

# IODP EXP 358 Daily Geomechanics Report

Report #059 20190107

## 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 Hole 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:	1.438 @600gpm 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 R hole kick off window. Worked through window and difficult zone to 4839 mBRT. Activated underreamer and reamed section 1 to 4,856mBRT.		

## Geomechanics Alert

<b>GREEN</b>	<p><b>Green</b> = 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>
<b>Basis for Alert Level + Recommendations</b>	<p>1.39 sg remains recommended MW for Section 1.                  Observation suggests hole cleaning remains a key factor in current wellbore condition.</p>

## Principal Findings

Fragments of Tuff lithology across the shakers has indicated a tuff interval ~4,830 mBRT to 4845 mBRT, with larger round coarse fragments predominately associated with a depth of ~ 4,840 mBRT. The top and base of the zone remains uncertain as the tuff fragments recovered in this run could have been stagnant in the enlarged section, and dislodged with the higher flow rates.

- Large blocks of tuff fragments have repeatedly arrived at the shakers around these depths
- These large tuff fragments potentially indicate anisotropic breakout. This combined with likely washout of the softer lithology may be combining to create an enlarged hole.
- Any interbedding present could contribute to ledging throughout the formation.
- LWD resistivity (Figure 5) shows an enlarged hole until 4,840mBRT, with invasion reducing until 4,845mBRT.

# IODP EXP 358 Daily Geomechanics Report

## Report #059 20190107

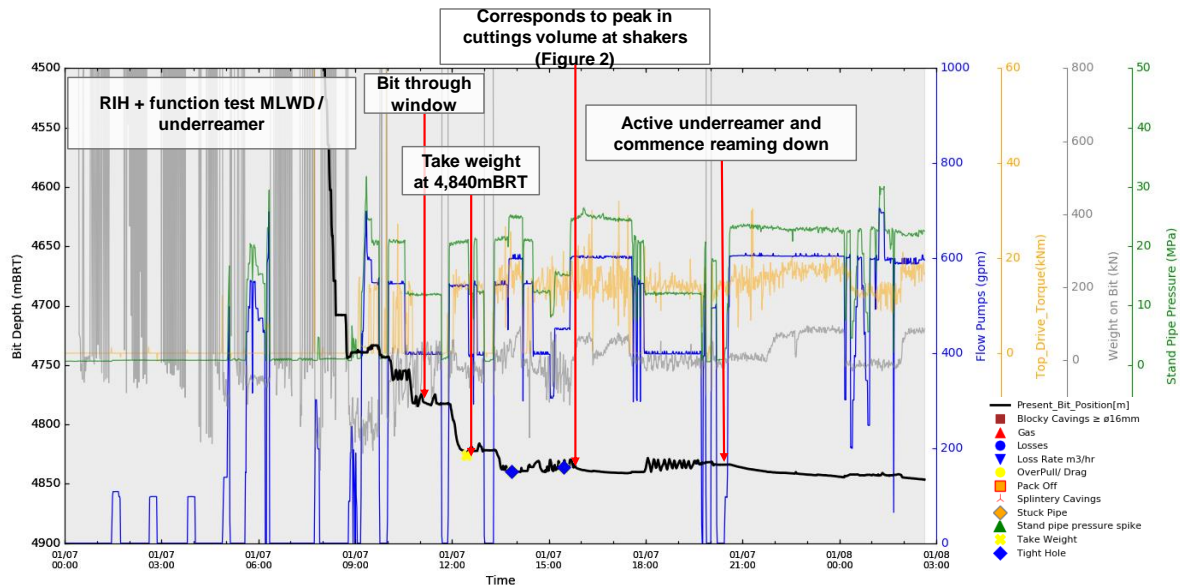
### Observations Summary

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

<b>Fracture Gradient</b>	N/A
<b>Pore Pressure</b>	No indications of overpressure observed.
<b>Wellbore Breakout</b>	N/A
<b>Tensile Failure</b>	N/A
<b>Drilling Parameters</b>	Once drilling/underreaming from 2000hrs A good match was seen between surface and downhole WOB once the drilling of new formation. However, surface and downhole torque difference indicates significant friction remains along the drillstring.
<b>Other</b>	N/A

