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### Customer Information

**Operator:** Noble Energy  
1625 Broadway  
Suite 2200  
Denver, Colorado 80202

**Geologist:** Cassidy Miller  
Noble Energy Inc.

### Mud Logging Details

**Logger:** Andrew Christiano & Hannah Blatchford  
**Log Interval:** 6600' MD to 10951' MD  
**Start Date:** September 23, 2013  
**Release Date:** September 26, 2013

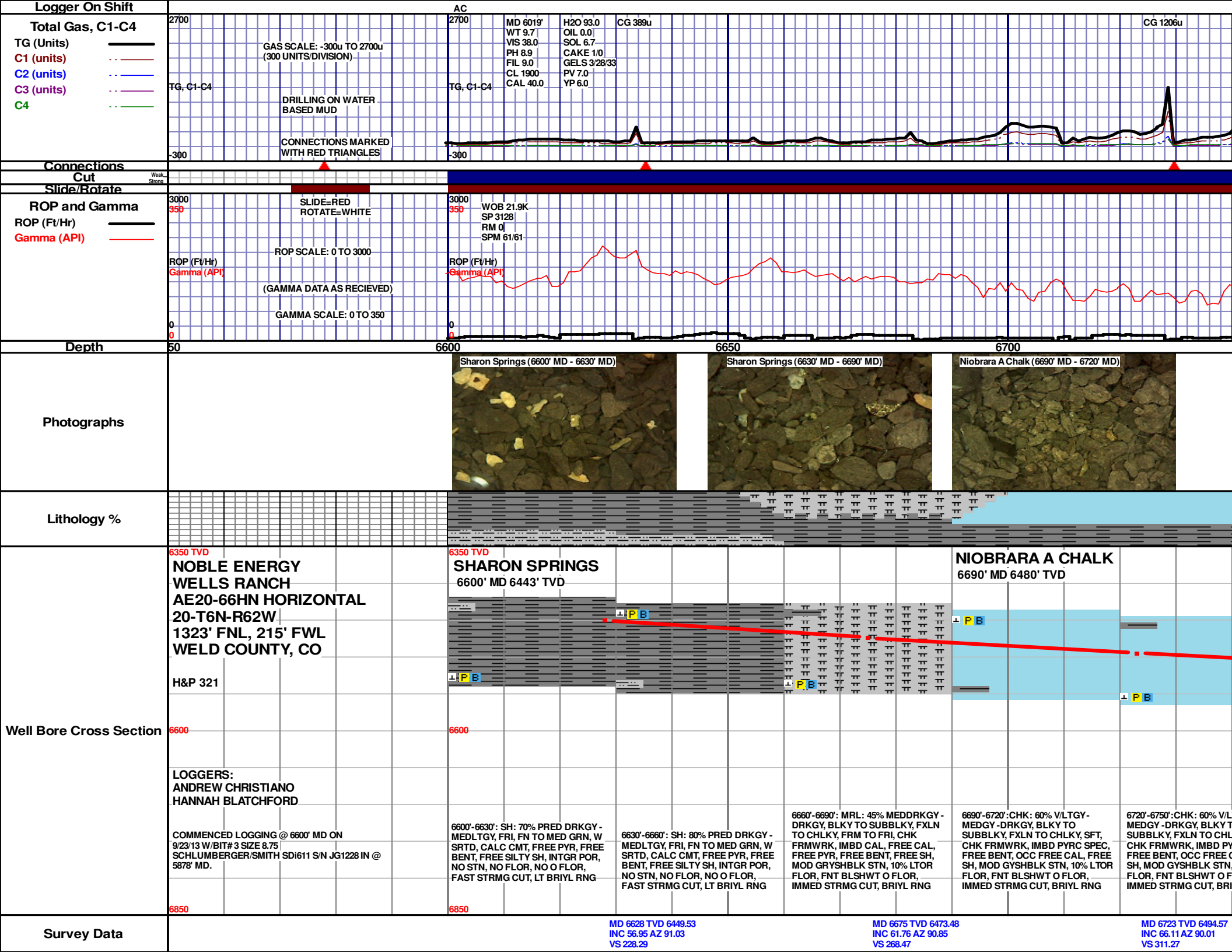
### Well Information

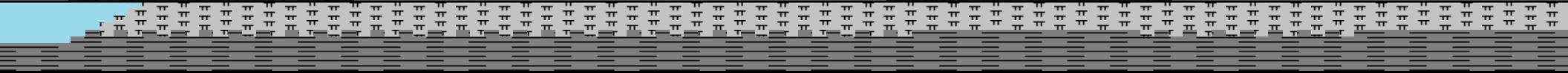
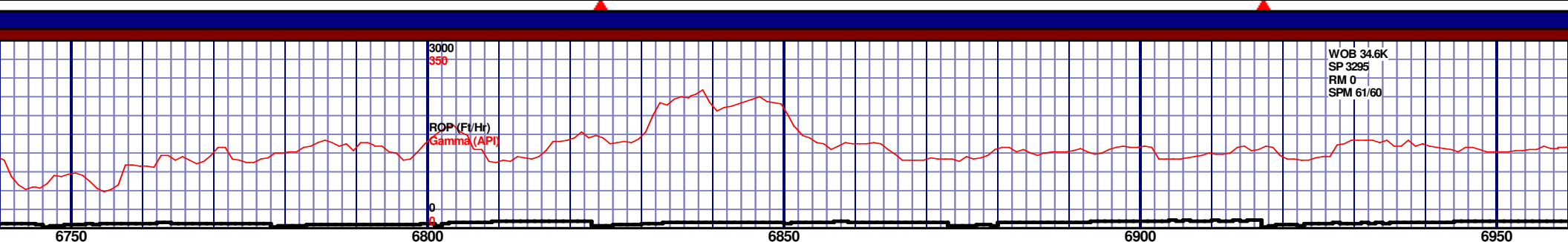
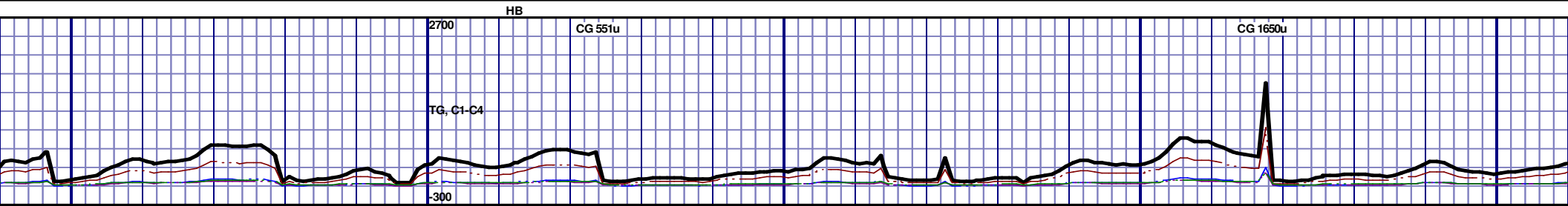
**Well Name:** Wells Ranch  
AE20-66HN Horizontal

**Location:** 20-T6N-R62W  
1323' FNL, 215' FWL

**County:** Weld Co.  
**State:** Colorado

**Drilling Rig:** H&P 321  
**Total Depth:** 10951' MD  
**TD Date:** September 26, 2013  
**Formation:** Niobrara B Chalk  
**KB Elevation:** 4,870'  
**GR Elevation:** 4,840'  
**API Number:** 05-123-37561-0000





NIOBRARA A MARL 6750' MD 6504' TVD									
6350 TVD									
6600									
6850									
TGY- TO KY, SFT, RC SPEC, CAL, FREE CAL, 10% LTOR FLOR, YL RNG	6750'-6780': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, FREE PYR, FREE BENT, FREE SH, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG	6780'-6810': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, FREE PYR, ABDT FREE BENT, FREE SH, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG	6810'-6840': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, ABDT FREE PYR, FREE BENT, FREE SH, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG	6840'-6870': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, ABDT FREE PYR, FREE BENT, FREE SH, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG	6870'-6900': MRL: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, FREE PYR, FREE BENT, FREE SH, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG	6900'-6930': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, FREE BENT, FREE SH, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG	6930'-6960': MRL: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, FREE PYR, FREE BENT, FREE SH, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG		

