

# IODP EXP 358 Daily Geomechanics Report

Report #026 20181205 Final 5166

## RTG Team

RTG Supervisor(s)	David Castillo / Thomas Finkbeiner / Demian Saffer
RTG Watch Lead (00:00-12:00)	Kan Aoike
RTG Watch Lead (12:00-24:00)	Emily Wisbey

## Well Status (as of 06:00 Dec.6 2018)

Site Name:	C0002	Hole Name:	Q
Water Depth:	1,939.0 m	RT-MSL:	28.5 m
Current Depth:	5166.0 mBRT (5164.0) mTVD	Section TD:	5,667.5 mBRT (5,665.5) mTVD
Section #:	1	CSG Depth / Size:	(4855.0) mBRT 11-3/4 "
Static MW:	1.37 sg	Current ECD:	1.42 sg
FIT/LOT/XLOT:	FIT maximum pressure = 1.45 sg, Possible "LOP" = 1.43 sg @4855 mBRT		
Current formation/ lithology:	Shale		
Sensor Offsets from the Bit:	arcVISION 675: (APWD: 3.59 m, Resistivity: 4.30 m, GR: 4.35 m) TeleScope 675: (IWOB: 8.47 m, Direction + Inclination: 11.84 m)		
Other BHA Offsets from the Bit	8-1/4" Stabiliser: 17.463~19.051 m 8-1/2" x 12-1/4" Z-reamer: 28.475~29.823 m 6 x 8-1/2" Drill Collar + Jar: 163.309~227.254 m 12 x 5.68" HWDP: 227.839~339.338 m Top of BHA: 340.338 m		
Current Operations:	Continued drilling and reaming down with 8-1/2" x 12-1/4" BHA with Z-reamer opened from 5,093mBRT to 5,160mBRT. Experienced a few high torques but no stall. Slow and steady progress with ROP 2 to 5 m/hr. Took surveys at 5,080.285, 5,112.62 and 5,148.93 mBRT (TeleScope depth) and obtained inclinations of 5.09°, 5.43 and 5.60 respectively. At 0000hrs on the 6 <sup>th</sup> December a leak on mud pump #1 was observed and repaired. Once back on bottom an issue with Auto Driller was observed, attempts to recalibrate the drawworks and hook height failed. Drilling resumed manually to 5,166mBRT at 0600.		

## Geomechanics Alert

<b>GREEN</b>	<p><b>Green</b> = Projected model remains accurate</p> <p>White = Unanticipated deviation from model which <i>should not</i> affect drilling</p> <p><b>Yellow</b> = Unanticipated deviation from model which <i>may</i> affect drilling</p> <p><b>Red</b> = Imminent requirement to stop drilling</p>
Basis for Alert Level + Recommendations	No issue with 1.37 sg MW for Section 1

