

# **WELL COMPLETION REPORT**

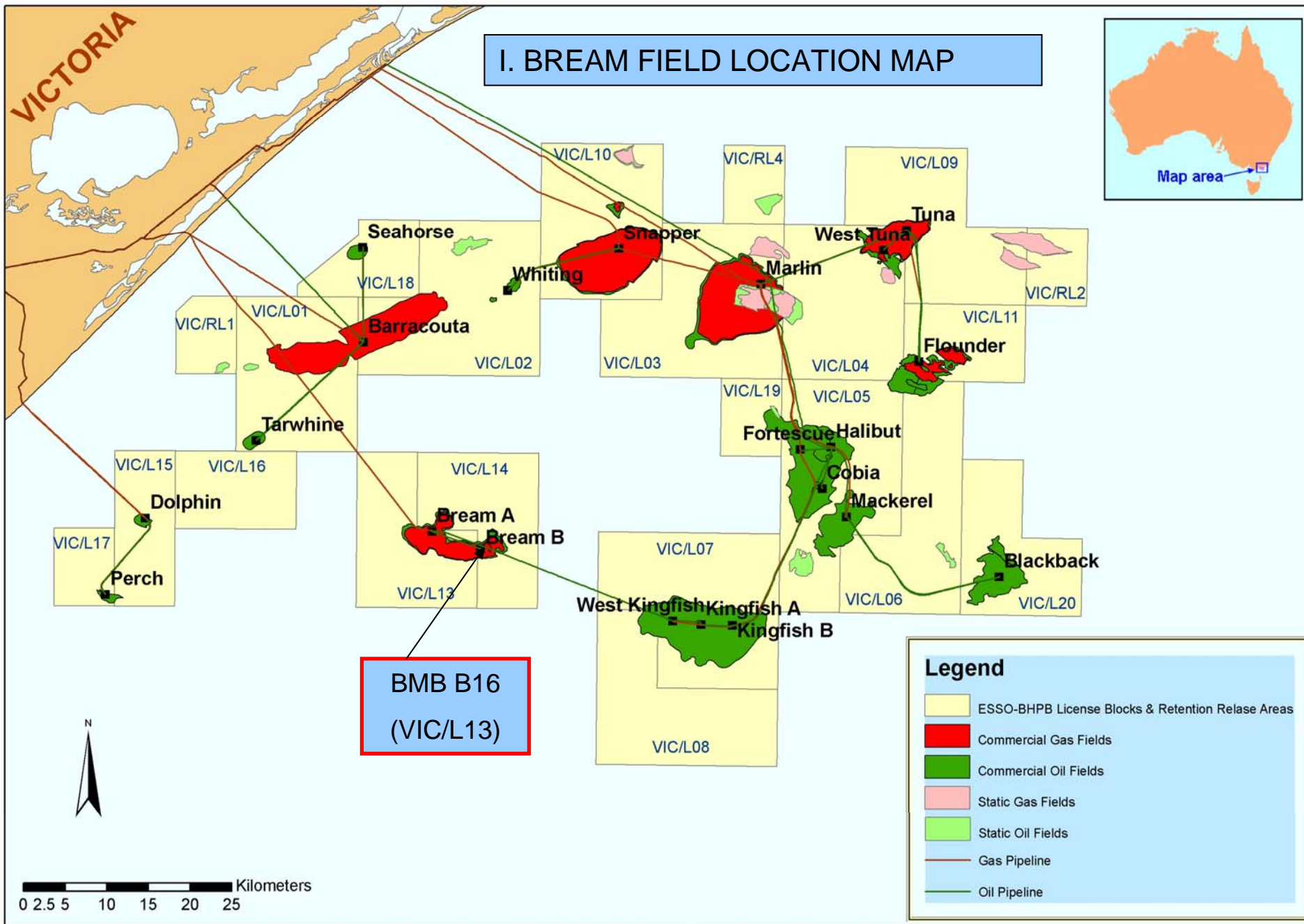
**BREAM B16**

**GIPPSLAND BASIN, VICTORIA**

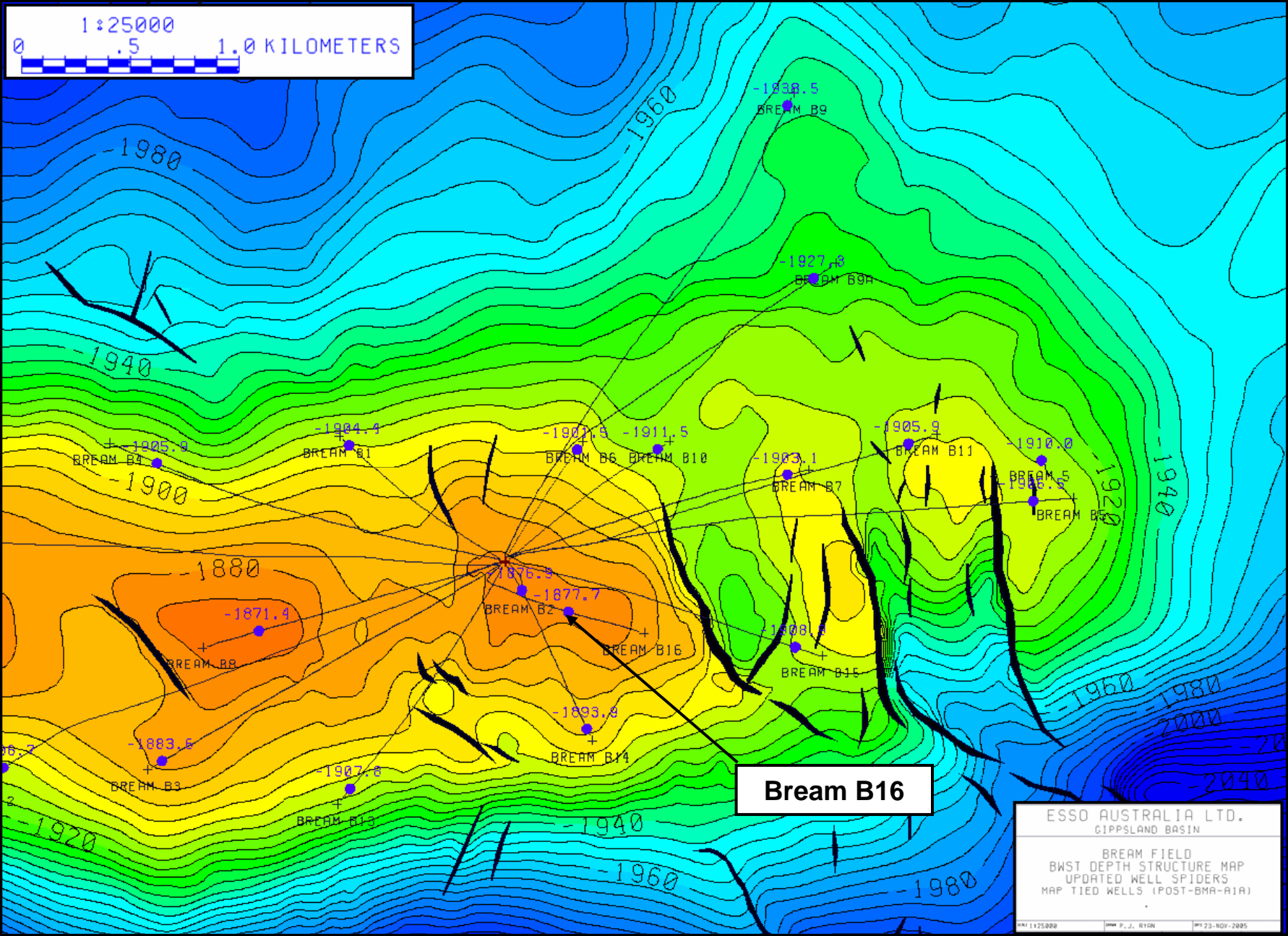
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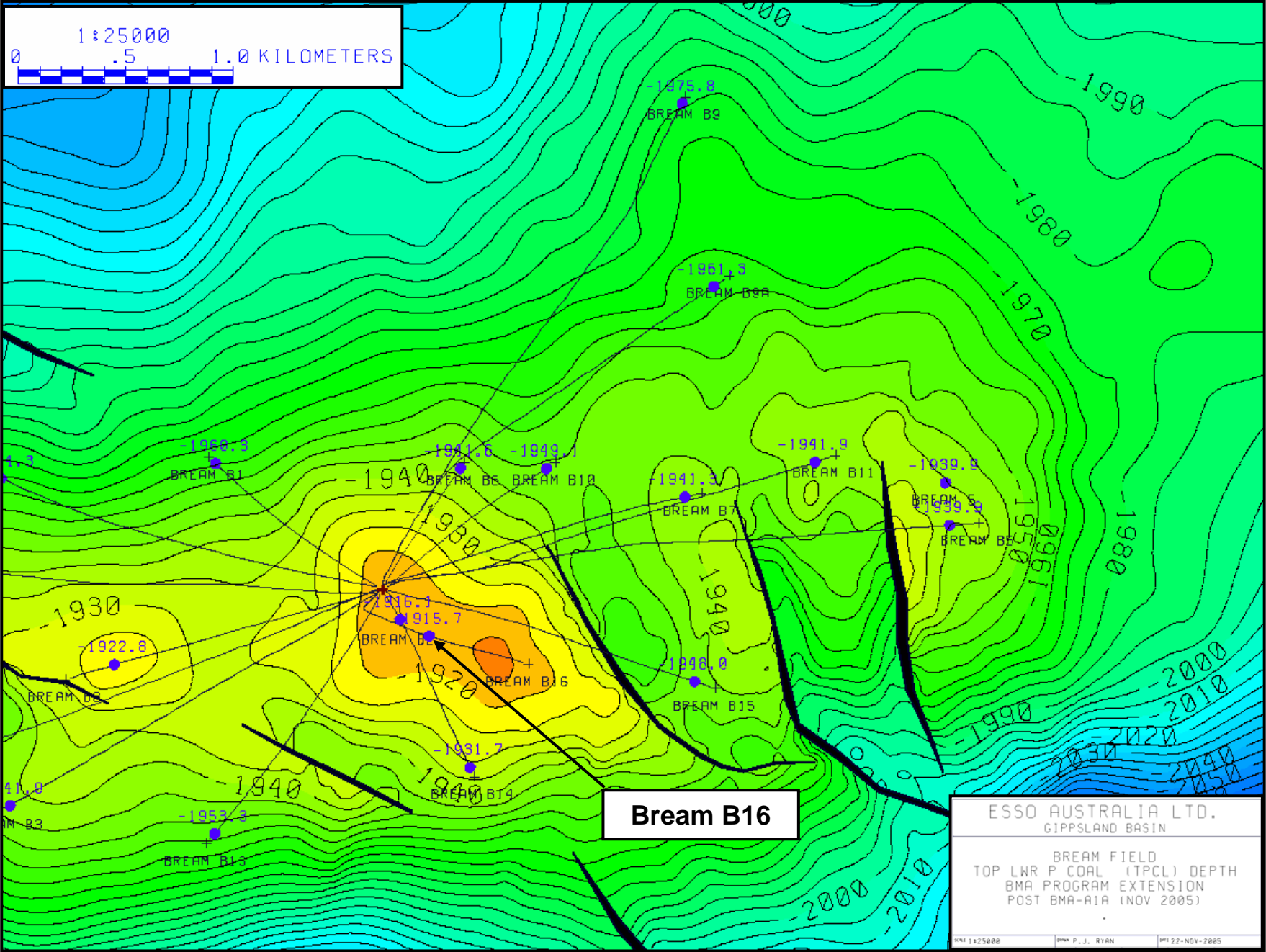
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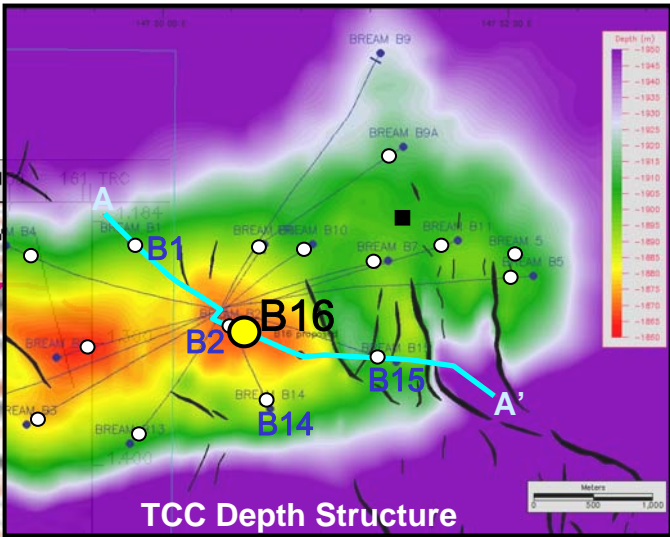
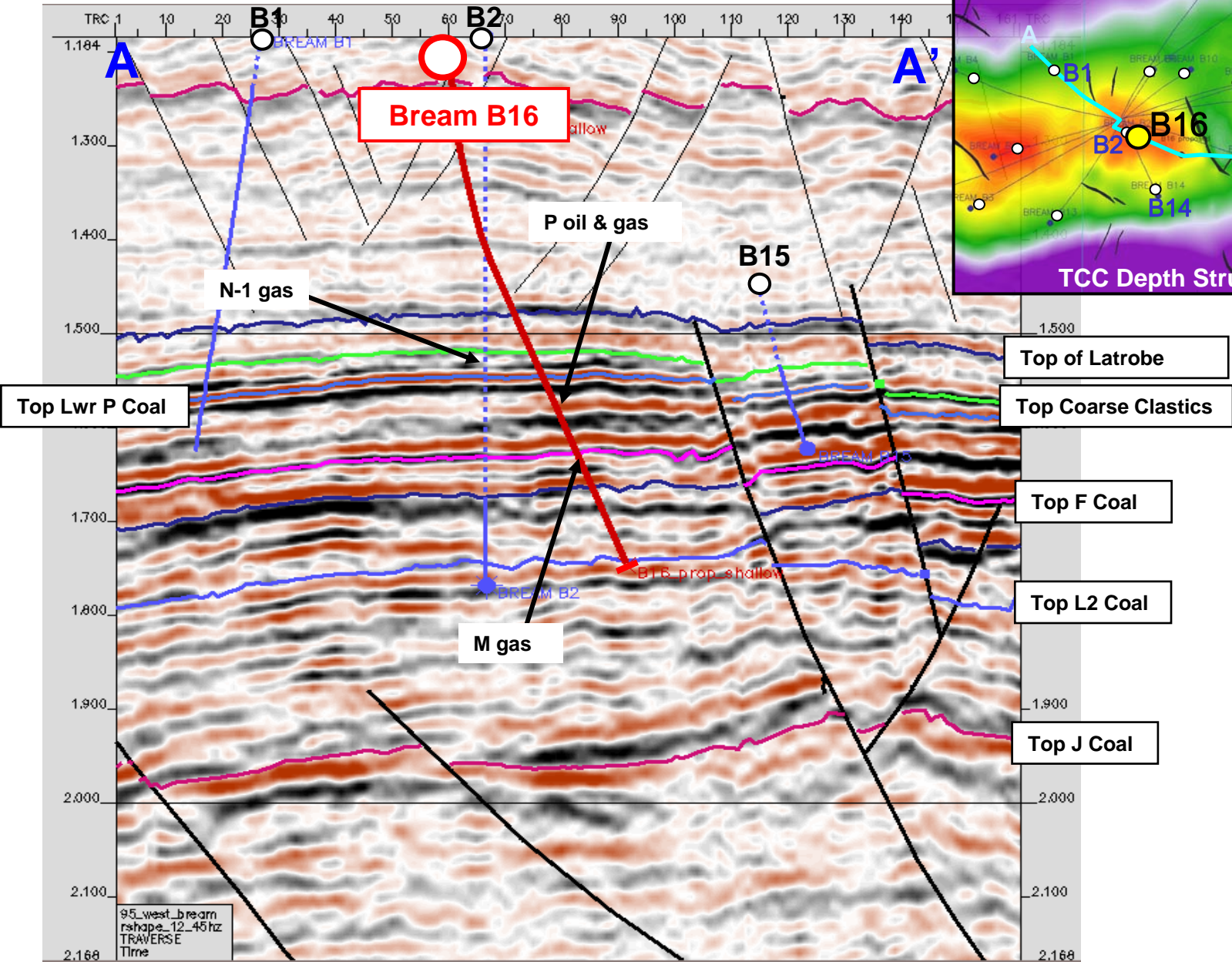
Bream Top N-1 (Base Waste) Reservoir Depth Structure Map



Bream Top P Coal Depth Structure Map



Bream B16 Seismic Profile



## II. WELL DATA RECORD (cont.)

### LOCATION

<b>Field</b>	<b>BREAM</b>	<b>Conductor #16 Surface Coordinates</b>	
<b>Well Name</b>	<b>B16 (Loc Y)</b>	(GDA94 ) X	573,164.7033mE
<b>Conductor Number</b>	Slot 16	(MGA94) Y	5,736,350.0138mN
<b>State</b>	Victoria	Latitude	38° 31' 5.628000"S
<b>Permit/Licence</b>	Vic/L13	Longitude	147° 50' 21.372000"E
<b>Geological Basin</b>	Gippsland		
<b>TCC</b>	1992.0 MDRT	<b>Perforations</b>	To be done at a later date
	1918.2m TVDRT	<b>Datum</b>	GDA94 (GRS80)
	573305.83 mE	<b>Projection</b>	MGA94/UTM Zone 55 (S)
	5,736,171.19 mN		
<b>Top M-6</b>	2510.6m MDRT		
	2219.5m TVDRT		
MGA94 X	573710.75 mE		
MGA94 Y	5,736,055.89 mN		

### ELEVATIONS & DEPTHS

<b>Water Depth</b>	61 m
<b>Top Wellhead to MSL</b>	26.17 m
<b>Main Deck Rel to MSL</b>	24.m
<b>RT Relative to MSL</b>	47.17 m
<b>Average Well Angle</b>	53.7° (tang)
<b>Total Depth</b>	2641.0 mMDRT
	2299.0 mTVDRT
<b>Plug Back Depth</b>	Not Plugged Back

### DATES

<b>Skid Rig</b>	06/07/2005
<b>Kicked Off</b>	30/07/2005
<b>Development Rig Days</b>	15.88
<b>NPT Days</b>	1.28
<b>Rig Released</b>	14/08/2005
<b>I.P. Established</b>	To be put on production in April 2006 following wireline perforation

### MISCELLANEOUS

<b>Operator</b>	Esso Australia Pty Ltd	<b>Contractor</b>	ENSCO International
<b>Esso Interest</b>	50%	<b>Rig Name</b>	ENSCO 102 (Keppel FELS Mod V "A" Class Jackup)
<b>Permittee/Licensee</b>	Esso/BHPP	<b>Equipment Type</b>	Platform
<b>Other Interest</b>	50% J.V. Interest	<b>Completion Type</b>	Single
<b>Overriding Royalty</b>	2.5%	<b>Completion Size</b>	3 ½ "
<b>Drilling AFE No.</b>	L0501F503		

### WELL CLASSIFICATION

<b>Before Drilling</b>	Oil Development	<b>After Drilling</b>	Cased and Suspended
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## II. WELL DATA RECORD (cont.)

### CASING RECORD

Type	Size (Inches)	Weight (lb/ft)	Grade	Thread	Depth (mMDRT)
Conductor	20"	129.33	X-56	Vetco	179.0
Surface	9 5/8"	47	L-80	VamTop	836.2
Production	7"	26	L-80	VamTop HC	2626.2

### CEMENTING RECORD

Casing details	Cement Type	Dry Cement Volume (sx)	Cement Additives	Mix Water (bbls)	Slurry Volume (bbls)	Slurry Density (ppg)	Cement to/from (mMDRT)	Casing Pressure Test (psi)
20"	Lead Class G	1057	NF-6: 0.25 gal  CaCl <sub>2</sub> : 1% BWOC	5.16	218	15.9	180-27.2	200
9 5/8"	Lead Class G	753	Econolite: 15gal  NF-6: 0.25gal	12.5	249	12.5	686-27.2	1500
	Tail Class G	267	NF-6: 0.25gal	5.27	56	15.8	836-686	-
7"	Lead Class G	586	Halad-413L: 30gal  CFR-3L: 3gal  SCR-100L: 0.5gal  NF-6: 0.25gal	4.37	118	15.8	2626.2-1700	2000

## II. WELL DATA RECORD (cont.)

### DRILLING PERFORMANCE

#### BMB B16 - Final Well Report

#### GENERAL

Platform:	Bream B	Rig:	Ensco 102	Reservoir:	N-1 Oil & Gas
Well:	B16	Well Slot:	#16	RT-MSL (Ensco 102)	47.24m
Drilling Complexity Index	3.9	Completion Complexity	2.1		

DEPTH		PERFORMANCE		MUD	
m MDRT	2,641.00	20" Cond. Hole	N/A	Max Wt (ppg)	9.85 (while drilling)
m TVDRT	2,299.0	12-1/4" Surf. Hole	393 m/day	Type (Surf. Hole)	SW / Bentonite
Vert. Section (m)	721.13	8-1/2" Prod. Hole	334 m/day	Type (Inter. Hole)	N/A
INCLINATION Max (deg) / Ave (deg)	Build & Hold 58.1 (2045mMD) / 53.7 (Tang)	6" Liner Hole	N/A	Type (Prod. Hole)	KCL/Polymer/Glycol WBM
		* Time to drill interval, incl's connections & NPT.		Type (Liner Hole)	N/A

Comments: Details of the conductor installation for the B16 can be found in the rig move well file. Surface Hole - 179m to 843mMD (664m drilled), Production Hole - 843m to 2,641mMDRT (1,798m drilled).

#### TIME ANALYSIS

Start Date:	29/7/2005, 0300hrs	Finish Date:	14/8/2005, 0000hrs		
Target Days:	14.6	Total Days:	15.88	% Over Target:	7.3%
AFE Days:	17.0	NPT Days:	1.28	% of Total Days:	8.1%
Supplementary AFE Days:	N/A				

#### COSTS (based on projected)

CCCCC (based on projected)

AFE No.:	L0501F503	Revisions:	N/A	\$ per m	A\$2.87k / metre (new hole)	
\$ per day:	A\$450k/day	\$ per day (excl. T + L) * Equipment, LWD/RSS & Reeves	A\$340k/day		A\$2.67k / metre*	
					* based on TD not new hole	
	Equipment	Materials	Contracts	Allocations	Contingency	Total
AFE (Original)	1,104,000	1,512,000	6,042,000	342,000	--	A\$9,000,000
AFE (Supp #1)	N/A	N/A	N/A	N/A	--	N/A
Projected	839,000	519,000	5,345,000	357,000	--	A\$7,060,000

#### CASING (all depths herein are based on Ensco 102 elevations: RT-MSL=47.24m)

	Size / Weight / Grade / Thread	m MDRT	m TVDRT	PIT (ppg)
Conductor Casing	20"	179	179	N/A
Surface Casing	9-5/8", 47ppf, L80, VamTop	836.2	833	12.8 (Jug)
Prod Casing	7", 26ppf, L80, VamTop HC	2626.2	2291	N/A
Prod Liner	N/A	N/A	N/A	N/A

Comments: Conductor casing installed under another AFE. Details of the conductor installation for the B16 can be found in the rig move well file.

#### COMPLETION

	Size / Weight / Grade / Thread	m MDRT	m TVDRT	Type
Completion	3.5" 9.2 ppf Vam Ace 13Cr80	1989.2	1917	Single

	Upper Interval [m MDRT]	Upper Interval [m TVDRT]	Lower Interval [mMDRT]	Lower Interval [mTVDRT]	Gun Type
Perforation Interval:	NA	NA	NA	NA	NA

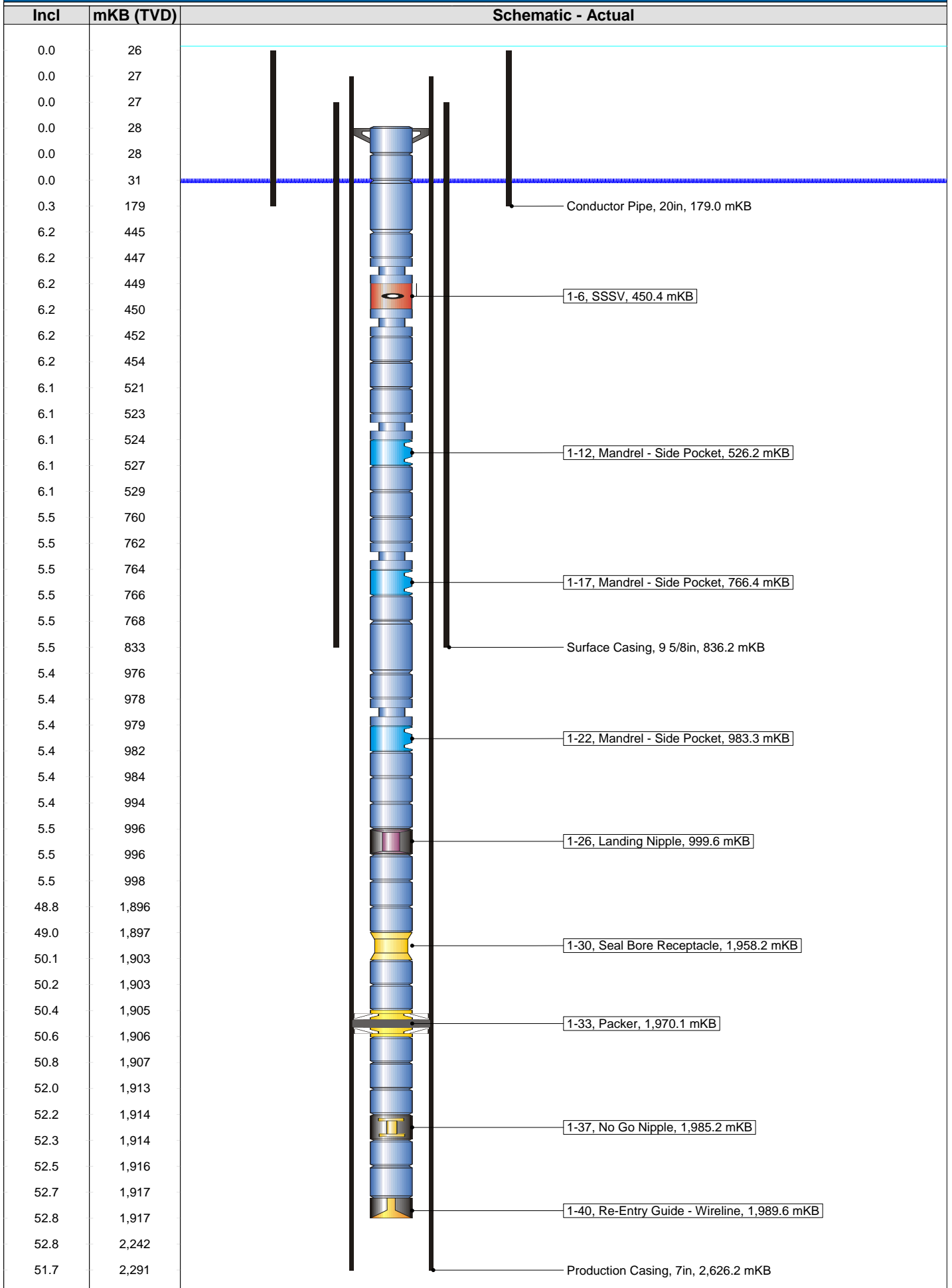
Comments: Perforations will be added with wireline at a later date.

#### ADDITIONAL

		Upper Interval [m MDRT]	Lower Interval [m MDRT]
Logs Run	LWD (GR-Res-Dens-Neut-Son-Cal)	843	2,641

Comments: The 8-1/2" hole interval was logged via LWD from the surface casing shoe to TD. Two failures of the LWD suite (ADN & GVR tool) occurred during the drilling of this well, with the GVR failure resulted in a trip to surface to change out the failed tool.

# Bream B16: Existing Schematic



## Bream B16: Existing Tubing String Summary

Tubing Description	Run Date	Run Job	Comment	Measured Depth (mKB)
Tubing - Production	12/08/2005	Drilling and Completion, 29/07/2005 03:00 - 14/08/2005 00:00	PU = 135 kips, SO = 125 kips w/ 85 kips block weight.	1,989.84

### Tubing Components

Item No.	Item Description	OD (in)	Wt (lbs/ft)	Grade	Top Thread	Jts	Make	Model	SN	Comments	Max OD (in)	Nom ID (in)	Len (m)	Top (mKB)
1-1	Tubing Hanger	3.500				1	Cameron	11" SSMC snapping			6.276	2.992	0.52	27.58
1-2	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	2					4.500	2.992	3.01	28.10
1-3	Tubing Joint(s)	3.500	9.20	13CR-80	VAM-ACE	43					4.500	2.992	415.43	31.11
1-4	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.97	446.54
1-5	Flow Coupling	3.500			VAM-ACE	1	Halliburton		811FN28711		4.020	2.880	1.87	448.50
1-6	SSSV	3.500			VAM-ACE	1	Halliburton	NE	781LXE27714-F	2.75" X profile	5.380	2.750	1.28	450.37
1-7	Flow Coupling	3.500			VAM-ACE	1	Halliburton				4.020	2.880	1.87	451.65
1-8	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.96	453.52
1-9	Tubing Joint(s)	3.500	9.20	13CR-80	VAM-ACE	7					4.500	2.992	66.87	455.48
1-10	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.97	522.35
1-11	Flow Coupling	3.500			VAM-ACE	1	Halliburton				4.020	2.880	1.87	524.32
1-12	Mandrel - Side Pocket	3.500			VAM-ACE	1	Wford	SPM18070...	SFO-2	1.5" Pocket	5.968	2.920	2.62	526.20
1-13	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.96	528.81
1-14	Tubing Joint(s)	3.500	9.20	13CR-80	VAM-ACE	24					4.500	2.992	231.90	530.78
1-15	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.98	762.68
1-16	Flow Coupling	3.500			VAM-ACE	1	Halliburton				4.020	2.880	1.75	764.65
1-17	Mandrel - Side Pocket	3.500			VAM-ACE	1	Wford	SPM110705B	SFO-2	1.5" Pocket	5.968	2.920	2.60	766.40
1-18	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.96	769.00
1-19	Tubing Joint(s)	3.500	9.20	13CR-80	VAM-ACE	22					4.500	2.992	208.53	770.96
1-20	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.97	979.49
1-21	Flow Coupling	3.500			VAM-ACE	1	Halliburton				4.020	2.880	1.88	981.47
1-22	Mandrel - Side Pocket	3.500			VAM-ACE	1	Wford	SPM10805A	SFO-2	1.5" Pocket	5.968	2.920	2.60	983.35
1-23	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.97	985.95
1-24	Tubing Joint(s)	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	9.67	987.92
1-25	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.98	997.59
1-26	Landing Nipple	3.500			VAM-ACE	1	Halliburton	X	811X27525-C	2.75" X profile	3.920	2.750	0.45	999.56
1-27	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.98	1,000.02
1-28	Tubing Joint(s)	3.500	9.20	13CR-80	VAM-ACE	99					4.500	2.992	954.20	1,002.00
1-29	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.97	1,956.20
1-30	Seal Bore Receptacle	3.500			VAM-ACE	1	Halliburton	PBR	812PBA70404...	PBR seal unit	5.870	2.880	9.27	1,958.16
1-31	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	0.67	1,967.44
1-32	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1		pip tag 1968.1			4.500	2.992	1.97	1,968.11
1-33	Packer	3.500	26.00		VAM-ACE	1	Halliburton	7" AHC	812AHC71291...	26 - 29#	6.151	2.954	1.56	1,970.07
1-34	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.95	1,971.63
1-35	Tubing Joint(s)	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	9.66	1,973.59
1-36	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.95	1,983.25
1-37	No Go Nipple	3.500			VAM-ACE	1	Halliburton	XN	811XN27517	2.750" XN Profile, 2.635" NoGo	3.920	2.635	0.51	1,985.20
1-38	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.97	1,985.70
1-39	Tubing Pup Joint	3.500	9.20	13CR-80	VAM-ACE	1					4.500	2.992	1.98	1,987.67
1-40	Re-Entry Guide - Wireline	3.500			VAM-ACE	1			812G40021		3.910	2.867	0.20	1,989.64

### III. SAMPLES

#### CUTTINGS

The cuttings sampling programme for BREAM B16 are detailed in the following table:

Interval (mMDRT)	Formation	Sampling Interval/Details
Surface Casing to 150m above Top of Latrobe (TOL)  181 m - 1750 mMDRT	Gippsland Limestone & Lakes Entrance Group	30 m interval  Spot samples only
150 m above TOL to Top of Latrobe (TOL)  1750 m – 1900 mMDRT	Lakes Entrance Formation	10 m interval  Three sets of washed and oven dried cuttings.
TOL to Total Depth (TD)  1900 m – 2641 mMDRT (TD)	Latrobe Group	5 m interval (10 m intervals at high ROP)  Three sets of washed and oven dried cuttings.

Note: It was not possible to collect 5m samples from the Top Latrobe Group to 2641 mMDRT (TD) as designated in the Well Program due to fast ROP. In addition, the volume of cuttings over the shaker was often insufficient to enable enough material to be collected to bag over a 5m interval. As a consequence 10m samples were taken throughout the Latrobe Group section apart from a few intervals of slow drilling where 5m samples were caught.

Intervals over which 5m samples were collected were: 1900-1920m, 2240-2250m, and 2410-2420m MDRT.

Detailed cuttings descriptions for the interval 843 to 2641 mMDRT (TD) are contained in Appendix 3a.

#### CONVENTIONAL CORING

No conventional cores were cut in BREAM B16.

#### SIDEWALL CORING

No sidewall core samples were shot in BREAM B16.

#### IV. LOGS AND SURVEYS

<b>Survey/Log</b>	<b>Company</b>	<b>Top (m MDRT)</b>	<b>Bottom (m MDRT)</b>
MWD Powerpulse (Directional)	Schlumberger/Anadrill	107.5	2623.93
MWD ARC (GR/Resistivity)	Schlumberger/Anadril	843.0	2641.0
MWD ADN6 (Density/Neutron)	Schlumberger/Anadrill	843.0	2641.0
MWD ISONIC (Sonic)	Schlumberger/Anadrill	843.0	2641.0

## V. FORMATION RESERVOIR TOPS- BREAM B16

Zone	m TVDSS			m MDRT	m TVD Gross HC Column	
	Predicted	Actual	Diff.		Predicted	Actual
Lakes Entrance	1170.0	1133.4	-35.9	1186.0	-	-
Top of Latrobe	1809.6	1810.1	0.5	1903.0	-	-
TCC	1868.0	1870.8	2.8	1992.0	-	7.9m gas
Top N-1 (BWST)	-	1877.7	-	2005.0	31m gas	29.5m gas
CBF1	-	1879.4	-	2007.9	-	-
CBSB	-	1883.0	-	2014.2	-	-
PKF2	-	1885.3	-	2018.3	-	-
PKF1	-	1887.0	-	2021.5	-	-
PKSB	-	1889.8	-	2026.6	-	-
MV4B	-	1895.3	-	2036.7	-	-
MVF2	-	1898.1	-	2042.0	-	-
MVSB	-	1902.7	-	2050.7	-	-
PCOL	-	1910.4	-	2065.0	-	-
TPCL	1916.5	1915.7	-0.8	2074.6	-	-
Top P-1a sand	-	1917.9	-	2078.7	-	4.0m oil
Top P-1b sand	-	1931.6	-	2103.4	-	2.0m gas
Top P-1c sand	-	1935.4	-	2110.2	-	1.0m gas, 1.8m oil
Top P-2a sand	-	1944.1	-	2125.8	4.5 m oil	4.8m oil
Top P-2c sand	-	1964.3	-	2161.6	-	2.1m oil
Top P-2d sand	-	1981.2	-	2191.3	-	1.1m oil
Top P-2e sand	-	1984.2	-	2196.6	-	1.2m poss. oil
Top P-3a sand	-	1987.5	-	2202.3	-	3.4m oil
Top P-3c sand	2018.5	2016.7	-1.8	2251.9	3.0 m oil	5.3m oil
Top P-3d sand	-	2039.4	-	2290.8	-	1.2m oil
Top F Coal	2038.1	2036.5	-1.6	2285.8	-	-
Top M1 sand	-	2069.5	-	2341.6	0.0	1.9m gas

## V. FORMATION RESERVOIR TOPS(cont'd)- BREAM B16

Zone	m TVDSS			m MDRT	m TVD Gross HC Column	
	Predicted	Actual	Diff.		Predicted	Actual
Top M2 sand	-	2089.0	-	2374.0	0.0	2.4m gas
Top M3 sand	-	2097.5	-	2388.1	0.0	2.5m gas
Top M6 sand	2158.6	2160.6	2.0	2491.5	6.5 gas/oil	0.0
Top L2 Coal	2220.1	2220.6	0.5	2590.2	-	-
Total Depth	2250.0	2251.8	1.9	2641.0	-	-

## VI. GEOLOGICAL ANALYSIS – BREAM B16

BREAM B16 (pre-drill Location Y) was the second of two wells to be drilled from the BREAM B platform during the 2005 Bream B Drilling and Workover program using the "Ensco-102 Jack-Up rig". BREAM B16 was designed as a drainage point on the central crest of the eastern Bream field near the Bream B platform. The well was drilled 70-500m from the existing BREAM B2 producer at the key reservoir intersections. The primary driver for the B16 was to capture and accelerate N-1 oil at a crestal location following gas cap blow-down and develop bypassed oil and gas in the P and M6 reservoirs discovered by the BREAM B2 well.

BMB-B16 was designed as a moderate angle (56 deg), short reach (2641 mMDRT) well targeting a four-way structural closure at the Top of Coarse Clastics (TCC), slightly up-dip of BREAM B2. Although B2 is completed in the N-1 gas column, the 7m gas perforations and the position of the lower packer of the sliding sleeve completion prevent access to the shallowest N-1 units. This would eventually result in loss of oil production at the crest following gas cap blowdown unless a tubing pull workover was performed. The B2 well gas completion was also designated to be utilized as a back-up gas lift supply well for the Bream B platform in the event of failure of the B17 in the future.

The B16 well path targeted structural crests at several deeper intra-Latrobe intervals, up-dip of the B2 well. The well effectively twinned the B2 well at the TCC level and then deviated to the southeast and penetrated mapped crests at the P, F and L2 coal seismic horizons. Oil was forecast in the P-2A and P-3C sands below the P coal horizon and a 7 metre gas and oil column was forecast at the M6 reservoir below the F coal horizon. The well was then deepened to the L2 coal to test a fault dependent closure at this level, up-dip of a wet B2 penetration.

The B16 well was drilled to accelerate oil from multiple producing intervals and therefore capture reserves by bringing them forward into the producing life of the BREAM B platform.

A spare well slot (# 16) on the south side of the Bream B concrete gravity structure was utilised for this well. A new conductor was drilled and grouted through the CGS base.

### Results

BREAM B16 was drilled to TD after drilling out of the new B16 conductor shoe (~179 mMDRT) and logged with a 6.75" Anadrill LWD suite (GR, Resistivity, Density, Neutron, ISONIC and Caliper). No wireline logs were run. The well reached a total depth of 2641.0 mMDRT (-2251.8 mSS), approximately 2m TVD deeper than programmed. This well intersected the TCC at 1870.8 mTVDSS and the Top Lower P Coal at 1915.7 mTVDSS which is 2.0m TVD low and 0.8m TVD high to prognosis respectively. Gross gas intersected in the N-1 reservoir is 29.5m TVD versus 31m TVD prognosed.

## **VI. GEOLOGICAL ANALYSIS (cont'd) - BREAM B16**

Ten hydrocarbon bearing reservoirs were intersected in the P reservoir interval. Oil was forecast to be present in the P-2A and P-3C sands and the other major zones were predicted to be swept by production from the B2 well. However due to the up-dip penetration of the B16 well, several additional oil and gas zones were penetrated. The well intersected a total of 21.6m TVD net oil pay and 2.7m TVD net gas pay (in 10 sands) versus a pre-drill prognosis of 7.5m.

The top of the M6 sand was intersected at 2491.5 mMDRT (-2160.6 mTVDss), approximately 2m low to prognosis. Sand development was poor at the top of this fining upwards sand package and the predicted gas and oil column was likely intersected in a non-net zone at the top of this package. No net pay is assessed for the M6 reservoir at B16.

Three gas bearing sands (M1, M2 & M3) were intersected between 2341 and 2392 mMDRT. Quantitative log analysis details can be found in Table 1 of Appendix 2a.

The sand below the L2 coal marker (2590.2 mMDRT, -2251.9 mTVDss) was found to be water bearing.

## **VII. APPENDICIES**

### **BREAM B16**

**APPENDIX 1a**

**BREAM B16**

**Survey Data**



# BMB B-16 Final Geodetic Survey

Report Date: October 25, 2005	Survey / DLS Computation Method: Minimum Curvature / Lubinski
Client: Esso Australia Pty Ltd	Vertical Section Azimuth: 119.190°
Field: Bream B GDA 94	Vertical Section Origin: S 7.800 m, W 0.300 m
Structure / Slot: Bream B / 16	TVD Reference Datum: RKB
Well: BMB B-16	TVD Reference Elevation: 47.2 m relative to MSL
Borehole: BMB B-16	Sea Bed / Ground Level Elevation: -61.000 m relative to MSL
UWI/API#:	Magnetic Declination: 13.135°
Survey Name / Date: BMB B-16 Final / March 2, 2005	Total Field Strength: 60144.350 nT
Tort / AHD / DDI / ERD ratio: 106.615° / 885.79 m / 5.551 / 0.385	Magnetic Dip: -69.030°
Grid Coordinate System: GDA94/MGA94 Zone 55	Declination Date: August 01, 2005
Location Lat/Long: S 38 31 5.642, E 147 50 21.375	Magnetic Declination Model: BGGM 2004
Location Grid N/E Y/X: N 5736349.580 m, E 573164.770 m	North Reference: Grid North
Grid Convergence Angle: -0.52269053°	Total Corr Mag North -> Grid North: +13.658°
Grid Scale Factor: 0.99966592	Local Coordinates Referenced To: Structure Reference Point

Comments	Measured Depth (m)	Inclination (deg)	Azimuth (deg)	TVD (m)	Vertical Section (m)	NS (m)	EW (m)	DLS (deg/30 m)	Northing (m)	Easting (m)	Latitude	Longitude
Tie-In	0.00	0.00	0.00	0.00	0.00	-7.80	-0.30	0.00	5736349.58	573164.77	S 38 31 5.642	E 147 50 21.375
	107.50	0.00	0.00	107.50	0.00	-7.80	-0.30	0.00	5736349.58	573164.77	S 38 31 5.642	E 147 50 21.375
	110.00	0.15	158.53	110.00	0.00	-7.81	-0.30	1.80	5736349.58	573164.77	S 38 31 5.642	E 147 50 21.375
	138.80	0.18	157.67	138.80	0.07	-7.88	-0.27	0.03	5736349.50	573164.80	S 38 31 5.645	E 147 50 21.376
	157.60	0.16	154.47	157.60	0.11	-7.93	-0.25	0.04	5736349.45	573164.82	S 38 31 5.646	E 147 50 21.377
	174.50	0.11	156.53	174.50	0.14	-7.97	-0.23	0.09	5736349.41	573164.84	S 38 31 5.647	E 147 50 21.378
	183.49	0.57	272.31	183.49	0.11	-7.98	-0.27	2.09	5736349.41	573164.80	S 38 31 5.648	E 147 50 21.376
	214.10	2.13	263.97	214.09	-0.49	-8.03	-0.99	1.54	5736349.35	573164.08	S 38 31 5.650	E 147 50 21.347
	244.30	4.13	267.49	244.24	-1.87	-8.14	-2.63	1.99	5736349.25	573162.44	S 38 31 5.654	E 147 50 21.279
	273.44	6.20	258.68	273.26	-3.96	-8.49	-5.22	2.28	5736348.89	573159.85	S 38 31 5.666	E 147 50 21.172
	302.32	6.79	248.99	301.96	-6.24	-9.41	-8.35	1.29	5736347.97	573156.73	S 38 31 5.697	E 147 50 21.043
	320.98	6.50	238.20	320.49	-7.46	-10.36	-10.27	2.06	5736347.02	573154.80	S 38 31 5.728	E 147 50 20.964
	360.36	6.56	225.35	359.62	-9.17	-13.12	-13.77	1.11	5736344.27	573151.31	S 38 31 5.818	E 147 50 20.821
	389.61	6.38	219.35	388.69	-9.92	-15.55	-15.99	0.72	5736341.84	573149.09	S 38 31 5.898	E 147 50 20.730
	418.79	6.26	225.03	417.69	-10.64	-17.93	-18.14	0.65	5736339.46	573146.93	S 38 31 5.976	E 147 50 20.642
	447.48	6.24	222.63	446.21	-11.43	-20.18	-20.30	0.27	5736337.21	573144.77	S 38 31 6.049	E 147 50 20.554
	476.58	6.16	224.05	475.14	-12.20	-22.46	-22.46	0.18	5736334.92	573142.62	S 38 31 6.124	E 147 50 20.466
	505.66	6.06	219.91	504.05	-12.88	-24.76	-24.53	0.47	5736332.63	573140.55	S 38 31 6.199	E 147 50 20.381
	534.65	6.06	217.45	532.88	-13.39	-27.15	-26.44	0.27	5736330.24	573138.64	S 38 31 6.277	E 147 50 20.303
	563.70	6.02	217.76	561.77	-13.83	-29.57	-28.31	0.05	5736327.82	573136.77	S 38 31 6.356	E 147 50 20.227
	592.73	5.72	226.27	590.65	-14.48	-31.78	-30.29	0.95	5736325.61	573134.79	S 38 31 6.428	E 147 50 20.146
	621.85	5.72	231.95	619.62	-15.47	-33.67	-32.48	0.58	5736323.72	573132.60	S 38 31 6.491	E 147 50 20.056
	650.71	5.56	228.28	648.34	-16.49	-35.49	-34.65	0.41	5736321.90	573130.43	S 38 31 6.550	E 147 50 19.967
	680.04	5.51	231.33	677.54	-17.48	-37.32	-36.81	0.31	5736320.08	573128.27	S 38 31 6.610	E 147 50 19.879
	697.53	5.50	228.98	694.95	-18.08	-38.39	-38.10	0.39	5736319.00	573126.98	S 38 31 6.645	E 147 50 19.826
	726.22	5.50	228.97	723.50	-19.01	-40.20	-40.18	0.00	5736317.20	573124.91	S 38 31 6.704	E 147 50 19.741
	755.02	5.47	224.63	752.17	-19.84	-42.08	-42.18	0.43	5736315.31	573122.90	S 38 31 6.766	E 147 50 19.659
	784.05	5.45	220.42	781.07	-20.48	-44.11	-44.05	0.41	5736313.28	573121.04	S 38 31 6.833	E 147 50 19.583
	812.94	5.55	224.13	809.83	-21.11	-46.16	-45.91	0.38	5736311.23	573119.18	S 38 31 6.899	E 147 50 19.507
	856.11	5.52	225.75	852.80	-22.24	-49.11	-48.85	0.11	5736308.29	573116.24	S 38 31 6.996	E 147 50 19.386
	885.50	5.60	224.98	882.05	-23.03	-51.11	-50.88	0.11	5736306.29	573114.21	S 38 31 7.061	E 147 50 19.304
	914.67	5.60	223.80	911.08	-23.78	-53.14	-52.87	0.12	5736304.26	573112.22	S 38 31 7.128	E 147 50 19.222
	943.84	5.47	223.94	940.11	-24.49	-55.17	-54.82	0.13	5736302.23	573110.27	S 38 31 7.194	E 147 50 19.142
	972.77	5.37	223.05	968.91	-25.17	-57.15	-56.70	0.14	5736300.25	573108.39	S 38 31 7.259	E 147 50 19.065
	1001.99	5.46	223.36	998.00	-25.83	-59.16	-58.59	0.10	5736298.24	573106.50	S 38 31 7.325	E 147 50 18.988
	1030.57	5.41	224.95	1026.45	-26.53	-61.11	-60.47	0.17	5736296.30	573104.62	S 38 31 7.388	E 147 50 18.911
	1059.72	5.32	225.10	1055.48	-27.28	-63.03	-62.40	0.09	5736294.37	573102.69	S 38 31 7.451	E 147 50 18.832
	1088.71	5.11	226.63	1084.35	-28.03	-64.87	-64.29	0.26	5736292.53	573100.80	S 38 31 7.512	E 147 50 18.755
	1117.66	5.03	225.28	1113.18	-28.77	-66.65	-66.13	0.15	5736290.76	573098.96	S 38 31 7.570	E 147 50 18.680
	1146.60	5.09	226.31	1142.01	-29.50	-68.42	-67.96	0.11	5736288.98	573097.13	S 38 31 7.628	E 147 50 18.605
	1175.41	5.01	225.26	1170.71	-30.22	-70.19	-69.78	0.13	5736287.21	573095.32	S 38 31 7.686	E 147 50 18.531
	1204.65	4.90	227.98	1199.84	-30.98	-71.93	-71.61	0.27	5736285.48	573093.48	S 38 31 7.743	E 147 50 18.455
	1233.79	4.85	227.90	1228.87	-31.78	-73.59	-73.45	0.05	5736283.82	573091.64	S 38 31 7.797	E 147 50 18.380
	1262.27	5.07	228.33	1257.25	-32.57	-75.23	-75.28	0.24	5736282.17	573089.81	S 38 31 7.851	E 147 50 18.305
	1291.51	5.31	229.22	1286.37	-33.46	-76.97	-77.27	0.26	5736280.43	573087.82	S 38 31 7.908	E 147 50 18.224
	1320.64	5.99	219.17	1315.36	-34.19	-79.03	-79.25	1.23	5736278.37	573085.84	S 38 31 7.975	E 147 50 18.143
	1349.52	7.66	193.37	1344.04	-33.92	-82.07	-80.65	3.58	5736275.33	573084.45	S 38 31 8.074	E 147 50 18.086
	1378.46	10.94	165.80	1372.61	-31.51	-86.62	-80.42	5.64	5736270.79	573084.67	S 38 31 8.222	E 147 50 18.097

1407.52	13.12	139.65	1401.05	-26.52	-91.81	-77.61	6.00	5736265.60	573087.49	S 38 31 8.389	E 147 50 18.215
1436.56	14.26	126.97	1429.27	-19.89	-96.47	-72.62	3.31	5736260.94	573092.48	S 38 31 8.539	E 147 50 18.423
1465.33	14.22	127.37	1457.16	-12.88	-100.75	-66.98	0.11	5736256.67	573098.12	S 38 31 8.676	E 147 50 18.658
1494.32	13.91	123.06	1485.28	-5.88	-104.81	-61.23	1.13	5736252.61	573103.86	S 38 31 8.806	E 147 50 18.897
1523.35	13.91	114.26	1513.46	1.08	-108.15	-55.12	2.18	5736249.27	573109.97	S 38 31 8.912	E 147 50 19.150
1552.33	13.77	107.16	1541.60	7.93	-110.60	-48.65	1.76	5736246.82	573116.44	S 38 31 8.990	E 147 50 19.418
1581.19	13.47	106.93	1569.65	14.57	-112.59	-42.15	0.32	5736244.83	573122.93	S 38 31 9.053	E 147 50 19.687
1610.23	13.22	106.90	1597.90	21.12	-114.54	-35.74	0.26	5736242.88	573129.34	S 38 31 9.114	E 147 50 19.952
1639.24	12.97	106.76	1626.16	27.54	-116.44	-29.45	0.26	5736240.98	573135.63	S 38 31 9.174	E 147 50 20.213
1668.40	14.75	106.71	1654.47	34.36	-118.45	-22.76	1.83	5736238.97	573142.32	S 38 31 9.237	E 147 50 20.490
1697.46	18.56	110.49	1682.31	42.55	-121.14	-14.88	4.09	5736236.28	573150.20	S 38 31 9.322	E 147 50 20.816
1726.01	22.22	113.20	1709.06	52.41	-124.85	-5.66	3.97	5736232.57	573159.41	S 38 31 9.440	E 147 50 21.198
1755.12	25.46	114.56	1735.69	64.12	-129.62	5.09	3.39	5736227.80	573170.16	S 38 31 9.591	E 147 50 21.643
1784.08	28.71	115.07	1761.47	77.27	-135.16	17.06	3.38	5736222.26	573182.12	S 38 31 9.767	E 147 50 22.139
1813.12	32.21	113.25	1786.50	91.93	-141.17	30.49	3.74	5736216.25	573195.55	S 38 31 9.958	E 147 50 22.696
1842.22	35.30	112.90	1810.69	108.01	-147.51	45.37	3.19	5736209.92	573210.42	S 38 31 10.159	E 147 50 23.313
1871.31	38.11	113.30	1834.01	125.29	-154.33	61.36	2.91	5736203.10	573226.41	S 38 31 10.376	E 147 50 23.975
1899.95	41.20	113.37	1856.05	143.47	-161.57	78.14	3.24	5736195.86	573243.18	S 38 31 10.605	E 147 50 24.671
1929.05	45.21	113.03	1877.26	163.28	-169.41	96.45	4.14	5736188.02	573261.48	S 38 31 10.854	E 147 50 25.429
1958.45	49.07	111.54	1897.26	184.67	-177.58	116.39	4.09	5736179.86	573281.42	S 38 31 11.113	E 147 50 26.255
1987.31	52.44	109.37	1915.51	206.75	-185.38	137.33	3.91	5736172.07	573302.35	S 38 31 11.360	E 147 50 27.123
2016.22	56.23	108.21	1932.37	229.85	-192.93	159.56	4.05	5736164.51	573324.58	S 38 31 11.598	E 147 50 28.043
2044.75	58.13	107.85	1947.83	253.37	-200.35	182.36	2.02	5736157.09	573347.37	S 38 31 11.832	E 147 50 28.987
2073.75	56.68	107.89	1963.45	277.33	-207.85	205.61	1.50	5736149.60	573370.61	S 38 31 12.068	E 147 50 29.950
2102.65	56.17	107.47	1979.43	300.92	-215.16	228.55	0.64	5736142.29	573393.54	S 38 31 12.299	E 147 50 30.900
2131.41	55.69	106.87	1995.54	324.22	-222.20	251.31	0.72	5736135.26	573416.30	S 38 31 12.520	E 147 50 31.842
2160.35	55.85	106.48	2011.82	347.58	-229.06	274.23	0.37	5736128.39	573439.21	S 38 31 12.736	E 147 50 32.791
2189.30	54.86	106.25	2028.28	370.80	-235.77	297.08	1.04	5736121.69	573462.06	S 38 31 12.947	E 147 50 33.736
2218.83	53.99	105.47	2045.46	394.17	-242.34	320.19	1.09	5736115.12	573485.15	S 38 31 13.153	E 147 50 34.693
2247.97	53.59	105.31	2062.67	417.01	-248.58	342.86	0.43	5736108.89	573507.81	S 38 31 13.348	E 147 50 35.631
2277.03	54.85	105.22	2079.67	439.89	-254.78	365.60	1.30	5736102.68	573530.55	S 38 31 13.543	E 147 50 36.572
2306.49	53.74	104.80	2096.86	463.08	-260.98	388.71	1.18	5736096.49	573553.65	S 38 31 13.737	E 147 50 37.528
2335.48	53.21	104.61	2114.11	485.64	-266.89	411.24	0.57	5736090.57	573576.17	S 38 31 13.922	E 147 50 38.460
2364.40	53.21	104.10	2131.43	508.03	-272.64	433.68	0.42	5736084.83	573598.60	S 38 31 14.102	E 147 50 39.389
2393.21	51.92	103.86	2148.94	530.10	-278.16	455.87	1.36	5736079.31	573620.79	S 38 31 14.274	E 147 50 40.307
2422.27	52.23	104.37	2166.81	552.23	-283.75	478.10	0.52	5736073.72	573643.01	S 38 31 14.449	E 147 50 41.227
2451.33	52.61	104.69	2184.53	574.52	-289.53	500.40	0.47	5736067.94	573665.30	S 38 31 14.630	E 147 50 42.149
2480.33	52.86	105.28	2202.09	596.89	-295.50	522.69	0.55	5736061.98	573687.59	S 38 31 14.817	E 147 50 43.072
2509.25	51.86	105.68	2219.75	619.14	-301.61	544.76	1.09	5736055.87	573709.65	S 38 31 15.008	E 147 50 43.985
2538.42	52.71	106.56	2237.59	641.61	-308.02	566.93	1.13	5736049.46	573731.81	S 38 31 15.209	E 147 50 44.903
2567.49	53.16	106.46	2255.11	664.24	-314.61	589.17	0.47	5736042.87	573754.04	S 38 31 15.416	E 147 50 45.823
2596.48	52.44	107.42	2272.64	686.81	-321.34	611.26	1.09	5736036.15	573776.12	S 38 31 15.628	E 147 50 46.738
2623.96	51.70	107.50	2289.53	708.03	-327.84	631.93	0.81	5736029.65	573796.79	S 38 31 15.833	E 147 50 47.594
2641.00	51.70	107.50	2299.00	721.13	-331.86	644.69	0.00	5736025.63	573809.54	S 38 31 15.959	E 147 50 48.122