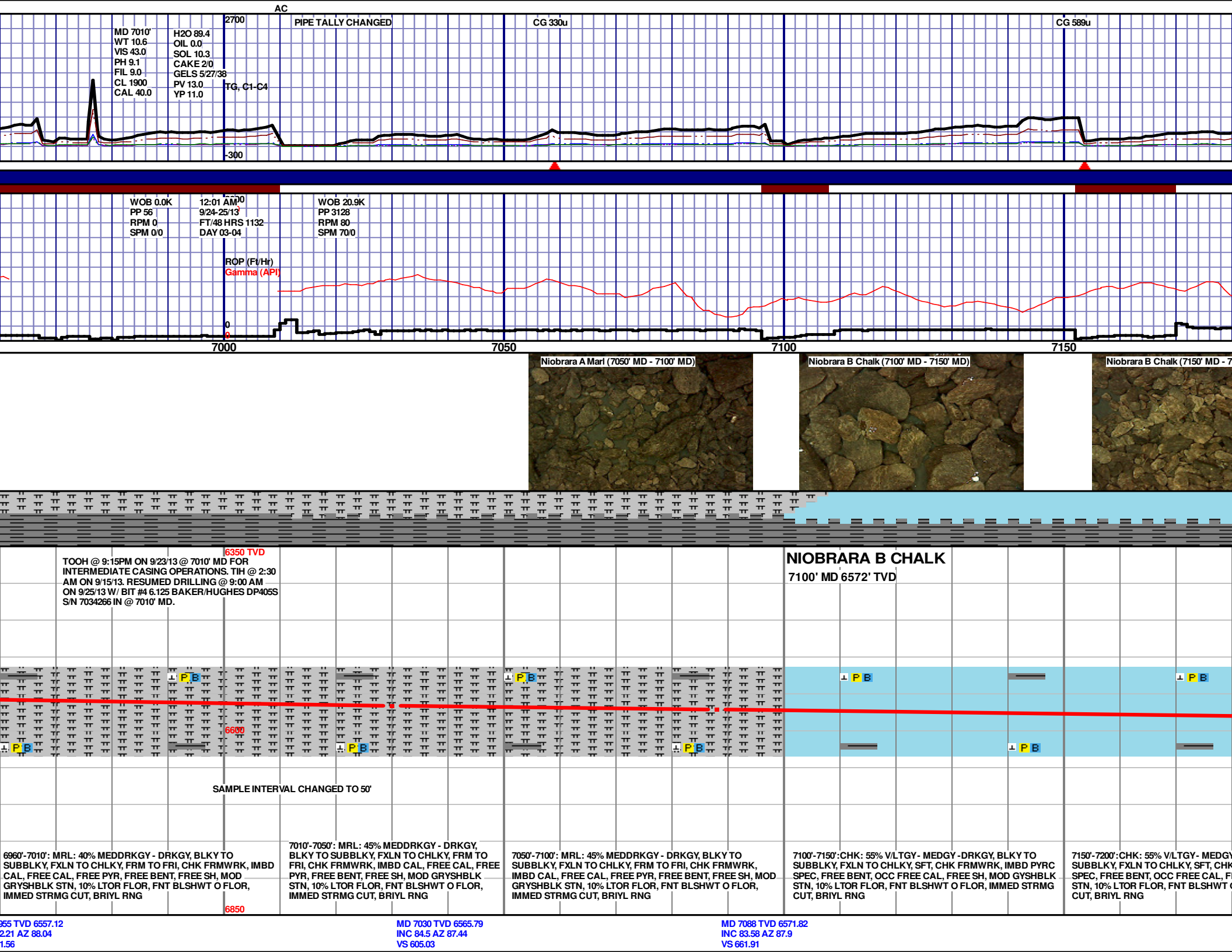
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INC 69.12 AZ 90.06  
VS 354.38

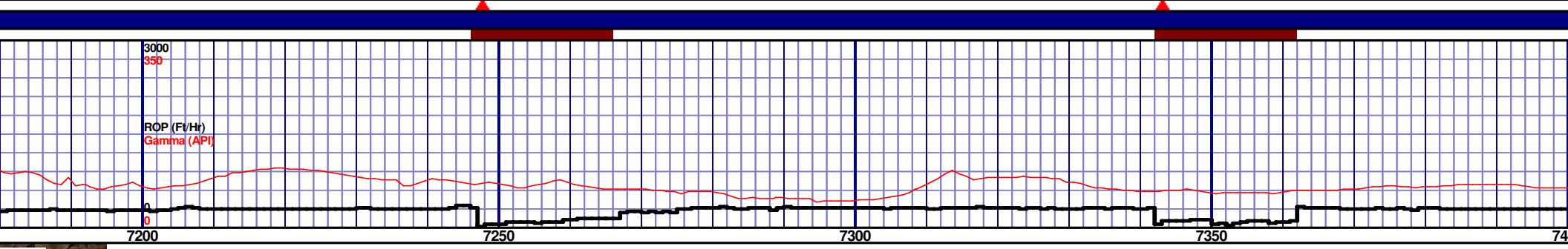
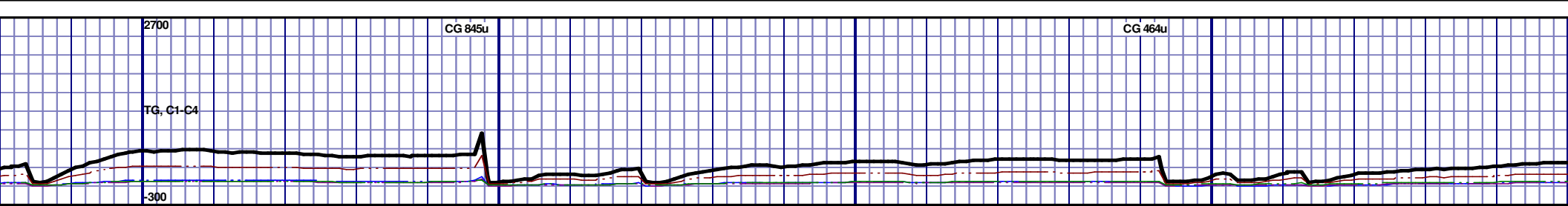
MD 6818 TVD 6528.04  
INC 73.02 AZ 89.05  
VS 399.37

