



Company: **WHITING OIL & GAS CORP.**

Well: **RAZOR 21 SMD #1**

Field: REDTAIL

County: **WELD** State: **COLORADO**

SPECTRAL GAMMA RAY MEMORY LOG

County: WELD									
Field: REDTAIL									
Location: 2317' FEL & 2595' FSL									
Well: RAZOR 21 SWD #1									
Company: WHITING OIL & GAS CO.									
<table border="1"> <tr> <td colspan="2">LOCATION</td> </tr> <tr> <td rowspan="3"> 2317' FEL & 2595' FSL AT SURFACE. </td> <td> Elev.: K.B. 4842.00 ft G.L. 4819.00 ft D.F. 4841.00 ft </td> </tr> <tr> <td> Permanent Datum: _____ Log Measured From: _____ Drilling Measured From: _____ </td> </tr> <tr> <td> GROUND LEVEL KELLY BUSHING KELLY BUSHING </td> </tr> <tr> <td> API Serial No. 05123407770000 </td> <td> Section 21 Township 10N Range 58W </td> </tr> </table>		LOCATION		2317' FEL & 2595' FSL AT SURFACE.	Elev.: K.B. 4842.00 ft G.L. 4819.00 ft D.F. 4841.00 ft	Permanent Datum: _____ Log Measured From: _____ Drilling Measured From: _____	GROUND LEVEL KELLY BUSHING KELLY BUSHING	API Serial No. 05123407770000	Section 21 Township 10N Range 58W
LOCATION									
2317' FEL & 2595' FSL AT SURFACE.	Elev.: K.B. 4842.00 ft G.L. 4819.00 ft D.F. 4841.00 ft								
	Permanent Datum: _____ Log Measured From: _____ Drilling Measured From: _____								
	GROUND LEVEL KELLY BUSHING KELLY BUSHING								
API Serial No. 05123407770000	Section 21 Township 10N Range 58W								

[illegible]

Logging Date	11-Feb-2015						
Run Number	1						
Depth Driller	8550 ft						
Schlumberger Depth	8530 ft						
Bottom Log Interval	8490 ft						
Top Log Interval	1568 ft						
Casing Driller Size @ Depth	7.000 in @ 1584 ft					@	
Casing Schlumberger	1588 ft						
Bit Size	8.750 in						
Type Fluid In Hole	WBM						
Density	10.2 lbm/gal		41 s				
Fluid Loss	9.2 cm3		8				
Source Of Sample	FLOW LINE						
RM @ Measured Temperature	1.799 ohm.m		@ 116 degF			@	
RMF @ Measured Temperature	1.349 ohm.m		@ 116 degF			@	
RMC @ Measured Temperature	2.699 ohm.m		@ 116 degF			@	
Source RMF	RMC		CALCULATED				
RM @ MRT	RMF @ MRT		0.964 @ 222 0.723 @ 222		@		@
Maximum Recorded Temperatures	222 degF						
Circulation Stopped	Time		19:45				
Logger On Bottom	Time		22:30				
Unit Number	Location		16 BRIGHTON, CO				
Recorded By	P. BROOKENS						
Witnessed By	BJ HONNEYCUTT / C. NEUROTH						

Logging Date						
Run Number						
Depth Driller						
Schlumberger Depth						
Bottom Log Interval						
Top Log Interval						
Casing Driller Size @ Depth		@				
Casing Schlumberger						
Bit Size						
Type Fluid In Hole						
Density	Viscosity					
Fluid Loss	PH					
Source Of Sample						
RM @ Measured Temperature		@				
RMF @ Measured Temperature		@				
RMC @ Measured Temperature		@				
Source RMF	RMC					
RM @ MRT	RMF @ MRT	@		@		
Maximum Recorded Temperatures						
Circulation Stopped	Time					
Logger On Bottom	Time					
Unit Number	Location					
Recorded By						
Witnessed By						

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

OTHER SERVICES2
OS1:
OS2:
OS3:
OS4:
OS5:

REMARKS: RUN NUMBER 2

ALL PRESENTATIONS AND SCALES PER CLIENT REQUEST.

LIMESTONE MATRIX, 2.71 G/CC USED FOR POROSITY MEASUREMENTS.

TOOLSTRING RAN WITH LARGE DECENTRALIZER, SWIVEL, AND KNUCKLES.

IHV REPRESENTS INTEGRATED HOLE VOLUME, FT^3.

ICV REPRESENTS INTEGRATED CEMENT VOLUME, FT^3.

DEPTH REFERENCE: PIPE TALLY.

RIG: PIONEER 54

CREW: T. HATCH, D. HUNTER

TBIRD # 3577

RUN 2

SERVICE ORDER #:
PROGRAM VERSION:
FLUID LEVEL:

LOGGED INTERVAL

START

STOP

LOGGED INTERVAL

START

STOP

RUN 1

RUN 2

SURFACE EQUIPMENT

WITM (ThruBit)

DOWNHOLE EQUIPMENT

CCL

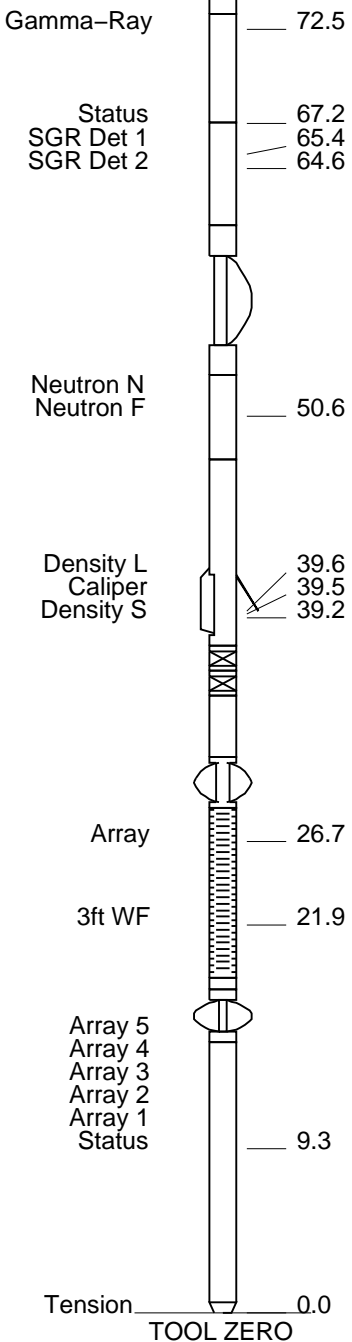
_____ 97.5

100.4

Hang-Off

91.1

TBAT2 21
TMG-A 38
TBSG-A 5
TILE-B 13
TBN-A 5
NNLS-EWA 4481
TBD-A 12
GGLS-FZ 3436
KAH-TB_2 6
KAH-TB_1 13
TBS-A 29
TCME-A
TBI-A 23



