

Company: ENCANA OIL & GAS (USA) INC

Well: FEDERAL 31-2C (PF31)

Field: PARACHUTE

County: GARFIELD

State: COLORADO

RESERVOIR SATURATION LOG

SIGMA MODE

GR-CCL

County:	GARFIELD		
Field:	PARACHUTE		
Location:	SHL: 2347 FNL & 1434 FWL		
Well:	FEDERAL 31-2C (PF31)		
Company:	ENCANA OIL & GAS (USA) INC		
	LOCATION		
	SHL: 2347 FNL & 1434 FWL		Elev.: K.B. 5855.00 ft
	BHL: 896 FNL & 2298 FEL		G.L. 5833.00 ft
			D.F. 5854.00 ft
	Permanent Datum:	GROUND LEVEL	Elev.: 5833.00 ft
	Log Measured From:	KELLY BUSHING	22.00 ft above Perm. Datum
	Drilling Measured From:	KELLY BUSHING	
	API Serial No.	Section 31	Township 7S
	05-045-20516-000C		Range 95W

	Run 1	Run 2	Run 3
PVT DATA			
Oil Density			
Water Salinity			
Gas Gravity			
Bo			
Bw			
1/Bg			
Bubble Point Pressure			
Bubble Point Temperature			
Solution GOR			
Maximum Deviation			
CEMENTING DATA			
Primary/Squeeze	Primary		
Casing String No			
Lead Cement Type			
Volume			
Density			
Water Loss			
Additives			
Tail Cement Type			
Volume			
Density			
Water Loss			
Additives			
Expected Cement Top			

Logging Date	18-Dec-2013		
Run Number	1		
Depth Driller	6935 ft		
Schlumberger Depth	6869 ft		
Bottom Log Interval	6855 ft		
Top Log Interval	2000 ft		
Casing Fluid Type	FRESH WATER		
Salinity			
Density	8.4 lbm/gal		
Fluid Level	70 ft		
BIT/CASING/TUBING STRING			
Bit Size	8.750 in		
From	22 ft		
To	6935 ft		
Casing/Tubing Size	4.500 in		
Weight	11.6 lbm/ft		
Grade	S-80		
From	22 ft		
To	6917 ft		
Maximum Recorded Temperatures	196 degF		
Logger On Bottom	18-Dec-2013	3:30	
Unit Number	Location		
Recorded By	KIRSTIE BUNTING		
Witnessed By	JOHN ANSBRO		

Logging Date			
Run Number			
Depth Driller			
Schlumberger Depth			
Bottom Log Interval			
Top Log Interval			
Casing Fluid Type			
Salinity			
Density			
Fluid Level			
BIT/CASING/TUBING STRING			
Bit Size			
From			
To			
Casing/Tubing Size			
Weight			
Grade			
From			
To			
Maximum Recorded Temperatures			
Logger On Bottom			
Unit Number	Location		
Recorded By			
Witnessed By			

DEPTH SUMMARY LISTING

Date Created: 14-AUG-2013 11:54:57

Depth System Equipment

Depth Measuring Device		Tension Device		Logging Cable	
Type:	IDW-JB	Type:	CMTD-B/A	Type:	1-25ZT
Serial Number:	6349	Serial Number:	3421	Serial Number:	112136
Calibration Date:	7-31-2013	Calibration Date:	14-AUG-201	Length:	19000 FT
Calibrator Serial Number:		Calibrator Serial Number:	174878	Conveyance Method:	Wireline
Calibration Cable Type:	1-25ZT	Number of Calibration Points:	10	Rig Type:	LAND
Wheel Correction 1:	-5	Calibration RMS:	3		
Wheel Correction 2:	-4	Calibration Peak Error:	8		

Depth Control Parameters

Log Sequence:	First Log In the Well
Rig Up Length At Surface:	0.00 FT
Rig Up Length At Bottom:	0.00 FT
Rig Up Length Correction:	0.00 FT
Stretch Correction:	
Tool Zero Check At Surface:	

Depth Control Remarks

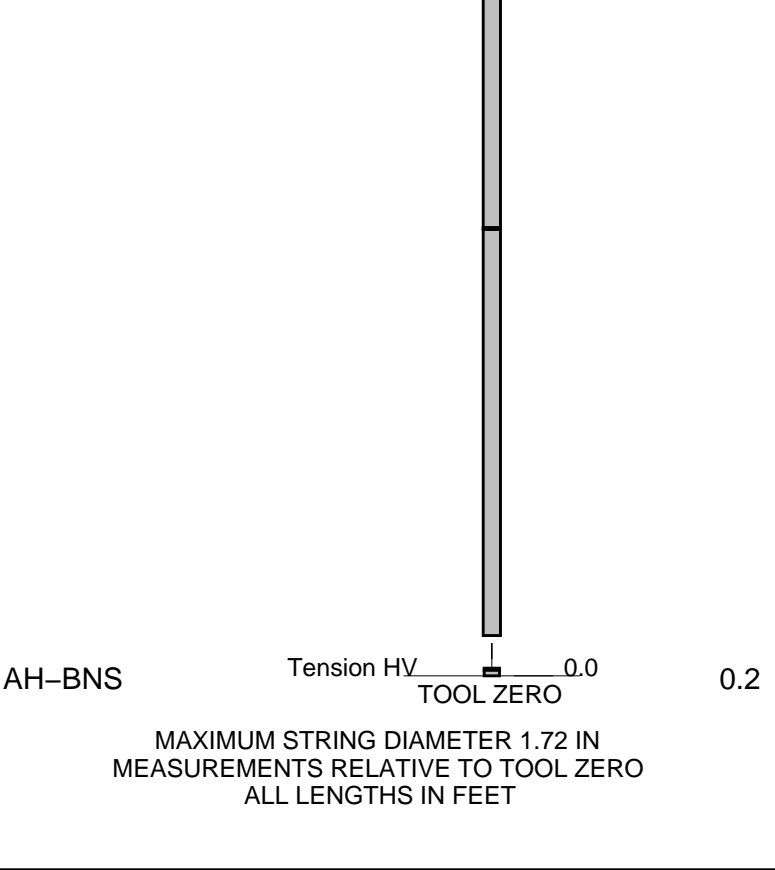
1. ALL SCHLUMBERGER DEPTH CONTROL PROCEDURES USED
2. IDW USED AS PRIMARY DEPTH REFERENCE
3. SPWT DRUM COUNTER USED AS SECONDARY DEPTH REFERENCE
- 4.
- 5.
- 6.

DISCLAIMER

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

OTHER SERVICES1 OS1: NONE OS2: OS3: OS4: OS5:	OTHER SERVICES2 OS1: OS2: OS3: OS4: OS5:
REMARKS: RUN NUMBER 1	REMARKS: RUN NUMBER 2
TOOL RUN AS PER TOOL SKETCH	
FIRST RUN IN HOLE CORRELATED TO SLB IBC LOG RUN ON 17-DEC-2013	
ENTRANCE TIME: 02:45	
TIME ON BOTTOM: 03:30	
EXIT TIME: 04:45	

MAXIMUM RECORDED TEMPERATURE: 196 DEGF					
MAXIMUM RECORDED PRESSURE: 2646 PSIA					
SHORT JOINTS: 4722 FT & 5753 FT					
SANDSTONE MATRIX USED					
CREW: KBUNTING, SKRAMER, WAZIZ, KJOHNS, JORTIZ					
THANK YOU FOR CHOOSING E&P WIRELINE, A SCHLUMBERGER COMPANY					
RUN 1			RUN 2		
SERVICE ORDER #: PROGRAM VERSION: FLUID LEVEL:			SERVICE ORDER #: PROGRAM VERSION: FLUID LEVEL:		
CGF9-00192	19C0-187	70 ft			
LOGGED INTERVAL	START	STOP	LOGGED INTERVAL	START	STOP
EQUIPMENT DESCRIPTION					
RUN 1			RUN 2		
SURFACE EQUIPMENT					
WITM-A PSC_16MHZ					
DOWNHOLE EQUIPMENT					
MH-22 MH-22		33.3			
AH-38	Detail MT TelStatus CTEM	31.7			
PSPT		31.5			
PSC-A PSPT-B 928 PSTC-A PBMS-B CQG_F_Mano RTD_Thermometer GR CCL PBMS		31.5			
	GR	27.8			
	Well_Temp CQG Manom CCL PBMS PSTC	24.7 24.4 23.9 23.2			
RST-C RSCH-A 374 RSC-E RSS-A 255 RSXH-A 220 RSX-E		23.2			
	RSC-A Far RSC-A PNG RSC-A Nea RSX-A PNG	14.1 13.6			