Projected to TD

**Survey Type:** Definitive Survey

**Survey Error Model:** SLB ISCWSA version 24 \*\*\* 3-D 95.00% Confidence 2.7955 sigma

**Surveying Prog:**

MD From ( m )	MD To ( m )	EOU Freq	Survey Tool Type	Borehole -> Survey
0.00	108.17	Act-Stns	SLB_CNSG+DPIPE-Depth Only	BMB B-16 -> BMB B-16 Final
108.17	174.50	Act-Stns	SLB_CNSG+DPIPE	BMB B-16 -> BMB B-16 Final
174.50	680.04	Act-Stns	SLB_GYRO-MWD	BMB B-16 -> BMB B-16 Final
680.04	2641.00	Act-Stns	SLB_MWD-STD	BMB B-16 -> BMB B-16 Final

**APPENDIX 1b**

**BREAM B16**

**MD-TVD Survey Data Listing**

Report Date:	5 December 2005
Well:	Bream B16
Structure / Slot:	ENSCO 102
TVD Reference Datum:	DrillSite Elevation
TVD Reference Elevation:	47.24 m relative to MSL
Sea Bed / Ground Level Elevation:	61.00 m relative to MSL
Grid Coordinate System:	GDA94/MGA94 Zone 55
Location Lat/Long:	S -38 31' 5.628000", E 147 50' 21.372000"
Location Grid N/E:	N 5736350.0138 m, E 573164.7033 m
Survey Azimuth Reference:	Grid North

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
0	0	360	0	47.24	0	0	5736349.99	573164.66
5	0	0	5	42.24	0	0	5736349.99	573164.66
10	0	0	9.99	37.25	0	0	5736349.99	573164.66
15	0	0	14.99	32.25	0	0	5736349.99	573164.66
20	0	0	19.99	27.25	0	0	5736349.99	573164.66
25	0	0	24.98	22.26	0	0	5736349.99	573164.66
30	0	0	29.98	17.26	0	0	5736349.99	573164.66
35	0	0	34.98	12.26	0	0	5736349.99	573164.66
40	0	0	39.98	7.26	0	0	5736349.99	573164.66
45	0	0	44.97	2.27	0	0	5736349.99	573164.66
50	0	0	49.97	-2.73	0	0	5736349.99	573164.66
55	0	0	54.97	-7.73	0	0	5736349.99	573164.66
60	0	0	59.96	-12.72	0	0	5736349.99	573164.66
65	0	0	64.96	-17.72	0	0	5736349.99	573164.66
70	0	0	69.96	-22.72	0	0	5736349.99	573164.66
75	0	0	74.95	-27.71	0	0	5736349.99	573164.66
80	0	0	79.95	-32.71	0	0	5736349.99	573164.66
85	0	0	84.95	-37.71	0	0	5736349.99	573164.66
90	0	0	89.95	-42.71	0	0	5736349.99	573164.66
95	0	0	94.94	-47.7	0	0	5736349.99	573164.66
100	0	0	99.94	-52.7	0	0	5736349.99	573164.66
105	0	0	104.94	-57.7	0	0	5736349.99	573164.67
110	0.13	141.54	109.93	-62.69	0	0	5736349.99	573164.67
115	0.15	158.39	114.93	-67.69	-0.02	0.01	5736349.98	573164.67
120	0.16	158.24	119.93	-72.69	-0.03	0.01	5736349.96	573164.68
125	0.17	158.09	124.92	-77.69	-0.04	0.02	5736349.95	573164.68
130	0.17	157.94	129.92	-82.68	-0.05	0.02	5736349.94	573164.69
135	0.18	157.78	134.92	-87.68	-0.07	0.03	5736349.92	573164.69
140	0.18	157.47	139.92	-92.68	-0.08	0.03	5736349.91	573164.7
145	0.17	156.61	144.91	-97.67	-0.1	0.04	5736349.89	573164.7
150	0.17	155.76	149.91	-102.67	-0.11	0.04	5736349.88	573164.71
155	0.16	154.91	154.91	-107.67	-0.12	0.05	5736349.87	573164.72
160	0.15	154.76	159.9	-112.66	-0.14	0.06	5736349.85	573164.72
165	0.14	155.37	164.9	-117.66	-0.15	0.06	5736349.84	573164.73
170	0.12	155.98	169.9	-122.66	-0.16	0.07	5736349.83	573164.73
175	0.14	162.97	174.89	-127.65	-0.17	0.06	5736349.83	573164.73
180	0.39	227.36	179.89	-132.65	-0.17	0.06	5736349.82	573164.72
185	0.65	271.9	184.89	-137.65	-0.17	0	5736349.82	573164.67
190	0.9	270.54	189.88	-142.64	-0.17	-0.05	5736349.82	573164.61
195	1.16	269.17	194.88	-147.64	-0.18	-0.15	5736349.81	573164.51
200	1.41	267.81	199.88	-152.64	-0.19	-0.25	5736349.81	573164.41
205	1.67	266.45	204.87	-157.63	-0.2	-0.4	5736349.79	573164.27
210	1.92	265.09	209.87	-162.63	-0.21	-0.54	5736349.78	573164.12
215	2.19	264.07	214.86	-167.62	-0.23	-0.74	5736349.76	573163.93
220	2.52	264.66	219.85	-172.61	-0.25	-0.93	5736349.74	573163.74
225	2.85	265.24	224.84	-177.6	-0.27	-1.17	5736349.72	573163.49

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
230	3.18	265.82	229.83	-182.59	-0.29	-1.42	5736349.71	573163.24
235	3.51	266.41	234.82	-187.58	-0.3	-1.73	5736349.69	573162.94
240	3.85	266.99	239.81	-192.57	-0.32	-2.03	5736349.67	573162.63
245	4.18	267.28	244.79	-197.55	-0.34	-2.4	5736349.65	573162.27
250	4.53	265.77	249.78	-202.54	-0.36	-2.76	5736349.63	573161.9
255	4.89	264.26	254.75	-207.51	-0.41	-3.18	5736349.58	573161.48
260	5.25	262.74	259.73	-212.49	-0.46	-3.61	5736349.53	573161.06
265	5.6	261.23	264.71	-217.47	-0.54	-4.09	5736349.45	573160.58
270	5.96	259.72	269.68	-222.44	-0.62	-4.57	5736349.37	573160.1
275	6.23	258.16	274.65	-227.41	-0.73	-5.09	5736349.26	573159.57
280	6.33	256.48	279.62	-232.38	-0.84	-5.62	5736349.15	573159.04
285	6.44	254.8	284.58	-237.34	-0.99	-6.16	5736349	573158.5
290	6.54	253.12	289.55	-242.31	-1.14	-6.7	5736348.85	573157.97
295	6.64	251.45	294.51	-247.27	-1.32	-7.25	5736348.67	573157.42
300	6.74	249.77	299.48	-252.24	-1.51	-7.79	5736348.48	573156.87
305	6.75	247.44	304.44	-257.2	-1.73	-8.33	5736348.26	573156.33
310	6.67	244.55	309.4	-262.16	-1.96	-8.87	5736348.03	573155.79
315	6.59	241.66	314.36	-267.12	-2.23	-9.38	5736347.76	573155.29
320	6.52	238.77	319.33	-272.09	-2.5	-9.88	5736347.49	573154.78
325	6.51	236.89	324.29	-277.05	-2.81	-10.35	5736347.18	573154.31
330	6.51	235.26	329.26	-282.02	-3.12	-10.83	5736346.87	573153.84
335	6.52	233.63	334.22	-286.98	-3.45	-11.28	5736346.54	573153.38
340	6.53	231.99	339.19	-291.95	-3.79	-11.74	5736346.2	573152.93
345	6.54	230.36	344.15	-296.91	-4.15	-12.17	5736345.84	573152.49
350	6.54	228.73	349.12	-301.88	-4.51	-12.61	5736345.48	573152.06
355	6.55	227.1	354.08	-306.84	-4.9	-13.02	5736345.09	573151.64
360	6.56	225.47	359.05	-311.81	-5.28	-13.44	5736344.71	573151.22
365	6.53	224.4	364.01	-316.77	-5.69	-13.84	5736344.3	573150.83
370	6.5	223.37	368.98	-321.74	-6.1	-14.24	5736343.89	573150.43
375	6.47	222.35	373.94	-326.7	-6.51	-14.62	5736343.48	573150.05
380	6.44	221.32	378.91	-331.67	-6.93	-14.99	5736343.06	573149.67
385	6.41	220.3	383.87	-336.63	-7.35	-15.36	5736342.64	573149.31
390	6.38	219.43	388.84	-341.6	-7.78	-15.72	5736342.21	573148.95
395	6.36	220.4	393.8	-346.56	-8.2	-16.07	5736341.79	573148.59
400	6.34	221.37	398.77	-351.53	-8.62	-16.43	5736341.37	573148.23
405	6.32	222.35	403.74	-356.5	-9.03	-16.8	5736340.96	573147.86
410	6.3	223.32	408.7	-361.46	-9.43	-17.17	5736340.56	573147.49
415	6.28	224.29	413.67	-366.43	-9.82	-17.55	5736340.17	573147.11
420	6.26	224.93	418.64	-371.4	-10.22	-17.94	5736339.77	573146.73
425	6.26	224.51	423.61	-376.37	-10.6	-18.32	5736339.39	573146.35
430	6.25	224.09	428.57	-381.33	-10.99	-18.7	5736339	573145.97
435	6.25	223.67	433.54	-386.3	-11.39	-19.08	5736338.6	573145.59
440	6.25	223.26	438.51	-391.27	-11.78	-19.45	5736338.21	573145.21
445	6.24	222.84	443.47	-396.23	-12.18	-19.82	5736337.81	573144.84
450	6.23	222.75	448.44	-401.2	-12.58	-20.19	5736337.41	573144.47
455	6.22	223	453.41	-406.17	-12.97	-20.56	5736337.02	573144.11
460	6.21	223.24	458.38	-411.14	-13.37	-20.93	5736336.62	573143.74
465	6.19	223.48	463.35	-416.11	-13.76	-21.3	5736336.23	573143.36
470	6.18	223.73	468.31	-421.07	-14.15	-21.67	5736335.84	573142.99
475	6.16	223.97	473.28	-426.04	-14.54	-22.04	5736335.45	573142.62
480	6.15	223.56	478.25	-431.01	-14.93	-22.42	5736335.06	573142.25
485	6.13	222.85	483.22	-435.98	-15.32	-22.78	5736334.67	573141.89
490	6.11	222.14	488.19	-440.95	-15.71	-23.14	5736334.28	573141.52
495	6.1	221.43	493.15	-445.91	-16.11	-23.49	5736333.88	573141.17
500	6.08	220.72	498.12	-450.88	-16.5	-23.84	5736333.49	573140.82
505	6.06	220	503.09	-455.85	-16.91	-24.18	5736333.08	573140.48
510	6.06	219.54	508.06	-460.82	-17.31	-24.52	5736332.68	573140.14
515	6.06	219.12	513.03	-465.79	-17.72	-24.86	5736332.27	573139.81

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
520	6.06	218.69	518	-470.76	-18.13	-25.19	5736331.86	573139.48
525	6.06	218.27	522.97	-475.73	-18.55	-25.52	5736331.45	573139.15
530	6.06	217.84	527.94	-480.7	-18.96	-25.84	5736331.03	573138.82
535	6.06	217.45	532.91	-485.67	-19.38	-26.17	5736330.61	573138.5
540	6.05	217.51	537.88	-490.64	-19.8	-26.49	5736330.19	573138.18
545	6.05	217.56	542.85	-495.61	-20.21	-26.81	5736329.78	573137.86
550	6.04	217.61	547.81	-500.57	-20.63	-27.13	5736329.36	573137.54
555	6.03	217.67	552.78	-505.54	-21.05	-27.45	5736328.94	573137.21
560	6.03	217.72	557.75	-510.51	-21.46	-27.77	5736328.53	573136.89
565	6.01	218.14	562.72	-515.48	-21.87	-28.09	5736328.12	573136.57
570	5.95	219.61	567.69	-520.45	-22.28	-28.42	5736327.71	573136.25
575	5.9	221.07	572.66	-525.42	-22.67	-28.76	5736327.32	573135.91
580	5.85	222.54	577.63	-530.39	-23.06	-29.09	5736326.93	573135.57
585	5.8	224	582.61	-535.37	-23.42	-29.44	5736326.57	573135.22
590	5.75	225.47	587.58	-540.34	-23.78	-29.79	5736326.21	573134.87
595	5.72	226.71	592.55	-545.31	-24.13	-30.15	5736325.86	573134.51
600	5.72	227.69	597.52	-550.28	-24.47	-30.52	5736325.52	573134.15
605	5.72	228.66	602.49	-555.25	-24.8	-30.89	5736325.19	573133.78
610	5.72	229.64	607.47	-560.23	-25.13	-31.26	5736324.86	573133.4
615	5.72	230.61	612.44	-565.2	-25.44	-31.65	5736324.55	573133.02
620	5.72	231.59	617.41	-570.17	-25.76	-32.03	5736324.23	573132.63
625	5.7	231.55	622.38	-575.14	-26.07	-32.42	5736323.92	573132.24
630	5.67	230.91	627.35	-580.11	-26.38	-32.81	5736323.62	573131.85
635	5.65	230.28	632.33	-585.09	-26.69	-33.19	5736323.3	573131.48
640	5.62	229.64	637.3	-590.06	-27	-33.57	5736322.99	573131.1
645	5.59	229.01	642.27	-595.03	-27.32	-33.93	5736322.67	573130.73
650	5.56	228.37	647.25	-600.01	-27.64	-34.3	5736322.35	573130.36
655	5.55	228.73	652.22	-604.98	-27.96	-34.67	5736322.03	573130
660	5.54	229.25	657.19	-609.95	-28.28	-35.03	5736321.71	573129.64
665	5.54	229.77	662.17	-614.93	-28.59	-35.4	5736321.4	573129.27
670	5.53	230.29	667.14	-619.9	-28.9	-35.77	5736321.09	573128.9
675	5.52	230.81	672.11	-624.87	-29.21	-36.14	5736320.78	573128.53
680	5.51	231.33	677.09	-629.85	-29.51	-36.51	5736320.48	573128.15
685	5.51	230.66	682.06	-634.82	-29.82	-36.88	5736320.18	573127.78
690	5.5	229.99	687.04	-639.8	-30.12	-37.25	5736319.87	573127.41
695	5.5	229.32	692.01	-644.77	-30.43	-37.62	5736319.56	573127.05
700	5.5	228.98	696.98	-649.74	-30.74	-37.98	5736319.25	573126.68
705	5.5	228.98	701.96	-654.72	-31.06	-38.34	5736318.93	573126.32
710	5.5	228.98	706.93	-659.69	-31.37	-38.7	5736318.62	573125.96
715	5.5	228.97	711.91	-664.67	-31.69	-39.07	5736318.3	573125.6
720	5.5	228.97	716.88	-669.64	-32	-39.43	5736317.99	573125.24
725	5.5	228.97	721.85	-674.61	-32.32	-39.79	5736317.67	573124.88
730	5.5	228.4	726.83	-679.59	-32.63	-40.15	5736317.36	573124.52
735	5.49	227.65	731.8	-684.56	-32.95	-40.5	5736317.04	573124.16
740	5.49	226.89	736.78	-689.54	-33.28	-40.86	5736316.71	573123.81
745	5.48	226.14	741.75	-694.51	-33.61	-41.2	5736316.38	573123.47
750	5.48	225.39	746.72	-699.48	-33.94	-41.54	5736316.05	573123.12
755	5.47	224.63	751.7	-704.46	-34.28	-41.88	5736315.71	573122.79
760	5.47	223.91	756.67	-709.43	-34.62	-42.21	5736315.37	573122.45
765	5.46	223.18	761.65	-714.41	-34.96	-42.54	5736315.03	573122.13
770	5.46	222.46	766.62	-719.38	-35.31	-42.86	5736314.68	573121.8
775	5.46	221.73	771.6	-724.36	-35.66	-43.18	5736314.33	573121.48
780	5.45	221.01	776.57	-729.33	-36.02	-43.5	5736313.97	573121.17
785	5.45	220.54	781.54	-734.3	-36.38	-43.81	5736313.61	573120.86
790	5.47	221.18	786.52	-739.28	-36.74	-44.12	5736313.25	573120.55
795	5.49	221.83	791.49	-744.25	-37.1	-44.44	5736312.9	573120.23
800	5.51	222.47	796.47	-749.23	-37.45	-44.76	5736312.54	573119.91
805	5.52	223.11	801.44	-754.2	-37.8	-45.08	5736312.19	573119.58

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
810	5.54	223.75	806.41	-759.17	-38.15	-45.41	5736311.84	573119.25
815	5.55	224.21	811.39	-764.15	-38.5	-45.75	5736311.49	573118.92
820	5.55	224.39	816.36	-769.12	-38.85	-46.09	5736311.14	573118.58
825	5.54	224.58	821.34	-774.1	-39.19	-46.42	5736310.8	573118.24
830	5.54	224.77	826.31	-779.07	-39.53	-46.76	5736310.46	573117.9
835	5.53	224.96	831.28	-784.04	-39.88	-47.1	5736310.12	573117.56
840	5.53	225.15	836.26	-789.02	-40.22	-47.45	5736309.77	573117.22
845	5.53	225.33	841.23	-793.99	-40.56	-47.79	5736309.44	573116.88
850	5.52	225.52	846.2	-798.96	-40.89	-48.13	5736309.1	573116.53
855	5.52	225.71	851.18	-803.94	-41.23	-48.47	5736308.76	573116.19
860	5.53	225.65	856.15	-808.91	-41.57	-48.82	5736308.42	573115.85
865	5.54	225.52	861.13	-813.89	-41.9	-49.16	5736308.09	573115.5
870	5.56	225.39	866.1	-818.86	-42.24	-49.51	5736307.75	573115.16
875	5.57	225.26	871.07	-823.83	-42.58	-49.85	5736307.41	573114.81
880	5.59	225.12	876.04	-828.8	-42.93	-50.2	5736307.06	573114.47
885	5.6	224.99	881.02	-833.78	-43.27	-50.54	5736306.72	573114.12
890	5.6	224.8	885.99	-838.75	-43.62	-50.89	5736306.37	573113.78
895	5.6	224.6	890.96	-843.72	-43.96	-51.23	5736306.03	573113.44
900	5.6	224.39	895.94	-848.7	-44.31	-51.57	5736305.68	573113.09
905	5.6	224.19	900.91	-853.67	-44.66	-51.91	5736305.33	573112.75
910	5.6	223.99	905.88	-858.64	-45.01	-52.25	5736304.98	573112.41
915	5.6	223.8	910.86	-863.62	-45.36	-52.59	5736304.63	573112.08
920	5.58	223.83	915.83	-868.59	-45.71	-52.93	5736304.28	573111.74
925	5.55	223.85	920.8	-873.56	-46.06	-53.26	5736303.93	573111.4
930	5.53	223.87	925.78	-878.54	-46.41	-53.6	5736303.58	573111.07
935	5.51	223.9	930.75	-883.51	-46.76	-53.93	5736303.23	573110.73
940	5.49	223.92	935.73	-888.49	-47.1	-54.26	5736302.89	573110.4
945	5.47	223.9	940.7	-893.46	-47.45	-54.59	5736302.54	573110.07
950	5.45	223.75	945.67	-898.43	-47.79	-54.92	5736302.2	573109.74
955	5.43	223.6	950.65	-903.41	-48.13	-55.25	5736301.86	573109.41
960	5.41	223.44	955.62	-908.38	-48.48	-55.58	5736301.51	573109.09
965	5.4	223.29	960.6	-913.36	-48.82	-55.9	5736301.17	573108.77
970	5.38	223.14	965.57	-918.33	-49.16	-56.22	5736300.83	573108.44
975	5.38	223.07	970.55	-923.31	-49.5	-56.54	5736300.49	573108.12
980	5.39	223.13	975.52	-928.28	-49.85	-56.86	5736300.15	573107.8
985	5.41	223.18	980.5	-933.26	-50.19	-57.18	5736299.8	573107.48
990	5.42	223.23	985.47	-938.23	-50.53	-57.51	5736299.46	573107.16
995	5.44	223.29	990.45	-943.21	-50.88	-57.83	5736299.11	573106.83
1000	5.45	223.34	995.42	-948.18	-51.22	-58.16	5736298.77	573106.51
1005	5.45	223.53	1000.4	-953.16	-51.57	-58.48	5736298.42	573106.18
1010	5.45	223.81	1005.37	-958.13	-51.91	-58.81	5736298.08	573105.85
1015	5.44	224.08	1010.34	-963.1	-52.25	-59.14	5736297.74	573105.52
1020	5.43	224.36	1015.32	-968.08	-52.59	-59.47	5736297.4	573105.19
1025	5.42	224.64	1020.29	-973.05	-52.93	-59.8	5736297.06	573104.86
1030	5.41	224.92	1025.27	-978.03	-53.26	-60.13	5736296.73	573104.53
1035	5.4	224.97	1030.24	-983	-53.6	-60.47	5736296.39	573104.2
1040	5.38	225	1035.22	-987.98	-53.93	-60.8	5736296.06	573103.87
1045	5.37	225.02	1040.19	-992.95	-54.26	-61.13	5736295.73	573103.54
1050	5.35	225.05	1045.17	-997.93	-54.59	-61.46	5736295.4	573103.2
1055	5.33	225.08	1050.14	-1002.9	-54.92	-61.79	5736295.07	573102.88
1060	5.32	225.11	1055.12	-1007.88	-55.25	-62.12	5736294.74	573102.55
1065	5.28	225.38	1060.09	-1012.85	-55.57	-62.45	5736294.42	573102.22
1070	5.25	225.64	1065.07	-1017.83	-55.89	-62.77	5736294.1	573101.89
1075	5.21	225.91	1070.05	-1022.81	-56.21	-63.1	5736293.78	573101.57
1080	5.17	226.17	1075.02	-1027.78	-56.53	-63.43	5736293.47	573101.24
1085	5.14	226.43	1080	-1032.76	-56.83	-63.75	5736293.16	573100.92
1090	5.11	226.57	1084.98	-1037.74	-57.14	-64.07	5736292.85	573100.59
1095	5.09	226.34	1089.95	-1042.71	-57.45	-64.4	5736292.54	573100.27

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
1100	5.08	226.1	1094.93	-1047.69	-57.76	-64.72	5736292.24	573099.95
1105	5.06	225.87	1099.91	-1052.67	-58.06	-65.03	5736291.93	573099.63
1110	5.05	225.64	1104.89	-1057.65	-58.37	-65.35	5736291.62	573099.31
1115	5.04	225.4	1109.86	-1062.62	-58.68	-65.66	5736291.31	573099
1120	5.03	225.36	1114.84	-1067.6	-58.99	-65.98	5736291	573098.69
1125	5.05	225.54	1119.82	-1072.58	-59.29	-66.29	5736290.7	573098.38
1130	5.06	225.72	1124.8	-1077.56	-59.6	-66.6	5736290.39	573098.06
1135	5.07	225.9	1129.77	-1082.53	-59.91	-66.92	5736290.08	573097.74
1140	5.08	226.08	1134.75	-1087.51	-60.22	-67.24	5736289.77	573097.43
1145	5.09	226.25	1139.73	-1092.49	-60.52	-67.56	5736289.47	573097.11
1150	5.08	226.19	1144.71	-1097.47	-60.83	-67.88	5736289.16	573096.79
1155	5.07	226	1149.68	-1102.44	-61.14	-68.19	5736288.85	573096.47
1160	5.05	225.82	1154.66	-1107.42	-61.44	-68.51	5736288.55	573096.15
1165	5.04	225.64	1159.64	-1112.4	-61.75	-68.83	5736288.24	573095.84
1170	5.03	225.46	1164.62	-1117.38	-62.06	-69.14	5736287.93	573095.52
1175	5.01	225.27	1169.6	-1122.36	-62.36	-69.45	5736287.63	573095.21
1180	4.99	225.69	1174.57	-1127.33	-62.67	-69.76	5736287.32	573094.9
1185	4.97	226.15	1179.55	-1132.31	-62.97	-70.07	5736287.02	573094.59
1190	4.96	226.62	1184.53	-1137.29	-63.27	-70.39	5736286.72	573094.28
1195	4.94	227.08	1189.51	-1142.27	-63.56	-70.7	5736286.43	573093.96
1200	4.92	227.55	1194.49	-1147.25	-63.86	-71.02	5736286.13	573093.65
1205	4.9	227.98	1199.47	-1152.23	-64.14	-71.33	5736285.85	573093.33
1210	4.89	227.97	1204.44	-1157.2	-64.43	-71.65	5736285.56	573093.01
1215	4.88	227.95	1209.42	-1162.18	-64.72	-71.97	5736285.28	573092.7
1220	4.87	227.94	1214.4	-1167.16	-65	-72.28	5736284.99	573092.38
1225	4.87	227.92	1219.38	-1172.14	-65.28	-72.6	5736284.71	573092.07
1230	4.86	227.91	1224.36	-1177.12	-65.57	-72.91	5736284.42	573091.75
1235	4.86	227.92	1229.34	-1182.1	-65.85	-73.23	5736284.14	573091.44
1240	4.9	227.99	1234.32	-1187.08	-66.14	-73.54	5736283.85	573091.12
1245	4.94	228.07	1239.3	-1192.06	-66.42	-73.86	5736283.57	573090.8
1250	4.98	228.14	1244.27	-1197.03	-66.71	-74.18	5736283.28	573090.48
1255	5.01	228.22	1249.25	-1202.01	-67	-74.51	5736282.99	573090.16
1260	5.05	228.3	1254.23	-1206.99	-67.29	-74.83	5736282.7	573089.83
1265	5.09	228.41	1259.21	-1211.97	-67.59	-75.17	5736282.4	573089.5
1270	5.13	228.57	1264.18	-1216.94	-67.88	-75.5	5736282.11	573089.17
1275	5.17	228.72	1269.16	-1221.92	-68.18	-75.84	5736281.81	573088.83
1280	5.22	228.87	1274.14	-1226.9	-68.48	-76.18	5736281.51	573088.49
1285	5.26	229.02	1279.11	-1231.87	-68.78	-76.52	5736281.21	573088.14
1290	5.3	229.17	1284.09	-1236.85	-69.08	-76.87	5736280.91	573087.8
1295	5.39	228.02	1289.06	-1241.82	-69.39	-77.22	5736280.6	573087.45
1300	5.51	226.29	1294.04	-1246.8	-69.71	-77.56	5736280.28	573087.1
1305	5.62	224.57	1299.01	-1251.77	-70.06	-77.9	5736279.93	573086.76
1310	5.74	222.84	1303.99	-1256.75	-70.41	-78.24	5736279.58	573086.42
1315	5.86	221.12	1308.96	-1261.72	-70.79	-78.58	5736279.2	573086.09
1320	5.98	219.39	1313.93	-1266.69	-71.18	-78.91	5736278.81	573085.75
1325	6.24	215.27	1318.9	-1271.66	-71.62	-79.21	5736278.37	573085.45
1330	6.53	210.81	1323.86	-1276.62	-72.06	-79.52	5736277.93	573085.15
1335	6.82	206.34	1328.83	-1281.59	-72.59	-79.76	5736277.4	573084.9
1340	7.11	201.87	1333.79	-1286.55	-73.11	-80	5736276.88	573084.66
1345	7.4	197.41	1338.75	-1291.51	-73.72	-80.18	5736276.27	573084.48
1350	7.71	192.91	1343.7	-1296.46	-74.33	-80.37	5736275.66	573084.3
1355	8.28	188.15	1348.65	-1301.41	-75.03	-80.45	5736274.96	573084.22
1360	8.85	183.39	1353.6	-1306.36	-75.73	-80.53	5736274.26	573084.14
1365	9.41	178.62	1358.53	-1311.29	-76.53	-80.47	5736273.46	573084.19
1370	9.98	173.86	1363.46	-1316.22	-77.32	-80.42	5736272.67	573084.24
1375	10.55	169.1	1368.38	-1321.14	-78.21	-80.23	5736271.78	573084.43
1380	11.06	164.41	1373.29	-1326.05	-79.1	-80.05	5736270.89	573084.62
1385	11.43	159.91	1378.19	-1330.95	-80	-79.7	5736269.99	573084.96

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
1390	11.81	155.42	1383.09	-1335.85	-80.91	-79.36	5736269.08	573085.31
1395	12.18	150.92	1387.98	-1340.74	-81.8	-78.84	5736268.19	573085.83
1400	12.56	146.42	1392.87	-1345.63	-82.69	-78.32	5736267.3	573086.35
1405	12.93	141.92	1397.74	-1350.5	-83.56	-77.63	5736266.43	573087.04
1410	13.22	138.57	1402.62	-1355.38	-84.43	-76.94	5736265.56	573087.73
1415	13.41	136.38	1407.48	-1360.24	-85.26	-76.14	5736264.73	573088.52
1420	13.61	134.2	1412.34	-1365.1	-86.1	-75.34	5736263.89	573089.32
1425	13.81	132.02	1417.19	-1369.95	-86.89	-74.46	5736263.1	573090.21
1430	14	129.83	1422.05	-1374.81	-87.68	-73.57	5736262.31	573091.09
1435	14.2	127.65	1426.89	-1379.65	-88.43	-72.61	5736261.56	573092.06
1440	14.26	127.02	1431.74	-1384.5	-89.18	-71.64	5736260.81	573093.03
1445	14.25	127.09	1436.58	-1389.34	-89.92	-70.66	5736260.07	573094.01
1450	14.24	127.16	1441.43	-1394.19	-90.66	-69.68	5736259.33	573094.99
1455	14.23	127.23	1446.27	-1399.03	-91.41	-68.7	5736258.59	573095.97
1460	14.23	127.3	1451.11	-1403.87	-92.15	-67.72	5736257.84	573096.95
1465	14.22	127.37	1455.96	-1408.72	-92.89	-66.74	5736257.1	573097.92
1470	14.17	126.68	1460.8	-1413.56	-93.63	-65.76	5736256.36	573098.9
1475	14.12	125.93	1465.65	-1418.41	-94.35	-64.78	5736255.64	573099.89
1480	14.06	125.19	1470.49	-1423.25	-95.06	-63.79	5736254.93	573100.87
1485	14.01	124.45	1475.34	-1428.1	-95.75	-62.79	5736254.24	573101.87
1490	13.96	123.7	1480.19	-1432.95	-96.43	-61.8	5736253.56	573102.87
1495	13.91	122.85	1485.04	-1437.8	-97.08	-60.78	5736252.91	573103.88
1500	13.91	121.34	1489.89	-1442.65	-97.73	-59.77	5736252.26	573104.89
1505	13.91	119.82	1494.74	-1447.5	-98.33	-58.73	5736251.66	573105.93
1510	13.91	118.31	1499.59	-1452.35	-98.93	-57.69	5736251.06	573106.97
1515	13.91	116.79	1504.45	-1457.21	-99.47	-56.62	5736250.52	573108.04
1520	13.91	115.28	1509.3	-1462.06	-100.01	-55.55	5736249.98	573109.11
1525	13.9	113.86	1514.15	-1466.91	-100.49	-54.45	5736249.5	573110.21
1530	13.88	112.63	1519	-1471.76	-100.98	-53.36	5736249.01	573111.31
1535	13.85	111.41	1523.85	-1476.61	-101.42	-52.24	5736248.58	573112.42
1540	13.83	110.18	1528.7	-1481.46	-101.85	-51.13	5736248.14	573113.53
1545	13.81	108.96	1533.55	-1486.31	-102.24	-50	5736247.75	573114.66
1550	13.78	107.73	1538.41	-1491.17	-102.63	-48.88	5736247.36	573115.79
1555	13.74	107.14	1543.26	-1496.02	-102.98	-47.74	5736247.01	573116.92
1560	13.69	107.1	1548.12	-1500.88	-103.33	-46.61	5736246.66	573118.06
1565	13.64	107.06	1552.97	-1505.73	-103.67	-45.48	5736246.32	573119.18
1570	13.59	107.02	1557.83	-1510.59	-104.02	-44.35	5736245.97	573120.31
1575	13.53	106.98	1562.69	-1515.45	-104.36	-43.24	5736245.63	573121.43
1580	13.48	106.94	1567.55	-1520.31	-104.7	-42.12	5736245.29	573122.55
1585	13.44	106.93	1572.41	-1525.17	-105.04	-41	5736244.95	573123.66
1590	13.39	106.92	1577.27	-1530.03	-105.38	-39.89	5736244.61	573124.77
1595	13.35	106.92	1582.13	-1534.89	-105.72	-38.79	5736244.27	573125.88
1600	13.31	106.91	1586.99	-1539.75	-106.05	-37.68	5736243.94	573126.98
1605	13.27	106.91	1591.85	-1544.61	-106.39	-36.59	5736243.6	573128.08
1610	13.22	106.9	1596.72	-1549.48	-106.72	-35.49	5736243.27	573129.18
1615	13.18	106.88	1601.58	-1554.34	-107.05	-34.4	5736242.94	573130.27
1620	13.14	106.85	1606.45	-1559.21	-107.38	-33.31	5736242.61	573131.36
1625	13.09	106.83	1611.31	-1564.07	-107.71	-32.22	5736242.28	573132.44
1630	13.05	106.8	1616.18	-1568.94	-108.04	-31.14	5736241.95	573133.53
1635	13.01	106.78	1621.05	-1573.81	-108.36	-30.06	5736241.63	573134.6
1640	13.02	106.76	1625.92	-1578.68	-108.69	-28.98	5736241.3	573135.68
1645	13.32	106.75	1630.78	-1583.54	-109.02	-27.88	5736240.97	573136.78
1650	13.63	106.74	1635.64	-1588.4	-109.35	-26.78	5736240.64	573137.89
1655	13.93	106.73	1640.49	-1593.25	-109.7	-25.62	5736240.29	573139.04
1660	14.24	106.72	1645.34	-1598.1	-110.04	-24.47	5736239.95	573140.19
1665	14.54	106.72	1650.18	-1602.94	-110.41	-23.27	5736239.58	573141.4
1670	14.96	106.92	1655.02	-1607.78	-110.77	-22.07	5736239.22	573142.6
1675	15.62	107.57	1659.83	-1612.59	-111.18	-20.78	5736238.81	573143.88

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
1680	16.27	108.22	1664.64	-1617.4	-111.59	-19.5	5736238.4	573145.16
1685	16.93	108.87	1669.42	-1622.18	-112.06	-18.13	5736237.93	573146.54
1690	17.58	109.52	1674.2	-1626.96	-112.54	-16.75	5736237.45	573147.91
1695	18.24	110.17	1678.95	-1631.71	-113.08	-15.28	5736236.91	573149.38
1700	18.89	110.73	1683.69	-1636.45	-113.62	-13.82	5736236.37	573150.85
1705	19.53	111.21	1688.4	-1641.16	-114.23	-12.26	5736235.76	573152.41
1710	20.17	111.68	1693.11	-1645.87	-114.83	-10.7	5736235.16	573153.96
1715	20.81	112.15	1697.78	-1650.54	-115.51	-9.06	5736234.48	573155.61
1720	21.45	112.63	1702.46	-1655.22	-116.18	-7.42	5736233.81	573157.25
1725	22.09	113.1	1707.09	-1659.85	-116.92	-5.69	5736233.07	573158.98
1730	22.66	113.39	1711.72	-1664.48	-117.65	-3.96	5736232.34	573160.71
1735	23.22	113.62	1716.31	-1669.07	-118.44	-2.15	5736231.55	573162.51
1740	23.78	113.85	1720.9	-1673.66	-119.24	-0.35	5736230.76	573164.32
1745	24.33	114.09	1725.45	-1678.21	-120.08	1.53	5736229.91	573166.2
1750	24.89	114.32	1730.01	-1682.77	-120.92	3.41	5736229.07	573168.08
1755	25.45	114.55	1734.52	-1687.28	-121.81	5.37	5736228.18	573170.03
1760	26.01	114.65	1739.03	-1691.79	-122.7	7.32	5736227.29	573171.99
1765	26.57	114.73	1743.5	-1696.26	-123.64	9.35	5736226.35	573174.02
1770	27.13	114.82	1747.97	-1700.73	-124.58	11.38	5736225.41	573176.05
1775	27.69	114.91	1752.39	-1705.15	-125.56	13.49	5736224.44	573178.15
1780	28.25	115	1756.82	-1709.58	-126.53	15.6	5736223.46	573180.26
1785	28.82	115.01	1761.2	-1713.96	-127.55	17.78	5736222.44	573182.45
1790	29.42	114.7	1765.58	-1718.34	-128.57	19.97	5736221.42	573184.63
1795	30.03	114.39	1769.9	-1722.66	-129.6	22.25	5736220.39	573186.91
1800	30.63	114.07	1774.23	-1726.99	-130.63	24.53	5736219.36	573189.19
1805	31.23	113.76	1778.5	-1731.26	-131.67	26.9	5736218.32	573191.57
1810	31.83	113.45	1782.77	-1735.53	-132.71	29.27	5736217.28	573193.94
1815	32.41	113.23	1786.99	-1739.75	-133.77	31.74	5736216.22	573196.4
1820	32.94	113.17	1791.21	-1743.97	-134.83	34.2	5736215.16	573198.86
1825	33.47	113.11	1795.38	-1748.14	-135.91	36.73	5736214.08	573201.4
1830	34	113.05	1799.55	-1752.31	-136.99	39.27	5736213	573203.94
1835	34.53	112.99	1803.66	-1756.42	-138.1	41.88	5736211.89	573206.55
1840	35.06	112.93	1807.78	-1760.54	-139.21	44.49	5736210.78	573209.15
1845	35.57	112.94	1811.85	-1764.61	-140.34	47.17	5736209.65	573211.83
1850	36.05	113.01	1815.91	-1768.67	-141.47	49.85	5736208.52	573214.51
1855	36.53	113.08	1819.93	-1772.69	-142.64	52.58	5736207.35	573217.24
1860	37.02	113.14	1823.94	-1776.7	-143.81	55.32	5736206.18	573219.99
1865	37.5	113.21	1827.91	-1780.67	-145.01	58.12	5736204.98	573222.78
1870	37.98	113.28	1831.88	-1784.64	-146.21	60.92	5736203.78	573225.58
1875	38.51	113.31	1835.79	-1788.55	-147.44	63.78	5736202.55	573228.44
1880	39.05	113.32	1839.7	-1792.46	-148.67	66.63	5736201.32	573231.3
1885	39.59	113.33	1843.56	-1796.32	-149.93	69.56	5736200.06	573234.22
1890	40.13	113.35	1847.41	-1800.17	-151.2	72.49	5736198.79	573237.15
1895	40.67	113.36	1851.2	-1803.96	-152.49	75.48	5736197.5	573240.14
1900	41.21	113.37	1854.99	-1807.75	-153.78	78.47	5736196.21	573243.13
1905	41.9	113.31	1858.72	-1811.48	-155.1	81.53	5736194.89	573246.2
1910	42.58	113.25	1862.44	-1815.2	-156.42	84.6	5736193.57	573249.27
1915	43.27	113.19	1866.08	-1818.84	-157.77	87.75	5736192.22	573252.42
1920	43.96	113.14	1869.72	-1822.48	-159.12	90.9	5736190.87	573255.57
1925	44.65	113.08	1873.28	-1826.04	-160.5	94.13	5736189.49	573258.8
1930	45.33	112.98	1876.83	-1829.59	-161.87	97.37	5736188.12	573262.03
1935	45.99	112.73	1880.31	-1833.07	-163.26	100.68	5736186.73	573265.35
1940	46.65	112.48	1883.78	-1836.54	-164.65	104	5736185.34	573268.67
1945	47.3	112.22	1887.17	-1839.93	-166.04	107.4	5736183.95	573272.07
1950	47.96	111.97	1890.56	-1843.32	-167.43	110.81	5736182.56	573275.47
1955	48.62	111.71	1893.87	-1846.63	-168.82	114.29	5736181.18	573278.96
1960	49.25	111.42	1897.17	-1849.93	-170.2	117.78	5736179.79	573282.44
1965	49.83	111.05	1900.4	-1853.16	-171.57	121.34	5736178.42	573286.01

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
1970	50.42	110.67	1903.62	-1856.38	-172.94	124.91	5736177.05	573289.57
1975	51	110.3	1906.77	-1859.53	-174.29	128.55	5736175.7	573293.22
1980	51.59	109.92	1909.92	-1862.68	-175.64	132.2	5736174.35	573296.86
1985	52.17	109.54	1912.98	-1865.74	-176.96	135.92	5736173.03	573300.59
1990	52.79	109.26	1916.05	-1868.81	-178.28	139.64	5736171.71	573304.31
1992	53.05	109.18	1917.24	-1870	-178.8	141.16	5736171.19	573305.83
1993	53.19	109.14	1917.84	-1870.6	-179.07	141.92	5736170.92	573306.59
1994	53.32	109.1	1918.43	-1871.19	-179.33	142.68	5736170.66	573307.34
1995	53.45	109.06	1919.03	-1871.79	-179.59	143.44	5736170.4	573308.1
1996	53.58	109.02	1919.62	-1872.38	-179.85	144.2	5736170.14	573308.86
1997	53.71	108.98	1920.22	-1872.98	-180.11	144.96	5736169.88	573309.62
1998	53.84	108.94	1920.81	-1873.57	-180.38	145.72	5736169.61	573310.38
1999	53.97	108.9	1921.41	-1874.17	-180.64	146.48	5736169.35	573311.14
2000	54.1	108.86	1922	-1874.76	-180.9	147.24	5736169.09	573311.9
2001	54.23	108.82	1922.58	-1875.34	-181.16	148.01	5736168.83	573312.67
2002	54.37	108.78	1923.16	-1875.92	-181.42	148.78	5736168.57	573313.45
2003	54.5	108.74	1923.73	-1876.49	-181.69	149.56	5736168.31	573314.22
2004	54.63	108.7	1924.31	-1877.07	-181.95	150.33	5736168.04	573315
2005	54.76	108.66	1924.89	-1877.65	-182.21	151.11	5736167.78	573315.77
2006	54.89	108.62	1925.47	-1878.23	-182.47	151.88	5736167.52	573316.54
2007	55.02	108.58	1926.04	-1878.8	-182.73	152.65	5736167.26	573317.32
2008	55.15	108.54	1926.62	-1879.38	-182.99	153.43	5736167	573318.09
2009	55.28	108.5	1927.2	-1879.96	-183.25	154.2	5736166.74	573318.87
2010	55.41	108.46	1927.77	-1880.53	-183.51	154.97	5736166.48	573319.64
2011	55.55	108.42	1928.33	-1881.09	-183.77	155.76	5736166.22	573320.43
2012	55.68	108.38	1928.89	-1881.65	-184.03	156.55	5736165.96	573321.21
2013	55.81	108.34	1929.45	-1882.21	-184.29	157.34	5736165.7	573322
2014	55.94	108.3	1930.01	-1882.77	-184.55	158.12	5736165.44	573322.79
2015	56.07	108.26	1930.57	-1883.33	-184.81	158.91	5736165.18	573323.58
2016	56.2	108.22	1931.13	-1883.89	-185.07	159.7	5736164.92	573324.36
2017	56.28	108.2	1931.69	-1884.45	-185.33	160.49	5736164.66	573325.15
2018	56.35	108.19	1932.25	-1885.01	-185.59	161.27	5736164.4	573325.94
2019	56.42	108.17	1932.8	-1885.56	-185.85	162.06	5736164.14	573326.73
2020	56.48	108.16	1933.36	-1886.12	-186.11	162.85	5736163.88	573327.51
2021	56.55	108.15	1933.91	-1886.67	-186.37	163.64	5736163.62	573328.31
2022	56.61	108.14	1934.46	-1887.22	-186.63	164.44	5736163.36	573329.1
2023	56.68	108.12	1935.01	-1887.77	-186.89	165.23	5736163.1	573329.9
2024	56.75	108.11	1935.55	-1888.31	-187.15	166.03	5736162.84	573330.69
2025	56.81	108.1	1936.1	-1888.86	-187.41	166.83	5736162.58	573331.49
2026	56.88	108.09	1936.65	-1889.41	-187.67	167.62	5736162.32	573332.29
2027	56.95	108.07	1937.19	-1889.95	-187.93	168.42	5736162.06	573333.08
2028	57.01	108.06	1937.74	-1890.5	-188.19	169.21	5736161.8	573333.88
2029	57.08	108.05	1938.29	-1891.05	-188.45	170.01	5736161.54	573334.67
2030	57.15	108.04	1938.84	-1891.6	-188.71	170.8	5736161.28	573335.47
2031	57.21	108.02	1939.37	-1892.13	-188.97	171.61	5736161.02	573336.27
2032	57.28	108.01	1939.91	-1892.67	-189.23	172.41	5736160.76	573337.07
2033	57.35	108	1940.45	-1893.21	-189.49	173.21	5736160.5	573337.87
2034	57.41	107.99	1940.99	-1893.75	-189.75	174.01	5736160.24	573338.68
2035	57.48	107.97	1941.53	-1894.29	-190.01	174.81	5736159.98	573339.48
2036	57.55	107.96	1942.06	-1894.82	-190.27	175.62	5736159.72	573340.28
2037	57.61	107.95	1942.6	-1895.36	-190.53	176.42	5736159.46	573341.08
2038	57.68	107.94	1943.14	-1895.9	-190.79	177.22	5736159.2	573341.88
2039	57.75	107.92	1943.68	-1896.44	-191.05	178.02	5736158.94	573342.69
2040	57.81	107.91	1944.21	-1896.97	-191.31	178.82	5736158.68	573343.49
2041	57.88	107.9	1944.74	-1897.5	-191.57	179.63	5736158.42	573344.3
2042	57.95	107.88	1945.27	-1898.03	-191.83	180.44	5736158.16	573345.1
2043	58.01	107.87	1945.8	-1898.56	-192.09	181.25	5736157.9	573345.91
2044	58.08	107.86	1946.33	-1899.09	-192.35	182.05	5736157.64	573346.72

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
2045	58.12	107.85	1946.86	-1899.62	-192.62	182.86	5736157.38	573347.52
2046	58.07	107.85	1947.39	-1900.15	-192.88	183.67	5736157.12	573348.33
2047	58.02	107.85	1947.92	-1900.68	-193.14	184.47	5736156.86	573349.14
2048	57.97	107.85	1948.45	-1901.21	-193.4	185.28	5736156.6	573349.94
2049	57.92	107.86	1948.98	-1901.74	-193.66	186.09	5736156.33	573350.75
2050	57.87	107.86	1949.51	-1902.27	-193.92	186.89	5736156.07	573351.56
2051	57.82	107.86	1950.05	-1902.81	-194.18	187.7	5736155.82	573352.36
2052	57.77	107.86	1950.59	-1903.35	-194.43	188.5	5736155.56	573353.17
2053	57.72	107.86	1951.12	-1903.88	-194.69	189.31	5736155.3	573353.97
2054	57.67	107.86	1951.66	-1904.42	-194.95	190.11	5736155.04	573354.77
2055	57.62	107.86	1952.19	-1904.95	-195.21	190.91	5736154.78	573355.58
2056	57.57	107.87	1952.73	-1905.49	-195.47	191.72	5736154.52	573356.38
2057	57.52	107.87	1953.26	-1906.02	-195.73	192.52	5736154.26	573357.18
2058	57.47	107.87	1953.8	-1906.56	-195.99	193.32	5736154	573357.99
2059	57.42	107.87	1954.33	-1907.09	-196.25	194.13	5736153.74	573358.79
2060	57.37	107.87	1954.87	-1907.63	-196.51	194.93	5736153.48	573359.6
2061	57.32	107.87	1955.41	-1908.17	-196.76	195.73	5736153.23	573360.4
2062	57.27	107.87	1955.96	-1908.72	-197.02	196.53	5736152.97	573361.19
2063	57.22	107.88	1956.5	-1909.26	-197.28	197.33	5736152.71	573361.99
2064	57.17	107.88	1957.04	-1909.8	-197.54	198.13	5736152.45	573362.79
2065	57.12	107.88	1957.58	-1910.34	-197.8	198.93	5736152.2	573363.59
2066	57.07	107.88	1958.13	-1910.89	-198.05	199.73	5736151.94	573364.39
2067	57.02	107.88	1958.67	-1911.43	-198.31	200.53	5736151.68	573365.19
2068	56.97	107.88	1959.21	-1911.97	-198.57	201.33	5736151.42	573365.99
2069	56.92	107.88	1959.76	-1912.52	-198.83	202.13	5736151.16	573366.79
2070	56.87	107.88	1960.3	-1913.06	-199.08	202.92	5736150.91	573367.59
2071	56.82	107.89	1960.85	-1913.61	-199.34	203.72	5736150.65	573368.38
2072	56.77	107.89	1961.4	-1914.16	-199.6	204.51	5736150.39	573369.18
2073	56.72	107.89	1961.95	-1914.71	-199.85	205.31	5736150.14	573369.97
2074	56.68	107.89	1962.5	-1915.26	-200.11	206.11	5736149.88	573370.77
2075	56.66	107.87	1963.05	-1915.81	-200.37	206.9	5736149.63	573371.57
2076	56.64	107.86	1963.59	-1916.35	-200.62	207.7	5736149.37	573372.36
2077	56.62	107.84	1964.14	-1916.9	-200.88	208.49	5736149.11	573373.16
2078	56.6	107.83	1964.69	-1917.45	-201.13	209.29	5736148.86	573373.95
2079	56.59	107.81	1965.24	-1918	-201.39	210.08	5736148.6	573374.75
2080	56.57	107.8	1965.79	-1918.55	-201.65	210.88	5736148.34	573375.54
2081	56.55	107.78	1966.34	-1919.1	-201.9	211.67	5736148.09	573376.34
2082	56.53	107.77	1966.9	-1919.66	-202.15	212.47	5736147.84	573377.13
2083	56.52	107.76	1967.45	-1920.21	-202.41	213.26	5736147.58	573377.92
2084	56.5	107.74	1968	-1920.76	-202.66	214.05	5736147.33	573378.72
2085	56.48	107.73	1968.55	-1921.31	-202.92	214.85	5736147.07	573379.51
2086	56.46	107.71	1969.11	-1921.87	-203.17	215.64	5736146.82	573380.31
2087	56.45	107.7	1969.66	-1922.42	-203.42	216.44	5736146.57	573381.1
2088	56.43	107.68	1970.21	-1922.97	-203.68	217.23	5736146.31	573381.89
2089	56.41	107.67	1970.76	-1923.52	-203.93	218.02	5736146.06	573382.69
2090	56.39	107.65	1971.31	-1924.07	-204.19	218.82	5736145.81	573383.48
2091	56.38	107.64	1971.87	-1924.63	-204.44	219.61	5736145.55	573384.28
2092	56.36	107.62	1972.42	-1925.18	-204.69	220.4	5736145.3	573385.07
2093	56.34	107.61	1972.98	-1925.74	-204.94	221.2	5736145.05	573385.86
2094	56.32	107.6	1973.53	-1926.29	-205.19	221.99	5736144.8	573386.66
2095	56.3	107.58	1974.09	-1926.85	-205.44	222.78	5736144.55	573387.45
2096	56.29	107.57	1974.64	-1927.4	-205.69	223.58	5736144.3	573388.24
2097	56.27	107.55	1975.2	-1927.96	-205.95	224.37	5736144.05	573389.04
2098	56.25	107.54	1975.75	-1928.51	-206.2	225.16	5736143.79	573389.83
2099	56.23	107.52	1976.31	-1929.07	-206.45	225.96	5736143.54	573390.62
2100	56.22	107.51	1976.86	-1929.62	-206.7	226.75	5736143.29	573391.41
2101	56.2	107.49	1977.42	-1930.18	-206.95	227.54	5736143.04	573392.21
2102	56.18	107.48	1977.98	-1930.74	-207.2	228.33	5736142.79	573393