MAXIMUM STRING DIAMETER 2.13 IN
MEASUREMENTS RELATIVE TO TOOL ZERO
ALL LENGTHS IN FEET



MAIN PASS

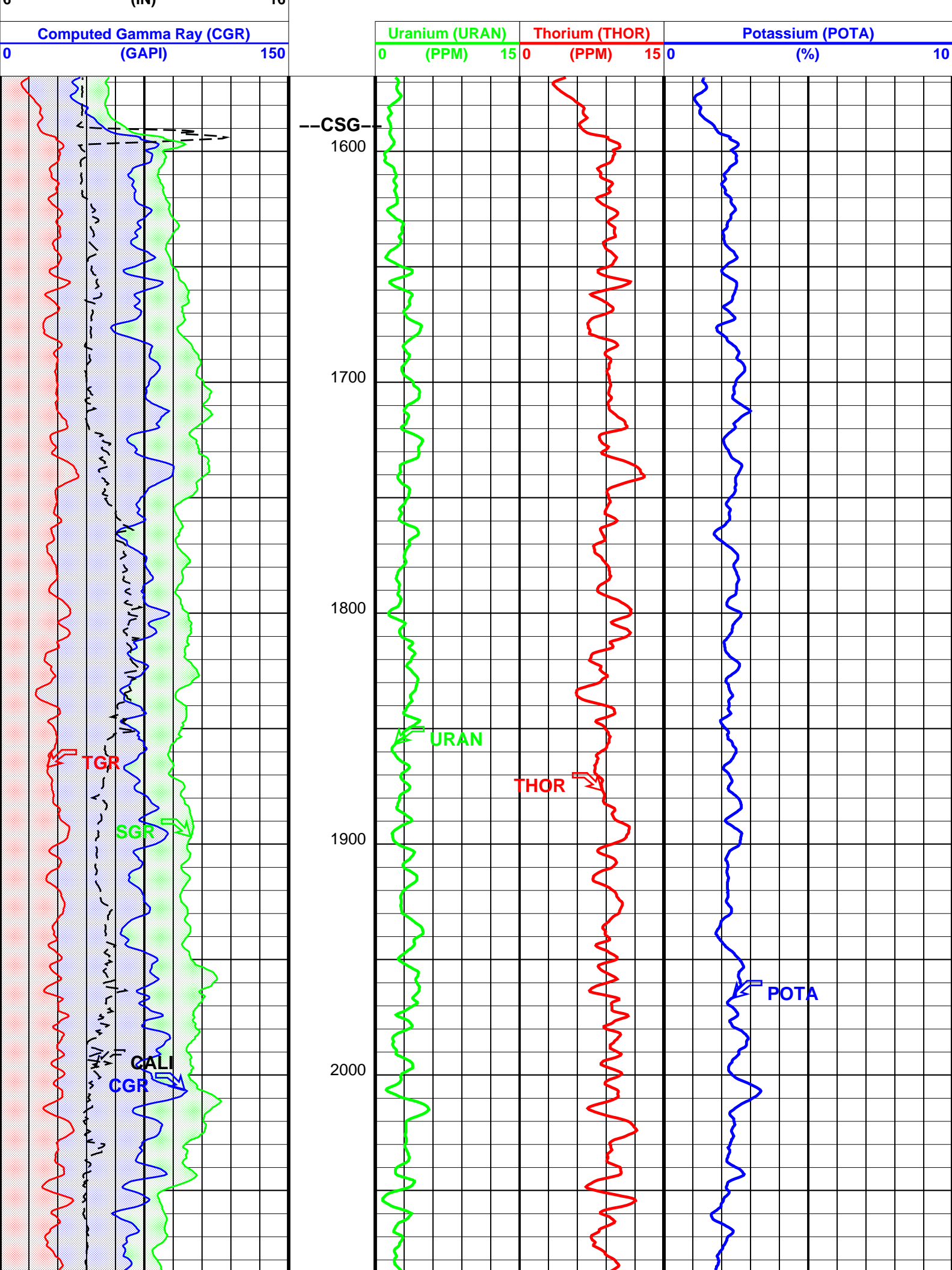
MAXIS Field Log

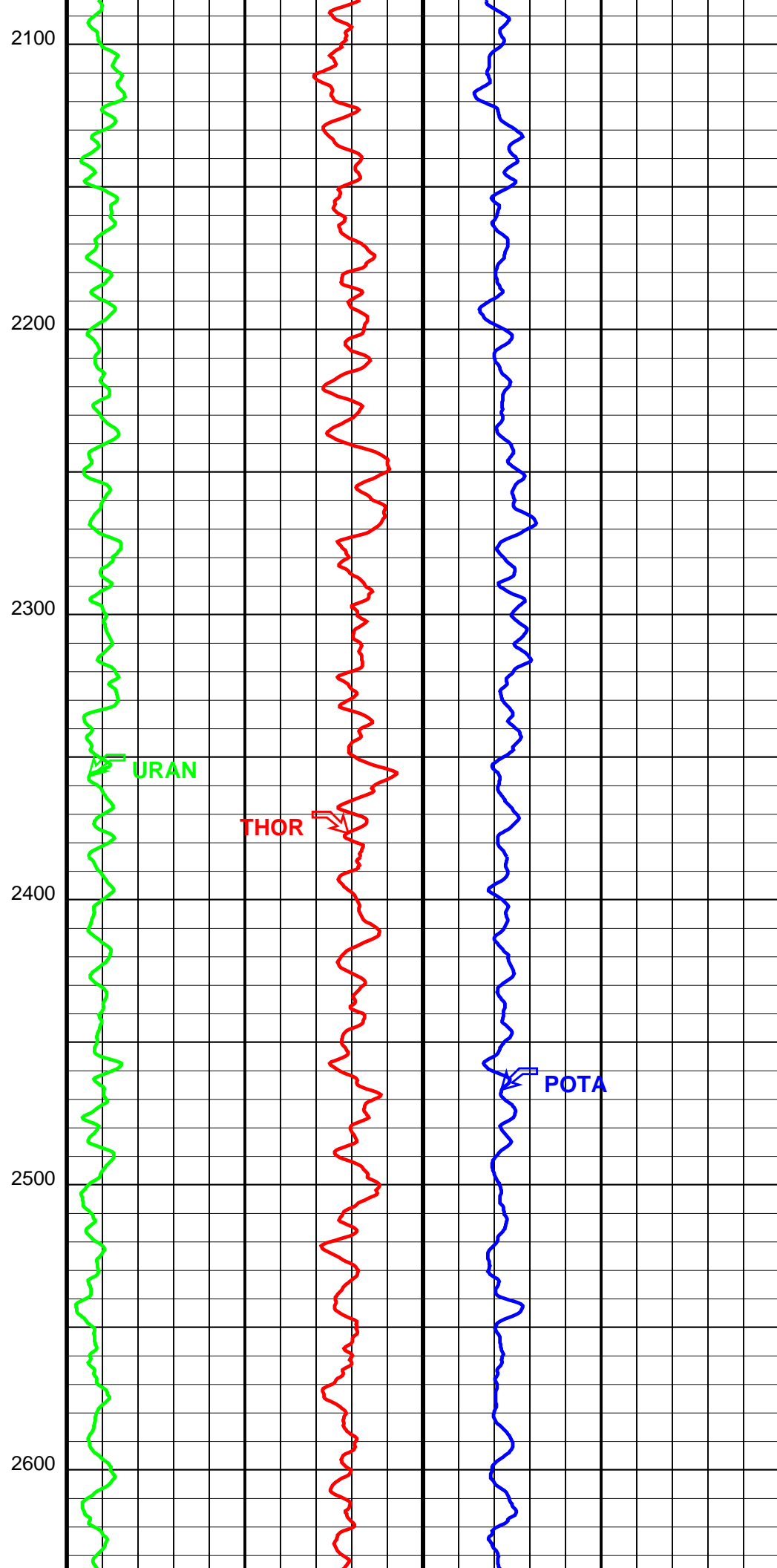
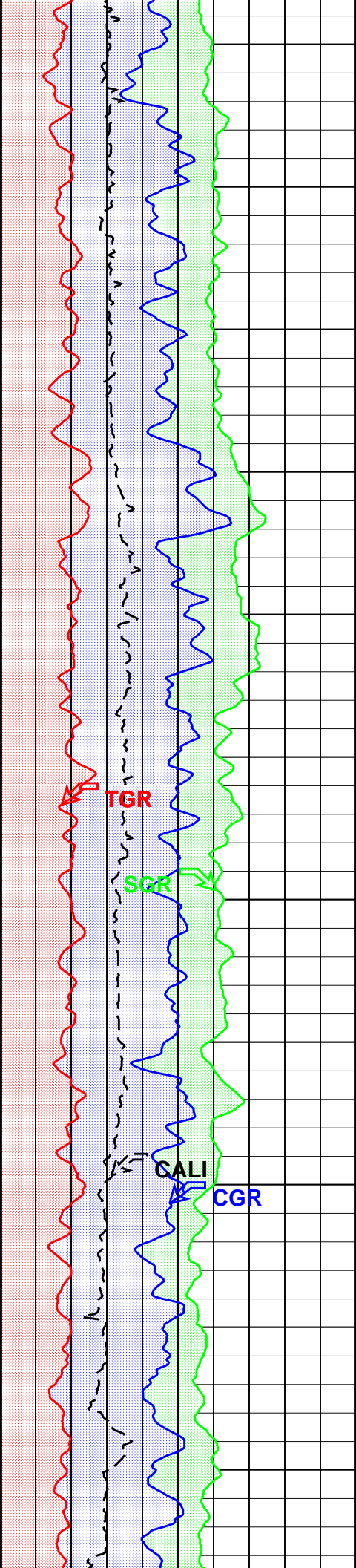
Company: WHITING OIL & GAS CORP. Well: RAZOR 21 SWD #1

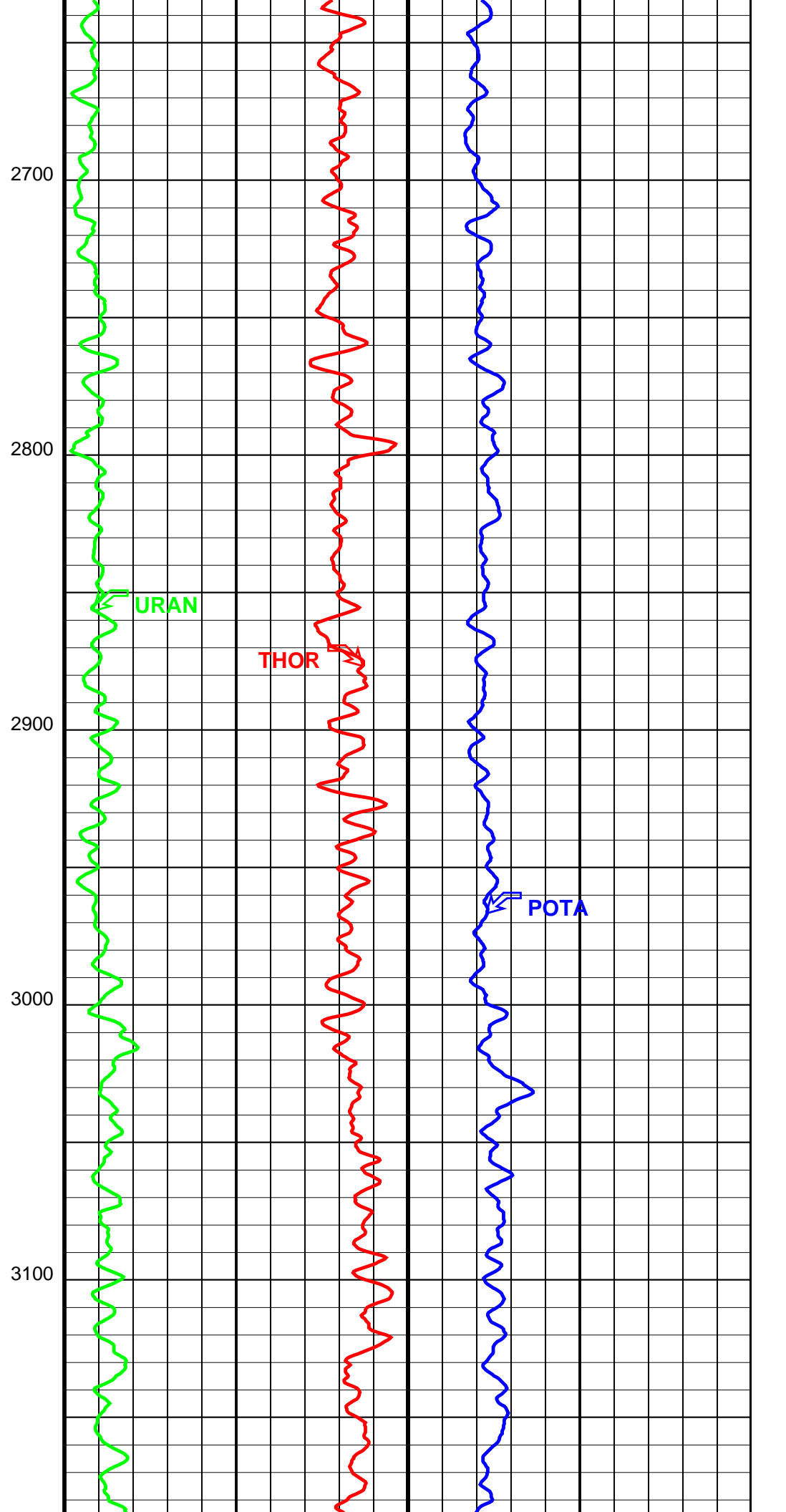
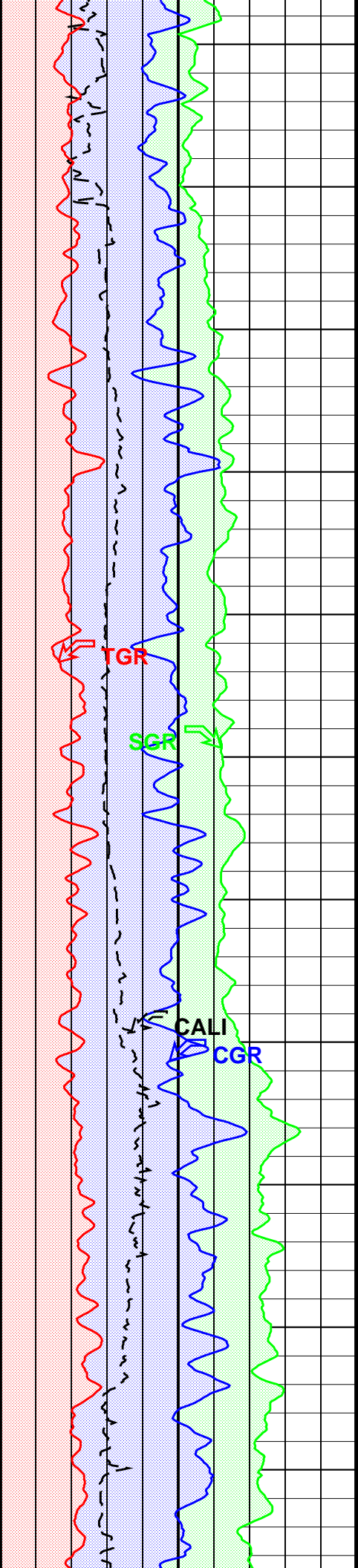
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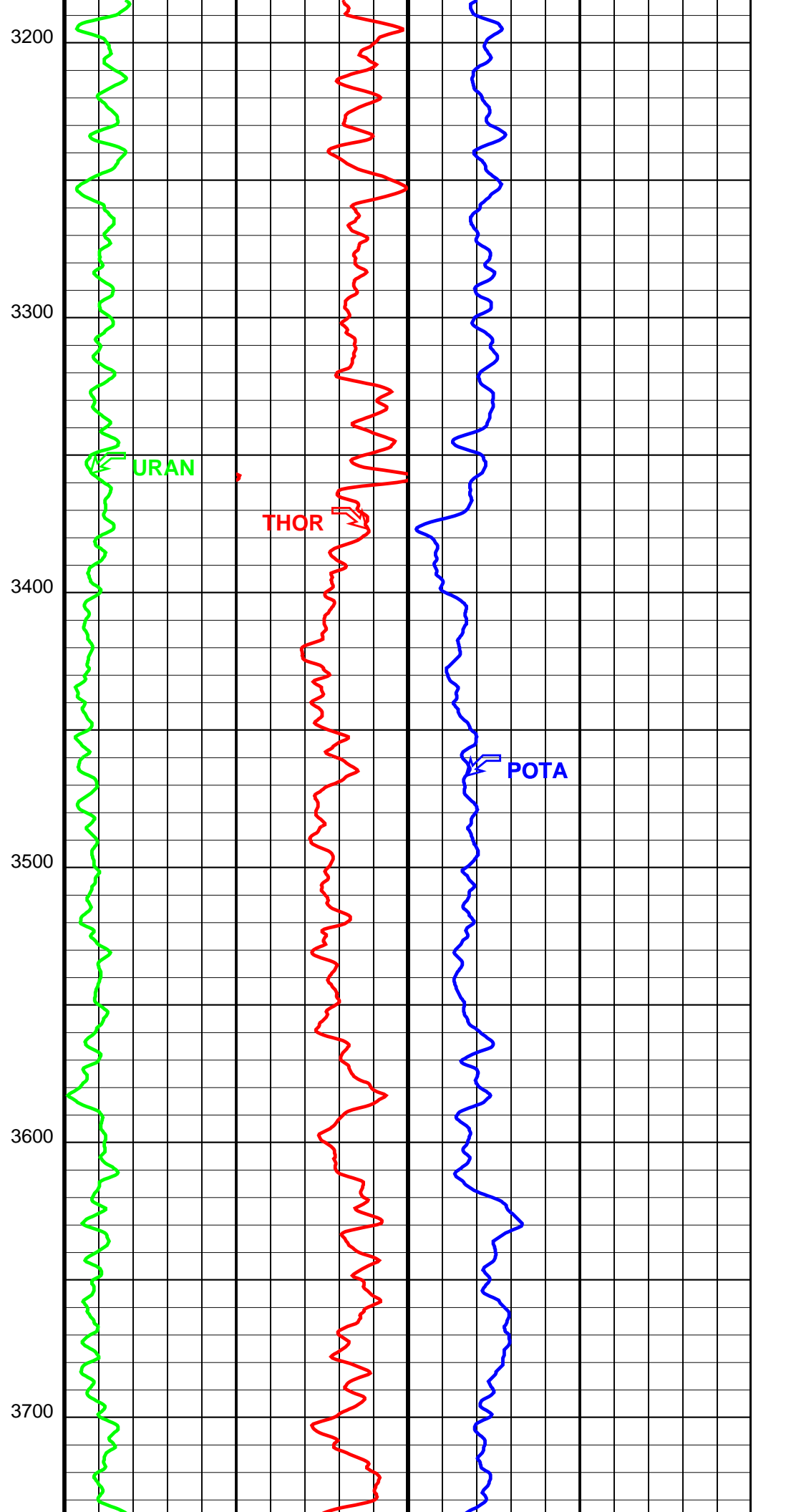
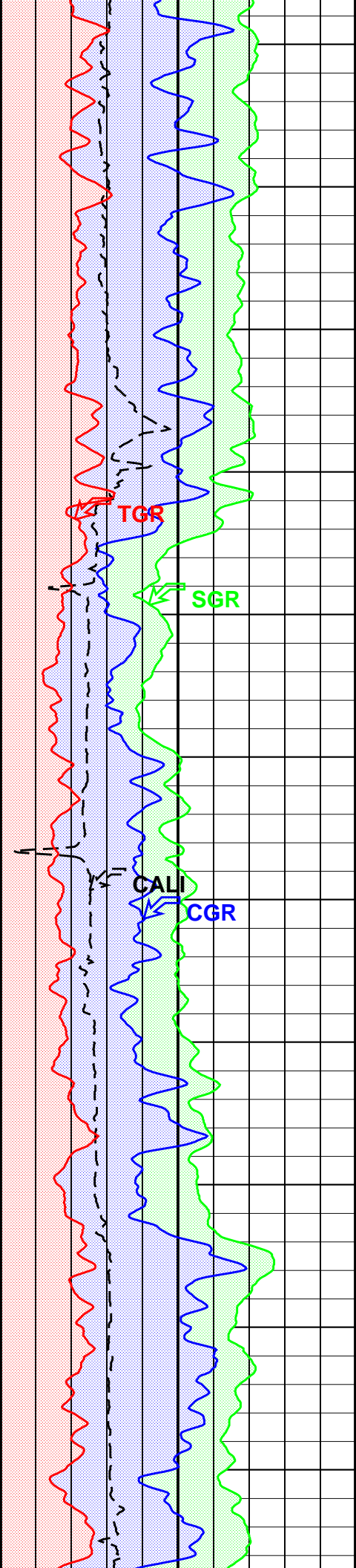
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TBT	SRPC-5307-ThruBit

