Schlumberger

Company: **ESSO Australia Pty. Ltd.**

Well: **HLA A5B**
Field: **Halibut**
Rig: **ISDL 453** State: **Victoria**

Rig: ISDL 453
Field: Halibut
Location: Bass Strait
Well: HLA A5B
Company: ESSO Australia Pty. Ltd.

GeoVISION Density−Neutron
1:200 True Vertical Depth
Recorded Mode Log

Location

Total depth:	3004.0 m
Spud date:	24−Apr−07
Runs:	2 To 3

Elevation

K.B.	Top Drive
G.L.	−73.0 m
D.F.	29.45 m

Permanent datum:	Mean Sea Level	Elev.:	0 m
Log measured from:	Drill Floor	29.45 m	above Perm. datum
Depth reference:	Driller's Depth		

Service Order no.	X = E 615270.159	Longitude	Latitude
07ASQ0003	Y = N 5748514.771	E 148°19'12.589"	S 38°24'15.016"

Depth logged:	2700.0 m To 2992.4 m	Mag decl:	13.23 deg.	Other services:	
Date logged:	07−May−07 To 08−May−07	Mag dip:	−68.86 deg.	See Remarks	

Bore hole record

Hole size	from	to
8.5 in.	549.0 m	3004.0 m

Casing record

Size	Density	from	to
10.75 in.	40.5 lb/ft	Surface	549.0 m

Mud record

Type	from	to
KCl/PHPA/Gycol	549.0 m	3004.0 m

Borehole deviation record

Min	Max	from	to
7.93 deg.	42.18 deg	549.0 m	2692.2 m
39.19 deg	40.12 deg	2692.2 m	3004.0 m

Surface equipment

Unit	OLU−JA−9602
Depth system	DES−CA−ASQ04−01

Software record

IDEAL Wis	ID12_0c_01		
SPM	HSPM12_0c_04		
LWD	See Remarks		
MWD	8.0C03		

Bit Run Summary

Run number		2	3
Bit size	in.	8.5	8.5
Bit start depth	m	2715.0	2715.0
Bit end depth	m	2715.0	3004.0
Top interval logged	m	N/A	2700.0
Bottom interval logged	m	N/A	2992.4
Begin log: time		N/A	01:08
Begin log: date		N/A	07−May−07
End log: time		N/A	09:36
End log: date		N/A	08−May−07
Mud data			
Depth	m	N/A	3004.0
Type		N/A	KCl/PHPA/Glycol
Mud weight	ppg	N/A	9.8
Solids	%	N/A	7.1
Chlorides	mg/L	N/A	45,000
Rm	Ohm−m@°C	N/A	0.11@22.0
Rmf	Ohm−m@°C	N/A	0.09@21.5
Rmc	Ohm−m@c	N/A	0.22@22.2

Potassium	%	N/A	4.4								
Environmental data											
GR											
Mud weight	ppg	N/A	9.8								
Bit size	in.	8.5	8.5								
Resistivity											
Neutron porosity											
Hole Size	in	8.5	8.5								
Mud weight	ppg	N/A	9.8								
Temperature	°C	N/A	87.0								
Mud salinity	ppk	N/A	66.0								
Formation salinity		N/A	N/A								
Recording rate 1	SEC	5	5								
Recording rate 2	SEC	10	10								
Filtering GR		3pt	3pt								
Filtering density		3pt	3pt								
Filtering Neutron		3pt	3pt								
Company representative		G. Doty	C. Stead	B. Davis	M. Turner						
Schlumberger D&M Personnel		B.Pattarakorn	R. Borjas	C.Hibberson	C. Cocks	M. Blacker					

DISCLAIMER

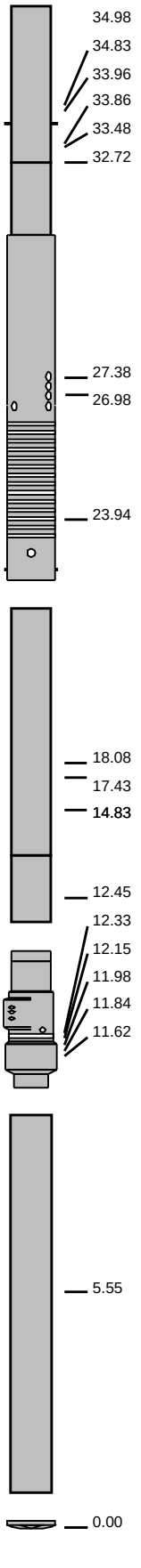
THE USE OF AND RELIANCE UPON THIS RECORDED−DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED−DATA; (b) DISCLAIMERS AND WAIVERS OF WARRANTIES AND REPRESENTATIONS REGARDING COMPANY'S USE OF AND RELIANCE UPON THE RECORDED−DATA; AND (c) CUSTOMER'S FULL AND SOLE RESPONSIBILITY FOR ANY INFERENCE DRAWN OR DECISION MADE IN CONNECTION WITH THE USE OF THIS RECORDED−DATA.

OTHER SERVICES FOR RUN2	OTHER SERVICES FOR RUN3	OTHER SERVICES FOR RUN
Directional Drilling Directional Surveys Annulus Pressure & Temperature Ultrasonic Caliper	Directional Drilling Directional Surveys Annulus Pressure & Temperature Ultrasonic Caliper	
REMARKS: RUN NUMBER 2	REMARKS: RUN NUMBER 3	REMARKS: RUN NUMBER
Depth is referenced to Driller's Depth . Gamma Ray is corrected for mud weight, tool size, bit size and potassium content. Resistivity is borehole compensated and environmentally corrected. Thermal Neutron Porosity is corrected for the effects of borehole size, temperature, mud salinity, and mud hydrogen index (a factor of mud weight, mud temperature and pressure. Neutron porosity is calculated using a limestone matrix density of 2.71 g/cm3. Delta−T is borehole compensated. POOH to repair TDS.	Depth is referenced to Driller's Depth . Gamma Ray is corrected for mud weight, tool size, bit size and potassium content. Resistivity is borehole compensated and environmentally corrected. Thermal Neutron Porosity is corrected for the effects of borehole size, temperature, mud salinity, and mud hydrogen index (a factor of mud weight, mud temperature and pressure. Neutron porosity is calculated using a limestone matrix density of 2.71 g/cm3. Delta−T is borehole compensated. Consistent high stick and slip experienced throughout the run. POOH due to TD of HLA A5B.	

EQUIPMENT DESCRIPTION

RUN2	RUN3	RUN
DOWNHOLE EQUIPMENT	DOWNHOLE EQUIPMENT	

DOWNHOLE EQUIPMENT



6−3/4 in. adnVISION* 36.89

S/N: 1469

DHS: V8.3

Blade OD: 8−1/4 in.

6−3/4 in. sonicVISION* 30.77

S/N: 607

DHS: V6.6

Blade OD: 8−3/8 in.

6−3/4 in. PowerPulse* 22.33

DHS: 8.0C03

MDC: V875

MEC: 1281

MDI: 1751

MGR: 146

6−3/4 in. GeoVISION* 13.94

DHS: V6.2B01

S/N: 41380

7 in. PowerPak* Motor 10.28

A700GT 7:8

S/N: 7413

0.78 Deg Bent Housing

Smith PDC Bit

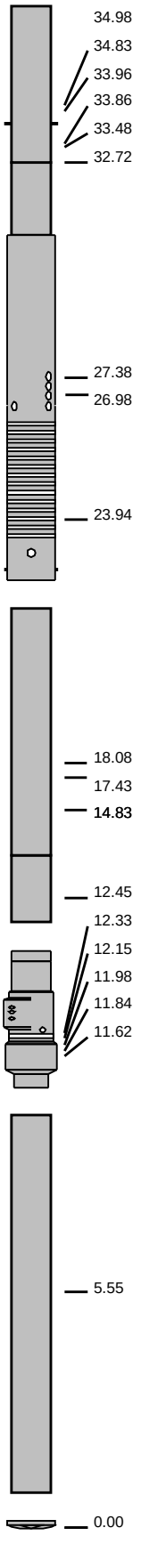
OD: 8−1/2 in. 0.22

S73PX S/N: JT0016A3

Maximum string diameter 8.50 in.

