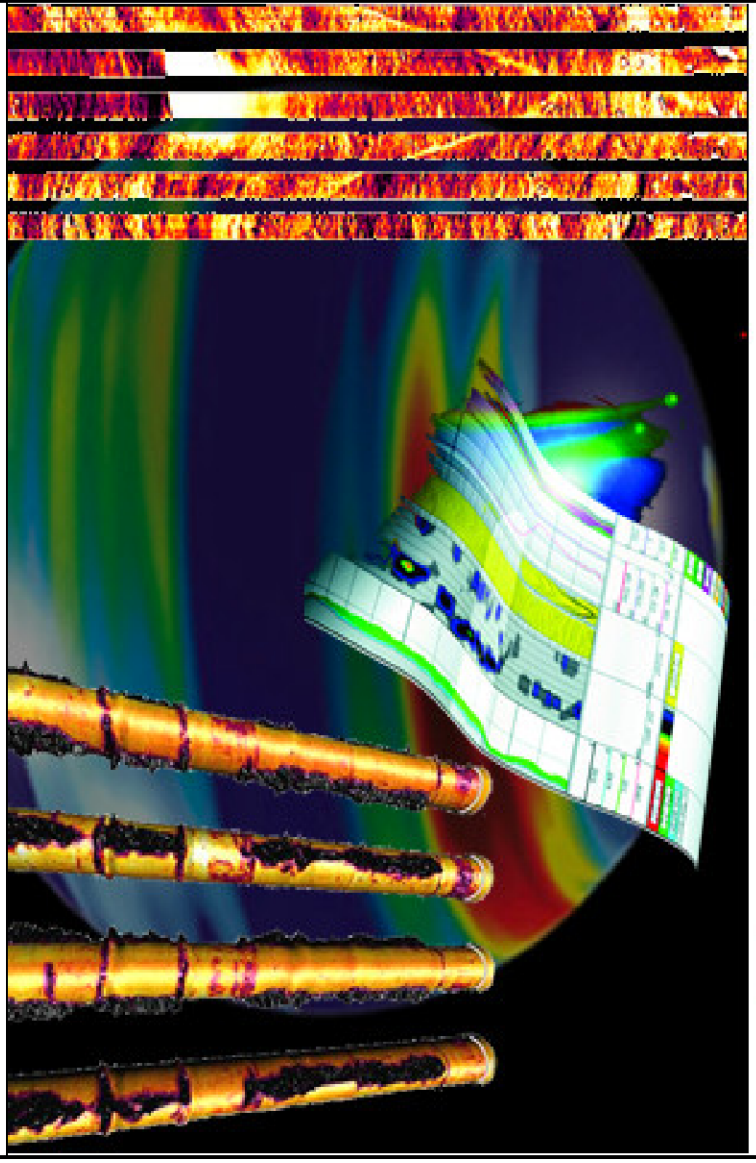
HALLIBURTON

- MRIL -
MAGNETIC RESONANCE IMAGING ANALYSIS



COMPANY SANDRIDGE ENERGY

WELL ALEXANDER 3114 1-1

FIELD/BLOCKSKINNER

COUNTY BARBER STATE KANSAS

Location SW-SW-SE-SE
200' FSL & 1056' FEL
1-31S-14W

Elev.: K.B. 1685.00 ft
D.F. 1683.00 ft
G.L. 1668.00 ft

Date Processed 04 FEB 2014 Processed At OKC FRS

Interval Processed 4759' - 3503' Processed By L. HAMILTON

Fold here

Service Ticket No.: 901088163	PGM Version: WL INSITE R3.8.4 (Build 5)	
Logs Processed: MRIL-D	Date Logged: 03 FEB 2014	Type Fluid In Hole: WBM 9.3 ppg
DIRECTIONAL INFORMATION		
Maximum Deviation @		KOP @

Remarks: OKIE ACTIVATION USED FOR SIMULTANEOUS T1 AND T2 DATA ACQUISITION
CUTOFFS LISTED IN THE PARAMETER TABLES
HYDROCARBON INDICATIONS ON THE PLOT ARE TAKEN FROM MRIL FLUSHED ZONE T1T2 2D FLUID CHARACTERIZATION MEASUREMENTS AND SHOULD NOT
CONFUSED WITH RESISTIVITY BASED SATURATION CALCULATIONS

PROCESSED AT OKC FORMATION AND RESERVOIR SOLUTIONS BY LAYNE HAMILTON 405-231-1873

nmrStudio Processing Parameters

Studio File: Merged.stu

Date: 04-Feb-2014 11:02:48

SHARED PARAMETERS

NAME	UNIT	PARAMETER DESCRIPTION	VALUE
DEPINC	FEET	DEPTH INCREMENT	0.250
DEPTHBOT	FEET	BOTTOM DEPTH	4763.000
DEPTHTOP	FEET	TOP DEPTH	3486.000
MEANDEPTHINC	FEET	MEAN DEPTH INCREMENT	-0.200
NULLVALUE	UNKNOWN	UNKNOWN	-999.250
NUMLEVEL	UNKNOWN	UNKNOWN	6386.000
TEMPGRADC	UNKNOWN	UNKNOWN	0.694
CALTEMP	UNKNOWN	UNKNOWN	22.222,22.222,22.222, 22.222,22.222,22.222
FILTLEN	UNKNOWN	UNKNOWN	1.000,1.000,1.000,1.000, 1.000,1.000
FREQAVG	UNKNOWN	UNKNOWN	641.618,641.618,770.576, 770.576,770.576,770.576
MINRA	UNKNOWN	UNKNOWN	12.000,12.000,8.000,8.000, 8.000,8.000
NE	UNKNOWN	UNKNOWN	400.000,400.000,10.000, 10.000,10.000,10.000
TE	UNKNOWN	UNKNOWN	1.200,1.200,0.600,0.600, 0.600,0.600
TW	UNKNOWN	UNKNOWN	8028.000,2130.000,10.000, 30.000,100.000,300.000
ACTSETNAME	UNKNOWN	UNKNOWN	OKIE
DEPUNIT	UNKNOWN	UNKNOWN	FEET
TOOLTYPE	UNKNOWN	UNKNOWN	MRIL PRIME
GROUPID	UNKNOWN	UNKNOWN	A,B,C,D,E,F
GROUPIDPTOT	UNKNOWN	UNKNOWN	A,B,C,D,E,F

