



## GEOLOGICAL REPORT

S. Pat Creek Prospect – Liberty #1-8  
Kingman County, Kansas

Operator: Okland Oil Company  
 Well Name: Liberty #2-8  
 Location: 1217' FNL & 1625' FWL of NW/4,  
 S/2 SW NE NW; Section 8-T29S-R9W  
 Elevation: GL: 1711' DF: 1722' KB: 1724'  
 Date Spud: September 8, 2016 @ 7:45 pm  
 Drilling Contractor: Duke Drilling Company, Rig 7  
 Surface Casing: 8 <sup>5</sup>/<sub>8</sub>" @ 223', 24#, J-55  
 Hole Size: 7 <sup>7</sup>/<sub>8</sub>"  
 Total Depth: 4,650'  
 Mud Logger: GeoDynamic Well Logging  
 Logging Services: Allied Wireline: IAT/GR, LDT/CNL/GR, MAS/GR,  
 MEL/GR  
 Status: Pipe set; 4½", N-80, 11.6#, 4,650'  
 Rig Release: September 13, 2016

<u>FORMATION TOPS</u>	<u>DEPTH</u>	<u>SUBSEA</u>
Topeka	3290	-1566
Heebner	3406	-1682
Douglas Shale	3434	-1710
Brown Lime	3604	-1880
Lansing	3610	-1886
Stark Shale	3946	-2222
Swope	3952	-2228
Hushpuckney Shale	3984	-2260
Hertha	3990	-2266
Mississippi	4196	-2472
Kinderhook Shale	4274	-2550
Woodford Shale	4452	-2728
Viola	4481	-2757
Simpson Shale	4557	-2833
Simpson Sand	4566	-2842

### Viola

The top of the Viola was encountered at 4481' (-2757). It was a white to off-white dolomite, sucrosic texture, fine crystalline, moderate hardness grading to firm hardness, some friable, fair intercrystalline porosity with some quartz grains present. The samples exhibited yellow-fluorescence with a poor streaming cut and a continuous hotwire show of 178 units with C<sub>1</sub> C<sub>2</sub> C<sub>3</sub> C<sub>4</sub> recorded on the chromatograph thru the upper 21 foot porosity interval (4481' – 4502'). This porosity interval drilled off at a rate of 30 to 40 seconds/foot versus overlying shales that drilled at a rate of 1 - ½ minutes/foot. Evaluation of samples, gas detector recordings, Open

Hole Log calculations and correlative relationship to offset wells indicate the Liberty #1-8 encountered 9 feet of productive porosity bearing Viola with a oil-water contact at 4490' (-2766). See log analysis below:

	Rt	Ø d	Ø n	Ø cp	Ø s	Pe	Ø ml	Sw
4481 – 84	8	8	13	10.5	10	2.8	16	65%
4484 – 86	5	10	13	12	11	2.8	20	72%
4486 – 88	7	15	12	13.5	14	2.2	18	53%
4488 – 90	4.5	9	15	12.5	11	2.5	18	72%
4490 – 92	2	9	19	15	14	3	18	96%
4492 – 94	2	10	19	15.5	13	3	16	93%
4494 – 96	2.5	7	17	13	11	3	16	100%
4496 – 98	3	4	13	9.5	10	3	15	100%
4498 – 4500	4	1	11	7.5	8	3	15	100%
4500 – 02	6	7	12	10	10	2.5	15	84%
4502 – 56		3	69	5.5	8	3.4	--	tite

The S. Pat Creek Prospect/Liberty #1-8 proposed location was based on both seismic and subsurface geology; requiring three components to be successful for Viola production:

1. Porosity development due to a paleo-structural high feature.
2. Present day subsurface structurally high feature.
3. Fault separation from the north with a thinning of the Mississippi Formation, resulting in the Viola structural high.

Evaluation of the Liberty #1-8 well data indicate that all three components were met.

1) The Viola developed 21 porosity feet of dolomite, averaging 12% porosity with an effective Microlog porosity (permeability) of 18%; confirming, the Liberty #1-8 paleo-structurally positive position. By our interpretation, a recent well drilled by Messenger, - Adelhart #1-7, was positioned structural up-dip; however, not positioned in a paleo-structural high feature. Therefore, no potential for porosity development occurred which accounts for the Open Hole Log values of only 2 porosity feet of 9%.

2) The Liberty #1-8 was projected to encounter the top of the Viola at -2753, actually encountering the top at -2757; with only a 4 foot difference. This critical structural position puts the Liberty #1-8 oil column 5 feet high to the Julius - Weber #1 (-2762) which produced 6,737 BO.

3) Finally the third component necessary is separation from the north offset Weber #2 (-2758); which was wet. This fault separation is confirmed by both a significant thinning of the Mississippi Formation in the south block (30' thinner in the Liberty #1-8 vs. north offset Weber #2), as well as the presence of a 9 foot oil column while being down-dip to the wet Weber #2.

It is Okland Oil Company's recommendation to set pipe and test the Viola.

#### Hertha (Kansas City)

The top of the Hertha was encountered at 3990' (-2266). It was a buff-white to tan limestone, moderately firm, very fine crystalline, slightly fossiliferous, pinpoint vugglar porosity with some oolomitic porosity. The samples exhibit spotty yellow fluorescence, poor ring cut, hotwire show of 29 units with C<sub>1</sub> C<sub>2</sub> C<sub>3</sub> C<sub>4</sub> on the chromatograph while drilling off at a rate of 20 seconds/foot

