

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

NMOCD

SUNDRY NOTICES AND REPORTS ON WELLS
Do not use this form for proposals to drill or to re-enter an abandoned well. Use form 3160-3 (APD) for such proposals.

FORM APPROVED
OMB NO. 1004-0137
Expires: January 31, 2018

5. Lease Serial No.
NMNM01510

6. If Indian, Allottee or Tribe Name

7. If Unit or CA/Agreement, Name and/or No.

8. Well Name and No.
MALCO 23 FEDERAL COM 13H

9. API Well No.
30-015-44297

10. Field and Pool or Exploratory Area
EMPIRE;GLORIETA-YESO

11. County or Parish, State
EDDY COUNTY, NM

SUBMIT IN TRIPLICATE - Other instructions on page 2

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other

2. Name of Operator
COG OPERATING LLC

Contact: KANICIA CASTILLO
E-Mail: kcastillo@concho.com

3a. Address
600 W ILLINOIS AVE
MIDLAND, TX 79701

3b. Phone No. (include area code)
Ph: 432-685-4332

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)
Sec 23 T17S R28E Mer NMP 125FNL 1443FWL

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT, OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☐ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☒ Subsequent Report	☐ Alter Casing	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☒ Other
	☐ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	Drilling Operations
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleat horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompleat in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.

Please see attached logs.

NM OIL CONSERVATION
ARTESIA DISTRICT

FEB 14 2018

AC 2-15-18
Accepted for record - NMOCD

RECEIVED

14. I hereby certify that the foregoing is true and correct.

Electronic Submission #400782 verified by the BLM Well Information System
For COG OPERATING LLC, sent to the Carlsbad
Committed to AFMSS for processing by PRISCILLA PEREZ on 01/15/2018 ()

Name (Printed/Typed) KANICIA CASTILLO

Title PREPARER

Signature (Electronic Submission)

Date 01/15/2018

THIS SPACE FOR FEDERAL OR STATE OFFICE USE

Approved By

Title

Date

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office

BUREAU OF LAND MANAGEMENT
CARLSBAD FIELD OFFICE

Title 18 U.S.C. Section 1001 and Title 43 U.S.C. Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

**** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED ** OPERATOR-SUBMITTED ****

Company: COG Operating LLC

Well: Malco 23 Federal Com 13H

Field: Empire - Glorieta Yeso

County: Eddy State: New Mexico

Platform Express

Compensated Neutron Log

Three Detector Litho-Density

County: Eddy
 Field: Empire - Glorieta Yeso
 Location: Section 23, Township 17S, Range 28E
 Well: Malco 23 Federal Com 13H
 Company: COG Operating LLC

Location:		Section 23, Township 17S, Range 28E	Elev.: K.B. 3655.00 ft
125' FNL & 1443 FWL			G.L. 3637.00 ft
Permanent Datum:			D.F. 3654.00 ft
Log Measured From:		Ground Level	Elev.: 3637.00 f
Drilling Measured From:		Kelly Bushing	18.00 ft above Perm.Datum
API Serial No. 30-015-44297		Section: 23	Township: 17S
			Range: 28E

Logging Date	29-Oct-2017
Run Number	1A
Depth Driller	8000.00 ft
Schlumberger Depth	8000.00 ft
Bottom Log Interval	3659.00 ft
Top Log Interval	1244.00 ft
Casing Driller Size @ Depth	9.625 in @ 1244.00 ft
Casing Schlumberger	1244 ft
Bit Size	8.75 in
Type Fluid In Hole	Salt Brine
Density	9.5 lbm/gal
Fluid Loss	18.2 cm3
PH	9.5
Source of Sample	Active Tank
RM @ Meas Temp	0.12 ohm.m @ 74.3 degF
RMF @ Meas Temp	0.12 ohm.m @ 74.3 degF
RMC @ Meas Temp	
Source RMF	Calculated
RM @ BHT	0.1 @ 90
RMF @ BHT	0.1 @ 90
Max Recorded Temperatures	90 degF
Circulation Stopped	28-Oct-2017 22:00:00
Logger on Bottom	29-Oct-2017 12:04:00
Unit Number	9104
Location:	Midland
Recorded By	Jennifer Situli
Witnessed By	Arrine Chenaf

Disclaimer

THE USE OF AND RELIANCE UPON THIS RECORDED-DATA BY THE HEREIN NAMED COMPANY (AND ANY OF ITS AFFILIATES, PARTNERS, REPRESENTATIVES, AGENTS, CONSULTANTS AND EMPLOYEES) IS SUBJECT TO THE TERMS AND CONDITIONS AGREED UPON BETWEEN SCHLUMBERGER AND THE COMPANY, INCLUDING: (a) RESTRICTIONS ON USE OF THE RECORDED-DATA; (b) DISCLAIMERS AND WAIVERS OF WARRANTIES AND REPRESENTATIONS REGARDING COMPANY'S USE AND RELIANCE UPON THE RECORDED-DATA; AND (c) CUSTOMER'S FULL AND SOLE RESPONSIBILITY FOR ANY INFERENCE DRAWN OR DECISION MADE IN CONNECTION WITH THE USE OF THIS RECORDED-DATA.

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Remarks and Equipment Summary

1A: Toolstring				1A: Remarks
Equip name	Length	MP name	Offset	Thank you for choosing Schlumberger Wireline All intervals and services confirmed with client Toolstring ran as per tool sketch Standoffs used for centralization Bowsprings used for eccentralization Limestone matrix used Hole size and standoff correction applied to HGNS Mud resistivity taken from mud sample Max recorded temp. taken from thermometers in head Data quality affected by washout and borehole rugosity Calipers checked in casing
LEH-QT	136.77			
LEH-QT				
AH-369	133.85			
EDTC-B	132.42			
EDTH-B				
EDTG-A				
EDTC-B				
		CTEM	128.92	
		ACCZ	0.00	
		HV	0.00	Mud resistivity taken from mud sample Max recorded temp. taken from thermometers in head Data quality affected by washout and borehole rugosity Calipers checked in casing
		Gamma Ray	127.05	
		Tel Statu s	125.92	
HNGS-BA:9	125.92			
9				
HEH-K:102				
HNGS-BA:9				
9				
		GR	122.94	
HNGC-B	117.73			Max recorded temp. taken from thermometers in head Data quality affected by washout and borehole rugosity Calipers checked in casing
HNGH-A:32				
5				
HNGC-B		Tel Statu s	115.98	
LDSC-B	114.23			
LDSH-A				
LDSC-B		Tel Statu s	112.48	
ECS-A:188	110.73			
ECSH-A				Max recorded temp. taken from thermometers in head Data quality affected by washout and borehole rugosity Calipers checked in casing
ECS-D-A				
NSR-F		Detector	109.45	
ECS-A:188				
HGNS-H	104.08	Tempera ture	104.06	
HGNH				Max recorded temp. taken from thermometers in head Data quality affected by washout and borehole rugosity Calipers checked in casing
NSR-F:5194				
NPV-N		GR	103.34	
HGNS-H				
HACCZ-H:5				
879				
HMCA-H				