ZONED PARAMETERS

NAME	UNIT	PARAMETER DESCRIPTION	2Top-2Bot VALUE
OILVISCOSITY	CP	OIL VISCOSITY	3486.000-4763.000 2.000
MICROPOROSITYT2	MS	MICRO-POROSITY CUTOFF T2	3486.000-4763.000 2.000
BT2	UNITLESS	SPECTRAL BVI T2 OFFSET	3486.000-4763.000 1.000
T2STARTSB	UNITLESS	SB T2 START	3486.000-4763.000 0.500
T2ENDSB	UNITLESS	SB T2 END	3486.000-4763.000 3000.000
MICROPOROSITYT1	MS	MICRO-POROSITY CUTOFF T1	3486.000-4763.000 5.000
BT1	UNITLESS	SPECTRAL BVI T1 OFFSET	3486.000-4763.000 1.000
COATESPERMA	UNITLESS	COATES PERM. A	3486.000-4763.000 4.000
COATESPERMB	UNITLESS	COATES PERM. B	3486.000-4763.000 2.000
COATESPERMC	UNITLESS	COATES PERM. C	3486.000-4763.000 10.000
THRESHFACTOR	DECP	THRESHHOLD FACTOR	3486.000-4763.000 0.050
SBCOEF	UNITLESS	SB PERM. COEFFICIENT	3486.000-4763.000 0.000
SBEXP	UNITLESS	SB PERM. EXPONENT	3486.000-4763.000 2.300
CUMSUMTHRESHHOLD	UNITLESS	CUMULATIVE SUM THRESHHOLD	3486.000-4763.000 0.500
LOGMEANPERMA	UNITLESS	LOG MEAN PERM. A	3486.000-4763.000 4.000
LOGMEANPERMB	UNITLESS	LOG MEAN PERM. B	3486.000-4763.000 2.000
LOGMEANPERMC	UNITLESS	LOG MEAN PERM. C	3486.000-4763.000 4.000
TEMPERATURE	DEGF	FORMATION TEMPERATURE	3486.000-0.000 70.000, 3486.000-3486.000 101.300, 4776.000-4763.000 127.400
PRESSURE	PSIG	FORMATION PRESSURE	3486.000-0.000 0.000, 3486.000-3486.000 1683.000, 4776.000-4763.000 2307.000
IRREDUCIBLET2	MS	IRREDUCIBLE CUTOFF T2	3486.000-3741.000 60.000, 3741.000-3791.000 25.000, 3791.000-4102.000 60.000, 4102.000-4115.000 33.000, 4115.000-4265.000 70.000, 4265.000-4312.000 33.000, 4312.000-4327.000 70.000,

			4327.000-4530.000 50.000, 4530.000-4607.000 25.000, 4607.000-4763.000 60.000
AT2	UNITLESS	SPECTRAL BVI T2 COEFFICIENT	3486.000-3741.000 0.009, 3741.000-3791.000 0.062, 3791.000-4102.000 0.009, 4102.000-4115.000 0.062, 4115.000-4265.000 0.009, 4265.000-4312.000 0.062, 4312.000-4327.000 0.009, 4327.000-4607.000 0.062, 4607.000-4763.000 0.009
IRREDUCIBLET1	MS	IRREDUCIBLE CUTOFF T1	3486.000-3741.000 120.000, 3741.000-3791.000 50.000, 3791.000-4102.000 120.000, 4102.000-4115.000 60.000, 4115.000-4265.000 140.000, 4265.000-4312.000 60.000, 4312.000-4327.000 140.000, 4327.000-4530.000 100.000, 4530.000-4607.000 50.000, 4607.000-4763.000 120.000
AT1	UNITLESS	SPECTRAL BVI T1 COEFFICIENT	3486.000-3741.000 0.004, 3741.000-3791.000 0.031, 3791.000-4102.000 0.004, 4102.000-4115.000 0.031, 4115.000-4265.000 0.004, 4265.000-4312.000 0.031, 4312.000-4327.000 0.004, 4327.000-4607.000 0.031, 4607.000-4763.000 0.004