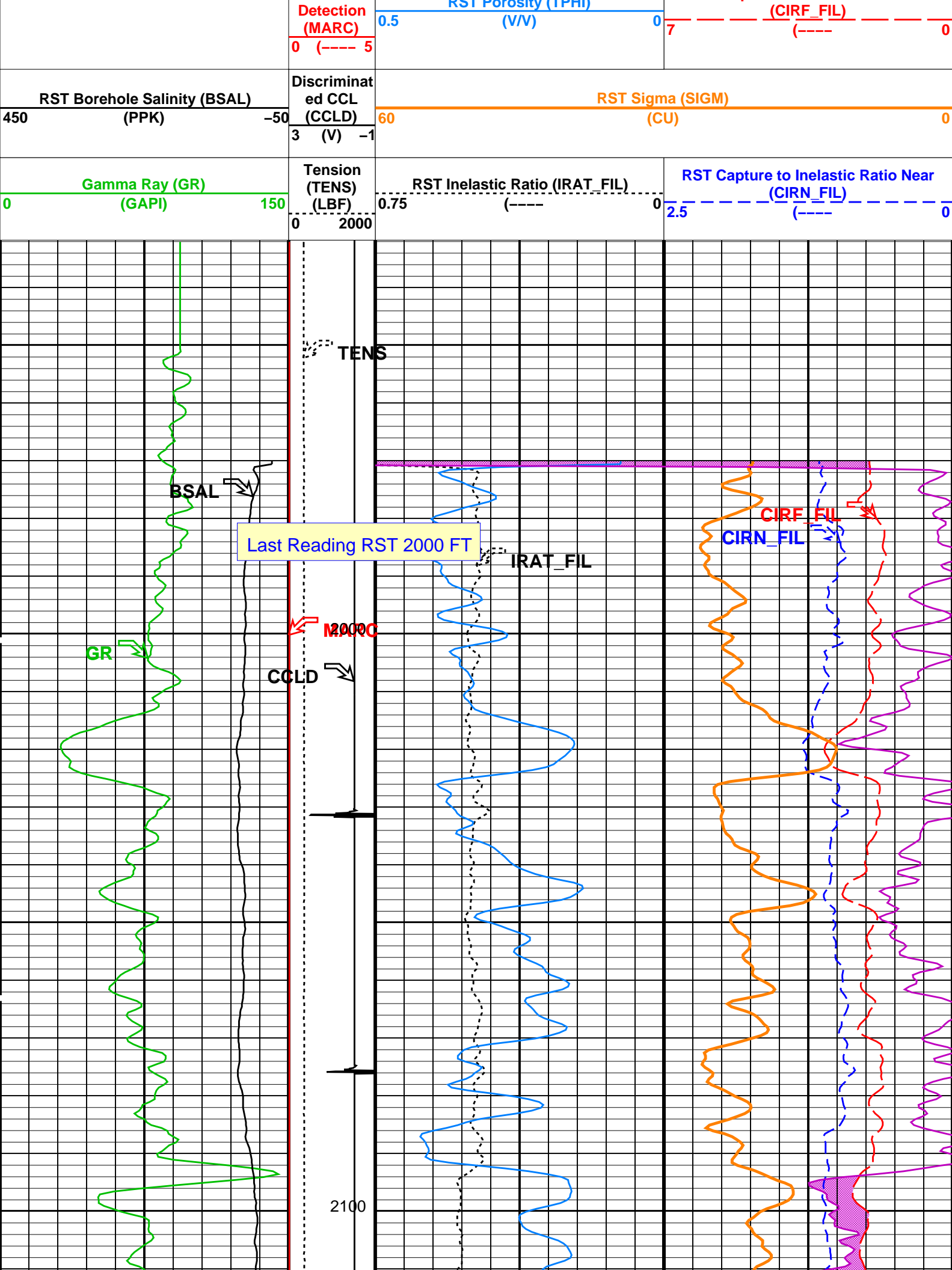


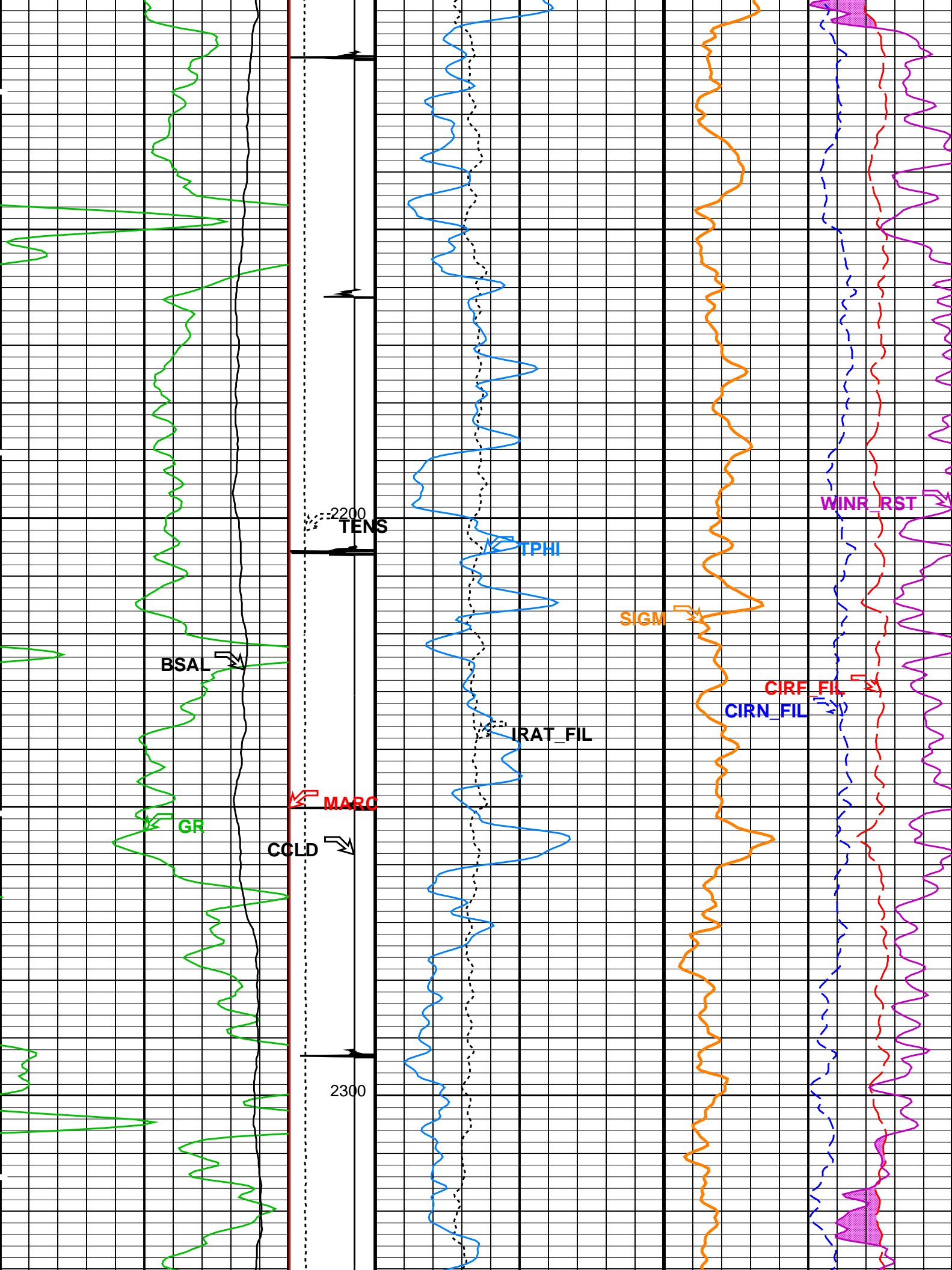
MAIN PASS RST SIGMA

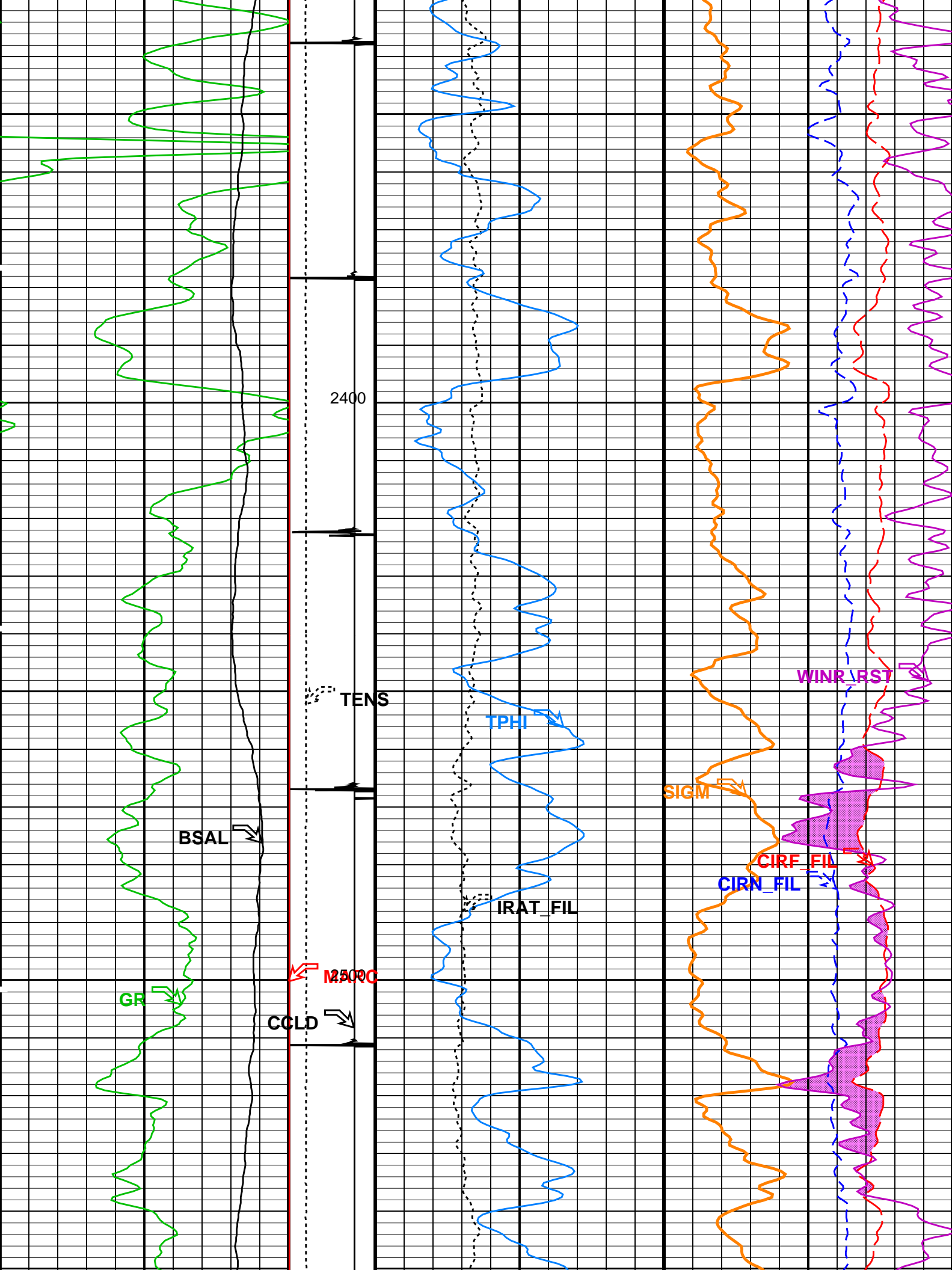
MAXIS Field Log

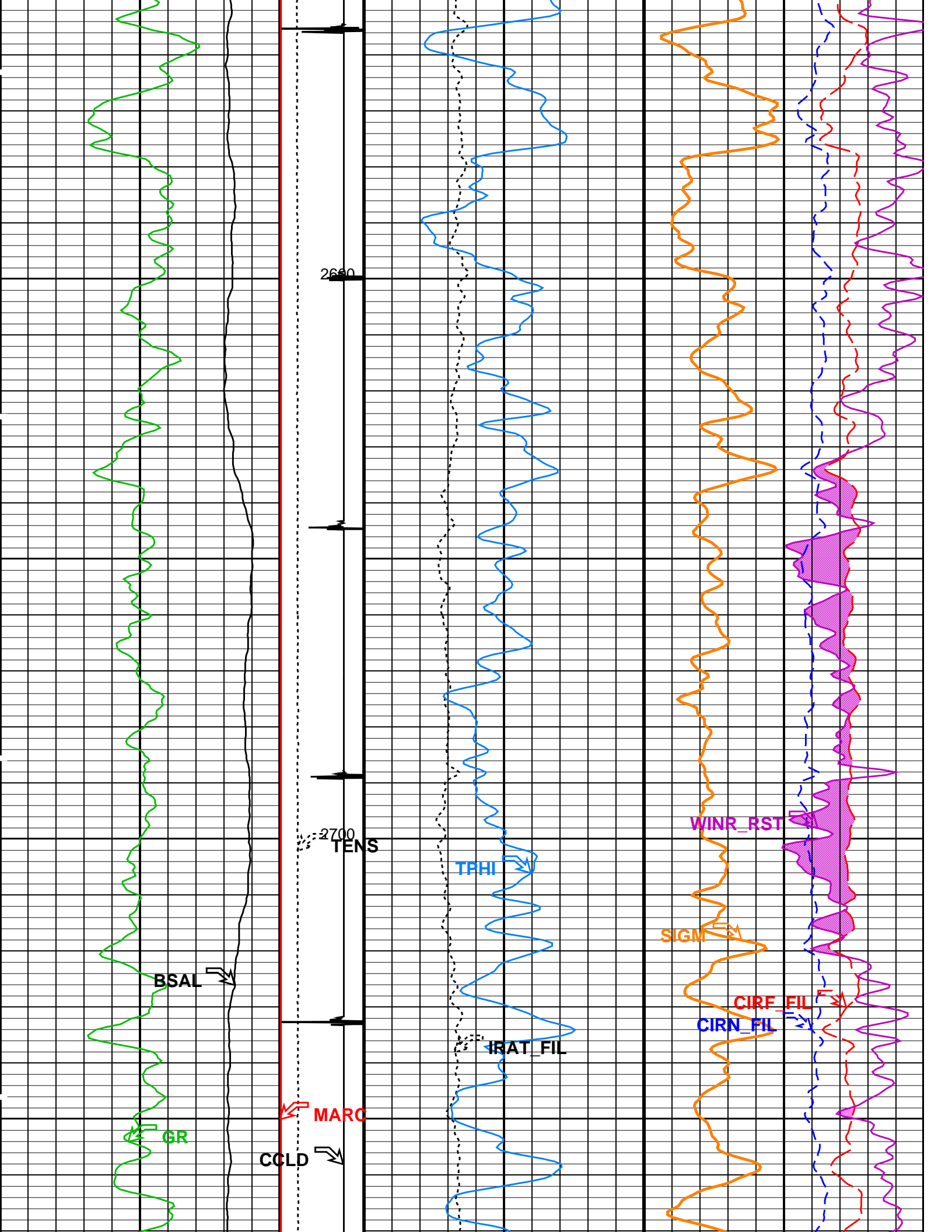
Input DLIS Files						
DEFAULT	RST_PSP_050LUP	FN:49	PRODUCER	18-Dec-2013 03:26	6874.0 FT	1943.5 FT
Output DLIS Files						
DEFAULT	RST_PSP_052PUP	FN:51	PRODUCER	18-Dec-2013 04:48	6880.0 FT	1931.5 FT
OP System Version: 19C0-187						
RST-C	19C0-187	PSPT	19C0-187			

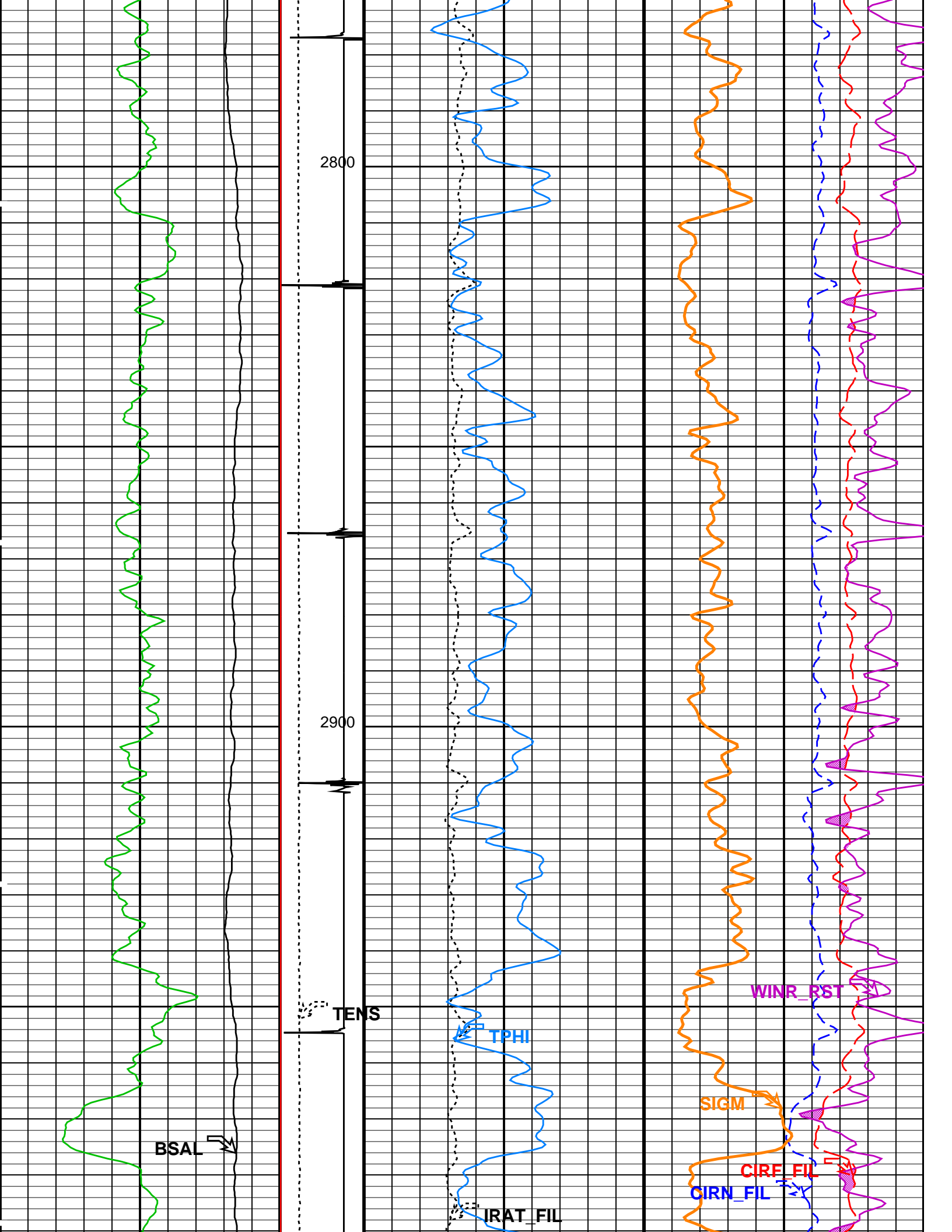
PIP SUMMARY		
Time Mark Every 60 S		
		Crossover in sand From RST_CIRF_FIL to RST_CIRN_FIL
WINR Gas Flag From WINR to RST_CIRF_FIL		
RST Weighted Inelastic Ratio (WINR_RST)		
0.4	(----	0
Minitron Arc	RST Density (TDIU)	RST Capture to Inelastic Ratio Far

