Geological Report

on

COPRC Mirror Lake P-20

Unit P, Section 20, Grid 65-00 126-45

Well Reached Total Depth on
Feb 19, 2014 @ 23:12

for

ConocoPhillips Canada Resources

Well License # : 1211. ID: 2081

Prepared For: Dave Oakley
ConocoPhillips Canada

Prepared By: Dave Lawrence / Gerry Pasveer
Black Gold Geotechnical Services Ltd.

Dave Lawrence / Gerry Pasveer

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The horizontal drilling target for this well is the Devonian Canol formation. The Canol is a siliceous organically-rich shale that is probably the source rock for the oil in the Norman Wells field (Kee Scarp Reef). The thickness of the Canol in this area makes it a good candidate to drill horizontally and then fracture hydraulically to obtain the hydrocarbons (hopefully light oil / condensate) which are trapped in the Canol due to the low permeability of the shale. Two vertical strat wells were drilled last winter and thoroughly investigated with cores and extensive logging programs to determine the best location in the Lower Canol to run the horizontal portion of this well.

The well was spudded on Jan 29, 2014 @ 00:01 hrs. While drilling 311mm surface hole, mud losses were encountered at approximently 110 meters, they remained manageable until 245 meters when we had to stop to build volume. We then drilled to 300 meters, stopped drilling and did a wiper trip. On the wiper trip we had to work tite hole and build more volume for heavy mud losses. We then drilled to 422m had to stop and build more volume before drilling to 450m, we stopped to build more volume and at that point it was decided to trip out of hole to run a cement plug to heal our losses. We drilled out the cement plug, were still losing volume but at a managable rate, so we drilled to a surface TD of 602 meters and started to trip out of hole. On the trip out, tite hole was encountered in a number of spots, we finally had stuck pipe at 138 meters. We backed off, leaving 2 nine inch drill collars and 7 six drill collars in the hole. We then rigged up fishing tools and recovered the fish. After another clean out trip, we ran and cemented our surface casing.

The intermediate vertical section of the hole went well to kick-off point @1720 meters. The build section of the well commenced and we the drilled to 1921 meters. Due to low build rates we had trip out at that point to dial up the motor and also change from a PDC bit to a tri-cone bit to acheive the necessary build rates in order to land our intermediate build section @ a measured depth of 2152 meters, 2013.99 meters TVD and at an approximent angle of 89 degrees. Landing point was 2.5 meters higher TVD than planned when our build rates just prior to the heel were too high and it was decided to land at that point. We had a half day delay to pull a damaged wear bushing. Our 177.8mm intermediate casing was then run and cemented.

The 156mm horizontal section of the well was drilled entirely within the programmed target window in the Lower Canol formation. At a measured depth of 3142m we had to trip for a suspected mud motor failure. At this point it was decided to trip out and lay down directional tools and then trip back in with just the bit and drill the last 10 meters to a final TD of 3152 meters on Feb 19, 2014 @ 23:12 hrs.

Well Summary

Storage Units: Metric

Well Information

Operator:	**ConocoPhillips Canada Resources**
Well Name:	**COPRC Mirror Lake P-20**
Location:	**Unit P, Section 20, Grid 65-00 126-45**
UWI:	300P206500126450
Pool:	Undefined
Field:	Mirror Lake
State / Province:	Northwest Terrortories
Country:	Canada
License Number:	1211, ID: 2081
Well Status:	**Cased**

Surface Co-ordinates

Hole Type: Horizontal **Fault Indicator:**

Latitude: 64 59 57.98372 N **Longitude:** 126 47 8.73410 W

UTM Northing: 7210027.78 **UTM Easting:** 604406.01

N / S :

E / W :

Int. Casing Co-ordinates

Latitude: 65 0 0.66 N **Longitude:** 126 47 26.42 W

N / S : 64.61m North (Northing 7210084.00)

E / W : 231.69m West of surface location (Easting 604172.250)

Bottom Hole Co-ordinates

Latitude: 65 0 7.76 N **Longitude:** 126 48 40.23 W

N / S : 314.62m North (Northing 7210300.15)

E / W : 1198.96m West of surface location (Easting 603197.09)

Elevations

		Reference:	Grd
Ground Elevation:	284.15	**Kelly Bushing to Ground:**	5.20
Kelly Bushing Elevation:	289.35	**Cut (-):**	
Casing Flange Elevation:	283.95	**Fill (+):**	0.85

Total Depth

	Measured Depth	**True Vertical Depth**
Total Depth Driller (Tally) :	3,152.00	2,024.98
Total Depth Driller (Strap or SLM):		
Total Depth Logger:		

Miscellaneous Depths

Plugback Depth:		**Water Depth Reference:**	
Sidetrack Depth:		**Water Depth:**	

Well Summary

Drilling Contractor:	Beaver Drilling Ltd.	**Spud Date:**	Jan 29, 2014	@ 00:01
Rig Release Date:		**Total Depth Date:**	Feb 19, 2014	@ 23:12

Cores

#	Formation	Interval	Cut	Recovered	%

Well Summary

Storage Units: Metric

Casing Summary

Casing Type	Casing Size	Landed Depth	Hole Size
Surface	244.5	602.00	311.0
Intermediate	177.8	2,152.00	222.0
Liner	114.3	3,148.70	156.0

Logging Summary

Company	Engineer	Total Depth (MD)	Logging tools
Schlumberger	Jeffrey Tatloc	2,152.00	AIT-TLD-HGNS-GR-BHC-TLD2-EMS-EMA-ECRD.
		3,142.00	USIT-CBL-GR (pressure pass)
			USIT-CBL-GR

Daily Drilling Summary

Storage Units: Metric

Date	Depth	Progress	Rotating Hours	Avg. P.R.	Daily Costs	Formation	Operational Status @ Report Time
Jan 28, 14	0.00		0.00	0.00		Surface	Rig up diverter
Jan 29, 14	58.00	58.00	5.75	10.09		Little Bear	Drilling 311mm surface hole
Jan 30, 14	301.00	243.00	13.25	18.34		Slater River	Wiper trip
Jan 31, 14	412.00	111.00	6.25	17.76		Slater River	Drilling 311mm hole.
Feb 01, 14	450.00	38.00	5.00	7.60		Slater River	Wait on cement
Feb 02, 14	521.00	71.00	7.75	9.16		Slater River	Drilling 311mm hole
Feb 03, 14	602.00	81.00	13.25	6.11		Slater River	Work tite pipe @ 161m
Feb 04, 14	602.00	0.00	0.00	0.00		Slater River	Wiper trip (RIH)
Feb 05, 14	602.00	0.00	0.00	0.00		Slater River	Run 244.5mm casing
Feb 06, 14	602.00	0.00	0.00	0.00		Slater River	Weld on casing bowl
Feb 07, 14	602.00	0.00	0.00	0.00		Slater River	Trip in hole
Feb 08, 14	1,180.00	578.00	19.75	29.27		Imperial	Drilling 222mm hole
Feb 09, 14	1,608.00	428.00	19.75	21.67		Imperial	Drilling 222mm hole
Feb 10, 14	1,902.00	294.00	20.50	14.34		Imperial	Rig Repair (pump#1)
Feb 11, 14	1,921.00	19.00	1.75	10.86		Upper Canol	Tripping (RIH)
Feb 12, 14	2,016.00	95.00	15.25	6.23		Lower Canol	Drilling 222mm build
Feb 13, 14	2,040.00	24.00	20.50	1.17		Lower Canol	Drilling 222mm build
Feb 14, 14	2,152.00	112.00	1.75	64.00		Lower Canol	Log with Schlumberger
Feb 15, 14	2,152.00	0.00	0.00	0.00		Lower Canol	Run 177.8mm casing
Feb 16, 14	2,152.00	0.00	0.00	0.00		Lower Canol	Tripping (RIH)
Feb 17, 14	2,470.00	318.00	15.75	20.19		Lower Canol	Drilling 156mm HZ hole
Feb 18, 14	2,980.00	510.00	19.75	25.82		Lower Canol	Drilling 156mm HZ hole
Feb 19, 14	3,142.00	162.00	6.25	25.92		Lower Canol	Clean floor before RIH
Feb 20, 14	3,152.00	10.00	0.50	20.00		Lower Canol	POOH to run liner
Feb 21, 14	3,152.00	0.00	0.00	0.00		Lower Canol	Safety meeting prior to cementing liner
Feb 22, 14	3,152.00	0.00	0.00	0.00		Lower Canol	Log with SChlumberger (USIT)
Feb 23, 14	3,152.00	0.00	0.00	0.00		Lower Canol	Install wellhead

Accumulated Daily Costs:

Casing Data Summary

Storage Units: Metric

Casing Type: Surface

Casing Size:	244.5	**Hole Size:**	311.0
Casing Landed @:	602.00	**Total Joints:**	47
Casing Date:	Feb 5, 2014 @ 07:45	**Plug Down Date:**	Feb 5, 2014 @ 13:57

# of Joints / Length / O.D. / Weight:
1 244.5mm float shoe
1 244.5mm jt of casing
1 244.5mm float shoe
46 jts of 244.5mm, J-55, LT&C csg.

Cementing Details:
Pump 5.0m3 H20, stop and pressure test lines to 21000kpa, bleed off pressure, pump 5.0m3 of 1300 kg/m3 mud push II pre-flush spacer. Then pump 40 T (37m3) (100% excess) of RFC 1740 cement with 0.2% anti-foam + 1.0% CaCl2 + 1.1% low temp fluid + 0.6% dispersant from 602 to 5.2m, drop plug and displace 23.8m3 of fresh water.

Remarks:
Bump plug 3500 kpa over final circ pressure of 6500 kpa at 13:57 hrs. Pressure test casing to 11,500kpa for 10 min (holding OK), bleed pressure, flush diverter and rig out cementers.

Casing Type: Intermediate

Casing Size:	177.8	**Hole Size:**	222.0
Casing Landed @:	2,152.00	**Total Joints:**	161
Casing Date:	Feb 15, 2014 @ 09:15	**Plug Down Date:**	Feb 15, 2014 @ 19:05

# of Joints / Length / O.D. / Weight:
1 177.8mm float shoe
1 jt 177.8mm csg
1 177.8mm float collar
160 jts of 177.8mm 38.69 kg/m, P-110, LT&C casing

Cementing Details:
Pump 8m3 of 1000kg/m3 CW8 preflush, stop & pressure test lines to 21000kpa, bleed off pressure, pump 8m3 of 1200kg/m3 MUDPUSH II pre-flush spacer, pump 19T (26.2m3) 35% excess Hi-lite 1400 lead with 0.2% anti-foam + 0.6% fluid loss + 0.6% low temp dispersant + 60L/T gas control agent + 0.3% antisettling from 1500 - 5.2 meters. Pump 16T (12.2m3) (35% excess) of 1900 kg/m3 conventional Class G tail cement with 0.6% fluid loss + 0.5% dispersant + 0.2% antifoam +0.2% retarder + 72 L/T Gas control agent from 2152 - 1500 meters. Drop plug and displace with 42.6m3 of invert. Bump plug 3500 kpa over final circ pressure of 9500 kpa at 19:05 hrs on Feb 15, 2014. Bleed off pressure and pressure test casing casing to 18500 kpa for 10 min. Bleed off pressure. Floats did not hold. Close valves on cementing head.

Remarks:

Casing Type: Liner

Casing Data Summary

Storage Units: Metric

Casing Size:	114.3	**Hole Size:**	156.0
Casing Landed @:	3,148.70	**Total Joints:**	101
Casing Date:	Feb 21, 2014 @ 03:30	**Plug Down Date:**	Feb 21, 2014 @ 09:05

# of Joints / Length / O.D. / Weight: 101 jts (1727.49m) of 114.3mm, 17.26 kg/m, P-110, LT&C liner

Cementing Details: Pump 8m3 of 1000kg/m3 CW8 preflush, pressure test lines to 35000 kpa (held), bleed off pressure, pump 5m3 of 1200 kg/m3 Mudpush II preflush spacer, pump 20T (14.7m3) (20% excess) of 1900kg/m3 Class G Tail cement with 0.6% fluid loss + 0.5% dispersant + 0.2% retarder + 72 L/T gas control agent from 3148.7m - 1727.49m MD. Drop dart and displace with 19.8m3 of fresh water. Bump plug 3500kpa over final circ pressure of 19200 kpa at 09:05 hrs. Bleed of pressure, floats held OK, pressure up to 28000 kpa and set liner top packer at 1727.49m MD, circ out preflush and 2m3 excess cement, displace hole to fresh water and rig out cementers.

Remarks:

Bit Record Table (IADC Grading System)

Storage Units: Metric

**** For more detailed Bit Information refer to Bit Record ****

Bit #	Make	Type	Size	Depth In	Depth Out	Made	Hours	Avg. P.R.	I.A.D.C. Bit Condition								
									I	O	MDC	Loc	B	G	ODC	RP1	RP2
1A	Smith	MI616	311.0	0.0	450.0	450.0	29.00	15.52	1	1	WT	G	X	I	NO	HP	
2A	Reed	M4685	311.0	450.0	602.0	152.0	21.00	7.24	1	2	WT	G	E	I	NO	TD	
1	Ulterra	U513	222.0	602.0	1,921.0	1,319.0	62.25	21.19	1	5	BT	G	X	I	CT	BHA	
2	Smith	FHI18B	222.0	1,921.0	2,152.0	231.0	30.25	7.64	2	3	WT	G	1	1	NO	TD	
3	Smith	MS1613U	156.0	2,152.0	3,142.0	990.0	36.50	27.12	1	1	WT	G	X	I	NO	DMF	
3RR	Smith	MS1613U	156.0	3,142.0	3,152.0	10.0	0.50	20.00	1	1	WT	G	X	I	NO	TD	

Total Rotating Hours: 179.50

Wireline Logging Summary

Storage Units: Metric

Logging Suite Number: 1
Wireline Logging Company: Schlumberger
District: Grande Prairie
Witness: Lawrence / Pasveer

Engineer: Jeffrey Tatloc
Unit Number: 3139

Was Pressure Control Equipment Utilized: No
Was the Logging Job Mechanically Assisted: No

Maximum Deviation: 89.000 º
Hole Size: 222.0

Total Lost Time: 0.00
Loggers' Total Down Time: 0.00
Total Job Time (From Rig up to Rig down): 8.50

	Measured Depth	True Vertical Depth
Casing Depth Driller	602.00	601.89
Casing Depth Logger	602.00	601.89
Total Depth Driller (Tally)	2,152.00	2,014.18
Total Depth Driller (Strap or SLM)		

General Remarks: Logger arrived on location Feb 13, 2014 @ 20:00 hrs.

Logging Run #: 1
Date: Feb 14, 2014

Drilling Fluid Data

Drilling Fluid Type: Invert (Versaclean)
Fluid Density: 1010.0 **Viscosity:** 78 **pH:** **Fluid Loss:**

Mud Resistivity (Rm): @ º
Mud Resistivity (Rm) @ BHT: @ º
Mud Filtrate Resistivity (Rmf): @ º
Mud Cake Resistivity (Rmc): @ º

Maximum Temperature: 74.2 º
Source (Rmf):
Source (Rmc):

Logging Run Information

Date on Bottom: Feb 14, 2014
Total Depth Logger: 2,068.00 (MD) 2,001.44 (TVD)

Logging Tools: AIT-TLD-HGNS-GR-BHC-TLD2-EMS-EMA-ECRD.

Remarks:

Hole Conditions: Good, wiper trip to 1700 meters went well.

Wireline Logging Summary

Storage Units: Metric

Logging Suite Number: 2
Wireline Logging Company: Schlumberger
District: Grande Prairie
Witness: Dave Lawrence

Engineer: Jeffrey Tatloc
Unit Number: 3039

Was Pressure Control Equipment Utilized: No
Was the Logging Job Mechanically Assisted: No

Maximum Deviation: 89.000 º
Hole Size: 156.0

Total Lost Time: 0.00
Loggers' Total Down Time: 0.00
Total Job Time (From Rig up to Rig down): 0.00

	Measured Depth	True Vertical Depth
Casing Depth Driller	3,152.00	2,024.98
Casing Depth Logger		
Total Depth Driller (Tally)	3,142.00	2,024.96
Total Depth Driller (Strap or SLM)		

General Remarks: Ran 2 logging passes with the same tools (USIT-CBL-GR) 2nd under 7mpa pressure.

Logging Run #: 1
Date: Feb 22, 2014

Drilling Fluid Data

Drilling Fluid Type: Water
Fluid Density: 1000.0 **Viscosity:** 29 **pH:** **Fluid Loss:**

Mud Resistivity (Rm): @ º
Mud Resistivity (Rm) @ BHT: @ º **Maximum Temperature:** 74.0 º
Mud Filtrate Resistivity (Rmf): @ º **Source (Rmf):**
Mud Cake Resistivity (Rmc): @ º **Source (Rmc):**

Logging Run Information

Date on Bottom: Feb 22, 2014
Total Depth Logger: 1,690.00 (MD) 1,689.74 (TVD)

Logging Tools: USIT-CBL-GR

Remarks:

Hole Conditions: Cased

Wireline Logging Summary

Storage Units: Metric

Logging Run #: 2
Date: Feb 22, 2014

Drilling Fluid Data

Drilling Fluid Type: Water
Fluid Density: 1000.0 **Viscosity:** 29 **pH:** **Fluid Loss:**

Mud Resistivity (Rm): @ º
Mud Resistivity (Rm) @ BHT: @ º **Maximum Temperature:** 74.0 º
Mud Filtrate Resistivity (Rmf): @ º **Source (Rmf):**
Mud Cake Resistivity (Rmc): @ º **Source (Rmc):**

Logging Run Information

Date on Bottom: Feb 22, 2014
Total Depth Logger: 1,690.00 (MD) 1,689.74 (TVD)

Logging Tools: USIT-CBL-GR (pressure pass)

Remarks: Pressure 7 mpa

Hole Conditions: Cased

Deviation / Directional Survey Report

Directional Drilling Company: Beaver Drilling
Directional Drillers:
Measured While Drilling (MWD) Hands:
Survey Type: drift
Survey Mode: wireline
Survey Date: Jan 28, 2014
Survey Calculation Method: minimum curvature
Target Azimuth: 90.00 °
Dog Leg Severity Characteristic: 30.00

Survey Tie-In Information

Tie-In Co-Ordinates
Latitude:
Longitude:
N / S:
E / W:

Measured Depth	T.V.D.	Drift Angle (º)	Azimuth (º)	+N / -S Distance	+E / -W Distance	Vertical Section	DogLeg Severity

Kick-Off (Whipstock) Information

Kick-Off Co-Ordinates
Latitude:
Longitude:
N / S:
E / W:

Measured Depth	T.V.D.	Drift Angle (º)	Azimuth (º)	+N / -S Distance	+E / -W Distance	Vertical Section	DogLeg Severity
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00

Remarks:

Survey Points

Storage Units: Metric

Measured Depth	T.V.D.	Drift Angle (º)	Azimuth (º)	+N / -S Distance	+E / -W Distance	Vertical Section	DogLeg Severity
28.00	28.00	0.500					
56.00	56.00	0.600					
85.00	85.00	0.400					
131.00	131.00	0.300					
151.00	151.00	0.300					
188.00	188.00	0.200					
208.00	208.00	0.200					
244.00	244.00	0.200					
281.00	281.00	0.200					
300.00	300.00	0.200					
328.00	327.99	0.900					
355.00	354.99	1.300					
388.00	387.98	1.600					
412.00	411.97	2.000					
450.00	449.94	2.300					
467.00	466.93	0.400					
487.00	486.93	1.300					
514.00	513.92	1.500					
544.00	543.91	1.900					

Deviation / Directional Survey Report

Directional Drilling Company: Schlumberger
Directional Drillers: Rick Kinsella, George Grigore
Measured While Drilling (MWD) Hands: Dennis Cassie
Survey Type: magnetic
Survey Mode: MWD
Survey Date: Feb 6, 2014
Survey Calculation Method: minimum curvature
Target Azimuth: 284.77 °
Dog Leg Severity Characteristic: 30.00

Survey Tie-In Information

Tie-In Co-Ordinates
Latitude:
Longitude:
N / S:
E / W:

Measured Depth	T.V.D.	Drift Angle (º)	Azimuth (º)	+N / -S Distance	+E / -W Distance	Vertical Section	DogLeg Severity

Kick-Off (Whipstock) Information

Kick-Off Co-Ordinates
Latitude:
Longitude:
N / S:
E / W:

Measured Depth	T.V.D.	Drift Angle (º)	Azimuth (º)	+N / -S Distance	+E / -W Distance	Vertical Section	DogLeg Severity
0.00	0.00	0.000	0.00	0.00	0.00	0.00	0.00

Remarks: Last survey point is an extrapolation to TD.

Measured Depth	T.V.D.	Drift Angle (º)	Azimuth (º)	+N / -S Distance	+E / -W Distance	Vertical Section	DogLeg Severity
28.00	28.00	0.500	17.20	0.12	0.04	-0.01	0.54
56.00	56.00	0.600	17.20	0.37	0.12	-0.02	0.11
84.98	84.98	0.400	17.20	0.62	0.19	-0.03	0.21
131.00	131.00	0.300	17.20	0.88	0.27	-0.04	0.07
188.00	188.00	0.200	17.20	1.12	0.35	-0.05	0.05
244.00	244.00	0.200	17.20	1.31	0.40	-0.06	0.00
300.00	300.00	0.200	17.20	1.49	0.46	-0.07	0.00
412.00	411.97	2.000	17.20	3.55	1.10	-0.16	0.48
450.00	449.94	2.300	17.20	4.91	1.52	-0.22	0.24
467.00	466.94	0.400	17.20	5.29	1.64	-0.23	3.35
486.00	485.94	1.300	17.20	5.56	1.72	-0.25	1.42
544.00	543.91	1.900	17.20	7.11	2.20	-0.32	0.31
600.00	599.89	1.400	17.20	8.65	2.68	-0.38	0.27
608.40	608.29	1.600	17.20	8.86	2.74	-0.39	0.71
645.63	645.51	0.600	311.10	9.48	2.75	-0.24	1.18
683.60	683.48	0.900	318.00	9.84	2.40	0.19	0.25
721.66	721.53	0.900	317.90	10.28	2.00	0.69	0.00
759.75	759.62	0.900	254.40	10.42	1.51	1.20	0.75
797.80	797.66	0.700	282.40	10.39	1.00	1.69	0.34
835.87	835.73	0.400	326.90	10.55	0.70	2.02	0.39
873.90	873.76	0.400	355.60	10.80	0.61	2.16	0.16
912.00	911.86	0.800	20.40	11.18	0.70	2.18	0.37
988.00	987.85	0.700	19.50	12.11	1.04	2.09	0.04
1,045.10	1,044.94	1.500	14.84	13.16	1.34	2.06	0.42
1,083.10	1,082.93	1.280	27.45	14.02	1.67	1.96	0.30
1,121.00	1,120.82	1.590	29.26	14.86	2.12	1.74	0.25
1,159.00	1,158.81	1.100	38.20	15.60	2.60	1.46	0.42
1,197.00	1,196.80	0.900	31.80	16.14	2.99	1.23	0.18
1,235.00	1,234.80	0.700	28.10	16.60	3.25	1.09	0.16
1,273.00	1,272.80	1.100	150.40	16.49	3.54	0.78	1.25
1,311.00	1,310.79	1.000	101.40	16.11	4.05	0.19	0.69
1,349.50	1,349.29	1.200	349.90	16.44	4.31	0.03	1.42

1,387.50	1,387.28	1.400	15.40	17.28	4.36	0.19	0.48
1,425.50	1,425.27	0.400	0.10	17.86	4.48	0.22	0.80
1,463.50	1,463.27	0.620	1.66	18.19	4.49	0.30	0.17
1,501.50	1,501.27	0.880	5.67	18.69	4.52	0.39	0.21
1,539.50	1,539.27	0.900	135.50	18.77	4.76	0.18	1.27
1,577.50	1,577.26	0.700	120.30	18.44	5.17	-0.30	0.23
1,615.50	1,615.26	0.500	75.00	18.36	5.53	-0.67	0.39
1,654.00	1,653.76	1.000	54.80	18.60	5.97	-1.03	0.43
1,692.00	1,691.75	1.200	31.40	19.13	6.45	-1.36	0.38
1,711.00	1,710.74	1.800	359.80	19.60	6.55	-1.34	1.58
1,720.00	1,719.74	1.900	10.60	19.89	6.58	-1.29	1.21
1,730.00	1,729.73	1.600	353.80	20.19	6.59	-1.23	1.77
1,739.00	1,738.73	2.300	320.90	20.45	6.46	-1.04	4.31
1,749.00	1,748.72	3.710	313.14	20.83	6.10	-0.59	4.39
1,758.00	1,757.69	5.100	309.20	21.28	5.58	0.03	4.74
1,767.50	1,767.14	6.100	306.60	21.85	4.85	0.88	3.26
1,777.00	1,776.58	7.000	301.50	22.45	3.95	1.91	3.38
1,786.00	1,785.50	8.480	304.86	23.12	2.94	3.06	5.16
1,796.50	1,795.86	9.900	302.26	24.05	1.54	4.64	4.23
1,805.50	1,804.72	10.780	296.84	24.84	0.13	6.21	4.37
1,815.00	1,814.04	11.620	293.18	25.62	-1.54	8.02	3.47
1,824.50	1,823.32	12.900	289.66	26.35	-3.42	10.02	4.68
1,834.00	1,832.55	14.580	285.16	27.02	-5.57	12.28	6.28
1,843.50	1,841.71	16.220	285.66	27.69	-8.00	14.80	5.20
1,853.00	1,850.78	18.120	286.88	28.48	-10.70	17.60	6.11
1,862.50	1,859.76	20.000	286.20	29.36	-13.67	20.70	5.98
1,873.00	1,869.58	21.610	284.46	30.34	-17.27	24.43	4.93
1,881.50	1,877.42	23.700	283.00	31.12	-20.45	27.70	7.64
1,891.50	1,886.51	25.500	284.70	32.12	-24.49	31.87	5.80
1,901.00	1,895.03	27.000	282.34	33.10	-28.57	36.07	5.77
1,910.50	1,903.43	28.800	283.40	34.09	-32.91	40.51	5.90
1,920.50	1,912.10	30.900	281.10	35.14	-37.77	45.48	7.17
1,929.50	1,919.67	34.600	284.40	36.22	-42.51	50.34	13.69
1,939.00	1,927.34	37.700	282.90	37.54	-47.96	55.95	10.18
1,948.50	1,934.72	40.300	282.34	38.85	-53.79	61.92	8.29

1,958.00	1,941.85	42.500	282.34	40.19	-59.93	68.20	6.95
1,967.50	1,948.75	44.320	279.87	41.44	-66.34	74.71	7.86
1,977.00	1,955.43	46.310	280.45	42.64	-72.98	81.44	6.42
1,986.50	1,961.87	48.390	279.96	43.87	-79.86	88.41	6.67
1,996.00	1,968.03	50.690	277.67	44.98	-87.00	95.59	9.11
2,006.50	1,974.46	53.800	279.70	46.23	-95.21	103.85	10.00
2,015.00	1,979.27	57.300	277.60	47.29	-102.13	110.81	13.78
2,024.50	1,984.17	60.600	278.50	48.43	-110.19	118.90	10.70
2,034.00	1,988.57	64.200	278.50	49.67	-118.52	127.26	11.37
2,043.50	1,992.57	66.000	277.50	50.87	-127.05	135.82	6.37
2,053.00	1,996.30	67.700	277.00	51.97	-135.71	144.48	5.56
2,062.50	1,999.71	70.220	276.74	53.03	-144.52	153.26	7.99
2,072.00	2,002.73	72.780	276.88	54.10	-153.46	162.18	8.10
2,081.50	2,005.34	75.300	278.37	55.31	-162.51	171.24	9.15
2,091.00	2,007.54	77.910	276.74	56.53	-171.67	180.41	9.64
2,100.50	2,009.38	79.720	277.98	57.72	-180.92	189.65	6.89
2,110.00	2,010.91	81.800	277.50	58.98	-190.21	198.96	6.74
2,119.50	2,012.07	84.200	277.36	60.20	-199.56	208.31	7.59
2,131.00	2,013.06	85.900	277.90	61.72	-210.91	219.68	4.65
2,152.00	2,014.19	87.900	276.70	64.39	-231.71	240.47	3.33
2,171.00	2,014.87	88.000	279.90	67.13	-250.49	259.33	5.05
2,190.00	2,015.54	88.000	280.50	70.49	-269.18	278.26	0.95
2,209.00	2,016.12	88.500	281.10	74.05	-287.84	297.20	1.23
2,228.00	2,016.50	89.200	281.20	77.72	-306.48	316.16	1.12
2,247.00	2,016.75	89.300	281.50	81.46	-325.10	335.13	0.50
2,266.00	2,017.16	88.200	276.50	84.43	-343.86	354.02	8.08
2,285.00	2,017.58	89.300	281.00	87.32	-362.63	372.91	7.31
2,304.00	2,017.73	89.800	281.90	91.09	-381.25	391.87	1.63
2,323.00	2,017.76	90.000	281.90	95.01	-399.84	410.85	0.32
2,342.50	2,017.69	90.400	283.80	99.35	-418.85	430.34	2.99
2,361.50	2,017.51	90.700	284.40	103.98	-437.28	449.34	1.06
2,380.50	2,017.29	90.600	283.40	108.54	-455.72	468.33	1.59
2,399.50	2,017.29	89.400	283.60	112.98	-474.19	487.33	1.92
2,418.50	2,017.41	89.880	284.94	117.66	-492.61	506.33	2.25
2,437.50	2,017.50	89.600	285.90	122.71	-510.92	525.32	1.58

2,456.50	2,017.56	90.000	286.50	128.01	-529.17	544.32	1.14
2,475.50	2,017.56	90.000	285.40	133.23	-547.44	563.31	1.74
2,494.50	2,017.76	88.800	286.80	138.50	-565.69	582.31	2.91
2,514.00	2,018.34	87.800	286.80	144.13	-584.35	601.78	1.54
2,532.50	2,019.02	88.000	287.10	149.52	-602.03	620.26	0.58
2,552.00	2,019.68	88.100	287.00	155.24	-620.66	639.73	0.22
2,571.00	2,020.28	88.300	287.10	160.81	-638.82	658.71	0.35
2,589.50	2,020.70	89.100	285.40	165.98	-656.58	677.20	3.05
2,609.00	2,020.90	89.700	285.60	171.19	-675.37	696.69	0.97
2,628.00	2,020.99	89.800	287.00	176.53	-693.60	715.69	2.22
2,646.50	2,021.07	89.700	284.10	181.48	-711.42	734.18	4.71
2,665.50	2,021.12	90.000	286.70	186.53	-729.74	753.18	4.13
2,685.00	2,021.10	90.100	286.70	192.13	-748.42	772.67	0.15
2,703.50	2,021.15	89.600	286.70	197.45	-766.14	791.16	0.81
2,722.50	2,021.38	89.000	287.30	203.00	-784.30	810.14	1.34
2,741.50	2,021.73	88.900	284.90	208.27	-802.55	829.13	3.79
2,760.50	2,022.06	89.100	285.60	213.27	-820.88	848.13	1.15
2,779.50	2,022.33	89.300	286.40	218.50	-839.14	867.12	1.30
2,798.50	2,022.54	89.400	286.30	223.85	-857.37	886.11	0.22
2,818.00	2,022.69	89.700	286.60	229.37	-876.08	905.60	0.65
2,837.00	2,022.76	89.900	286.60	234.80	-894.28	924.59	0.32
2,856.00	2,022.79	89.900	284.70	239.93	-912.58	943.59	3.00
2,875.00	2,023.01	88.800	283.80	244.60	-930.99	962.59	2.24
2,894.00	2,023.37	89.000	285.50	249.41	-949.37	981.58	2.70
2,913.00	2,023.69	89.100	286.00	254.57	-967.65	1,000.58	0.81
2,932.00	2,023.99	89.100	285.60	259.74	-985.93	1,019.57	0.63
2,951.00	2,024.24	89.400	285.80	264.88	-1,004.22	1,038.57	0.57
2,970.00	2,024.44	89.400	283.30	269.65	-1,022.61	1,057.57	3.95
2,989.00	2,024.55	89.900	285.60	274.39	-1,041.01	1,076.56	3.72
3,008.00	2,024.62	89.700	284.50	279.33	-1,059.36	1,095.56	1.77
3,027.00	2,024.68	89.900	285.10	284.18	-1,077.73	1,114.56	1.00
3,046.00	2,024.75	89.700	284.30	289.00	-1,096.10	1,133.56	1.30
3,065.00	2,024.83	89.800	283.80	293.61	-1,114.54	1,152.56	0.81
3,085.00	2,024.89	89.900	284.90	298.57	-1,133.91	1,172.56	1.66
3,103.00	2,024.92	89.900	283.70	303.02	-1,151.35	1,190.56	2.00

3,152.00	2,025.00	89.900	283.70	314.62	-1,198.96	1,239.55	0.00

Drilling Fluid Summary

Storage Units: Metric

Drilling Fluid Type:	Gel Chem	**From:**	0	**To:**	600
Drilling Fluid Type:	Invert (Versaclean)	**From:**	600	**To:**	3,152

Work Schedule

Storage Units: Metric

Company: Black Gold Getechnical
Geologist: **Dave Lawrence / Gerry Pasveer**

Work Performed	**From:**	Jan 28, 2014	**To:**	Feb 20, 2014
Depths Logged	**From:**	0.0	**To:**	3,152.0

Remarks: Maintained NOV total gas detector for duration of well.
Stayed on location until Feb 23 for logging (USIT)

Formation Top Summary

Storage Units: Metric

Kelly Bushing Elevation: 289.35 **Casing Flange Elevation:** 283.95
Ground Elevation: 284.15

***** All Depths measured from Kelly Bushing Elevation *****

Group *Formation* Member	Prognosis (TVD)	Sample Top (MD)	Sample Top (TVD)	Log Top (MD)	Log Top (TVD)	Subsea	Thickness
Little Bear	28.00	43.00	43.00	36.50	36.50	252.85	164.00
Slater River	196.50	207.00	207.00	208.00	208.00	81.35	747.00
Artic Red	930.00	954.00	953.85	958.00	957.85	-668.50	152.00
Martin House	1083.00	1106.00	1105.82	1106.40	1106.22	-816.87	34.00
Imperial	1117.00	1140.00	1139.82	1139.00	1138.82	-849.47	762.70
Upper Canol	1903.00	1902.70	1896.52	1900.70	1894.75	-1605.40	33.10
Lower Canol	1928.50	1935.80	1924.75	1939.00	1927.33	-1637.98	
Heel	2012.50	2152.00	2014.18			-1724.83	
Toe	2022.50	3152.00	2024.98			-1735.63	

Kelly Bushing Elevation: 289.35 **Casing Flange Elevation:** 283.95
Ground Elevation: 284.15

All Depths Measured from Kelly Bushing Elevation

Group:
Formation: Little Bear
Member:
Boundary Type: conformable
Fault Type:

Era: mesozoic
Series:
Period: Cretaceous
Stage:
Age (Approx): Million years.

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	43.00	43.00	246.35	164.00
Log Top	36.50	36.50	252.85	

Evaluation:

The Little Bear consisted of SANDSTONE salt and pepper, upper fine grained, sub angular, moderate sorting, unconsolidated, quartz & chert, dark lithic grains, trace pyrite nodules, good intergranular porosity, no visible shows.

Conclusion:

Due to the lack of sample or gas shows, this sand is probably wet.

Group:
Formation: Slater River
Member:
Boundary Type: conformable
Fault Type:

Era: mesozoic
Series:
Period: Cretaceous
Stage:
Age (Approx): Million years.

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	207.00	207.00	82.35	747.00
Log Top	208.00	208.00	81.35	

Evaluation:

The Slater River consisted of SHALE medium gray, blocky, soft to moderately firm, slightly micromicaceous, sandy in part, poor trace carbonaceous matter, trace pyrite nodules, occasional gray brown shale, sideritic with minor Sandstone stringers, medium gray, very fine grained, well sorted, sub angular, clay cement, dark lithic grains, carbonaceous matter, tight, no show.

Conclusion:

Zone of little interest.

Kelly Bushing Elevation: 289.35 **Casing Flange Elevation:** 283.95
Ground Elevation: 284.15

All Depths Measured from Kelly Bushing Elevation

Group:
Formation: Artic Red
Member:
Boundary Type: conformable
Fault Type:

Era: mesozoic
Series:
Period: Cretaceous
Stage:
Age (Approx): Million years.

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	954.00	953.85	-664.50	152.00
Log Top	958.00	957.85	-668.50	

Evaluation:

The Artic Red consisted of SHALE: medium to dark gray, sub blocky, platy to fissile in part, moderately carbonaceous when darker gray, local micro laminations visible, micromicaceous in part, trace pyritic with occasional pyrite nodules, very minor siderite fragments, minor micro fractures visible.

Conclusion:

Zone of little interest.

Group:
Formation: Martin House
Member:
Boundary Type: conformable
Fault Type:

Era: mesozoic
Series:
Period: Cretaceous
Stage:
Age (Approx): Million years.

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	1106.00	1105.82	-816.47	34.00
Log Top	1106.40	1106.22	-816.87	

Evaluation:

The Martin House consisted predominately of SANDSTONE: off white to occasional gray green, minor salt and pepper in part, silt to very fine grained, sub angular, well sorted, quartzose, calcareous and clay cement, glauconitic, tight, no visible porosity or shows. With interbedded SHALE; medium to dark gray, sub blocky, platy to fissile in part, partly moderately carbonaceous, silty & sandy in part, locally glauconitic, micromicaceous in part. no shows.

Conclusion:

These sands are probably wet.

Formation Evaluations

Storage Units: Metric

Kelly Bushing Elevation: 289.35 **Casing Flange Elevation:** 283.95
Ground Elevation: 284.15

All Depths Measured from Kelly Bushing Elevation

Group:
Formation: Imperial
Member:
Boundary Type: disconformable
Fault Type:

Era: paleozoic
Series:
Period: Devonian
Stage:
Age (Approx): Million years.

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	1140.00	1139.82	-850.47	762.70
Log Top	1139.00	1138.82	-849.47	

Evaluation:

The Imperial formation can be separated into three distinct zones, an upper SHALE light to medium gray green, medium gray in part, blocky, slight waxy texture in part, poor trace calcite, slightly micromicaceous, soft to moderately firm, trace silty, trace sandy in part, trace sideritic. With minor Sandstone & Siltstone stringers.
The middle zone consisting of interbedded SILTSTONE light gray, calcareous & clay matrix, sandy, trace glauconite, occasionally grades to very fine grain sandstone in part, occasionally shaly, tight, no shows and SANDSTONE cream to very light gray, very fine grain, sub angular, well sorted, calcite & clay cement, silty, trace dark lithic grains, poor trace glauconite, grades to siltstone in part, trace carbonaceous specks, no visible porosity, no show with interbedded Shale as above. There on sand of particular interest from 1575-1582 meters, it was SANDSTONE cream to spotty tan, quartzose, upper very fine grained, sub angular, well sorted, calcareous, minor dark lithic grains, poor trace glauconitic, tight to poor intgr porosity 2%, spotty tan dead oil stain, pale yellow dry fluorescence, pale yellow very slow streaming cut fluorescence. This sand had a gas show of 500 units from a background of 65 units.
The lower Imperial consisted predominately of SHALE medium gray, dark gray in part, platy & subfissile, blocky in part, moderately firm, slightly micromicaceous, slightly calcareous, trace silty in part with a trace of minor Marlstone & Limestone stringers.

Conclusion:

The imperial should not produce any hydrocarbons, but the sand at 1575 meters should be looked at closely because of the gas show, however it did appear to be too tite for hydrocarbon production, at least from this well bore.

Kelly Bushing Elevation: 289.35 **Casing Flange Elevation:** 283.95
Ground Elevation: 284.15

All Depths Measured from Kelly Bushing Elevation

Group:
Formation: Upper Canol
Member:
Boundary Type: conformable
Fault Type:

Era: paleozoic
Series:
Period: Devonian
Stage:
Age (Approx): Million years.

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	1902.70	1896.52	-1607.17	33.10
Log Top	1900.70	1894.75	-1605.40	

Evaluation:

The Upper Canol consisted of SHALE: very dark gray, trace black, blocky, sub fissile, slightly micromicaceous, siliceous, calcareous in part, hard, brittle in part, carbonaceous, silty texture, trace pyritic with pyrite nodules, trace fossil casts (pellets?), spicules, with trace minor dark gray brown bituminous shale, soft, possibly appearance caused from bitumen damage.

Conclusion:

The Upper Canol is a siliceous organically rich shale and with horizontal drilling and modern formation fracturing technologies should produce hydrocarbons.

Group:
Formation: Lower Canol
Member:
Boundary Type: conformable
Fault Type:

Era: paleozoic
Series:
Period: Devonian
Stage:
Age (Approx): Million years.

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	1935.80	1924.75	-1635.40	
Log Top	1939.00	1927.33	-1637.98	

Evaluation:

The Lower Canol was the target formation and was drilled horizontally and consisted entirely of SHALE: dark gray to occasionally black, dark gray brown, blocky, commonly fissile to subfissile, occasional carbonaceous matter, firm to occasionally hard, commonly brittle, calcareous in part, siliceous, slightly micromicaceous in part, trace disseminated pyrite, occasional pyrite nodules, occasional thinly laminated pyrite, trace minor siderite fragments (nodules?), trace minor micro fractures usually infilled with calcite, no dry fluorescence with weak slow pale cloudy yellow cut. Some shale was dark gray brown, blocky, soft, bituminous. This bituminous shale is probably caused by bit damage.

Conclusion:

Once these organically rich siliceous shales are stimulated with hydraulic fracturing, hydrocarbons (gas with liquids) should be produced.

Spud on January 29th, 2014 at 00:01hrs
Samples from 0 to 20m caught previously when conductor hole was drilled.

20-30 SHALE: light to medium grey, blocky, slightly micromicaceous, silty in part, grades to shaley Siltstone in part, soft to moderately firm, trace carbonaceous material with 20% interbedded SANDSTONE light grey, very fine grained, sub angular, well sorted, clay matrix, minor dark lithic grained, no visible porosity, no show. 20% cement in sample.

30-40 SHALE: light to medium grey, blocky, slightly micromicaceous, silty in part, grades to shaley Siltstone in part, soft to moderately firm, trace carbonaceous material with interbedded SANDSTONE light grey, very fine grained, sub angular, well sorted, clay matrix, minor dark lithic grained, no visible porosity, no show. 10% cement in sample.

Little Bear Formation 43.00mMD, (43.00mTVD, 246.35mSS.)

40-50 SANDSTONE: salt and pepper, upper fine grained, sub angular, moderate sorted, unconsolidated, quartz and chert, dark lithic grains, trace pyrite nodules, good intergranular porosity, no visible show

50-60m SANDSTONE: very light grey, very fine grained, sub angular, well sorted, quartz and light color chert, clay matrix, occasional white kaolinitic, soft, friable, trace disseminated pyrite, trace dark lithic grained, poor to fair intergranular porosity, no visible show.

60-70 SHALE: medium grey, blocky, soft to firm, silty, grades to silty shale in part, slightly micromicaceous, minor carbonaceous material, trace disseminated pyrite, trace minor SANDSTONE stringers as above.

70-80 SHALE: medium grey, blocky, soft to firm, silty, grades to silty shale in part, slightly micromicaceous, minor carbonaceous material, trace pyrite nodules, trace minor SANDSTONE stringers as above.

80-90 SHALE: medium grey, blocky, soft to firm, silty, grades to silty shale in part, slightly micromicaceous, minor carbonaceous material, very pyritic with minor SANDSTONE stringers, salt and pepper, fine grained, sub angular, moderate sorted, clay matrix, minor calcareous, tight to poor intergranular porosity, no visible show.

90-100 SANDSTONE: predominantly light grey, salt and pepper in part, lower fine grained, sub angular, well sorted, clay matrix, dark lithic grains, trace carbonaceous material, trace pyrite, poor trace glauconitic, friable in part, poor intergranular porosity, no show with 40% Shale as above.

SAMPLE DESCRIPTIONS

100-110 SANDSTONE: predominantly light grey, salt and pepper in part, very fine grained, sub angular, well sorted, clay matrix, dark lithic grains, trace carbonaceous material, trace pyrite, poor trace glauconitic, friable in part, tight to trace poor intergranular porosity, no show with minor Shale as above.

110-120 SANDSTONE: as above with increasing Shale as above with SHALE light brown, grey brown, blocky, sideritic, occasionally silty , trace sandy, trace brown siderite fragments.

120-130 SHALE: light to medium grey, blocky, silty, slightly micromicaceous, grades to siltstone in part, trace pyritic, trace pyrite nodules with 40% SANDSTONE, light grey, lower very fine grained, sub angular, well sorted, clay cement, silty, shaley, trace dark lithic grains, trace pyritic, predominantly tight, no show

130-140 SANDSTONE: medium grey, lower very fine grained, sub angular, well sorted, clay cement, silty, shaley, trace dark lithic grains, trace pyritic, predominantly tight, no show with 10% SHALE laminations as above.

140-150 SANDSTONE: light grey, upper very fine grained, sub angular, well sorted, clay cement, silty, shaley, trace dark lithic grains, trace pyritic, pry filled worm burrows, predominantly tight, no show with 50% Shale as above.

150-160 SANDSTONE: light grey to salt and pepper, very fine grained, sub angular, well sorted, clay and calcareous cement, silty, shaley in part, trace dark lithic grains, trace glauconitic, trace pyritic, predominantly tight, no show with minor Shale as above.

160-170 SANDSTONE: light grey to salt and pepper, very fine grained, sub angular, well sorted, clay and trace calcareous cement, silty, shaley in part, trace dark lithic grains, trace glauconitic, pyritic, trace carbonaceous material, predominantly tight to poor intergranular porosity, no show with minor Shale as above.

170-180 SANDSTONE: as above, becoming increasing shaley, Shale increasing to 40%, medium grey, blocky, silty, sandy, trace carbonaceous specs.

180-190 SANDSTONE light grey to salt and pepper, upper very fine grained, sub angular, moderately well sorted, clay and trace calcareous cement, silty, shaley in part, trace dark lithic grains, trace glauconitic, pyritic, trace carbonaceous material, predominantly tight to poor intergranular porosity, no show with minor Shale as above.

190-200 SANDSTONE: light grey to salt and pepper, lower fine grained, sub angular, well sorted, clay matrix and trace calcareous cement, silty in part, slightly shaley in part, trace dark lithic grains, trace glauconitic, trace pyritic, trace carbonaceous material, minor mica flakes, predominantly tight to poor intergranular porosity, no show with minor Shale as above.

Slater River Formation 207.00mMD, (207.00mTVD, 82.35mSS.)

200-210 SANDSTONE: as above with SHALE increasing slightly.

210-220 SHALE: medium grey, blocky, moderately firm, slightly micromicaceous, trace silty, poor trace carbonaceous material, trace silty with minor Sandstone stringers as above.

220-230 SHALE: medium grey, blocky, moderately firm, slightly micromicaceous, trace silty, poor trace carbonaceous material, trace silty with minor Sandstone stringers as above.

230-240 SHALE: medium grey, blocky, moderately firm, slightly micromicaceous, trace sandy, poor trace carbonaceous material, poor trace glauconitic, trace silty, trace micro fracture infilled with calcite.

240-250 SHALE: medium grey, blocky, moderately firm, slightly micromicaceous, trace sandy, poor trace carbonaceous material, poor trace glauconitic, trace silty.

250-260 SHALE: medium grey, blocky, moderately firm, slightly micromicaceous, trace silty, poor trace carbonaceous material, trace pyrite nodules with minor Siltstone stringers, light grey, clay cement, dark lithic grains, tight, no show

260-270 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace silty, poor trace carbonaceous material, trace pyritic with minor Siltstone stringers, light grey, clay cement, dark lithic grains, tight, no show.

270-280 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, sandy in part, poor trace carbonaceous material, trace pyrite nodules, occasional grey brown shale, sideritic with minor Sandstone stringers, medium grey, very fine grained, well sorted, sub angular, clay cement, dark lithic grains, tight, no show.

280-290 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, sandy in part, poor trace carbonaceous material, trace pyrite nodules, occasional grey brown shale, sideritic with minor Sandstone stringers, medium grey, very fine grained, well sorted, sub angular, clay cement, dark lithic grains, carbonaceous material, tight, no show.

SAMPLE DESCRIPTIONS

290-300 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, sandy in part, poor trace carbonaceous material, trace pyrite nodules, trace sideritic in part.

300-310 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace sandy in part, trace silty, poor trace carbonaceous material, trace pyrite with minor Sandstone stringers light grey, upper very fine grained, sub angular, well sorted, clay matrix, slightly calcareous, dark lithic grains, poor trace glauconite, no visible porosity, no show.

