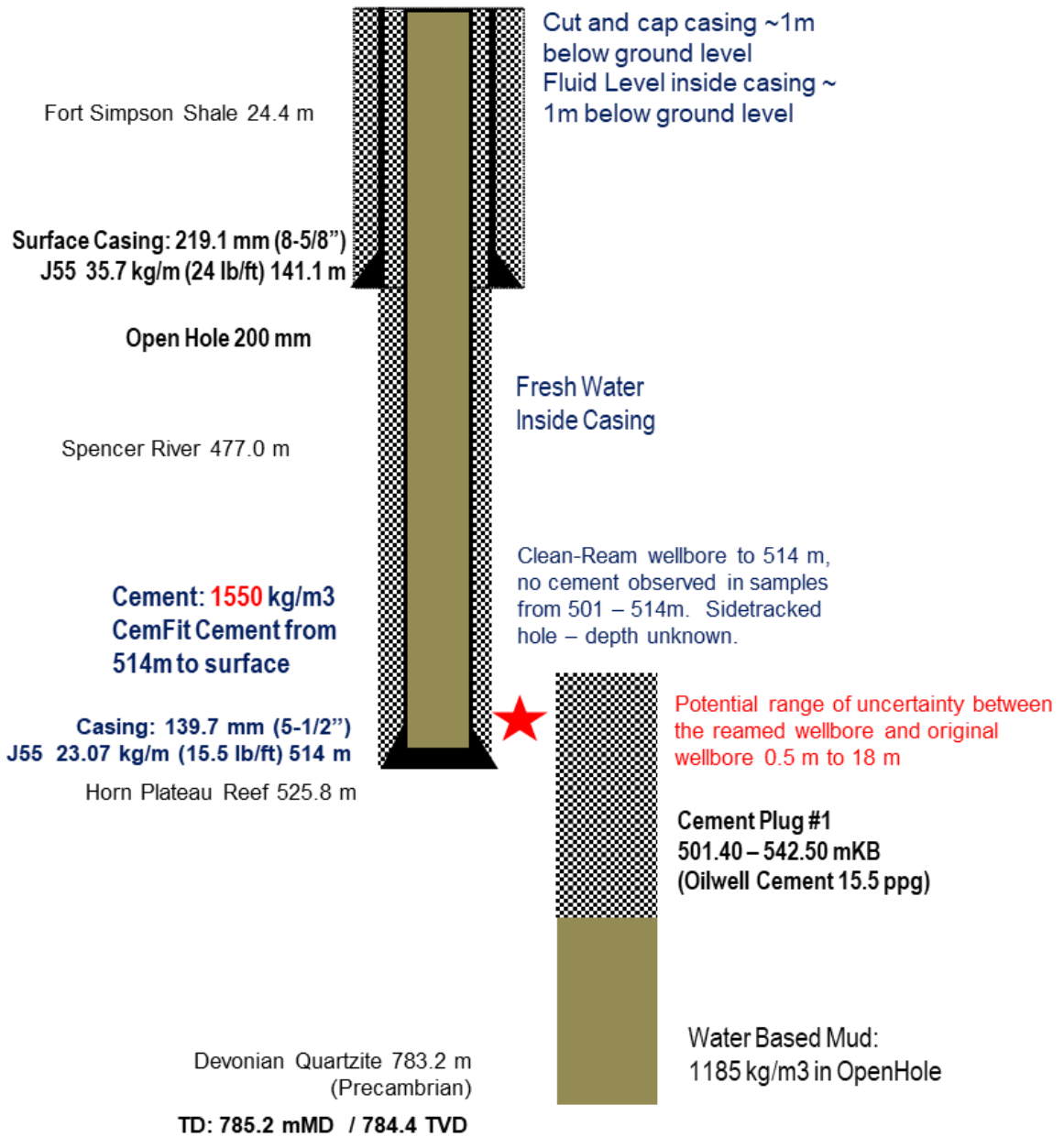
Additionally, the risk of getting the OH logging tools stuck in the re-entered open hole is high based on the sticky-gumbo type returns observed in the well. A stuck logging tool could jeopardize the ability to run casing and cement the casing as recommended.

Imperial is requesting removal of the Bridge Plug and 90m cement plug, Steps 40 thru 45, in the Drilling Execution Plan, since the casing shoe will be set at 514m which is above the shallowest HC zone at ~520m. Imperial does not require this barrier for the proposed abandonment plan.

