

Company: Esso Australia Pty Ltd.

Well: A21a  
Field: Cobia  
Rig: Prod4 / Crane  
Country: Australia

RST-C Sigma Survey

Rig: Prod4 / Crane	
Field: Cobia	
Location: Gippsland	
Well: A21a	
Company: Esso Australia Pty Ltd.	
LOCATION	
Gippsland Basin Bass Strait	Elev.: K.B. 40.99 m G.L. -79.00 m D.F. 40.99 m
Permanent Datum: _____ Log Measured From: _____ Drilling Measured From: _____	M.S.L. _____ D.F. _____ D.F. _____ Elev.: 0.00 m 40.99 m above Perm. Datum
State: Victoria	Max. Well Deviation 60.18 deg Longitude 148 18'28.6"E Latitude 038 27'03.1"S

Logging Date	6-Jun-2009		
Run Number	1		
Depth Driller	3923 m		
Schlumberger Depth	3835 m		
Bottom Log Interval	3835 m		
Top Log Interval	3660 m		
Casing Fluid Type	Production Fluids		
Salinity			
Density			
Fluid Level	0 m		
BIT/CASING/TUBING STRING			
Bit Size	9.875 in		
From	664 m		
To	3904 m		
Casing/Tubing Size	7.000 in		
Weight	26 lbm/ft		
Grade	L-80		
From	21.44 m		
To	3818.8 m		
Maximum Recorded Temperatures	226 degF		
Logger On Bottom	6-Jun-2009	12:00	
Unit Number	889	Prod4 / Ausl	
Recorded By	B.Donahoe.		
Witnessed By	J.Digiovanni		

	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	60.18 deg		
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			
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			
Recorded By			
Witnessed By			

## DEPTH SUMMARY LISTING

Date Created: 6-JUN-2009 16:07:24

## Depth System Equipment

Depth Measuring Device		Tension Device		Logging Cable	
Type:	IDW-EB	Type:	PSDS/OSDS	Type:	2-32ZT
Serial Number:	6373	Serial Number:	325357	Serial Number:	207308
Calibration Date:	2-Dec-2008	Calibration Date:	5-May-2009	Length:	6180 M
Calibrator Serial Number:	30	Calibrator Serial Number:	1174		
Calibration Cable Type:	2-23ZT	Number of Calibration Points:	0	Conveyance Method:	Wireline
Wheel Correction 1:	-1			Rig Type:	LAND
Wheel Correction 2:	-2				

## Depth Control Parameters

Log Sequence:	Subsequent Log In the Well
Reference Log Name:	CBA A-21A Log
Reference Log Run Number:	
Reference Log Date:	26-Mar-2009

### Depth Control Remarks

1. IDW used as primary depth control.
2. Z-chart used as secondary backup
3. Log Correlated on depth over Zone of interest
4. CMTD Calibration:  $A=8.95E-6$ ,  $B=0.8647$ ,  $C=-82.7$
- 5.
- 6.

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OTHER SERVICES1	OTHER SERVICES2
OS1:   None	OS1:
OS2:	OS2:
OS3:	OS3:
OS4:	OS4:
OS5:	OS5:

REMARKS: RUN NUMBER 1

REMARKS: RUN NUMBER 2

Log correlated to ExxonMobil composite supplied with logging program.

Maximum well deviation = 60.18deg @ 3685m MDKB.

Objectives: RST-C Sigma log with one static pass over the interval 3835m to 3660m MDKB

at 900 ft/hr. Flow the well until stable (3 to 4 hours) then complete flowing pass over the same

interval 3835m to 3660m MDKB.

RST Survey: 3835m MDKB SBHP: 3266 psia SBHT: 225.6 degf

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Nathan Simmons, Andrew McLellan

[illegible]

WITM-A  
PSC\_16MHZ

AH-SWBS-B 789  
AH-SWBS-B 789

13.30

AH-SWBS-B 788  
AH-SWBS-B 788

12.61

AH-SWBS-B 787  
AH-SWBS-B 787

11.93

AH-SWBS-B 786  
AH-SWBS-B 786

11.24

AH-SWBS-B 785  
AH-SWBS-B 785

10.55

MH-SWHS-A 759  
MH-SWHS-A 759

Detail MT  
TelStatus  
CTEM

9.87

9.54

PSPT-B  
PSC-A 3918  
PSPT-B 827  
PSTC 806  
PBMS-B 827  
CQG\_F\_Mano 827  
RTD Thermometer 827  
GR 827  
CCL 827  
PBMS 827

GR

8.41

Well\_Temp  
CQG Manom  
CCL  
PBMS PSTC

7.48

7.37

7.25  
7.00

7.02

RST-C BLK-2

RSCH-A 111  
RSC-C 132  
RSS-A 106  
RSXH-A 145  
RSX-C 132

7.02

RSC-A Far  
RSC-A PNG  
RSC-A Nea  
RSX-A PNG

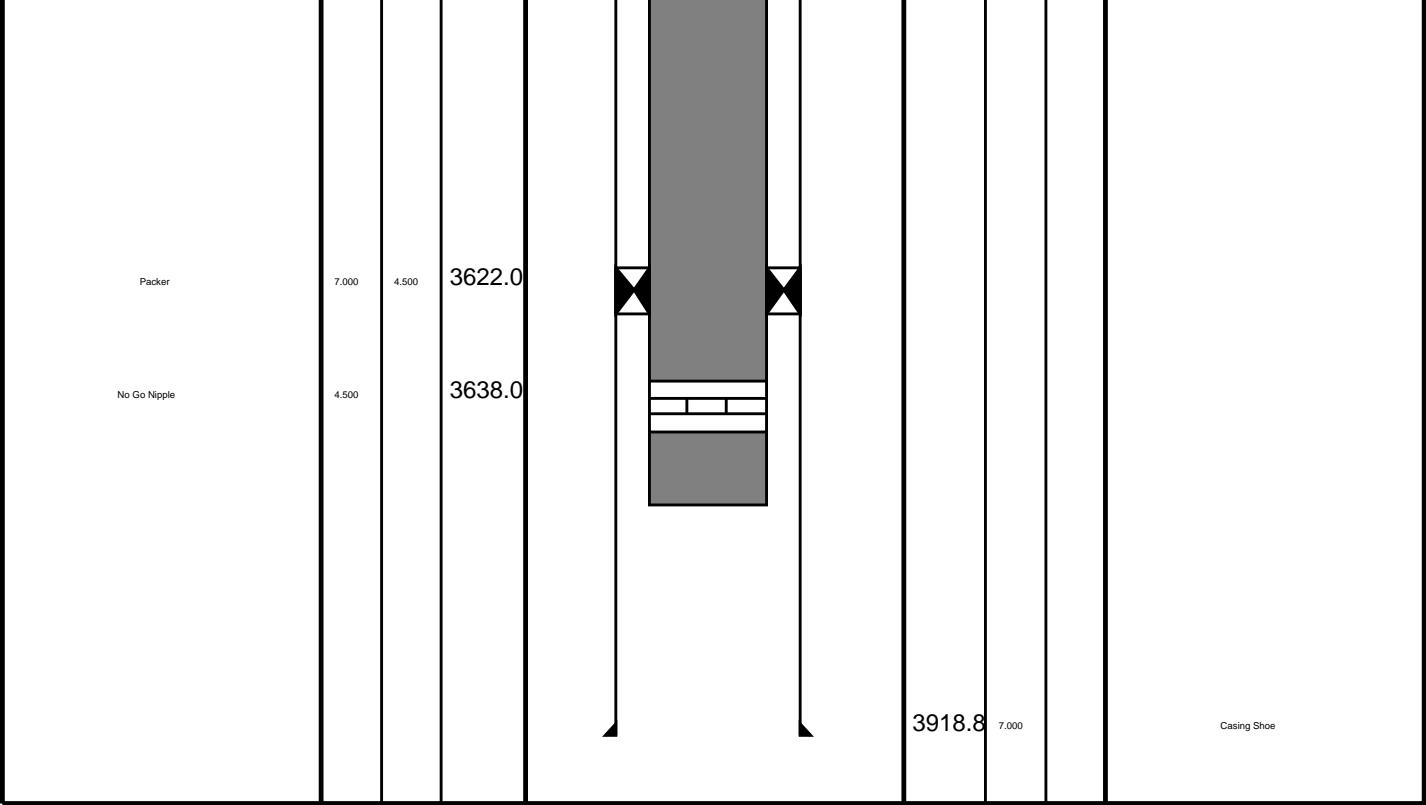
4.24

4.09

Tension HV 0.00  
TOOL ZERO

MAXIMUM STRING DIAMETER 1.72 IN  
MEASUREMENTS RELATIVE TO TOOL ZERO  
ALL LENGTHS IN METERS

Production String	(in)		(m)	Well Schematic	(m)		(in)	Casing String
	OD	ID	MD		MD	OD	ID	
Tubing	4.500		20.7		21.3 <del>21.3</del>	7.000 10.750	Casing String Casing String	
SSSV	4.500		448.3		637.7	10.750		Casing Shoe
Side Pocket Mandrel	4.500		958.2					
Side pocket Mandrel	4.500		1409.5					
Landing Nipple								



Job Event Summary

MAXIS Field Log

Schlumberger Job Event Summary						
		Time	Elapsed Time	Depth (M)		File
Log	Pass (up)	6-Jun-2009 12:16	000:14	3848.4	- 3637.3	RST_PSP_017LUP
Log	Pass (up)	6-Jun-2009 12:43	000:42	3840.2	- 3643.3	RST_PSP_019LUP
Log	Pass (up)	6-Jun-2009 14:54	000:44	3844.9	- 3639.2	RST_PSP_021LUP

Company: Esso Australia Pty Ltd.