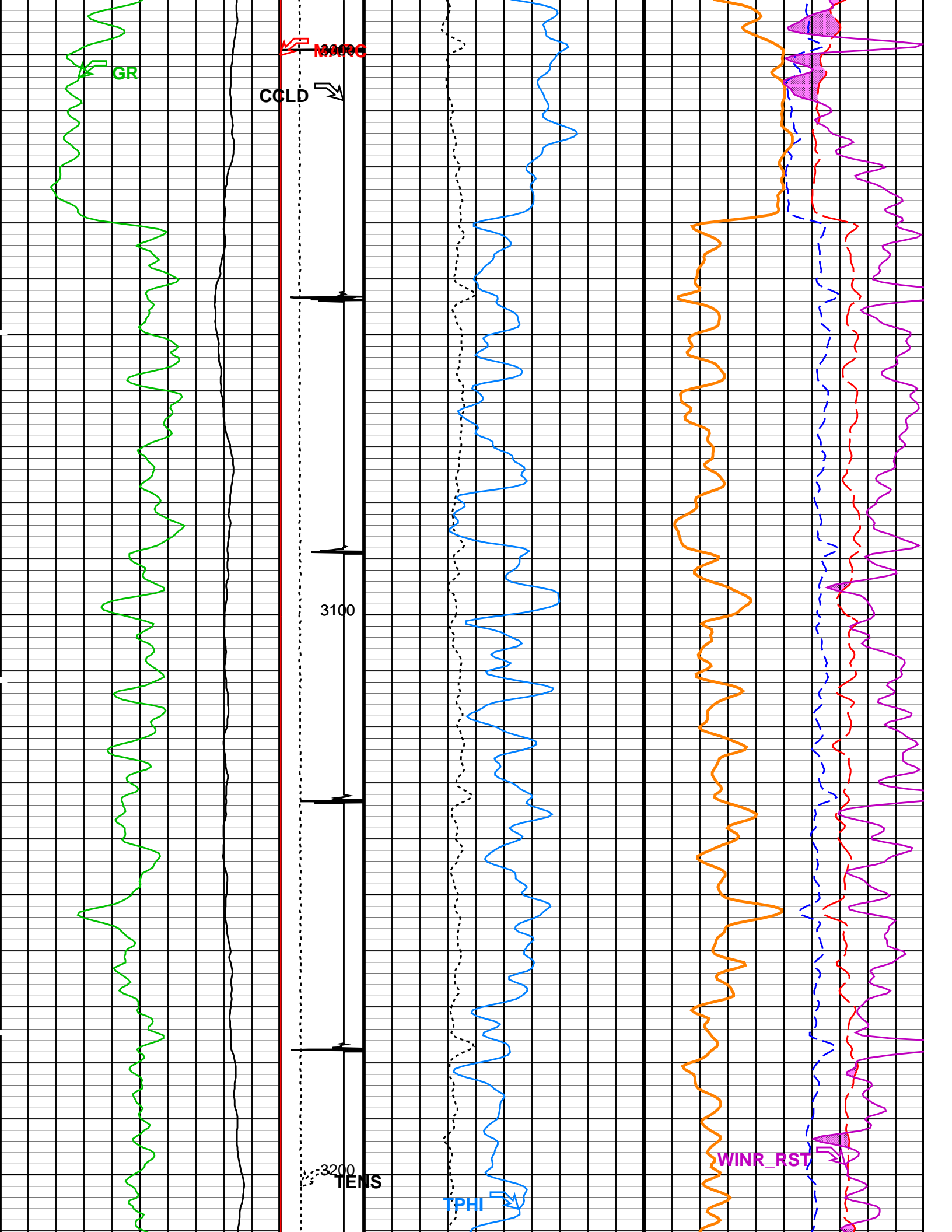


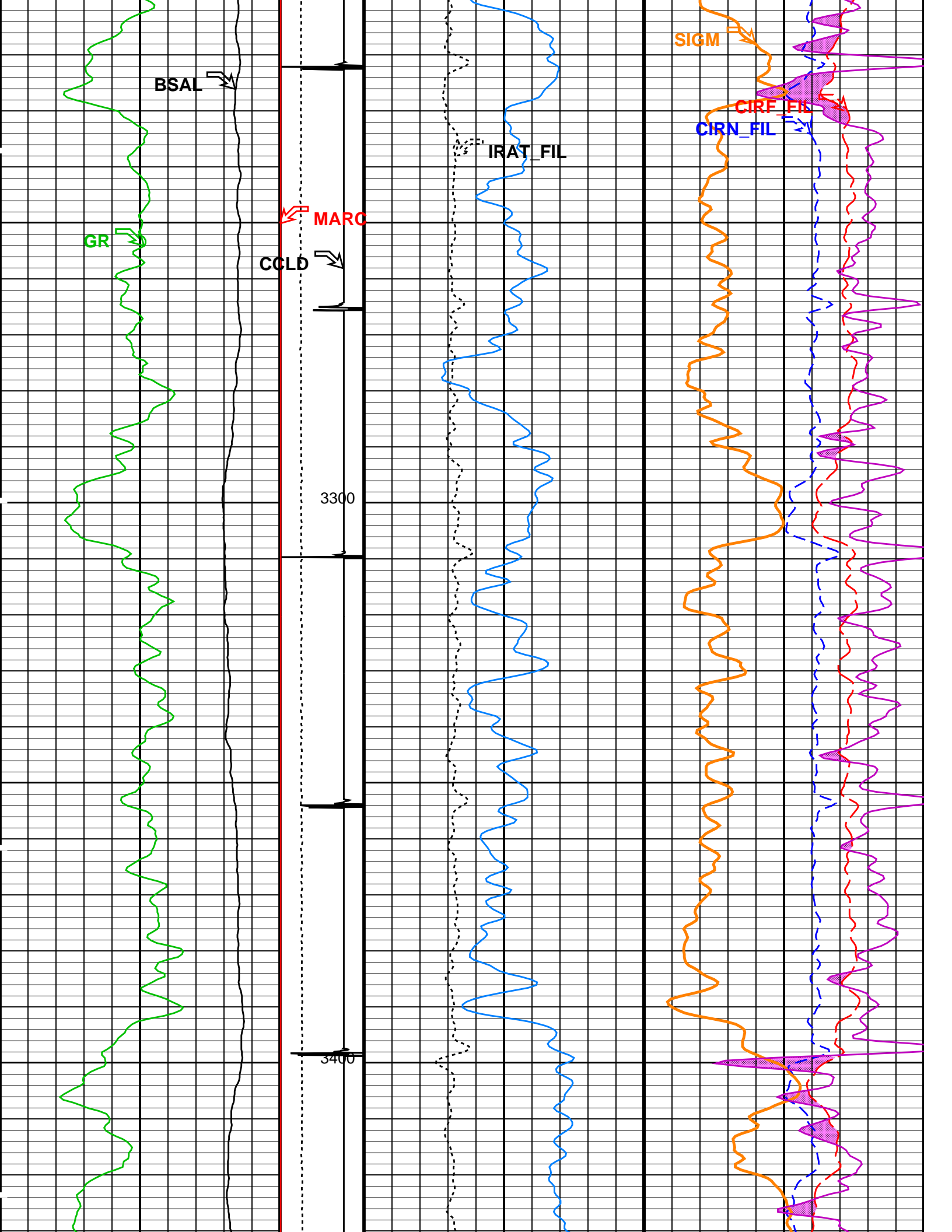


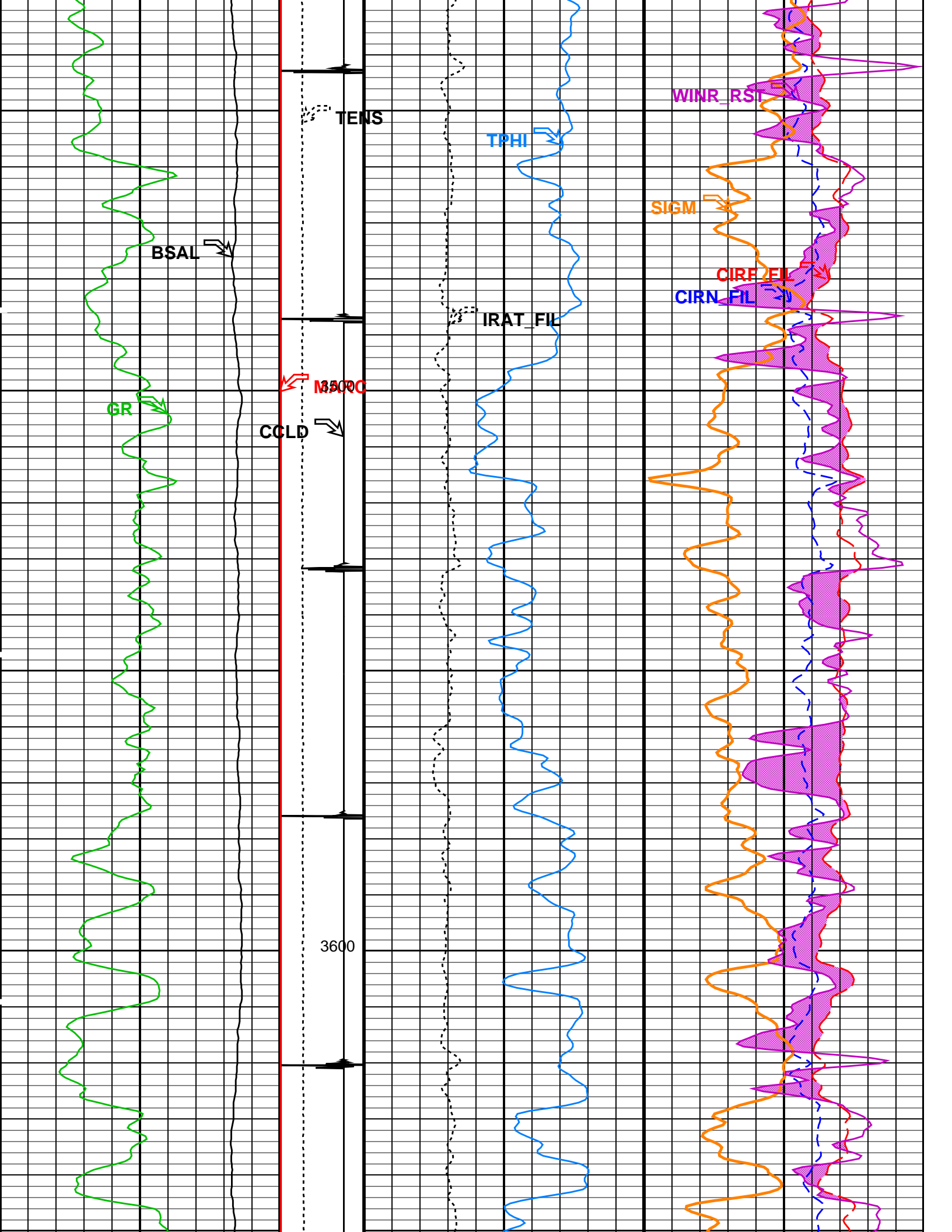


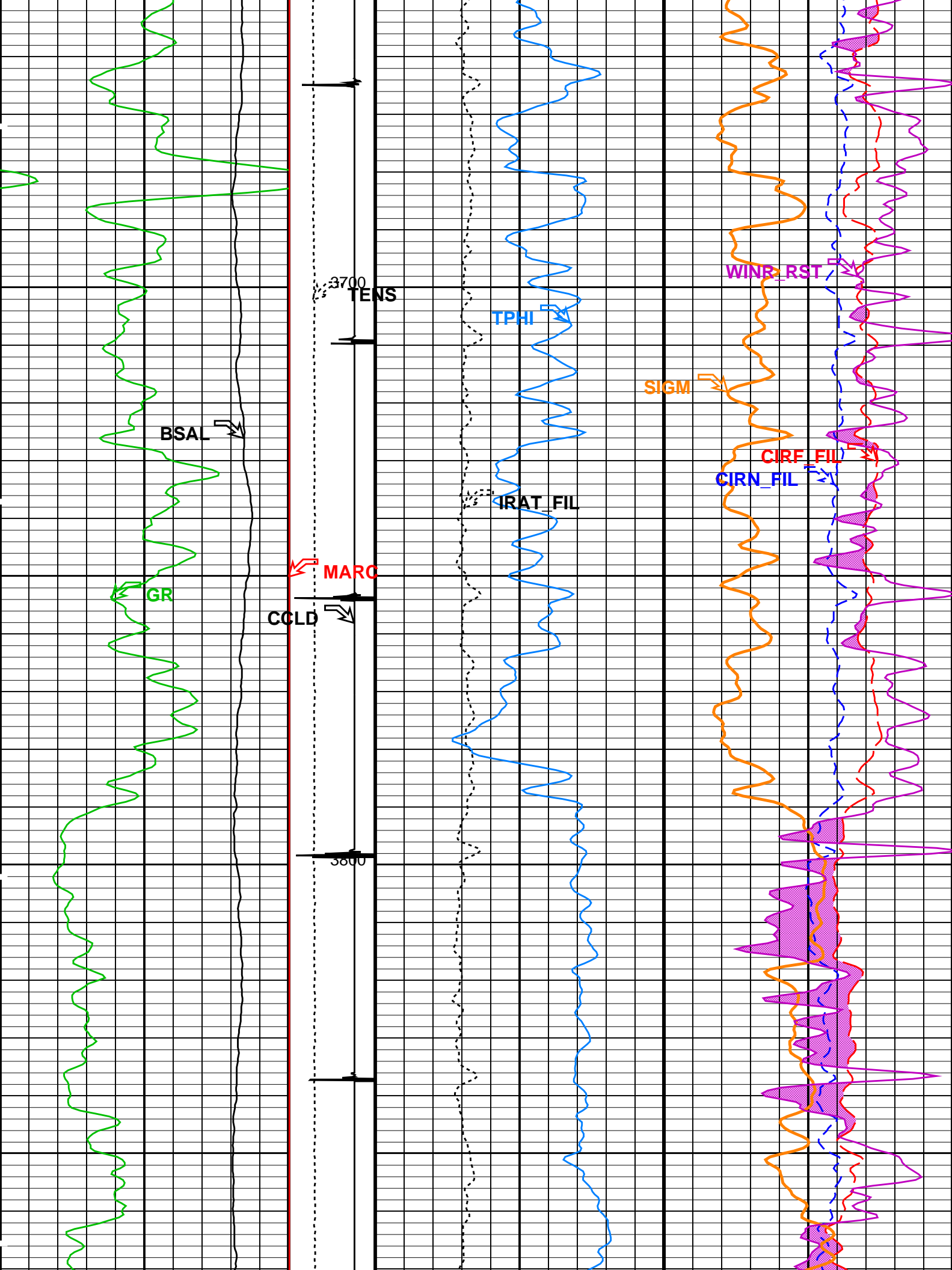


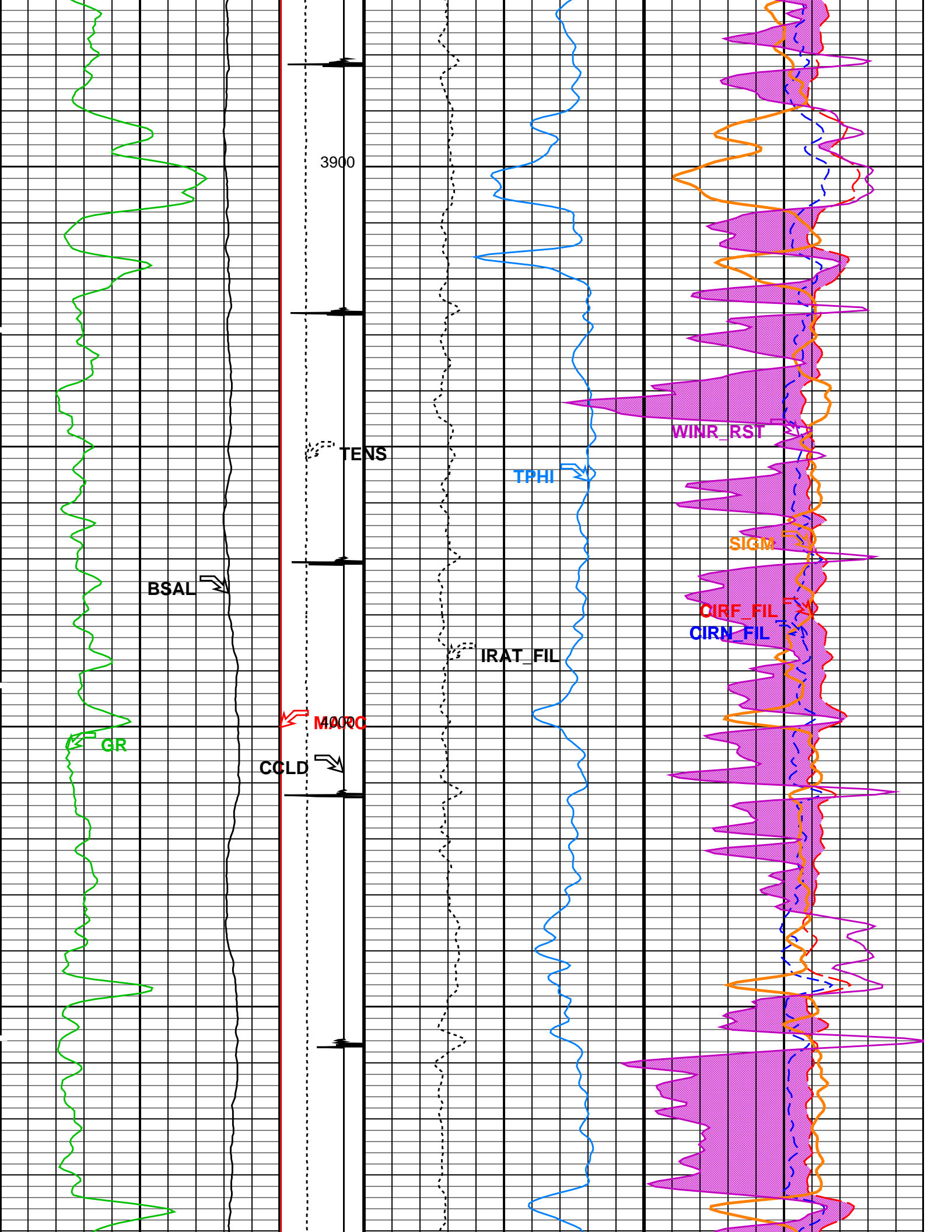


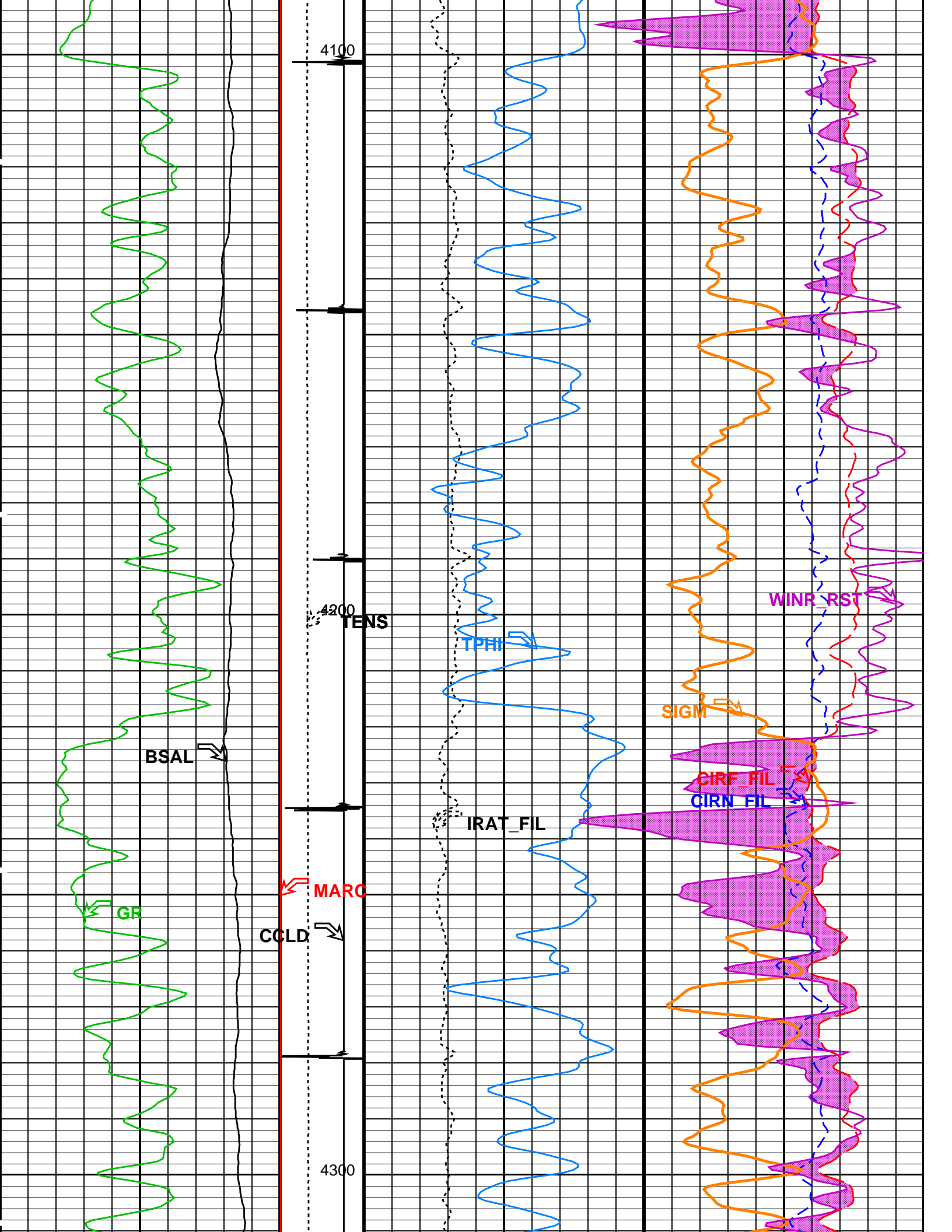


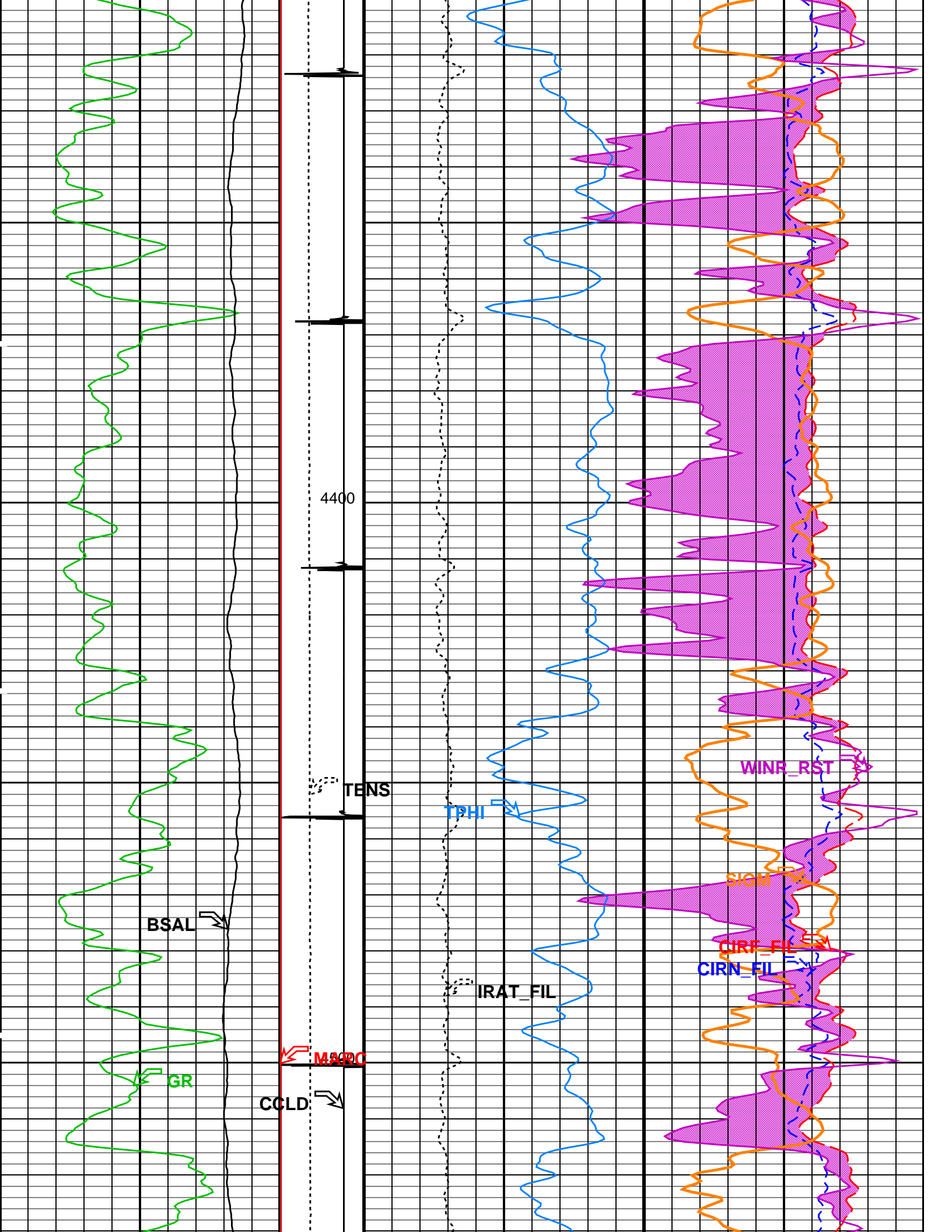


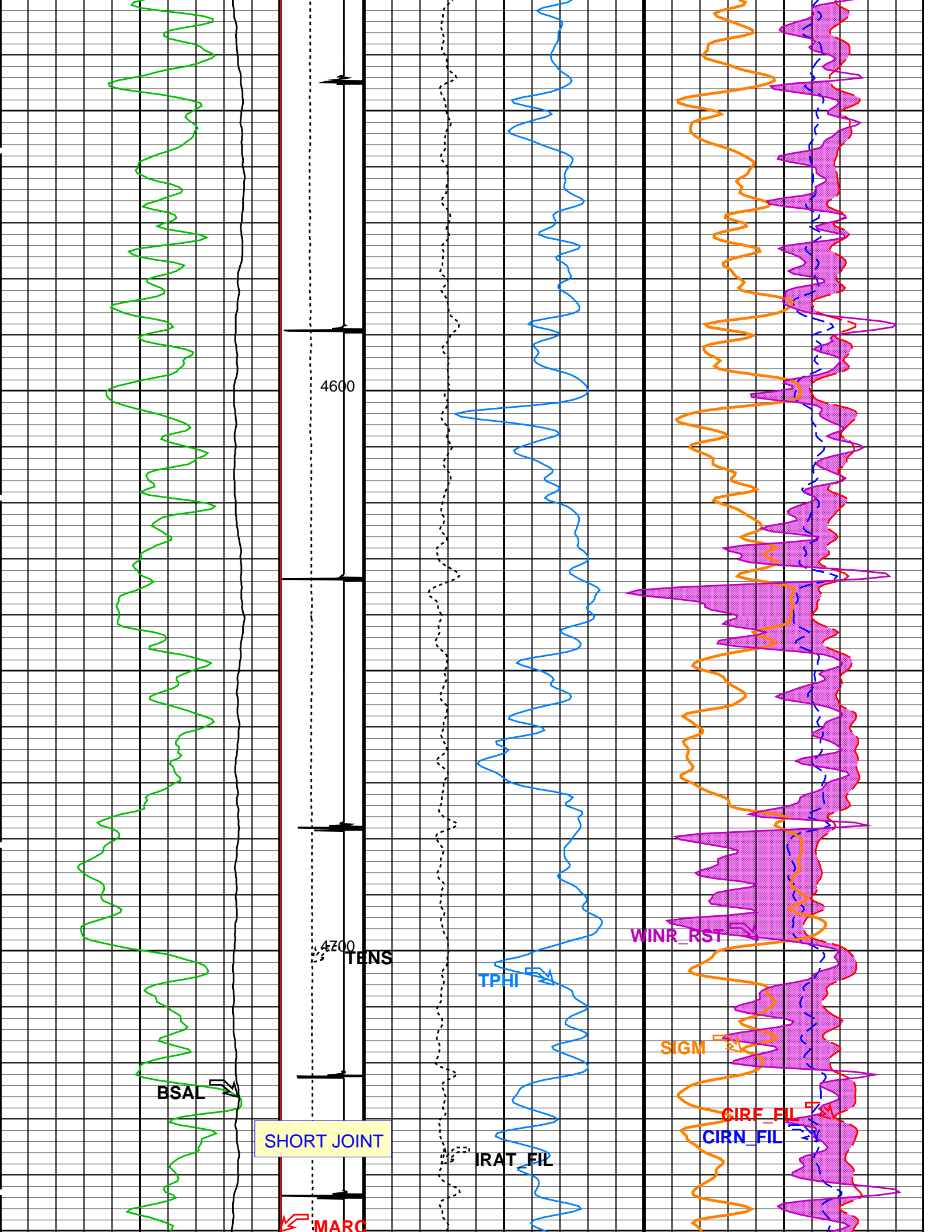


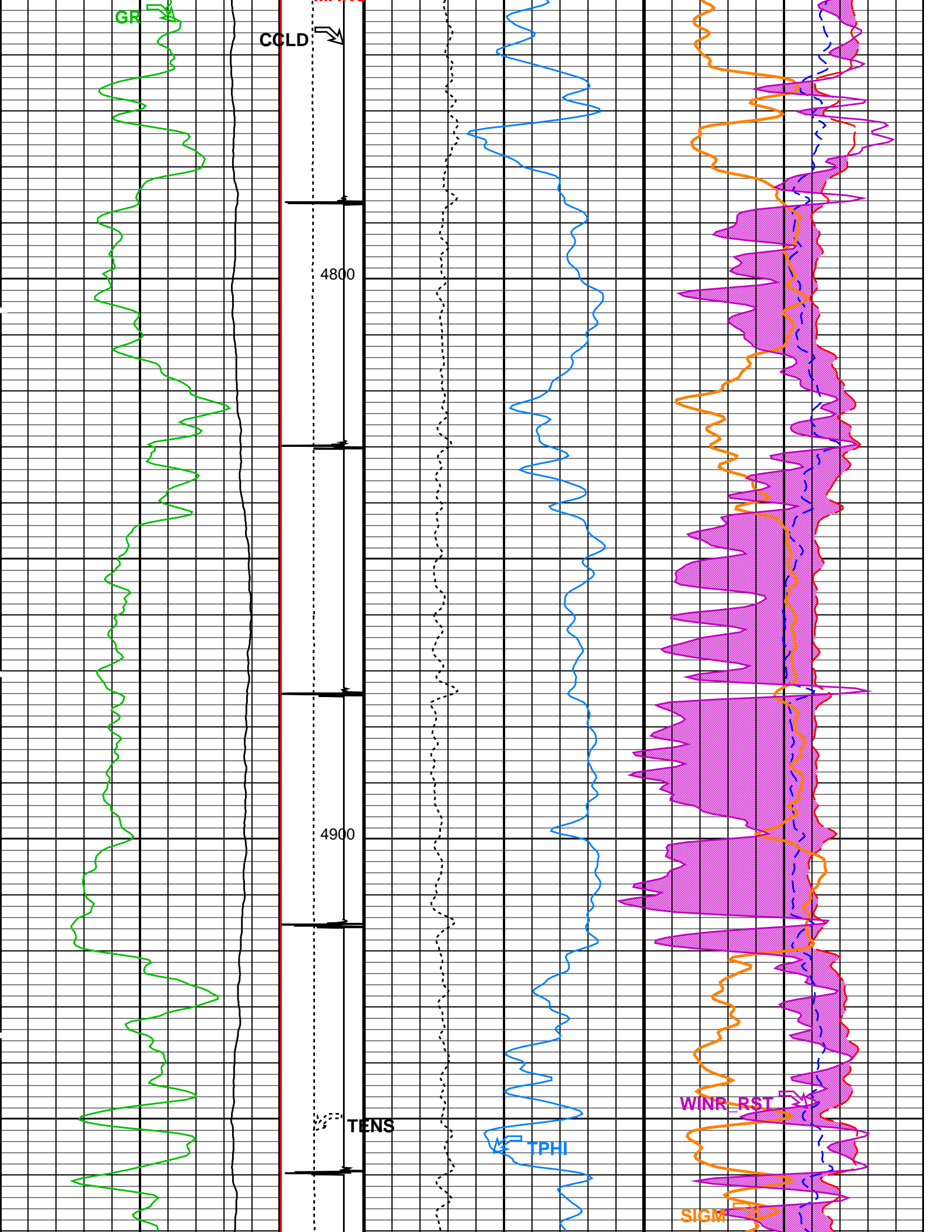


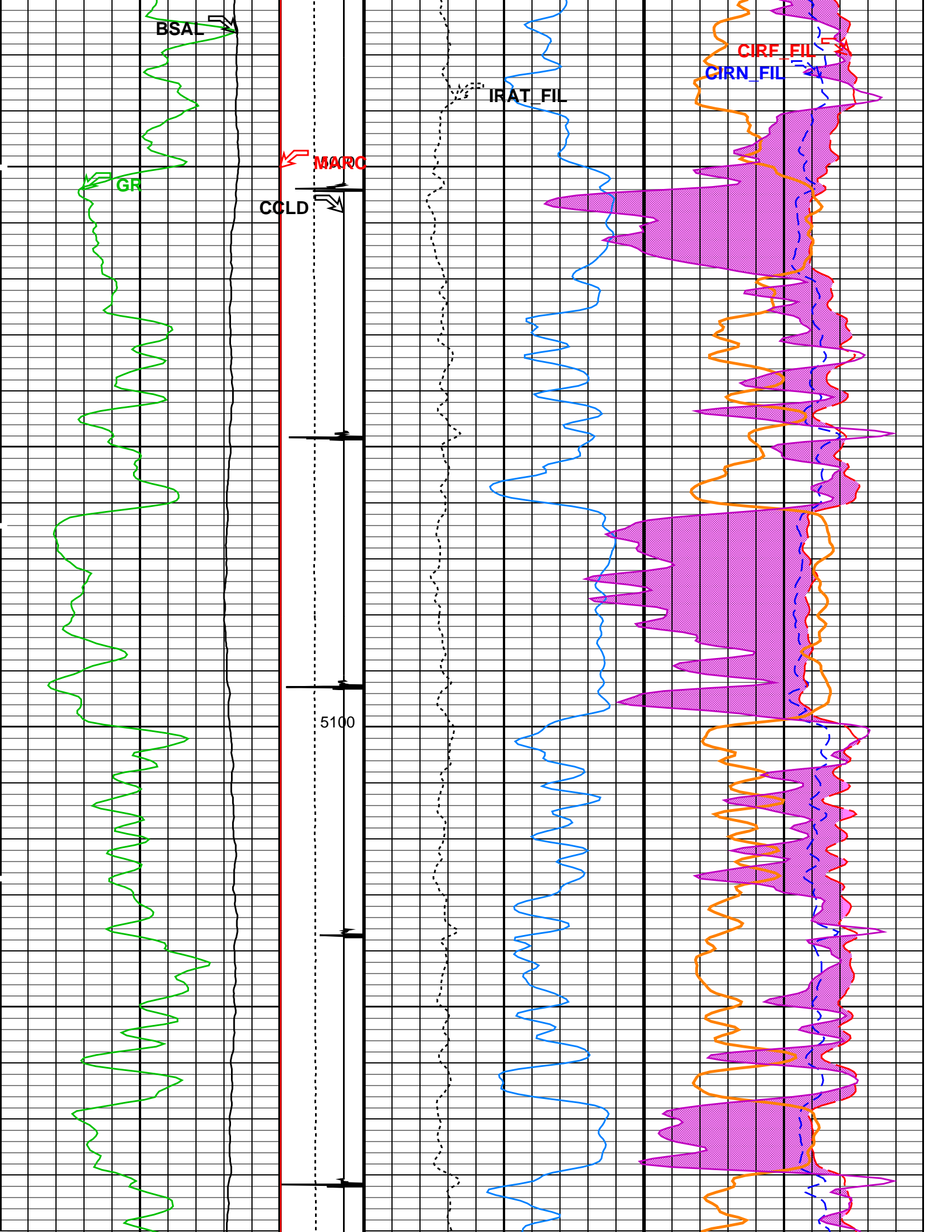


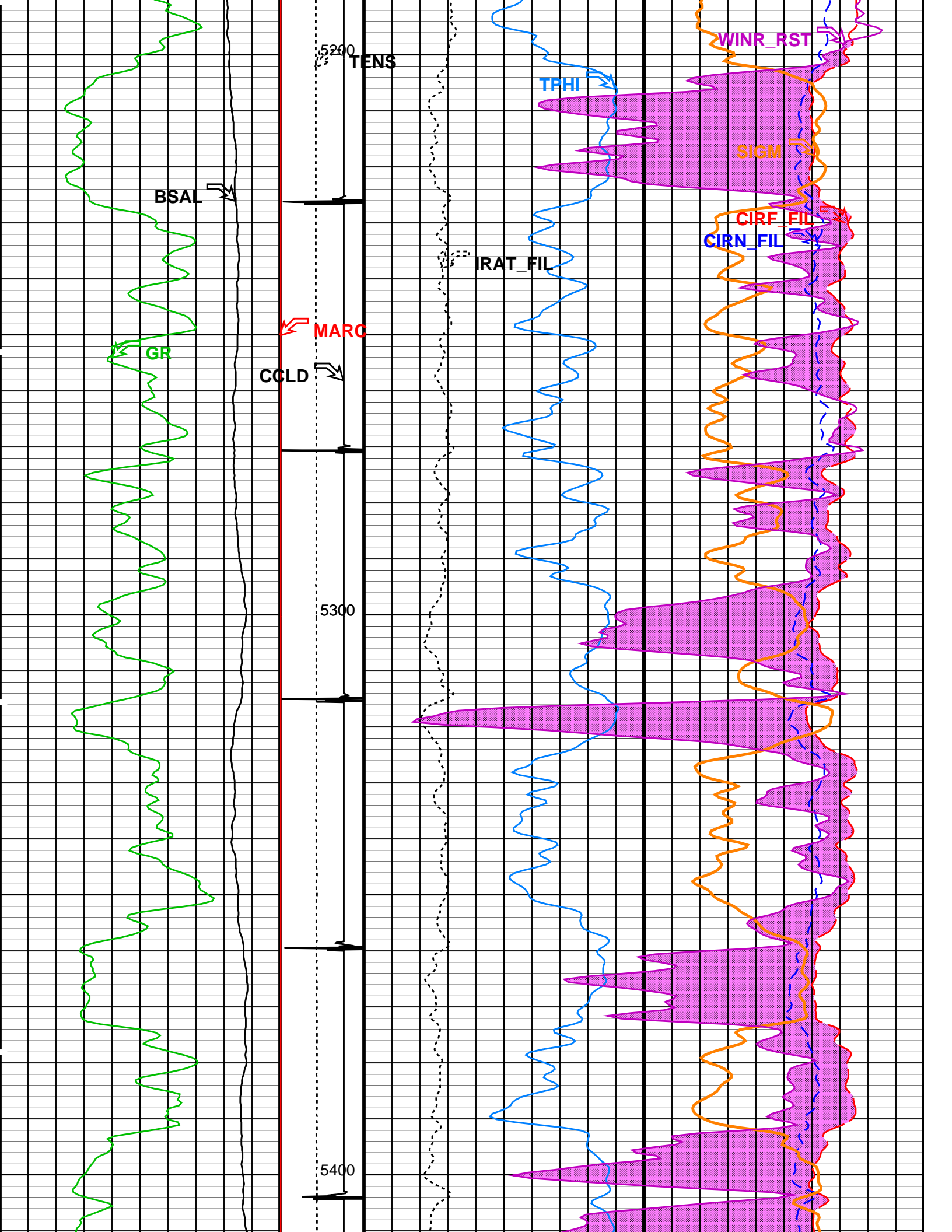


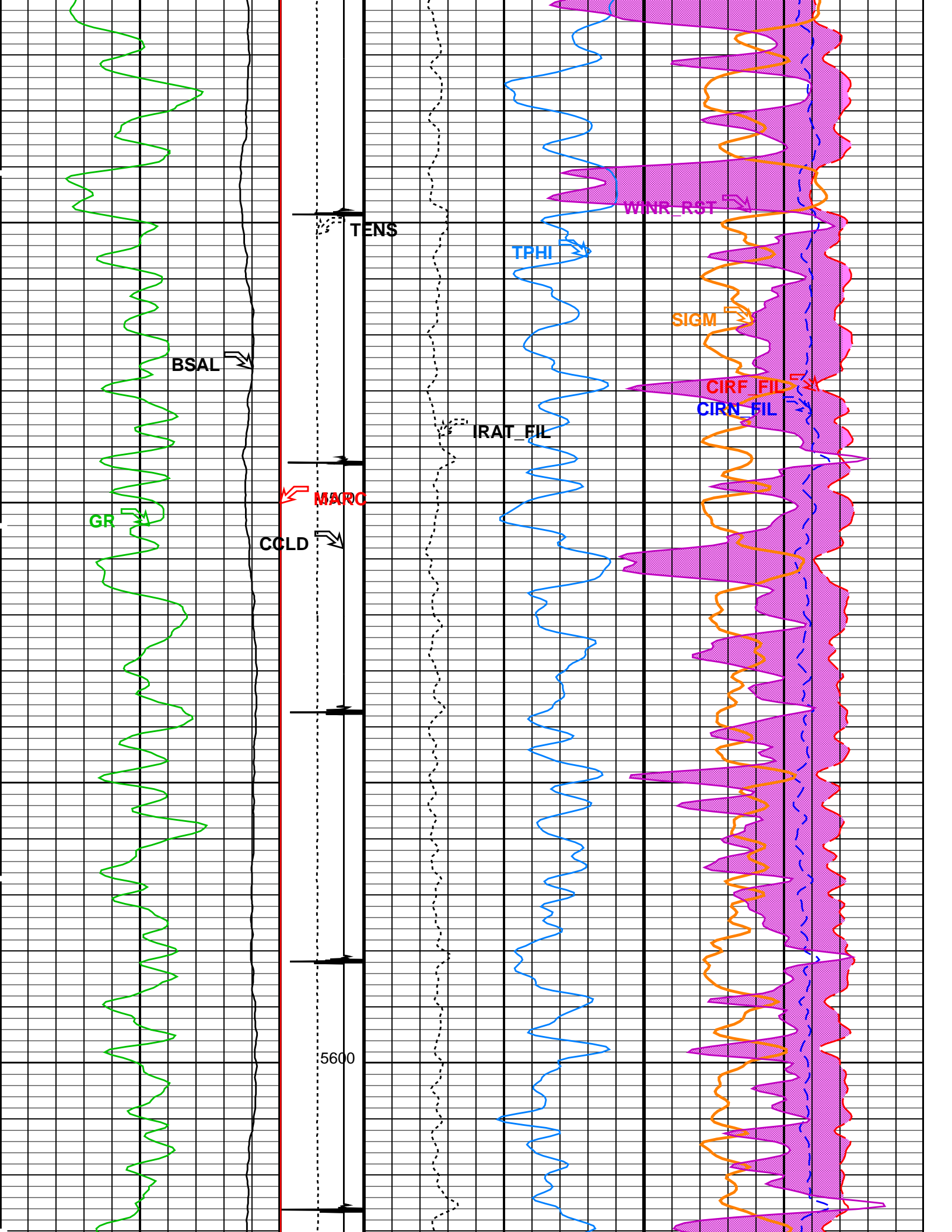


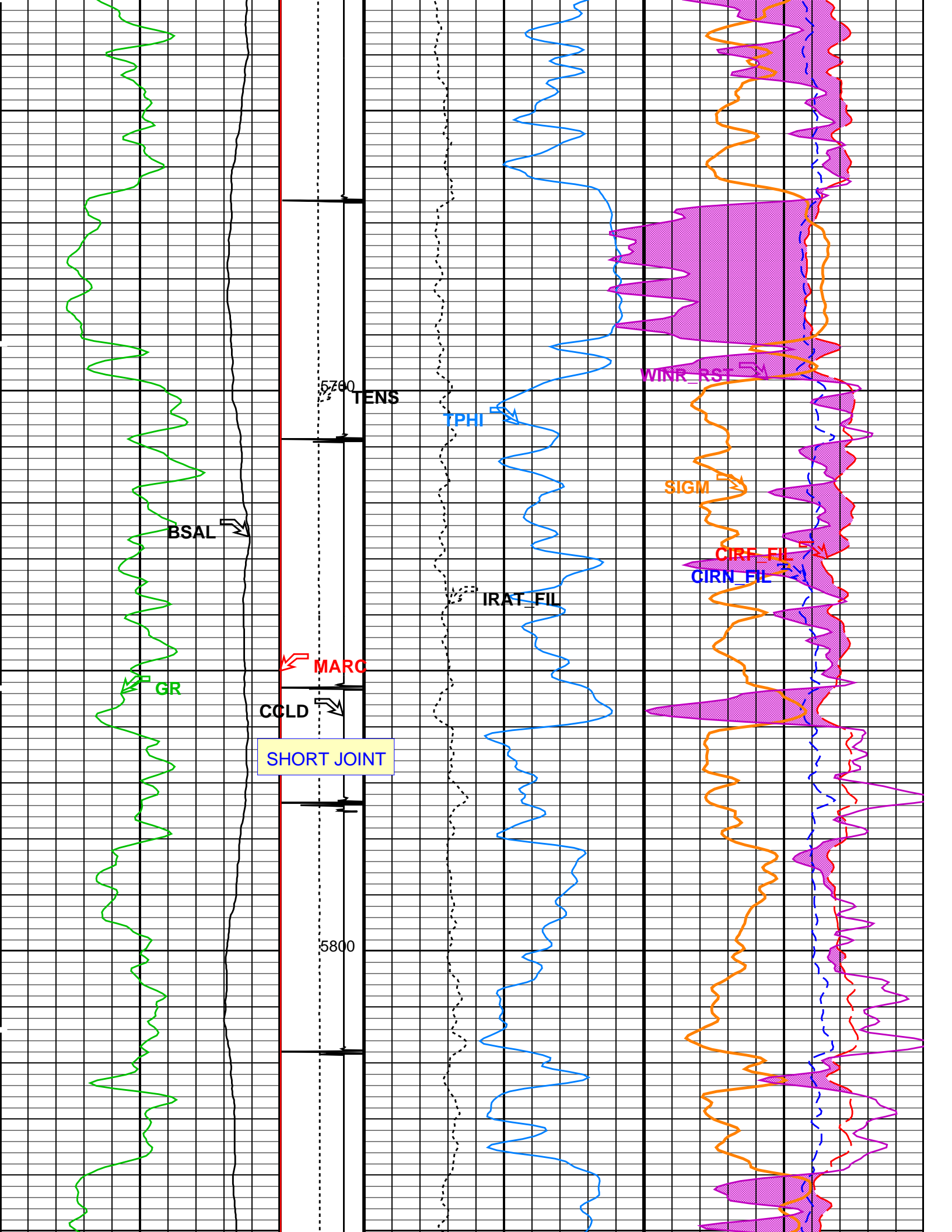


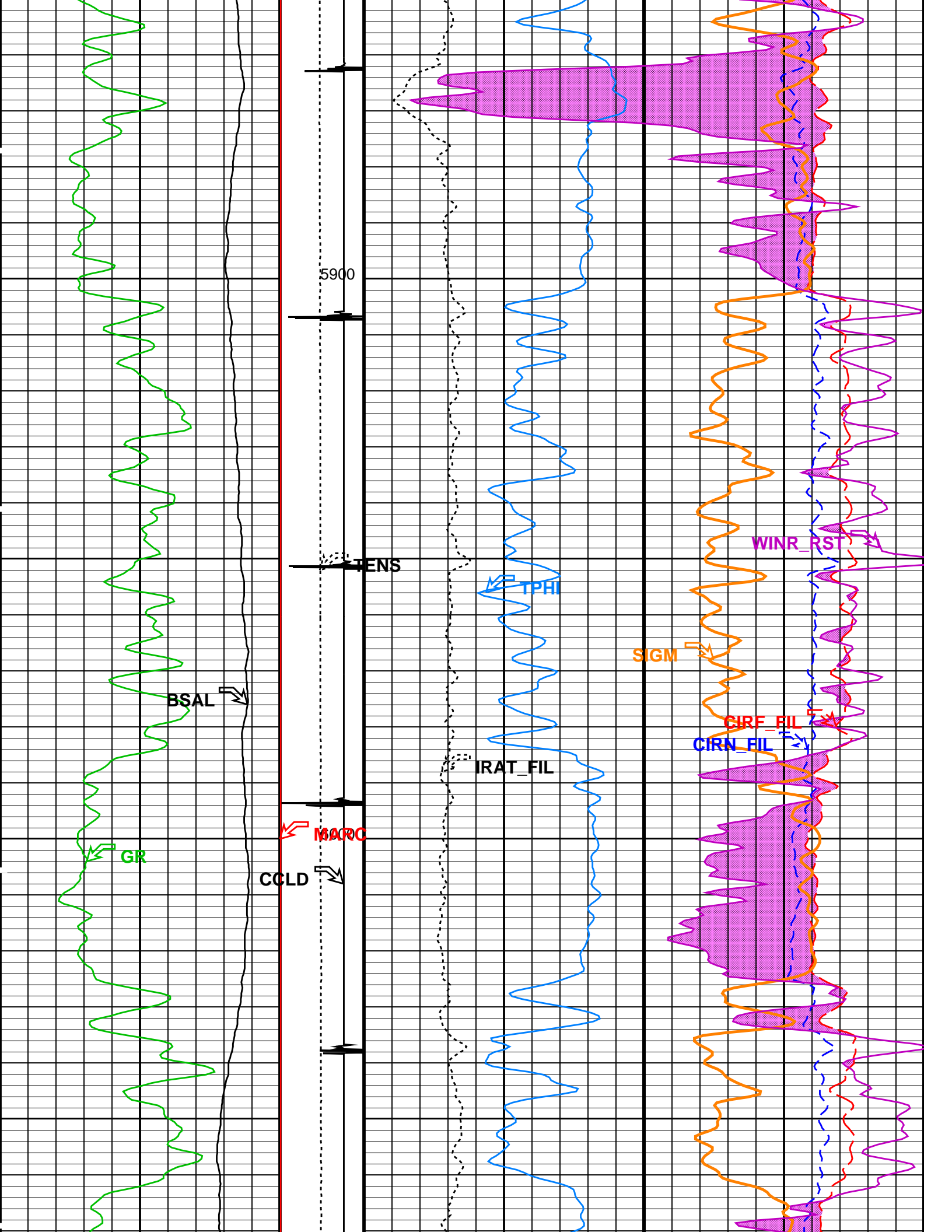


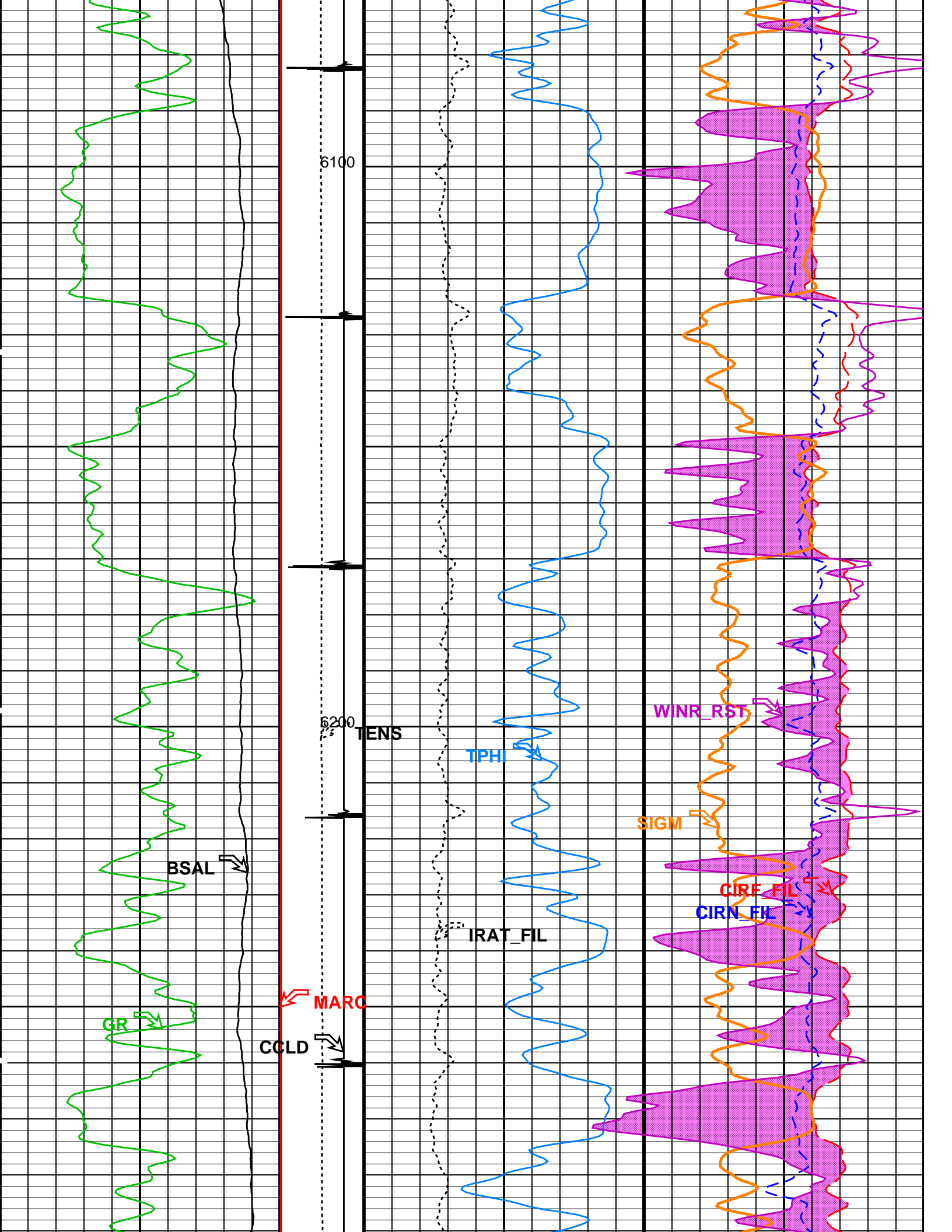


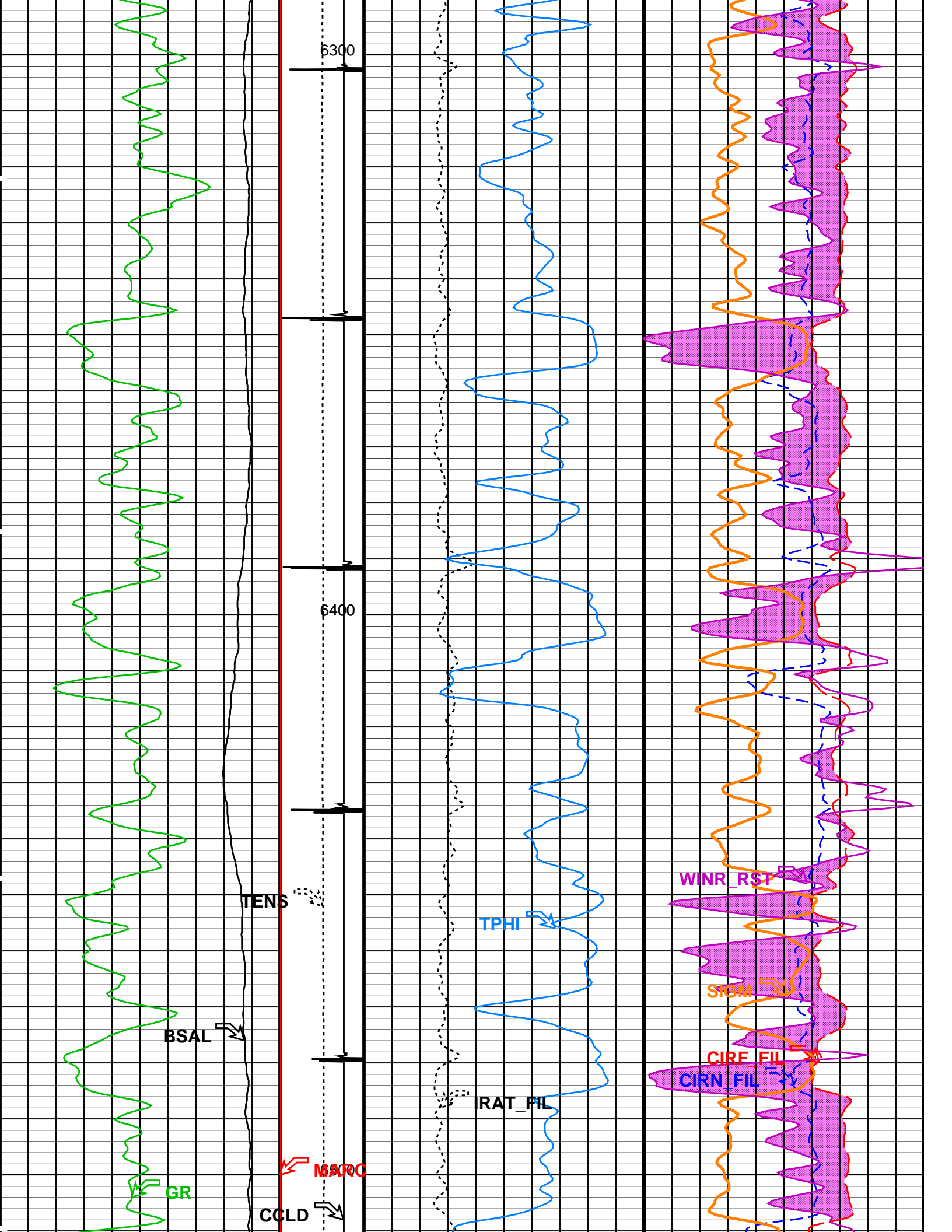


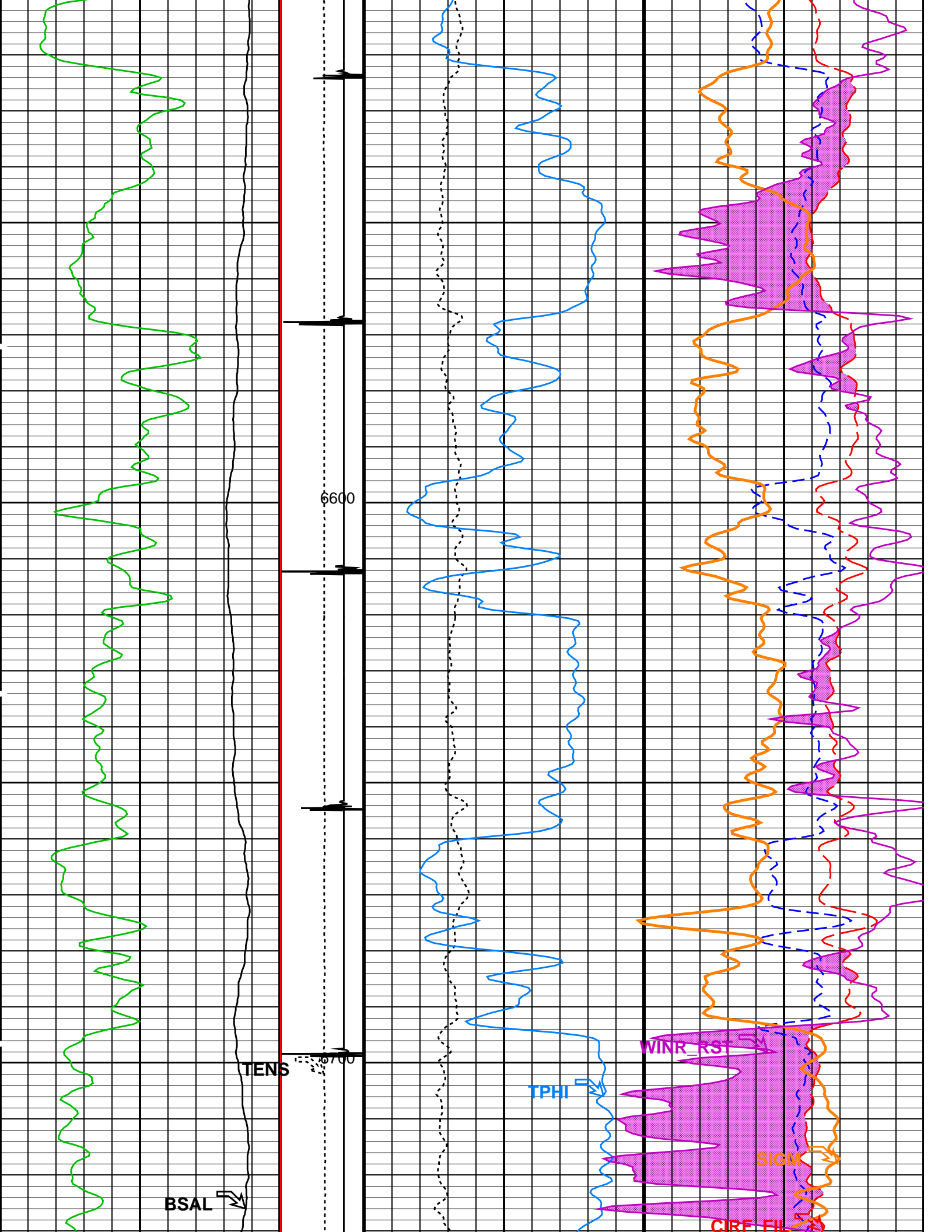


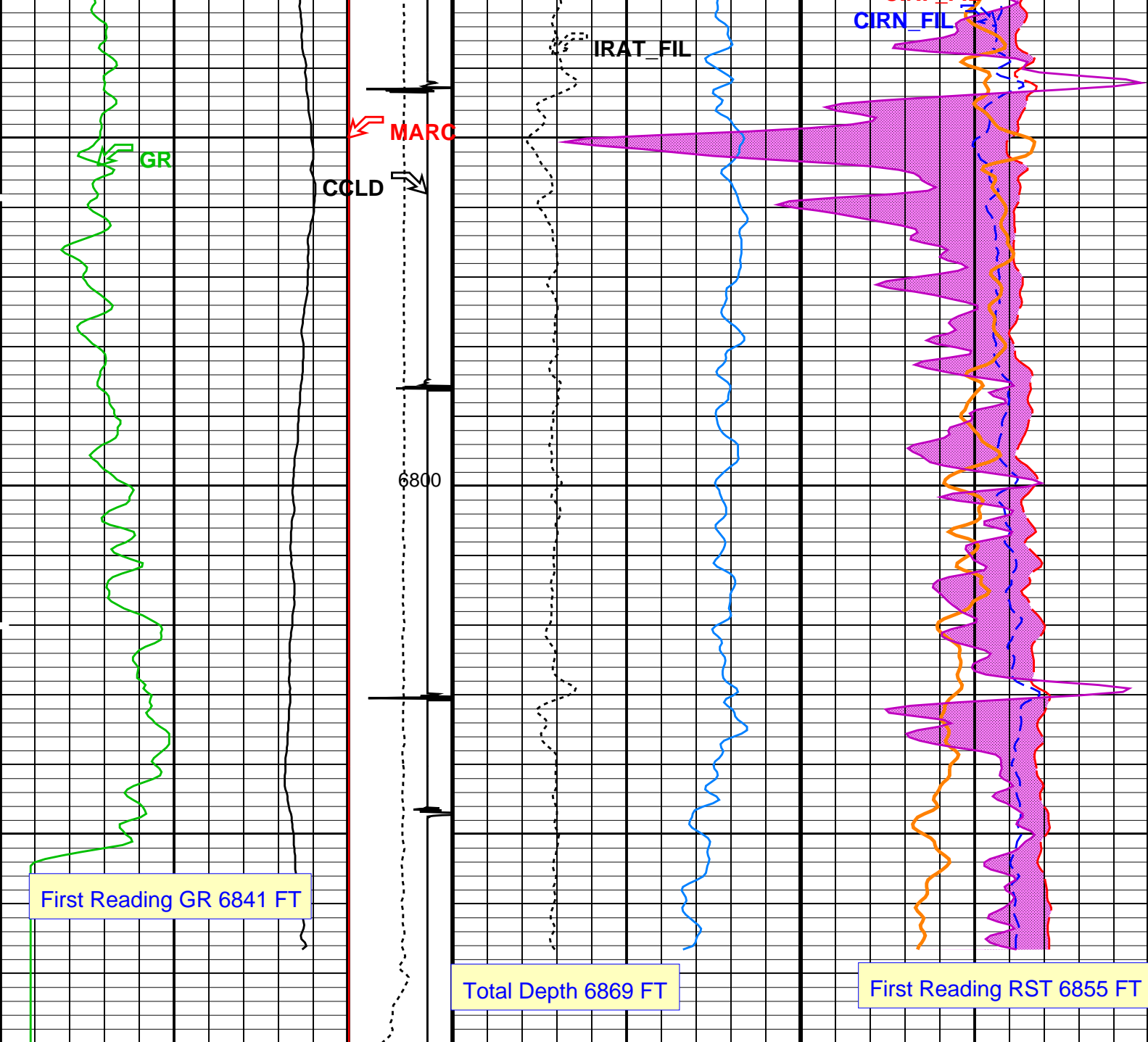












<div>Gamma Ray (GR) (GAPI)</div> <div>0150</div>	<div>Tension (TENS) (LBF)</div> <div>02000</div>	<div>RST Inelastic Ratio (IRAT_FIL)</div> <div>0.75-----0</div>	<div>RST Capture to Inelastic Ratio Near (CIRD_FIL)</div> <div>2.5-----0</div>
