



Company	LINN ENERGY		
Well	CHADD 5 ATU 20		
Field	HUGOTON		
County	STANTON	State	KANSAS
		Country	USA
Location			

Section	<u>16</u>	Township	<u>27S</u>	Range	<u>39W</u>	API Num	<u>1518721238</u>
Permanent Datum	<u>GL</u>			Elevation	<u>3168</u>	K.B.	<u>3175</u>
Log Measured From	<u>KB</u>	<u>, 7</u>		Above Perm Datum		D.F.	<u></u>
Drilling Meas From	<u>KB</u>					G.L.	<u>3168</u>

Max. Rec. Temp.

[illegible]

PLOT TYPE: * CH SHADED LITHOLOGY AND SATURATION EVALUATION *

REMARKS:

Project: 203348
API Number: 1518721238
Company: LINN ENERGY
Well: CHADD 5 ATU 20
Field: HUGOTON
County: STANTON
State: KANSAS
Country: USA
Log Date: SEP 06, 2013 PND

Computed PND-S depth data matches PND-S field print.

Porosity is derived from PND-S capture (Neutron) and inelastic data (Density).

Vsh computed from Cased Hole GR, Neutron, Density-Neutron x-plot, and Sigma.

Lithology was determined by Density-Neutron crossplot.

Sigma Water is based on calibrating the wettest intervals in the well to 100% water saturation. This was calibrated against Water analyses provided by the client and matched closely.

Matrix model = Sand/Lime/Dolomite/Anhydrite/Shale.

** Hydrocarbon Pay Flags **

PHIE >= 0.06
VSH <= 0.40
Sw <= 0.60

APP Jobnum: #5648

CURVE DESCRIPTIONS:

CURVE LEGEND:

GRE = Gamma Ray, Environmentally Corrected.
CCL = Collar Locator
QUAL = Generator Output Quality, from (PND-S) data
CSG1L = 5.5" Casing Flag
CSG1R = 5.5" Casing Flag
RATI = Formation Ratio
SIGC = Formation Sigma, from (PND-S) data
NEAR = Near Detector Counts
FAR = Far Detector Counts

DELI = Inelastic Data Quality Indicator, from (PND-S) Inelastic data
 AIPN = Neutron-Type Porosity, from (PND-S) Capture data
 AIPD = Density-Type Porosity, from (PND-S) Inelastic data
 VSH = Shale Volume
 MIN12 = Sandstone Volume
 MIN23 = Limestone Volume
 MIN34 = Dolomite Volume
 MIN45 = Anhydrite Volume
 PHIE = Effective Porosity
 SWPN = Water Saturation, computed from (PND-S) Capture data
 PAYPN = Hydrocarbon Pay Flag, PND Evaluation
 BVWPN = Bulk Volume Water, computed from (PND-S) Sigma data
 BVWPNI = BVW at Irreducible Water Saturation from CH (PND-S) data
 BVWPNR = BVW at Residual Hydrocarbon Saturation from CH (PND-S) data

PARAMETERS:

** Shale Volume **

Zone	Top-Zone	Bot	GRcl	GRsh	SIGcl	SIGsh	NEUTcl	NEUTsh	RHOBsh	SSP
2199.0	-	2277.9	'	25.0	58.0	20.5	32.0	9.5	22.5	2.51
2278.0	-	2397.9	'	25.0	50.0	13.0	27.5	5.5	17.5	2.55
2398.0	-	2410.4	'	23.0	52.0	12.0	29.5	5.8	18.5	2.54
2410.5	-	2614.9	'	25.0	50.0	13.0	27.5	5.5	17.5	2.55
2615.0	-	3047.9	'	26.0	50.0	14.5	28.5	5.5	16.5	2.55
3048.0	-	3064.0	'			14.5	28.5	5.5	16.5	2.55

** PND-S Variable Matrix Water Saturation **

Zone	Top-Zone	Bot	SigWa	SigMcl	SigMsh	SigHC	PhiSh	PhiMn	PhiMx	VclMx	
2199.0	-	2277.9	'	132.0	VAR	32.0	2.0	22.5	4.0	VAR	40.0
2278.0	-	2397.9	'	132.0	VAR	27.5	2.0	17.5	4.0	VAR	40.0
2398.0	-	2410.4	'	132.0	VAR	29.5	3.0	18.5	4.0	VAR	52.0
2410.5	-	2614.9	'	132.0	VAR	27.5	2.0	17.5	4.0	VAR	40.0
2615.0	-	3064.0	'	132.0	VAR	28.5	3.0	16.5	4.0	VAR	50.0