Well: A21a

Output DLIS Files

DEFAULT

RST\_PSP\_021LUP

FN:20

PRODUCER

06-Jun-2009 14:54

3844.9 M

3639.2 M

OP System Version: 16C0-147  
MCM

RST-C

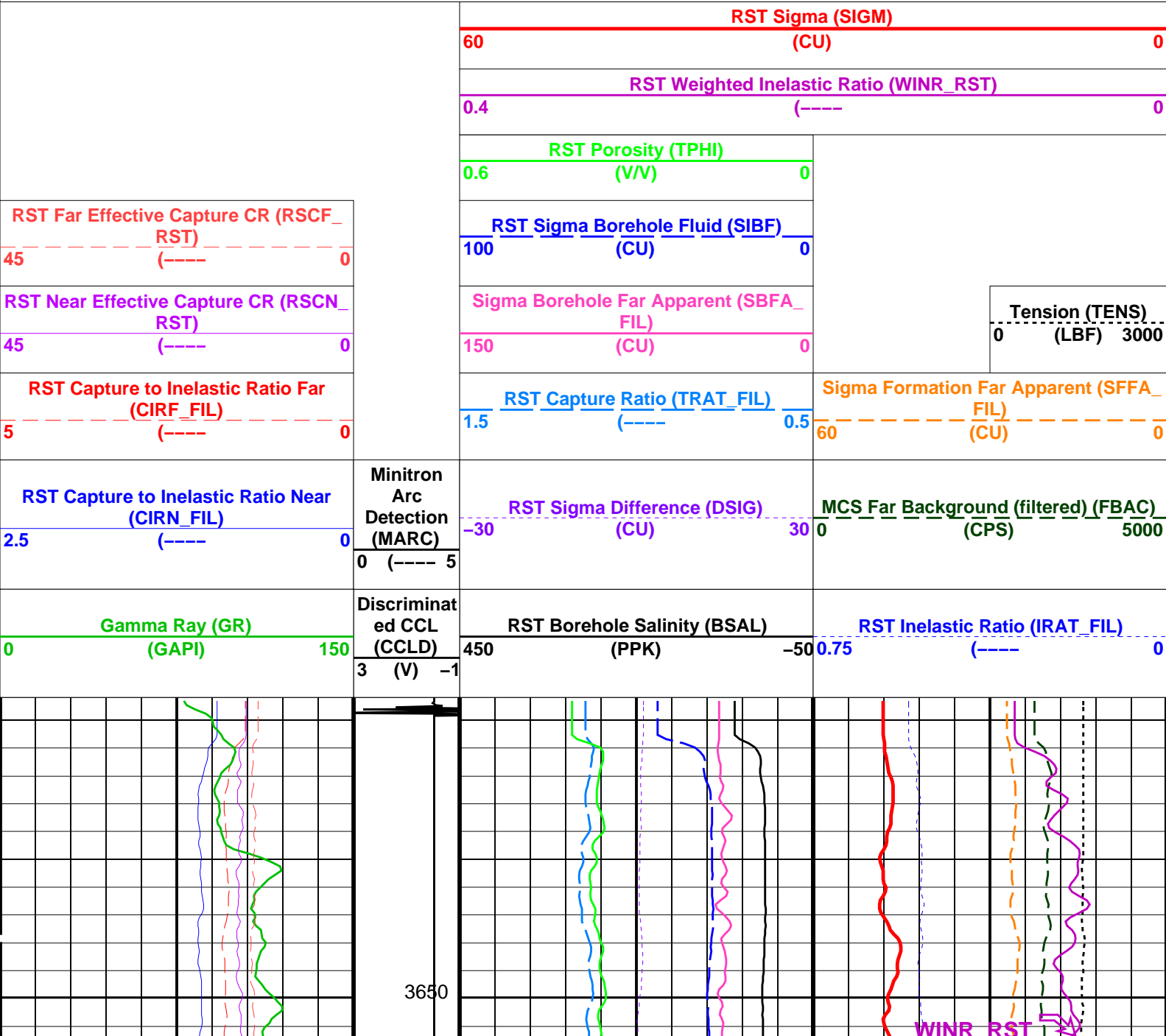
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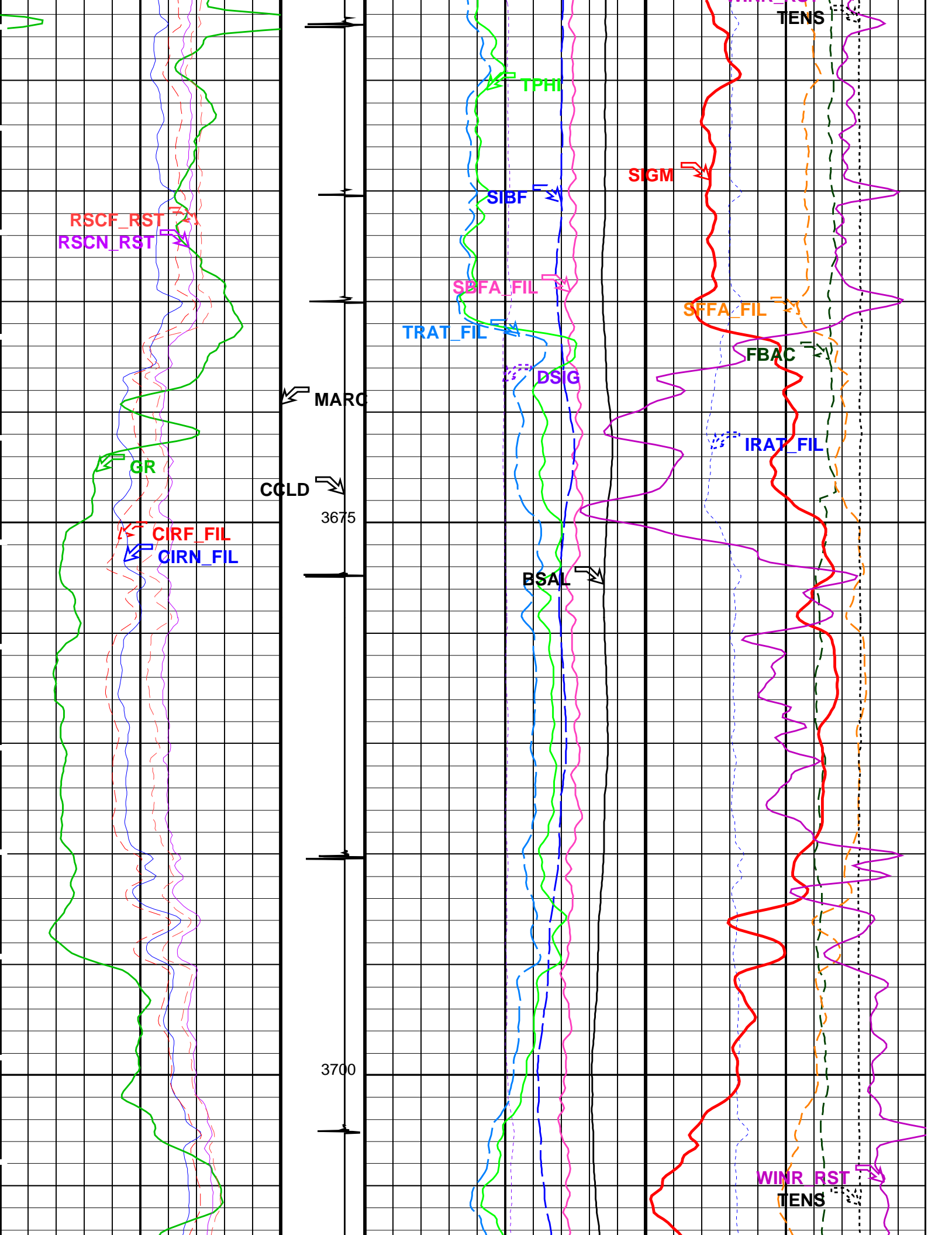
PSPT-B