310-320 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace sandy in part, trace silty, poor trace carbonaceous material, trace pyrite with minor Sandstone stringers light grey, upper very fine grained, sub angular, well sorted, clay matrix, slightly calcareous, dark lithic grains, poor trace glauconite, no visible porosity, no show.

320-330 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace sandy in part, trace silty, poor trace carbonaceous material, trace pyrite with minor Sandstone stringers light grey, upper very fine grained, sub angular, well sorted, clay matrix, slightly calcareous, dark lithic grains, poor trace glauconite, no visible porosity, no show.

330-340 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace sandy in part, trace silty, poor trace carbonaceous material, trace pyrite with minor Sandstone stringers as above.

340-350 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace sandy in part, trace silty, poor trace carbonaceous material, trace pyrite with minor Sandstone stringers as above.

350-360 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace sandy in part, trace silty, poor trace carbonaceous material, trace pyrite with minor Sandstone stringers as above.

360-370 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace sandy in part, trace silty, poor trace carbonaceous material, trace pyrite with minor Sandstone stringers as above.

POOR SAMPLE QUALITY FROM 300 to 400 METERS
DUE TO MUD LOSSES AND ABUNDANT LCM IN MUD.

370-380 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace sandy in part, trace silty, poor trace carbonaceous material, trace sideritic in part with trace siderite fragments, trace pyrite with minor Sandstone stringers as above.

SAMPLE DESCRIPTIONS

380-390 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace sandy in part, trace silty, poor trace carbonaceous material, trace sideritic in part with trace siderite fragments, trace pyrite with minor Sandstone stringers as above.

390-400 SHALE: medium grey, blocky, soft to firm, slightly micromicaceous, trace pyritic, trace carbonaceous material, minor Sandstone stringers as above.

400-410 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace pyritic, trace carbonaceous material, trace silty with minor Sandstone stringers as above.

410-420 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace pyritic, trace carbonaceous material, trace silty with 10% Sandstone stringers, light to medium grey, very fine grained, sub angular, well sorted, clay matrix and calcareous cement in part, silty, grades to sandy siltstone in part, tight, no shows

420-430 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace pyritic, trace carbonaceous material, trace silty with 10% Sandstone stringers and laminations light to medium grey, very fine grained, sub angular, well sorted, clay matrix and calcareous cement in part, trace pyritic, silty, grades to sandy siltstone in part, tight, no shows

430-440 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace pyritic, trace carbonaceous material, trace silty.

440-450 SHALE: medium grey, blocky, soft to moderately firm, slightly micromicaceous, trace pyritic, trace carbonaceous material, trace silty.

450-460 SHALE: medium grey, blocky to sub blocky, micromicaceous, occasionally part carbs, silty in part, firm to part soft, trace pyritic, part finely laminated with SILTSTONE and occasional SANDSTONE; off white to light grey, salt and pepper, lower very fine to trace lower fine, lithic, trace glauconitic and carbonaceous grains, moderately to well consolidated, clay with trace calcareous cement, friable in part, very minor medium grey silty MDSTN preserved, no shows.

460-470 SHALE: medium grey, blocky to sub blocky, micromicaceous, occasionally part carbs, silty in part, firm to part soft, trace pyritic, part finely laminated with SILTSTONE and occasional SANDSTONE; off white to light grey, salt and pepper, lower very fine to trace lower fine, lithic, trace glauconitic and carbonaceous grains, moderately to well consolidated, clay with trace calcareous cement, no shows.

SAMPLE DESCRIPTIONS

470-480 SHALE: medium grey, trace darker grey, blocky to sub blocky, micromicaceous, locally part silty, firm to part soft, trace nodules pyrite, occasional very fine SILTSTONE laminations, trace MDSTN, rare siderite fragments, argillaceous sample wash, tight, no shows.

480-490 SHALE: medium grey, blocky to sub blocky, part platy, micromicaceous, trace part carbs, silty in part, firm to soft, trace very fine micro laminations of SILTSTONE, light to medium grey, slightly salt and pepper, argillaceous, trace sideritic, moderate to well indurated, grading to very fine Sandstone in part, no shows.

490-500 SHALE: medium grey, blocky to sub blocky, part platy, micromicaceous, trace part carbs, silty in part, firm to soft, trace very fine micro laminations of SILTSTONE.

500-510 SHALE: medium grey, blocky, minor platy in part, slightly micromicaceous, trace silty, slightly carbonaceous with minor carbonaceous material, unidentifiable fossil fragments (casts?) poor trace pyritic with minor Siltstone laminations as above, occasionally sandy, grades to very fine grained Sandstone in part.

510-520 SHALE: as above, increasing arenaceous with depth, trace sideritic with occasional brown siderite fragments (nodules?) 3% Sandstone stringers, medium grey, very fine grained, sub angular, well sorted, clay matrix, trace calcareous, dark lithic grains, pyritic with pyrite nodules, trace glauconitic, silty, shaley in part, no visible porosity, no shows.

520-530 SHALE: medium grey, blocky, trace platy, slightly micromicaceous, trace silty in part, trace sandy in part, trace carbonaceous specs, trace sideritic with brown siderite fragments (nodules + laminations?) trace pyritic with occasional Sandstone and Siltstone stringers as above.

530-540 SHALE: medium grey, blocky, trace platy, slightly micromicaceous, trace carbonaceous material, pyrite nodules, trace sideritic, trace sandy and silty in part with minor Sandstone stringers, medium grey, very fine grained, sub angular, well sorted, clay cement, slightly calcareous, trace glauconitic, dark lithic grains, no visible porosity or shows.

540-550 SHALE: medium grey, blocky, trace platy, slightly micromicaceous, trace carbonaceous material, pyrite nodules, trace sideritic, trace sandy and silty in part with minor Sandstone stringers, medium grey, very fine grained, sub angular, well sorted, clay cement, slightly calcareous, trace glauconitic, dark lithic grains, no visible porosity or shows.

SAMPLE DESCRIPTIONS

550-560 SHALE: medium grey, blocky, trace platy, slightly micromicaceous, trace carbonaceous material, pyrite nodules, trace sideritic, trace Inoceramus, slightly sandy and silty in part with 5% Sandstone stringers, medium grey, very fine grained, sub angular, well sorted, clay cement, slightly calcareous, trace glauconitic, dark lithic grains, no visible porosity or shows.

560-570 SHALE: medium grey, blocky, minor platy, slightly micromicaceous, trace carbonaceous material, trace Inoceramus, trace pyritic, trace sandy and silty in part with minor Sandstone stringers, medium grey, very fine grained, sub angular, well sorted, clay cement, slightly calcareous, trace glauconitic, dark lithic grains, no visible porosity or shows.

570-580 SHALE: medium grey, becoming slightly darker with depth, blocky, increasing platy, slightly micromicaceous, trace carbonaceous material, poor trace pyritic, trace silty in part.

580-590 SHALE: medium to slightly darker grey, blocky, platy in part, slightly micromicaceous, trace carbonaceous material, trace Inoceramus, trace pyrite nodules, trace sandy and silty in part with minor Sandstone stringers as above.

590-602 SHALE: medium to part darker grey, blocky, platy in part, slightly micromicaceous, trace carbonaceous material, trace Inoceramus, trace pyrite nodules, trace sandy and silty in part with occasional Sandstone stringers as above.

Surface Casing Final total depth @ 602.0m reached on February 2nd 2014 at 19:48hrs
Drilled out through surface casing @ 602m on February 7th at 06:50 hrs.

602-610 SHALE: medium to dark grey, blocky, platy in part, slightly micromicaceous, trace carbonaceous material, trace Inoceramus, trace pyrite nodules, trace sandy and silty in part with Sandstone stringers as above with abundant cement in sample

610-620 SHALE: medium to dark grey, blocky, platy in part, slightly micromicaceous, slightly carbonaceous, slightly silty, trace sandy in part to minor SANDSTONE stringers, light to medium grey, lower fine grained, sub angular, well sorted, clay matrix, trace calcareous cement, occasional dark lithic grains, poor trace glauconitic, no visible porosity or show.

620-630 SHALE: medium to dark grey, blocky, platy in part, slightly micromicaceous, slightly carbonaceous, slightly silty, trace sandy in part with minor SANDSTONE stringers, light to medium grey, lower fine grained, sub angular, well sorted, clay matrix, trace calcareous cement, occasional dark lithic grains, poor trace glauconitic, no visible porosity or show.

630-640 SHALE: medium to dark grey, blocky, platy in part, slightly micromicaceous, slightly carbonaceous, slightly silty, trace sandy in part with trace SANDSTONE stringers as above.

SAMPLE DESCRIPTIONS

640-650 SHALE: medium to dark grey, blocky, platy in part, micromicaceous, slightly carbonaceous, slightly silty, trace sandy in part.

650-660 SHALE: medium to dark grey, blocky, platy in part, micromicaceous, slightly carbonaceous, poor trace pyritic, slightly silty, trace sandy in part with minor Sandstone stringers, light to medium grey, very fine to fine grained as above.

660-670 SHALE: medium to dark grey, blocky, platy in part, micromicaceous, slightly carbonaceous, poor trace pyritic, slightly silty, trace sandy in part with minor Sandstone stringers, light to medium grey, very fine to fine grained as above.

670-680 SHALE: medium to dark grey, blocky, platy in part, micromicaceous, slightly carbonaceous, poor trace pyritic, slightly silty, trace sandy in part with minor Sandstone stringers, light to medium grey, very fine to fine grained as above.

680-690 SHALE: medium to dark grey, blocky, platy in part, micromicaceous, slightly carbonaceous, poor trace pyritic, slightly silty, trace sandy in part with minor Sandstone stringers, light to medium grey, very fine to fine grained as above.

690-700 SHALE: medium to dark grey, blocky, platy in part, micromicaceous, slightly carbonaceous, poor trace pyritic with occasional pyrite nodules, slightly silty, trace sandy in part with minor Sandstone stringers as above.

700-710 SHALE: medium to dark grey, blocky and platy, micromicaceous, slightly carbonaceous, poor trace pyritic with occasional pyrite nodules, slightly silty, trace sandy in part with minor Sandstone stringers, light to medium grey, lower fine grained, sub angular, well sorted, quartz and chert, clay matrix, slightly calcareous, trace siliceous, dark lithic grains, trace pyritic, shaley in part, no visible porosity or shows.

710-720 SHALE: medium to dark grey, blocky and platy, micromicaceous, slightly carbonaceous, poor trace pyritic with occasional pyrite nodules, slightly silty, trace sandy in part with minor Sandstone stringers, light to medium grey, lower fine grained, sub angular, well sorted, quartz and chert, clay matrix, slightly calcareous, trace siliceous, dark lithic grains, trace pyritic, shaley in part, no visible porosity or shows.

720-730 SHALE: medium to dark grey, platy, blocky in part, micromicaceous, slightly carbonaceous, soft to firm, poor trace pyritic with occasional pyrite nodules, slightly silty, trace sandy in part with trace Sandstone laminations as above.

730-740 SHALE: medium to dark grey, blocky and platy, slightly micromicaceous, slightly carbonaceous, soft to firm, poor trace pyritic with occasional pyrite nodules, slightly silty, trace sandy in part, poor trace plant remains with trace Sandstone laminations as above.

SAMPLE DESCRIPTIONS

740-750 SHALE: medium to dark grey, blocky and platy, slightly micromicaceous, slightly carbonaceous, soft to firm, poor trace pyritic with occasional pyrite nodules, slightly silty, trace sandy in part, with trace Sandstone laminations, light to medium grey, upper very fine grained, sub angular, well sorted, clay matrix, slightly calcareous, dark lithic grains, trace pyritic, trace glauconitic, shaley in part, tight, no shows.

750-760 SHALE: medium to dark grey, blocky and platy, slightly micromicaceous, slightly carbonaceous, soft to firm, poor trace pyritic with occasional pyrite nodules, slightly silty, trace sandy in part, with trace Sandstone laminations, light to medium grey, upper very fine grained, sub angular, well sorted, clay matrix, slightly calcareous, dark lithic grains, trace pyritic, trace glauconitic, shaley in part, tight, no shows.

760-770 SHALE: medium to dark grey, blocky and platy, slightly micromicaceous, slightly carbonaceous, soft to firm, poor trace pyritic with occasional pyrite nodules, slightly silty, trace sandy in part, with trace Sandstone laminations, medium grey, upper very fine grained, sub angular, well sorted, clay matrix, slightly calcareous, dark lithic grains, trace pyritic, trace glauconitic, shaley in part, tight, no shows.

770-780 SHALE: medium to dark grey, blocky and platy, slightly micromicaceous, slightly carbonaceous, soft to firm, poor trace pyritic with occasional pyrite nodules, slightly silty, trace sandy in part, with trace Sandstone laminations, medium grey, lower very fine grained, sub angular, well sorted, clay matrix, slightly calcareous, dark lithic grains, trace pyritic, trace glauconitic, shaley in part, tight, no shows.

780-790 SHALE: medium to dark grey, blocky and platy, slightly micromicaceous, slightly carbonaceous, soft to moderately firm, poor trace pyritic with occasional pyrite nodules, slightly silty, trace sandy in part, with minor Sandstone laminations, medium grey, lower very fine grained, sub angular, well sorted, clay matrix, slightly calcareous, dark lithic grains, trace pyritic, trace glauconitic, shaley in part, tight, no shows.

790-800 SHALE: medium to dark grey, blocky and platy, slightly micromicaceous, slightly carbonaceous, soft to moderately firm, poor trace pyritic with occasional pyrite nodules, slightly silty, trace sandy in part, with minor Sandstone stringers, medium grey, lower very fine grained, sub angular, well sorted, clay matrix, slightly calcareous, dark lithic grains, trace pyritic, trace glauconitic, occasionally silty, grades to sandy siltstone in part, shaley in part, tight, no shows.

SAMPLE DESCRIPTIONS

800-810 SHALE: medium to dark grey, blocky and platy, slightly micromicaceous, slightly carbonaceous, soft to moderately firm, poor trace pyritic with occasional pyrite nodules, slightly silty, trace sandy in part, with Sandstone laminations decreasing.

810-820 SHALE: medium to dark grey, blocky and platy, slightly micromicaceous, slightly carbonaceous, soft to moderately firm, poor trace pyritic with occasional pyrite nodules, slightly silty in part, trace Inoceramus.

820-830 SHALE: medium to dark grey, blocky and platy, slightly micromicaceous, slightly carbonaceous, soft to moderately firm, poor trace pyritic with occasional pyrite nodules, slightly silty in part with trace Siltstone stringers, medium grey, clay cement, slightly shaley, trace sandy, tight, no shows.

830-840 SHALE: medium to dark grey, blocky and platy, slightly micromicaceous, slightly carbonaceous, soft to moderately firm, trace pyrite nodules, trace micro fractures infilled with pyrite with trace Siltstone stringers as above.

840-850 SHALE: medium to part dark grey, blocky to platy and fissile in part, part moderately carbonaceous, micromicaceous in part, satiny texture in part, trace silty, firm, trace hard to part soft, trace calcareous partings, trace local calcite healing micro fractures, very minor Siltstone stringers, tight, no shows.

850-860 SHALE: medium to part dark grey, blocky to platy and fissile in part, part moderately carbonaceous, micromicaceous in part, satiny texture in part, trace silty, firm, trace hard to part soft, trace calcareous partings, silt increase in calcite healing micro fractures, very minor Siltstone stringers, tight, no shows.

860-870 SHALE: medium to part dark grey, blocky to platy and fissile in part, part moderately carbonaceous, micromicaceous in part, satiny waxy texture in part, trace silty, firm, trace hard to part soft, occasional calcite healing micro fractures, very minor Siltstone stringers, tight, no shows.

870-880 SHALE: medium to part dark grey, blocky to platy and fissile in part, part moderately carbonaceous, micromicaceous in part, satiny waxy texture in part, trace silty, firm, trace hard to part soft, trace acicular calcite, occasional calcite healing micro fractures, very minor Siltstone stringers, tight, no shows.

880-890 SHALE: medium to part dark grey, blocky to platy and fissile in part, part moderately carbonaceous, micromicaceous in part, satiny texture in part, firm, trace hard to part soft, trace acicular calcite, minor Claystone, increase to common calcite healing micro fractures.

SAMPLE DESCRIPTIONS

890-900 SHALE: medium to part dark grey, blocky to platy and fissile in part, part moderately carbonaceous, micromicaceous in part, satiny texture in part, firm, trace hard to part soft, trace acicular calcite, increase to common calcite healing micro fractures.

900-910 SHALE: medium to part dark grey, blocky to platy and fissile in part, part moderately carbonaceous, micromicaceous in part, satiny texture in part, firm, trace hard, soft in part, minor grading to silty, trace acicular calcite, minor Claystone, common micro fractures, trace Bentonite stringers.

910-920 SHALE: medium to part dark grey, blocky to platy and fissile in part, part moderately carbonaceous, micromicaceous in part, satiny texture in part, firm, trace hard to part soft, minor grading silty, minor Claystone, trace acicular calcite, very minor micro fractures, very rare Bentonite.

920-930 SHALE: medium to part dark grey, blocky to platy and fissile in part, part moderately carbonaceous, micromicaceous in part, satiny texture in part, firm, trace hard, soft in part, very rare micro fractures, minor Claystone, very rare Bentonite.

930-940 SHALE: medium to dark grey, blocky to sub fissile in part, part moderately carbonaceous, slightly silty, occasionally micromicaceous, occasional very fine calcite healed micro fractures, very rare pyritic, occasional dark brown mica flakes.

940-954 SHALE: medium to dark grey, blocky, sub fissile in part, part moderately carbonaceous, slightly silty, part micromicaceous, occasional micro fractures infilled with calcite with occasional Bentonite, trace brown mica flakes, tight, no shows

Arctic Red 954.00mMD, (953.89mTVD, -664.54mSS.)

954-960 SHALE: medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous with darker grey, part micromicaceous, occasional micro fractures infilled with calcite.

960-970 SHALE: medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous with darker grey, part micromicaceous, very rarely glaucic, trace calcareous partings, occasional micro fractures healed with calcite.

970-980 SHALE: medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous when darker grey, part micromicaceous, trace pyritic, trace siderite fragments, moderate micro fractures healed with calcite.

SAMPLE DESCRIPTIONS

980-990 SHALE: medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous when darker grey, local micro laminations visible, part micromicaceous, trace nodules pyrite, trace pyritic, very minor siderite fragments, minor micro fractures visible.

990-1000 SHALE: medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous when darker grey, part micromicaceous, trace nodules pyrite, trace pyritic, very minor siderite fragments, minor micro fractures visible.

1000-1010 SHALE: medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous, micromicaceous in part, trace nodules pyrite, trace pyritic, very minor siderite fragments, trace micro fractures visible.

1010-1020 SHALE: medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous, micromicaceous in part, trace nodules pyrite, trace pyritic, very minor siderite fragments, trace micro fractures visible.

1020-1030 SHALE: medium with dark grey, sub blocky, platy, part carbonaceous and fissile where darker grey, micromicaceous in part, trace nodules pyrite, trace pyric.

1030-1040 SHALE: medium with dark grey, sub blocky, platy, part carbonaceous and fissile when darker grey, micromicaceous in part, trace nodules pyrite, trace pyritic.

1040-1050 SHALE: medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous, firm to soft, micromicaceous in part, trace nodules pyrite, trace pyritic, very minor siderite fragments.

1050-1060 SHALE: medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous, firm to soft, micromicaceous in part, trace nodules pyrite, very rarely pyritic.

1060-1070 SHALE: medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous, firm to soft, micromicaceous in part, trace sideritic, trace nodules pyrite, very rarely pyritic, very minor dark brown siderite fragments.

1070-1080 SHALE: medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous, firm to soft, micromicaceous in part, trace nodules pyrite, very rarely pyritic, very minor dark brown siderite fragments.

1080-1090 SHALE: medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous, firm to soft, trace sideritic, micromicaceous in part, trace nodules pyrite, very rarely pyritic, very minor dark brown siderite fragments.

1090-1100 SHALE: medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous, firm to soft, micromicaceous in part, trace dark brown siderite fragments.

Martin House 1106.00mMD, (1105.82mTVD, -816.47mSS.)

1100-1110 SHALE: medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous, firm to soft, trace sideritic, micromicaceous in part, trace dark brown siderite fragments.

1110-1120 SHALE; medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous, silty in part, micromicaceous in part, trace to locally common glauconitic, trace dark brown siderite fragments; SANDSTONE off white to trace light grey, slightly salt and pepper in part, silt to very fine grained, sub angular, very well sorted, quartzose, slight to moderate with trace very calcareous with clay cement, locally part to very glauconitic, occasionally part shaley, no visible porosity.

1120-1130 SHALE; medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous, silty in part, micromicaceous in part, trace to locally common glauconitic, trace dark brown siderite fragments; SANDSTONE off white to occasional grey grain, slightly salt and pepper in part, silt to very fine grained, sub angular, very well sorted, quartzose, slight with moderate and trace very calcareous with clay cement, occasional moderately glauconitic, occasionally partly shaley, no visible porosity

1130-1140 SANDSTONE: off white to occasional grey grain, slightly salt and pepper in part, silt to very fine grained, sub angular, very well sorted, quartzose, slight with moderate and trace very calcareous with clay cement, part glaucic, dense, tight, no visible porosity, SHALE; medium with dark grey, sub blocky, platy to fissile in part, part moderately carbonaceous, silty sandy in part, locally glauconitic, micromicaceous in part. no shows.

Imperial 1140.00mMD, (1139.81mTVD, -850.46mSS.)

1140-1150 SHALE: light to medium grey green, blocky and platy, slightly micromicaceous, slightly calcareous, trace pyritic, abundant Sandstone laminations as above.

1150-1160 SHALE: light to medium grey green, grey, blocky and platy, slightly micromicaceous, slightly calcareous, trace pyritic, abundant Sandstone laminations light grey, cream, quartz and light color chert, fine grained, sub angular, well sorted, calcareous, clay cement in part, glauconitic, sideritic in part, no visible porosity or show.

SAMPLE DESCRIPTIONS

1160-1170 SHALE: light to medium grey green, grey, blocky and platy, slightly micromicaceous, slightly calcareous, soft to moderately firm, trace pyritic, abundant Sandstone laminations light grey, cream, sparry yellow brown, quartz and light color chert, fine grained, sub angular, well sorted, calcareous, clay cement in part, glauconitic, sideritic in part, no visible porosity or show.

1170-1180 SHALE: light to medium grey green, grey, blocky and platy, slightly micromicaceous, slightly calcareous, soft to moderately firm, trace pyritic, abundant Sandstone laminations light grey, cream, sparry yellow brown, quartz and light color chert, very fine grained, sub angular, well sorted, calcareous, clay cement in part, glauconitic, sideritic in part, no visible porosity or show.

1180-1190 SHALE: medium grey, grey green in part, blocky and platy, slightly micromicaceous, slightly calcareous, soft to moderately firm, occasionally sandy, trace silty, trace pyritic, abundant Sandstone laminations light to medium grey, sparry yellow brown, quartz and light color chert, very fine grained, sub angular, well sorted, calcareous, clay cement in part, glauconitic, sideritic in part, no visible porosity or show.

1190-1200 SHALE: medium grey, grey green in part, blocky and platy, slightly micromicaceous, slightly calcareous, soft to moderately firm, occasionally sandy, trace silty, trace pyritic, abundant Sandstone laminations medium grey, quartz and light color chert, very fine grained, sub angular, well sorted, calcareous, clay cement in part, glauconitic, trace sideritic in part, no visible porosity or show.

1200-1210 SHALE: medium grey, grey green in part, blocky and platy, slightly micromicaceous, slightly calcareous, soft to moderately firm, occasionally sandy, trace silty, trace pyritic, abundant Sandstone laminations medium grey, quartz and light color chert, very fine grained, sub angular, well sorted, calcareous, clay cement in part, glauconitic, trace sideritic in part, no visible porosity or show.

1210-1220 SHALE: medium grey, grey green in part, blocky and platy, slightly micromicaceous, slightly calcareous, soft to moderately firm, occasionally sandy, trace silty, trace pyritic, trace Pelecyopods with abundant Sandstone laminations, grey, brown in part, grey green, fine grained, sub angular, well sorted, clay and calcareous cement, trace pyritic, trace glauconitic, sideritic in part, Ostracods, Gastropod, shaley in part, tight, no shows.

SAMPLE DESCRIPTIONS

1220-1230 SHALE: medium grey, grey green in part, blocky and platy, slightly micromicaceous, slightly calcareous, soft to moderately firm, occasionally sandy, trace silty, trace pyritic, trace Pelecyopods with abundant Sandstone laminations, light to medium grey, fine grained, sub angular, well sorted, clay and calcareous cement, trace pyritic, trace glauconitic, sideritic in part, shaley in part, tight, no shows.

1230-1240 SHALE: medium grey, slightly darker in part, grey green in part, blocky and platy, slightly micromicaceous, slightly calcareous, soft to moderately firm, occasionally sandy, trace silty, trace pyritic, trace Pelecyopods with abundant Sandstone laminations as above.

1240-1250 SHALE: medium grey, slightly darker in part, grey green in part, blocky and platy, slightly micromicaceous, slightly calcareous, soft to moderately firm, occasionally sandy, trace silty, trace pyritic, with minor Sandstone laminations as above.

1250-1260 SHALE: medium grey, slightly darker in part, grey green in part, blocky and platy, slightly micromicaceous, slightly calcareous, soft to moderately firm, occasionally sandy, trace silty, trace pyritic, with minor Sandstone laminations as above

1260-1270 SHALE: medium grey, blocky and platy, micromicaceous, slightly calcareous, occasionally sandy with 10% SANDSTONE stringers, light to medium grey, lower fine grained, sub angular, well sorted, calcareous and clay cement, trace dark lithic grains, silty, shaley in part, tight, no shows.

1270-1280 SHALE: medium grey, blocky and platy, micromicaceous, slightly calcareous, occasionally sandy with 20% SANDSTONE stringers, light to medium grey, lower fine grained, sub angular, well sorted, calcareous and clay cement, trace dark lithic grains, silty, shaley in part, unidentifiable fossil debris, tight, no shows.

1280-1290 SHALE: medium grey, blocky and platy, micromicaceous, slightly calcareous, occasionally sandy with 15% SANDSTONE stringers, light to medium grey, lower fine grained, sub angular, well sorted, calcareous and clay cement, trace dark lithic grains, silty, shaley in part, unidentifiable fossil debris, tight, no shows.

1290-1300 SHALE: medium grey, blocky and platy, micromicaceous, slightly calcareous, occasionally sandy with 10% SANDSTONE stringers, light to medium grey, lower fine grained, sub angular, well sorted, calcareous and clay cement, trace dark lithic grains, silty, shaley in part, unidentifiable fossil debris, tight, no shows.

SAMPLE DESCRIPTIONS

1300-1310 SHALE: medium grey, blocky and platy, micromicaceous, slightly calcareous, occasionally sandy with 10% SANDSTONE stringers, light to medium grey, lower fine grained, sub angular, well sorted, calcareous and clay cement, trace dark lithic grains, silty, shaley in part, unidentifiable fossil debris, tight, no shows.

1310-1320 SHALE: medium grey, blocky and platy, micromicaceous, slightly calcareous, trace sandy and silty in part, with 10% SANDSTONE stringers, light to medium grey, lower fine grained, sub angular, well sorted, calcareous and clay cement, trace dark lithic grains, silty, shaley in part, tight, no shows.

1320-1330 SHALE: medium grey, blocky and platy, micromicaceous, slightly calcareous, trace sandy and silty in part, with 40% SANDSTONE stringers, light to medium grey, very fine to lower fine grained, sub angular, well sorted, calcareous and clay cement, trace dark lithic grains, slightly sideritic, trace glauconitic, silty, shaley in part, tight, no shows.

1330-1340 SHALE: medium grey, blocky and platy, micromicaceous, slightly calcareous, trace sandy and silty in part, with 30% SANDSTONE stringers, light to medium grey, very fine to lower fine grained, sub angular, well sorted, calcareous and clay cement, trace dark lithic grains, slightly sideritic, trace glauconitic, silty, shaley in part, tight, no shows.

1340-1350 SHALE: medium grey, blocky and platy, micromicaceous, slightly calcareous, trace sandy and silty in part, with 40% SANDSTONE stringers, light to medium grey, very fine to lower fine grained, sub angular, well sorted, calcareous and clay cement, trace dark lithic grains, slightly sideritic, trace glauconitic, silty, shaley in part, tight, no shows.

1350-1360 SHALE: light to medium grey, blocky and platy, micromicaceous, slightly calcareous, trace carbonaceous material, trace sandy and silty in part, grades to shaley siltstone in part, with 10% SANDSTONE stringers as above.

1360-1370 SHALE: light to medium grey, blocky and platy, micromicaceous, slightly calcareous, trace carbonaceous material, trace sandy and silty in part, grades to shaley siltstone in part, with 10% SANDSTONE stringers as above.

1370-1380 SHALE: light to medium grey, blocky and platy, micromicaceous, slightly calcareous, trace carbonaceous material, trace sandy and silty in part, grades to shaley siltstone in part, with 30% SANDSTONE stringers, light to medium grey, very fine grained, sub angular, well sorted, calcareous and clay cement, silty, shaley in part, grades to sandy siltstone in part, trace dark lithic grains, trace glauconitic, no visible porosity, no show.

SAMPLE DESCRIPTIONS

1380-1390 SHALE: light to medium grey, part darker grey, blocky to platy, trace fissile, part micromicaceous, trace carbonaceous material, firm brittle to part soft, inter bedded with SANDSTONE, off white to medium grey green, slightly salt and pepper, silty to very fine grained, predominantly sub angular, trace dark lithic grains, occasionally slight to moderately glauconitic, clay cement, slightly to moderately calcareous, dense, tight, part grading to SILTSTONE, no shows.

1390-1400 SHALE: light to medium grey, part darker grey, blocky to platy, trace fissile, part micromicaceous, firm brittle to part soft, inter bedded with SANDSTONE, off white to medium grey green, slightly salt and pepper, silty to very fine grained, predominantly sub angular, trace dark lithic grains, occasionally slight to moderately glauconitic, very rare ferruginous, clay cement, slightly to moderately calcareous, dense, tight, part grading to SILTSTONE, no shows.

1400-1410 SHALE: light to medium grey, part darker grey, trace grey green, blocky to platy, trace fissile, part micromicaceous, firm brittle to part soft, inter bedded with SANDSTONE, off white to medium grey green, slightly salt and pepper, silty to very fine grained, predominantly sub angular, trace dark lithic grains, trace carbonaceous material, occasionally slight to moderately glauconitic, clay cement, slightly to moderately calcareous, dense, tight, part grading to SILTSTONE, no shows.

1410-1420 SANDSTONE: off white to grey green, slightly salt and pepper, silty to very fine grained, sub angular, occasional dark lithic grains, occasionally slight to moderately glauconitic, clay cement, slightly to moderately calcareous, dense, tight, trace micro fractures, SHALE; light to medium grey, part darker grey, blocky to platy, trace fissile, part micromicaceous, part silty sandy, firm brittle to part soft.

1420-1430 SANDSTONE: off white to grey green, slightly salt and pepper, silty to very fine grained, sub angular, occasional dark lithic grains, part slight to moderately glauconitic, clay cement, slightly to moderately calcareous, trace very calcareous, tight, SHALE; light to medium grey, part darker grey, blocky to platy, trace fissile, part micromicaceous, trace carbonaceous flakes, part silty sandy, firm brittle to part soft.

1430-1440 SANDSTONE: off white to grey green, slightly salt and pepper, silty to very fine grained, sub angular, occasional dark lithic grains, occasionally slight to moderately glauconitic, clay cement, slightly to moderately calcareous, trace very calcareous, dense, tight, no shows,

1440-1450 SILTSTONE: light grey, slightly salt and pepper, quartzose, clay with slight to trace very calcareous cement, trace carbonaceous flakes, occasionally grading to very fine Sandstone, glauconitic in part, tight, no shows, interbedded with SHALE; light to medium grey, sub blocky to platy, trace fissile, part micromicaceous, minor carbonaceous flakes, more commonly silty sandy.

SAMPLE DESCRIPTIONS

1450-1460 SILTSTONE: off white to light grey, slightly salt and pepper, quartzose, clay with slight to trace very calcareous cement, common scattered carbonaceous flakes, occasionally grading to very fine Sandstone, glauconitic in part, tight, no shows, interbedded with SHALE; light to medium grey, sub blocky to platy, trace fissile, part micromicaceous, minor carbonaceous flakes, more commonly silty sandy.

1460-1470 SILTSTONE: off white to light grey, trace buff white, slightly salt and pepper, quartzose, clay with slight to trace very calcareous cement, moderate to trace very common carbonaceous material, occasionally grading to very fine Sandstone, glauconitic in part, tight, no shows, interbedded with SHALE; light to medium grey, sub blocky to platy, trace fissile, part silty sandy, part micromicaceous, minor carbonaceous flakes, satiny texture in part.

1470-1480 SILTSTONE: off white to light grey, slightly salt and pepper, quartzose, clay with part calcareous cement, moderate to trace very common carbonaceous material, trace glauconitic, tight, interbedded with SHALE; light to medium grey, sub blocky to platy, trace fissile, satiny texture in part.

1480-1490 SILTSTONE: off white to light grey, slightly salt and pepper, quartzose, clay with trace local calcareous cement, moderate carbonaceous material, trace locally glauconitic, tight, trace grading to SANDSTONE; off white to light grey, slightly salt and pepper, very fine quartz grains, sub angular, clay trace calcareous cement, trace carbonaceous flakes, interbedded with SHALE; light to medium grey, sub blocky to platy, trace fissile, satiny texture in part.

1490-1500 SILTSTONE: off white to light grey, pale green grey, slightly salt and pepper, quartzose, clay with more common calcareous reaction, moderate carbonaceous material, part glauconitic, tight, grading to SANDSTONE; off white to light grey, pale green grey, trace buff white, slightly salt and pepper, lithic, very fine quartz grains, sub angular, clay with more common calcareous cement, minor SHALE, no shows.

1500-1510 SILTSTONE: off white to light grey, part pale green grey, slightly salt and pepper, quartzose, lithic, clay with slight with trace very calcareous reaction, moderate carbonaceous material, part moderately to trace very glauconitic, tight, grading in part to SANDSTONE; off white to light grey, pale green grey, trace buff white, slightly salt and pepper, lithic, silt to very fine quartz grains, sub angular, clay with increasing calcareous cement, sideritic, minor SHALE, no shows.

SAMPLE DESCRIPTIONS

1510-1520 SANDSTONE: off white to light grey, part pale green grey, trace buff white, slightly salt and pepper, lithic, silt to lower very fine quartz grains, sub angular, clay with slight and trace very calcareous cement, sideritic, argillaceous in part, minor carbonaceous flakes, glauconitic in part, firm to part hard, grading to SILTSTONE in part, minor silty SHALE.

1520-1530 SANDSTONE: off white to light grey, trace buff white, slightly salt and pepper, lithic, silt to lower very fine quartz grains, sub angular, clay with trace calcareous cement, sideritic, argillaceous in part, very fine carbonaceous material seen throughout, trace locally glauconitic, firm to part hard, grading in part to SILTSTONE, minor SHALE.

1530-1540 SANDSTONE: off white to light grey, slightly salt and pepper, lithic, silt to lower very fine quartz grains, sub angular, predominantly clay cement with very minor calcareous cement, argillaceous in part, very fine carbonaceous material, trace glauconitic, sideritic, firm to part hard, grading in part to SILTSTONE, minor SHALE stringers.

1540-1550 SANDSTONE: off white to light grey, slightly salt and pepper, lithic, silt to lower very fine quartz grains, sub angular, predominantly clay cement with very minor calcareous cement, argillaceous in part, sideritic, very fine carbonaceous material, trace glauconitic, firm to part hard, grading in part to SILTSTONE, minor SHALE stringers.

1550-1560 SANDSTONE: off white to light grey, slightly salt and pepper, lithic, silt to lower very fine quartz grains, sub angular, predominantly clay cement with occasional calcareous cement, argillaceous in part, sideritic, very fine carbonaceous material, trace glauconitic, firm to part hard, occasionally grading to SILTSTONE, minor SHALE stringers.

1560-1570 SILTSTONE: light to medium grey, clay cement, slightly calcareous in part, sandy and shaley in part, occasionally grades to silty very fine grained sandstone in part, occasional carbonaceous material, trace dark lithic grains, tight, no shows with minor Shale laminations, medium to dark grey, blocky and platy, slightly micromicaceous, silty in part, slightly carbonaceous.

1570-1580 SANDSTONE: cream to spotty tan, quartzose, upper very fine grained, sub angular, well sorted, calcareous, minor dark lithic grains, poor trace glauconitic, tight to poor intergranular porosity 2%, spotty tan dead oil stain, pale yellow dry fluorescence, pale yellow very slow streaming cut fluorescence, with Shale and Siltstone as above.

SAMPLE DESCRIPTIONS

1580-1590 SANDSTONE: as above with Siltstone as above with SHALE medium grey, blocky, platy in part, micro mica, occasionally silty, slightly carbonaceous.

1590-1600: SANDSTONE cream to spotty tan, quartzose, lower very fine grained, sub angular, well sorted, calcareous, minor dark lithic grains, trace glauconitic, no visible porosity, spotty tan dead oil stain, pale yellow dry fluorescence, pale yellow very slow streaming cut fluorescence, with interbed Shale and Siltstone as above.

1600-1610 SHALE: medium to slightly darker grey, blocky to sub platy, micromicaceous, occasionally silty, trace sideritic in part, minor carbonaceous specks, slightly sandy in part, with interbedded Siltstone and Sandstone as above.

1610-1620 SHALE: medium to slightly darker grey, blocky to sub platy, micromicaceous, occasionally silty, trace sideritic in part, minor carbonaceous specks, slightly sandy in part, with interbedded Siltstone light to medium grey, calcareous and clay cement, sandy, grades to very fine grained sandstone in part, slightly shaley, trace dark lithic grains, trace carbonaceous material, trace mica flakes, tight, no show with minor Sandstone as above.

1620-1630 SHALE: as above with Siltstone as above and occasional brown Siltstone, sideritic, slightly calcareous, sandy occasionally grades to very fine grained sandstone in part, occasionally shaley, tight, no show.

1630-1640 SHALE: medium grey, slightly darker grey in part, blocky, sub fissile in part, slightly micromicaceous, trace silty in part, trace pyrite nodules with interbedded Siltstone stringers as above.

1640-1650 SHALE: medium grey, slightly darker grey in part, platy and sub fissile, blocky in part, slightly micromicaceous, trace silty in part, trace pyrite nodules with interbedded Siltstone stringers as above.

1650-1660 SHALE: medium grey, slightly darker grey in part, platy and sub fissile, blocky in part, slightly micromicaceous, trace silty in part, trace minor carbonaceous material, trace minor siltstone stringers as above.

1660-1670 SHALE: medium grey, slightly darker grey in part, platy and sub fissile, blocky in part, slightly micromicaceous, trace silty in part, trace minor carbonaceous material, trace minor Siltstone stringers, medium grey, slightly calcareous and clay cement, trace dark lithic grains, shaley, tight, no shows.

1670-1680 SHALE: predominantly medium grey, slightly darker grey in part, platy and sub fissile, blocky in part, slightly micromicaceous, silty in part, trace minor carbonaceous material, trace minor Siltstone stringers as above.

SAMPLE DESCRIPTIONS

1680-1690 SHALE: predominantly medium grey, slightly darker grey in part, platy and sub fissile, blocky in part, slightly micromicaceous, silty in part, trace minor carbonaceous material, trace minor Siltstone stringers as above.

1690-1700 SHALE: predominantly medium grey, slightly darker grey in part, platy and sub fissile, blocky in part, slightly micromicaceous, silty in part, trace minor carbonaceous material, trace minor Siltstone stringers as above.

1700-1710 SHALE: predominantly medium grey, slightly darker grey in part, platy and sub fissile, blocky in part, slightly micromicaceous, silty in part, trace minor carbonaceous material, trace minor Limestone stringers, cream to buff, mudstone to wackestone, trace unidentifiable fossil fragments (Gastropod) dense, no shows.

1710-1720 SHALE: predominantly medium grey, slightly darker grey in part, platy and sub fissile, blocky in part, slightly micromicaceous, silty in part, trace minor carbonaceous material, trace minor Siltstone stringers as above.

1720-1730 SHALE: predominantly medium grey, slightly darker grey in part, platy and sub fissile, blocky in part, slightly micromicaceous, silty in part, trace minor carbonaceous material.

1730-1740 SHALE: predominantly medium grey, slightly darker grey in part, platy and sub fissile, blocky in part, slightly micromicaceous, silty in part, trace minor carbonaceous material.

1740-1750 SHALE: predominantly medium grey, slightly darker grey in part, platy and sub fissile, blocky in part, slightly micromicaceous, trace silty in part, trace minor carbonaceous material.

1750-1760 SHALE: predominantly medium grey, slightly darker grey in part, platy and sub fissile, blocky in part, slightly micromicaceous, trace silty in part, trace minor carbonaceous material.

1760-1770 SHALE: predominantly medium grey, trace minor darker grey in part, platy and sub fissile, slightly micromicaceous, trace silty in part, trace minor carbonaceous material.

1770-1780 SHALE: predominantly medium grey, trace minor darker grey in part, platy and sub fissile, trace blocky, slightly micromicaceous, trace silty in part, trace minor carbonaceous material.

SAMPLE DESCRIPTIONS

1780-1790 SHALE: medium grey to part darker grey, sub fissile to fissile, part platy, trace sub blocky, part micromicaceous, argillaceous, satiny waxy appearance, trace scattered very fine carbonaceous material, trace locally silty, sparse pinpoint disseminated pyrite, soft to part firm, very rare grading silty, common well ground cuttings.

1790-1800 SHALE: medium grey to part darker grey, sub fissile to fissile, part platy, trace sub blocky, satiny waxy appearance, part micromicaceous, argillaceous, trace scattered very fine carbonaceous material, sparse pinpoint disseminated pyrite, trace locally silty, soft to part firm, very rare grading silty.

1800-1810 SHALE: medium grey to part darker grey, sub fissile to fissile, part platy, trace sub blocky, part micromicaceous, satiny waxy appearance, argillaceous, sparse pinpoint disseminated pyrite, trace scattered very fine carbonaceous material, trace locally silty, soft to part firm, common well ground cuttings.

1810-1820 SHALE: medium grey to part darker grey, sub fissile to fissile, part platy, trace sub blocky, part micromicaceous, argillaceous, satiny appearance, sparse pinpoint disseminated pyrite, decreased amount to very minor scattered very fine carbonaceous material, soft to part firm.

1820-1830 SHALE: medium grey to trace darker grey, sub fissile to fissile, part sub blocky to platy, part micromicaceous, satiny appearance, argillaceous, slightly carbonaceous in part, trace pinpoint disseminated pyrite, trace local carbonaceous material, soft to part firm, common well ground cuttings.

1830-1840 SHALE: medium grey to trace darker grey, sub fissile to fissile, part sub blocky to platy, part micromicaceous, argillaceous, slightly carbonaceous in part, trace pinpoint disseminated pyrite, very minor grading silty, soft to part firm, common well ground cuttings.

1840-1850 SHALE: medium grey to trace darker grey, sub fissile to fissile, part sub blocky to platy, part micromicaceous, argillaceous, slightly carbonaceous in part, trace pinpoint disseminated pyrite, satiny appearance, very minor grading silty, soft to part firm, common well ground cuttings.

1850-1860 SHALE: medium grey to trace darker grey, sub fissile to fissile, part sub blocky to platy, part micromicaceous, argillaceous, slightly carbonaceous in part, locally common very fine LIMESTONE grains (very good calcareous reaction), trace pinpoint disseminated pyrite, satiny appearance, very minor grading silty, soft to part firm, common well ground cuttings.

1860-1867 SHALE: medium grey to trace darker grey, sub fissile to fissile, part sub blocky to platy, part micromicaceous, argillaceous, slightly carbonaceous in part, locally common very fine LIMESTONE grains (very good calcareous reaction), trace pinpoint disseminated pyrite, soft to part firm.

1867-1880 SHALE: brown black to black, minor medium brown, rare medium grey, predominantly carbs, micromicaceous in part, blocky to sub blocky to fissile in part, soft to firm, trace locally calcitic, trace calcite filled micro fractures, trace pyritic, common disseminated pinpoint pyrite, silty texture in part, trace silty micro laminations, no fluorescence, very slow weak pale halo cut.

1880-1890 SHALE: brown black to black, minor medium brown, predominantly carbs, blocky to sub blocky to fissile in part, firm brittle to part soft, trace calcite filled micro fractures, trace pyritic, silty texture in part, no fluorescence, very slow weak pale halo cut.

1890-1900 SHALE: very dark grey, blocky, sub fissile, slightly micromicaceous, siliceous, hard, brittle in part, carbonaceous, silty texture, pyritic with pyrite nodules, good trace spicule, trace small fracture infilled with calcite, shale occasionally brown and bituminous and soft (Bit Damage?), very slow weak pale yellow cloudy cut.

Upper Canol 1902.70mMD, (1896.54mTVD, -1607.19mSS.)

1900-1910 SHALE: very dark grey, blocky, sub fissile, slightly micromicaceous, siliceous, hard, brittle in part, carbonaceous, silty texture, trace pyritic, trace spicule, shale occasionally brown and bituminous (Bit Damage?), show as above.

1910-1920 SHALE: very dark grey, trace black, blocky, sub fissile, slightly micromicaceous, siliceous, becoming calcareous in part, hard, brittle in part, carbonaceous, silty texture, trace pyritic with pyrite nodules, trace fossil casts(pellets?), with trace minor dark grey brown bituminous shale as above, with show as above.

1920-1930 SHALE: dark grey to black, blocky, sub fissile, slightly micromicaceous, siliceous, calcareous in part, hard, brittle in part, carbonaceous, silty texture, trace pyritic with pyrite nodules, with show as above.

** Lower Canol 1935.80mMD, (1924.75mTVD, -1635.40mSS.)

1930-1940 SHALE: dark grey, occasionally grades to black, blocky, sub fissile in part, siliceous, hard, occasionally brittle, trace pyritic with occasional pyrite nods, slightly calcareous in part, pale yellow cloudy fluorescence in solvent, trace minor Limestone stringers, mottled grey white, argillaceous, dense.

1940-1950 SHALE: dark grey, occasionally grades to black, blocky, sub fissile in part, siliceous, hard, occasionally brittle, trace pyritic with occasional pyrite nods, slightly calcareous in part, brown soft bituminous shale in part, pale yellow cloudy fluorescence in solvent, increasing hydrocarbon odor, trace Limestone laminations as above.

SAMPLE DESCRIPTIONS

1950-1960 SHALE: very dark grey, brown black to black, moderate to very carbonaceous in part, siliceous cement, blocky to sub blocky, trace fissile, firm to hard angular chips, rare calcareous partings, trace pyritic banding, trace pyritized, pinpoint disseminated pyrite common, no fluorescence, with occasional SHALE grey brown, blocky, soft, bituminous, weak slow pale cloudy yellow cut.

1960-1970 SHALE: very dark grey, black, brown black, carbonaceous to less carbonaceous where more siliceous, siliceous with trace local weak calcareous cement, blocky to sub blocky, trace locally fissile, firm to hard, local very fine pyritic banding, pinpoint disseminated pyrite common, trace muddy shaley LIMESTONE stringers, no fluorescence, very slow weak cloudy pale yellow halo cut.

1970-1980 SHALE: very dark grey, black, part brown black, carbonaceous to moderately carbs, siliceous with trace local weak calcareous cement, blocky to sub blocky, shards in part, firm, very firm to hard, local very fine pyritic banding, pinpoint disseminated pyrite common, trace nodules pyrite, trace muddy shaley LIMESTONE stringers, no fluorescence, with occasional SHALE grey brown, blocky, soft, bituminous, weak slow pale cloudy yellow cut.

1980-1990 SHALE: very dark grey, black, part brown black, carbonaceous to moderately carbs, siliceous with trace local weak calcareous cement, blocky to sub blocky, shards in part, rubbly appearance common, firm, very firm to hard, local very fine pyritic banding, pinpoint disseminated pyrite common, more common nodules pyrite, trace muddy shaley LIMESTONE stringers, common mud additive OPTISEAL III visible in samples, with occasional SHALE grey brown, blocky, soft, bituminous, weak slow pale cloudy yellow cut.