CURVE LIST

NAME	UNIT	PARAMETER DESCRIPTION
GAMM	API	GAMMA RAY
TENS	LBS	CABLE TENSION
TMP3	DEGC	PROBE TEMPERATURE
GAINA	UNITLESS	GAIN
GAINC	UNITLESS	GAIN
D0GAS	1E-5 CM2/S	DIFFUSION COEFFICIENT FOR GAS (METHANE)
D0OIL	1E-5 CM2/S	DIFFUSION COEFFICIENT FOR OIL
DIAM	IN	DIAMETER OF INVESTIGATION
FPRES	PSIA	FORMATION PRESSURE
FTEMP	DEGF	FORMATION TEMPERATURE
HIGAS	UNITLESS	HYDROGEN INDEX FOR GAS
RHOGAS	G/CC	GAS DENSITY (METHANE)
T1GAS	MS	T1 FOR GAS (METHANE)
T1OIL	MS	T1 FOR OIL
T2GAS	MS	T2 FOR GAS (METHANE)
T2OIL	MS	T2 FOR OIL
T1DIST	PU	T1 DISTRIBUTION
T2KBENS	MD	T2 DIST. SB PERMEABILITY
T2KLOGM	MD	T2 DIST. LOG MEAN PERMEABILITY
VOIL	PU	VOLUME WATER + OIL
CHIT1	PU	RMS FIT ERROR - T1- FOR THE FIRST GROUP
MBVIT1	PU	T1 IRREDUCIBLE POROSITY MAX(CUT-OFF, SPECTRAL).
MCBWT1	PU	T1 MICRO-POROSITY
MPERMT1	MD	PERMEABILITY - FROM T1-DISTRIBUTION - USING COATS METHOD
MPHIT1	PU	T1 EFFECTIVE POROSITY
MSIGT1	PU	T1 TOTAL POROSITY
P01T1F	PU	T1-GROUP BIN# 01 POROSITY T1BIN TIME=1)
P02T1F	PU	T1-GROUP BIN# 02 POROSITY T1BIN TIME=2)
P05T1F	PU	T1-GROUP BIN# 0.5 POROSITY T1BIN TIME=0.5)
P10T1F	PU	T1-GROUP BIN# 10 POROSITY T1BIN TIME=2048)
P1T1F	PU	T1-GROUP BIN# 1 POROSITY T1BIN TIME=4)
P2T1F	PU	T1-GROUP BIN# 2 POROSITY T1BIN TIME=8)
P3T1F	PU	T1-GROUP BIN# 3 POROSITY T1BIN TIME=16)
P4T1F	PU	T1-GROUP BIN# 4 POROSITY T1BIN TIME=32)
P5T1F	PU	T1-GROUP BIN# 5 POROSITY T1BIN TIME=64)
P6T1F	PU	T1-GROUP BIN# 6 POROSITY T1BIN TIME=128)
P7T1F	PU	T1-GROUP BIN# 7 POROSITY T1BIN TIME=256)
P8T1F	PU	T1-GROUP BIN# 8 POROSITY T1BIN TIME=512)
P9T1F	PU	T1-GROUP BIN# 9 POROSITY T1BIN TIME=1024)
T1SPEC	PU	T1-GRP POR-T1-DISTRIBUTION
CHIA	PU	RMS FIT ERROR FOR GROUP A INVERSION
CHIB	PU	RMS FIT ERROR FOR GROUP B INVERSION
MBVITA	PU	MAXIMUM BOUND POROSITY VOLUME (MAX(CBVI,SBVI))FOR TA-GROUP
MCBW	PU	MICROPOROSITY VOLUME FROM PR06

MPERM	MD	PERMEABILITY COMPUTED USING COATES MODEL
MPHITA	PU	SUM-TOTAL-EFFECTIVE-POROSITY FOR GROUP TA
MPHITB	PU	SUM-TOTAL-EFFECTIVE-POROSITY FOR GROUP TB
MSIGTA	PU	SUM-TOTAL-POROSITY FOR GROUP TA (PR06+A T2-DOMAIN-SPLICED)
MSIGTB	PU	SUM-TOTAL-POROSITY FOR GROUP TB (PR06+A T2-DOMAIN-SPLICED)
P01AF	PU	A-GROUP BIN# 01 POROSITY T2BIN TIME=1)
P01BF	PU	B-GROUP BIN# 01 POROSITY T2BIN TIME=1)
P02AF	PU	A-GROUP BIN# 02 POROSITY T2BIN TIME=2)
P02BF	PU	B-GROUP BIN# 02 POROSITY T2BIN TIME=2)
P10AF	PU	A-GROUP BIN# 10 POROSITY T2BIN TIME=2048)
P10BF	PU	B-GROUP BIN# 10 POROSITY T2BIN TIME=2048)
P1AF	PU	A-GROUP BIN# 1 POROSITY T2BIN TIME=4)
P1BF	PU	B-GROUP BIN# 1 POROSITY T2BIN TIME=4)
P1PRF	PU	PR06 GRP BIN#1 POROSITY (T2BIN TIME=0.5)
P2AF	PU	A-GROUP BIN# 2 POROSITY T2BIN TIME=8)
P2BF	PU	B-GROUP BIN# 2 POROSITY T2BIN TIME=8)
P2PRF	PU	PR06 GRP BIN#2 POROSITY (T2BIN TIME=1)
P3AF	PU	A-GROUP BIN# 3 POROSITY T2BIN TIME=16)
P3BF	PU	B-GROUP BIN# 3 POROSITY T2BIN TIME=16)
P3PRF	PU	PR06 GRP BIN#3 POROSITY (T2BIN TIME=2)
P4AF	PU	A-GROUP BIN# 4 POROSITY T2BIN TIME=32)
P4BF	PU	B-GROUP BIN# 4 POROSITY T2BIN TIME=32)
P4PRF	PU	PR06 GRP BIN#4 POROSITY (T2BIN TIME=4)
P5AF	PU	A-GROUP BIN# 5 POROSITY T2BIN TIME=64)
P5BF	PU	B-GROUP BIN# 5 POROSITY T2BIN TIME=64)
P6AF	PU	A-GROUP BIN# 6 POROSITY T2BIN TIME=128)
P6BF	PU	B-GROUP BIN# 6 POROSITY T2BIN TIME=128)
P7AF	PU	A-GROUP BIN# 7 POROSITY T2BIN TIME=256)
P7BF	PU	B-GROUP BIN# 7 POROSITY T2BIN TIME=256)
P8AF	PU	A-GROUP BIN# 8 POROSITY T2BIN TIME=512)
P8BF	PU	B-GROUP BIN# 8 POROSITY T2BIN TIME=512)
P9AF	PU	A-GROUP BIN# 9 POROSITY T2BIN TIME=1024)
P9BF	PU	B-GROUP BIN# 9 POROSITY T2BIN TIME=1024)
PRSPEC	PU	PR06 T2-DISTRIBUTION 7-BINS (T2TIME=0.5,1,2,4,8,16,256)
TASPEC	PU	A-GRP TOTAL-POR-T2-DISTRIBUTION (T2-DOMAIN-SPLICED)
TBSPEC	PU	B-GRP TOTAL-POR-T2-DISTRIBUTION (T2-DOMAIN-SPLICED)