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
2103	56.16	107.46	1978.53	-1931.29	-207.44	229.13	5736142.55	573393.79
2104	56.15	107.44	1979.09	-1931.85	-207.69	229.92	5736142.3	573394.58
2105	56.13	107.42	1979.65	-1932.41	-207.94	230.71	5736142.05	573395.38
2106	56.11	107.4	1980.21	-1932.97	-208.19	231.5	5736141.8	573396.17
2107	56.1	107.38	1980.76	-1933.52	-208.44	232.3	5736141.55	573396.96
2108	56.08	107.36	1981.32	-1934.08	-208.69	233.09	5736141.3	573397.75
2109	56.06	107.34	1981.88	-1934.64	-208.94	233.88	5736141.05	573398.54
2110	56.05	107.32	1982.43	-1935.19	-209.18	234.67	5736140.81	573399.34
2111	56.03	107.3	1982.99	-1935.75	-209.43	235.46	5736140.56	573400.13
2112	56.01	107.27	1983.55	-1936.31	-209.67	236.26	5736140.32	573400.92
2113	56	107.25	1984.11	-1936.87	-209.92	237.05	5736140.07	573401.71
2114	55.98	107.23	1984.67	-1937.43	-210.17	237.84	5736139.83	573402.5
2115	55.96	107.21	1985.23	-1937.99	-210.41	238.63	5736139.58	573403.3
2116	55.95	107.19	1985.79	-1938.55	-210.66	239.42	5736139.33	573404.09
2117	55.93	107.17	1986.35	-1939.11	-210.9	240.21	5736139.09	573404.88
2118	55.91	107.15	1986.91	-1939.67	-211.15	241.01	5736138.84	573405.67
2119	55.9	107.13	1987.47	-1940.23	-211.39	241.8	5736138.6	573406.46
2120	55.88	107.11	1988.03	-1940.79	-211.64	242.59	5736138.35	573407.25
2121	55.86	107.09	1988.59	-1941.35	-211.88	243.38	5736138.11	573408.04
2122	55.85	107.07	1989.16	-1941.92	-212.12	244.17	5736137.87	573408.83
2123	55.83	107.05	1989.72	-1942.48	-212.36	244.96	5736137.63	573409.63
2124	55.81	107.02	1990.28	-1943.04	-212.6	245.75	5736137.39	573410.42
2125	55.8	107	1990.84	-1943.6	-212.85	246.54	5736137.14	573411.21
2126	55.78	106.98	1991.4	-1944.16	-213.09	247.33	5736136.9	573412
2127	55.76	106.96	1991.97	-1944.73	-213.33	248.12	5736136.66	573412.79
2128	55.75	106.94	1992.53	-1945.29	-213.57	248.92	5736136.42	573413.58
2129	55.73	106.92	1993.09	-1945.85	-213.81	249.71	5736136.18	573414.37
2130	55.71	106.9	1993.65	-1946.41	-214.06	250.5	5736135.93	573415.16
2131	55.7	106.88	1994.22	-1946.98	-214.3	251.29	5736135.7	573415.95
2132	55.69	106.86	1994.78	-1947.54	-214.53	252.08	5736135.46	573416.74
2133	55.7	106.85	1995.34	-1948.1	-214.77	252.87	5736135.22	573417.53
2134	55.7	106.84	1995.91	-1948.67	-215.01	253.66	5736134.98	573418.32
2135	55.71	106.82	1996.47	-1949.23	-215.25	254.45	5736134.74	573419.12
2136	55.72	106.81	1997.03	-1949.79	-215.49	255.24	5736134.5	573419.91
2137	55.72	106.79	1997.6	-1950.36	-215.73	256.03	5736134.26	573420.7
2138	55.73	106.78	1998.16	-1950.92	-215.97	256.82	5736134.02	573421.49
2139	55.73	106.77	1998.72	-1951.48	-216.21	257.61	5736133.78	573422.28
2140	55.74	106.75	1999.29	-1952.05	-216.45	258.41	5736133.54	573423.07
2141	55.74	106.74	1999.85	-1952.61	-216.68	259.2	5736133.31	573423.86
2142	55.75	106.73	2000.41	-1953.17	-216.92	259.99	5736133.07	573424.65
2143	55.75	106.71	2000.97	-1953.73	-217.16	260.78	5736132.83	573425.45
2144	55.76	106.7	2001.54	-1954.3	-217.4	261.57	5736132.59	573426.24
2145	55.77	106.69	2002.1	-1954.86	-217.63	262.37	5736132.36	573427.03
2146	55.77	106.67	2002.66	-1955.42	-217.87	263.16	5736132.12	573427.82
2147	55.78	106.66	2003.23	-1955.99	-218.11	263.95	5736131.88	573428.61
2148	55.78	106.65	2003.79	-1956.55	-218.35	264.74	5736131.64	573429.41
2149	55.79	106.63	2004.35	-1957.11	-218.58	265.53	5736131.41	573430.2
2150	55.79	106.62	2004.91	-1957.67	-218.82	266.32	5736131.17	573430.99
2151	55.8	106.61	2005.47	-1958.23	-219.06	267.12	5736130.93	573431.78
2152	55.8	106.59	2006.04	-1958.8	-219.29	267.91	5736130.7	573432.58
2153	55.81	106.58	2006.6	-1959.36	-219.53	268.7	5736130.46	573433.37
2154	55.81	106.57	2007.16	-1959.92	-219.76	269.5	5736130.23	573434.16
2155	55.82	106.55	2007.72	-1960.48	-220	270.29	5736129.99	573434.95
2156	55.83	106.54	2008.28	-1961.04	-220.23	271.08	5736129.76	573435.75
2157	55.83	106.53	2008.85	-1961.61	-220.47	271.88	5736129.52	573436.54
2158	55.84	106.51	2009.41	-1962.17	-220.71	272.67	5736129.28	573437.33
2159	55.84	106.5	2009.97	-1962.73	-220.94	273.46	5736129.05	573438.13
2160	55.85	106.48	2010.53	-1963.29	-221.18	274.25	5736128.81	573438.92

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
2161	55.83	106.47	2011.09	-1963.85	-221.41	275.05	5736128.58	573439.71
2162	55.79	106.47	2011.66	-1964.42	-221.64	275.84	5736128.35	573440.5
2163	55.76	106.46	2012.22	-1964.98	-221.88	276.63	5736128.11	573441.3
2164	55.73	106.45	2012.79	-1965.55	-222.11	277.42	5736127.88	573442.09
2165	55.69	106.44	2013.35	-1966.11	-222.35	278.22	5736127.64	573442.88
2166	55.66	106.44	2013.91	-1966.67	-222.58	279.01	5736127.41	573443.67
2167	55.62	106.43	2014.48	-1967.24	-222.81	279.8	5736127.18	573444.46
2168	55.59	106.42	2015.04	-1967.8	-223.05	280.59	5736126.94	573445.26
2169	55.55	106.41	2015.6	-1968.36	-223.28	281.38	5736126.71	573446.05
2170	55.52	106.4	2016.17	-1968.93	-223.52	282.18	5736126.48	573446.84
2171	55.49	106.4	2016.74	-1969.5	-223.75	282.97	5736126.24	573447.63
2172	55.45	106.39	2017.3	-1970.06	-223.98	283.76	5736126.01	573448.42
2173	55.42	106.38	2017.87	-1970.63	-224.21	284.54	5736125.78	573449.21
2174	55.38	106.37	2018.44	-1971.2	-224.44	285.33	5736125.55	573450
2175	55.35	106.36	2019.01	-1971.77	-224.67	286.12	5736125.32	573450.79
2176	55.31	106.36	2019.58	-1972.34	-224.91	286.91	5736125.08	573451.58
2177	55.28	106.35	2020.15	-1972.91	-225.14	287.7	5736124.85	573452.37
2178	55.25	106.34	2020.72	-1973.48	-225.37	288.49	5736124.62	573453.16
2179	55.21	106.33	2021.28	-1974.04	-225.6	289.28	5736124.39	573453.95
2180	55.18	106.32	2021.85	-1974.61	-225.83	290.07	5736124.16	573454.73
2181	55.14	106.32	2022.43	-1975.19	-226.06	290.86	5736123.93	573455.52
2182	55.11	106.31	2023	-1975.76	-226.29	291.64	5736123.7	573456.31
2183	55.08	106.3	2023.57	-1976.33	-226.52	292.43	5736123.47	573457.09
2184	55.04	106.29	2024.15	-1976.91	-226.75	293.22	5736123.24	573457.88
2185	55.01	106.28	2024.72	-1977.48	-226.98	294	5736123.01	573458.67
2186	54.97	106.28	2025.29	-1978.05	-227.21	294.79	5736122.78	573459.45
2187	54.94	106.27	2025.87	-1978.63	-227.44	295.57	5736122.55	573460.24
2188	54.9	106.26	2026.44	-1979.2	-227.67	296.36	5736122.32	573461.03
2189	54.87	106.25	2027.01	-1979.77	-227.9	297.15	5736122.09	573461.81
2190	54.84	106.23	2027.59	-1980.35	-228.13	297.93	5736121.86	573462.6
2191	54.81	106.21	2028.17	-1980.93	-228.36	298.72	5736121.63	573463.38
2192	54.78	106.18	2028.74	-1981.5	-228.58	299.5	5736121.41	573464.17
2193	54.75	106.15	2029.32	-1982.08	-228.81	300.29	5736121.18	573464.95
2194	54.72	106.13	2029.9	-1982.66	-229.04	301.07	5736120.95	573465.73
2195	54.69	106.1	2030.48	-1983.24	-229.26	301.85	5736120.73	573466.52
2196	54.66	106.07	2031.06	-1983.82	-229.49	302.64	5736120.5	573467.3
2197	54.63	106.05	2031.63	-1984.39	-229.71	303.42	5736120.28	573468.09
2198	54.6	106.02	2032.21	-1984.97	-229.94	304.21	5736120.05	573468.87
2199	54.57	105.99	2032.79	-1985.55	-230.17	304.99	5736119.82	573469.65
2200	54.54	105.97	2033.37	-1986.13	-230.39	305.77	5736119.6	573470.44
2201	54.52	105.94	2033.95	-1986.71	-230.62	306.56	5736119.37	573471.22
2202	54.49	105.91	2034.53	-1987.29	-230.84	307.34	5736119.15	573472
2203	54.46	105.89	2035.11	-1987.87	-231.06	308.12	5736118.93	573472.79
2204	54.43	105.86	2035.7	-1988.46	-231.28	308.9	5736118.71	573473.57
2205	54.4	105.84	2036.28	-1989.04	-231.5	309.68	5736118.49	573474.35
2206	54.37	105.81	2036.86	-1989.62	-231.73	310.47	5736118.27	573475.13
2207	54.34	105.78	2037.44	-1990.2	-231.95	311.25	5736118.04	573475.91
2208	54.31	105.76	2038.02	-1990.78	-232.17	312.03	5736117.82	573476.7
2209	54.28	105.73	2038.61	-1991.37	-232.39	312.81	5736117.6	573477.48
2210	54.25	105.7	2039.19	-1991.95	-232.61	313.6	5736117.38	573478.26
2211	54.22	105.68	2039.78	-1992.54	-232.83	314.38	5736117.16	573479.04
2212	54.19	105.65	2040.36	-1993.12	-233.05	315.16	5736116.94	573479.82
2213	54.16	105.62	2040.95	-1993.71	-233.27	315.94	5736116.73	573480.6
2214	54.13	105.6	2041.53	-1994.29	-233.48	316.72	5736116.51	573481.38
2215	54.1	105.57	2042.12	-1994.88	-233.7	317.5	5736116.29	573482.16
2216	54.07	105.54	2042.71	-1995.47	-233.92	318.28	5736116.07	573482.94
2217	54.04	105.52	2043.29	-1996.05	-234.14	319.06	5736115.86	573483.72
2218	54.01	105.49	2043.88	-1996.64	-234.35	319.84	5736115.64	573484.5

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
2219	53.99	105.47	2044.47	-1997.23	-234.57	320.62	5736115.42	573485.28
2220	53.97	105.46	2045.05	-1997.81	-234.79	321.4	5736115.2	573486.06
2221	53.96	105.46	2045.64	-1998.4	-235	322.18	5736114.99	573486.84
2222	53.95	105.45	2046.23	-1998.99	-235.22	322.96	5736114.77	573487.62
2223	53.93	105.45	2046.82	-1999.58	-235.43	323.74	5736114.56	573488.4
2224	53.92	105.44	2047.41	-2000.17	-235.65	324.52	5736114.34	573489.18
2225	53.91	105.44	2048	-2000.76	-235.86	325.29	5736114.13	573489.96
2226	53.89	105.43	2048.59	-2001.35	-236.08	326.07	5736113.91	573490.74
2227	53.88	105.43	2049.18	-2001.94	-236.29	326.85	5736113.7	573491.52
2228	53.86	105.42	2049.77	-2002.53	-236.51	327.63	5736113.48	573492.3
2229	53.85	105.41	2050.35	-2003.11	-236.72	328.41	5736113.27	573493.07
2230	53.84	105.41	2050.94	-2003.7	-236.94	329.19	5736113.05	573493.85
2231	53.82	105.4	2051.53	-2004.29	-237.15	329.97	5736112.84	573494.63
2232	53.81	105.4	2052.13	-2004.89	-237.37	330.74	5736112.62	573495.41
2233	53.8	105.39	2052.72	-2005.48	-237.58	331.52	5736112.41	573496.19
2234	53.78	105.39	2053.31	-2006.07	-237.79	332.3	5736112.2	573496.96
2235	53.77	105.38	2053.9	-2006.66	-238.01	333.08	5736111.98	573497.74
2236	53.75	105.38	2054.49	-2007.25	-238.22	333.85	5736111.77	573498.52
2237	53.74	105.37	2055.08	-2007.84	-238.44	334.63	5736111.55	573499.3
2238	53.73	105.36	2055.67	-2008.43	-238.65	335.41	5736111.34	573500.08
2239	53.71	105.36	2056.26	-2009.02	-238.86	336.19	5736111.13	573500.85
2240	53.7	105.35	2056.85	-2009.61	-239.08	336.97	5736110.91	573501.63
2241	53.69	105.35	2057.45	-2010.21	-239.29	337.74	5736110.7	573502.41
2242	53.67	105.34	2058.04	-2010.8	-239.5	338.52	5736110.49	573503.18
2243	53.66	105.34	2058.63	-2011.39	-239.72	339.3	5736110.27	573503.96
2244	53.64	105.33	2059.23	-2011.99	-239.93	340.07	5736110.06	573504.74
2245	53.63	105.33	2059.82	-2012.58	-240.14	340.85	5736109.85	573505.51
2246	53.62	105.32	2060.41	-2013.17	-240.35	341.63	5736109.64	573506.29
2247	53.6	105.32	2061	-2013.76	-240.57	342.4	5736109.42	573507.07
2248	53.59	105.31	2061.6	-2014.36	-240.78	343.18	5736109.21	573507.84
2249	53.63	105.31	2062.19	-2014.95	-240.99	343.96	5736109	573508.62
2250	53.68	105.3	2062.78	-2015.54	-241.21	344.73	5736108.78	573509.4
2251	53.72	105.3	2063.37	-2016.13	-241.42	345.51	5736108.57	573510.18
2252	53.76	105.3	2063.96	-2016.72	-241.63	346.29	5736108.36	573510.96
2253	53.81	105.29	2064.55	-2017.31	-241.85	347.07	5736108.15	573511.74
2254	53.85	105.29	2065.14	-2017.9	-242.06	347.85	5736107.93	573512.51
2255	53.89	105.29	2065.73	-2018.49	-242.27	348.63	5736107.72	573513.29
2256	53.94	105.29	2066.32	-2019.08	-242.48	349.41	5736107.51	573514.07
2257	53.98	105.28	2066.91	-2019.67	-242.7	350.19	5736107.29	573514.85
2258	54.02	105.28	2067.5	-2020.26	-242.91	350.97	5736107.08	573515.63
2259	54.07	105.28	2068.09	-2020.85	-243.12	351.75	5736106.87	573516.41
2260	54.11	105.27	2068.68	-2021.44	-243.34	352.53	5736106.65	573517.19
2261	54.15	105.27	2069.26	-2022.02	-243.55	353.31	5736106.44	573517.97
2262	54.2	105.27	2069.84	-2022.6	-243.76	354.09	5736106.23	573518.76
2263	54.24	105.26	2070.42	-2023.18	-243.98	354.88	5736106.01	573519.54
2264	54.29	105.26	2071.01	-2023.77	-244.19	355.66	5736105.8	573520.33
2265	54.33	105.26	2071.59	-2024.35	-244.41	356.44	5736105.58	573521.11
2266	54.37	105.25	2072.17	-2024.93	-244.62	357.23	5736105.37	573521.89
2267	54.42	105.25	2072.76	-2025.52	-244.83	358.01	5736105.16	573522.68
2268	54.46	105.25	2073.34	-2026.1	-245.05	358.8	5736104.94	573523.46
2269	54.5	105.24	2073.92	-2026.68	-245.26	359.58	5736104.73	573524.24
2270	54.55	105.24	2074.51	-2027.27	-245.47	360.36	5736104.52	573525.03
2271	54.59	105.24	2075.08	-2027.84	-245.69	361.15	5736104.3	573525.82
2272	54.63	105.24	2075.66	-2028.42	-245.9	361.94	5736104.09	573526.6
2273	54.68	105.23	2076.24	-2029	-246.12	362.73	5736103.87	573527.39
2274	54.72	105.23	2076.82	-2029.58	-246.33	363.51	5736103.66	573528.18
2275	54.76	105.23	2077.39	-2030.15	-246.55	364.3	5736103.44	573528.97
2276	54.81	105.22	2077.97	-2030.73	-246.76	365.09	5736103.23	573529.76

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
2277	54.85	105.22	2078.55	-2031.31	-246.97	365.88	5736103.02	573530.54
2278	54.81	105.21	2079.13	-2031.89	-247.19	366.67	5736102.8	573531.33
2279	54.78	105.19	2079.7	-2032.46	-247.4	367.45	5736102.59	573532.12
2280	54.74	105.18	2080.28	-2033.04	-247.62	368.24	5736102.37	573532.91
2281	54.7	105.16	2080.86	-2033.62	-247.83	369.03	5736102.16	573533.69
2282	54.66	105.15	2081.44	-2034.2	-248.04	369.81	5736101.95	573534.48
2283	54.63	105.13	2082.02	-2034.78	-248.25	370.6	5736101.74	573535.27
2284	54.59	105.12	2082.6	-2035.36	-248.47	371.39	5736101.52	573536.05
2285	54.55	105.11	2083.18	-2035.94	-248.68	372.17	5736101.31	573536.84
2286	54.51	105.09	2083.76	-2036.52	-248.89	372.96	5736101.1	573537.62
2287	54.47	105.08	2084.34	-2037.1	-249.1	373.75	5736100.89	573538.41
2288	54.44	105.06	2084.92	-2037.68	-249.32	374.53	5736100.67	573539.2
2289	54.4	105.05	2085.5	-2038.26	-249.53	375.32	5736100.46	573539.98
2290	54.36	105.04	2086.08	-2038.84	-249.74	376.11	5736100.25	573540.77
2291	54.32	105.02	2086.67	-2039.43	-249.95	376.89	5736100.04	573541.55
2292	54.29	105.01	2087.25	-2040.01	-250.16	377.67	5736099.83	573542.34
2293	54.25	104.99	2087.84	-2040.6	-250.37	378.46	5736099.62	573543.12
2294	54.21	104.98	2088.42	-2041.18	-250.58	379.24	5736099.41	573543.9
2295	54.17	104.96	2089.01	-2041.77	-250.79	380.02	5736099.2	573544.69
2296	54.14	104.95	2089.59	-2042.35	-251	380.81	5736098.99	573545.47
2297	54.1	104.94	2090.18	-2042.94	-251.21	381.59	5736098.78	573546.25
2298	54.06	104.92	2090.76	-2043.52	-251.42	382.37	5736098.57	573547.04
2299	54.02	104.91	2091.35	-2044.11	-251.63	383.16	5736098.37	573547.82
2300	53.98	104.89	2091.93	-2044.69	-251.83	383.94	5736098.16	573548.6
2301	53.95	104.88	2092.53	-2045.29	-252.04	384.72	5736097.95	573549.38
2302	53.91	104.86	2093.12	-2045.88	-252.25	385.5	5736097.74	573550.16
2303	53.87	104.85	2093.71	-2046.47	-252.45	386.28	5736097.54	573550.94
2304	53.83	104.84	2094.3	-2047.06	-252.66	387.06	5736097.33	573551.72
2305	53.8	104.82	2094.89	-2047.65	-252.87	387.84	5736097.12	573552.5
2306	53.76	104.81	2095.48	-2048.24	-253.07	388.62	5736096.92	573553.28
2307	53.73	104.8	2096.07	-2048.83	-253.28	389.4	5736096.71	573554.06
2308	53.71	104.79	2096.66	-2049.42	-253.49	390.18	5736096.5	573554.84
2309	53.69	104.78	2097.25	-2050.01	-253.69	390.96	5736096.3	573555.62
2310	53.68	104.78	2097.84	-2050.6	-253.9	391.74	5736096.09	573556.4
2311	53.66	104.77	2098.43	-2051.19	-254.11	392.52	5736095.89	573557.18
2312	53.64	104.76	2099.03	-2051.79	-254.31	393.3	5736095.68	573557.96
2313	53.62	104.76	2099.62	-2052.38	-254.51	394.07	5736095.48	573558.74
2314	53.6	104.75	2100.21	-2052.97	-254.72	394.85	5736095.27	573559.52
2315	53.58	104.74	2100.81	-2053.57	-254.92	395.63	5736095.07	573560.3
2316	53.57	104.74	2101.4	-2054.16	-255.13	396.41	5736094.86	573561.07
2317	53.55	104.73	2102	-2054.76	-255.33	397.19	5736094.66	573561.85
2318	53.53	104.72	2102.59	-2055.35	-255.54	397.97	5736094.45	573562.63
2319	53.51	104.72	2103.18	-2055.94	-255.74	398.74	5736094.25	573563.41
2320	53.49	104.71	2103.78	-2056.54	-255.95	399.52	5736094.04	573564.19
2321	53.47	104.7	2104.37	-2057.13	-256.15	400.3	5736093.84	573564.96
2322	53.46	104.7	2104.97	-2057.73	-256.36	401.08	5736093.64	573565.74
2323	53.44	104.69	2105.56	-2058.32	-256.56	401.85	5736093.43	573566.52
2324	53.42	104.69	2106.16	-2058.92	-256.76	402.63	5736093.23	573567.29
2325	53.4	104.68	2106.76	-2059.52	-256.97	403.41	5736093.03	573568.07
2326	53.38	104.67	2107.35	-2060.11	-257.17	404.18	5736092.82	573568.85
2327	53.37	104.67	2107.95	-2060.71	-257.37	404.96	5736092.62	573569.62
2328	53.35	104.66	2108.55	-2061.31	-257.58	405.74	5736092.42	573570.4
2329	53.33	104.65	2109.14	-2061.9	-257.78	406.51	5736092.21	573571.18
2330	53.31	104.65	2109.74	-2062.5	-257.98	407.29	5736092.01	573571.95
2331	53.29	104.64	2110.34	-2063.1	-258.18	408.06	5736091.81	573572.73
2332	53.27	104.63	2110.93	-2063.7	-258.39	408.84	5736091.6	573573.5
2333	53.26	104.63	2111.53	-2064.29	-258.59	409.62	5736091.4	573574.28
2334	53.24	104.62	2112.13	-2064.89	-258.79	410.39	5736091.2	573575.05

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
2335	53.22	104.61	2112.73	-2065.49	-258.99	411.17	5736091	573575.83
2336	53.21	104.6	2113.33	-2066.09	-259.19	411.94	5736090.8	573576.61
2337	53.21	104.58	2113.93	-2066.69	-259.4	412.72	5736090.59	573577.38
2338	53.21	104.57	2114.53	-2067.29	-259.6	413.49	5736090.39	573578.16
2339	53.21	104.55	2115.12	-2067.88	-259.8	414.27	5736090.19	573578.93
2340	53.21	104.53	2115.72	-2068.48	-260	415.04	5736089.99	573579.71
2341	53.21	104.51	2116.32	-2069.08	-260.2	415.82	5736089.79	573580.48
2342	53.21	104.5	2116.92	-2069.68	-260.4	416.59	5736089.59	573581.26
2343	53.21	104.48	2117.52	-2070.28	-260.6	417.37	5736089.39	573582.03
2344	53.21	104.46	2118.12	-2070.88	-260.8	418.14	5736089.19	573582.81
2345	53.21	104.44	2118.72	-2071.48	-261	418.92	5736088.99	573583.58
2346	53.21	104.42	2119.32	-2072.08	-261.2	419.69	5736088.79	573584.36
2347	53.21	104.41	2119.92	-2072.68	-261.4	420.47	5736088.59	573585.13
2348	53.21	104.39	2120.51	-2073.27	-261.6	421.25	5736088.39	573585.91
2349	53.21	104.37	2121.11	-2073.87	-261.8	422.02	5736088.19	573586.69
2350	53.21	104.35	2121.71	-2074.47	-262	422.8	5736087.99	573587.46
2351	53.21	104.34	2122.31	-2075.07	-262.2	423.57	5736087.79	573588.24
2352	53.21	104.32	2122.91	-2075.67	-262.39	424.35	5736087.6	573589.01
2353	53.21	104.3	2123.51	-2076.27	-262.59	425.12	5736087.4	573589.79
2354	53.21	104.28	2124.11	-2076.87	-262.79	425.9	5736087.2	573590.57
2355	53.21	104.27	2124.71	-2077.47	-262.99	426.68	5736087	573591.34
2356	53.21	104.25	2125.31	-2078.07	-263.18	427.45	5736086.81	573592.12
2357	53.21	104.23	2125.9	-2078.66	-263.38	428.23	5736086.61	573592.89
2358	53.21	104.21	2126.5	-2079.26	-263.58	429.01	5736086.41	573593.67
2359	53.21	104.2	2127.1	-2079.86	-263.78	429.78	5736086.22	573594.45
2360	53.21	104.18	2127.7	-2080.46	-263.97	430.56	5736086.02	573595.22
2361	53.21	104.16	2128.3	-2081.06	-264.17	431.33	5736085.82	573596
2362	53.21	104.14	2128.9	-2081.66	-264.36	432.11	5736085.63	573596.77
2363	53.21	104.12	2129.5	-2082.26	-264.56	432.89	5736085.43	573597.55
2364	53.21	104.11	2130.1	-2082.86	-264.75	433.66	5736085.24	573598.33
2365	53.18	104.1	2130.7	-2083.46	-264.95	434.44	5736085.04	573599.1
2366	53.14	104.09	2131.3	-2084.06	-265.14	435.21	5736084.85	573599.88
2367	53.09	104.08	2131.9	-2084.66	-265.34	435.99	5736084.65	573600.65
2368	53.05	104.07	2132.5	-2085.26	-265.53	436.77	5736084.46	573601.43
2369	53	104.06	2133.1	-2085.86	-265.73	437.54	5736084.26	573602.21
2370	52.96	104.05	2133.7	-2086.46	-265.92	438.32	5736084.07	573602.98
2371	52.91	104.05	2134.3	-2087.06	-266.12	439.09	5736083.88	573603.76
2372	52.87	104.04	2134.91	-2087.67	-266.31	439.86	5736083.68	573604.53
2373	52.82	104.03	2135.52	-2088.28	-266.5	440.63	5736083.49	573605.3
2374	52.78	104.02	2136.12	-2088.88	-266.69	441.41	5736083.3	573606.07
2375	52.74	104.01	2136.73	-2089.49	-266.89	442.18	5736083.1	573606.84
2376	52.69	104	2137.33	-2090.09	-267.08	442.95	5736082.91	573607.62
2377	52.65	104	2137.94	-2090.7	-267.27	443.72	5736082.72	573608.39
2378	52.6	103.99	2138.54	-2091.3	-267.46	444.49	5736082.53	573609.16
2379	52.56	103.98	2139.15	-2091.91	-267.66	445.27	5736082.33	573609.93
2380	52.51	103.97	2139.75	-2092.51	-267.85	446.04	5736082.14	573610.7
2381	52.47	103.96	2140.37	-2093.13	-268.04	446.81	5736081.95	573611.47
2382	52.42	103.95	2140.98	-2093.74	-268.23	447.57	5736081.76	573612.24
2383	52.38	103.95	2141.59	-2094.35	-268.42	448.34	5736081.57	573613.01
2384	52.33	103.94	2142.2	-2094.96	-268.61	449.11	5736081.38	573613.78
2385	52.29	103.93	2142.81	-2095.57	-268.8	449.88	5736081.19	573614.54
2386	52.24	103.92	2143.42	-2096.18	-268.99	450.65	5736081	573615.31
2387	52.2	103.91	2144.04	-2096.8	-269.18	451.41	5736080.81	573616.08
2388	52.15	103.9	2144.65	-2097.41	-269.37	452.18	5736080.62	573616.85
2389	52.11	103.9	2145.26	-2098.02	-269.56	452.95	5736080.43	573617.61
2390	52.06	103.89	2145.87	-2098.63	-269.75	453.72	5736080.24	573618.38
2391	52.02	103.88	2146.49	-2099.25	-269.94	454.48	5736080.05	573619.15
2392	51.97	103.87	2147.1	-2099.86	-270.13	455.25	5736079.86	573619.91

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
2393	51.93	103.86	2147.72	-2100.48	-270.32	456.01	5736079.67	573620.68
2394	51.93	103.87	2148.34	-2101.1	-270.51	456.78	5736079.48	573621.44
2395	51.94	103.89	2148.95	-2101.71	-270.7	457.54	5736079.29	573622.21
2396	51.95	103.91	2149.57	-2102.33	-270.89	458.31	5736079.1	573622.97
2397	51.96	103.93	2150.18	-2102.94	-271.08	459.07	5736078.91	573623.73
2398	51.97	103.94	2150.8	-2103.56	-271.27	459.83	5736078.72	573624.5
2399	51.98	103.96	2151.42	-2104.18	-271.46	460.6	5736078.53	573625.26
2400	51.99	103.98	2152.03	-2104.79	-271.65	461.36	5736078.34	573626.03
2401	52	104	2152.65	-2105.41	-271.84	462.13	5736078.15	573626.79
2402	52.01	104.01	2153.26	-2106.02	-272.03	462.89	5736077.96	573627.56
2403	52.02	104.03	2153.88	-2106.64	-272.22	463.66	5736077.77	573628.32
2404	52.04	104.05	2154.49	-2107.25	-272.41	464.42	5736077.58	573629.09
2405	52.05	104.07	2155.11	-2107.87	-272.61	465.19	5736077.39	573629.85
2406	52.06	104.08	2155.72	-2108.48	-272.8	465.95	5736077.19	573630.62
2407	52.07	104.1	2156.34	-2109.1	-272.99	466.72	5736077	573631.38
2408	52.08	104.12	2156.95	-2109.71	-273.18	467.48	5736076.81	573632.15
2409	52.09	104.14	2157.57	-2110.33	-273.37	468.25	5736076.62	573632.91
2410	52.1	104.15	2158.18	-2110.94	-273.56	469.01	5736076.43	573633.68
2411	52.11	104.17	2158.8	-2111.56	-273.76	469.78	5736076.23	573634.44
2412	52.12	104.19	2159.41	-2112.17	-273.95	470.54	5736076.04	573635.21
2413	52.13	104.21	2160.02	-2112.78	-274.15	471.31	5736075.84	573635.97
2414	52.14	104.22	2160.64	-2113.4	-274.34	472.07	5736075.65	573636.74
2415	52.15	104.24	2161.25	-2114.01	-274.53	472.84	5736075.46	573637.5
2416	52.16	104.26	2161.86	-2114.62	-274.73	473.6	5736075.26	573638.27
2417	52.17	104.28	2162.48	-2115.24	-274.92	474.37	5736075.07	573639.03
2418	52.18	104.3	2163.09	-2115.85	-275.12	475.13	5736074.87	573639.8
2419	52.2	104.31	2163.7	-2116.46	-275.31	475.9	5736074.68	573640.56
2420	52.21	104.33	2164.32	-2117.08	-275.51	476.67	5736074.48	573641.33
2421	52.22	104.35	2164.93	-2117.69	-275.7	477.43	5736074.29	573642.1
2422	52.23	104.37	2165.54	-2118.3	-275.9	478.2	5736074.09	573642.86
2423	52.24	104.38	2166.15	-2118.91	-276.1	478.96	5736073.89	573643.63
2424	52.25	104.39	2166.77	-2119.53	-276.29	479.73	5736073.7	573644.39
2425	52.27	104.4	2167.38	-2120.14	-276.49	480.5	5736073.5	573645.16
2426	52.28	104.41	2167.99	-2120.75	-276.69	481.26	5736073.3	573645.93
2427	52.29	104.42	2168.6	-2121.36	-276.88	482.03	5736073.11	573646.69
2428	52.3	104.43	2169.21	-2121.97	-277.08	482.79	5736072.91	573647.46
2429	52.32	104.44	2169.83	-2122.59	-277.28	483.56	5736072.71	573648.22
2430	52.33	104.46	2170.44	-2123.2	-277.47	484.33	5736072.52	573648.99
2431	52.34	104.47	2171.05	-2123.81	-277.67	485.09	5736072.32	573649.76
2432	52.36	104.48	2171.66	-2124.42	-277.87	485.86	5736072.12	573650.52
2433	52.37	104.49	2172.27	-2125.03	-278.07	486.63	5736071.92	573651.29
2434	52.38	104.5	2172.88	-2125.64	-278.27	487.39	5736071.72	573652.06
2435	52.4	104.51	2173.49	-2126.25	-278.47	488.16	5736071.53	573652.83
2436	52.41	104.52	2174.1	-2126.86	-278.66	488.93	5736071.33	573653.59
2437	52.42	104.53	2174.71	-2127.47	-278.86	489.7	5736071.13	573654.36
2438	52.44	104.54	2175.32	-2128.08	-279.06	490.46	5736070.93	573655.13
2439	52.45	104.55	2175.93	-2128.69	-279.26	491.23	5736070.73	573655.89
2440	52.46	104.57	2176.54	-2129.3	-279.46	492	5736070.53	573656.66
2441	52.47	104.58	2177.15	-2129.91	-279.66	492.76	5736070.33	573657.43
2442	52.49	104.59	2177.76	-2130.52	-279.86	493.53	5736070.13	573658.2
2443	52.5	104.6	2178.37	-2131.13	-280.06	494.3	5736069.93	573658.96
2444	52.51	104.61	2178.97	-2131.73	-280.26	495.07	5736069.73	573659.73
2445	52.53	104.62	2179.58	-2132.34	-280.46	495.84	5736069.53	573660.5
2446	52.54	104.63	2180.19	-2132.95	-280.66	496.6	5736069.33	573661.27
2447	52.55	104.64	2180.8	-2133.56	-280.86	497.37	5736069.13	573662.04
2448	52.57	104.65	2181.41	-2134.17	-281.06	498.14	5736068.93	573662.8
2449	52.58	104.66	2182.02	-2134.78	-281.26	498.91	5736068.73	573663.57
2450	52.59	104.68	2182.62	-2135.39	-281.46	499.68	5736068.53	573664.34

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
2451	52.61	104.69	2183.23	-2135.99	-281.66	500.44	5736068.33	573665.11
2452	52.62	104.7	2183.84	-2136.6	-281.87	501.21	5736068.12	573665.88
2453	52.62	104.72	2184.45	-2137.21	-282.07	501.98	5736067.92	573666.65
2454	52.63	104.74	2185.05	-2137.81	-282.27	502.75	5736067.72	573667.41
2455	52.64	104.76	2185.66	-2138.42	-282.47	503.52	5736067.52	573668.18
2456	52.65	104.79	2186.27	-2139.03	-282.68	504.29	5736067.31	573668.95
2457	52.66	104.81	2186.87	-2139.63	-282.88	505.06	5736067.11	573669.72
2458	52.67	104.83	2187.48	-2140.24	-283.08	505.82	5736066.91	573670.49
2459	52.68	104.85	2188.09	-2140.85	-283.28	506.59	5736066.71	573671.26
2460	52.68	104.87	2188.69	-2141.45	-283.49	507.36	5736066.5	573672.03
2461	52.69	104.89	2189.3	-2142.06	-283.69	508.13	5736066.3	573672.79
2462	52.7	104.91	2189.9	-2142.66	-283.9	508.9	5736066.09	573673.56
2463	52.71	104.93	2190.51	-2143.27	-284.1	509.67	5736065.89	573674.33
2464	52.72	104.95	2191.12	-2143.88	-284.31	510.44	5736065.68	573675.1
2465	52.73	104.97	2191.72	-2144.48	-284.51	511.2	5736065.48	573675.87
2466	52.74	104.99	2192.33	-2145.09	-284.72	511.97	5736065.27	573676.64
2467	52.75	105.01	2192.93	-2145.69	-284.93	512.74	5736065.07	573677.41
2468	52.75	105.03	2193.54	-2146.3	-285.13	513.51	5736064.86	573678.18
2469	52.76	105.05	2194.14	-2146.9	-285.34	514.28	5736064.65	573678.94
2470	52.77	105.07	2194.75	-2147.51	-285.54	515.05	5736064.45	573679.71
2471	52.78	105.09	2195.35	-2148.11	-285.75	515.82	5736064.24	573680.48
2472	52.79	105.11	2195.96	-2148.72	-285.96	516.59	5736064.03	573681.25
2473	52.8	105.13	2196.56	-2149.32	-286.17	517.36	5736063.82	573682.02
2474	52.81	105.15	2197.17	-2149.93	-286.38	518.12	5736063.61	573682.79
2475	52.81	105.17	2197.77	-2150.53	-286.58	518.89	5736063.41	573683.56
2476	52.82	105.19	2198.38	-2151.14	-286.79	519.66	5736063.2	573684.33
2477	52.83	105.21	2198.98	-2151.74	-287	520.43	5736062.99	573685.1
2478	52.84	105.23	2199.58	-2152.34	-287.21	521.2	5736062.78	573685.86
2479	52.85	105.25	2200.19	-2152.95	-287.42	521.97	5736062.57	573686.63
2480	52.86	105.27	2200.79	-2153.55	-287.63	522.74	5736062.36	573687.4
2481	52.84	105.29	2201.4	-2154.16	-287.84	523.5	5736062.15	573688.17
2482	52.8	105.3	2202.01	-2154.77	-288.05	524.27	5736061.94	573688.94
2483	52.77	105.32	2202.61	-2155.37	-288.26	525.04	5736061.73	573689.7
2484	52.73	105.33	2203.22	-2155.98	-288.47	525.81	5736061.52	573690.47
2485	52.7	105.34	2203.82	-2156.58	-288.68	526.57	5736061.31	573691.24
2486	52.66	105.36	2204.43	-2157.19	-288.89	527.34	5736061.1	573692.01
2487	52.63	105.37	2205.04	-2157.8	-289.1	528.11	5736060.89	573692.77
2488	52.59	105.39	2205.64	-2158.4	-289.31	528.87	5736060.68	573693.54
2489	52.56	105.4	2206.25	-2159.01	-289.52	529.64	5736060.47	573694.31
2490	52.53	105.41	2206.85	-2159.61	-289.73	530.41	5736060.26	573695.07
2491	52.49	105.43	2207.46	-2160.22	-289.94	531.17	5736060.05	573695.84
2492	52.46	105.44	2208.08	-2160.84	-290.15	531.94	5736059.84	573696.6
2493	52.42	105.46	2208.69	-2161.45	-290.37	532.7	5736059.62	573697.36
2494	52.39	105.47	2209.3	-2162.06	-290.58	533.46	5736059.41	573698.13
2495	52.35	105.48	2209.91	-2162.67	-290.79	534.22	5736059.2	573698.89
2496	52.32	105.5	2210.52	-2163.28	-291	534.99	5736058.99	573699.65
2497	52.28	105.51	2211.13	-2163.89	-291.21	535.75	5736058.78	573700.42
2498	52.25	105.52	2211.74	-2164.5	-291.42	536.51	5736058.57	573701.18
2499	52.21	105.54	2212.35	-2165.11	-291.63	537.28	5736058.36	573701.94
2500	52.18	105.55	2212.96	-2165.72	-291.85	538.04	5736058.15	573702.7
2501	52.15	105.57	2213.58	-2166.34	-292.06	538.8	5736057.93	573703.46
2502	52.11	105.58	2214.19	-2166.95	-292.27	539.56	5736057.72	573704.22
2503	52.08	105.59	2214.81	-2167.57	-292.48	540.32	5736057.51	573704.98
2504	52.04	105.61	2215.42	-2168.18	-292.69	541.08	5736057.3	573705.74
2505	52.01	105.62	2216.04	-2168.8	-292.91	541.83	5736057.08	573706.5
2506	51.97	105.64	2216.66	-2169.42	-293.12	542.59	5736056.87	573707.26
2507	51.94	105.65	2217.27	-2170.03	-293.33	543.35	5736056.66	573708.02
2508	51.9	105.66	2217.89	-2170.65	-293.54	544.11	5736056.45	573708.78

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
2509	51.87	105.68	2218.5	-2171.26	-293.76	544.87	5736056.24	573709.53
2510	51.88	105.7	2219.12	-2171.88	-293.97	545.63	5736056.02	573710.29
2511	51.91	105.73	2219.73	-2172.49	-294.18	546.39	5736055.81	573711.05
2512	51.94	105.76	2220.35	-2173.11	-294.4	547.15	5736055.59	573711.81
2513	51.97	105.79	2220.96	-2173.72	-294.61	547.9	5736055.38	573712.57
2514	52	105.82	2221.58	-2174.34	-294.83	548.66	5736055.16	573713.33
2515	52.03	105.85	2222.19	-2174.95	-295.04	549.42	5736054.95	573714.09
2516	52.06	105.88	2222.81	-2175.57	-295.26	550.18	5736054.73	573714.84
2517	52.09	105.91	2223.42	-2176.18	-295.48	550.94	5736054.52	573715.6
2518	52.11	105.94	2224.04	-2176.8	-295.69	551.7	5736054.3	573716.36
2519	52.14	105.97	2224.65	-2177.41	-295.91	552.45	5736054.09	573717.12
2520	52.17	106	2225.27	-2178.03	-296.12	553.21	5736053.87	573717.88
2521	52.2	106.03	2225.88	-2178.64	-296.34	553.97	5736053.65	573718.64
2522	52.23	106.06	2226.49	-2179.25	-296.56	554.73	5736053.43	573719.4
2523	52.26	106.09	2227.1	-2179.86	-296.78	555.49	5736053.21	573720.16
2524	52.29	106.12	2227.72	-2180.48	-297	556.25	5736052.99	573720.92
2525	52.32	106.16	2228.33	-2181.09	-297.22	557.01	5736052.77	573721.68
2526	52.35	106.19	2228.94	-2181.7	-297.44	557.77	5736052.55	573722.44
2527	52.38	106.22	2229.55	-2182.31	-297.66	558.53	5736052.33	573723.2
2528	52.41	106.25	2230.16	-2182.92	-297.88	559.29	5736052.11	573723.96
2529	52.44	106.28	2230.77	-2183.53	-298.1	560.05	5736051.89	573724.72
2530	52.46	106.31	2231.38	-2184.14	-298.32	560.81	5736051.67	573725.48
2531	52.49	106.34	2231.99	-2184.75	-298.55	561.58	5736051.44	573726.24
2532	52.52	106.37	2232.6	-2185.36	-298.77	562.34	5736051.22	573727
2533	52.55	106.4	2233.2	-2185.96	-299	563.1	5736050.99	573727.76
2534	52.58	106.43	2233.81	-2186.57	-299.22	563.86	5736050.77	573728.53
2535	52.61	106.46	2234.42	-2187.18	-299.45	564.62	5736050.54	573729.29
2536	52.64	106.49	2235.03	-2187.79	-299.67	565.39	5736050.32	573730.05
2537	52.67	106.52	2235.63	-2188.39	-299.9	566.15	5736050.09	573730.81
2538	52.7	106.55	2236.24	-2189	-300.12	566.91	5736049.87	573731.57
2539	52.72	106.56	2236.85	-2189.61	-300.35	567.67	5736049.64	573732.34
2540	52.73	106.55	2237.45	-2190.22	-300.57	568.43	5736049.42	573733.1
2541	52.75	106.55	2238.06	-2190.82	-300.8	569.2	5736049.19	573733.86
2542	52.77	106.55	2238.66	-2191.42	-301.03	569.96	5736048.96	573734.63
2543	52.78	106.54	2239.27	-2192.03	-301.25	570.72	5736048.74	573735.39
2544	52.8	106.54	2239.87	-2192.63	-301.48	571.49	5736048.51	573736.15
2545	52.81	106.54	2240.48	-2193.24	-301.71	572.25	5736048.28	573736.92
2546	52.83	106.53	2241.08	-2193.84	-301.93	573.02	5736048.06	573737.68
2547	52.84	106.53	2241.69	-2194.45	-302.16	573.78	5736047.83	573738.44
2548	52.86	106.53	2242.29	-2195.05	-302.39	574.54	5736047.6	573739.21
2549	52.87	106.52	2242.9	-2195.66	-302.62	575.31	5736047.38	573739.97
2550	52.89	106.52	2243.5	-2196.26	-302.84	576.07	5736047.15	573740.73
2551	52.9	106.52	2244.1	-2196.86	-303.07	576.84	5736046.92	573741.5
2552	52.92	106.51	2244.7	-2197.46	-303.3	577.6	5736046.7	573742.27
2553	52.94	106.51	2245.31	-2198.07	-303.52	578.37	5736046.47	573743.03
2554	52.95	106.51	2245.91	-2198.67	-303.75	579.13	5736046.24	573743.8
2555	52.97	106.5	2246.51	-2199.27	-303.98	579.9	5736046.02	573744.56
2556	52.98	106.5	2247.11	-2199.87	-304.2	580.66	5736045.79	573745.33
2557	53	106.5	2247.72	-2200.48	-304.43	581.43	5736045.56	573746.09
2558	53.01	106.49	2248.32	-2201.08	-304.66	582.19	5736045.34	573746.86
2559	53.03	106.49	2248.92	-2201.68	-304.88	582.96	5736045.11	573747.62
2560	53.04	106.49	2249.52	-2202.28	-305.11	583.72	5736044.88	573748.39
2561	53.06	106.48	2250.12	-2202.88	-305.34	584.49	5736044.66	573749.16
2562	53.08	106.48	2250.72	-2203.48	-305.56	585.26	5736044.43	573749.92
2563	53.09	106.48	2251.32	-2204.08	-305.79	586.03	5736044.2	573750.69
2564	53.11	106.47	2251.92	-2204.68	-306.02	586.79	5736043.97	573751.46
2565	53.12	106.47	2252.52	-2205.28	-306.24	587.56	5736043.75	573752.22
2566	53.14	106.47	2253.12	-2205.88	-306.47	588.33	5736043.52	573752.99

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
2567	53.15	106.46	2253.72	-2206.48	-306.7	589.09	5736043.29	573753.76
2568	53.15	106.48	2254.32	-2207.08	-306.92	589.86	5736043.07	573754.52
2569	53.12	106.51	2254.92	-2207.68	-307.15	590.63	5736042.84	573755.29
2570	53.1	106.54	2255.53	-2208.29	-307.38	591.39	5736042.61	573756.06
2571	53.07	106.58	2256.13	-2208.89	-307.61	592.16	5736042.38	573756.82
2572	53.05	106.61	2256.73	-2209.49	-307.84	592.92	5736042.15	573757.59
2573	53.02	106.64	2257.33	-2210.09	-308.07	593.69	5736041.92	573758.35
2574	53	106.68	2257.93	-2210.69	-308.3	594.45	5736041.7	573759.12
2575	52.97	106.71	2258.54	-2211.3	-308.53	595.22	5736041.47	573759.88
2576	52.95	106.74	2259.14	-2211.9	-308.75	595.98	5736041.24	573760.65
2577	52.92	106.77	2259.74	-2212.5	-308.98	596.75	5736041.01	573761.41
2578	52.9	106.81	2260.34	-2213.1	-309.21	597.51	5736040.78	573762.18
2579	52.87	106.84	2260.94	-2213.7	-309.44	598.28	5736040.55	573762.94
2580	52.85	106.87	2261.55	-2214.31	-309.67	599.04	5736040.32	573763.71
2581	52.82	106.91	2262.15	-2214.91	-309.91	599.8	5736040.09	573764.47
2582	52.8	106.94	2262.76	-2215.52	-310.14	600.56	5736039.85	573765.23
2583	52.77	106.97	2263.36	-2216.12	-310.37	601.32	5736039.62	573765.99
2584	52.75	107.01	2263.97	-2216.73	-310.61	602.08	5736039.39	573766.75
2585	52.73	107.04	2264.58	-2217.34	-310.84	602.84	5736039.15	573767.51
2586	52.7	107.07	2265.18	-2217.94	-311.07	603.61	5736038.92	573768.27
2587	52.68	107.11	2265.79	-2218.55	-311.3	604.37	5736038.69	573769.03
2588	52.65	107.14	2266.39	-2219.15	-311.54	605.13	5736038.45	573769.79
2589	52.63	107.17	2267	-2219.76	-311.77	605.89	5736038.22	573770.55
2590	52.6	107.21	2267.6	-2220.36	-312	606.65	5736037.99	573771.31
2591	52.58	107.24	2268.21	-2220.97	-312.24	607.41	5736037.75	573772.07
2592	52.55	107.27	2268.82	-2221.58	-312.48	608.16	5736037.51	573772.83
2593	52.53	107.3	2269.43	-2222.19	-312.71	608.92	5736037.28	573773.58
2594	52.5	107.34	2270.04	-2222.8	-312.95	609.68	5736037.04	573774.34
2595	52.48	107.37	2270.65	-2223.41	-313.19	610.43	5736036.8	573775.1
2596	52.45	107.4	2271.26	-2224.02	-313.42	611.19	5736036.57	573775.86
2597	52.43	107.42	2271.87	-2224.63	-313.66	611.95	5736036.33	573776.61
2598	52.4	107.42	2272.48	-2225.24	-313.9	612.7	5736036.09	573777.37
2599	52.37	107.43	2273.09	-2225.85	-314.13	613.46	5736035.86	573778.13
2600	52.35	107.43	2273.7	-2226.46	-314.37	614.22	5736035.62	573778.88
2601	52.32	107.43	2274.31	-2227.07	-314.61	614.97	5736035.38	573779.64
2602	52.29	107.44	2274.92	-2227.68	-314.84	615.73	5736035.15	573780.39
2603	52.26	107.44	2275.53	-2228.29	-315.08	616.48	5736034.91	573781.15
2604	52.24	107.44	2276.15	-2228.91	-315.32	617.23	5736034.67	573781.9
2605	52.21	107.44	2276.76	-2229.52	-315.55	617.99	5736034.44	573782.65
2606	52.18	107.45	2277.37	-2230.13	-315.79	618.74	5736034.2	573783.41
2607	52.16	107.45	2277.98	-2230.74	-316.03	619.5	5736033.96	573784.16
2608	52.13	107.45	2278.6	-2231.36	-316.27	620.25	5736033.73	573784.91
2609	52.1	107.46	2279.21	-2231.97	-316.5	621	5736033.49	573785.67
2610	52.08	107.46	2279.82	-2232.58	-316.74	621.76	5736033.25	573786.42
2611	52.05	107.46	2280.44	-2233.2	-316.98	622.51	5736033.02	573787.17
2612	52.02	107.47	2281.06	-2233.82	-317.21	623.26	5736032.78	573787.92
2613	52	107.47	2281.67	-2234.43	-317.45	624.01	5736032.54	573788.68
2614	51.97	107.47	2282.29	-2235.05	-317.68	624.76	5736032.31	573789.43
2615	51.94	107.47	2282.9	-2235.66	-317.92	625.51	5736032.07	573790.18
2616	51.91	107.48	2283.52	-2236.28	-318.16	626.26	5736031.83	573790.93
2617	51.89	107.48	2284.14	-2236.9	-318.39	627.01	5736031.6	573791.68
2618	51.86	107.48	2284.75	-2237.51	-318.63	627.77	5736031.36	573792.43
2619	51.83	107.49	2285.37	-2238.13	-318.87	628.52	5736031.12	573793.18
2620	51.81	107.49	2285.99	-2238.75	-319.1	629.27	5736030.89	573793.93
2621	51.78	107.49	2286.61	-2239.37	-319.34	630.02	5736030.65	573794.68
2622	51.75	107.49	2287.23	-2239.99	-319.57	630.77	5736030.42	573795.43
2623	51.73	107.5	2287.85	-2240.61	-319.81	631.51	5736030.18	573796.18
2624	51.7	107.5	2288.47	-2241.23	-320.05	632.26	5736029.94	573796.93

MD	Angle	Direction	TVDRT	TVDSS	Dnorth	Deast	Northing	Easting
2625	51.7	107.5	2289.08	-2241.84	-320.28	633.01	5736029.71	573797.68
2626	51.7	107.5	2289.7	-2242.46	-320.52	633.76	5736029.47	573798.42
2627	51.7	107.5	2290.32	-2243.08	-320.76	634.51	5736029.24	573799.17
2628	51.7	107.5	2290.94	-2243.7	-320.99	635.26	5736029	573799.92
2629	51.7	107.5	2291.56	-2244.32	-321.23	636.01	5736028.76	573800.67
2630	51.7	107.5	2292.18	-2244.94	-321.46	636.75	5736028.53	573801.42
2631	51.7	107.5	2292.8	-2245.56	-321.7	637.5	5736028.29	573802.17
2632	51.7	107.5	2293.42	-2246.18	-321.94	638.25	5736028.06	573802.92
2633	51.7	107.5	2294.04	-2246.8	-322.17	639	5736027.82	573803.67
2634	51.7	107.5	2294.66	-2247.42	-322.41	639.75	5736027.58	573804.41
2635	51.7	107.5	2295.28	-2248.04	-322.64	640.5	5736027.35	573805.16
2636	51.7	107.5	2295.9	-2248.66	-322.88	641.25	5736027.11	573805.91
2637	51.7	107.5	2296.52	-2249.28	-323.12	641.99	5736026.88	573806.66
2638	51.7	107.5	2297.14	-2249.9	-323.35	642.74	5736026.64	573807.41
2639	51.7	107.5	2297.76	-2250.52	-323.59	643.49	5736026.4	573808.16
2640	51.7	107.5	2298.38	-2251.14	-323.82	644.24	5736026.17	573808.9
2641	51.7	107.5	2299	-2251.76	-324.06	644.99	5736025.93	573809.65

**APPENDIX 2a**

**BREAM B16**

**Petrophysics Evaluation Summary**

**Esso Australia Pty Ltd.**  
**Exploration Department**

**Bream B16**  
**Petrophysics Report**

**Petrophysicist: K.Kuttan**  
**November 2005**

## Bream B16 Log Interpretation

The Bream B16 well was designed to capture N-1 oil that will not be produced from the Bream B2 N-1 perforations once gas-cap blowdown oil reaches these perforations. It was also designed to accelerate N-1 oil production. In addition the well was designed to access any undrained, partially drained or by-passed oil in the M and P reservoirs.

The well was drilled from a new 20 inch conductor set at 179 mMDRT. The 12¼" hole section was drilled from 179 mMDRT to 843 mMDRT. After setting the 95/8" casing at 837mMDRT, a 8½" hole section was drilled from 843.0 mMDRT to a final TD of 2641.0 mMDRT. 7" production casing was run, with the casing shoe set at 2626.0 mMDRT.

The well was logged with Schlumberger's 6.75 inch LWD tools which consisted of RAB-ADN-SonicVision combination.

The LWD logs have been analysed for porosity, water saturation and net pay over the interval 1920- 2608 mMDRT.

Note that all depth quoted in this report are logged mMDRT unless otherwise specified

### DATA

Data from the following logging surveys were used in the interpretation:

Survey/Log	Suite	Company	Top (m MDRT)	Bottom (m MDRT)
RAB-ADN	2	Schlumberger	836	1243.8
RAB-ADN	3	Schlumberger	1221	1892.8
RAB-ADN-SonicVision	4	Schlumberger	1870	2631.8

### Deviation

The well angle over the reservoirs was 52 degrees.