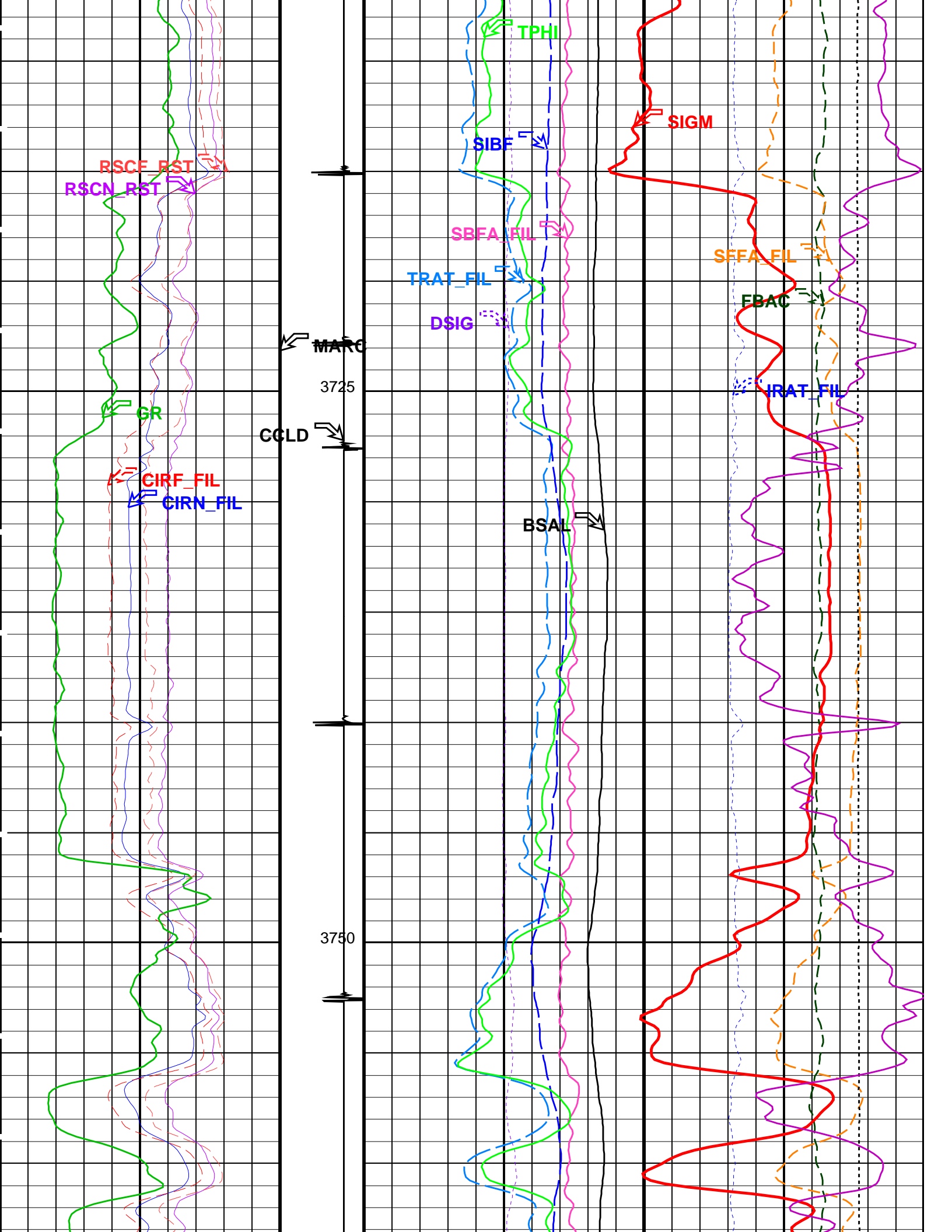
SRPC-3777-Q4\_2008\_OP16

PIP SUMMARY

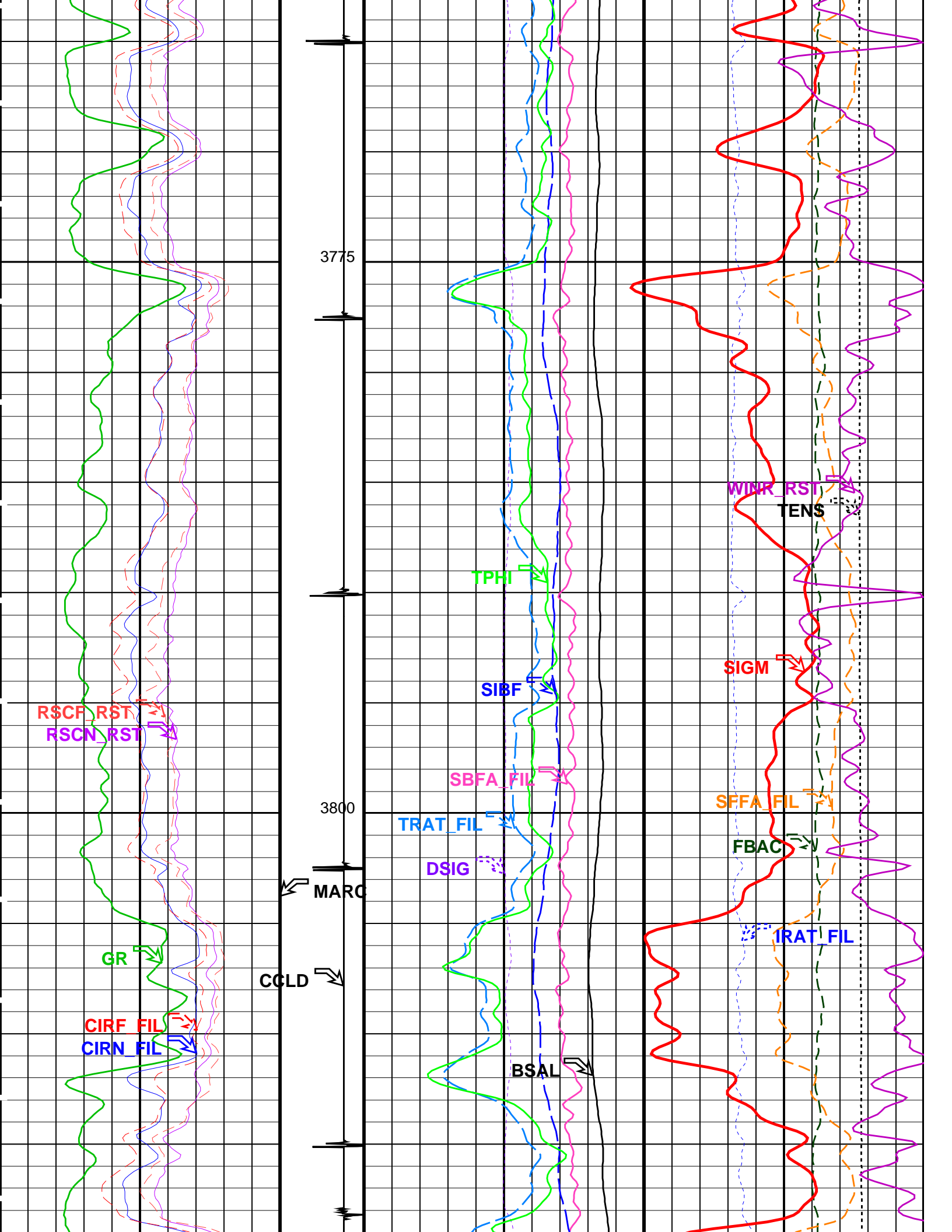
Time Mark Every 60 S

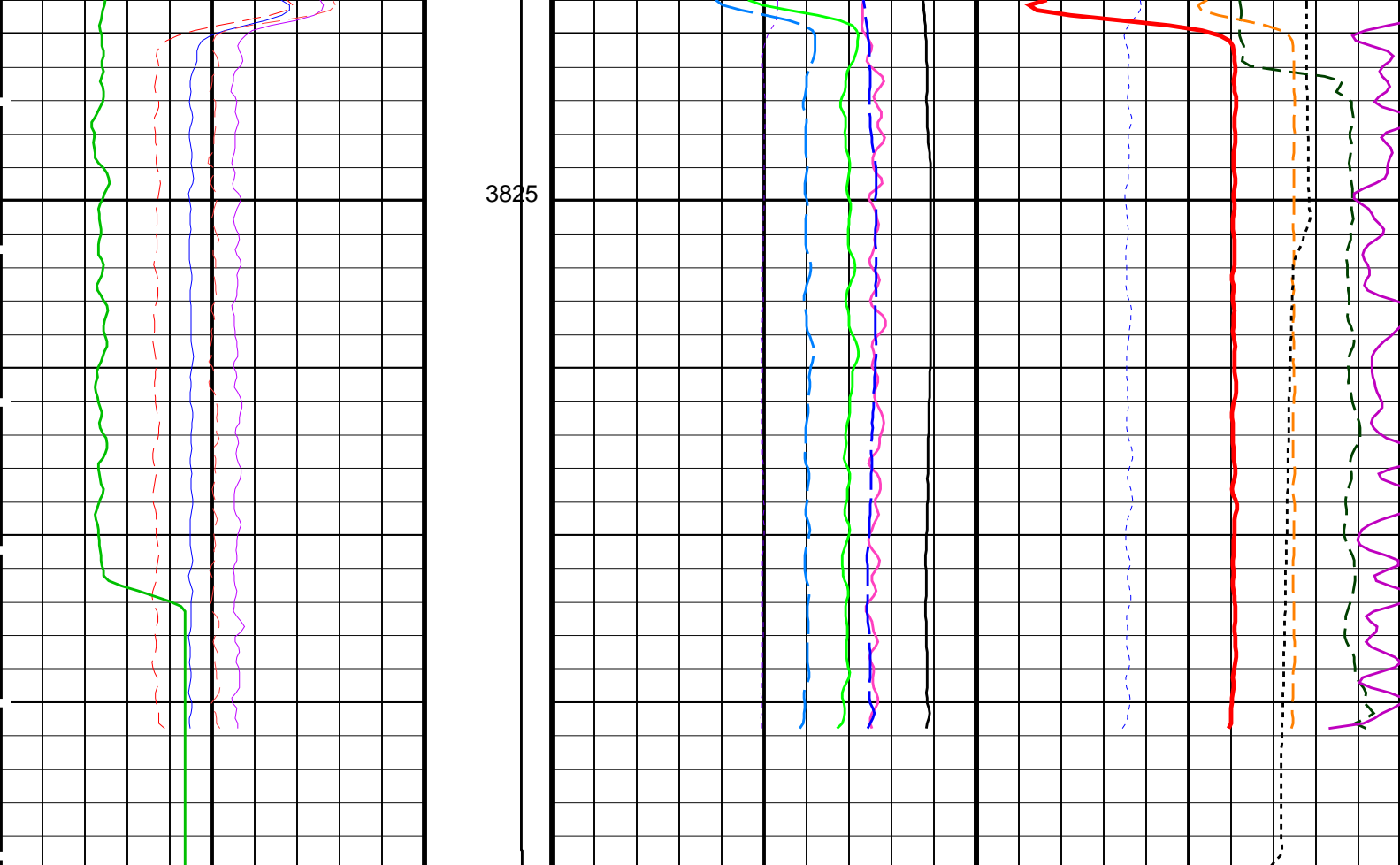












Gamma Ray (GR) (GAPI)		Discriminat ed CCL (CCLD) 3 (V) -1	RST Borehole Salinity (BSAL) (PPK)		RST Inelastic Ratio (IRAT_FIL) (----	
0	150		450	-50	0.75	0
RST Capture to Inelastic Ratio Near (CIRN_FIL) (----		Minitron Arc Detection (MARC) 0 (---- 5	RST Sigma Difference (DSIG) (CU)		MCS Far Background (filtered) (FBAC) (CPS)	
2.5	0		-30	30	0	5000
RST Capture to Inelastic Ratio Far (CIRF_FIL) (----			RST Capture Ratio (TRAT_FIL) (----		Sigma Formation Far Apparent (SFFA_ FIL) (CU)	
5	0		1.5	0.5	60	0
RST Near Effective Capture CR (RSCN_ RST) (----			Sigma Borehole Far Apparent (SBFA_ FIL) (CU)		Tension (TENS) (LBF)	
45	0		150	0		
RST Far Effective Capture CR (RSCF_ RST) (----			RST Sigma Borehole Fluid (SIBF) (CU)			
45	0		100	0		
			RST Porosity (TPHI) (V/V)			
			0.6		0	
			RST Weighted Inelastic Ratio (WINR_RST) (----			
			0.4			
			RST Sigma (SIGM) (CU)			
			60			

PIP SUMMARY

Time Mark Every 60 S


Parameters		
DLIS Name	Description	Value

DLIS Name	Description	Value
RST-C: Reservoir Saturation Pro Tool C		
AIRB	RST Air Borehole	No
BHS	Borehole Status	CASED
BSALOPT	RST Borehole Salinity Option	Unknown
BSFL	RST Borehole Salinity Filter Length	51
DFPC	RST Depth Filter Processing Constant	One
DFPC_TDTL	RST Depth Filter Processing Constant (TDT-like)	Two
MATR	Rock Matrix for Neutron Porosity Corrections	SANDSTONE
NORM_IRAT_RST	RST Normalized Inelastic Ratio	0.48
NORM_SIGM_RST	RST Normalized Sigma	30
RGAI	Near/Far Gain Calibration Ratio	1
TIER_SIGM	RST Sigma Acquisition Mode	0_RST_Sigma
PSPT-B: Production Services Logging Platform		
BHS	Borehole Status	CASED
MATR	Rock Matrix for Neutron Porosity Corrections	SANDSTONE
System and Miscellaneous		
BS	Bit Size	9.875 IN
BSAL	Borehole Salinity	-50000.00 PPM
CSIZ	Current Casing Size	7.000 IN

Format: RST\_SIG\_ANSW
Vertical Scale: 1:200
Graphics File Created: 06-Jun-2009 14:54

OP System Version: 16C0-147			
MCM			
RST-C	SRPC-3777-Q4_2008_OP16	PSPT-B	SRPC-3777-Q4_2008_OP16

Output DLIS Files			
DEFAULT	RST_PSP_021LUP	FN:20	PRODUCER 06-Jun-2009 14:54



Sigma Pass Static

MAXIS Field Log

Company: Esso Australia Pty Ltd.
Well: A21a

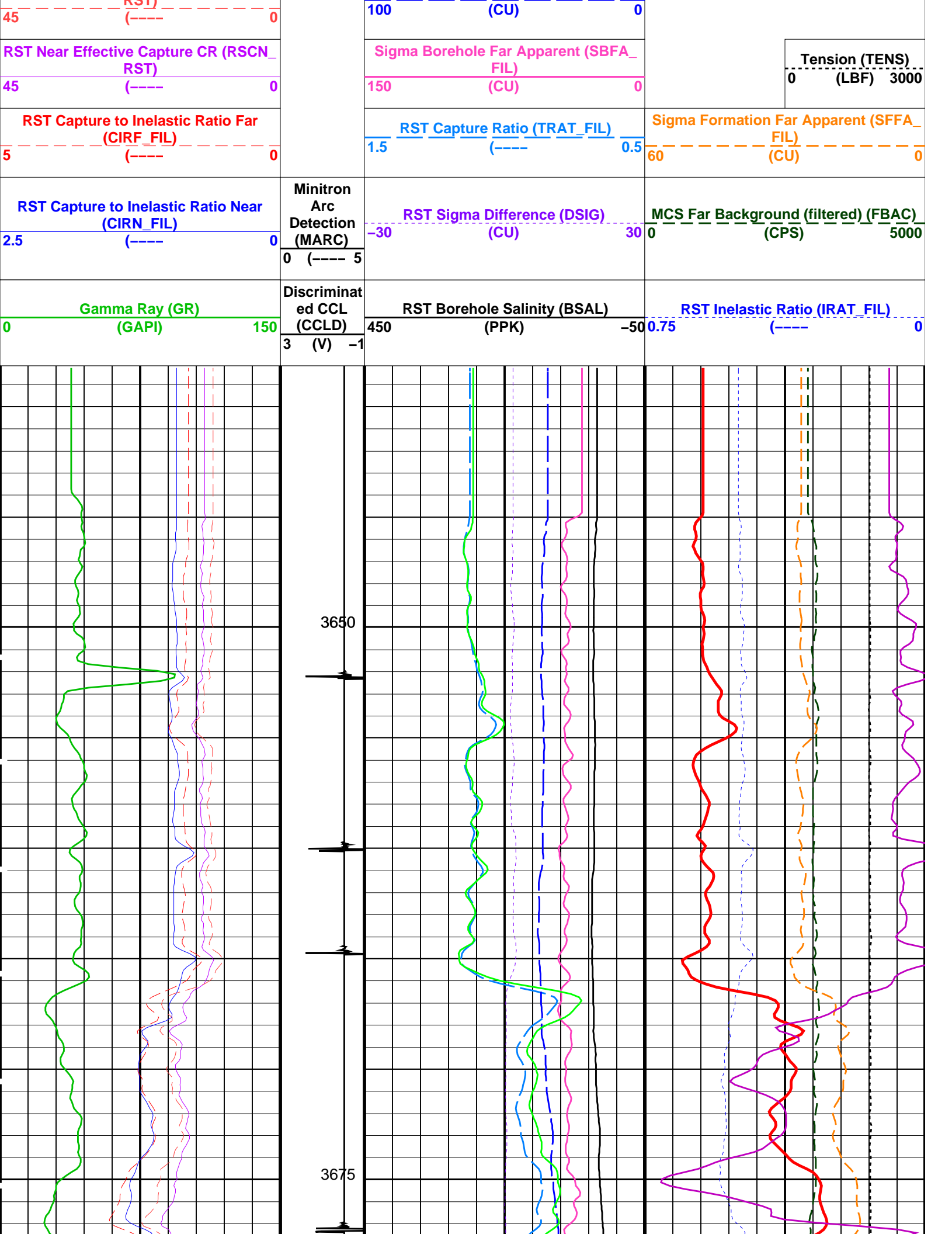
Input DLIS Files					
DEFAULT	RST_PSP_019LUP	FN:18	PRODUCER	06-Jun-2009 12:43	3840.2 M 3643.3 M
Output DLIS Files					
DEFAULT	RST_PSP_020PUP	FN:19	PRODUCER	06-Jun-2009 13:30	3840.5 M 3638.1 M