Of note, the following should be considered:

- No pressure or gas encountered drilling out cement plug 1 (surface plug)
- No pressure or gas encountered drilling out cement plug 2 (casing shoe plug)
- Confirmed formation integrity at casing shoe with D-FIT test to 18 KPA/m after drilling out 3m cement to 144m (casing set at 141 m)
- No pressure or gas encountered below cement plug 2 to depth 514m
- No losses have been observed during the entire open hole operations and all flow checks have shown the well is static.

Proposed Abandonment



Note: Schematics not to scale

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Summary of Completed Operations

Drilled out Cement Plug # 1 with snubbing unit and returns to MPD system (Step 1 – 8 Execution Plan)

- Drilled cement from 7.9m to 10.6m with 159mm bit, no gas pressure or flow observed thru MPD system.
- Reamed / washed inside casing to 24.6m, no gas pressure or flow observed thru MPD system, pulled out of hole, and rigged out snubbing unit.

Surface casing inspection and cement evaluation (Step 9 – 13 Execution Plan)

- Washed / reamed in casing with 200mm bit from 7.8m to 65.3m, tagged early versus 115.3m (original well record: TOC at 115.2m), drilled plug from 65.3m to 115.2m (60-70% contaminated cement, 30-40% semi-solidified drilling mud)
- Ran casing scraper to 115.2 m to condition casing for running cased hole logs
- Rigged in Wireline and ran HRVRT, MFC and SBT logs
 - Max metal loss identified was ~ 31% (adjusted casing burst pressure to 14,019 kPa)
 - SBT log shows some bond over the interval 18m to 72m (zero pressure pass) and no apparent bond above 18m and below 72m to 115m, but there probably of deposit build up (cement sheath) on the casing wall, identified with MFC data that may impact SBT tool response
 - Main SBT interval 9.8 m to 115m the 1000 psi for oilwell cement was used in the analysis

Drilled out cement plug #2 with drilling rig and returns to MPD system (Step 14 – 17 Execution Plan)

- Based on casing inspection results, pressure tested casing to 7.0 MPA for 10 minutes – good test
- Drilled hard cement from 115.2m to 144 (3m below casing shoe) with the 200mm rotary plug tracker BHA, no gas pressure or flow observed thru MPD system
- Cuttings Description
 - 115.2-130m: 55-60% cement, variable hardness (original well record: TOC tagged at 115.2m)
 - 130 - 138m: 75-80 % cement, hard-dense
 - 138-142m: 75% cement, hard-dense (casing shoe @ 141.1m)
 - 142-143m: 65-73% cement, hard-dense
- Conducted Dynamic Formation Integrity Test with MPD. Confirmed casing shoe gradient of 18.0 KPA/m
- Drilled cement plug with plug tracker BHA from 143m to 154.4m in open hole (65-70% cement and 30-35% drilling mud) with trace of cement at 154.4m (bottom of plug), no gas pressure or flow observed thru MPD system
- Cuttings Description
 - 143-147m: 30-35% cement, trace of siltstone, 65-75% drilling mud
 - 147-150m: 70-75% cement, hard-dense, trace shale, 25-35% drilling mud
 - 150-153m: 50% estimated cement, hard-dense, trace shale, 50% drilling mud
 - 153-154m: 10% cement, 10% shale, 80% drilling mud
 - 154-155.4m: trace cement, 15% shale, 85% drilling mud (original well record: base of cement plug at 155.4m)
- Reamed-cleaned open hole from 154.4m to 193.4m with plug tracker BHA, monitor parameters and samples. Time drill @ 3-5m/hr Rotary: 80-90 RPM, Pump Rate: 1.0- 1.1 m³/min, WOB 3-5 kDaN
- Cuttings Description
 - 160m: Shale - green grey, slightly calcareous, micro micaceous, fissle

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- 175-200m: Shale – green grey, very fine texture, medium hard, slightly calcareous, micro micaceous, fissile
- Observed MPD peak gas at 229 U @ 165m – false readings as analyzer was plugged - MPD gas flow out was zero. Switched flow from MPD over to shakers at 174.4m.
- Circulated hole clean with 1250 kg/m³ mud prior to tripping for BHA. Flow check @ 180m, 108m and 40m – well static.

