

LWD data QC and processing memo in 2827-4279 mBRT (860-2312mbsf)

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Depth index

mBRT: meter below the rotary table (rig floor)

mbsf: meter below sea floor

MSL: mean sea level

MD: Measured depth, linear length from the rig floor

TVDSS: True Vertical Depth SubSea, vertical depth from MSL

Well summary

Expedition: 348

Hole: C0002N (sidetrack of C0002F)

Longitude / Latitude = 136_38.2029 E / 33_18.0507 N

X / Y = 652382.4 / 3685834.6 (Coordinates: WGS84-N53)

3D seismic location: Inline = 2533, Xline = 6229

Magnetic field information (calculated by BGGM2013)

- Total magnetic force: 46029 nT
- Horizontal component: 31463 nT
- Vertical component: 33597 nT
- Grid North: 0.8988
- Inclination: 46.878 deg
- Declination: -6.7586 deg

Water Depth: 1939.0m (sea floor from rig floor: 1967.5m)

Rig floor to MSL Elevation: 28.5 m

Last casing : 20" till 2827.8 mBRT (860.30 mbsf)

Bit size: 17"-PDC

Total depth: 4297.5 mBRT (2330.0mbsf)

Max hole deviation: 5.36 deg @3083.4mBRT (1115.9mbsf) (directional drilling)

Measured interval:

- Run1: 2840.00-3976.00 mBRT (872.5-2008.5mbsf)
- Run2: 3976.00-4297.00 mBRT (2008.5-2329.5mbsf)

Mud type: KNPP

Mud weight: 1.12

Mud resistivity: 0.10 Ohm·m @24.0 DegC

Mud filtrate: 0.08 Ohm·m @24.0 DegC

Mud cake: 0.14 Ohm-m @ 24.0 DegC

KCL concentration: 4.58-5.96 %wt

LWD BHA: (GeoPilot: directional drilling)-DGR (GR) - EWR-Phase4 (resistivity) - PWD
(pressure while drilling)

- Sampling rate:
 - Real time data: 36 sec
 - Memory data: DGR: 10 sec, EWR: 10 sec

Operation and logging summary

Nov-2 make up tools, run in hole

Nov-3 Tag top of cement #2 bridge plug @2316mBRT, drill out cement

Nov-4 Bit passed 20" casing shoe@2827.8mBRT
Start kick-off sidetrack @2833mBRT

Nov-7 Stop drilling @3645.1mBRT, pull out of hole
WOW (wait on weather)

Nov-8 run in hole
Resume drilling down from 3645.1 m

Nov-9 Lost MWD signals
Stopped drilling at 3976.0mBRT
pull out of hole

Nov-10 Tools at rigfloor, dump memory data
Remove GeoPilot, check and change borehole assembly
make up borehole assembly w/o GeoPilot

Nov-11 RIH, Resume drill down
Mud lost @4004.39 mBRT

Nov-12 Resume drilling down
Mud lost @4084 mBRT
Resume drilling down

Nov-13 Reached 17" TD 4297.5 mBRT (2330mbsf)
pull out of hole

Nov-14 pull out of hole

Nov-15 LWD on the rig floor, data dump

See Figure 1

Logging data quality control

Data quality control was performed by monitoring real time data, trip out log, and memory data. LSSs assessed real time data drilling parameters and data from the downhole tools in terms of realistic values for the lithology of drilling interval and comparing with the logs in C0002F in the IODP expedition 338. The overall quality of the logging data was good. The natural gamma ray has similar curve trend with one in C0002F, but the value is ~10-20gAPI smaller than one in C0002F (Figure 2). The LSSs confirmed that the measured value and mud correction was correct with Schlumberger, logging service company for C0002F, and Halliburton for C0002N. Halliburton mentioned that the smaller values in C0002N was due to large hole diameters and bad hole condition, which are beyond their correction. 9" (extra-shallow) phase-shift and 15" (shallow) attenuation resistivities were affected with mud resistivity. 27" (medium) and 39" (deep) resistivities would measure uninvaded formation resistivities. The resistivities in 3628-3646mBRT (1720.5-1678.5mbsf), 3940-3956mBRT (1972.5-1988.5mbsf), and 3990-4005mBRT (2022.5-2037.5mbsf) are affected with washout borehole (large diameter) by the long time lags between the bit and the sensors due to WOW (wait on weather) on 7th November, WOW on 10th November, and treating mud loss at 4004mBRT (2036.5mbsf), respectively (Figure 3).