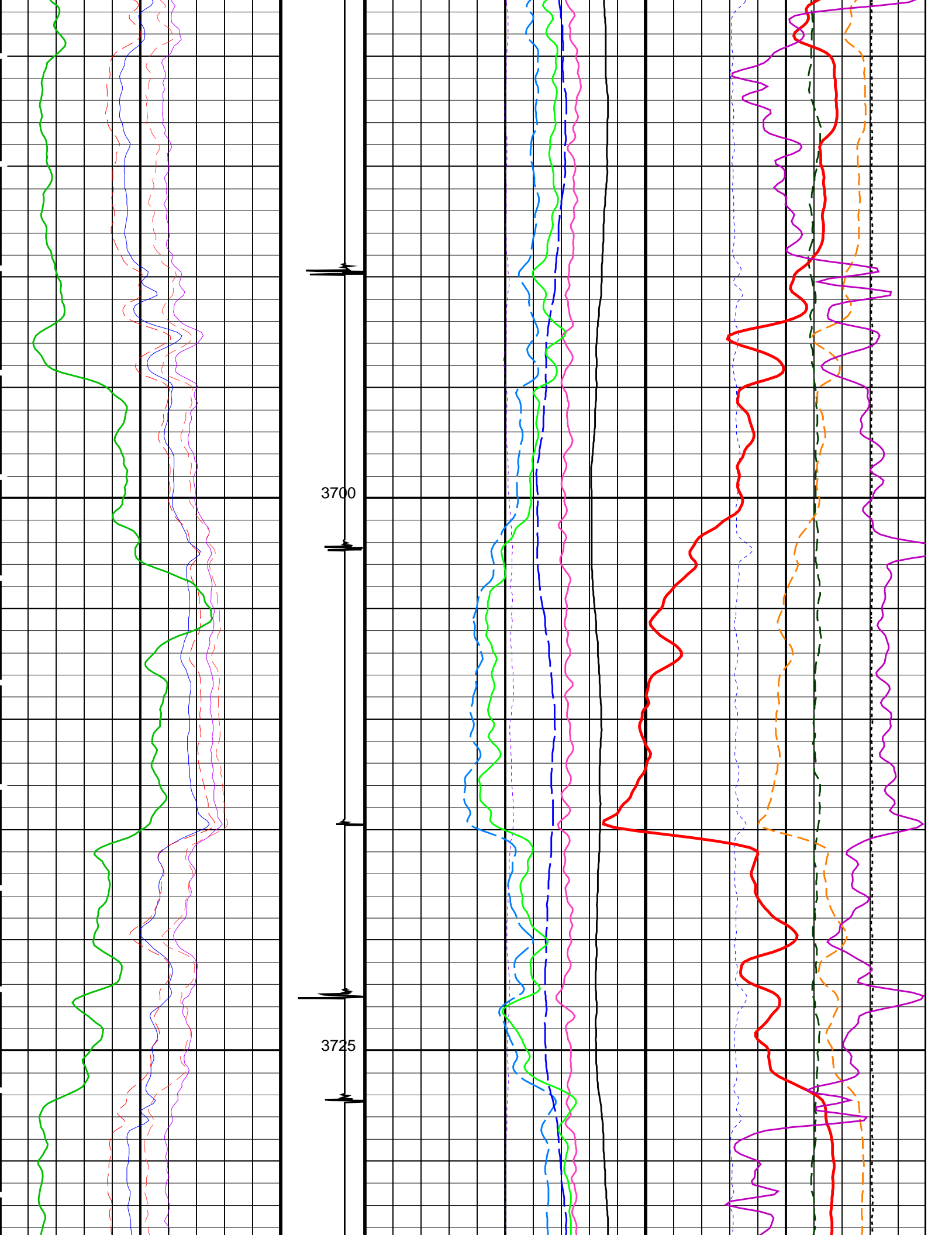
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MCM			
RST-C	SRPC-3777-Q4_2008_OP16	PSPT-B	SRPC-3777-Q4_2008_OP16