MD 6864 TVD 6540.13  
INC 76.49 AZ 88.61  
VS 443.26

MD 6912 TVD 6550.2  
INC 79.28 AZ 88.43  
VS 489.65

MD 6960 TVD 6560.3  
INC 81.28 AZ 88.25  
VS 534.15



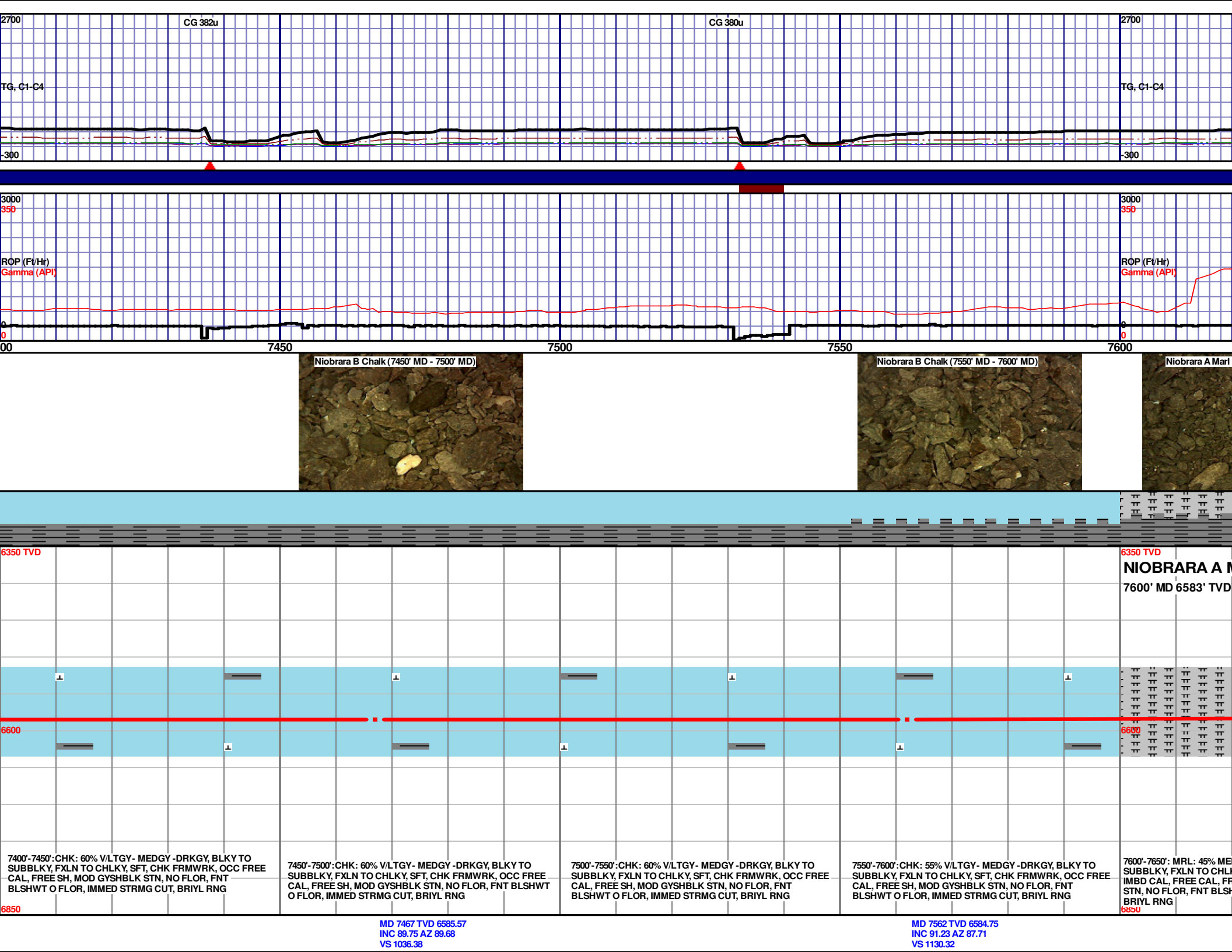


6350 TVD									
6600									
6850									
<p>7200'-7250': CHK: 60% V/LTGY - MEDGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, SFT, CHK FRMWK, OCC FREE CAL, FREE SH, MOD GYSHBLK STN, NO FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG</p> <p>7250'-7300': CHK: 65% V/LTGY - MEDGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, SFT, CHK FRMWK, OCC FREE CAL, FREE SH, MOD GYSHBLK STN, NO FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG</p> <p>7300'-7350': CHK: 60% V/LTGY - MEDGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, SFT, CHK FRMWK, OCC FREE CAL, FREE SH, MOD GYSHBLK STN, NO FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG</p> <p>7350'-7400': CHK: 60% V/LTGY - MEDGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, SFT, CHK FRMWK, OCC FREE CAL, FREE SH, MOD GYSHBLK STN, NO FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG</p>									

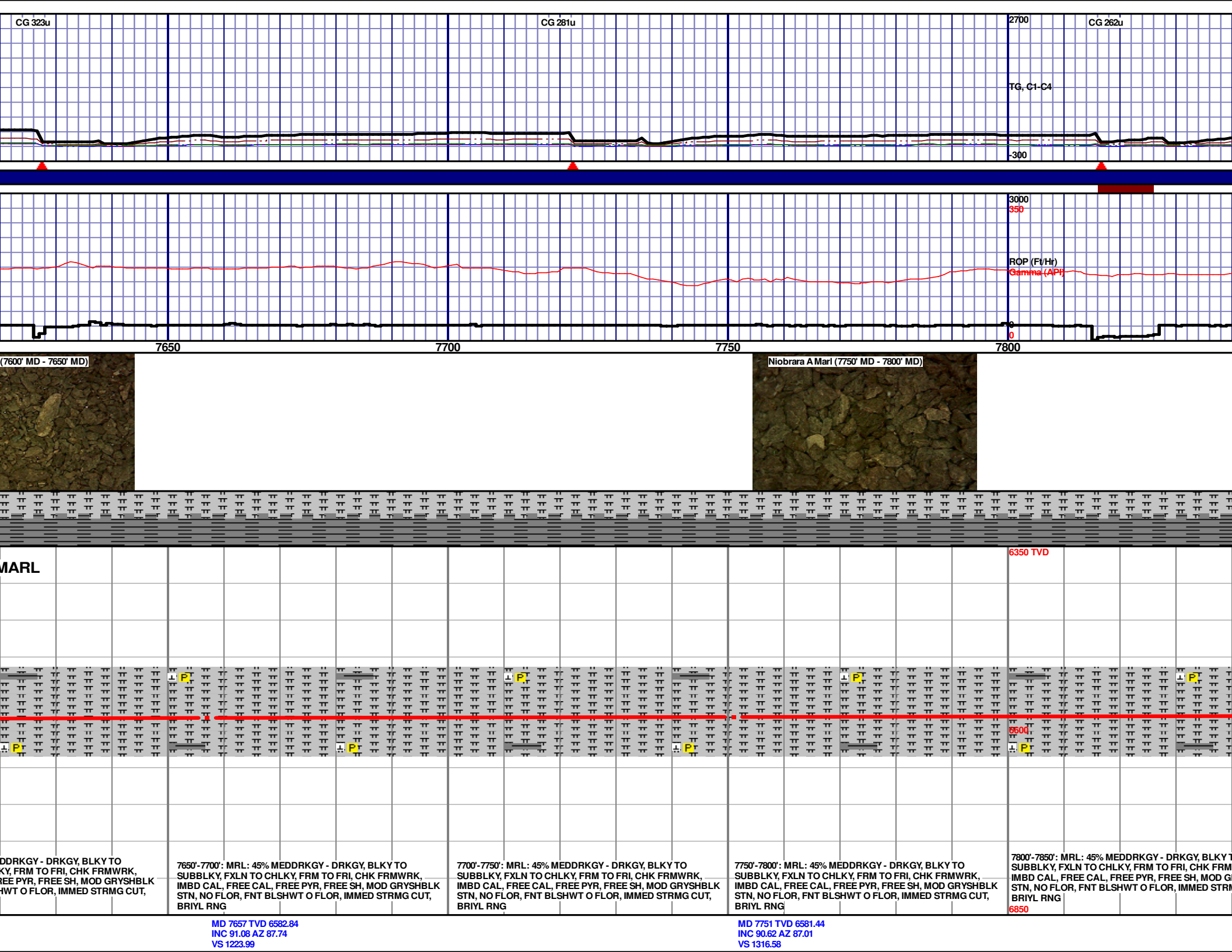
MD 7183 TVD 6579.94  
INC 86.61 AZ 88.66  
VS 755.39

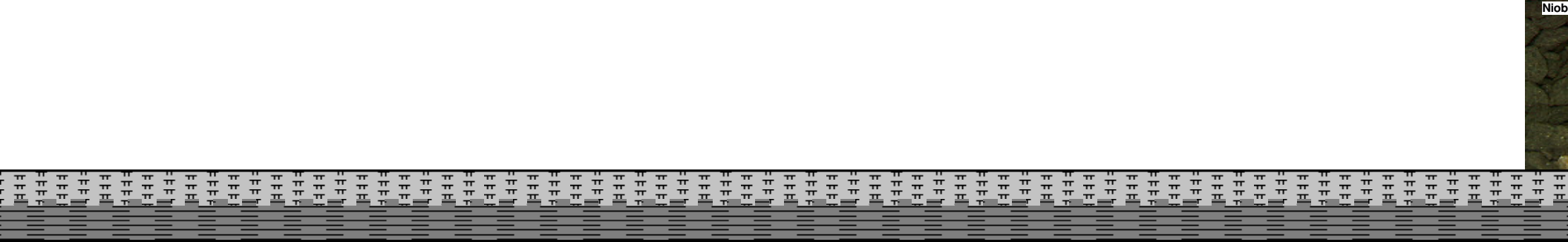
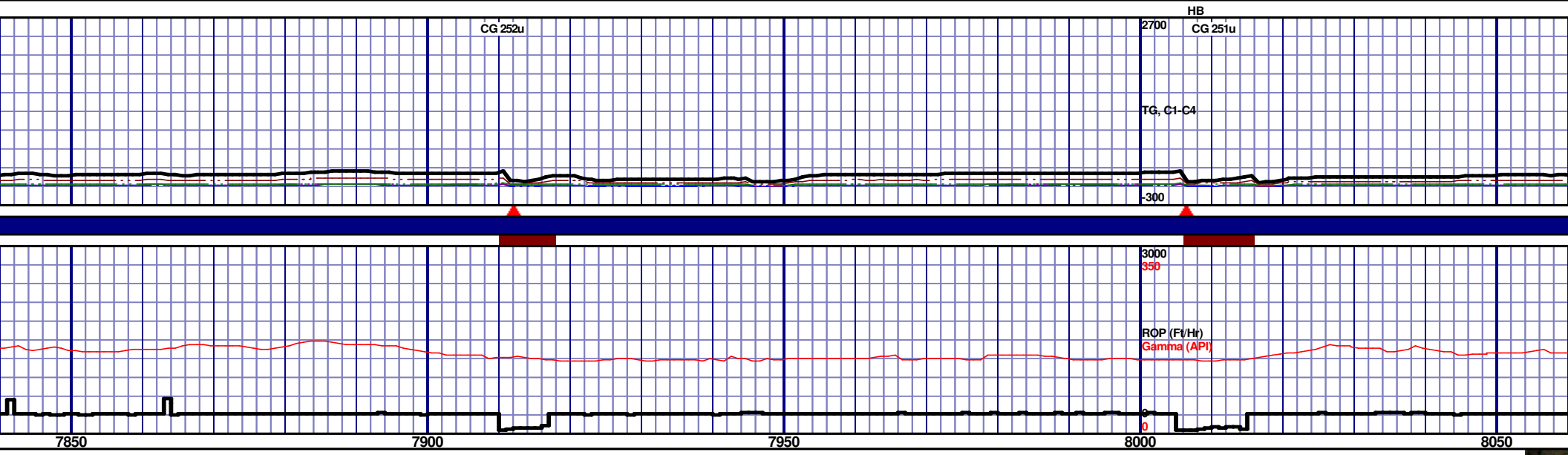
MD 7277 TVD 6584.01  
INC 88.43 AZ 88.69  
VS 848.25