Clean-ream hole from 193.4m to 514m with 159mm Pilot Rotary BHA (Step 18 – 19 Execution Plan)

- Ream and clean hole from 193.4m to 197.5m, Time Drill @ 3-5m/hr Rotary: 80 - 90 RPM, Pump Rate: 1.0-1.1 m³/min, WOB 1.80 - 3.0 kDaN
- Ream and clean from 197.15 mKB to 228.66 mKB. Time Drill @ 3-5m/hr Rotary: 80 - 90 RPM, Pump Rate: 1.0-1.1 m³/min, WOB 1.80 - 3.0 kDaN
- Ream and clean from 228.66 mKB to 239.27 mKB. Time Drill @ 8m/hr Rotary: 70-90 RPM, Pump Rate: 1.0- 1.2 m³/min, WOB 1.8-3 kDaN. Pump sawdust sweep @ 237 mKB
- Ream and clean from 239.27 mKB to 249.95 mKB. Time Drill @ 8m/hr Rotary: 70-90 RPM, Pump Rate: 1.0- 1.1 m³/min, WOB 1.8-3 kDaN.
- Ream and clean from 249.95 mKB to 265.00 mKB. Time Drill @ 8m/hr Rotary: 70-90 RPM, Pump Rate: 1.0- 1.1 m³/min, WOB 1.8-3 kDaN.
- Ream and clean from 265.0 mKB to 274.92 mKB. Time Drill @ 8m/hr Rotary: 70-90 RPM, Pump Rate: 1.0- 1.2 m³/min, WOB 1.8-3 kDaN.
- Ream and clean from 274.92 mKB to 282.37. Time Drill @ 8m/hr Rotary: 70-90 RPM, Pump Rate: 1.0-1.2 m³/min, WOB 1.8-3 kDaN.
- Ream and clean from 282.37 mKB to 313.60 mKB. Time Drill @ 8m/hr Rotary: 70-90 RPM, Pump Rate: 1.0- 1.2 m³/min, WOB 1.8-3 kDaN.
- Ream and clean from 313.60 mKB to 321 mKB Time Drill @ 8m/hr Rotary: 80-100 RPM, Pump Rate: 1.1-1.2 m³/min, WOB 1.8-2.5 kDaN.
- Ream and clean from 321 mKB to 343 mKB Time Drill @ 8m/hr Rotary: 80-100 RPM, Pump Rate: 1.1- 1.2 m³/min, WOB 1.8-2.5 kDaN.
- Ream and clean from 343.0 mKB to 372.0 mKB Time Drill @ 8m/hr Rotary: 80-100 RPM, Pump Rate: 1.1- 1.2 m³/min, WOB 1.8-2.5 kDaN.
- Ream and clean from 376.86 mKB to 402.0 mKB Time Drill @ 8m/hr Rotary: 70-110 RPM, Pump Rate: 1.1- 1.2 m³/min, WOB 1.8-2.5 kDaN.
- eam and clean from 402.02 mKB to 410.0 mKB. Rotary: 90-110 RPM, Pump Rate: 1.1-1.2 m³/min, WOB 1.3-1.8 kDaN.
- Ream and clean from 410.0 mKB to 427.0 mKB. Rotary: 90-110 RPM, Pump Rate: 1.1-1.2 m³/min, WOB 1.3- 1.8 kDaN.
- Ream and clean from 427.0 mKB to 439.10 mKB. Time Drill @ 8m/hr Rotary: 80-100 RPM, Pump Rate: 1.1- 1.2 m³/min, WOB 1.8-2.5 kDaN
- Ream and clean from 439.10 mKB to 446.60 mKB. Time Drill @ 8m/hr Rotary: 80-100 RPM, Pump Rate: 1.1 -1.2 m³/min, WOB 1.8-2.5 kDaN
- Ream and clean from 446.60 mKB to 486.41 mKB. Time Drill @ 8m/hr Rotary: 70-90 RPM, Pump Rate: 1.0- 1.2 m³/min, WOB 1.8-3 kDaN.