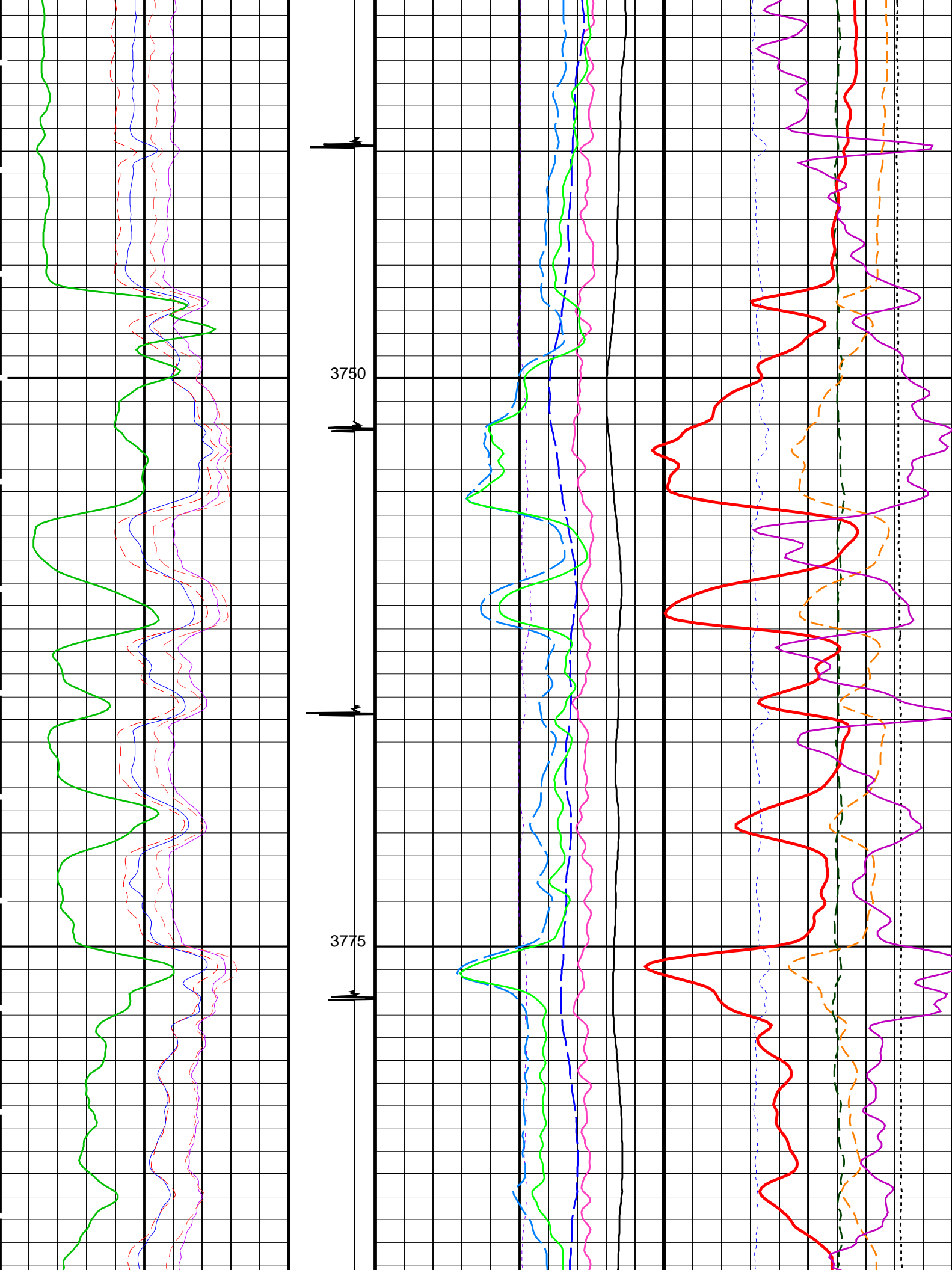
PIP SUMMARY

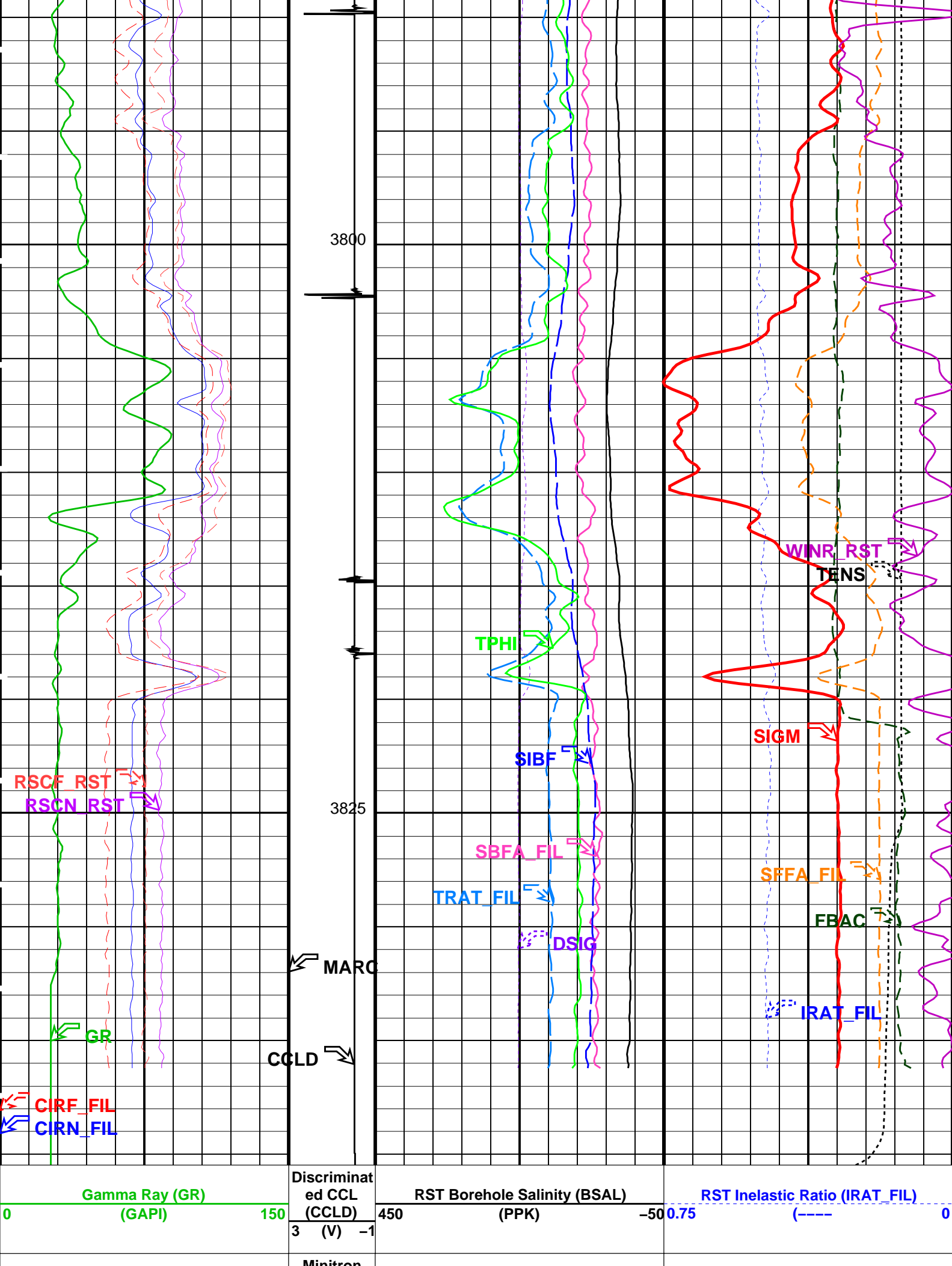
Time Mark Every 60 S

	RST Sigma (SIGM)	
	60	(CU) 0
	RST Weighted Inelastic Ratio (WINR_RST)	
	0.4	(----) 0
	RST Porosity (TPHI)	
RST Far Effective Capture CR (RSCF_RST)	0.6	(V/V) 0
	RST Sigma Borehole Fluid (SIBF)	









RST Capture to Inelastic Ratio Near (CIRN_FIL)	Arc Detection (MARC)	RST Sigma Difference (DSIG)	MCS Far Background (filtered) (FBAC)
2.5 (-----) 0	0 (----- 5	-30 (CU) 30	0 (CPS) 5000
RST Capture to Inelastic Ratio Far (CIRF_FIL)		RST Capture Ratio (TRAT_FIL)	Sigma Formation Far Apparent (SFFA_FIL)
5 (-----) 0		1.5 (-----) 0.5	60 (CU) 0
RST Near Effective Capture CR (RSCN_RST)		Sigma Borehole Far Apparent (SBFA_FIL)	Tension (TENS)
45 (-----) 0		150 (CU) 0	0 (LBF) 3000
RST Far Effective Capture CR (RSCF_RST)		RST Sigma Borehole Fluid (SIBF)	
45 (-----) 0		100 (CU) 0	
		RST Porosity (TPHI)	
		0.6 (V/V) 0	
		RST Weighted Inelastic Ratio (WINR_RST)	
		0.4 (-----) 0	
		RST Sigma (SIGM)	
		60 (CU) 0	

PIP SUMMARY

Time Mark Every 60 S

Parameters

DLIS Name	Description	Value
RST-C: Reservoir Saturation Pro Tool C		
AIRB	RST Air Borehole	No
BHS	Borehole Status	CASED
BSALOPT	RST Borehole Salinity Option	Unknown
BSFL	RST Borehole Salinity Filter Length	51