MD 7372 TVD 6585.33  
INC 89.97 AZ 89.31  
VS 942.25





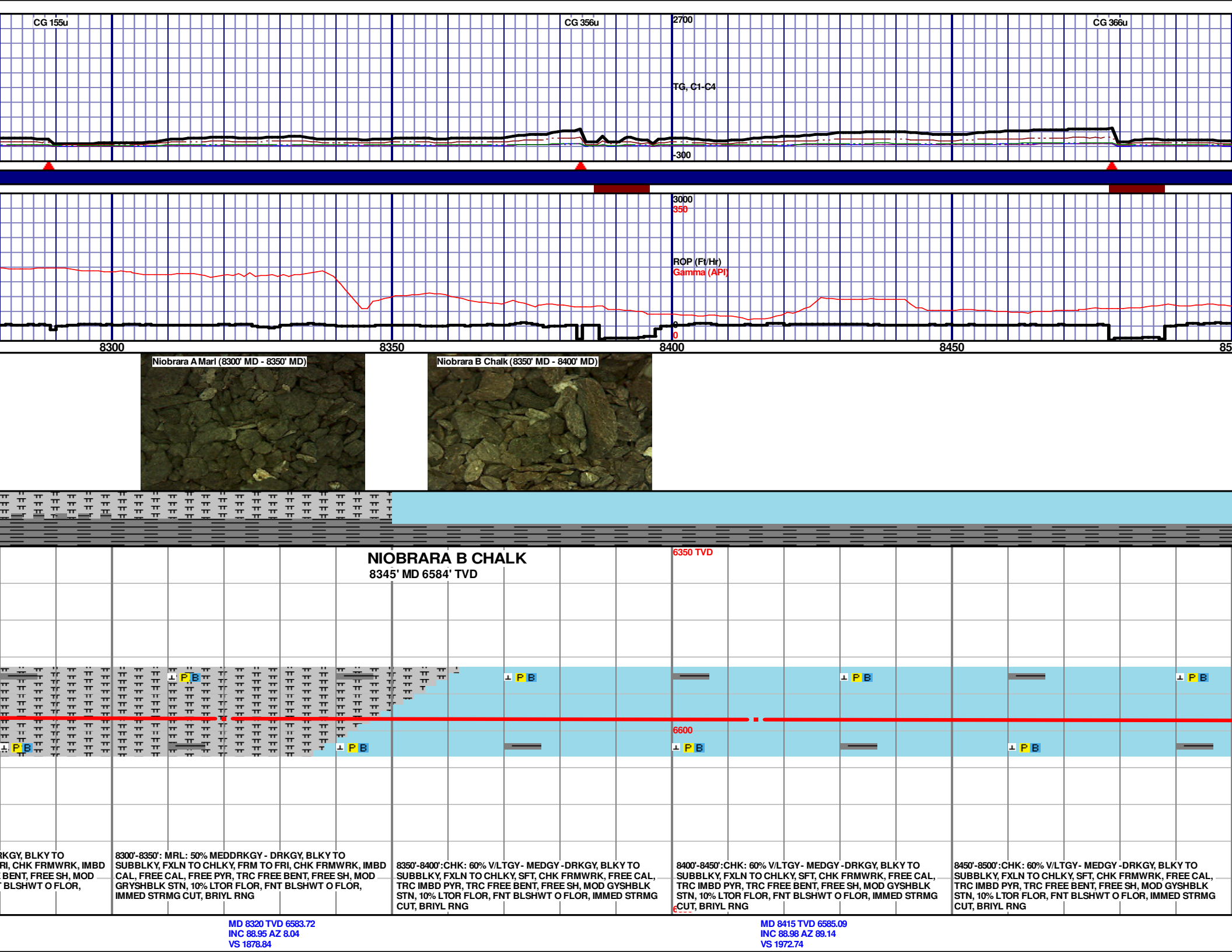


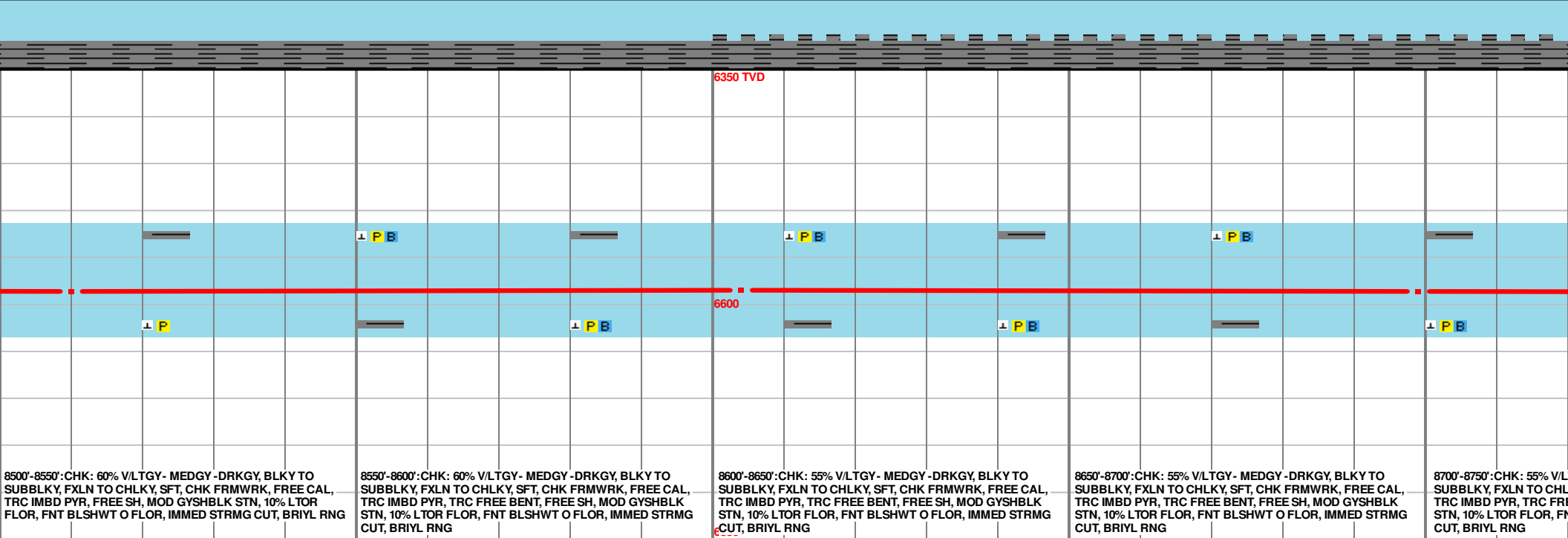
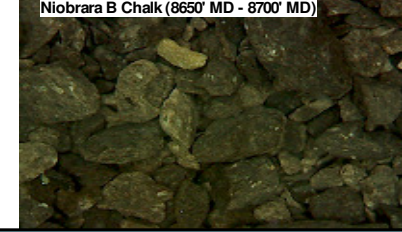
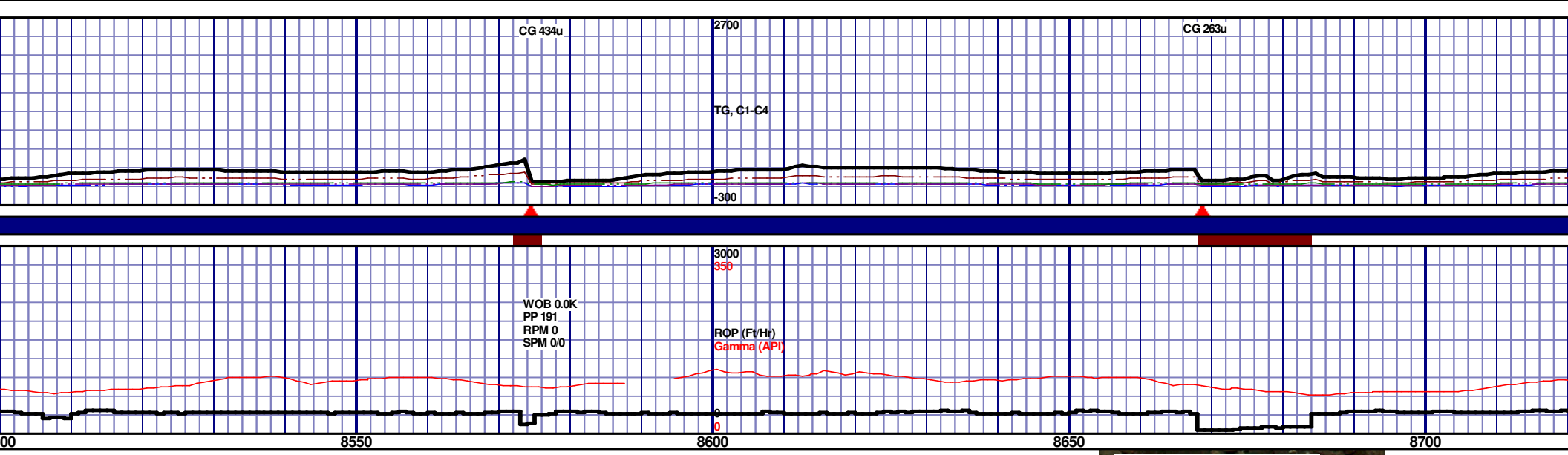