All lengths in Meters

DOWNHOLE EQUIPMENT



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All lengths in Meters

Variable Name	Variable Description	Run Name & Value
Run Number		3
General Information		
1:200 True Vertical Depth		
BSAL_RM	Mud Salinity (RM)	66.000000
BS_RM	Bit Size (RM)	8.500000
COEF_M	User Defined FEXP in Clean Sand	1.650000
C_WS	Overpressure correction to Sw and M	1.000000
FEXP	Formation Factor Exponent(RM)	2.000000
FNUM	Formation Factor Enumerator(RM)	1.000000
FPHI_RM	Formation Factor Porosity Source (RM)	XPLOT
MST_RM	Mud Sample temperature (RM)	22.000000
MW_RM	Mud Weight (RM)	9.800000
OBMF_RM	Oil Based Mud (RM)	NO
RHOF_RM	Mud Filtrate Density (RM)	1.000000
RHOM_RM	Matrix density (RM)	2.710000
RMS_RM	Resistivity of Mud Sample (RM)	0.108900
RWA_COMP_M	Rwa computation model	BASIC
RWA_DEN_AD	Rwa Density Input ADN	RHOB
RWA_DEN_CD	Rwa Density Input CDN	RHOB
RWA_DEN_IN	Rwa Density Input	RHOB
RWA_FORM_M	Rwa computation formation model	CLASTIC
RWA_RES_IN	Rwa computation resistivity input	RAB_RING
RWS_RM	Resistivity of Connate Water (RM)	1.000000
SHT_RM	Surface Hole Temperature (RM)	25.000000
TD_RM	Total Measured Depth (RM)	3004.000000
TWS_RM	Temperature of Connate Water (RM)	75.000000
VF_ILLI	Fraction of illite in shales	0.500000
VF_KAOL	Fraction of kaolinite in shales	0.500000
VF_MONT	Fraction of montmorillonite in shales	0.000000
XPDM_RM	Cross plot density porosity multiplier	0.675000
XPNM_RM	Cross plot neutron porosity multiplier	0.325000
RAB		
LWD_RM/STATION_FILE/PARAMETERStation Time-frame file name		Station
RAB/BTN_SLV_SIZE/PARAMETERRAB: Button Sleeve Diameter		RAB6:
RAB/STAB_SIZE/PARAMETERRAB: Stabilizer Diameter		RAB6:
BDBHCA	RAB: Button Deep Borehole A Factor	0.003555
BDBHCB	RAB: Button Deep Borehole B Factor	0.000000
BHA_COEF_V	RAB: BHA Coef Generator Version	2.000000
BITBHCA	RAB: Bit A Borehole Factor	0.057576
BITBHCB	**RAB: Bit B Borehole Factor**	**0.000000**
BIT_K_FACT	**RAB: Bit K Factor**	**14.555817**
BMBHCA	RAB: Button Medium Borehole A Factor	0.022478
BMBHCB	RAB: Button Medium Borehole B Factor	0.000000
BSBHCA	RAB: Button Shallow Borehole A Factor	0.021991
BSBHCB	RAB: Button Shallow Borehole B Factor	0.000000
BUT_KIMP_A	RAB: Button Impedance Coeff A	0.000000
BUT_KIMP_B	RAB: Button Impedance Coeff B	0.000000
DBUTTON_K_	RAB: Button Deep K factor	0.004594
GR_BHC_TOO	RAB: Gamma-Ray Borehole Coeff 1	6.750000
HI_CSDEPTH	RAB: Allow Hi-Resolution CS_DEPTH Image Data Output	NO
HI_DLIS_OU	RAB: Allow Hi-Resolution DLIS Image Data Output	NO
HI_RIVER_O	RAB: Allow Hi-Resolution River for Image Data Output	NO
IMAGE_MAX_	RAB: GR Image Maximum Scale Value	120.000000
IMAGE_MAX_	RAB: Image Maximum Resistivity Value	100.000000
IMAGE_MIN_	RAB: GR Image Minimum Scale Value	20.000000
IMAGE_MIN_	RAB: Image Minimum Resistivity Value	1.000000
JSD_RAB	RAB Acquisition start date	1.000000
MAG_DECL_R	RAB: Magnetic Declination	13.229998
MAG_INCL_R	RAB: Magnetic Dip	-68.859993
MBUTTON_K_	RAB: Button Medium K Factor	0.005263
OBM	RAB: Oil base Mud	NO
ORIENTATIO	Rab Image Orientation	TOH
RABBDA0	RAB: Button Deep A0 Coeff	-0.049596
RABBDA1	RAB: Button Deep A1 Coeff	0.019506
RABBDA2	RAB: Button Deep A2 Coeff	-0.004362
RABBDA3	RAB: Button Deep A3 Coeff	0.000455
RABBDA4	RAB: Button Deep A4 Coeff	-0.000017
RABBDA5	RAB: Button Deep A5 Coeff	0.000000
RABBDMIN	RAB: Button Deep Minimum Value	0.051084
RABBITA0	RAB: Bit A0 Coeff	3.854714
RABBITA1	RAB: Bit A1 Coeff	-4.215636
RABBITA2	RAB: Bit A2 Coeff	11.380002
RABBITA3	RAB: Bit A3 Coeff	-11.876993
RABBITA4	RAB: Bit A4 Coeff	4.796427
RABBITA5	RAB: Bit A5 Coeff	0.000000
RABBITMIN	RAB: Bit Minimum Value	21.114967
RABBMA0	RAB: Button Medium A0 Coeff	-0.059916
RABBMA1	RAB: Button Medium A1 Coeff	0.025609
RABBMA2	RAB: Button Medium A2 Coeff	-0.005951
RABBMA3	RAB: Button Medium A3 Coeff	0.000628
RABBMA4	RAB: Button Medium A4 Coeff	-0.000024
RABBMA5	RAB: Button Medium A5 Coeff	0.000000
RABBMMIN	RAB: Button Medium Minimum Value	0.059503
RABBSA0	RAB: Button Shallow A0 Coeff	-0.071702
RABBSA1	RAB: Button Shallow A1 Coeff	0.030312
RABBSA2	RAB: Button Shallow A2 Coeff	-0.006846
RABBSA3	RAB: Button Shallow A3 Coeff	0.000699
RABBSA4	RAB: Button Shallow A4 Coeff	-0.000026

