

Tucker
ENERGY SERVICES

COMPENSATED NEUTRON
PEL DENSITY MICRO LOG

Company LANGSTON D.S.
Well REIF A & B #31-3
Field MARY IDA
County RICE
State KANSAS
Country USA
API No. 15-159-22781

File No : TUL-59596
Company : LANGSTON D.S.
Well : REIF A & B #31-3
Field : MARY IDA
County : RICE
State : KANSAS
Country : USA
API No : 15-159-22781

Location :
825' FSL & 2970' FEL
S2 NE SE SW

LSD : Sect : 31 Twp : 18S Rge : 10W

Permanent Datum: GL
Drilling Measured From: KB
Log Measured From: KB
Above Permanent Datum: 9.00 Ft
Elevations: KB 1765.00 Ft, DF 1764.00 Ft, GL 1756.00 Ft

Services: CNT, LDT, MLT, CST, PIT

Date	05-20-2014	
Run Number	1	
Depth--Driller	3470.0	Ft
Depth--Logger	3470.0	Ft
First Reading	3437.0	Ft
Last Reading	486.0	Ft
Casing--Driller	486.0	Ft
Casing--Logger	486.0	Ft
Bit Size	7.875	in
Casing Size	8.625	in
Hole Fluid Type	WBM	
Density	9.3	
Fluid Loss	8.8	
PH/Viscosity	11.0	58.0
Sample Source	MEASURED	
RM@Measured Temp.	0.500	@ 80 F
RMF@Measured Temp	0.430	@ 80 F
RMG@Measured Temp.	0.580	@ 80 F
Source RMF/RMG	CALCULATED/CALCULATED	
RM@BHT	0.360	@ 115 F
Time Circulation Stopped	05-20-2014 1:30 pm	
Max Recorded Temp.	117	F
Equipment/Base	T-123	TULSA
Recorded By	S. DAVIS	
Witnessed By	D. LANGSTON	

The customer is hereby warned that by providing the log data herein, T. E. S. does not agree to provide any interpretation of log data, conversion of log data to physical rock parameters or recommendations. T. E. S. does not guarantee or warrant either expressly or impliedly, the accuracy of any interpretation of log data, conversion of log data to physical rock parameters or recommendations which may be given by T. E. S. personnel. Any interpretation, conversion or recommendation is not part of the consideration for the agreement between the parties and is not part of any part of the charge by T. E. S. for its services. Any user of the log data is warned that said user is not entitled to rely on interpretations, conversions or recommendations as aforesaid.

Bitsize Intervals		Casing Strings			
Size (In)	Bottom (Ft)	Size (In)	Weight (Lbs)	Bottom (Ft)	Top (Ft)
7.875	3470.00	8.625	24.00	486.00	0.00

Run Number	1	
Date	05-20-2014	
Date/Time On Bottom	05-20-2014 4:15 pm	
Depth to Fluid	0.0	Ft
Salinity	8800.000	
RMF@BHT	0.300	@ 115 F
RMC@BHT	0.410	@ 115 F

Run Number 1

Comments

ALL PRESENTATIONS AS PER CUSTOMER REQUEST
 GRT, CNT, LDT, MLT, CST, AND PIT RUN IN COMBINATION
 CALIPERS ORIENTED ON X-Y AXIS
 2.71 G/CC USED TO CALCULATE POROSITY
 ANNULAR HOLE VOLUME CALCULATED USING 5.50" PRODUCTION CASING
 PHIN IS CALIPER CORRECTED
 DETAIL SECTION FROM TD TO 2600'
 ANHYDRATE SECTION FROM 1350' TO 950'

GRT: GRP.
 CNT: PHIN, CLCNIN.
 LDT: PORL, LCORN, PECLN, LDENN, CLLDIN.
 MLT: NOR_RF, INV_RF, MSCLPIN.
 CST: PORS, ITT, CDTF, TT1, TT2, TT3, TT4.
 PIT: ILD, ILM, SFLAEC, CIRD, SPU

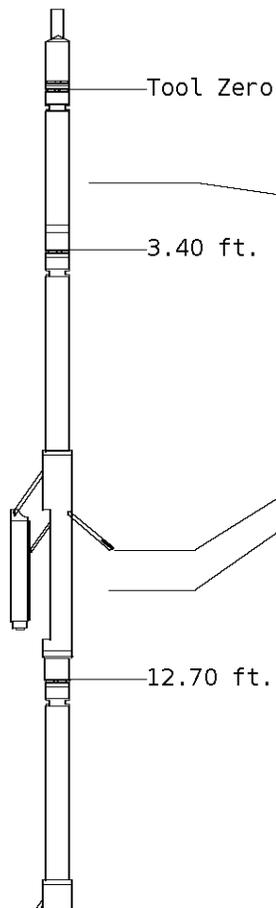
OPERATORS:

C. GONZALES

J. THOMAS

Tool String Schematic

Total Tool Length - 67.37 ft.
Maximum Outside diameter - 6.00 in.
Net Weight in Air - 1171.00 lbs.



Tool: GRT-B **Length:** 3.40 ft. **O.D.** 3.60 in.
 Gamma Ray Controller

Sonde ID :GRT-BB-107

Measure Point	Tool Offset	Stack Offset	Bottom Offset
GRP	2.00	2.00	65.37

Tool: CNT-AA **Length:** 9.30 ft. **O.D.** 4.36 in.
 Compensated Neutron A Pad on NDT-A

Sonde ID :NDT-BD-133

Source ID :N-1045

Pad ID :CNP-AA-024

Measure Point	Tool Offset	Stack Offset	Bottom Offset
CLCN	6.00	9.40	57.97
PHIN	6.80	10.20	57.17

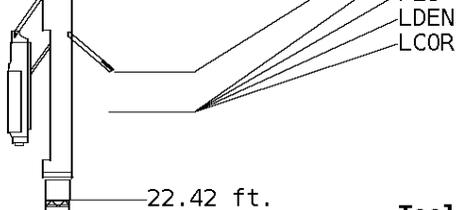
Tool: LDT-DF **Length:** 9.72 ft. **O.D.** 4.80 in.
 Litho Density D Pad on NDT-F

Sonde ID :PDT-GA-466

Source ID :2991GW

Pad ID :LDP-DA-065

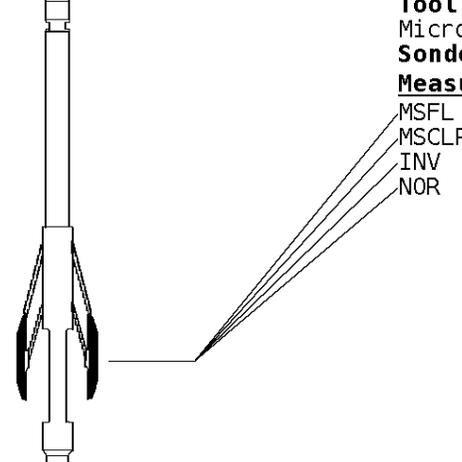
Measure Point	Tool Offset	Stack Offset	Bottom Offset
CLLD	6.42	19.12	48.25
PEL	7.42	20.12	47.25
PES	7.82	20.52	46.85