### Analysis

#### Drilling Experience Analysis



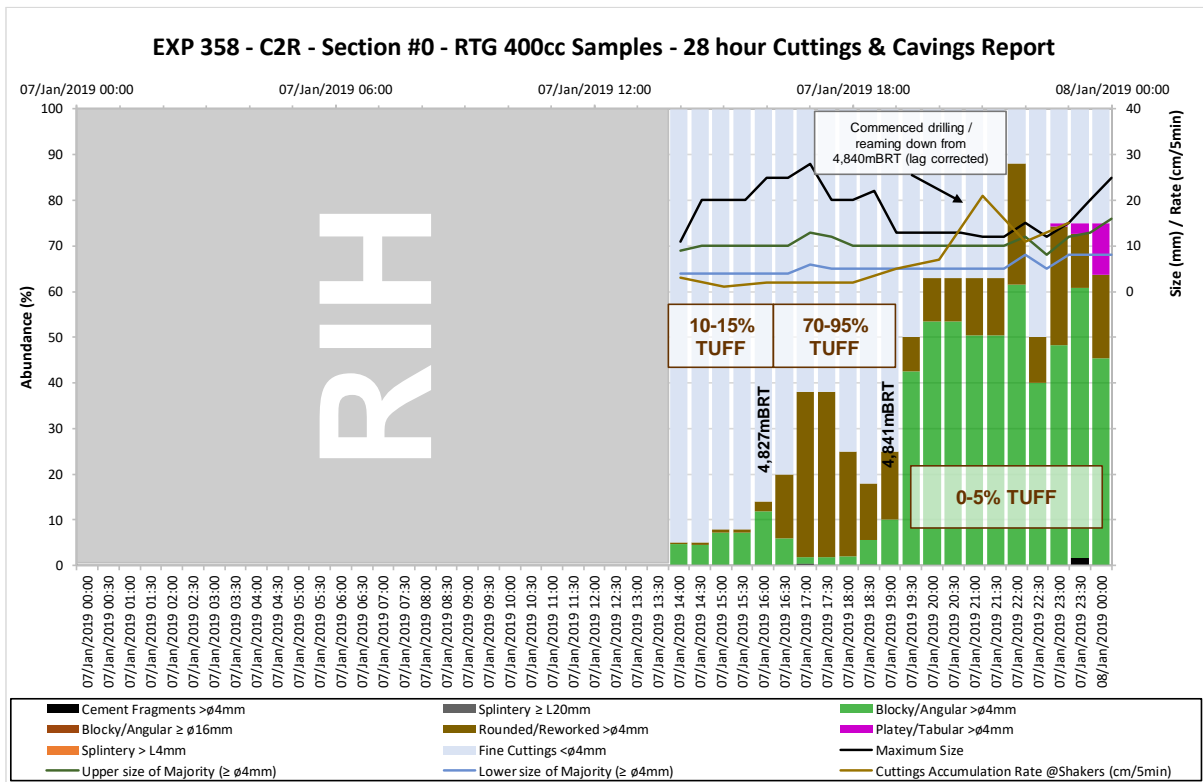
**Figure 1 Drilling experiences over the last 24 hrs**

- RIH with 8-1/2" x 12-1/4" LWD BHA to window (not shown)
- Successfully passed 8-1/2" bit through bottom of window at 4,762 mBRT on fourth attempt with increased RPM and speed
- Washed down to previous tight spot at 4,840 mBRT (no obstruction at 4,809 mBRT – previous tight spot)
- Took weight at 4,839 mBRT and worked through 4,840 mBRT to 4,841 mBRT. Suspected new hole was being drilled below 4,840 mBRT (1800 – 19:30)
- Picked up, activated reamer and commenced reaming ahead.