### Mud Data

Mud Type : KCl/Glycol/PHPA  
Mud Weight: 9.85 ppg  
Rm: 0.106 @ 21 °C  
Rmf: 0.08 @ 20.9 °C  
Rmc: 0.13 @ 21.7 °C  
Potassium 8%  
BHT: 87 °C (as measured by the LWD tools)

### Hole Size

843-2641 mMDRT 8.5 inches

### Data Acquisition & Log Quality

No problems were encountered in the acquisition of the RAB and ADN data. No valid sonic data were obtained during drilling. Sonic data was acquired in memory while POOH after reaching TD. An attempt was made to process the sonic data at the wellsite, however, because there were numerous collar arrivals it was not possible to obtain good quality compressional DT. The sonic data was processed by Schlumberger's DCS group in Perth. Although the processed DT/CO appears to be acceptable, there were several zones over which no DT/CO could be extracted and these were over coals. The DCS processing was unable to extract any coherent shear data.

## Data Processing

There were several zones in this well which are carbonaceous shales and in order to prevent the petrophysical model from calculating anomalous porosities, the bottom density (ROBB) were edited to true shale values. The resistivity curves (RES\_RING, RES\_BD, RES\_BM, RES\_BS) were depth aligned to the GR\_RAB\_DN. A detailed comparison of all the logs indicated that the resistivity curves had the best vertical resolution in terms of defining bed boundaries especially over the coals and therefore it was decided to depth match ROBB and associated curves to the GR-depth-matched RES\_RING. It was also observed that over many of the clean water sands the density-neutron logs (ROBB-TNPH) showed an apparent gas effect when plotted on a sandstone compatible scale. To get the curves to overlay one another the TNPH was adjusted by +0.02. The TNPH and associated neutron data (near and far counts) were then depth matched to the RES\_RING-depth-matched ROBB. The compressional sonic data (DTCO) was depth matched to the RES\_RING-depth-matched ROBB.

## INTERPRETATION

### Logs Used

The primary logs used in the interpretation were RES\_RING (deep resistivity), GR\_RAB\_DN (RAB GR down quadrant), ROBB (bulk density, down) and TNPH (thermal neutron porosity in LPU). In addition coal intervals were identified using a coal flag (Flag\_coal). Hydrocarbon types were denoted using a hydrocarbon flag (Flag\_rhoH). A temperature log was created using the following data:

<u>Depth (mMDRT)</u>	<u>Temperature (deg. C)</u>
108	10
2632	97

The temperature at depth 108 mMDRT represents the temperature of the sea-bed and the temperature at 2632 MDRT (first reading of the LWD logs) is the estimated formation temperature –BHT +10 deg.

### Formation Water Salinity

$R_{wa}$  analysis using  $a = 1$ ,  $m = 2$  and  $n = 2$  indicates clean water sands have an apparent formation water salinity of 50,000 ppm NaCl equivalent down to 2340 mMDRT. Below 2340 mMDRT the apparent salinity is 40,000 ppm NaCl equivalent.

### Hydrocarbon Type Identification

A combination of density-neutron logs, total Near-Far neutron counts, mud log shows and production from nearby Bream B wells were used to determine hydrocarbon types present in the reservoirs. The following table lists the determination made using this process:

<u>Depth Interval (mMDRT)</u>	<u>Hydrocarbon Type</u>
1920.0 – 2077.0	Gas
2077.0 – 2100.0	Oil
2100.0 – 2112.3	Gas
2112.3 – 2340.0	Oil
2340.0 – 2610.0	Gas

Shale Volume, Porosity and Water Saturation

Schlumberger's Geoframe ELAN+ module was used to determine mineral volumes, total porosity, effective porosity and effective saturation. The details of the models are illustrated in the figures and tables below.

ELAN+ MODEL

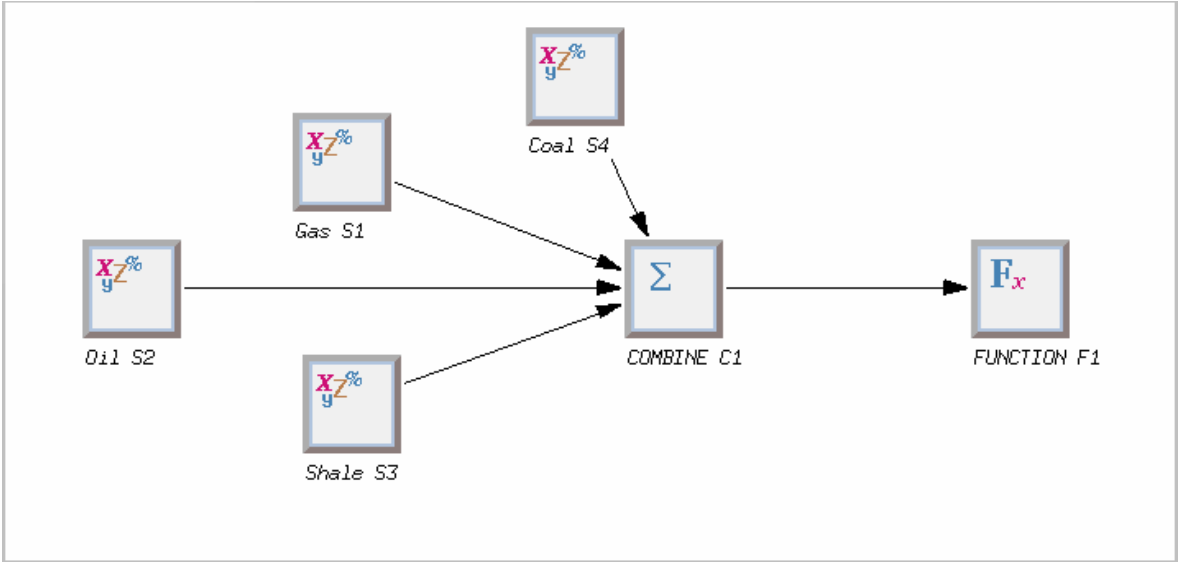


Figure 2: Elan + Model and Module Configuration

ELAN Input Channels

Log Curve Selector		Selector Options	
		Compound Name Spec	BREAM B16
TEMP_CH	TEMP;*	TEMP	TEMP TEMP TEMP@Elan_Input;3 [A1290676]
RHOB_IFAC_CH	IFRH;*		
NPHI_IFAC_CH	INPH;*		
RHOB_CH	ROBB;*	ROBB	ROBB ROBB ROBB@Elan_Input;7 [A1290673]
NPHI_CH	TNPH;*	TNPH	TNPH TNPH TNPH@Elan_Input;9 [A1290667]
CUDC_CH/RT_CH	RES_RING;*	RES_RING	RES_RING RES_RING RES_RING@Elan_Input
GR_CH	GR_RAB_DN;*	GR_RAB_DN	GR_RAB_DN GR_RAB_DN GR_RAB_DN@Elan
PRB1_CH	FLAG_RHOH;*	FLAG_RHOH	FLAG_RHOH FLAG_RHOH FLAG_RHOH@Elan
PRB2_CH	DEPT;*	DEPT	DEPT DEPT DEPT@Elan_Input;3 [A1290660]
PRB3_CH	PRB3;*		
PRB4_CH	FLAG_COAL;*	FLAG_COAL	FLAG_COAL FLAG_COAL FLAG_COAL@Elan_In
M_CH	MXP;*		
N_CH	SXP;*		

### ELAN Global Parameters

---

Reference Index	MD
Processing Interval	1920.0(m) To 2608.0(m)
Sampling Rate	0.1(m)
Uncertainty Channel	FALSE
Clay Input	DRY
Special Fluids	IMMOVABLE_HYDROCARBON

---

### ELAN Zone Definition

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Name	Bottom To Top
M-Sands	2631.0000(m) To 2340.0000(m)
P2-3	2340.0000(m) To 2112.3000(m)
P Gas	2112.3000(m) To 2100.0000(m)
N-1 Oil	2100.0000(m) To 2077.0000(m)
N-1 Gas	2077.0000(m) To 2005.0000(m)
Gurn L	2005.0000(m) To 1992.0000(m)
Gurn U	1992.0000(m) To 1920.0000(m)

---

### ELAN Process Definition

#### Process SOLVE1 "Gas"

Equations	RHOB	NPHI	CUDC_DWA		GR	CT1	CT3	
Volumes	QUAR	ORTH	PYRI	ILLI	XWAT	UWAT	XGAS	UGAS

User Constraints pyrcut=if((PRB2\_CH<2005), PYRI,0)

constraint(pyrlim, PYRI<pyrcut)

Constraint Zones Bottom Top

UNDEFINED 2631.0000(m ) 1920.0000(m )

#### Constraints Applied

UNDEFINED - pyrlim  
UNDEFINED - WaterBaseMud\_SXO\_gt\_SW  
UNDEFINED - IrreducibleXWater  
UNDEFINED - IrreducibleUWater

---

#### Process SOLVE2 "Oil"

Equations	RHOB	NPHI	CUDC_DWA	GR	CT2	CT3	
Volumes	QUAR	ORTH	ILLI	XWAT	UWAT	XOIL	UOIL

#### Constraints Applied

UNDEFINED - IrreducibleXWater  
UNDEFINED - IrreducibleUWater  
UNDEFINED - WaterBaseMud\_SXO\_gt\_SW

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**Process SOLVE3 "Shale"**

Equations	RHOB	NPHI	CUDC_DWA	GR
Volumes	QUAR	ILLI	XWAT	UWAT

---

**Process SOLVE4 "Coal"**

Equations	RHOB
Volumes	COAL

---

**Process COMBINE 1 "COMBINE"**

Order	SOL.2	SOL.1	SOL.3	SOL.4
-------	-------	-------	-------	-------

**Combine Method**

"Coarse Clast" 8631.8896 (m ) Internal Average

**Probability Functions**

```
probability(SOL.4, PRB4_CH)
prob3 = linear(ILLI_VOL.SOL.3, 0.3, 0, 0.5, 1)
probability(SOL.3, prob3)
prob1 = if (PRB1_CH <=0.25, 1, 0)
probability(SOL.1, prob1)
```

---

**Process FUNCTION 1 "FUNCTION"**

Outputs	VCL	SXWI	SWT	SUWI	PIGN	PHIT
---------	-----	------	-----	------	------	------

User-defined Function

```
swt_cmp=if((PRB4_CH > 0),1,(UWAT_VOL + XBWA_VOL)/(UWAT_VOL + XBWA_VOL + UOIL_VOL + GAS_VOL))
output(SWT, swt_cmp)
```

---

**ELAN Different Parameters**

Parameters		M-Sands	P2-3	P Gas	N-1 Oil
n*****	*****	*****	*****	*****	*****
RHOB_XGAS	(g/cm3 )	-0.009	-0.014	-0.014	-0.107
RHOB_UGAS	(g/cm3 )	-0.009	-0.014	-0.014	-0.107
NPHI_XGAS	(m3/m3 )	0.159	0.139	0.139	0.147
NPHI_UGAS	(m3/m3 )	0.159	0.139	0.139	0.147
CXDC_XWAT	(mS/m )	19.130	17.308	15.895	15.819
CXDC_XBWA	(mS/m )	10.930	9.891	9.077	9.034
CUDC_UWAT	(mS/m )	16.600	18.459	17.130	17.058
CUDC_UBWA	(mS/m )	4.804	4.347	3.990	3.970
RW	(ohm.m )	0.299	0.245	0.245	0.245
CUDC_UNC_ZP	(mS/m )	0.061	0.064	0.062	0.062
GR_UNC_WM	( )	0.300	0.300	0.000	0.300
RHOB_IFAC_ZP	( )	0.500	0.500	0.500	0.500

---

Parameters n*****	N-1 Gas *****	Gurn L *****	Gurn U *****	*****
RHOB_XGAS (g/cm3 )	-0.107	-0.018	-0.019	
RHOB_UGAS (g/cm3 )	-0.107	-0.018	-0.019	
NPHI_XGAS (m3/m3 )	0.147	0.160	0.163	
NPHI_UGAS (m3/m3 )	0.147	0.160	0.163	
CXDC_XWAT (mS/m )	15.678	15.234	15.155	
CXDC_XBWA (mS/m )	8.952	8.694	8.648	
CUDC_UWAT (mS/m )	16.923	16.495	16.419	
CUDC_UBWA (mS/m )	3.935	3.821	3.801	
RW (ohm.m )	0.245	0.245	0.245	
CUDC_UNC_ZP (mS/m )	0.062	0.061	0.061	
GR_UNC_WM ( )	0.000	0.000	0.000	
RHOB_IFAC_ZP( )	0.500	0.800	0.800	

### LAN Same Parameters

Parameter	Value	Parameter	Value
RHOB_QUAR	2.650(g/cm3 )	RHOB_CALC	2.710(g/cm3 )
RHOB_DOLO	2.847(g/cm3 )	RHOB_ORTH	2.570(g/cm3 )
RHOB_PYRI	4.990(g/cm3 )	RHOB_GLAU	2.650(g/cm3 )
RHOB_ILLI	2.780(g/cm3 )	RHOB_KAOL	2.620(g/cm3 )
RHOB_COAL	1.200(g/cm3 )	RHOB_IGNE	3.000(g/cm3 )
RHOB_XWAT	1.022(g/cm3 )	RHOB_UWAT	0.992(g/cm3 )
RHOB_XOIL	0.600(g/cm3 )	RHOB_UOIL	0.600(g/cm3 )
RHOB_XBWA	0.965(g/cm3 )	NPHI_QUAR	-0.059(m3/m3 )
NPHI_CALC	0.000(m3/m3 )	NPHI_DOLO	0.032(m3/m3 )
NPHI_ORTH	-0.010(m3/m3 )	NPHI_PYRI	0.008(m3/m3 )
NPHI_GLAU	0.410(m3/m3 )	NPHI_ILLI	0.247(m3/m3 )
NPHI_KAOL	0.450(m3/m3 )	NPHI_COAL	0.450(m3/m3 )
NPHI_XWAT	1.000(m3/m3 )	NPHI_UWAT	1.000(m3/m3 )
NPHI_XOIL	1.000(m3/m3 )	NPHI_UOIL	1.000(m3/m3 )
NPHI_XBWA	1.000(m3/m3 )	DT_QUAR	55.500(us/m )
DT_CALC	47.800(us/m )	DT_DOLO	43.500(us/m )
DT_ORTH	60.000(us/m )	DT_ILLI	60.000(us/m )
DT_KAOL	91.318(us/m )	DT_COAL	121.920(us/m )
DT_IGNE	16.916(us/m )	DT_XWAT	0.000(us/m )
DT_UWAT	220.000(us/m )	DT_XOIL	0.000(us/m )
DT_UOIL	240.000(us/m )	DT_XGAS	0.000(us/m )
DT_UGAS	289.865(us/m )	DT_XBWA	189.000(us/m )
U_QUAR	5.000( )	U_CALC	14.100( )
U_DOLO	9.100( )	U_ILLI	9.900( )
U_KAOL	5.100( )	U_COAL	1.000( )
U_XWAT	0.692( )	U_UWAT	0.000( )
U_XOIL	0.136( )	U_UOIL	0.000( )
U_XGAS	0.012( )	U_UGAS	0.000( )
U_XBWA	0.398( )	CXDC_ILLI	-999.250(mS/m )
CXDC_KAOL	-999.250(mS/m )	CUDC_GLAU	-999.250(mS/m )
CUDC_ILLI	-999.250(mS/m )	CUDC_KAOL	-999.250(mS/m )
GR_QUAR	40.000(gAPI )	GR_CALC	11.000(gAPI )
GR_DOLO	3.000(gAPI )	GR_ORTH	200.000(gAPI )
GR_PYRI	0.000(gAPI )	GR_GLAU	150.000(gAPI )
GR_ILLI	220.000(gAPI )	GR_KAOL	98.000(gAPI )
GR_COAL	40.000(gAPI )	GR_IGNE	40.000(gAPI )
GR_XWAT	0.000(gAPI )	GR_UWAT	0.000(gAPI )
GR_XOIL	0.000(gAPI )	GR_UOIL	0.000(gAPI )
GR_XGAS	0.000(gAPI )	GR_UGAS	0.000(gAPI )

Parameter	Value	Parameter	Value
GR_XBWA	0.000(gAPI )	EX1_QUAR	0.000( )
EX1_CALC	0.000( )	EX1_ORTH	0.000( )
EX1_PYRI	0.000( )	EX1_ILLI	0.000( )
EX1_COAL	0.000( )	EX1_XWAT	0.000( )
EX1_UWAT	0.000( )	EX1_XOIL	0.000( )
EX1_UOIL	0.000( )	EX1_XGAS	0.000( )
EX1_UGAS	0.000( )	EX1_XBWA	0.000( )
CT1_QUAR	0.000( )	CT1_CALC	0.000( )
CT1_DOLO	0.000( )	CT1_ORTH	0.000( )
CT1_PYRI	0.000( )	CT1_GLAU	0.000( )
CT1_ILLI	0.000( )	CT1_KAOL	0.000( )
CT1_COAL	0.000( )	CT1_IGNE	0.000( )
CT1_XWAT	0.000( )	CT1_UWAT	0.000( )
CT1_XOIL	0.000( )	CT1_UOIL	0.000( )
CT1_XGAS	1.000( )	CT1_UGAS	-0.300( )
CT1_XBWA	0.000( )	CT2_QUAR	0.000( )
CT2_CALC	0.000( )	CT2_DOLO	0.000( )
CT2_ORTH	0.000( )	CT2_PYRI	0.000( )
CT2_GLAU	0.000( )	CT2_ILLI	0.000( )
CT2_KAOL	0.000( )	CT2_COAL	0.000( )
CT2_IGNE	0.000( )	CT2_XWAT	0.000( )
CT2_UWAT	0.000( )	CT2_XOIL	1.000( )
CT2_UOIL	-0.600( )	CT2_XGAS	0.000( )
CT2_UGAS	0.000( )	CT2_XBWA	0.000( )
CT3_QUAR	-0.050( )	CT3_CALC	0.000( )
CT3_ORTH	1.000( )	CT3_PYRI	0.000( )
CT3_GLAU	0.000( )	CT3_ILLI	0.000( )
CT3_KAOL	0.000( )	CT3_COAL	0.000( )
CT3_XWAT	0.000( )	CT3_UWAT	0.000( )
CT3_XOIL	0.000( )	CT3_UOIL	0.000( )
CT3_XGAS	0.000( )	CT3_UGAS	0.000( )
CT3_XBWA	0.000( )	CT4_QUAR	0.010( )
CT4_CALC	0.000( )	CT4_ORTH	0.000( )
CT4_PYRI	-1.000( )	CT4_GLAU	0.000( )
CT4_ILLI	0.000( )	CT4_COAL	0.000( )
CT4_XWAT	0.000( )	CT4_UWAT	0.000( )
CT4_XOIL	0.000( )	CT4_UOIL	0.000( )
CT4_XGAS	0.000( )	CT4_UGAS	0.000( )
CT4_XBWA	0.000( )	ARHOB_GLAU	2.960(g/cm3 )
ARHOB_ILLI	2.780(g/cm3 )	ARHOB_KAOL	2.620(g/cm3 )
WCLP_GLAU	0.156(m3/m3 )	WCLP_ILLI	0.154(m3/m3 )
WCLP_KAOL	0.058(m3/m3 )	CBWA_GLAU	-999.250(mS/m )
CBWA_ILLI	-999.250(mS/m )	CBWA_KAOL	-999.250(mS/m )
CECA_GLAU	0.233(meq/g )	CECA_ILLI	0.200(meq/g )
CECA_KAOL	0.090(meq/g )	RMF	0.160(ohm.m )
MST	61.880(degC )	RWT	-999.250(degC )
SALIN_ISOL	-999.250(ppk )	SALIN_PARA	-999.250(ppk )
SALIN_XWAT	12.924(ppk )	SALIN_UWAT	30.000(ppk )
SALIN_XIWA	-999.250(ppk )	SALIN_UIWA	-999.250(ppk )
SALIN_XOIL	0.000(ppk )	SALIN_UOIL	0.000(ppk )
SALIN_XGAS	0.000(ppk )	SALIN_UGAS	0.000(ppk )
SALIN_XSFL	-999.250(ppk )	SALIN_USFL	-999.250(ppk )
CT1_ZP	0.000( )	CT2_ZP	0.000( )
CT3_ZP	0.000( )	CT4_ZP	0.000( )
RHOB_UNC_ZP	0.027(g/cm3 )	NPHI_UNC_ZP	0.015(m3/m3 )
DT_UNC_ZP	2.250(us/m )	U_UNC_ZP	0.225( )
CXDC_UNC_ZP	0.072(mS/m )	GR_UNC_ZP	2.250(gAPI )
EX1_UNC_ZP	0.015( )	CT1_UNC_ZP	0.015( )
CT2_UNC_ZP	0.015( )	CT3_UNC_ZP	0.015( )

CT4_UNC_ZP	0.015( )	VOLS_UNC_ZP	0.015(m3/m3 )
RHOB_UNC_WM	1.000( )	NPHI_UNC_WM	1.000( )
DT_UNC_WM	0.300( )	U_UNC_WM	0.400( )
CXDC_UNC_WM	0.500( )	CUDC_UNC_WM	0.670( )
EX1_UNC_WM	1.000( )	CT1_UNC_WM	0.800( )
CT2_UNC_WM	0.800( )	CT3_UNC_WM	0.900( )
CT4_UNC_WM	1.000( )	VOLS_UNC_WM	1.000( )
NPHI_IFAC_ZP	0.500( )	A_ZP	1.000( )
N_ZP	2.000( )	C_DWA	0.000( )
M_DWA	2.000( )	BVIRR	0.010(m3/m3 )

## RESULTS AND DISCUSSION

In the interval 1940 – 1991.1 there were significant gas shows but the observed formation resistivities are low and consequently the petrophysical analysis suggest the interval to be non hydrocarbon bearing. One possible explanation for this behaviour is that zone could be gas bearing but because of the presence of conductive minerals, the formation resistivity has been reduced. Another possibility is that this zone consists of clay rich sand with low gas saturation. The only way of proving as to whether there is any reservoir gas in this interval, is to flow test a small interval when all the hydrocarbon below this zone have been produced.

The N-1 reservoir is all gas bearing (Fig.2). The first oil zone is the P-1A reservoir (Fig. 2) with an observable current OWC. Below the P-1A oil reservoir, there are a number of zones which are predominantly oil bearing, down to 2340 mMDRT Fig.3) Below 2340 mMDRT there are three thin hydrocarbon bearing zones and all of these are gas bearing (Fig. 4).

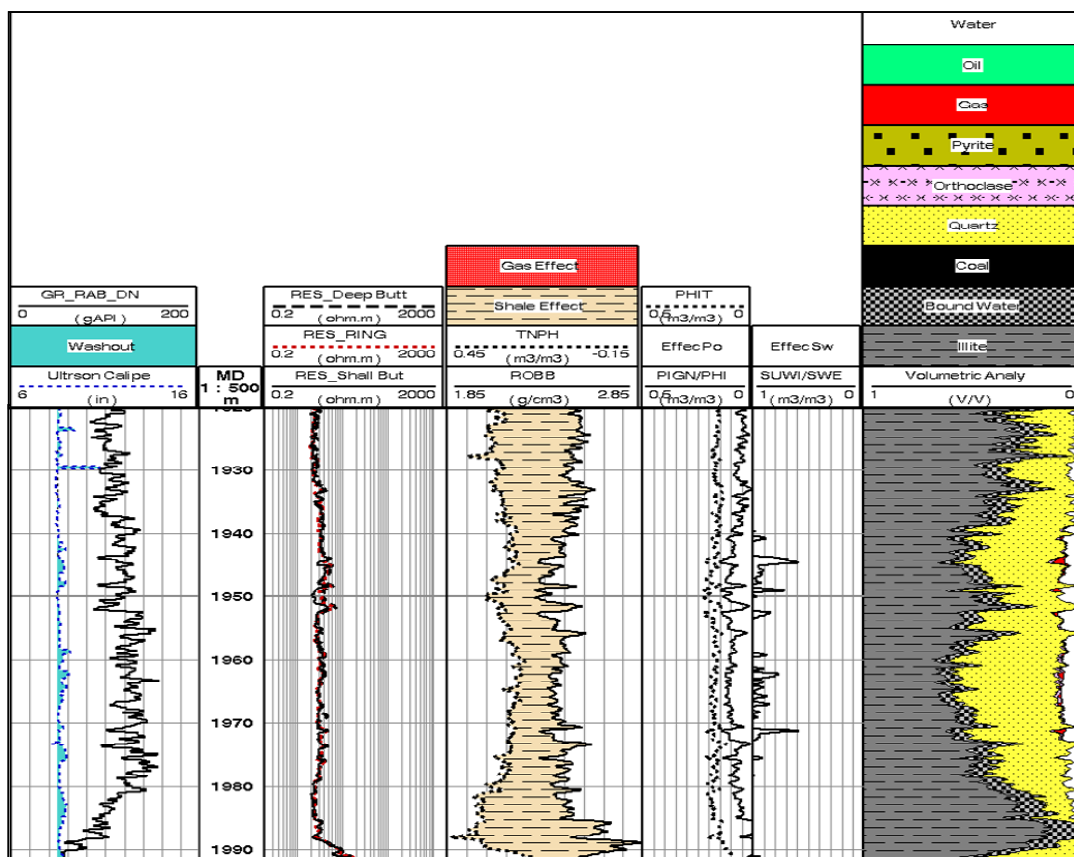


Fig. 1 : Interval 1920-1991mMDRT

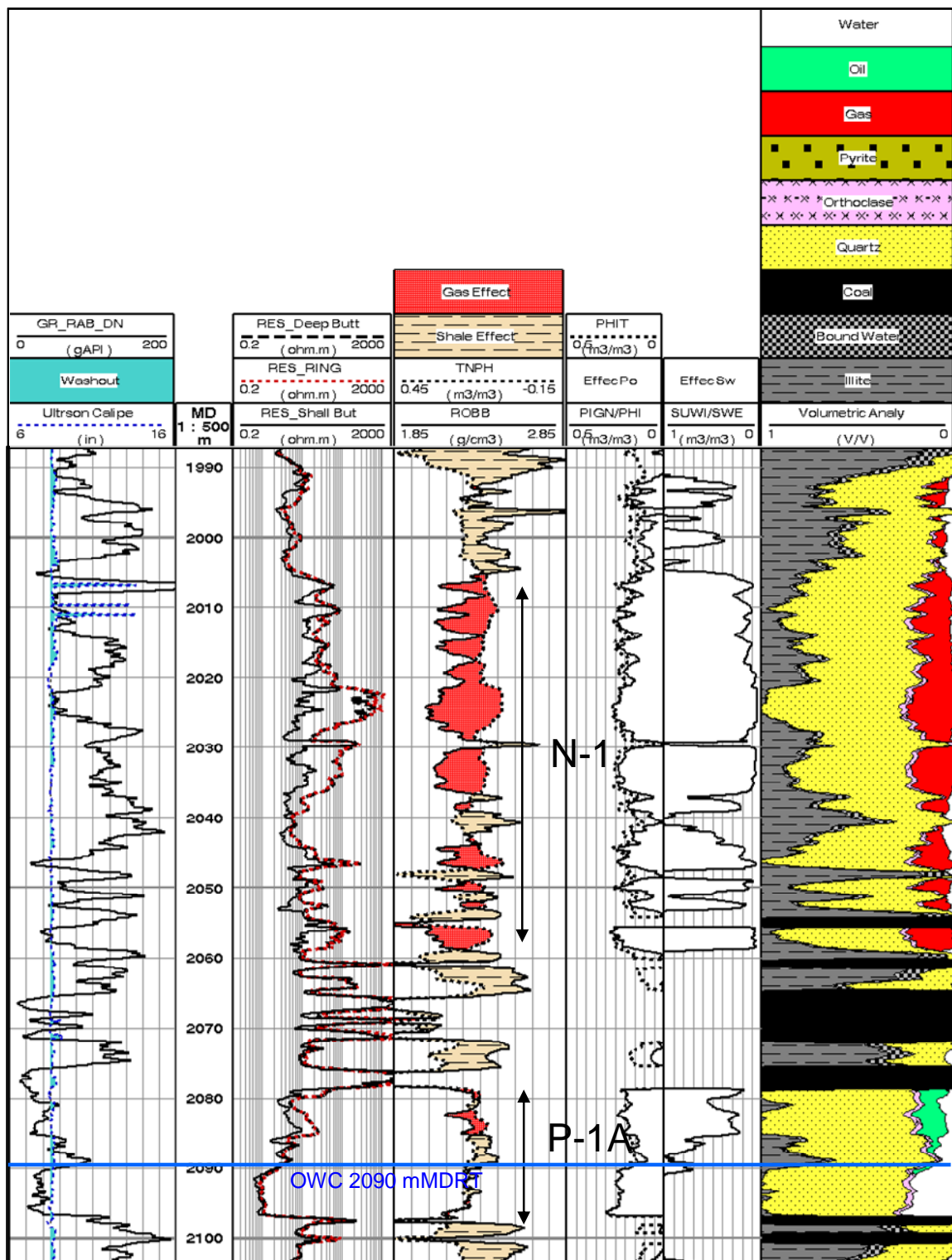


Fig. 2 : N-1 and P-1A Reservoirs

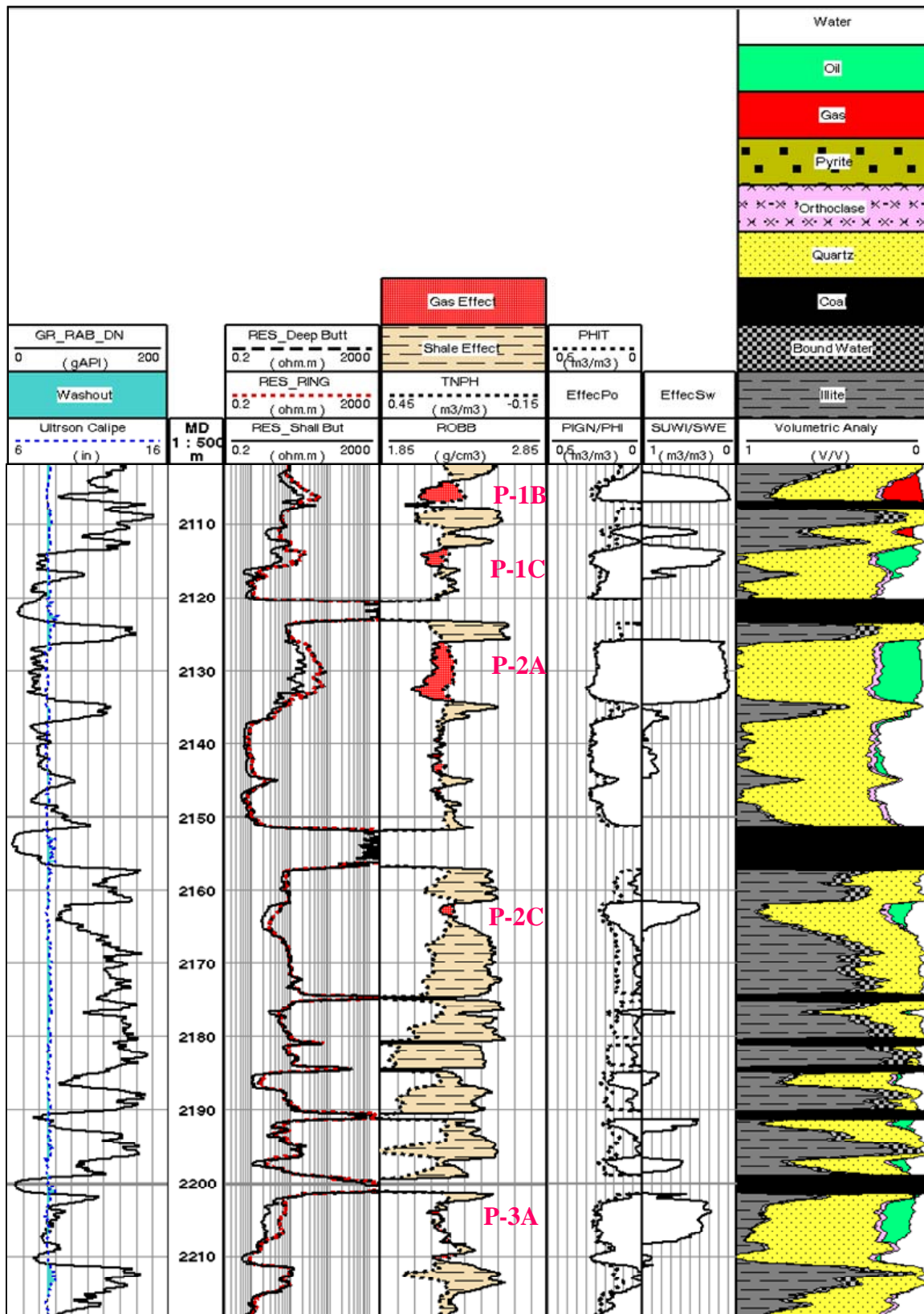


Fig. 3 P-1B – P-3A Reservoirs

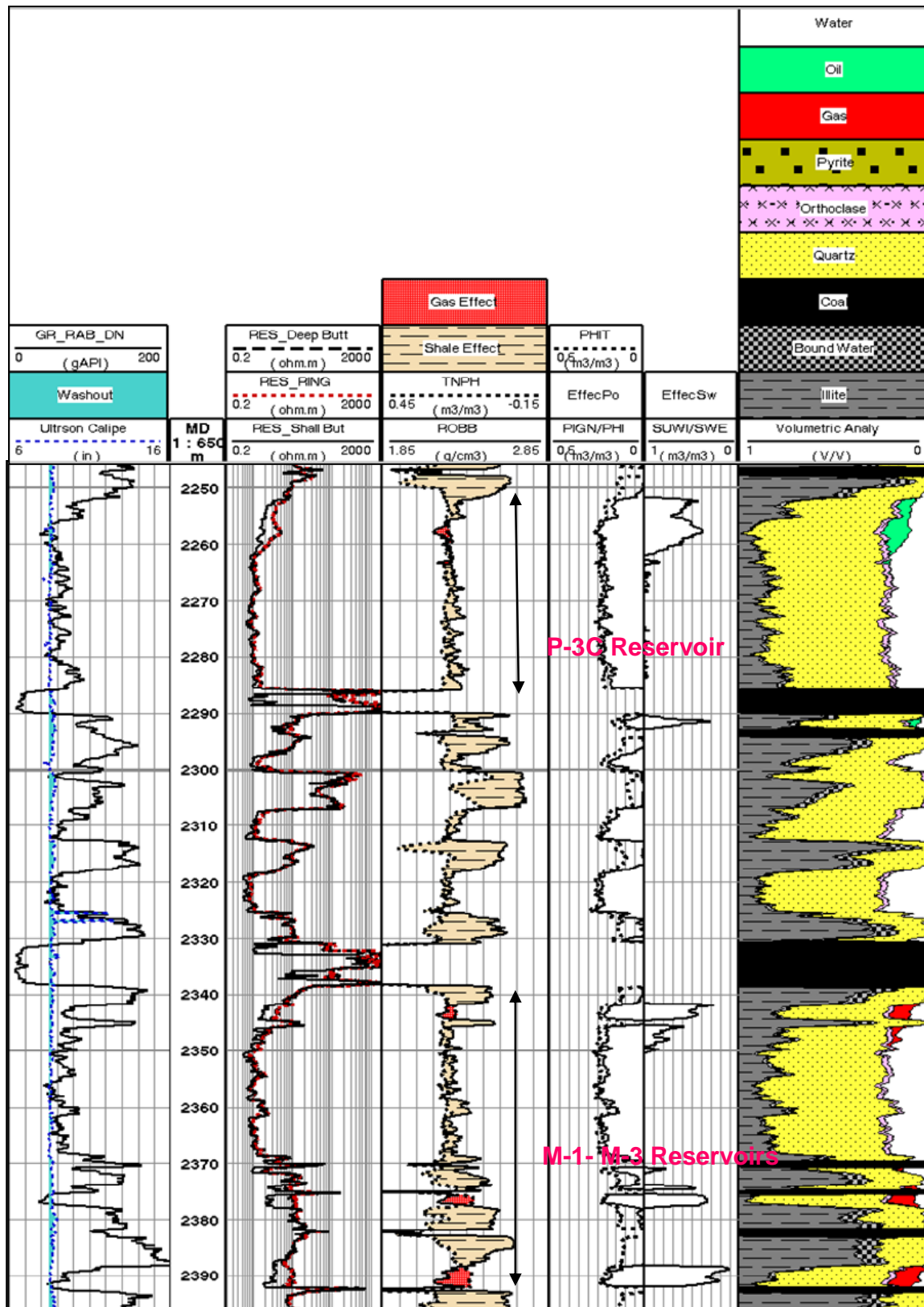


Fig. 4 P-3C- M Reservoirs

## Bream B16

### Petrophysical Summary 1920 - 2608m MD

Depth Reference:

Mean VCL, Mean PHIE (or PIGN), Mean SWE (or SUWI) is based on a PHIE or PIGN cutoff:

Primary: MDKB

0.08 for Gas, 0.12 for oil and water

Zone	Top Depth mMD	Top Depth mTVDSS	Bottom Depth mMD	Bottom Depth mTVDSS	Gross Thickness mMD	Gross Thickness mTVD	Net/Gross	Mean VCL	Mean PHIE	Mean SWE	Comments	Net Pay Thickness mMD	Net Pay Thickness mTVD
UTCC_SGas	1991.5	1869.8	2005.0	1877.7	13.5	7.9	0.58	0.36	0.119	0.53	Gas Bearing	7.9	4.6
N-1Gas	2005.0	1877.7	2059.1	1907.2	54.1	29.5	0.86	0.20	0.185	0.14	Gas Bearing	46.7	25.5
P-1AOil	2078.7	1917.9	2086.0	1921.9	7.3	4.0	0.98	0.04	0.189	0.35	Oil Bearing, OWC @ 2086mMD (1921.9mTVDSS)	7.2	3.9
P-1AResid_Oil	2086.0	1921.9	2090.0	1924.1	4.0	2.2	0.68	0.18	0.143	0.72	Residual oil		
P-1AWtr	2090.0	1924.1	2097.0	1928.0	7.0	3.9	0.99	0.03	0.231	0.98	Water Bearing		
P-1BGas	2103.4	1931.6	2107.0	1933.6	3.6	2.0	0.94	0.27	0.190	0.16	Gas Bearing	3.4	1.9
P-1CGas	2110.2	1935.4	2111.9	1936.3	1.7	1.0	0.82	0.42	0.127	0.55	Gas Bearing	1.4	0.8
P-1COil	2113.0	1936.9	2116.2	1938.7	3.2	1.8	0.95	0.10	0.235	0.28	Oil Bearing, OWC @ 2116.2mMD (1938.7mTVDSS)	3.0	1.7
P-1CWtr	2116.2	1938.7	2120.2	1941.0	4.0	2.2	1.00	0.13	0.216	0.94	Water Bearing		
P-2AOil	2125.8	1944.1	2134.4	1949.0	8.6	4.8	0.98	0.03	0.242	0.14	Oil Bearing	8.4	4.8
P-2AResid_Oil	2135.6	1949.6	2144.7	1954.8	9.1	5.1	0.91	0.07	0.251	0.91	Residual oil		
P-2AWtr	2145.3	1955.1	2151.3	1958.5	6.0	3.4	0.99	0.13	0.216	1.00	Water Bearing		
P-2COil	2161.6	1964.3	2165.4	1966.4	3.8	2.1	0.84	0.18	0.179	0.54	Oil Bearing	3.2	1.8
P-2DOil	2191.3	1981.2	2193.2	1982.3	1.9	1.1	0.63	0.20	0.159	0.50	Oil Bearing	1.2	0.7
P-2EOil	2196.6	1984.2	2198.6	1985.4	2.0	1.2	0.85	0.37	0.156	0.64	Possibly oil bearing, shaly sand	1.7	1.0
P-3AOil	2202.3	1987.5	2208.2	1991.0	5.9	3.4	0.99	0.13	0.219	0.40	Oil Bearing, OWC @2208.2mMD (1991mTVDSS)	5.8	3.4
P-3AWtr	2208.2	1991.0	2211.4	1992.8	3.2	1.9	0.95	0.11	0.200	0.96	Water Bearing		
P-3COil	2251.9	2016.7	2260.9	2022.0	9.0	5.3	0.98	0.16	0.195	0.55	Oil Bearing, OWC @ 2260.9mMD (2022mTVDSS)	8.8	5.2
P-3CResid_oil	2260.9	2022.0	2263.7	2023.7	2.8	1.6	1.00	0.12	0.215	0.91	Residual oil		
P-3CWtr	2263.7	2023.7	2285.7	2036.4	22.0	12.8	1.00	0.17	0.198	0.99	Water Bearing		
P-3DOil	2290.8	2039.4	2292.9	2040.6	2.1	1.2	0.05	0.29	0.124	0.31	Oil Bearing, low porosity	0.1	0.1
M-1Gas	2341.6	2069.5	2344.8	2071.4	3.2	1.9	0.91	0.28	0.182	0.48	Gas Bearing	2.9	1.7
M-1Relic_Gas	2345.7	2072.0	2350.2	2074.7	4.5	2.7	1.01	0.25	0.194	0.83	Relic gas zone		
M-1Wtr	2350.2	2074.7	2369.6	2086.3	19.4	11.6	0.96	0.18	0.206	1.00	Water Bearing		
M-2Gas	2374.0	2089.0	2377.9	2091.3	3.9	2.4	0.74	0.18	0.165	0.41	Gas Bearing	2.9	1.8
M-3Gas	2388.1	2097.5	2392.1	2100.0	4.0	2.5	0.90	0.22	0.173	0.28	Gas Bearing	3.6	2.2

Table 1



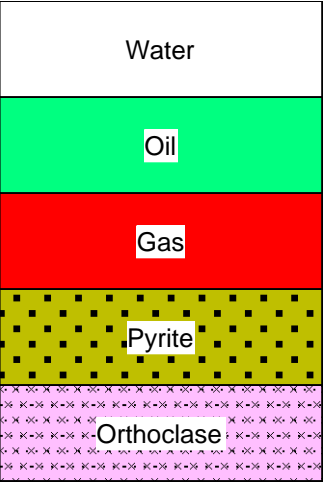
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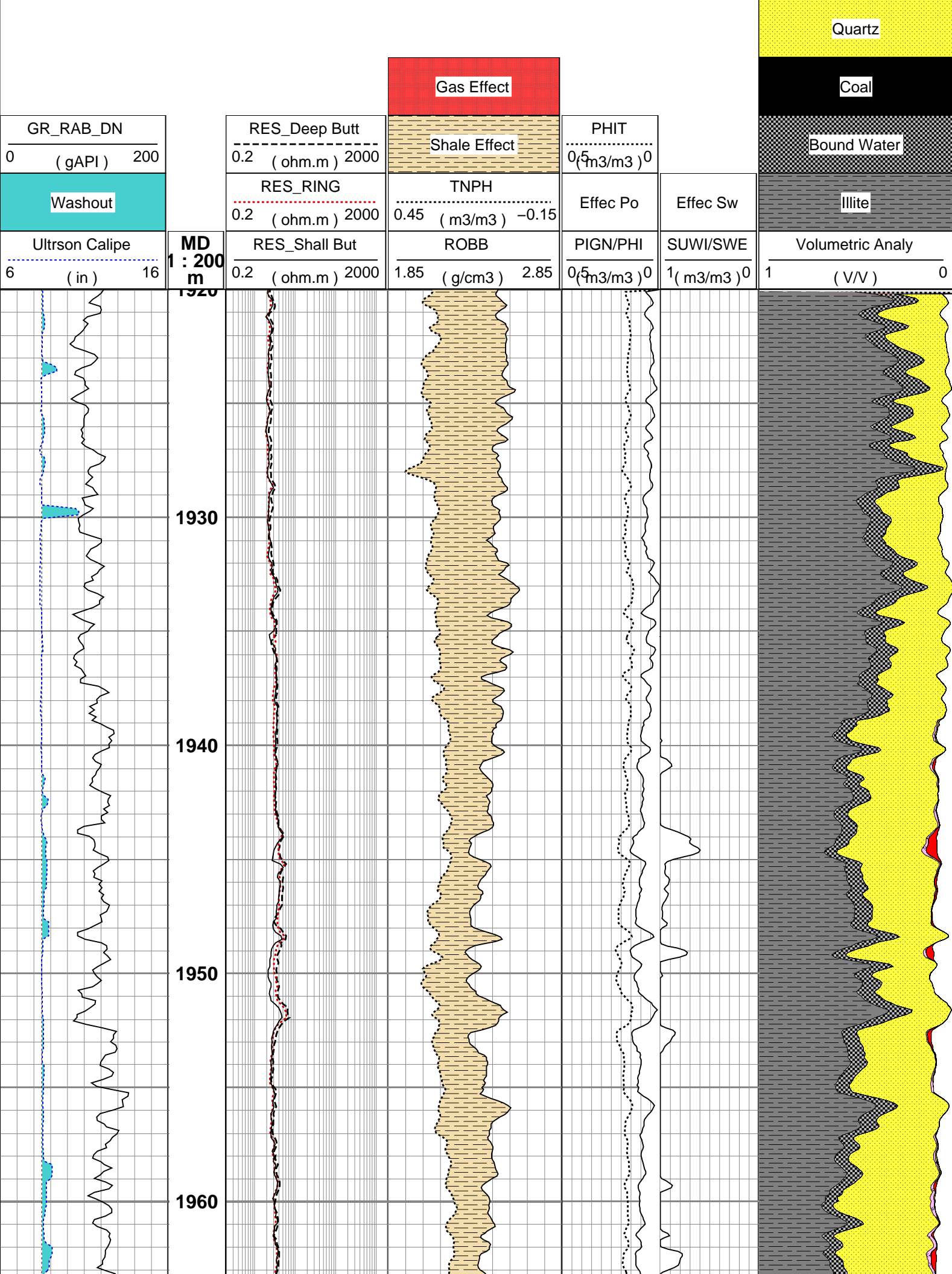
BREAM B16

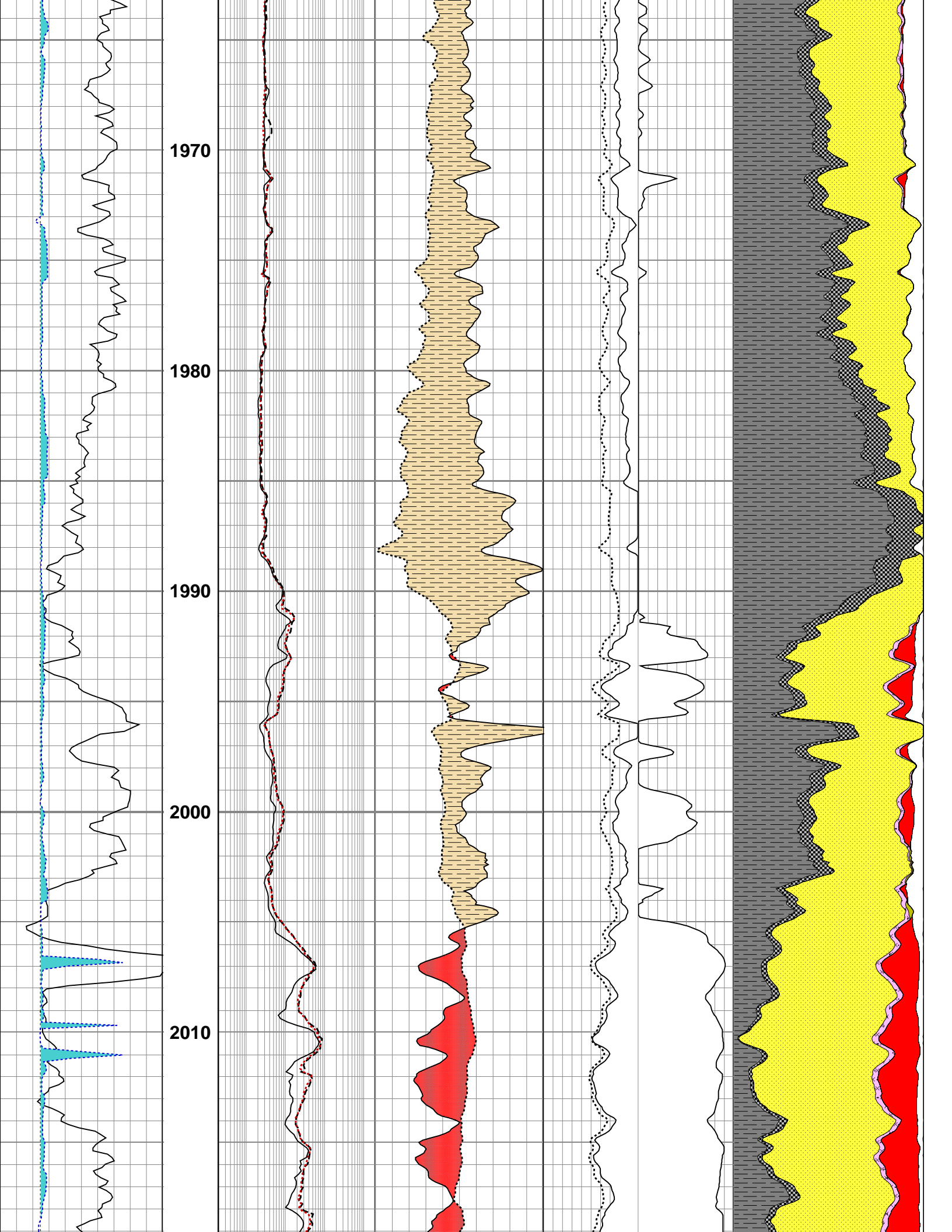
Petrophysical Analysis

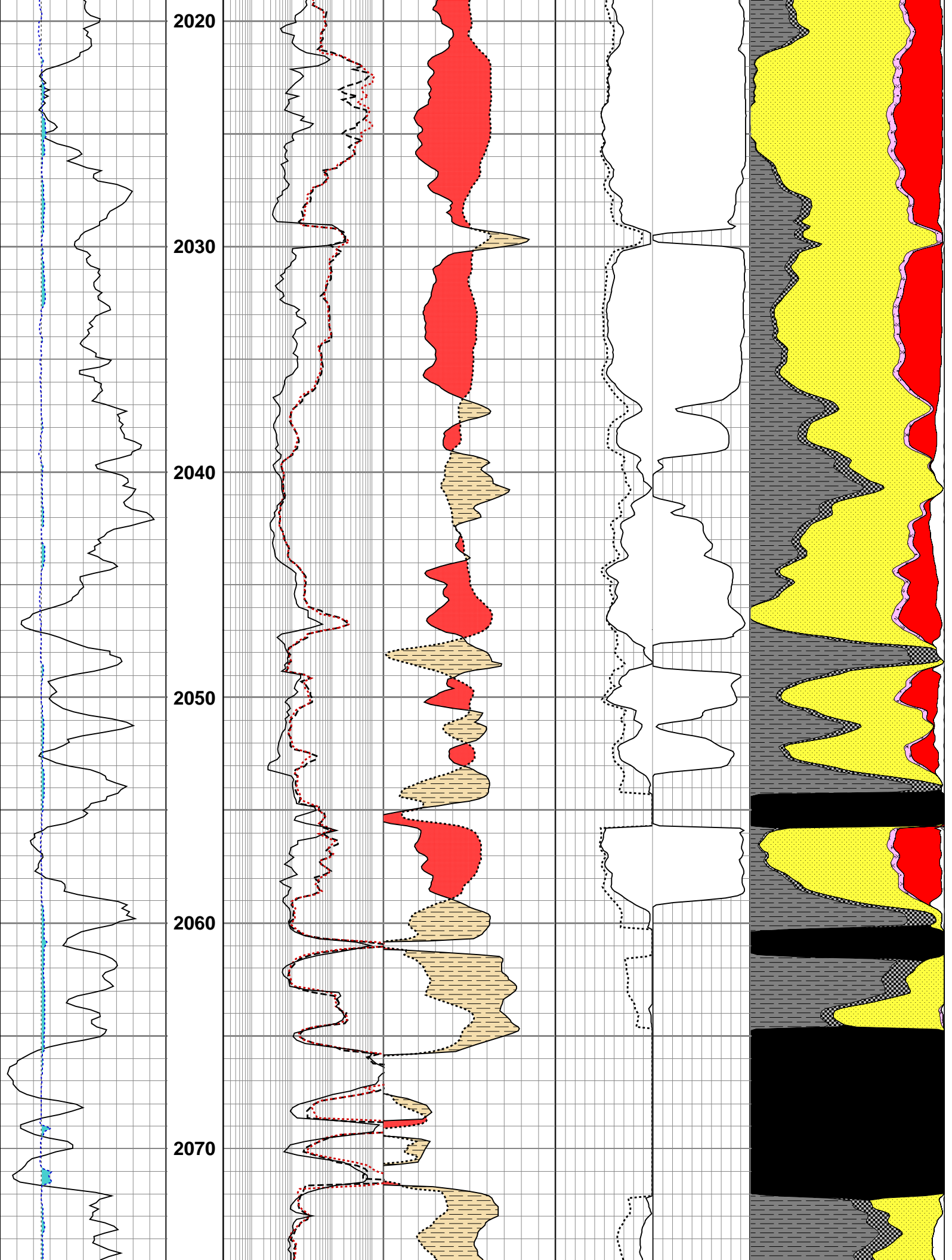
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BOREHOLE:  
FIELD: BREAM  
STATE: Victoria  
COUNTRY: AUSTRALIA  
  