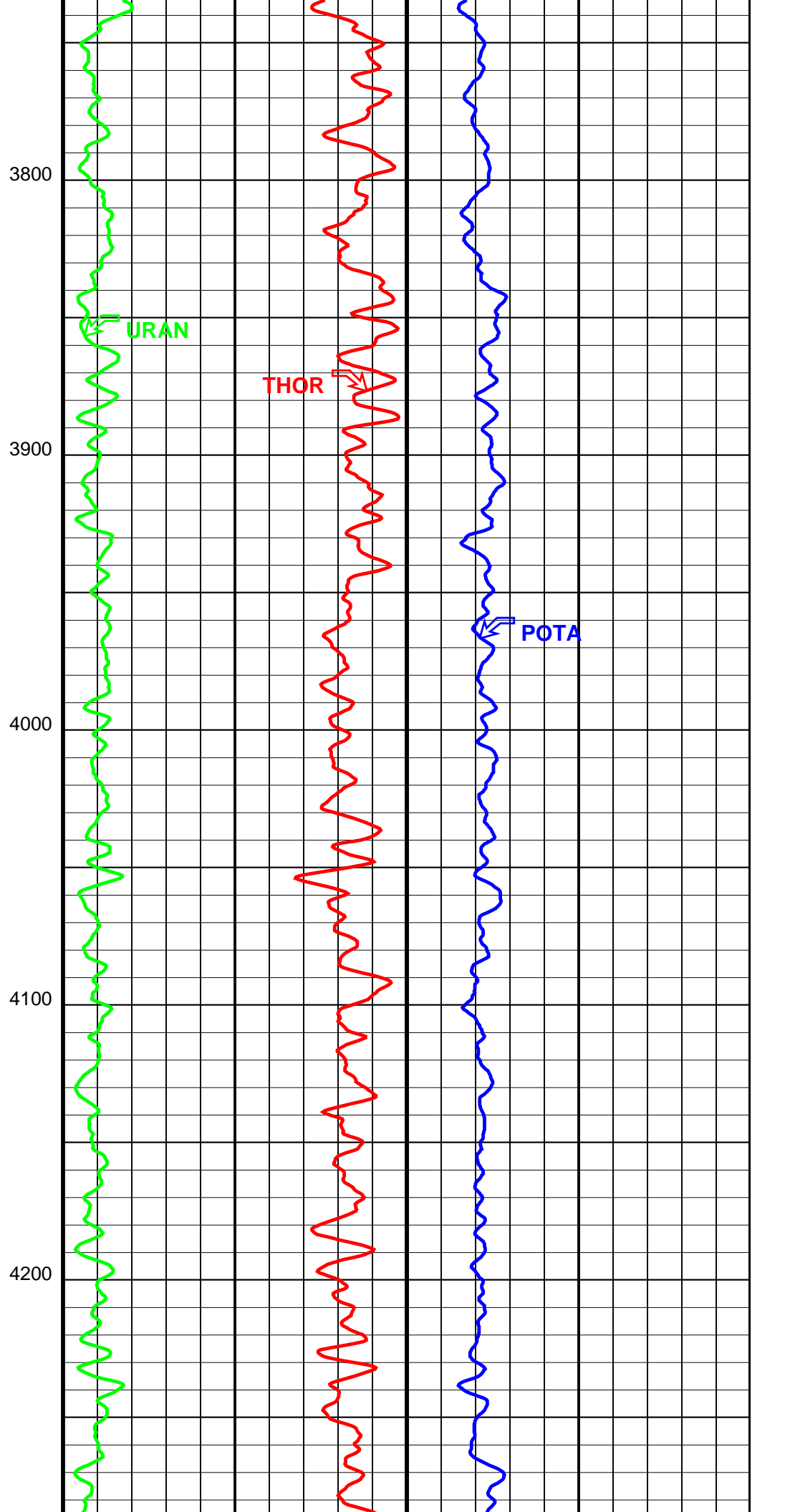
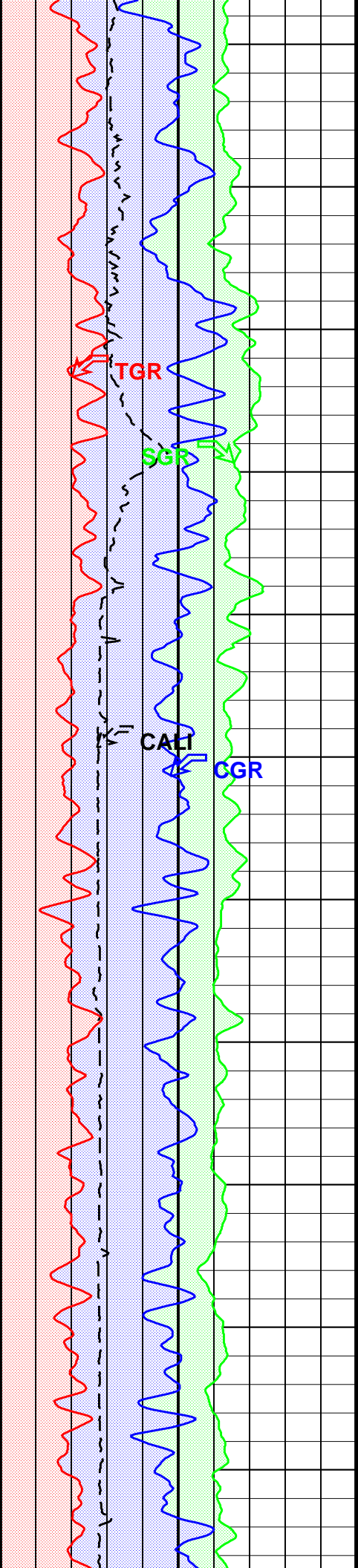
UraniumContribution Between CGR and SGR
ThoriumContribution Between LHT1 and TGR
PotassiumContribution Between TGR and CGR
Thorium Gamma Ray (TGR) 0 (GAPI) 150
Spectroscopy Gamma Ray (SGR) 0 (GAPI) 150
Caliper (CALI) 6 (IN) 16