7.62 20.32 47.05
 7.62 20.32 47.05

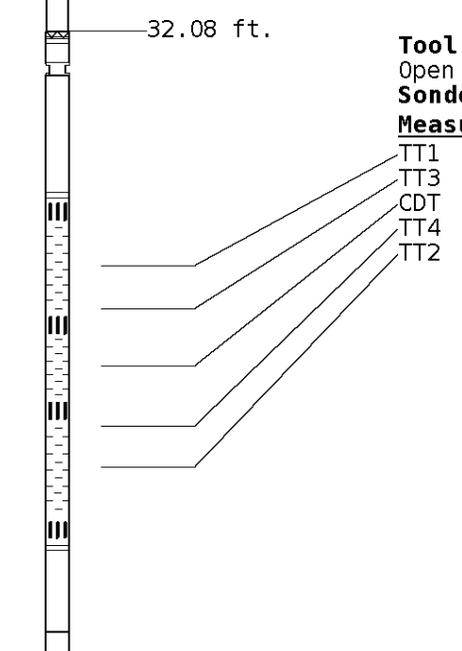
Tool: MST-DA **Length:** 9.66 ft. **O.D.** 6.00 in.
 Micro Spherically Focused (IC)
Sonde ID :MST-DA-057

Measure Point	Tool Offset	Stack Offset	Bottom Offset
MSFL	7.60	30.02	37.35
MSCLP	7.60	30.02	37.35
INV	7.60	30.02	37.35
NOR	7.60	30.02	37.35



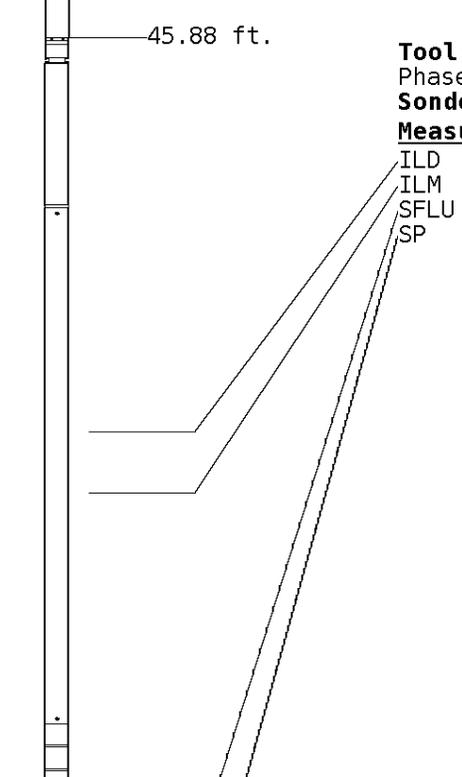
Tool: CST-AD **Length:** 13.80 ft. **O.D.** 3.60 in.
 Open Hole Sonic
Sonde ID :CST-AB-25

Measure Point	Tool Offset	Stack Offset	Bottom Offset
TT1	4.80	36.88	30.49
TT3	5.80	37.88	29.49
CDT	7.30	39.38	27.99
TT4	8.80	40.88	26.49
TT2	9.80	41.88	25.49



Tool: PIT-CA **Length:** 21.49 ft. **O.D.** 3.62 in.
 Phased Dual Induction w/ RM & D
Sonde ID :PIT-AB-005

Measure Point	Tool Offset	Stack Offset	Bottom Offset
ILD	8.92	54.80	12.56
ILM	10.10	55.98	11.39
SFLU	17.49	63.37	4.00
SP	20.60	66.48	0.88



LWT 67.37 ft.

Well File: lang-reif-31-3-quint-may-20
 Segment: V1.D1.S6 MAIN
 Reference: 0

Scale: 1:240 Format: NLD-240
 Acquired: 2014-05/20 16:23 3.3.0-12594
 Processed: 2014-05/20 17:54 3.3.0-12594