HALLIBURTON

Plot Time: 04-Feb-14 13:44:12
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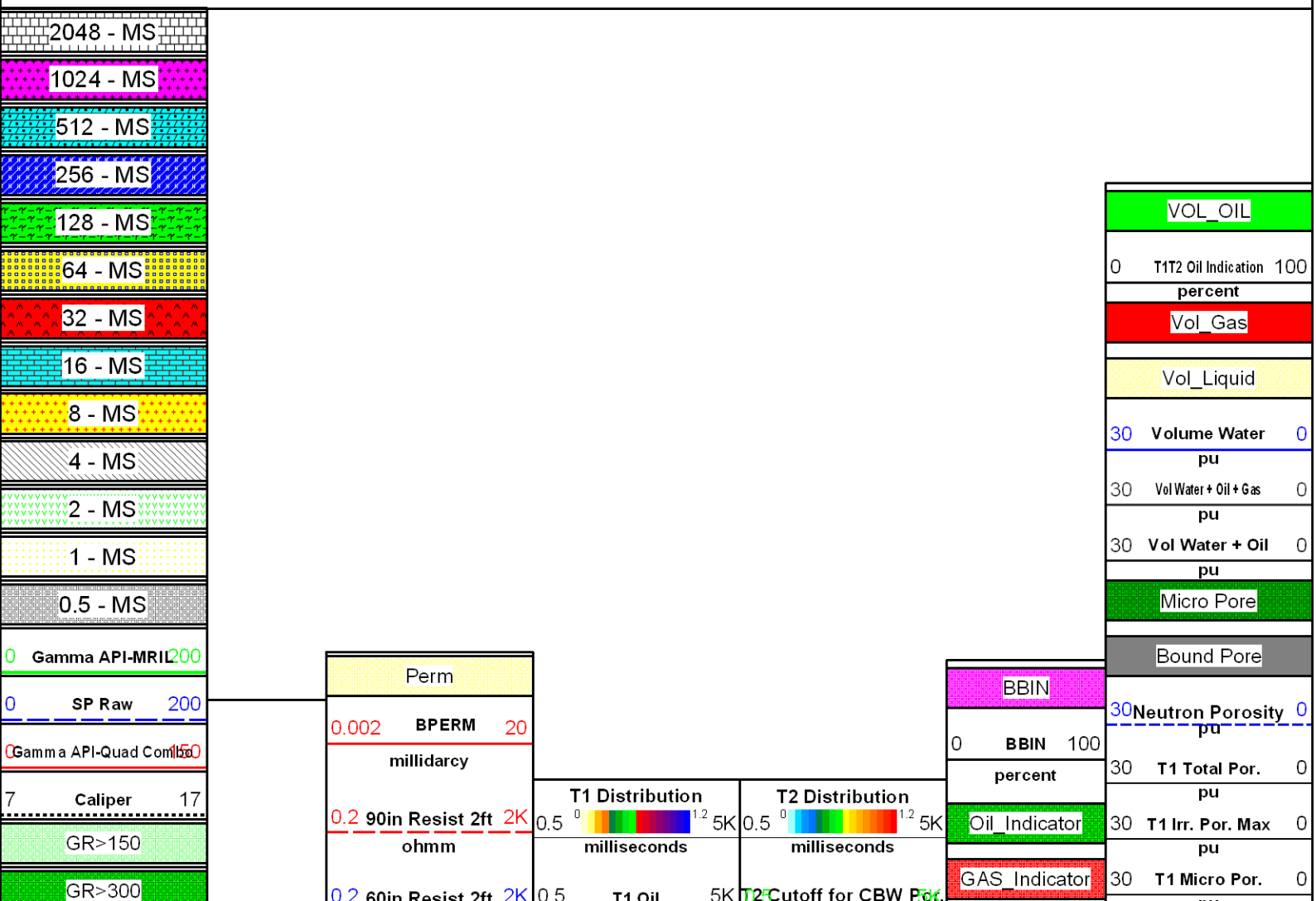
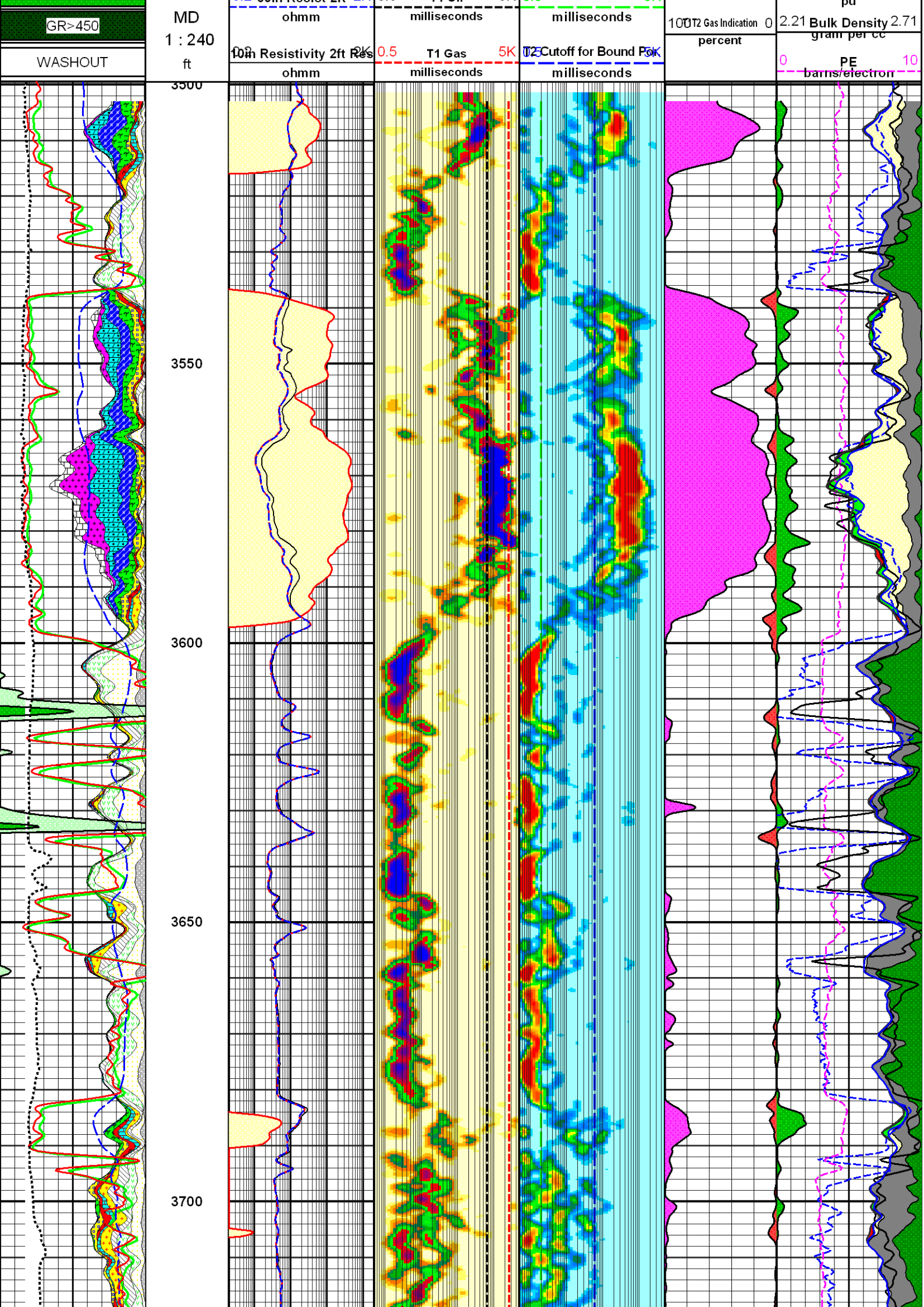
Plot File: \\-LOCAL-\(not saved)\LH_FRS_MRIL_BPerm_Saturations_Distribution Display