## Principal Findings

N/A

## Observations Summary

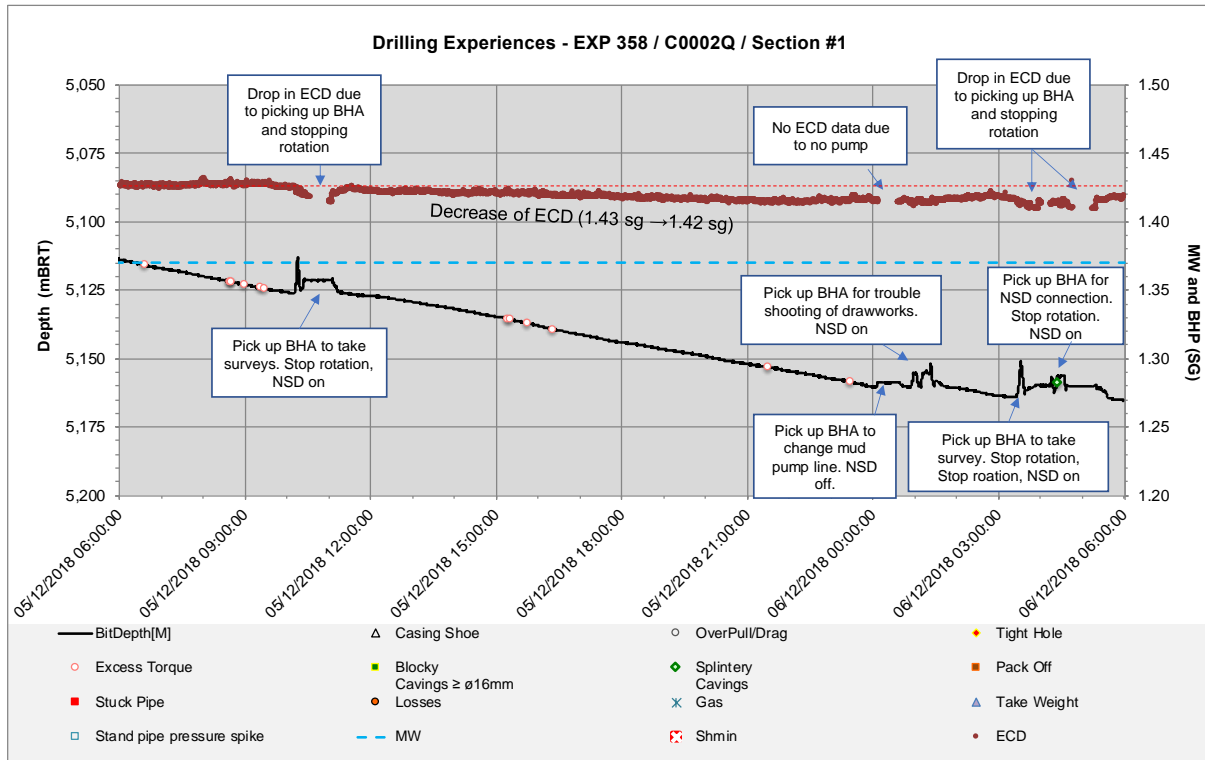
*Use this space to discuss any observations while drilling, running casing etc.*

Fracture Gradient	N/A
Pore Pressure	Total gas < 1%.
Wellbore Breakout	N/A
Tensile Failure	N/A

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<b>Drilling Parameters</b>	Steady ECD of 1.42~1.43 sg with slight short cycle fluctuations at NSD connections. General ECD trend is decreasing from 1.43sg to 1.42sg. DTOR 1.3~2.5 kNm while STOR 15~33 kNm. DWOB 10~80 kN while SWOB 70~130 kN. 625gpm and 160 rpm. Average ROP 2.8 m/h (2~4 m/h).
<b>Other</b>	No seepage losses have been observed in last 24hrs.



**Figure 1. Drilling experiences in Section 1 of the C0002Q well between 5<sup>th</sup> Dec 2018 06:00 and 6<sup>th</sup> Dec 2018 06:00.**

## Analyses

### Drilling Experience Analysis

Figure 1 shows the time series variations of the bit depth and ECD while the drilling and underreaming with the 8-1/2" x 12-1/4" LWD BHA during last 24 hrs. There were two ECD drop event due to picking the BHA off bottom for surveys at 10:00 on the 5<sup>th</sup> and 00:30 on the 6<sup>th</sup> Dec. ECD is steadily decreasing 0.01sg over the 24hrs, likely due to slower ROP and reducing annulus loading. Flow rate has remained steady at 625gpm.

### Cuttings Analysis

No updated data of cuttings volume measurement has provided from Geoservices as of this report. The percentage of sandstone in cuttings has decreased from 2-5% to trace from 5,085mBRT to 5,160mBRT.

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### Cavings Analysis

The amount of cuttings/cavings >ø4mm per unit volume of all solids varied from 20~50 % in the last 24 hours (06:00 Dec.5 ~ 06:00 Dec.6), increasing slightly from the previous day.

The percentage of cuttings/cavings with rounded edges continued to dominate 80~90%, reducing to ~60% over the 24hr period.