1990-2000 SHALE: very dark grey, black, part brown black, carbonaceous to moderately carbs, siliceous with trace slight calcareous reaction, blocky to sub blocky, shards in part, rubbly appearance common, firm, very firm to hard, commonly brittle, pinpoint disseminated pyrite common, moderate nodules pyrite, no fluorescence, with occasional SHALE grey brown, blocky, soft, bituminous, weak slow pale cloudy yellow cut.

2000-2010 SHALE: dark grey to very dark grey, grades to black in part, blocky, sub fissile in part, carbonaceous, hard and siliceous, often brittle, increasing calcareous, pyritic, slightly micromicaceous, occasional grey brown Shale blocky soft, bituminous, pale yellow slow cloudy cut in part.

2010-2020 SHALE: dark grey to very dark grey, grades to black in part, blocky, sub fissile in part, hard, siliceous and calcareous, brittle in part, carbonaceous, pyritic, slightly micromicaceous, occasional grey brown Shale blocky soft, bituminous, pale yellow slow cloudy cut in part. Trace minor Limestone laminations medium to dark grey, mudstone, argillaceous, dense.

SAMPLE DESCRIPTIONS

2020-2030 SHALE: very dark grey, grades to black in part, blocky, slightly micromicaceous, carbonaceous, siliceous and calcareous, hard, brittle in part, trace pyritic, slightly silty texture, occasional grey brown bituminous shale, blocky, soft, slow pale yellow cloudy cut in solvent, weak hydrocarbon odor.

2030-2040 SHALE: very dark grey, grades to black in part, blocky, slightly micromicaceous, carbonaceous, siliceous and calcareous, hard, brittle in part, trace pyritic, slightly silty texture, occasional grey brown bituminous shale, blocky, soft, slow pale yellow cloudy cut in solvent, weak hydrocarbon odor.

2040-2050 SHALE: very dark grey, blocky, slightly micromicaceous, carbonaceous, siliceous and calcareous, hard, brittle in part, trace pyritic with trace pyrite nodules, silty texture in part, occasional grey brown bituminous shale, blocky, soft, slow pale yellow cloudy cut in solvent, weak hydrocarbon odor, trace micro fracture infilled with calcite.

2050-2060 SHALE: very dark grey, blocky, slightly micromicaceous, carbonaceous, siliceous and calcareous, hard, brittle in part, trace pyritic with increasing pyrite nodules, silty texture in part, occasional grey brown bituminous shale, blocky, soft, slow pale yellow cloudy cut in solvent, hydrocarbon odor.

2060-2070 SHALE: very dark grey, blocky, slightly micromicaceous, carbonaceous, siliceous and calcareous, hard, brittle in part, trace pyritic with pyrite nodules, silty texture in part, occasional grey brown bituminous shale, blocky, soft, slow pale yellow cloudy cut in solvent, hydrocarbon odor.

2070-2080 SHALE: very dark grey, black, part brown black, carbonaceous to moderately carbs, siliceous with part very slightly calcareous to trace moderately calcareous, blocky, rubbly, trace shards, silty appearance in part, firm, very firm to hard, commonly brittle, pinpoint disseminated pyrite common, trace nodules pyrite, with occasional SHALE grey brown, blocky, soft, bituminous, weak slow pale cloudy yellow cut.

2080-2090 SHALE: very dark grey, black, part brown black, carbonaceous to moderately carbs, siliceous with slightly to part moderately calcareous, blocky, rubbly, firm, very firm to hard, commonly brittle, pinpoint disseminated pyrite common, trace pyritic, minor SHALE grey brown, blocky, soft, bituminous, weak slow pale cloudy yellow cut.

2090-2100 SHALE: very dark grey, black, part brown black, carbonaceous to part moderately carbonaceous when more siliceous, with slightly to part moderately calcareous, blocky, rubbly, firm, very firm to hard, commonly brittle, pinpoint disseminated pyrite common, trace pyritic, very rare calcite healing micro fracture, minor SHALE grey brown, blocky, soft, bituminous, weak slow pale cloudy yellow cut.

SAMPLE DESCRIPTIONS

2100-2110 SHALE: very dark grey, black, part brown black, carbs, siliceous, locally slight to moderately calcareous, blocky, firm, very firm to hard, brittle, pinpoint disseminated pyrite common, trace pyritic, trace calcite healing micro fractures, minor SHALE grey brown, soft, bituminous, weak slow pale cloudy yellow cut.

2110-2120 SHALE: very dark grey, black, part brown black, carbs, siliceous, locally slight to moderately calcareous, blocky, firm, very firm to hard, brittle, pinpoint disseminated pyrite common, trace pyritic, very rare micro fractures, occasional SHALE grey brown, soft, bituminous, weak slow pale cloudy yellow cut.

2120-2130 SHALE: very dark grey, blocky, carbonaceous, siliceous and calcareous, hard, common brittle, sub fissile in part, slightly micromicaceous, trace pyritic, occasional Shale brown, bituminous, soft. Pale yellow slow cloudy cut in solvent, weak hydrocarbon odor, with trace minor Limestone laminations, mottled medium grey cream, mudstone, argillaceous, dense.

2130-2140 SHALE: very dark grey, blocky, carbonaceous, siliceous, calcareous decreasing, hard, common brittle, sub fissile in part, slightly micromicaceous, trace pyritic, occasional Shale brown, bituminous, soft. Pale yellow slow cloudy cut in solvent, hydrocarbon odor.

2140-2152 SHALE: very dark grey, blocky, carbonaceous, siliceous and calcareous, hard, common brittle, sub fissile in part, slightly micromicaceous, trace pyritic, occasional Shale brown, bituminous, soft. Pale yellow slow cloudy cut in solvent, weak hydrocarbon odor, with trace minor Limestone laminations, mottled medium grey cream, mudstone, argillaceous, dense.

ICP reached on February 13th, 2014. 09:05hrs.
Ext to: 2152.00mMD, (2013.99mTVD, -1724.64mSS, 240.52m VS)
64.61m North 231.69m West of Well Center

Grid N/E Y/X: N 7210084.220m, E 604172.260m
Lat with Long: N 65° 0' 0.7, W 126° 47' 26.41

SAMPLE DESCRIPTIONS

Drilled out through Intermediate casing on February 16th, 2014 at 11:05hrs

2152-2170 SHALE: very dark grey, grades to black in part, blocky, carbonaceous, siliceous and calcareous, moderately firm to occasionally hard, minor brittle, sub fissile in part, slightly micromicaceous, trace pyritic, occasional Shale brown, blocky, bituminous, soft. Pale yellow slow cloudy cut in solvent, weak hydrocarbon odor.

2170-2190 SHALE: very dark grey, grades to black in part, blocky, carbonaceous, siliceous and slightly decreasing calcareous, moderately firm to occasionally hard, occasionally brittle, sub fissile in part, slightly micromicaceous, trace pyritic, occasional Shale brown, blocky, bituminous, soft. Pale yellow slow cloudy cut in solvent, weak hydrocarbon odor.

2190-2210 SHALE: very dark grey, grades to black in part, blocky, carbonaceous, siliceous and slightly calcareous, moderately firm to occasionally hard, occasionally brittle, sub fissile in part, trace micromicaceous, pyritic with occasional pyrite nodules, with occasional Shale brown, blocky, bituminous, soft. Pale yellow slow cloudy cut in solvent.

2210-2230 SHALE: very dark grey to black, blocky, occasionally part sub fissile, part rubbly, carbonaceous, soft to moderately firm to occasionally hard, occasionally siliceous with part slightly calcareous, micromicaceous in part, trace disseminated pinpoint pyrite, trace nodular pyrite, very minor local very very fine pyritic laminations, occasional brown black SHALE, blocky, bituminous, soft; very weak slow pale cloudy yellow cut.

2230-2250 SHALE: very dark grey to black, blocky, occasionally part sub fissile, part rubbly, carbonaceous, soft to moderately firm to occasionally hard, occasionally siliceous with part slightly calcareous, micromicaceous in part, trace disseminated pinpoint pyrite, trace nodular pyrite, very minor local very very fine pyritic laminations, occasional brown black SHALE, blocky, bituminous, soft; very weak slow pale cloudy yellow cut.

2250-2060 SHALE: very dark grey to black, blocky, occasionally part sub fissile, carbonaceous, soft to moderately firm to occasionally hard, occasionally siliceous with trace part calcareous, micromicaceous in part, trace disseminated pinpoint pyrite, trace nodular pyrite, occasional brown black SHALE, blocky, bituminous, soft; very weak slow pale cloudy yellow cut.

SAMPLE DESCRIPTIONS

2260-2080 SHALE: very dark grey to black, blocky, trace part sub fissile to fissile, part rubbly, carbonaceous, soft to firm to occasionally hard, slight increase in occurring siliceous with more commonly slightly to moderately calcareous, micromicaceous in part, trace disseminated pinpoint pyrite, occasional nodular pyrite, trace very very fine pyritic laminations, occasional brown black SHALE, blocky, bituminous, soft; common Bit generated texture, very weak slow pale cloudy yellow cut.

2080-2300 SHALE: very dark grey to black, blocky, trace part sub fissile to fissile, part rubbly, carbonaceous, soft to firm to occasionally hard, slight increase in occurring siliceous with more commonly slightly to moderately calcareous, micromicaceous in part, trace disseminated pinpoint pyrite, occasional nodular pyrite, trace very very fine pyritic laminations, occasional brown black SHALE, blocky, bituminous, soft; common Bit generated texture, very weak slow pale cloudy yellow cut.

2300-2320 SHALE: very dark grey to black, blocky, trace part sub fissile to fissile, part rubbly, carbonaceous, soft to firm to occasionally hard, moderately siliceous with slight to part moderately calcareous, micromicaceous in part, trace disseminated pinpoint pyrite, occasional nodular pyrite, with occasional brown black SHALE, blocky, bituminous, soft to slightly firm; common BGT, very weak slow pale cloudy yellow cut.

2320-2340 SHALE: very dark grey to black, blocky, trace part sub fissile to fissile, part rubbly, carbonaceous, soft to firm to occasionally hard, moderately siliceous with moderately to part slightly calcareous, micromicaceous in part, occasional nodular pyrite, with occasional brown black SHALE, blocky, bituminous, soft; moderately common BGT, very weak slow pale cloudy yellow cut.

2340-2360 SHALE: very dark grey to black, blocky, trace shards, part rubbly, carbonaceous, firm to occasionally hard, part soft, part moderately siliceous with slight to moderately calcareous, micromicaceous in part, trace nodular pyrite, with occasional brown black SHALE, blocky, bituminous, soft to slightly firm; very weak slow pale cloudy yellow cut.

2360-2380 SHALE: very dark grey to black, blocky, part rubbly, carbonaceous, firm to occasionally hard, part soft, brittle in part, part trace to moderately siliceous with slight to part moderately calcareous, micromicaceous in part, trace pyritic laminations, minor nodular pyrite, trace pyritic fragments, pinpoint disseminated pyrite common, with occasional brown black SHALE, blocky, bituminous, soft to slightly firm; very weak slow pale cloudy yellow cut.

SAMPLE DESCRIPTIONS

2380-2400 SHALE: very dark grey to black, blocky, part rubbly, carbonaceous, firm to occasionally hard, part soft, brittle in part, part trace to moderately siliceous with slight to part moderately calcareous, micromicaceous in part, trace pyritized, occasional nodular pyrite, trace pyritic fragments, pinpoint disseminated pyrite common, with occasional brown black SHALE, blocky, bituminous, soft to slightly firm; very weak slow pale cloudy yellow cut.

2400-2420 SHALE: very dark grey to black, blocky, part rubbly, carbonaceous, soft to firm to occasionally hard, part trace to moderately siliceous with slight to trace very calcareous, micromicaceous in part, occasional LIMESTONE stringers, off white, part cream, wackestone, muddy, silty, shaley, part pyritic, with occasional brown black SHALE, blocky, bituminous, soft to slightly firm; common Bit generated texture, very weak slow pale cloudy yellow cut.

2420-2430 SHALE: very dark grey to black, blocky, part rubbly, carbonaceous, soft to firm to occasionally hard, part trace to moderately siliceous with slight to trace very calcareous, micromicaceous in part, occasional LIMESTONE stringers, off white, part cream, wackestone, silty, muddy, shaley, part pyritic, with occasional brown black SHALE, blocky, bituminous, soft to slightly firm; common Bit generated texture, very weak slow pale cloudy yellow cut.

2430-2450 SHALE: very dark grey to black, blocky, part rubbly, carbonaceous, soft to firm to occasionally hard, part trace to moderately siliceous with slight to trace very calcareous, micromicaceous in part, slightly pyritic, show as above. LIMESTONE stringers as above, but decreasing.

2450-2470 SHALE: very dark grey, grades to black, blocky, sub fissile, carbonaceous, common brittle, firm, siliceous, slightly calcareous, trace pyritic, slightly micromicaceous, trace pyrite laminations, pale yellow slow cloudy cut with minor LIMESTONE laminations, mottled grey cream, mudstone to wackestone, argillaceous, grades to marlstone in part, trace pyritic, no visible porosity.

2470-2490 SHALE: very dark grey, grades to black, blocky, sub fissile, carbonaceous, common brittle, firm, siliceous, slightly calcareous, trace pyritic with trace pyrite nodules, slightly micromicaceous, trace pyrite laminations, pale yellow slow cloudy cut with minor LIMESTONE laminations as before.

2490-2510 SHALE: very dark grey, grades to black, blocky, sub fissile, carbonaceous, common brittle, firm to hard, siliceous, calcareous cement decreasing, trace pyritic with trace pyrite nodules, slightly micromicaceous, pale yellow slow cloudy cut. No visible limestone laminations.

SAMPLE DESCRIPTIONS

2510-2530 SHALE: very dark grey, grades to black, blocky, sub fissile, carbonaceous, common brittle, firm to hard, siliceous, slightly calcareous, trace pyritic with trace pyrite nodules, slightly micromicaceous, pale yellow slow cloudy cut. No visible limestone laminations.

2530-2550 SHALE: very dark grey, grades to black, blocky, sub fissile, carbonaceous, common brittle, firm to hard, siliceous, very slightly calcareous, trace pyritic with trace pyrite nodules, slightly micromicaceous, pale yellow slow cloudy cut.

2550-2570 SHALE: very dark grey, grades to black, blocky, sub fissile, carbonaceous, common brittle, firm to hard, siliceous, very slightly calcareous, trace pyritic with trace pyrite nodules, trace pyrite laminations, slightly micromicaceous, pale yellow slow cloudy cut.

2570-2590 SHALE: very dark grey, grades to black, blocky, sub fissile, carbonaceous, common brittle, firm to hard, siliceous, very slightly calcareous, trace pyritic with trace pyrite nodules, trace pyrite laminations, slightly micromicaceous, pale yellow slow cloudy cut. Poor trace LIMESTONE laminations as before.

2590-2610 SHALE: very dark grey, grades to black, blocky, sub fissile, carbonaceous, common brittle, firm to hard, siliceous, very slightly calcareous, trace pyritic with trace pyrite nodules, trace pyrite laminations, slightly micromicaceous, pale yellow slow cloudy cut.

2610-2630 SHALE: very dark grey to black, blocky, sub fissile, carbonaceous, common brittle, firm to hard, siliceous, very slightly calcareous, trace pyritic with trace pyrite nodules, slightly micromicaceous, pale yellow slow cloudy cut. Trace minor brown siderite laminations and sideritic Claystone laminations.

2630-2650 SHALE: very dark grey to black, blocky, sub fissile, carbonaceous, common brittle, firm to hard, siliceous, slightly calcareous, pyritic with trace pyrite nodules, slightly micromicaceous, pale yellow slow cloudy cut. Trace minor brown siderite laminations and sideritic Claystone laminations.

2650-2660 SHALE: very dark grey to black, blocky, sub fissile, carbonaceous, brittle, firm to hard, siliceous, very slightly calcareous, trace pyritic with trace pyrite nodules, slightly micromicaceous, pale yellow slow cloudy cut.

2660-2680 SHALE: very dark grey to black, blocky, part rubbly, trace shards, carbonaceous, firm to occasionally hard, brittle, siliceous with slightly calcareous in part, micromicaceous in part, trace calcite healed micro fracture, moderate Bit generated texture, very weak slow pale cloudy yellow cut.

SAMPLE DESCRIPTIONS

2680-2700 SHALE: very dark grey to black, blocky, part rubbly, trace shards, carbonaceous, brittle, firm to occasionally hard, siliceous with slightly calcareous in part, micromicaceous in part, pinpoint disseminated pyrite common, trace locally pyritic, minor nodular pyrite, moderate Bit generated texture, very weak slow pale cloudy yellow cut.

2700-2720 SHALE: very dark grey to black, blocky, part rubbly, trace shards, carbonaceous, commonly brittle, firm to occasionally hard, siliceous with slightly calcareous in part, micromicaceous in part, pinpoint disseminated pyrite common, trace locally pyritic, minor nodular pyrite, very rare calcite healed fracture, moderate Bit generated texture, very weak slow pale cloudy yellow cut.

2720-2740 SHALE: very dark grey to black, blocky, part rubbly, trace shards, carbonaceous, commonly brittle, firm to occasionally hard, siliceous with slightly calcareous in part, micromicaceous in part, trace locally pyritic, very rare calcite healed fracture, very weak slow pale cloudy yellow cut.

2740-2760 SHALE: very dark grey to black, blocky, part rubbly, trace shards, carbonaceous, commonly brittle, firm to occasionally hard, siliceous with slightly calcareous in part, micromicaceous in part, more common nodular pyrite, trace locally pyritic, very weak slow pale cloudy yellow cut.

2760-2780 SHALE: very dark grey to black, blocky, part rubbly, trace shards, carbonaceous, commonly brittle, firm to occasionally hard, siliceous with slightly calcareous in part, micromicaceous in part, minor nodular pyrite, trace locally pyritic, trace pyritic very fine laminations, very weak slow pale cloudy yellow cut.

2780-2800 SHALE: very dark grey to black, blocky, carbonaceous, brittle, firm to occasionally hard, siliceous with slightly calcareous in part, micromicaceous in part, pinpoint disseminated pyrite, occasional nodular pyrite, trace locally pyritic, very weak slow pale cloudy yellow cut.

2800-2820 SHALE: very dark grey to black, blocky, sub blocky, trace shards, carbonaceous, brittle, firm to occasionally hard, siliceous with locally trace calcareous in part, micromicaceous in part, pinpoint disseminated pyrite, occasional nodular pyrite, trace pyritic, very weak slow pale cloudy yellow cut.

2820-2840 SHALE: very dark grey to black, blocky, sub blocky, trace shards, carbonaceous, brittle, firm to occasionally hard, siliceous with locally trace calcareous in part, micromicaceous in part, pinpoint disseminated pyrite, occasional nodular pyrite, trace pyritic, very weak slow pale cloudy yellow cut.

SAMPLE DESCRIPTIONS

2840-2860 SHALE: very dark grey to black, blocky, sub blocky, carbonaceous, brittle, firm to occasionally hard, trace moderately firm, siliceous with more commonly slightly calcareous, micromicaceous in part, pinpoint disseminated pyrite, very rare nodular pyrite, very weak slow pale cloudy yellow cut.

2860-2880 SHALE: very dark grey to black, blocky, sub blocky, trace shards, carbonaceous, brittle, firm to occasionally hard, trace moderately firm, siliceous with more commonly slightly calcareous, micromicaceous in part, pinpoint disseminated pyrite, very rare nodular pyrite, no visible fractures or pyritic laminations, very weak slow pale cloudy yellow cut.

2880-2900 SHALE: very dark grey to black, blocky, sub blocky, carbonaceous, brittle, firm to part hard, trace moderately firm, siliceous with more commonly slightly calcareous, micromicaceous in part, pinpoint disseminated pyrite, very rare nodular pyrite, no visible fractures or pyritic micro laminations, very weak slow pale cloudy yellow cut.

2900-2920 SHALE: very dark grey to black, blocky, occasional shards, carbonaceous, brittle, firm to part hard, trace moderately firm, siliceous with slightly calcareous, micromicaceous in part, pinpoint disseminated pyrite, trace nodular pyrite, trace locally pyritic, very weak slow pale cloudy yellow cut.

2920-2940 SHALE: very dark grey to black, blocky, carbonaceous, common brittle, firm to hard, siliceous, increasing calcareous, slightly micromicaceous, trace disseminated pyrite, trace nodular pyrite, very weak slow pale cloudy yellow cut. Trace Limestone stringers, grey white, mudstone, argillaceous, dense.

2940-2960 SHALE: very dark grey to black, blocky, carbonaceous, common brittle, firm to hard, siliceous and calcareous, slightly micromicaceous, trace disseminated pyrite, trace nodular pyrite, very weak slow pale cloudy yellow cut.

2960-2980 SHALE: very dark grey to black, blocky, carbonaceous, common brittle in part, firm to hard, siliceous and calcareous, slightly micromicaceous, trace disseminated pyrite, trace nodular pyrite, very weak slow pale cloudy yellow cut.

2980-3000 SHALE: very dark grey to black, blocky, carbonaceous, brittle, firm to hard, siliceous and slightly calcareous, slightly micromicaceous, pyritic, increasing nodular pyrite, very weak slow pale cloudy yellow cut.

3000-3020 SHALE: very dark grey to black, blocky, carbonaceous, common brittle, firm to hard, siliceous and slightly calcareous, slightly micromicaceous, pyritic with occasional nodular pyrite, very weak slow pale cloudy yellow cut.

SAMPLE DESCRIPTIONS

3020-3040 SHALE: very dark grey to black, blocky, carbonaceous, common brittle, firm to hard, siliceous and slightly calcareous, slightly micromicaceous, pyritic with occasional nodular pyrite, very weak slow pale cloudy yellow cut.

3040-3060 SHALE: very dark grey to black, blocky, carbonaceous, common brittle, firm to hard, siliceous and slightly calcareous, slightly micromicaceous, pyritic with occasional nodular pyrite, very weak slow pale cloudy yellow cut.

3060-3080 SHALE: very dark grey to black, blocky, carbonaceous, common brittle, firm to hard, siliceous and slightly calcareous, slightly micromicaceous, pyritic with occasional nodular pyrite, very weak slow pale cloudy yellow cut.

3080-3100 SHALE: very dark grey to black, blocky, carbonaceous, common brittle, firm to hard, siliceous and slightly calcareous, slightly micromicaceous, pyritic with occasional nodular pyrite, very weak slow pale cloudy yellow cut.

3100-3120 SHALE: very dark grey to black, blocky, carbonaceous, common brittle, firm to hard, siliceous, very slightly calcareous, slightly micromicaceous, trace pyritic with occasional nodular pyrite, very weak slow pale cloudy yellow cut.

3120-3130 SHALE: very dark grey to black, blocky, carbonaceous, common brittle, firm to hard, siliceous, very slightly calcareous, slightly micromicaceous, trace pyritic with occasional nodular pyrite, very weak slow pale cloudy yellow cut.

3130-3152 SHALE: very dark grey to black, blocky, carbonaceous, common brittle, firm to hard, siliceous, very slightly calcareous, slightly micromicaceous, trace pyritic with occasional nodular pyrite, very weak slow pale cloudy yellow cut.

Driller's TD on February 19th, 2014 at 23:12hrs

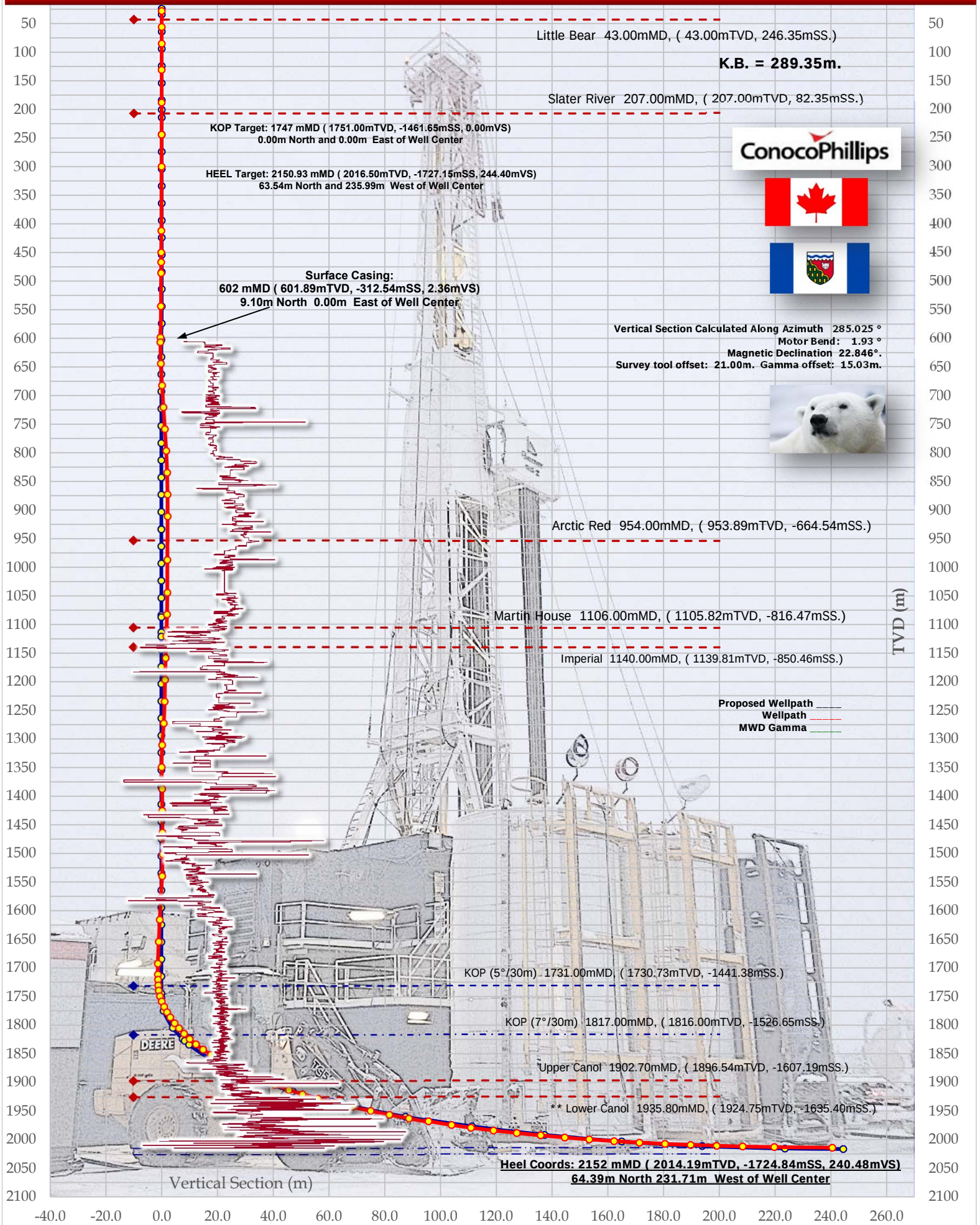
Extrapolated to:
3152 mMD (2025.00mTVD, to 1735.65mSS, 1239.53mVS)
314.62m North 1198.96m West of Well Center

Lat with Long: N 65° 0' 8.13", W 126° 48' 40.23"
Grid N/E Y/X: N 7210300.15 m, E 603197.09 m

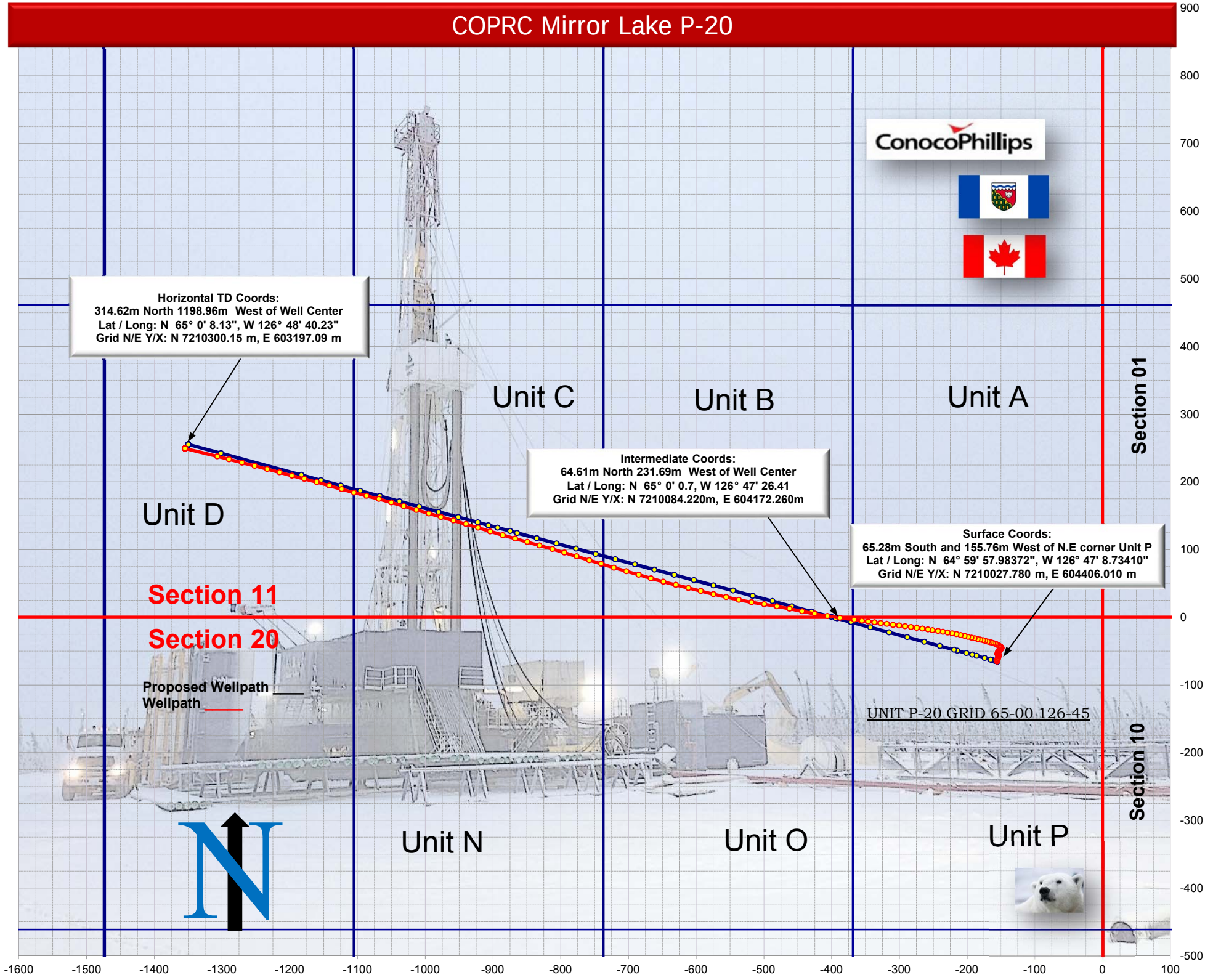
1000.00 meters have been drilled from the Heel at 2152.00m MD to FTD at 3152.00m MD

Spud on January 29th, 2014 at 00:01 hrs
Surface casing Drillout at 602m on February 7th at 06:50 hrs
Intermediate casing Drillout at 2152m on Feb 16, 2014 at 11:05 hrs

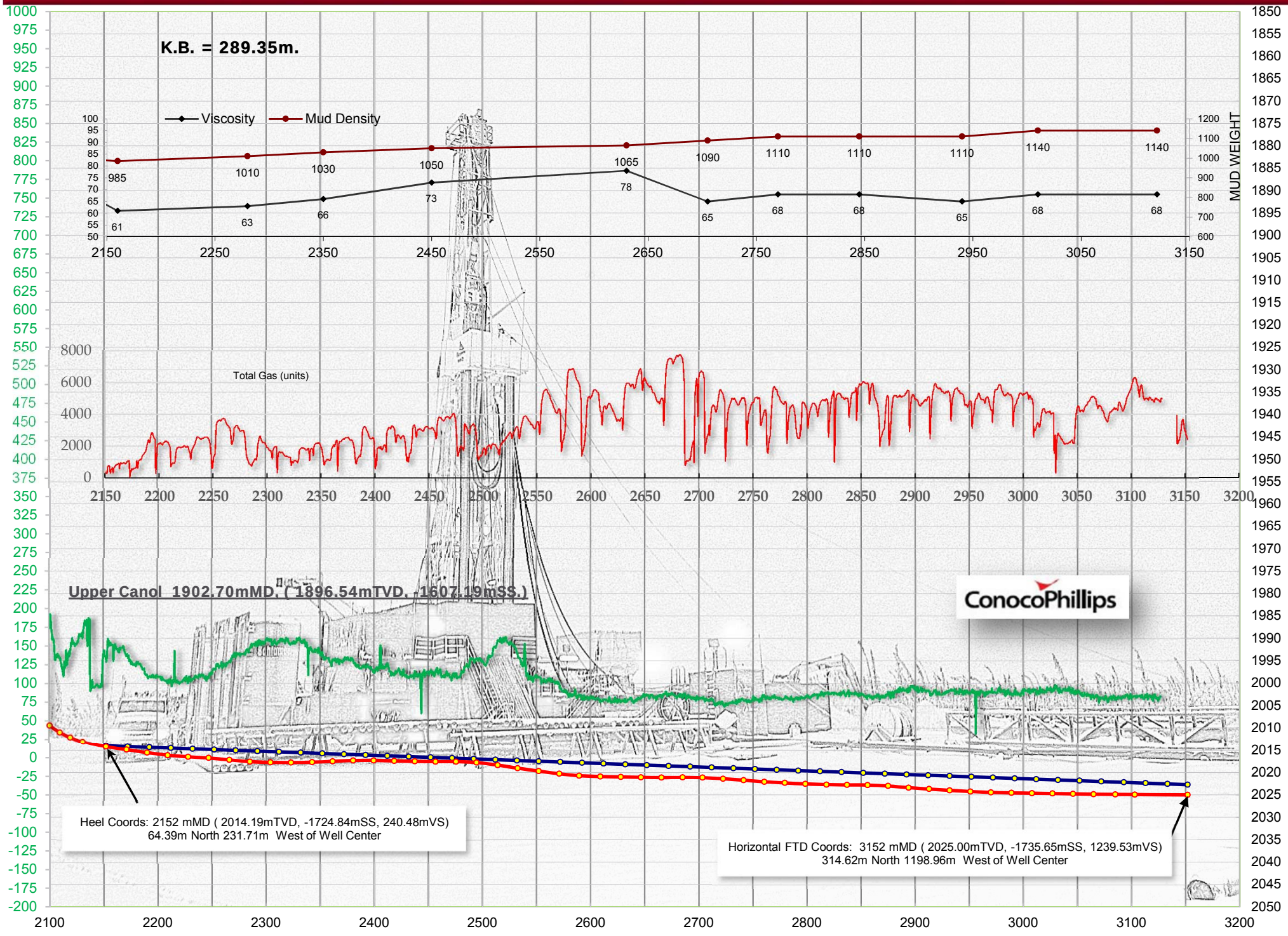
COPRC Mirror Lake P-20

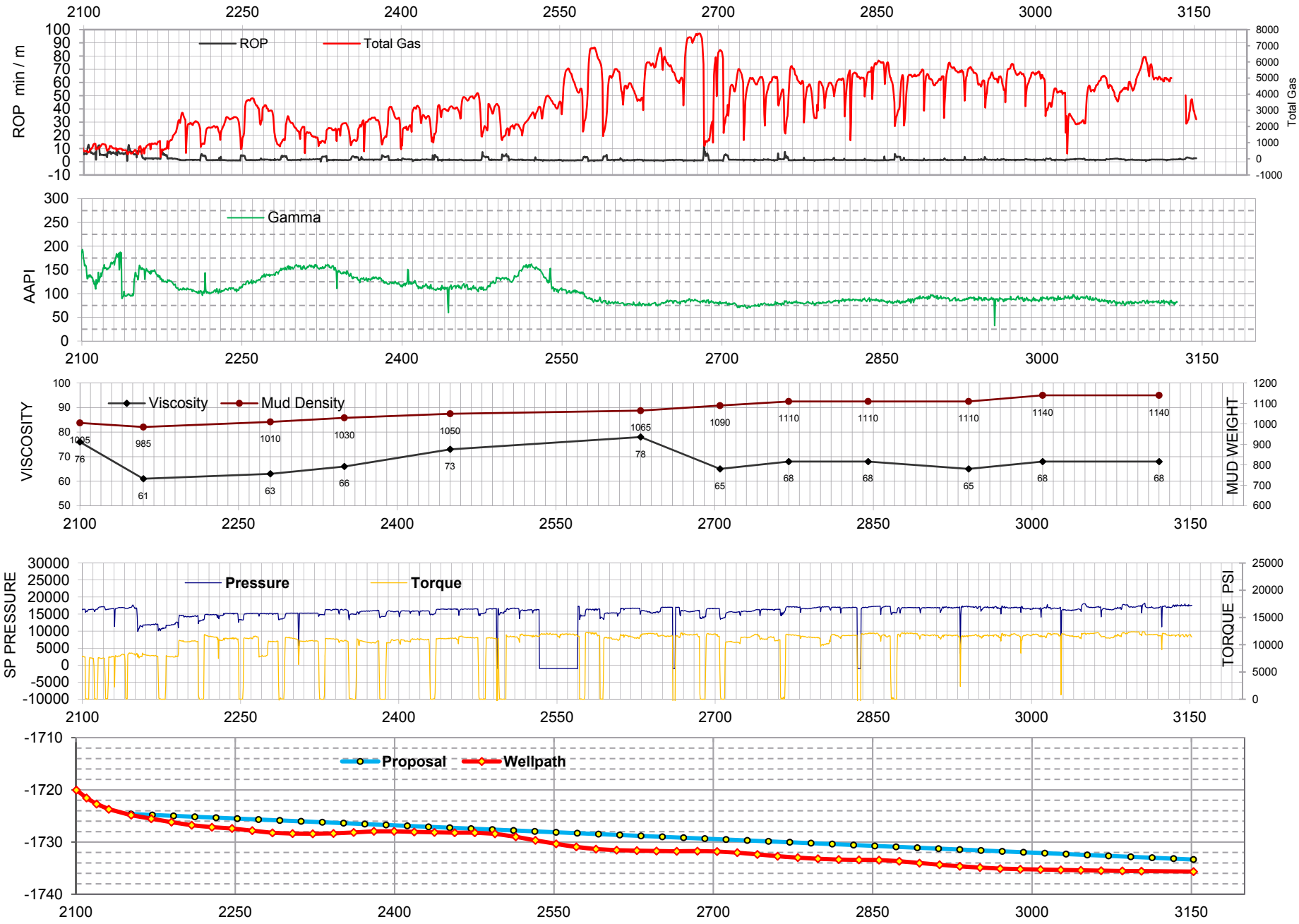


COPRC Mirror Lake P-20



COPRC Mirror Lake P-20




ROP min / m
ROP
Total Gas
Total Gas
AAPI
Gamma
VISCOSITY
Viscosity
Mud Density
MUD WEIGHT
SP PRESSURE
Pressure
Torque
TORQUE PSI
Proposal
Wellpath
2100
2250
2400
2550
2700
2850
3000
3150

ConocoPhillips

Scale 1:240 (5"=100') Metric
Measured Depth Log

Well Name:	COPRC MIRROR LAKE P-20
Location:	UWID: 300P206500126450 ; Surf. Loc: UNIT P-20 GRID 65-00 126-45
License Number:	EL 470, ID# 2081
Region:	Norman Wells
Spud Date:	Jan 29, 2014 00:01hrs
Drilling Completed:	Feb 13, 2014 09:05hrs
Surface Coordinates:	Lat / Long: N 64° 59' 57.98372", W 126° 47' 8.73410"
	Grid N/E Y/X: N 7210027.780 m, E 604406.010 m
Bottom Hole Coordinates:	64.61m North 231.69m West of Well Center
	Grid N/E Y/X: N 7210084.220m, E 604172.260m
Ground Elevation (m):	284.15
K.B. Elevation (m):	289.35
Logged Interval (m):	0 To: 2131
Total Depth (m):	2152
Formation:	Lower Canol Fm
Type of Drilling Fluid:	Gel Chem (Surface) Invert VersaClean C12 (Build; Lateral)

Printed by STRIP.LOG from WellSight Systems 1-800-447-1534 www.WellSight.com

OPERATOR

Company:	ConocoPhillips Canada
Address:	2100, 401- 9 Ave SW
	Calgary, Alberta
	T2P 2H7

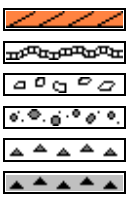
GEOLOGIST

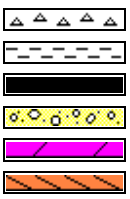
Name:	Dave Lawrence / Gerald Pasveer
Company:	Black Gold Geotechnical Services
Address:	2009 Colville Road
	New Haven, P.E.
	C0A 1H3

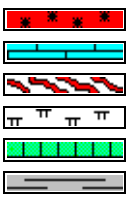
Drilling

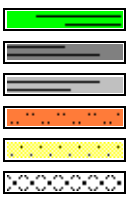
Samples from: 0m to 3152mMD (Build and Lateral), washed and vialed for Operator and NEB & NWT at 5m intervals;
AFE#: 10351812
Drilling Rig: Beaver #2
Drilling Supervisor: Richard Turgeon; Dave Oper
Gas Detection: MD Totco Gas Analyzer
Geological Services: David Lawrence; Black Gold Geotechnical Services LTD.
Gerry Pasveer; Coromandel Resources LTD.
Directional Services: Sperry Drilling Services
MWD Services: Extreme Engineering Services
Wireline Logs: Schlumberger (Vertical into Build)

ROCK TYPES


Anhy
Bent
Brec
Cement
Cht gy
Cht blk


Cht
Clyst
Coal
Congl
Dol
Gyp


Igne
Lmst
Meta
Mrlst
Salt
Shale


Shcol
Shblk
Shgy
Sltst
Ss
Till

ACCESSORIES

FOSSIL
- Algae
- Amph
- Belm
- Bioclst
- Brach
- Bryozoa
- Cephal
- Coral
- Crin
- Echin
- Fish
- Foram
- Fossil
- Gastro
- Oolite
- Ostra
- Pelec
- Pellet
- Pisolite
- Plant
- Strom

MINERAL
- Anhy
- Arggrn
- Arg
- Bent
- Bit
- Brecfrag
- Calc
- Carb
- Chtdk
- Chtlt
- Dol
- Feldspar
- Ferrpel
- Ferr
- Glau
- Gyp
- Hvymin
- Kaol
- Marl
- Minxl
- Nodule
- Phos
- Pyr
- Ls grs
- Sideritic
- Siderite
- Salt
- Sandy
- Silt
- Sil
- Sulphur
- Tuff
- fracture
- Micmica

STRINGER
- Anhy
- Arg
- Bent
- Coal
- Dol
- Gyp
- pebbles

- Ls
- Mrst
- Pyric bands
- Shstgr dk
- Sltstrg
- Ssstrg

TEXTURE
- Boundst
- Chalky
- Cryxln
- Earthy
- Finexln
- Grainst
- Lithogr
- Microxln
- Mudst
- Packst
- Wackest
- Sh mudst

OTHER SYMBOLS

POROSITY
- Earthy
- Fenest
- Fracture
- Inter
- Moldic
- Organic
- Pinpoint
- Vuggy

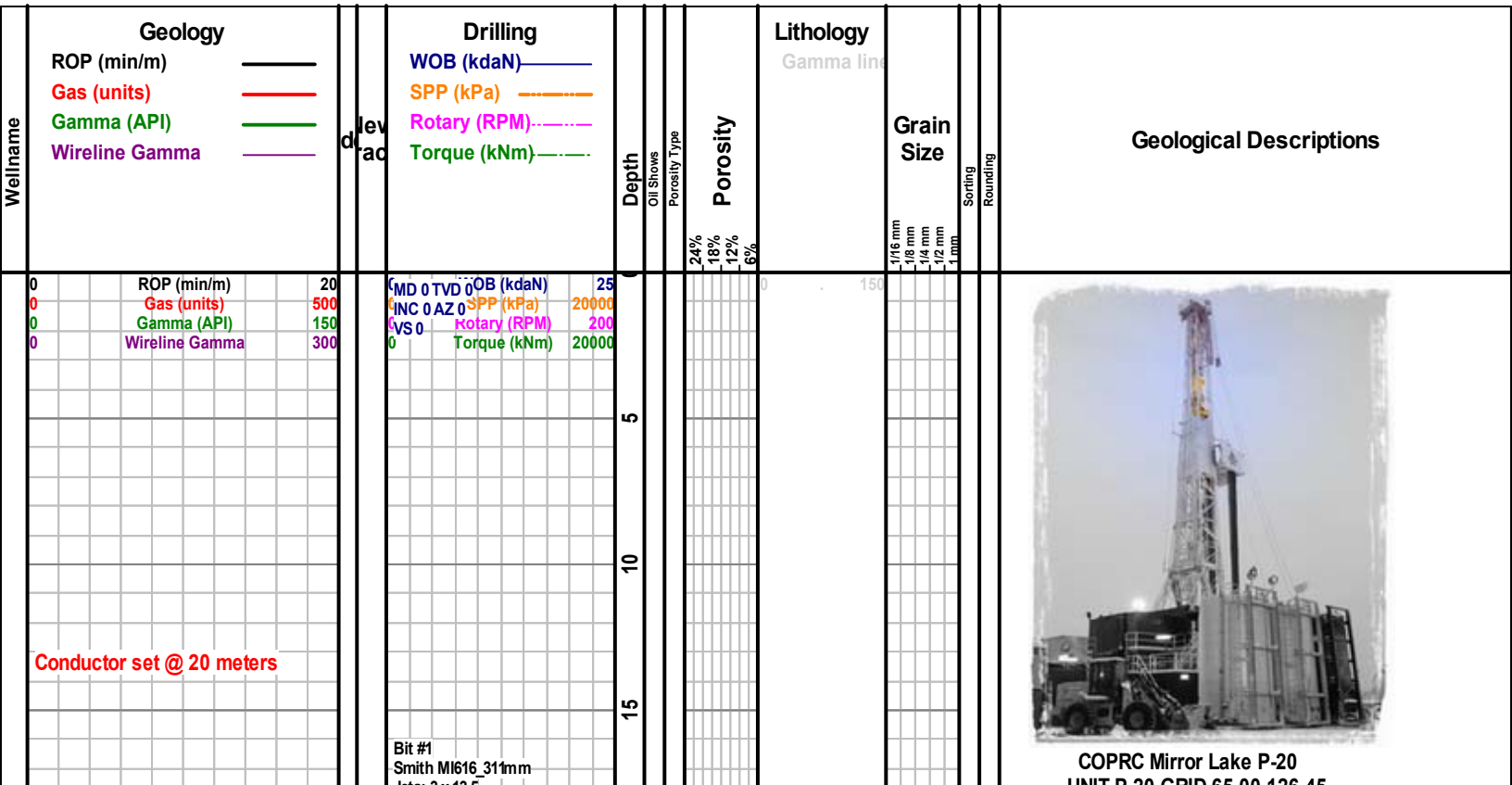
OIL SHOW
- Even
- Spotted
- Ques
- Dead

SORTING
- Well
- Moderate
- Poor

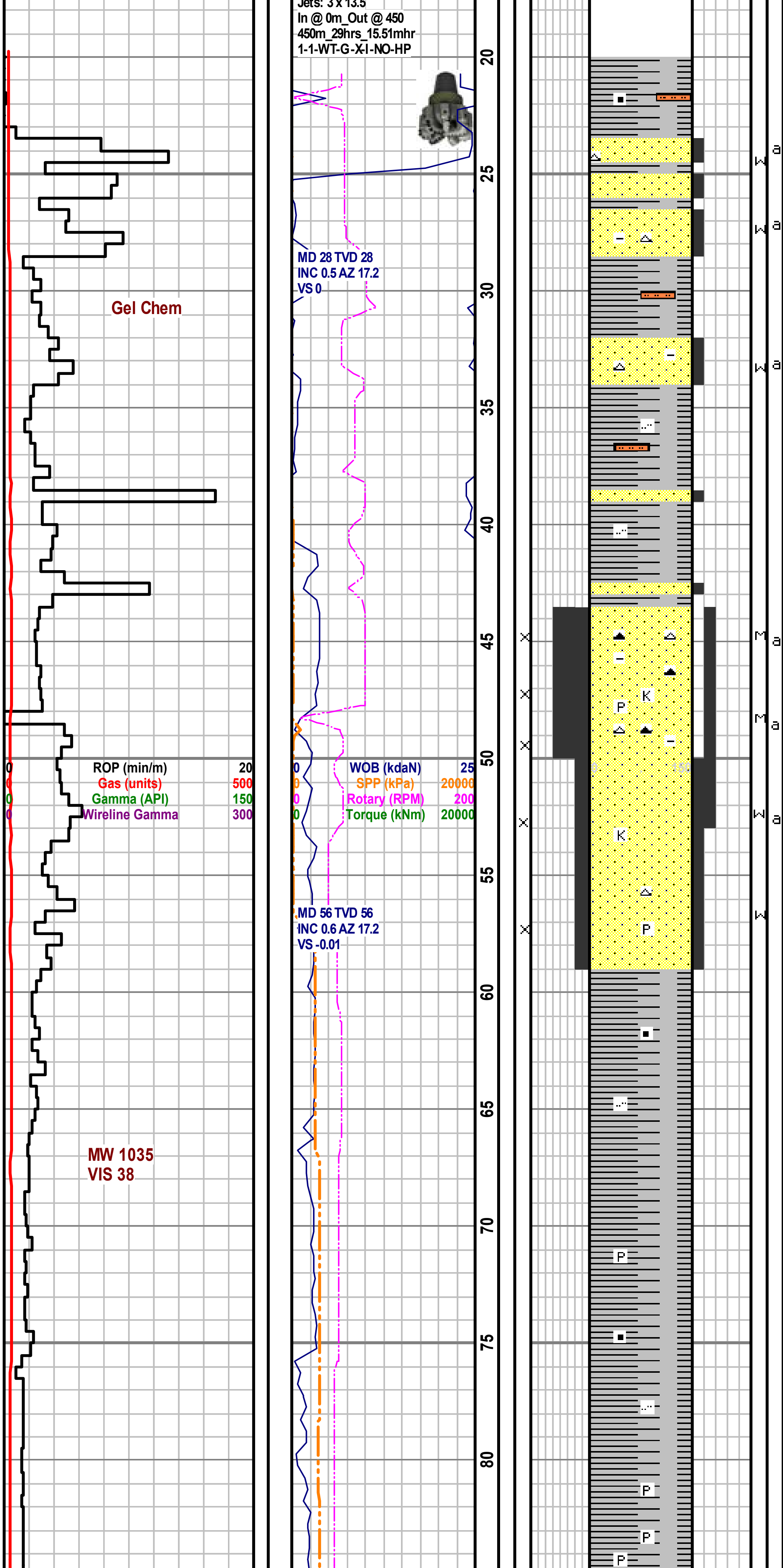
ROUNDING
- Rounded
- Subrnd
- Subang
- Angular

INTERVAL
- Core
- Dst

EVENT
- Rft
- Casing
- Top
- Bit trip
- Sidewall



COPRC Mirror Lake P-20 / Surface:UNIT P-20 GRID 65-00 126-45 / 300P206500126450 / K.B. = 289.35m



UNIT P-20 GRID 65-00 126-45
300P206500126450
Spud Well: Jan 29, 2014 @ 00:01 hrs
Conductor set @ 20 meters

20-30 SH: lt to med gy, blky, slly micmica, slty in pt, grds to shy Sltst in pt, sft to modly firm, tr carb mat with 20% intbdd SS lt gy, vf gr, sub ang, w srtd, cly mtx, mnr dk lithic gr, no vis por, no show. 20% cement in sample.