BOREHOLE ENVIRONMENT:

CASING RECORD:

Size	Top	-	Bottom
8.625"	Surface	-	725.5'
5.5"	Surface	-	3121.6'

PETROPHYSICAL REPORTS:

WELL#5648 Weatherford International, Inc. - CASED HOLE PETROPHYSICAL EVALUATION REPORT AI

COMPANY - LINN ENERGY	COUNTY - STANTON	API # - 1518721238
WELL - CHADD 5 ATU 20	STATE - KANSAS	LOCATION - 16 - 2
FIELD - HUGOTON	COUNTRY - USA	DATE - 9/ 9/2013

FORMATION - + SIGMA TOTAL DEPTH - + TOTAL PVT - + PVT - + TOTAL PVT - + PVT - + TOTAL PVT - +

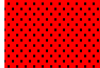
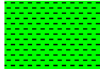
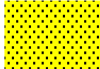
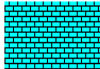
FORMATION NAMES	CUM ZONE DEPTHS TOP	BOTTOM	TOTAL h	PHI Avg	SW Avg	BVW Avg	TOTAL h	PHI Avg	SW Avg	BVW Avg	TOTAL h	PHI Avg
	>>>>-CUTOFFS->>>>		SW .LE.	60.0%			VSH .LE.	40.0%				
	>>>>----->>>>	S	PHI CUTOFF =	6.0%			PHI CUTOFF =	8.0%			PHI CUTOFF =	
	2615.0	3047.9	38.0	10.1	47	.048	29.3	11.0	46	.051	17.4	12.1
	2410.5	2614.9	59.9	9.2	38	.035	45.8	9.8	38	.037	16.1	11.1
	2398.0	2410.4	7.7	10.3	30	.031	5.7	11.4	30	.035	3.4	13.1
	2278.0	2397.9	33.9	11.5	31	.035	29.9	12.1	30	.036	19.1	13.1

ANALYST: R.L. Smith, B. Smith

PROGRAM: APPLESv2.77

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WEATHERFORD INTERNATIONAL, LTD.