RABBSA5	RAB: Button Shallow A5 Coeff	0.000000
RABBSMIN	RAB: Button Shallow Minimum Value	0.086483
RABDHS	RAB Down Hole Software	6.200000
RABEC	RAB: Resistivity Env-Cor	YES
RABRNGA0	RAB: RING A0 Coeff	-0.045486
RABRNGA1	RAB: RING A1 Coeff	0.017751
RABRNGA2	RAB: RING A2 Coeff	-0.004021
RABRNGA3	RAB: RING A3 Coeff	0.000427
RABRNGA4	RAB: RING A4 Coeff	-0.000016
RABRNGA5	RAB: RING A5 Coeff	0.000000
RABRNGMIN	RAB: Ring Minimum Value	1.696959
RAB_BIT_EC	Bit Resistivity for ECAL_RAB?	YES
RAB_BIT_IN	Input Bit Resistivity for Inversion? (Recommended at the bit)	NO
RAB_CALIPE	Compute ECAL_RAB?	YES
RAB_DEEPBT	Deep Button Resistivity for ECAL_RAB?	YES
RAB_DEEPBT	Input Deep Button Resistivity for Inversion?	YES
RAB_INVERS	Perform Rt Inversion?	YES
RAB_INVERS	RAB Bit Sensor Weight for Inversion[0,1]	0.000000
RAB_INVERS	Ending Depth for GR Cutoff in Zone1	100000.000000
RAB_INVERS	Continuity Multiplier[0,1]	0.500000
RAB_INVERS	RAB Deep Button Sensor Weight for Inversion[0,1]	1.000000
RAB_INVERS	RAB inversion for Dh?	NO
RAB_INVERS	RAB inversion for Di?	YES
RAB_INVERS	GR Cutoff for Shale Formation	75.000000
RAB_INVERS	GR Cutoff for Shale Formation in Zone1	75.000000
RAB_INVERS	GR Cutoff in Zone10	75.000000
RAB_INVERS	GR Cutoff in Zone2	75.000000
RAB_INVERS	GR Cutoff in Zone3	75.000000
RAB_INVERS	GR Cutoff in Zone4	75.000000
RAB_INVERS	GR Cutoff in Zone5	75.000000
RAB_INVERS	GR Cutoff in Zone6	75.000000
RAB_INVERS	GR Cutoff in Zone7	75.000000
RAB_INVERS	GR Cutoff in Zone8	75.000000
RAB_INVERS	GR Cutoff in Zone9	75.000000
RAB_INVERS	RAB Medium Button Sensor Weight for Inversion[0,1]	1.000000
RAB_INVERS	Resistivity Cutoff for Shale Formation	2.000000
RAB_INVERS	Resistive Invasion Allowed	NO
RAB_INVERS	RAB Ring Sensor Weight for Inversion[0,1]	0.000000
RAB_INVERS	RAB inversion for Rmud?	NO
RAB_INVERS	RAB inversion for Rt?	YES
RAB_INVERS	Rt to R-deepest separation penalty multiplier[0,1]	0.500000
RAB_INVERS	RAB inversion for Rxo?	YES
RAB_INVERS	RAB Shallow Button Sensor Weight for Inversion[0,1]	1.000000
RAB_INVERS	Inversion Threshold[0, 0.3]	0.010000
RAB_INVERS	Formation Water Resistivity	0.100000
RAB_INVERS	Formation Water Temperature	150.000000
RAB_MEDIUM	Medium Button Resistivity for ECAL_RAB?	YES
RAB_MEDIUM	**Input Medium Button Resistivity for Inversion?**	**YES**
RAB_QUAD	**RAB: Process Quadrant data ?**	**YES**
RAB_RIGMOD	Bit on Bottom?	YES
RAB_RING_E	Ring Resistivity for ECAL_RAB?	YES
RAB_RING_I	Imput RING Resistivity for Inversion?	NO
RAB_SHALLO	Shallow Button Resistivity for ECAL_RAB?	YES
RAB_SHALLO	Input Shallow Button Resistivity for Inversion?	YES
RAB_TAB	RAB: Compute TAB ?	YES
RAB_TECHLO	RAB: Generate Techlog ?	YES
RAB_TEMP_S	RAB Temperature Selection	MEASURED
RAB_TICKS	RAB: Generate Ticks ?	YES
READOUT_PO	RAB: ROP to Bit Face Distance	11.840000
RINGBHCA	RAB: Ring Borehole A Factor	0.159092
RINGBHCB	RAB: Ring Borehole B Factor	0.000000
RING_KIMP_	RAB: Ring Impedance Coeff A	0.000000
RING_KIMP_	RAB: Ring Impedance Coeff B	0.000000
RING_K_FAC	RAB: Ring K Factor	0.153555
SBUTTON_K_	RAB: Button Shallow K Factor	0.007135
SCALE_IMAG	RAB: Process Image Data	YES
SHT_RM	Ground Level Temperature (Mud-Line When Offshore) (RM)	76.999977
STAB	RAB: Run with Stabilizer	YES
TFF_OFFSET	RAB Time-Frame File Time Offset	0.000000
TIMEFRAME_	RAB: Time Frame File Name	0.000000
TOOLTYPE	RAB: Azimuthal Tool	YES
VRAB6	Rab Tool type (ENP/PILOT)	RAB6_C_SERIES
WIN_SIZE_D	RAB: Window Size for Scaling Dynamic Image	3.000000

ISONIC

FP_SD	First Sample delay	400.00
STC_CF	Center frequency of Filter	13.00
STC_BW	Bandwidth (kHz)	5.00 kHz
STC_RWI	Receiver waveform ignored	None
PM_TOFF	Tool Time offset from surface system	0.00
DT_COH	Delta-T Coherence Cutoff Value	0.70
PPC_PF	Porosity Formula	Raymer-Hunt
PPC_PS	Sonic Porosity Source	DTRA
PPC_MDT	Matrix Delta-T	55.50
PPC_FDT	Fluid Delta-T	189.00

ADN

ADN_CHASSI	ADN Chassis Type String	ADN
ADN_COLLAR	ADN Collar Type String	ADN
ADN_STAB_S	ADN Stabilizer Type String	ADN
ALPHA_COMP	Perform Density Enhanced Vertical Resolution process ?	NO
ALPHA_COMP	Perform Neutron Enhanced Vertical Resolution process ?	NO
AVE_ADN	ADN/Array Channels: perform averaging(RM) :	YES
A_DHS	ADN Down Hole Software Version String	YES
CHI_RM	Caliper High limit from BS (RM)	3.000000
CLO_RM	Caliper Low limit from BS (RM)	0.000000

CLO_RM	Caliper Low Limit from BS (RM)	0.000000
DEVI	Well Section Deviation	34.930000
DTIK_SEL	ADN: Density Tick Channel Name	LSAZ
DTMUD	Delta-T for Mud	185.000000
DYN_IMG_CO	Generate Dynamic Normalized Image?	YES
ECC_CORR_A	Perform Eccentering Correction for TNPH?	YES
ENVCOR	Neutron Quadrant Processing: Environmental Correction?	YES
EVRL	EVR Process averaging number of samples (RM)	49
FCD	Future Casing (Outer) Diameter	7.000000
GCSE	Generalized Caliper Selection	BS
HPS	ADSE-EB (High Pressure Inconel Chassis)?	NO
IBS	Intergal Blade Stabilizer Collar?	YES
IDQT	Image Derived Quality Threshold	1.000000
IHVS	Integrated Hole Volume Start Value(RM)	0.000000
IMAGE_MAX_	Image SOA (Quadrant) Right Scale	2.500000
IMAGE_MAX_	Image PEF(Segment) Right Scale	6.000000
IMAGE_MAX_	Image RHOB(Segment) Right Scale	2.650000
IMAGE_MIN_	Image SOA (Quadrant) Left Scale	0.000000
IMAGE_MIN_	Image PEF(Segment) Left Scale	2.000000
IMAGE_MIN_	Image RHOB(Segment) Left Scale	2.050000
LITHO_TYPE	Lithology (RM)	LIME
N1FTU_6_RM	ADN: Neutron Bank 1 Far Tubes used :	1-2-3
N2FTU_6_RM	ADN: Neutron Bank 2 Far Tubes used :	1-2-3
NNTU_RM	ADN Neutron Near Banks Used	1-2
NTIK_SEL	ADN: Neutron Tick Channel Name	FR11
SOCNL	Standoff Distance of the CNL Tool	1.000000
SSIZ_ADN	ADN Stabilizer Size	8.250000
STOH	ADN Density Top of Hole Sector (Left Boundary):	SECTOR_0
TRPM_RM	Average Tool Rotational Speed	20.000000
USMIN_RM	ADN:Minimum Ultrasonic standoff (RM)	0.180000
USWF_RM	ADN:Process Ultrasonic Waveform?	YES
VERS_ADN	ADN Downhole Software Version	8.300000
WSDI	Window Size of Dynamic Normalization Image	15.000000

Schlumberger Drilling & Measurements Parameter Insert Header Software version 2.0c

IDEAL Version: ID12_0C_09

IDF

RAB	id11_0c_01	MWD_10	id11_0c_01
ADN	id11_0c_01		

Format: GeoVISION Density Neutron Log **Vertical Scale: 1:200** **Graphics File Created: 14-May-2007 09:49**

PIP SUMMARY

Neutron Samples

Density Samples

Rate of Penetration, Averaged over Last 5ft (ROP5_RM)
200 (M/HR) 0

RAB Gamma Ray (GR_RAB)
0 (GAPI) 200

Vertical Hole Diameter (VERD)
6 (IN) 16

Horizontal Hole Diameter (HORD)
6 (IN) 16

Thermal Neutron Porosity (TNPH)
45 (PU) -15

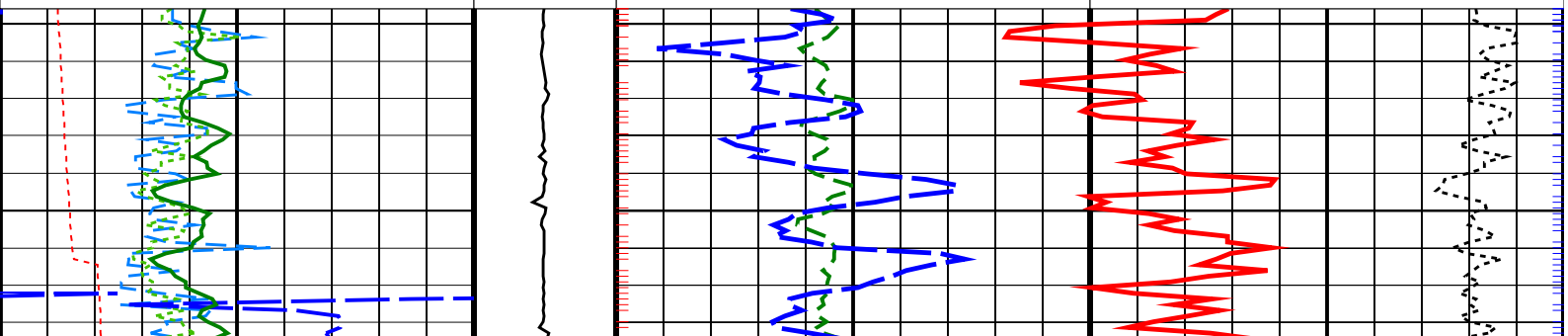
Bulk Density, Bottom (ROBB)
1.85 (G/C3) 2.85