<div>RST Borehole Salinity (BSAL) (PPK)</div> <div>450-50</div>	<div>Discriminat ed CCL (CCLD)</div> <div>3 (V) -1</div>	<div>RST Sigma (SIGM) (CU)</div> <div>60-----0</div>	
<div>Minitron Arc Detection (MARC)</div> <div>0 (---- 5)</div>		<div>RST Porosity (TPHI) (V/V)</div> <div>0.5-----0</div>	<div>RST Capture to Inelastic Ratio Far (CIRD_FIL)</div> <div>7 (---- 0)</div>
		<div>RST Weighted Inelastic Ratio (WINR_RST)</div> <div>0.4-----0</div>	<div>WINR Gas Flag From WINR to RST_CIRD_FIL</div>

PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
RST-C: Reservoir Saturation Pro Tool C			
AIRB	Tractor Available in Tool String	NO	
BHS	RST Air Borehole	No	
BHT	Borehole Status	CASED	
BSALOPT	Bottom Hole Temperature (used in calculations)	212	DEGF
BSFL	RST Borehole Salinity Option	Unknown	
CSID	RST Borehole Salinity Filter Length	51	
DFPC	Casing Size I.D.	4	IN
DFPC_TDTL	RST Depth Filter Processing Constant	One	
GCSE	RST Depth Filter Processing Constant (TDT-like)	Two	
GDEV	Generalized Caliper Selection	BS	
GGRD	Average Angular Deviation of Borehole from Normal	0	DEG
GRSE	Geothermal Gradient	0.01	DF/F
GTSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
ISSBAR	Generalized Temperature Selection	LINEAR_ESTIMATE	
MATR	Barite Mud Switch	NOBARITE	
NORM_IRAT_RST	Rock Matrix for Neutron Porosity Corrections	SANDSTONE	
NORM_SIGM_RST	RST Normalized Inelastic Ratio	0.48	
PTIER	RST Normalized Sigma	30	CU
PVL_PSNT_PRST	RST Tiered Presentation Selection	0_Customer	
RGAI	PVL Peak Signal/Noise Threshold	3	
SHT	Near/Far Gain Calibration Ratio	1	
TIER_IC	Surface Hole Temperature	68	DEGF
TIER_SIGM	RST IC Acquisition Mode	0_CO_Yield_and_Spectrolith	
WOFSL_PRST	RST Sigma Acquisition Mode	0_RST_Sigma	