30-40 SH: lt to med gy, blky, slly micmica, slty in pt, grds to shy Sltst in pt, sft to modly firm, tr carb mat with intbdd SS lt gy, vf gr, sub ang, w srtd, cly mtx, mnr dk lithic gr, no vis por, no show. 10% cement in sample.

Little Bear 43.00mMD, (43.00mTVD, 245.50mSS.)

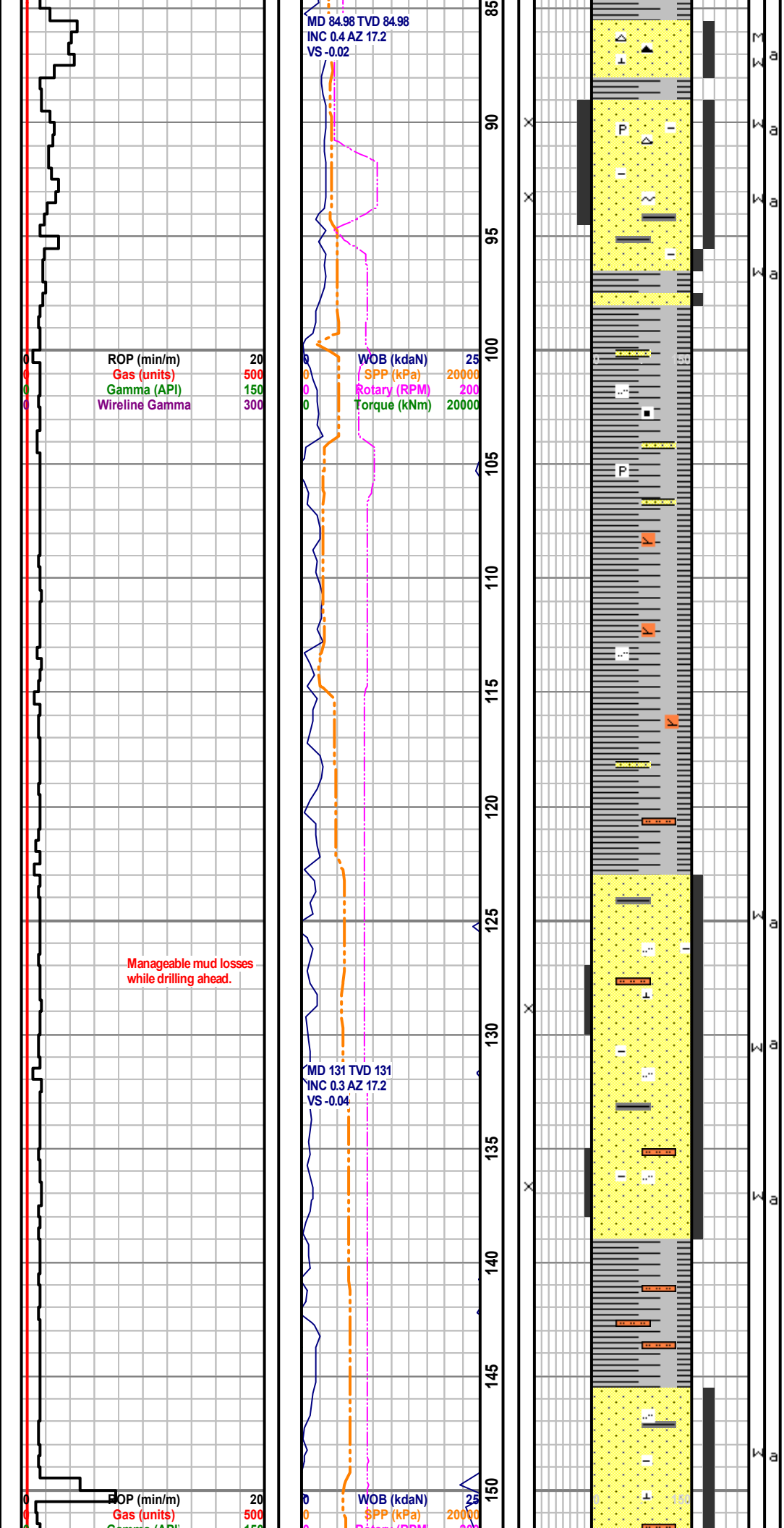
40-50 SS s&p, u f gr, sub ang, mod srtd, uncons, qtz & cht, dk lithic grs, tr pyr nod, g intgr por, no vis show

50-60m SS v lt gy, vf gr, sub ang, w srtd, qtz & lt col cht, cly mtx, occ wh kaol, sft, fri, tr dism pyr, tr dk lithic gr, p to fr intgr por, no vis show.

60-70 SH: med gy, blky, sft to firm, slty, grds to slty sh in pt, slly micmica, minor carb mat, tr dism pyr, tr mnr SS strgs aa.

70-80 SH: med gy, blky, sft to firm, slty, grds to slty sh in pt, slly micmica, minor carb mat, tr pyr nod, tr mnr SS strgs aa.

80-90 SH: med gy, blky, sft to firm, slty, grds to slty sh in pt, slly micmica, minor carb mat, v pyrc wi mnr SS strgs, s&p, f gr, sub ang, mod srtd, cly mtx, mnr calc, tt



to p intgran por, no vis show.

90-100 SS predly lt gy, s&p in pt, l f gr, sb ang, w srtd, cly mtx, dk lithic grs, tr carb mat, tr pyr, p tr glauc, fri in pt, p intgr por, no show wi 40% Sh aa.

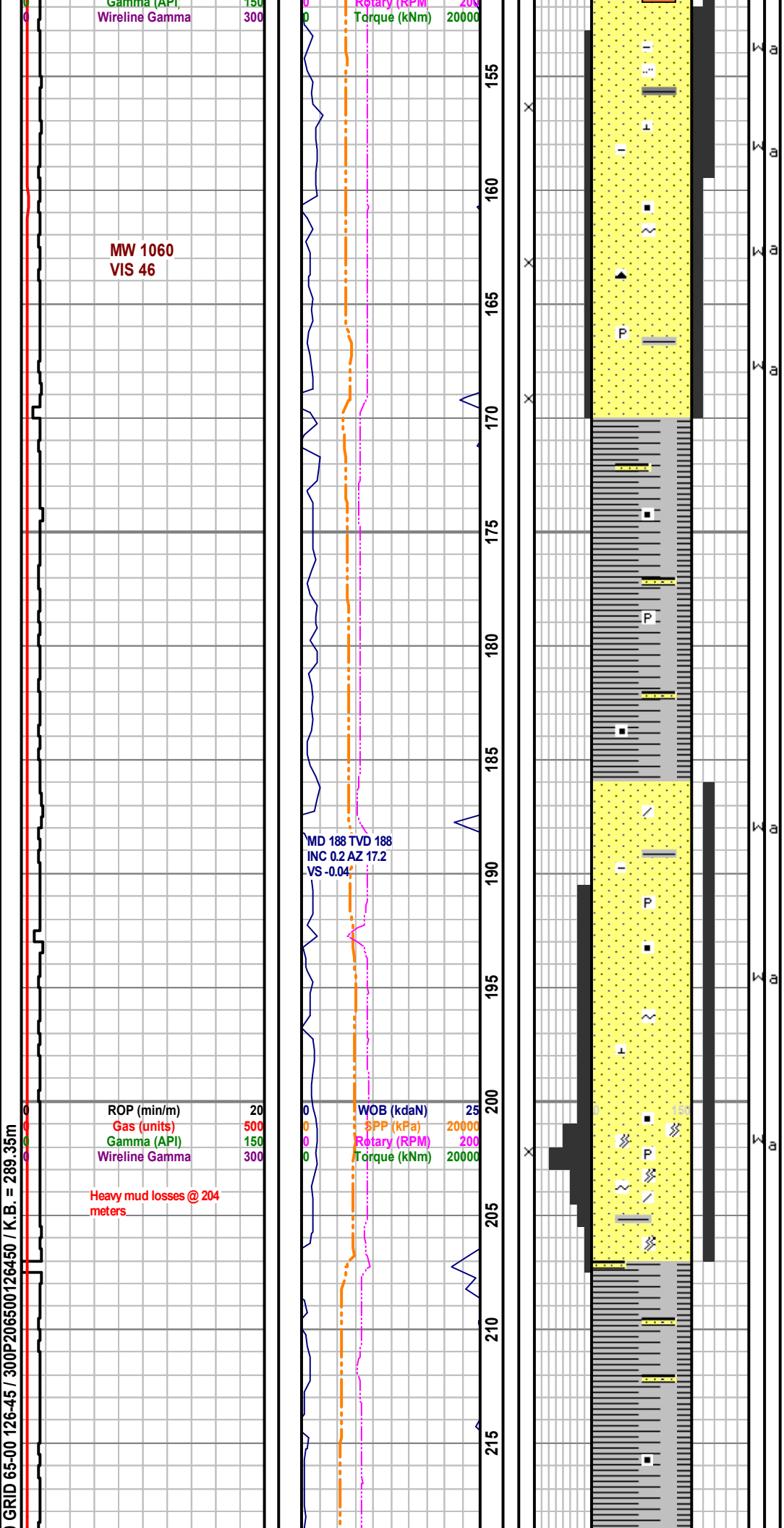
100-110 SS predly lt gy, s&p in pt, vf gr, sb ang, w srtd, cly mtx, dk lithic grs, tr carb mat, tr pyr, p tr glauc, fri in pt, tt to tr p intgr por, no show wi minor Sh aa.

110-120 SS aa wi incrg Sh aa wi SH lt brn, gy brn, blky, sidc, occly slty , tr sdy, tr brn sid frags.

120-130 SH lt to med gy, blky, slty, slly micmica, grds to sltst ip, tr pyrc, tr pyr nod wi 40% SS, lt gy, l vf gr, sub ang, w srtd, cly cmt, slty, shy, tr dk lithic grs, tr pyric, predly tt, no show

130-140 SS SS, med gy, l vf gr, sub ang, w srtd, cly cmt, slty, shy, tr dk lithic grs, tr pyrc, predly tt, no show wi 10% SH lams aa.

140-150 SS lt gy, u vf gr, sub ang, w srtd, cly cmt, slty, shy, tr dk lithic grs, tr pyrc, pyr filled worm burrows, predly tt, no show wi 50% Sh aa.



150-160 SS lt gy to s&p, vf gr, sub ang, w srtd, cly & calc cmt, slty, shy in pt, tr dk lithic grs, tr glauc, tr pyrc, predly tt, no show wi mnr Sh aa.

160-170 SS lt gy to s&p, vf gr, sub ang, w srtd, cly & tr calc cmt, slty, shy in pt, tr dk lithic grs, tr glauc, pyrc, tr carb mat, predly tt - p intgr por, no show wi mnr Sh aa.

170-180 SS aa, bcmg incrg shy, Sh incrg to 40%, med gy, blky, slty, sdy, tr carb specks.

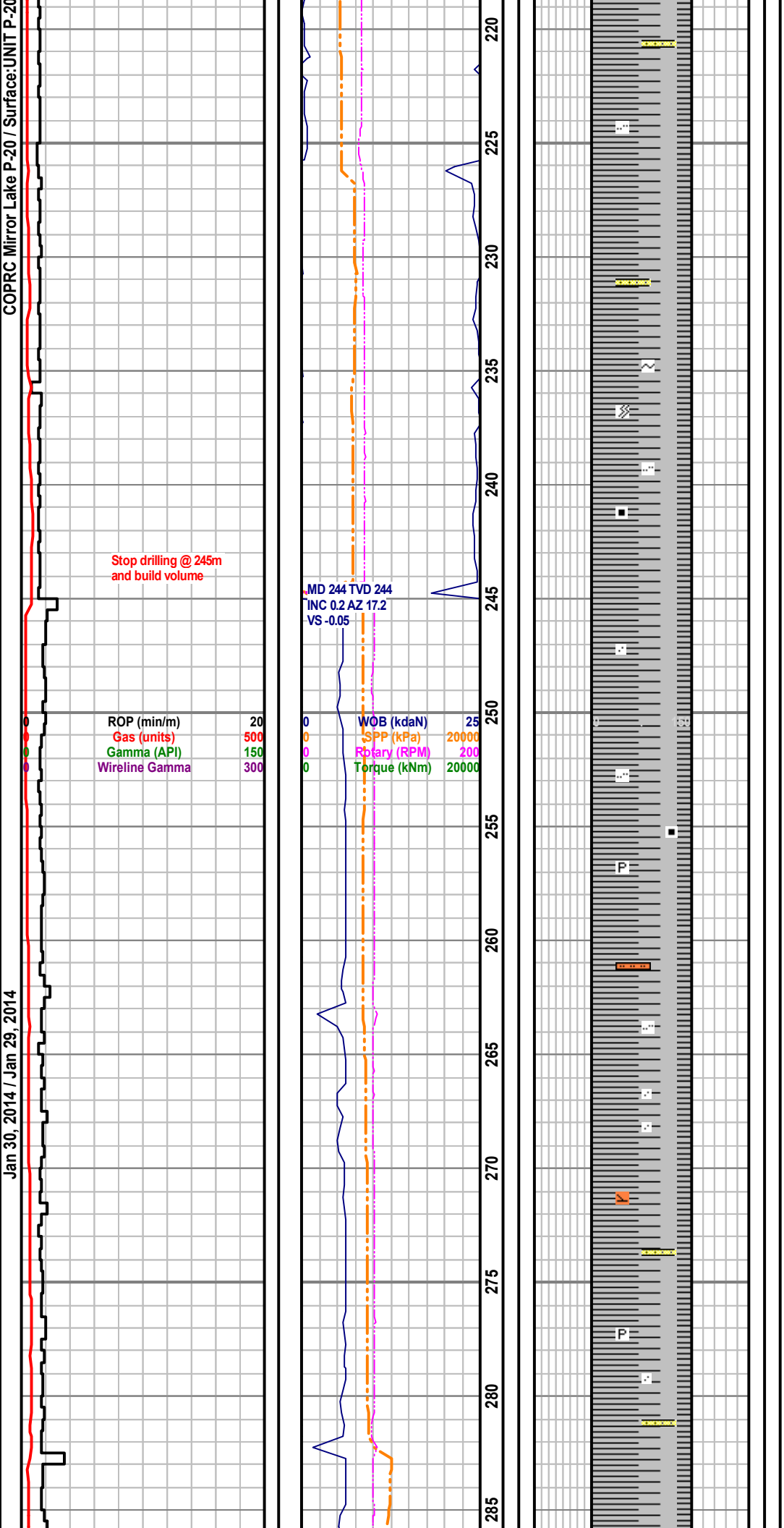
180-190 SS lt gy to s&p, u vf gr, sub ang, modly w srtd, cly & tr calc cmt, slty, shy in pt, tr dk lithic grs, tr glauc, pyrc, tr carb mat, predly tt to p intgr por, no show wi mnr Sh aa.

190-200 SS lt gy to s&p, l f gr, sub ang, w srtd, cly mtx & tr calc cmt, slty in pt, slly shy in pt, tr dk lithic grs, tr glauc, tr pyrc, tr carb mat, mnr mica flks, predly tt to p intgr por, no show wi mnr Sh aa.

200-210 SS aa wi SH incrg slly.

Slater River 207.00mMD, (207.00mTVD, 81.5mSS.)

210-220 SH med gy, blky, modly firm, slly micmica, tr slty, p tr carb mat, tr slty wi mnr Ss strgs aa.



220-230 SH med gy, blky, modly firm, slly micmica, tr slty, p tr carb mat, tr slty wi mnr Ss strgs aa.

230-240 SH med gy, blky, modly firm, slly micmica, tr sdy, p tr carb mat, p tr glauc, tr slty, tr micro fracs infilled with calcite.

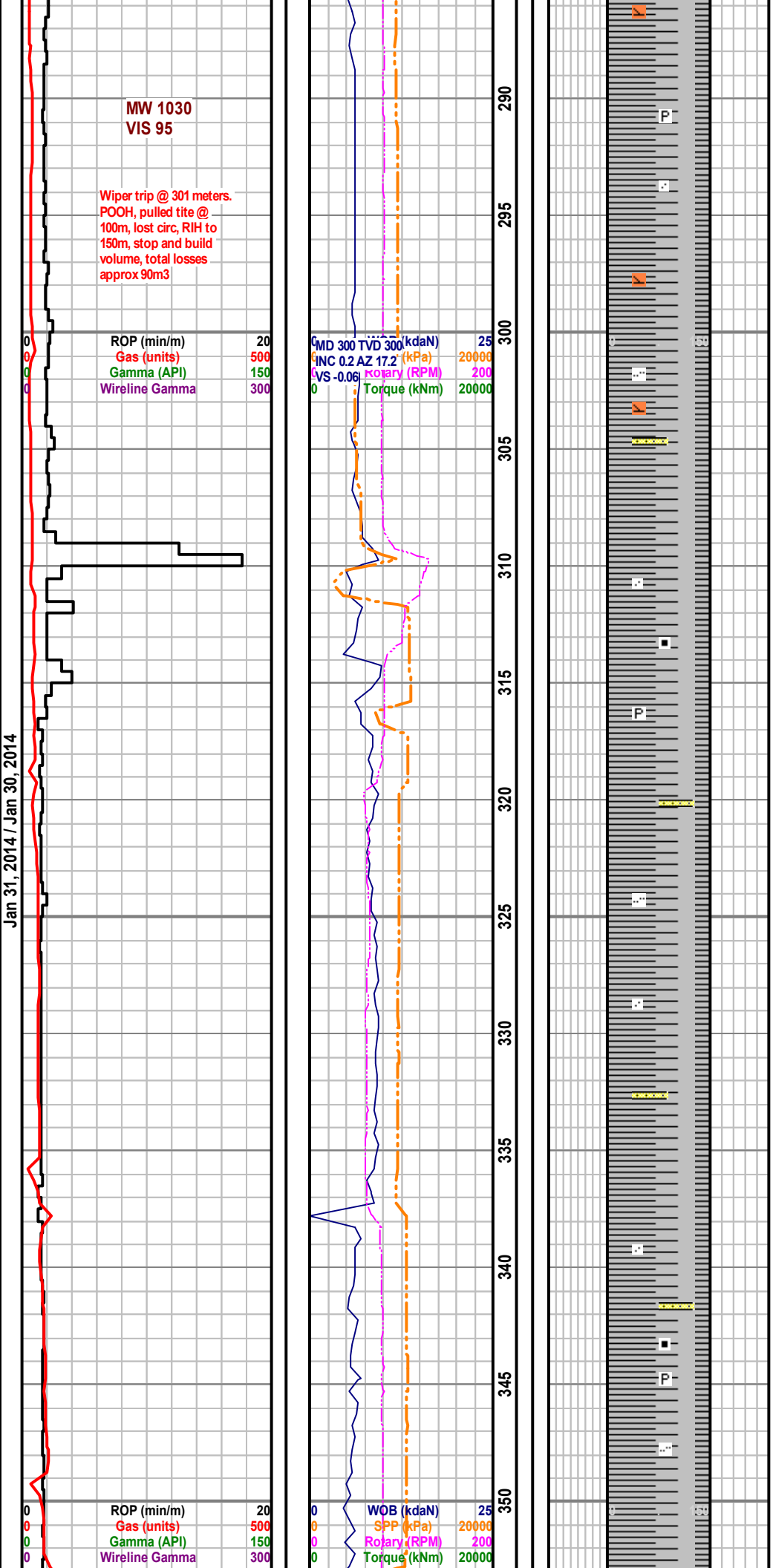
240-250 SH med gy, blky, modly firm, slly micmica, tr sdy, p tr carb mat, p tr glauc, tr slty.

250-260 SH med gy, blky, modly firm, slly micmica, tr slty, p tr carb mat, tr pyr nod with mnr Sltst strgs, lt gy, cly cmt, dk lithic grs, tt, no show

260-270 SH med gy, blky, sft to modly firm, slly micmica, tr slty, p tr carb mat, tr pyrc with mnr Sltst strgs, lt gy, cly cmt, dk lithic grs, tt, no show.

270-280 SH med gy, blky, sft to modly firm, slly micmica, sdy ip, p tr carb mat, tr pyr nod, occ gy brn sh, sidc with mnr Ss strgs, med gy, vf gr, w srtd, sub ang, cly cmt, dk lithic grs, tt, no show.

280-290 SH med gy, blky, sft to modly firm, slly micmica, sdy ip, p tr carb mat, tr pyr nod, occ gy brn sh, sidc with mnr Ss strgs, med gy, vf gr, w srtd, sub



ang, cly cmt, dk lithic grs, carb mat, tt, no show.

290-300 SH med gy, blky, sft to modly firm, slly micmica, sdy ip, p tr carb mat, tr pyr nod, tr sidc in pt.

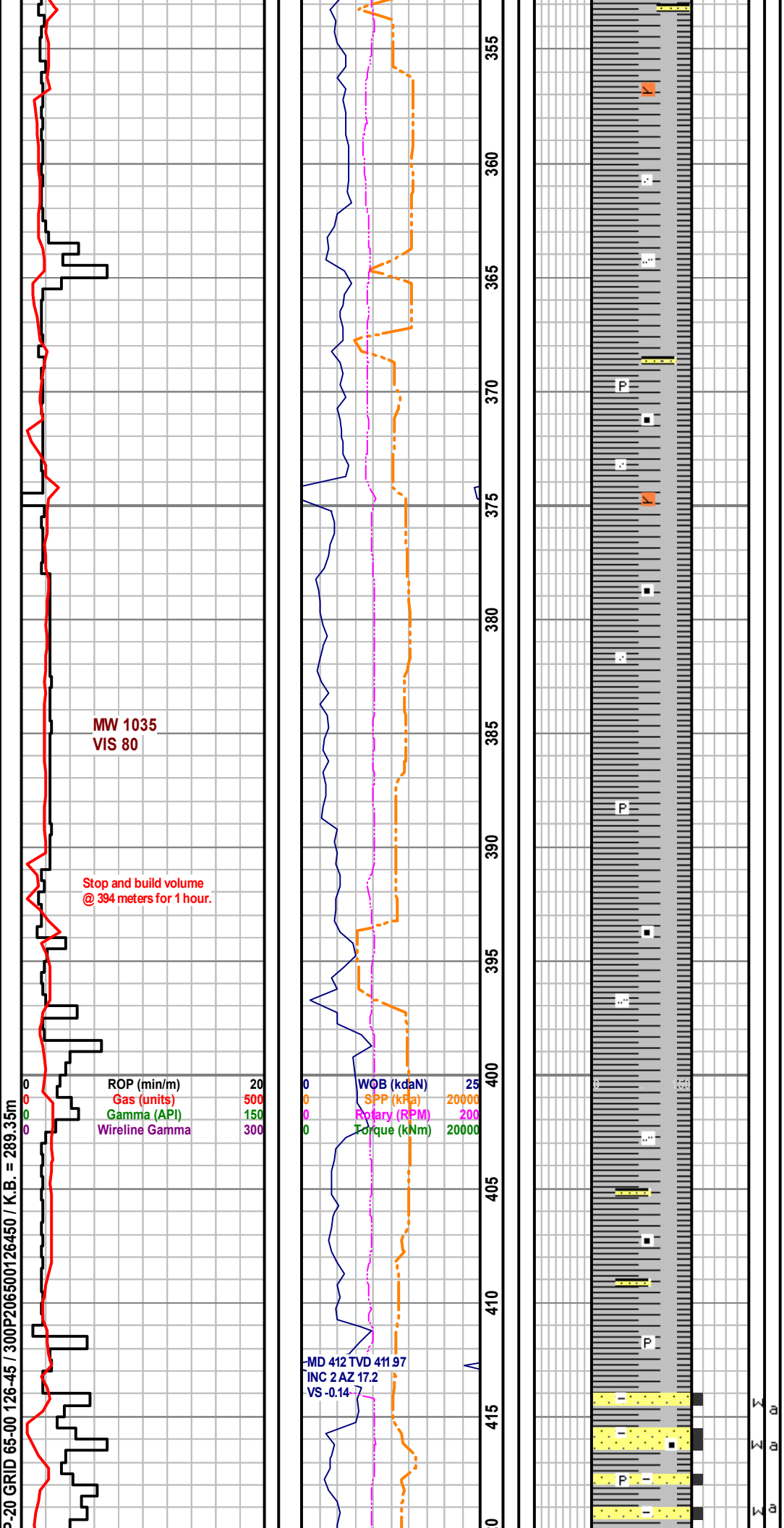
300-310 SH med gy, blky, sft to modly firm, slly micmica, tr sdy ip, tr slty, p tr carb mat, tr pyr wi mnr Ss strgs lt gy, u vf gr, sub ang, w srt, cly mtx, slly calcs, dk lithic grs, p tr glau, no vis por, no show.

310-320 SH med gy, blky, sft - modly firm, slly micmica, tr sdy ip, tr slty, p tr carb mat, tr pyr wi mnr Ss strgs lt gy, u vf gr, sub ang, w srt, cly mtx, slly calcs, dk lithic grs, p tr glau, no vis por, no show.

320-330 SH med gy, blky, sft to modly firm, slly micmica, tr sdy ip, tr slty, p tr carb mat, tr pyr wi mnr Ss strgs lt gy, u vf gr, sub ang, w srt, cly mtx, slly calc, dk lithic grs, p tr glau, no vis por, no show.

330-340 SH med gy, blky, sft to modly firm, slly micmica, tr sdy ip, tr slty, p tr carb mat, tr pyr wi mnr Ss strgs aa.

340-350 SH med gy, blky, sft to modly firm, slly micmica, tr sdy ip, tr slty, p tr carb mat, tr pyr wi mnr Ss strgs aa.



350-360 SH med gy, blky, sft to modly firm, slly micmica, tr sdy ip, tr slty, p tr carb mat, tr pyr wi mnr Ss strgs aa.

360-370 SH med gy, blky, sft to modly firm, slly micmica, tr sdy ip, tr slty, p tr carb mat, tr pyr wi mnr Ss strgs aa.

POOR SAMPLE QUALITY FROM 300-400 METERS DUE TO MUD LOSSES AND ABUNDANT LCM IN MUD.

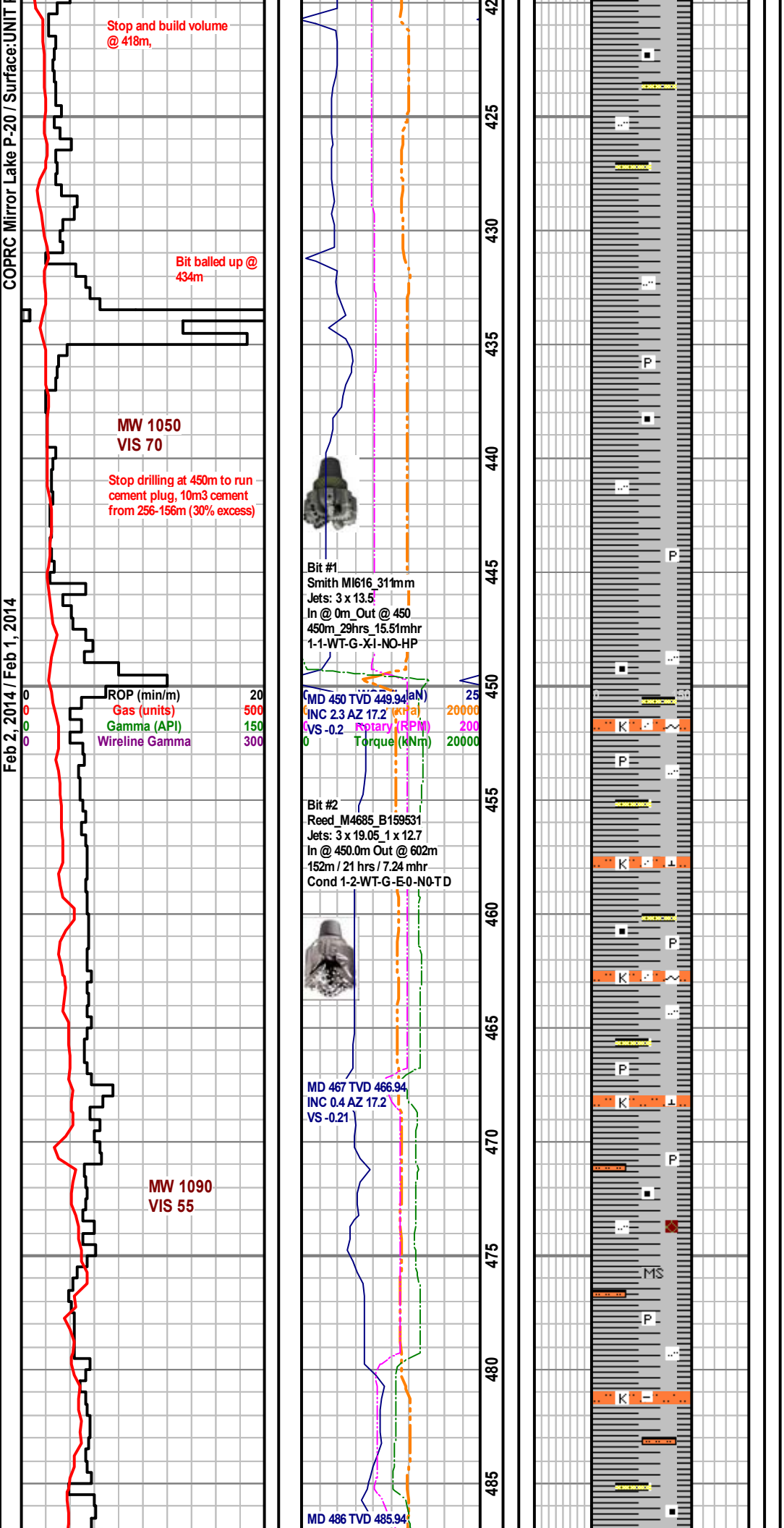
370-380 SH med gy, blky, sft to modly firm, slly micmica, tr sdy ip, tr slty, p tr carb mat, tr sidc in pt wi tr sid frags, tr pyr wi mnr Ss strgs aa.

380-390 SH med gy, blky, sft to modly firm, slly micmica, tr sdy ip, tr slty, p tr carb mat, tr sidc in pt wi tr sid frags, tr pyr wi mnr Ss strgs aa.

390-400 SH med gy, blky, sft to firm, slly micmica, tr pyrc, tr carb mat, mnr Ss strgs aa.

400-410 SH med gy, blky, sft to modly firm, slly micmica, tr pyrc, tr carb mat, tr slty wi mnr Ss strgs aa.

410-420 SH med gy, blky, sft to modly firm, slly micmica, tr pyrc, tr carb mat, tr slty wi 10% Ss strgs, lt to med gy, vf gr, sub ang, w srtd, cly mtx & calcs cmt ip, slty, grds to sdy sltst ip, tt, no shows



420-430 SH med gy, blky, sft to modly firm, slly micmica, tr pyrc, tr carb mat, tr slty wi 10% Ss strgs & lams lt to med gy, vf gr, sub ang, w srtd, cly mtx & calcs cmt ip, tr pyric, slty, grds to sdy sltst ip, tt, no shows

430-440 SH med gy, blky, sft to modly firm, slly micmica, tr pyrc, tr carb mat, tr slty.

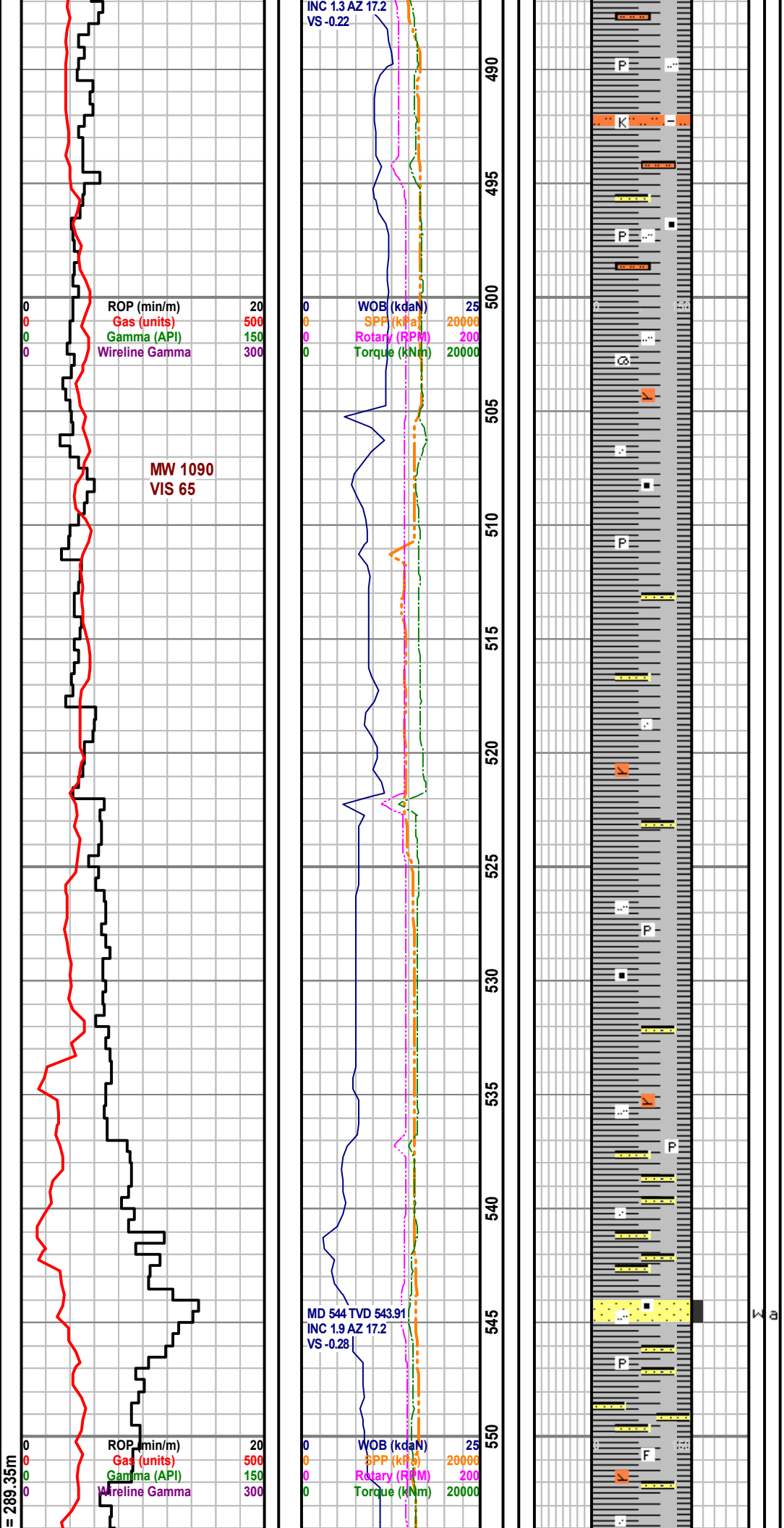
440-450 SH med gy, blky, sft to modly firm, slly micmica, tr pyrc, tr carb mat, tr slty.

450-460 SH: med gy, blky to sb blky, micmica, occly pt carb, silty ip, firm to pt sft, tr pyric, pt finely laminated wi SLTST and occ SS; off wh - lt gy, s&p, l v f - tr l f, lithic, tr glauc & carb grns, modly - w cons, cly wi tr calcs cmt, fri ip, v mnr med gy silty mdstn pres, ns.

460-470 SH: med gy, blky - sb blky, micmica, occly pt carb, silty ip, firm - pt sft, tr pyrc, pt finely laminated wi SLTST and occ SS; off wh - lt gy, s&p, l v f - tr l f, lithic, tr glauc & carb grns, modly - w cons, cly wi tr calcs cmt, ns.

470-480 SH: med gy, tr dkr gy, blky - sb blky, micmica, locally pt silty, firm - pt sft, tr nod pyr, occ v f SLTST lams, tr mdstn, rr sid frags, arg smpl ws, tt, ns.

480-490 SH: med gy, blky - sb blky, pt plty, micmica, tr pt carbs, silty ip, firm - sft, tr v f micro lams of SLTST, lt - med gy, slly s&p, arg, tr sidic, mod - w ind, grdg - v f Ss ip, ns.



490-500 SH: med gy, blky - sb blky, pt plty, micmica, tr pt carb, silty ip, firm - sft, tr v f micro lams of SLTST.

500-510 SH: med gy, blky, mnr plty ip, slly micmica, tr slty, slly carb wi mnr carb mat, unident fos frags (Gast?) p tr pyrc wi mnr Sltst lams aa, occly sdy, grds to vf gr Ss ip.

510-520 SH: aa, incrg aren with depth, tr sidc wi occ brn sid frags (nod?) 3% Ss strgs, med gy, vf gr, sub ang, w srtd, cly mtx, tr calcs, dk lithic grs, pyrc pyr nod, tr glauc, slty, shy ip, no vis por, no shows.

520-530 SH: med gy, blky, tr plty, slly micmica, tr slty in pt, tr sdy in pt, tr carb specks, tr sidc wi brn sid frags (nod + lams?) tr pyric wi occ Ss & Sltst strgs aa.

530-540 SH: med gy, blky, tr plty, slly micmica, tr carb mat, pyr nod, tr sidc, tr sdy & slty in pt wi mnr Ss strgs, med gy, vf gr, sub ang, w srtd, cly cmt, slly calcs, tr glauc, dk lithic grs, no vis por or shows.

540-550 SH: med gy, blky, tr plty, slly micmica, tr carb mat, pyr nod, tr sidc, tr sdy & slty in pt wi mnr Ss strgs, med gy, vf gr, sub ang, w srtd, cly cmt, slly calcs, tr glauc, dk lithic grs, no vis por or shows.

550-560 SH: med gy, blky, tr plty, slly micmica, tr carb mat, pyr nod, tr sidc, tr lnoc, slly sdy & slty in pt wi 5%

COPRC Mirror Lake P-20 / Surface:UNIT P-20 GRID 65-00 126-45 / 300P20650012645O / K.B.

MW 1100
VIS 53
WL 21
PH 10.5

MW 1120
VIS 70
WL 21
PH 10.5

0 ROP (min/m) 20
0 Gas (units) 500
0 Gamma (API) 150
0 Wireline Gamma 300

555 560 565 570 575 580 585 590 595 600 605 610 615 620

Bit #2
Reed_M4685_B159531
Jets: 3 x 19.05_1 x 12.7
In @ 450.0m Out @ 602m
152m / 21 hrs / 7.24 mhr
Cond 1-2-WT-G-E-0-N0-TD

MD 600 TVD 599.89
INC 1.4 AZ 17.2
VS -0.34

0 WOB (kN) 25
0 Rotary (RPM) 200
0 Torque (kNm) 20000

MD 608.4 TVD 608.29
INC 1.6 AZ 17.2
VS -0.35

Bit #3
Ulterra_U513_17071
Jets: 7 x 11.1
In: 602m, Out: 1921m
1319m drilled in 62.75 hrs
for 21.02 mhr
Cond:

P F F P P F P P

Ss strgs, med gy, vf gr, sub ang, w srtd, cly cmt, slly calcs, tr glauc, dk lithic grs, no vis por or shows.

560-570 SH: med gy, blky, mnr plty, slly micmica, tr carb mat, tr Inoc, tr pyrc, tr sdy & slty in pt wi mnr Ss strgs, med gy, vf gr, sub ang, w srtd, cly cmt, slly calcs, tr glauc, dk lithic grs, no vis por or shows.

570-580 SH: med gy, bcmg slly darker with depth, blky, incrg plty, slly micmica, tr carb mat, p tr pyrc, tr slty in pt.

580-590 SH: med to slly dkr gy, blky, plty in pt, slly micmica, tr carb mat, tr Inoc, tr pyr nod, tr sdy & slty in pt wi mnr Ss strgs aa.

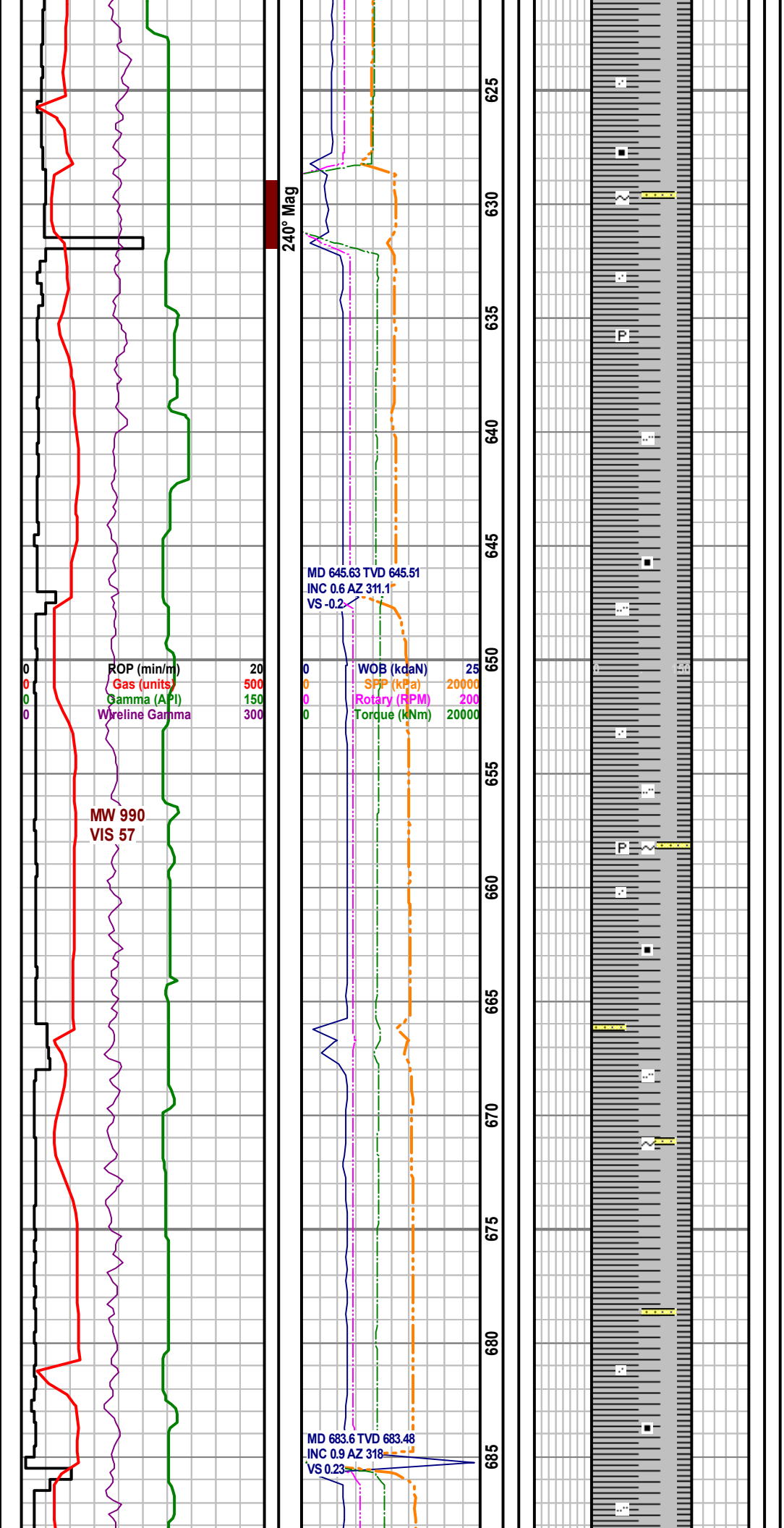
590-602 SH: med to pt dkr gy, blky, plty in pt, slly micmica, tr carb mat, tr Inoc, tr pyr nod, tr sdy & slty in pt wi occ Ss strgs aa.

Surface Casing Final total depth @ 602.0m reached on February 2nd 2014 at 19:48hrs

Drilled out through surface casing @ 602m on February 7th at 06:50 hrs

602-610 SH: med to dk gy, blky, plty in pt, slly micmica, tr carb mat, tr Inoc, tr pyr nod, tr sdy & slty in pt wi Ss strgs aa wi abnt cement in sample

610-620 SH: med to dk gy, blky, plty in pt, slly micmica, slly carb, slly slty, tr sdy in pt to mnr SS strgs, lt to med gy, l f gr, sub ang, w srt, cly mtx, tr calc cmt, occ dk lithic grs, p tr glauc, no vis por or show.



620-630 SH: med to dk gy, blky, plty in pt, slly micmica, slly carb, slly slty, tr sdy in pt wi mnr SS strgs, lt - med gy, l f gr, sub ang, w srt, cly mtx, tr calc cmt, occ dk lithic grs, p tr glauc, no vis por or show.

630-640 SH: med - dk gy, blky, plty in pt, slly micmica, slly carb, slly slty, tr sdy in pt wi tr SS strgs aa.

