Operation summary

Hole C0003A

Latitude: 33°13.3982’N

Longitude: 136°42.1382’E

Seafloor (drill pipe measurement from rig floor, m): 2481.5

Distance between rig floor and sea level (m): 28.5

Water depth (drill pipe measurement from sea level, m): 2453.0

Logging run

LWD(geoVISION-sonicVISION-adnVISION-seismicVISION)-MWD-APWD

Available data

Hole C0003A was drilled with LWD-MWD-APWD tools. Similar to Hole C0002A, all MWD-APWD data and a limited set of LWD data were transmitted in real time. As the tools were not recovered, these real-time data are the only data available for this site. In addition to surface and downhole drilling parameter logs, this data set includes the following main geophysical logs:

- Bulk density (RHOB_DH) and bulk density correction (DRHO_DH) computed downhole with a less sophisticated algorithm than the one normally used at the surface with the memory data;
- Thermal neutron ratio (TNRA_ADN_RT) and thermal neuron porosity (TNPH_ADN_RT);
- Average borehole diameter from the ultrasonic caliper (ADIA);
- Natural gamma ray log (GR) and resistivities (bit [RES_BIT_RT] and ring [RES_RING_RT], shallow [RES_BS_RT], medium [RES_BM_RT], and deep [RES_BD_RT] button) from the geoVISION resistivity (GVR) tool;
- Hole deviation data such as relative bearing (RB_RT), hole azimuth (HAZI_RT), and hole deviation (DEVI_RT); and
- Δt compressional wave transit time (DTCO) and sonic compressional semblance (CHCO) and semblance (DTCO and CHCO) from the sonicVISION tool (see Table **T2**).

Depth shift

As Hole C0003A was jetted-in to 50 m LSF at a reduced pump rate, real-time fluid pulse data were available only while the bit was below 50 m LSF. Therefore, geoVISION data are available from ~50 m LSF (Fig. **F2,** yellow zone), whereas adnVISION data (sensors located ~27–29 m above) are available from ~22 m LSF (Fig. **F2,** orange zone). Therefore, the mudline was impossible to identify based on a first response in the gamma ray (GR) log and so was picked at 2481.5 m DRF. The depth-shifted version of the main drilling data and geophysical logs in Hole C0003A is given in Figure **F2.** Figure **F3** presents the time-depth relationship linking the time (Fig. **F1**) and depth version (Fig. **F2**) of the data in Hole C0003A.

Logging data quality

Figure **F2** shows the quality control logs for Hole C0003A real-time LWD data. After the hole was jetted-in to 50 m LSF, the target ROP of 35 m/h was generally achieved to 525.5 m LSF, where loss of the BHA stopped drilling operations (see “Operations”). Below 50 m LSF, SPPA slightly increased from 15 to 18 MPa. CRPM also progressively increased from 30 to 50 rpm, then 80 rpm, and stabilized at 100 rpm below 190 m LSF. Average annular pressure and ECD followed the normal trend of increasing with depth with moderate jumps at pipe connections. Even though not perfectly calibrated (negative temperature value above 280 m LSF), annular temperature (ATMP_MWD) shows a normal increase with depth until the tool became stuck and