CALIPER MICRO INCHES (IN)	
16	26
6	16

BIT SIZE INCHES (IN)	
6	16

NEUTRON (Y) CALIPER INCHES (IN)	
16	26
6	16

NORMAL OHMM	
0	40
INVERSE OHMM	
0	40

DENSITY (X) CALIPER INCHES (IN)	
16	26
6	16

Volume Quartz	PE CROSS-SECTION BARNs/ELECTRON	DENSITY CORRECTION G/CC
0	10	-0.25
		0.25

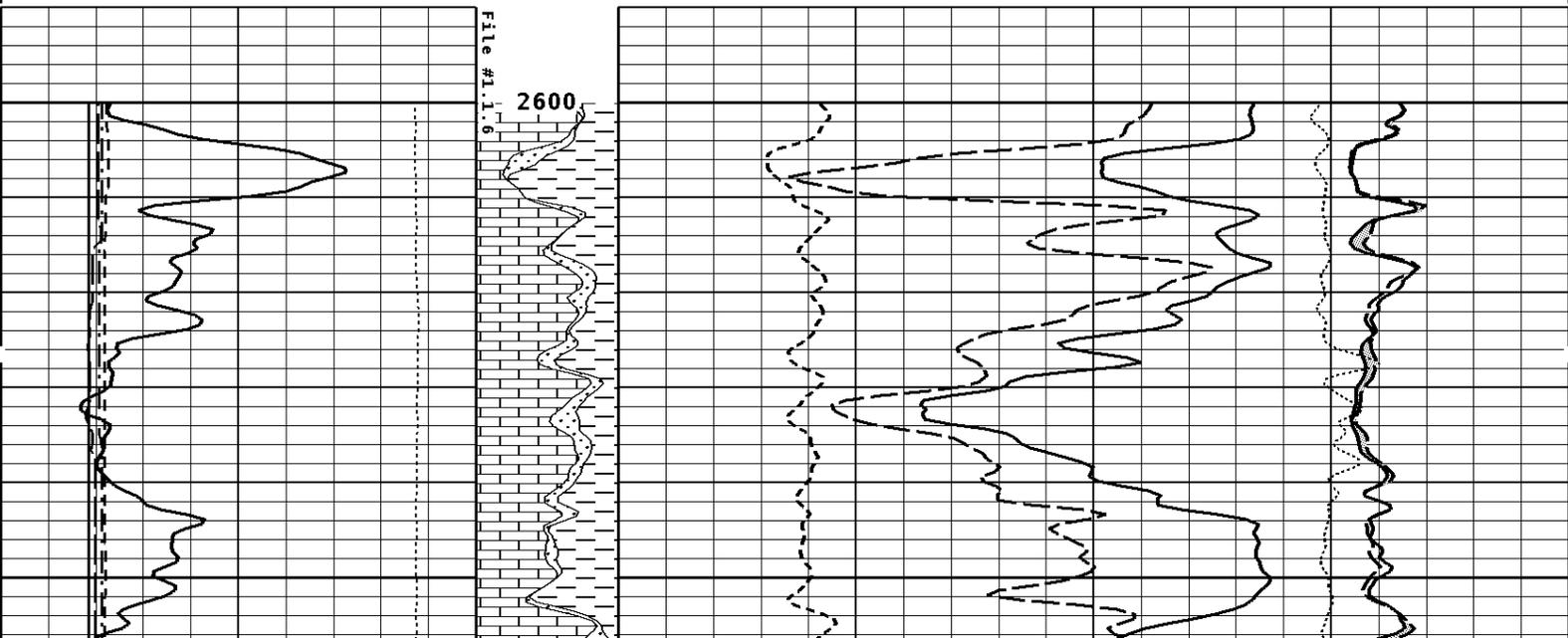
TENSION LBS	
10000	0

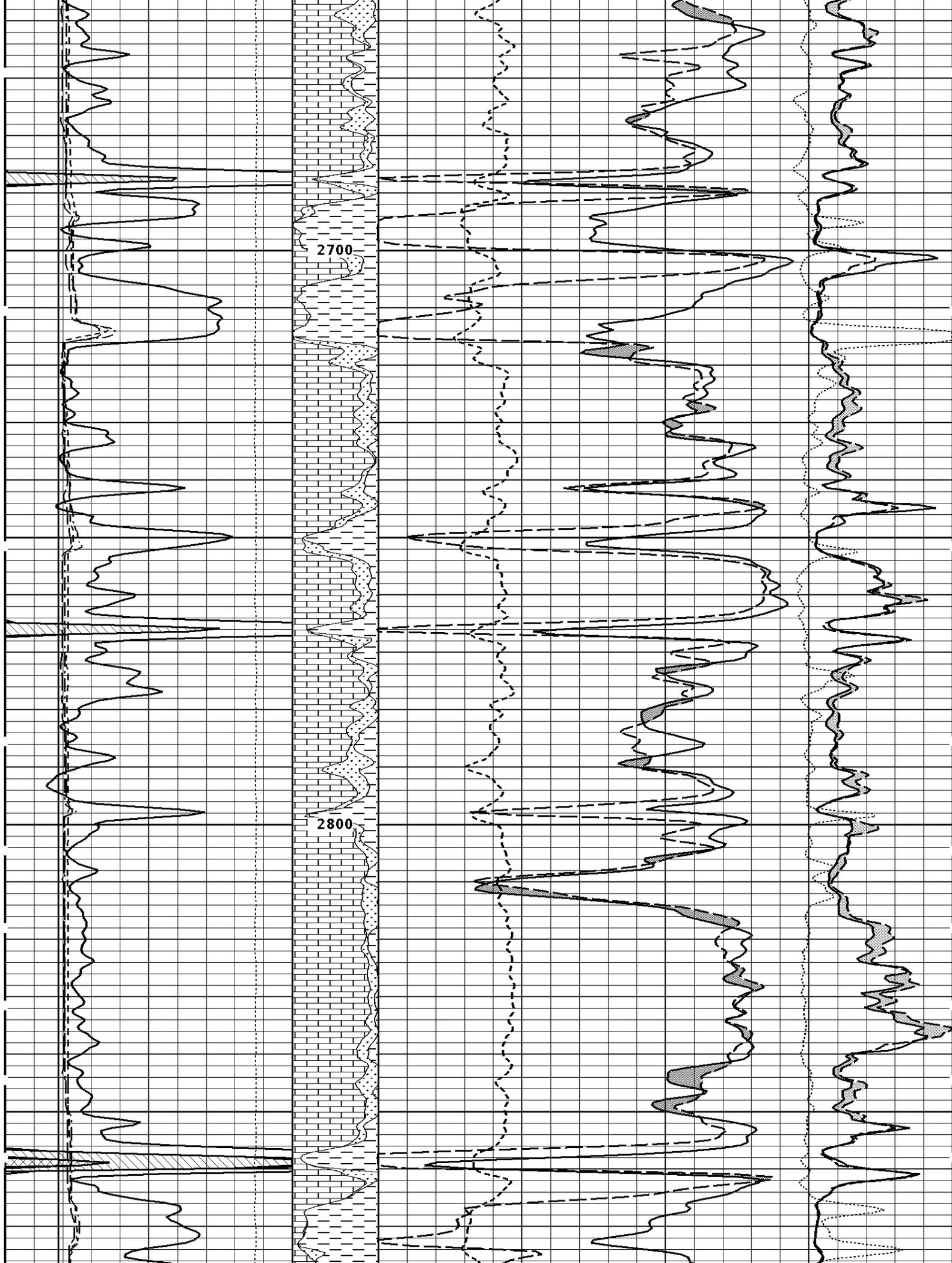
Volume Calcite	DENSITY POROSITY (2.71g/cc) PERCENT
70	30
30	-10
-10	-50