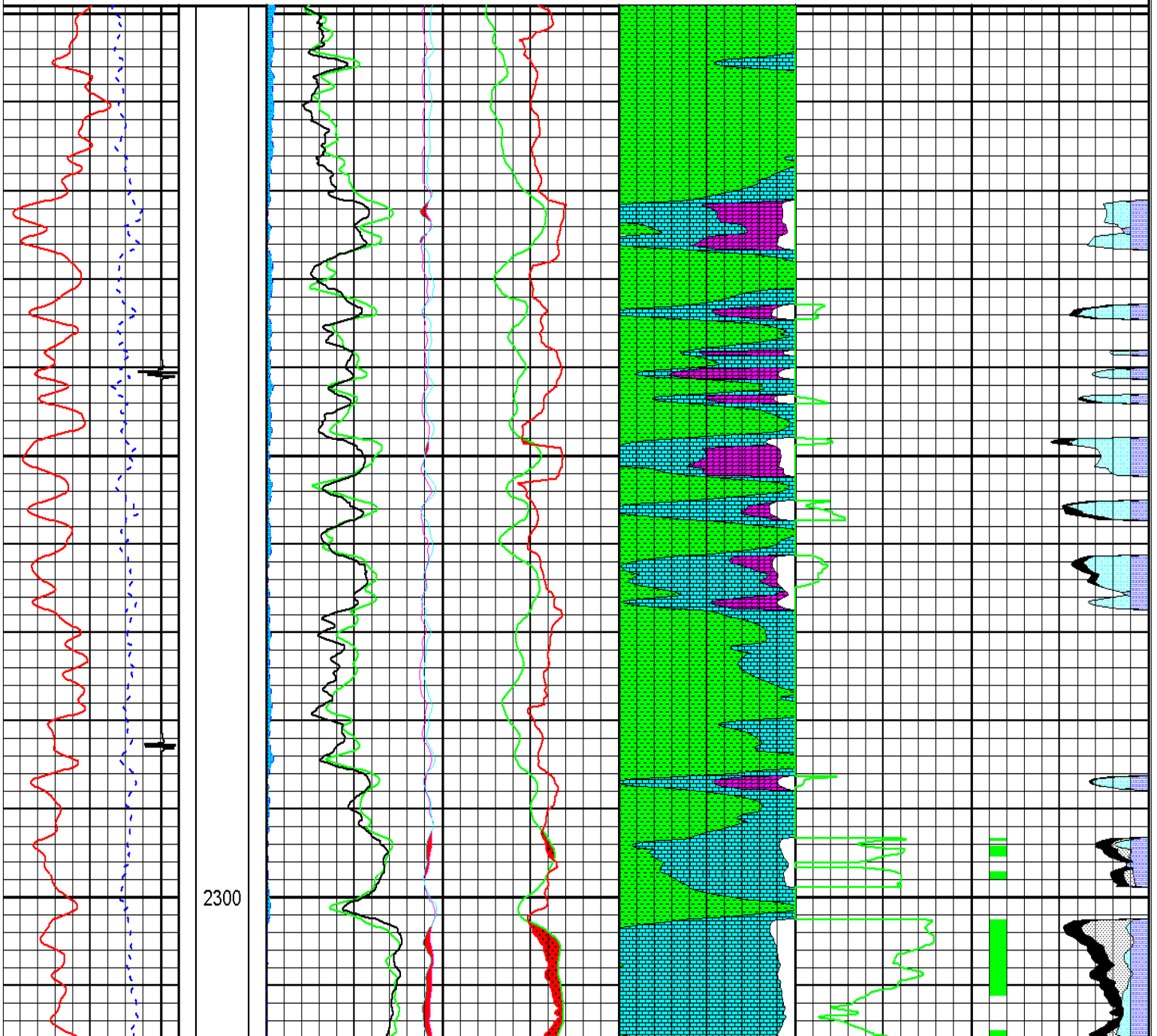
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 Lower_Inelastic_Data_Quality
 Possible_Gas_or_Matrix_Effects
 Shale_Volume
 Sandstone_Volume
 Limestone_Volume