pump flow increased. Based on previous experience in Hole C0002A, drilled with a similar ROP, time after bit (TAB) measurements were ~5 min for resistivity and gamma ray logs (geoVISION tool), except in short depth inter-vals corresponding to pipe connections. TAB measurements for density and neutron porosity logs are ~45–60 min. The real-time acoustic caliper (ADIA) log, which gives the average diameter of the LWD borehole, is the best indicator of borehole conditions. The ECAL_RAB caliper is a resistivity-derived caliper. In respect to ADIA, it has the advantage of providing a caliper reading shortly after the hole has been drilled, but its physical foundation (resistivity derived) is less reliable than the acoustic reading (relying only on drilling fluid sound velocity). The ADIA caliper should read a value of 8.5 inches. (21.6 cm) for a perfect in-gauge hole but instead showed values slightly >9 inches for the depth interval from 30 (first reading) to 75 m LSF and slightly <9 inches (22.9 cm) for the depth intervals 155–390 and 460–525.6 m LSF. ADIA exceeds 10 inches in a low–gamma ray zone (sandy formation; 75–155 m LSF). ADIA also shows a complex washout/bridge pattern between 390 and 460 m LSF that is not concomitant to any change in gamma ray value (lithology indicator) and was therefore interpreted as the result of a fault zone. Hole deviation never exceeded 3°. LWD tools experienced moderate radial and tangential shocks. The highest shocks (SHKPK) correspond to the lower section of the sand-rich interval (110–155 m LSF) where the stick-slip indicator (STICK) gradually increased to 450 m LSF, where it reduced and stabilized to a value of 150 rpm (far below the 250 rpm limit that can impair image quality and therefore also far below the maximum rating of the tool). The washouts in the interpreted fault zone and, more specifically, in the upper sand-rich interval are associated with major decreases in the bulk density log (RHOB) where bulk density correction (DRHO) could not be fully compensated for this major washout and are therefore underestimated (Fig. **F2**). Otherwise, a stand-off <1 inch (2.5 cm) between the tool and the borehole wall indicates high-quality density measurements with an accuracy of ±0.015 g/cm3. Comparison between deep button (RES_BD) and shallow button (RES_BS) resistivity values shows that drilling fluid invasion is null or not significant, confirming the short TAB readings. Because of the loss of the LWD tools, sonic data are limited to real-time downhole automatic picking of compressional arrival time (DTCO) and coherence (CHCO) information. The full waveforms were not available, limiting further processing and detailed quality check. However, interval velocity data derived from the real-time check shot show a surprisingly good fit with the upper limit of V_P data derived from DTCO from 162 to 523 m LSF.

This note is extracted from

Kinoshita, M., Tobin, H., Ashi, J., Kimura, G., Lallement, S., Screaton, E.J., Curewitz, D.,Masago, H., Moe, K.T., and the Expedition 314/315/316 Scientists, Proceedings of the Integrated Ocean Drilling Program, Volume 314/315/316.