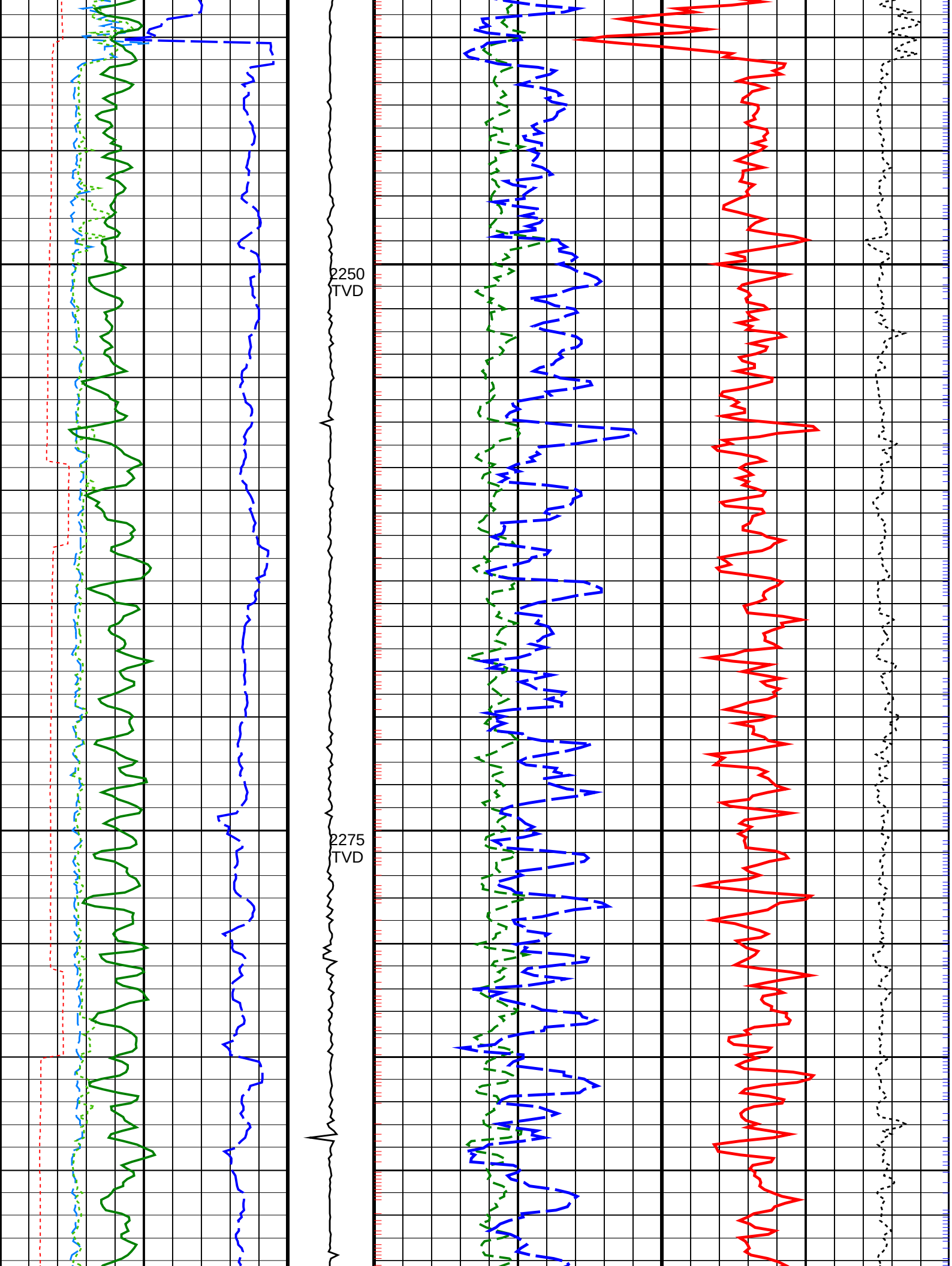
Density Time After Bit (TAB_DEN)
0 (HR) 10

