

IODP EXP 358 Daily Geomechanics Report

Report #029 20181208 Final 5230

RTG Team

RTG Supervisor(s)	David Castillo / Thomas Finkbeiner / Demian Saffer
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Well S

tatus (as of 06:00 Dec.9 2018)

Site Name:	C0002	Hole Name:	Q
Water Depth:	1,939.0 m	RT-MSL:	28.5 m
Current Depth:	5230.0 mBRT (5227.0) mTVD	Section TD:	5,667.5 mBRT (5,664.5) mTVD
Section #:	1	CSG Depth / Size:	(4855.0) mBRT 11-3/4 "
Static MW:	1.37 sg	Current ECD:	1.41 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 POOH 8-1/2" x 12-1/4" BHA. Performed BOP test between 08:00~13:15. Z-reamer on deck at 02:00 Dec.9. No significant damage was observed in Z-reamer. Carried out Z-reamer test and confirmed proper function. Bit on deck at 04:10. Observed -3/16" under gauge for the gauge cutters while in gauge for the bit body. Layout MLWD tools is underway as of 06:00 Dec.9.		

Geomechanics Alert

GREEN	<p>Green = Projected model remains accurate</p> <p>White = Unanticipated deviation from model which <i>should not</i> affect drilling</p> <p>Yellow = Unanticipated deviation from model which <i>may</i> affect drilling</p> <p>Red = 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	N/A
Wellbore Breakout	N/A
Tensile Failure	N/A
Drilling Parameters	N/A

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Other	N/A
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Analysis

Drilling Experience Analysis

N/A

Cuttings Analysis

We calculated theoretical cumulative cuttings volumes for the from Dec.4th to Dec.5th period (5038~5230 mBRT in bit depth) based on a 12-1/4" hole from instantaneous ROPs and varying formation porosities (Table 1 and Figure 1). Given a fractional porosity of 0.17 as a plausible porosity of the formation in this section (after Sone, Physical Property Specialist), the total cuttings volume are calculated at 46.3 m³ for the 4 days. For comparison, results of the same calculation for porosities of 0.1, 0.2 and 0.25 are also shown, indicating that no significant difference is expected among these cases.

On the other hand, actual waste mud/cuttings volumes can be estimated from number of cuttings skips (ea. 5 m³) which were filled up and offloaded. From the records of daily cuttings skip operations, the total volume of waste mud/cuttings for the 4 days is 95 m³, almost double of the theoretical cuttings volumes. This apparent discrepancy could be accounted for if we assume the water content was 50% of the total waste mud/cuttings. If this assumption is correct, it could imply that the 12-1/4" hole at least below about 5030 mBRT has not experienced excessive rock failure and is in reasonably good shape.

Table 1. Comparison between theoretical cuttings volumes at different porosities and actual waste mud/cuttings volumes based on daily number of filled-up cuttings skips from Dec.4 to Dec.7.

Hole Diameter (inch)	12.25	Theoretical Cumulative Cuttings Volume				
		Dec.4 (0-24)	Dec.5 (0-24)	Dec.6 (0-24)	Dec.7 (0-14.5)	Total
		[m3]	[m3]	[m3]	[m3]	[m3]
Porosity	0.1	15.65	15.69	10.63	8.21	50.18
	0.17	14.43	14.47	9.81	7.57	46.28
	0.2	13.91	13.95	9.45	7.29	44.61
	0.25	13.04	13.08	8.86	6.84	41.82
Full Cuttings Skips		2	6	7	4	19
Volume	[m3]	10	30	35	20	<u>95</u>

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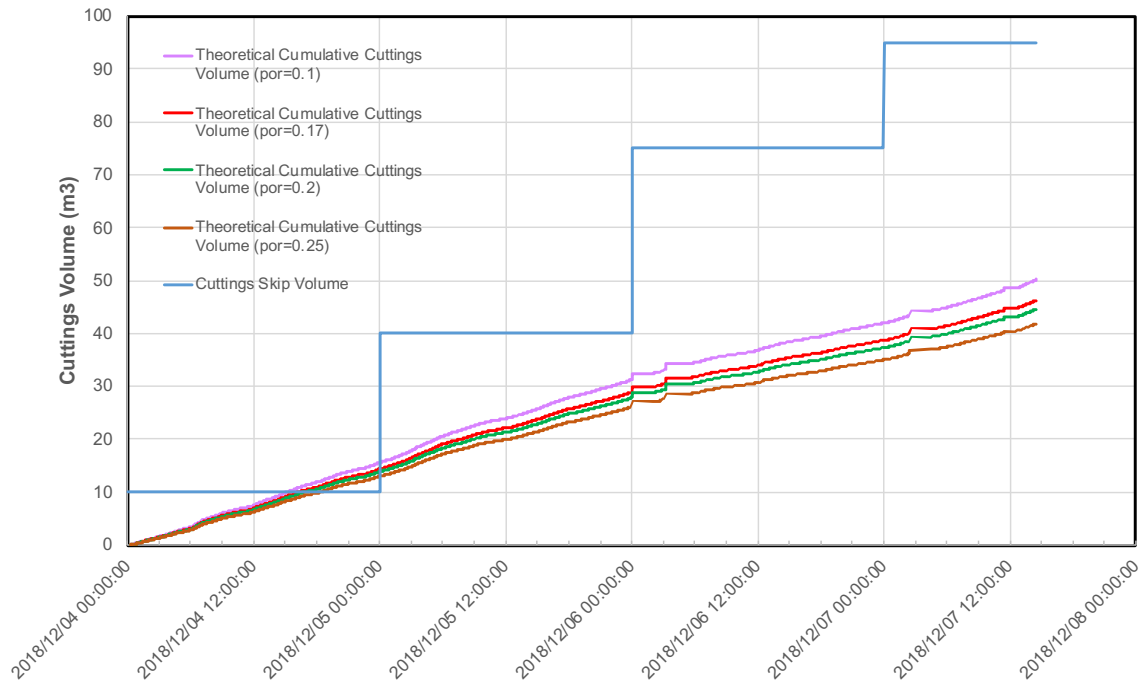


Figure 1. Plots of theoretical cuttings volumes at different porosities and actual waste mud/cuttings volumes based on daily number of filled-up cuttings skips from Dec.4 to Dec.7. The estimated volumes assuming various porosity values comes close to the actual volumes if we assume ~50% of the contents of each skip is water.

Cavings Analysis

N/A

LWD Data Analysis

N/A

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 S3 or Shmin 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 S3, 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.