7850'-7900': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, FREE PYR, FREE SH, MOD GRYSBLK STN, NO FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG					7900'-7950': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, FREE PYR, FREE SH, MOD GRYSBLK STN, NO FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG					7950'-8000': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, FREE PYR, FREE SH, MOD GRYSBLK STN, NO FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG					8000'-8050': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, FREE PYR, FREE SH, MOD GRYSBLK STN, NO FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG					8050'-8100': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, FREE PYR, FREE SH, MOD GRYSBLK STN, NO FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG				
TO WRK, RYSHBLK MG CUT,																								





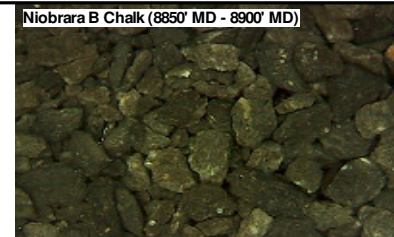
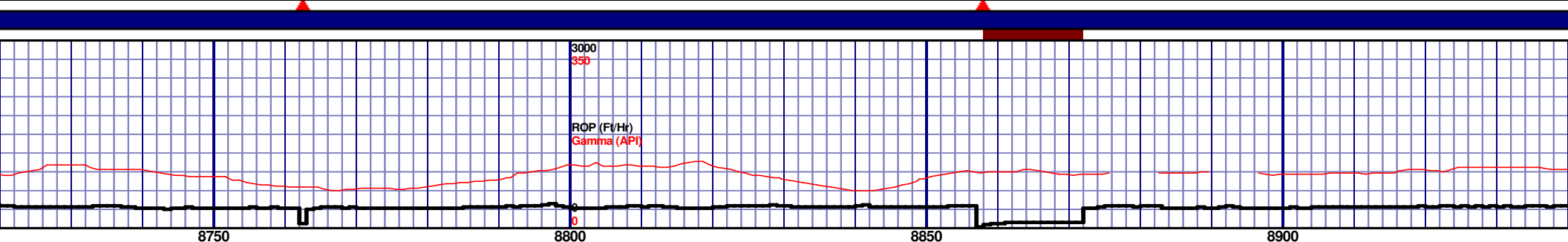
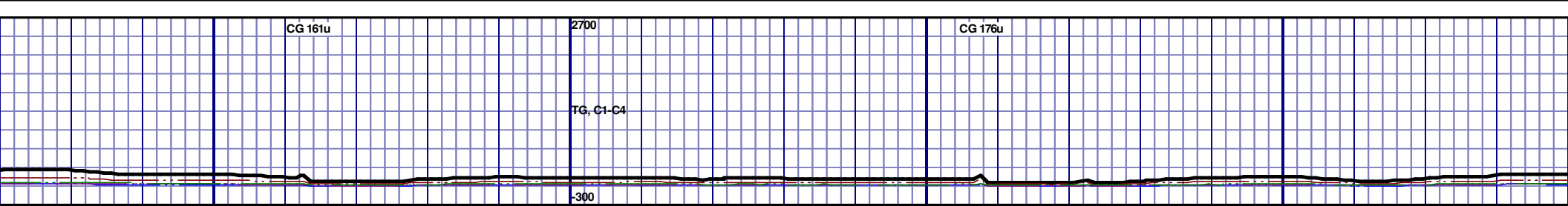