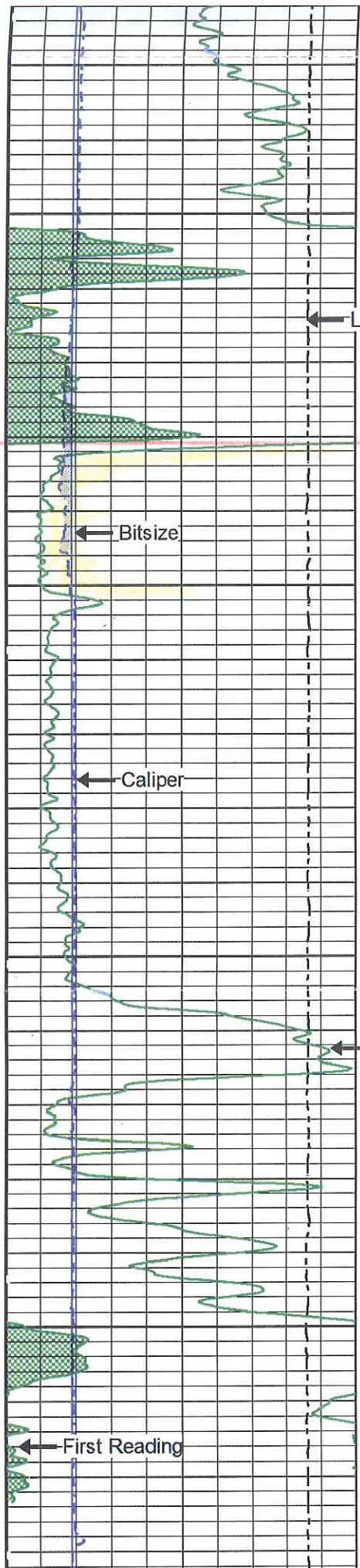
versus overlying shales that drilled at a rate of 1 - ¼ minutes/foot. There appear to be 2 porosity members within the Hertha, from 3992' – 3996' and 3998' – 4006'. The first porosity member (3992' – 3996') calculates on average porosity of 20.5% with a Sw of 19%. The second porosity member (3998 – 4004') calculates an average porosity of 26% with a Sw of 29%. See Log analysis below.

	Rt	Ø d	Ø n	Ø cp	Ø s	Pe	Ø ml	Sw
3992 – 94	30	18	20	19	12	5	11	20%
3994 – 96	28	22	21	21.5	14	4.5	11	18%
3998 – 4000	8	25	30	27	17	4.5	13	26%
4000 – 4002	6	25	28	26	17	4.5	12	32%
4002 – 4004	7	25	27	26	17	4.5	12	29%

This zone calculates productive on the Open Hole Logs as well as exhibiting sample and gas detector shows. More significant is the correlative relationship with two wells 5 miles to the southeast which were productive from the Hertha with similar log characteristics. The Edmiston - Lubbers "B" #2, NE NE NW, Section 25-29S-9W produced 75,315 BO and the Edmiston - Miller #3, SW SE SW, Section 24-29S-9W produced 85,231 BO.

It is Okland Oil Company's recommendation that the Hertha merits testing in the Liberty #1-8.

Gregg Alletag  
Geologist



Line Tension

VIOLA

Bitsize

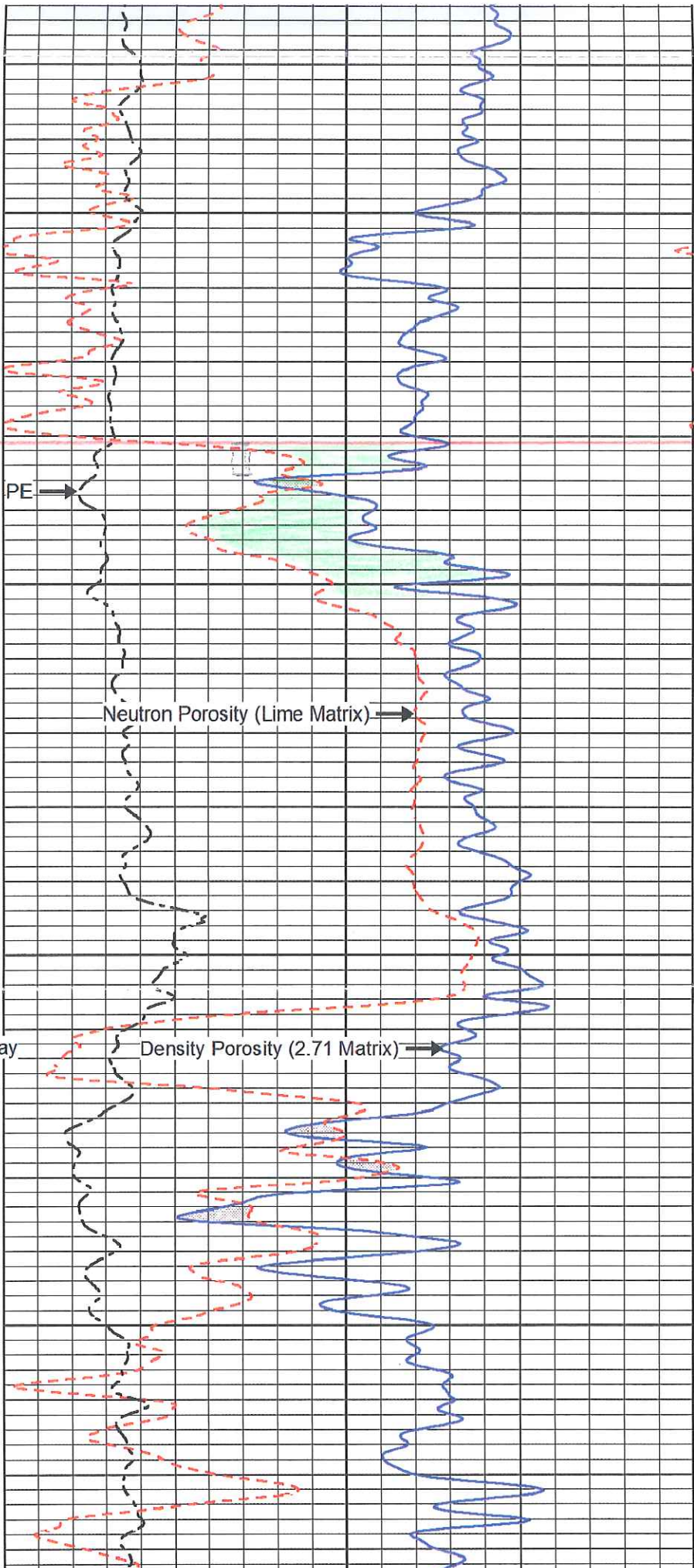
Caliper

Gamma Ray

First Reading

4500

4600



PE

Neutron Porosity (Lime Matrix)