ADN Rotational Speed (RPM_ADN) (RPM)
0 250

Photoelectric Factor, Bottom (PEB)
0 (---- 10

Bulk Density Correction, Bottom (DRHB)
-0.75 (G/C3) 0.25

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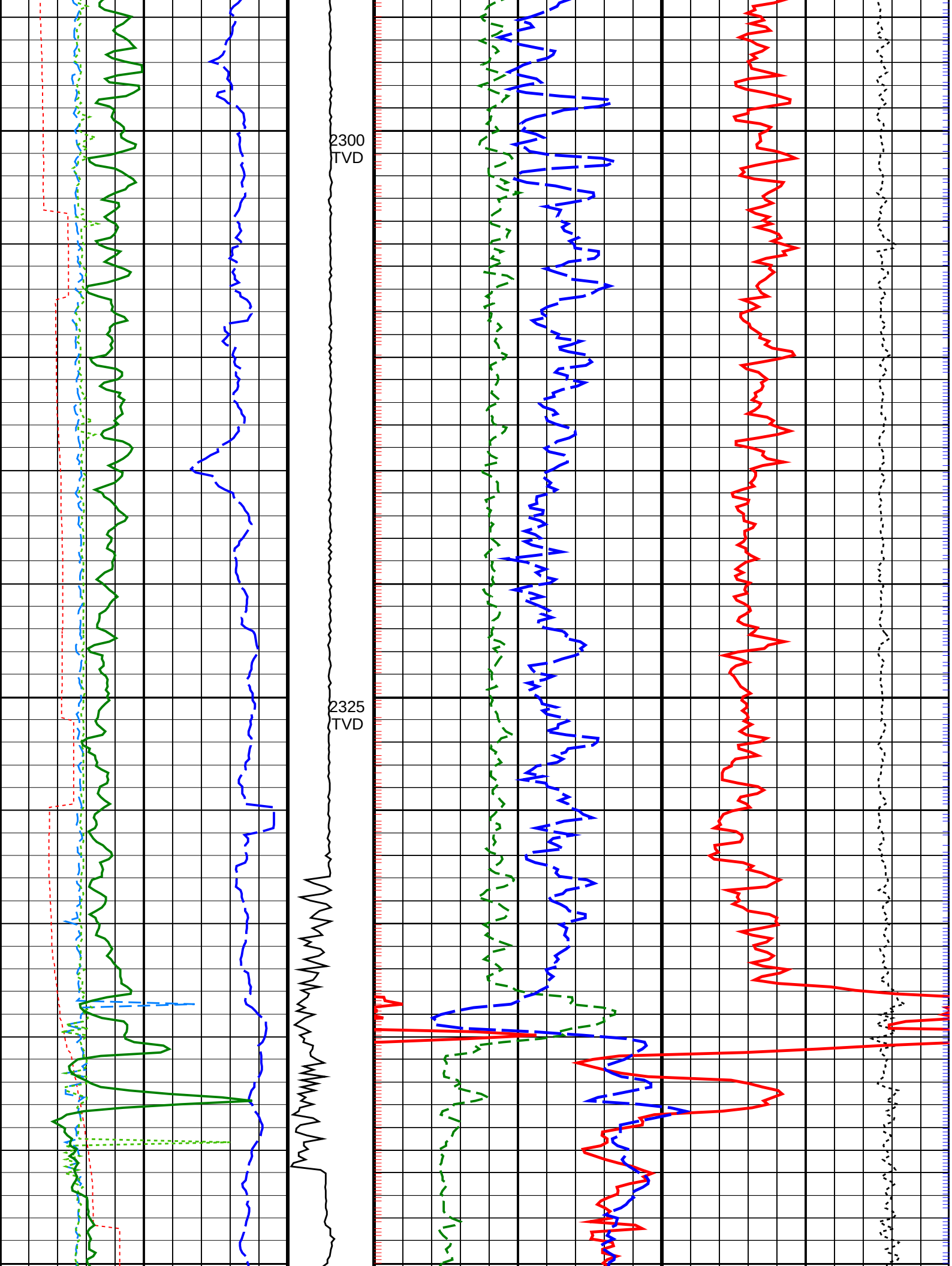
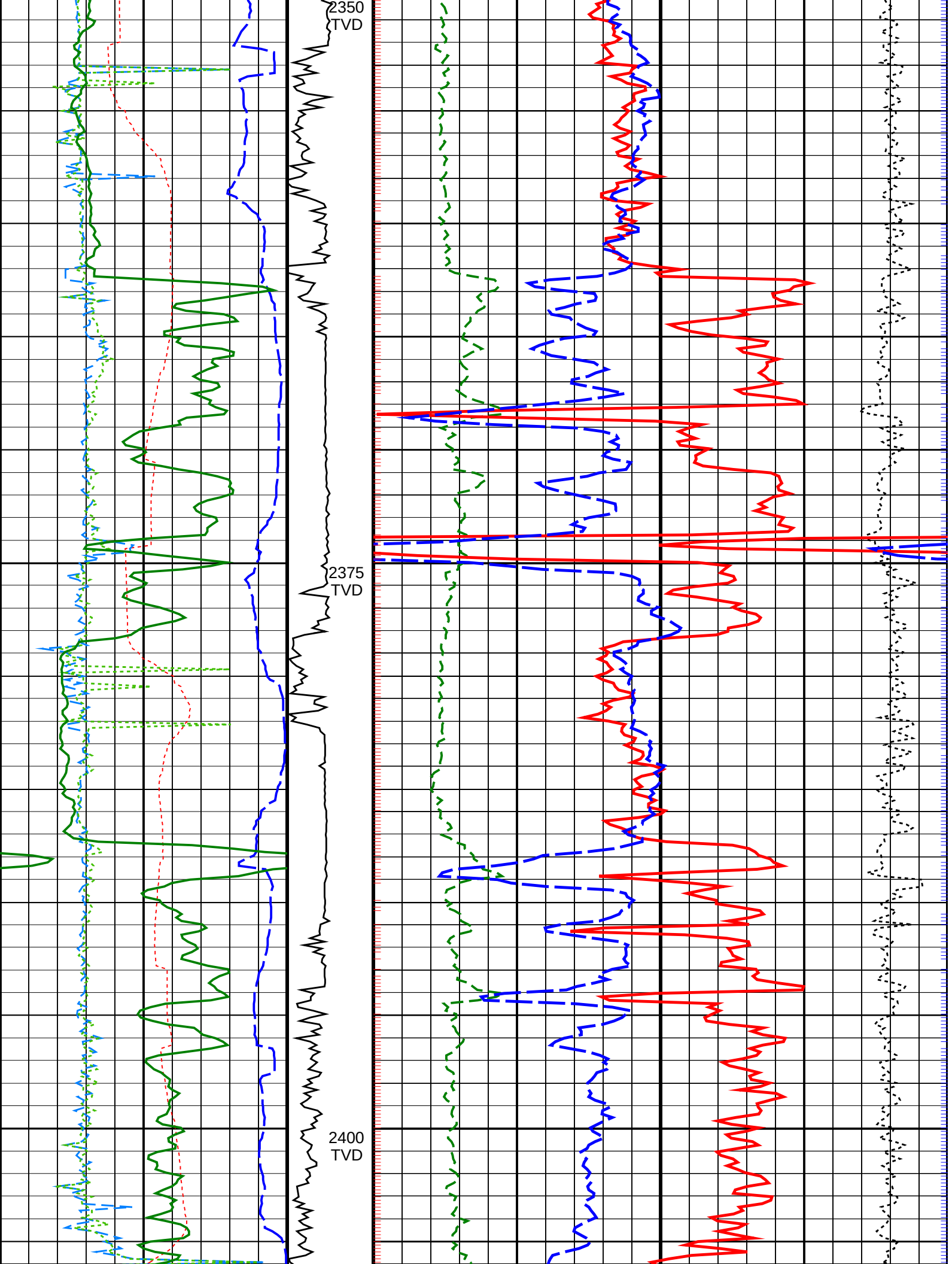
TVD
2275
TVD


2300
TVD
2325
TVD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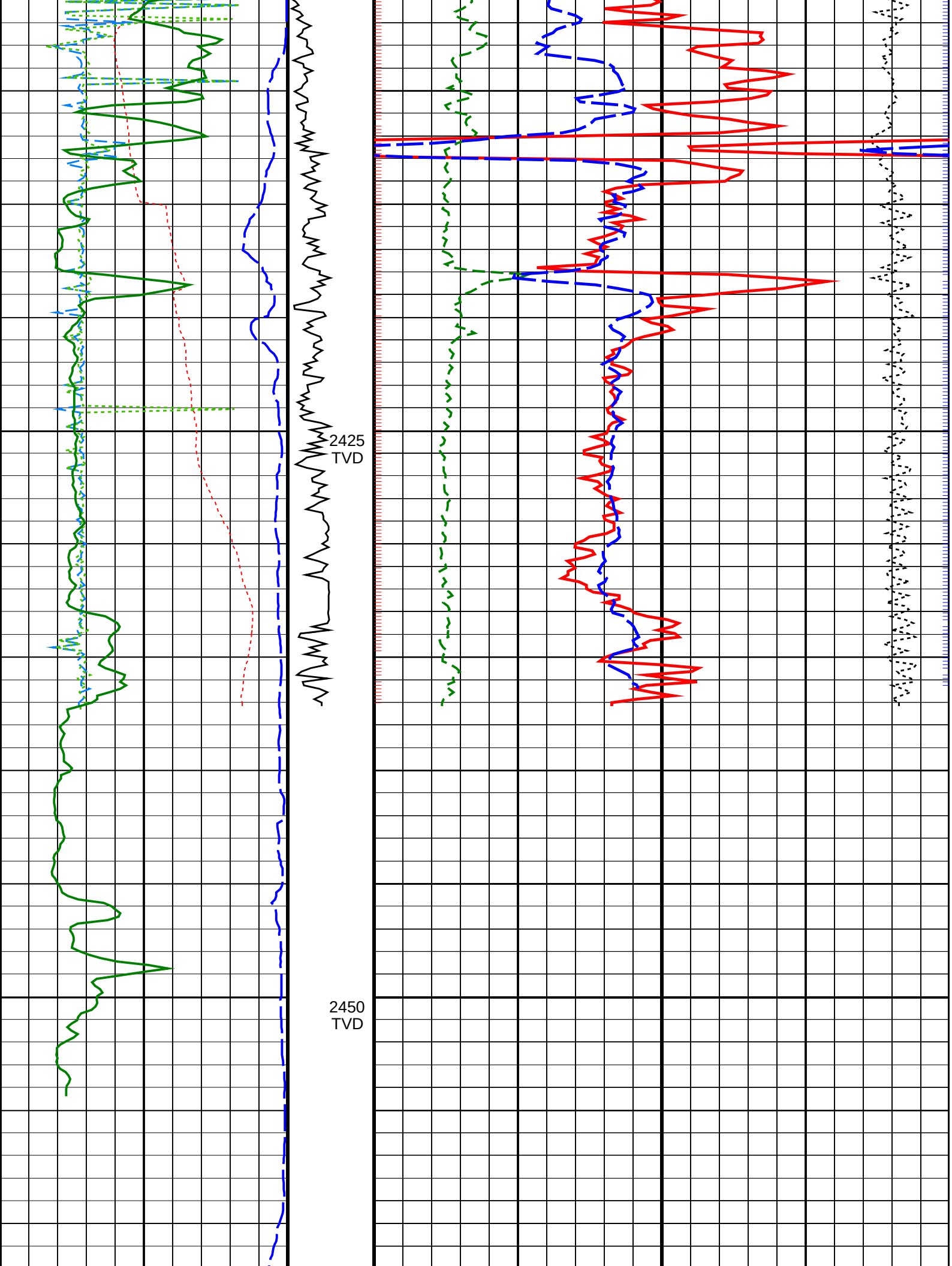
TVD
2375
TVD
2400
TVD


2425
TVD
2450
TVD

Density Time After Bit (TAB_DEN) 0 (HR) 10	ADN Rotational Speed (RPM_ADN) (RPM) 0 250	Photoelectric Factor, Bottom (PEB) 0 (–––– 10	Bulk Density Correction, Bottom (DRHB) –0.75 (G/C3) 0.25
Horizontal Hole Diameter (HORD) 6 (IN) 16		Bulk Density, Bottom (ROBB) 1.85 (G/C3) 2.85	
Vertical Hole Diameter (VERD) 6 (IN) 16		Thermal Neutron Porosity (TNPH) 45 (PU) –15	
RAB Gamma Ray (GR_RAB) 0 (GAPI) 200			
Rate of Penetration, Averaged over Last 5ft (ROP5_RM) 200 (M/HR) 0			