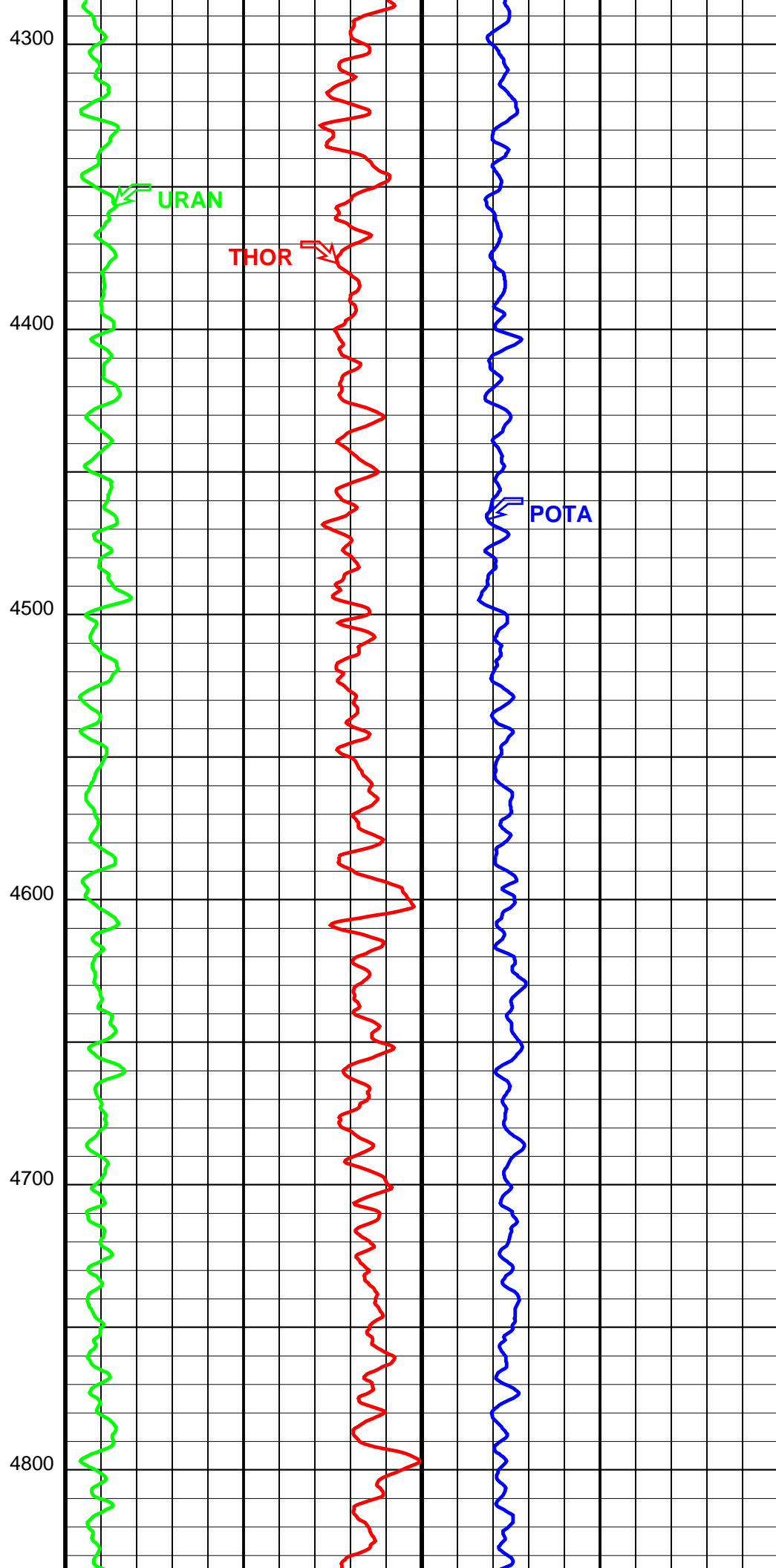
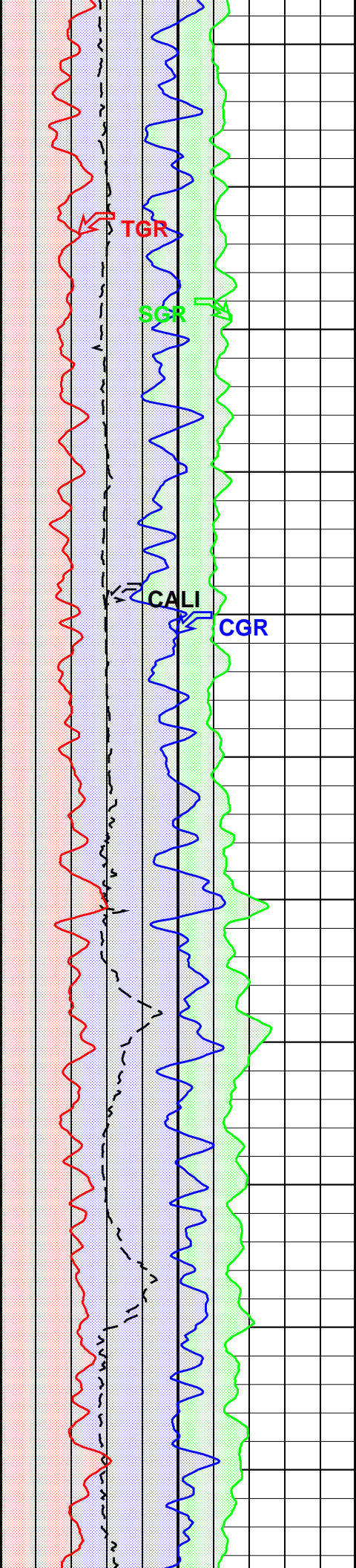


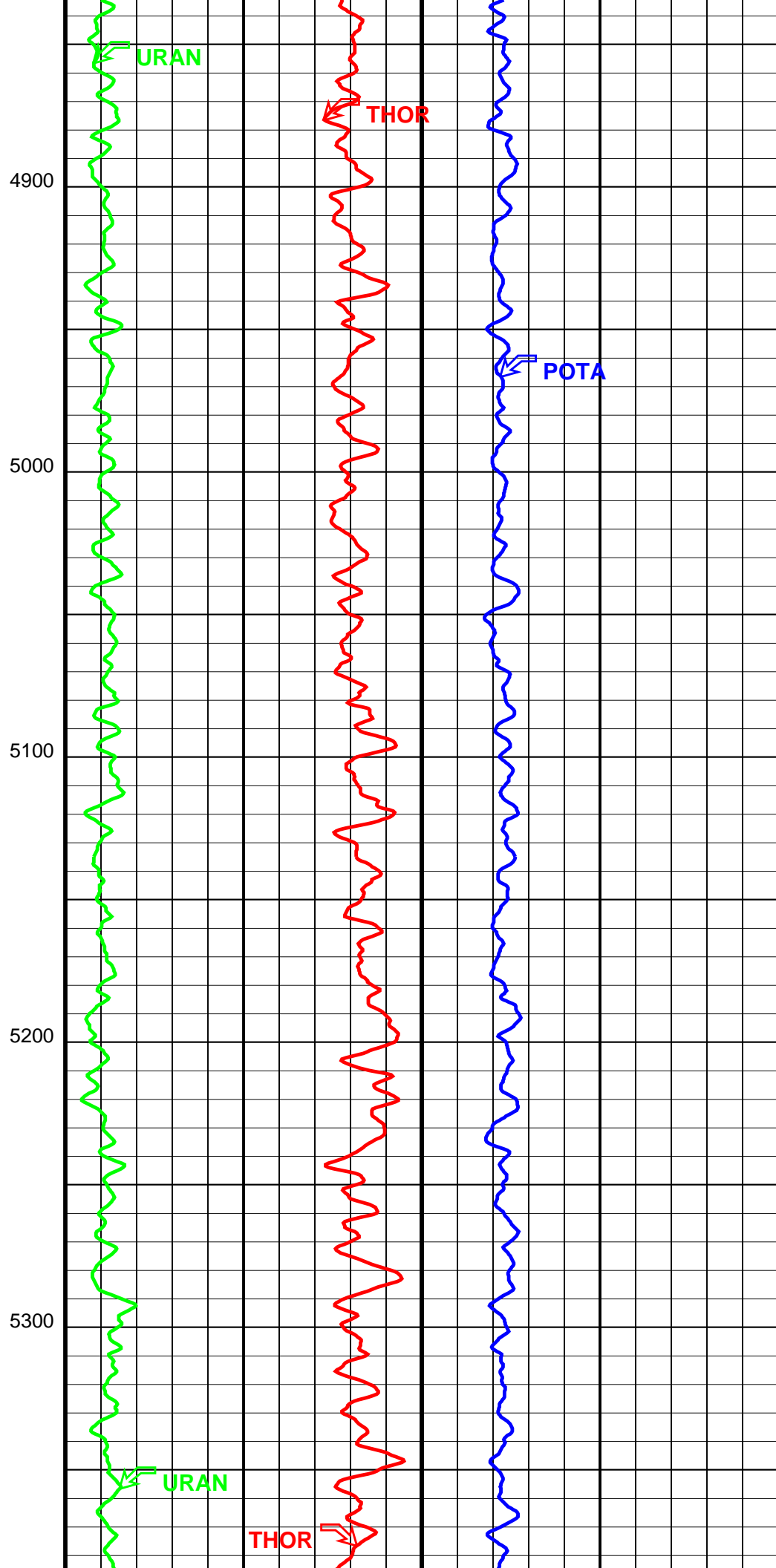
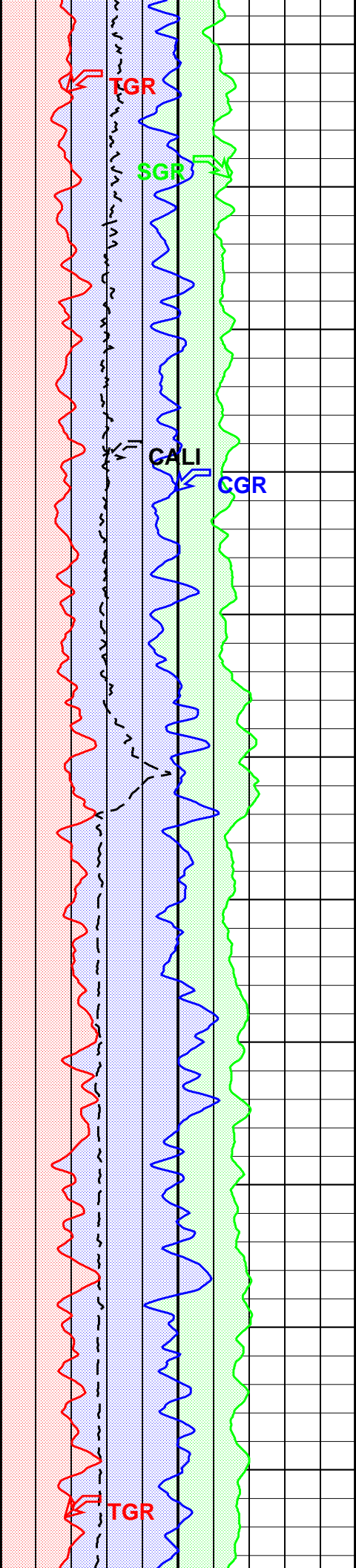