MD 8510 TVD 6585.83  
INC 90.12 AZ 90.31  
VS 2066.91

MD 8604 TVD 6584.71  
INC 90.89 AZ -999.25  
VS 2160.33

MD 8699 TVD 6586.26  
INC 89.78 AZ 88.12  
VS 2254.4

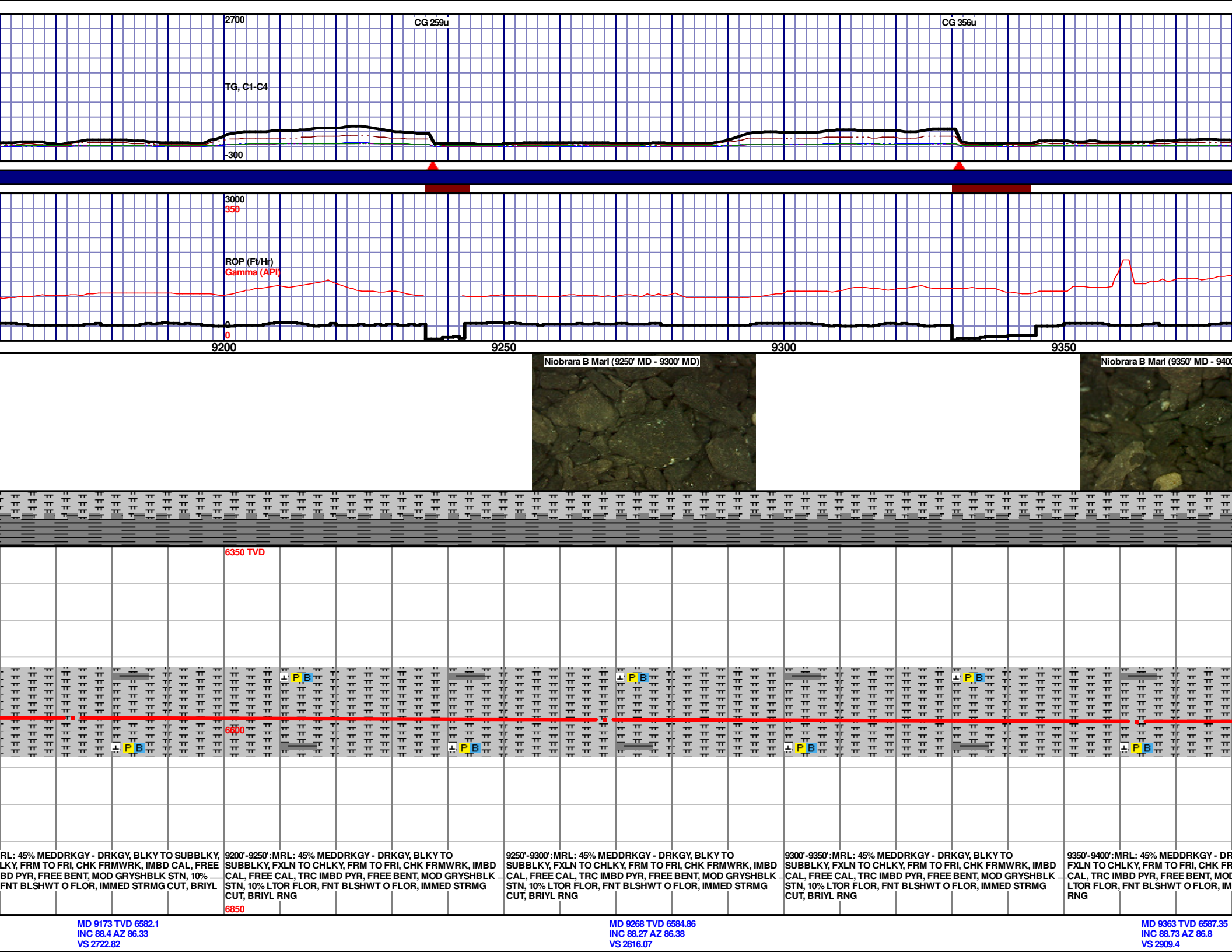


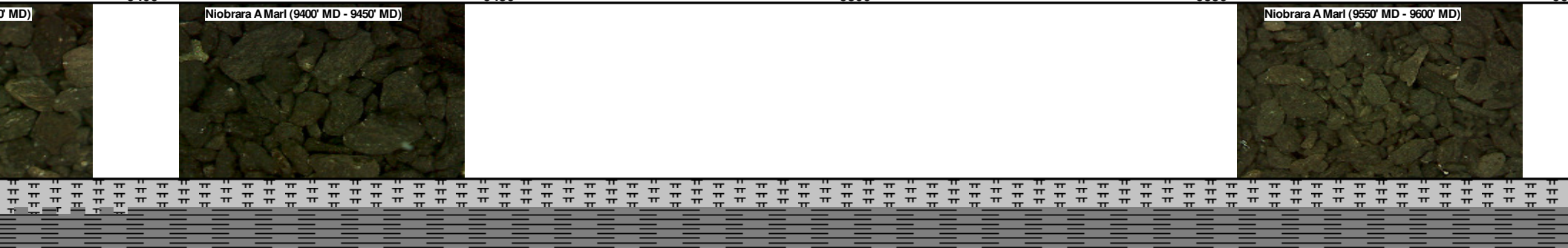
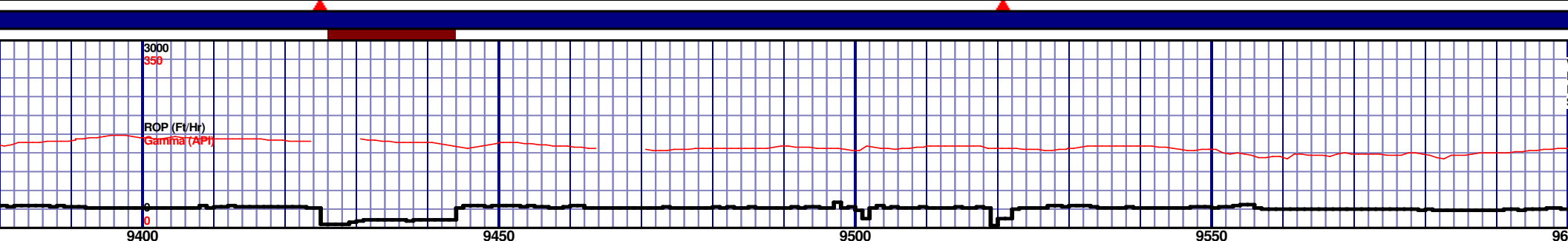
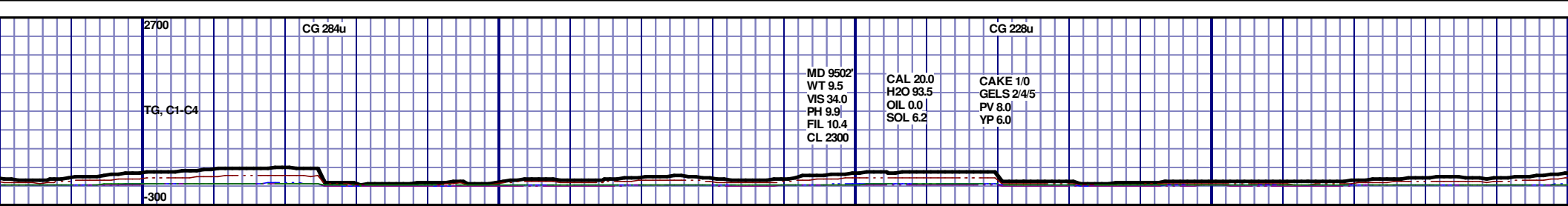
8750'-8800':CHK: 55% V/LTGY- MEDGY-DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, SFT, CHK FRMWRK, FREE CAL, TRC IMBD PYR, TRC FREE BENT, FREE SH, MOD GYSHBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG				8800'-8850':CHK: 55% V/LTGY- MEDGY-DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, SFT, CHK FRMWRK, FREE CAL, TRC IMBD PYR, TRC FREE BENT, FREE SH, MOD GYSHBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG				8850'-8900':CHK: 55% V/LTGY- MEDGY-DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, SFT, CHK FRMWRK, FREE CAL, TRC IMBD PYR, TRC FREE BENT, FREE SH, MOD GYSHBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG				8900'-8950':MRL: 50% MEDDRKGY- DRKGY, BLKY TO FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, TRC IMBD PYR, FREE BENT, MOD GRYSHBLK LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG RNG			
8750'-8800':CHK: 55% V/LTGY- MEDGY-DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, SFT, CHK FRMWRK, FREE CAL, TRC IMBD PYR, TRC FREE BENT, FREE SH, MOD GYSHBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG				8800'-8850':CHK: 55% V/LTGY- MEDGY-DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, SFT, CHK FRMWRK, FREE CAL, TRC IMBD PYR, TRC FREE BENT, FREE SH, MOD GYSHBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG				8850'-8900':CHK: 55% V/LTGY- MEDGY-DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, SFT, CHK FRMWRK, FREE CAL, TRC IMBD PYR, TRC FREE BENT, FREE SH, MOD GYSHBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG				8900'-8950':MRL: 50% MEDDRKGY- DRKGY, BLKY TO FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, TRC IMBD PYR, FREE BENT, MOD GRYSHBLK LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG RNG			

MD 8794 TVD 6586.96  
INC 89.38 AZ 88.08  
VS 2348.19

MD 8889 TVD 6585.97  
INC 91.82 AZ 89.34  
VS 2442.13

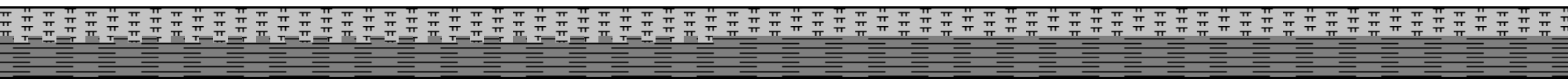
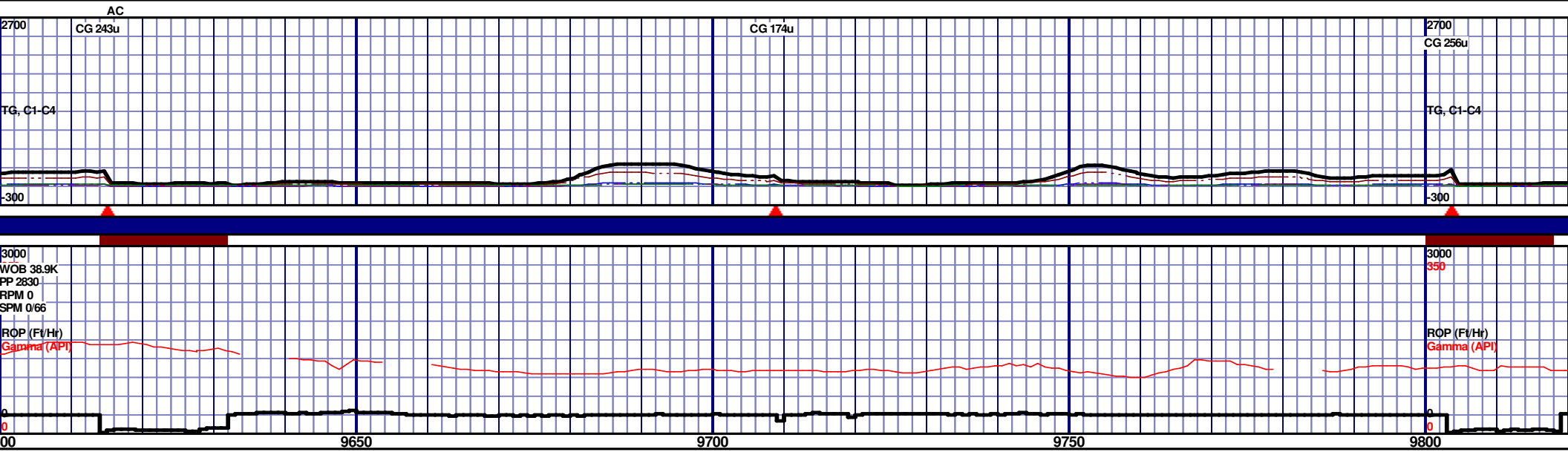