PETROPHYSICIST: KUMAR KUTTAN

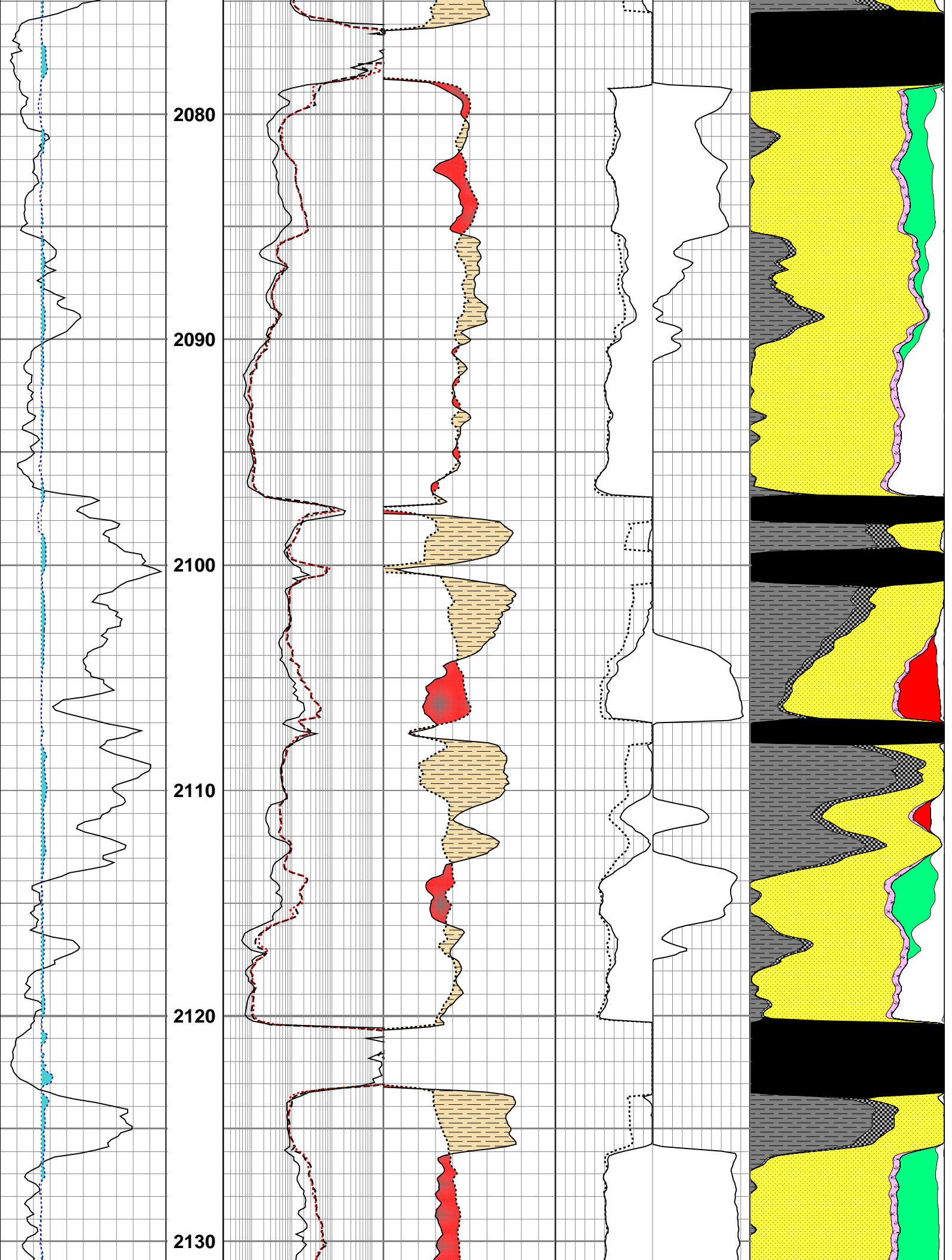
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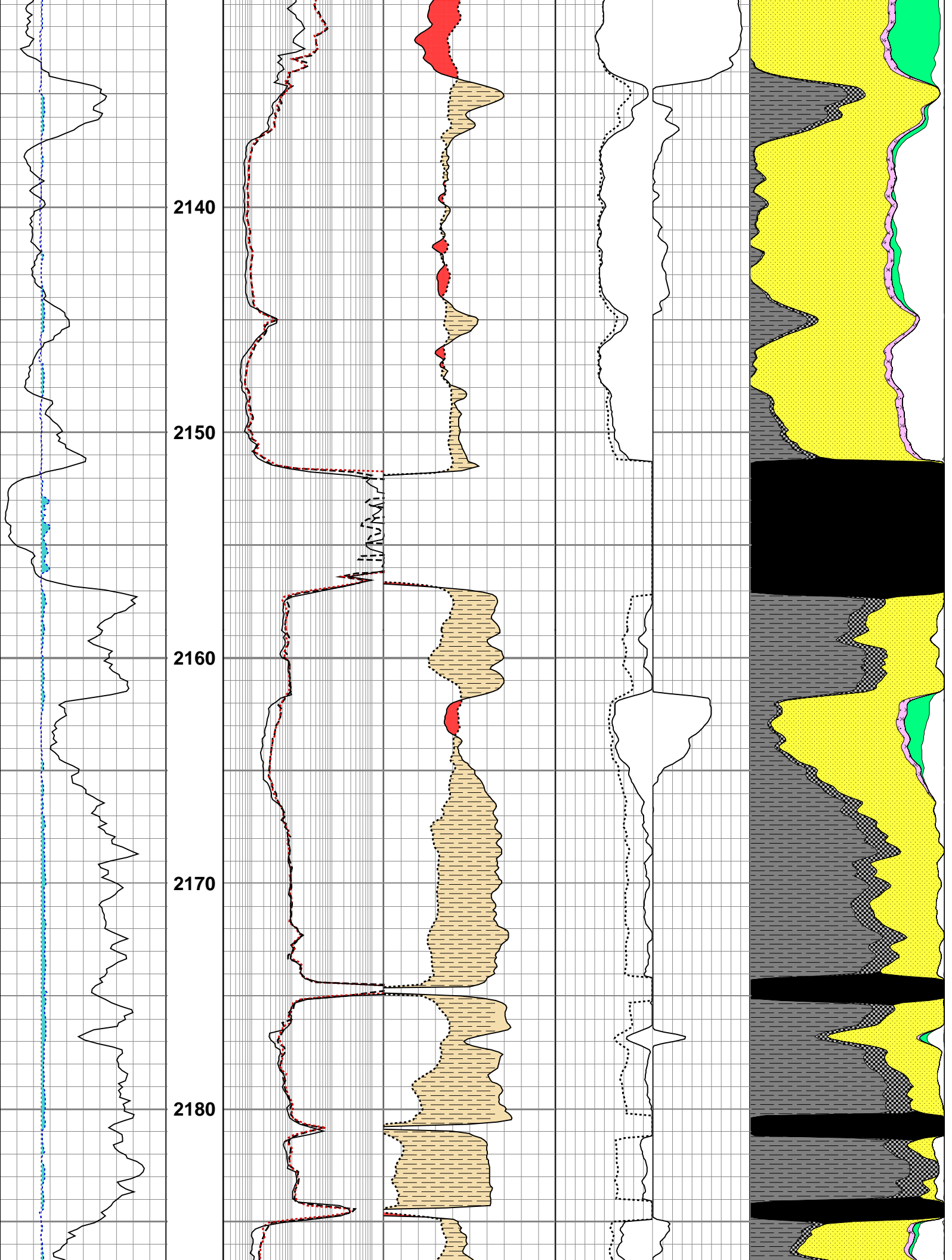


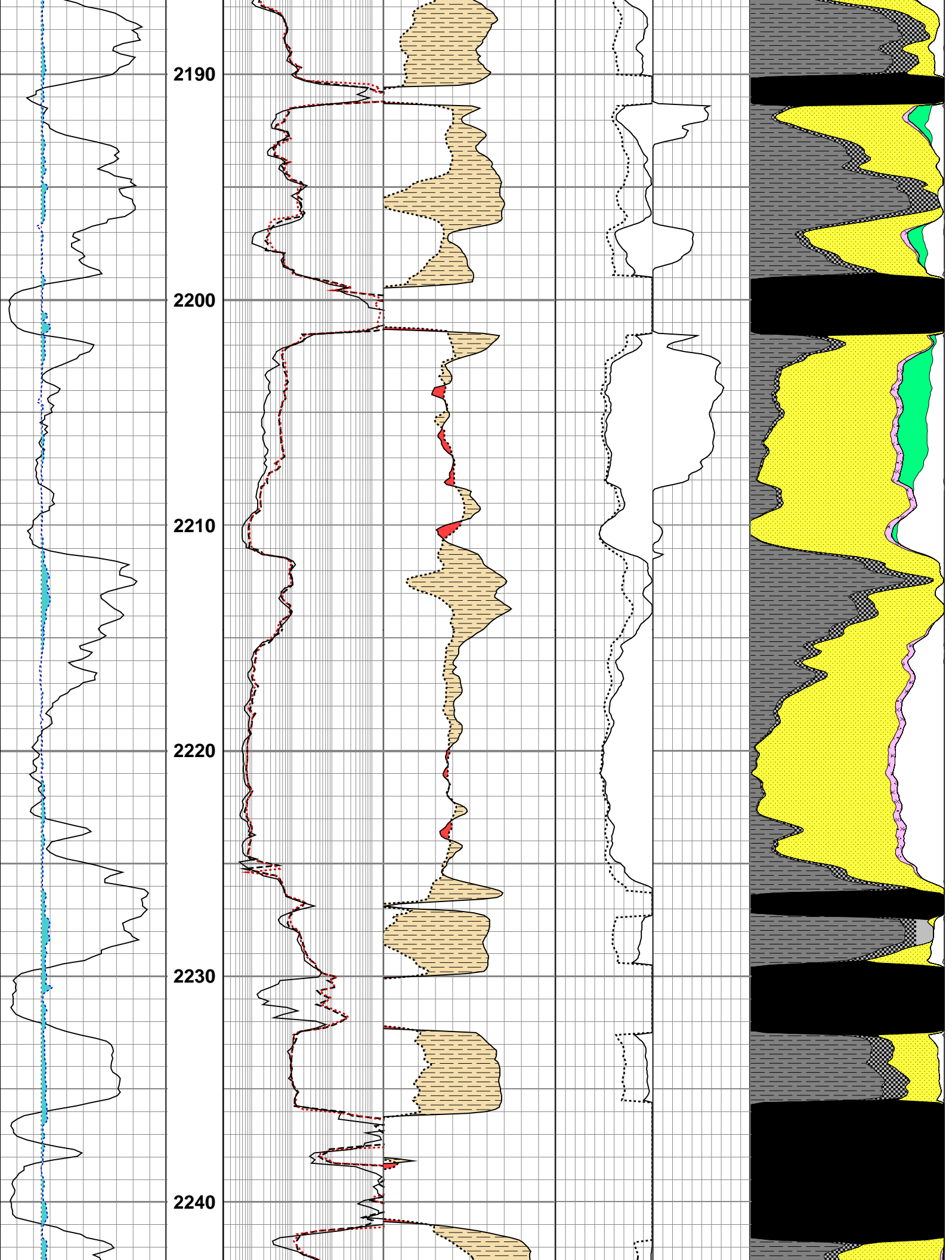


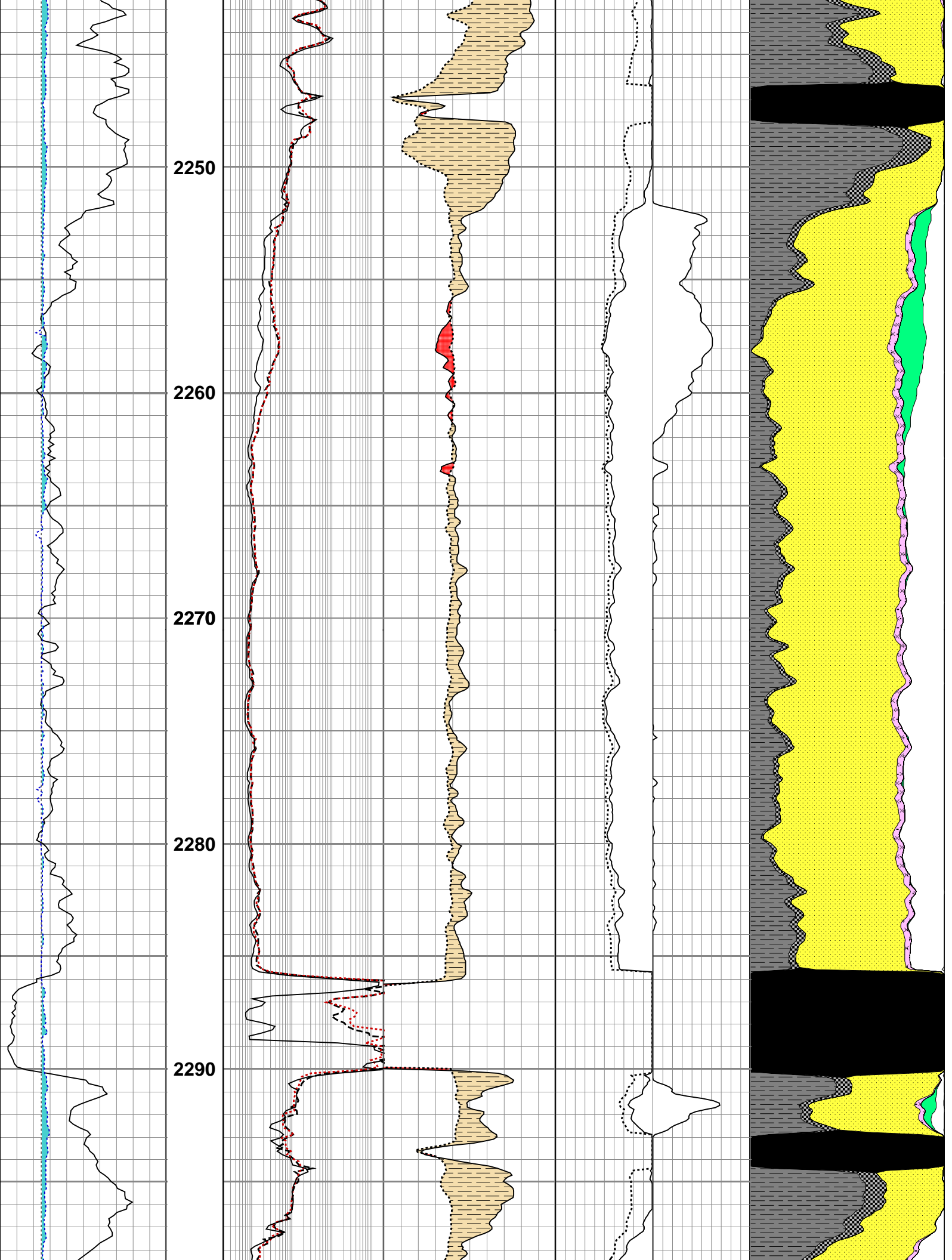


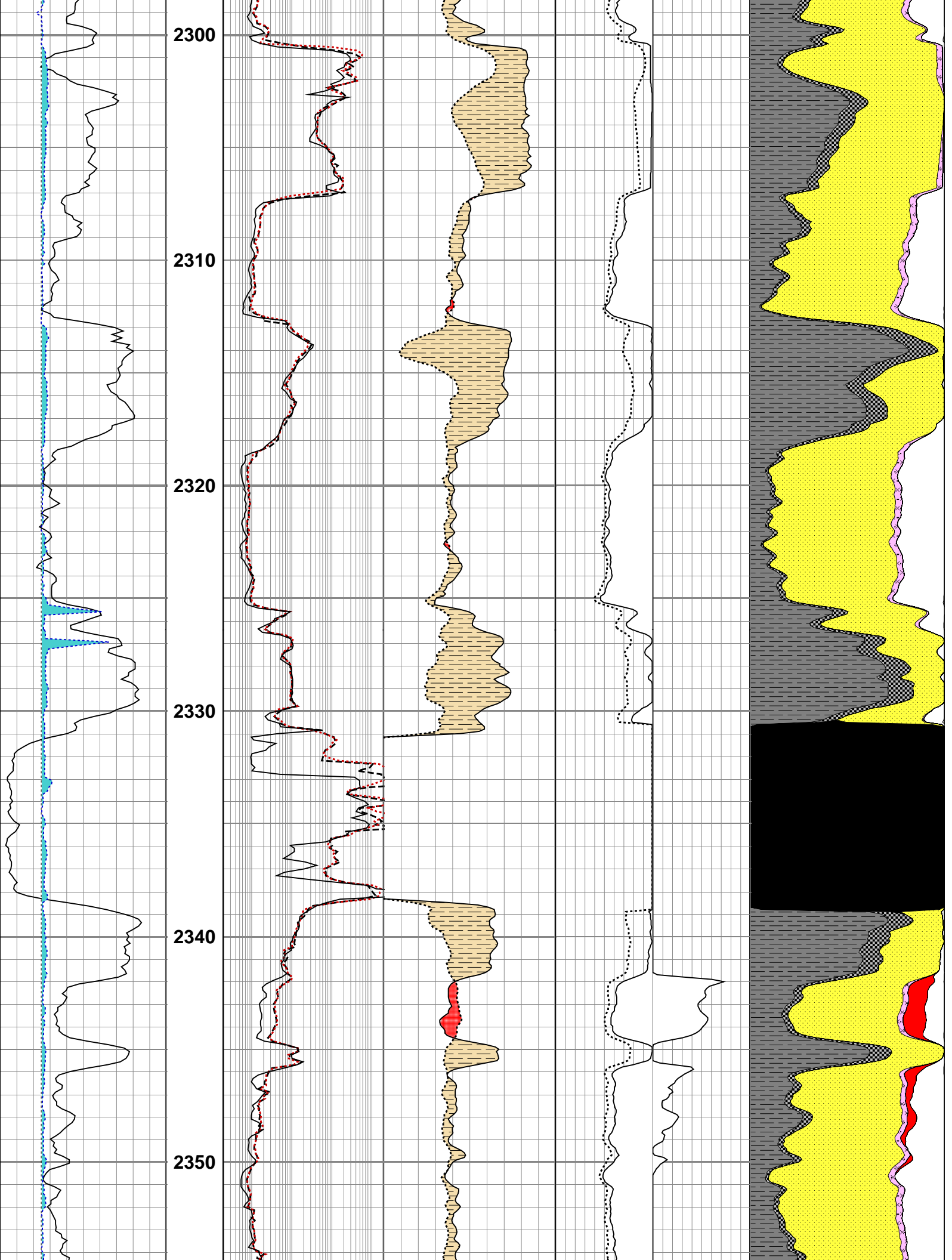


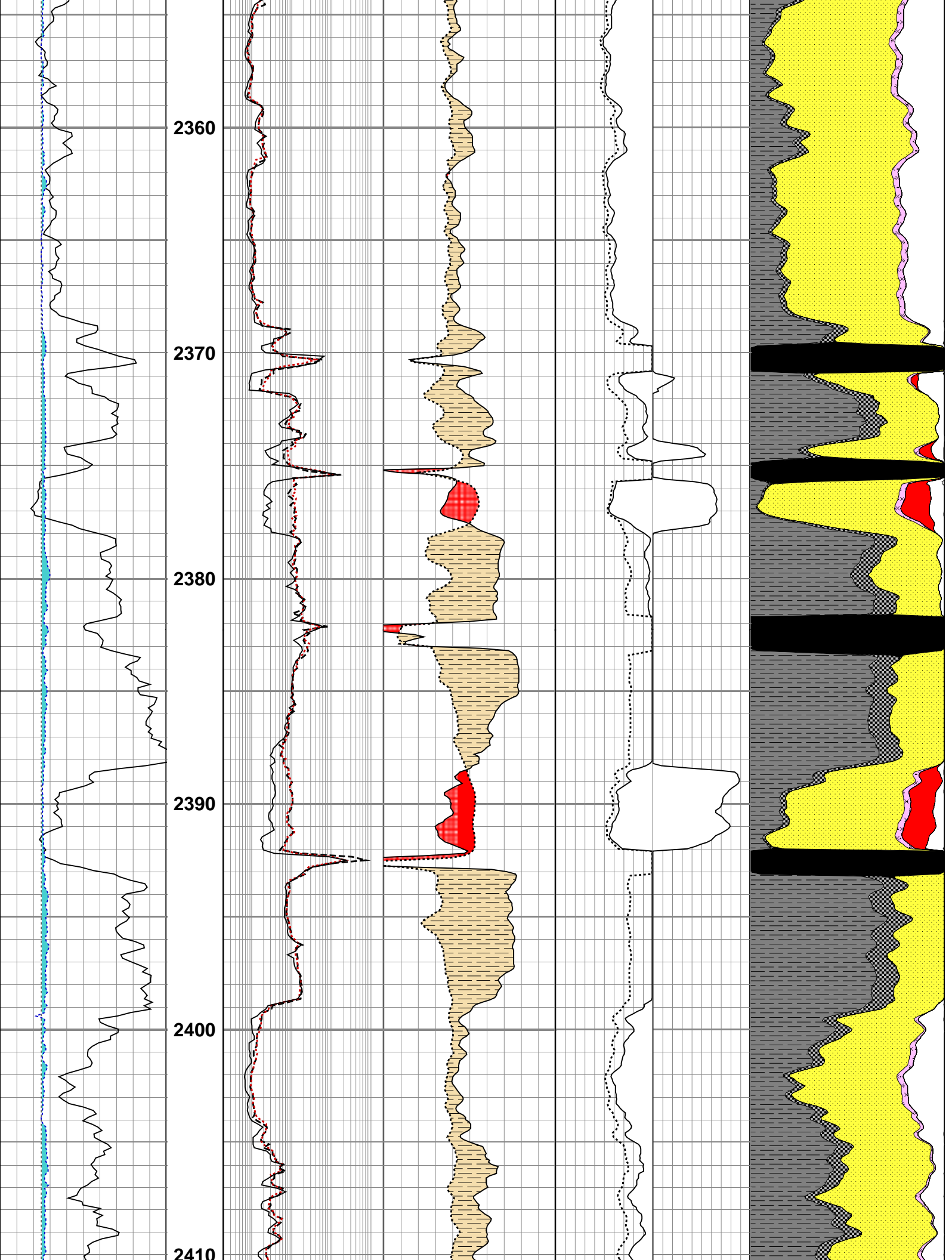


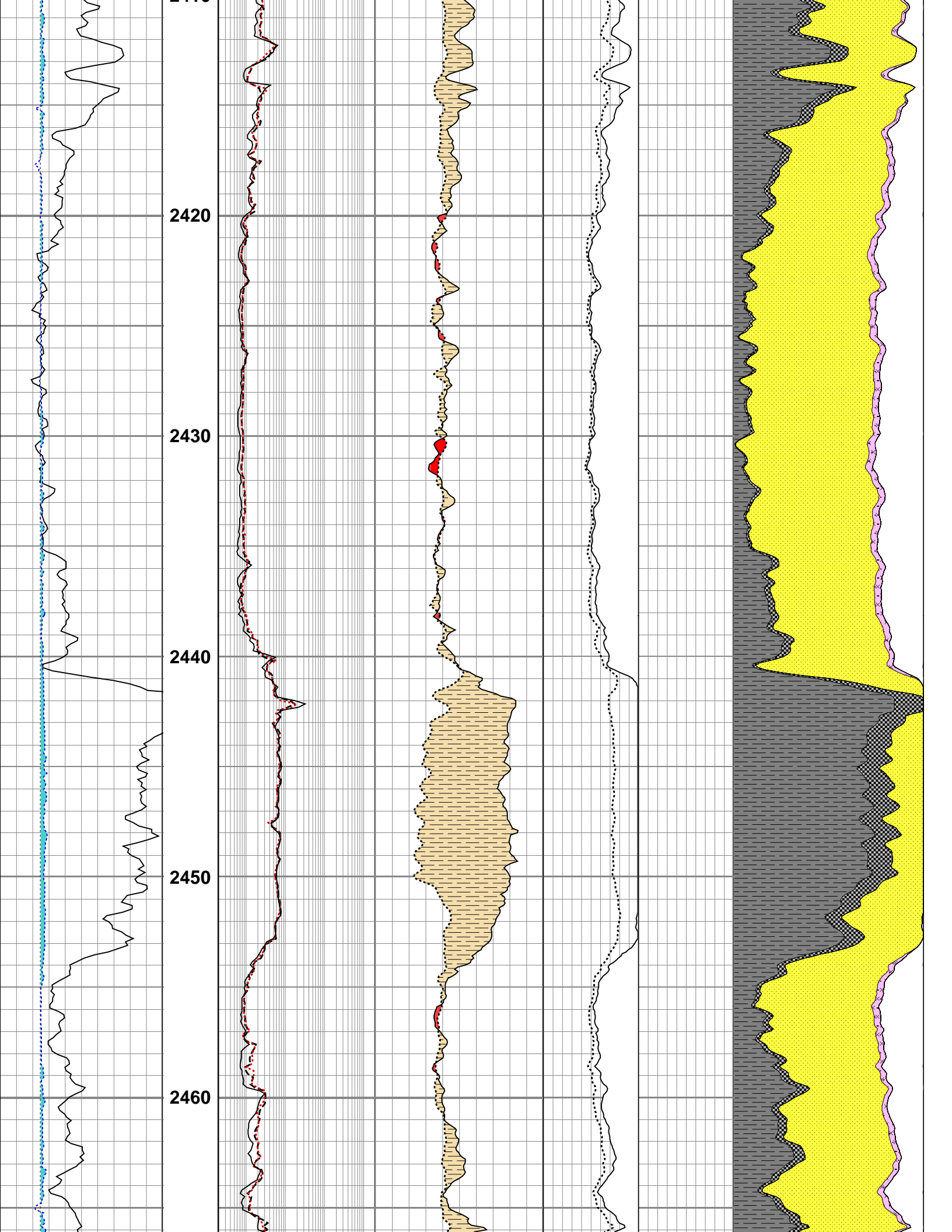


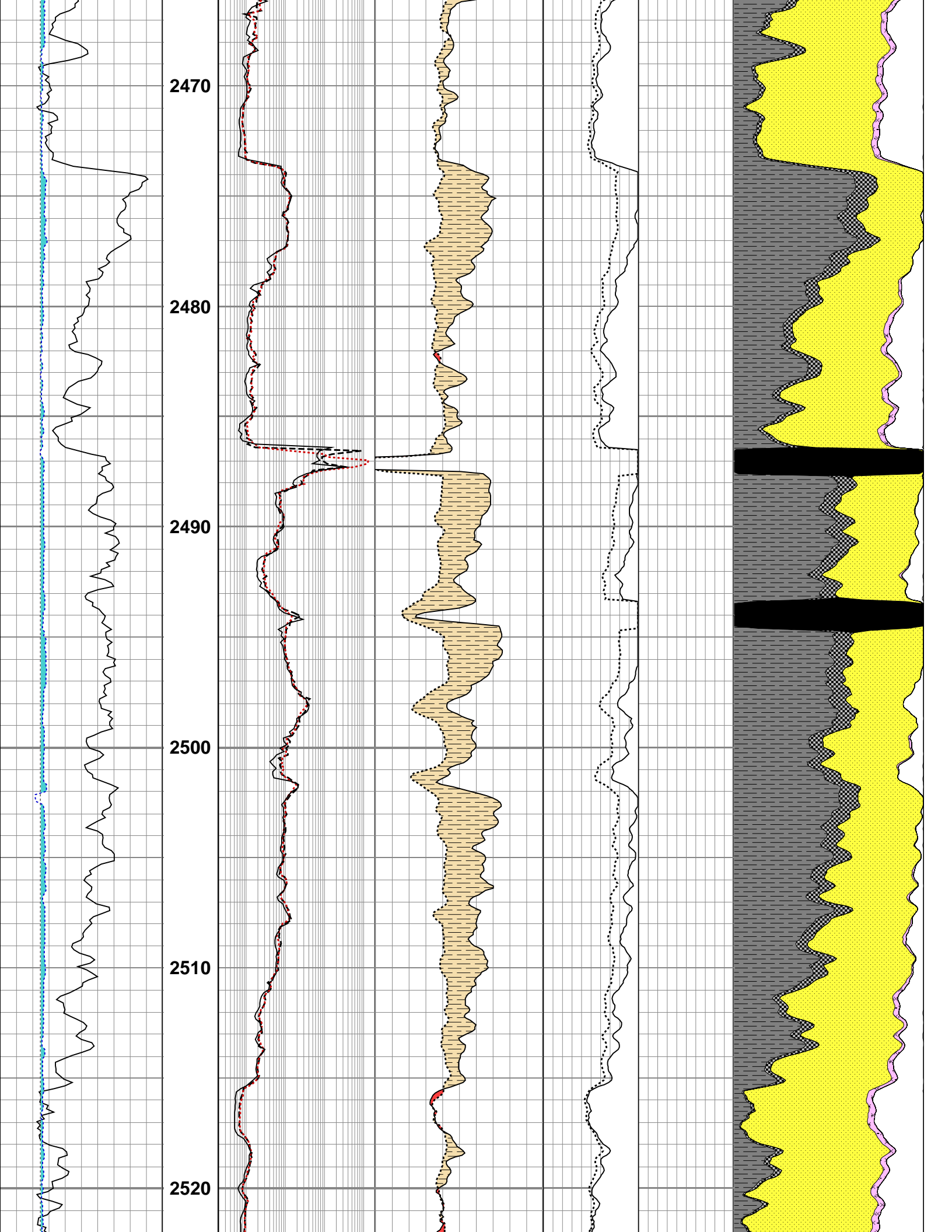


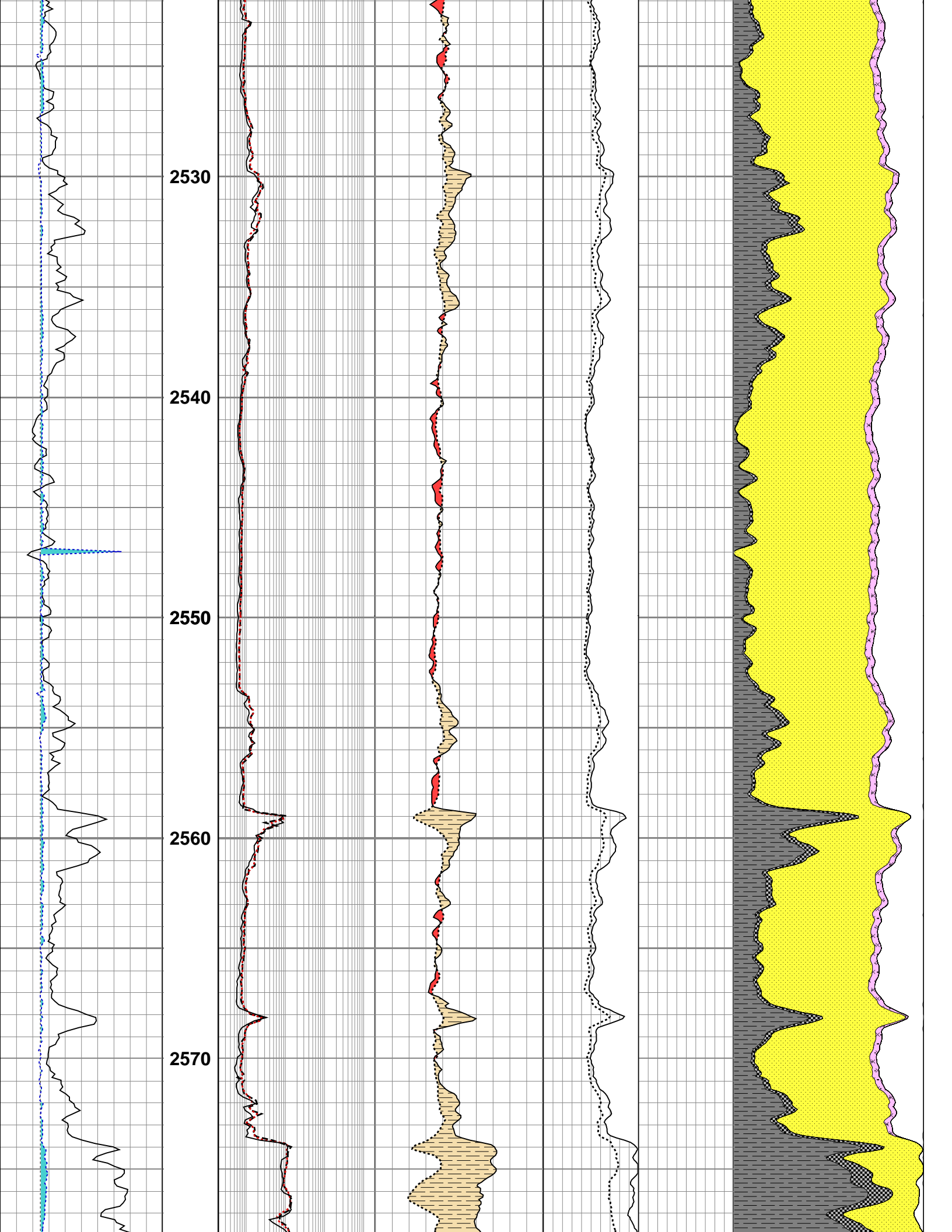


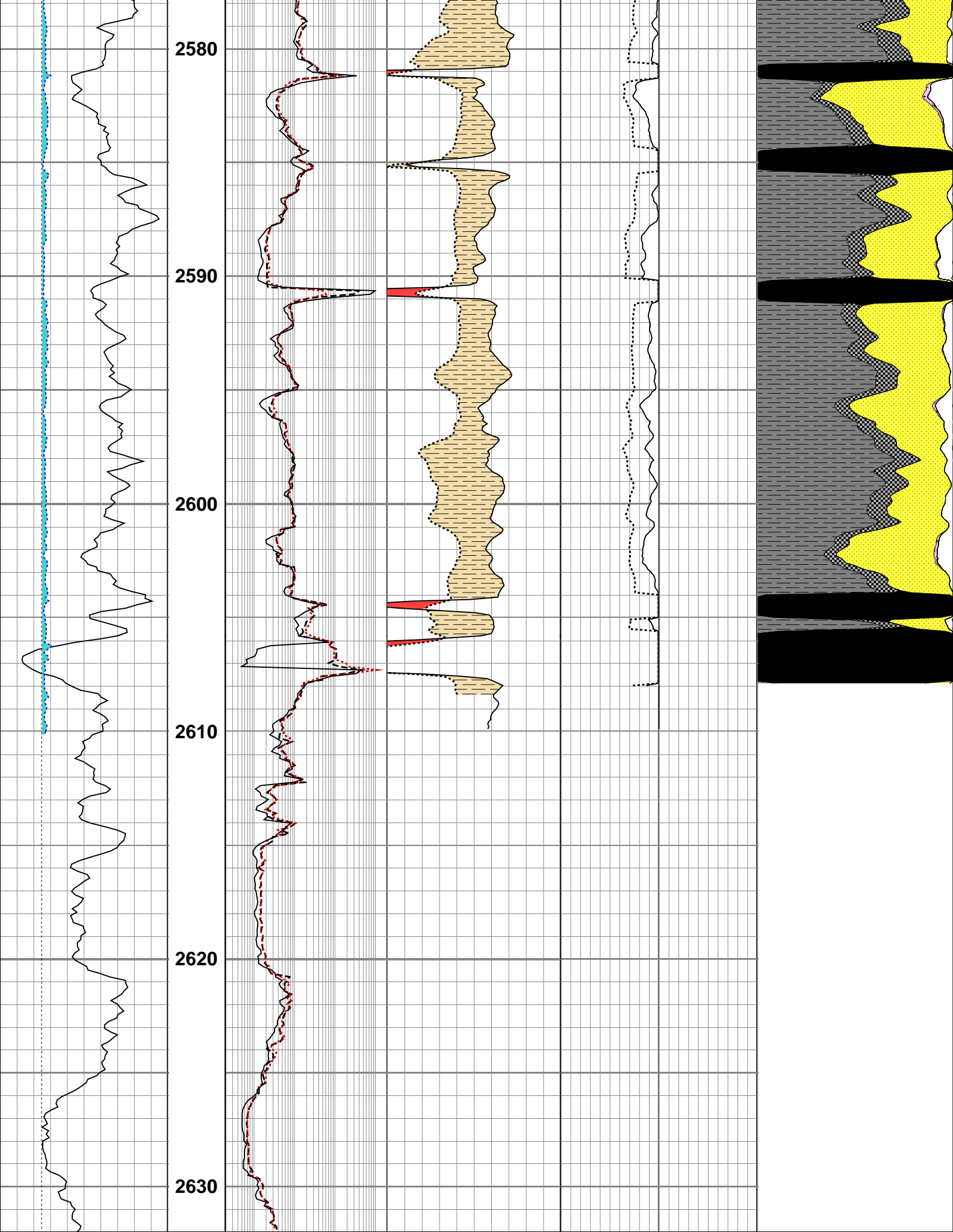












**APPENDIX 3a**

**BREAM B16**

**Lithology/Show Descriptions**

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
<b>Geologist on board from 843.0m MDRT on 2 August 2005.</b>			
<b>30m spot samples taken for description only from 843 to 1750 mMDRT (150 m above the TOL at 1903 mMDRT).</b>			
843	880	100	<b>ARGILLACEOUS CALCARENITE:</b> greenish grey, very fine to fine, soft to occasionally firm, friable, sub blocky to blocky, lutitic, common to abundant argillaceous matrix, grades to calcareous CLAYSTONE in part, rare benthonic forams, trace planktonic forams, trace indeterminate shell fragments, trace to rare disseminated fine carbonaceous material, trace glauconite grains, nil to very poor visible intergranular porosity. NO SHOW.
880	910	100	<b>ARGILLACEOUS CALCARENITE:</b> as above, but becoming finer grained and tending to argillaceous CALCILUTITE, slightly less fossiliferous. NO SHOW.
		Tr	<b>LIMESTONE:</b> translucent olive grey, medium to occasionally fine crystalline, moderately hard to hard, sub blocky, rare to minor glauconite, trace to rare disseminated carbonaceous specks, trace to rare microcrystalline pyrite in patches, dense, tight, no visible porosity. NO SHOW.
910	930	100	<b>ARGILLACEOUS CALCARENITE:</b> greenish grey to dark greenish grey, olive grey in part, very fine to silty, lutitic, common to abundant argillaceous material, grades to calcareous CLAYSTONE and argillaceous CALCISILTITE in part, soft to firm, occasionally moderately hard, sub blocky to blocky, becoming sub fissile in places, moderately to very calcareous, rare to minor forams (predominantly planktonic types), trace to rare disseminated carbonaceous specks, trace micropyrte, trace very light grey to white fine to medium crystalline calcite (subhedral crystals in aggregates, vein material?), nil to very poor visible porosity. NO SHOW.
930	960	100	<b>ARGILLACEOUS CALCARENITE:</b> olive grey, dark greenish grey, generally as above, moderately calcareous, tending more to calcareous CLAYSTONE, minor to common forams. NO SHOW.
960	990	100	<b>ARGILLACEOUS CALCISILTITE:</b> olive grey, dark greenish grey, grades from CALCARENITE above, but more argillaceous and finer grained, commonly grades to calcareous CLAYSTONE, trace fine CALCARENITE, moderately calcareous, trace pyrite veining (microcrystalline, very thin veins), no glauconite present, trace to rare forams, tight, no visible porosity. NO SHOW.
990	1020	100	<b>ARGILLACEOUS CALCISILTITE:</b> medium dark grey, olive grey, dark greenish grey in part, silty and very argillaceous, lutitic, commonly grades to calcareous CLAYSTONE, trace very fine CALCARENITE, soft to firm, blocky to sub fissile, moderately calcareous, trace to rare pyrite (very finely divided, botryoidal habit, occurs as small patches and in small friable aggregates), trace to rare forams, trace indeterminate fossil debris, trace disseminated carbonaceous specks, nil to occasional very poor visible intergranular porosity. NO SHOW.
1020	1050	100	<b>ARGILLACEOUS CALCARENITE:</b> medium dark grey, occasionally dark greenish grey, very fine to fine, silty in places, lutitic, soft, friable, rarely firm, sub blocky to blocky, occasionally grades to calcareous CLAYSTONE and argillaceous CALCISILTITE, moderately to very calcareous, rare to minor forams (common planktonic types, often replaced by pyrite), rare to minor pyrite

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
			(microcrystalline, botryoidal habit, occurs as small aggregates, trace thin veins, occasional disseminated patches and as replacement of fossil tests), trace carbonaceous specks, trace fossil fragments, trace glauconite, nil to rarely very poor visible porosity. NO SHOW.
1050	1080	100	<b>ARGILLACEOUS CALCISILTITE:</b> olive grey, medium dark grey, lutitic, commonly very soft to soft & dispersive, minor firm and sub blocky, moderately to very calcareous, grades to calcareous CLAYSTONE, trace to rare micropyrrite, trace carbonaceous specks, trace forams, nil to occasional very poor visible porosity. NO SHOW.
1080	1110	100	<b>ARGILLACEOUS CALCISILTITE:</b> as above, predominantly very soft and dispersive, trace fossiliferous, trace very small pyrite aggregates (massive granular pyrite), grades to calcareous CLAYSTONE.
1110	1140	100	<b>ARGILLACEOUS CALCILUTITE:</b> light grey to medium light grey, occasionally greenish grey, very soft to soft, dispersive in part, generally sub blocky, very calcareous, grades from CALCISILTITE above, common argillaceous material, grades to calcareous CLAYSTONE in part, rare forams (mainly planktonic, minor benthonic), trace to rare microcrystalline pyrite (subhedral to euhedral crystals, occasionally botryoidal habit, as disseminated crystals, some small friable aggregates and often partially replacing fossil tests), occasional trace dispersed very fine carbonaceous matter, no visible porosity. NO SHOW.
1140	1170	80	<b>ARGILLACEOUS CALCILUTITE:</b> light grey to medium light grey, generally as above, dispersive in part, very calcareous, rare to minor forams (predominantly planktonic). NO SHOW.
		20	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to dark grey, firm, sub blocky, amorphous, hackly fracture in part, slightly to moderately calcareous, non silty, trace disseminated carbonaceous specks. <b>Preliminary Top Lakes Entrance Formation at 1186m MDRT, 1181.3m TVDRT, -1134.1m SS.</b>
1170	1200	90	<b>ARGILLACEOUS CALCILUTITE:</b> medium light grey to medium grey, very soft, very dispersive (hygroturgid), sticky in part, amorphous, non silty, moderately to very calcareous, grades to calcareous CLAYSTONE in part, rare microfossils, trace disseminated carbonaceous specks, trace micropyrrite.
		10	<b>CALCAREOUS CLAYSTONE:</b> dark grey to medium dark grey in part, soft to firm, sub blocky, slightly to moderately calcareous, non silty, slightly dispersive in part, trace microfossils.
1200	1230	60	<b>ARGILLACEOUS CALCILUTITE:</b> light grey to medium light grey, greenish grey in part, lutitic, locally microcrystalline and sparry (grades to argillaceous CALCISILTITE in places), very soft, dispersive, hygroturgid, friable in part, amorphous, sub blocky when firmer, moderately to very calcareous, locally grades to calcareous CLAYSTONE, rare to minor planktonic forams, trace to rare disseminated micropyrrite (botryoidal habit), nil to occasional very poor visible porosity. NO SHOW.
		40	<b>CALCAREOUS CLAYSTONE:</b> medium grey to medium dark grey, soft and sticky (slightly dispersive) to firm, sub blocky, rarely becomes sub fissile, slightly to moderately calcareous, amorphous, trace to rare disseminated very fine

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
1230	1253 (BU)		carbonaceous specks, trace to rare disseminated micropyrrite (botryoidal habit), possible trace micromica, non fossiliferous.
		10	<b>ARGILLACEOUS CALCILUTITE:</b> as above, rare micropyrrite, rare planktonic forams (pyritised in places). NO SHOW.
		90	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to medium grey in part, soft to firm, amorphous, sub blocky to blocky, slightly to moderately calcareous, rare to minor microcrystalline pyrite (botryoidal habit, occurs in small patches of very finely divided crystals, trace veins, occasionally becomes locally abundant and forms friable aggregates), trace benthonic forams, trace carbonaceous fragments. <b>Took spot sample at 1253m MDRT after CBU prior to POOH for bit change (due to very slow ROP and to replace failed LWD nuclear tool).</b>
1253	1290	100	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to medium grey in part, greenish grey in part, predominantly very soft to soft, dispersive, hygroturgid, sticky in part, amorphous, smooth, minor soft to firm, sub blocky, moderately calcareous, trace coaly fragments, trace to rare very finely divided pyrite (occurs in patches), trace planktonic forams.
1290	1320	100	<b>CALCAREOUS CLAYSTONE:</b> generally as above, becoming predominantly soft to firm, minor very soft and dispersive, rare forams (benthonic and planktonic, occasionally pyritised), trace pyrite, moderately calcareous, locally becoming slightly more calcareous and grading to MARL.
		Tr	<b>SANDSTONE:</b> brownish black, dark yellowish brown, very fine to fine grained, moderately well sorted, sub angular to rounded, sub spherical, very soft, friable, minor argillaceous matrix, very slightly calcareous (trace calcite cement), minor carbonaceous fragments, nil to very poor visible porosity. NO SHOW. <b>[Possibly contamination].</b>
1320	1350	100	<b>CALCAREOUS CLAYSTONE:</b> medium grey to medium dark grey, soft to firm, sometimes very firm, predominantly sub blocky, occasionally blocky to sub fissile, moderately to sometimes very calcareous, grades to MARL, rare to minor forams (benthonic and planktonic), trace indeterminate fossil fragments, trace to rare microcrystalline pyrite (very finely divided crystals in small patches and trace very friable aggregates), trace pyrite aggregates (hard, subhedral very fine crystalline to massive granular habit), trace carbonaceous matter.
1350	1380	100	<b>CALCAREOUS CLAYSTONE:</b> as above, rarely greenish grey, becoming firmer in general, rare to minor forams (predominantly planktonic), rare to minor pyrite (hard aggregates are more common but generally occurs as very finely divided crystals in patches, locally abundant), trace to rare greenish grey to dark greenish grey glauconite clasts (usually 'shot' with micropyrrite).
1380	1410	100	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to medium grey, soft to firm, sub blocky, occasionally blocky, hackly fracture in part, moderately calcareous, silty in part, rare to minor planktonic forams, trace to rare micropyrrite, trace small pyrite aggregates (massive granular habit), trace biotite micromica, grades to MARL in part.
1410	1440	95	<b>CALCAREOUS CLAYSTONE:</b> as above, minor forams (locally pyritised), trace dark greenish grey glauconite clasts.
		5	<b>ARGILLACEOUS DOLOMITE:</b> crystalline carbonate, moderate to dark

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
			yellowish brown, cryptocrystalline to microcrystalline, aphanitic to occasionally micro sucrosic texture, hard to very hard, brittle, sub blocky, slightly to moderately calcareous (more calcareous when crushed), grades to dolomitic LIMESTONE, slightly argillaceous, trace carbonaceous specks, dense, tight, no visible intercrystalline porosity. NO SHOW.
1440	1470	100	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to dark grey, soft to firm, occasionally very firm, sub blocky to blocky, becoming sub fissile in part, moderately calcareous, becomes slightly more calcareous and grades to MARL in places, massive, amorphous, smooth, plastic, silty in part, locally slightly dispersive, minor forams (rare benthonics, mostly planktonic types), rare to minor pyrite (as small massive granular aggregates and disseminated patches of microcrystalline botryoidal pyrite), trace dark greenish grey to greenish grey glauconite clasts, trace translucent honey brown siderite, trace carbonaceous flecks.
		Tr	<b>ARGILLACEOUS DOLOMITE:</b> as above. NO SHOW.
1470	1500	100	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to dark grey, olive grey in part, generally as above, rarely dispersive and hygroturgid, rare to minor pyrite, rare forams, trace to rare dark greenish grey to greenish black glauconite clasts (typically shot with pyrite). <b>Trace to rare BARABLOK contamination evident in sample at 1530m (started adding to mud system early - 3ppb concentration at this depth).</b>
1500	1530	100	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to occasionally dark grey, soft to firm, sometimes very firm, sub blocky to blocky, becoming sub fissile in part, massive, amorphous, moderately to occasionally very calcareous, grades to MARL in part (argillaceous CALCISILTITE), smooth, silty in part, non to slightly dispersive, rare to minor pyrite (botryoidal habit, microcrystalline, occurs in patches), rare to minor forams, trace indeterminate fossil fragments, trace greenish black glauconite clasts and patches.
1530	1560	90	<b>CALCAREOUS CLAYSTONE:</b> generally as above, rarely greenish grey, becoming firmer and less dispersive, trace calcite veining in part.
		10	<b>ARGILLACEOUS CALCISILTITE:</b> light grey to medium light grey, occasionally very fine crystalline and micritic, grades to very fine CALCARENITE in places, soft and friable, sub blocky in part, moderately to very calcareous, grades to calcareous CLAYSTONE in part, trace micropyrrite, nil to very poor visible porosity. NO SHOW.
1560	1590	80	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to dark grey, soft to firm, sub blocky to blocky, occasionally tending to sub fissile, hackly fracture in part, moderately calcareous, massive, amorphous, silty, rare to minor microcrystalline pyrite (botryoidal habit, disseminated in patches), trace to rare indeterminate fine fossil debris, trace microfossils.
		20	<b>ARGILLACEOUS CALCARENITE:</b> medium light grey to light grey, very fine to silty - locally grades to argillaceous CALCISILTITE, sparry to micritic, sucrosic texture in part, soft to firm, sub blocky, occasionally friable, very calcareous, grades to calcareous CLAYSTONE in part, trace micropyrrite, trace to rare microfossils (locally common planktonic forams), nil to occasional very poor

## **Bream B16 Lithology / Show Descriptions**

<b>Interval (m)</b>		<b>%</b>	<b>Lithology / Show Description</b>
<b>From</b>	<b>To</b>		
1590	1620	95	visible porosity. NO SHOW. <b>CALCAREOUS CLAYSTONE:</b> as above, occasionally very firm, pyritic, trace very thin carbonaceous to coaly streaks and laths, trace translucent honey brown siderite, trace fossil material.
		5	<b>ARGILLACEOUS CALCARENITE:</b> as above, tending to CALCISILTITE, nil to very poor porosity. NO SHOW.
1620	1650	100	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to dark grey, firm, sub blocky to blocky, becoming sub fissile in part, moderately to locally very calcareous, grades to MARL in part, silty, non dispersive, massive, amorphous, minor pyrite (microcrystalline, commonly botryoidal, distributed in patches, sometimes as subhedral to euhedral disseminated crystals, locally abundant), trace to rare planktonic forams (some benthonic types also present), trace greenish black glauconite clasts (clasts contain common to abundant pyrite), trace carbonaceous streaks, trace indeterminate very fine fossil debris.
		Tr	<b>ARGILLACEOUS CALCARENITE:</b> as above, tending to CALCISILTITE, nil to very poor porosity. NO SHOW.
		Tr	<b>ARGILLACEOUS DOLOMITE:</b> pale to moderate yellowish brown, microcrystalline, sucrosic texture, slightly to moderately calcareous (more calcareous when crushed), grades to dolomitic LIMESTONE in part, slightly argillaceous, very firm to moderately hard, sub blocky to blocky, tight, no visible intercrystalline porosity. NO SHOW.
1650	1680	100	<b>CALCAREOUS CLAYSTONE:</b> generally as above, minor to common microfossils (dominantly planktonic forams), minor to common small pyrite aggregates (typically massive granular habit, sometimes very fine to fine subhedral crystals), rare pyrite patches (microcrystalline, botryoidal), trace to rare dark greenish grey to greenish black highly pyritic glauconite clasts.
		Tr	<b>ARGILLACEOUS DOLOMITE:</b> as above. NO SHOW.
1680	1710	90	<b>CALCAREOUS CLAYSTONE:</b> as above.
		10	<b>ARGILLACEOUS CALCISILTITE:</b> medium light grey to light grey, as above, tending to CALCILUTITE in part, very calcareous, nil to very poor porosity. NO SHOW.
1710	1740	100	<b>Generally trace BARACARB contamination in samples below 1710m</b> <b>CALCAREOUS CLAYSTONE:</b> as above, rare fossil material, rare pyrite, no glauconite.
1740	1750	100	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to dark grey, soft to firm, becoming very firm in part, sub blocky to blocky, trace sub fissile, non dispersive, amorphous, massive, moderately to occasionally very calcareous, grades to MARL in part, rare to minor pyrite (microcrystalline, botryoidal, distributed in patches), trace pyrite aggregates (massive granular to very fine crystalline), trace to rare microfossils (dominantly planktonic and benthonic forams, occasionally pyritised).
1750	1760	100	<b>Commence bagging 10m cuttings samples below 1750m</b> <b>CALCAREOUS CLAYSTONE:</b> as above, minor pyrite.
1760	1770	100	<b>Rare BARACARB contamination in sample at 1770m</b> <b>CALCAREOUS CLAYSTONE:</b> medium dark grey to dark grey, as above, rare to minor pyrite, trace small pyrite aggregates, minor to common microfossils

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
1770	1780	100	(predominantly planktonic forams), no glauconite. <b>CALCAREOUS CLAYSTONE:</b> medium dark grey to dark grey, firm to very firm, blocky to sub fissile, occasionally soft, minor sub blocky, massive, amorphous, moderately calcareous, silty to very silty, locally grades to calcareous SILTSTONE, rare to minor pyrite (microcrystalline, botryoidal, generally distributed as small patches, locally abundant and forming friable aggregates of finely divided crystals), rare to minor microfossils (dominantly planktonic forams), trace dark greenish grey glauconitic mottles, trace indeterminate shell fragments.
1780	1790	100	<b>CALCAREOUS CLAYSTONE:</b> as above, minor to common microfossils, trace glauconite grains, trace carbonaceous fragments (laths).
1790	1800	100	<b>CALCAREOUS CLAYSTONE:</b> as above, minor microfossils (some pyritised), no glauconite or carbonaceous matter.
1800	1810	100	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to dark grey, olive grey, soft to firm, occasionally very firm, sub blocky to blocky, sub fissile in part, massive, amorphous, moderately to occasionally very calcareous, grades to MARL in part, silty, rare to minor pyrite (microcrystalline, botryoidal, distributed in small patches), minor to common microfossils (including planktonic and benthonic forams, occasionally pyritised), trace brachiopods, trace fossils, trace dark greenish grey glauconite clasts, trace glauconite grains, trace aggregates of medium to coarse crystalline translucent sparry calcite (vein filling).
		Tr	<b>ARGILLACEOUS DOLOMITE:</b> pale to moderate yellowish brown, microcrystalline to cryptocrystalline, slightly to moderately calcareous, firm to moderately hard, brittle in part, grades to dolomitic LIMESTONE, trace disseminated micropyrte, tight, no visible intercrystalline porosity. NO SHOW.
1810	1820	100	<b>CALCAREOUS CLAYSTONE:</b> as above, silty, locally grades to calcareous SILTSTONE, moderately calcareous, rare translucent dark honey brown siderite (medium crystalline, hard, brittle), trace calcite veining (anhedral, translucent, medium to coarse crystalline), trace glauconite grains.
1820	1830	100	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to dark grey, olive grey, becoming pale yellowish brown in part (ie colour changing slightly from above), soft to firm, sub blocky to blocky, occasionally sub fissile to fissile, moderately to sometimes very calcareous, grades to MARL in part, silty, massive, minor to common microfossils (predominantly forams), minor micropyrte (patchy distribution), trace indeterminate shell fragments, trace very fine biotite mica flakes.
1830	1840	80	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to dark grey, olive grey, pale yellowish brown, as above, common microfossils, fossil tests are sometimes partially to fully replaced by pyrite, occasional patchy replacement by glauconite, trace calcite veining.
		20	<b>ARGILLACEOUS CALCISILTITE:</b> medium light grey to light grey, silty to occasionally very fine grained, lutitic, locally grades to argillaceous very fine CALCARENITE, moderately to very calcareous, soft to firm, friable, occasionally sub blocky, trace to rare micropyrte (in thin streaks and disseminated crystals), trace planktonic forams, trace pyritised sponge spicules, nil to very poor visible porosity. NO SHOW.