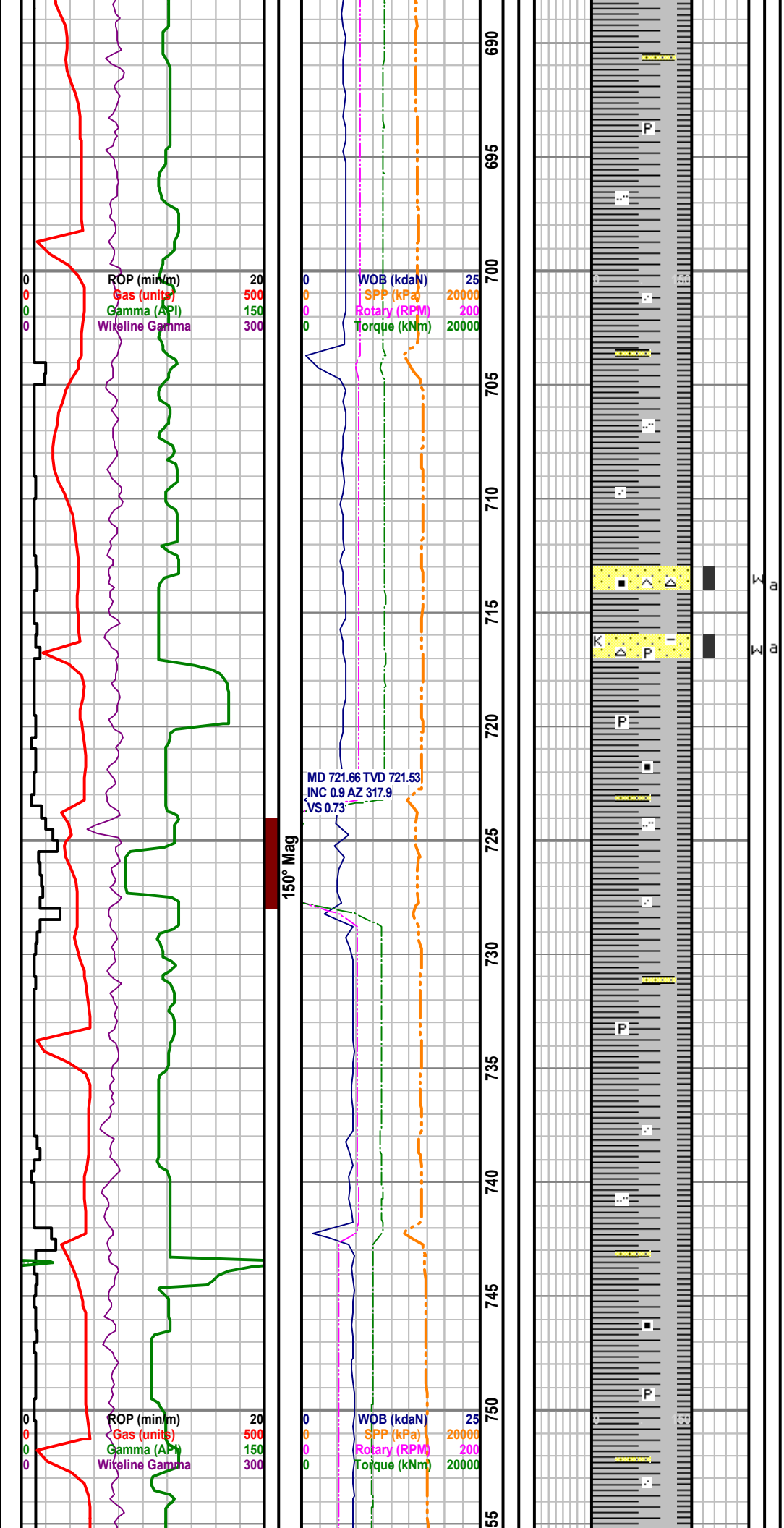
640-650 SH: med - dk gy, blky, plty in pt, micmica, slly carb, slly slty, tr sdy in pt.

650-660 SH: med - dk gy, blky, plty in pt, micmica, slly carb, p tr pyric, slly slty, tr sdy in pt wi mnr Ss strgs, lt - med gy, vf - f gr aa.

660-670 SH: med - dk gy, blky, plty in pt, micmica, slly carb, p tr pyrc, slly slty, tr sdy in pt wi mnr Ss strgs, lt - med gy, vf - f gr aa.

670-680 SH: med - dk gy, blky, plty in pt, micmica, slly carb, p tr pyric, slly slty, tr sdy in pt wi mnr Ss strgs, lt - med gy, vf - f gr aa.

680-690 SH: med - dk gy, blky, plty in pt, micmica, slly carb, p tr pyrc, slly slty, tr sdy in pt wi mnr Ss strgs, lt - med gy, vf - f gr aa.



690-700 SH: med - dk gy, blky, plty in pt, micmica, slly carb, p tr pyrc with occ pyr nod, slly slty, tr sdy in pt wi mnr Ss strgs aa.

700-710 SH: med - dk gy, blky & plty, micmica, slly carb, p tr pyrc with occ pyr nod, slly slty, tr sdy in pt wi mnr Ss strgs, lt - med gy, l f gr, sub ang, w srtd, qtz & cht, cly mtx, slly calcs, tr sils, dk lithic grs, tr pyrc, shy ip, no vis por or shows.

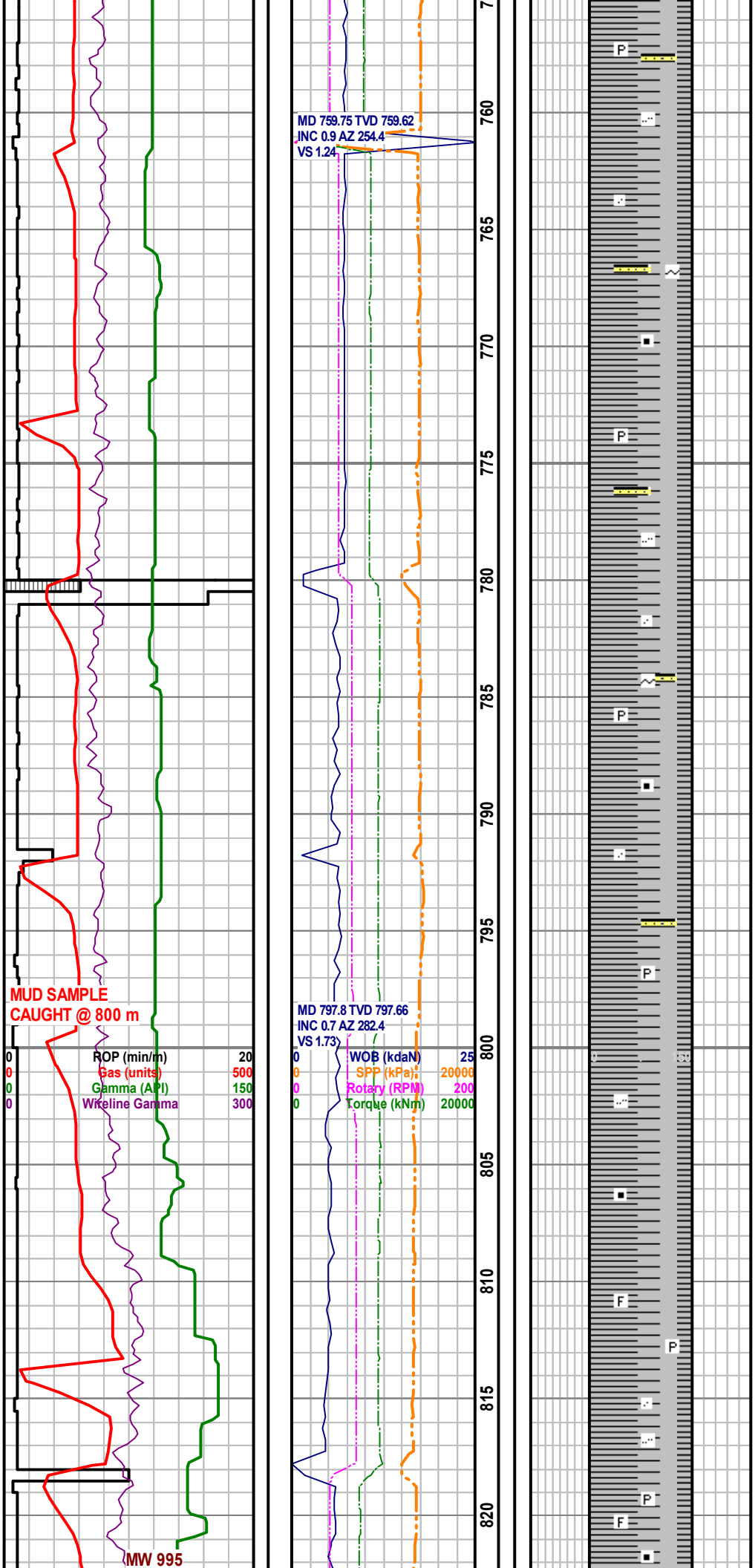
710-720 SH: med - dk gy, blky & plty, micmica, slly carb, p tr pyrc with occ pyr nod, slly slty, tr sdy in pt wi mnr Ss strgs, lt - med gy, l f gr, sub ang, w srtd, qtz & cht, cly mtx, slly calcs, tr sils, dk lithic grs, tr pyrc, shy ip, no vis por or shows.

720-730 SH: med - dk gy, plty, blky ip, micmica, slly carb, sft - firm, p tr pyrc with occ pyr nod, slly slty, tr sdy in pt wi tr Ss lams aa.

730-740 SH: med - dk gy, blky & plty, slly micmica, slly carb, sft - firm, p tr pyrc with occ pyr nod, slly slty, tr sdy in pt, p tr pl rmn wi tr Ss lams aa.

740-750 SH: med - dk gy, blky & plty, slly micmica, slly carb, sft - firm, p tr pyrc with occ pyr nod, slly slty, tr sdy in pt, wi tr Ss lams, lt - med gy, u vf gr, sub ang, w srt, cly mtx, slly calcs, dk lithic grs, tr pyrc, tr glauc, shy ip, tt, no shows.

750-760 SH: med - dk gy, blky & plty, slly micmica, slly carb, sft - firm, p tr pyrc with occ pyr nod, slly slty, tr



sdy in pt, wi tr Ss lams, lt - med gy, u vf gr, sub ang, w srt, cly mtx, slly calcs, dk lithic grs, tr pyrc, tr glauc, shy ip, tt, no shows.

760-770 SH: med - dk gy, blky & plty, slly micmica, slly carb, sft - firm, p tr pyrc with occ pyr nod, slly slty, tr sdy in pt, wi tr Ss lams, med gy, u vf gr, sub ang, w srt, cly mtx, slly calcs, dk lithic grs, tr pyrc, tr glauc, shy ip, tt, no shows.

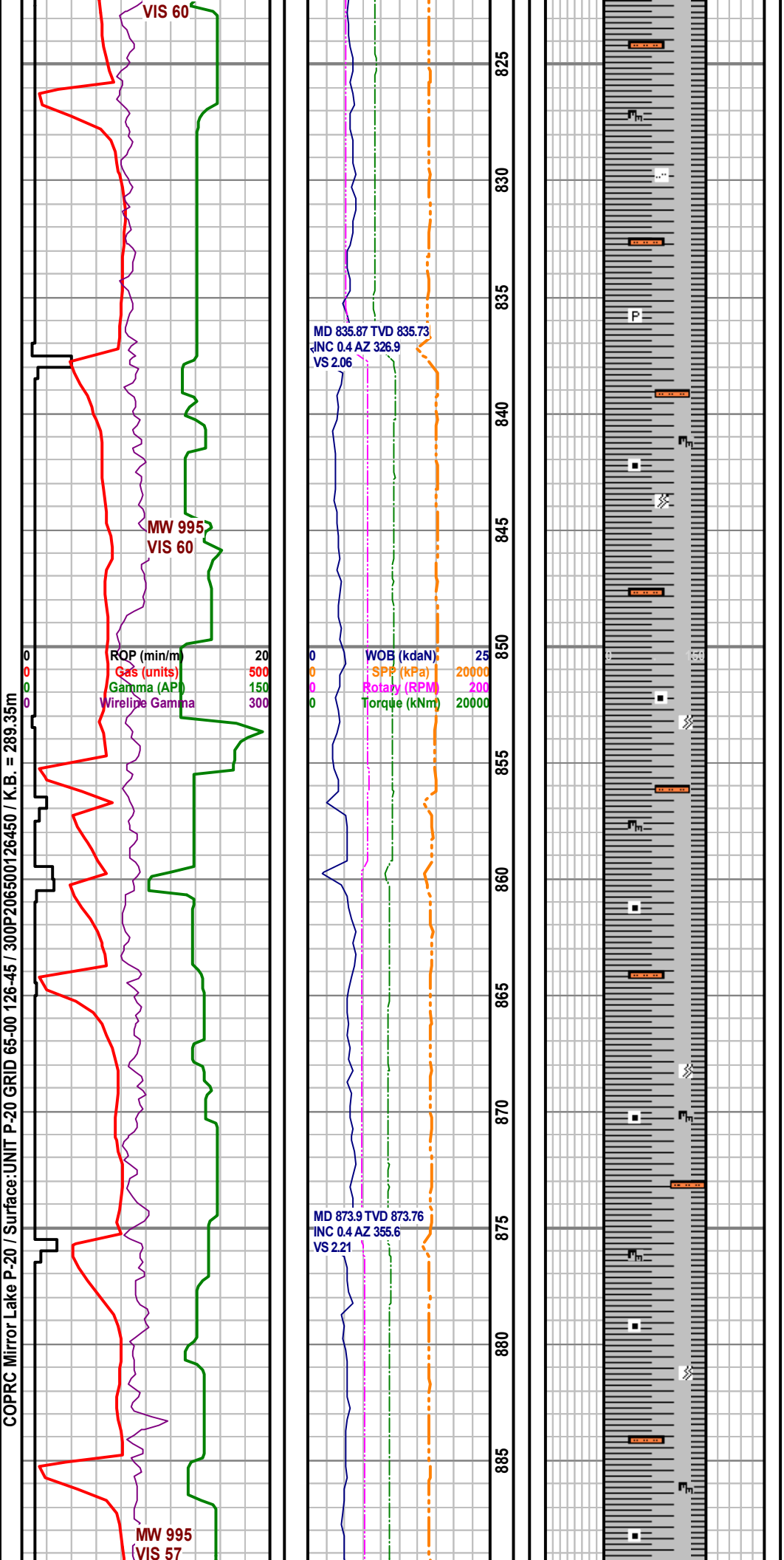
770-780 SH: med - dk gy, blky & plty, slly micmica, slly carb, sft - firm, p tr pyrc with occ pyr nod, slly slty, tr sdy in pt, wi tr Ss lams, med gy, l vf gr, sub ang, w srt, cly mtx, slly calcs, dk lithic grs, tr pyrc, tr glauc, shy ip, tt, no shows.

780-790 SH: med - dk gy, blky & plty, slly micmica, slly carb, sft - modly firm, p tr pyric with occ pyr nod, slly slty, tr sdy in pt, wi mnr Ss lams, med gy, l vf gr, sub ang, w srt, cly mtx, slly calcs, dk lithic grs, tr pyrc, tr glauc, shy ip, tt, no shows.

790-800 SH: med - dk gy, blky & plty, slly micmica, slly carb, sft - modly firm, p tr pyrc with occ pyr nod, slly slty, tr sdy in pt, wi mnr Ss strgs, med gy, l vf gr, sub ang, w srt, cly mtx, slly calcs, dk lithic grs, tr pyrc, tr glauc, occly slty, grds to sdy sltst ip, shy ip, tt, no shows.

800-810 SH: med - dk gy, blky & plty, slly micmica, slly carb, sft - modly firm, p tr pyrc with occ pyr nod, slly slty, tr sdy in pt, wi Ss lams decrng.

810-820 SH: med - dk gy, blky & plty, slly micmica, slly carb, sft - modly firm, p tr pyrc with occ pyr nod, slly slty ip, tr lnoc.



820-830 SH: med - dk gy, blky & plty, slly micmica, slly carb, sft - modly firm, p tr pyrc with occ pyr nod, slly slty ip wi tr Sltst strgs, med gy, cly cmt, slly shy, tr sdy, tt, no shows.

830-840 SH: med - dk gy, blky & plty, slly micmica, slly carb, sft - modly firm, tr pyr nod, tr microfracs infilled with pyr wi tr Sltst strgs aa.

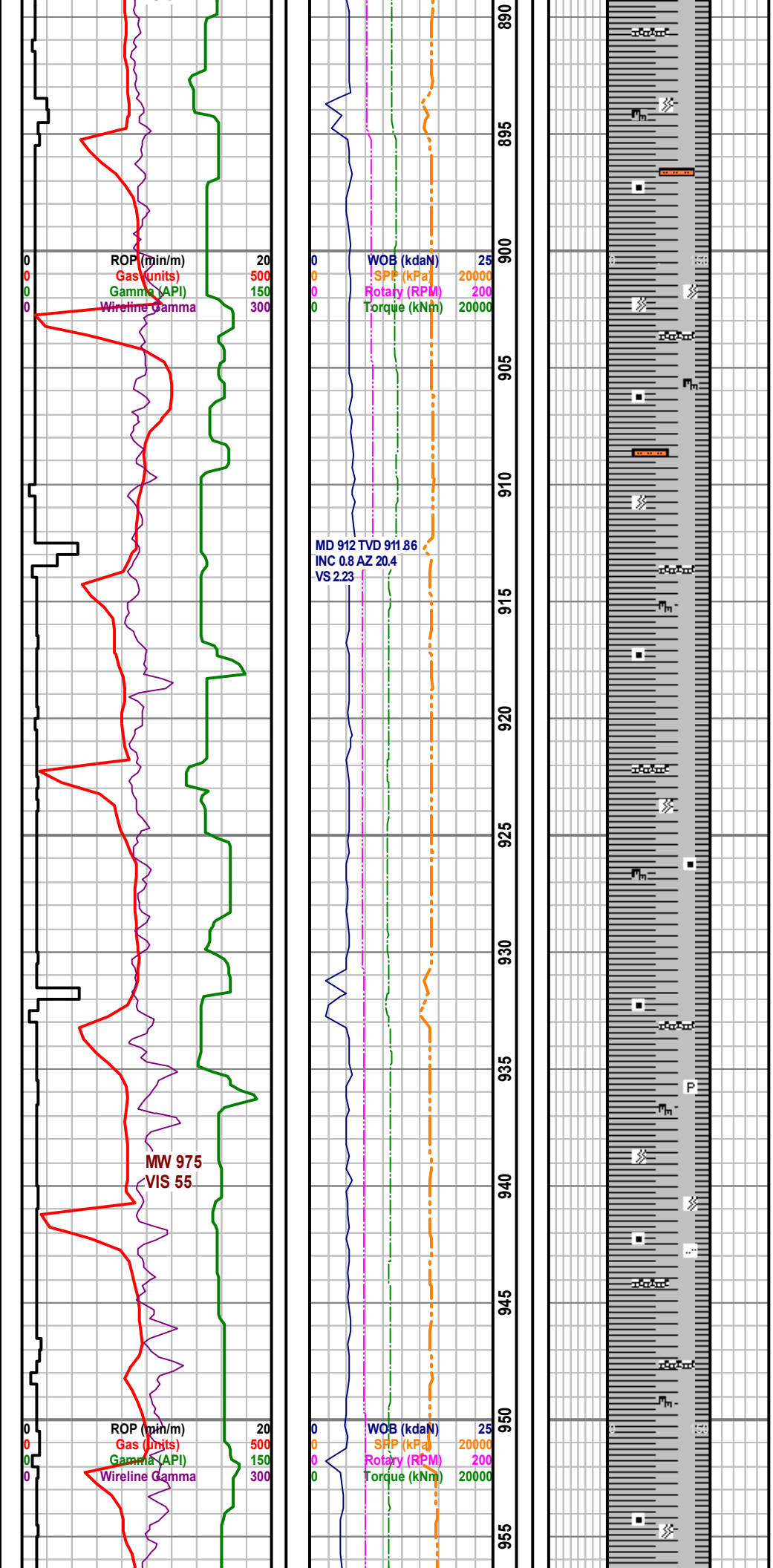
840-850 SH: med - pt dk gy, blky - plty & fis ip, pt modly carb, micmica ip, satiny tex ip, tr silty, firm, tr hd - pt sft, tr calc prtgs, tr loc calcite healing micro fracs, v mnr Sltst strgs, tt, no shows.

850-860 SH: med - pt dk gy, blky - plty & fis ip, pt modly carb, micmica ip, satiny tex ip, tr silty, firm, tr hd - pt sft, tr calc prtgs, slt incr in calcite healing micro fracs, v mnr Sltst strgs, tt, ns.

860-870 SH: med - pt dk gy, blky - plty & fis ip, pt modly carb, micmica ip, satiny waxy tex ip, tr silty, firm, tr hd - pt sft, occ calcite healing micro fracs, v mnr Sltst strgs, tt, ns.

870-880 SH: med - pt dk gy, blky - plty & fis ip, pt modly carb, micmica ip, satiny waxy tex ip, tr silty, firm, tr hd - pt sft, tr acicular calcite, occ calcite healing micro fracs, v mnr Sltst strgs, tt, ns.

880-890 SH: med - pt dk gy, blky - plty & fis ip, pt modly carb, micmica ip, satiny tex ip, firm, tr hd - pt sft, tr acicular calcite, mnr Clyst, incr to com calcite healing micro fracs.



890-900 SH: med - pt dk gy, blky - plty & fis ip, pt modly carb, micmica ip, satiny tex ip, firm, tr hd - pt sft, tr acicular calcite, incr to com calcite healing micro fracs.

900-910 SH: med - pt dk gy, blky - plty & fis ip, pt modly carb, micmica ip, satiny tex ip, firm, tr hd, sft in pt, mnr grdg to silty, tr acicular calcite, mnr Clyst, com micro fracs, tr Bent strgs.

910-920 SH: med - pt dk gy, blky - plty & fis ip, pt modly carb, micmica ip, satiny tex ip, firm, tr hd - pt sft, mnr grdg silty, mnr Clyst, tr acicular calcite, v mnr micro fracs, v rr Bent.

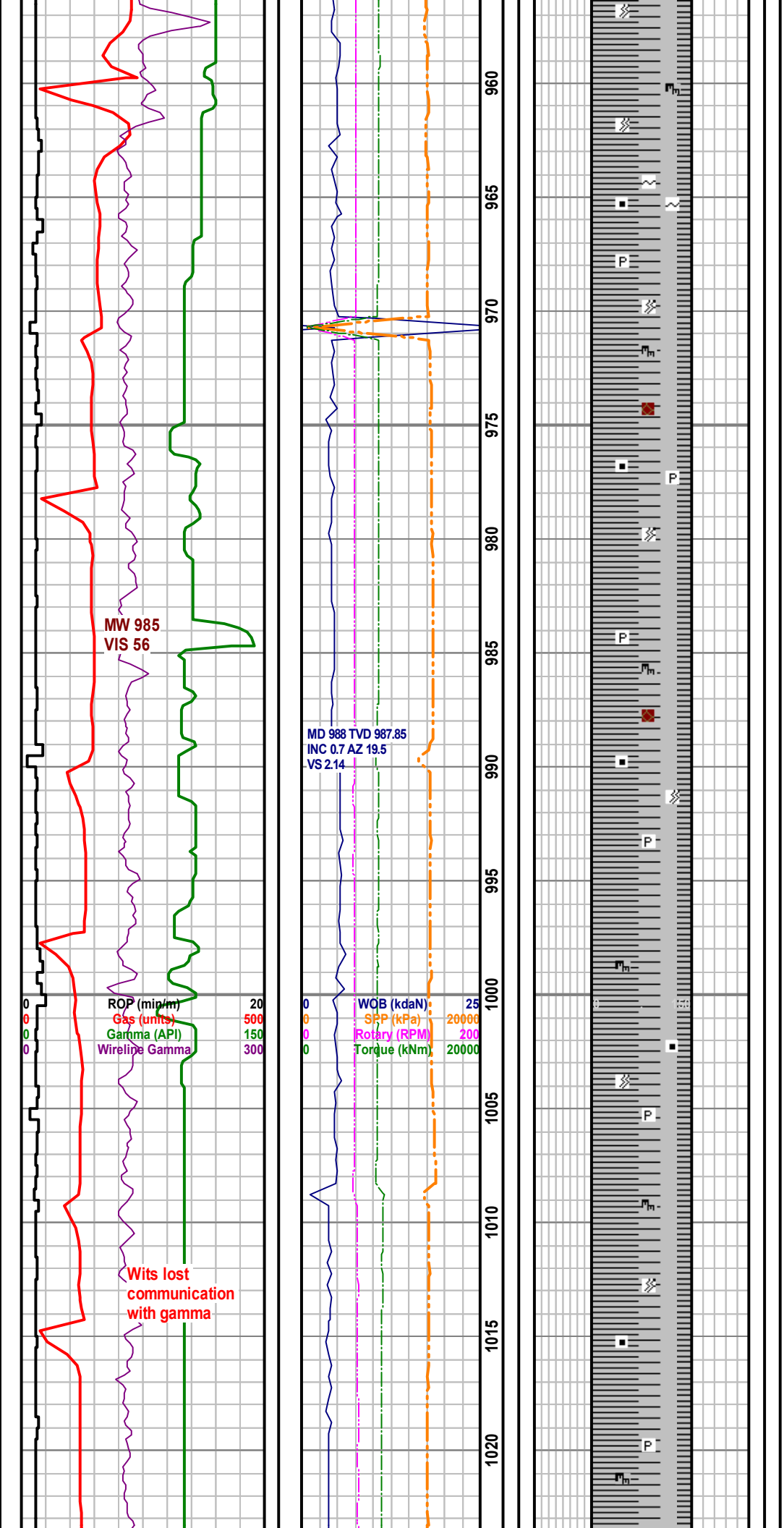
920-930 SH: med - pt dk gy, blky - plty & fis ip, pt modly carb, micmica ip, satiny tex ip, firm, tr hd, sft in pt, v rr micro fracs, mnr Clyst, v rr Bent.

930-940 SH: med - dk gy, blky - sbfis ip, pt modly carb, slly slty, occly micmica, occ v f calcite healed micro fracs, v rr pyrc, occ dk brn mica flks.

940-954 SH: med - dk gy, blky, sbfis ip, pt modly carb, slly slty, pt micmica, occ micro fracs infilled with calcite wi occ Bent, tr brn mica flks, tt, no shows

Arctic Red 954.00mMD, (953.89mTVD, -664.54mSS.)

954-960 SH: med wi dk gy, sb blky, plty - fis ip, pt modly carb wi dkr gy, pt micmica, occ micro fracs infilled with calcite.



960-970 SH: med wi dk gy, sb blky, plty - fis ip, pt modly carb wi dkr gy, pt micmica, v rrly glaucic, tr calcs prtgs, occ micro fracs healed with calcite.

970-980 SH: med wi dk gy, sb blky, plty - fis ip, pt modly carb when dkr gy, pt micmica, tr pyrc, tr sid frags, mod micro fracs healed with calcite.

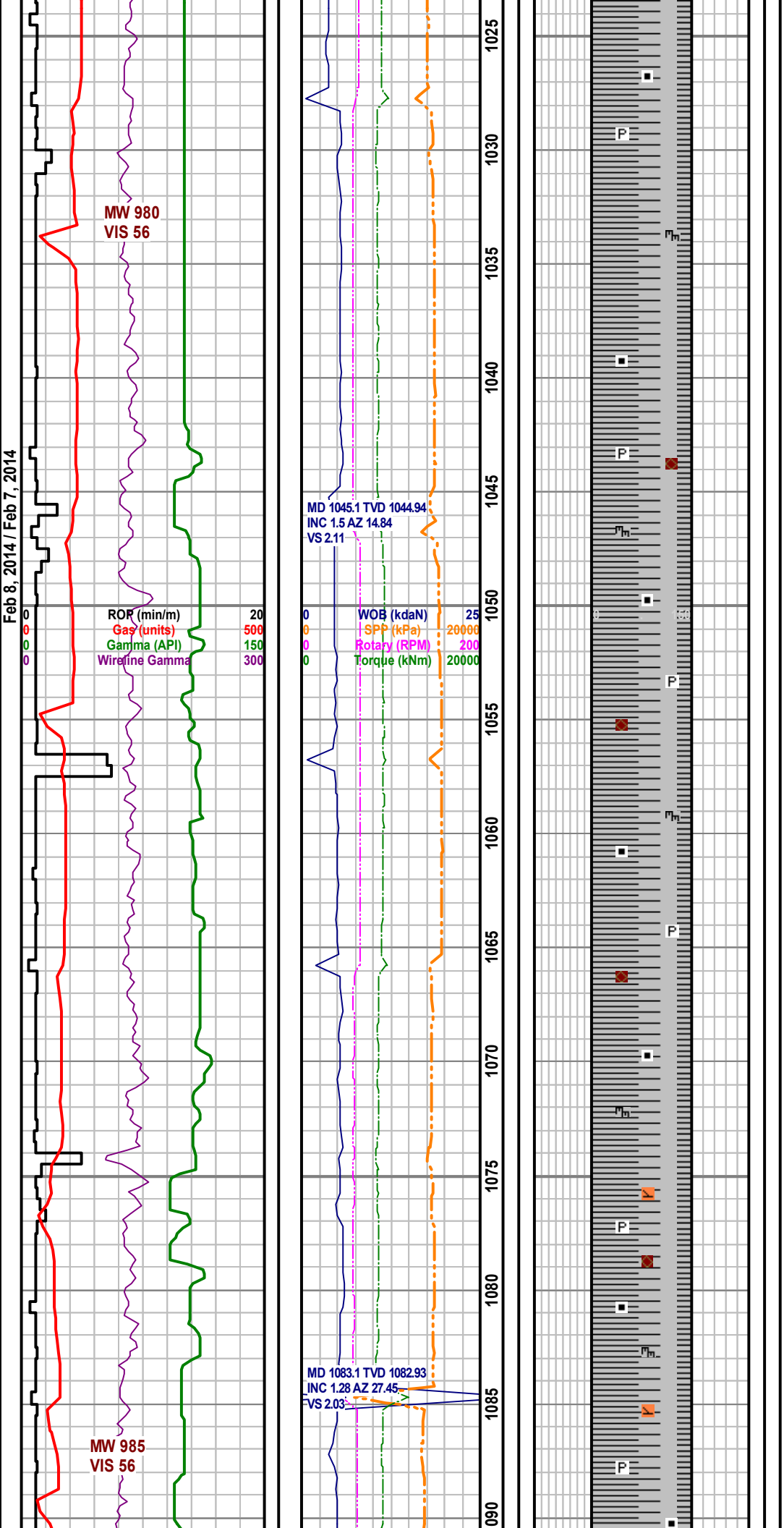
980-990 SH: med wi dk gy, sb blky, plty - fis ip, pt modly carb when dkr gy, loc micro lams vis, pt micmica, tr nod pyr, tr pyrc, v mnr sid frags, mnr micro fracs vis.

990-1000 SH: med wi dk gy, sb blky, plty - fis ip, pt modly carb when dkr gy, pt micmica, tr nod pyr, tr pyrc, v mnr sid frags, mnr micro fracs vis.

1000-1010 SH: med wi dk gy, sb blky, plty - fis ip, pt modly carb, micmica ip, tr nod pyr, tr pyrc, v mnr sid frags, tr micro fracs vis.

1010-1020 SH: med wi dk gy, sb blky, plty - fis ip, pt modly carb, micmica ip, tr nod pyr, tr pyrc, v mnr sid frags, tr micro fracs vis.

1020-1030 SH: med wi dk gy, sb blky, plty, pt carb & fis where dkr gy, micmica ip, tr nod pyr, tr pyric.



1030-1040 SH: med wi dk gy, sb blky, plty, pt carb & fis when dkr gy, micmica ip, tr nod pyr, tr pyrc.

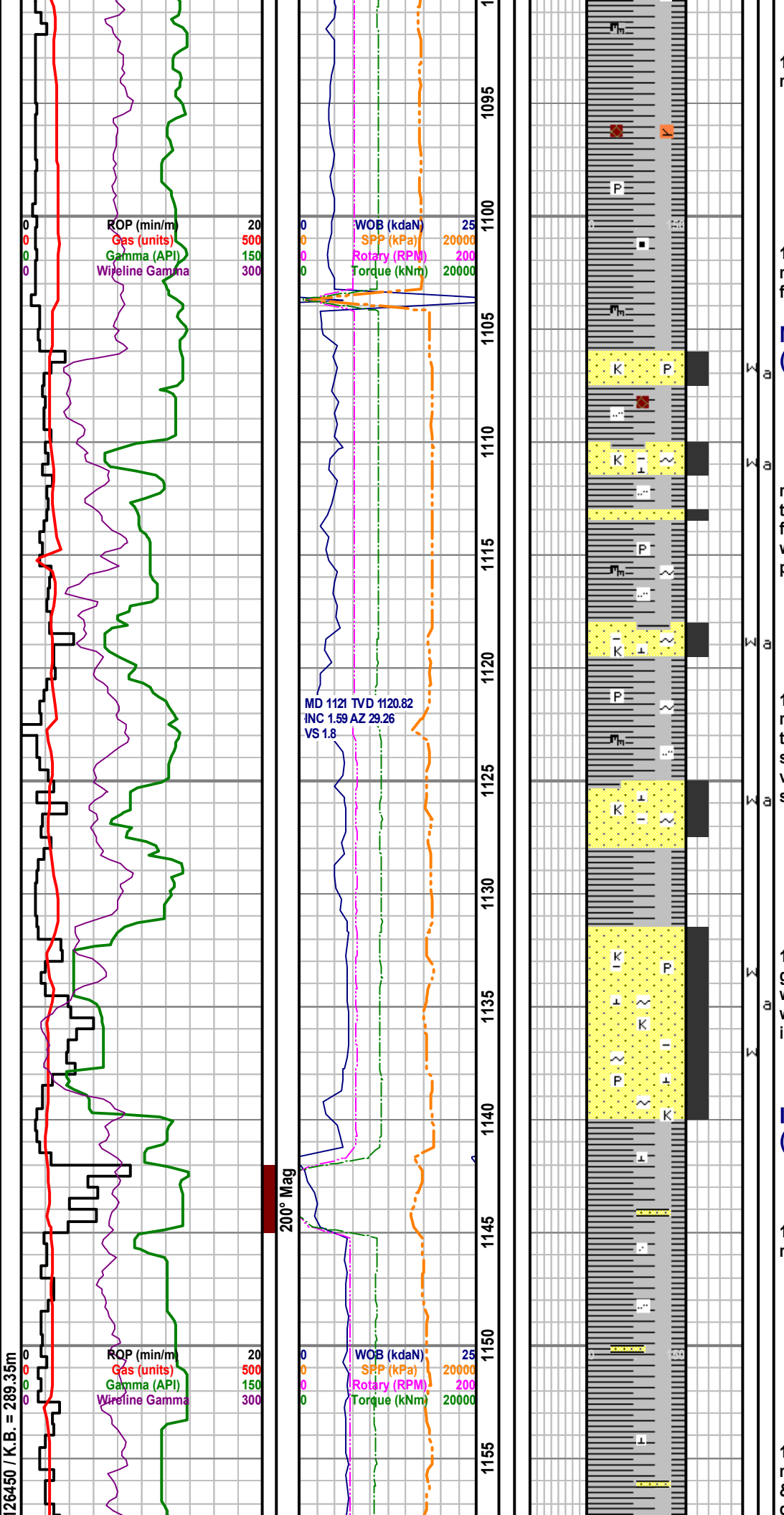
1040-1050 SH: med wi dk gy, sb blky, plty - fis ip, pt modly carb, firm - sft, micmica ip, tr nod pyr, tr pyrc, v mnr sid frags.

1050-1060 SH: med wi dk gy, sb blky, plty - fis ip, pt modly carb, firm - sft, micmica ip, tr nod pyr, v rrly pyrc.

1060-1070 SH: med wi dk gy, sb blky, plty - fis ip, pt modly carb, firm - sft, micmica ip, tr sidc, tr nod pyr, v rrly pyrc, v mnr dk brn sid frags.

1070-1080 SH: med wi dk gy, sb blky, plty - fis ip, pt modly carb, firm - sft, micmica ip, tr nod pyr, v rrly pyrc, v mnr dk brn sid frags.

1080-1090 SH: med wi dk gy, sb blky, plty - fis ip, pt modly carb, firm - sft, tr sidc, micmica ip, tr nod pyr, v rrly pyrc, v mnr dk brn sid frags.



1090-1100 SH: med wi dk gy, sb blky, plty - fis ip, pt modly carb, firm - sft, micmica ip, tr dk brn sid frags.

1100-1110 SH: med wi dk gy, sb blky, plty - fis ip, pt modly carb, firm - sft, tr sidc, micmica ip, tr dk brn sid frags.

Martin House 1106.0mMD, (1105.82mTVD, -816.47mSS.)

1110-1120 SH; med wi dk gy, sb blky, plty - fis ip, pt modly carb, silty ip, micmica ip, tr - locally com glauc, tr dk brn sid frags; SS off wh - tr lt gy, slly s&p ip, slt - v f grnd, sub ang, v w srt, qtzs, slight - mod wi tr v calc with cly cmt, locally pt - v glauc, occly pt shaley, no vis por.

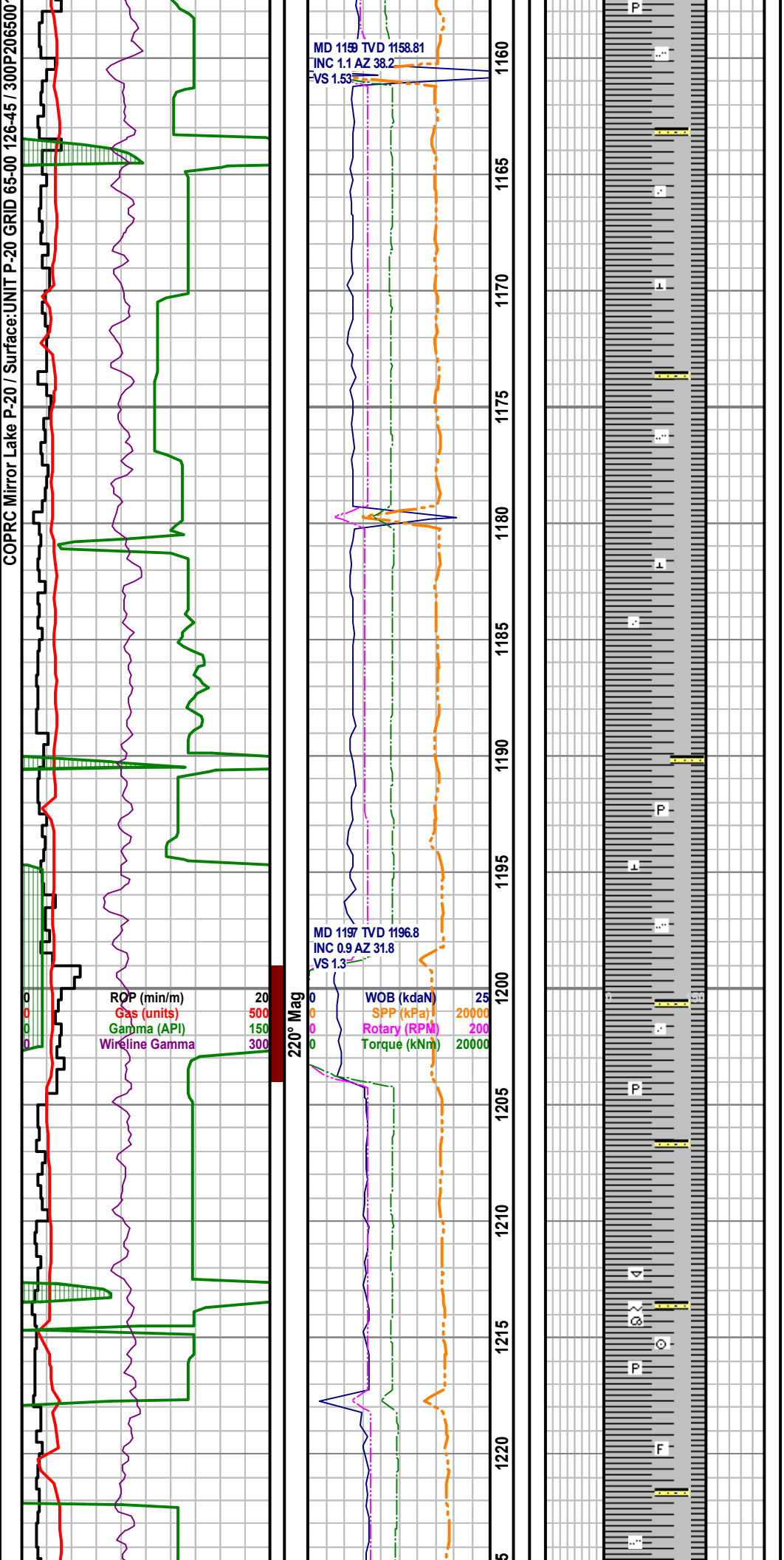
1120-1130 SH; med wi dk gy, sb blky, plty - fis ip, pt modly carb, silty ip, micmica ip, tr - locally com glauc, tr dk brn sid frags; SS off wh - occ gy grn, slly s&p ip, slt - v f grnd, sub ang, v w srt, qtzs, slight with mod & tr v calc with cly cmt, occ modly glauconitic, occly pty shaley, no vis por

1130-1140 SS: off wh - occ gy grn, slly s&p ip, slt - v f grnd, sub ang, v w srt, qtzs, slight with mod & tr v calc with cly cmt, pt glaucic, dense, tt, no vis por, SH; med wi dk gy, sb blky, plty - fis ip, pt modly carb, silty sandy ip, locally glauc, micmica ip. ns.

Imperial 1140.00mMD, (1139.81mTVD, -850.46mSS.)

1140-1150 SH: lt to med gy gn, blky & plty, slly micmica, slly calcs, tr pyrc, abnt Ss lams aa.

1150-1160 SH: lt to med gy gn, gy, blky & plty, slly micmica, slly calcs, tr pyrc, abnt Ss lams lt gy, crm, qtz & lt col cht, f gr, sub ang, w srt, calc, cly cmt in pt, glauc, sidc ip, no vis por or show.



1160-1170 SH: lt to med gy gn, gy, blky & plty, slly micmica, slly calcs, sft to modly firm, tr pyrc, abnt Ss lams lt gy, crm, spy yel brn, qtz & lt col cht, f gr, sub ang, w srt, calc, cly cmt in pt, glauc, sidc ip, no vis por or show.

1170-1180 SH: lt to med gy gn, gy, blky & plty, slly micmica, slly calcs, sft to modly firm, tr pyrc, abnt Ss lams lt gy, crm, spy yel brn, qtz & lt col cht, vf gr, sub ang, w srt, calc, cly cmt in pt, glauc, sidc ip, no vis por or show.

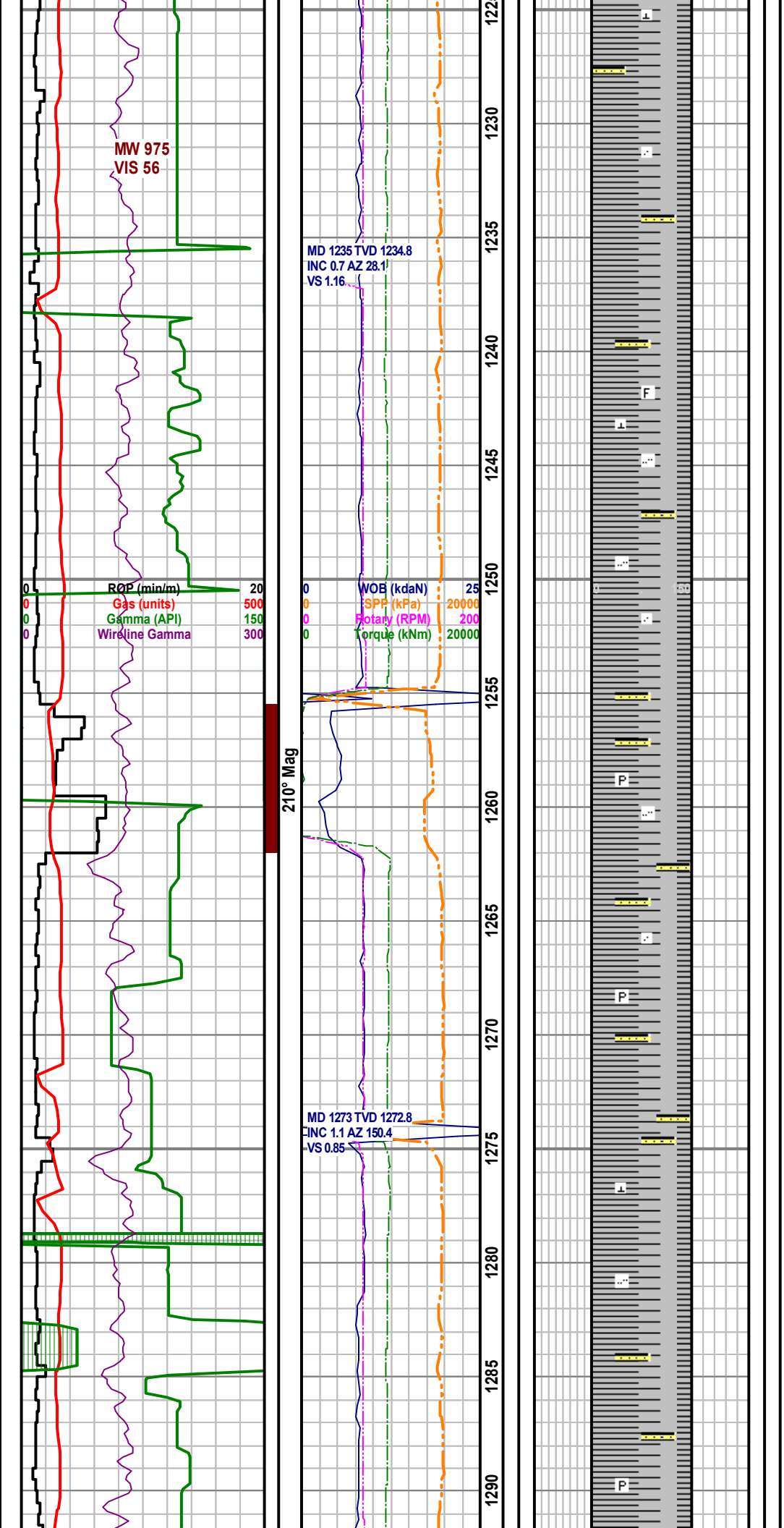
1180-1190 SH: med gy, gy gn ip, blky & plty, slly micmica, slly calcs, sft to modly firm, occly sdy, tr slty, tr pyrc, abnt Ss lams lt to med gy, spy yel brn, qtz & lt col cht, vf gr, sub ang, w srt, calc, cly cmt in pt, glauc, sidc ip, no vis por or show.

1190-1200 SH: med gy, gy gn in pt, blky & plty, slly micmica, slly calcs, sft to modly firm, occly sdy, tr slty, tr pyrc, abnt Ss lams med gy, qtz & lt col cht, vf gr, sub ang, w srt, calc, cly cmt in pt, glauc, tr sidc ip, no vis por or show.

1200-1210 SH: med gy, gy gn in pt, blky & plty, slly micmica, slly calcs, sft to modly firm, occly sdy, tr slty, tr pyrc, abnt Ss lams med gy, qtz & lt col cht, vf gr, sub ang, w srt, calc, cly cmt in pt, glauc, tr sidc ip, no vis por or show.

1210-1220 SH: med gy, gy gn in pt, blky & plty, slly micmica, slly calcs, sft to modly firm, occly sdy, tr slty, tr pyrc, tr plcy wi abnt Ss lams, gy, brn in pt, gy gn, f gr, sub ang, w srtd, cly & calcs cmt, tr pyrc, tr glauc, sidc in pt, Ost, Gast, shy in pt, tt, no shows.

1220-1230 SH: med gy, gy gn in pt, blky & plty, slly micmica, slly calcs, sft to modly firm, occly sdy, tr slty, tr pyrc, tr Plcy wi abnt Ss lams, lt to med gy, f gr, sub



tr pyrc, tr Plcy wi abnt Ss lams, lt to med gy, l gr, sub ang, w srtd, cly & calcs cmt, tr pyrc, tr glauc, sidc in pt, shy in pt, tt, no shows.

1230-1240 SH: med gy, slly dkr in pt, gy gn in pt, blky & plty, slly micmica, slly calcs, sft to modly firm, occly sdy, tr slty, tr pyrc, tr Plcy wi abnt Ss lams aa.