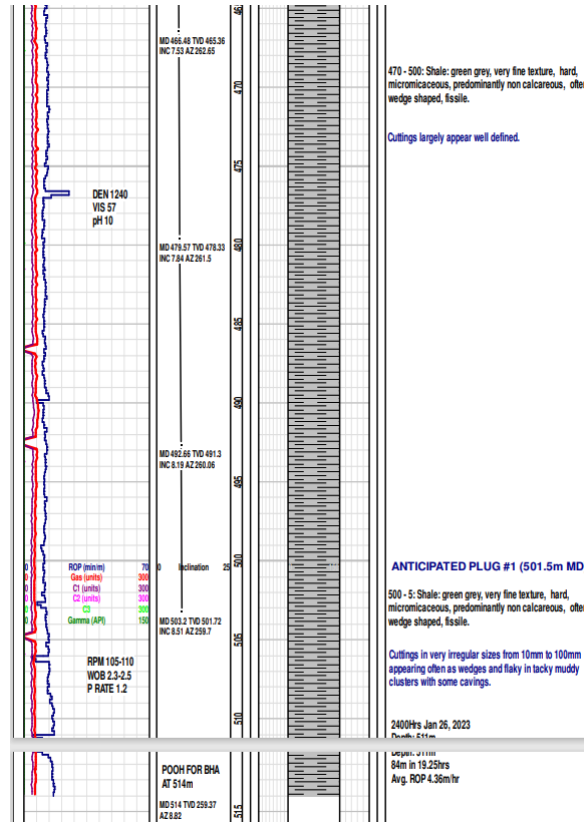
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- Ream and clean from 486.41 mKB to 498.44 mKB. Time Drill @ 8m/hr Rotary: 80-100 RPM, Pump Rate: 1.0 -1.2 m³/min, WOB 1.8-3 kDaN.
- Ream and clean from 498.44 mKB to 506.0 mKB. Time Drill @ 8m/hr Rotary: 80-100 RPM, Pump Rate: 1.0- 1.2 m³/min, WOB 1.8-3 kDaN. Circulated bottom hole sample up at 501m – no indication of cement in returns. (Original well record: TOC cement plug 1 tagged at 501 m).
- Ream and clean from 506.0 mKB to 511.0 mKB. Time Drill @ 8m/hr Rotary: 80-100 RPM, Pump Rate: 1.0- 1.2 m³/min, WOB 1.8-3 kDaN. Circulate bottom hole sample at 511m - no indication of cement in returns.
- Ream and clean from 511.0 mKB to 514.0 mKB. Time Drill @ 8m/hr Rotary: 80-100 RPM, Pump Rate: 1.0- 1.2 m³/min, WOB 1.8-3 kDaN. Circulate bottom hole sample at 514m - no indication of cement in returns or evidence of cement plug 1 – most likely reason due to well sidetracked – all drilling parameters and cuttings samples were relatively constant.
 - Top of shallowest Hydrocarbon zone at ~520m based on existing well logs – stopped reaming to avoid penetrating gas zone.
- Cuttings Description:
 - 200-240m – shale: green grey, very fine, medium hard, slightly calcareous, micro micaceous, fissile (sample appear as tacky, soluble mudstone)
 - 240-270m - shale: green grey, very fine, medium hard, slightly calcareous, micro micaceous, fissile
 - 270-300m - shale: green grey, very fine, medium hard, slightly calcareous, micro micaceous, fissile (cuttings to surface do vary in appearance with respect to ROP, Cuttings are generally associated with muddy clusters, dominant appearance of very inconsistent cuttings sizes)
 - 300-320m - shale: green grey, very fine, medium hard, slightly calcareous, micro micaceous, fissile (samples are difficult to wash due to the muddy nature, consisting of grainy particles in tacky clusters and variable sized fragments from 10mm to 100mm with occasional large splintery cavings)
 - 320-330m - shale: green grey, very fine, medium hard, slightly calcareous, micro micaceous, fissile
 - 330-360m - shale: green grey, very fine, medium hard, slightly calcareous, micro micaceous, fissile(samples 350 - 360 appearing with estimated 60% fairly uniform cuttings and 40% tacky clusters)
 - 360 - 410: Shale: green grey, very fine texture, medium hard, micromicaceous, predominantly non calcareous to very slightly calcareous, often silty, fissile (cuttings largely fine in tacky clusters, common well defined, rare cavings. This could correlate to the fact that stratigraphically we are in a silty shale section of the well as the gamma log indicates over the interval from 360 to 411m)
 - 410 - 440: Shale: green grey, very fine texture, hard, micromicaceous, predominantly non calcareous, fissile
 - 440 - 470: Shale: green grey, very fine texture, hard, micromicaceous, predominantly non calcareous, often wedge shaped, fissile (cuttings in very irregular sizes from 10mm to 100mm appearing often as wedges and flaky in tacky muddy clusters with minor cavings)
 - 470 - 500: Shale: green grey, very fine texture, hard, micromicaceous, predominantly non calcareous, often wedge shaped, fissile (cuttings largely appear well defined)

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- 500 - 514: Shale: green grey, very fine texture, hard, micromicaceous, predominantly non calcareous, often wedge shaped, fissile (cuttings in very irregular sizes from 10mm to 100mm appearing often as wedges and flaky in tacky muddy clusters with some cavings)

- Strip Log for interval 465m to 514m:



- Samples of cuttings from the wellbore @ 230m, 360m and 514m