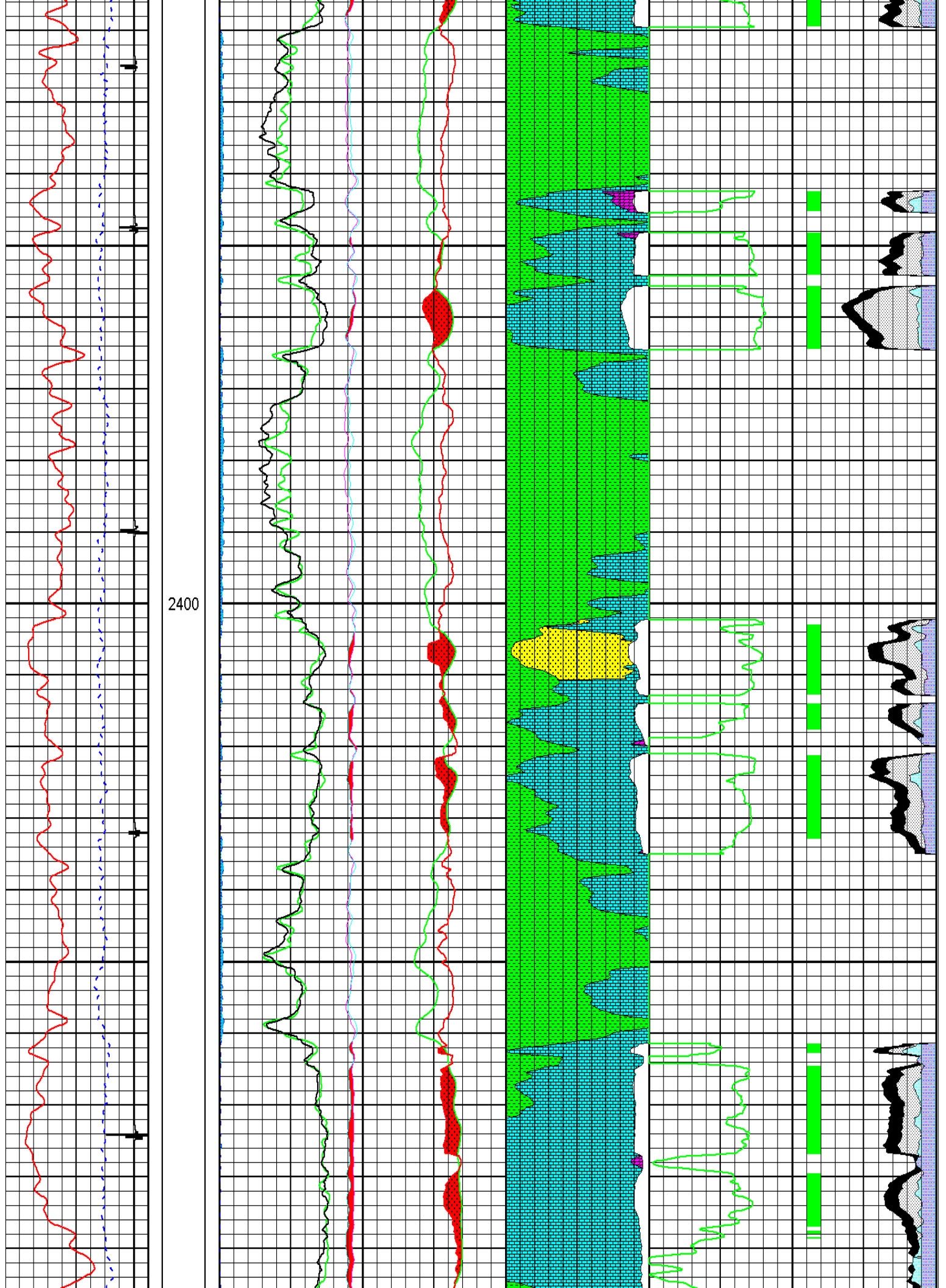
Porosity

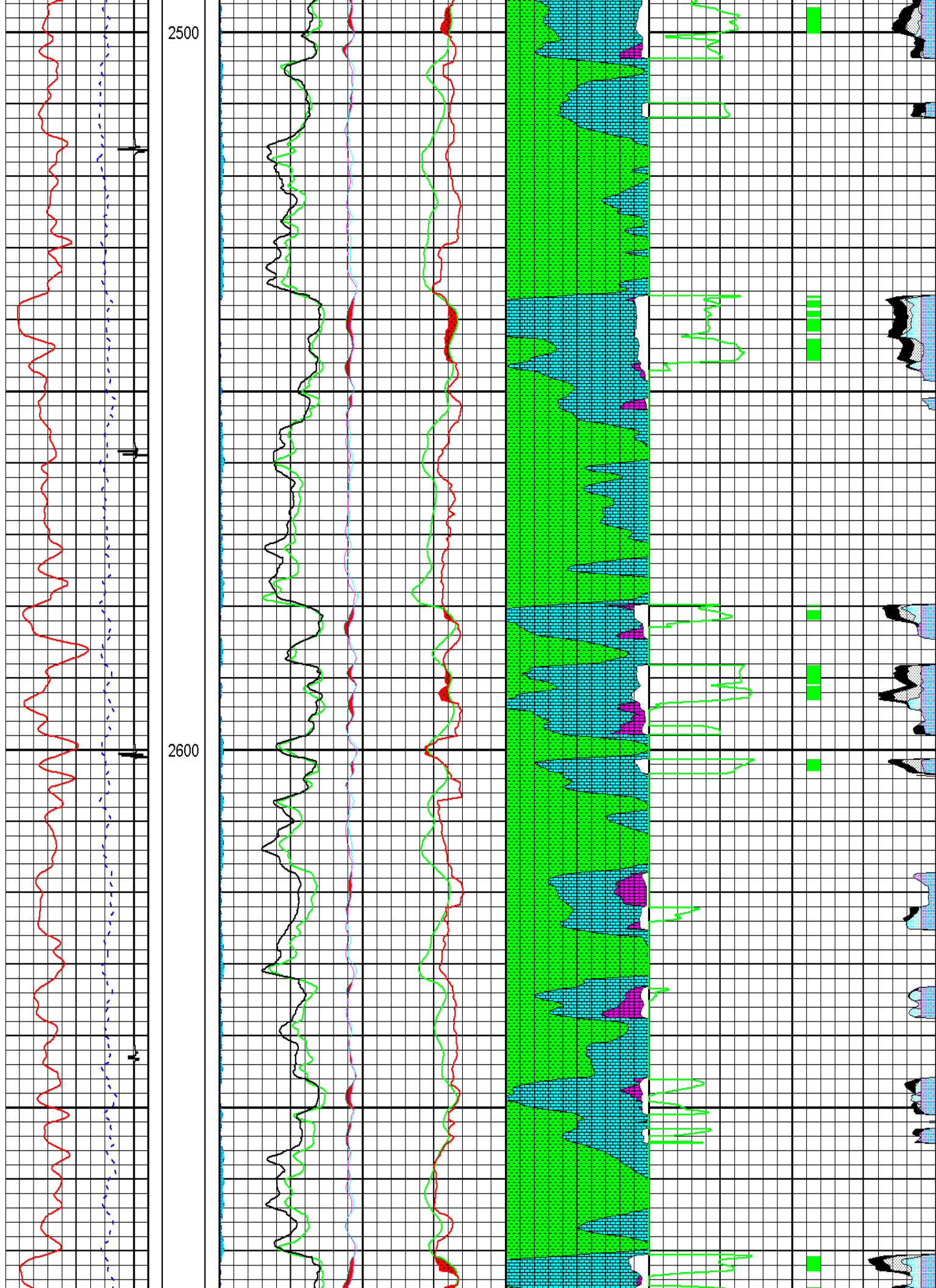
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 Anhydrite_Volume
 PND_Pay_Flag
 Moveable_Hydrocarbon
 Moveable_Water
 Irreducible_Water
 Hydrocarbons