# IODP EXP 358 Daily Geomechanics Report

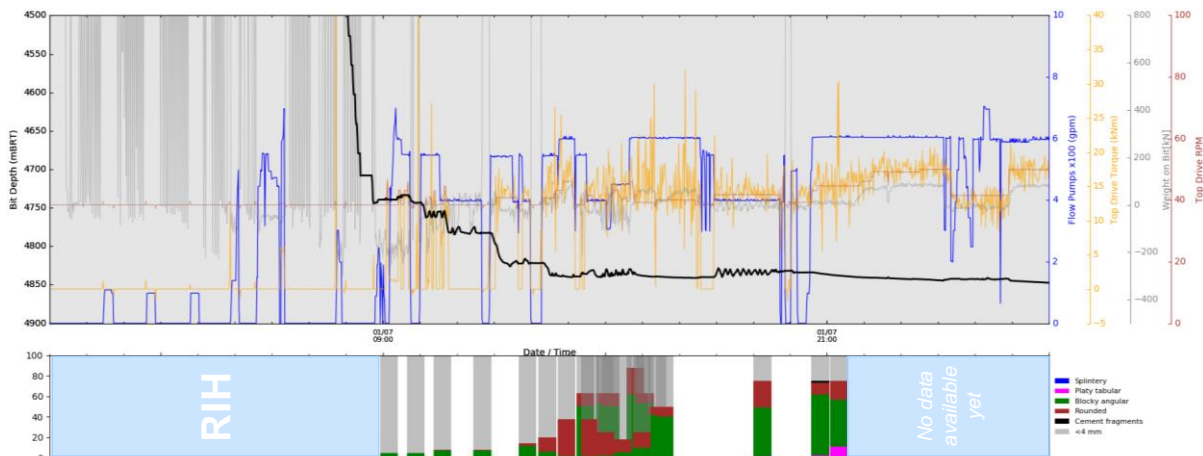
## Report #059 20190107

### Cuttings and Cavings Analysis



**Figure 2 Analysis of cuttings/cavings > ø 4mm (taken from 400cc RTG Samples) over last 24 hrs. *Not corrected for lag-time***

- Coarser shale/mudstone fragments > ø4mm with sharp edges remain blocky with minor occurrence of platy fragments
- Tuff fragments with rounded shapes represented between 90 and 100% of the rounded cuttings in the kick off section between 4,760 and 4,780 mBRT. These cuttings could have been temporarily trapped in the washed-out interval but released later.
- Tuff also represented 95% of the coarse fragments from 4,826mBRT / 1700hrs, but disappeared from 4,840mBRT / 1930
- Fresh blocky coarse fragments become dominant past ~4,840.5 mBRT with the portion of tuff quickly falling, and remaining at ~0-1%. The % of rounded blocky fragments appears to be increasing with time
- Coarser grains ≥ ø16mm are 100% tuff fragments in all samples
- The abundance of cuttings during the trip through the kick off zone was generally low, however, indications of drilling new formation below 4,840 mBRT was marked by a 50% increase in abundance remaining on 4mm sieve.



**Figure 3 Correlation between drilling events and lag corrected cuttings/cavings occurrences**

IODP EXP 358 Daily Geomechanics Report  
Report #059 20190107



**Figure 4 Example of cuttings/cavings >  $\varnothing$  4mm (taken from 400cc RTG Samples).**  
The predominant cuttings above 4,840 mBRT are rounded tuff fragments and below 4,840 mBRT fresh small blocky cuttings  $\leq$   $\varnothing$ 10 mm. The cuttings photo at 1930 hrs (left) indicates an abundance of cuttings, but this abundance increases again, as indicated in the cuttings photo at 2330 hrs (right).