Data processing

The LWD data was downloaded from the tools at the surface during waiting for recovering from bad weather on 10th November, and after the tagged target depth on 15th November. The data in run1 and run2 were merged by Halliburton field engineers. The raw data was delivered by Halliburton field engineers to LSS (Logging staff scientists). LSS applied depth shift of -1967.5m from the rig floor to the sea floor. The all data was uploaded the share server to distribute to the scientists. The GR and resistivity data in run1 and run2 were merged at 3963.2m and 3942.8m by Halliburton, respectively ("MergedByHalliburton" composite log in the processed category). The scientists merged at 2008.5m to overlay with the earlier (fresher) measurement ("Merged" composite log in the processed category).

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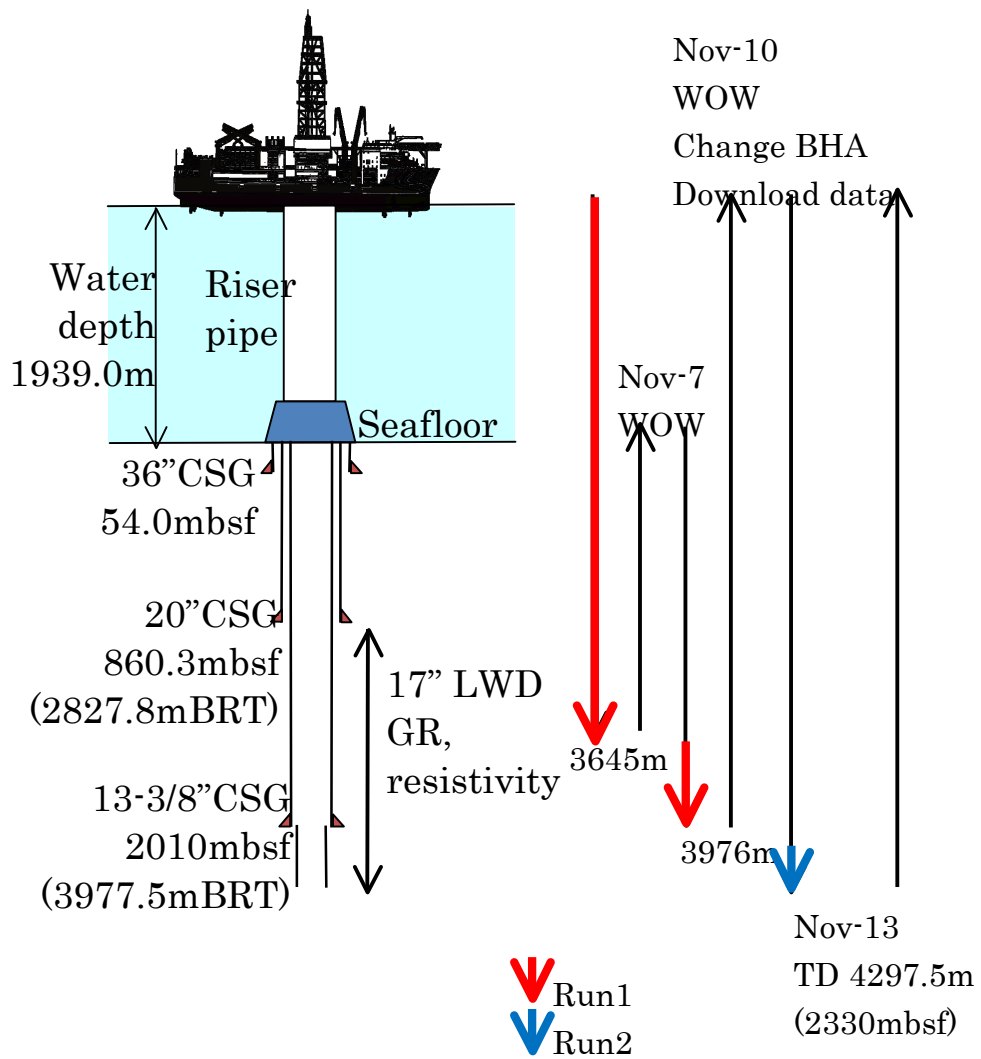