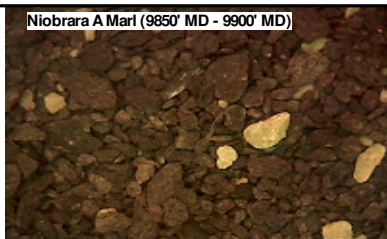
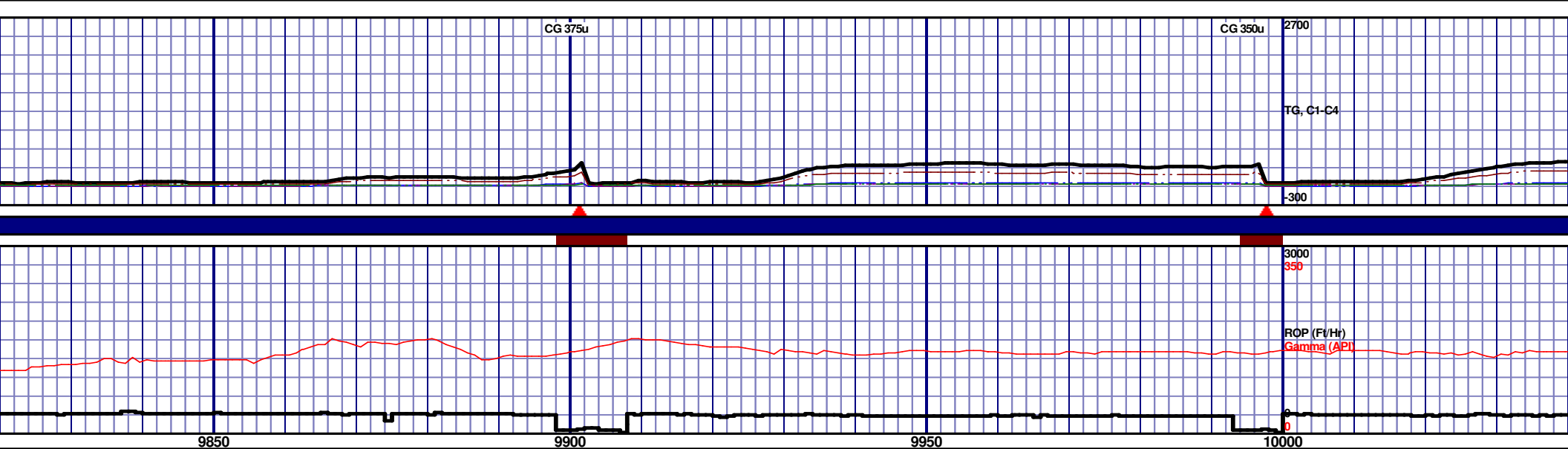


NIOBRARA A MARL 9400' MD 6588' TVD									
DRKGY, BLKY TO SUBBLKY, IMWRK, IMBD CAL, FREE O GRYSBLK STN, 10% MED STRMG CUT, BRIYL	9400'-9450': MRL: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG	9450'-9500': MRL: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG	9500'-9550': MRL: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG	9550'-9600': MRL: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG					
6690	6850								