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
1840	1850	70	<b>CALCAREOUS CLAYSTONE:</b> as above, firm to very firm, sub blocky to blocky, sub fissile in part, non dispersive, slightly to moderately calcareous, common microfossils (occasionally replaced by pyrite and rarely by glauconite or siderite), dominantly planktonic forams with rare benthonics, trace pyritised porifera, trace patchy glauconite.
		30	<b>ARGILLACEOUS CALCISILTITE:</b> medium light grey, silty to very fine, commonly grades to argillaceous very fine CALCILUTITE, generally as above, moderately to occasionally very calcareous, rare micropyrte, trace to rare dark greenish grey glauconitic patches, trace to rare planktonic forams, trace pyritised sponge spicules, nil to very poor visible porosity. NO SHOW. <b>Note: May contain some small mesovug porosity with botryoidal pyrite lining walls of voids.</b>
1850	1860	60	<b>CALCAREOUS CLAYSTONE:</b> as above, common to abundant fossils, trace siderite replaced fossil tests, trace glauconite replaced tests, trace to locally rare patches of greenish grey to dark greenish grey glauconite.
		40	<b>ARGILLACEOUS CALCISILTITE:</b> as above, becoming very fine to fine grained and grading to argillaceous CALCARENITE, very poor visible porosity. NO SHOW.
1860	1870	95	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to dark grey, olive grey, firm to very firm, rarely soft, non dispersive, sub blocky to blocky, occasionally sub fissile, silty to very silty, grades in part to calcareous SILTSTONE, moderately calcareous, rare micropyrte (botryoidal habit, distributed in veinlets and small patches), minor to common microfossils (predominantly planktonic forams), trace siderite as replacement for shell material, trace calcite veining (translucent fine to medium subhedral crystals in aggregates), rare pyrite replacement of fossils (microcrystalline, occasional spicules).
		5	<b>ARGILLACEOUS CALCISILTITE:</b> as above. NO SHOW.
		80	<b>CALCAREOUS CLAYSTONE:</b> as above, becoming siltier and less pyritic, grades to calcareous SILTSTONE.
1870	1880	20	<b>ARGILLACEOUS CALCISILTITE:</b> as above. NO SHOW.
		70	<b>CALCAREOUS CLAYSTONE:</b> as above, grades to calcareous SILTSTONE, trace small pyrite aggregates (massive granular habit).
		30	<b>ARGILLACEOUS CALCISILTITE:</b> as above, grades to argillaceous CALCARENITE, trace glauconite grains, nil to very poor visible porosity. NO SHOW.
1880	1890	60	<b>CALCAREOUS CLAYSTONE:</b> medium dark grey to dark grey, olive grey, firm to very firm, non dispersive, blocky to sub fissile, occasionally sub blocky, slightly to moderately calcareous, rare to minor microfossils, rare pyrite veinlets and patches (microcrystalline), trace glauconite, trace micromica.
		40	<b>ARGILLACEOUS CALCARENITE:</b> medium light grey to light grey, soft and friable to very firm and well cemented in part, very fine to fine, sparitic in part, lutitic in part, locally sucrosic texture, grades from argillaceous CALCISILTITE above, very calcareous, variably argillaceous (more crystalline form is less clay rich), trace to rare planktonic forams, trace to rare disseminated micropyrte, trace dark greenish grey glauconite grains, trace pyritised sponge spicules, very poor

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
1900	1902 (BU)	70	visible porosity. NO SHOW. <b>CALCAREOUS CLAYSTONE:</b> as above, grades to calcareous SILTSTONE, minor to common microfossils, trace small pyrite aggregates (massive granular habit to fine subhedral-euhedral crystals in part), trace calcite veining (anhedral to subhedral, coarse to very coarse crystalline, transparent-translucent calcite, speckled with trace secondary microcrystalline pyrite), trace pelletal glauconite.
		30	<b>ARGILLACEOUS CALCARENITE:</b> as above, grades from argillaceous CALCISILTITE, trace to rare pyritised sponge spicules (usually occur concentrated in a pyritised fossil 'hash'), nil to very poor visible porosity. NO SHOW. <b>CBU at 1902m. Take spot sample at bottoms up. POOH to change out failed LWD Resistivity tool.</b> <b>Commence taking 5m bagged samples below 1900m (1902m BU sample bagged as 1905m).</b> <b>Preliminary Top of Latrobe (TOL) at 1903m MDRT, 1858.3m TVDRT, -1811.1m TVDSS.</b>
1902	1910	90	<b>GLAUCONITIC CALCAREOUS CLAYSTONE:</b> olive grey to olive black, rarely greenish grey, silty to very silty, commonly grades to argillaceous SILTSTONE, soft to firm, rarely very firm, moderately calcareous, blocky to sub fissile, occasionally sub blocky, common to abundant pelletal glauconite (greenish black to dark greenish grey in part, medium to very coarse sand-sized pellets), rare greenish grey patches of glauconite, rare to minor micropyrte (botryoidal habit, occurs as disseminated crystals and in patches), trace to rare microfossils (including mostly benthonic forams, trace pyritised spines), trace siderite (replacing fossil material).
		10	<b>ARGILLACEOUS CALCARENITE:</b> medium grey to medium dark grey, olive grey, silty to very fine, micritic, firm to very firm, sub blocky to blocky, very calcareous, grades to argillaceous CALCISILTITE in part, trace to rare disseminated microcrystalline pyrite (in very small patches), trace greenish black to dark greenish grey glauconite grains, trace planktonic forams, no visible porosity. NO SHOW. Intermixed and interlaminated with CLAYSTONE.
1910	1915	100	<b>GLAUCONITIC CLAYSTONE:</b> olive grey to olive black, rarely greenish grey, occasional mottles of moderate olive brown and light olive to dark greenish yellow, silty to very silty, commonly grades to argillaceous glauconitic SILTSTONE, soft and slightly dispersive to firm and sub blocky to blocky in part, non to slightly calcareous, rarely moderately calcareous, abundant fine to medium sand sized pelletal glauconite (greenish black), occasional glauconite grains and patches, trace siderite, trace microfossils. The light olive and yellowish green mottling may be due to presence of limonite.
1915	1920	95	<b>GLAUCONITIC SILTSTONE:</b> olive grey to olive black, rare greenish grey, as above, common to abundant greenish black pelletal glauconite, slightly to moderately calcareous, grades from CLAYSTONE above, trace small massive granular pyrite aggregates.
		5	<b>ARGILLACEOUS CALCARENITE:</b> medium light grey, olive grey, silty to very fine, grades to CALCISILTITE, soft, friable, very calcareous, as above. NO

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
			SHOW.
			<b>Reverted to 10m sampling interval below 1920m due to high ROP. Maintain 10m sampling interval to TD except where noted below.</b>
1920	1930	100	<b>GLAUCONITIC SILTSTONE:</b> olive grey to olive black, rare greenish grey, very argillaceous, grades from CLAYSTONE, slightly to moderately calcareous, abundant to very abundant greenish black pelletal glauconite.
1930	1940	100	<b>GLAUCONITIC SILTSTONE:</b> olive black, occasionally olive grey, trace dark yellowish brown, soft and dispersive, minor firm and sub blocky, argillaceous, locally grades to silty CLAYSTONE, slightly calcareous, occasionally moderately calcareous, common to abundant greenish black pelletal glauconite (medium to very coarse sand sized pellets), rare pyrite aggregates (massive granular habit, 0.5-2mm in size, sometimes containing glauconite pellets), trace biotite mica flakes, trace benthonic forams.
			<b>Common BARACARB contamination in samples at 1950m, 1960m and 1970m</b>
1940	1950	40	<b>GLAUCONITIC SILTSTONE:</b> olive grey, occasionally olive black, slightly calcareous, as above, trace pyrite aggregates.
		60	<b>GLAUCONITIC SILTY SANDSTONE:</b> quartzose, olive grey to light olive grey, silty to very fine grained, sub angular to rounded, sub elongate to sub spherical, occasional well rounded quartz, moderately sorted, firm to moderately hard, well cemented, moderately calcareous (calcite cement), rare argillaceous matrix, minor to common greenish black glauconite grains and pellets, trace to rare biotite mica, trace pyrite, nil to very poor visible porosity. NO SHOW.
1950	1960	90	<b>GLAUCONITIC SILTSTONE:</b> as above, common pelletal glauconite, rare biotite mica flakes.
		10	<b>GLAUCONITIC SILTY SANDSTONE:</b> as above. NO SHOW.
1960	1970	80	<b>GLAUCONITIC SILTSTONE:</b> olive grey to olive black, occasional greenish grey mottles, trace moderate olive brown mottles, argillaceous, soft and dispersive to occasionally firm and sub blocky, slightly to moderately calcareous, common to abundant greenish black pelletal glauconite, rare biotite mica flakes, trace pyrite aggregates.
		20	<b>GLAUCONITIC SILTY SANDSTONE:</b> generally as above, silty to very fine grained, firm and friable to hard and well cemented, moderately calcareous, patchy weak to moderately strong calcite cement, minor to common argillaceous matrix in part, rare to minor mica, tight, no visible intergranular porosity. NO SHOW.
			<b>Minor BARACARB contamination in sample at 1980m</b>
1970	1980	100	<b>GLAUCONITIC SILTSTONE:</b> olive grey, olive black, with minor scattered greenish grey, moderate olive brown and light olive to moderate yellowish green mottling, very soft and dispersive to occasionally firm and sub blocky, non to occasionally slightly calcareous, common to abundant greenish black pelletal glauconite (medium to occasionally coarse sand sized), rare biotite mica flakes, trace to rare small pyrite aggregates (massive granular to very fine crystalline, anhedral).
			<b>Preliminary Top of Coarse Clastics (TCC) / N1 Sand at 1992.3m MDRT, 1918.5m TVDRT, -1871.3m TVDSS</b>

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
1980	1990	20	<b>GLAUCONITIC SILTSTONE:</b> as above, common mottling, possibly limonitic, common to abundant pelletal glauconite, rare biotite mica flakes, minor carbonaceous material.
		80	<b>SANDSTONE:</b> quartzose, olive grey, fine to very coarse and granule grained, predominantly coarse to very coarse, poorly sorted, translucent and minor transparent quartz grains, sub rounded to well rounded, sub elongate to sub spherical, occasional elongate grains, rare to minor quartz overgrowths (angular shards), predominantly disaggregated grains, rare cemented aggregates (hard, well cemented, slightly to moderately calcareous, dolomitic cement), rare to minor glauconite (pellets and grains), trace to rare pyrite (massive granular, cement in part, disseminated crystals in part), trace siderite cement, no visible porosity in cemented aggregates, fair to good inferred porosity. NO OIL SHOW.
1990	2000	10	<b>GLAUCONITIC SILTSTONE:</b> as above.
		90	<b>SANDSTONE:</b> quartzose, light olive grey, predominantly disaggregated grains, rare cemented aggregates, fine to very coarse and trace granule grains, dominantly medium to coarse grained, poorly sorted, sub angular to rounded, occasionally very well rounded, elongate to sub spherical, translucent and common transparent quartz, minor quartz overgrowths, minor to common pyrite (very fine to fine crystalline, subhedral to euhedral, occurs as strong cement, disseminated crystals on grain surfaces and as inclusions in quartz overgrowths), minor to common greenish black pelletal glauconite, trace argillaceous matrix, rare to minor patchy strong dolomitic cement (slightly to moderately calcareous in places), nil to very poor visible porosity in cemented aggregates, fair to good inferred porosity. NO OIL SHOW.
2000	2010	30	<b>GLAUCONITIC SILTSTONE:</b> as above, becoming less glauconitic (now rare to minor only) and more argillaceous, limonitic in places.
		70	<b>SANDSTONE:</b> generally as above, very fine to coarse, rare very coarse and trace granule quartz, predominantly fine to medium grained, very poorly to poorly sorted, transparent and rare translucent grains, sub elongate to spherical, sub angular to rounded, rare quartz overgrowths, rare to minor glauconite, rare pyrite (cement in part), generally unconsolidated, non calcareous, good inferred porosity. NO OIL SHOW.
2010	2020	100	<b>SANDSTONE:</b> light olive grey, unconsolidated quartz grains, quartzose, fine to coarse, rare to minor very coarse and granule quartz, predominantly medium to coarse grained, very poorly to poorly sorted, translucent and minor transparent quartz, sub elongate to sub spherical, sub angular to rounded, sometimes well rounded, rare to minor quartz overgrowths, rare greenish black glauconite grains, trace disseminated micropyrte, non calcareous, possible trace argillaceous matrix material, good inferred porosity. NO OIL SHOW.
2020	2030	20	<b>GLAUCONITIC SILTSTONE:</b> as above, soft, dispersive, very argillaceous, rare glauconite, limonitic in places.
		80	<b>SANDSTONE:</b> light olive grey, medium light grey to medium grey, dominantly unconsolidated, rare to minor cemented aggregates, quartzose, predominantly very fine to medium grained, minor coarse quartz, rare very coarse and granule grains, very poorly to poorly sorted, translucent and minor transparent quartz, sub angular

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
2030	2040		to rounded, sub elongate to spherical, minor quartz overgrowths, common to abundant kaolinitic matrix, slightly to moderately calcareous in places (patchy weak dolomitic cement), firm and friable to moderately hard when cemented, possibly some strong silica cement in part, minor to common greenish black pelletal glauconite, trace pyrite aggregates, nil to very poor visible porosity in cemented aggregates, poor inferred porosity.
			<b>FLUORESCENCE:</b> 5% spotty, dim pale yellow fluorescence, no visible oil stain, no HC odour, no cut, very weak diffuse thin pale yellow crush cut, thick dim pale yellow white ring residue, thin colourless visible ring residue.
		50	<b>SANDSTONE:</b> quartzose, unconsolidated, light olive grey, very fine to medium grained, rare coarse and trace very coarse quartz grains, poorly sorted, sub elongate to spherical, sub angular to well rounded, transparent and translucent quartz, minor quartz overgrowths, rare greenish black pelletal glauconite, trace disseminated micropyrte, trace weak silica cemented aggregates, very poor to poor visible porosity, fair inferred porosity.
2040	2050		<b>FLUORESCENCE:</b> trace pin point to spotty moderately bright yellow fluorescence, no cut, weak, thin pale milky yellow crush cut, faint, medium to thick pale greenish yellow ring residue, no visible residue.
		50	<b>SILTSTONE:</b> olive grey, argillaceous, very soft to soft, dispersive, minor firm and sub blocky to blocky, non to occasionally very slightly calcareous, rare carbonaceous fragments and thin streaks, trace to rare glauconite.
		40	<b>SANDSTONE:</b> olive grey, quartzose, disaggregated, dominantly medium to very coarse grained, rare to minor granule grains, possibly pebbly, poorly sorted, sub angular to very well rounded, sub elongate to spherical, translucent and minor transparent quartz, rare to minor quartz overgrowths, rare to minor pyrite (massive granular aggregates, forms weak to very strong cement in part), trace pelletal glauconite, trace weak silica cemented aggregates, fair to good inferred porosity. NO OIL SHOW.
2050	2060	60	<b>SILTSTONE:</b> olive black, brownish black, dark yellowish brown, firm to very firm, blocky to sub fissile, minor argillaceous material, non calcareous, minor carbonaceous matter (dispersed fine specks and flecks, occasional wisps and thin laminations), trace coaly laminations, faintly laminated in part, trace micropyrte (in patches), locally grades to CARBONACEOUS SILTSTONE.
		Tr	<b>COAL:</b> black, brownish black, dull, moderately hard, blocky, brittle, locally abundant pyrite, moderately well cleated, interlaminated with SILTSTONE in part.
		10	<b>SANDSTONE:</b> as above, fine to medium grained. NO OIL SHOW.
		60	<b>SILTSTONE:</b> dark yellowish brown, brownish black, variably argillaceous, common very soft and dispersive (hygroturgid), generally firm and blocky to sub fissile, non calcareous, minor to common carbonaceous matter (specks, flecks and laminations), locally grades to CARBONACEOUS SILTSTONE.
		30	<b>COAL:</b> brownish black, black, lignitic, dull, rare bright streaks, firm and friable in part, blocky, generally very firm and sub fissile (grades to CARBONACEOUS SHALE), usually poorly developed cleat only, rare vitrain with subconchoidal fracture (hard and brittle), trace limonite. Thinly to very thickly interlaminated with SILTSTONE in part.

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
2060	2070	Tr 60 40	<b>SANDSTONE:</b> as above. NO OIL SHOW. <b>SILTSTONE:</b> as above, thinly laminated in part. <b>COAL:</b> as above. <b>Preliminary Top of P asperopolus Coal (TPCL) at 2074.6m MDRT, 1963.9m TVDRT, -1916.7m TVDSS</b>
2070	2080	70  10 20	<b>SANDSTONE:</b> quartzose, disaggregated, olive grey, fine to very coarse, rare granule quartz, predominantly coarse to very coarse grained, poorly to moderately sorted, sub rounded to very well rounded, sub elongate to sub spherical, translucent and common transparent quartz, some frosted grains, occasional pitted quartz grains, rare pyrite (microcrystalline to very fine crystalline, as small aggregates, often as coating on grain surfaces and occasionally as inclusions in overgrowths), no visible matrix or cement, good inferred porosity. NO OIL SHOW. <b>SILTSTONE:</b> dark yellowish brown, brownish black, dispersive in part, carbonaceous, as above. <b>COAL:</b> brownish black, black, dull with rare to minor bright vitrain (brittle, sub conchoidal fracture), as above, grades to CARBONACEOUS SHALE.
2080	2090	75  20 5	<b>SANDSTONE:</b> quartzose, light olive grey, disaggregated, predominantly medium to coarse grained, rare to minor very coarse and granule quartz, poorly to moderately sorted, elongate to sub spherical, sub rounded to very well rounded, translucent and frosted grains, rare transparent quartz, minor quartz overgrowths, trace to rare pyrite (as inclusions and occasionally as massive granular to very fine crystalline cement, weak cement), trace kaolin matrix, good inferred porosity. <b>FLUORESCENCE:</b> 3% spotty dull to moderate yellow orange fluorescence, no visible oil stain, very slow developing weak bleeding thin milky yellow white cut, instant thin milky yellow white crush cut, medium to thick pale greenish yellow ring residue, no visible residue. <b>SILTSTONE:</b> mainly dark yellowish brown, brownish black, argillaceous, dispersive, as above, very carbonaceous, rare glauconite. Rare medium dark grey to dark grey, argillaceous, firm to moderately hard, blocky in part, usually sub fissile to fissile, slightly to moderately calcareous, grades to SHALE. <b>COAL:</b> brownish black, black, dull lustre, rare bright material, firm to moderately hard, sub fissile to occasionally blocky, poorly developed cleat, lignitic, grades to CARBONACEOUS SHALE, thinly interlaminated with SILTSTONE in part.
2090	2100	30  60  10	<b>SANDSTONE:</b> quartzose, disaggregated, light olive grey, medium to very coarse and granule, dominantly coarse grained, very poorly sorted, otherwise as above, good inferred porosity. <b>FLUORESCENCE:</b> trace pin point to spotty dim dull yellow orange fluorescence, as above. <b>SILTSTONE:</b> predominantly (1) dark yellowish brown, brownish black, dusky brown, minor argillaceous material, firm, sub fissile to fissile, occasionally blocky, non calcareous, carbonaceous, grades to CARBONACEOUS SILTSTONE in part. Minor (2) olive grey, medium grey, slightly argillaceous, firm to very firm, blocky in part, generally sub fissile, non calcareous, trace disseminated carbonaceous specks. <b>COAL:</b> as above, grades to CARBONACEOUS SHALE.

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
2100	2110	90	<b>SILTY CLAYSTONE:</b> light olive grey, silty, very soft, sticky and dispersive, hygroturgid, non calcareous, massive, amorphous, smooth, plastic, rarely becomes very silty and firm and grades to SILTSTONE (2) above.
		10	<b>SILTSTONE:</b> carbonaceous, as above.
		Tr	<b>COAL:</b> as above.
2110	2120	80	<b>SANDSTONE:</b> olive grey to light olive grey, quartzose, disaggregated, fine to very coarse and granule grained, possibly pebbly in part, dominantly medium to coarse grained, poorly sorted, elongate to sub spherical, sub angular to rounded, minor quartz overgrowths, translucent, frosted and minor transparent quartz grains, rare microcrystalline pyrite (weak cement in part), rare kaolin matrix material, good inferred porosity. NO OIL SHOW.
		10	<b>CALCAREOUS SILTSTONE:</b> medium dark grey to dark grey, argillaceous, moderately calcareous, firm to moderately hard, sub fissile to fossile, splintery in part, grades to SHALE, trace micropyrrite.
		10	<b>COAL:</b> brownish black, black, dull, firm and blocky to moderately hard and sub fissile, poorly to moderately well cleated, rare to minor bright vitrain material (hard, brittle, subconchoidal fracture), trace siderite mineralisation in cleats.
		Tr	<b>SILTSTONE:</b> carbonaceous, as above, grades from COAL.
2120	2130	80	<b>SANDSTONE:</b> as above, dominantly medium to very coarse grained, minor granules, possibly pebbly in part, poorly to moderately sorted, coarsens from sample above, trace iron stained grains, good inferred porosity. NO OIL SHOW.
		20	<b>CALCAREOUS SILTSTONE:</b> as above, grades to SHALE.
		Tr	<b>COAL:</b> as above.
2130	2140	55	<b>SANDSTONE:</b> light olive grey, quartzose, disaggregated, fine to very coarse and granule grains, possibly pebbly in part, predominantly medium to coarse grained, very poorly to poorly sorted, translucent and frosted grains, rare transparent quartz, elongate to sub spherical, sub angular to sub rounded, occasional rounded grains, minor to common quartz overgrowths, trace pyrite aggregates, rare to minor kaolin matrix, trace to rare weakly cemented aggregates, non calcareous, trace iron stained grains, fair inferred porosity. NO OIL SHOW.
		40	<b>SILTY CLAYSTONE:</b> light olive grey, very soft, dispersive, hygroturgid, non calcareous, silty, smooth, amorphous.
		5	<b>COAL:</b> brownish black, black, dull, grades to CARBONACEOUS SHALE in part, as above.
		60	<b>SANDSTONE:</b> light olive grey, quartzose, disaggregated, as above, dominantly medium to coarse grained, fewer very coarse to granule grains, minor to common kaolin matrix, poor to fair inferred porosity. NO OIL SHOW.
2140	2150	20	<b>SILTSTONE:</b> dusky brown, brownish black, dark yellowish brown, argillaceous, soft and dispersive in part, common firm and sub fissile, interlaminated with COAL in part, non calcareous, rare to locally common carbonaceous matter, grades in part to CARBONACEOUS SILTSTONE.
		10	<b>CALCAREOUS SILTSTONE:</b> medium dark grey to dark grey, as above, grades to SHALE, occasionally splintery.
		10	<b>COAL:</b> as above, occasionally woody and lignitic, friable and blocky in part, generally moderately hard and sub fissile, grades to CARBONACEOUS SHALE.

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
2150	2160	20	<b>SANDSTONE:</b> quartzose, light olive grey, mainly disaggregated, rare cemented aggregates, medium to coarse grained, rare fine and very coarse grains, poorly to moderately sorted, sub elongate to spherical, sub angular to rounded, translucent, frosted and rare transparent quartz, minor quartz overgrowths, trace to rare weak to moderately strong pyrite cement, patchy weak silica cement (firm and friable aggregates), non calcareous, rare massive granular pyrite aggregates, trace to rare very thin carbonaceous laminae, thinly laminated in part, very poor to poor visible porosity. NO OIL SHOW.
		20	<b>SILTSTONE:</b> as above, firm, grades to CARBONACEOUS SILTSTONE.
		60	<b>COAL:</b> brownish black, black, dull with minor to common bright vitrain, earthy lustre, firm and sub blocky to moderately hard and sub fissile, grades to CARBONACEOUS SHALE in part, vitrain is hard with sub conchoidal fracture, trace pyrite mineralisation (locally common pyrite), poorly cleated.
2160	2170	20	<b>SANDSTONE:</b> as above, dominantly fine to medium grained, rare to minor coarse to very coarse quartz, poorly to moderately sorted, minor pyrite cemented aggregates (strong cement), poor visible porosity. NO OIL SHOW.
		80	<b>SILTSTONE:</b> dusky brown, dark yellowish brown, firm to hard, blocky to sub fissile, non calcareous, trace to rare finely disseminated carbonaceous matter, trace pyrite aggregates, trace to rare micromica, massive to faintly laminated in part.
2170	2180	10	<b>SANDSTONE:</b> light olive grey, disaggregated, minor cemented aggregates, medium to coarse grained, as above, minor pyrite aggregates, poor inferred porosity. NO OIL SHOW.
		55	<b>SILTSTONE:</b> dusky brown, dark yellowish brown, rarely brownish black, firm to hard, blocky in part, generally sub fissile to fissile, slightly argillaceous, trace very soft, sticky and dispersive (hygrotergic), non calcareous, rare to minor disseminated carbonaceous matter (locally common to abundant), rarely grades to CARBONACEOUS SILTSTONE. Laminated in part, contains occasional very thin to thin interlaminae of COAL and silty SANDSTONE.
		30	<b>CLAYSTONE:</b> medium dark grey, dark greenish grey in part, occasionally olive grey, soft to firm, blocky in part, generally sub fissile, occasionally platy, silty in part, non calcareous, grades to SHALE.
		5	<b>COAL:</b> as above.
		90	<b>SILTSTONE:</b> as above.
2180	2190	5	<b>CLAYSTONE:</b> as above.
		5	<b>COAL:</b> as above.
		60	<b>SILTSTONE:</b> as above.
		30	<b>CLAYSTONE:</b> as above.
2190	2200	10	<b>COAL:</b> as above, trace amber (has moderately bright yellow pin point mineral fluorescence).
		75	<b>SANDSTONE:</b> quartzose, dominantly disaggregated, light olive grey to olive grey, fine to coarse grained, rare very coarse and trace granule grains, predominantly medium to coarse grained, poorly to moderately sorted, sub elongate to spherical, sub angular to rounded, minor quartz overgrowths, transparent and translucent grains, trace to rare strong pyrite cement (microcrystalline to very fine crystalline pyrite), aggregates are firm to hard, minor

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
			to common kaolin matrix material, very poor to poor inferred porosity. NO OIL SHOW.
		20	<b>SILTSTONE:</b> pale to dark yellowish brown, dusky brown, rare brownish black, very soft and dispersive, hygroturgid, argillaceous to very argillaceous, grades to silty CLAYSTONE in part.
		5	<b>COAL:</b> brownish black, black, hard, brittle, dull, as above, trace amber.
2210	2220	80	<b>SANDSTONE:</b> as above, abundant kaolin matrix, very poor inferred porosity. NO OIL SHOW.
		20	<b>SILTSTONE:</b> as above.
2220	2230	40	<b>SILTSTONE:</b> as above.
		60	<b>COAL:</b> brownish black, black, dull, minor bright vitrain, firm to moderately nhard, blocky in part, sub fissile in part, occasional subconchoidal fracture (vitrain), hackly fracture in part, very poorly to poorly cleated, grades to CARBONACEOUS SHALE in part, interlaminated with SILTSTONE in part.
2230	2240	70	<b>SILTSTONE:</b> pale to dark yellowish brown, dusky brown, rare brownish black, firm to moderately hard, blocky to sub fissile, minor argillaceous material, non dispersive, non calcareous, rare to minor disseminated carbonaceous material (specks flecks and occasional very thin, even laminations).
		30	<b>COAL:</b> as above.
			<b>Slower drilling interval from 2242-2245m (negative drill break). Take 5m samples over interval 2240-2250m MDRT.</b>
			<b>Preliminary top P3C reservoir sand (appears to have pinched out) at 2241.5m MDRT, 2058.9m TVDRT, -2011.7m TVDSS.</b>
2240	2245	80	<b>DOLOMITIC SANDSTONE:</b> quartzose, well cemented, minor disaggregated grains, light olive grey, very fine to medium, predominantly very fine to fine grained, moderately to well sorted, silty in part, sub angular, elongate to sub spherical, translucent and transparent quartz, minor quartz overgrowths, firm to moderately hard, slightly calcareous (becomes very calcareous when crushed), pervasive moderate to strong dolomitic cement, trace to rare pyrite (massive granular aggregates, strong cement in part), minor to common kaolin matrix, tight, no visible porosity. Locally grades to dolomitic sandy SILTSTONE.
			<b>FLUORESCENCE:</b> 20% pin point to spotty moderately bright orange fluorescence, weak diffuse slow bleeding pale yellow white cut, instant thick milky yellow white crush cut, medium to thick moderately bright pale greenish yellow residual ring, thin faint colourless visible ring residue.
		10	<b>CLAYSTONE:</b> medium dark grey, firm, non calcareous, as above, sub fissile to fissile, platy in part, grades to SHALE.
		10	<b>SILTSTONE:</b> as above.
2245	2250	70	<b>DOLOMITIC SANDSTONE:</b> olive grey, very fine to fine and medium grained, as above, well cemented, rare to minor disaggregated grains, becoming finer grained overall and commonly grading to sandy SILTSTONE, no visible porosity.
			<b>FLUORESCENCE:</b> 5% pin point to spotty moderately bright orange fluorescence, as above.
		30	<b>SILTSTONE:</b> as above.
2250	2260	60	<b>DOLOMITIC SANDSTONE:</b> generally as above, becoming less well cemented,

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
			minor to common disaggregated quartz grains, predominantly very fine to medium grained, rare to minor coarse to granule quartz, poorly sorted, firm and friable in part, minor to common kaolin matrix, nil to occasional very poor visible porosity. <b>FLUORESCENCE:</b> trace to 1% spotty moderately bright orange fluorescence, no discernible cut, instant thin milky yellow crush cut, ring residues as above.
		30	<b>SILTSTONE:</b> as above.
		10	<b>COAL:</b> as above.
2260	2270	100	<b>SANDSTONE:</b> quartzose, disaggregated, light olive grey to yellowish grey, very pale orange in part, very fine to coarse, rare very coarse and granule quartz grains, predominantly fine to medium grained, poorly to moderately sorted, sub elongate to spherical, sub angular to rounded, occasional well rounded to very well rounded quartz, rare to minor quartz overgrowths, translucent and minor transparent quartz, trace patchy dolomitic cement, trace coaly fragments, minor to common kaolin matrix, very poor to poor inferred porosity. <b>FLUORESCENCE:</b> trace to 1% pin point to spotty moderately bright orange fluorescence, as above.
2270	2280	100	<b>SANDSTONE:</b> quartzose, disaggregated, light olive grey, fine to coarse grained, rare very coarse quartz, predominantly coarse grained, moderately sorted, elongate to sub spherical, sub angular to sub rounded, occasional very elongate quartz, occasional rounded grains, transparent and translucent quartz, minor to common quartz overgrowths, rare pyrite (massive granular habit, moderately strong cement), trace dolomitic cement, common kaolin matrix, generally soft and friable, rarely moderately hard, poor to fair inferred porosity. <b>FLUORESCENCE:</b> trace pin point moderately bright orange fluorescence, as above. <b>Preliminary top F Coal Marker (FCL) at 2285.8m MDRT, 2084.7m TVDRT, -2037.5m TVDSS.</b>
2280	2290	60	<b>SANDSTONE:</b> as above. NO OIL SHOW.
		40	<b>COAL:</b> brownish black, black, dull, minor bright vitrain, firm, friable, blocky to sub blocky, hackly fracture in part, rare subconchoidal fracture (vitrain), trace amber.
2290	2300	60	<b>SANDSTONE:</b> quartzose, olive grey, predominantly disaggregated grains, minor cemented aggregates, very fine to medium, trace coarse quartz, dominantly very fine to fine grained, silty in part, poorly to moderately sorted, sub angular to sub rounded, sub elongate to spherical, translucent and minor transparent quartz, minor quartz overgrowths, trace to rare pyrite (cement in part, generally as small aggregates), common to abundant argillaceous matrix, very soft to soft, friable, patchy weak silica cement, non calcareous, very poor visible porosity. NO OIL SHOW.
		10	<b>SILTSTONE:</b> dusky brown, dark yellowish brown, brownish black in part, soft to firm, blocky to sub fissile, non calcareous, rare to minor disseminated very fine carbonaceous matter.
		30	<b>CLAYSTONE:</b> medium grey, medium dark grey, firm, sub blocky, platy in part, non calcareous, rare to minor pyrite (locally abundant), silty in part, occasionally grades to SHALE.

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
			<b>Slower drilling interval from 2300-2309m (negative drill break). Take 5m samples over interval 2300-2320m MDRT.</b>
2300	2305	100	<b>DOLOMITIC SANDSTONE:</b> quartzose, cemented, minor disaggregated grains, light olive grey, very fine to medium, silty in part, predominantly silty to very fine grained, grades to dolomitic sandy SILTSTONE, moderately to well sorted, sub elongate to sub spherical, sub angular, transparent and translucent quartz grains, moderately to very hard, slightly calcareous (moderately calcareous when crushed), pervasive strong dolomitic cement, minor argillaceous matrix, trace micropyrrite, tight, no visible porosity. <b>FLUORESCENCE:</b> 5% pin point to spotty moderately bright yellow to orange fluorescence, no cut, instant thin pale milky yellow crush cut, thick, dim pale greenish yellow ring residue, very thin, faint colourless to pale brown visible ring residue.
2305	2310	90	<b>DOLOMITIC SANDSTONE:</b> as above, generally silty and grades to dolomitic SILTSTONE, abundant cement, tight, no visible porosity. <b>FLUORESCENCE:</b> 2-5% pin point to spotty moderately bright yellow fluorescence, as above.
2310	2315	10	<b>CLAYSTONE:</b> medium dark grey, as above, rare pelletal glauconite.
		70	<b>DOLOMITIC SANDSTONE:</b> light olive grey to olive grey, cemented, silty to very fine grained, moderately to well sorted, sub angular, sub elongate to sub spherical, commonly grades to dolomitic sandy SILTSTONE, minor disaggregated fine to coarse quartz grains, transparent to translucent, firm to moderately hard, slightly to moderately calcareous (becomes very calcareous when crushed), pervasive moderately strong dolomitic cement, minor to common argillaceous matrix, trace to rare pyrite aggregates (massive granular habit), trace carbonaceous matter, trace pelletal glauconite, tight, no visible porosity. <b>FLUORESCENCE:</b> 5% spotty dull to moderately bright yellow fluorescence, thin, nil to very slow streaming pale milky yellow cut, instant thin milky yellow crush cut, thick dim greenish yellow ring residue, faint, thin, colourless visible ring residue.
		30	<b>CLAYSTONE:</b> medium dark grey to dark grey, dark greenish grey in part, moderately hard, blocky, occasionally sub platy, non calcareous, silty, trace carbonaceous fragments, trace to rare micropyrrite, trace greenish grey to greenish black glauconite (patches in part).
2315	2320	80	<b>SANDSTONE:</b> quartzose, predominantly disaggregated, light olive grey to olive grey in part, dominantly very fine to medium grained, rare coarse to very coarse quartz grains, poorly to moderately sorted, sub elongate to spherical, sub angular to rounded, occasionally well rounded, translucent and rare transparent quartz, trace quartz overgrowths, minor to common kaolin matrix, soft, friable, trace carbonaceous streaks, rare pyrite cement, poor inferred porosity. NO OIL SHOW.
2320	2330	20	<b>SILTSTONE:</b> dusky brown, dark yellowish brown, brownish black in part, common disseminated carbonaceous matter, as above.
		80	<b>SANDSTONE:</b> as above, trace feldspar, poor inferred porosity. NO OIL SHOW. <b>SILTSTONE:</b> dark yellowish brown, greyish brown, rarely brownish black, firm to very firm, rarely hard, sub fissile to fissile, blocky in part, non calcareous, minor

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
2330	2340		argillaceous material, rare to minor disseminated very fine mica flakes, minor carbonaceous matter (disseminated specks, occasional very thin laminae), trace coaly fragments and lenses, trace micropyrte, occasional very thin interlaminae of silty SANDSTONE.
		30	<b>SANDSTONE:</b> as above, but very fine grained, well sorted, abundant dispersive argillaceous matrix, rare soft and friable aggregates, grades to sandy SILTSTONE, nil to very poor porosity. NO OIL SHOW.
		50	<b>SILTSTONE:</b> as above.
2340	2350	20	<b>COAL:</b> brownish black to occasionally black, dull, soft and friable, sub blocky to blocky in part, rare bright vitrain (hard, with subconchoidal fracture), remnant woody texture in places, very poorly cleated, grades to CARBONACEOUS SHALE in part.
		50	<b>SANDSTONE:</b> quartzose, light olive grey, disaggregated, very fine to medium grained, trace coarse quartz, poorly to moderately sorted, angular to sub rounded, elongate to sub spherical, translucent and rare transparent quartz, rare quartz overgrowths, rare carbonaceous matter, trace pyrite aggregates, common to abundant dispersive argillaceous matrix, non calcareous, very poor inferred porosity. NO OIL SHOW.
		50	<b>SILTSTONE:</b> as above but more argillaceous, very soft and dispersive, grades to silty CLAYSTONE in part.
2350	2360	Tr	<b>COAL:</b> as above.
		80	<b>SANDSTONE:</b> quartzose, disaggregated, light olive grey, fine to coarse, rare very coarse to granule quartz, possibly pebbly in part, predominantly medium to coarse grained, poorly sorted, elongate to sub spherical, sub angular to rounded, transparent and translucent quartz grains, minor quartz overgrowths (some angular shards), rare cemented aggregates (friable, weak to moderately strong silica cement), slightly calcareous in part, trace feldspar, rare carbonaceous matter, trace coaly lenses and fragments, trace disseminated micropyrte, common to abundant kaolin matrix, very poor visible porosity, very poor to poor inferred porosity. NO OIL SHOW.
		10	<b>SILTSTONE:</b> as above.
2360	2370	10	<b>COAL:</b> as above.
		30	<b>SANDSTONE:</b> as above, with minor to common coarse to granule quartz grains, very poorly sorted, trace strong pyrite cement, poor inferred porosity. NO OIL SHOW.
		60	<b>SILTSTONE:</b> dusky brown to greyish brown, dark yellowish brown, brownish black in part, firm to moderately hard, sub fissile, occasionally blocky in part, non calcareous, rare to minor disseminated carbonaceous matter, occasional coaly laminations, locally grades to CARBONACEOUS SILTSTONE.
2370	2380	10	<b>COAL:</b> as above, brownish black, dull, commonly grades to CARBONACEOUS SHALE.
		50	<b>SANDSTONE:</b> as above, dominantly medium to coarse grained, moderately sorted, abundant dispersive argillaceous matrix, very poor inferred porosity. NO OIL SHOW.
		50	<b>SILTSTONE:</b> as above.

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
2380	2390	Tr	<b>COAL:</b> as above.
		Tr	<b>SANDSTONE:</b> as above. NO OIL SHOW.
		90	<b>SILTSTONE:</b> mostly as above, commonly becoming argillaceous and grading to silty CLAYSTONE, very soft and dispersive, rare massive granular pyrite aggregates (to several mm in size).
2390	2400	10	<b>COAL:</b> brownish black, dull, commonly grades to CARBONACEOUS SHALE, often interlaminated with SILTSTONE.
		70	<b>SILTSTONE:</b> as above.
		20	<b>CLAYSTONE:</b> medium dark grey, firm to moderately hard, sub fissile, as above.
2400	2410	10	<b>COAL:</b> as above, grades to CARBONACEOUS SHALE.
		60	<b>SANDSTONE:</b> quartzose, disaggregated, common cemented aggregates, light olive grey, very fine to fine grained, silty in part, moderately to well sorted, sub angular, sub elongate to sub spherical, transparent quartz grains, rare medium grains, grades to sandy SILTSTONE in part, soft and friable, non calcareous, weak silica cement, common kaolin matrix material, rare to minor thin carbonaceous streaks and disseminated flecks, rare disseminated micropyrte, trace to rare feldspar, trace mica flakes, often thinly interlaminated with SILTSTONE, nil to very poor visible porosity. NO OIL SHOW.
		40	<b>SILTSTONE:</b> as above, firm, common interlamination of silty SANDSTONE. <b>Reverted to 5m samples at 2410-2420m</b>
2410	2415	30	<b>SANDSTONE:</b> as above, light olive grey silty to very fine grained, trace small pyrite aggregates, abundant kaolin matrix, nil to very poor visible porosity. NO OIL SHOW.
		50	<b>SILTSTONE:</b> pale to dark yellowish brown, greyish brown, rare brownish black, argillaceous, very soft and dispersive, grades to silty CLAYSTONE, rarely firm and sub blocky, non calcareous, rare carbonaceous matter.
		20	<b>COAL:</b> brownish black to black, dull, minor bright vitrain, firm to moderately hard, blocky to sub blocky, occasional subconchoidal fracture, grades to CARBONACEOUS SHALE, rare microcrystalline pyrite mineralisation in cleats, poorly to moderately well cleated in part.
2415	2420	100	<b>SANDSTONE:</b> quartzose, disaggregated, light olive grey to olive grey, fine to coarse and rare very coarse quartz grains, dominantly medium to coarse grained, poorly to moderately sorted, elongate to sub spherical, sub angular to rounded, translucent, frosted and common transparent quartz grains, minor quartz overgrowths, rare to minor pyrite (massive granular cement in part, moderately strong cement), trace patchy weak silica cement, non calcareous, trace feldspar, trace carbonaceous matter, rare to minor kaolin matrix, poor inferred porosity. NO OIL SHOW.
2420	2430	Tr	<b>COAL:</b> as above.
		90	<b>SANDSTONE:</b> as above, dominantly fine to medium grained, rare matrix, trace pyrite, poor to fair inferred porosity. NO OIL SHOW.
		10	<b>SILTSTONE:</b> as above.
2430	2440	60	<b>SANDSTONE:</b> quartzose, disaggregated, olive grey, very fine to very coarse quartz with trace granule to pebble grains, predominantly medium to coarse grained, very poorly to poorly sorted, elongate to sub spherical, sub angular to

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
			rounded, translucent, frosted and rare transparent quartz, minor quartz overgrowths, rare cemented aggregates, soft and friable to very firm, non calcareous, weak to moderately strong silica cement, trace to rare feldspar, rare carbonaceous streaks, trace fine crystalline pyrite, rare to minor kaolin matrix, very poor to poor visible porosity. NO OIL SHOW. Thinly interlaminated with silty CLAYSTONE in part.
		25	<b>SILTSTONE:</b> pale yellowish brown, greyish brown, rarely brownish black, as above, generally very soft and dispersive, grades to silty CLAYSTONE.
		10	<b>CLAYSTONE:</b> medium dark grey, firm to moderately hard, blocky in part, generally sub fissile to fissile, grades to SHALE, non calcareous, locally common micropyrte (rare overall abundance). Occasionally becomes coarse silty and grades to argillaceous SILTSTONE, trace very fine glauconite grains, rare disseminated carbonaceous streaks.
		5	<b>COAL:</b> as above, grades to CARBONACEOUS SHALE.
2440	2450	100	<b>SILTSTONE:</b> brownish black, dark grey, dusky brown, firm, sub fissile to fissile, rarely blocky, grades to SHALE in part, non calcareous, rare to minor disseminated fine carbonaceous flecks and very thin streaks, trace mica flakes, trace to rare micropyrte (locally common, subhedral crystals in part). Contains rare to minor interlaminae of medium grey, silty to very fine SANDSTONE (with trace glauconite and feldspar and rare very fine crystalline pyrite), nil to very poor visible porosity.
2450	2460	55	<b>SANDSTONE:</b> quartzose, disaggregated, rare to minor cemented aggregates, light olive grey to occasionally olive grey, dominantly medium to coarse grained, as above, rare muscovite mica flakes, trace to rare pelletal glauconite (greenish black, medium sand sized), trace to rare feldspar, trace pyrite aggregates (massive granular, up to several mm in size), trace to rare kaolin matrix, non calcareous, poor to fair inferred porosity. NO OIL SHOW.
		10	<b>SILTSTONE:</b> as above, interlaminated with COAL.
		30	<b>CLAYSTONE:</b> as above.
		5	<b>COAL:</b> brownish black, dull, grades to CARBONACEOUS SHALE, often interlaminated very thinly with SILTSTONE.
2460	2470	70	<b>SANDSTONE:</b> quartzose, olive grey, disaggregated grains, very fine to very coarse, dominantly fine to medium grained, moderately to well sorted, transparent and rare translucent grains, elongate to sub spherical, sub angular to rounded, rare quartz overgrowths, rare carbonaceous to coaly streaks and thin laminae, trace to rare pyrite aggregates, trace pyrite inclusions in quartz, trace pyrite cement in part, trace greenish black pelletal glauconite, trace greenish grey glauconite grains, trace to rare benthonic forams, trace muscovite mica flakes, rare to minor kaolin matrix material, rare soft and friable aggregates, non calcareous, weak silica cement in part, poor to fair inferred porosity. NO OIL SHOW.
		10	<b>SILTSTONE:</b> as above, interlaminated with COAL.
		20	<b>CLAYSTONE:</b> as above.
		Tr	<b>COAL:</b> as above, interlaminated with SILTSTONE.
2470	2480	20	<b>SANDSTONE:</b> as above. NO OIL SHOW.
		80	<b>SILTSTONE:</b> dark yellowish brown, greyish brown, rare brownish black, firm to

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
2480	2490		moderately hard, sub blocky to blocky, sub fissile in part, as above, minor to common disseminated carbonaceous matter, occasional coaly laminae, non calcareous.
		30	<b>SANDSTONE:</b> quartzose, olive grey, disaggregated, fine to very coarse, dominantly medium to coarse grained, poorly sorted, generally as above, poor inferred porosity. NO OIL SHOW.
		50	<b>SILTSTONE:</b> as above.
2490	2500	20	<b>COAL:</b> brownish black, dusky brown, rare black, dull, firm and friable in part, moderately hard and sub fissile in part, poorly cleated, commonly grades to CARBONACEOUS SHALE, rare to minor thin laminae of bright vitrain.
		50	<b>SILTY SANDSTONE:</b> medium dark grey to dark grey, quartzose, cemented, silty to very fine grained, well sorted, minor medium to coarse quartz float, sub angular, sub spherical, translucent, firm and friable to very firm, non calcareous, weak silica cement, minor argillaceous matrix, common to locally abundant very fine carbonaceous specks (form faint carbonaceous rich laminae in part), trace coaly streaks in part, trace to rare feldspar, trace to rare dispersed microcrystalline to very fine crystalline pyrite, nil to very poor visible porosity. NO OIL SHOW.
		30	<b>SILTY CLAYSTONE:</b> dark yellowish brown, firm to moderately hard, sub platy, sub fissile in part, non calcareous, massive to amorphous, non dispersive, occasional trace disseminated carbonaceous matter.
		10	<b>SILTSTONE:</b> as above.
		10	<b>COAL:</b> greyish black, brownish black, dusky brown, dull, soft and friable, earthy texture, commonly grades to CARBONACEOUS SHALE, interlaminated with SILTSTONE and silty SANDSTONE.
2500	2510	40	<b>SANDSTONE:</b> quartzose, olive grey, disaggregated grains and common cemented aggregates, fine to coarse and trace very coarse quartz, predominantly medium to coarse grained, poorly to moderately sorted, sub elongate to spherical, sub angular to rounded, transparent and translucent quartz, rare overgrowths, soft and friable, non calcareous, common dispersive argillaceous matrix, rare carbonaceous fragments and streaks (locally common laminations), trace to rare feldspar, trace mica, trace to rare micropyrte, nil to very poor visible porosity, poor inferred porosity. <b>FLUORESCENCE:</b> trace-1% pin point to spotty, moderately bright to bright yellow fluorescence, no cut, instant weak pale milky yellow crush cut, thick moderately bright pale greenish yellow ring residue, no visible ring residue.
		60	<b>SILTSTONE:</b> dusky brown, greyish brown, dusky yellowish brown in part, rare brownish black, firm to occasionally very firm, sub blocky, rarely sub fissile, non dispersive, minor argillaceous material, minor to common disseminated carbonaceous and coaly matter, containing interlaminations of silty SANDSTONE in part. <b>Preliminary top M6 Reservoir Sand at 2513.3m MDRT, 2222.1m TVDRT, -2174.9m TVDSS.</b>
2510	2520	70	<b>SANDSTONE:</b> quartzose, olive grey to light olive grey, disaggregated, fine to medium grained, silty in part, rare coarse quartz, moderately to well sorted, sub angular to sub rounded, elongate to sub spherical, transparent and translucent

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
2520	2530		grains, minor quartz overgrowths, rare to minor dispersive argillaceous matrix, trace micropyrte, poor to fair inferred porosity. NO OIL SHOW.
		30	<b>SILTSTONE:</b> as above, interlaminated very thinly with silty to very fine SANDSTONE in part.
		60	<b>SANDSTONE:</b> as above, trace feldspar, minor to common argillaceous matrix, poor inferred porosity. NO OIL SHOW.
		20	<b>SILTSTONE:</b> as above.
2530	2540	20	<b>CLAYSTONE:</b> medium dark grey to dark grey, firm to moderately hard, as above.
		100	<b>SANDSTONE:</b> quartzose, disaggregated, light olive grey, fine to very coarse, dominantly medium to coarse grained, moderately sorted, angular to sub rounded, elongate to sub spherical, transparent and translucent quartz, minor quartz overgrowths, trace to rare pyrite inclusions in quartz, trace small pyrite aggregates, trace forams, trace mica flakes, rare dispersive argillaceous matrix, fair to good inferred porosity. NO OIL SHOW.
		90	<b>SANDSTONE:</b> as above, dominantly medium to coarse, minor argillaceous matrix, poor to fair inferred porosity. NO OIL SHOW.
2540	2550	10	<b>CLAYSTONE:</b> medium dark grey to dark grey, firm to moderately hard, sub fissile to fissile, grades to SHALE in part, non dispersive, non calcareous, trace microfossils, trace disseminated micropyrte.
		40	<b>SANDSTONE:</b> as above, trace pyrite aggregates (massive granular habit), poor to fair visible porosity. NO OIL SHOW.
2550	2560	30	<b>SILTSTONE:</b> dusky brown, greyish brown, dark yellowish brown, brownish plack in part, firm to hard, sub fissile to fissile, occasionally blocky, grades to SHALE in part, non calcareous, minor to common disseminated carbonaceous and coaly matter (including laths and laminations), laminated in part, often massive.
		20	<b>CLAYSTONE:</b> medium dark grey to dark grey, as above.
		10	<b>SILTY CLAYSTONE:</b> dark yellowish brown, firm to moderately hard, blocky to sub fissile, amorphous, non calcareous, non dispersive, trace carbonaceous in part.
		100	<b>SANDSTONE:</b> quartzose, disaggregated, light olive grey, very fine to very coarse, dominantly medium grained, well sorted, sub angular to sub rounded, sub elongate to sub spherical, transparent and translucent quartz, minor quartz overgrowths, trace pyrite inclusions in quartz, trace iron stained grains, rare to minor kaolin matrix, fair inferred porosity. NO OIL SHOW.
2570	2580	20	<b>SILTY SANDSTONE:</b> quartzose, cemented, olive grey, medium grey, silty to very fine grained, well sorted, sub angular, sub elongate, transparent and translucent quartz, rare to minor disseminated carbonaceous and coaly matter (including specks and laminae), trace to rare feldspar, trace micropyrte, rare to minor argillaceous matrix, soft to firm, friable, non calcareous, weak silica cement, very poor visible porosity, usually thinly interlaminated with SILTSTONE. NO OIL SHOW.
		70	<b>SILTSTONE:</b> as above, locally very carbonaceous and grades to COAL, contains thin laminations of silty SANDSTONE in part.
		10	<b>CLAYSTONE:</b> as above, grades to SHALE.
2580	2590	30	<b>SILTY SANDSTONE:</b> as above. NO OIL SHOW.