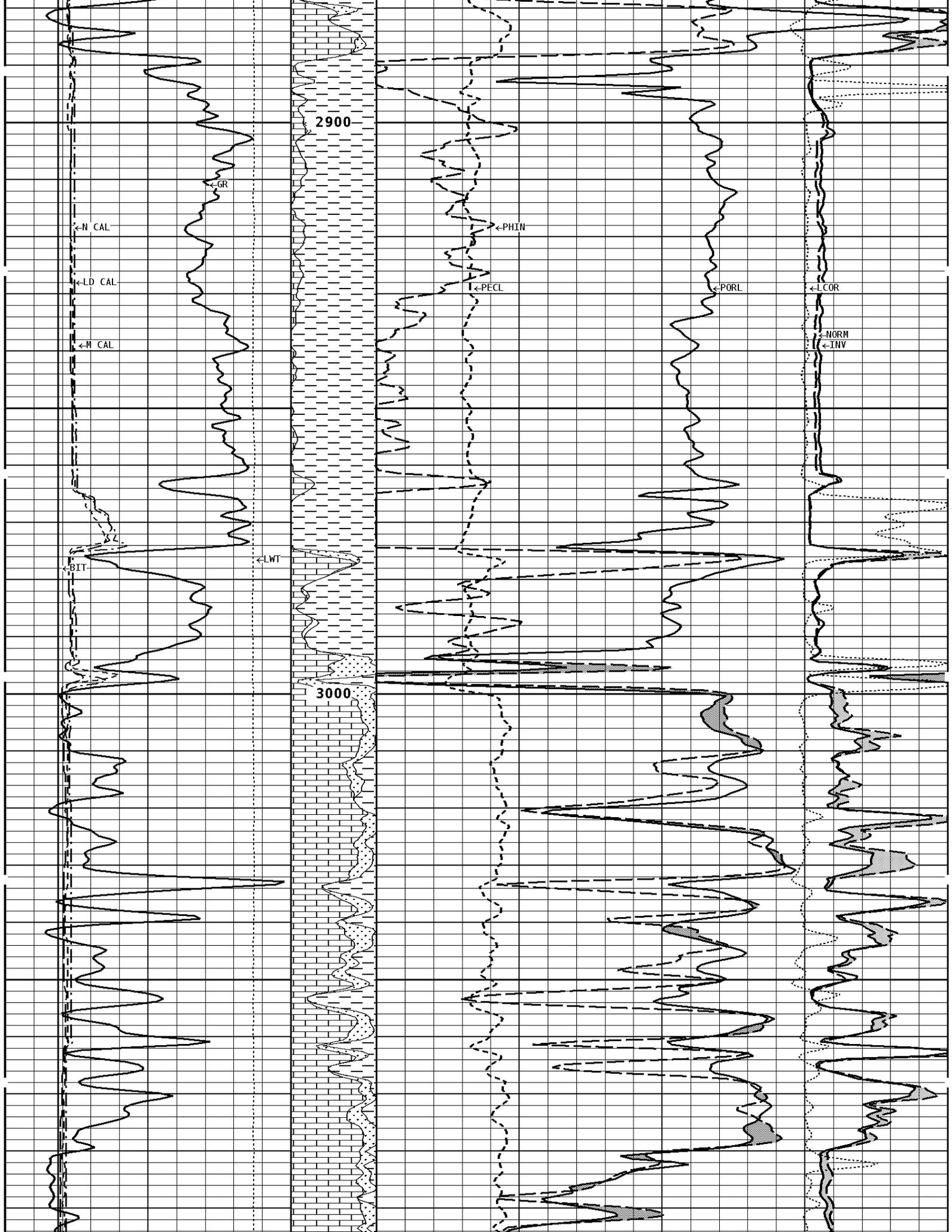
GAMMA RAY API UNITS	
150	300
0	150

Volume Dolo/Shale	NEUTRON POROSITY (LIMESTONE) PERCENT
30	-10

1:240 MAIN SECTION



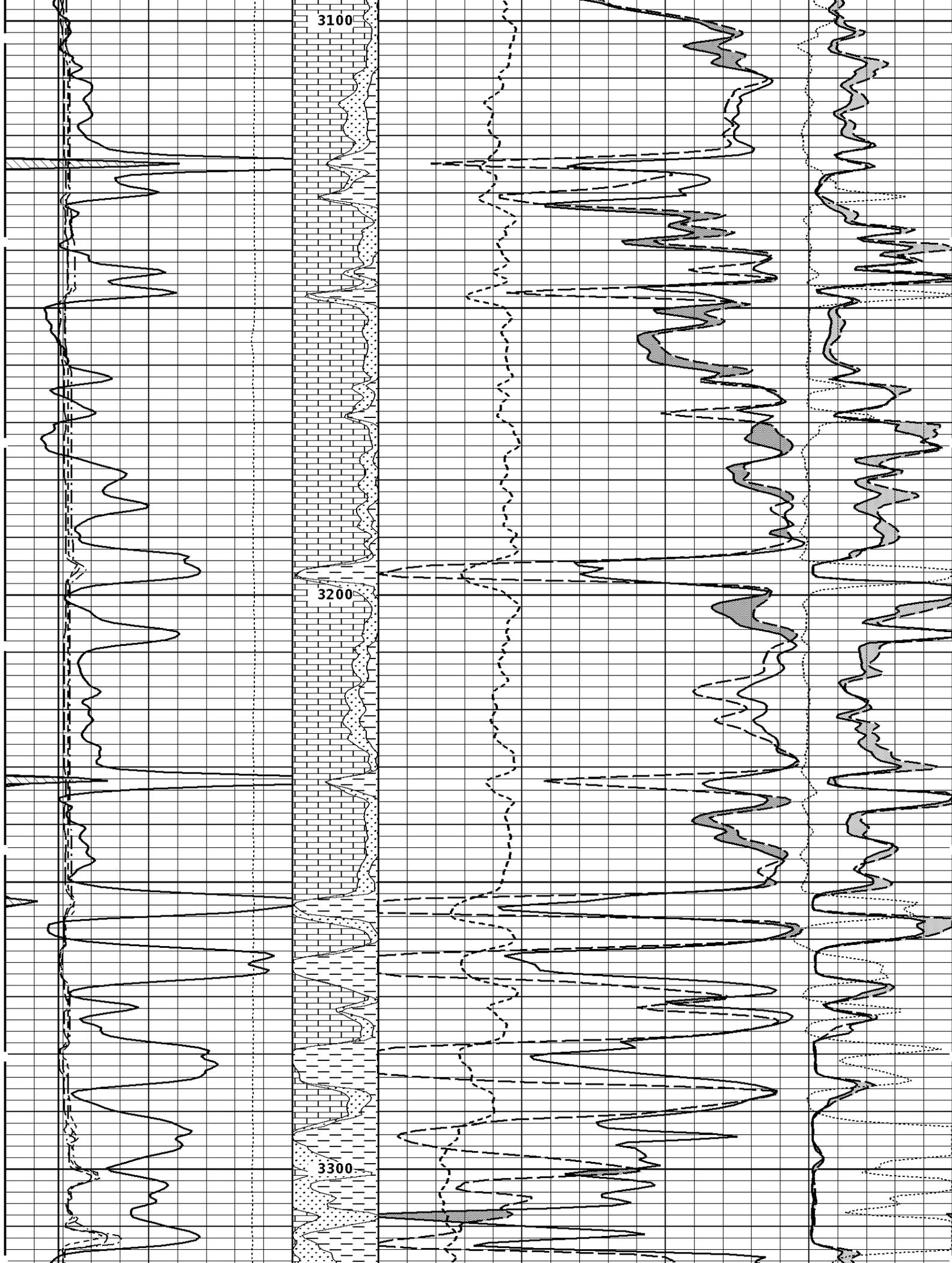




3100

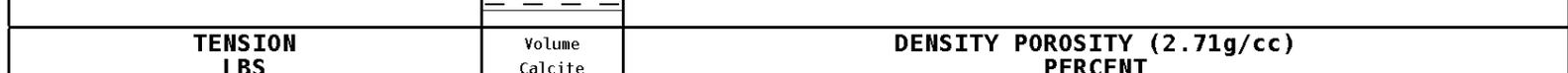
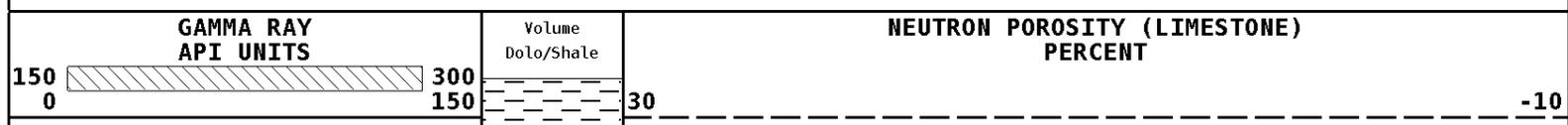
3200

3300





1:240 MAIN SECTION



10000	0		70	30	30
			-10		-10
					-50
DENSITY (X) CALIPER INCHES (IN)		Volume Quartz	PE CROSS-SECTION BARNS/ELECTRON		DENSITY CORRECTION G/CC
16	26		0	10	-0.25
6	16				0.25
NEUTRON (Y) CALIPER INCHES (IN)					INVERSE OHMM
16	26				0
6	16				40
BIT SIZE INCHES (IN)					NORMAL OHMM
6	16				0
					40
CALIPER MICRO INCHES (IN)					
16	26				
6	16				

*** Borehole Zone Factors ***

Zone 1 99999.0 to 0.0 Feet		
Matrix Density	_____	2.71 g/cc
Fluid Density	_____	1.00 g/cc
Formation Matrix	_____	Limestone
Drill Bit Size	_____	7.875 in
Casing Diameter	_____	5.500 in
Casing Thickness	_____	0.250 in
Casing Correction (PHI N)	_____	Disable

Well File: lang-reif-31-3-quint-may-20 **Scale:** 1:240 **Format:** NLD-240
Segment: V1.D1.S4 RP **Acquired:** 2014-05/20 16:09 3.3.0-12594
Reference: 0 **Processed:** 2014-05/20 17:54 3.3.0-12594

CALIPER MICRO INCHES (IN)					
16	26				
6	16				
BIT SIZE INCHES (IN)					NORMAL OHMM
6	16				0
					40
NEUTRON (Y) CALIPER INCHES (IN)					INVERSE OHMM
16	26				0
6	16				40
DENSITY (X) CALIPER INCHES (IN)		Volume Quartz	PE CROSS-SECTION BARNS/ELECTRON		DENSITY CORRECTION G/CC
16	26		0	10	-0.25
6	16				0.25
TENSION LBS		Volume Calcite	DENSITY POROSITY (2.71g/cc) PERCENT		
10000	0		70		30
			30		-10
			-10		-50
GAMMA RAY API UNITS		Volume Dolo/Shale	NEUTRON POROSITY (LIMESTONE) PERCENT		
150	300		30		-10
0	150				