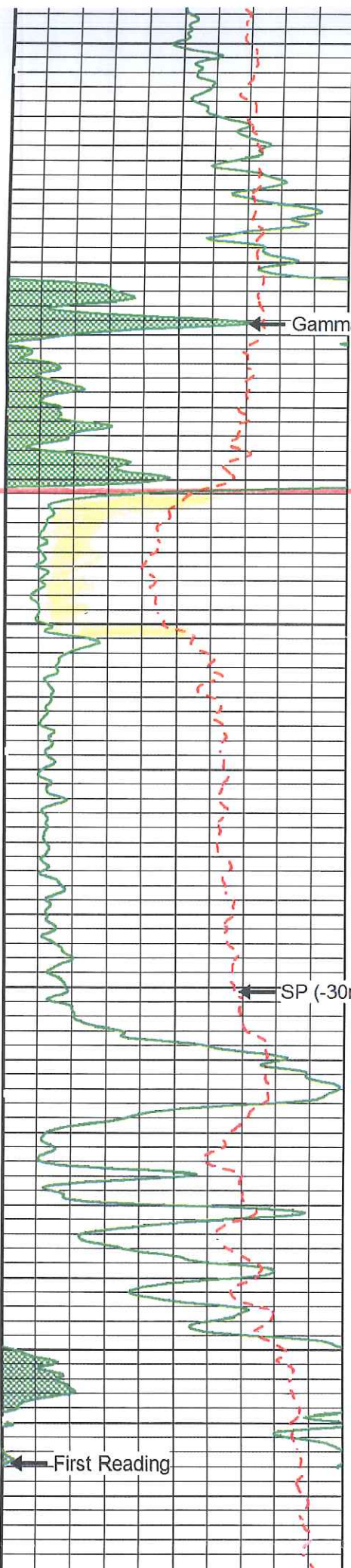
Density Porosity (2.71 Matrix)

First Reading

4500

4600





Gamma Ray

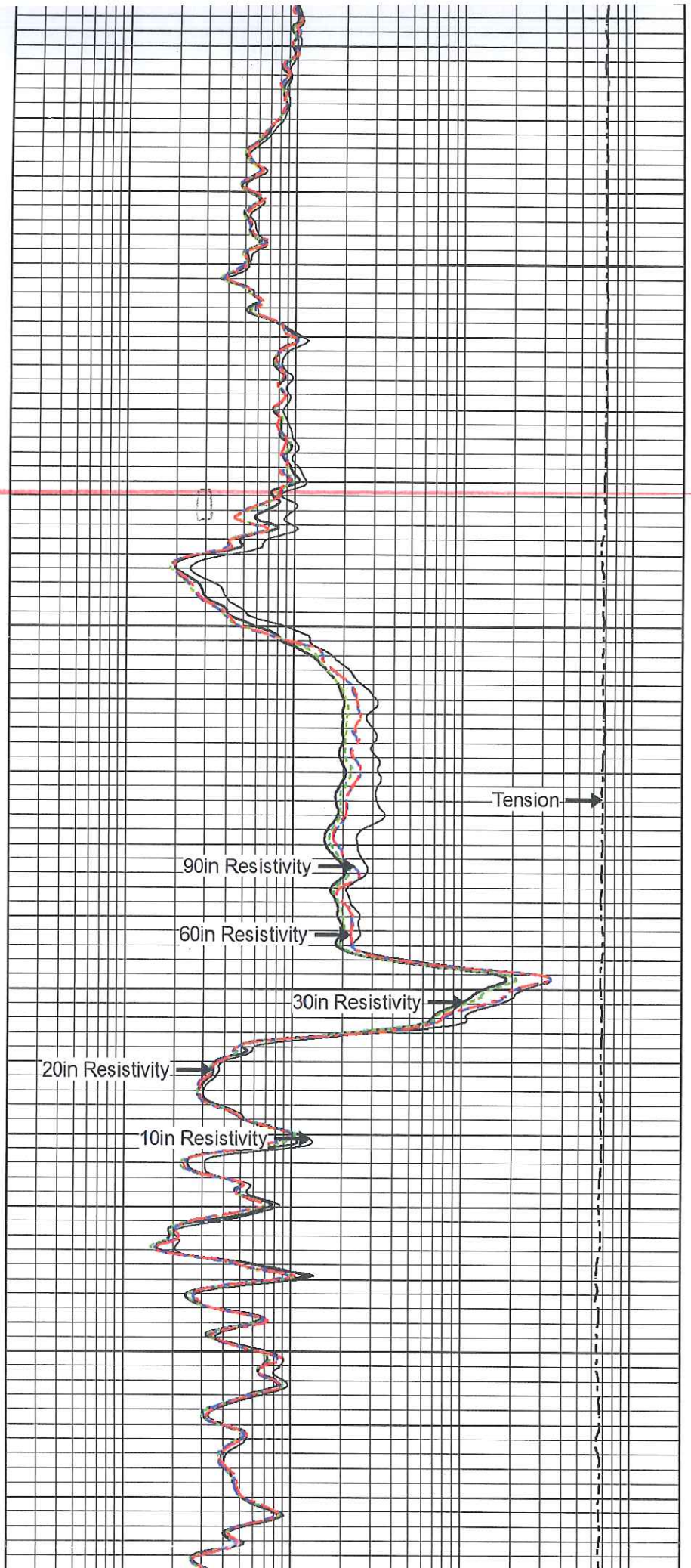
VIOLA

4500

SP (-30mv+)