PIP SUMMARY

Neutron Samples

Density Samples

IDEAL Version: ID12_0C_09

IDF

RAB	**id11_0c_01**	**MWD_10**	**id11_0c_01**
ADN	**id11_0c_01**		

6.75–in. Azimuthal Density Neutron / Equipment Identification

Primary Equipment:

Tool Name and Serial Number	ADN6 – CA	435
Collar Type and Serial Number	ADDC – AA	1469
Chassis Type and Serial Number	ADSE – EA	435
Stabilizer Type and Serial Number	–	1
Neutron Logging Source	NSR – M	202
Density Logging Source	GSR – J/Z	1994
Stabilizer Size	8.25 – in.	
Calibration Status	Top Drive	

Master: 1–Mar–2007 1:59

6.75–in. Azimuthal Density Neutron Calibration

Density: Magnesium Block

Phase	LS window 3 – Mg CPS	Value	Phase	SS window 1 – Mg CPS	Value	Phase	SS window 3 – Mg CPS	Value
Master		1105	Master		2640	Master		6482
	250.0 (Minimum) 4125 (Nominal) 8000 (Maximum)			700.0 (Minimum) 9350 (Nominal) 18000 (Maximum)			2500 (Minimum) 23750 (Nominal) 45000 (Maximum)	

Master: 1–Mar–2007 1:59

6.75–in. Azimuthal Density Neutron Calibration

Density: Aluminum Block

Phase	LS window 3 – Al CPS	Value	Phase	SS window 1 – Al CPS	Value	Phase	SS window 3 – Al CPS	Value
Master		167.6	Master		1348	Master		4074
	50.00 (Minimum) 725.0 (Nominal) 1400 (Maximum)			500.0 (Minimum) 4250 (Nominal) 8000 (Maximum)			1500 (Minimum) 15750 (Nominal) 30000 (Maximum)	

Master: 1–Mar–2007 1:59

6.75–in. Azimuthal Density Neutron Calibration

Density: Background

Phase	LS window 3 – Background CPS	Value	Phase	SS window 1 – Background CPS	Value	Phase	SS window 3 – Background CPS	Value
Master		45.51	Master		130.3	Master		561.2
	15.00 (Minimum) 82.50 (Nominal) 150.0 (Maximum)			40.00 (Minimum) 220.0 (Nominal) 400.0 (Maximum)			150.0 (Minimum) 825.0 (Nominal) 1500 (Maximum)	

Master: 1–Mar–2007 1:59

6.75–in. Azimuthal Density Neutron Calibration

Density: Water Block Check

Phase	Long spacing water density G/C3	Value
Master		1.034
	1.030 (Minimum) 1.045 (Nominal) 1.060 (Maximum)	

Phase	Short spacing water density G/C3	Value
Master		1.131
	1.101 (Minimum) 1.131 (Nominal) 1.161 (Maximum)	

Master: 1−Mar−2007 1:59

6.75−in. Azimuthal Density Neutron Calibration

Neutron: 3−Point Calibration

Phase	Far 1 tube 1 Air Point Measure CPS	Value
Master		21.47
	13.30 (Minimum) 19.05 (Nominal) 24.70 (Maximum)	

Phase	Far 1 tube 1 Rod Point Measure CPS	Value
Master		5.317
	3.400 (Minimum) 4.857 (Nominal) 6.200 (Maximum)	

Phase	Far 1 tube 1 H2O Point Measure CPS	Value
Master		2.551
	1.600 (Minimum) 2.363 (Nominal) 3.100 (Maximum)	

Phase	Far 1 tube 2 Air Point Measure CPS	Value
Master		23.35
	13.30 (Minimum) 19.05 (Nominal) 24.70 (Maximum)	

Phase	Far 1 tube 2 Rod Point Measure CPS	Value
Master		5.477
	3.400 (Minimum) 4.857 (Nominal) 6.200 (Maximum)	

Phase	Far 1 tube 2 H2O Point Measure CPS	Value
Master		2.654
	1.600 (Minimum) 2.363 (Nominal) 3.100 (Maximum)	

Phase	Far 1 tube 3 Air Point Measure CPS	Value
Master		21.97
	13.30 (Minimum) 19.05 (Nominal) 24.70 (Maximum)	

Phase	Far 1 tube 3 Rod Point Measure CPS	Value
Master		5.618
	3.400 (Minimum) 4.857 (Nominal) 6.200 (Maximum)	

Phase	Far 1 tube 3 H2O Point Measure CPS	Value
Master		2.643
	1.600 (Minimum) 2.363 (Nominal) 3.100 (Maximum)	

Phase	Far 2 tube 1 Air Point Measure CPS	Value
Master		20.80
	13.30 (Minimum) 19.05 (Nominal) 24.70 (Maximum)	

Phase	Far 2 tube 1 Rod Point Measure CPS	Value
Master		5.324
	3.400 (Minimum) 4.857 (Nominal) 6.200 (Maximum)	

Phase	Far 2 tube 1 H2O Point Measure CPS	Value
Master		2.410
	1.600 (Minimum) 2.363 (Nominal) 3.100 (Maximum)	

Phase	Far 2 tube 2 Air Point Measure CPS	Value
Master		21.57
	13.30 (Minimum) 19.05 (Nominal) 24.70 (Maximum)	

Phase	Far 2 tube 2 Rod Point Measure CPS	Value
Master		5.248
	3.400 (Minimum) 4.857 (Nominal) 6.200 (Maximum)	

Phase	Far 2 tube 2 H2O Point Measure CPS	Value
Master		2.501
	1.600 (Minimum) 2.363 (Nominal) 3.100 (Maximum)	

Phase	Far 2 tube 3 Air Point Measure CPS	Value
Master		20.94
	13.30 (Minimum) 19.05 (Nominal) 24.70 (Maximum)	

Phase	Far 2 tube 3 Rod Point Measure CPS	Value
Master		5.190
	3.400 (Minimum) 4.857 (Nominal) 6.200 (Maximum)	

Phase	Far 2 tube 3 H2O Point Measure CPS	Value
Master		2.496
	1.600 (Minimum) 2.363 (Nominal) 3.100 (Maximum)	

Phase	Near 1 tube 1 Air Point Measure CPS	Value
Master		537.6
	345.0 (Minimum) 487.5 (Nominal) 595.0 (Maximum)	

Phase	Near 1 tube 1 Rod Point Measure CPS	Value
Master		836.6
	535.0 (Minimum) 768.8 (Nominal) 925.0 (Maximum)	

Phase	Near 1 tube 1 H2O Point Measure CPS	Value
Master		370.6
	230.0 (Minimum) 343.7 (Nominal) 430.0 (Maximum)	

Phase	Near 2 tube 1 Air Point Measure CPS	Value
Master		540.3
	345.0 (Minimum) 487.5 (Nominal) 595.0 (Maximum)	

Phase	Near 2 tube 1 Rod Point Measure CPS	Value
Master		852.5
	535.0 (Minimum) 768.8 (Nominal) 925.0 (Maximum)	

Phase	Near 2 tube 1 H2O Point Measure CPS	Value
Master		386.8
	230.0 (Minimum) 343.7 (Nominal) 430.0 (Maximum)	

Master: 1−Mar−2007 1:59

6.75−in. Azimuthal Density Neutron Calibration

Neutron: Water Block Check

Phase	Far Neutron water porosity PU	Value
Master		98.10
	90.00 (Minimum) 100.0 (Nominal) 125.0 (Maximum)	

6.75−in. Resistivity At−the−Bit / Equipment Identification

Primary Equipment:

Tool Name and Serial Number	RAB6 − CA	223
Calibration Status	AUTO −	

Master: 19−Apr−2007 14:05

6.75−in. Resistivity At−the−Bit Calibration

Resistivity: Fixture

Phase	Ring/T1 factor ----	Value	Phase	Ring/T2 factor ----	Value	Phase	M0/T1 factor ----	Value
Master	0.9961		Master	0.9977		Master	0.9891	
0.9750 (Minimum)	1.000 (Nominal)	1.025 (Maximum)	0.9750 (Minimum)	1.000 (Nominal)	1.025 (Maximum)	0.9750 (Minimum)	1.000 (Nominal)	1.025 (Maximum)