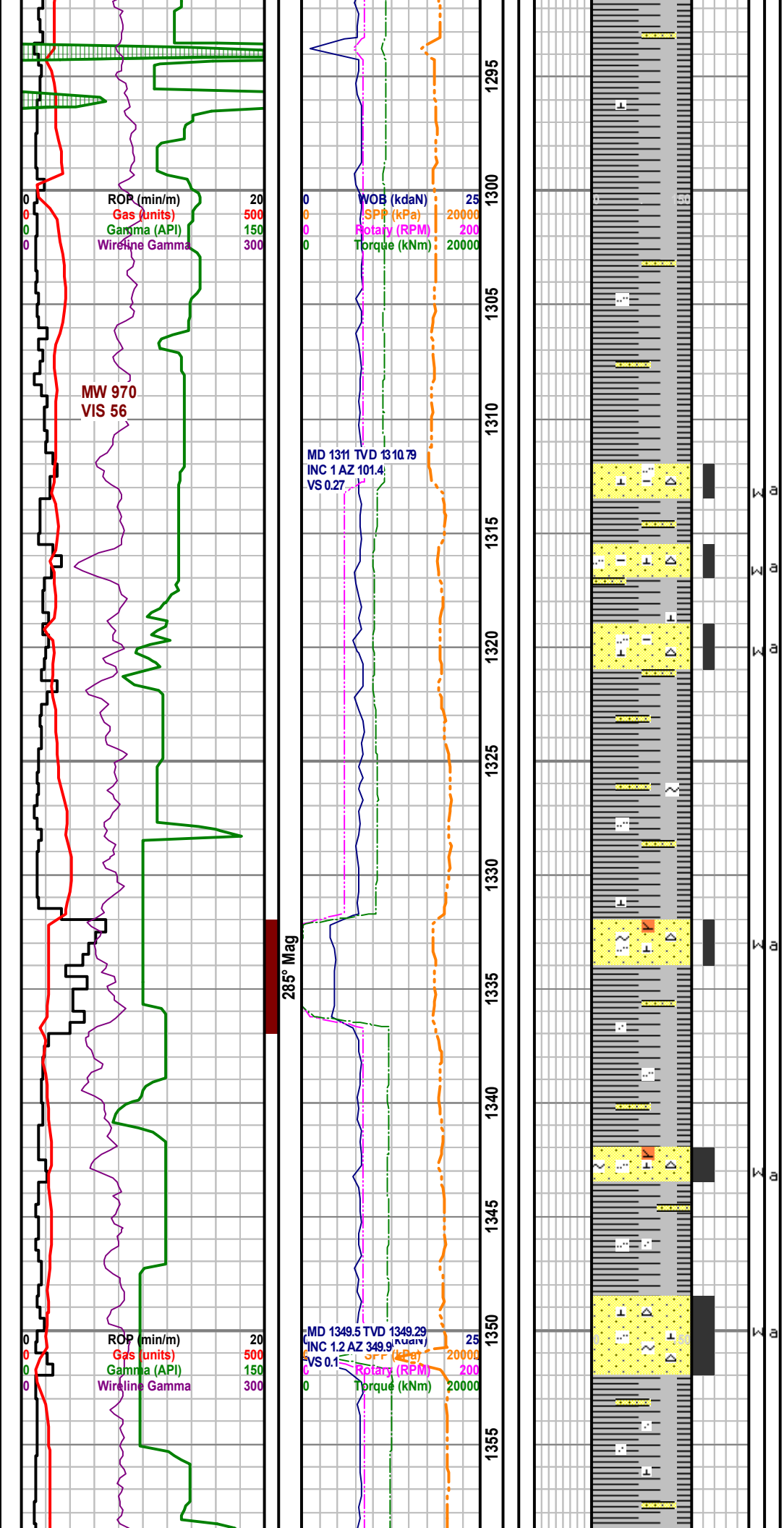
1240-1250 SH: med gy, slly dkr in pt, gy gn in pt, blky & plty, slly micmica, slly calcs, sft to modly firm, occly sdy, tr slty, tr pyrc, wi mnr Ss lams aa.

1250-1260 SH: med gy, slly dkr in pt, gy gn in pt, blky & plty, slly micmica, slly calcs, sft to modly firm, occly sdy, tr slty, tr pyrc, wi mnr Ss lams aa

1260-1270 SH: med gy, blky and plty, micmica, slly calcs, occly sdy wi 10% SS strgs, lt - med gy, l f gr, sub ang, w srtd, calc & cly cmt, tr dk lithic grs, slty, shy in pt, tt, no shows.

1270-1280 SH: med gy, blky and plty, micmica, slly calcs, occly sdy wi 20% SS strgs, lt - med gy, l f gr, sub ang, w srtd, calc & cly cmt, tr dk lithic grs, slty, shy in pt, unident fos debris, tt, no shows.

1280-1290 SH: med gy, blky and plty, micmica, slly calcs, occly sdy wi 15% SS strgs, lt - med gy, l f gr, sub ang, w srtd, calc & cly cmt, tr dk lithic grs, slty, shy in pt, unident fos debris, tt, no shows.



1290-1300 SH: med gy, blky and plty, micmica, slly calcs, occly sdy wi 10% SS strgs, lt - med gy, l f gr, sub ang, w srtd, calc & cly cmt, tr dk lithic grs, slty, shy in pt, unident fos debris, tt, no shows.

1300-1310 SH: med gy, blky and plty, micmica, slly calcs, occly sdy wi 10% SS strgs, lt - med gy, l f gr, sub ang, w srtd, calc & cly cmt, tr dk lithic grs, slty, shy in pt, unident fos debris, tt, no shows.

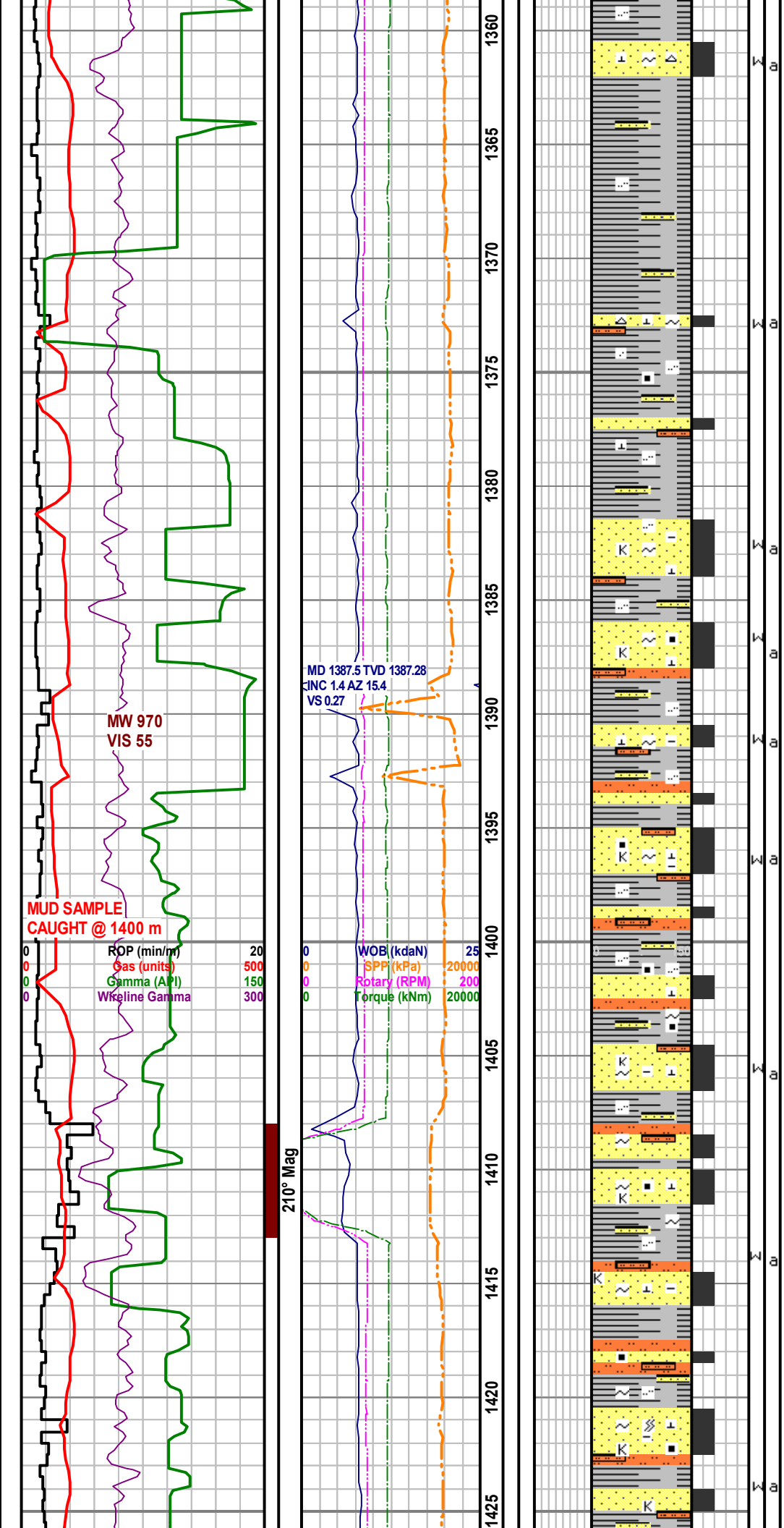
1310-1320 SH: med gy, blky and plty, micmica, slly calcs, tr sdy & slty in pt, wi 10% SS strgs, lt - med gy, l f gr, sub ang, w srtd, calc & cly cmt, tr dk lithic grs, slty, shy in pt, tt, no shows.

1320-1330 SH: med gy, blky and plty, micmica, slly calcs, tr sdy & slty in pt, wi 40% SS strgs, lt - med gy, vf - l f gr, sub ang, w srtd, calc & cly cmt, tr dk lithic grs, slly sidc, tr glauc, slty, shy in pt, tt, no shows.

1330-1340 SH: med gy, blky and plty, micmica, slly calcs, tr sdy & slty in pt, wi 30% SS strgs, lt - med gy, vf - l f gr, sub ang, w srtd, calc & cly cmt, tr dk lithic grs, slly sidc, tr glauc, slty, shy in pt, tt, no shows.

1340-1350 SH: med gy, blky and plty, micmica, slly calcs, tr sdy & slty in pt, wi 40% SS strgs, lt - med gy, vf - l f gr, sub ang, w srtd, calc & cly cmt, tr dk lithic grs, slly sidc, tr glauc, slty, shy in pt, tt, no shows.

1350-1360 SH: lt - med gy, blky and plty, micmica, slly calcs, tr carb mat, tr sdy & slty in pt, grds to shy sltst ip, wi 10% SS strgs aa.



1360-1370 SH: lt - med gy, blky and plty, micmica, slly calcs, tr carb mat, tr sdy & slty in pt, grds to shy sltst ip, wi 10% SS strgs aa.

1370-1380 SH: lt - med gy, blky and plty, micmica, slly calcs, tr carb mat, tr sdy & slty in pt, grds to shy sltst ip, wi 30% SS strgs, lt - med gy, vf gr, sub ang, w srtd, calc & cly cmt, slty, shy ip, grds to sdy sltst ip, tr dk lithic grs, tr glauc, no vis por, no show.

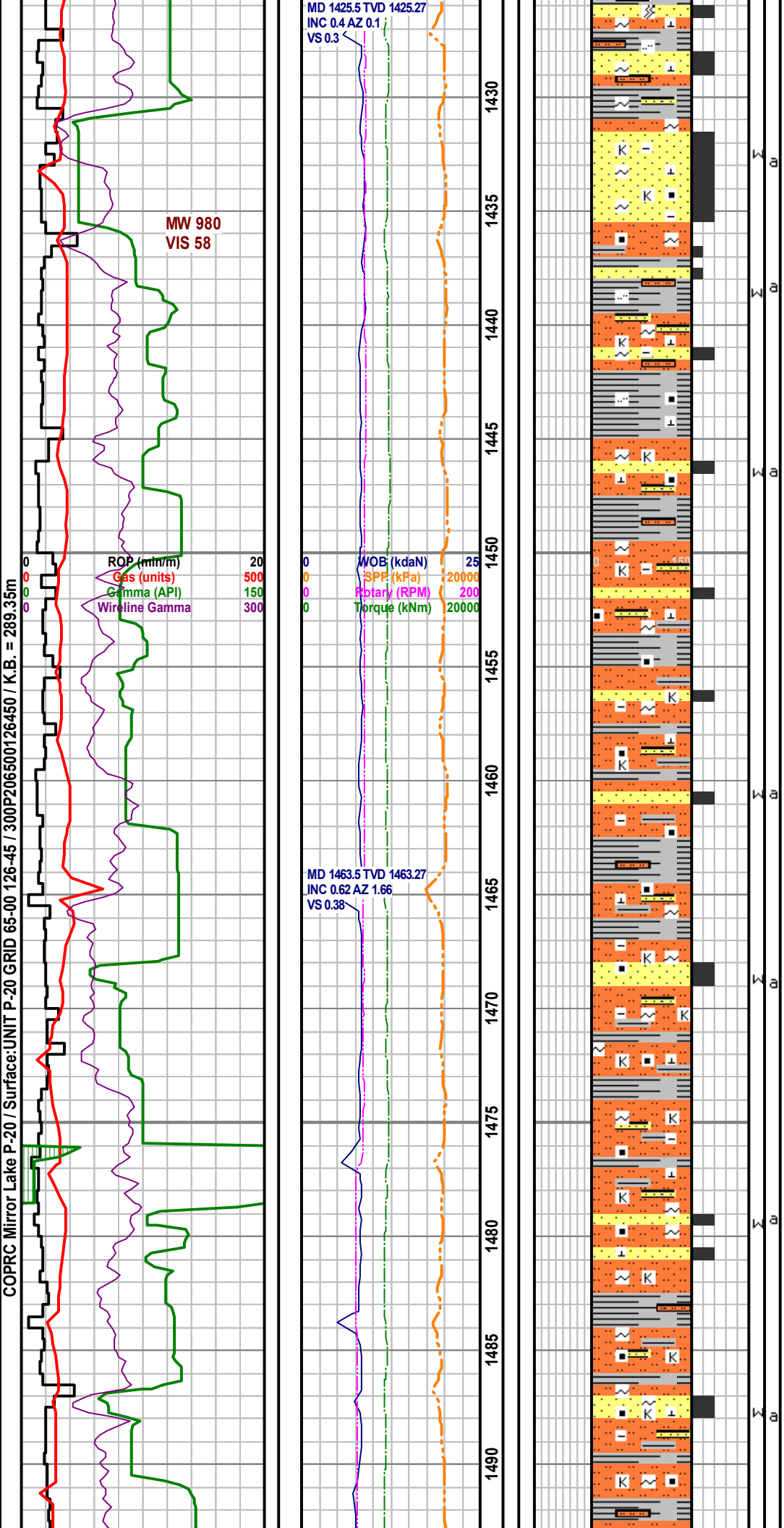
1380-1390 SH: lt - m gy, pt dkr gy, blky - plty, tr fis, pt micmica, tr carbs mat, frm brittle - pt sft, int bdd wi SS, off wh - med gy gn, slly s&p, silty - v f grnd, predly sb ang, tr dk llithic grns, occly slight - modly glauc, cly cmt, slly - modly calcs, dense, tt, pt grdg - SLTST, no shows.

1390-1400 SH: lt - m gy, pt dkr gy, blky - plty, tr fis, pt micmica, frm brittle - pt sft, int bdd wi SS, off wh - med gy gn, slly s&p, silty - v f grnd, predly sb ang, tr dk llithic grns, occly slight - modly glauc, v rr fer, cly cmt, slly - modly calcs, dense, tt, pt grdg - SLTST, no shows.

1400-1410 SH: lt - m gy, pt dkr gy, tr gy gn, blky - plty, tr fis, pt micmica, frm brittle - pt sft, int bdd wi SS, off wh - med gy gn, slly s&p, silty - v f grnd, predly sb ang, tr dk llithic grns, tr carbs mat, occly slight - modly glauc, cly cmt, slly - modly calcs, dense, tt, pt grdg - SLTST, no shows.

1410-1420 SS: off wh - gy gn, slly s&p, silty - v f grnd, sb ang, occ dk llithic grns, occly slight - modly glauc, cly cmt, slly - modly calcs, dense, tt, tr micro fracs, SH; lt - m gy, pt dkr gy, blky - plty, tr fis, pt micmica, pt silty sandy, frm brittle - pt sft.

1420-1430 SS: off wh - gy gn, slly s&p, silty - v f grnd, sb ang, occ dk llithic grns, part slight - modly glauc, cly cmt, slly - modly calcs, tr v calcs, tt, SH; lt - m gy, pt dkr gy, blky - plty, tr fis, pt micmica, tr carbs flks, pt silty sandy, frm brittle - pt sft.



1430-1440 SS: off wh - gy gn, slly s&p, silty - v f grnd, sb ang, occ dk llithic grns, occly slight - modly glauc, cly cmt, slly - modly calcs, tr v calcs, dense, tt, ns,

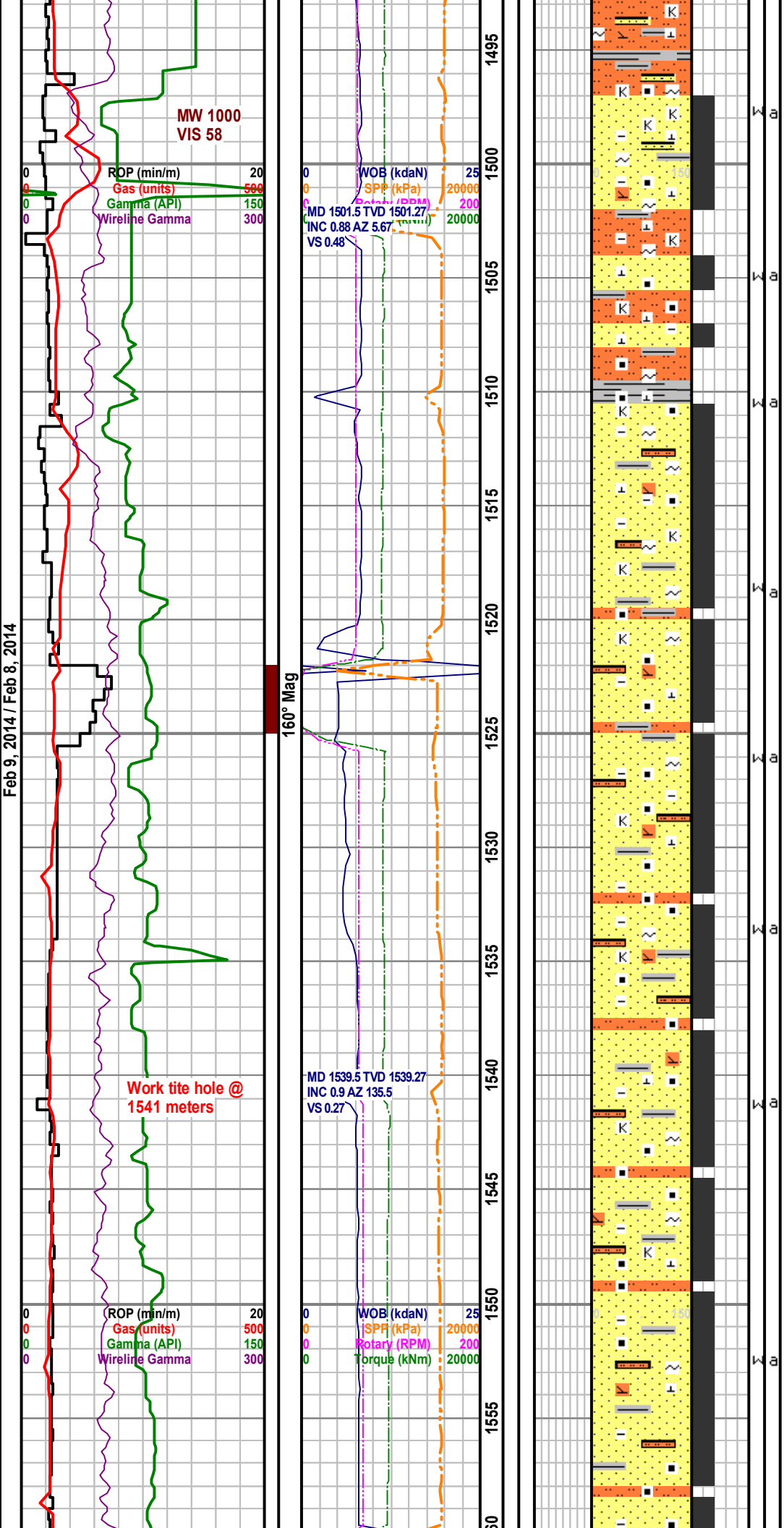
1440-1450 SLTST: lt gy, slly s&p, qtzs, cly wi slight - tr v calcs cmt, tr carbs flks, occly grdg - v f Ss, glauc ip, tt, no shows, intbdd wi SH; lt - m gy, sb blky - plty, tr fis, pt micmica, mnr carbs flks, more comly silty sandy.

1450-1460 SLTST: off wh - lt gy, slly s&p, qtzs, cly wi slight - tr v calcs cmt, com scat carbs flks, occly grdg - v f Ss, glauc ip, tt, no shows, intbdd wi SH; lt - m gy, sb blky - plty, tr fis, pt micmica, mnr carbs flks, more comly silty sandy.

1460-1470 SLTST: off wh - lt gy, tr bff wh, slly s&p, qtzs, cly wi slight - tr v calcs cmt, mod - tr v com carbs mat, occly grdg - v f Ss, glauc ip, tt, no shows, intbdd wi SH; lt - m gy, sb blky - plty, tr fis, pt silty sandy, pt micmica, mnr carbs flks, satiny tex ip.

1470-1480 SLTST: off wh - lt gy, slly s&p, qtzs, cly wi pt calcs cmt, mod - tr v com carbs mat, tr glauc, tt, intbdd wi SH; lt - m gy, sb blky - plty, tr fis, satiny tex ip.

1480-1490 SLTST: off wh - lt gy, slly s&p, qtzs, cly wi tr local calcs cmt, mod carbs mat, tr locly glauc, tt, tr grdg to SS; off wh - lt gy, slly s&p, v f qtz grns, sb ang, cly tr calcs cmt, tr carbs flks, intbdd wi SH; lt - m gy, sb blky - plty, tr fis, satiny tex ip.



1490-1500 SLTST: off wh - lt gy, pale gn gy, slly s&p, qtzs, cly wi more com calcs reaction, mod carbs mat, pt glauc, tt, grdg to SS; off wh - lt gy, pale gn gy, tr bff wh, slly s&p, lithic, v f qtz grns, sb ang, cly wi more com calcs cmt, mnr SH, ns.

1500-1510 SLTST: off wh - lt gy, pt pale gn gy, slly s&p, qtzs, lithic, cly wi slight wi tr v calcs reaction, mod carbs mat, pt modly - tr v glauc, tt, grdg ip to SS; off wh - lt gy, pale gn gy, tr bff wh, slly s&p, lithic, silt - v f qtz grns, sb ang, cly wi increasing calcs cmt, sidic, mnr SH, ns.

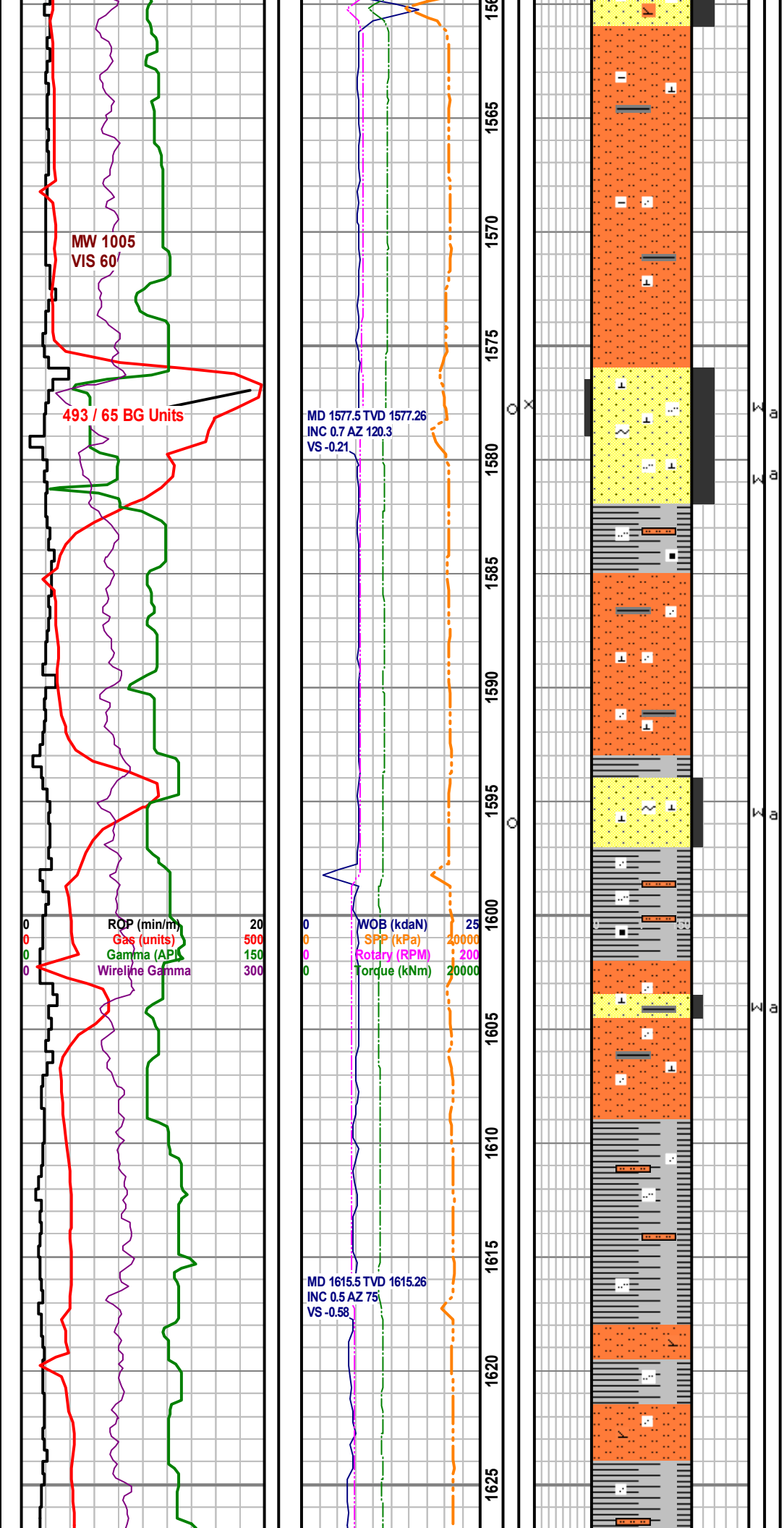
1510-1520 SS: off wh - lt gy, pt pale gn gy, tr bff wh, slly s&p, lithic, silt - l v f qtz grns, sb ang, cly wi slight and tr v calcs cmt, sidic, arg ip, mnr carbs flks, glauc ip, firm - pt hd, grdg - SLTST ip, mnr silty SH.

1520-1530 SS: off wh - lt gy, tr bff wh, slly s&p, lithic, silt - l v f qtz grns, sb ang, cly wi tr calcs cmt, sidic, arg ip, v f carbs mat seen through out, tr locly glauc, firm - pt hd, grdg ip - SLTST, mnr SH.

1530-1540 SS: off wh - lt gy, slly s&p, lithic, silt - l v f qtz grns, sb ang, predly cly cmt wi v mnr calcs cmt, arg ip, v f carbs mat, tr glauc, sidic, firm - pt hd, grdg ip - SLTST, mnr SH stgrs.

1540-1550 SS: off wh - lt gy, slly s&p, lithic, silt - l v f qtz grns, sb ang, predly cly cmt wi v mnr calcs cmt, arg ip, sidic, v f carbs mat, tr glauc, firm - pt hd, grdg ip - SLTST, mnr SH stgrs.

1550-1560 SS: off wh - lt gy, slly s&p, lithic, silt - l v f qtz grns, sb ang, predly cly cmt wi occ calcs cmt, arg ip, sidic, v f carbs mat, tr glauc, firm - pt hd, occly grdg - SLTST, mnr SH stgrs.



1560-1570 SLTST: lt - med gy, cly cmt, slly calcs in pt, sdy & shy in pt, occly grds to silty vf gr ss in pt, occ carb mat, tr dk lithic grs, tt, no shows / mnr Sh lams, med - dk gy, blky & plty, slly micmica, slty in pt, slly carb.

1570-1580 SS: crm - sp tan, qtzs, u vf gr, sub ang, w srtd, calc, minor dk lithic grs, p tr glauc, tt to p intgr por 2%, sp tan dd o stn, pale yel dry flor, pale yel v slow stmg cut flor, wi Sh & Sltst aa.

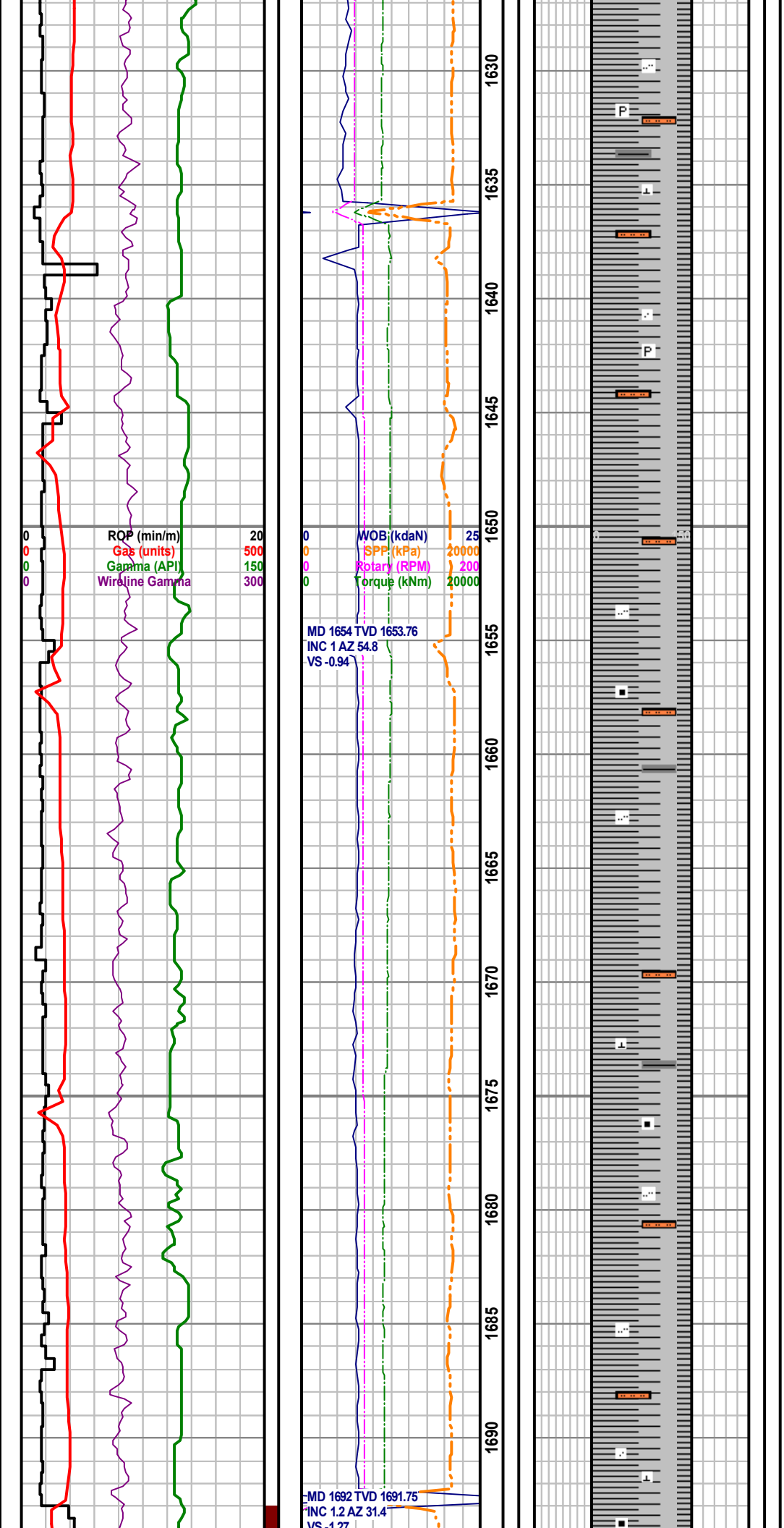
1580-1590 SS: aa wi Sltst aa wi SH med gy, blky, plty in pt, mic mica, occly slty, slly carb.

1590-1600: SS crm - sp tan, qtzs, l vf gr, sub ang, w srtd, calc, minor dk lithic grs, tr glauc, no vis por, sp tan dd o stn, pale yel dry flor, pale yel v slow stmg cut flor, wi intbd Sh & Sltst aa.

1600-1610 SH: med - slly dkr gy, blky - sub plty, micmica, occly slty, tr sidc in pt, minor carb specks, sslly sdy in pt, wi intbdd Sltst & Ss aa.

1610-1620 SH: med - slly dkr gy, blky - sub plty, micmica, occly slty, tr sidc in pt, minor carb specks, slly sdy in pt, wi intbdd Sltst lt - med gy, calc & cly cmt, sdy, grds to vf gr ss in pt, slly shy, tr dk lithic grs, tr carb mat, tr mica flakes, tt, no show / mnr Ss aa.

1620-1630 SH: aa wi Sltst aa & occ brn Sltst, sidc, slly calcs, sdy occly grds to vf gr ss ip, occly shy, tt, no show.



1630-1640 SH: med gy, slly dkr gy in pt, blky, sub fis in pt, slly micmica, tr slty ip, tr pyr nod wi intbdd Sltst strgs aa.

1640-1650 SH: med gy, slly dkr gy in pt, plty & sub fis, blky in pt, slly micmica, tr slty ip, tr pyr nod wi intbdd Sltst strgs aa.

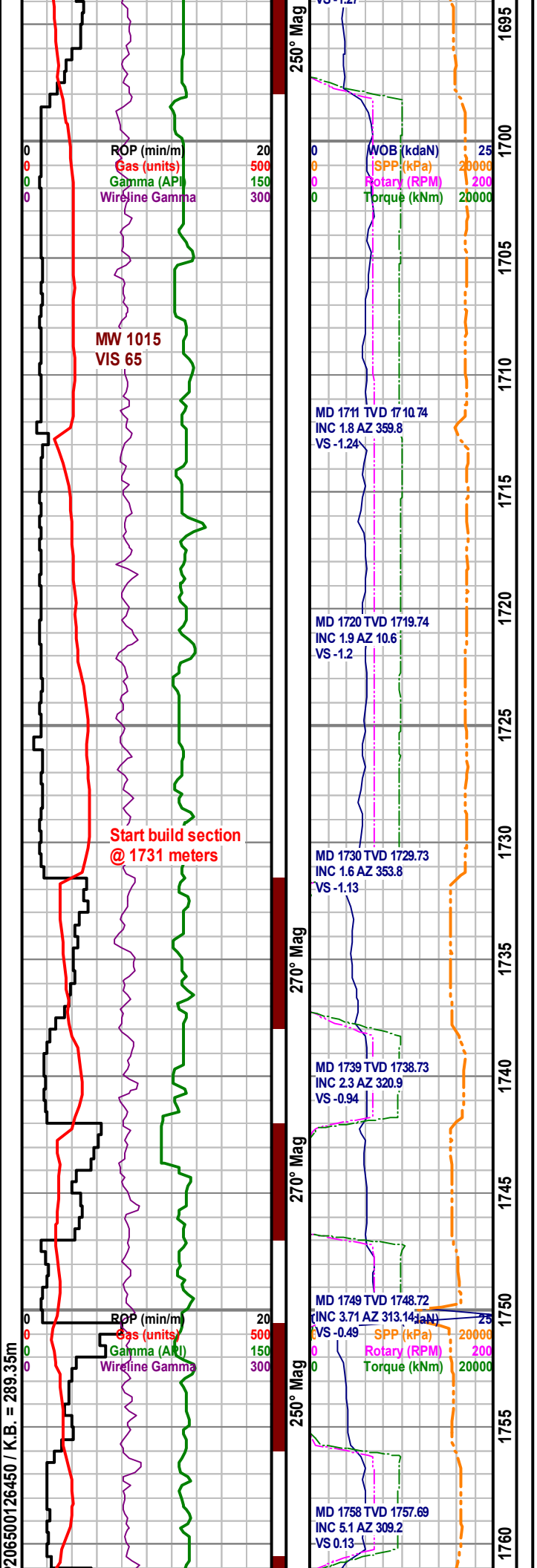
1650-1660 SH: med gy, slly dkr gy in pt, plty & sub fis, blky in pt, slly micmica, tr slty ip, tr minor carb mat, tr mnr sltst strgs aa.

1660-1670 SH: med gy, slly dkr gy in pt, plty & sub fis, blky in pt, slly micmica, tr slty ip, tr minor carb mat, tr mnr Sltst strgs, med gy, slly calcs & cly cmt, tr dk lithic grs, shy, tt, no shows.

1670-1680 SH: predly med gy, slly dkr gy in pt, plty & sub fis, blky in pt, slly micmica, slty ip, tr minor carb mat, tr mnr Sltst strgs aa.

1680-1690 SH: predly med gy, slly dkr gy in pt, plty & sub fis, blky in pt, slly micmica, slty ip, tr minor carb mat, tr mnr Sltst strgs aa.

1690-1700 SH: predly med gy, slly dkr gy in pt, plty &



1690-1700 SH: predly med gy, slly dkr gy in pt, plty & sub fis, blky in pt, slly micmica, slty ip, tr minor carb mat, tr mnr Sltst strgs aa.

1700-1710 SH: predly med gy, slly dkr gy in pt, plty & sub fis, blky in pt, slly micmica, slty ip, tr minor carb mat, tr mnr Ls strgs, crm - bf, mudst - wkest, tr unident fos frags (Gast) dns, no shows.

1710-1720 SH: predly med gy, slly dkr gy in pt, plty & sub fis, blky in pt, slly micmica, slty ip, tr minor carb mat, tr mnr Sltst strgs aa.

1720-1730 SH: predly med gy, slly dkr gy in pt, plty & sub fis, blky in pt, slly micmica, slty ip, tr minor carb mat.

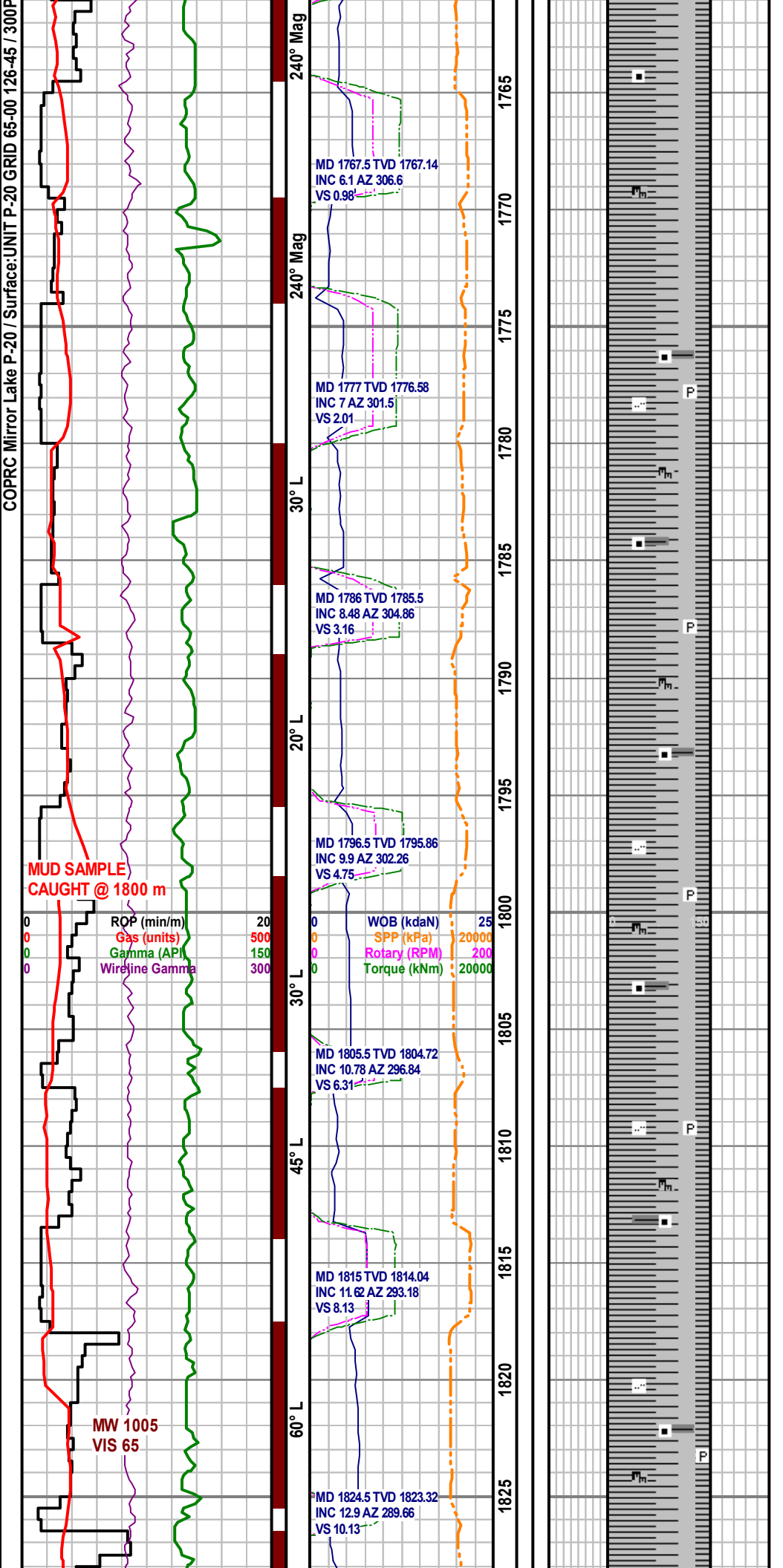
KOP (5°/30m)
1731.00mMD, (1730.73mTVD, -1441.38mSS.)
February 9th, 2014 @ 11:48 hrs

DIRECTIONAL:
Vertical Section Azimuth: 285.025°
Motor Bend: 1.59°
Magnetic Declination: 22.846°
Survey tool offset: 21.00m
Gamma offset: 14.97m

1730-1740 SH: predly med gy, slly dkr gy in pt, plty & sub fis, blky in pt, slly micmica, slty ip, tr minor carb mat.

1740-1750 SH: predly med gy, slly dkr gy in pt, plty & sub fis, blky in pt, slly micmica, tr slty ip, tr minor carb mat.

1750-1760 SH: predly med gy, slly dkr gy in pt, plty & sub fis, blky in pt, slly micmica, tr slty ip, tr minor carb mat.



1760-1770 SH: predly med gy, tr mnr dkr gy in pt, plty & sub fis, slly micmica, tr slty ip, tr minor carb mat.

1770-1780 SH: predly med gy, tr mnr dkr gy in pt, plty & sub fis, tr blky, slly micmica, tr slty ip, tr minor carb mat.

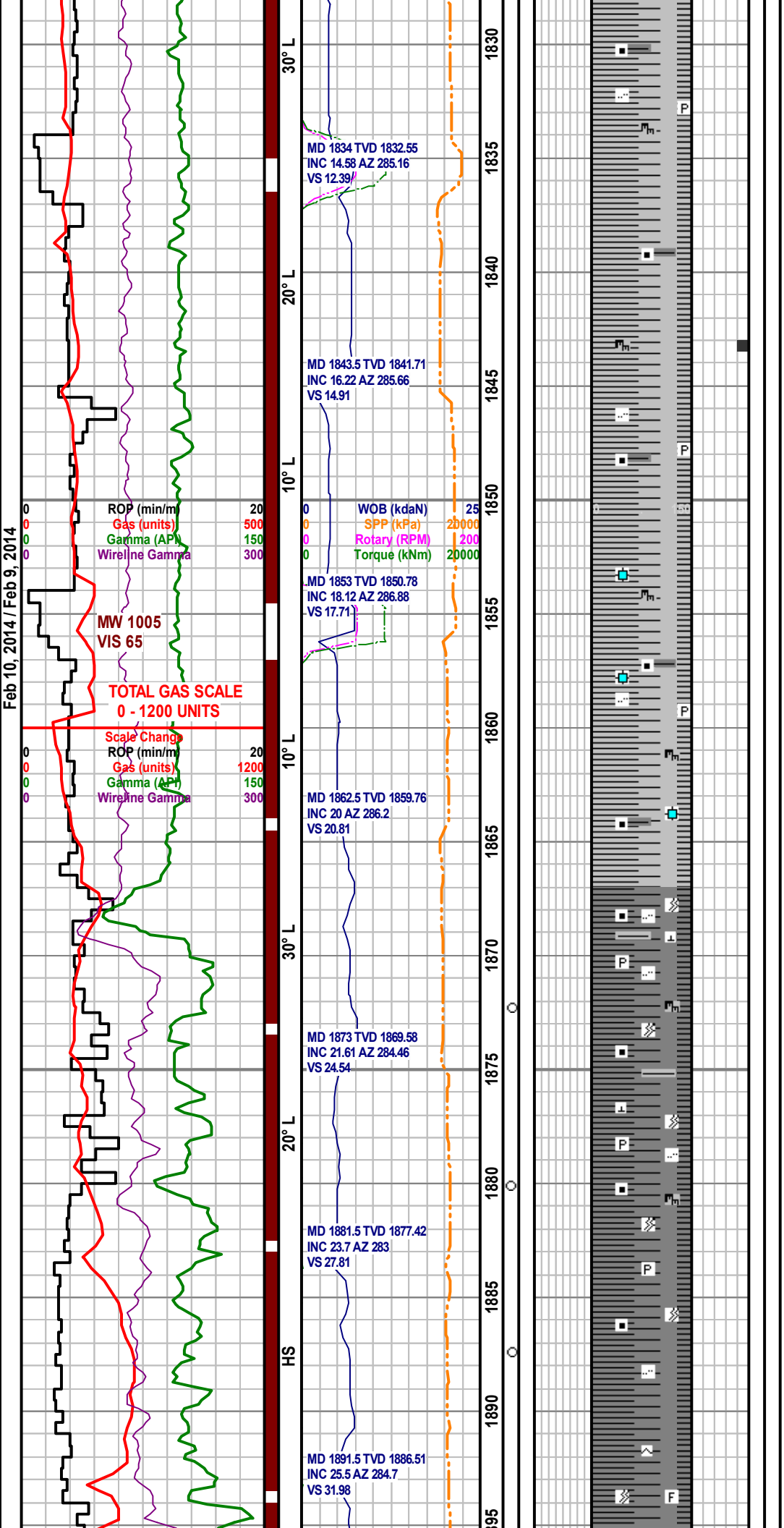
1780-1790 SH: med gy - pt dkr gy, sb fis - fis, pt plty, tr sb blky, pt micmica, arg, satiny waxy app, tr scattered v f carbs mat, tr locly silty, sparse pp dism pyr, sft - pt firm, v rr grdg silty, com w grnd cuttings.

1790-1800 SH: med gy - pt dkr gy, sb fis - fis, pt plty, tr sb blky, satiny waxy app, pt micmica, arg, tr scattered v f carbs mat, sparse pp dism pyr, tr locly silty, sft - pt firm, v rr grdg silty.

1800-1810 SH: med gy - pt dkr gy, sb fis - fis, pt plty, tr sb blky, pt micmica, satiny waxy app, arg, sparse pp dism pyr, tr scattered v f carbs mat, tr locly silty, sft - pt firm, com w grnd cuttings.

1810-1820 SH: med gy - pt dkr gy, sb fis - fis, pt plty, tr sb blky, pt micmica, arg, satiny app, sparse pp dism pyr, decreased amount to v mnr scattered v f carbs mat, sft - pt firm.

1820-1830 SH: med gy - tr dkr gy, sb fis - fis, pt sb blky - plty, pt micmica, satiny app, arg, slly carbs ip, tr pp dism pyr, tr loc carbs mat, sft - pt firm, com w grnd cuttings.



1830-1840 SH: med gy - tr dkr gy, sb fis - fis, pt sb blky - plty, pt micmica, arg, slly carbs ip, tr pp dism pyr, v mnr grdg silty, sft - pt firm, com w grnd cuttings.

1840-1850 SH: med gy - tr dkr gy, sb fis - fis, pt sb blky - plty, pt micmica, arg, slly carbs ip, tr pp dism pyr, satiny app, v mnr grdg silty, sft - pt firm, com w grnd cuttings.