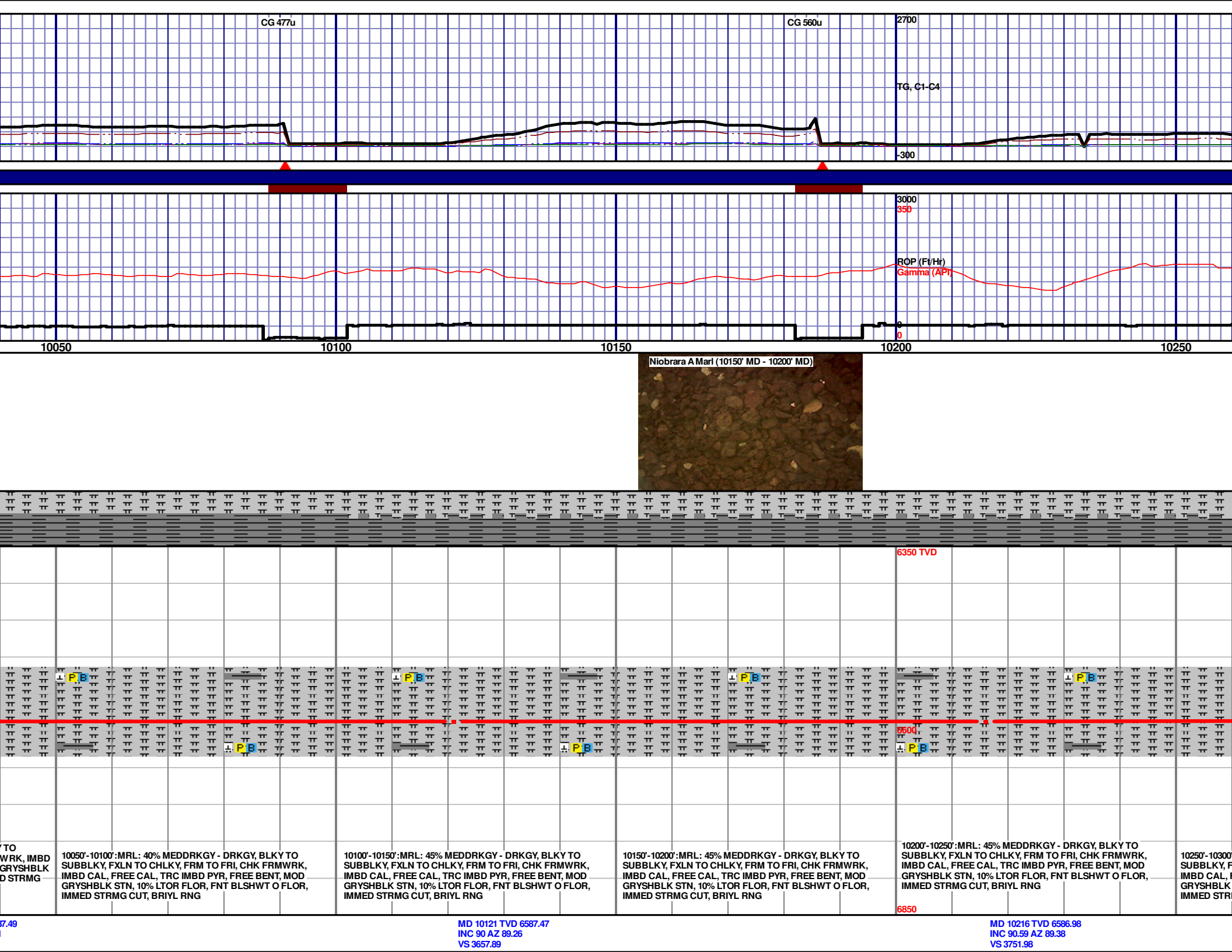


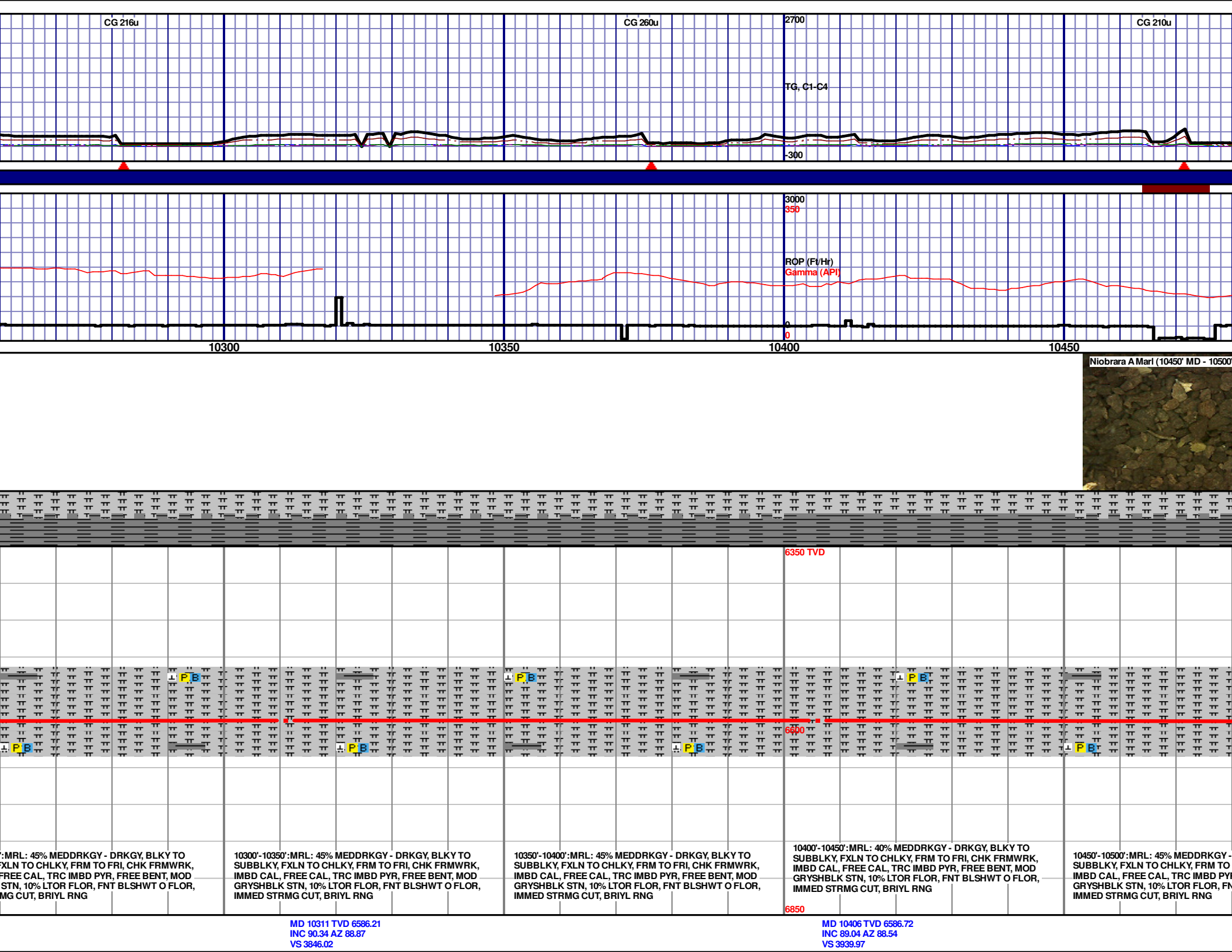


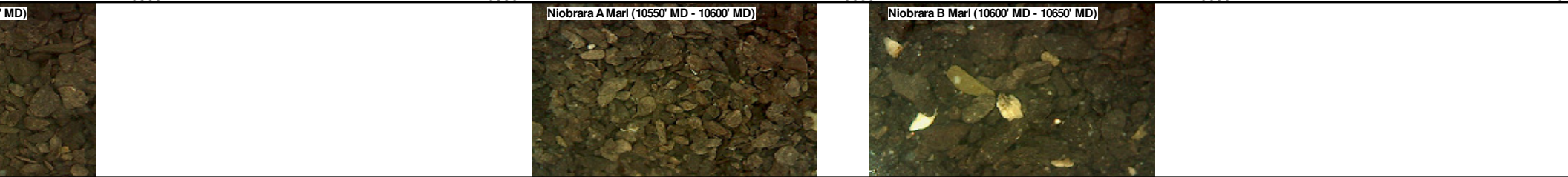
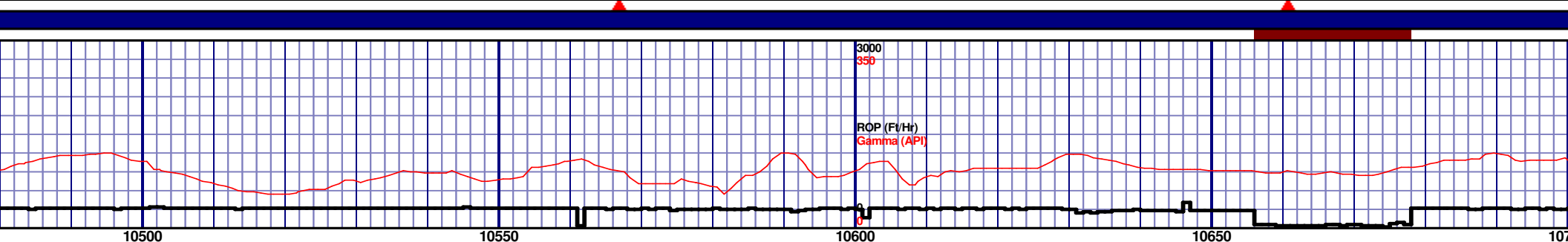
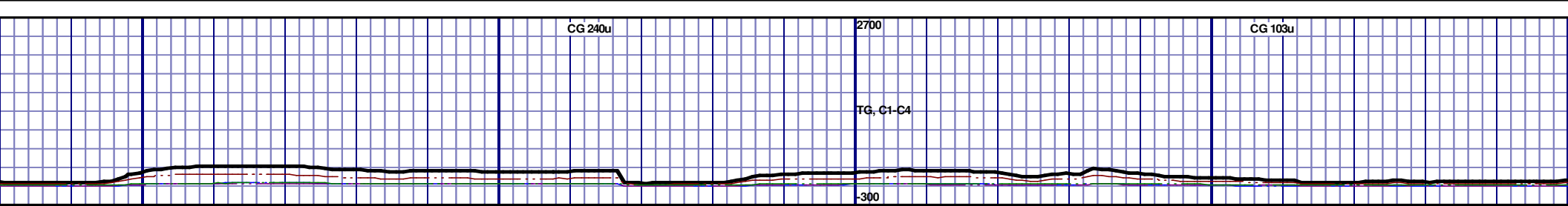
6350 TVD										6350 TVD									
9600'-9650': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSHLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG										9600'-9650': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSHLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG									
9650'-9700': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSHLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG										9650'-9700': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSHLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG									
9700'-9750': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSHLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG										9700'-9750': MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSHLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG									
9750'-9800': MRL: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSHLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG										9750'-9800': MRL: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSHLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG									
9800'-9850': MRL: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSHLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG										9800'-9850': MRL: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSHLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG									



<p>DDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG</p>	<p>9850'-9900':MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG</p>	<p>9900'-9950':MRL: 45% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG</p>	<p>9950'-10000':MRL: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG</p>	<p>10000'-10050':MRL: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GRYSBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG</p>
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			<b>6350 TVD</b> <b>NIOBARRA B MARL</b> 10600' MD 6590' TVD		
			<b>6690</b>		
			<b>6850</b>		
DRKGY, BLKY TO FRI, CHK FRMWRK, TRC IMBD PYR, TRC FREE BENT, FREE SH, MOD GYSHBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG			10500'-10550':CHK: 50% V/LTGY- MEDGY-DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, SFT, CHK FRMWRK, FREE CAL, TRC IMBD PYR, TRC FREE BENT, FREE SH, MOD GYSHBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG		
			10550'-10600':CHK: 50% V/LTGY- MEDGY-DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, SFT, CHK FRMWRK, FREE CAL, TRC IMBD PYR, TRC FREE BENT, FREE SH, MOD GYSHBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG		
			10600'-10650':MRL: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GYSHBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG		
			10650'-10700':MRL: 40% MEDDRKGY - DRKGY, BLKY TO SUBBLKY, FXLN TO CHLKY, FRM TO FRI, CHK FRMWRK, IMBD CAL, FREE CAL, TRC IMBD PYR, FREE BENT, MOD GYSHBLK STN, 10% LTOR FLOR, FNT BLSHWT O FLOR, IMMED STRMG CUT, BRIYL RNG		

MD 10500 TVD 6587.96  
INC 89.45 AZ 88.7  
VS 4032.89

MD 10595 TVD 6590.2  
INC 87.85 AZ 88.3  
VS 4126.76

MD 10690 TVD  
INC 86.17 AZ  
VS 4220.5