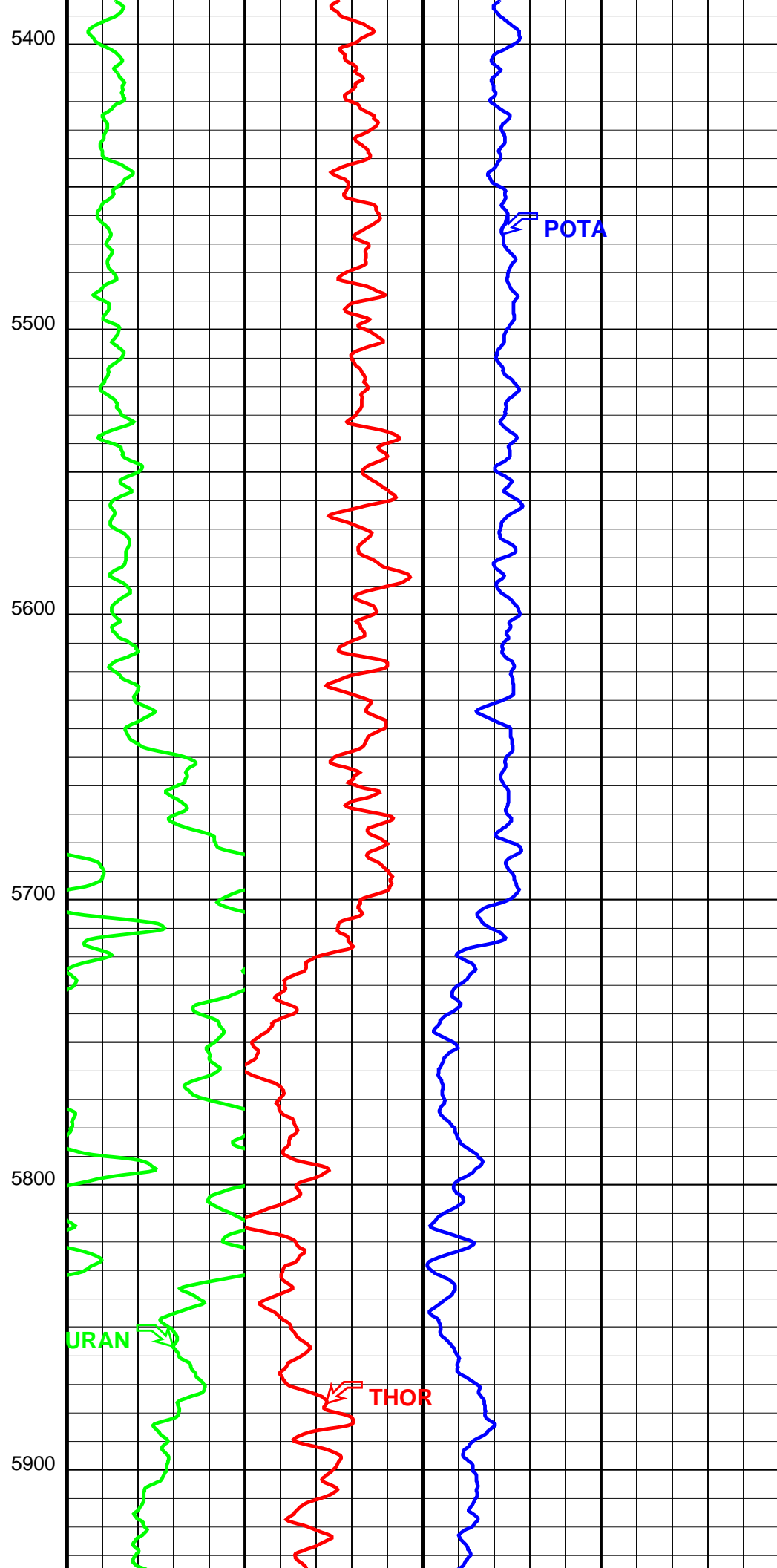
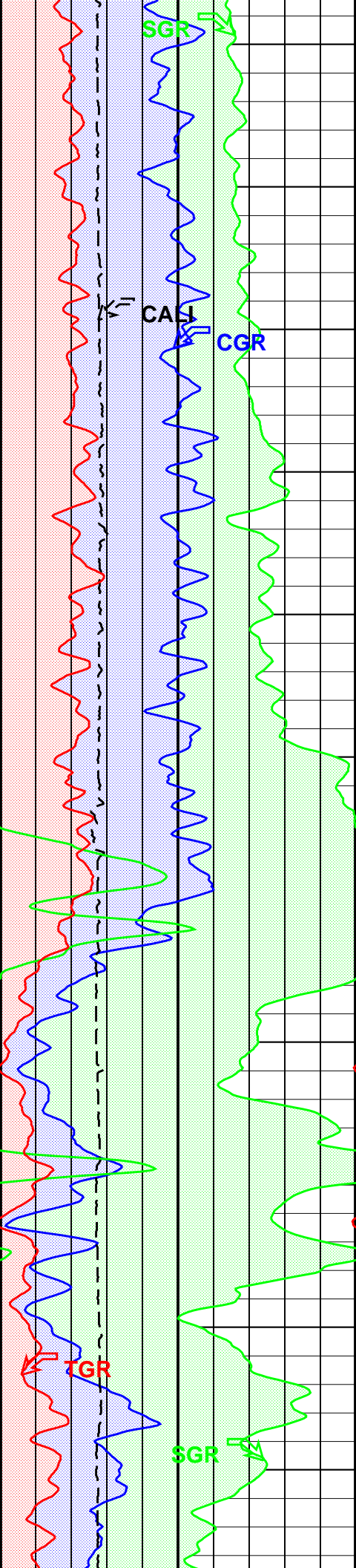


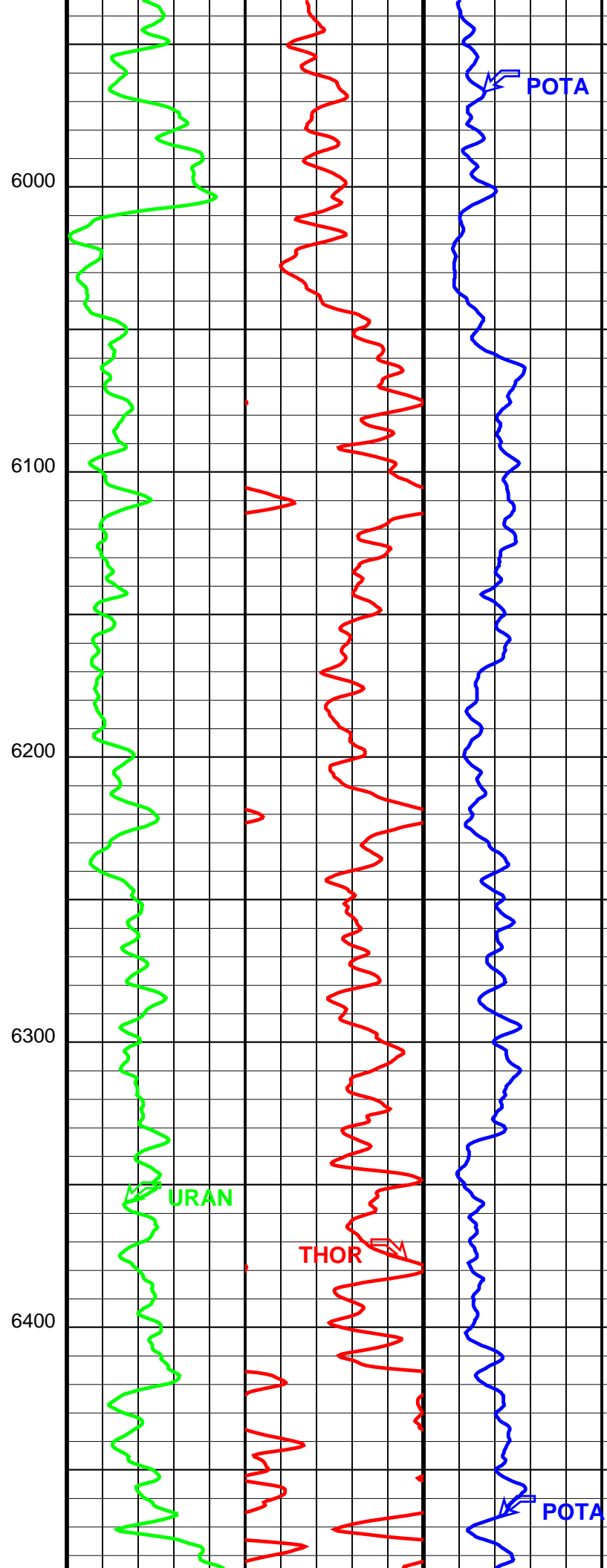
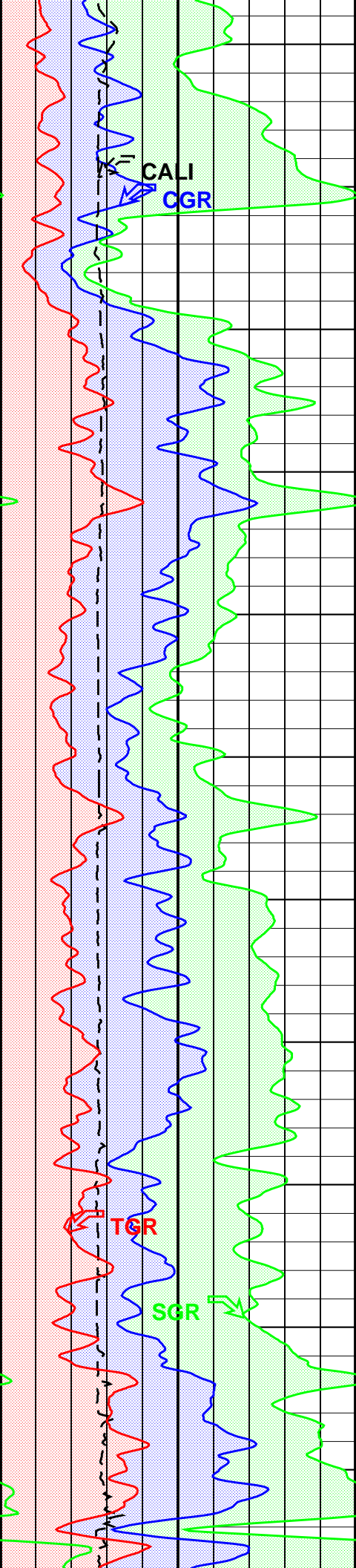


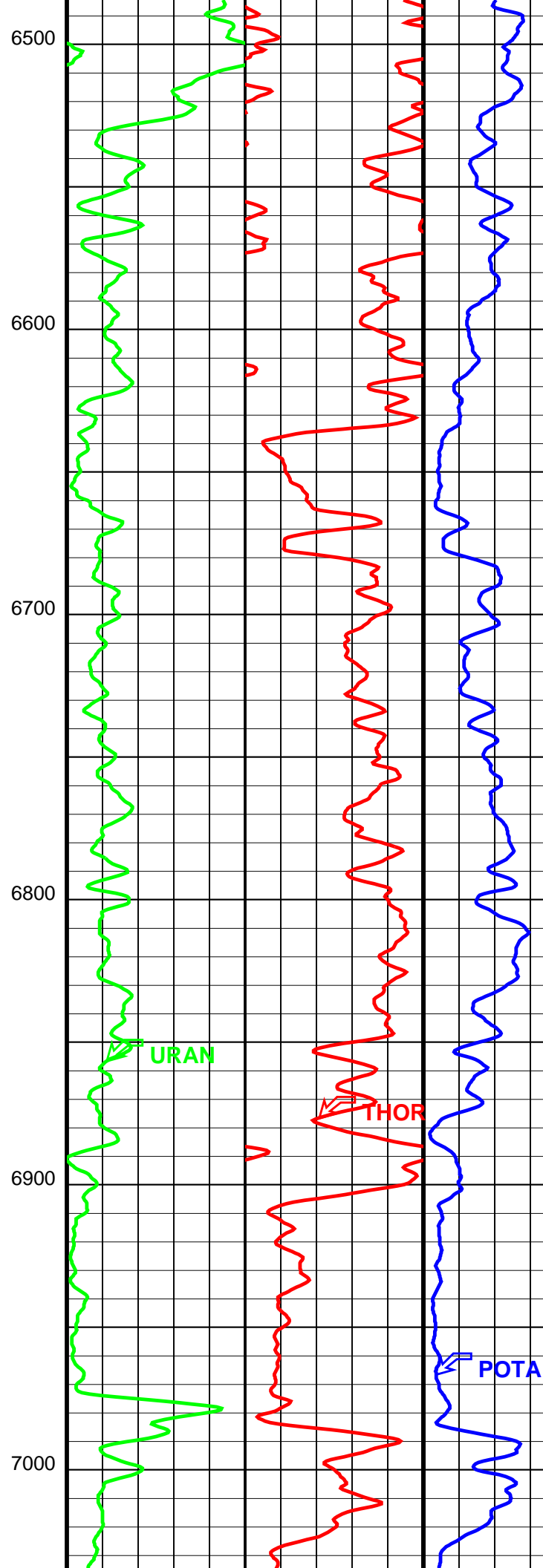
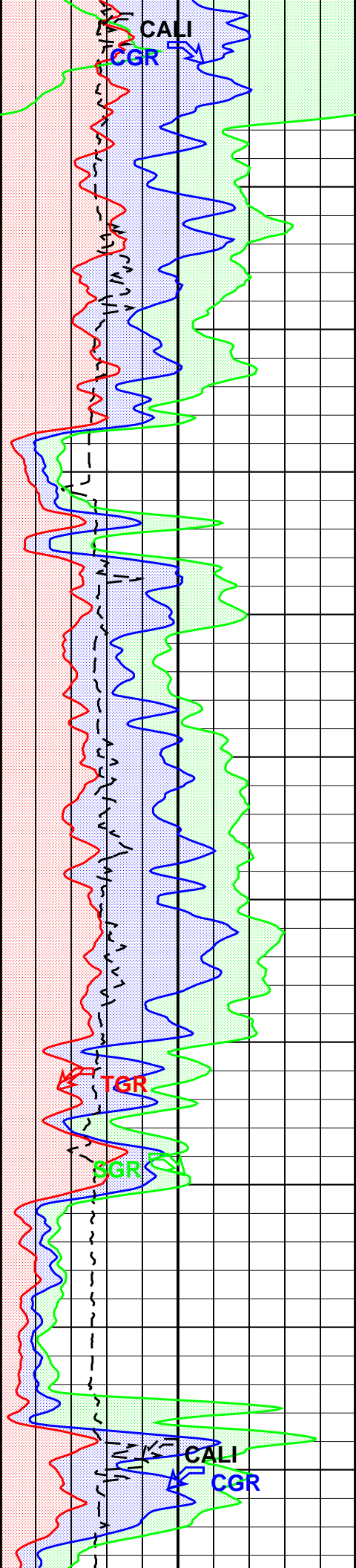