WONSL_PRST	RST WFL-Off Subcycle Length	0	
WSCOM_PRST	RST WFL-On Subcycle Length	0	
PSPT: Production Services Logging Platform			
BHS	Borehole Status	CASED	
BHT	Bottom Hole Temperature (used in calculations)	212	DEGF
CSID	Casing Size I.D.	4	IN
GCSE	Generalized Caliper Selection	BS	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
ISSBAR	Barite Mud Switch	NOBARITE	
MATR	Rock Matrix for Neutron Porosity Corrections	SANDSTONE	
PBPO	PBMS Tool position on CAN	2	
PCCG	PBMS CCL Gain	DB0	
PSTP	PSTC Tool Position on CAN Bus	1	
SHT	Surface Hole Temperature	68	DEGF
System and Miscellaneous			
ALTDPCCHAN	Name of alternate depth channel	SpeedCorrectedDepth	
BS	Bit Size	8.750	IN
BSAL	Borehole Salinity	-50000.00	PPM
CSIZ	Current Casing Size	4.500	IN
CWEI	Casing Weight	11.60	LB/F
DFD	Drilling Fluid Density	8.40	LB/G
DO	Depth Offset for Playback	6.0	FT
FLEV	Fluid Level	70.00	FT
MST	Mud Sample Temperature	-50000.00	DEGF