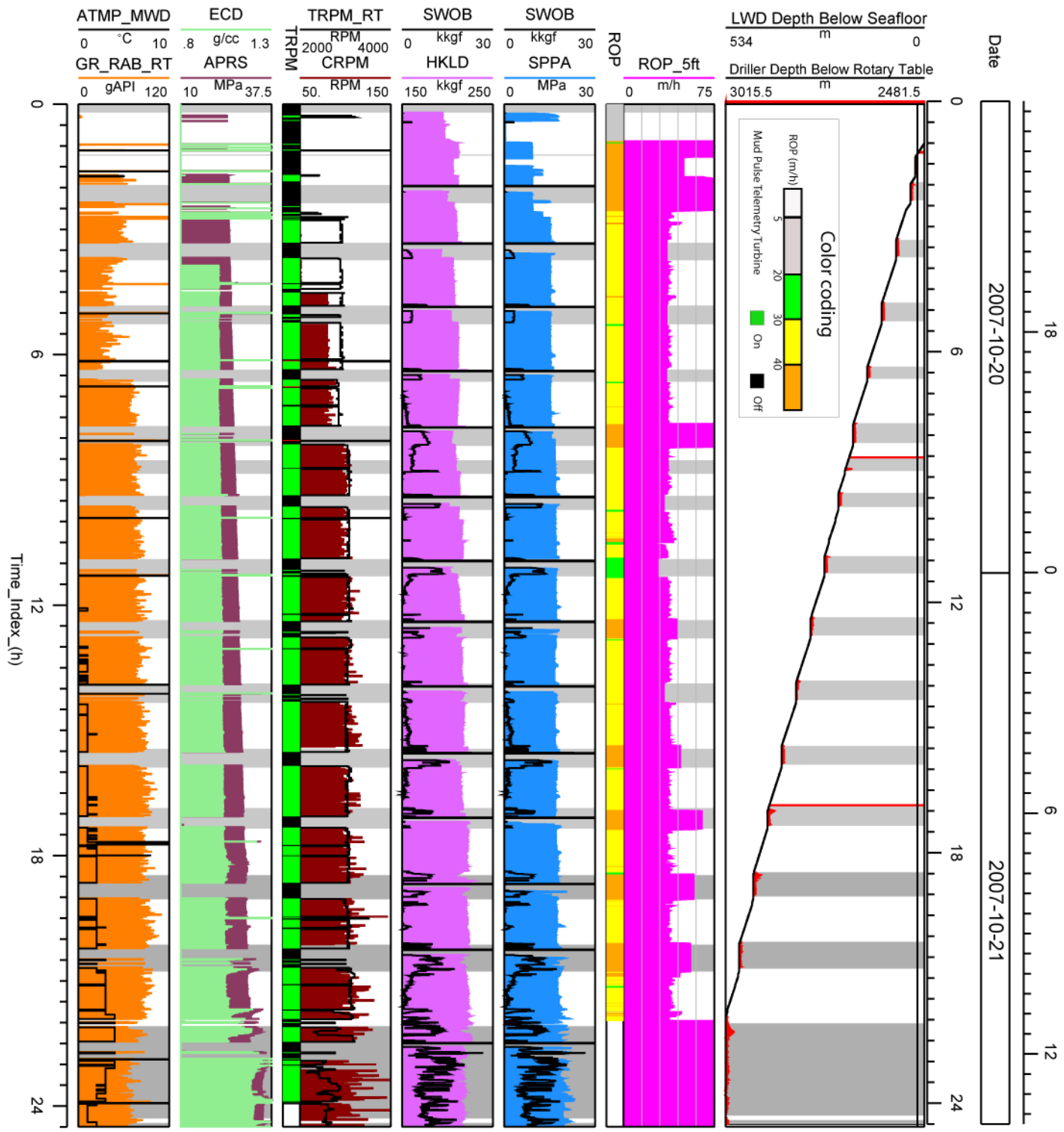

Figure F1. Drilling parameters and gamma ray log vs. time for MWD-APWD operations in Hole C0003A. ATMP_MWD = annular temperature from the real-time APWD tool, GR_RAB_RT = gamma ray resistivity-at-thebit (real time), ECD = equivalent circulating density, APRS = average annular pressure, TRPM = MWD turbine rotation speed, TRPM_RT = TRMP (real time), CRPM = collar rotation, SWOB = surface weight on bit, HKLD = hook load, SPPA = standpipe pressure, ROP = rate of penetration, ROP_5ft = 5 feet averaged ROP, LSF = LWD depth below seafloor, DRF = drillers depth below rig floor.