Grains < ø1cm continued to make up 90~100 %.

Cement fragments made up a small amount of cuttings, but appeared continuously throughout the samples in volumes < 5%.

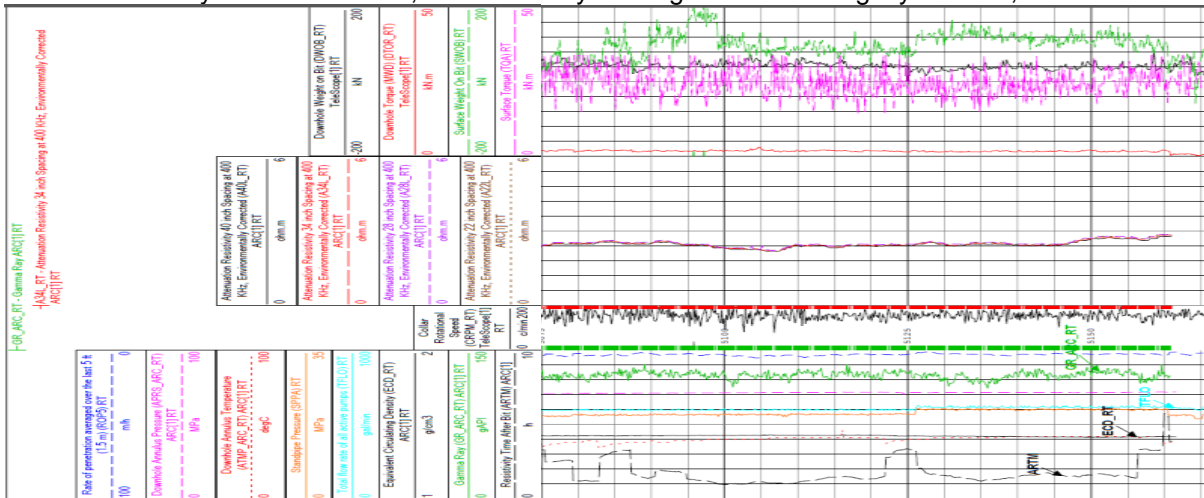
Platy or tabular cavings, ~ø2.5 cm in size are also found, likely formed by being chipped- off from the foliated formation bedding. These platy/tabular cavings are both fresh and re-worked.



### LWD Data Analysis

The 4x resistivity curves with shallow to deep depths of investigation continue to overlay each other perfectly, indicating there is no mud invasion.

GR and resistivity remain constant, with resistivity starting to increase slightly from ~5,145mBRT.



### SFIB Analysis

N/A

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## Geomechanical Model Review (a review of the FIT results)

Potentially no changes to the pre-drill geomechanical model because FIT (Formation Integrity Test) does not directly contribute sufficient information for constraining or refining subsurface earth stresses. By design, FIT is intended to determine whether the planned mud weight can be supported by the formation.

The planned mud weight of 1.37 sg with an operational safety upper margin of +0.06 sg (surge pressure), required a formation pressure integrity up to 1.43 sg. The FIT in the C0002Q rat-hole achieved that objective. It is possible that a leak-off pressure of 1.43 sg may have occurred, but a maximum pressure of 1.45 sg was achieved before the pumps were shut-in. If a leak-off pressure of 1.43 sg did occur, this implies a leak-off-test (LOT) had occurred (no longer a FIT). A leak-off-pressure of 1.43 sg may be interpreted as a possible approximation of  $S_3$  or  $S_{hmin}$  stress magnitudes.

This interpretation would require a pass of the LWD image log across the rat-hole section to identify whether a new tensile was created, or drilling fluids leaked into a pre-existing bedding plane or natural fracture. The former would have direct implications of  $S_3$ , while the latter would require further information such as bedding plane orientation.

However, since no LWD data acquisition is planned for the rat hole section, we will have no chance to confirm which case occurred. Therefore, we continue to call this test a FIT.