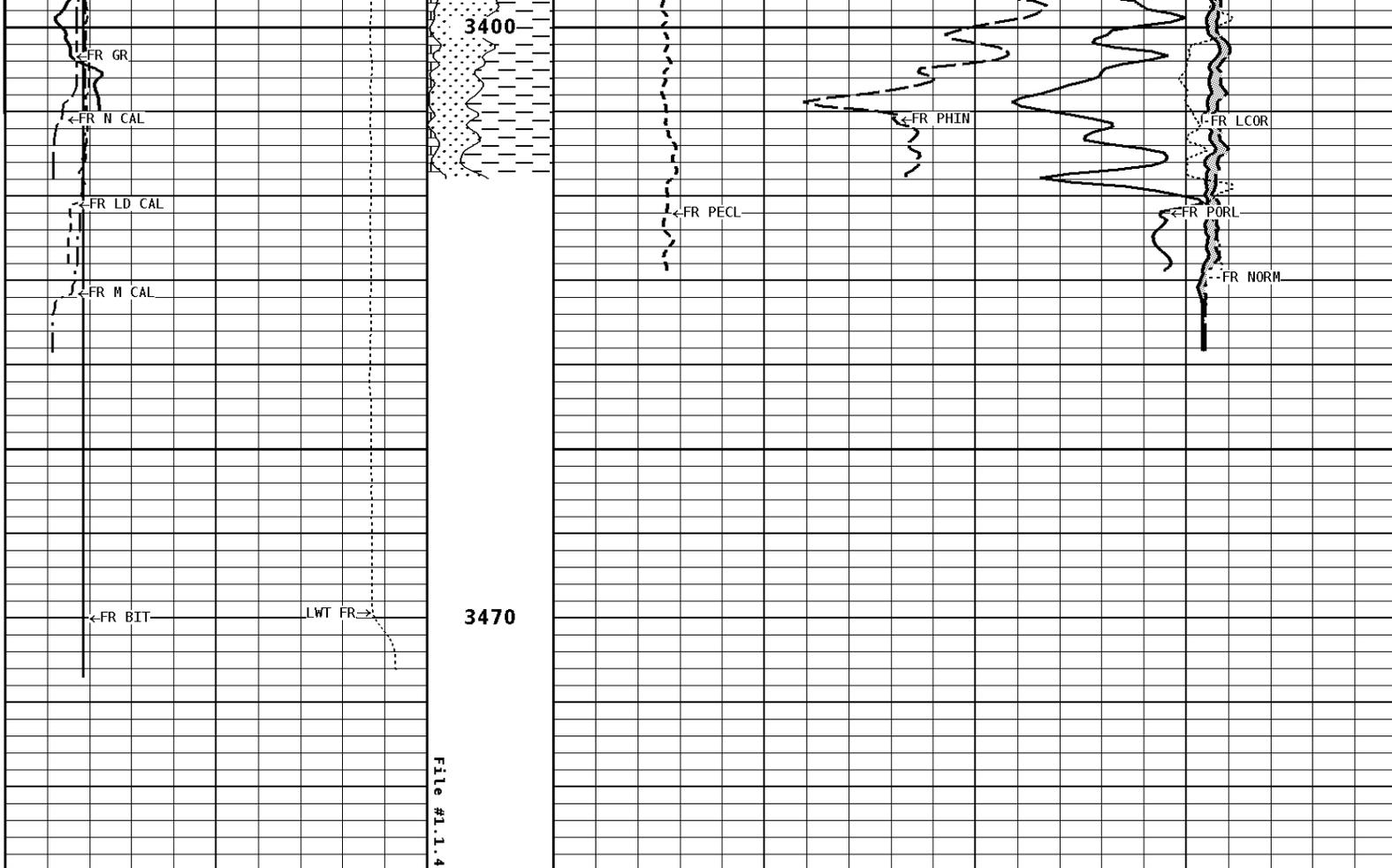
1:240 REPEAT SECTION

File #1.1.4

3200

3300





1:240 REPEAT SECTION

GAMMA RAY API UNITS 150 0 300 150		Volume Dolo/Shale 30	NEUTRON POROSITY (LIMESTONE) PERCENT ----- -10	
TENSION LBS 10000 0		Volume Calcite 70 30 -10	DENSITY POROSITY (2.71g/cc) PERCENT ----- -50	
DENSITY (X) CALIPER INCHES (IN) 16 6 26 16		Volume Quartz 0	PE CROSS-SECTION BARN/ELECTRON 10 -0.25	DENSITY CORRECTION G/CC ----- 0.25
NEUTRON (Y) CALIPER INCHES (IN) 16 6 26 16				INVERSE OHM 0 40
BIT SIZE INCHES (IN) 6 16				NORMAL OHM 0 40
CALIPER MICRO INCHES (IN) 16 6 26 16				

* Borehole Zone Factors *

Zone 1 99999 0 to 0 0 Feet

Matrix Density	2.71	g/cc
Fluid Density	1.00	g/cc
Formation Matrix	Limestone	
Drill Bit Size	7.875	in
Casing Diameter	5.500	in
Casing Thickness	0.250	in
Casing Correction (PHI N)	Disable	

Well File: lang-reif-31-3-quint-may-20 Scale: 1:240 Format: LDT-240
 Segment: V1.D1.S6 MAIN Acquired: 2014-05/20 16:23 3.3.0-12594
 Reference: 0 Processed: 2014-05/20 17:54 3.3.0-12594

BIT SIZE INCHES (IN)	
6	16

NEUTRON (Y) CALIPER INCHES (IN)	
16	26
6	16

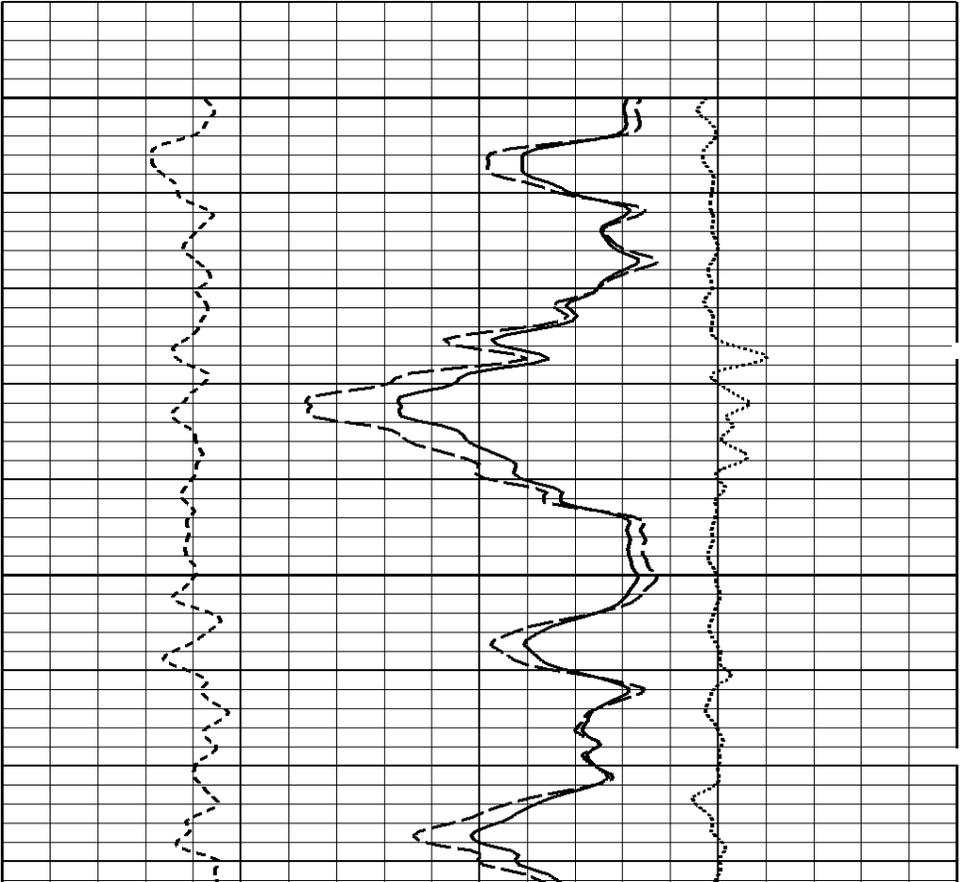
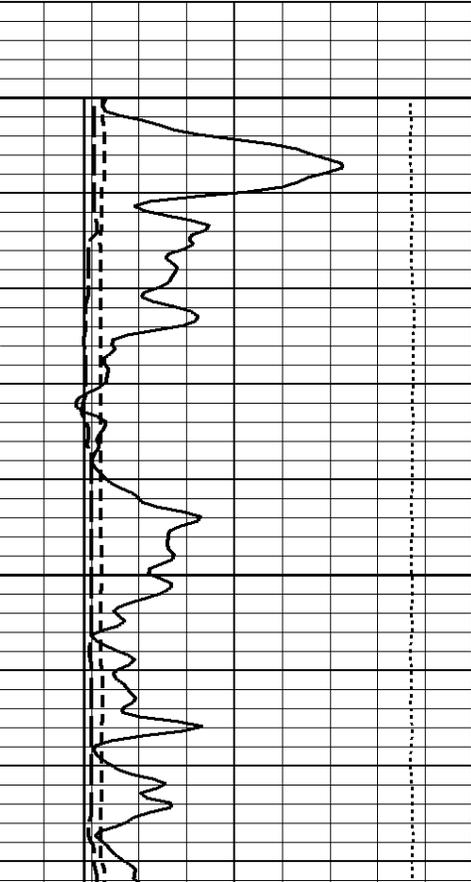
DENSITY (X) CALIPER INCHES (IN)	
16	26
6	16