HDRS-H 94.67
ECH-MEB
HRCC-H
HRMS-H
Long Spacing
HRGD-H:57
20
GPV-Q
Backscatter
GSR-J:5407
Short Spacing

CNL Porosity 97.01
HMCA 94.67
HGNS 94.67
Accelerometer 0.00

HRCC 90.67

MCFL 85.24
Caliper 84.76
TLD Density 84.37

HRLT-B 82.43
HRUH-B
HRUC-B
HRLS-B
HRLH-B
HRLC-B
AH-270

Resistivity 70.66

AH-107[4] 58.23
1

AH-107[3] 56.23
1

ASLT-B:80 54.23
67
ASLT-BB:80
67

CBL_UP 47.7

VDL_UP 46.7

RX_ARR 45.2
AY

VDL_LOW 43.7

DT_DDB 43.2

HC

CBL_LOW 42.7

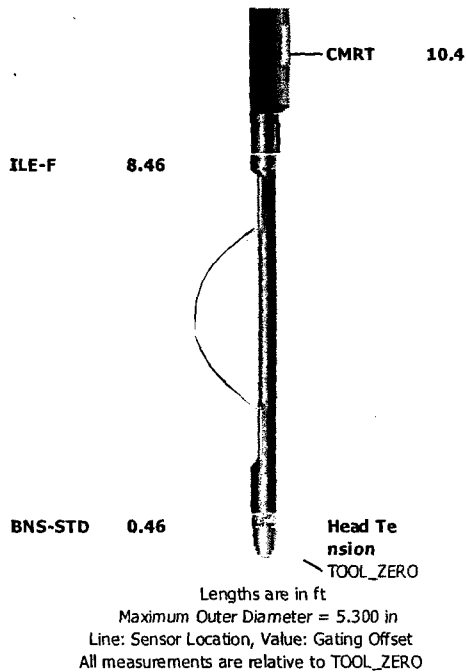
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ADT-CB 37.58
HECH-KDB
ADC-C
ADS-C
ADP-CB

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Pad 28.61
Caliper 28.23

AH-107[1 26.04
]

CMRT-B:1 24.04
3
CMRC:255
CMRH:342
CMRS:13



Depth Summary

1A

Depth Measuring Device

Type	IDW-B
Serial Number	
Calibration Date	16-Jun-2017
Calibrator Serial Number	
Calibration Cable Type	
Wheel Correction 1	-7
Wheel Correction 2	-7

Tension Device

Type	CMTD-B/A
Serial Number	
Calibration Date	24-Oct-2017
Calibrator Serial Number	
Number of Calibration Points	10
Calibration Root Mean Square Error	6
Calibration Peak Error	9

Logging Cable

Type	7-46P-XS
Serial Number	U715062
Length	24000.00 ft
Conveyance Type	Wireline
Rig Type	Land

1A: Depth Control Parameters

Log Sequence	First Log In the Well
Rig Up Length At Surface	135.80 ft
Rig Up Length At Bottom	135.60 ft

Rin In Length Correction

Depth Control Remarks

IDW used as primary depth control device
ZChart used as secondary depth control device

Stretch Correction	3.50 ft
Tool Zero Check At Surface	0.40 ft

1A

Main Pass 2" = 100'

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	506.6	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	1151.79	ft3

Software Version

Acquisition System	Version
Maxwell 2017 SP2	7.2.87778.3100
Application Patch	Wireline_Hotfix-HLDS-2017SP2_7.2.88062
	Wireline_Hotfix-APS-2017SP2_7.2.89323
	Wireline_TestKit-CMR-NG-2017SP2_7.2.93478
	Wireline_Hotfix-LTZ-CmdHandler-2017SP2_7.2.88121
	Wireline_Hotfix-MWSML-2017SP2_7.2.91383

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1A	Log[6]:Up	Up	131.82 ft	3663.70 ft	29-Oct-2017 12:04:32 PM	29-Oct-2017 3:10:45 PM	ON	3.39 ft	No

All depths are referenced to toolstring zero

Log

Company: COG Operating LLC Well: Malco 23 Federal Com 13H

1A: Log[6]:Up:S003

Description: HRLT BASIC LOG / Format: Log (Porosity 2 inch General) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 29-Oct-2017 16:55:56

Channel	Source	Sampling
CALI	HDRS-H:HRCC-H:HRCC-H	1in
CGR	HNGS-BA:HNGS-BA:HNGS-BA	6in
ICV	Borehole	6in - RT
IHV	Borehole	6in - RT
PEFZ	HDRS-H:HRMS-H:HRGD-H	2in
RHOZ	HDRS-H:HRMS-H:HRGD-H	2in
SGR	HNGS-BA:HNGS-BA:HNGS-BA	6in
TENS	WLWorkflow	1in
TIME_1900	WLWorkflow	0.1in
TNPH	HGNS-H:HGNS-H:HGNS-H	6in

— IHV - Integrated Hole Volume every 100.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

— IHV - Integrated Hole Volume every 10.00 (ft3)

— ICV - Integrated Cement Volume every 100.00 (ft3)

— ICV - Integrated Cement Volume every 10.00 (ft3)

Uranium Indicator

Cable Tension (TENS)

10000 lbf 0

Gamma Ray Contribution from Thorium and Potassium (HCGR) HNGS-BA

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

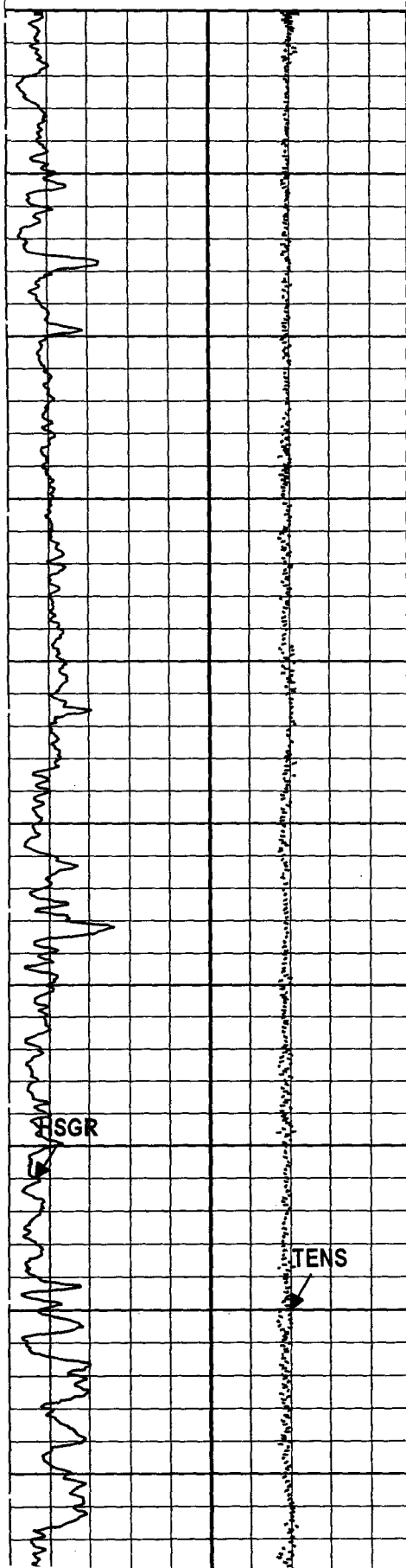
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Spectroscopy Gamma Ray (HSGR) HNGS-BA