4600

First Reading



Tension

90in Resistivity

60in Resistivity

30in Resistivity

20in Resistivity

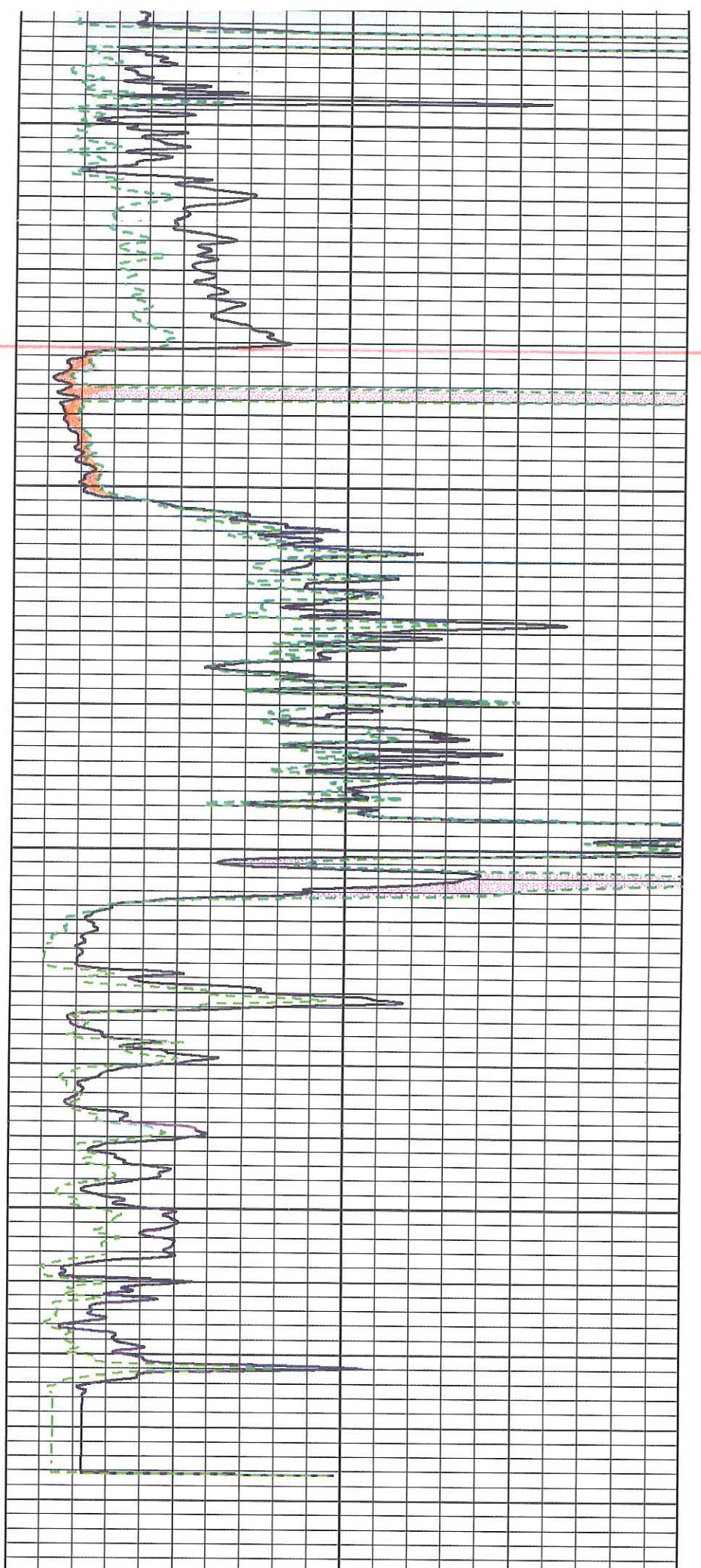
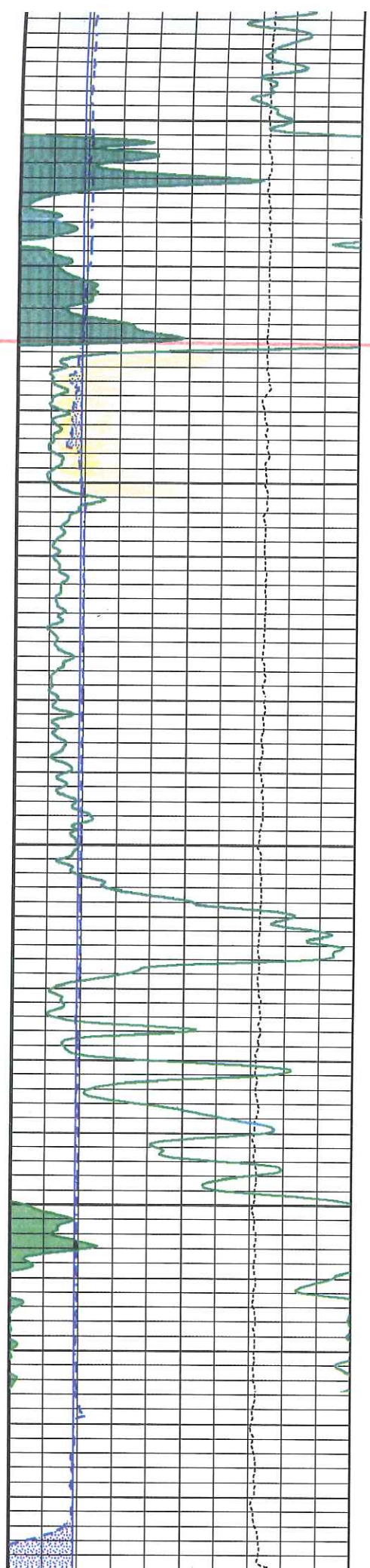
10in Resistivity



VIOLA

4500

4600





SH-MOD FRM, PLTY SPLNTY, SLI  
SLTY I.P., FNLY MICA

SH-DK GY-DK BRN-BLK, V/F TXT,  
SFT-MOD FRM, SPLNTY, SM BLKY  
I.P., W/ TR ORNG SPTTD FLOUR

SH-DK GY-DK BRN-BLK, V/F TXT,  
SFT-MOD FRM, SPLNTY, FISS, W/  
SPTTD ORNGE MIN FLOUR

LS-LT BRN-BRN, V/F-F XLN, MOD  
FRM, MOTT, SM SLI ARGL I.P., W/  
SLI SUC TXT, SLI OOLMOL'IC, W/  
TR-FR INTR-XLN POR, W/ SPTTD  
MOD BRT YEL FLOUR, W/ SLOW  
STRMNG CUT, NO VIS STN, NO  
ODOR

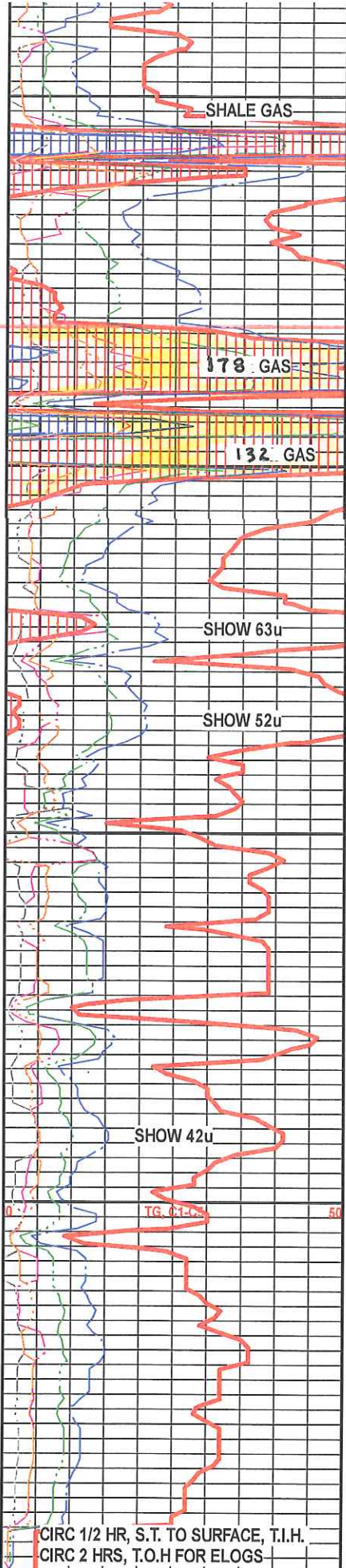
LS-OFF WHT-CRM, V/F-F XLN,  
MOD FRM, SLI SUC, SLI DOLOMIC,  
W/ FR INTR-XLN POR, NO VIS  
FLOUR, NO VIS CUT OR STN, NO  
ODOR