Figure 1. Schematic of operation timeline and logging runs

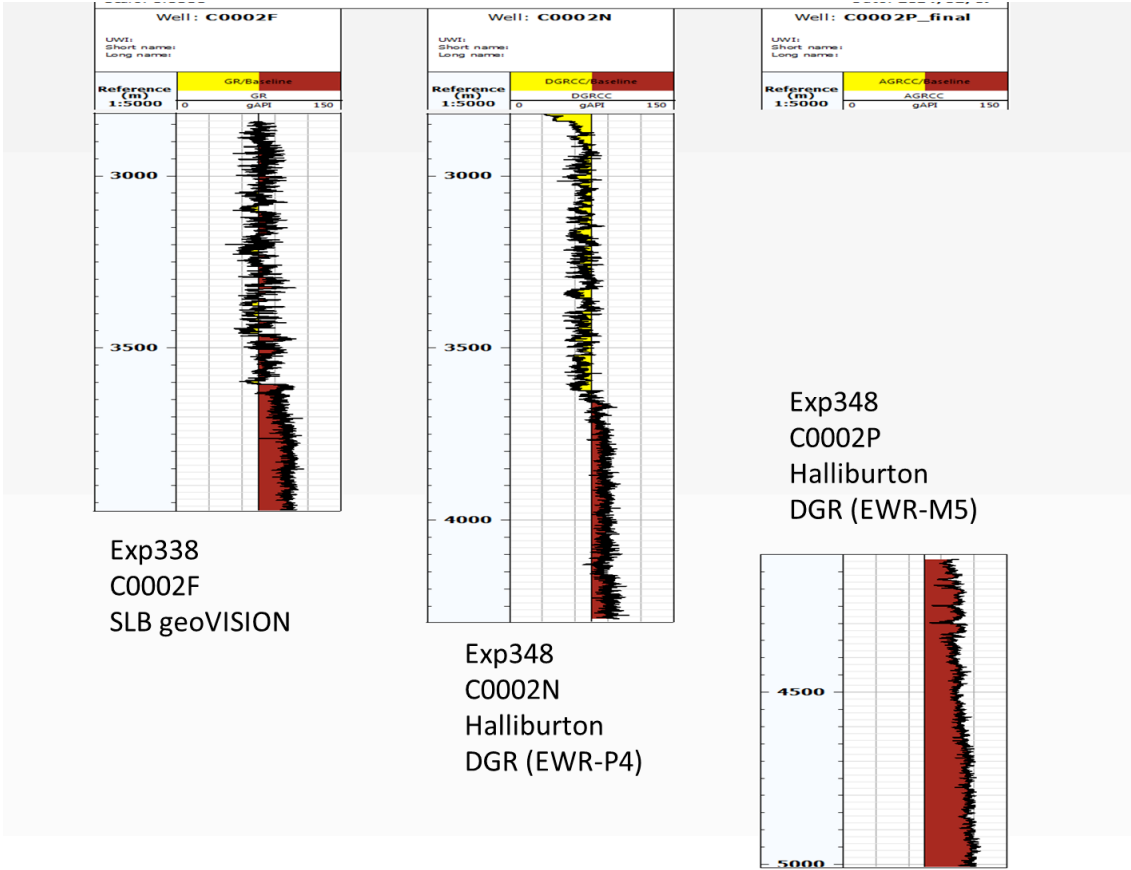


Figure 2. GR value in C0002N is smaller than ones in C0002F and C0002P.