Phase	M0/T2 factor ----	Value	Phase	M2/T1 factor ----	Value	Phase	M2/T2 factor ----	Value
Master	0.9900		Master	0.9903		Master	0.9916	
0.9750 (Minimum)	1.000 (Nominal)	1.025 (Maximum)	0.9750 (Minimum)	1.000 (Nominal)	1.025 (Maximum)	0.9750 (Minimum)	1.000 (Nominal)	1.025 (Maximum)

Phase	BTN shallow/T1 factor ----	Value	Phase	BTN shallow/T2 factor ----	Value	Phase	BTN medium/T1 factor ----	Value
Master	0.9966		Master	0.9976		Master	0.9956	
0.9750 (Minimum)	1.000 (Nominal)	1.025 (Maximum)	0.9750 (Minimum)	1.000 (Nominal)	1.025 (Maximum)	0.9750 (Minimum)	1.000 (Nominal)	1.025 (Maximum)

Phase	BTN medium/T2 factor ----	Value	Phase	BTN deep/T1 factor ----	Value	Phase	BTN deep/T2 factor ----	Value
Master	0.9965		Master	0.9992		Master	1.000	
0.9750 (Minimum)	1.000 (Nominal)	1.025 (Maximum)	0.9750 (Minimum)	1.000 (Nominal)	1.025 (Maximum)	0.9750 (Minimum)	1.000 (Nominal)	1.025 (Maximum)

Master: Calibration date not found

6.75−in. Resistivity At−the−Bit Calibration

Gamma Ray: Blanket

Phase	Gamma ray factor ----	Value
Master		1.055
0.7500 (Minimum)	1.000 (Nominal)	1.250 (Maximum)

SCHLUMBERGER

Survey report 9-May-2007 00:09:33 Page 1 of 4

Client.....: ESSO Australia Pty. Ltd.
Field.....: Halibut

Well.....: HLA A5B
API number.....: N/A
Engineer.....: R. Borjas/B. Pattarakorn

RIG:.....: ISDL 453
STATE:.....: Victoria

----- Survey calculation methods-----
Method for positions.....: Minimum curvature
Method for DLS.....: Mason & Taylor

----- Depth reference -----
Permanent datum.....: Mean Sea level
Depth reference.....: Driller's Depth
GL above permanent.....: -73.46 m
KB above permanent.....: 29.45 m
DF above permanent.....: 29.45 m

----- Vertical section origin-----
Latitude (+N/S-).....: -4.33 m
Departure (+E/W-).....: 5.59 m

Azimuth from Vsect Origin to target: 351.32 degrees

Spud date.....: 25-April-2007
Last survey date.....: 08-May-07
Total accepted surveys...: 83
MD of first survey.....: 548.00 m
MD of last survey.....: 3004.00 m

----- Geomagnetic data -----
Magnetic model.....: BGGM version 2006
Magnetic date.....: 23-Apr-2007
Magnetic field strength..: 1199.17 HCNT
Magnetic dec (+E/W-).....: 13.23 degrees
Magnetic dip.....: -68.86 degrees

----- MWD survey Reference Criteria -----
Reference G.....: 1000.04 mGal
Reference H.....: 1199.17 HCNT
Reference Dip.....: -68.86 degrees
Tolerance of G.....: (+/-) 2.50 mGal
Tolerance of H.....: (+/-) 6.00 HCNT
Tolerance of Dip.....: (+/-) 0.45 degrees

----- Corrections -----
Magnetic dec (+E/W-).....: 13.23 degrees
Grid convergence (+E/W-).: -0.82 degrees
Total az corr (+E/W-)....: 14.05 degrees
(Total az corr = magnetic dec - grid conv)
Survey Correction Type ...:
I=Sag Corrected Inclination
M=Schlumberger Magnetic Correction
S=Shell Magnetic Correction
F=Failed Axis Correction
R=Magnetic Resonance Tool Correction
D=Dmag Magnetic Correction

Seq #	Measured depth (m)	Incl angle (deg)	Azimuth angle (deg)	Course length (m)	TVD depth (m)	Vertical section (m)	Displ +N/S- (m)	Displ +E/W- (m)	Total displ (m)	At Azim (deg)	DLS (deg/ 10m)	Srvy tool type	Tool Corr (deg)
1	548.00	8.75	195.17	0.00	547.38	-13.00	-17.79	3.56	18.14	168.68	0.00	TIP	None
2	651.70	7.93	306.64	103.70	650.48	-15.14	-21.15	-4.28	21.58	191.44	1.33	MWD	None
3	680.35	8.05	339.26	28.65	678.86	-11.77	-18.09	-6.58	19.25	199.98	1.56	MWD	None
4	709.93	11.77	358.35	29.58	708.01	-6.75	-13.14	-7.40	15.08	209.39	1.66	MWD	None
5	738.63	17.15	359.20	28.70	735.79	0.36	-5.97	-7.54	9.62	231.62	1.88	MWD	None
6	768.09	20.23	353.89	29.46	763.69	9.75	3.44	-8.15	8.84	292.87	1.19	MWD	None
7	797.35	21.80	347.64	29.26	791.01	20.23	13.77	-9.85	16.93	324.44	0.93	MWD	None

Seq #	Measured depth (m)	Incl angle (deg)	Azimuth angle (deg)	Course length (m)	TVD depth (m)	Vertical section (m)	Displ +N/S- (m)	Displ +E/W- (m)	Total displ (m)	At Azim (deg)	DLS (deg/ 10m)	Srvy tool type	Tool Corr (deg)
8	826.60	25.20	345.64	29.25	817.83	31.85	25.12	-12.56	28.08	333.44	1.19	MWD	None
9	855.72	29.34	347.65	29.12	843.71	45.14	38.10	-15.62	41.18	337.71	1.46	MWD	None
10	885.13	33.49	350.64	29.41	868.80	60.45	53.15	-18.48	56.27	340.82	1.51	MWD	None
11	914.28	37.33	351.99	29.15	892.56	77.34	69.84	-21.02	72.94	343.25	1.34	MWD	None
12	943.48	40.84	352.19	29.20	915.22	95.75	88.08	-23.56	91.17	345.03	1.20	MWD	None
13	972.57	40.38	351.68	29.09	937.30	114.68	106.82	-26.21	109.99	346.21	0.20	MWD	None
14	1001.73	41.31	351.44	29.16	959.36	133.75	125.69	-29.01	128.99	347.00	0.32	MWD	None
15	1031.06	41.73	351.38	29.33	981.32	153.19	144.91	-31.91	148.38	347.58	0.14	MWD	None
16	1059.93	41.08	351.40	28.87	1002.97	172.29	163.79	-34.77	167.44	348.01	0.23	MWD	None
17	1089.24	41.93	351.64	29.31	1024.92	191.71	183.00	-37.64	186.83	348.38	0.30	MWD	None
18	1118.59	42.38	351.44	29.35	1046.68	211.41	202.48	-40.54	206.50	348.68	0.16	MWD	None
19	1147.69	42.10	351.25	29.10	1068.23	230.97	221.82	-43.48	226.04	348.91	0.11	MWD	None
20	1177.02	41.90	351.99	29.33	1090.02	250.59	241.24	-46.34	245.65	349.13	0.18	MWD	None
21	1206.23	41.78	351.05	29.21	1111.78	270.08	260.51	-49.21	265.12	349.30	0.22	MWD	None
22	1235.35	41.41	350.63	29.12	1133.56	289.41	279.60	-52.29	284.44	349.41	0.16	MWD	None
23	1264.67	41.90	351.67	29.32	1155.47	308.89	298.85	-55.29	303.92	349.52	0.29	MWD	None
24	1293.84	41.73	351.34	29.17	1177.21	328.34	318.08	-58.16	323.36	349.64	0.10	MWD	None
25	1323.03	42.11	352.14	29.19	1198.93	347.84	337.38	-60.96	342.85	349.76	0.22	MWD	None
26	1352.02	41.79	352.53	28.99	1220.49	367.22	356.59	-63.55	362.21	349.90	0.14	MWD	None
27	1381.54	41.15	353.05	29.52	1242.61	386.76	375.98	-66.00	381.73	350.04	0.25	MWD	None
28	1410.60	42.02	353.24	29.06	1264.35	406.04	395.13	-68.30	400.99	350.19	0.30	MWD	None
29	1439.58	41.62	353.34	28.98	1285.94	425.35	414.33	-70.56	420.29	350.34	0.14	MWD	None
30	1468.99	41.78	353.37	29.41	1307.90	444.90	433.76	-72.82	439.83	350.47	0.05	MWD	None