# IODP EXP 358 Daily Geomechanics Report

## Report #059 20190107

### LWD Data Analysis

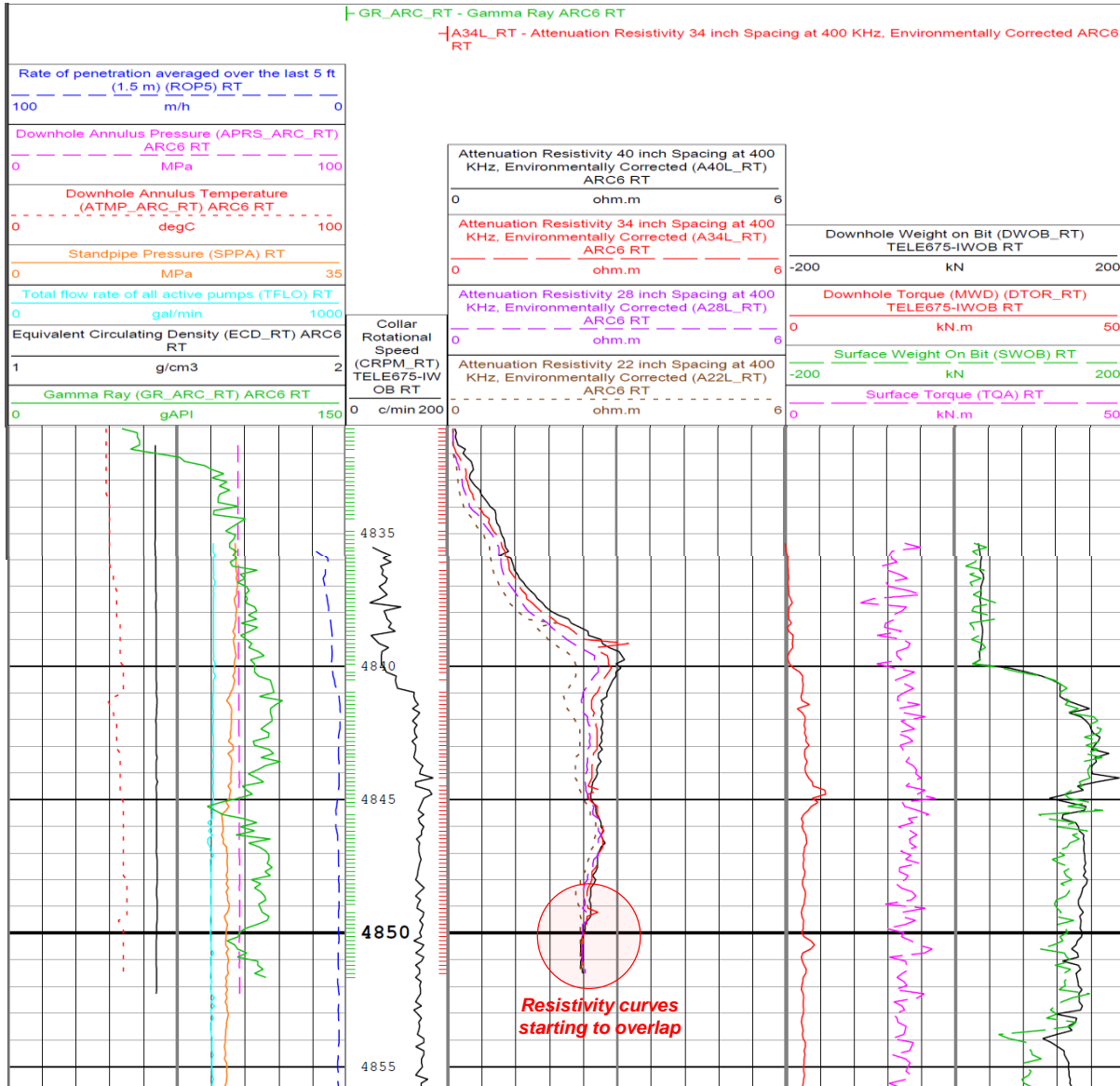


Figure 5 LWD resistivity data over last 24hrs

- Excessive low resistivity ~4,827mBRT to ~4,835mBRT indicates an enlarged hole, and could be related to the anisotropic breakout and/or washout of the tuff formation. Note;
  - While drilling tuff first appeared at a lag depth of 4,841mBRT
  - While reaming down with second motor BHA tuff first appeared at 4,827 mBRT. This however was the first instance of circulation
  - While RIH with LWD BHA tuff first appeared at ~4,827mBRT
- Resistivity was initially low (~1 to 2 ohm.m) consistent with C2Q through similar claystone/siltstone formation, however it increased from ~4,832mBRT to ~2.5ohm.m, possibly indicating a more in gauge hole
- Change in resistivity at 4,840mBRT could indicate a more in gauge hole and/or a formation boundary between the tuff and claystone layers.
- Invasion profile has largely reduced from ~4,845mBRT

### SFIB Analysis

No further updates.

# IODP EXP 358 Daily Geomechanics Report

## Report #059 20190107

### Geomechanical Model Review

No change in the current stress model.