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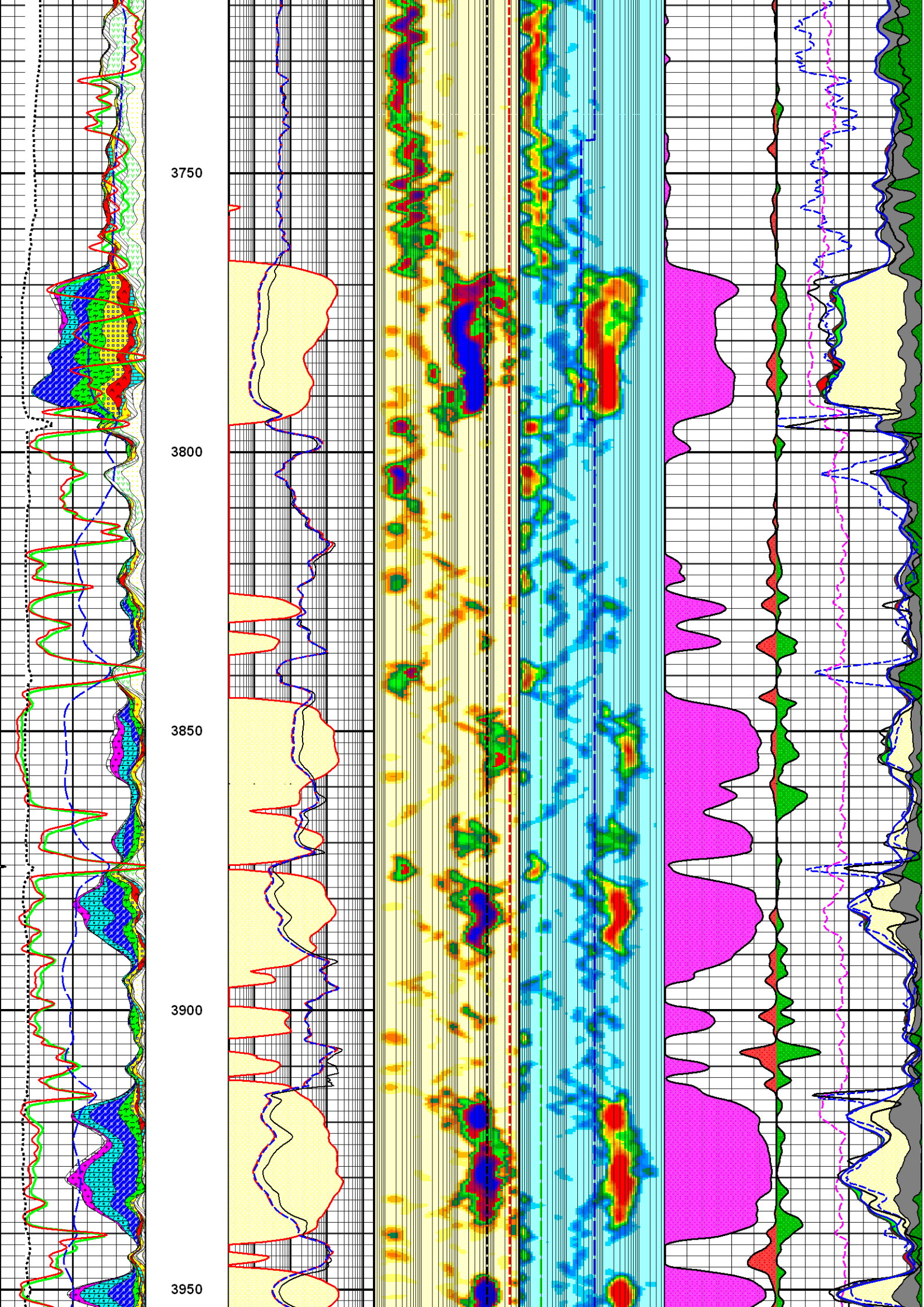
WASHOUT
MD
1 : 240
ft
ohmm
10in Resistivity 2ft Res
0.2
2K
milliseconds
T1 Gas
0.5
5K
milliseconds
T2 Cutoff for Bound P
5K
milliseconds
T2 Gas Indication