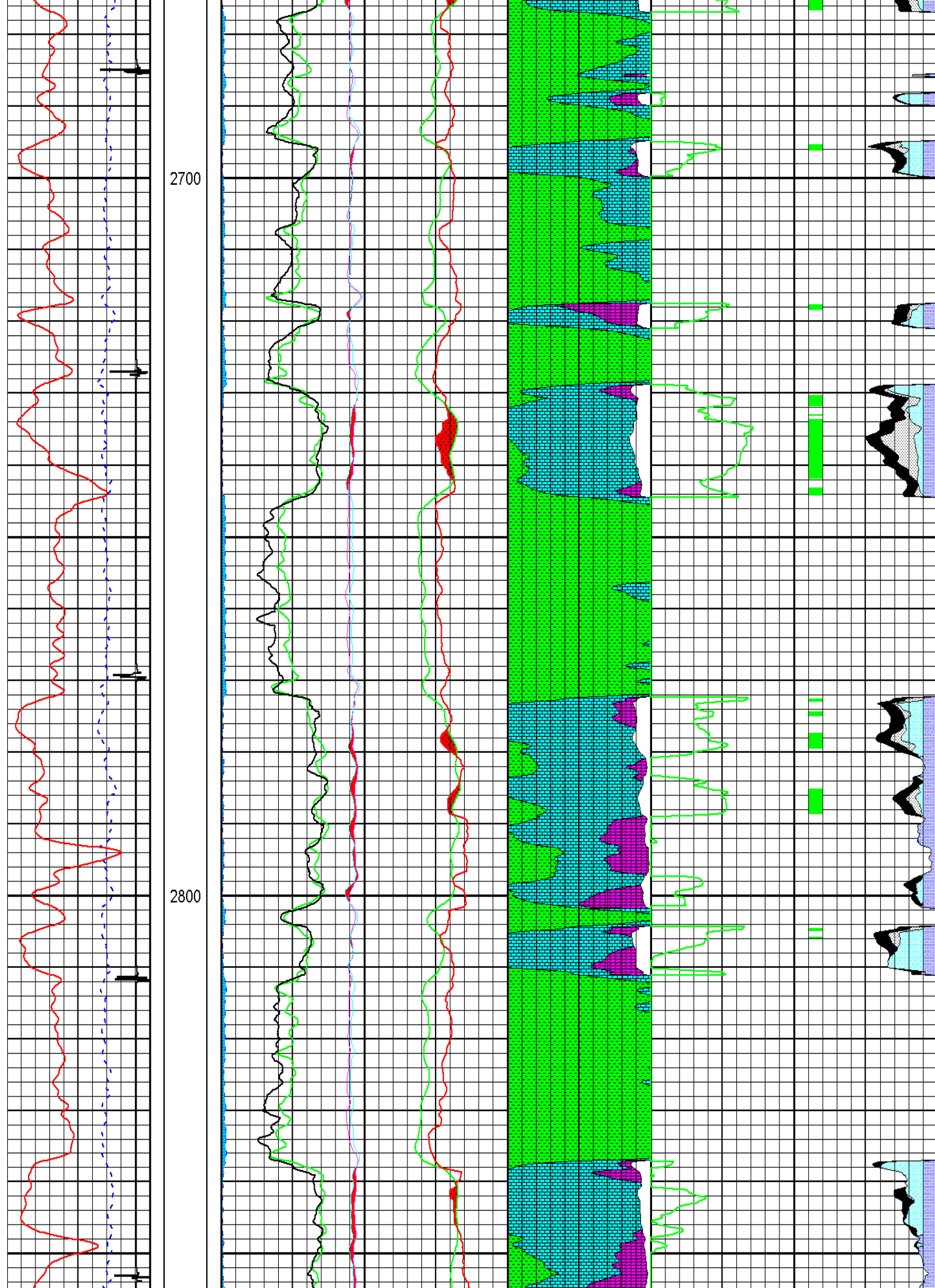
CHADD 5 ATU 20
9 Sep 2013 @ 5:06
DEPTH (FT)
Interval: 2199.00 to 3064.00
Depth Scale Ratio: 1/240