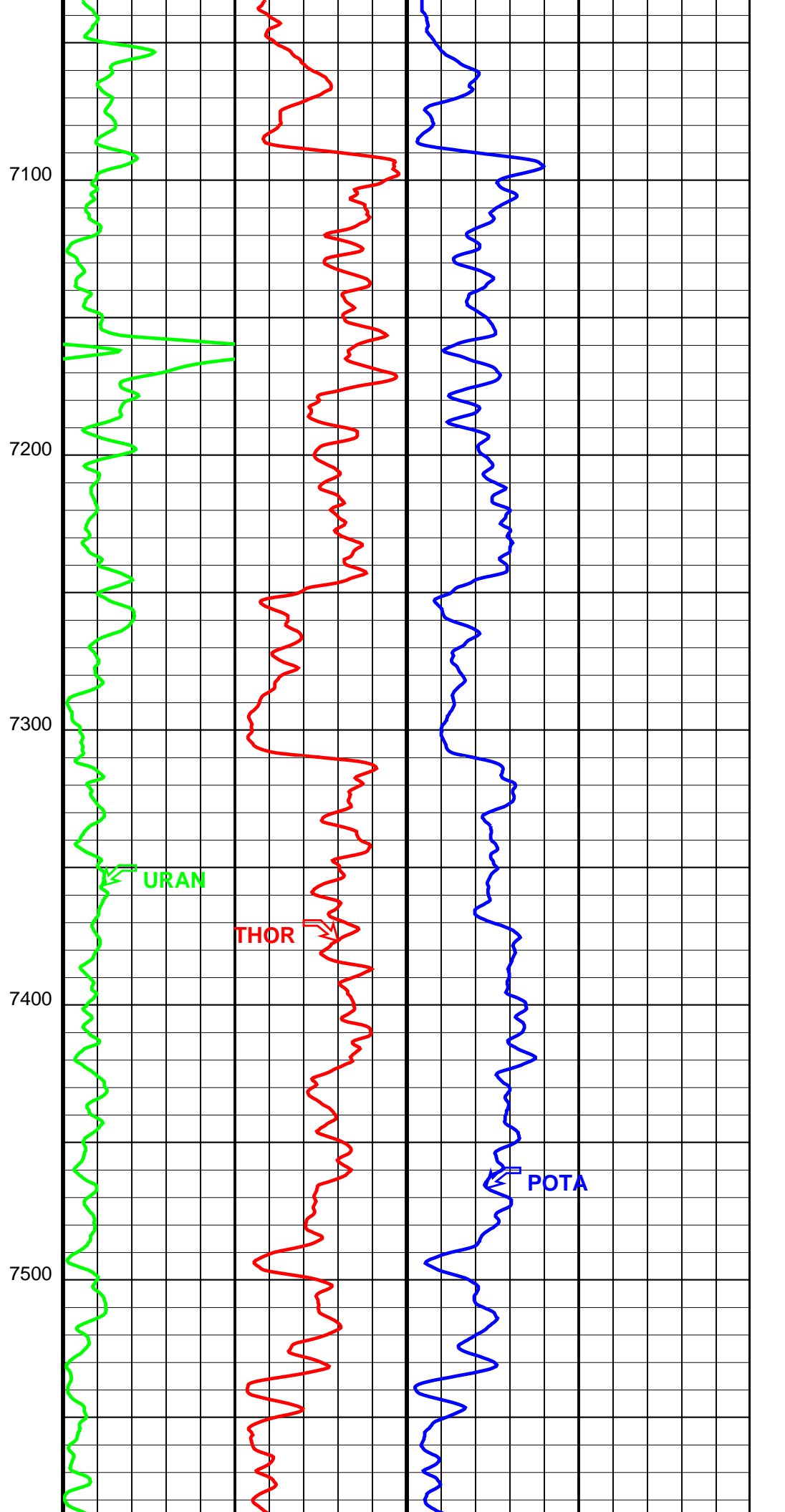
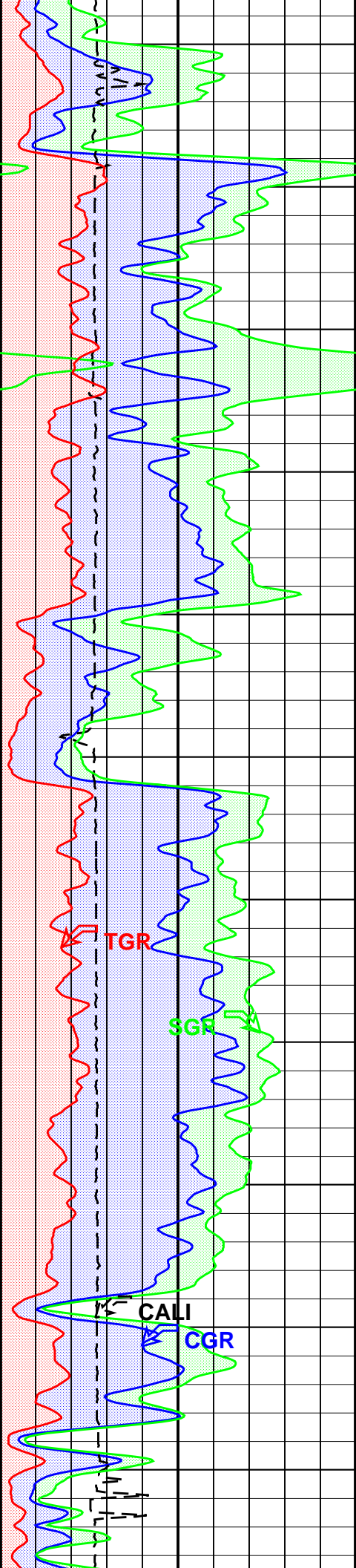


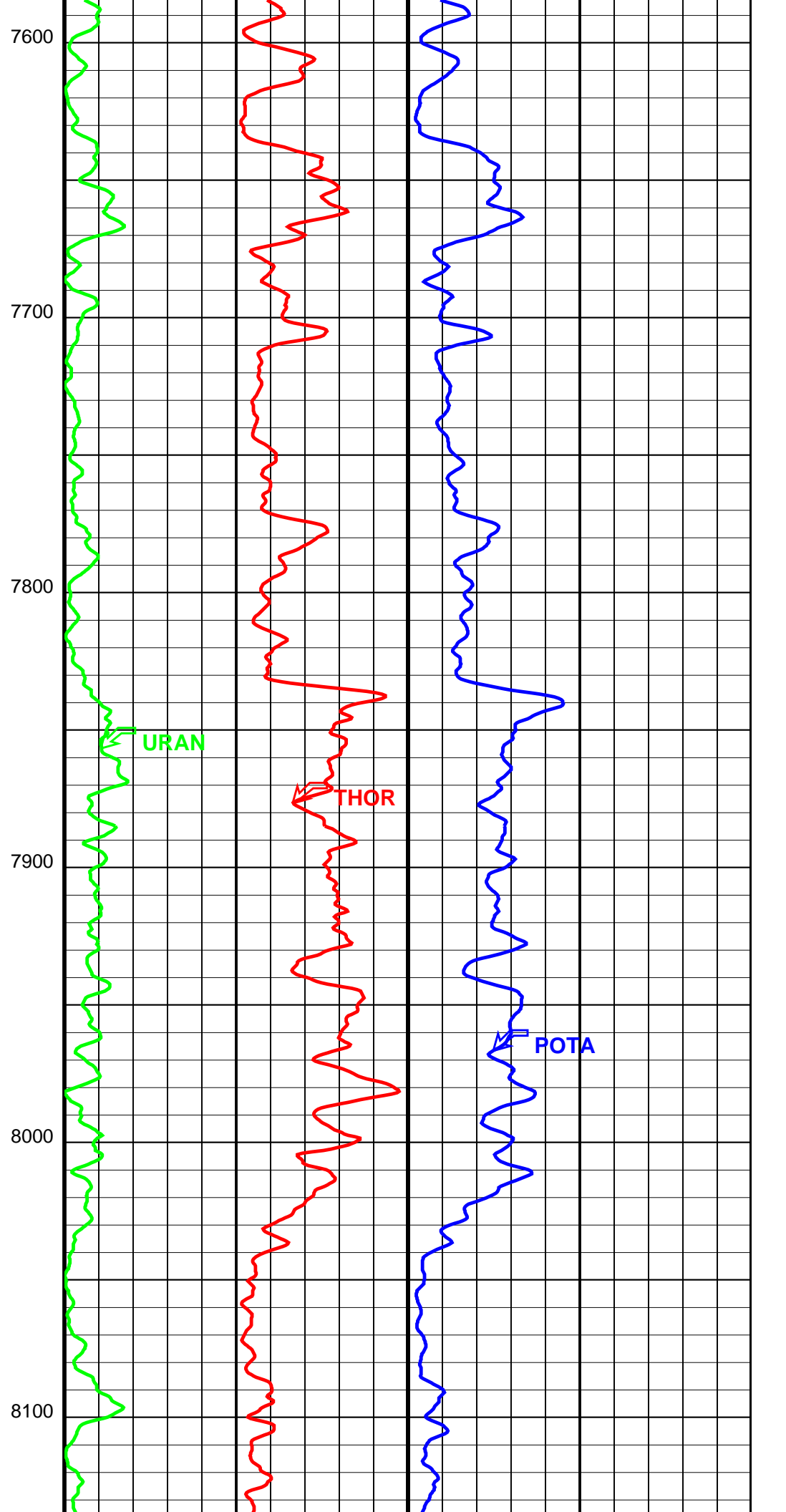
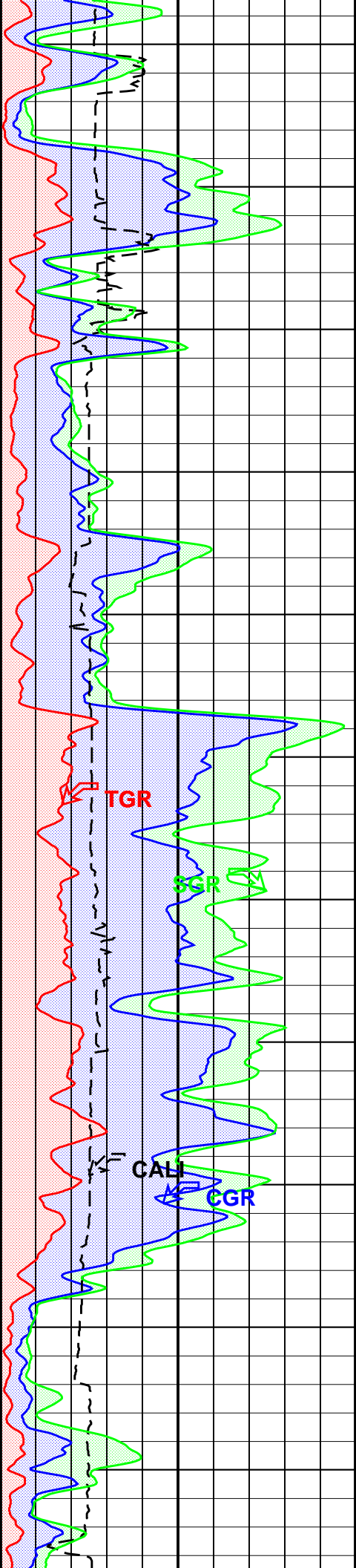