100
0
percent
pu
Bulk Density
2.21
2.71
gram per cc
PE
0
10
barns/electron
3500
3550
3600
3650
3700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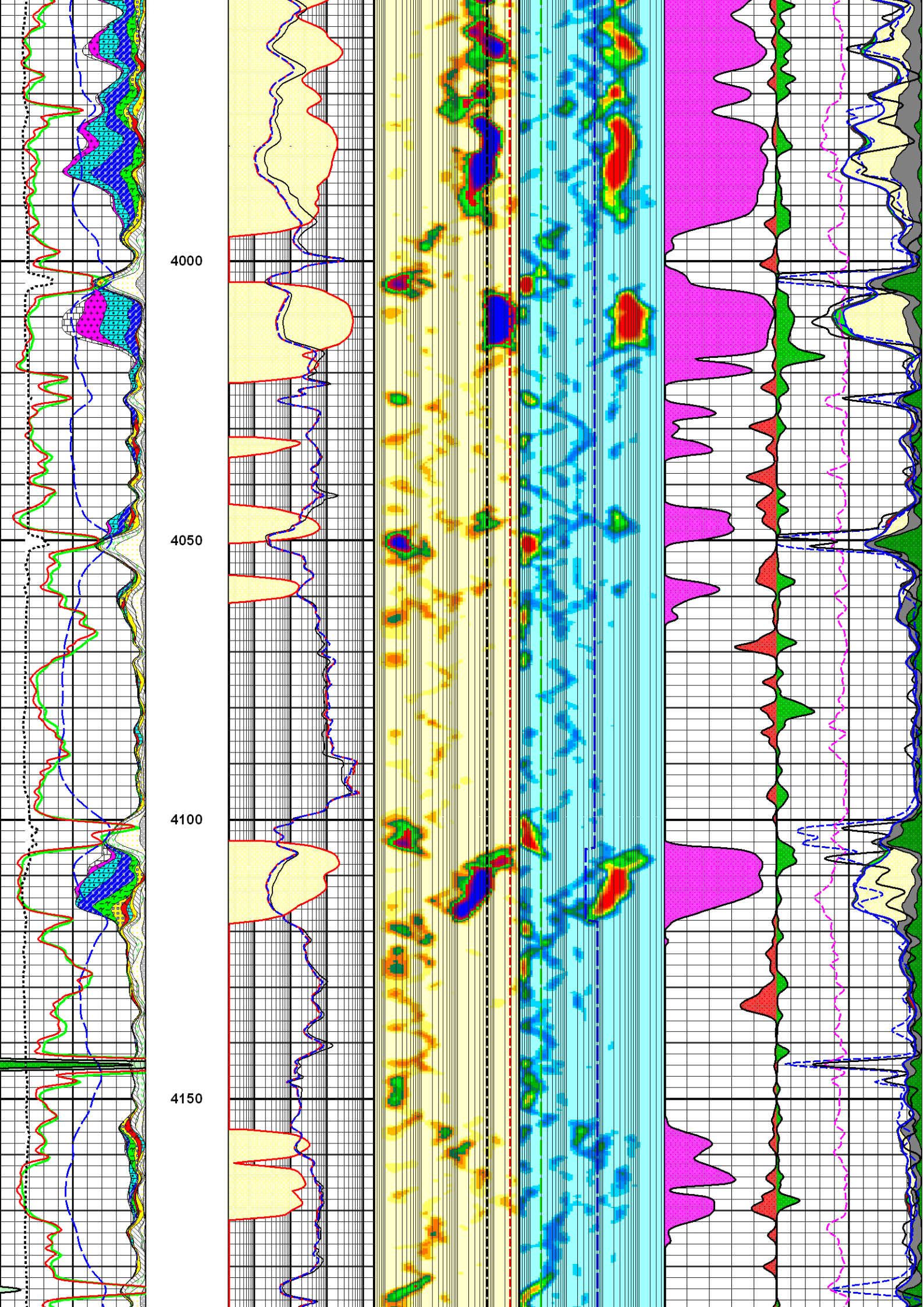
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