0 gAPI 150

Caliper (HCAL) HDRS-H

6 in 16



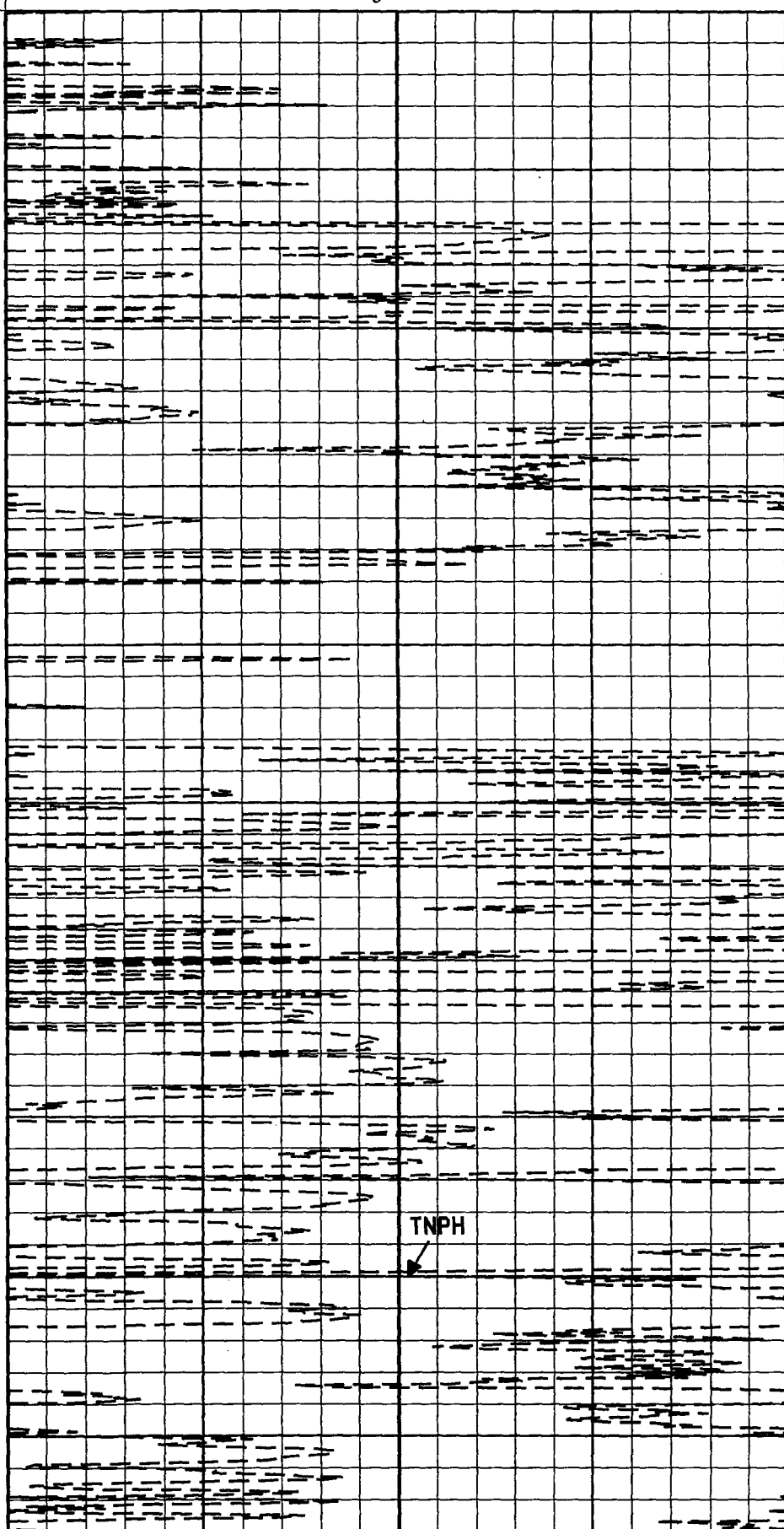
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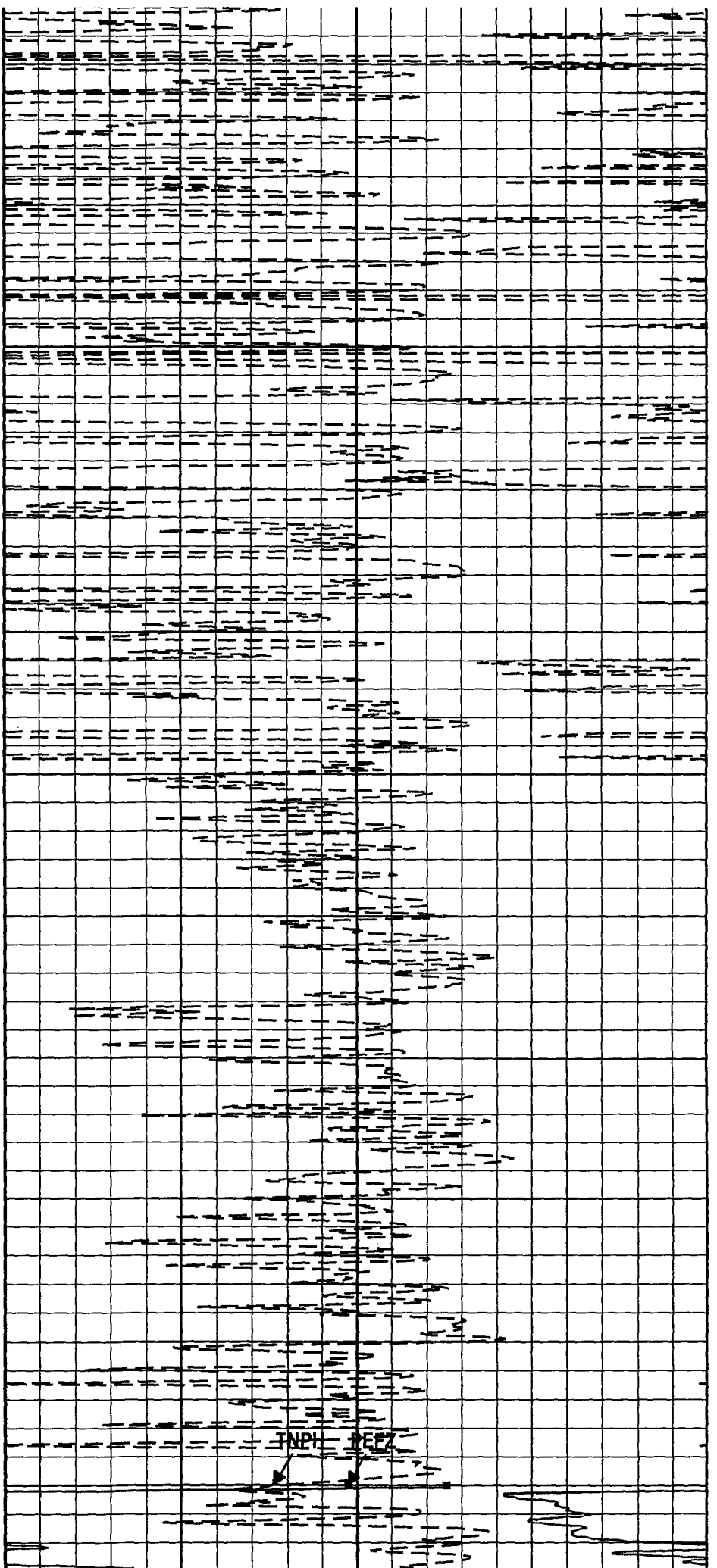
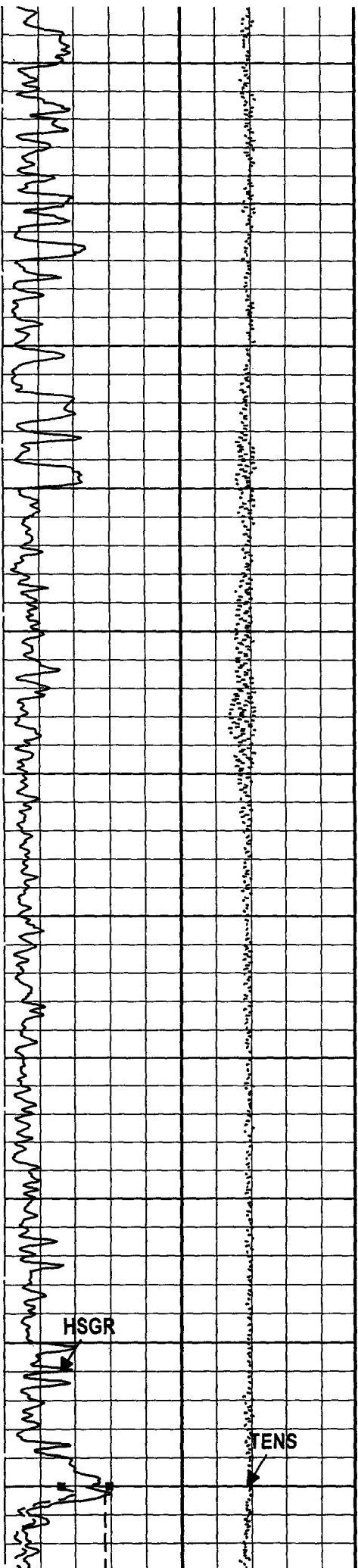
Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS-H