SH-MED GY, F TXT, SLI CALC I.P.,  
SM SLI SNDY I.P.

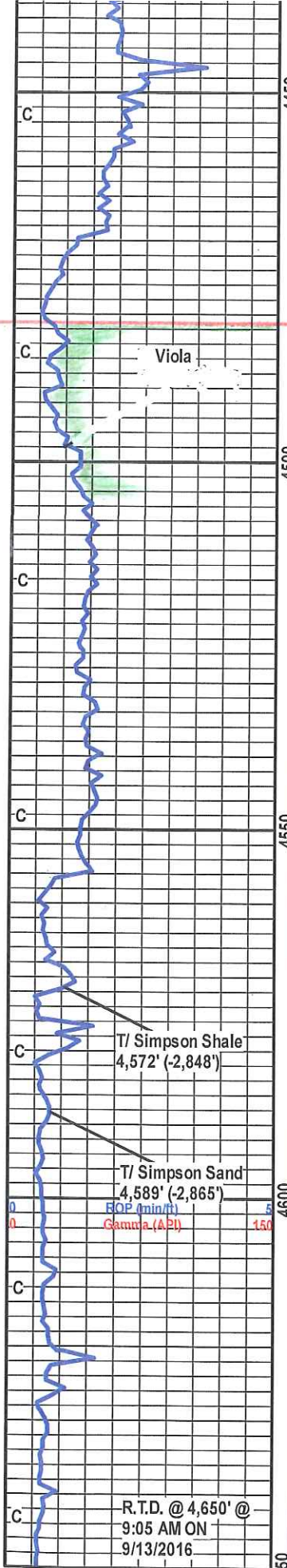
SS-LT GY-MED GY, V/FG, CONSD,  
WELL SRTD, S/RND-S/ANG, SLI  
SLTY-ARGL, W/ TR INTR-GRAN  
POR, W/ SPTTD DULL YEL MIN  
FLOUR, NO VIS CUT OR STN, NO  
ODOR

SH-DK GY-BLK, V/F TXT, SFT-MOD  
FRM, PLTY, SLI PYR'IC I.P., FNLY  
MICA

THANK YOU FOR CHOOSING  
GEODYNAMIC WELL LOGGING

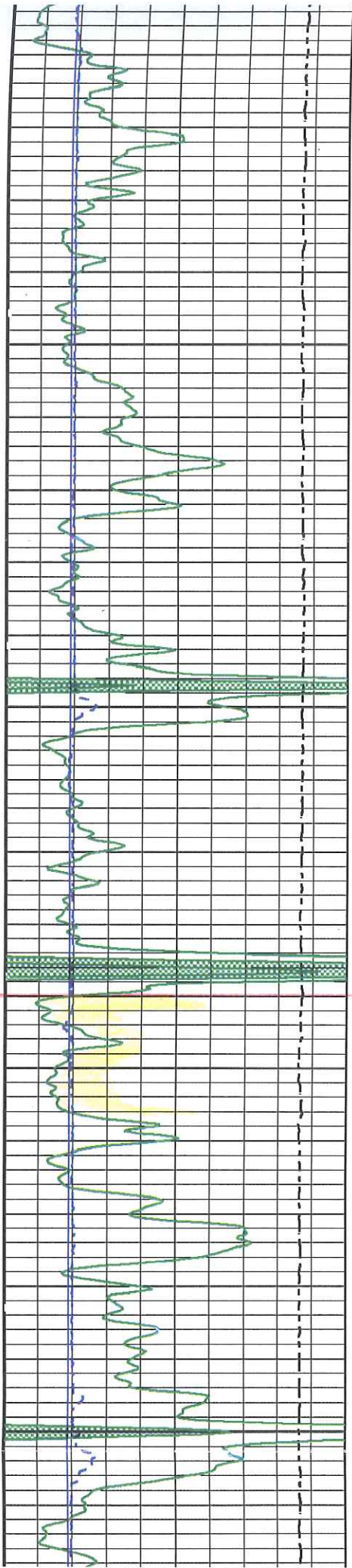


CIRC 1/2 HR, S.T. TO SURFACE, T.I.H.  
CIRC 2 HRS, T.O.H FOR ELOGS



BCP (min/f)  
Gamma (API)