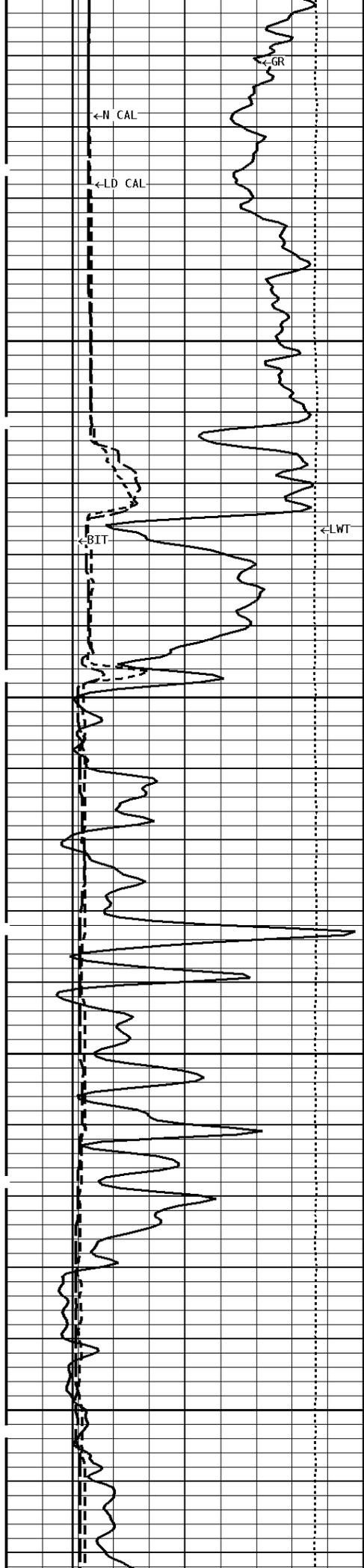
TENSION LBS	
10000	0

GAMMA RAY API UNITS	
150	300
0	150

PE CROSS-SECTION BARNS/ELECTRON		DENSITY CORRECTION G/CC	
0	10	-0.25	0.25
COMPENSATED BULK DENSITY G/CC			
3.0			4.0
2.0			3.0
1.0			2.0
DENSITY POROSITY (2.71g/cc) PERCENT			
70			30
30			-10
-10			-50

1:240 MAIN SECTION
BULK DENSITY

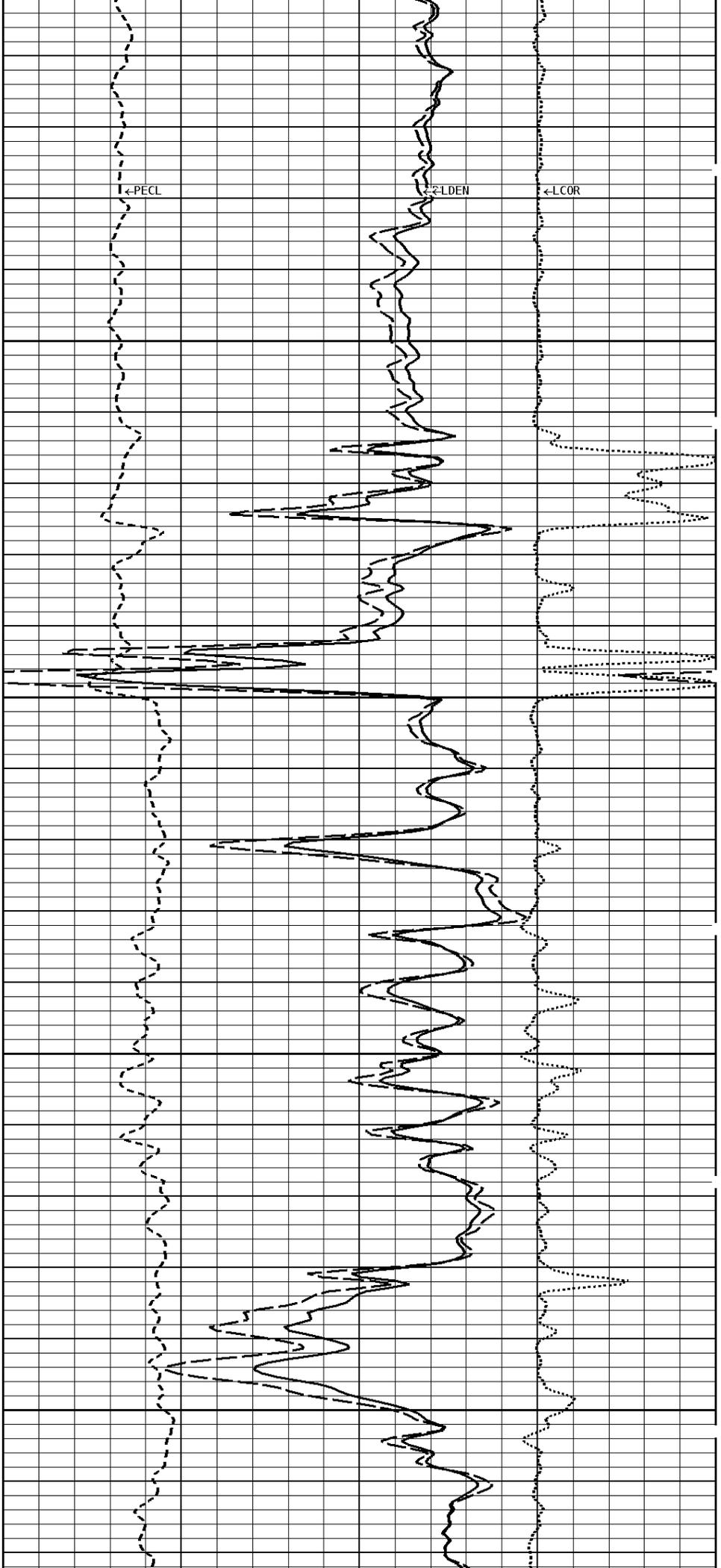




100Cu.Ft.