PBVSADP	Use alternate depth channel for playback	NO	
PP	Playback Processing	RECOMPUTE	
RMFS	Resistivity of Mud Filtrate Sample	-50000.0000	OHMM
RW	Resistivity of Connate Water	1.0000	OHMM
TD	Total Depth	6869	FT
TDD	Total Depth - Driller	6935.00	FT
TDL	Total Depth - Logger	6869.00	FT
TWS	Temperature of Connate Water Sample	100.00	DEGF

Format: RST_SIGMA_S5 Vertical Scale: 5" per 100' Graphics File Created: 18-Dec-2013 04:48

OP System Version: 19C0-187

RST-C 19C0-187 PSPT 19C0-187

Input DLIS Files

DEFAULT RST_PSP_050.LIB EN-19 PRODUCER 18-Dec-2013 03:26 6874.0 FT 1943.5 FT

Schlumberger

REPEAT ANALYSIS RST SIGMA

MAXIS Field Log

Input DLIS Files						
DEFAULT	RST_PSP_048LUP	FN:47	PRODUCER	18-Dec-2013 03:11	4850.0 FT	4578.5 FT
DEFAULT	RST_PSP_052PUP	FN:51	PRODUCER	18-Dec-2013 04:48	6880.0 FT	1931.5 FT
Output DLIS Files						
DEFAULT	RST_PSP_053PUP	FN:52	PRODUCER	18-Dec-2013 04:51	4853.0 FT	4563.5 FT