Seq #	Measured depth (m)	Incl angle (deg)	Azimuth angle (deg)	Course length (m)	TVD depth (m)	Vertical section (m)	Displ +N/S- (m)	Displ +E/W- (m)	Total displ (m)	At Azim (deg)	DLS (deg/ 10m)	Srvy tool type	Tool Corr (deg)
31	1498.23	42.02	352.84	29.24	1329.66	464.42	453.14	-75.17	459.34	350.58	0.15	MWD	None
32	1527.49	42.06	351.80	29.26	1351.40	484.01	472.56	-77.79	478.92	350.65	0.24	MWD	None
33	1556.47	41.64	351.89	28.98	1372.98	503.35	491.70	-80.53	498.25	350.70	0.15	MWD	None
34	1586.04	41.90	351.25	29.57	1395.04	523.04	511.19	-83.42	517.95	350.73	0.17	MWD	None
35	1614.92	41.43	351.18	28.88	1416.61	542.24	530.16	-86.35	537.15	350.75	0.16	MWD	None
36	1644.13	42.18	351.82	29.21	1438.39	561.71	549.42	-89.23	556.61	350.78	0.30	MWD	None
37	1673.24	42.04	351.55	29.11	1459.98	581.23	568.73	-92.05	576.13	350.81	0.08	MWD	None
38	1702.36	41.72	352.02	29.12	1481.66	600.67	587.97	-94.83	595.57	350.84	0.15	MWD	None
39	1731.55	41.17	352.37	29.19	1503.54	619.99	607.11	-97.45	614.88	350.88	0.20	MWD	None
40	1760.90	41.62	351.78	29.35	1525.56	639.40	626.33	-100.13	634.29	350.92	0.20	MWD	None
41	1789.87	41.78	352.23	28.97	1547.19	658.67	645.42	-102.81	653.56	350.95	0.12	MWD	None
42	1819.29	41.61	352.45	29.42	1569.16	678.23	664.81	-105.42	673.12	350.99	0.08	MWD	None
43	1848.21	41.08	352.86	28.92	1590.87	697.33	683.76	-107.86	692.22	351.04	0.21	MWD	None
44	**1877.70**	**41.39**	**351.79**	**29.49**	**1613.05**	**716.77**	**703.02**	**-110.46**	**711.65**	**351.07**	**0.26**	**MWD**	**None**
45	**1906.85**	**41.76**	**351.61**	**29.15**	**1634.85**	**736.11**	**722.17**	**-113.25**	**730.99**	**351.09**	**0.13**	**MWD**	**None**
46	1935.97	41.58	351.78	29.12	1656.60	755.47	741.32	-116.04	750.35	351.10	0.07	MWD	None
47	1965.34	40.91	352.22	29.37	1678.69	774.83	760.50	-118.74	769.71	351.13	0.25	MWD	None
48	1994.29	41.54	352.19	28.95	1700.46	793.91	779.40	-121.33	788.79	351.15	0.22	MWD	None
49	2023.49	42.02	351.60	29.20	1722.24	813.36	798.66	-124.07	808.24	351.17	0.21	MWD	None
50	2052.61	41.57	351.98	29.12	1743.95	832.77	817.87	-126.84	827.65	351.18	0.18	MWD	None
51	2081.95	41.81	352.14	29.34	1765.86	852.28	837.20	-129.54	847.16	351.20	0.09	MWD	None
52	2111.16	41.38	352.09	29.21	1787.70	871.67	856.40	-132.20	866.55	351.22	0.15	MWD	None
53	2140.02	41.84	352.03	28.86	1809.28	890.83	875.38	-134.85	885.71	351.24	0.16	MWD	None
54	2169.57	41.34	351.75	29.55	1831.38	910.45	894.80	-137.61	905.32	351.26	0.18	MWD	None
55	2198.71	41.48	351.23	29.14	1853.23	929.72	913.87	-140.47	924.60	351.26	0.13	MWD	None
56	2227.83	41.17	351.03	29.12	1875.10	948.95	932.86	-143.43	943.83	351.26	0.12	MWD	None
57	2257.05	41.35	350.94	29.22	1897.07	968.22	951.90	-146.45	963.10	351.25	0.06	MWD	None
58	2286.21	41.33	351.01	29.16	1918.96	987.48	970.92	-149.47	982.36	351.25	0.02	MWD	None
59	2315.40	41.55	352.01	29.19	1940.84	1006.80	990.03	-152.32	1001.67	351.25	0.24	MWD	None
60	2344.68	41.66	352.76	29.28	1962.74	1026.24	1009.30	-154.90	1021.11	351.27	0.17	MWD	None

Seq #	Measured depth (m)	Incl angle (deg)	Azimuth angle (deg)	Course length (m)	TVD depth (m)	Vertical section (m)	Displ +N/S- (m)	Displ +E/W- (m)	Total displ (m)	At Azim (deg)	DLS (deg/ 10m)	Srvy tool type	Tool Corr (deg)
61	2373.83	41.90	353.18	29.15	1984.48	1045.65	1028.57	-157.28	1040.53	351.31	0.13	MWD	None
62	2403.04	42.18	353.28	29.21	2006.17	1065.20	1047.99	-159.58	1060.08	351.34	0.10	MWD	None
63	2432.37	41.77	353.27	29.33	2027.97	1084.80	1067.48	-161.88	1079.68	351.38	0.14	MWD	None
64	2461.47	41.96	352.77	29.10	2049.65	1104.22	1086.75	-164.24	1099.09	351.41	0.13	MWD	None
65	2490.75	41.60	352.63	29.28	2071.48	1123.72	1106.10	-166.72	1118.60	351.43	0.13	MWD	None
66	2519.73	41.70	352.30	28.98	2093.13	1142.97	1125.20	-169.24	1137.85	351.45	0.08	MWD	None
67	2549.00	40.97	352.26	29.27	2115.11	1162.30	1144.35	-171.84	1157.18	351.46	0.25	MWD	None
68	2578.41	41.17	352.18	29.41	2137.28	1181.62	1163.50	-174.46	1176.50	351.47	0.07	MWD	None
69	2606.81	41.60	351.94	28.40	2158.59	1200.40	1182.09	-177.05	1195.28	351.48	0.16	MWD	None
70	2635.81	40.53	351.69	29.00	2180.46	1219.45	1200.95	-179.76	1214.33	351.49	0.37	MWD	None
71	2662.49	40.46	352.00	26.68	2200.75	1236.77	1218.10	-182.22	1231.65	351.49	0.08	MWD	None
72	2692.17	39.95	352.08	29.68	2223.41	1255.93	1237.07	-184.87	1250.81	351.50	0.17	MWD	None
73	2723.76	39.43	352.12	31.59	2247.72	1276.10	1257.06	-187.64	1270.98	351.51	0.16	MWD	None
74	2752.53	39.45	352.15	28.77	2269.94	1294.38	1275.16	-190.15	1289.26	351.52	0.01	MWD	None
75	2781.34	39.49	352.41	28.81	2292.18	1312.69	1293.31	-192.61	1307.57	351.53	0.06	MWD	None
76	2811.42	39.19	352.09	30.08	2315.45	1331.75	1312.20	-195.18	1326.64	351.54	0.12	MWD	None
77	2840.55	39.35	352.30	29.13	2338.00	1350.19	1330.47	-197.68	1345.08	351.55	0.07	MWD	None
78	2868.98	40.12	352.26	28.43	2359.86	1368.36	1348.48	-200.12	1363.25	351.56	0.27	MWD	None
79	2898.20	39.96	351.99	29.22	2382.23	1387.16	1367.10	-202.70	1382.04	351.57	0.08	MWD	None
80	2926.43	39.87	352.13	28.23	2403.88	1405.27	1385.04	-205.20	1400.16	351.57	0.05	MWD	None

81	2956.44	39.81	351.79	30.01	2426.93	1424.49	1404.08	-207.89	1419.38	351.58	0.08	MWD	None
82	2984.55	40.07	351.65	28.11	2448.48	1442.54	1421.93	-210.49	1437.43	351.58	0.10	MWD	None
83	3004.00	40.20	351.60	19.45	2463.35	1455.07	1434.34	-212.31	1449.97	351.58	0.07	Proj. to TD	

Company: **ESSO Australia Pty. Ltd.**

Schlumberger

Well: **HLA A5B**

Field: **Halibut**

Rig: **ISDL 453**

State: **Victoria**

GeoVISION Density−Neutron

Top Drive

Recorded Mode Log