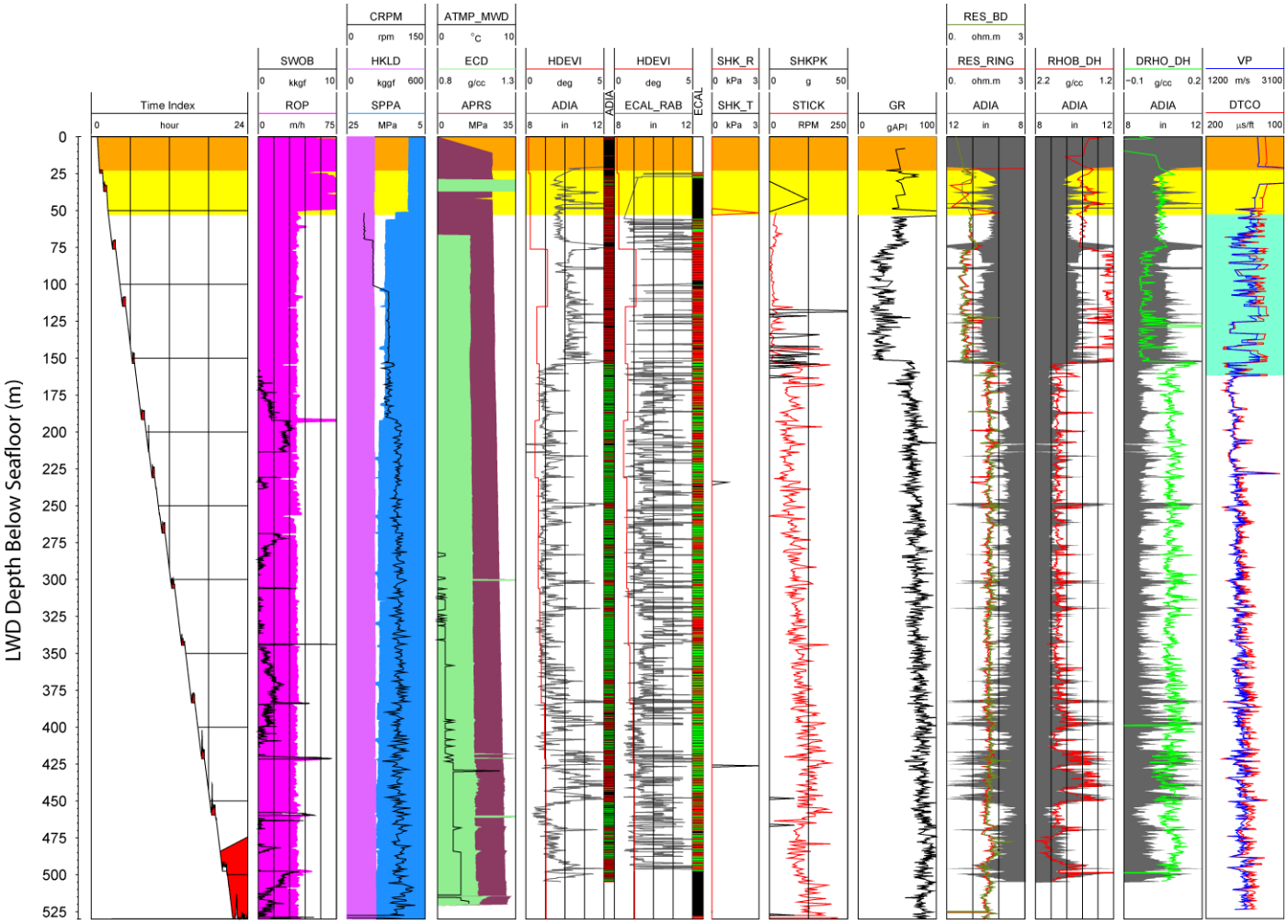

Figure F2. Real-time control logs of Hole C0003A. Fluid pulse telemetry began transmitting real-time data from ~50 m LSF (bit depth). Yellow = no reading of the geoVISION tool, orange = no reading of the adnVISION tool. LSF = LWD depth below seafloor, SWOB = surface weight on bit, ROP = rate of penetration, SPPA = standpipe pressure, HKLD = hook load, CRPM = collar (bit) rotation speed, ADIA= ultrasonic caliper from the adnVISION tool, HDEVI = hole deviation, ECAL_RAB = resistivity-derived caliper from the geoVISION resistivity (GVR) tool, APRS = average annular pressure, ECD = equivalent circulating density, ATMP_MWD = average annular temperature, SHK_R = radial shocks and SHK_T = tangential shocks on the geoVISION tool, STICK = stick slip indicator, SHKPK = shock peak level, GR = gamma ray log from the GVR tool, RES_BD = deep button resistivity, RES_RING = ring resistivity, RHOB_DH = bulk formation density computed downhole, DRHO_DH = bulk density correction also computed downhole, DTCO = transit time of compressional wave automatically picked downhole, V_P = velocity of compressional wave derived from DTCO.