OP System Version: 19C0-187

RST-C

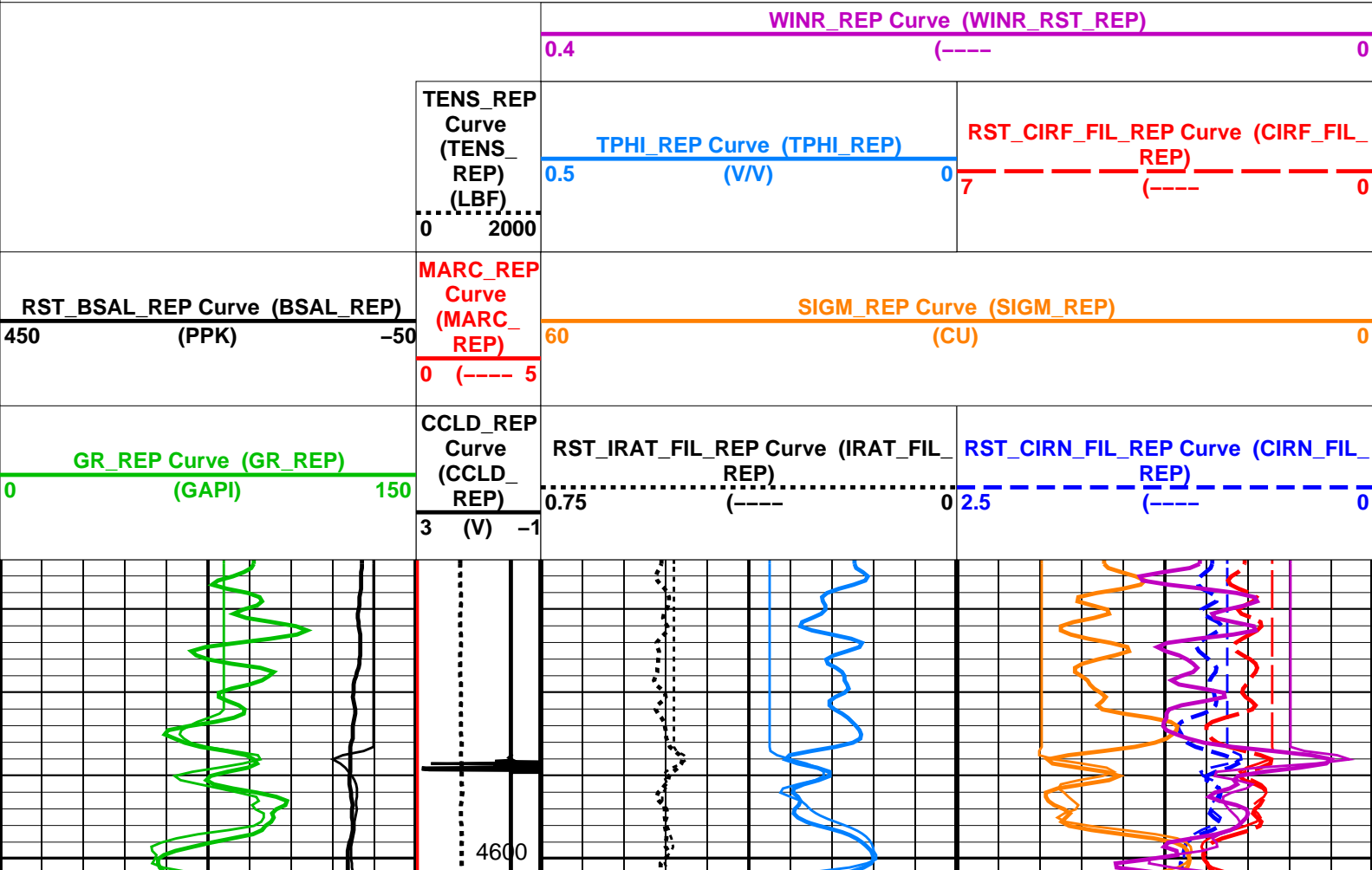
19C0-187

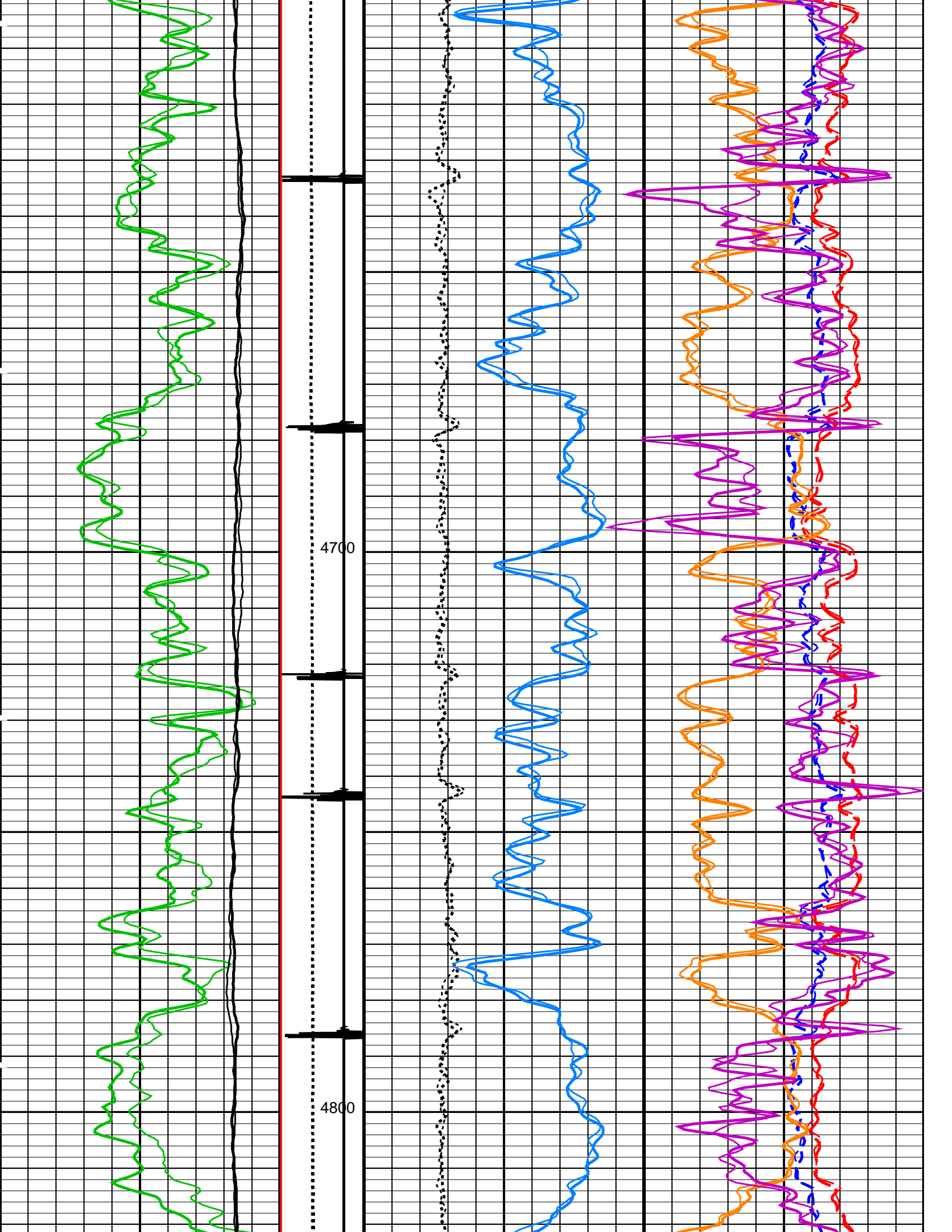
PSPT

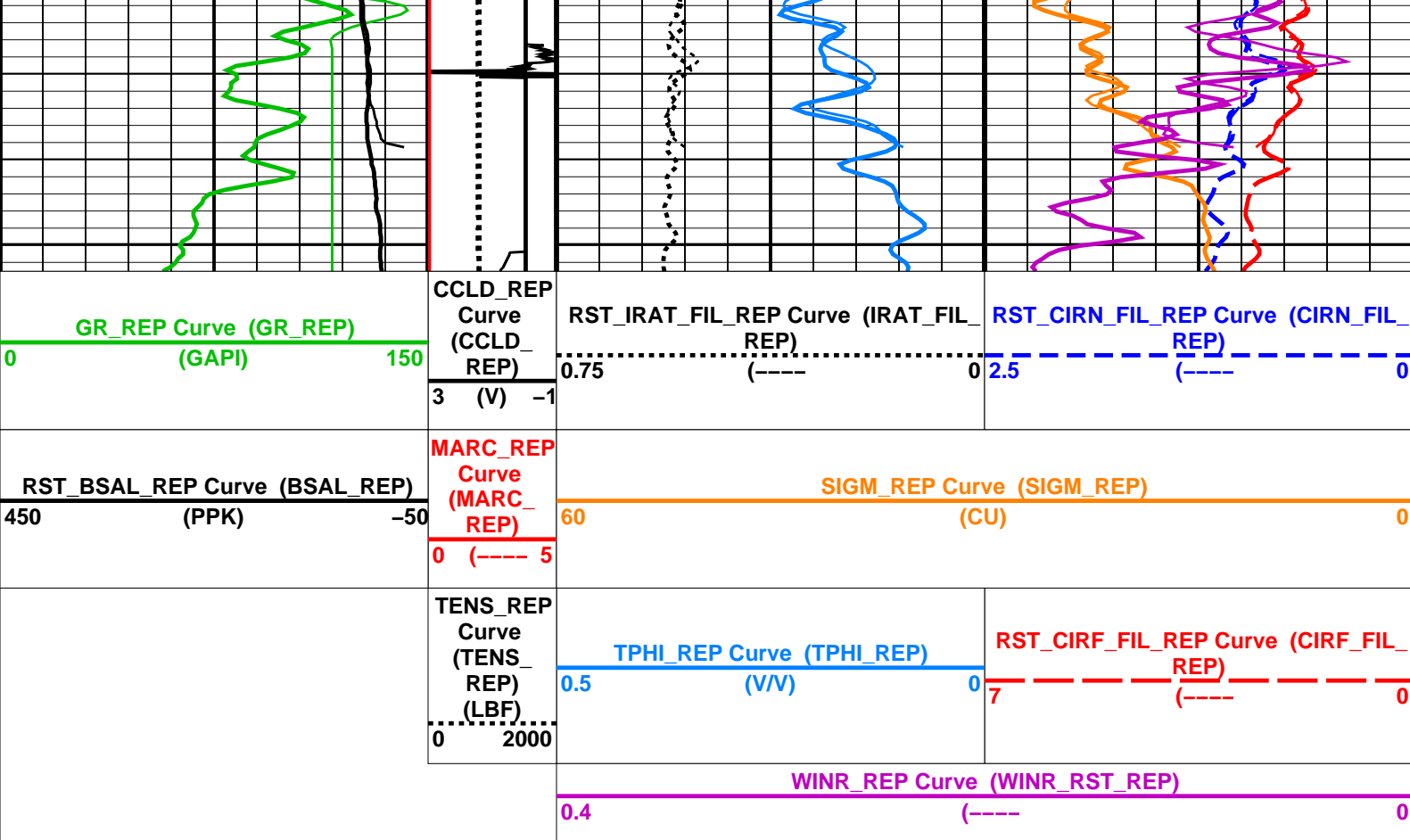
19C0-187

PIP SUMMARY

Time Mark Every 60 S







PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value	
RST-C: Reservoir Saturation Pro Tool C			
	Tractor Available in Tool String	NO	
AIRB	RST Air Borehole	No	
BHS	Borehole Status	CASED	
BHT	Bottom Hole Temperature (used in calculations)	212	DEGF
BSALOPT	RST Borehole Salinity Option	Unknown	
BSFL	RST Borehole Salinity Filter Length	51	
CSID	Casing Size I.D.	4	IN
DFPC	RST Depth Filter Processing Constant	One	
DFPC_TDTL	RST Depth Filter Processing Constant (TDT-like)	Two	
GCSE	Generalized Caliper Selection	BS	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
ISSBAR	Barite Mud Switch	NOBARITE	
MATR	Rock Matrix for Neutron Porosity Corrections	SANDSTONE	
NORM_IRAT_RST	RST Normalized Inelastic Ratio	0.48	
NORM_SIGM_RST	RST Normalized Sigma	30	CU
PTIER	RST Tiered Presentation Selection	0_Customer	
PVL_PSNT_PRST	PVL Peak Signal/Noise Threshold	3	
RGAI	Near/Far Gain Calibration Ratio	1	
SHT	Surface Hole Temperature	68	DEGF
TIER_IC	RST IC Acquisition Mode	0_CO_Yield_and_Spectrolith	
TIER_SIGM	RST Sigma Acquisition Mode	0_RST_Sigma	
WOFSL_PRST	RST WFL-Off Subcycle Length	0	
WONSL_PRST	RST WFL-On Subcycle Length	0	
WSCOM_PRST	RST Station Log Comment		
PSPT: Production Services Logging Platform			
BHS	Borehole Status	CASED	
BHT	Bottom Hole Temperature (used in calculations)	212	DEGF
CSID	Casing Size I.D.	4	IN
GCSE	Generalized Caliper Selection	BS	
GDEV	Average Angular Deviation of Borehole from Normal	0	DEG
GGRD	Geothermal Gradient	0.01	DF/F
GRSE	Generalized Mud Resistivity Selection	CHART_GEN_9	
GTSE	Generalized Temperature Selection	LINEAR_ESTIMATE	
ISSBAR	Barite Mud Switch	NOBARITE	

MATR	Rock Matrix for Neutron Porosity Corrections	SANDSTONE	
PBPO	PBMS Tool position on CAN	2	
PCCG	PBMS CCL Gain	DB0	
PSTP	PSTC Tool Position on CAN Bus	1	
SHT	Surface Hole Temperature	68	DEGF
System and Miscellaneous			
ALTDCHAN	Name of alternate depth channel	SpeedCorrectedDepth	
BS	Bit Size	8.750	IN
BSAL	Borehole Salinity	-50000.00	PPM
CSIZ	Current Casing Size	4.500	IN
CWEI	Casing Weight	11.60	LB/F
DFD	Drilling Fluid Density	8.40	LB/G
DO	Depth Offset for Playback	3.0	FT
DORL	Depth Offset for Repeat Analysis	0.0	FT
FLEV	Fluid Level	70.00	FT
MST	Mud Sample Temperature	-50000.00	DEGF
PBVSADP	Use alternate depth channel for playback	NO	
PP	Playback Processing	RECOMPUTE	
RMFS	Resistivity of Mud Filtrate Sample	-50000.0000	OHMM
RW	Resistivity of Connate Water	1.0000	OHMM
TD	Total Depth	6869	FT
TDD	Total Depth - Driller	6935.00	FT
TDL	Total Depth - Logger	6869.00	FT
TWS	Temperature of Connate Water Sample	100.00	DEGF

Format: RST_SIGMA_S5_REP Vertical Scale: 5" per 100' Graphics File Created: 18-Dec-2013 04:51

OP System Version: 19C0-187

RST-C 19C0-187 PSPT 19C0-187

Input DLIS Files

DEFAULT	RST_PSP_048LUP	FN:47	PRODUCER	18-Dec-2013 03:11	4850.0 FT	4578.5 FT
DEFAULT	RST_PSP_052PUP	FN:51	PRODUCER	18-Dec-2013 04:48	6880.0 FT	1931.5 FT

Output DLIS Files

DEFAULT	RST_PSP_053PUP	FN:52	PRODUCER	18-Dec-2013 04:51
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Schlumberger

PBMS COEFFICIENTS

MAXIS Field Log

Client: ENCANA OIL & GAS (USA) INC
Field: PARACHUTE
Well: FEDERAL 31-2C (PF31)
Run date: 18-Dec-2013

Tool: PSP
Sub Type: PBMS
Sensor: GR

PBMS Gamma Ray

Sonde Serial NB

Sensor Serial NB

Calib Date ddmmyy

Matrix Size

Coeff CRC

GR HV Rf

RESISTORS FOR GR SENSOR N.33223, TOOL PBMS-BA0928. SENSOR S/N:

33223

090800

12

CFE2

Rt**0

Rt**1

Rt**0

+.182000000000e+04

+.332000000000e+04

PBMS RTD Well Thermometer

Sonde Serial NB

Sensor Serial NB

Calib Date ddmmyy

Matrix Size

Coeff CRC

COEFFICIENTS FOR RTD THERMOMETER PBMS-B.928 S/N:

928

280612

16

A24E

WTemp Coeff

Tt**0

Tt**1

Tt**2

Tt**0

-.391987973189E+03

+.191346892512E+03

-.440920753451E+02

Tt**3

Tt**4

Tt**5

Tt**0

+.957191300908E+01

-.711421725686E+00

0.0

Client: ENCANA OIL & GAS (USA) INC

Field: PARACHUTE

Well: FEDERAL 31-2C (PF31)

Run date: 18-Dec-2013

Tool:

Sub Type:

Sensor:

PSP

PBMS

CQG

PBMS Quartz Gauge type F

Sonde Serial NB
 Sensor Serial NB
 Calib Date ddmmyy
 Matrix Size
 Coeff CRC

COEFFICIENTS FOR CQG PBMS-B.928 S/N:
 928
 280612
 66
 9DC3

Pres Coeff

	Fb**0	Fb**1	Fb**2
Fc**0	+714463802232E+04	+183434658655E-01	-.156620073569E-06
Fc**1	-.100638308957E+01	-.119899563644E-04	-.912155899025E-10
Fc**2	+936268101283E-06	+423898071451E-10	+958076371919E-15
Fc**3	+185123362373E-11	+203107925433E-15	0.0
Fc**4	0.0	0.0	0.0
Fc**5	0.0	0.0	0.0

	Fb**3	Fb**4	Fb**5
Fc**0	-.746577997611E-10	-.588773826860E-15	-.622250441458E-19
Fc**1	-.120636521092E-15	+400325894750E-19	0.0
Fc**2	0.0	0.0	0.0
Fc**3	0.0	0.0	0.0
Fc**4	0.0	0.0	0.0
Fc**5	0.0	0.0	0.0

PBMS Quartz Gauge type F

Sonde Serial NB :
 Sensor Serial NB 928
 Calib Date ddmmyy 280612
 Matrix Size 66
 Coeff CRC 283B

Temp Coeff

	Fc**0	Fc**1	Fc**2
Fb**0	+117016867873E+03	-.284359629614E-03	+604391180345E-08
Fb**1	-.598309140812E-02	+182731130848E-07	+160166486172E-12
Fb**2	-.307621454576E-07	+300601550309E-12	+311233548560E-17
Fb**3	-.419658736767E-12	+117473708647E-16	0.0
Fb**4	0.0	0.0	0.0
Fb**5	0.0	0.0	0.0

	Fc**3	Fc**4	Fc**5
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Fb**0	+.114322792679E-12	+.153807711176E-17	-.736714260866E-21
Fb**1	-.528037875456E-18	-.220337637519E-21	0.0
Fb**2	0.0	0.0	0.0
Fb**3	0.0	0.0	0.0
Fb**4	0.0	0.0	0.0
Fb**5	0.0	0.0	0.0

PBMS Quartz Gauge type F

Sonde Serial NB :
Sensor Serial NB 928
Calib Date ddmmyy 280612
Matrix Size 16
Coeff CRC 093F

Clock Freq Coeff

	(Fb'-Fc')**0	(Fb'-Fc')**1	(Fb'-Fc')**2
(Fb'-Fc')**0	+.310874009898E+05	+.288920923041E-02	+.697940727038E-06
	(Fb'-Fc')**3	(Fb'-Fc')**4	(Fb'-Fc')**5
(Fb'-Fc')**0	-.657432344763E-10	-.412920638782E-15	+.213369826099E-20

PBMS Quartz Gauge type F

Sonde Serial NB :
Sensor Serial NB 928
Calib Date ddmmyy 280612
Matrix Size 16
Coeff CRC 8419

Clock Temp Coeff

	(Fb'-Fc')**0	(Fb'-Fc')**1	(Fb'-Fc')**2
(Fb'-Fc')**0	+.115369519827E+03	-.565338877075E-02	-.333717531829E-07
	(Fb'-Fc')**3	(Fb'-Fc')**4	(Fb'-Fc')**5
(Fb'-Fc')**0	-.124387135327E-12	+.713102327208E-16	-.316084316842E-20

Company: ENCANA OIL & GAS (USA) INC



Well: FEDERAL 31-2C (PF31)
Field: PARACHUTE
County: GARFIELD

State: **COLORADO**

RESERVOIR SATURATION LOG

SIGMA MODE

GR-CCL