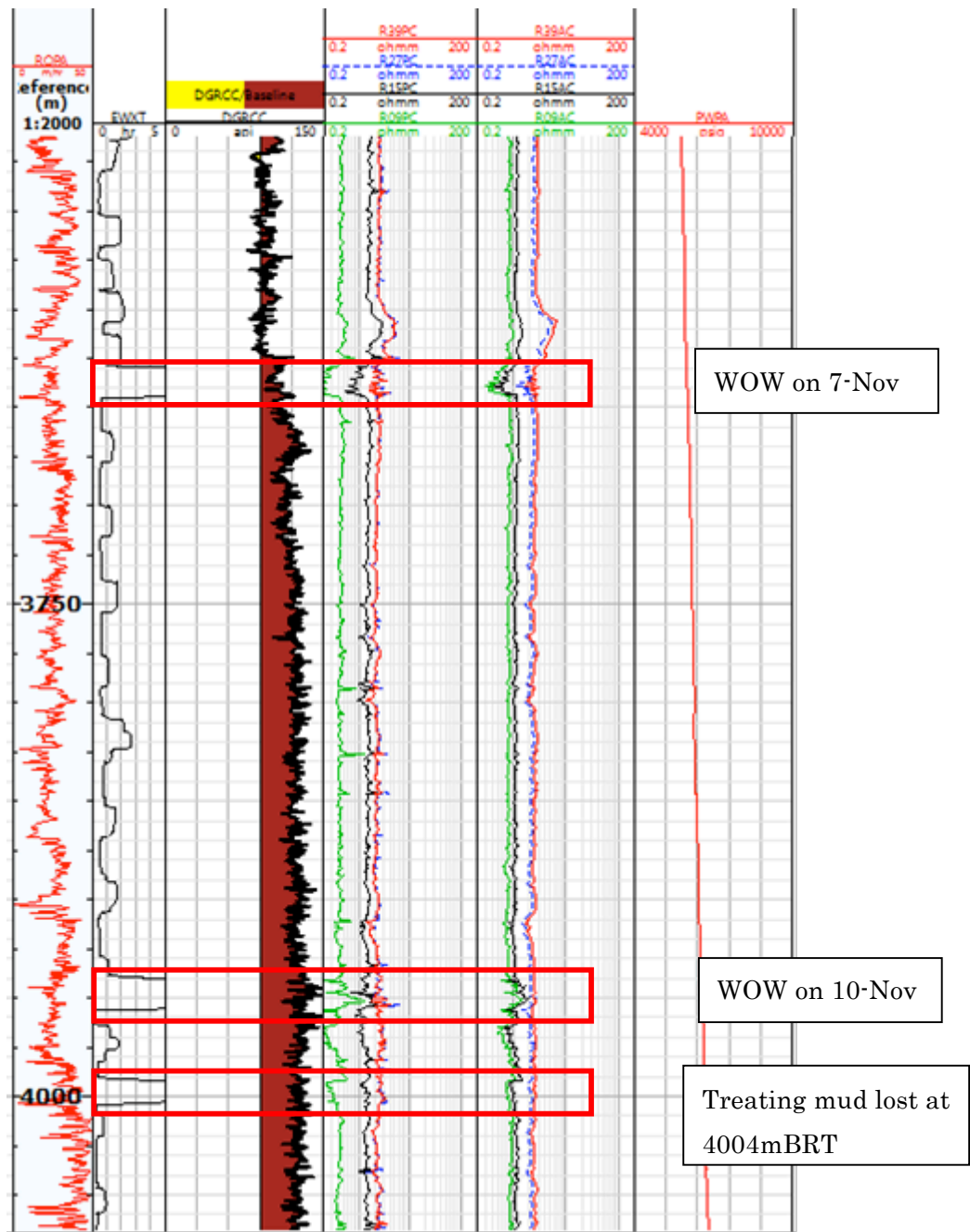


Figure 3. WOW and log responses. EWXT is Exposure Time of EWR (resistivity) tool. Time lag passing between the bit and the resistivity sensor (15.2m above the bit).

Acronyms:

- Surface data
 - ROPA.m/hr : Avg Rate of Penetration
- EWR-P4
 - DGRCC.api : DGR Comb Gamma Ray BCorr
 - R09PC.ohmm : 9in Phase Resistivity
 - R15PC.ohmm : 15in Phase Resistivity
 - R27PC.ohmm : 27in Phase Resistivity
 - R39PC.ohmm : 39in Phase Resistivity
 - R09AC.ohmm : 9in Atten Resistivity
 - R15AC.ohmm : 15in Atten Resistivity
 - R27AC.ohmm : 27in Atten Resistivity
 - R39AC.ohmm : 39in Atten Resistivity
 - EWTEMP.degC : EWR Temperature
 - EWDD.ptpm: EWR Data Density
 - EWXT.hr : EWR Formation Exp Time
 - PWPA.psig : PWD Annular Pressure
 - PWEA.ppg : PWD Annular EMW