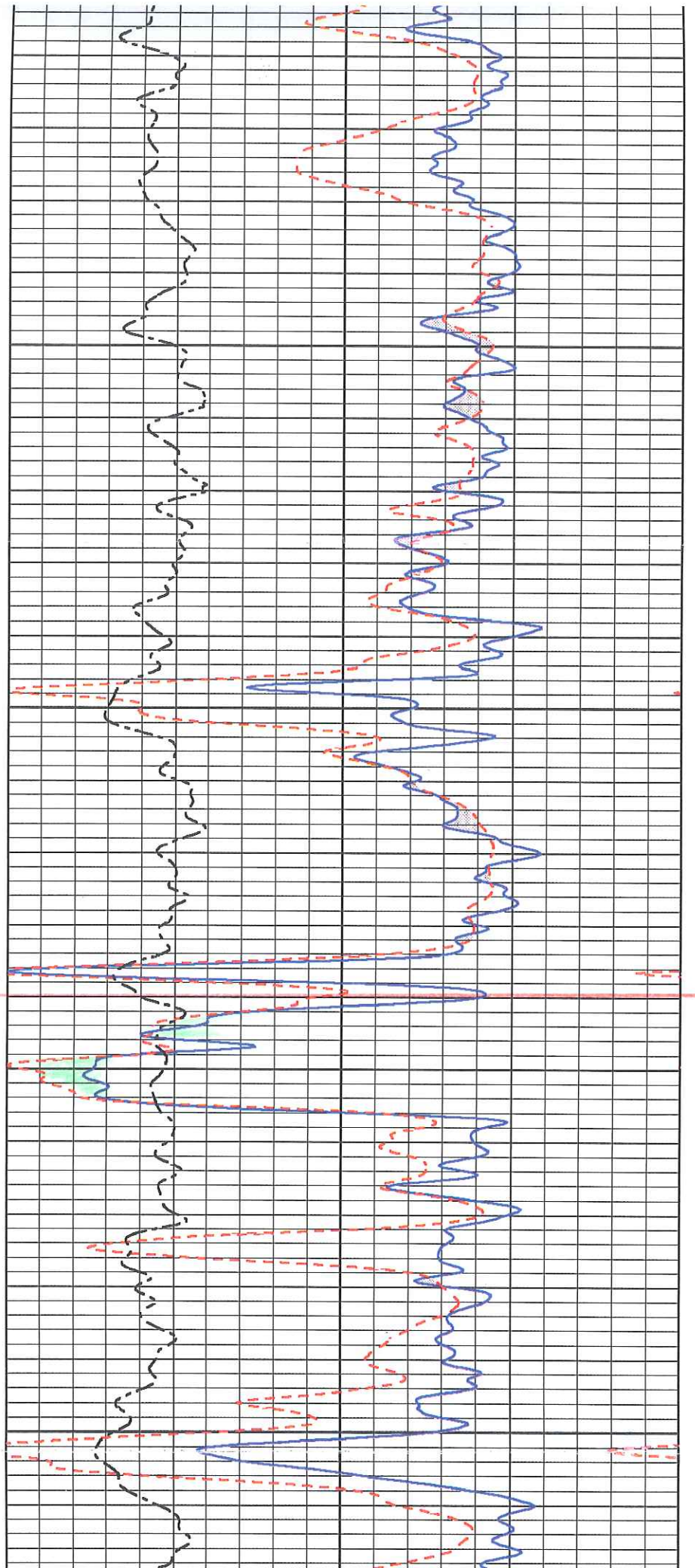




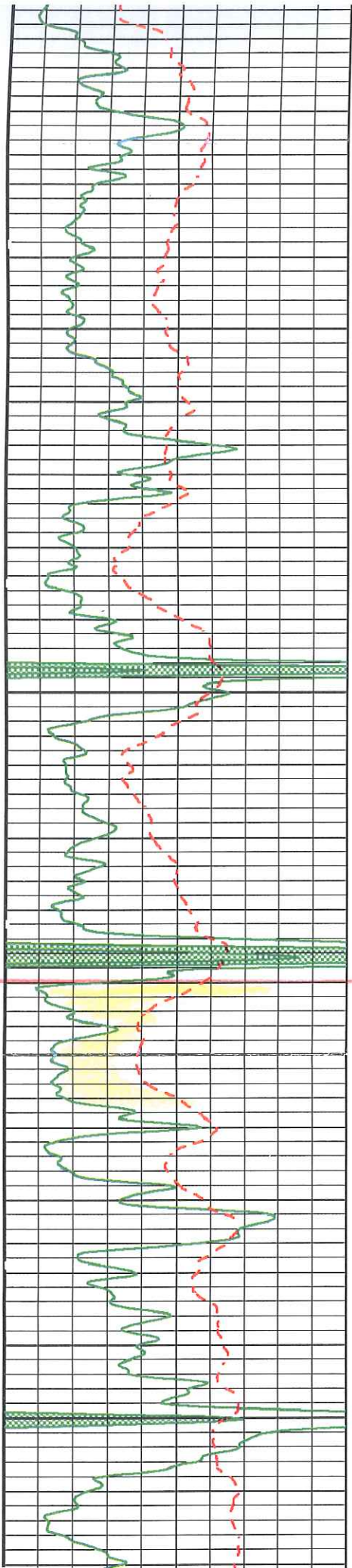
3900

HERTHA

4000



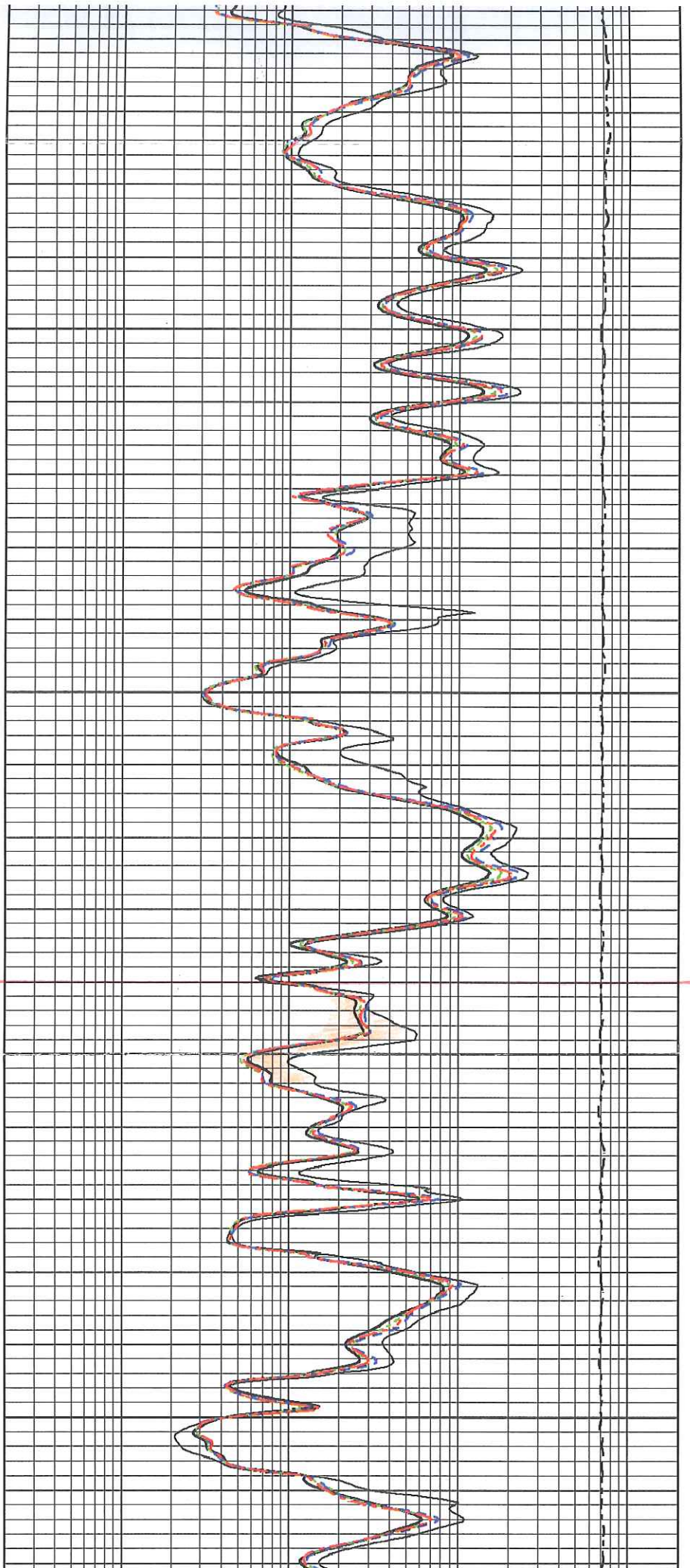




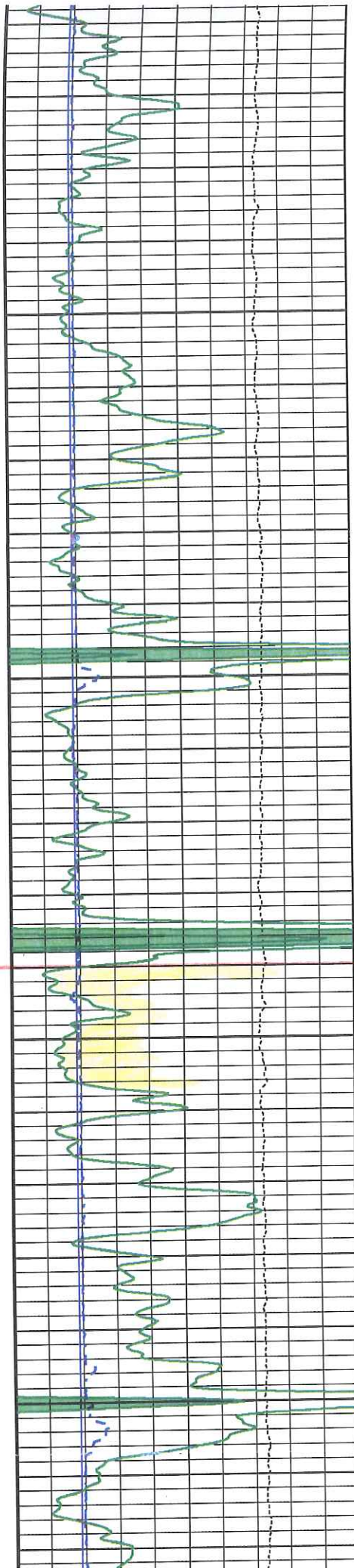
3900

HERTHA

4000



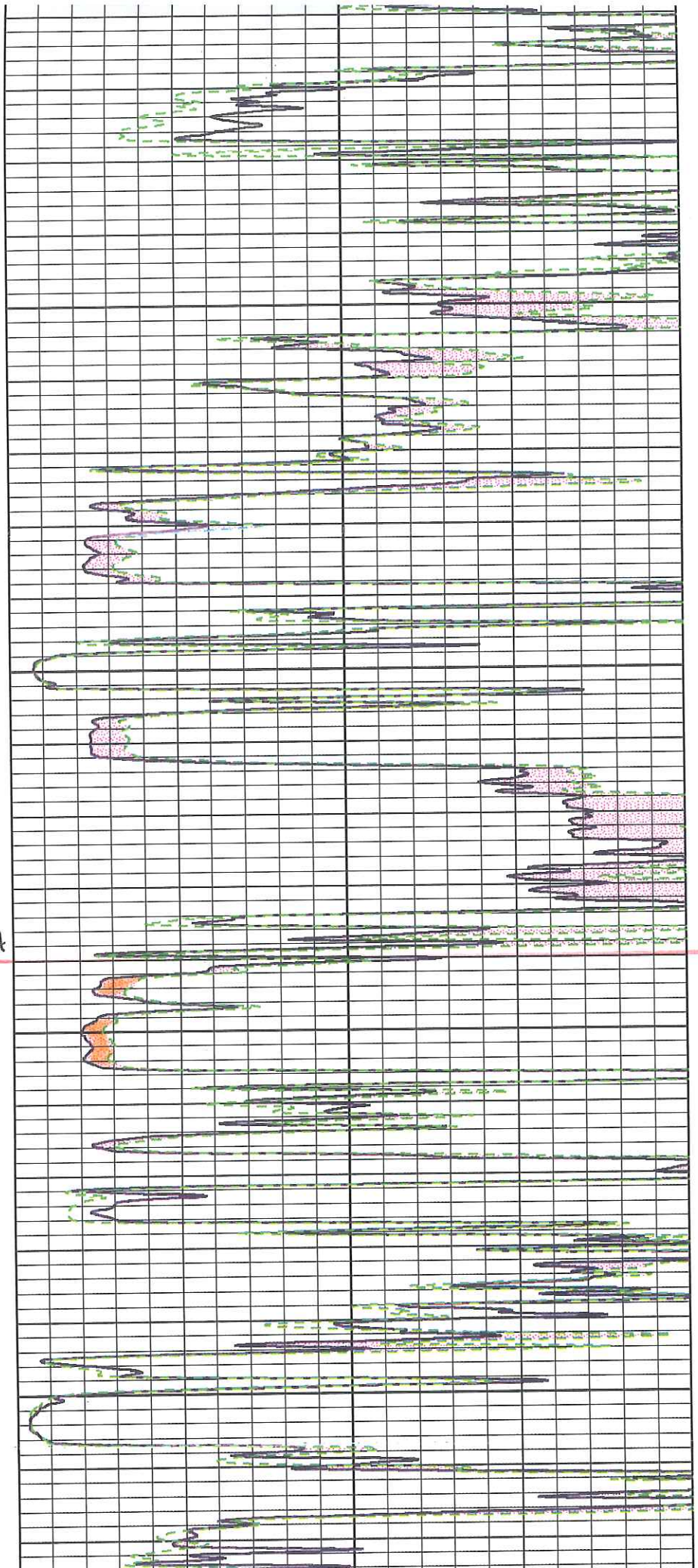




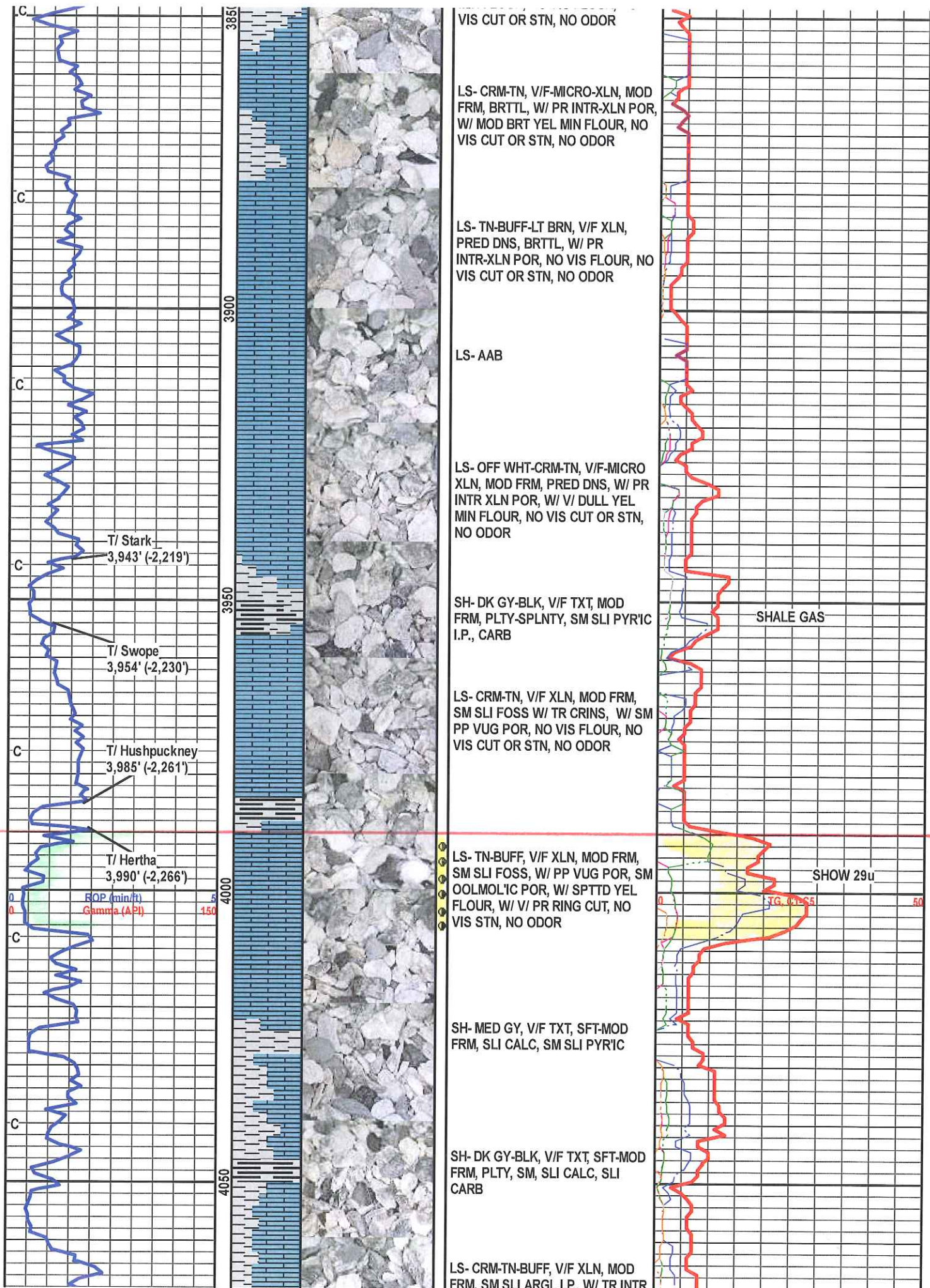
3900

HERTHA

4000







VIS CUT OR STN, NO ODOR

LS- CRM-TN, V/F-MICRO-XLN, MOD FRM, BRTTL, W/ PR INTR-XLN POR, W/ MOD BRT YEL MIN FLOUR, NO VIS CUT OR STN, NO ODOR