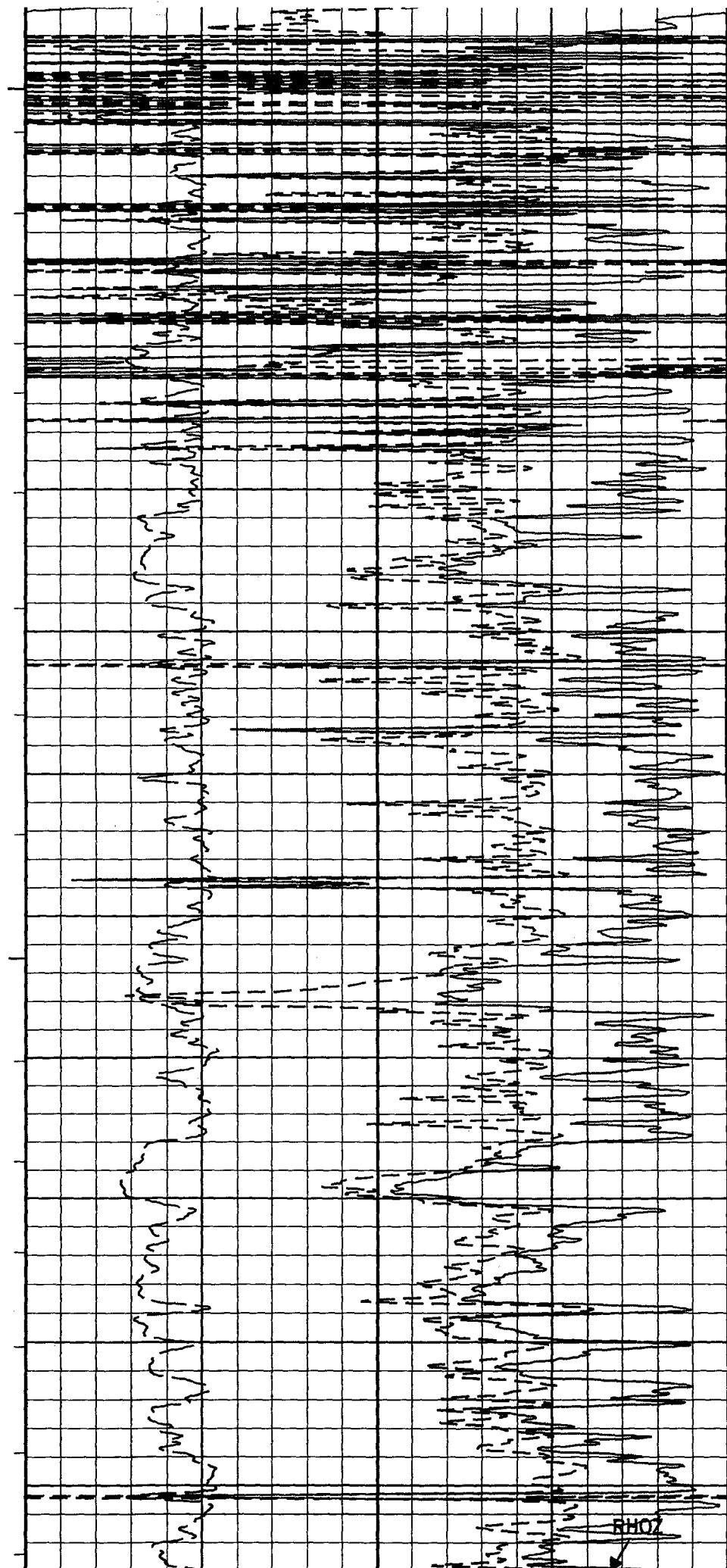
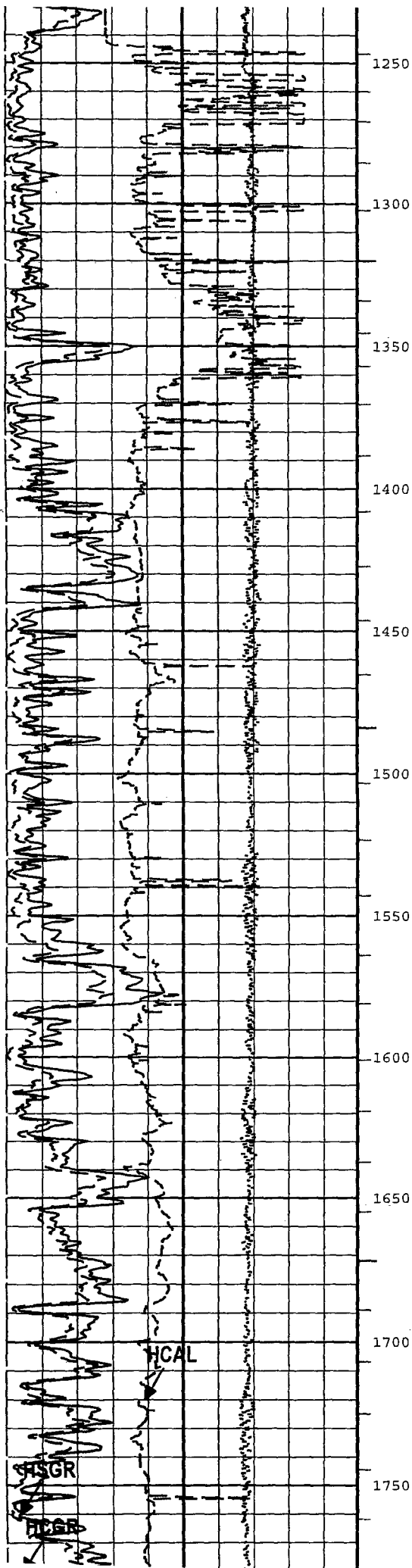
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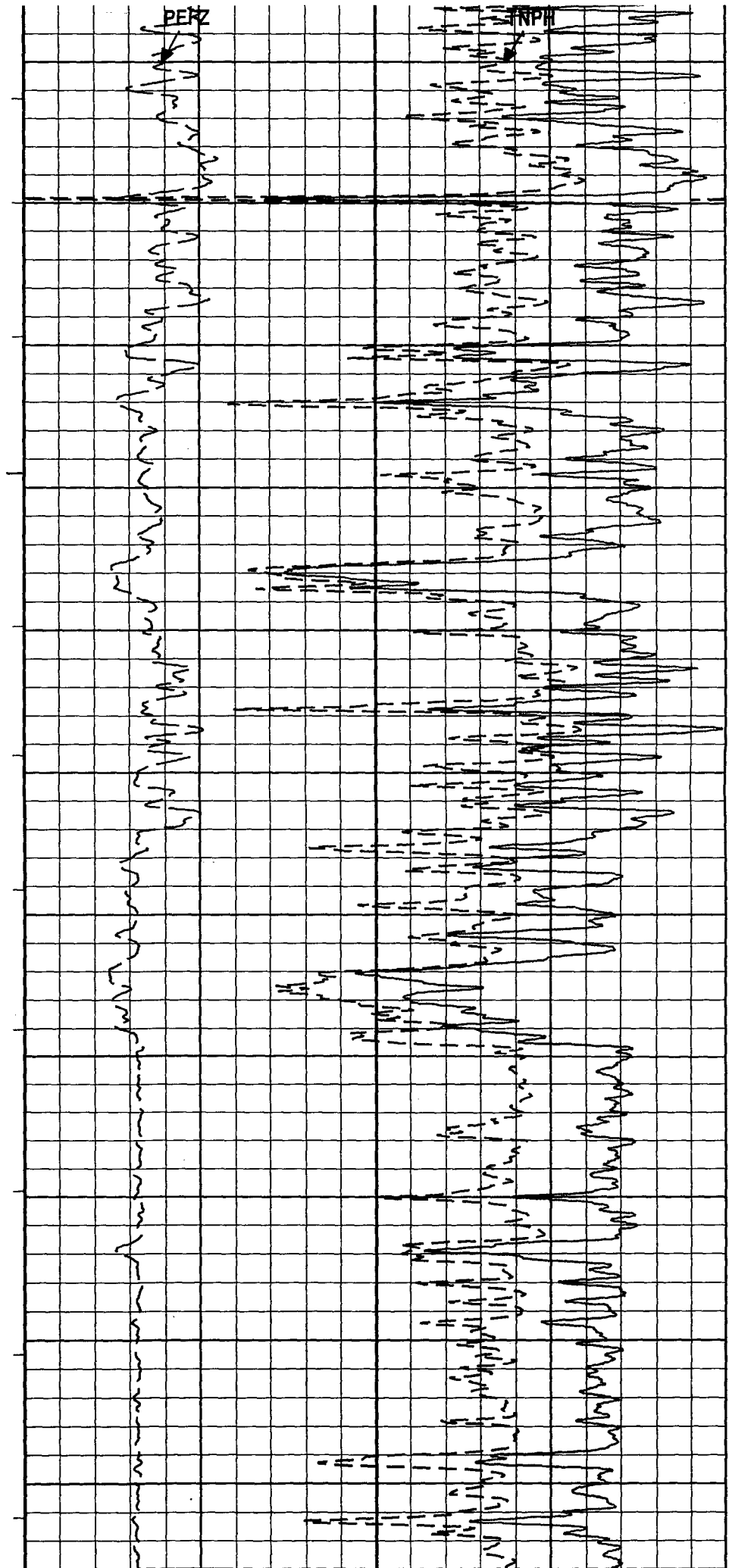
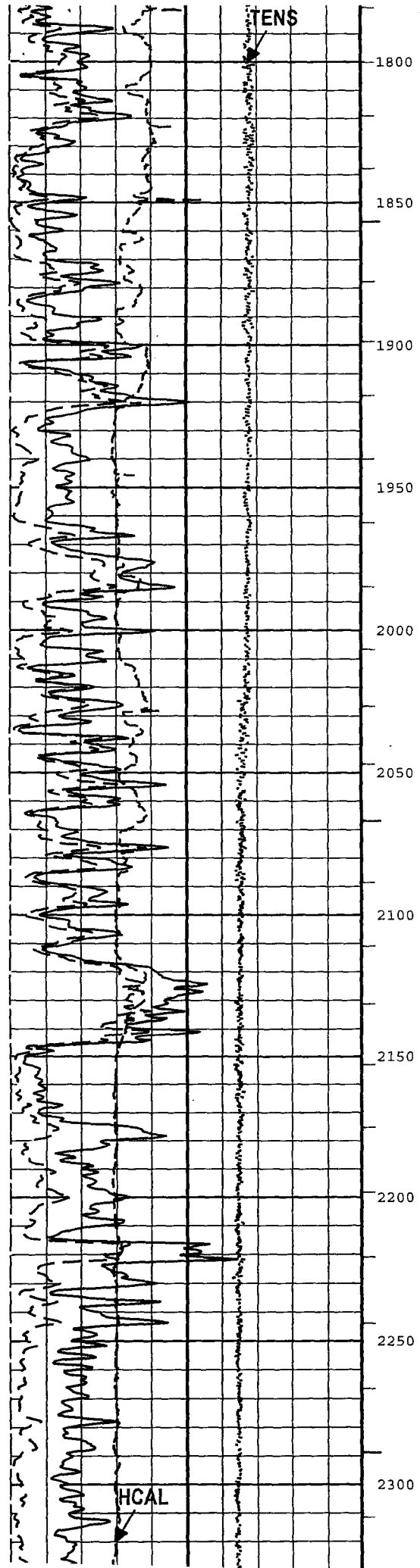
Standard Resolution Formation Density (RHOZ) HDRS-H