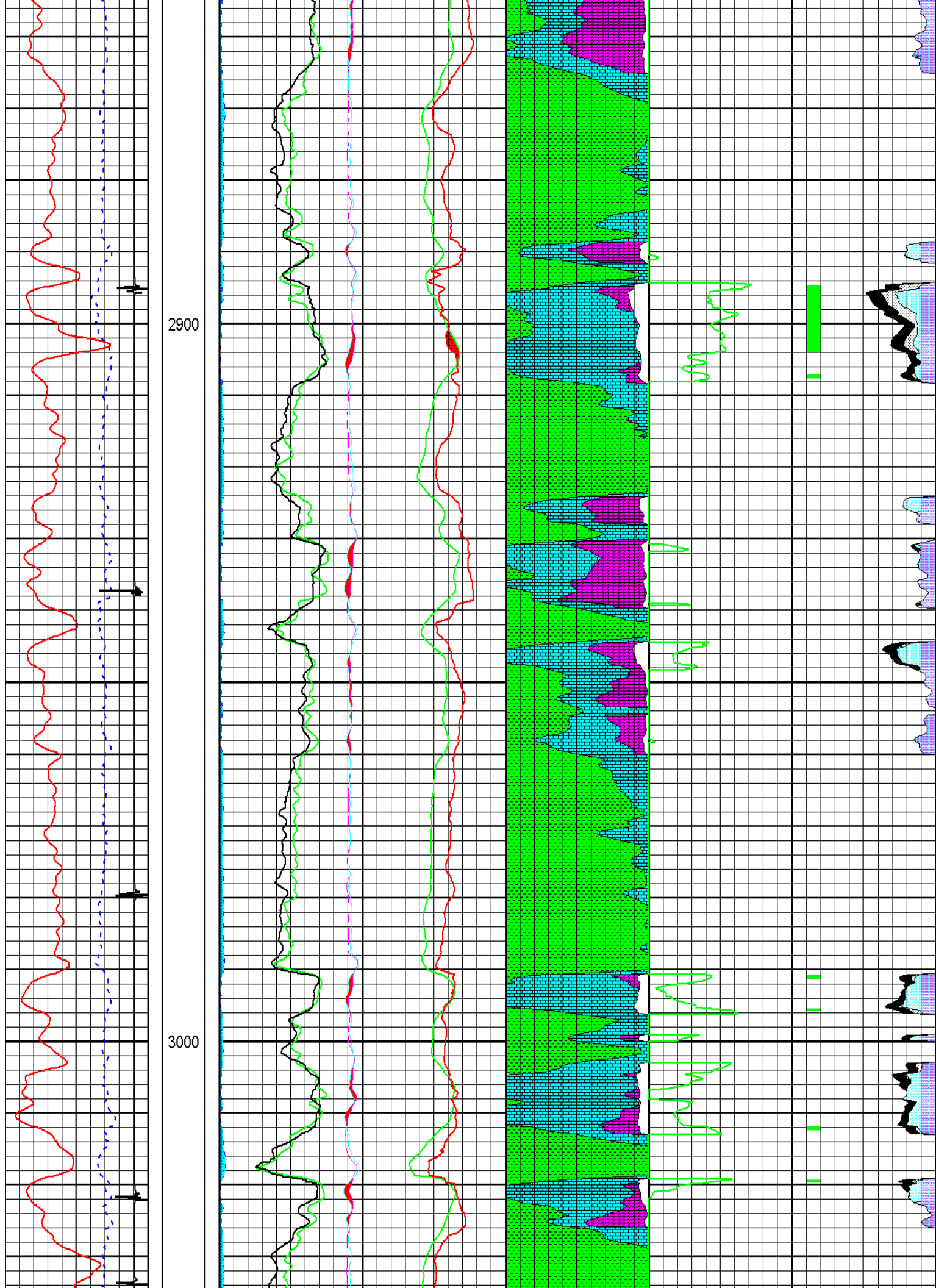
QUAL 0 160000	DEPTH FT	RATI 7 0	AIPN 0.45 dec(ls) -0.15	VSH 0 dec 1	SWPN 1 dec 0	PAYPN -1 9
CCL -5000 mv 500	CSG1L 0 flg 10	SIGC 50 cu 0	AIPD 0.45 dec(ls) -0.15	MIN12 0 dec 1	PHIE 0.3 dec 0	
GRE 0 gapi 150	CSG1R 10 flg 0	NEAR 240 cps 0		MIN23 0 dec 1	BVWPNI 0.3 dec 0	
		FAR 40 cps 0		PHIE 1 dec 0	BVWPNI 0.3 dec 0	
		DELI 0 -100		MIN34 0 dec 1	BVWPNI 0.3 dec 0	
				MIN45 0 dec 1		