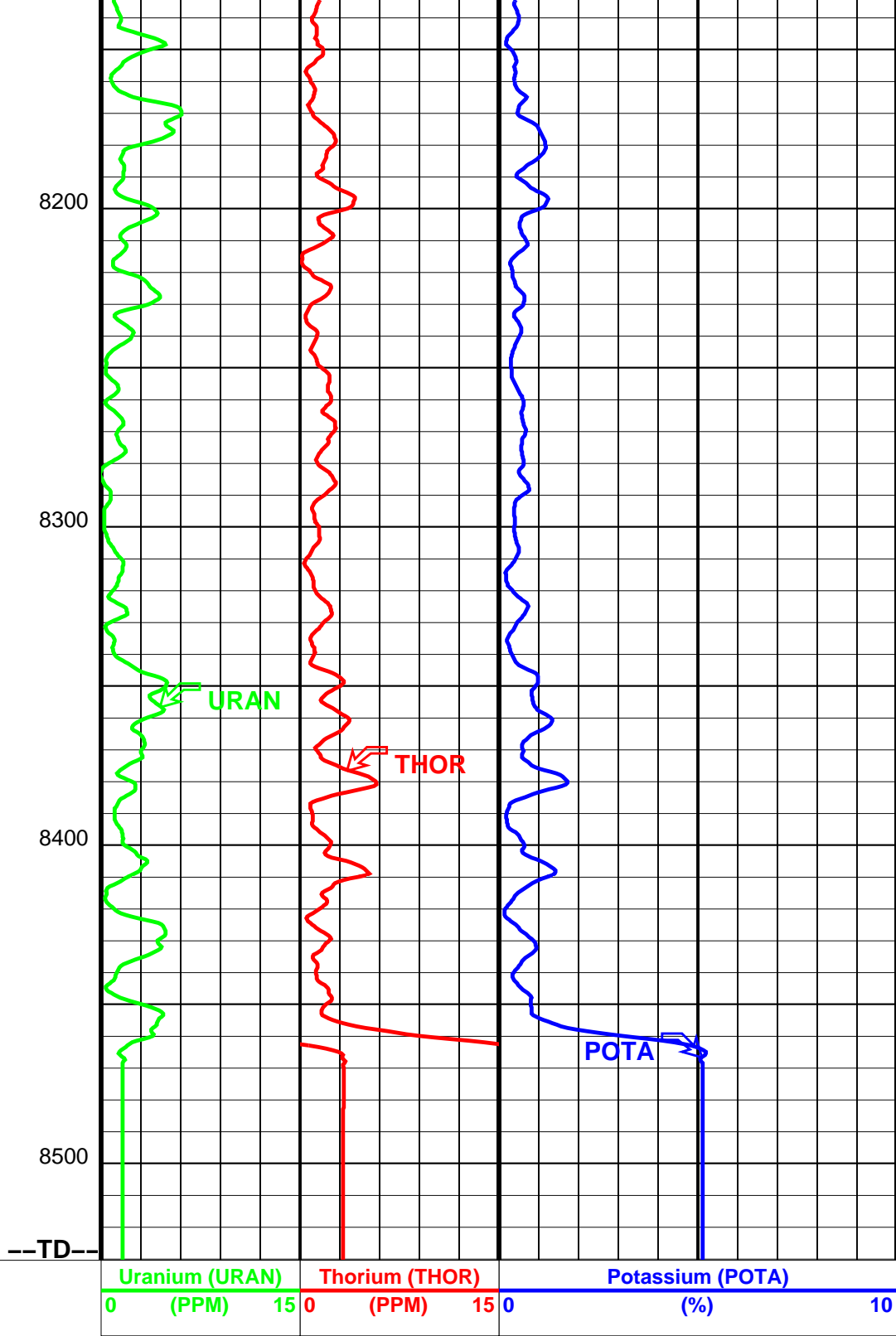
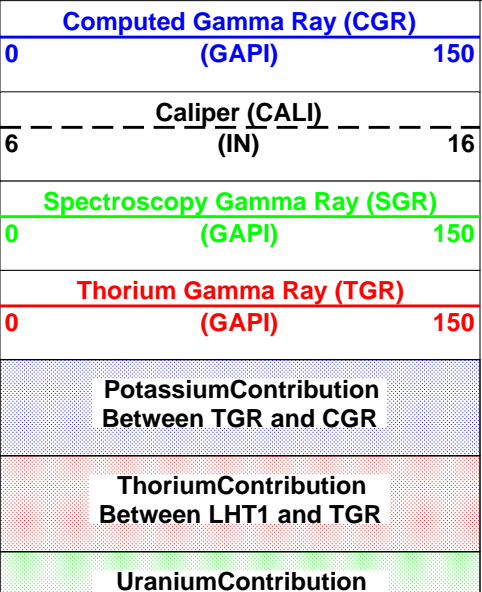
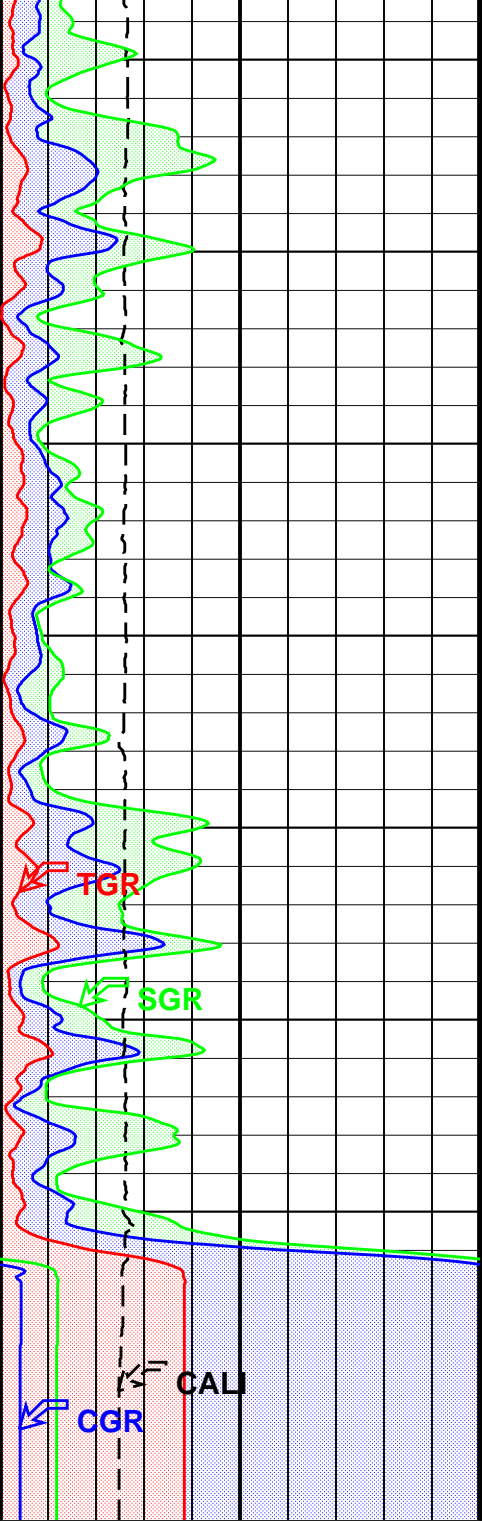












Parameters

DLIS Name	Description	Value
TBT-A: ThruBit String		
BHS	Borehole Status	OPEN
CALTEMP	SGR Calibration Temperature	77.000 degF
CSID	Casing Size I.D.	8.921 in
SGBF	Spectral GR Bins Filtered	1
SGDFA	Spectral GR Depth Frames Averaged	11
SGDS	TBSG Detector Selection	BOTH
SGISG	TBSG Initial Spectral Gain	6.537
SGR1_CAL_TH	SGR1 Thorium Peak Calibration Bin Number	400.0
SGR2_CAL_TH	SGR2 Thorium Peak Calibration Bin Number	400.0
SGRIG	Re-use initial gain computation from last pass?	YES
SGR_TEMP_SRC	Spectra Temperature Correction Source	SGR2_TEMP
SGSS	TBSG Initial Log Interval Stabilisation Skip	0.000 ft
TBSG_ALGO	TBSG Algorithm Type	MARQUARDT
TBSG_BHC	Borehole Correction Option (for TBSG)	CALIPER
TBSG_ECCE	TBSG Excentralised Flag	YES
TBSG_SFEB	TBSG Spectral Fit End Bin	450
TBSG_SFSB	TBSG Spectral Fit Start Bin	77
TBSG_SGV	TBSG Spectrum Gain Variation, bins per degC	1.500
TBSG_TYPE	TBSG Tool Type	PS
WMUD	Mud Weight	10.200 lbm/gal
HOLEV: Integrated Hole/Cement Volume		
BHS	Borehole Status	OPEN
System and Miscellaneous		
CSIZ	Current Casing Size	7.000 in

Format: TB_SGR_PRESENTATION Vertical Scale: 2" per 100' Graphics File Created: 11-Feb-2015 15:12

OP System Version: 19C2-270

TBT SRPC-5307-ThruBit

Input DLIS Files

DEFAULT	ThruBit_016PUP	FN:15	PRODUCER	11-Feb-2015 14:35	8530.2 FT	84.2 FT
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


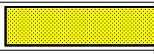









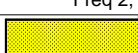


















CALIBRATIONS









MAXIS Field Log









































ThruBit String / Equipment Identification




Primary Equipment:		
Induction Resistivity	TBI - A	
Sonic	TBS - A	
Density	TBD - A	
Gamma-Ray Logging Source	GGLS - FZ	
Thermal Neutron	TBN - A	
Neutron Logging Source	NNLS - EWA	
Spectral GR	TBSG - A	
Telemetry Memory GR	TMG - A	
Auxiliary Equipment:		

ThruBit String Master Calibration					
TBI Master Calibration Sonde Errors					
Freq 1, A1, R	Value	Nominal	Freq 1, A1, X	Value	Nominal