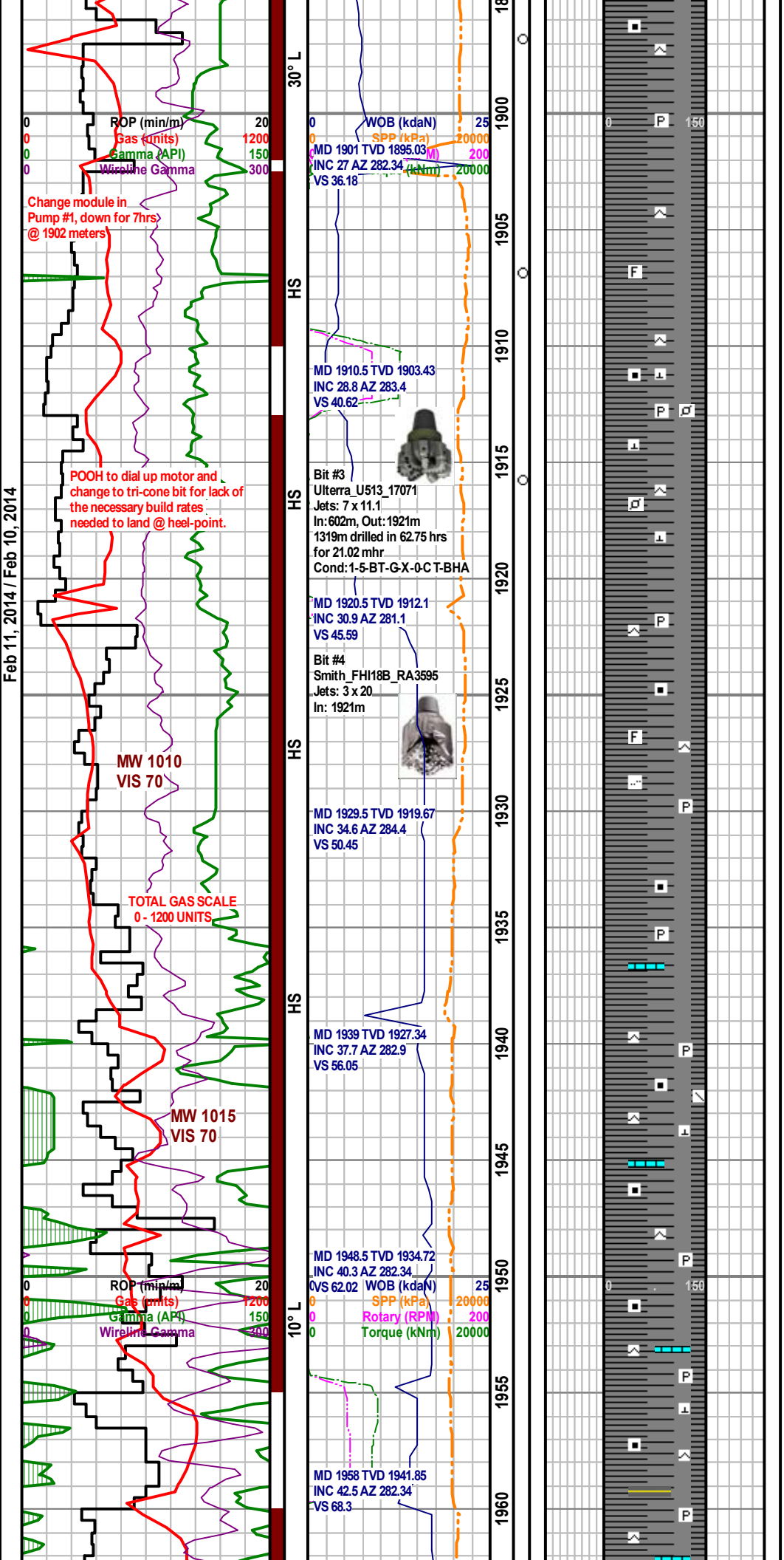
1850-1860 SH: med gy - tr dkr gy, sb fis - fis, pt sb blky - plty, pt micmica, arg, slly carbs ip, locly com v f LMST grns (v gd calcs reac), tr pp dism pyr, satiny app, v mnr grdg silty, sft - pt firm, com w grnd cuttings.

1860-1867 SH: med gy - tr dkr gy, sb fis - fis, pt sb blky - plty, pt micmica, arg, slly carbs ip, locly com v f LMST grns (v gd calcs reac), tr pp dism pyr, sft - pt firm.

1867-1880 SH: brn blk - blk, mnr med brn, rr med gy, predly carbs, micmica ip, blky - sb blky - fiss ip, sft - firm, tr locly calcitic, tr calcite filled micro fracs, tr pyric, com dism pp pyr, silty tex ip, tr silty micro lams, no flor, v slow wk pale halo cut.

1880-1890 SH: brn blk - blk, mnr med brn, predly carbs, blky - sb blky - fiss ip, firm britlle - pt sft, tr calcite filled micro fracs, tr pyric, silty tex ip, no flor, v slow wk pale halo cut.

1890-1900 SH: v dk gy, blky, sub fis, slly micmica, sils, hd, brit in pt, carb, slty tex, pyrc / pyr nod, g tr spic, tr small frac infilled wi calcite, sh occly brn & bits & soft (bit damage?), v slow weak pale yel cloudy cut.



Upper Canol 1902.7m MD, (1896.54mTVD, -1607.19mSS.)

1900-1910 SH: v dk gy, blky, sub fis, slly micmica, sils, hd, brit in pt, carb, slty tex, tr pyrc, tr spic, sh occly brn & bits (bit damage?), show aa.

1910-1920 SH: v dk gy, tr blk, blky, sub fis, slly micmica, sils, bcmg calc in pt, hd, brit in pt, carb, slty tex, tr pyrc / pyr nod, tr fos casts(pels?), wi tr mnr dk gy brn bits sh aa, wi show aa.

1920-1930 SH: dk gy - blk, blky, sub fis, slly micmica, sils, calc in pt, hd, brit in pt, carb, slty tex, tr pyrc / pyr nod, wi show aa.

DIRECTIONAL:	In at 1921m
VS Azimuth:	285.025°
Motor Bend:	1.93°
Magnetic Dec:	22.846°
Survey tool offset:	21.00m
Gamma offset:	15.02m

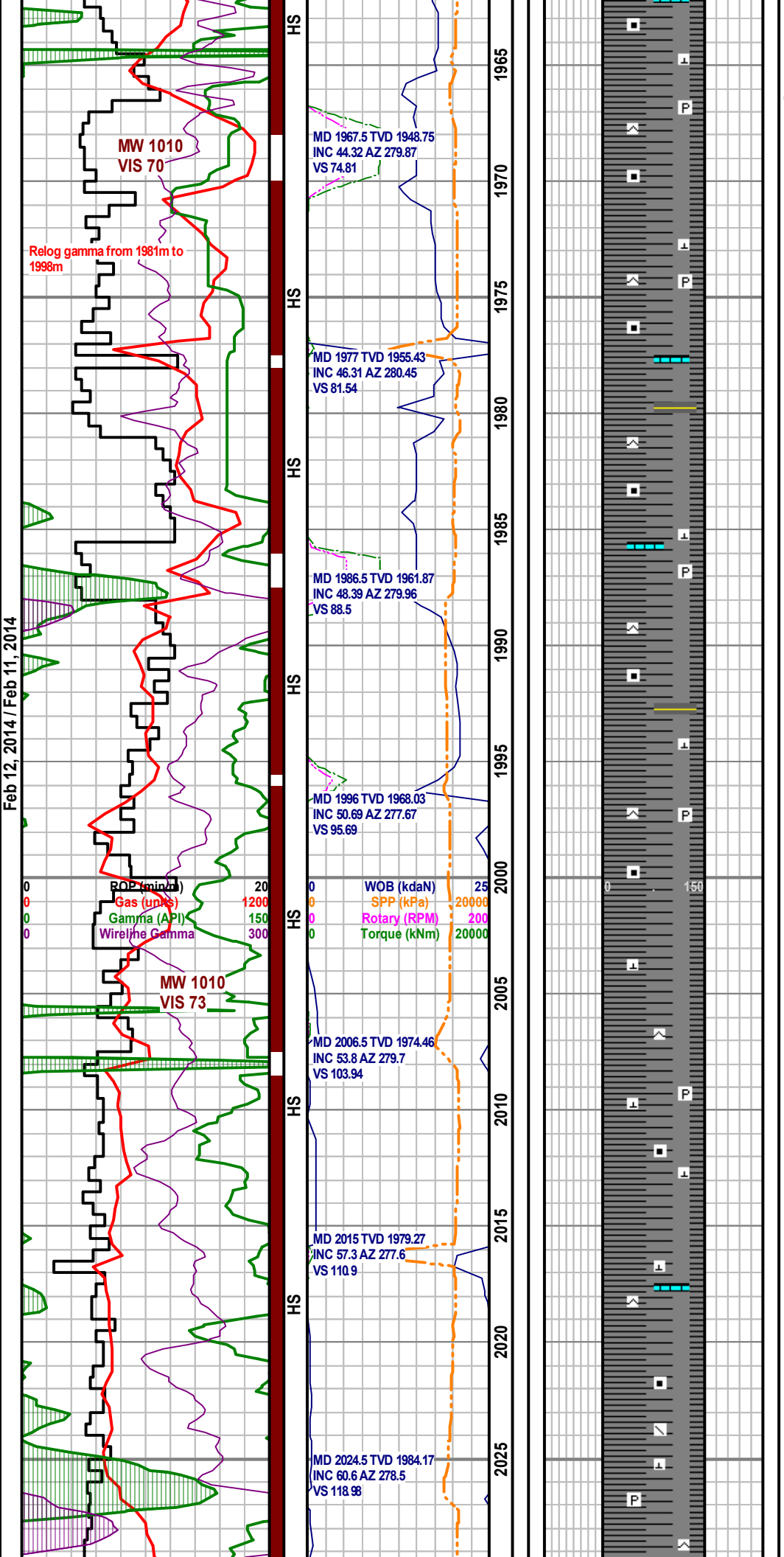
1930-1940 SH: dk gy, occly grds to blk, blky, sub fis in pt, sils, hd, occly brit, tr pyrc / occ pyr nods, slly calc in pt, pale yel cloudy flor in solvent, tr mnr Ls strgs, mot gy wh, arg, dns.

Lower Canol 1935.8m MD, (1924.75mTVD, -1635.4mSS.)

1940-1950 SH: dk gy, occly grds to blk, blky, sub fis in pt, sils, hd, occly brit, tr pyrc / occ pyr nods, slly calc in pt, brn sft bits sh in pt, pale yel cloudy flor in solvent, incrg hydc odor, tr Ls lams aa.

1950-1960 SH: v dk gy, brn blk - blk, mod - v carbs ip, sil cmt, blky - sb blky, tr fiss, firm - hd ang chips, rr calcs ptgs, tr pyric banding, tr pyritized, pp dism pyr com, no flor, wi occ SH gy brn, blky, sft, bits, wk slow pale cldy yel cut.

1960-1970 SH: v dk gy, blk, brn blk, carbs - less carbs



where more sil, sil / tr loc weak calc cmt, blky - sb blky, tr locly fiss, firm - hd, loc v f pyric banding, pp dism pyr com, tr muddy shaley LMST stgrs, no flor, v slow wk cloudy pale yel halo cut.

Bit Depth Correction
Relog gamma from 1981m to 1998m

1970-1980 SH: v dk gy, blk, pt brn blk, carbs - modly carbs, sil / tr loc weak calc cmt, blky - sb blky, shards ip, firm, v firm - hd, loc v f pyric banding, pp dism pyr com, tr nod pyr, tr muddy shaley LMST stgrs, no flor, wi occ SH gy brn, blky, sft, bits, wk slow pale cldy yel cut.

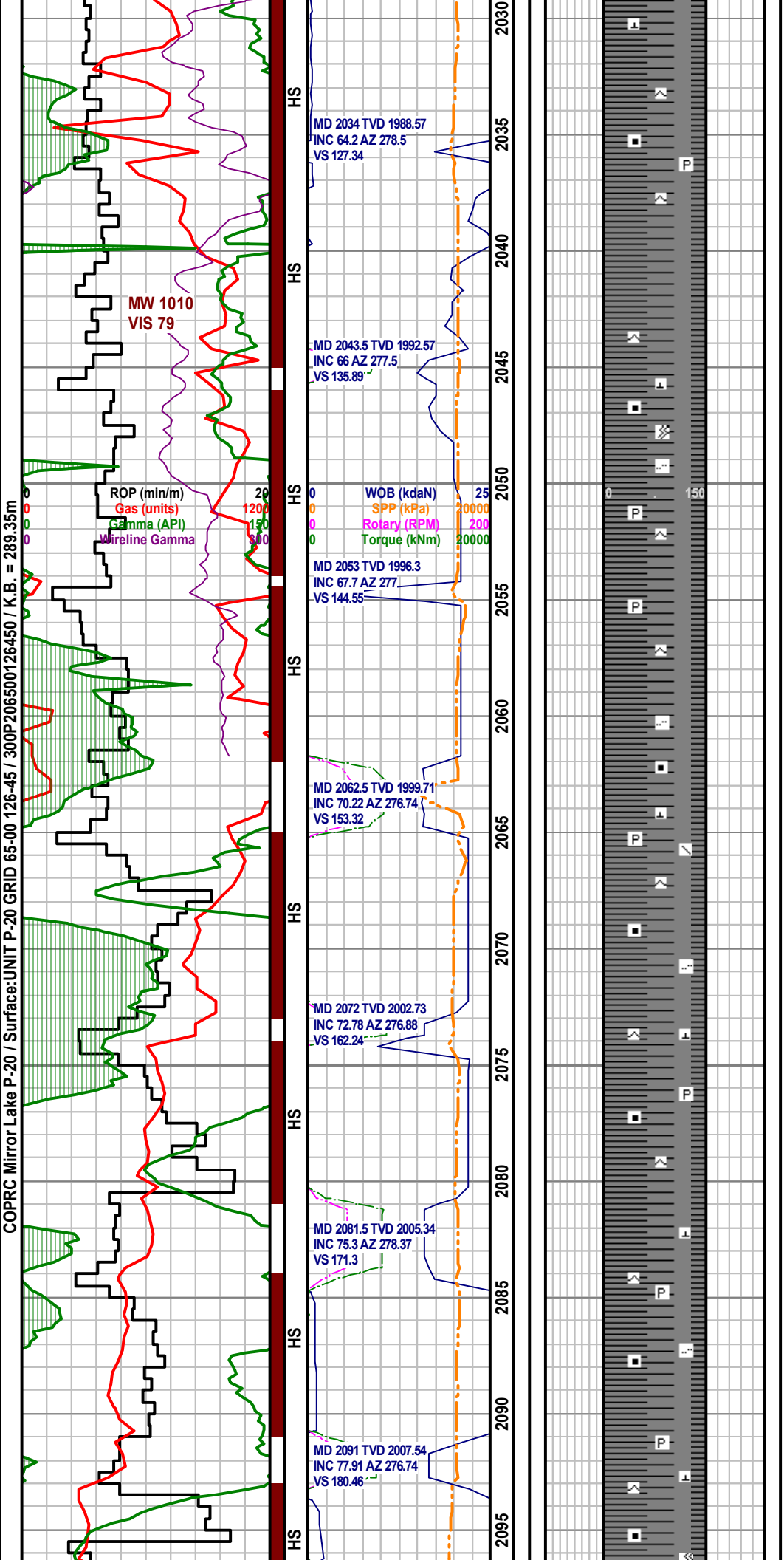
1980-1990 SH: v dk gy, blk, pt brn blk, carbs - modly carbs, sil / tr loc weak calc cmt, blky - sb blky, shards ip, rubbly app com, firm, v firm - hd, loc v f pyric banding, pp dism pyr com, more com nod pyr, tr muddy shaley LMST stgrs, com mud additive OPTISEAL III vis in smpls, wi occ SH gy brn, blky, sft, bits, wk slow pale cldy yel cut.

1990-2000 SH: v dk gy, blk, pt brn blk, carbs - modly carbs, sil / tr slight calc reac, blky - sb blky, shards ip, rubbly app com, firm, v firm - hd, comly brittle, pp dism pyr com, mod nod pyr, no flor, wi occ SH gy brn, blky, sft, bits, wk slow pale cldy yel cut.

2000-2010 SH: dk gy - v dk gy, grds to blk in pt, blky, sub fis in pt, carb, hd & sil, often brit, incrg calc, pyrc, slly micmica, occ gy brn Sh blky sft, bits, pale yel slow cloudy cut in pt.

2010-2020 SH: dk gy - v dk gy, grds to blk in pt, blky, sub fis in pt, hd, sil & calc, brit ip, carb, pyrc, slly micmica, occ gy brn Sh blky sft, bits, pale yel slow cloudy cut in pt. Tr mnr Ls lams m - dk gy, mudst, arg, dns.

2020-2030 SH: v dk gy, grds to blk in pt, blky, slly micmica, carb, sils & calc, hd, brit in pt, tr pyrc, slly slty tex, occ gy brn bits sh, blky, sft, slow pale yel cloudy cut in solvent, wk hydc odor.



2030-2040 SH: v dk gy, grds to blk in pt, blky, slly micmica, carb, sils & calc, hd, brit in pt, tr pyrc, slly slty tex, occ gy brn bits sh, blky, sft, slow pale yel cloudy cut in solvent, wk hydc odor.

2040-2050 SH: v dk gy, blky, slly micmica, carb, sils & calc, hd, brit in pt, tr pyrc wi tr pyr nod, slty tex in pt, occ gy brn bits sh, blky, sft, slow pale yel cloudy cut in solvent, wk hydc odor, tr micro frac infilled wi calcite.

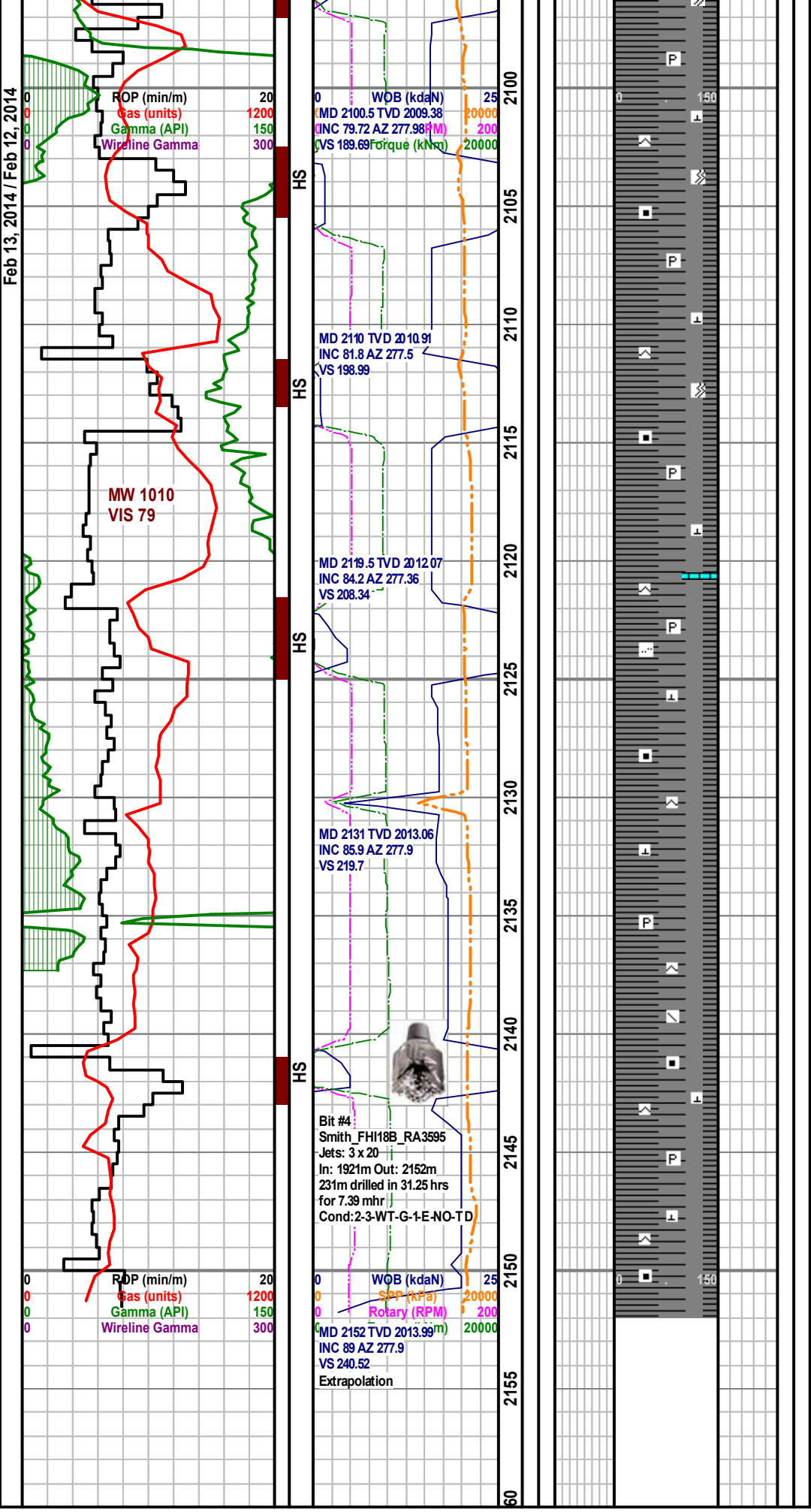
2050-2060 SH: v dk gy, blky, slly micmica, carb, sils & calc, hd, brit in pt, tr pyrc wi incrg pyr nod, slty tex in pt, occ gy brn bits sh, blky, sft, slow pale yel cloudy cut in solvent, hydc odor.

2060-2070 SH: v dk gy, blky, slly micmica, carb, sils & calc, hd, brit in pt, tr pyrc wi pyr nod, slty tex in pt, occ gy brn bits sh, blky, sft, slow pale yel cloudy cut in solvent, hydc odor.

2070-2080 SH: v dk gy, blk, pt brn blk, carbs - modly carbs, sil wi pt v slly calcs to tr modly calc, blky, rubbly, tr shards, silty app ip, firm, v firm - hd, comly brittle, pp dism pyr com, tr nod pyr, wi occ SH gy brn, blky, sft, bits, wk slow pale cldy yel cut.

2080-2090 SH: v dk gy, blk, pt brn blk, carbs - modly carbs, sil wi slly - pt modly calc, blky, rubbly, firm, v firm - hd, comly brittle, pp dism pyr com, tr pyric, mnr SH gy brn, blky, sft, bits, wk slow pale cldy yel cut.

2090-2100 SH: v dk gy, blk, pt brn blk, carbs - pt modly carbs when more sil, wi slly - pt modly calc, blky, rubbly, firm, v firm - hd, comly brittle, pp dism pyr com, tr pyric, v rr calcite healing micro frac, mnr SH gy brn, blky, sft, bits, wk slow pale cldy yel cut.



2100-2110 SH: v dk gy, blk, pt brn blk, carbs, sil, locly slight - modly calc, blky, firm, v firm - hd, brittle, pp dism pyr com, tr pyric, tr calcite healing micro fracs, mnr SH gy brn, sft, bits, wk slow pale cldy yel cut.

2110-2120 SH: v dk gy, blk, pt brn blk, carbs, sil, locly slight - modly calc, blky, firm, v firm - hd, brittle, pp dism pyr com, tr pyric, v rr micro fracs, occ SH gy brn, sft, bits, wk slow pale cldy yel cut.

2120-2130 SH: v dk gy, blky, carb, sils & calc, hd, com brit, sub fis in pt, slly micmica, tr pyrc, occ Sh brn, bits, sft. Pale yel slow cludy cut in solvent, wk hydc odor, wi tr minor Ls lams, mot m gy crm, mudst, arg, dns.

2130-2140 SH: v dk gy, blky, carb, sils, calc decrg, hd, com brit, sub fis in pt, slly micmica, tr pyrc, occ Sh brn, bits, sft. Pale yel slow cludy cut in solvent, hydc odor.

2140-2150 SH: v dk gy, blky, carb, sils & calc, hd, com brit, sub fis in pt, slly micmica, tr pyrc, occ Sh brn, bits, sft. Pale yel slow cludy cut in solvent, wk hydc odor, wi tr minor Ls lams, mot m gy crm, mudst, arg, dns.

Intermediate TD:
2152m MD, 2013.99m TVD @ 89 degrees,
277.9 AZ, 240.52m VS,
64.61m North, 231.69m West of well center
on Feb 13, 2014 @ 09:05hrs.

Grid N/E Y/X: N 7210084.220m, E 604172.260m

ConocoPhillips

Scale 1:240 (5"=100') Metric
Measured Depth Log

Well Name:	COPRC MIRROR LAKE P-20		
Location:	UWID: 300P206500126450 ; Surf. Loc: UNIT P-20 GRID 65-00 126-45		
License Number:	EL 470, ID# 2081	Region:	Norman Wells
Spud Date:	Jan 29, 2014 00:01hrs	Drilling Completed:	Feb 19, 2014 23:12hrs
Surface Coordinates:	Lat / Long: N 64° 59' 57.98372", W 126° 47' 8.73410"		
	Grid N/E Y/X: N 7210027.780 m, E 604406.010 m		
Bottom Hole Coordinates:	314.62m North 1198.96m West of Well Center		
	Grid N/E Y/X: N 7210300.15 m, E 603197.09 m		
Ground Elevation (m):	284.15	K.B. Elevation (m):	289.35
Logged Interval (m):	2152 To: 3103	Total Depth (m):	3152
Formation:	Lower Canol Fm		
Type of Drilling Fluid:	Gel Chem (Surface) Invert VersaClean C12 (Build; Lateral)		

OPERATOR

Company: ConocoPhillips Canada
Address: 2100, 401- 9 Ave SW
Calgary, Alberta
T2P 2H7

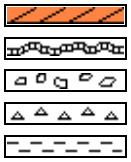
GEOLOGIST

Name: Dave Lawrence; Gerald Pasveer
Company: Black Gold Geotechnical Services LTD.
Address: 2009 Colville Road
Route 9
New Haven PE

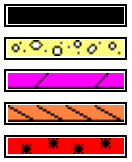
Comments

Samples from: 0m to 3152mMD (Build and Lateral), washed and vialed for Operator and NEB & NWT at 5m intervals;
AFE#: 10351812
Drilling Rig: Beaver #2
Drilling Supervisor: Richard Turgeon; Dave Oper
Gas Detection: MD Totco Gas Analyzer
Geological Services: David Lawrence; Black Gold Geotechnical Services LTD.
Gerry Pasveer; Coromandel Resources LTD.
Directional Services: Sperry Drilling Services
MWD Services: Extreme Engineering Services
Wireline Logs: Schlumberger (Vertical into Build)
Gas Chromate / Isotubes: Continental Labs Rahil Kiani / Ukeme Dan.

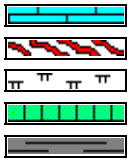
ROCK TYPES



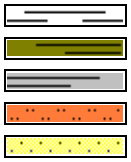
Anhy
Bent
Brec
Cht
Clyst



Coal
Congl
Dol
Gyp
Igne



Lmst
Meta
Mrlst
Salt
Shale blk



Shale blk 2
Shcol
Shgy
Sltst
Ss

Till

ACCESSORIES

FOSSIL

Algae
Amph
Belm
Bioclst
Brach
Bryozoa
Cephal
Coral
Crin
Echin
Fish
Foram
Fossil
Gastro
Oolite
Ostra
Pelec
Pellet
Pisolite
Plant
Strom

MINERAL

Anhy
Arg
Bent
Bit
Brecfrag
Calc
Carb
Chtdk
Chtlt
Dol
Feldspar
Ferrpel
Ferr
Fracture
Gyp
Hvymin
Kaol
Ls grns
Marl
Micmica
Minxl
Phos
Pyr
Salt
Sandy
Sideritic
Sil
Silt
Sulphur
Tuff

STRINGER

Anhy
Arg
Bent
Coal
Dol
Gyp
Ls
Mrst
Sltstrg
Ssstrg

TEXTURE

Boundst
Chalky
Cryxln
Earthy
Finexln
Grainst
Lithogr
Microxln
Mudst
Packst
Wackest

Well Name COPRC Mirror Lake P-20 / Surface:UNIT P-20 GRID 65-00 126-45 / 300P206500126450 / K.B. = 289.35m

ROP / Gas / Gamma

ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)

30 1000 200 700 0 0 0 0

MW 1010
VIS 79

Orientation HS HS HS HS HS HS HS

Slide / Rotate

Depth 30 2035 2040 2045 2050 2055 2060 2065 2070 2075 2080 2085

Well Bore Cross Section

MD 2030 TVD 0
Sub Sea (-1706.65)

1996 TVD
Sub Sea (-1706.65)

Lower Canol 1935.8m MD, (1924.75mTVD, -1635.4mSS.)

ConocoPhillips

COPRC Mirror Lake P-20
UNIT P-20 GRID 65-00 126-45
300P206500126450

2016
(-1726.65)

Ground Elevation 284.15m
+ Fill / - Cut 0.0m
Adjusted Ground 284.15m
K.B. - Grnd 5.2m
K.B. Elevation 289.35m

2016
(-1726.65)

Spud on January 29th, 2014 @ 00:01 hrs

Drilled out through surface casing @ 602m
on February 7th at 06:50 hrs

2050-2060 SH: v dk gy, blky, slly micmica, carb, sils & calc, hd, brit in pt, tr pyrc wi incrg pyr nod, slty tex in pt, occ gy brn bits sh, blky, sft, slow pale yel cloudy cut in solvent, hydc odor.

2060-2070 SH: v dk gy, blky, slly micmica, carb, sils & calc, hd, brit in pt, tr pyrc wi pyr nod, slty tex in pt, occ gy brn bits sh, blky, sft, slow pale yel cloudy cut in solvent, hydc odor.

2070-2080 SH: v dk gy, blk, pt brn blk, carbs - modly carbs, sil wi pt v slly calcs to tr modly calc, blky, rubbly, tr shards, silty app ip, firm, v firm - hd, comly brittle, pp dism pyr com, tr nod pyr, wi occ SH gy brn, blky, sft, bits, wk slow pale cldy yel cut.

2090-2100 SH: v dk gy, blk, pt
carbs when more sil, wi slly -
firm, v firm - hd, comly brittle,
rr calcite healing micro frac, m
wk slow pale cldy yel cut.

DIREC
VS Azi
Motor
Magne
Survey
Gamm

MD 2034 TVD 1988.57
INC 64.2 AZ 278.5
VS 127.27

MD 2043.5 TVD 1992.57
INC 66 AZ 277.5
VS 135.82

2036
(-1746.65)

MD 2053 TVD 1996.3
INC 67.7 AZ 277
VS 144.48

MD 2062.5 TVD 1999.71
INC 70.22 AZ 276.74
VS 153.26

MD 2072 TVD 2002.73
INC 72.78 AZ 276.88
VS 162.18

MD 2081.5 TVD 2005.34
INC 75.3 AZ 278.37
VS 171.25

2036
(-1746.65)

Drilling Parameters

Diff Pressure (kPa)
WOB (DaN)
Torque (KFT-LB)
Standpipe Pressure (kPa)

3000 30 20000 30000 0 0 0 0

Depth 30 2035 2040 2045 2050 2055 2060 2065 2070 2075 2080 2085

TOTAL GAS 0 - 1000 UNITS

30
1000
200
700
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
0
0
0
0

MW 1005
VIS 76

HS HS HS HS HS

2090 2095 2100 2105 2110 2115 2120 2125 2130 2135 2140 2145 2150

1996 TVD
Sub Sea (-1706.65)

2100-2110 SH: v dk gy, blk, pt brn blk, carbs, sil, locly slight - modly calc, blky, firm, v firm - hd, brittle, pp dism pyr com, tr pyric, tr calcite healing micro fracs, mnr SH gy brn, sft, bits, wk slow pale cldy yel cut.

2120-2130 SH: v dk gy, blky, carb, sils & calc, hd, com brit, sub fis in pt, slly micmica, tr pyrc, occ Sh brn, bits, sft. Pale yel slow cldy cut in solvent, wk hydc odor, wi tr minor Ls lams, mot m gy crm, mudst, arg, dns.

2140-2152 SH: v dk gy, blky, carb, sils & calc, hd, com brit, sub fis in pt, slly micmica, tr pyrc, occ Sh brn, bits, sft. Pale yel slow cldy cut in solvent, wk hydc odor, wi tr minor Ls lams, mot m gy crm, mudst, arg, dns.

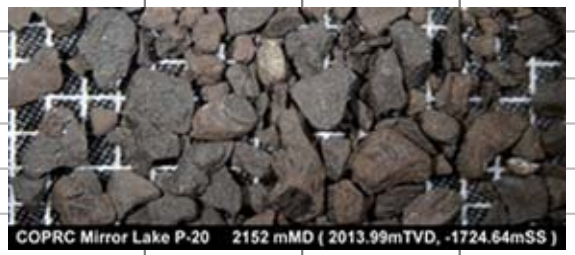
Drilled o

brn blk, carbs - pt modly
pt modly calc, blky, rubbly,
pp dism pyr com, tr pyric, v
nr SH gy brn, blky, sft, bits,

2016
(-1726.65)

2110-2120 SH: v dk gy, blk, pt brn blk, carbs, sil, locly slight - modly calc, blky, firm, v firm - hd, brittle, pp dism pyr com, tr pyric, v rr micro fracs, occ SH gy brn, sft, bits, wk slow pale cldy yel cut.

2130-2140 SH: v dk gy, blky, carb, sils, calc decrg, hd, com brit, sub fis in pt, slly micmica, tr pyrc, occ Sh brn, bits, sft. Pale yel slow cldy cut in solvent, hydc odor.



1 sq unit = 1mm

ICP reached on February 13th, 2
Ext to: 2152.00mMD, (2013.99m
64.61m North 231.69m West of
Grid N/E Y/X: N 7210084.220m,
Lat / Long: N 65° 0' 0.7, W 126°

TIONAL: In at 1921m
muth: 285.025°
Bend: 1.93°
etic Dec: 22.846°
y tool offset: 21.00m
a offset: 15.02m
Out at 2158m

MD 2091 TVD 2007.54
INC 77.91 AZ 276.74
VS 180.41

MD 2100.5 TVD 2009.38
INC 79.72 AZ 277.98
VS 189.65

MD 2110 TVD 2010.91
INC 81.8 AZ 277.5
VS 198.96

MD 2119.5 TVD 2012.07
INC 84.2 AZ 277.36
VS 208.31

MD 2131 TVD 2013.06
INC 85.9 AZ 277.9
VS 219.68

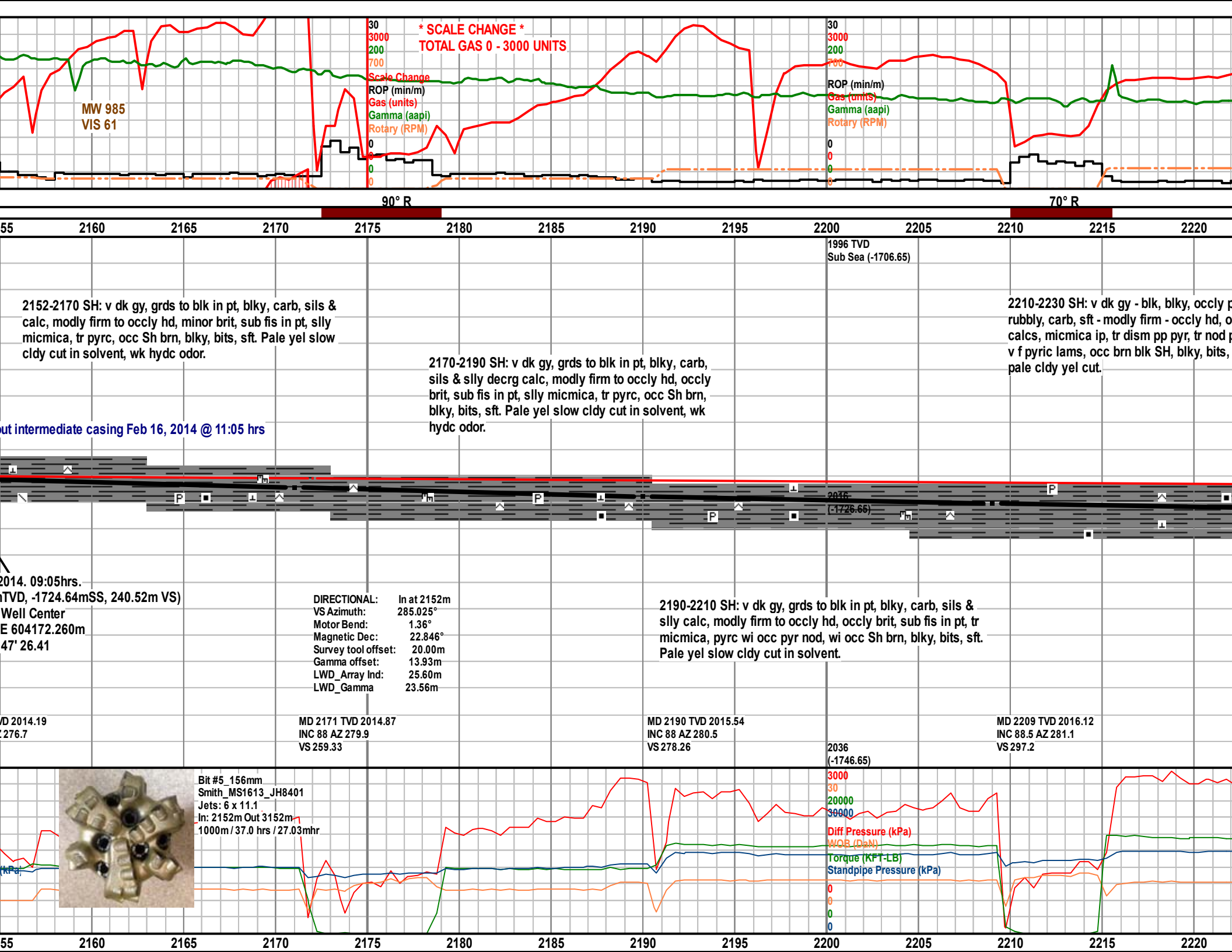
MD 2152 TV
INC 87.9 AZ
VS 240.47

2036
(-1746.65)

3000
30
20000
30000
Diff Pressure (kPa)
WOB (DaN)
Torque (KFT-LB)
Standpipe Pressure (kPa)
0
0
0
0

Bit #4_222mm
Smith_FHI18B_RA3595
Jets: 3 x 20
In: 1921m Out: 2152m
231m drilled in 31.25 hrs
for 7.39 mhr
Cond:2-3-WT-G-1-E-NO-TD

2090 2095 2100 2105 2110 2115 2120 2125 2130 2135 2140 2145 2150


MW 985
VIS 61
30
3000
200
700
* SCALE CHANGE *
TOTAL GAS 0 - 3000 UNITS
Scale Change
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
0
0
0
0
30
3000
200
700
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
0
0
0
0
90° R
70° R
55
2160
2165
2170
2175
2180
2185
2190
2195
2200
2205
2210
2215
2220
1996 TVD
Sub Sea (-1706.65)
2152-2170 SH: v dk gy, grds to blk in pt, blky, carb, sils & calc, modly firm to occly hd, minor brit, sub fis in pt, slly micmica, tr pyrc, occ Sh brn, blky, bits, sft. Pale yel slow cldy cut in solvent, wk hydc odor.
2170-2190 SH: v dk gy, grds to blk in pt, blky, carb, sils & slly decrg calc, modly firm to occly hd, occly brit, sub fis in pt, slly micmica, tr pyrc, occ Sh brn, blky, bits, sft. Pale yel slow cldy cut in solvent, wk hydc odor.
2210-2230 SH: v dk gy - blk, blky, occly p
rubbly, carb, sft - modly firm - occly hd, o
calcs, micmica ip, tr dism pp pyr, tr nod p
v f pyric lams, occ brn blk SH, blky, bits,
pale cldy yel cut.
ut intermediate casing Feb 16, 2014 @ 11:05 hrs
2036
(-1726.65)
2014. 09:05hrs.
nTVD, -1724.64mSS, 240.52m VS)
Well Center
E 604172.260m
47' 26.41
DIRECTIONAL: In at 2152m
VS Azimuth: 285.025°
Motor Bend: 1.36°
Magnetic Dec: 22.846°
Survey tool offset: 20.00m
Gamma offset: 13.93m
LWD_Array Ind: 25.60m
LWD_Gamma 23.56m
2190-2210 SH: v dk gy, grds to blk in pt, blky, carb, sils & slly calc, modly firm to occly hd, occly brit, sub fis in pt, tr micmica, pyrc wi occ pyr nod, wi occ Sh brn, blky, bits, sft. Pale yel slow cldy cut in solvent.
VD 2014.19
Z 276.7
MD 2171 TVD 2014.87
INC 88 AZ 279.9
VS 259.33
MD 2190 TVD 2015.54
INC 88 AZ 280.5
VS 278.26
MD 2209 TVD 2016.12
INC 88.5 AZ 281.1
VS 297.2
2036
(-1746.65)
Bit #5_156mm
Smith_MS1613_JH8401
Jets: 6 x 11.1
In: 2152m Out 3152m
1000m / 37.0 hrs / 27.03mhr
3000
30
20000
30000
Diff Pressure (kPa)
WOB (DaN)
Torque (KFT-LB)
Standpipe Pressure (kPa)
0
0
0
0
55
2160
2165
2170
2175
2180
2185
2190
2195
2200
2205
2210
2215
2220

COPRC Mirror Lake P-20 / Surface:UNIT P-20 GRID 65-00 126-45 / 300P206500126450 / K.B. = 289.35m

30
3000
200
700
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
0
0
0
0

MW 1010
VIS 63

90° R

45° R

2225 2230 2235 2240 2245 2250 2255 2260 2265 2270 2275 2280 2285

1996 TVD
Sub Sea (-1706.65)

pt sb fis, pt
ccly sil / pt slly
pyr, v mnr loc v
sft; v wk slow

2230-2250 SH: v dk gy - blk, blky, occly pt sb fis, pt rubbly, carb, sft - modly firm - occly hd, occly sil / pt slly calcs, micmica ip, tr dism pp pyr, tr nod pyr, v mnr loc v v f pyric lams, occ brn blk SH, blky, bits, sft; v wk slow pale cldy yel cut.

2260-2080 SH: v dk gy - blk, blky, tr pt sb fis - fis, pt rubbly, carb, sft - firm - occly hd, slight incr in occuring sil / more comly slly - modly calcs, micmica ip, tr dism pp pyr, occ nod pyr, tr v v f pyric lams, occ brn blk SH, blky, bits, sft; com bit generated tex, v wk slow pale cldy yel cut.

2080-2300 S
carb, sft - firm
comly slly -
pyr, tr v v f p
generated te

2016
(-1726.65)

2250-2060 SH: v dk gy - blk, blky, occly pt sb fis, carb, sft - modly firm - occly hd, occly sil / tr pt calcs, micmica ip, tr dism pp pyr, tr nod pyr, occ brn blk SH, blky, bits, sft; v wk slow pale cldy yel cut.

MD 2228 TVD 2016.5
INC 89.2 AZ 281.2
VS 316.16

MD 2247 TVD 2016.75
INC 89.3 AZ 281.5
VS 335.13

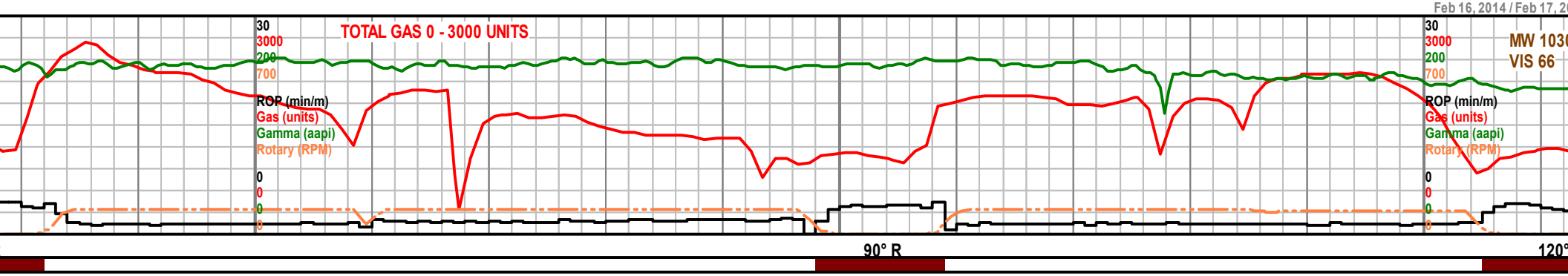
2036
(-1746.65)

MD 2266 TVD 2017.16
INC 88.2 AZ 276.5
VS 354.02

MD 2285 TVD 20
INC 89.3 AZ 281
VS 372.91

3000
30
20000
30000
Diff Pressure (kPa)
WOB (DaN)
Torque (KFT-LB)
Standpipe Pressure (kPa)
0
0
0
0

2225 2230 2235 2240 2245 2250 2255 2260 2265 2270 2275 2280 2285



2290 2295 2300 2305 2310 2315 2320 2325 2330 2335 2340 2345 2350 2355

1996 TVD
Sub Sea (-1706.65)

H: v dk gy - blk, blky, tr pt sb fis - fis, pt rubbly,
m - occly hd, slight incr in occuring sil / more
modly calcs, micmica ip, tr dism pp pyr, occ nod
yric lams, occ brn blk SH, blky, bits, sft; com bit
x, v wk slow pale cldy yel cut.

2320-2340 SH: v dk gy - blk, blky, tr pt sb fis - fis, pt rubbly, carb, sft - firm - occly hd, modly sil / modly - pt slly calcs, micmica ip, occ nod pyr, wi occ brn blk SH, blky, bits, sft; modly com BGT, v wk slow pale cldy yel cut.

2340-2360 SH: v dk gy - blk, blky, tr shards, p
rubbly, carb, firm - occly hd, pt sft, pt modly s
slight - modly calcs, micmica ip, tr nod pyr, w
brn blk SH, blky, bits, sft - slly firm; v wk slow
cldy yel cut.

1996 TVD
Sub Sea (-1706.65)

2016
(-1726.65)

2016
(-1726.65)

2300-2320 SH: v dk gy - blk, blky, tr pt sb fis - fis, pt rubbly, carb, sft - firm - occly hd, modly sil / slight - pt modly calcs, micmica ip, tr dism pp pyr, occ nod pyr, wi occ brn blk SH, blky, bits, sft - slly firm; com BGT, v wk slow pale cldy yel cut.

017.58

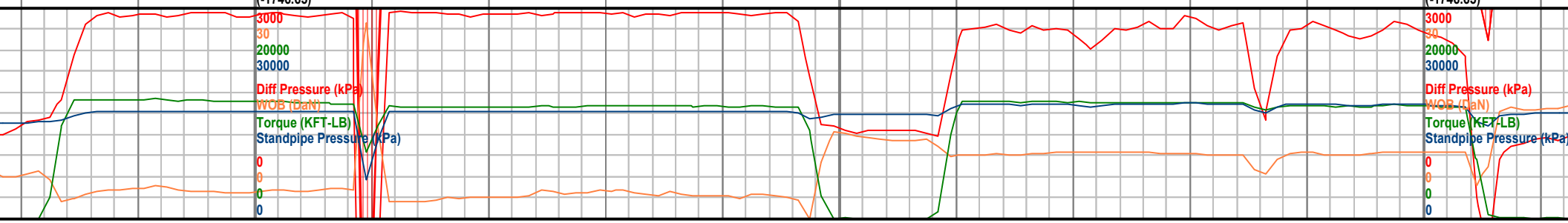
MD 2304 TVD 2017.73
INC 89.8 AZ 281.9
VS 391.87

MD 2323 TVD 2017.76
INC 90 AZ 281.9
VS 410.85

MD 2342.5 TVD 2017.69
INC 90.4 AZ 283.8
VS 430.34

2036
(-1746.65)

2036
(-1746.65)



2290 2295 2300 2305 2310 2315 2320 2325 2330 2335 2340 2345 2350 2355

014

0

30
3000
200
700

ROP (mm/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)

0
0
0

° R

160° R

2360 2365 2370 2375 2380 2385 2390 2395 2400 2405 2410 2415 2420

1996 TVD
Sub Sea (-1706.65)

2400-2420 SH: v dk gy - blk, blky, pt rubbly, carb, soft -firm - occly hd, pt tr - modly sil / slight - tr v calcs, micmica ip, occ LMST stgrs, off wh, pt crm, wkstn, mdy, silty, shly, pt pyric, wi occ brn blk SH, blky, bits, sft - slly firm; com bit gen tex, v wk slow pale cldy yel cut.

2420-2430
-firm - occl
micmica ip
mdy, shly,
firm; com

pt
il /
vi occ
v pale

2380-2400 SH: v dk gy - blk, blky, pt rubbly, carb, firm - occly hd, pt sft, brittle ip, pt tr - modly sil / slight - pt modly calcs, micmica ip, tr pyrz, occ nod pyr, tr pyric frags, pp dism pyr com, wi occ brn blk SH, blky, bits, sft - slly firm; v wk slow pale cldy yel cut.

2016
(-1726.66)

2360-2380 SH: v dk gy - blk, blky, pt rubbly, carb, firm - occly hd, pt sft, brittle ip, pt tr - modly sil / slight - pt modly calcs, micmica ip, tr pyric lams, mnr nod pyr, tr pyric frags, pp dism pyr com, wi occ brn blk SH, blky, bits, sft - slly firm; v wk slow pale cldy yel cut.