DFPC	RST Depth Filter Processing Constant	One
DFPC_TDTL	RST Depth Filter Processing Constant (TDT-like)	Two
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
RGAI	Near/Far Gain Calibration Ratio	1
TIER_SIGM	RST Sigma Acquisition Mode	0_RST_Sigma
PSPT-B: Production Services Logging Platform		
BHS	Borehole Status	CASED
MATR	Rock Matrix for Neutron Porosity Corrections	SANDSTONE
System and Miscellaneous		
BS	Bit Size	9.875 IN
BSAL	Borehole Salinity	-50000.00 PPM
CSIZ	Current Casing Size	7.000 IN
DO	Depth Offset for Playback	0.3 M
PP	Playback Processing	NORMAL

Format: RST\_SIG\_ANSW    Vertical Scale: 1:200    Graphics File Created: 06-Jun-2009 13:30

OP System Version: 16C0-147

MCM

RST-C      SRPC-3777-Q4\_2008\_OP16      PSPT-B      SRPC-3777-Q4\_2008\_OP16

Input DLIS Files

DEFAULT      RST\_PSP\_019LUP      FN:18    PRODUCER    06-Jun-2009 12:43    3840.2 M    3643.3 M

Output DLIS Files

DEFAULT      RST\_PSP\_020PUP      FN:19    PRODUCER    06-Jun-2009 13:30



## MAXIS Field Log

Company: Esso Australia Pty Ltd.

Well: A21a

## Output DLIS Files

DEFAULT RST\_PSP\_017LUP FN:16 PRODUCER 06-Jun-2009 12:16 3848.4 M 3637.3 M

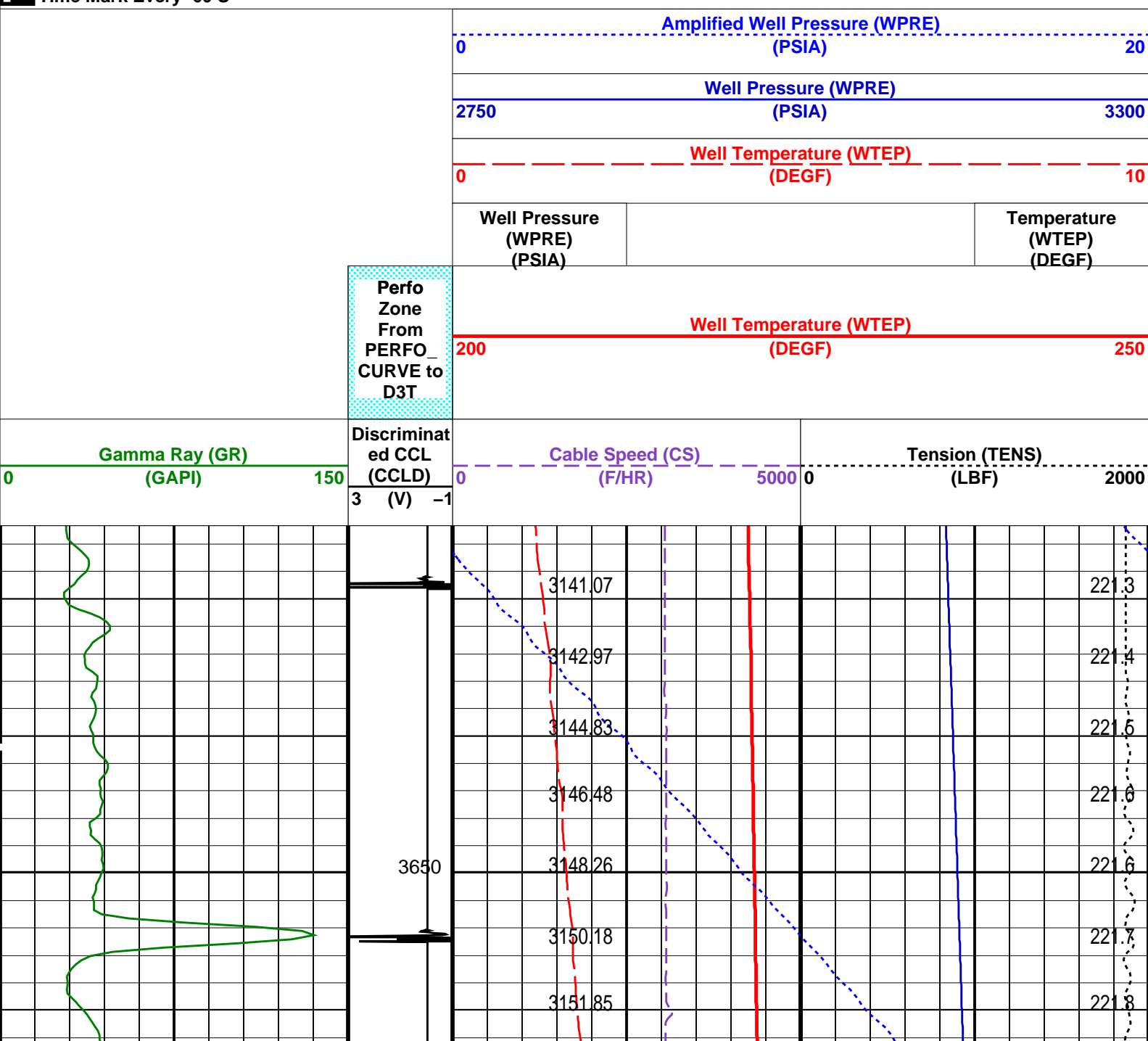
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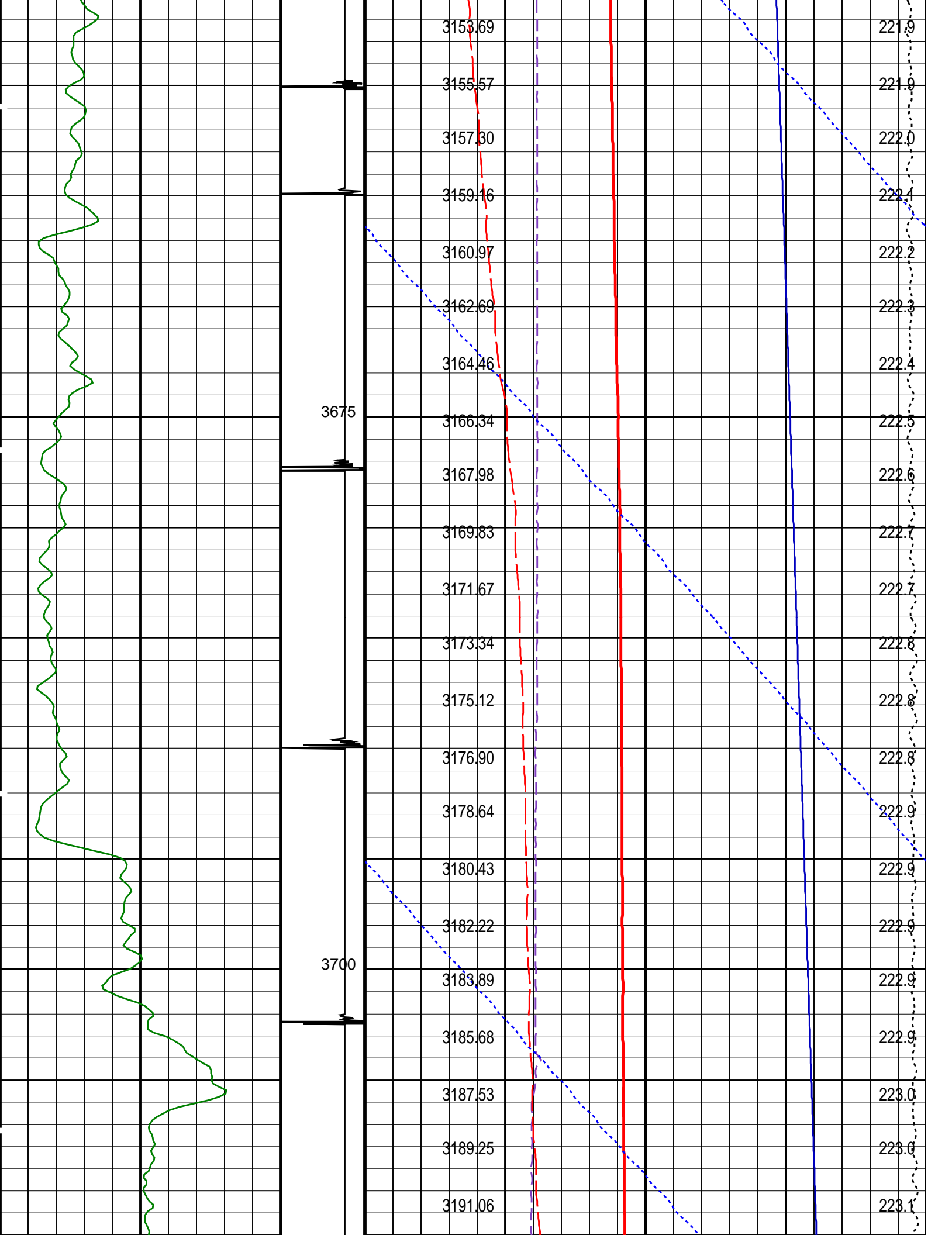
MCM