## Bream B16 Lithology / Show Descriptions

Interval (m) From To		%	Lithology / Show Description
2590	2600	60	<b>SILTSTONE:</b> as above, locally very carbonaceous and grading to COAL.
		10	<b>COAL:</b> brownish black, greyish black, dusky brown, dull, firm to moderately hard, friable in part, sub fissile in part, blocky in part, poorly cleated, rare bright vitrain, commonly grades to CARBONACEOUS SHALE, often interlaminated with SILTSTONE.
		30	<b>SILTY SANDSTONE:</b> as above. NO OIL SHOW.
		50	<b>SILTSTONE:</b> as above, less carbonaceous (rare carbonaceous matter).
		20	<b>SILTY CLAYSTONE:</b> dark yellowish brown, firm to hard, sub blocky to blocky, rarely sub fissile, as above.
2600	2610	20	<b>SILTY SANDSTONE:</b> as above. NO OIL SHOW.
		75	<b>SILTSTONE:</b> dusky brown, greyish brown, brownish black, dark yellowish brown, generally firm to very firm, sub fissile to fissile, occasionally blocky in part, rarely very argillaceous and dispersive (very soft, hygrotergic), non calcareous, very carbonaceous (forms partings in part), laminated in part. Contains thin interlaminae of silty SANDSTONE.
		5	<b>COAL:</b> brownish black, dusky brown, dull, as above, often thickly interlaminated with SILTY SANDSTONE.
2610	2620	50	<b>SANDSTONE:</b> quartzose, predominantly disaggregated grains, olive grey, medium grey, very fine to medium grained, silty in part, trace coarse and very coarse quartz grains, sub elongate to spherical, sub angular to rounded, transparent and rare translucent quartz, rare quartz overgrowths, common to abundant dispersive argillaceous matrix, rare firm and friable to very firm aggregates, non calcareous, rare patchy weak to moderately strong silica cement, minor carbonaceous matter (flecks and streaks), trace glauconite grains, trace feldspar, trace micropyrilite, nil to very poor visible porosity. NO OIL SHOW.
		30	<b>SILTSTONE:</b> as above, slightly less carbonaceous, generally argillaceous and very soft, grades to silty CLAYSTONE in part.
		20	<b>CLAYSTONE:</b> medium dark grey to dark grey, as above, grades to SHALE.
		30	<b>SANDSTONE:</b> as above, locally grading to SILTY SANDSTONE, nil to very poor porosity. NO OIL SHOW.
2620	2630	60	<b>SILTSTONE:</b> dusky brown, greyish brown, dark yellowish brown, brownish black, firm to moderately hard, sub blocky to blocky in part, generally sub fissile, carbonaceous, non dispersive, non calcareous, otherwise as above.
		10	<b>CLAYSTONE:</b> as above.
		Tr	<b>COAL:</b> as above.
		Tr	<b>SILTY CLAYSTONE:</b> dark yellowish brown, as above.
		80	<b>SILTY SANDSTONE:</b> quartzose, olive grey, medium dark grey, common unconsolidated grains, minor cemented aggregates, very fine to very coarse grained, dominantly fine to medium grained, silty in part, moderately sorted, sub elongate to spherical, sub angular to rounded, transparent and minor translucent quartz, rare to minor quartz overgrowths, locally grades to SILTY SANDSTONE, common dispersive argillaceous matrix, rare carbonaceous matter, trace mica, trace micropyrilite, trace pyrite cement (massive granular, strong), non calcareous, patchy weak silica cement, trace moderately strong silica cement, trace feldspar, very poor visible porosity in cemented aggregates, poor to fair inferred porosity. NO OIL
2630	2641 (BU)		

## **Bream B16 Lithology / Show Descriptions**

<b>Interval (m) From      To</b>		<b>%</b>	<b>Lithology / Show Description</b>
			SHOW.
10			<b>SILTSTONE:</b> as above.
10			<b>CLAYSTONE:</b> medium dark grey to dark grey, as above.
Tr			<b>SILTY CLAYSTONE:</b> as above, firm to very firm, sub fissile to fissile, non calcareous, non dispersive.
<b>Bream B16 reached a TD of 2641.0 mMDRT (2300.1m TVDRT, -2252.9m TVDSS), at 13:05 hrs 09 August 2005.</b>			

**APPENDIX 4a**

**BREAM B16**

**Mud Log**















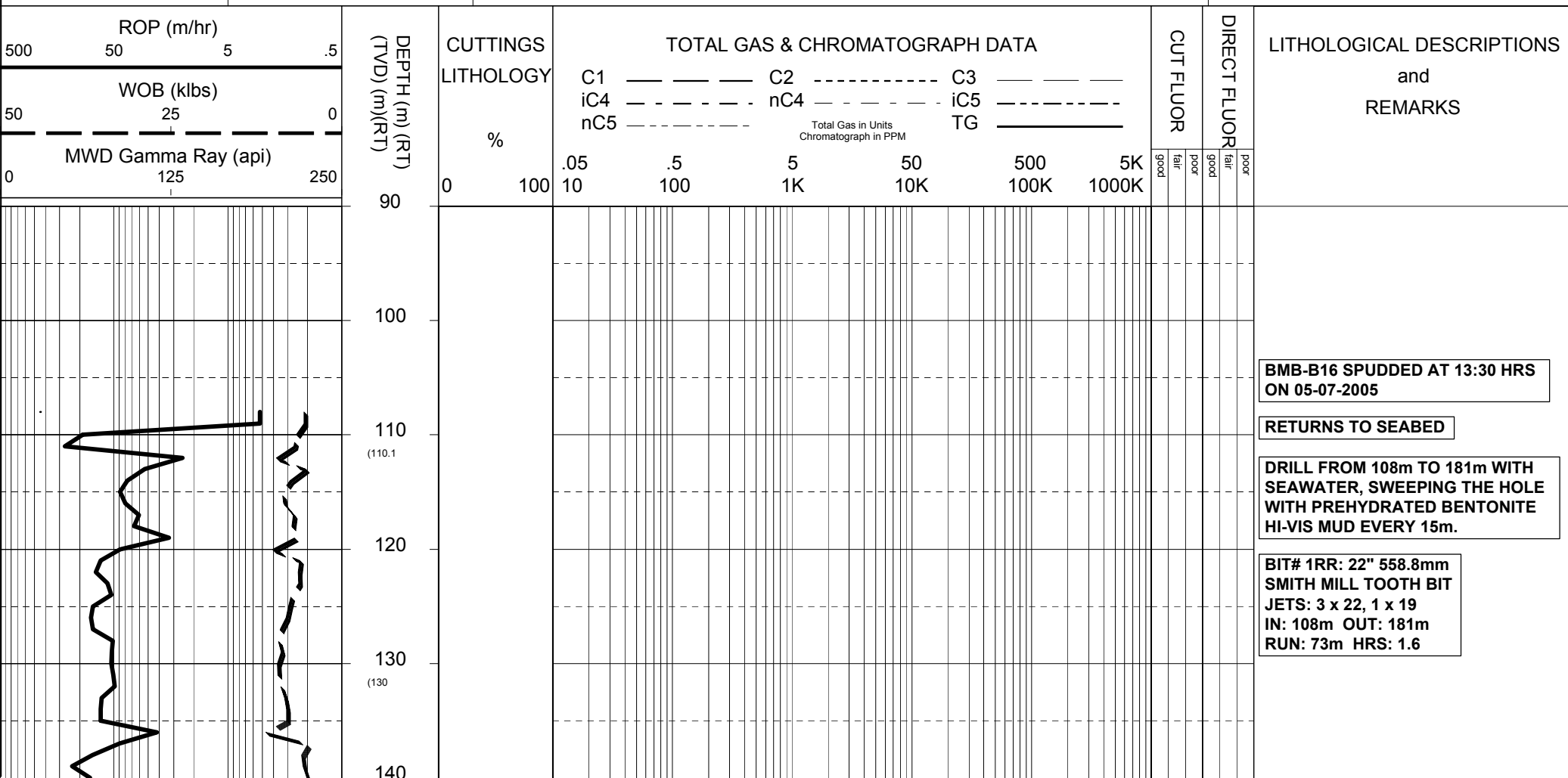
SCALE: 1/ 500

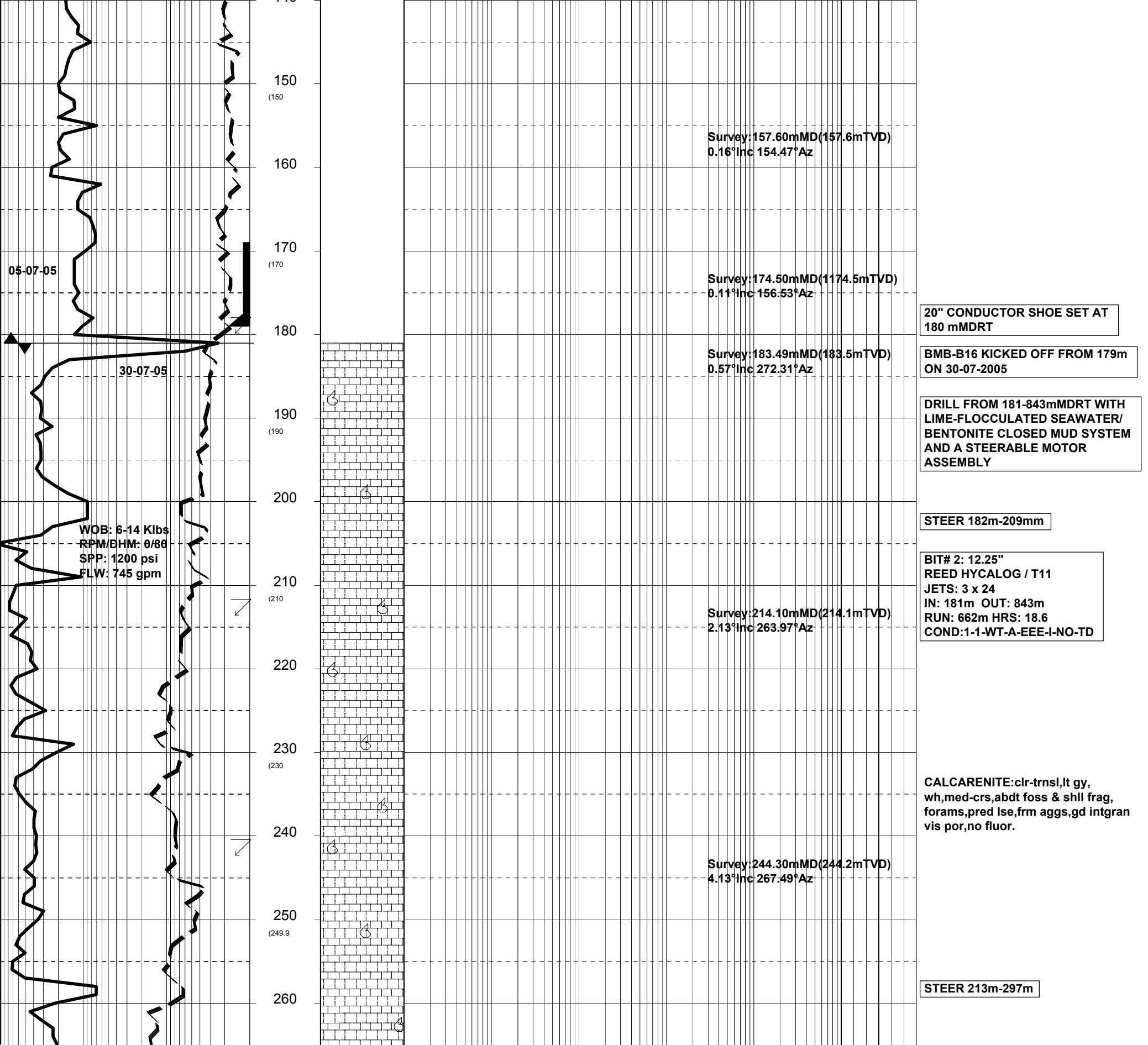
## ENGINEERS

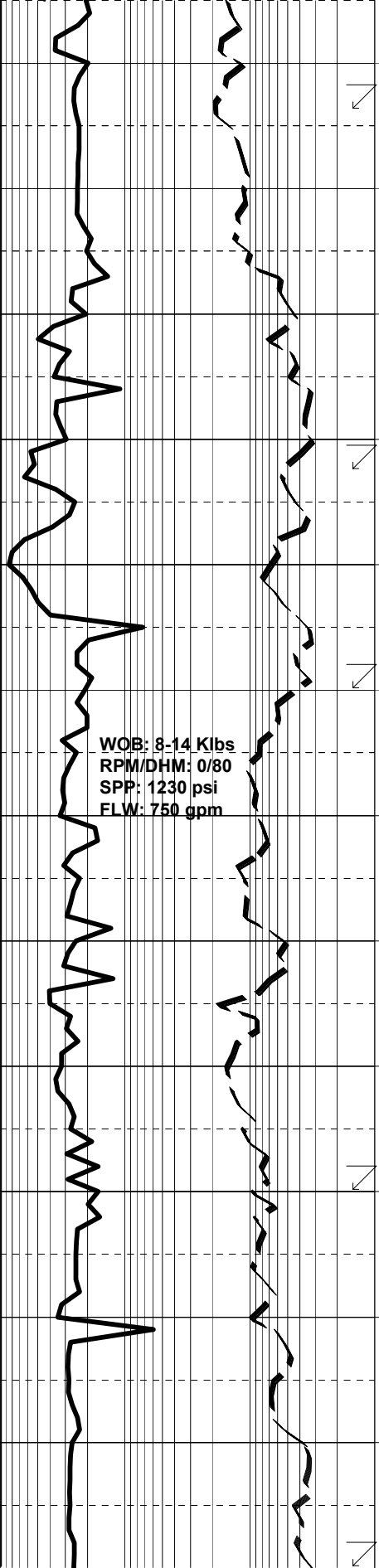
Matt Boyd  
Daniel van der Aa  
Boris Beranek

## ENGINEERING LEGEND

	CASING SHOE		WIRELINE LOGS
	LINER HANGER	MDT POINTS:	
	BIT CHANGE		PRESSURE ONLY
	DEVIATION SURVEY		SAMPLE
	SWC UNRECOVERED		SEAL FAILURE
	SIDEWALL CORE		TIGHT
	CORE		







WOB: 8-14 Klbs  
RPM/DHM: 0/80  
SPP: 1230 psi  
FLW: 750 gpm

270

(269.8)

280

290

(289.7)

300

310

(309.6)

320

330

(329.5)

340

350

(349.3)

360

370

(369.2)

380

390

Survey: 273.44mMD(273.3mTVD)  
6.20°Inc 258.68°Az

Survey: 302.32mMD(302.0mTVD)  
6.79°Inc 248.99°Az

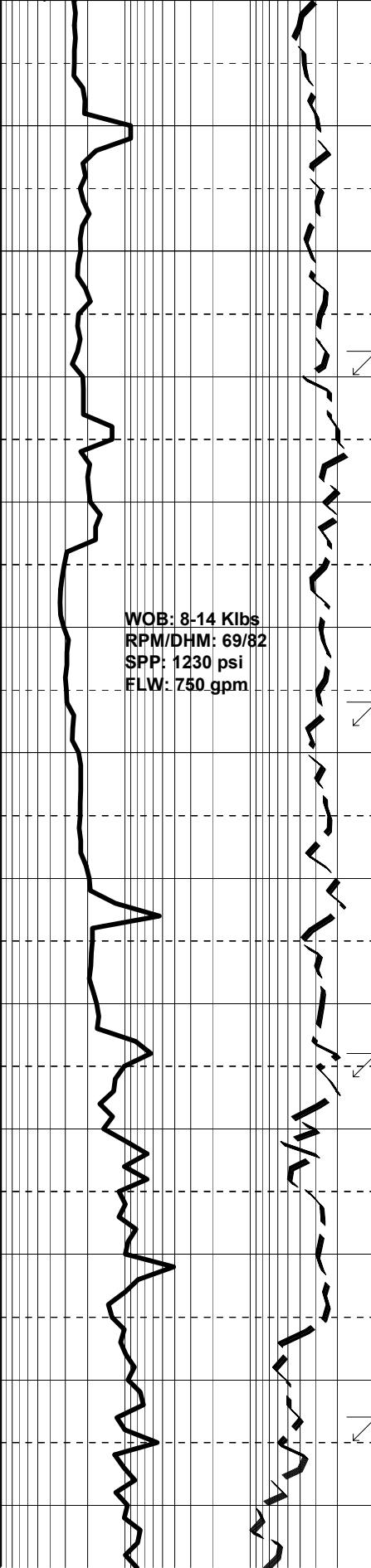
STEER 315m-341m

Survey: 320.98mMD(320.5mTVD)  
6.50°Inc 238.20°Az

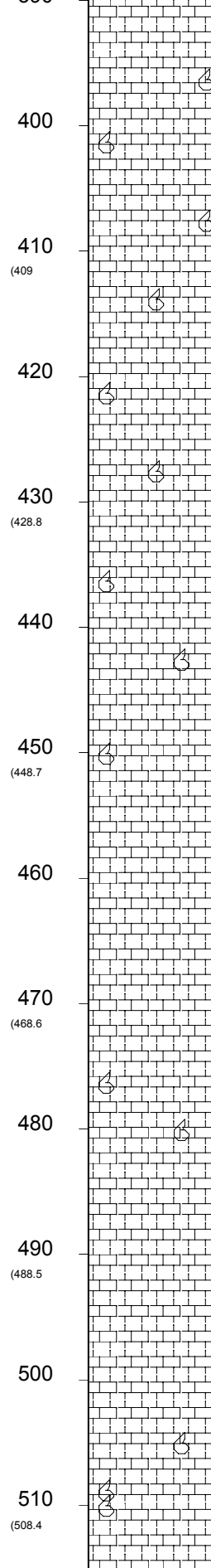
CALCARENITE: lt gy, lt gn gy  
i/p, abdt foss frag, fri, occ  
g/t CLCLT, gd intgran inf por,  
no fluor.

Survey: 360.36mMD(359.6mTVD)  
6.56°Inc 225.35°Az

Survey: 389.61mMD(388.7mTVD)  
6.28°Inc 219.25°Az



WOB: 8-14 Klbs  
RPM/DHM: 69/82  
SPP: 1230 psi  
FLW: 750 gpm



6.36°Inc 219.35°Az

Survey: 418.79mMD(417.7mTVD)  
6.26°Inc 225.03°Az

Survey: 447.48mMD(446.2mTVD)  
6.24°Inc 222.63°Az

Survey: 476.58mMD(475.1mTVD)  
6.16°Inc 224.05°Az

Survey: 505.66mMD(504.1mTVD)  
6.06°Inc 219.91°Az

**CALCARENITE:**lt gy,lt gn gy  
i/p,abdt foss frag,fri,occ  
g/t CLCLT,gd intgran inf por,  
no fluor.

**CALCARENITE:**lt gy,lt gn gy  
i/p,abdt foss frag,fri,occ  
g/t CLCLT,gd intgran inf por,  
no fluor.

WOB: 8-14 Klbs  
RPM/DHM: 73/83  
SPP: 1300 psi  
FLW: 755 gpm

WOB: 5-15 Klbs  
RPM/DHM: 74/88  
SPP: 1570 psi  
FLW: 802 gpm

520  
530  
540  
550  
560  
570  
580  
590  
600  
610  
620  
630  
640

(528.3)

(548.1)

(568)

(587.9)

(607.8)

(627.7)

Survey: 534.65mMD(532.9mTVD)  
6.06°Inc 217.45°Az

Survey: 563.70mMD(561.8mTVD)  
6.02°Inc 217.76°Az

CLEAR BLOCKED LINE  
ON MAIN DEGASSER

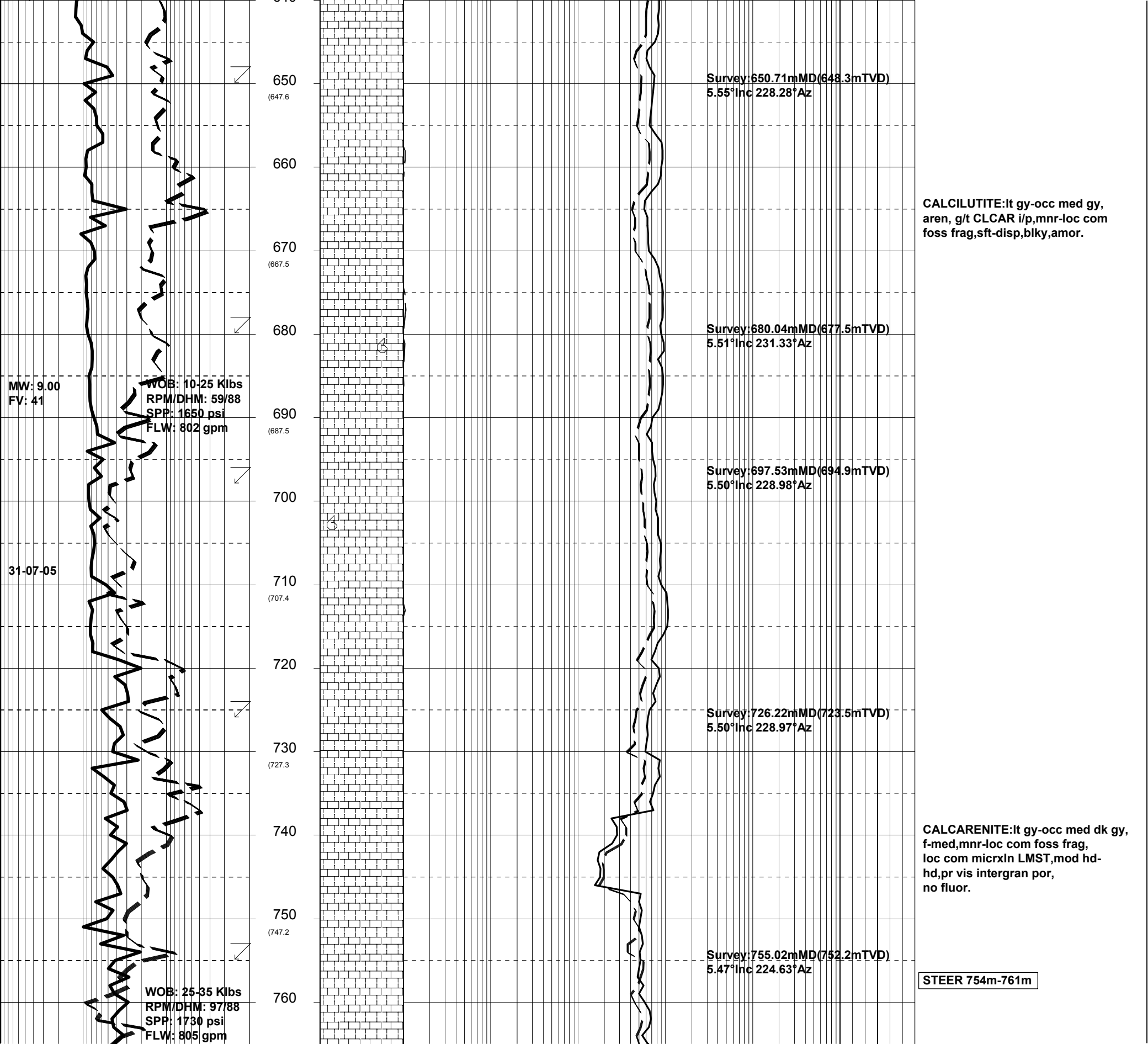
Survey: 592.73mMD(590.6mTVD)  
5.72°Inc 226.27°Az

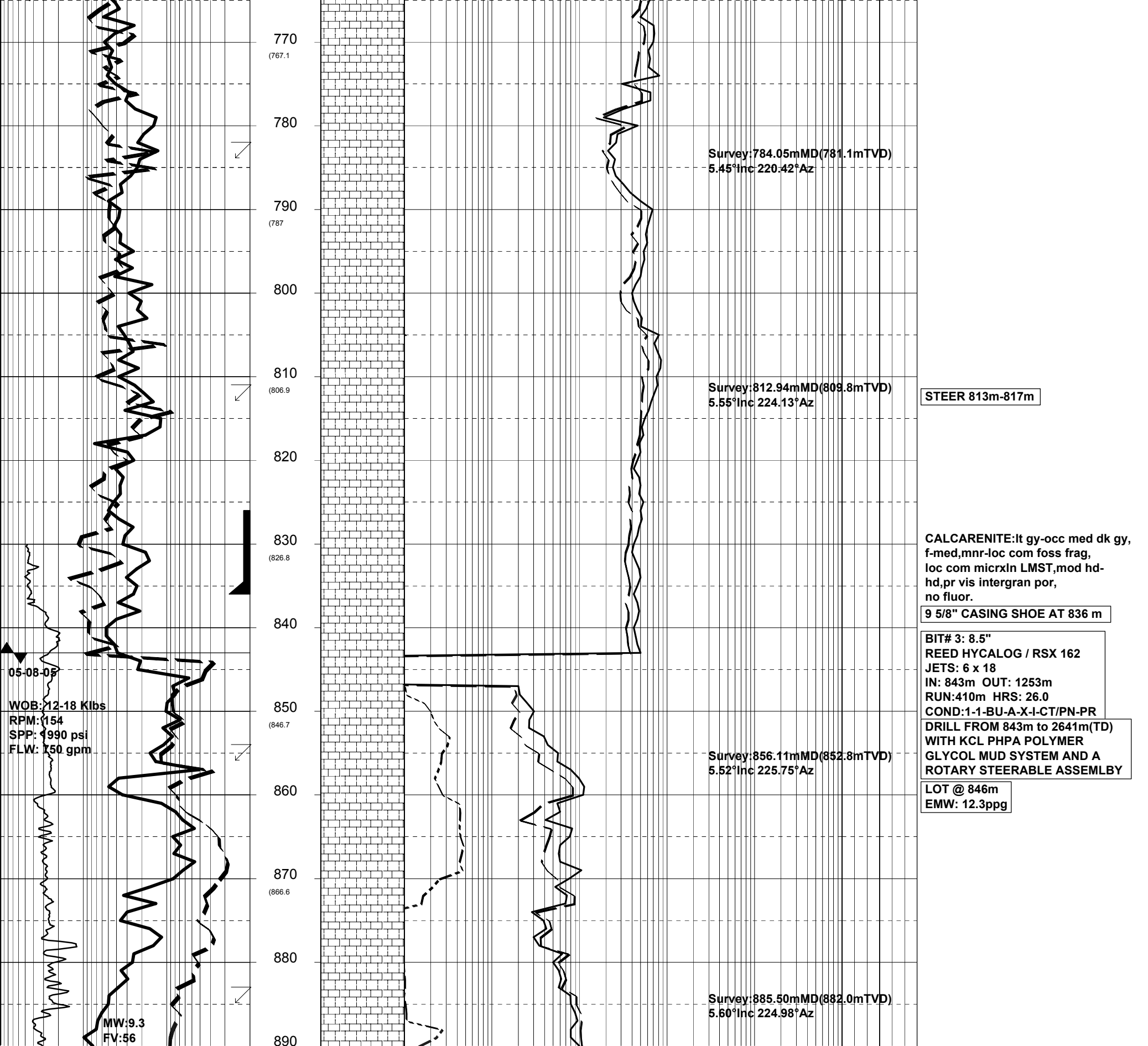
Survey: 621.85mMD(619.6mTVD)  
5.72°Inc 231.95°Az

CALCILUTITE:lt gy-occ gn gy,abdt  
foss frag,g/t CLSLT i/p,frm-com sft,  
sbbiky-blky.

STEER 580m-587m

CALCARENITE:lt gy,occ med gy,  
abdt foss frag,fri,com  
g/t CLCLT,ti-pr inf por,  
no fluor.





PV:23  
YP:23  
Gel:10/18/2  
pH:10.4  
Cl:42k  
KCl:8

WOB: 15-22 Klbs  
RPM: 190  
SPP: 2050 psi  
FLW: 747 gpm

BLOCKED DEGASSER LINE  
901m - 910m

Survey:914.67mMD(911.1mTVD)  
5.60°Inc 223.80°Az

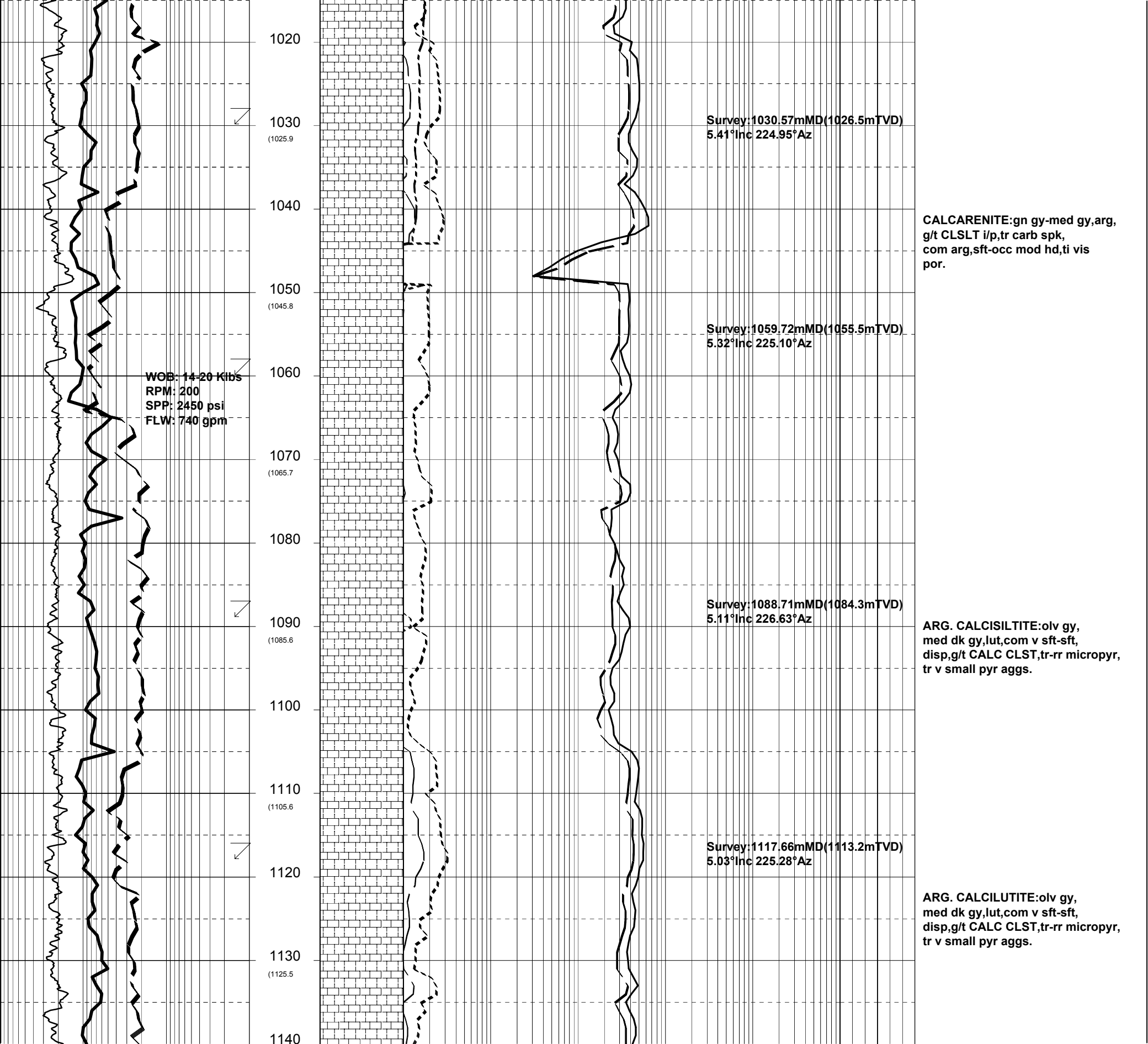
Survey:943.84mMD(940.1mTVD)  
5.47°Inc 223.94°Az

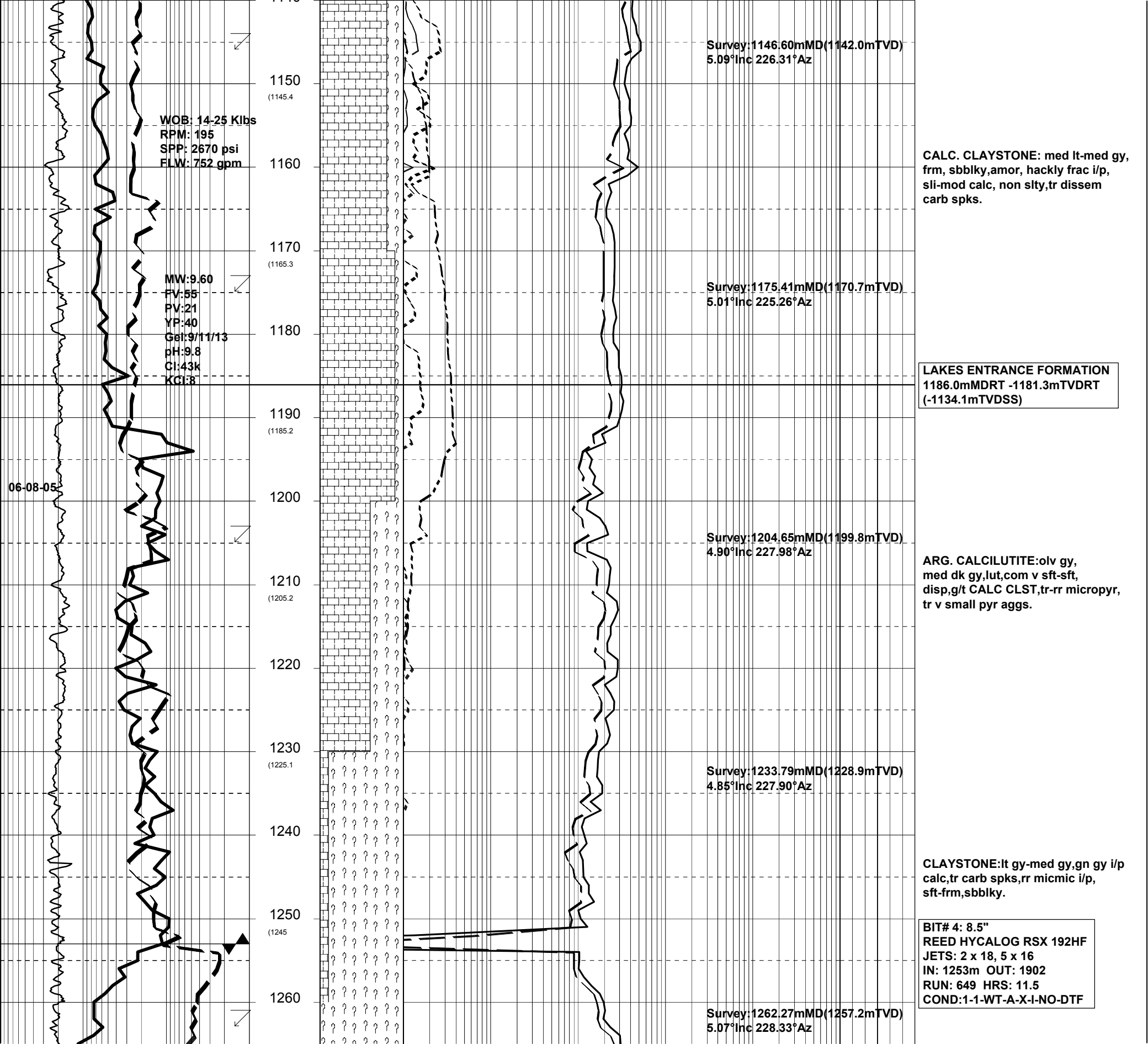
Survey:972.77mMD(968.9mTVD)  
5.37°Inc 223.05°Az

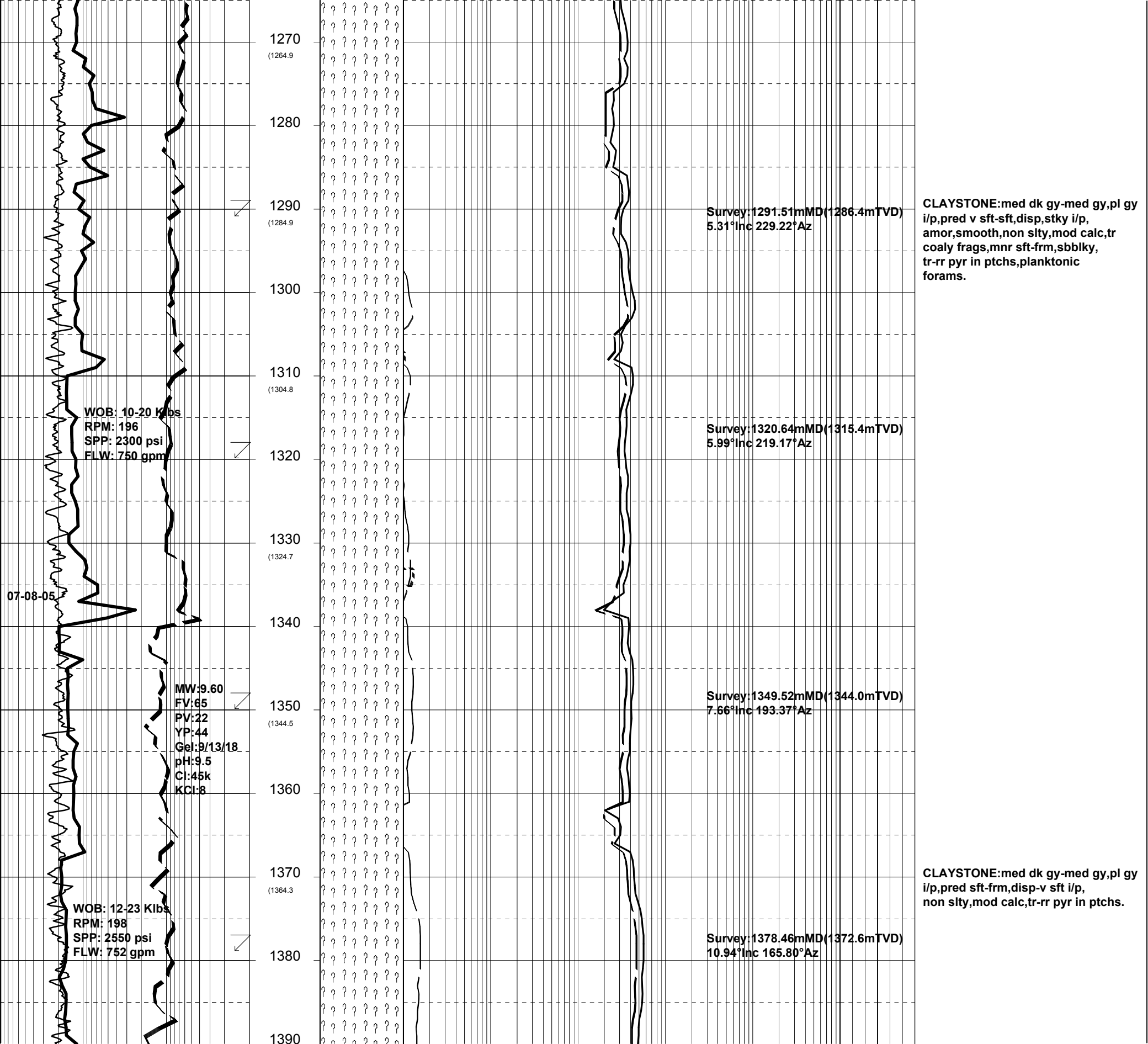
Survey:1001.99mMD(998.0mTVD)  
5.46°Inc 223.36°Az

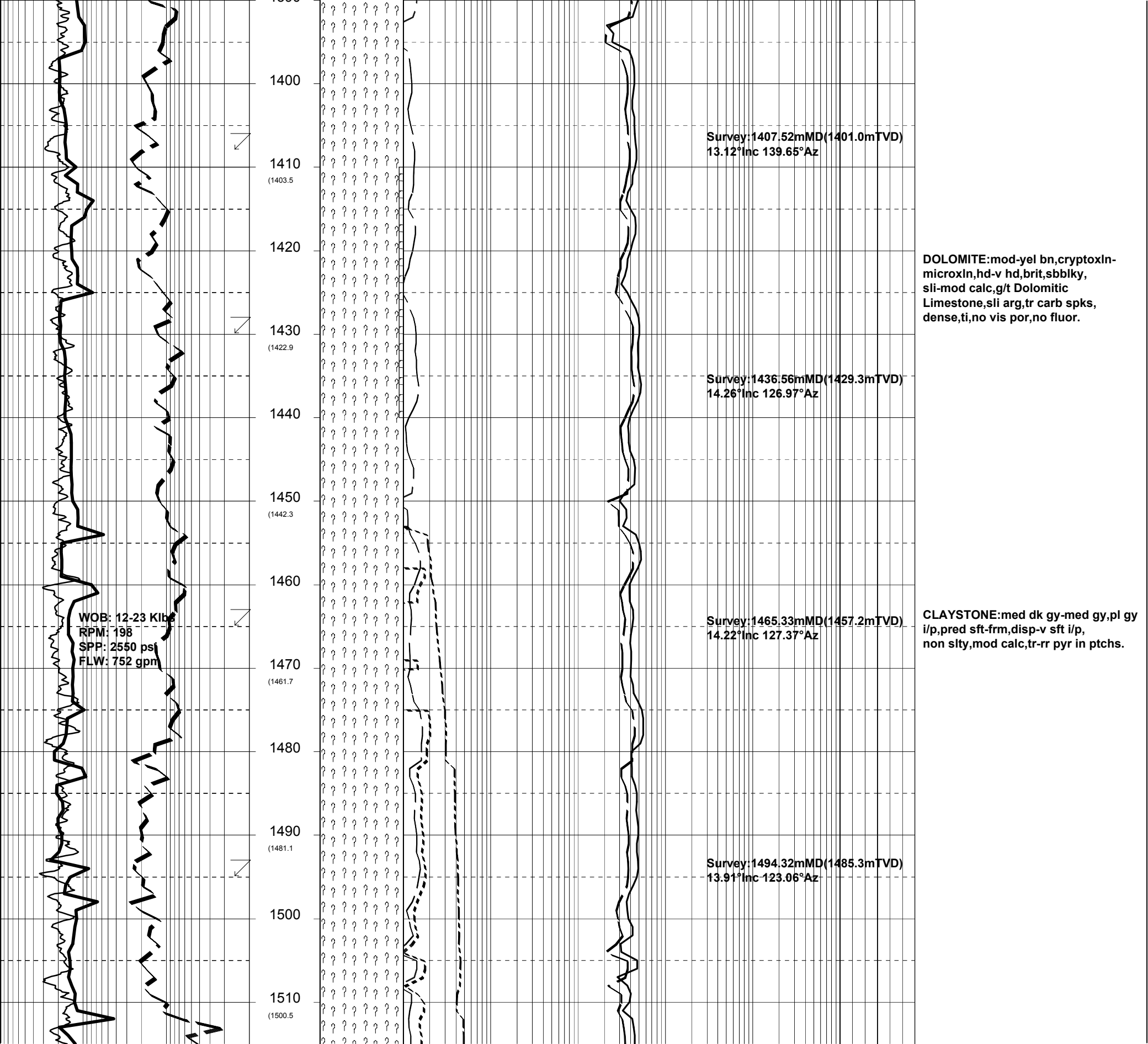
**CALCARENITE:**gn gy,vf-f,rr carb  
spk,tr glauc grns,rr foss,  
abdt arg,g/t CLCLT,sft-frn,  
ti vis por.

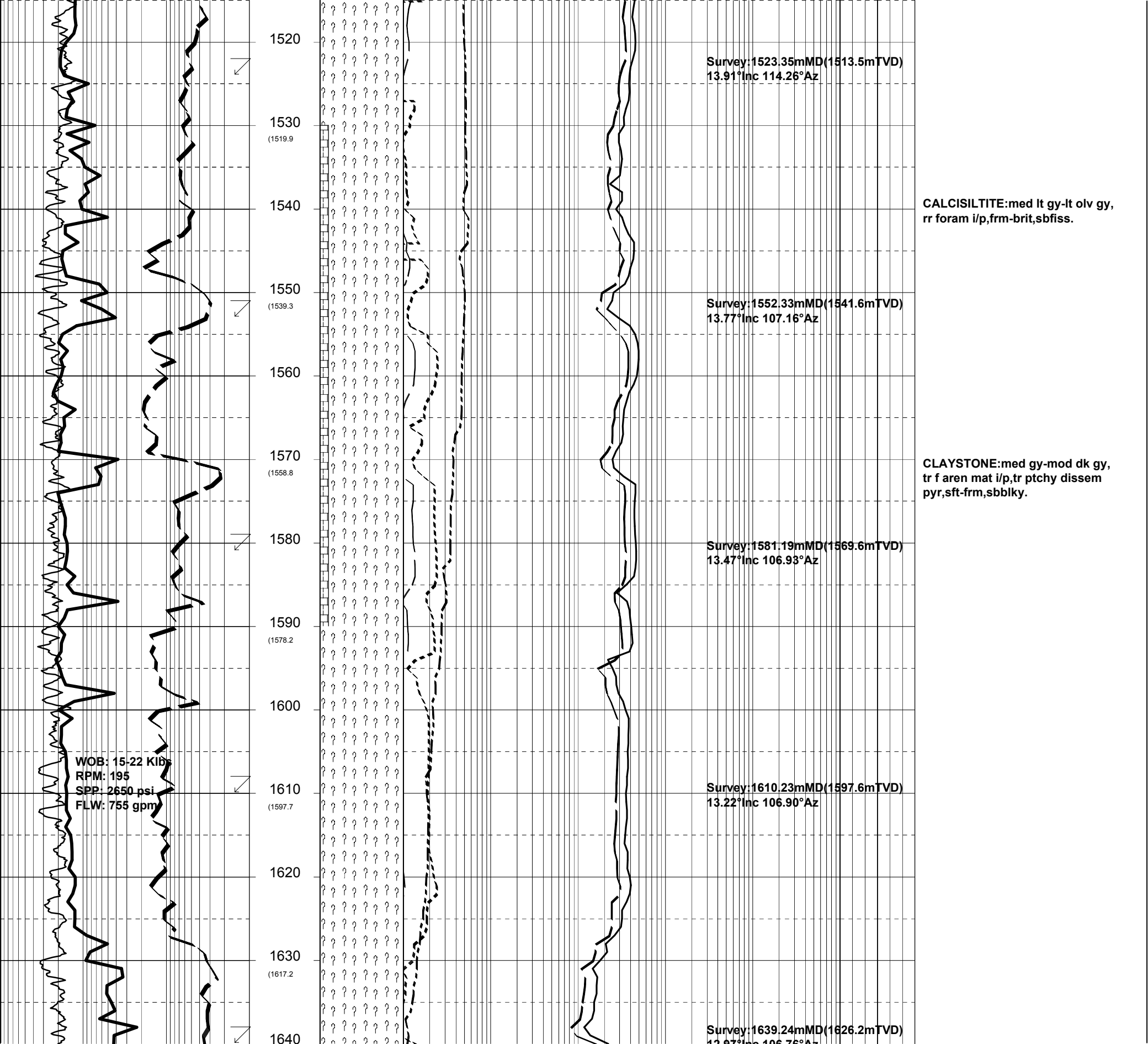
**CALCISILTITE:**gn gy-med gy,occ lt  
gy,com g/t CLCAR,rr micro foss,  
rr carb spks,sft-frn,sbblky-blky.











WOB: 15-22 Kib  
RPM: 195  
SPP: 2650 psi  
FLW: 755 gpm

Survey: 1523.35mMD(1513.5mTVD)  
13.91°Inc 114.26°Az

CALCISILTITE: med lt gy-lt olv gy,  
rr foram i/p, frm-brit, sbfiss.

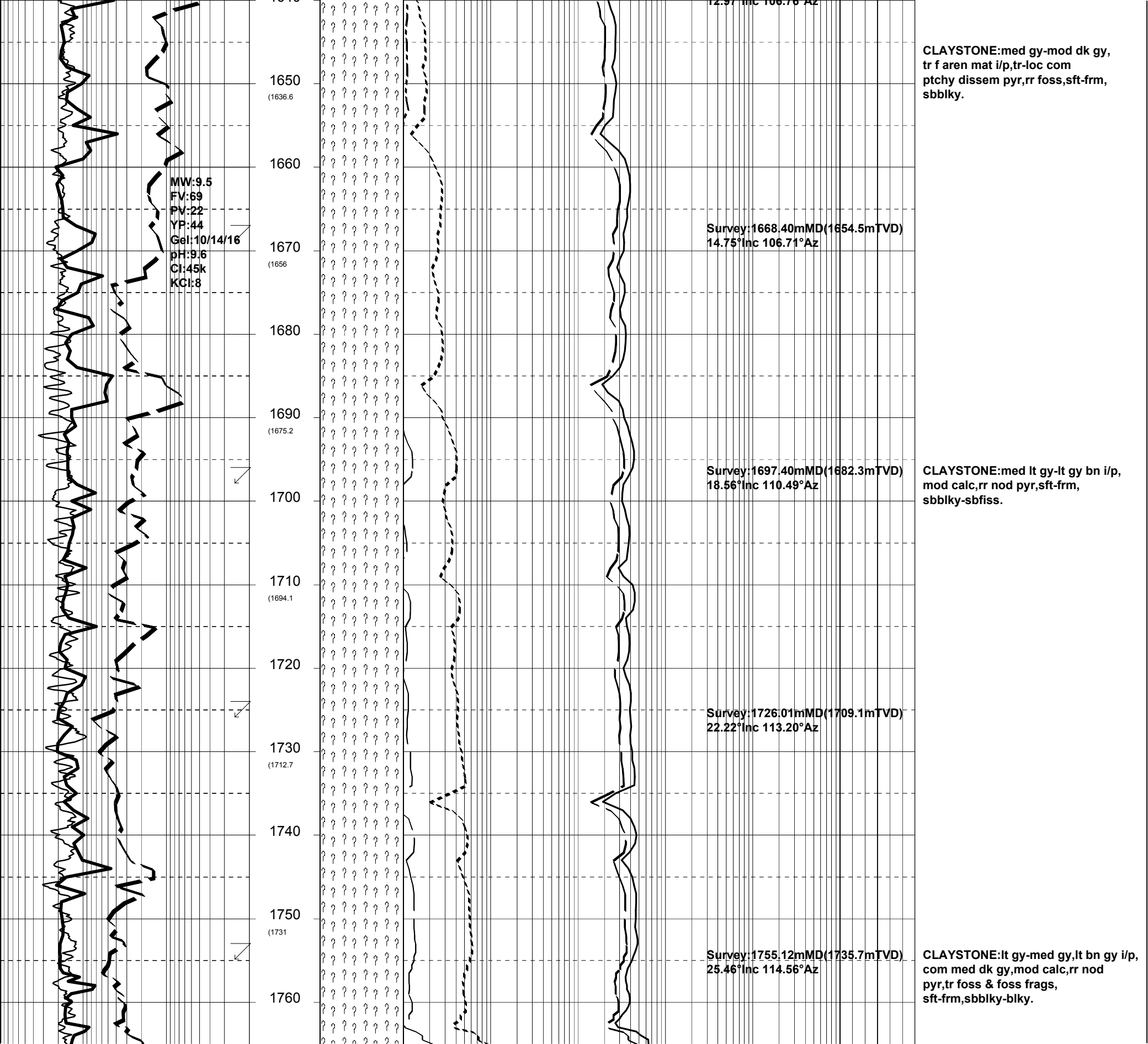
Survey: 1552.33mMD(1541.6mTVD)  
13.77°Inc 107.16°Az

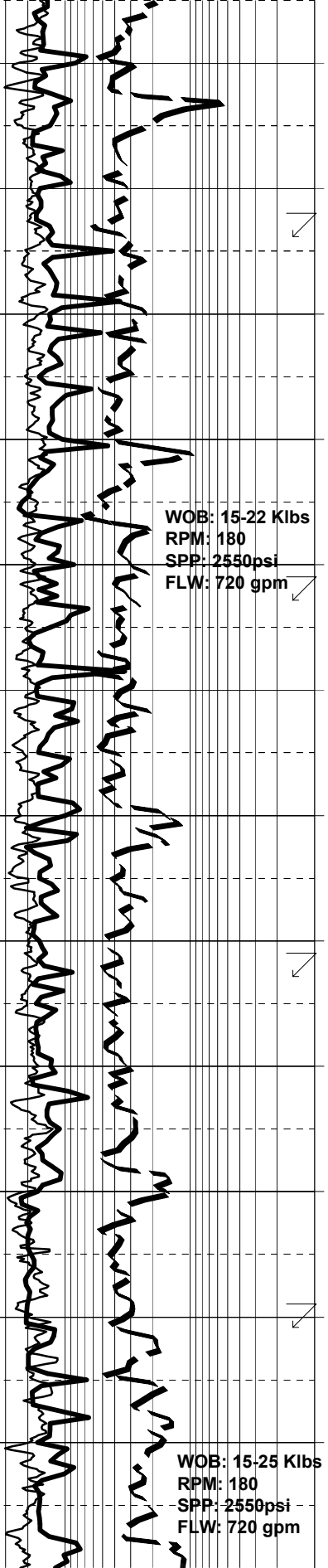
CLAYSTONE: med gy-mod dk gy,  
tr f aren mat i/p, tr ptchy dissem  
pyr, sft-frm, sbblky.