MD 2361.5 TVD 2017.51
INC 90.7 AZ 284.4
VS 449.33

MD 2380.5 TVD 2017.29
INC 90.6 AZ 283.4
VS 468.33

MD 2399.5 TVD 2017.29
INC 89.4 AZ 283.6
VS 487.32
(-1746.65)

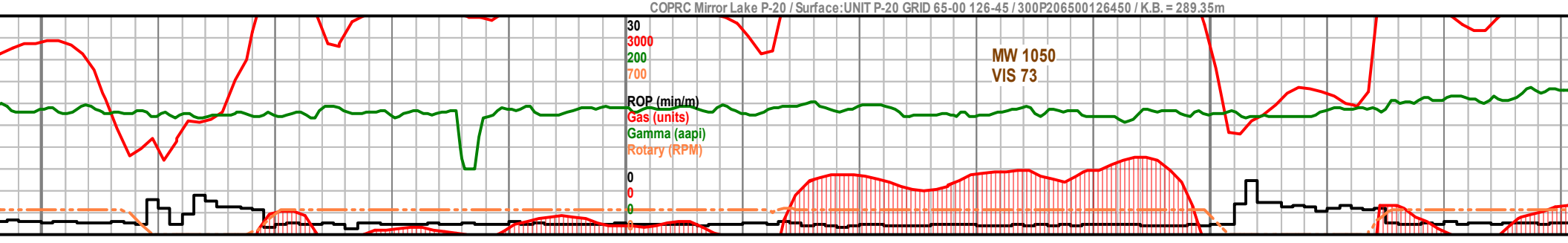
MD 2418.5 TVD 20
INC 89.88 AZ 284.9
VS 506.32

3000
30
20000
30000

Diff Pressure (kPa)
WOB (Klb)
Torque (KFT-LB)
Standpipe Pressure (kPa)

0
0
0
0

2360 2365 2370 2375 2380 2385 2390 2395 2400 2405 2410 2415 2420



120° R

180°

2425 2430 2435 2440 2445 2450 2455 2460 2465 2470 2475 2480 2485 249

1996 TVD
Sub Sea (-1706.65)

SH: v dk gy - blk, blky, pt rubbly, carb, soft
ly hd, pt tr - modly sil / slight - tr v calcs,
, occ LMST stgrs, off wh, pt crm, wkstn, silty,
pt pyric, wi occ brn blk SH, blky, bits, sft - slly
bit gen tex, v wk slow pale cldy yel cut.

2450-2470 SH: v dk gy, grds to blk, blky, sb fis, carb, com brit, firm, sils, slly calcs, tr pyrc, slly micmica, tr pyr lams, pale yel slow cloudy cut / mnr LMST lams, mot gy crm, mudst - wkest, arg, grds to mrlst in pt, tr pyrc, no vis por.

2470-2490 SH: v dk gy, grds to blk, blky, sb fis, carb, com brit, firm, sils, slly calcs, tr pyrc wi tr pyr nod, slly micmica, tr pyr lams, pale yel slow cloudy cut / mnr LMST lams as before.

2016
(1725.55)

2430-2450 SH: v dk gy - blk, blky, pt rubbly, carb, soft -firm - occly hd, pt tr - modly sil / slight - tr v calcs, micmica ip, slly pyrc, show aa. LMST strgs aa, but decrg.

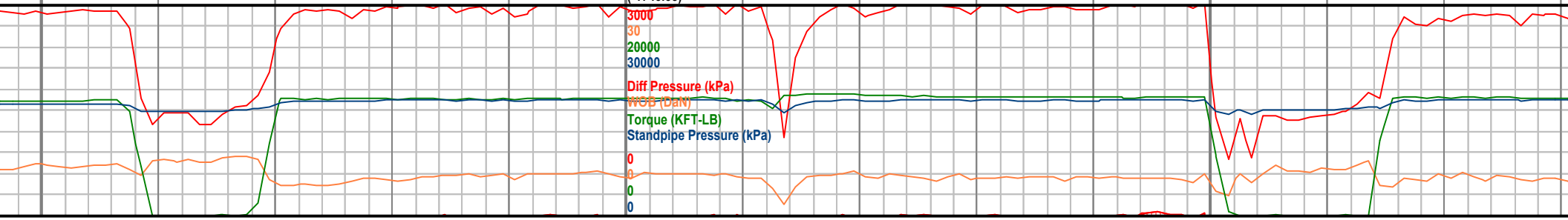
17.41
04

MD 2437.5 TVD 2017.5
INC 89.6 AZ 285.9
VS 525.32

MD 2456.5 TVD 2017.56
INC 90 AZ 286.5
VS 544.32

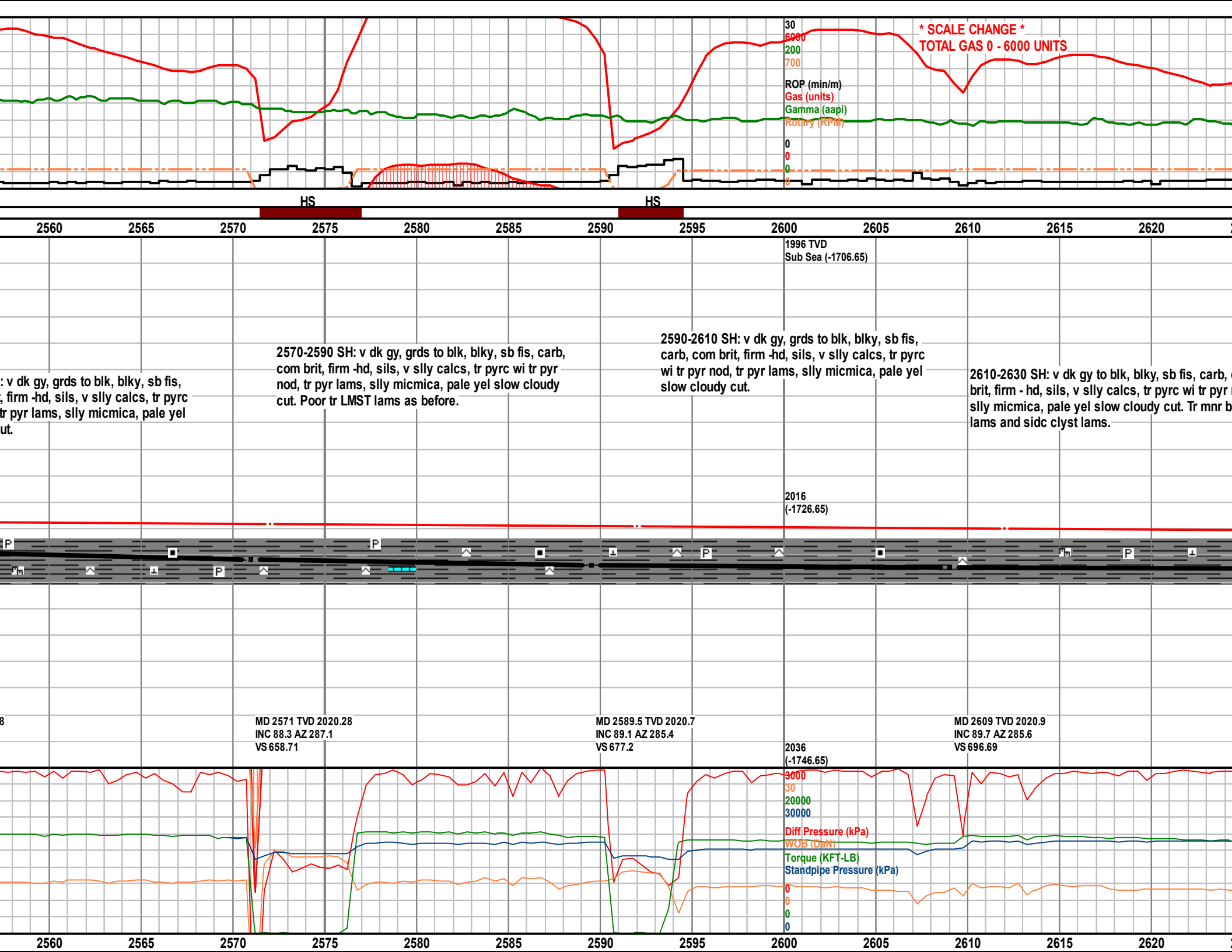
MD 2475.5 TVD 2017.56
INC 90 AZ 285.4
VS 563.31

2036
(-1746.65)



2425 2430 2435 2440 2445 2450 2455 2460 2465 2470 2475 2480 2485 249


30
3000
200
700
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
0
0
0
0
30
6000
200
700
Scale Change
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
0
0
0
0
30
6000
200
700
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
0
0
0
0
150° R
0
2495
2500
2505
2510
2515
2520
2525
2530
2535
2540
2545
2550
2555
1996 TVD
Sub Sea (-1706.65)
1996 TVD
Sub Sea (-1706.65)
2490-2510 SH: v dk gy, grds to blk, blky, sb fis, carb, com brit, firm -hd, sils, calcs cmt decrg, tr pyrc wi tr pyr nod, slly micmica, pale yel slow cloudy cut. No vis lmst lams.
2510-2530 SH: v dk gy, grds to blk, blky, sb fis, carb, com brit, firm -hd, sils, slly calcs, tr pyrc wi tr pyr nod, slly micmica, pale yel slow cloudy cut. No vis lmst lams.
2530-2550 SH: v dk gy, grds to blk, blky, sb fis, carb, com brit, firm -hd, sils, v slly calcs, tr pyrc wi tr pyr nod, slly micmica, pale yel slow cloudy cut.
2550-2570 SH
carb, com brit
wi tr pyr nod,
slow cloudy c
2016
(-1726.65)
2016
(-1726.65)
COPRC Mirror Lake P-20 2530 mMD (2018.93mTVD, -1729.58mSS, 617.72mVS)
MD 2494.5 TVD 2017.76
INC 88.8 AZ 286.8
VS 582.3
MD 2514 TVD 2018.34
INC 87.8 AZ 286.8
VS 601.78
MD 2532.5 TVD 2019.02
INC 88 AZ 287.1
VS 620.26
MD 2552 TVD 2019.6
INC 88.1 AZ 287
VS 639.73
2036
(-1746.65)
2036
(-1746.65)
3000
30
20000
30000
Diff Pressure (kPa)
WOB (Dan)
Torque (KFT-LB)
Standpipe Pressure (kPa)
0
0
0
0
3000
30
20000
30000
Diff Pressure (kPa)
WOB (Dan)
Torque (KFT-LB)
Standpipe Pressure (kPa)
0
0
0
0
0
2495
2500
2505
2510
2515
2520
2525
2530
2535
2540
2545
2550
2555


30
6000
200
700
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
* SCALE CHANGE *
TOTAL GAS 0 - 6000 UNITS
0
0
0
0
HS
HS
2560
2565
2570
2575
2580
2585
2590
2595
2600
2605
2610
2615
2620
1996 TVD
Sub Sea (-1706.65)
: v dk gy, grds to blk, blky, sb fis,
, firm -hd, sils, v slly calcs, tr pyrc
tr pyr lams, slly micmica, pale yel
ut.
2570-2590 SH: v dk gy, grds to blk, blky, sb fis, carb, com brit, firm -hd, sils, v slly calcs, tr pyrc wi tr pyr nod, tr pyr lams, slly micmica, pale yel slow cloudy cut. Poor tr LMST lams as before.
2590-2610 SH: v dk gy, grds to blk, blky, sb fis, carb, com brit, firm -hd, sils, v slly calcs, tr pyrc wi tr pyr nod, tr pyr lams, slly micmica, pale yel slow cloudy cut.
2610-2630 SH: v dk gy to blk, blky, sb fis, carb,
brit, firm - hd, sils, v slly calcs, tr pyrc wi tr pyr
slly micmica, pale yel slow cloudy cut. Tr mnr b
lams and sidc clyst lams.
2016
(-1726.65)
8
MD 2571 TVD 2020.28
INC 88.3 AZ 287.1
VS 658.71
MD 2589.5 TVD 2020.7
INC 89.1 AZ 285.4
VS 677.2
MD 2609 TVD 2020.9
INC 89.7 AZ 285.6
VS 696.69
2036
(-1746.65)
3000
30
20000
30000
Diff Pressure (kPa)
WOB (DaN)
Torque (KFT-LB)
Standpipe Pressure (kPa)
0
0
0
0
2560
2565
2570
2575
2580
2585
2590
2595
2600
2605
2610
2615
2620

COPRC Mirror Lake P-20 / Surface:UNIT P-20 GRID 65-00 126-45 / 300P206500126450 / K.B. = 289.35m

MW 1065
VIS 78

30
6000
200
700

ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)

0
0
0
0

180°

2625 2630 2635 2640 2645 2650 2655 2660 2665 2670 2675 2680 2685 2690

1996 TVD
Sub Sea (-1706.65)

com
nod,
rn sid

2630-2650 SH: v dk gy to blk, blky, sb fis, carb, com brit, firm - hd, sils, slly calcs, pyrc wi tr pyr nod, slly micmica, pale yel slow cloudy cut. Tr mnr brn sid lams and sidc clyst lams.

2650-2660 SH: v dk gy to blk, blky, sb fis, carb, brit, firm - hd, sils, v slly calcs, tr pyrc wi tr pyr nod, slly micmica, pale yel slow cloudy cut.

2660-2680 SH: v dk gy - blk, blky, pt rubbly, tr shards, carb, firm - occly hd, brittle, sil / slightly calc ip, micmica ip, tr calcite healed micro frac, mod bit gen tex, v wk slow pale cldy yel cut.

Calcite Healing Micro Fracture

2680-2700 SH: v dk gy - bl
shards, carb, brittle, firm -
calc ip, micmica ip, pp dis
mnr nod pyr, mod bit gen te
yel cut.

2016
(-1726.65)

MD 2628 TVD 2020.99
INC 89.8 AZ 287
VS 715.69

MD 2646.5 TVD 2021.07
INC 89.7 AZ 284.1
VS 734.18

2036
(-1746.65)

MD 2665.5 TVD 2021.12
INC 90 AZ 286.7
VS 753.18

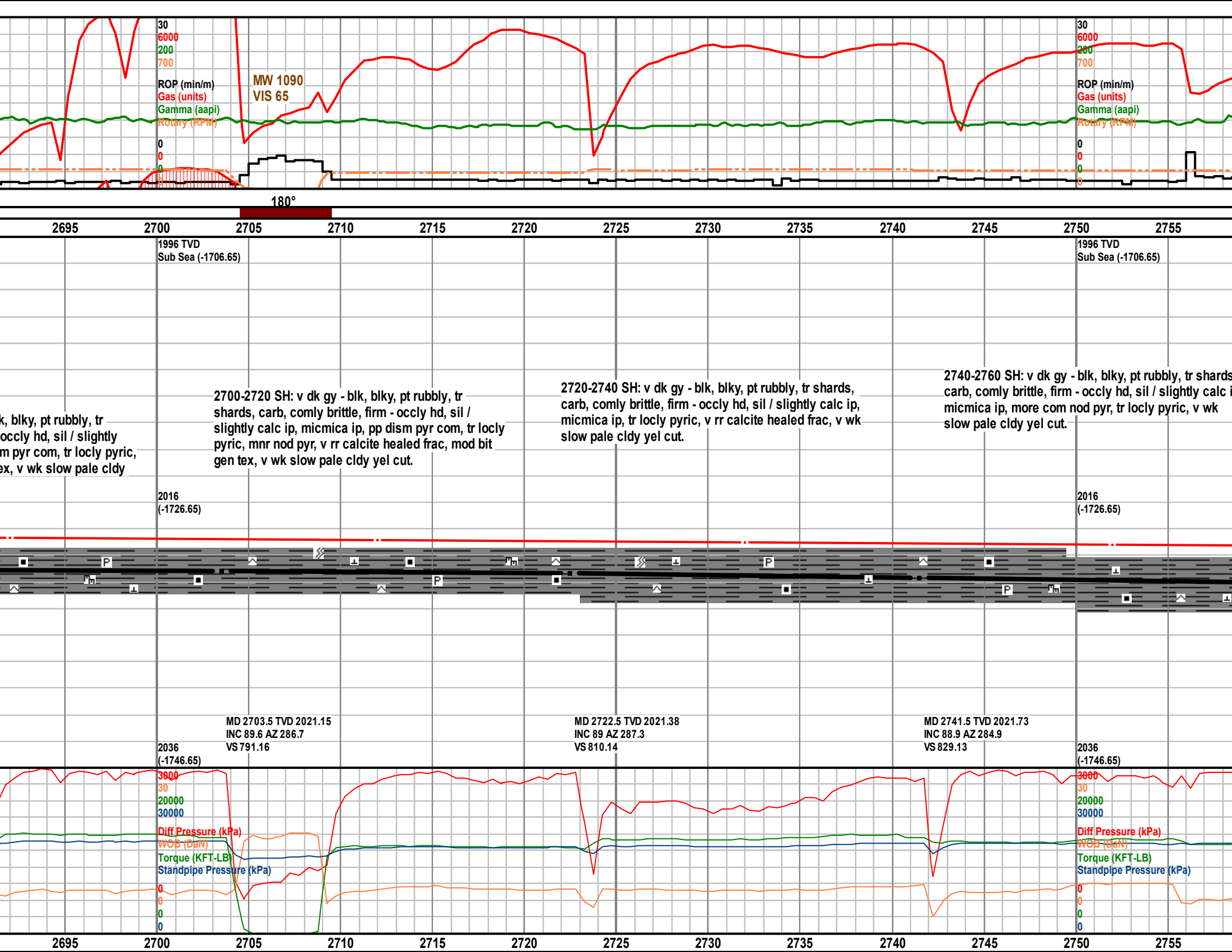
MD 2685 TVD 2021.1
INC 90.1 AZ 286.7
VS 772.67

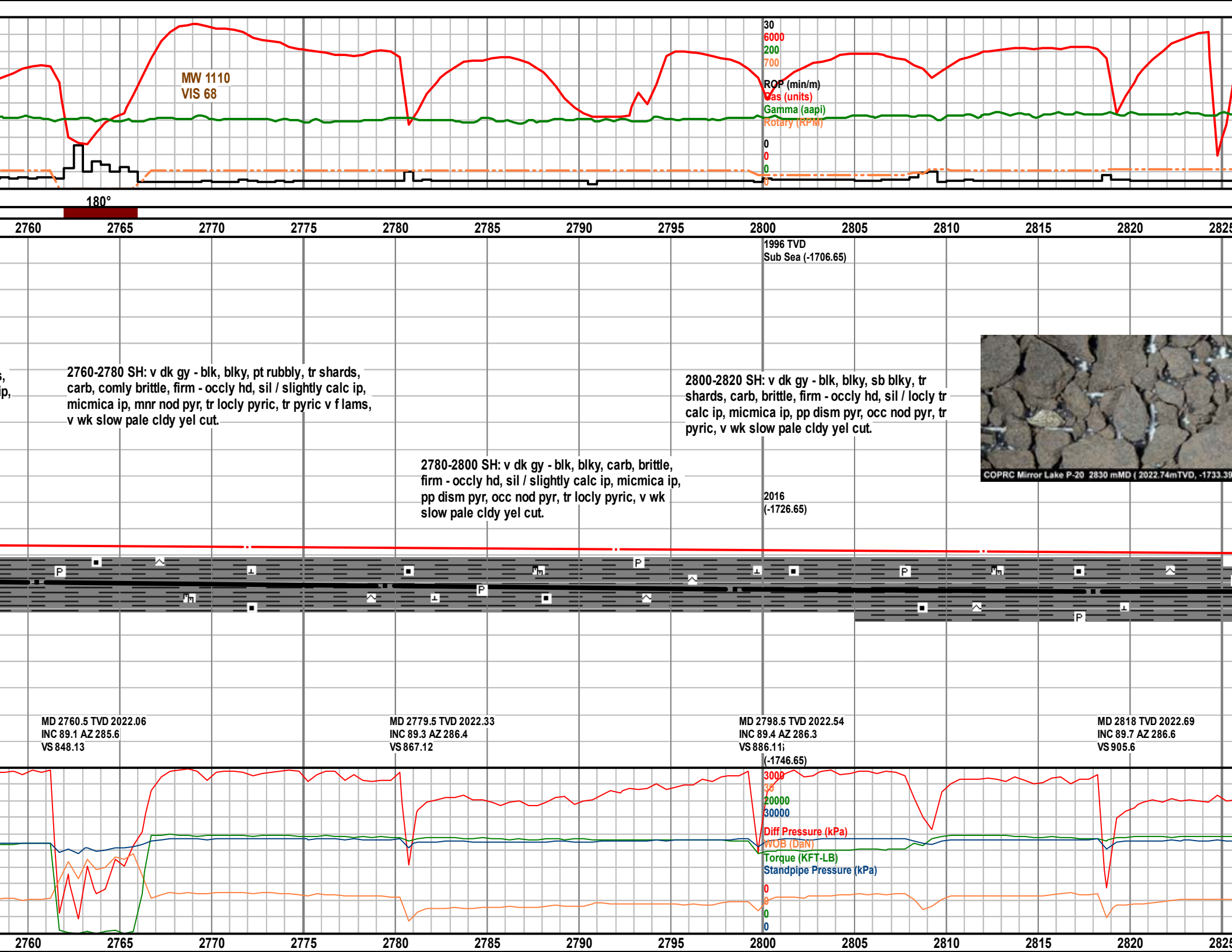
3000
30
20000
30000

Diff Pressure (kPa)
WOB (DaN)
Torque (KFT-LB)
Standpipe Pressure (kPa)

0
0
0
0

2625 2630 2635 2640 2645 2650 2655 2660 2665 2670 2675 2680 2685 2690


30
6000
200
700
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
MW 1090
VIS 65
0
0
0
0
180°
2695
2700
2705
2710
2715
2720
2725
2730
2735
2740
2745
2750
2755
1996 TVD
Sub Sea (-1706.65)
k, blky, pt rubbly, tr
occly hd, sil / slightly
m pyr com, tr locly pyric,
ex, v wk slow pale cldy
2700-2720 SH: v dk gy - blk, blky, pt rubbly, tr shards, carb, comly brittle, firm - occly hd, sil / slightly calc ip, micmica ip, pp dism pyr com, tr locly pyric, mnr nod pyr, v rr calcite healed frac, mod bit gen tex, v wk slow pale cldy yel cut.
2720-2740 SH: v dk gy - blk, blky, pt rubbly, tr shards, carb, comly brittle, firm - occly hd, sil / slightly calc ip, micmica ip, tr locly pyric, v rr calcite healed frac, v wk slow pale cldy yel cut.
2740-2760 SH: v dk gy - blk, blky, pt rubbly, tr shards
carb, comly brittle, firm - occly hd, sil / slightly calc i
micmica ip, more com nod pyr, tr locly pyric, v wk
slow pale cldy yel cut.
2016
(-1726.65)
MD 2703.5 TVD 2021.15
INC 89.6 AZ 286.7
VS 791.16
MD 2722.5 TVD 2021.38
INC 89 AZ 287.3
VS 810.14
MD 2741.5 TVD 2021.73
INC 88.9 AZ 284.9
VS 829.13
2036
(-1746.65)
3000
30
20000
30000
Diff Pressure (kPa)
WOB (DaN)
Torque (KFT-LB)
Standpipe Pressure (kPa)
0
0
0
0


MW 1110
VIS 68
30
6000
200
700
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
0
0
0
0
180°
2760
2765
2770
2775
2780
2785
2790
2795
2800
2805
2810
2815
2820
2825
1996 TVD
Sub Sea (-1706.65)
2760-2780 SH: v dk gy - blk, blky, pt rubbly, tr shards, carb, comly brittle, firm - occly hd, sil / slightly calc ip, micmica ip, mnr nod pyr, tr locly pyric, tr pyric v f lams, v wk slow pale cldy yel cut.
2780-2800 SH: v dk gy - blk, blky, carb, brittle, firm - occly hd, sil / slightly calc ip, micmica ip, pp dism pyr, occ nod pyr, tr locly pyric, v wk slow pale cldy yel cut.
2800-2820 SH: v dk gy - blk, blky, sb blky, tr shards, carb, brittle, firm - occly hd, sil / locly tr calc ip, micmica ip, pp dism pyr, occ nod pyr, tr pyric, v wk slow pale cldy yel cut.
COPRC Mirror Lake P-20 2830 mMD (2022.74mTVD, -1733.39
2016
(-1726.65)
MD 2760.5 TVD 2022.06
INC 89.1 AZ 285.6
VS 848.13
MD 2779.5 TVD 2022.33
INC 89.3 AZ 286.4
VS 867.12
MD 2798.5 TVD 2022.54
INC 89.4 AZ 286.3
VS 886.11
MD 2818 TVD 2022.69
INC 89.7 AZ 286.6
VS 905.6
(-1746.65)
3000
30
20000
30000
Diff Pressure (kPa)
WOB (DaN)
Torque (KFT-LB)
Standpipe Pressure (kPa)
0
0
0
0
2760
2765
2770
2775
2780
2785
2790
2795
2800
2805
2810
2815
2820
2825

MW 1110
VIS 68

30
6000
200
700
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
0
0
0
0

180°

5 2830 2835 2840 2845 2850 2855 2860 2865 2870 2875 2880 2885 2890

1996 TVD
Sub Sea (-1706.65)

2820-2840 SH: v dk gy - blk, blky, sb blky, tr shards, carb, brittle, firm - occly hd, sil / locly tr calc ip, micmica ip, pp dism pyr, occ nod pyr, tr pyric, v wk slow pale cldy yel cut.

2840-2860 SH: v dk gy - blk, blky, sb blky, carb, brittle, firm - occly hd, tr modly firm, sil / more comly slly calc, micmica ip, pp dism pyr, v rr nod pyr, v wk slow pale cldy yel cut.

2860-2880 SH: v dk gy - blk, blky, sb blky, tr shards, carb, brittle, firm - occly hd, tr modly firm, sil / more comly slly calc, micmica ip, pp dism pyr, v rr nod pyr, no vis fracs or pyric lams, v wk slow pale cldy yel cut.

2880-2900 SH: v dk gy - blk, blky, sb blky pt hd, tr modly firm, sil / more comly slly dism pyr, v rr nod pyr, no vis fracs or py slow pale cldy yel cut.

2016
(-1726.65)

MD 2837 TVD 2022.76
INC 89.9 AZ 286.6
VS 924.59

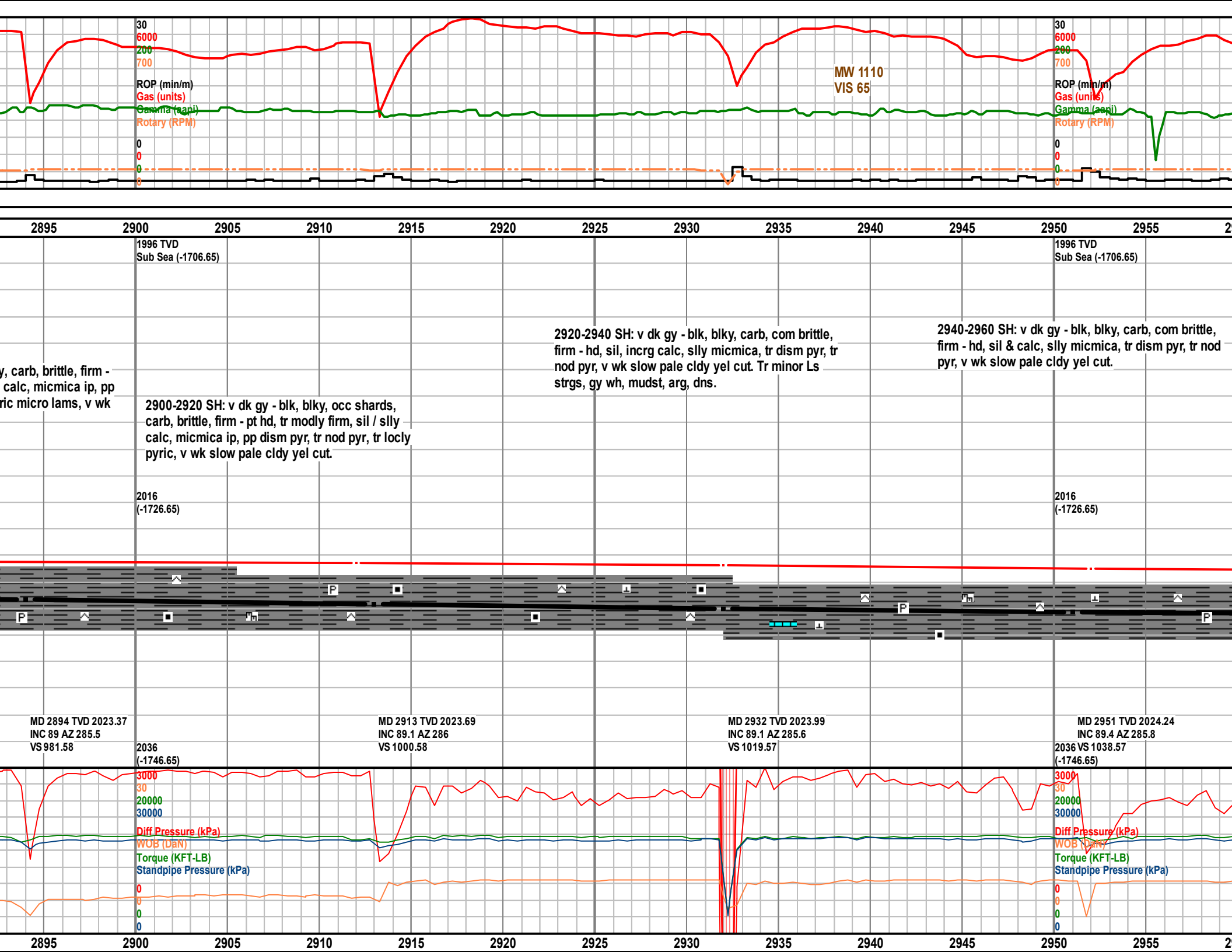
MD 2856 TVD 2022.79
INC 89.9 AZ 284.7
VS 943.59

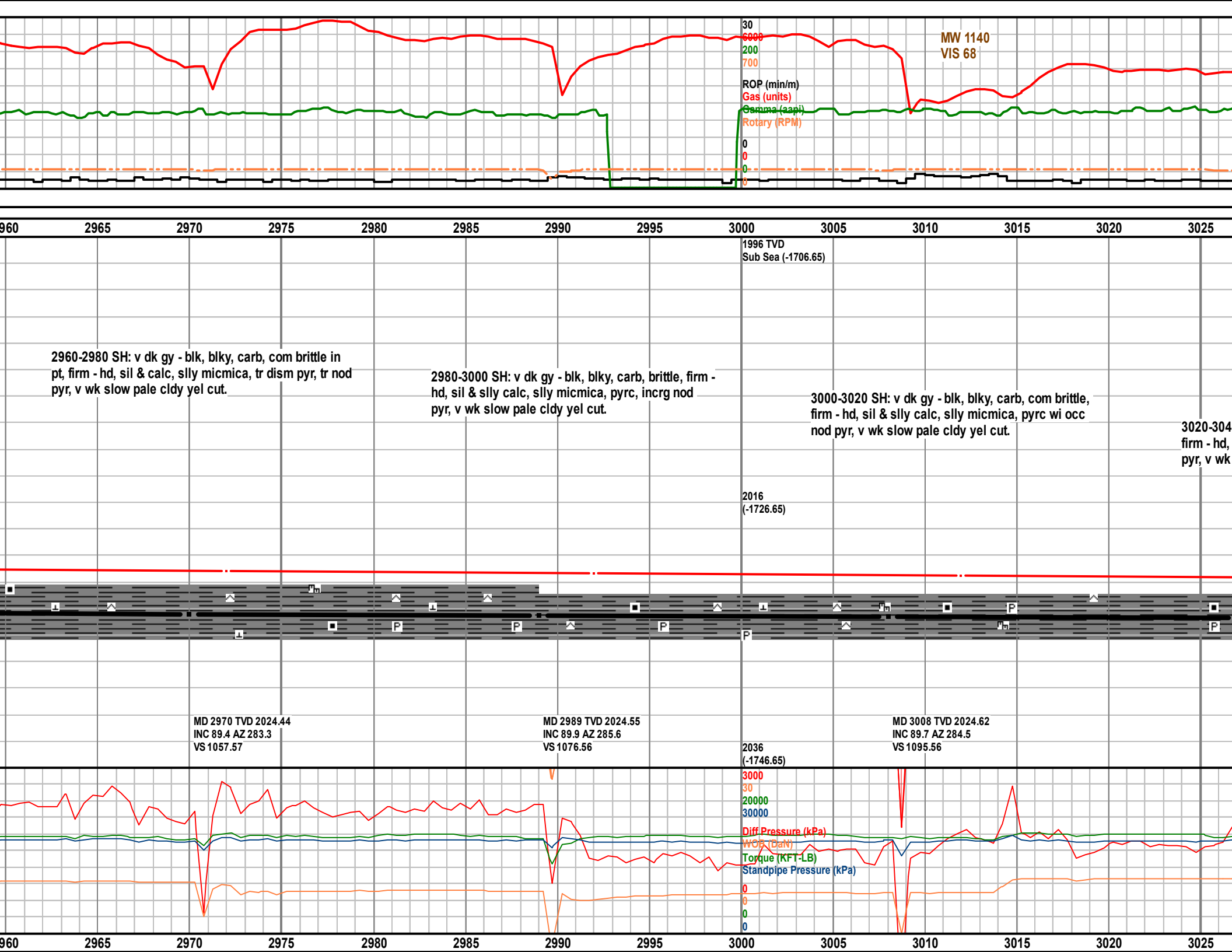
MD 2875 TVD 2023.01
INC 88.8 AZ 283.8
VS 962.59

2036
(-1746.65)

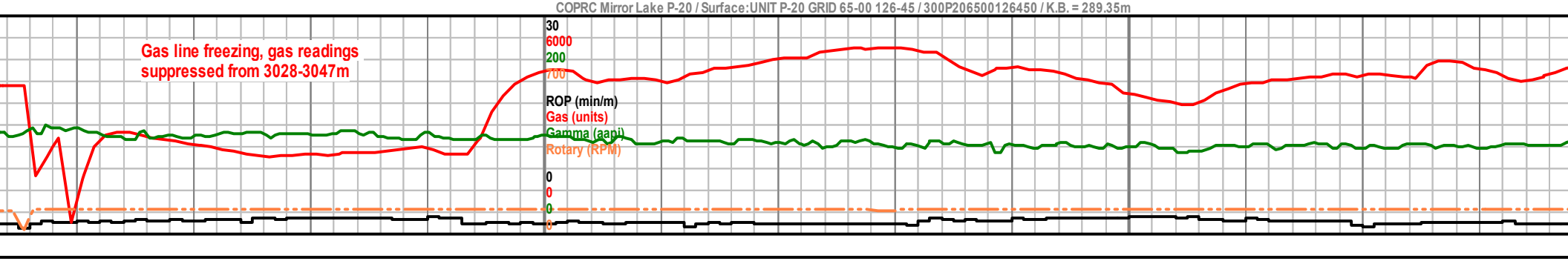
3000
30
20000
30000
Diff Pressure (kPa)
WOB (DaN)
Torque (KFT-LB)
Standpipe Pressure (kPa)
0
0
0
0

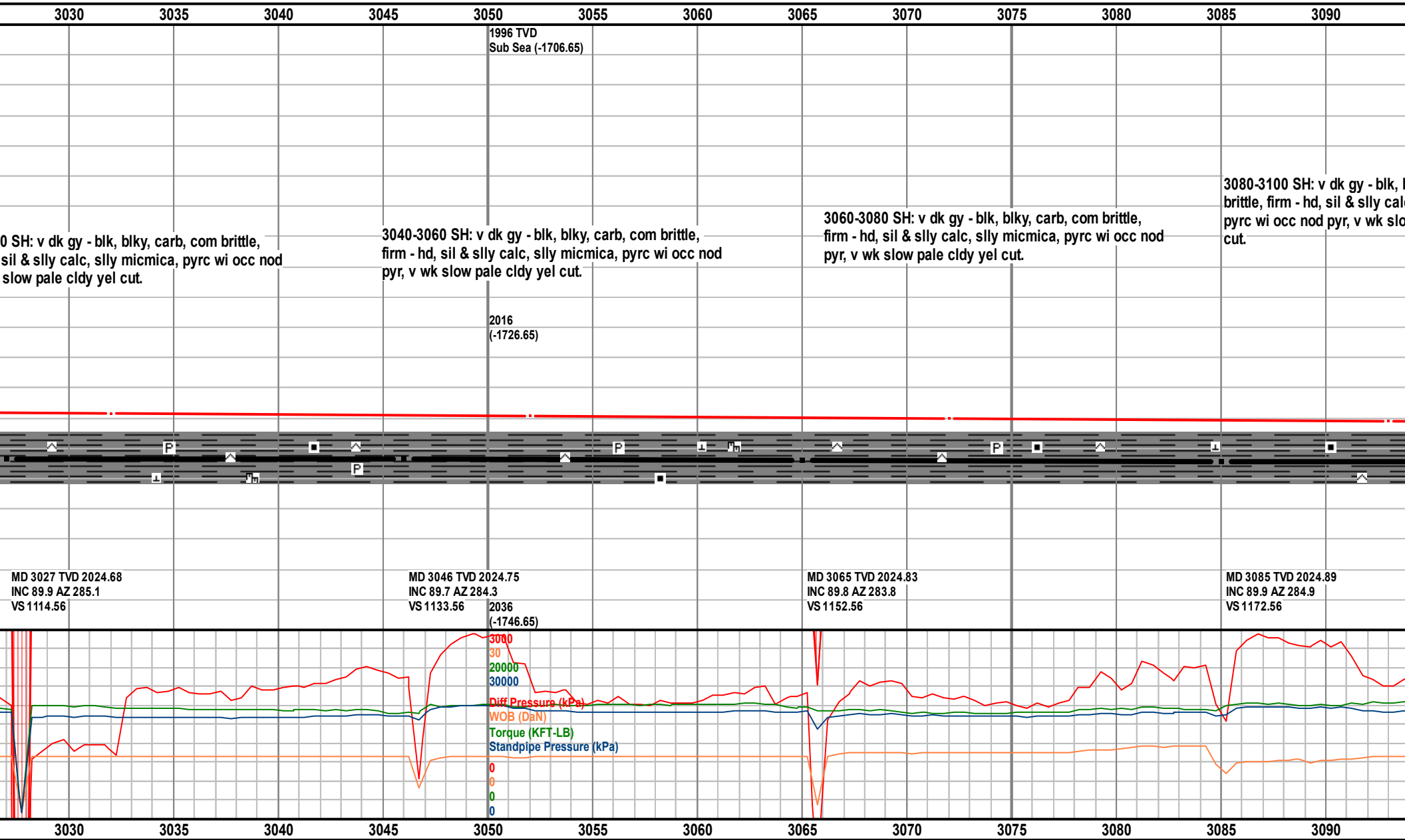
5 2830 2835 2840 2845 2850 2855 2860 2865 2870 2875 2880 2885 2890

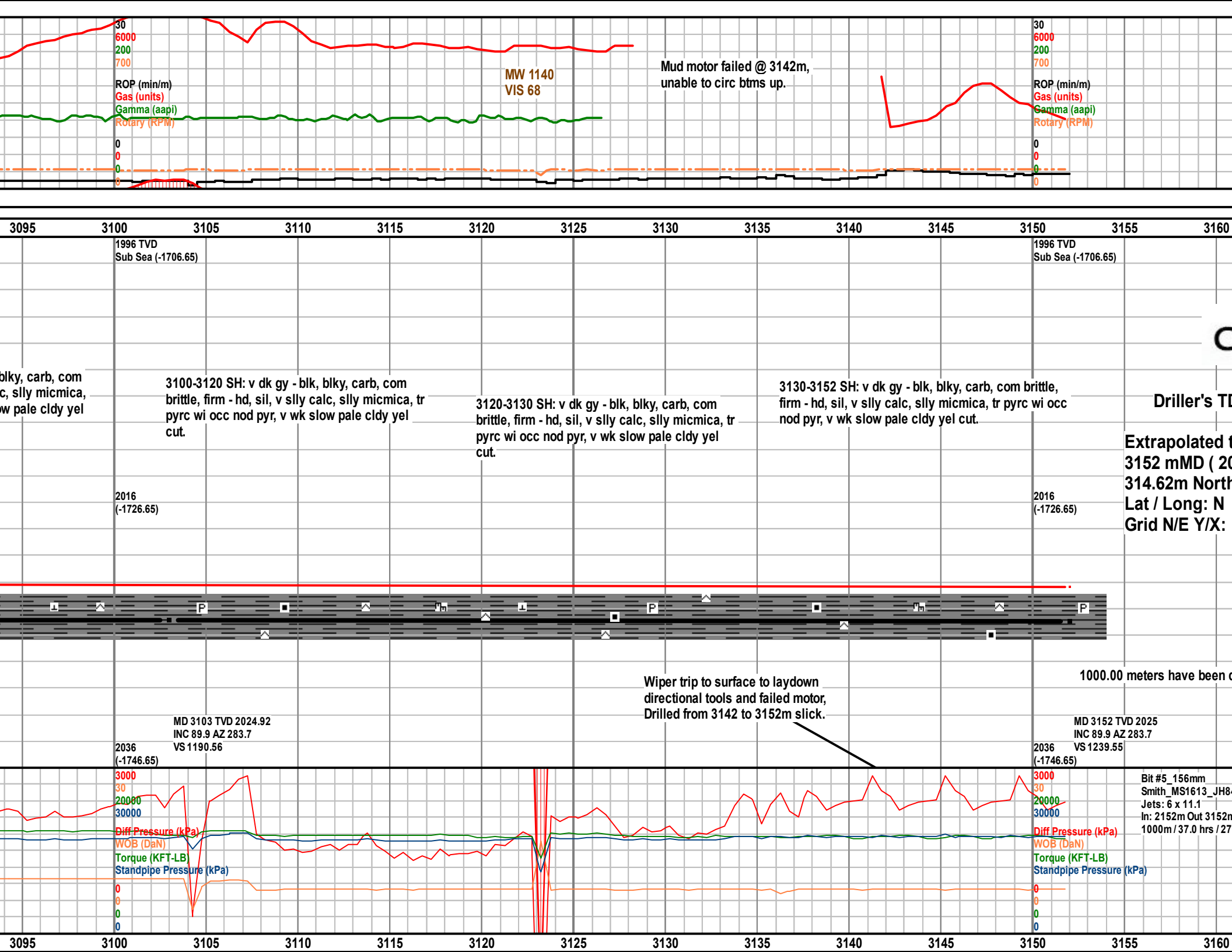

30
6000
200
700
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
0
0
0
0
MW 1110
VIS 65
30
6000
200
700
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
0
0
0
0
2895
2900
2905
2910
2915
2920
2925
2930
2935
2940
2945
2950
2955
1996 TVD
Sub Sea (-1706.65)
1996 TVD
Sub Sea (-1706.65)
y, carb, brittle, firm -
calc, micmica ip, pp
ric micro lams, v wk
2900-2920 SH: v dk gy - blk, blky, occ shards, carb, brittle, firm - pt hd, tr modly firm, sil / slly calc, micmica ip, pp dism pyr, tr nod pyr, tr locly pyric, v wk slow pale cldy yel cut.
2920-2940 SH: v dk gy - blk, blky, carb, com brittle, firm - hd, sil, incrg calc, slly micmica, tr dism pyr, tr nod pyr, v wk slow pale cldy yel cut. Tr minor Ls strgs, gy wh, mudst, arg, dns.
2940-2960 SH: v dk gy - blk, blky, carb, com brittle, firm - hd, sil & calc, slly micmica, tr dism pyr, tr nod pyr, v wk slow pale cldy yel cut.
2016
(-1726.65)
2016
(-1726.65)
P
P
P
P
MD 2894 TVD 2023.37
INC 89 AZ 285.5
VS 981.58
2036
(-1746.65)
MD 2913 TVD 2023.69
INC 89.1 AZ 286
VS 1000.58
MD 2932 TVD 2023.99
INC 89.1 AZ 285.6
VS 1019.57
MD 2951 TVD 2024.24
INC 89.4 AZ 285.8
2036 VS 1038.57
(-1746.65)
3000
30
20000
30000
Diff Pressure (kPa)
WOB (DaN)
Torque (KFT-LB)
Standpipe Pressure (kPa)
0
0
0
0
3000
30
20000
30000
Diff Pressure (kPa)
WOB (DaN)
Torque (KFT-LB)
Standpipe Pressure (kPa)
0
0
0
0
2895
2900
2905
2910
2915
2920
2925
2930
2935
2940
2945
2950
2955


30
6000
200
700
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
0
0
0
0
MW 1140
VIS 68
960
2965
2970
2975
2980
2985
2990
2995
3000
3005
3010
3015
3020
3025
1996 TVD
Sub Sea (-1706.65)
2960-2980 SH: v dk gy - blk, blky, carb, com brittle in pt, firm - hd, sil & calc, slly micmica, tr dism pyr, tr nod pyr, v wk slow pale cldy yel cut.
2980-3000 SH: v dk gy - blk, blky, carb, brittle, firm - hd, sil & slly calc, slly micmica, pyrc, incrg nod pyr, v wk slow pale cldy yel cut.
3000-3020 SH: v dk gy - blk, blky, carb, com brittle, firm - hd, sil & slly calc, slly micmica, pyrc wi occ nod pyr, v wk slow pale cldy yel cut.
3020-304
firm - hd,
pyr, v wk
2016
(-1726.65)
MD 2970 TVD 2024.44
INC 89.4 AZ 283.3
VS 1057.57
MD 2989 TVD 2024.55
INC 89.9 AZ 285.6
VS 1076.56
MD 3008 TVD 2024.62
INC 89.7 AZ 284.5
VS 1095.56
2036
(-1746.65)
3000
30
20000
30000
Diff Pressure (kPa)
WOB (DaN)
Torque (KFT-LB)
Standpipe Pressure (kPa)
0
0
0
0
960
2965
2970
2975
2980
2985
2990
2995
3000
3005
3010
3015
3020
3025

COPRC Mirror Lake P-20 / Surface:UNIT P-20 GRID 65-00 126-45 / 300P206500126450 / K.B. = 289.35m






30
6000
200
700
ROP (min/m)
Gas (units)
Gamma (aapi)
Rotary (RPM)
0
0
0
0
MW 1140
VIS 68
Mud motor failed @ 3142m,
unable to circ btms up.
3095
3100
3105
3110
3115
3120
3125
3130
3135
3140
3145
3150
3155
3160
1996 TVD
Sub Sea (-1706.65)
blky, carb, com
c, slly micmica,
w pale cldy yel
3100-3120 SH: v dk gy - blk, blky, carb, com brittle, firm - hd, sil, v slly calc, slly micmica, tr pyrc wi occ nod pyr, v wk slow pale cldy yel cut.
3120-3130 SH: v dk gy - blk, blky, carb, com brittle, firm - hd, sil, v slly calc, slly micmica, tr pyrc wi occ nod pyr, v wk slow pale cldy yel cut.
3130-3152 SH: v dk gy - blk, blky, carb, com brittle, firm - hd, sil, v slly calc, slly micmica, tr pyrc wi occ nod pyr, v wk slow pale cldy yel cut.
Driller's TD
Extrapolated t
3152 mMD (20
314.62m North
Lat / Long: N
Grid N/E Y/X:
2016
(-1726.65)
1000.00 meters have been d
Wiper trip to surface to laydown directional tools and failed motor, Drilled from 3142 to 3152m slick.
MD 3103 TVD 2024.92
INC 89.9 AZ 283.7
VS 1190.56
2036
(-1746.65)
MD 3152 TVD 2025
INC 89.9 AZ 283.7
VS 1239.55
3000
30
20000
30000
Diff Pressure (kPa)
WOB (DaN)
Torque (KFT-LB)
Standpipe Pressure (kPa)
0
0
0
0
Bit #5_156mm
Smith_MS1613_JH8
Jets: 6 x 11.1
In: 2152m Out 3152m
1000m / 37.0 hrs / 27

3165 3170 3175 3180 31

onocoPhillips

D on February 19th, 2014 at 23:12hrs

to:
025.00mTVD, -1735.65mSS, 1239.53mVS)
n 1198.96m West of Well Center
65° 0' 8.13", W 126° 48' 40.23"
N 7210300.15 m, E 603197.09 m

drilled from the Heel at 2152.00m MD to TD at 3152.00m MD

Spud on January 29th, 2014 @ 00:01 hrs
Surface casing Drillout @ 602m on February 7th at 06:50 hrs
Intermediate casing Drillout @ 2152m on Feb 16, 2014 @ 11:05 hrs

401
n
.03mhr

DIRECTIONAL:	In at 2152m
VS Azimuth:	285.025°
Motor Bend:	1.36°
Magnetic Dec:	22.846°
Survey tool offset:	20.00m
Gamma offset:	13.93m
LWD_Array Ind:	25.60m
LWD_Gamma	23.56m
	Out at 3152m

3165 3170 3175 3180 31