3000

3100



PECL

LDEN

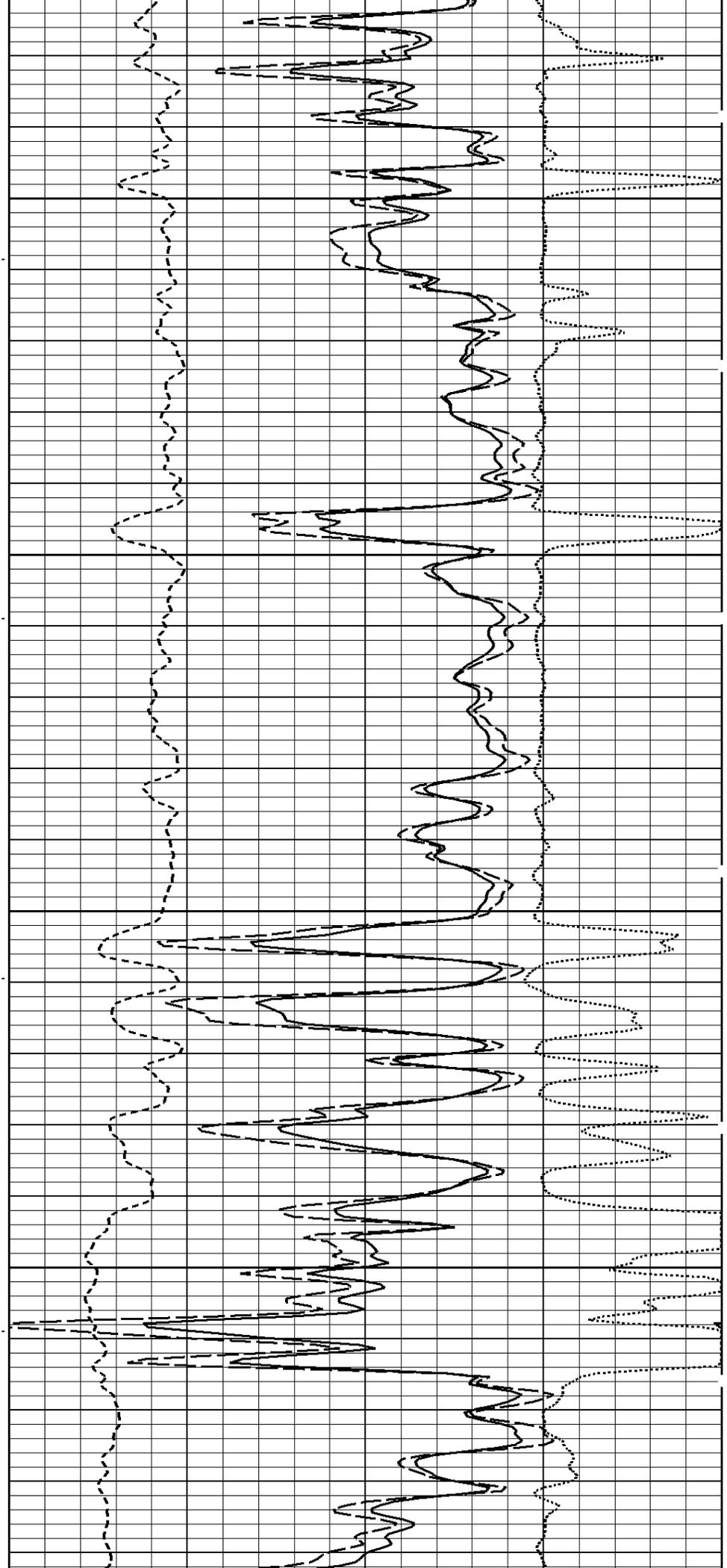
LCOR

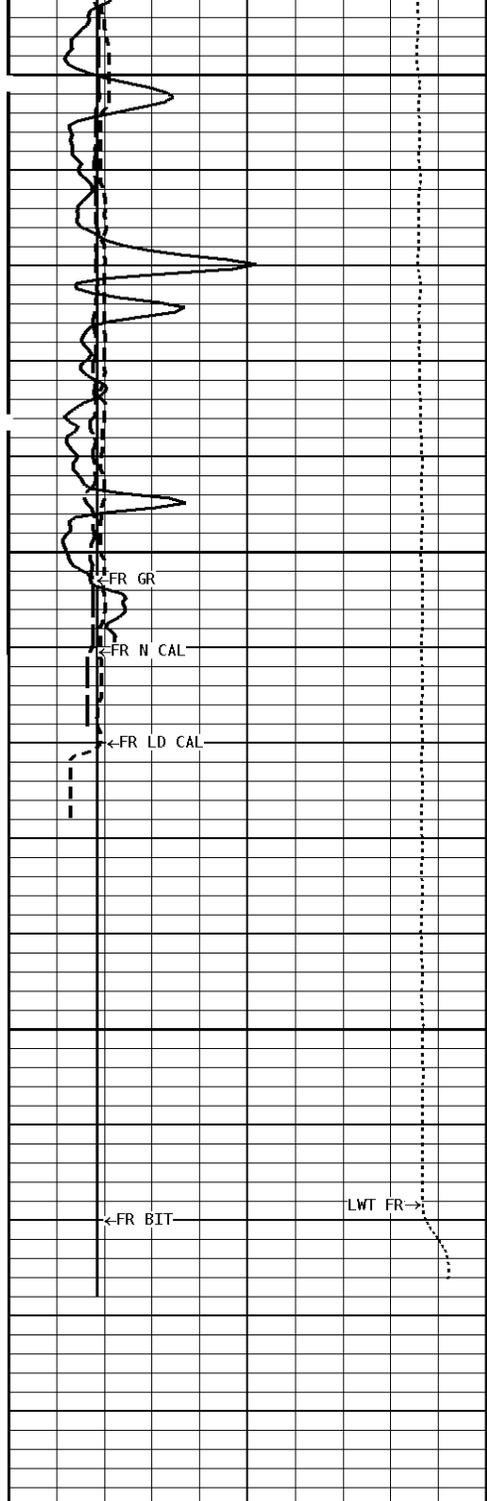


--100Cu.Ft

3200

3300

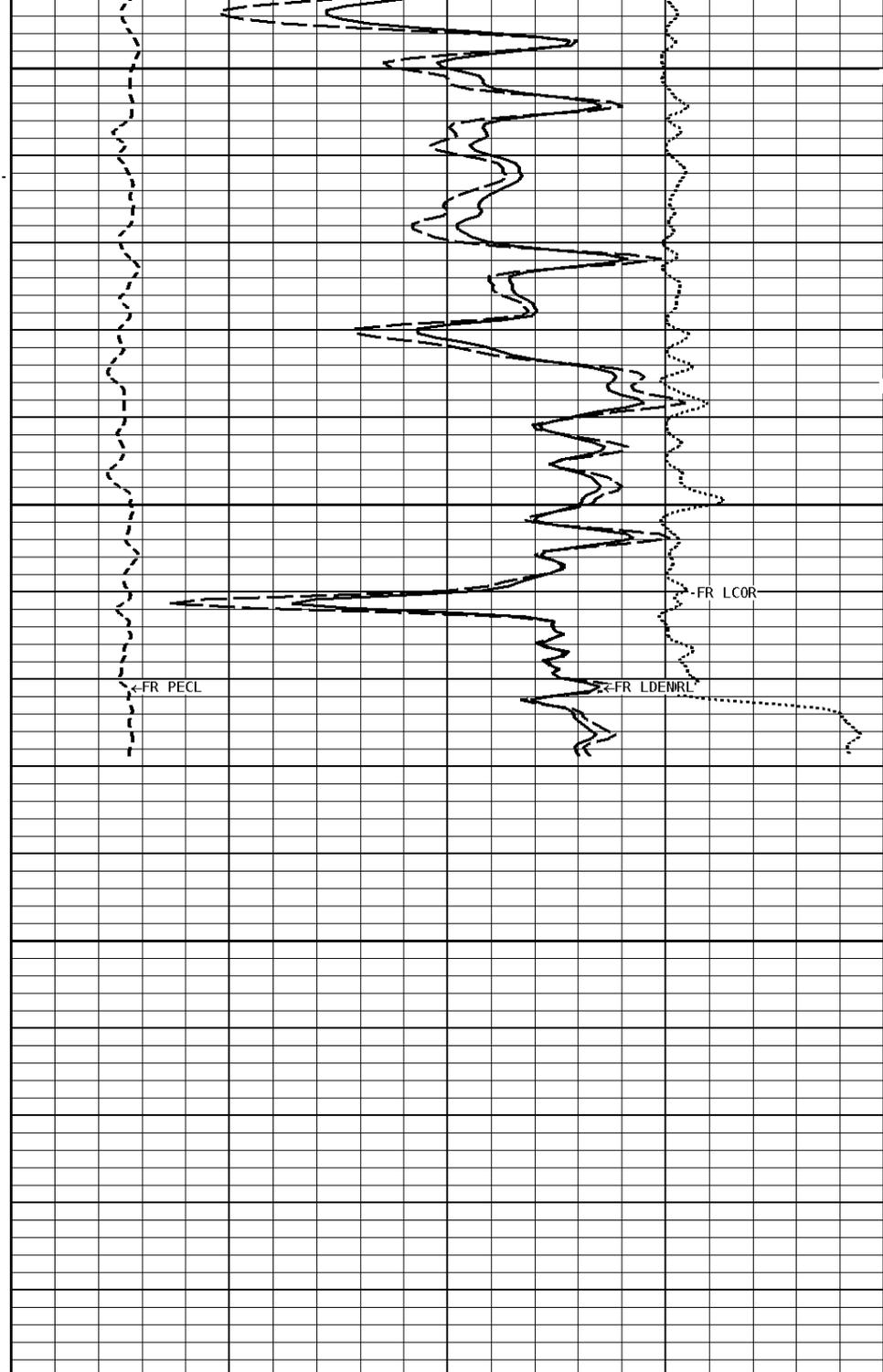




File # 1.1.6

3400

3470



1:240 MAIN SECTION
BULK DENSITY

GAMMA RAY API UNITS	
150 0	300 150

- BHV AHV -
CU. FT

DENSITY POROSITY (2.71g/cc) PERCENT	
70 30	30 -10

-10	-50

TENSION LBS	
10000	0

COMPENSATED BULK DENSITY G/CC	
3.0 2.0	4.0 3.0
1.0	2.0

DENSITY (X) CALIPER INCHES (IN)	
16 6	26 16

PE CROSS-SECTION BARN/ELECTRON	
0	10

DENSITY CORRECTION G/CC	
-0.25	0.25

NEUTRON (Y) CALIPER	
INCHES (IN)	
16	26
6	16

BIT SIZE	
INCHES (IN)	
6	16

*** Borehole Zone Factors ***

Zone 1 99999.0 to 0.0 Feet		
Matrix Density	_____	2.71 g/cc
Fluid Density	_____	1.00 g/cc
Formation Matrix	_____	Limestone
Drill Bit Size	_____	7.875 in
Casing Diameter	_____	5.500 in
Casing Correction (PHI N)	_____	Disable

*** Calibration Summary ***

Shop Calibration						
GRT-B						
Performed : 21-APR-2014			Time : 11:21			
Sensor Suite : GR-GR5			ID : GRT-BB-107			
	Measured	Units	Calibrated	Units		
GR	Background	Jig	Jig			
	75	381	175	GRAPI		
Shop Calibration						
CNT-AA						
Performed : 28-APR-2014			Time : 11:56			
Sensor Suite : CALI-BCN			ID : NDT-BD-133			
	Jig - Measured		Jig - Calibrated	Units		
	Ring#1	Ring#2	Ring#1	Ring#2		
CL # 1	9.3	13.9	6.0	12.0	IN.	
Shop Calibration						
CNP-AA-024						
Performed : 21-Apr-2014			Time : 10:00			
Sensor Suite : BHC NEUT			ID : CNP-AA-024			
Source ID : N-1045						
	Measured	Tank	Verification	Units		
N/F	3.7923	Calibrated	Jig			
Porosity	22.1	3.6893	3.6669	20.2	%	
Shop Calibration						
LDT-DF						
Performed : 29-APR-2014			Time : 09:48			
Sensor Suite : CALI-LTH			ID : PDT-GA-466			
	Jig - Measured		Jig - Calibrated	Units		