		-463.745	-457.000			21.6895	300.000
-556.000 (Minimum)	(Nominal)	-387.000 (Maximum)		-500.000 (Minimum)	(Nominal)	1100.00 (Maximum)	
Freq 1, A2, R		Value	Nominal	Freq 1, A2, X		Value	Nominal
		-147.974	-141.000			23.8014	320.000
-182.000 (Minimum)	(Nominal)	-120.000 (Maximum)		-75.0000 (Minimum)	(Nominal)	700.000 (Maximum)	
Freq 1, A3, R		Value	Nominal	Freq 1, A3, X		Value	Nominal
		-30.9365	-28.0000			-60.2282	50.0000
-38.0000 (Minimum)	(Nominal)	-18.0000 (Maximum)		-375.000 (Minimum)	(Nominal)	475.000 (Maximum)	
Freq 1, A4, R		Value	Nominal	Freq 1, A4, X		Value	Nominal
		-15.7389	-16.0000			246.869	300.000
-24.0000 (Minimum)	(Nominal)	-8.00000 (Maximum)		25.0000 (Minimum)	(Nominal)	575.000 (Maximum)	
Freq 1, A5, R		Value	Nominal	Freq 1, A5, X		Value	Nominal
		-13.2952	-14.0000			125.977	150.000
-21.0000 (Minimum)	(Nominal)	-7.00000 (Maximum)		25.0000 (Minimum)	(Nominal)	300.000 (Maximum)	
Freq 2, A1, R		Value	Nominal	Freq 2, A1, X		Value	Nominal
		-242.609	-237.000			-15.4109	150.000
-313.000 (Minimum)	(Nominal)	-186.000 (Maximum)		-375.000 (Minimum)	(Nominal)	675.000 (Maximum)	
Freq 2, A2, R		Value	Nominal	Freq 2, A2, X		Value	Nominal
		-95.0302	-92.0000			-13.1811	160.000
-126.000 (Minimum)	(Nominal)	-76.0000 (Maximum)		-100.000 (Minimum)	(Nominal)	425.000 (Maximum)	
Freq 2, A3, R		Value	Nominal	Freq 2, A3, X		Value	Nominal
		-22.5481	-21.0000			-91.7764	-20.0000
-28.0000 (Minimum)	(Nominal)	-13.0000 (Maximum)		-325.000 (Minimum)	(Nominal)	250.000 (Maximum)	
Freq 2, A4, R		Value	Nominal	Freq 2, A4, X		Value	Nominal
		-18.5681	-20.0000			76.9623	100.000
-28.0000 (Minimum)	(Nominal)	-10.0000 (Maximum)		-75.0000 (Minimum)	(Nominal)	275.000 (Maximum)	
Freq 2, A5, R		Value	Nominal	Freq 2, A5, X		Value	Nominal
		-18.1662	-20.0000			-13.6644	-25.0000
-27.0000 (Minimum)	(Nominal)	-10.0000 (Maximum)		-125.000 (Minimum)	(Nominal)	100.000 (Maximum)	
Freq 3, A1, R		Value	Nominal	Freq 3, A1, X		Value	Nominal
		-152.267	-149.000			-79.2011	25.0000
-213.000 (Minimum)	(Nominal)	-108.000 (Maximum)		-375.000 (Minimum)	(Nominal)	425.000 (Maximum)	
Freq 3, A2, R		Value	Nominal	Freq 3, A2, X		Value	Nominal
		-71.7259	-70.0000			-51.9323	70.0000
-101.000 (Minimum)	(Nominal)	-57.0000 (Maximum)		-125.000 (Minimum)	(Nominal)	250.000 (Maximum)	
Freq 3, A3, R		Value	Nominal	Freq 3, A3, X		Value	Nominal
		-18.1412	-17.0000			-126.563	-90.0000
-23.0000 (Minimum)	(Nominal)	-11.0000 (Maximum)		-300.000 (Minimum)	(Nominal)	125.000 (Maximum)	
Freq 3, A4, R		Value	Nominal	Freq 3, A4, X		Value	Nominal
		-20.0402	-22.0000			-35.7218	-50.0000
-31.0000 (Minimum)	(Nominal)	-11.0000 (Maximum)		-200.000 (Minimum)	(Nominal)	100.000 (Maximum)	
Freq 3, A5, R		Value	Nominal	Freq 3, A5, X		Value	Nominal
		-20.8150	-22.0000			-115.638	-110.000
-32.0000 (Minimum)	(Nominal)	-11.0000 (Maximum)		-250.000 (Minimum)	(Nominal)	0 (Maximum)	
Freq 4, A1, R		Value	Nominal	Freq 4, A1, X		Value	Nominal
		-81.0738	-80.0000			-205.881	-190.000
-128.000 (Minimum)	(Nominal)	-54.0000 (Maximum)		-450.000 (Minimum)	(Nominal)	75.0000 (Maximum)	
Freq 4, A2, R		Value	Nominal	Freq 4, A2, X		Value	Nominal

	-51.1084	-50.0000		-119.496	-75.0000
-80.0000 (Minimum)	(Nominal)	-41.0000 (Maximum)	-200.000 (Minimum)	(Nominal)	50.0000 (Maximum)
Freq 4, A3, R	Value	Nominal	Freq 4, A3, X	Value	Nominal
	-14.3587	-14.0000		-193.330	-190.000
-19.0000 (Minimum)	(Nominal)	-8.00000 (Maximum)	-350.000 (Minimum)	(Nominal)	-25.0000 (Maximum)
Freq 4, A4, R	Value	Nominal	Freq 4, A4, X	Value	Nominal
	-22.6574	-25.0000		-202.352	-235.000
-37.0000 (Minimum)	(Nominal)	-11.0000 (Maximum)	-400.000 (Minimum)	(Nominal)	-75.0000 (Maximum)
Freq 4, A5, R	Value	Nominal	Freq 4, A5, X	Value	Nominal
	-26.3123	-28.0000		-287.496	-300.000
-43.0000 (Minimum)	(Nominal)	-12.0000 (Maximum)	-475.000 (Minimum)	(Nominal)	-100.000 (Maximum)
Master: 17-Dec-2014 12:15					

ThruBit String Master Calibration					
TBI Master Calibration COMPLEX GAINS					
Freq 1, R	Value	Nominal	Freq 1, X	Value	Nominal
	0.9913	1.000		-0.002511	0
	0.9936	1.000		8.835E-00	0
	1.001	1.000		-0.007671	0
	0.9905	1.000		0.001384	0
	0.9958	1.000		-0.0009894	0
0.9500 (Minimum)	(Nominal)	1.050 (Maximum)	-0.05000 (Minimum)	(Nominal)	0.05000 (Maximum)
Freq 2, R	Value	Nominal	Freq 2, X	Value	Nominal
	0.9856	1.000		-0.01034	0
	0.9877	1.000		-0.008304	0
	0.9895	1.000		-0.008829	0
	0.9857	1.000		-0.007471	0
	0.9923	1.000		-0.01101	0
0.9500 (Minimum)	(Nominal)	1.050 (Maximum)	-0.05000 (Minimum)	(Nominal)	0.05000 (Maximum)
Freq 3, R	Value	Nominal	Freq 3, X	Value	Nominal
	0.9909	1.000		-0.004360	0
	0.9934	1.000		-0.002591	0
	0.9949	1.000		-0.003426	0
	0.9901	1.000		-0.002363	0
	0.9991	1.000		-0.005548	0
0.9500 (Minimum)	(Nominal)	1.050 (Maximum)	-0.05000 (Minimum)	(Nominal)	0.05000 (Maximum)
Freq 4, R	Value	Nominal	Freq 4, X	Value	Nominal
	1.002	1.000		-0.009834	0
	1.004	1.000		-0.008900	0
	1.008	1.000		-0.01179	0
	1.001	1.000		-0.009381	0
	1.021	1.000		-0.01520	0
0.9300 (Minimum)	(Nominal)	1.070 (Maximum)	-0.05000 (Minimum)	(Nominal)	0.05000 (Maximum)
Master: 17-Dec-2014 12:15					

ThruBit String Master Calibration								
TBD Caliper Master Calibration								
Caliper 12in Ring IN	Value	Nominal	Caliper 9in Ring IN	Value	Nominal	Caliper 6in Ring IN	Value	Nominal
	1909.2	1949.8		2070.9	2096.7		2237.1	2285.7

1799.8 (Minimum)	2099.8 (Nominal)	2099.8 (Maximum)		1946.7 (Minimum)	2246.7 (Nominal)	2246.7 (Maximum)		2135.7 (Minimum)	2435.7 (Nominal)	2435.7 (Maximum)	
Master: 6-Feb-2015 14:00											

ThruBit String Master Calibration						
TBD Density Master Calibration. Ti Window, ThruBit blocks						
LS1 Background CPS	Value	Nominal	SS1 Background CPS	Value	Nominal	
	129.49	143.00		137.37	143.00	
100.00 (Minimum)	186.00 (Maximum)		100.00 (Minimum)	186.00 (Maximum)		
LS2 Background CPS	Value	Nominal	SS2 Background CPS	Value	Nominal	
	32.8639	37.0000		36.4400	38.0000	
26.0000 (Minimum)	48.0000 (Maximum)		27.0000 (Minimum)	50.0000 (Maximum)		
LS3 Background CPS	Value	Nominal	SS3 Background CPS	Value	Nominal	
	19.7968	22.0000		22.1248	23.0000	
15.0000 (Minimum)	29.0000 (Maximum)		16.0000 (Minimum)	30.0000 (Maximum)		
LS4 Background CPS	Value	Nominal	SS4 Background CPS	Value	Nominal	
	27.07	30.00		30.8240	31.0000	
20.00 (Minimum)	40.00 (Maximum)		22.0000 (Minimum)	40.0000 (Maximum)		
LS1 Aluminium CPS	Value	Nominal	SS1 Aluminium CPS	Value	Nominal	
	1232.4	1210.0		7228.16	7850.00	
850.00 (Minimum)	1570.0 (Maximum)		5500.00 (Minimum)	10200.0 (Maximum)		
LS2 Aluminium CPS	Value	Nominal	SS2 Aluminium CPS	Value	Nominal	
	1131.12	1110.00		3649.52	4000.00	
780.000 (Minimum)	1440.00 (Maximum)		2800.00 (Minimum)	5200.00 (Maximum)		
LS3 Aluminium CPS	Value	Nominal	SS3 Aluminium CPS	Value	Nominal	
	1059.88	1010.00		3001.41	3350.00	
710.000 (Minimum)	1300.00 (Maximum)		2350.00 (Minimum)	4360.00 (Maximum)		
LS4 Aluminium CPS	Value	Nominal	SS4 Aluminium CPS	Value	Nominal	
	771.27	760.00		2885.1079	3230.0000	
530.00 (Minimum)	990.00 (Maximum)		2260.0000 (Minimum)	4200.0000 (Maximum)		
LS1 Al + Sleeve CPS	Value	Nominal	SS1 Al + Sleeve CPS	Value	Nominal	
	990.46	970.00		5771.24	6160.00	
680.00 (Minimum)	1260.0 (Maximum)		4300.00 (Minimum)	8000.00 (Maximum)		
LS2 Al + Sleeve CPS	Value	Nominal	SS2 Al + Sleeve CPS	Value	Nominal	
	827.752	830.000		2800.52	3050.00	
580.000 (Minimum)	1080.00 (Maximum)		2130.00 (Minimum)	4000.00 (Maximum)		
LS3 Al + Sleeve CPS	Value	Nominal	SS3 Al + Sleeve CPS	Value	Nominal	
	619.842	650.000		1976.16	2190.00	
460.000 (Minimum)	850.000 (Maximum)		1533.00 (Minimum)	2850.00 (Maximum)		
LS4 Al + Sleeve CPS	Value	Nominal	SS4 Al + Sleeve CPS	Value	Nominal	
	383.30	420.00		1587.77	1700.00	
300.00 (Minimum)	550.00 (Maximum)		1190.00 (Minimum)	2200.00 (Maximum)		
LS1 Magnesium CPS	Value	Nominal	SS1 Magnesium CPS	Value	Nominal	
	8418.67	8100.00		11871.4	12740.0	
5670.00 (Minimum)	10530.0 (Maximum)		8920.00 (Minimum)	16560.0 (Maximum)		
LS2 Magnesium CPS	Value	Nominal	SS2 Magnesium CPS	Value	Nominal	
	7702.34	7650.00		6073.78	6670.00	
5360.00 (Minimum)	9950.00 (Maximum)		4670.00 (Minimum)	8670.00 (Maximum)		
LS3 Magnesium CPS	Value	Nominal	SS3 Magnesium CPS	Value	Nominal	
	6687.05	6800.00		4873.83	5400.00	

Company: **WHITING OIL & GAS CORP.**

Well: **RAZOR 21 SWD #1**

Field: **REDTAIL**

County: **WELD**

State: **COLORADO**



SPECTRAL GAMMA RAY
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