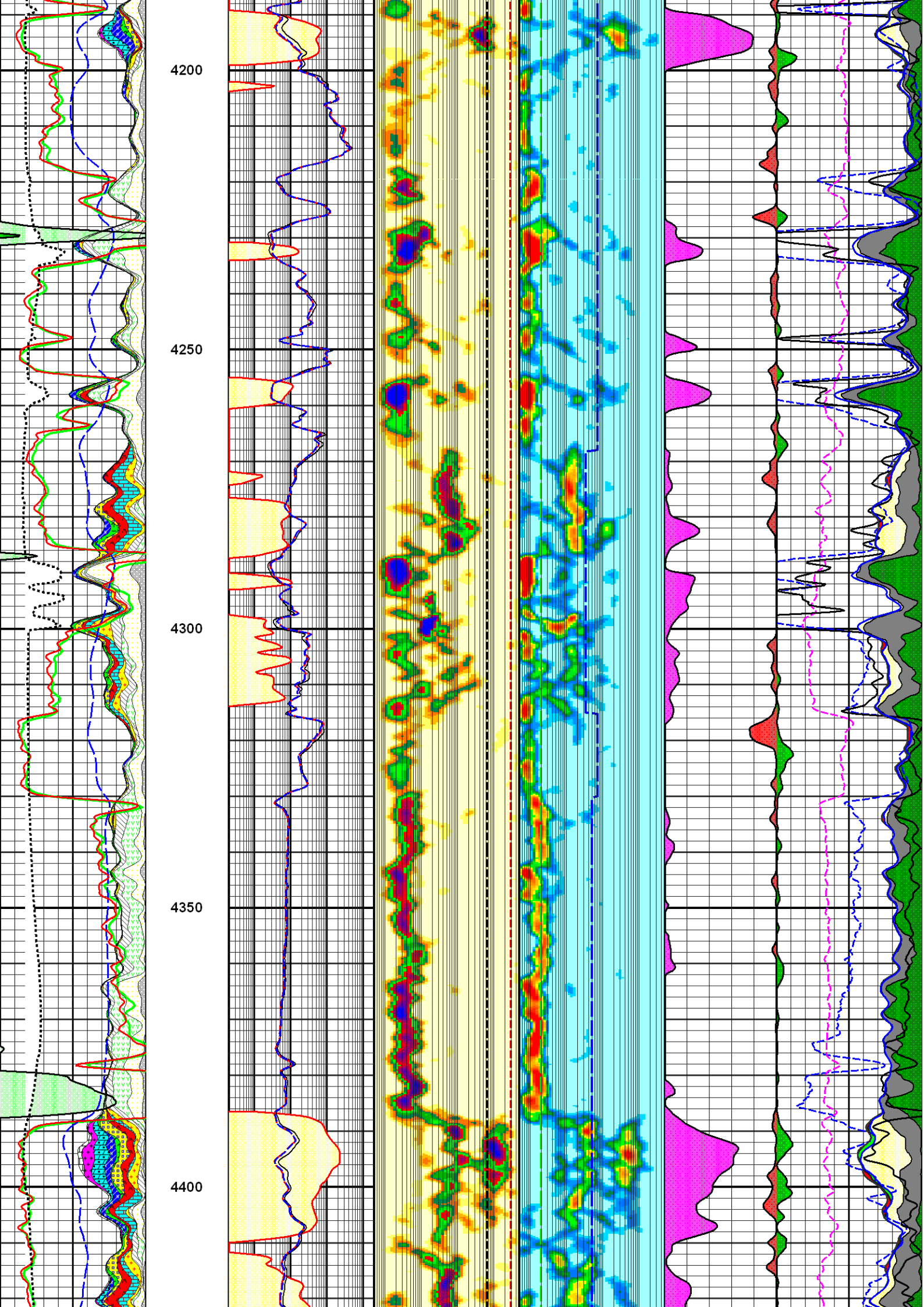
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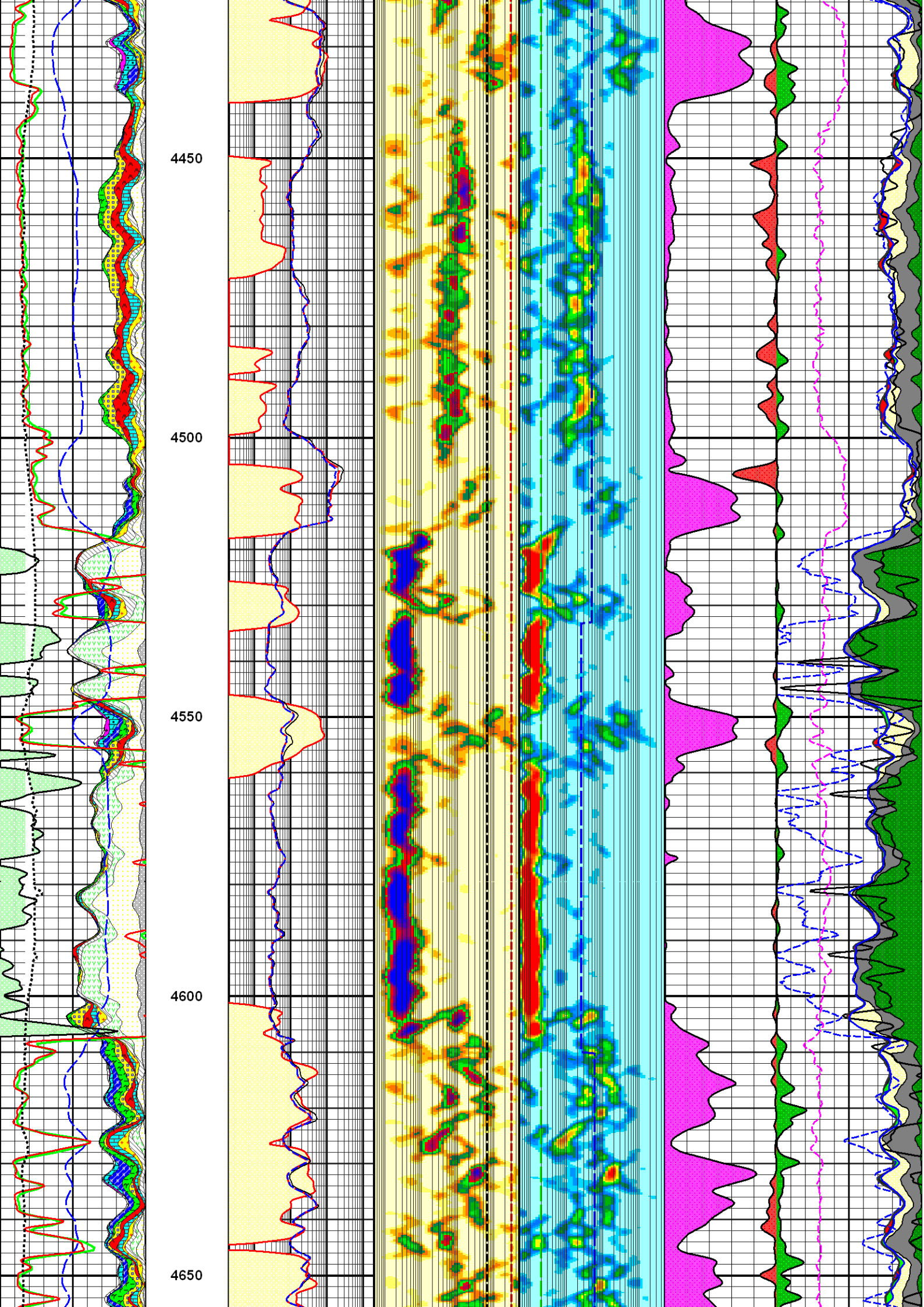
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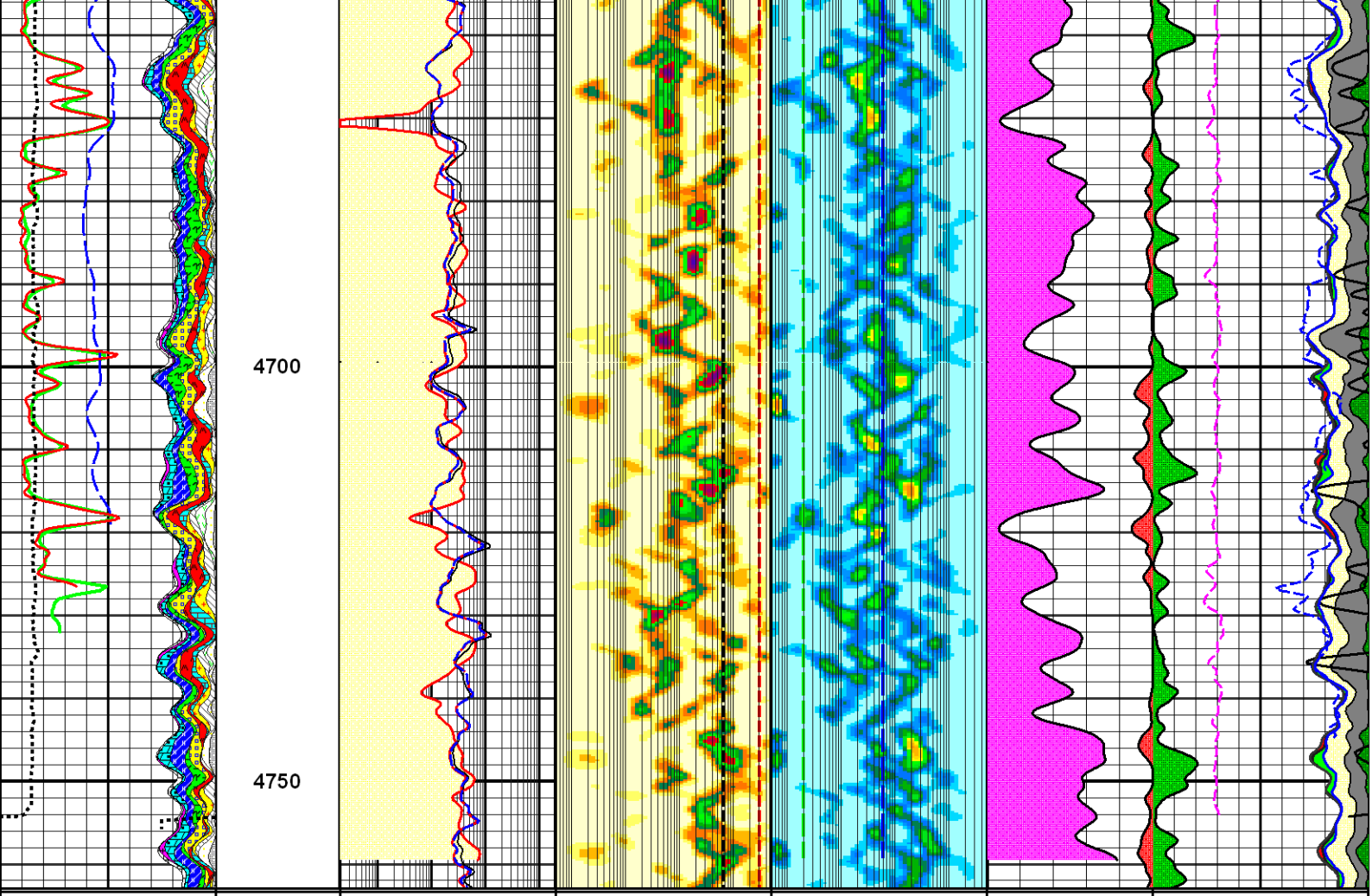