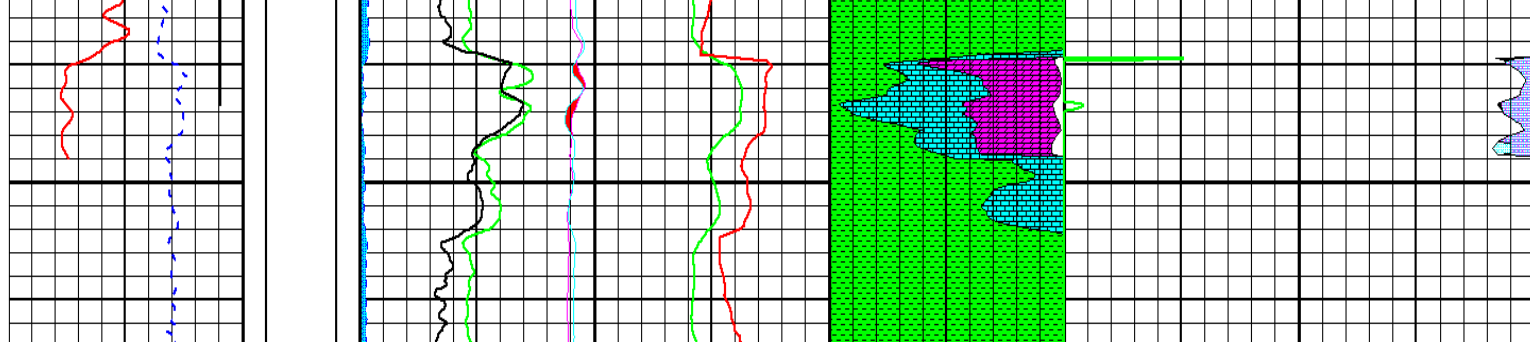












QUAL 0160000	DEPTH FT	RATI 70	AIPN 0.45dec(l s)-0.15	VSH 0dec1	SWPN 1dec0	PAYPN -19
CCL -5000mv500	CSG1L 0flg10	SIGC 50cu0	AIPD 0.45dec(l s)-0.15	MIN12 0dec1		PHIE 0.3dec0
GRE 0gapi150	CSG1R 10flg0	NEAR 240cps0		MIN23 0dec1		BVWPN 0.3dec0
		FAR 40cps0		PHIE 1dec0		BVWPNI 0.3dec0
		DELI 0-100		MIN34 0dec1		BVWPNR 0.3dec0
				MIN45 0dec1		