Survey: 1581.19mMD(1569.6mTVD)  
13.47°Inc 106.93°Az

Survey: 1610.23mMD(1597.6mTVD)  
13.22°Inc 106.90°Az

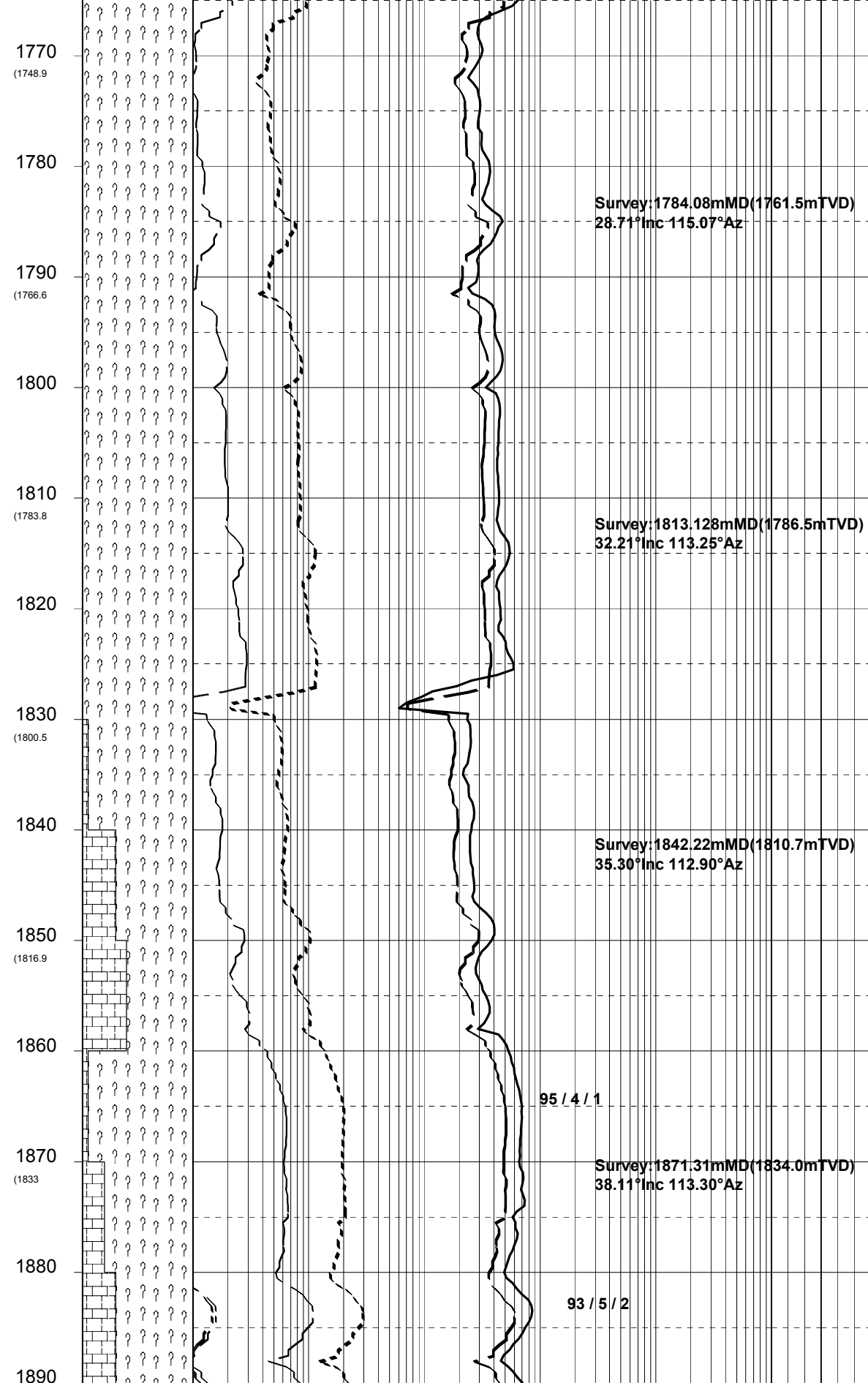
Survey: 1639.24mMD(1626.2mTVD)  
13.97°Inc 106.76°Az





WOB: 15-22 Klbs  
RPM: 180  
SPP: 2550psi  
FLW: 720 gpm

WOB: 15-25 Klbs  
RPM: 180  
SPP: 2550psi  
FLW: 720 gpm



Survey: 1784.08mMD(1761.5mTVD)  
28.71°Inc 115.07°Az

Survey: 1813.128mMD(1786.5mTVD)  
32.21°Inc 113.25°Az

Survey: 1842.22mMD(1810.7mTVD)  
35.30°Inc 112.90°Az

Survey: 1871.31mMD(1834.0mTVD)  
38.11°Inc 113.30°Az

95 / 4 / 1

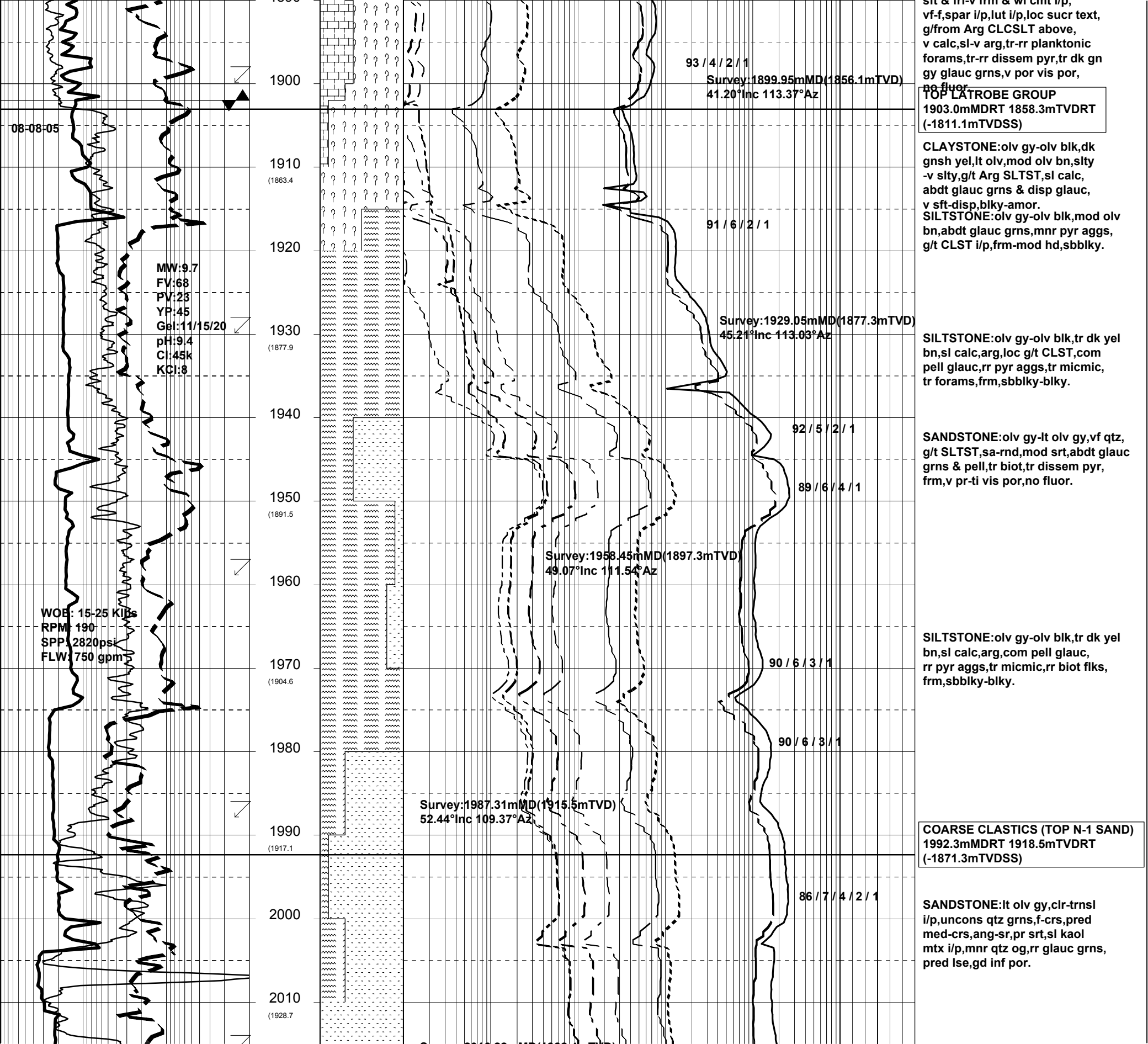
93 / 5 / 2

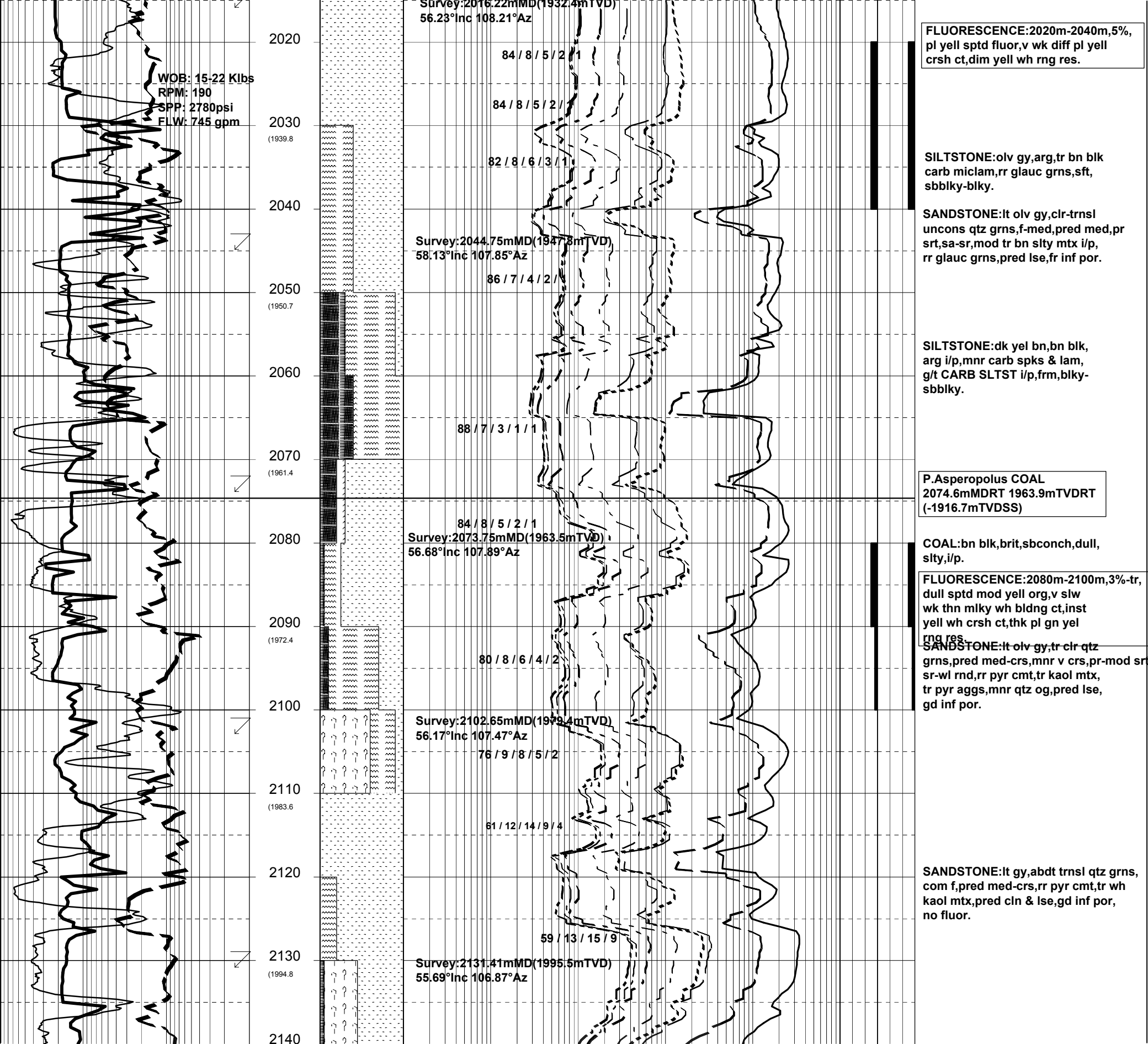
CLAYSTONE: med gy-med dk gy,  
lt gy bn, lt bn-yel bn i/p, calc,  
rr nod pyr, mnrr foss, tr nod glauc,  
frm-brit, sbblky-blky.

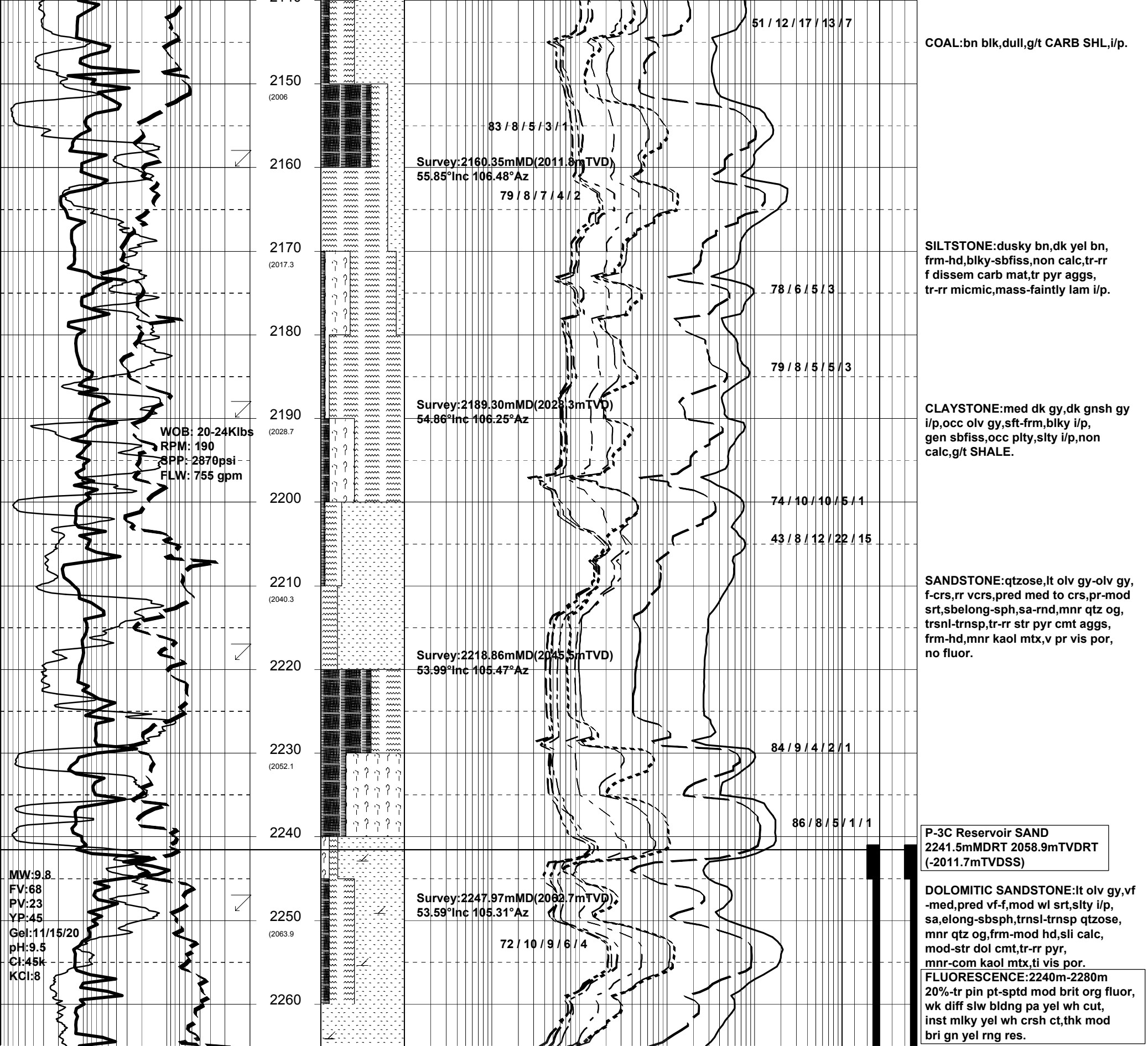
CALCISILTITE: med lt gy, arg g/t  
arg CLCAR, mod-occ v calc, rr micro  
pyr, tr pyr foss frag, sft, sbblky.

CLAYSTONE: med lt gy-lt bn gy,  
lt bn, lt yel bn i/p, tr dk bn  
sid, rr glauc grns, tr foss frags,  
rr planktonic forams, frm, sbblky.

BIT# 4RR: 8.5"  
REED HYCALOG RSX 192HF  
JETS: 2 x 18, 5 x 16  
IN: 1902m OUT: 2641m  
RUN: 739m HRS: 19.6  
COND: 1-4-WT-A-X-1/16-ER/DEL-TD  
CALCARENITE: med lt gy-lt gy,  
sft & fri v frm & wd cmt iln







2270  
(2075.6

2280

87 / 7 / 4 / 2 / 1

**COAL:**bn blk,blk,dll,mnr brit vitrain,  
frm,fri,blky-sbblky,hkly frac i/p,  
rr sbconch frac,tr amber.

82 / 6 / 5 / 4 / 3

**CLAYSTONE:** med dk gy-dk gy, dk  
gnsh gy i/p, mod hd, blk, occ  
sbplty, non calc, slty, tr carb frags,  
tr-rr gnsh gy-gnsh blk, glauc  
in ptchs.

91 / 6 / 2 / 1

91 / 6 / 2 / 1

**SILTSTONE:** dusky bn, dk yel bn, bnsh  
blk i/p, com dissem pyr, non calc,  
tr-rr micmic, mass-faintly lam i/p.

89 / 6 / 3 / 1 / 1

**SILTSTONE:** dusky bn, dk yel bn, bnsh  
blk i/p, com dissem pyr, non calc,  
tr-rr micmic, mass-faintly lam i/p.

**COAL:bn blk-blk,dull,mnr brt**

91 / 5 / 3 / 1

Survey: 2335.48mMD(2114.1mTVD)  
53.21°Inc 104.61°Az

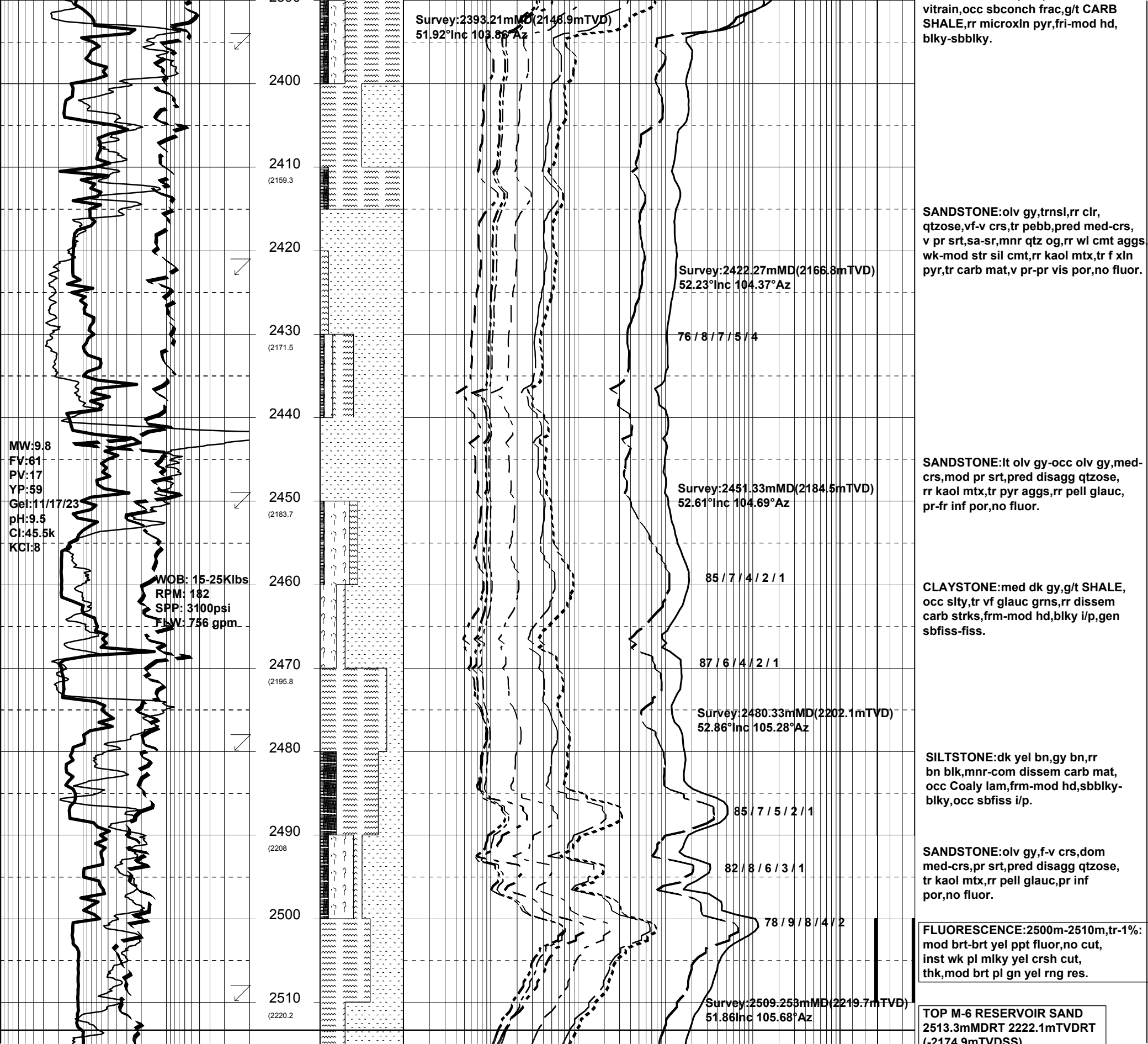
Survey: 2364.40m MD (2131.4m TVD)  
53.21° Inc 104.10° Az

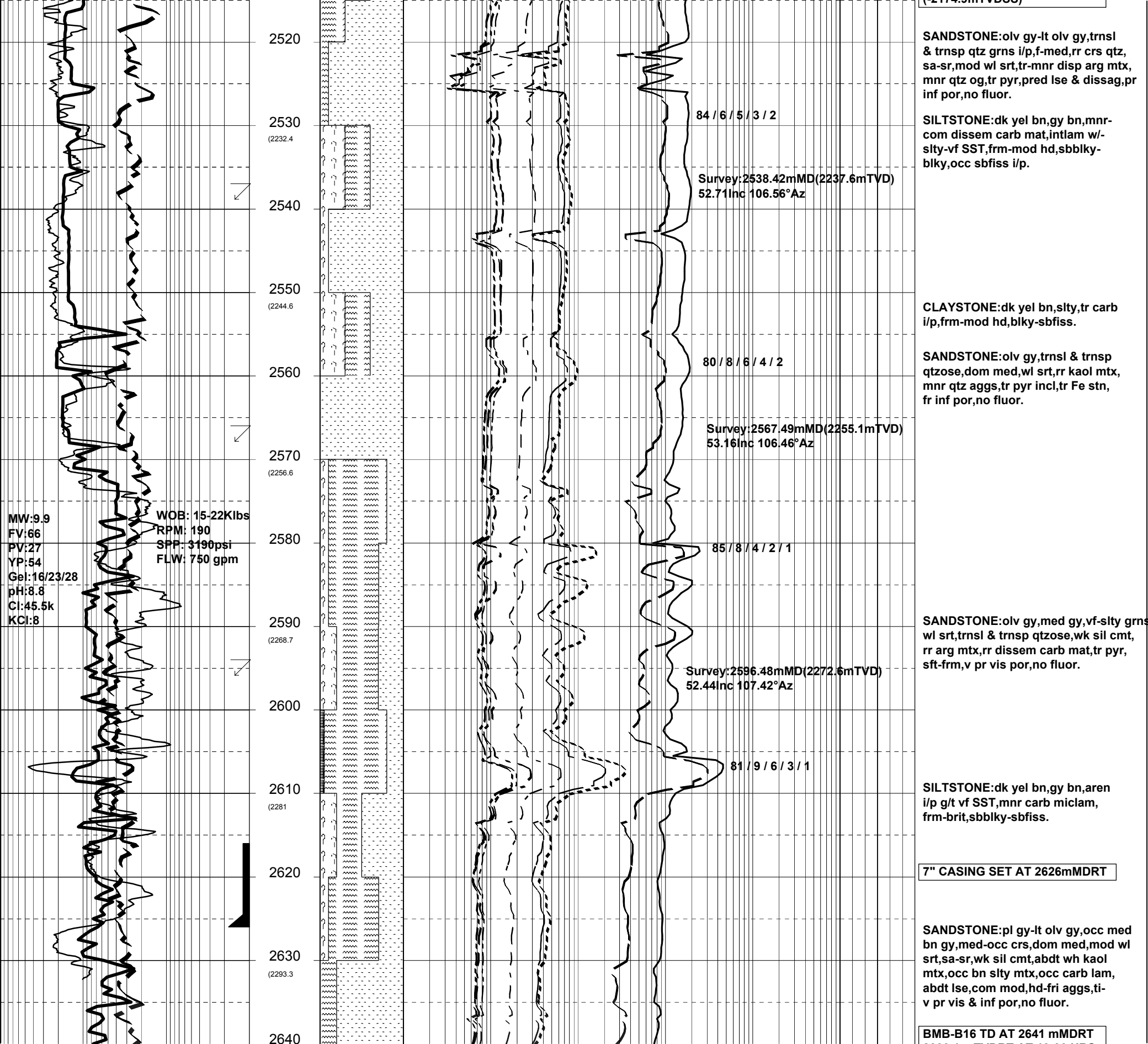
09-08-05

MW:9.7  
FV:61  
PV:24  
YP:49  
Gel:14/  
pH:8.8  
CI:45k <  
KCI:8

WOB: 12-26Klbs  
RPM: 192  
SPP: 2920psi  
FLW: 750 gpm

2390





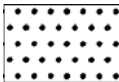
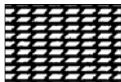


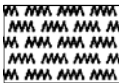
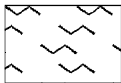


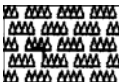
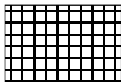

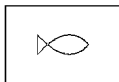
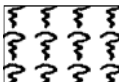

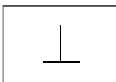
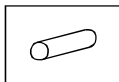
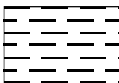
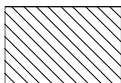
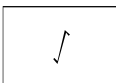
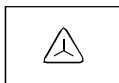


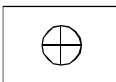
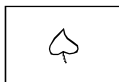
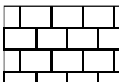
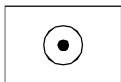
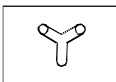
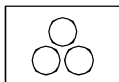
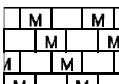
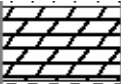
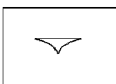

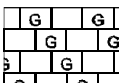
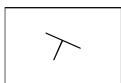

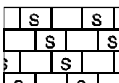
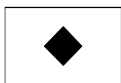
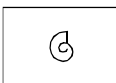
[illegible]

**APPENDIX 4b**

**BREAM B16**

**Well Completion Log**



LITHOLOGICAL SYMBOLS							
	Sandstone		Dolomite		Mica		Pelecypods
	Siltstone		Marl		Chert		Echinoids
	Mudstone		Anhydrite		Carbonaceous Matter		Fish Remains
	Claystone		Volcanics		Calcareous		Plant Remains
	Shale		Basement		Glauconite		Spores
	Coal		Granule		Corals		Leaves
	Limestone		Oolites		Bryozoans		Foram
	Micritic Limestone		Dolomitic		Brachiopods		Fossils
	Grain Limestone		Pyrite		Gastropods		
	Skeletal Limestone		Pyrite		Cephalopods		

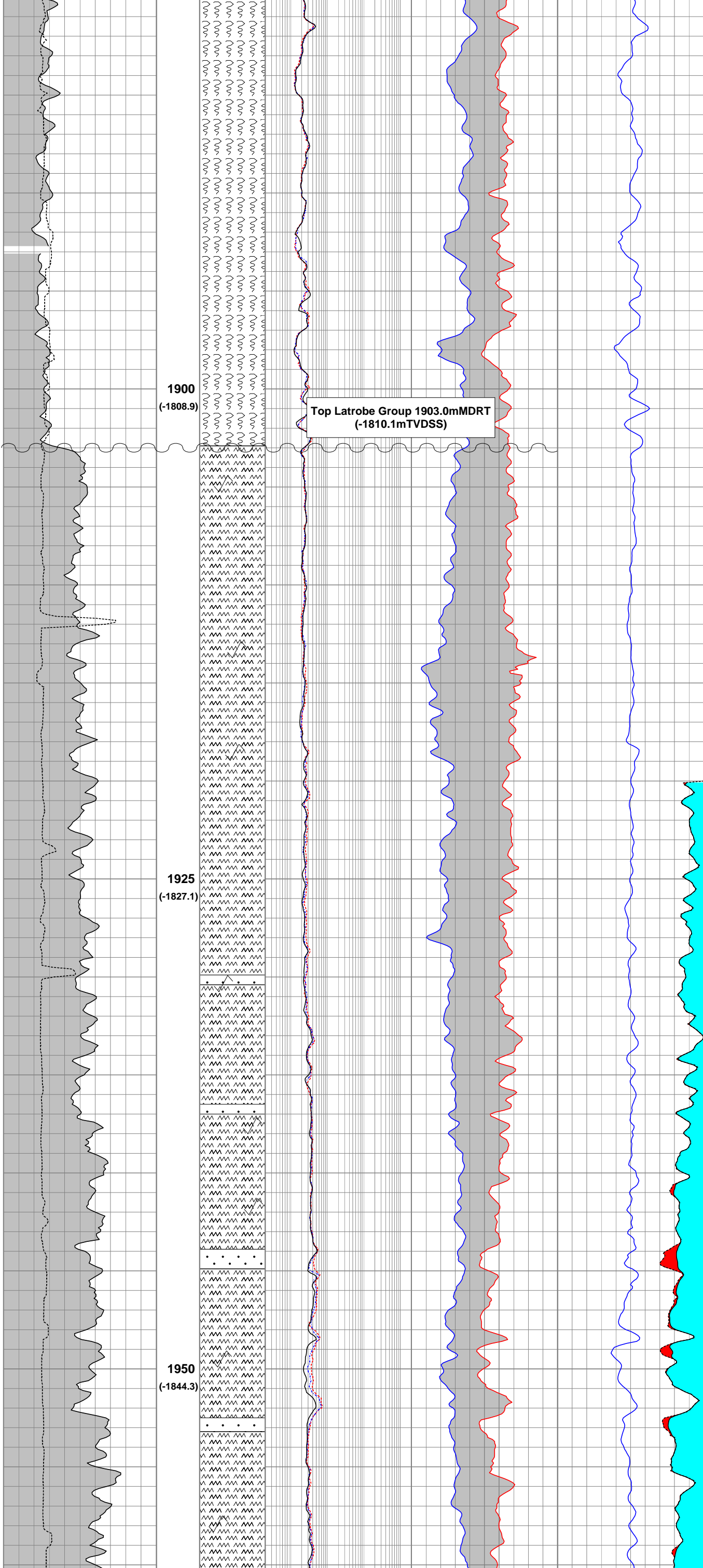
LOGGING AND SURVEYING				
Company/Log		Interval (mMDRT)		
Schlumberger Anadrill/ Powerpulse (Dir)		107.5 – 2623.93 mMDRT		
Schlumberger Anadrill/ GVR6 (Res & GR)		843.0 - 2641.0 mMDRT		
Schlumberger Anadrill/ ADN6 (Dens & Neutron)		843.0 - 2641.0 mMDRT		
Schlumberger Anadrill/ sonicVISION (Sonic)		843.0 - 2641.0 mMDRT		(Logged in memory while POOH from TD)
Date	4 Aug 2005 - 6 Aug 2005	6 Aug 2005 - 7 Aug 2005	7 Aug 2005 - 9 Aug 2005	
Run	MWD 2 / LWD 1	MWD 3 / LWD 2	MWD 4 / LWD 3	
Log	Powerpulse-GVR-sonicVISION-ADN6	Powerpulse-GVR-sonicVISION-ADN6	Powerpulse-GVR-sonicVISION-ADN6	
Depth Driller	1253.0 mMDRT	1902.0 mMDRT	2641.0 mMDRT	
Depth Logger	1253.0 mMDRT	1902.0 mMDRT	2641.0 mMDRT	
Bottom Log Interval	1243.8 mMDRT	1892.8 mMDRT	2631.8 mMDRT	
Top Log Interval	836.0 mMDRT	1221.2 mMDRT	1870.2 mMDRT	
Casing Driller	836.0 mMDRT	836.0 mMDRT	836.0 mMDRT	
Casing Logger	837.0 mMDRT	837.0 mMDRT	837.0 mMDRT	
Casing Size	9 5/8"	9 5/8"	9 5/8"	
Casing Weight	47ppf	47ppf	47ppf	
Bit Size	8.5"	8.5"	8.5"	
Type of Fluid in Hole	KCI-PHPA-Poly-Glycol-CP	KCI-PHPA-Poly-Glycol-CP	KCI-PHPA-Poly-Glycol-CP	
Density	9.6 ppg	9.7 ppg	9.85 ppg	
Rm @ Measured Temp.	0.0955 @ 21.0 C	0.0972 @ 21.1 C	0.0911 @ 20.8 C	
Rmf @ Measured Temp.	0.0853 @ 20.9 C	0.0862 @ 21.0 C	0.0759 @ 20.6 C	
Rmc @ Measured Temp.	0.1260 @ 21.0 C	0.1274 @ 21.7 C	0.1409 @ 21.0 C	
Max. Recorded Temp.	65.0°C	68.0°C	87.0°C	
Equipment / Location	OLU-JA-9602/Sale	OLU-JA-9602/Sale	OLU-JA-9602/Sale	
Recorded By	J.Dolan, M.Y.Tan, D. Hastie.	J.Dolan, M.Y.Tan, D. Hastie.	J.Dolan, M.Y.Tan, D. Hastie.	
Witnessed By	T.Kress	T.Kress	T.Kress	

CORES			PERFORATIONS		
From (mMDRT)	To (mMDRT)	Rec %	From (mMDRT)	To (mMDRT)	Shots/ft
----	----	---	---	---	---

CASING				PLUGS		
Size	Set @ (mMDRT)	Sx Cmt	Formation	From (mMDRT)	To (mMDRT)	Sx Cmt
9.625"	836.2	---	Gippsland Limestone			
7"	2626.2	585	Latrobe Group	--	--	--

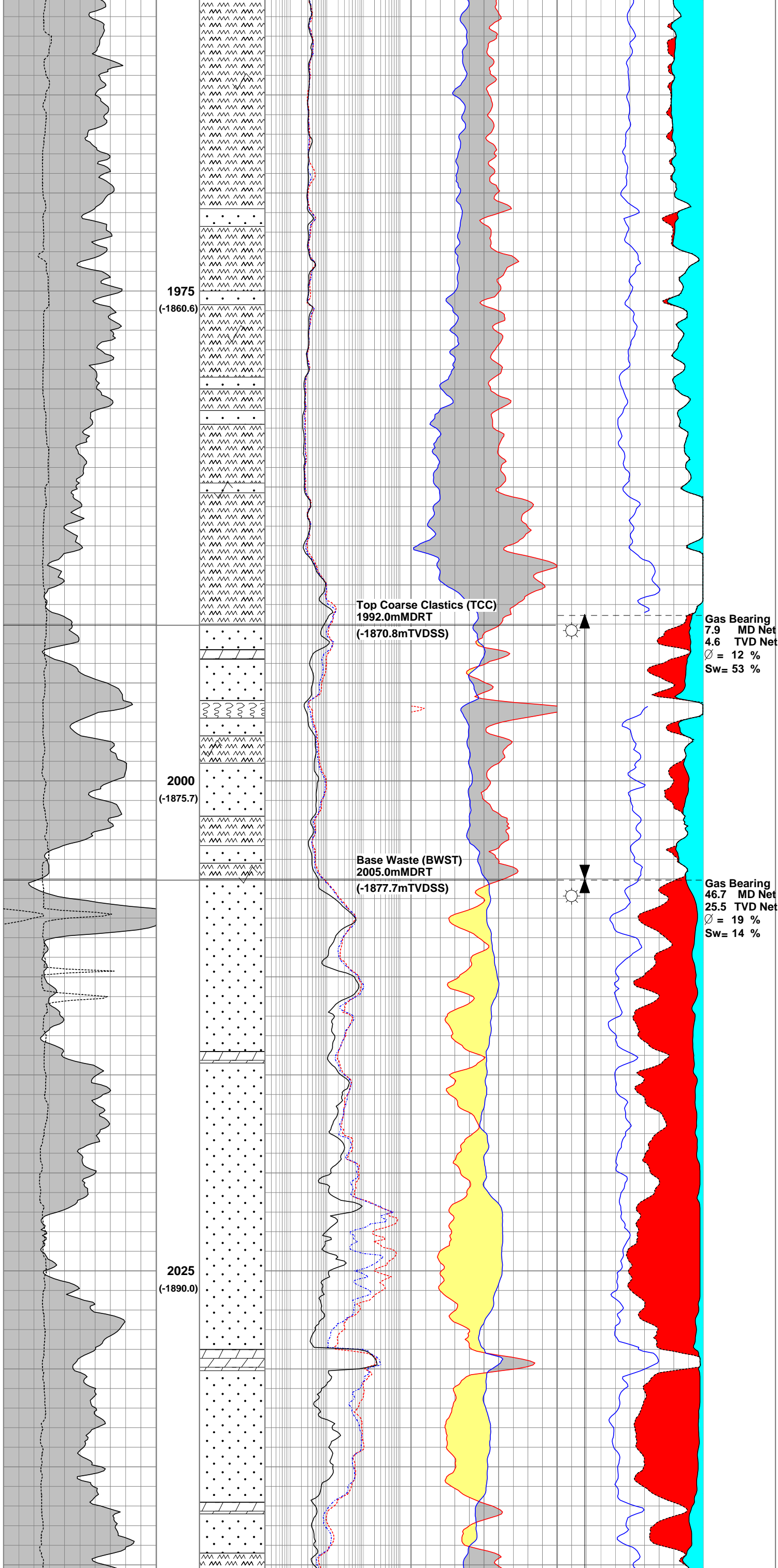
Gamma Ray			DEPTH	LITHOLOGY	Deep Button Resistivity			Bulk Density			Sonic Transit Time			TEST	COMPLETION	WELL ID / SURVEY DATA	PLUGS	FORMATION	PALYNOLOGY	AGE
0	API	200			0.2	OHMM	2000	1.85	G/C3	2.85	500	US/M	100							
Horizontal Hole Diameter					Medium Button Resistivity			Neutron Porosity			Effective Porosity									
6	IN	16			0.2	OHMM	2000	0.45	V/V	-0.15	0.5	V/V	0							
					Shallow Button Resistivity						Volume of Water									
			0.2	OHMM	2000				0.5	V/V	0									



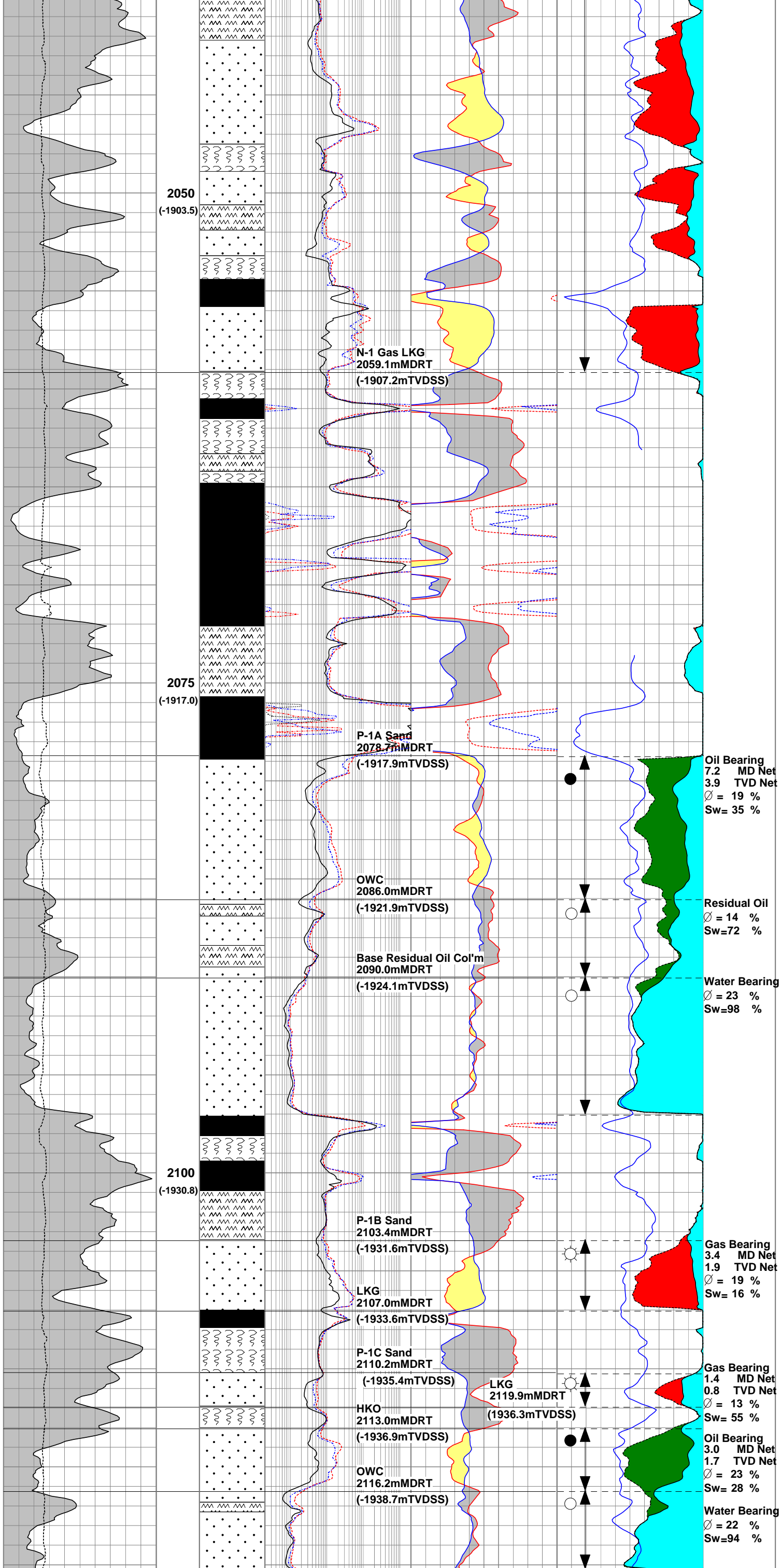


1922.0  
MW 9.7ppg  
FV 68sec/qt  
PV 23cP  
YP 45  
pH 9.4  
KCI 28





2016.22  
ANG 56  
DIR 108  
(-1885.2)



2102.65  
ANG 56  
DIR 107  
(-1932.2)

2125  
(-1944.8)

P-2A Sand  
2125.8mMDRT  
(-1944.1mTVDSS)

Oil Bearing  
8.4 MD Net  
4.8 TVD Net  
Ø = 24 %  
Sw= 14 %

Residual Oil  
Ø = 25 %  
Sw=91 %

Base Residual Oil Col'm  
2144.7mMDRT  
(-1954.8mTVDSS)

Water Bearing  
Ø = 22 %  
Sw=10 %

2150  
(-1958.8)

P-2C sand  
2161.6mMDRT  
(-1964.3mTVDSS)

Oil Bearing  
3.2 MD Net  
1.8 TVD Net  
Ø = 18 %  
Sw= 54 %

LKO  
2165.4mMDRT  
(-1966.4mTVDSS)

2175  
(-1973.0)

P-2D Sand  
2191.3mMDRT  
(-1981.2mTVDSS)

Oil Bearing  
1.2 MD Net  
0.7 TVD Net  
Ø = 16 %  
Sw= 50 %

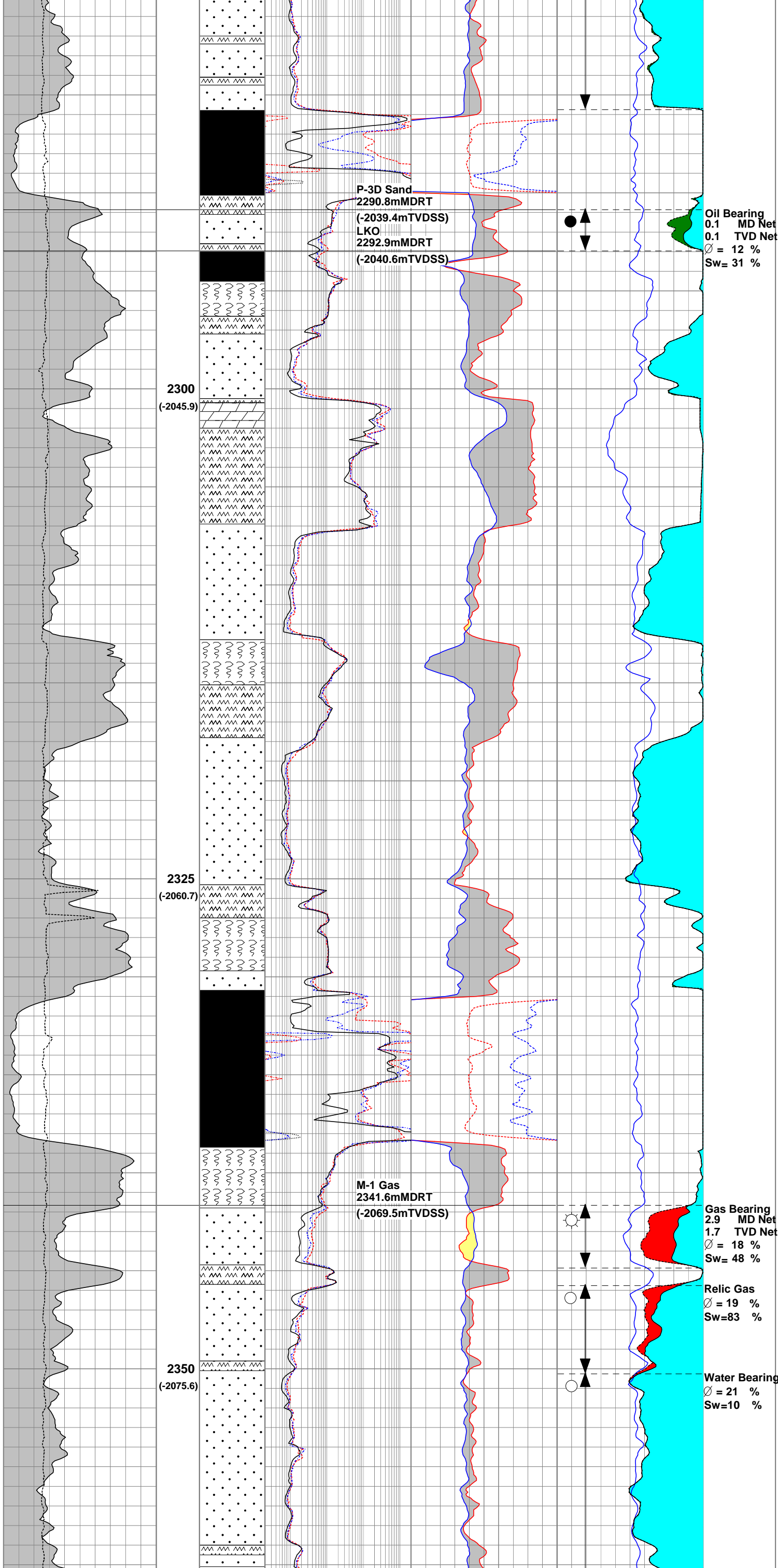
LKO  
2193.2mMDRT  
(-1982.3mMDRT)

P-2E Sand  
2196.6mMDRT  
(-1984.2mTVDSS)  
LKO  
2198.6mMDRT  
(-1985.4mTVDSS)

Possibly Oil  
1.7 MD Net  
1.0 TVD Net  
Ø = 16 %  
Sw= 64 %

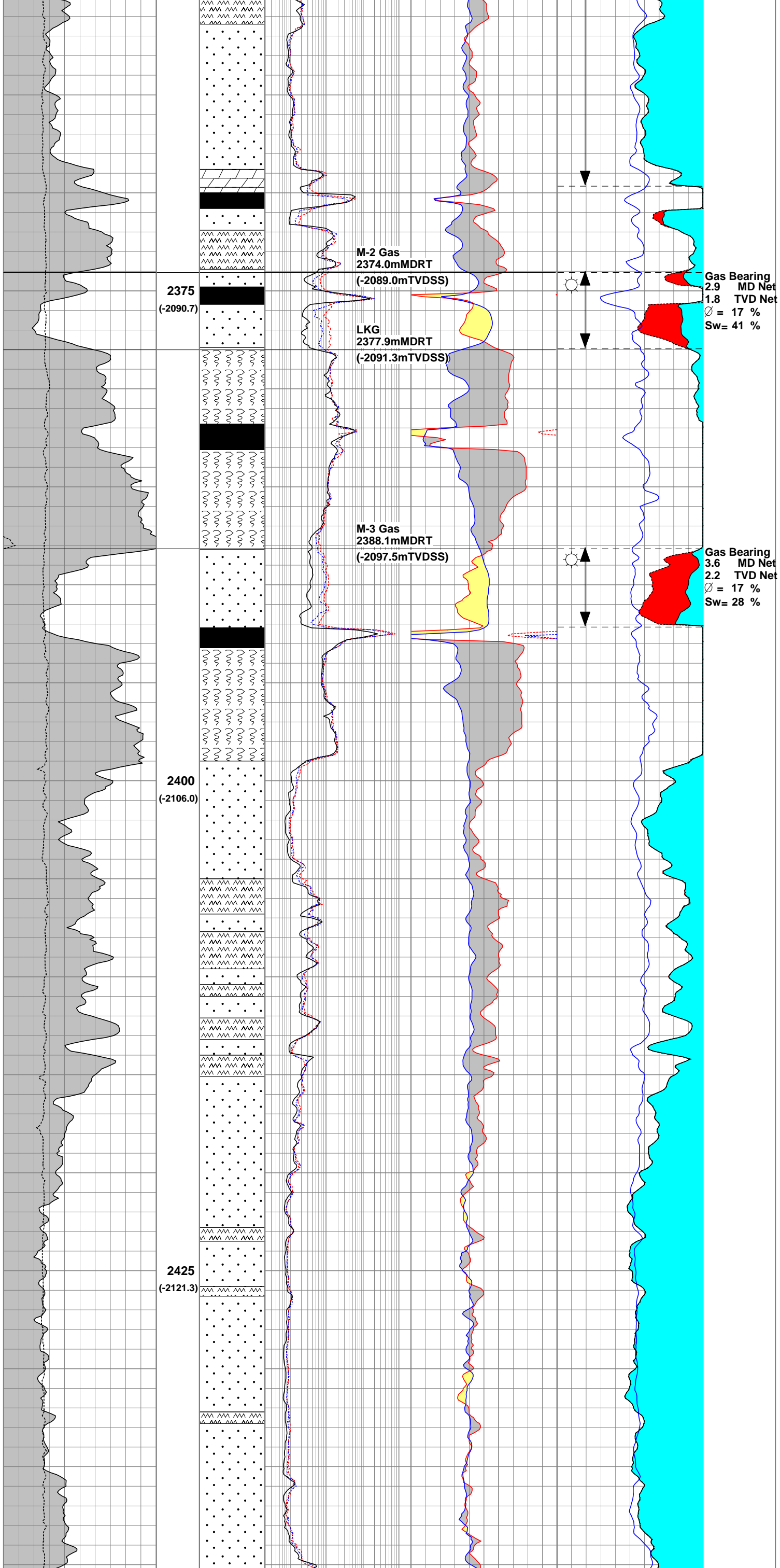
2200

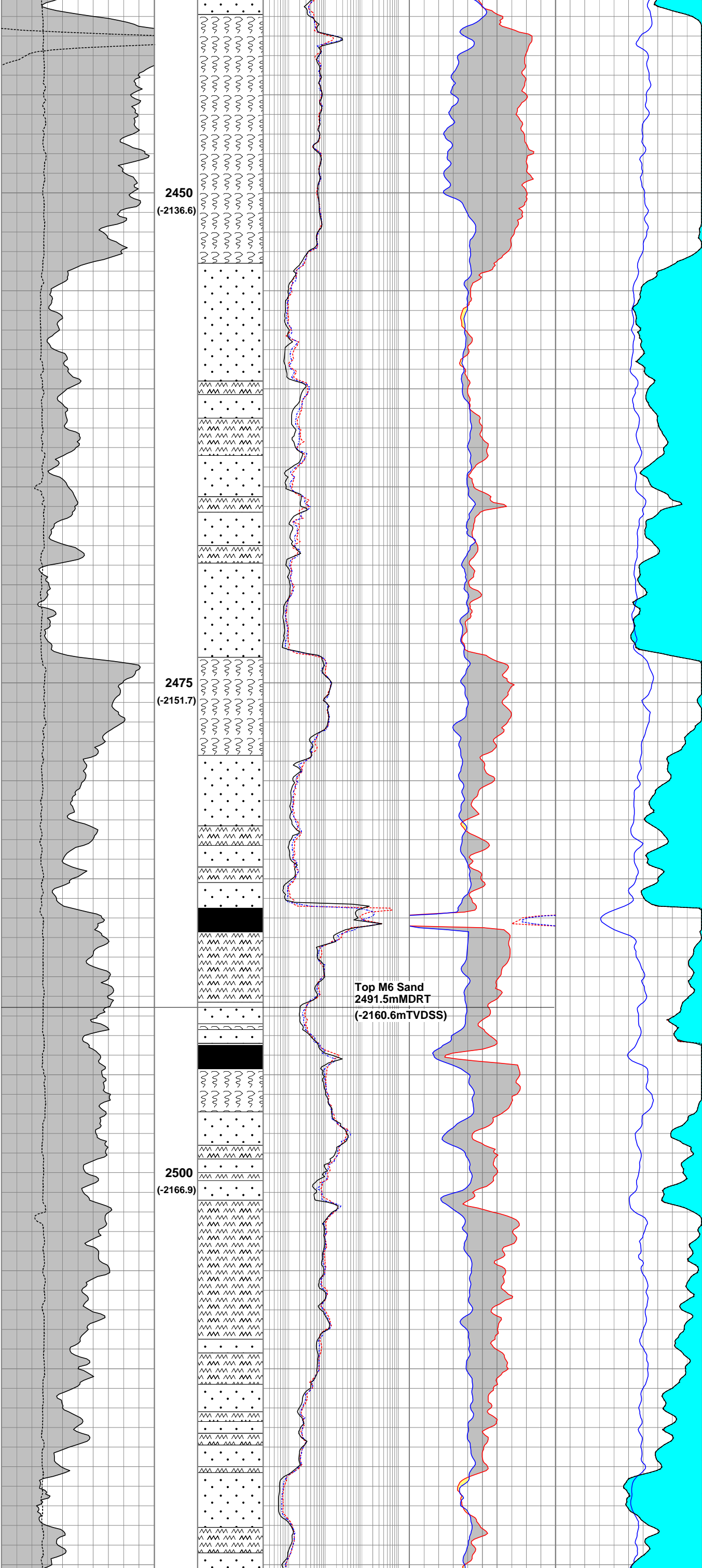




2335.48  
ANG 53  
DIR 105  
(-2066.9)

2340.0  
MW 9.7ppg  
FV 61sec/qt  
PV 24cP  
YP 49  
pH 8.8  
KCI 28





2444.0  
MW 9.8ppg  
FV 61sec/qt  
PV 17cP  
YP 59  
pH 9.5  
KCl 28

2451.33  
ANG 53  
DIR 105  
(-2137.3)

2525  
(-2182.2)

2550  
(-2197.4)

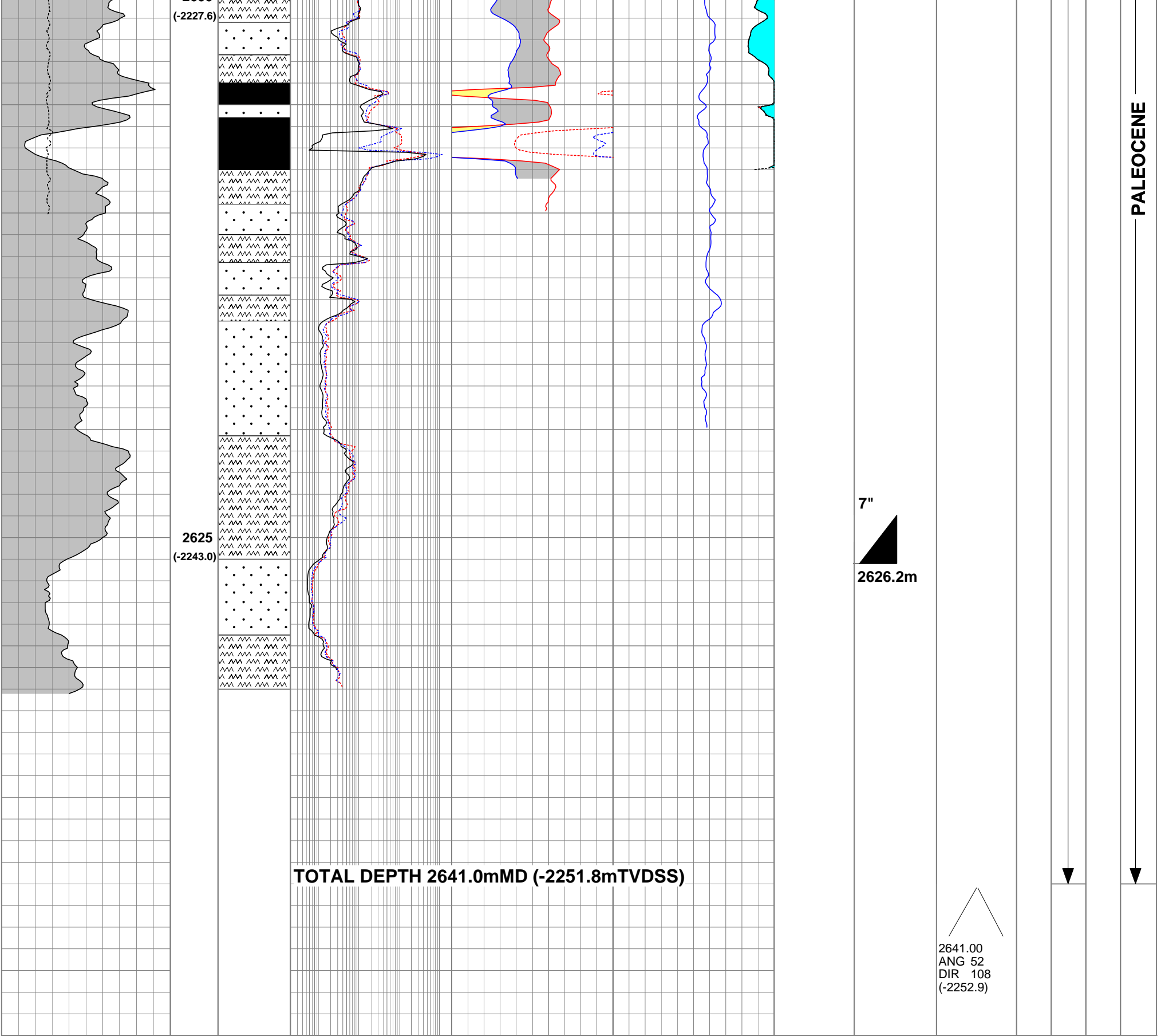
2575  
(-2212.5)

Top L2 Coal  
2590.2mMDRT  
(-2251.9mTVDSS)

2600

2567.49  
ANG 53  
DIR 106  
(-2207.9)

2577.0  
MW 9.9ppg  
FV 66sec/qt  
PV 27cP  
YP 54  
pH 8.8  
KCl 28



GR\_RAB Gamma Ray  
HORD Horizontal Hole Diameter  
RES\_BD Deep Button Resistivity  
RES\_BM Medium Button Resistivity  
RES\_BS Shallow Button Resistivity  
ROBB Bulk Density  
TNPH Thermal Neutron Porosity  
DTCO Sonic Transit Time  
PIGN Effective Porosity  
VUWA Bulk Volume Water

Bream B16  
To be put on Production  
January 2006