	Ring#1	Ring#2	Ring#1	Ring#2		
CL # 1	6.9	10.1	6.0	12.0	IN.	
Shop Calibration						
LDP-DA-065						
Performed : 29-Apr-2014			Time : 09:32			
Sensor Suite : BHCPELNG			ID : LDP-DA-065			
Source ID : 2991GW						
Short Space						
	BKGD	Al	Mg	Al+Fe	Units	
LSW1	67	1135	1803	726	CPS	
LSW2	70	1369	2164	970	CPS	
LSW3	263	3128	5001	2644	CPS	
LSW4	324	2784	3989	2435	CPS	
LSW5	29	55	63	53	CPS	
LSW6	91	91	91	91	CPS	
LSW7	55	58	60	60	CPS	
LSW8	1	4	5	4	CPS	
QS	0.246	0.218	0.204	0.208		
PES			2.778	5.967		
SSDN		2.600	1.680		G/CC	
Long Space						
	BKGD	Al	Mg	Al+Fe	Units	
LLW1	93	1299	5288	780	CPS	

LLW2	102	2274	8834	1639	CPS
LLW3	396	4083	15315	3480	CPS
LLW4	510	1958	6261	1761	CPS
LLW5	60	73	134	71	CPS
LLW6	159	153	146	154	CPS
LLW7	106	103	98	102	CPS
LLW8	5	8	20	8	CPS
QL	0.200	0.195	0.198	0.202	
PEL			2.697	5.458	
LSDN		2.600	1.680		G/CC

**Shop Calibration
MST-DA**

Performed : 12-May-2014 Time : 11:19
 Sensor Suite : CALI-MSN ID : MST-DA-057

CL # 1	Jig - Measured		Jig - Calibrated		Units
	Ring#1	Ring#2	Ring#1	Ring#2	
	7.1	11.4	6.0	12.0	IN.

Performed : 12-May-2014 Time : 11:13
 Sensor Suite : MSTDA-NI ID : MST-DA-057

	Measured		Internal Units	Calibrated		Units
	Zero	Reference		Zero	Reference	
	INV-V	288.8		30429.7	0.00	
NOR-V	165.4	30363.3	0.00	1636.00	MV	
IN-C	163.6	30670.3	0.00	15.46	UA	
INV-R				32.14	OHMM	
NOR-R				58.31	OHMM	

Performed : 12-May-2014 Time : 11:15
 Sensor Suite : MSTDAMSF ID : MST-DA-057

	Measured		Internal Units	Calibrated		Units
	Zero	Reference		Zero	Reference	
	MSFC	20.2		42595.3	0.00	
MSFB	32762.1	52824.9	0.00	1522.00	MA	
MOM1	0.0	42313.5	0.00	1522.00	MV	
MSFRA				43.30	OHMM	



Company: LANGSTON D.S.
 Well: REIF A & B #31-3
 Location: 825' FSL & 2970' FEL
 Logged: 05-20-2014
 K.B. Elev: 1765.0 Ft