LS- TN-BUFF-LT BRN, V/F XLN, PRED DNS, BRTTL, W/ PR INTR-XLN POR, NO VIS FLOUR, NO VIS CUT OR STN, NO ODOR

LS- AAB

LS- OFF WHT-CRM-TN, V/F-MICRO XLN, MOD FRM, PRED DNS, W/ PR INTR XLN POR, W/ V/ DULL YEL MIN FLOUR, NO VIS CUT OR STN, NO ODOR

SH- DK GY-BLK, V/F TXT, MOD FRM, PLTY-SPLNTY, SM SLI PYR'IC I.P., CARB

SHALE GAS

LS- CRM-TN, V/F XLN, MOD FRM, SM SLI FOSS W/ TR CRINS, W/ SM PP VUG POR, NO VIS FLOUR, NO VIS CUT OR STN, NO ODOR

LS- TN-BUFF, V/F XLN, MOD FRM, SM SLI FOSS, W/ PP VUG POR, SM OOLMOL'IC POR, W/ SPTTD YEL FLOUR, W/ V/ PR RING CUT, NO VIS STN, NO ODOR

SHOW 29u

SH- MED GY, V/F TXT, SFT-MOD FRM, SLI CALC, SM SLI PYR'IC

SH- DK GY-BLK, V/F TXT, SFT-MOD FRM, PLTY, SM, SLI CALC, SLI CARB

LS- CRM-TN-BUFF, V/F XLN, MOD FRM, SM SLI ARGL I.P. W/ TR INTR

T/ Stark  
3,943' (-2,219')

T/ Swope  
3,954' (-2,230')

T/ Hushpuckney  
3,985' (-2,261')

T/ Hertha  
3,990' (-2,266')

ROP (min/ft)

Gamma (API)

TG (TSS)