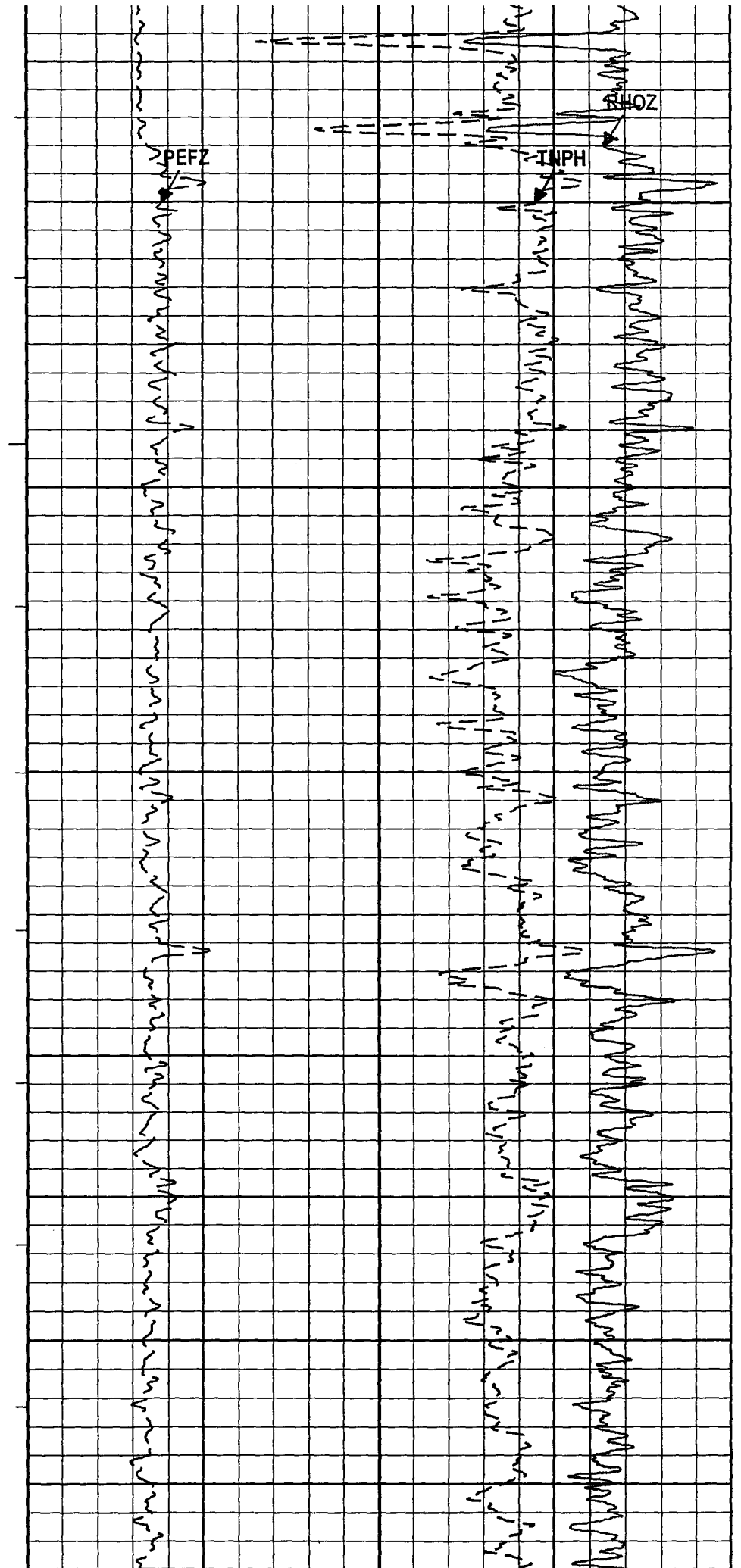
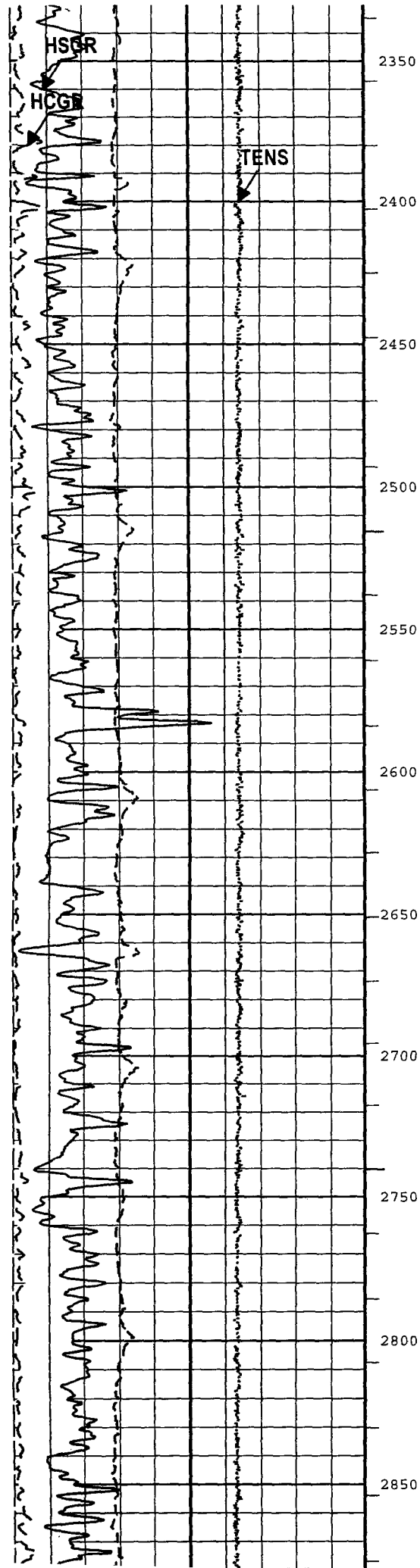
2 g/cm3 3