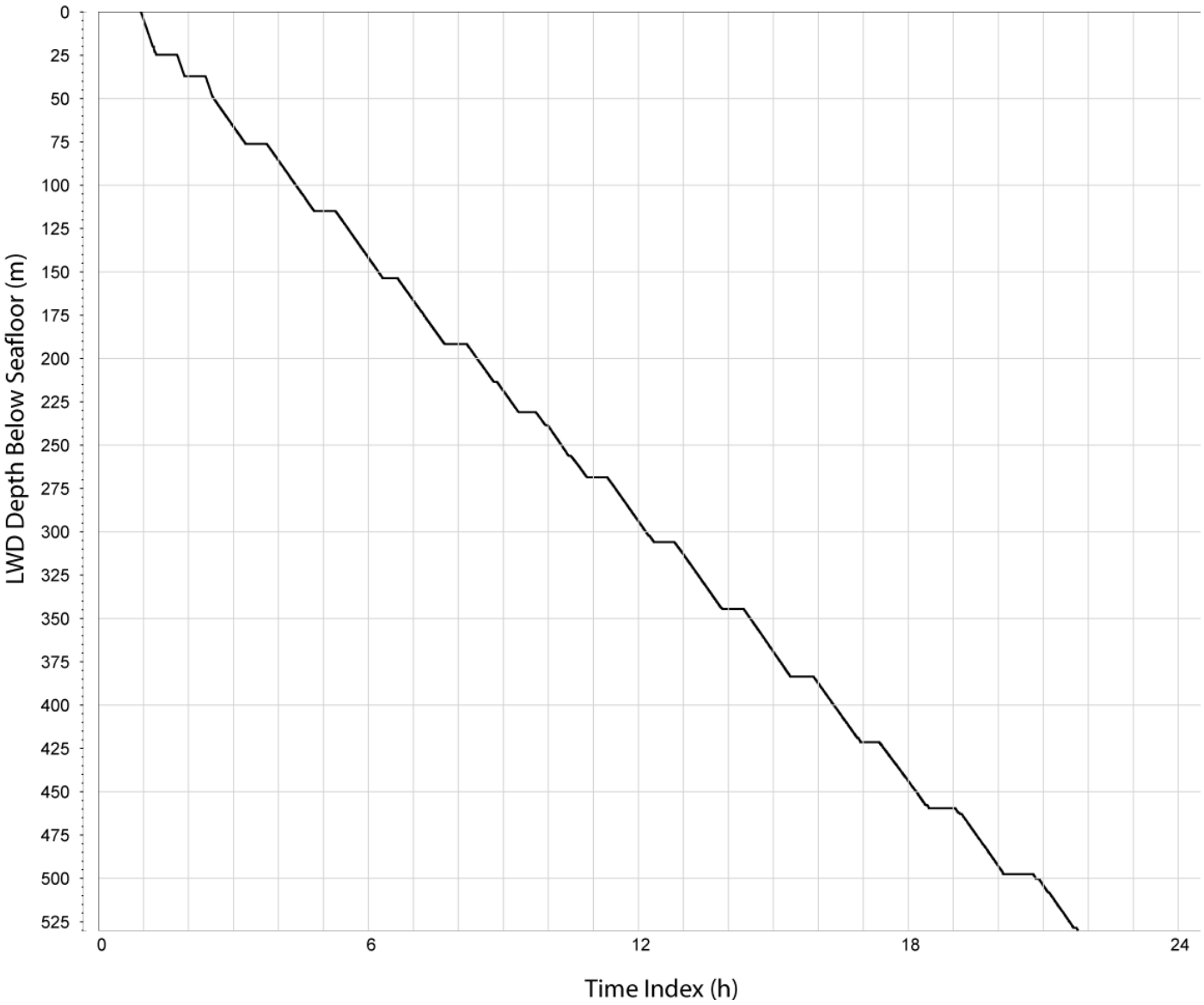

Figure F3. Time vs. depth in Hole C0003A. LSF = LWD depth below seafloor.

Table T1. Operations summary, Site C0003.

