

IODP EXP 358 Daily Geomechanics Report

Report #058a 20190106

RTG Team

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

Well Status

Site Name:	C0002	Hole Name:	R
Water Depth:	1,939.0 m	RT-MSL:	28.5 m
0600h Depth:	5,052.0 mBRT (5049.0 mTVD)	Section TD:	5,667.5 mBRT (5,664.5 mTVD)
Section #:	1	CSG Depth/Size:	4757.0 mBRT 11-3/4" inches
Static MW:	1.39 sg	Current ECD:	sg
FIT/LOT/ XLOT:	1.46sg FIT @ 4,757mBRT.		
Current formation/ lithology:	Shale		
Sensor Offsets from the Bit:	arcVISION 675: (APWD: 3.604 m, Resistivity: 4.316 m, GR: 4.367 m) TeleScope 675: (IWOB: 8.384m, Direction + Inclination: 11.749 m)		
Other BHA Offsets from the Bit:	8-1/4" Stabilizer: 17.23 – 18.9 m 8-1/4" x 12-1/4" Z-reamer: 28.528-29.62 m 8-1/8" Stabilizer: 39.64 – 41.30 m Top of BHA: 331 m		
Current Operations:	RIH with 8-1/2" x 12-1/4" LWD BHA to 1932 BRT. Trouble shot dolly retract. Continued RIH with 8-1/2" x 12-1/4" LWD BHA.		

Geomechanics Alert

GREEN	<p>Green = Projected model remains accurate White = Unanticipated deviation from model which <i>should not</i> affect drilling Yellow = Unanticipated deviation from model which <i>may</i> affect drilling Red = Imminent requirement to stop drilling</p>
Basis for Alert Level + Recommendations	<p>1.39 sg remains recommended MW for Section 1. Observation suggests hole cleaning remains a key factor in current wellbore condition.</p>

Principal Recommendations

Memorandum from IODP Technical Advisory Team

As I'm sure you are aware, John Thorogood (TAT Drilling), Kjell Ovreik (TAT Drilling Fluids) and myself (RTG Lead Supervisor) have been closely following Exp 358 drilling operations. We frequently discuss observations and related interpretations in parallel to daily discussions within the RTG Team and Science Leaders.

It is our opinion that CDEX's decision to shorten Section #1 in the C0002R Hole was a strategically robust decision to secure a stable kick-off section that to date has been highly problematic. Casing this short ~300 m section better positions this expedition to achieve the original scientific goals.

Key Technical Advisory Team (TAT) Members (i.e., John T, Keir B., and Kjell O) and the RTG Lead Supervisor (David C.) have concerns with the operational plan as outlined in "#24 Run 8.5in x 12.25in LWD Assy_R3"; specifically, with respect to the mud additives. The evidence is compelling that FracSeal is efficiently sealing the interfaces between the claystones and siltstones beds. However, the use of BaroLift and SteelSeal diminishes and is probably detrimental to the effectiveness of the

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FracSeal, from a wellbore stability perspective. If BaroLift and/or SteelSeal is used to minimize FracSeal screenout, the unintended consequence is rendering FracSeal to be less effective. Continued use of BaroLift and SteelSeal could actively contribute to failure to complete Section #1 and any other section of Exp 358. The addition of FracSeal must be continuous so that freshly drilled rock is immediately treated.

We believe the application of SteelSeal was the main mechanism for inducing anisotropic failure within the tuff layer(s) that produced large ~3 cm blocky tuff cavings. The naturally weak boundaries between the tuff layer(s) and the claystone/siltstone beds was further weakened by the application of low material friction SteelSeal graphite in the mud. The resultant spalling of the large tuff cavings was avoidable with the high 1.39 SG MW and FracSeal along.

It is the recommendation from the key TAT Members and RTG Lead Supervisor to discontinue using BaroLift and SteelSeal for the duration of this expedition, starting with Section #1, and not to use BaroLift and SteelSeal in any subsequent hole section.

It is also our recommendation to discontinue using sweeps of BaroLift as an additional hole cleaning measure. The cellulous fibres in FracSeal are more than efficient and have demonstrated to be effective in hole cleaning and sealing in repeated case studies globally.

We believe there are 3 principal mechanisms for creating a complete and efficient hole cleaning system for Exp 358. When Items 1-3 below are executed in hole Section #1 and #2, hole stability is optimized.

- 1) application of a high 1.39 SG MW to prevent or markedly reduce rock failure (an increase in MW in Section #2 may be required),
- 2) continuous inclusion of the mud additive FracSeal only to seal and plug cracks/joints to prevent drilling fluids from rupturing the bedding interfaces, and
- 3) Continuous NSD should be applied during drilling and underreaming operations at all conditions. Circulation rates should be high and maintained within the 600-800 gpm range.

If the expandable casing run fails in Section #1, the one last remaining option would be to set a whipstock in the C0002N well and wash down to ~5,000 mBRT and set 11 ¾- inch casing. This option may no longer be available (originally recommended by RTG 13 Dec 2019). If so, our recommendation would be to abandon Site C0002 and sail to a Site the Science Leaders choose and drill riserless.

Our Best Regards,

David Castillo (RTG Supervisor)
John Thorogood (TAT Drilling)
Kjell Ovreivik (TAT Drilling Fluids)
Keir Becker (TAT Chairperson)