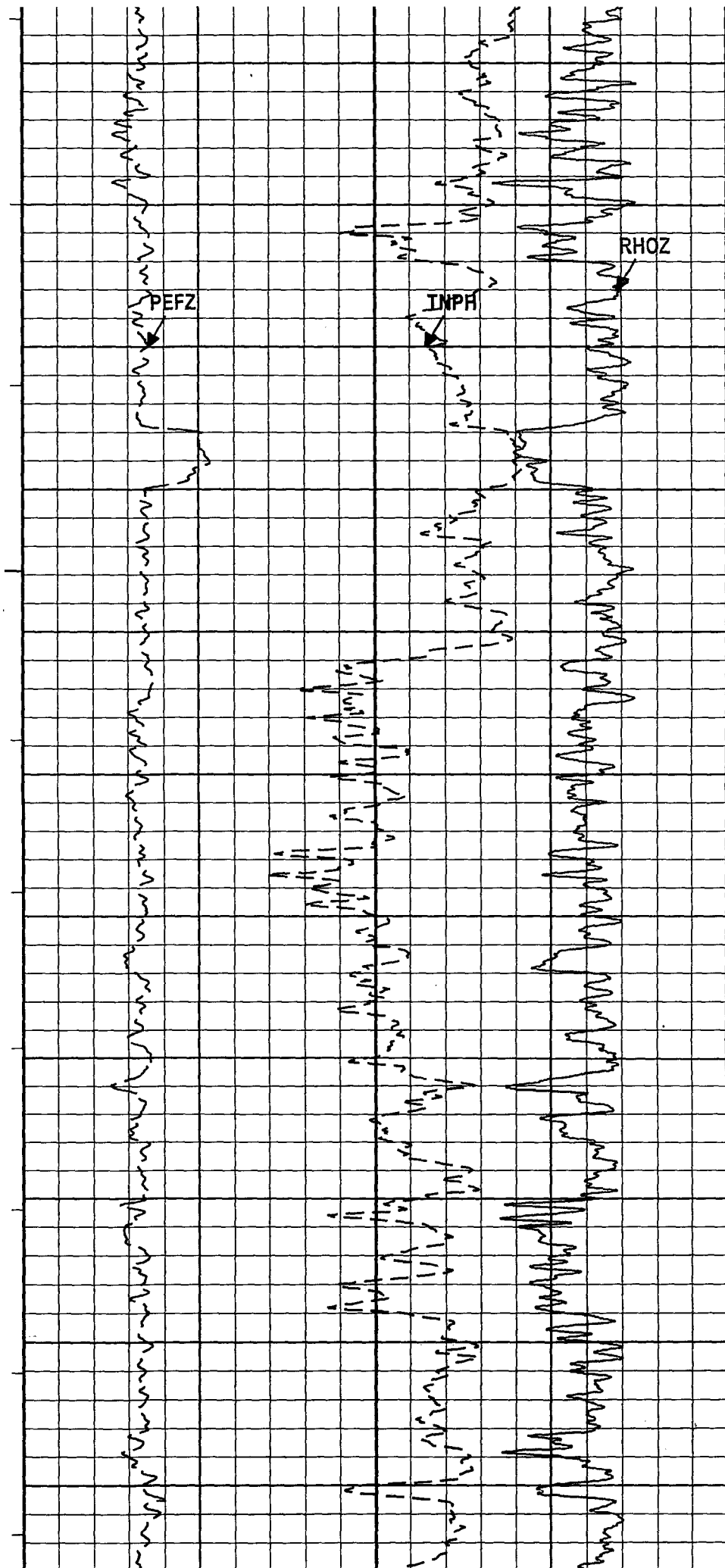
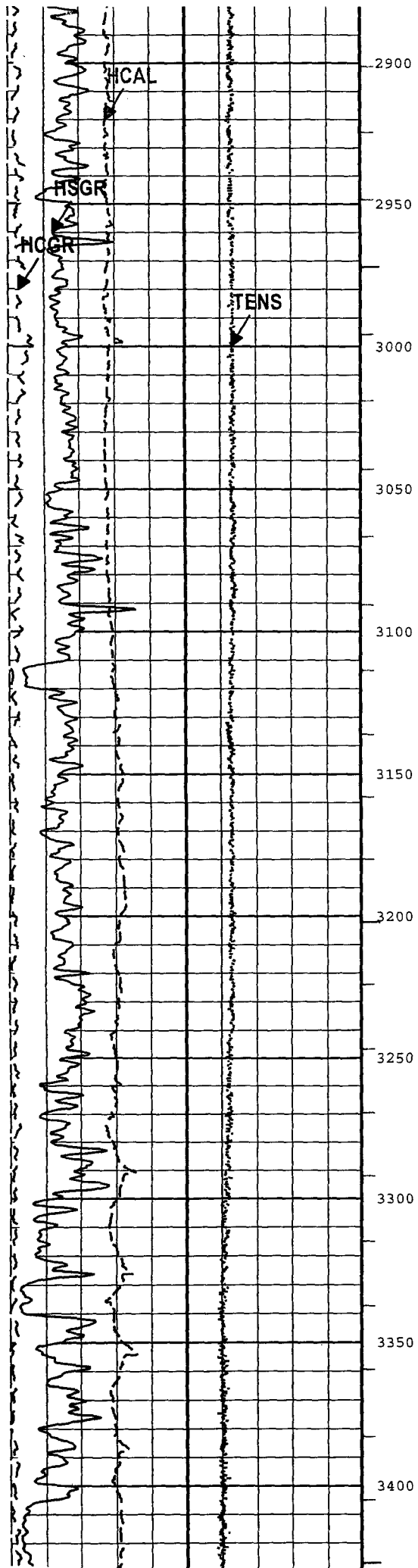