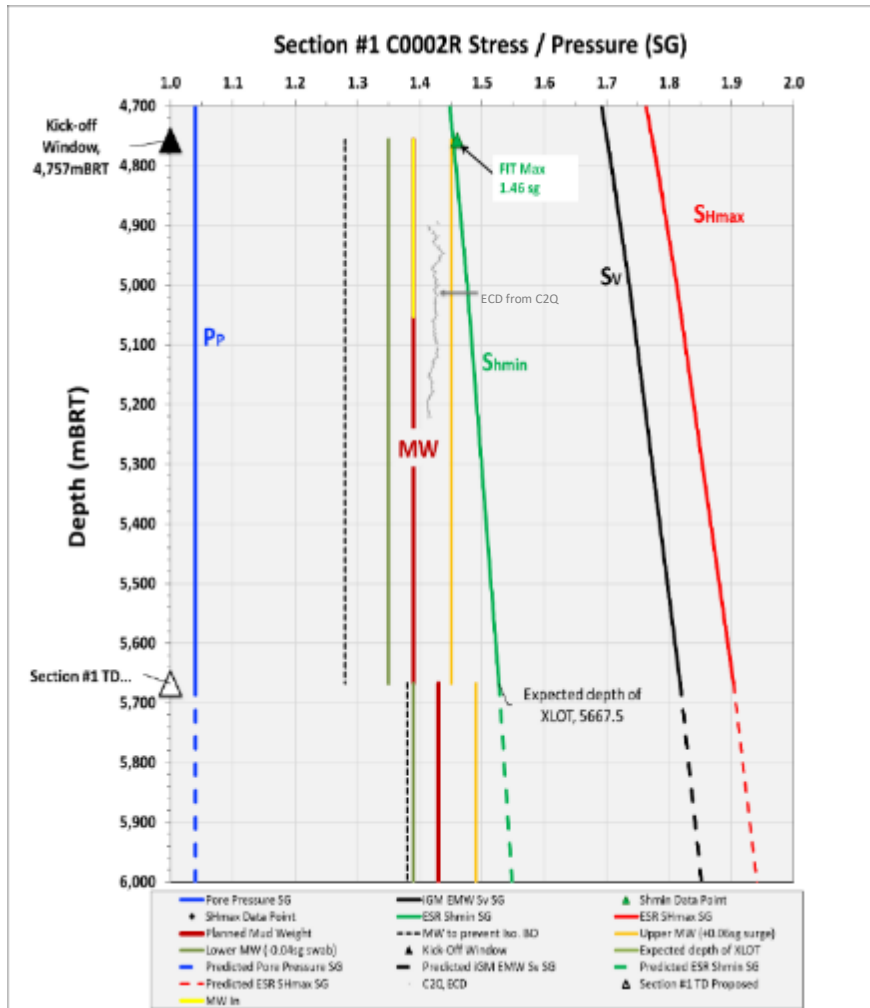


Figure 6 Current stress model for Section #1

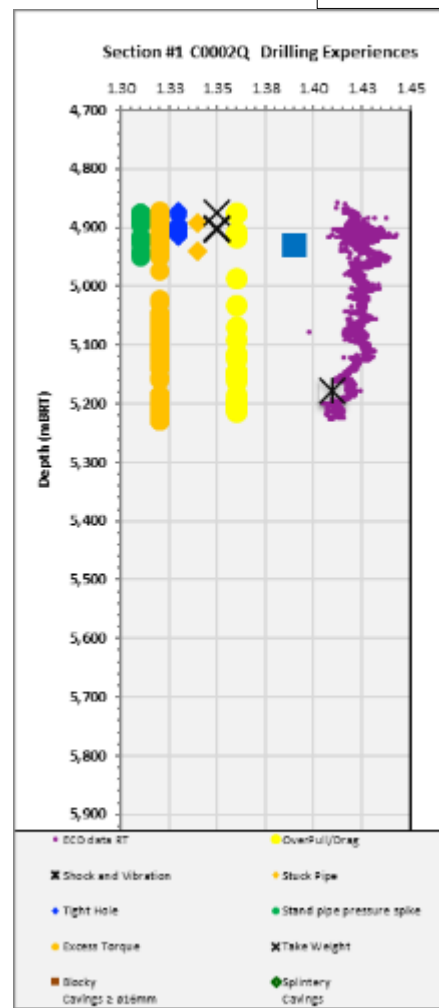


Figure 7 C0002Q Drilling Experiences

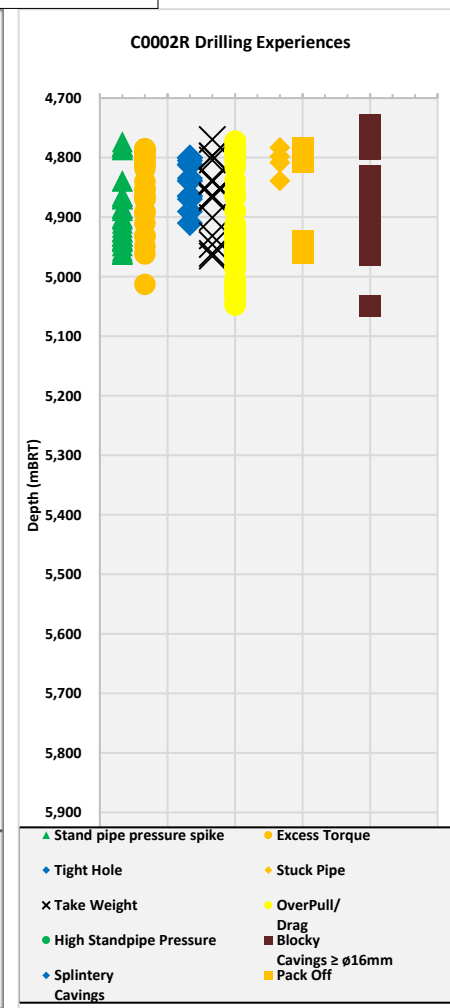


Figure 8 C0002R Drilling Experiences