Hole C0003A

Latitude: 33° 13.3982'N

Longitude: 136° 42.1382'E

Seafloor (drill pipe measurement from rig floor, mBRF): 2481.5

Distance between rig floor and sea level (m): 28.5

Water depth (drill pipe measurement from sea level, m): 2453

Operation	Start		End		Depth		Drilled	Comments
	Date	Time	Date	Time	T	Bottom	(mbsf)	
C0003A-LWD hole	18-Oct	22:00	31-Oct	2:00	0	525.5	533.5	8.5″ LWD (GVR-SWD-SVWD-MWD-APWD-ADN)
ROV Survey	20-Oct	11:45						
Seafloor Tagging	20-Oct	12:10						
Spud-in	20-Oct	12:45						
Drilled depth	21-Oct	13:45			0	533.5	533.5	
Tools stuck & packed-off	21-Oct	10:00	21-Oct	14:45				Packed-off at 3015 mBRT after pipe-connection at 1000 h. Reamed & worked string between 3015 and 3006 m. Stuck in hole at 3007 m BRT at 1345 h. Failed several attempts for torque up and jar down. Pumped Hi-Vis mud to clean. Backed off while trying to turn and move the pipe at 1445 h.
Fishing & Cementing	21-Oct	15:45	31-Oct	2:00				
Preparation	21-Oct	15:45	22-Oct	0:00				Made up free-fall-funnel, landed on seafloor, then pulled out drill string to surface and checked the break point of assembly.
1st overshot fishing	22-Oct	14:05	24-Oct	14:30				8-1/8″ overshot assembly was made up, run in, re-entered, washed down and reamed from 2707 to 2785 mBRT. Attempted 7 times during 0000 and 0745 h on 24 October and only one was successful but failed to pull up. Pulled out at 1415 on 24th.
2nd overshot fishing	24-Oct	14:05	27-Oct	0:00				6-3/4″ overshot assembly was made up and run again on the 25th. Re-entry took 10 hrs and the overshot failed again to catch the fallen LWD assembly. Wireline was rigged up with a 7 m sinker bar for dummy run at 2215 h on 25th. After failing to pass through 2780.5 m at 0145 h on 26th, the dummy tool was retrieved. Sinker bar unscrewed and dropped off. Overshot assembly was recovered back on deck at 0000 h on 27th.
3rd overshot fishing	27-Oct	00:00	29-Oct	12:00				Made up 8-1/8″ overshot assembly with 6-5/8″ spiral grapple and re-entered the hole at 0315 h on 28th. Ran into 2774 mBRT and rigged up wireline assembly at 0600 h. Overshot latched the pipe after several attempts but failed to pass below 2788 m by wireline and rigged down. Overshot fishing continued until decision was made to pull out 1200 h of 29th.

Plug & cementing	29-Oct	12:00	31-Oct	2:00	Made up a cement stinger, run in and rigged up cement stand. Cement lines flushed at 0200 h on Oct. 30, 1st cement job was conducted at 0430 h and 2nd cement job was done at 0730 h. After confirming cement return to the seabed by ROV, cementing assembly was pulled out and drill string was cleaned.

Notes: LSF = LWD depth below seafloor. LWD = logging while drilling, GVR = geoVISION resistivity tool, sonic = sonic while drilling (sonicVISION), SVWD = seismicVISION while drilling, MWD = measurement while drilling, APWD = annular pressure while drilling, ADN = Azimuthal Density Neutron tool (adnVISION). ROV = remotely operated vehicle. DRF = drillers depth below rig floor.

Table T2. Bottom-hole assembly, Hole C0003A.

Description	Length (m)	Cumulated Length from Bit (m)
PDC bit	0.320	0.320
Stabilizer / float sub	1.500	1.820
Cross-over sub	0.612	2.432
GVR-VISION	3.067	5.499
Sonic-VISION	7.620	13.119
Power Pulse	9.025	22.144
Seismic-VISION	4.630	26.774
ADN-VISION	6.230	33.004
Cross-over sub	0.610	33.614
6 3/4 Drilling collar	9.315	42.929
6 3/4 Drilling collar	9.319	52.248
6 3/4 Drilling collar	9.313	61.561
6 3/4 Drilling collar	9.315	70.876
6 3/4 Drilling collar	9.316	80.192
6 3/4 Drilling collar	9.313	89.505
6 3/4 Drilling collar	9.315	98.820
6 3/4 Drilling collar	9.314	108.134
6 3/4 Drilling collar	9.314	117.448
6 3/4 Drilling collar	9.318	126.766
6 3/4 Drilling collar	9.315	136.081
6 3/4 Drilling collar	9.314	145.395
Jar	10.212	155.607
6 3/4 Drilling collar	9.314	164.921
6 3/4 Drilling collar	9.314	174.235
6 3/4 Drilling collar	9.310	183.545
6 3/4 Drilling collar	9.310	192.855
6 3/4 Drilling collar	9.315	202.170
6 3/4 Drilling collar	9.310	211.480
6 3/4 Drilling collar	9.310	220.790
6 3/4 Drilling collar	9.315	230.105
Cross-over sub	0.610	230.715
Cross-over sub	0.800	231.515
Cross-over sub	0.610	232.125

Note: BHA = bottom-hole assembly, PDC = polycrystalline diamond compact.