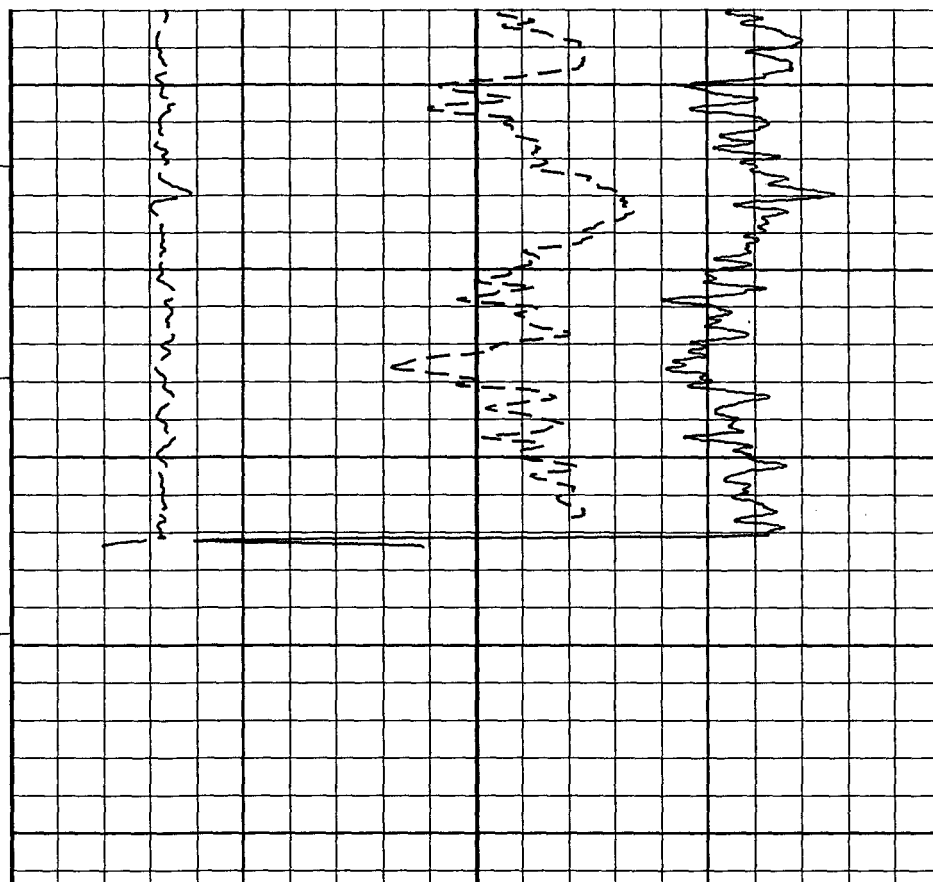
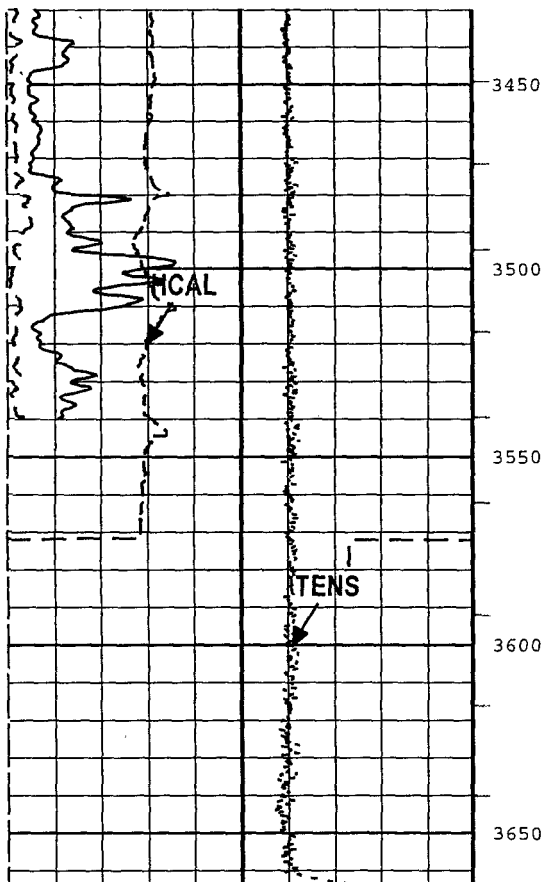