WASHOUT

GR>450

GR>300

GR>150

7 Caliper 17

0 Gamma API-Quad Combo 150

0 SP Raw 200

0 Gamma API-MRIL 200

0.5 - MS

1 - MS

2 - MS

4 - MS

8 - MS

16 - MS

32 - MS

64 - MS

128 - MS

256 - MS

512 - MS

1024 - MS

2048 - MS

MD
1 : 240
ft

0.2 10in Resistivity 2ft Res 2K
ohmm

0.2 60in Resist 2ft 2K
ohmm

0.2 90in Resist 2ft 2K
ohmm

0.002 BPERM 20
millidarcy

Perm

0.5 T1 Gas 5K
milliseconds

0.5 T1 Oil 5K
milliseconds

T1 Distribution
0.5 0 1.2 5K
milliseconds

T2 Cutoff for Bound Por 5K
milliseconds

T2 Cutoff for CBW Por. 5K
milliseconds

T2 Distribution
0.5 0 1.2 5K
milliseconds

100 T1T2 Gas Indication 0
percent

GAS_Indicator

Oil_Indicator

0 BBIN 100
percent

BBIN

0 PE 10
barns/electron

2.21 Bulk Density 2.71
gram per cc

30 T1 Micro Por. 0
pu

30 T1 Irr. Por. Max 0
pu

30 T1 Total Por. 0
pu

30 Neutron Porosity 0
pu

Bound Pore

Micro Pore

30 Vol Water + Oil 0
pu

30 Vol Water + Oil + Gas 0
pu

30 Volume Water 0
pu

Vol_Liquid

Vol_Gas

0 T1T2 Oil Indication 100
percent

VOL_OIL

HALLIBURTON

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Plot Range: 3499.49 ft to 4763 ft
Data: ALEXANDER_3114\Well Based**
Plot File: \\-LOCAL-\(not saved)\LH_FRS_MRIL_BPerm_Saturations_Distribution Display

COMPANY	SANDRIDGE ENERGY
WELL	ALEXANDER 3114 1-1
FIELD	SKINNER
COUNTY	BARBER
STATE	KANSAS

HALLIBURTON

- MRIL -
MAGNETIC RESONANCE
IMAGING ANALYSIS