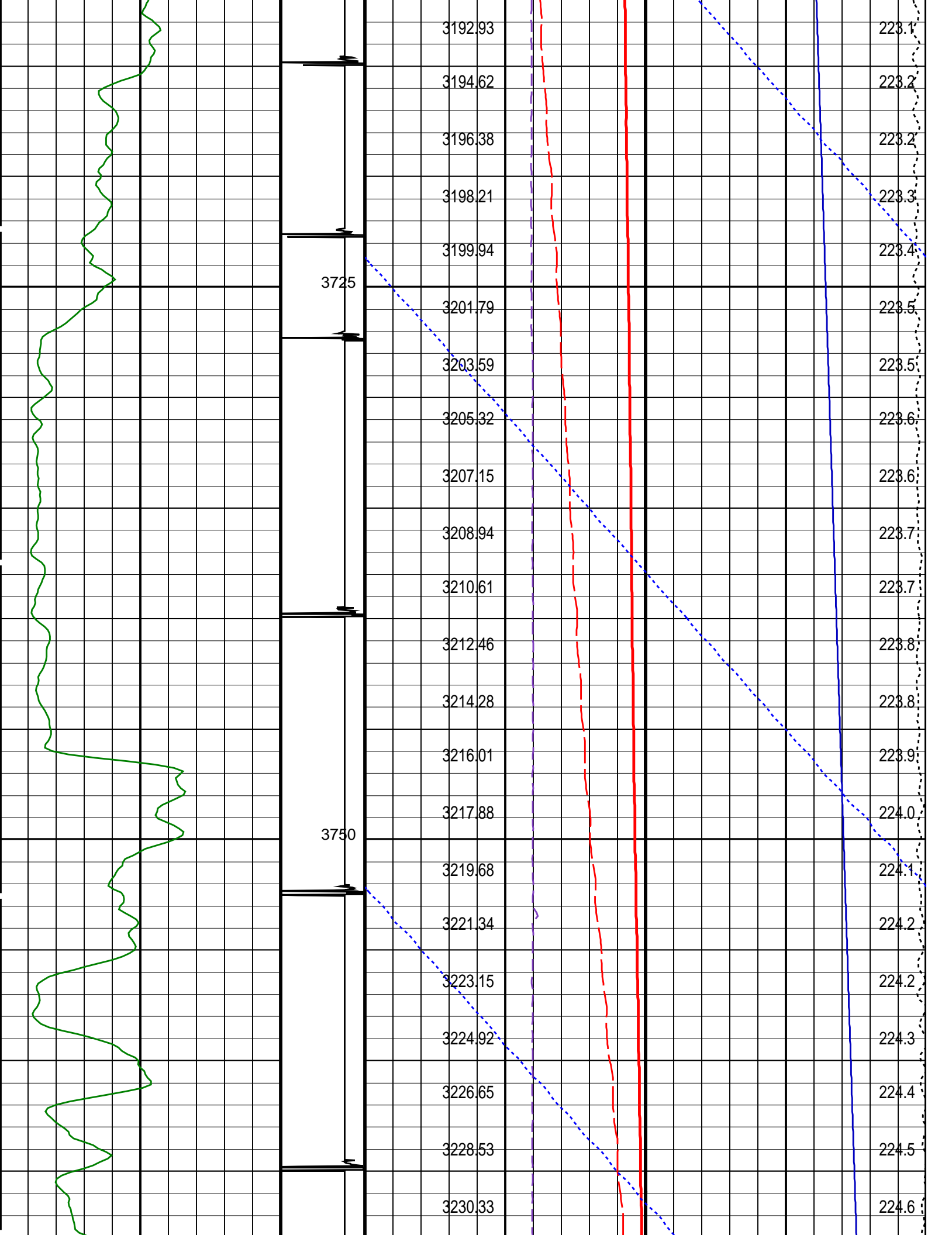
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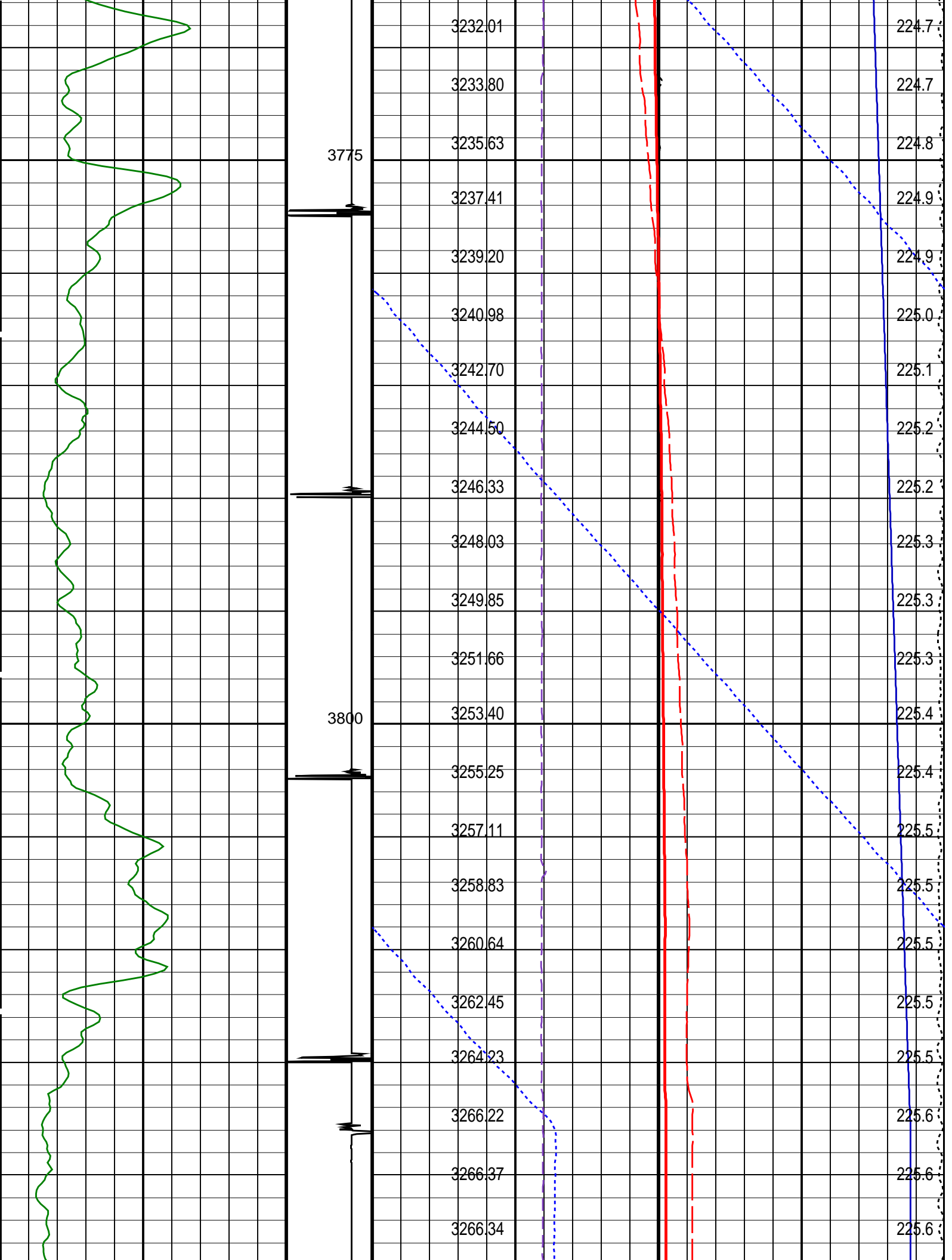
## PIP SUMMARY

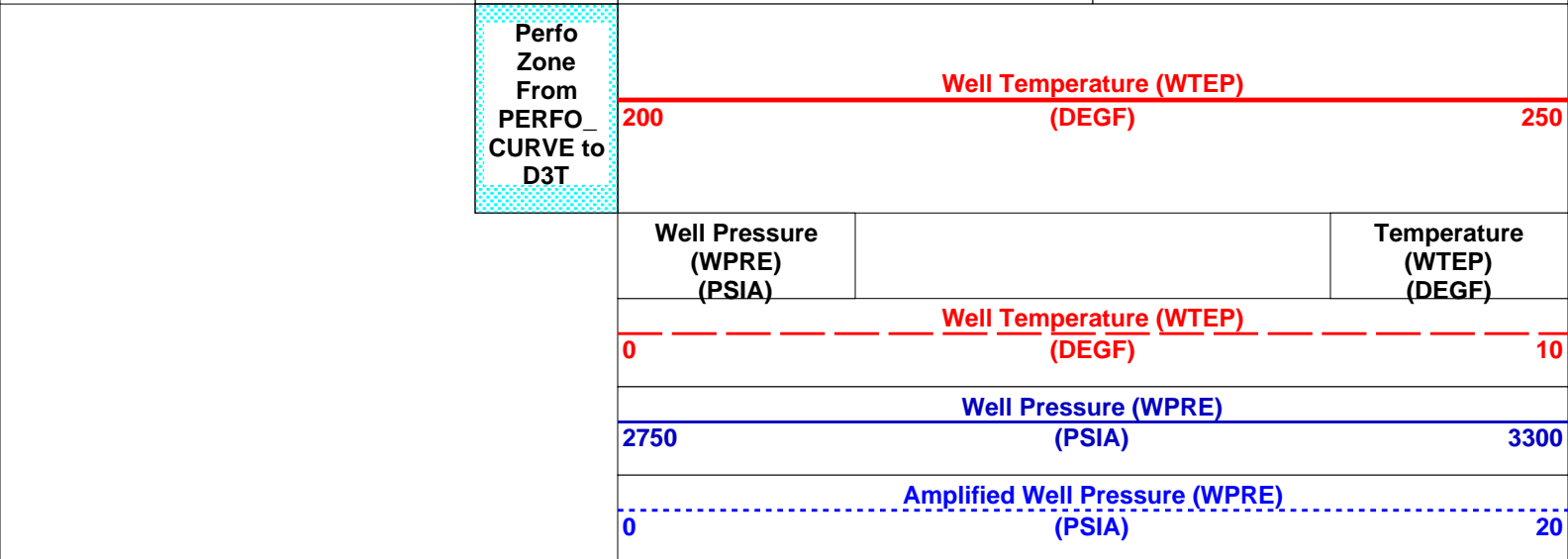
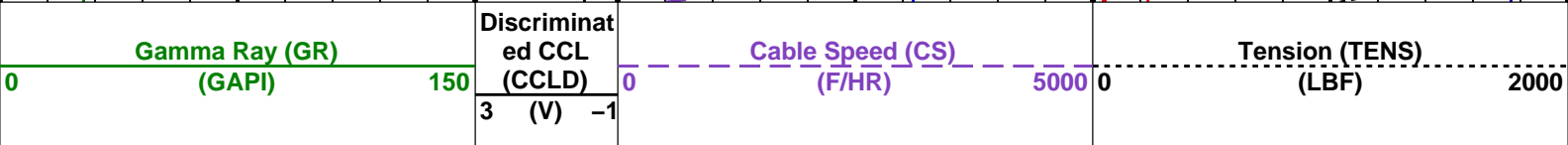
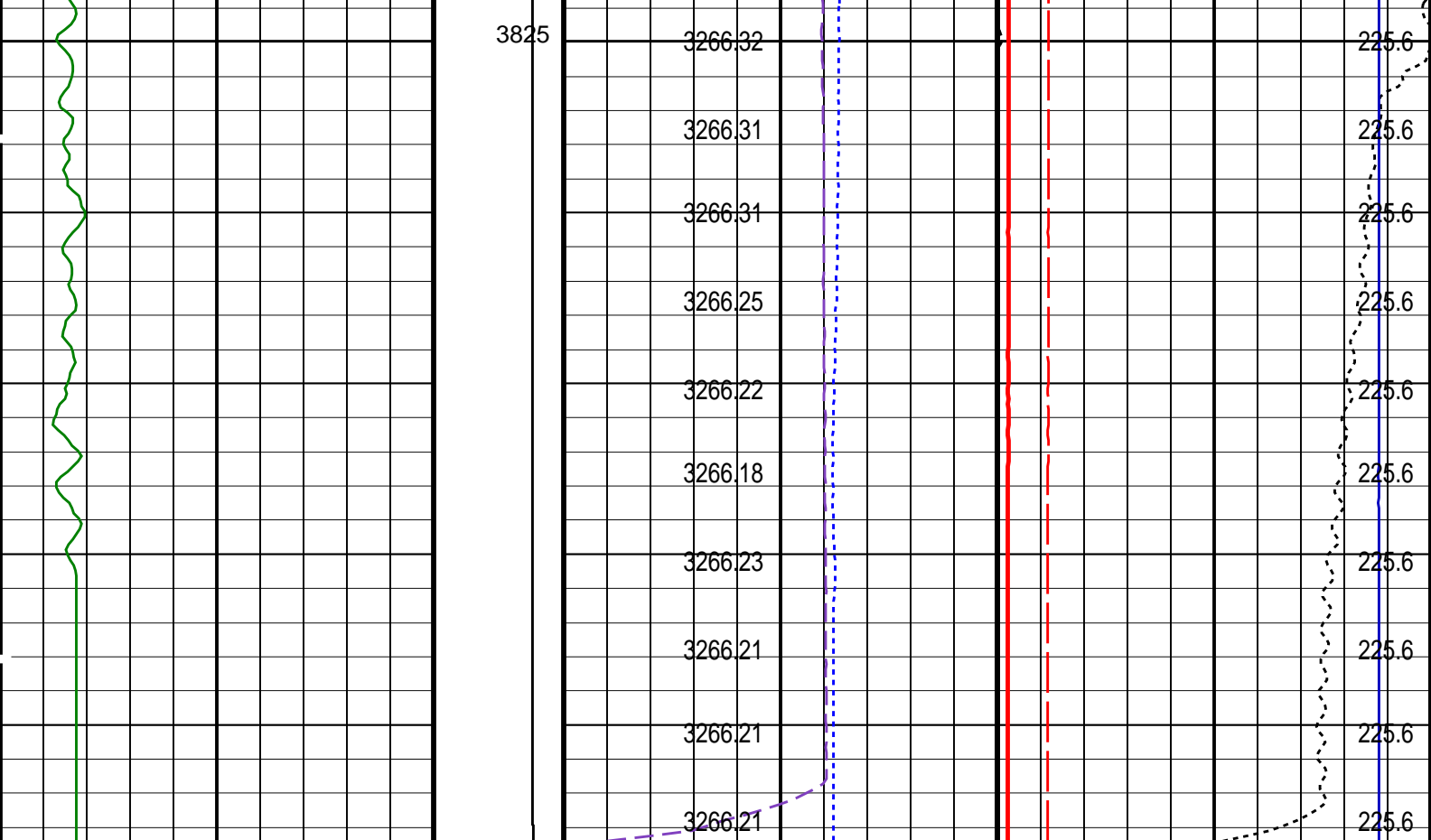
Time Mark Every 60 S











PIP SUMMARY			
Time Mark Every 60 S			
Format: PSP_1_1		Vertical Scale: 1:200	
Graphics File Created: 06-Jun-2009 12:16			
OP System Version: 16C0-147			
MCM			
RST-C	SRPC-3777-Q4_2008_OP16	PSPT-B	SRPC-3777-Q4_2008_OP16
Output DLIS Files			
DEFAULT	RST_PSP_017LUP	FN:16	PRODUCER 06-Jun-2009 12:16

Company: ESSO Australia Pty Ltd.

**Schlumberger**

Well: **A21a**  
Field: **Cobia**  
Rig: **Prod4 / Crane**  
Country: **Australia**

RST-C Sigma Survey