Uranium Indicator

Cable Tension (TENS)

10000 lbf 0

Gamma Ray Contribution from Thorium and Potassium (HCGR) HGNS-BA

0 gAPI 150

Spectroscopy Gamma Ray (HSGR) HGNS-BA

0 gAPI 150

Caliper (HCAL) HDRS-H

6 in 16

Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS-H

0.3 ft³/ft³ -0.1

Standard Resolution Formation Density (RHOZ) HDRS-H

2 g/cm³ 3

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

0 10

—ICV - Integrated Cement Volume every 10.00 (ft³)

—ICV - Integrated Cement Volume every 100.00 (ft³)

—IHV - Integrated Hole Volume every 10.00 (ft³)

TIME_1900 - Time Marked every 60.00 (s)

—IHV - Integrated Hole Volume every 100.00 (ft³)

Description: HRLT BASIC LOG Format: Log (Porosity 2 inch General) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth
Creation Date: 29-Oct-2017 16:55:56

1A

Main Pass 5" = 100'

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	506.6	ft ³
IHV	Integrated Hole Volume	GCSE_UP_PASS	1151.79	ft ³

Pass Summary

Pass Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Includes
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Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	LOG Mode	Depth Unit	Include Parallel Data
1A	Log[6]:Up	Up	131.82 ft	3663.70 ft	29-Oct-2017 12:04:32 PM	29-Oct-2017 3:10:45 PM	ON	3.39 ft	No

All depths are referenced to toolstring zero

Log

Company: COG Operating LLC

Well: Malco 23 Federal Com 13H

1A: Log[6]:Up:S003

Description: HRLT BASIC LOG Format: Log (Porosity_5_Inch) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation

Date: 29-Oct-2017 16:55:58

Channel	Source	Sampling
CALI	HDRS-H:HRCC-H:HRCC-H	1in
CGR	HNGS-BA:HNGS-BA:HNGS-BA	6in
DPHZ	HDRS-H:HRMS-H:HRGD-H	2in
HDRA	HDRS-H:HRMS-H:HRGD-H	2in
ICV	Borehole	6in - RT
IHV	Borehole	6in - RT
PEFZ	HDRS-H:HRMS-H:HRGD-H	2in
PXND	PEQL	6in
SGR	HNGS-BA:HNGS-BA:HNGS-BA	6in
TENS	WLWorkflow	1in
TIME_1900	WLWorkflow	0.1in
TNPH	HGNS-H:HGNS-H:HGNS-H	6in

— IHV - Integrated Hole Volume every 100.00 (ft3)

— IHV - Integrated Hole Volume every 10.00 (ft3)

— ICV - Integrated Cement Volume every 100.00 (ft3)

— ICV - Integrated Cement Volume every 10.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

Uranium Indicator

Cable Tension (TENS)

10000 lbf 0

Gamma Ray Contribution from Thorium and Potassium (HCGR) HNGS-BA

0 gAPI 150

Spectroscopy Gamma Ray (HSGR) HNGS-BA

0 gAPI 150

Caliper (HCAL) HDRS-H

6 in 16

Density Standoff
Correction (HDRA)
HDRS-H

-0.05 g/cm3 0.2

Standard Resolution Formation Photoelectric
Factor (PEFZ) HDRS-H

0 10

Crossplot Porosity for Neutron-Density (PXND_HILT)

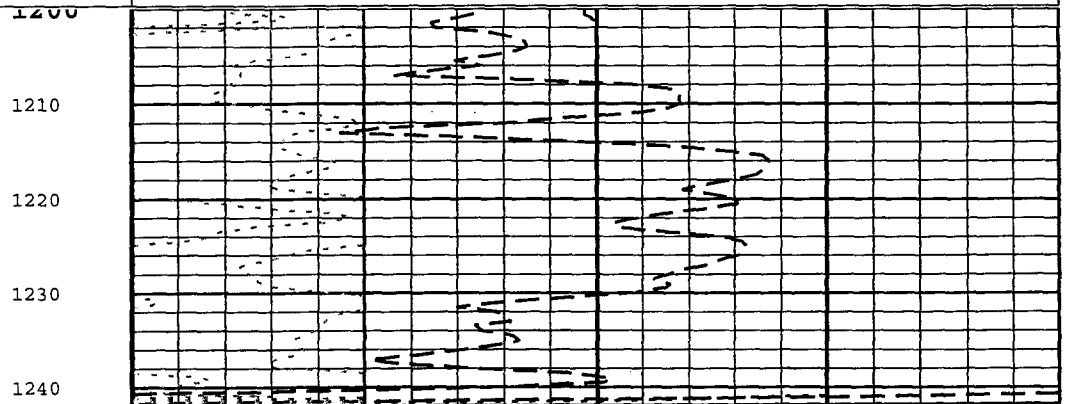
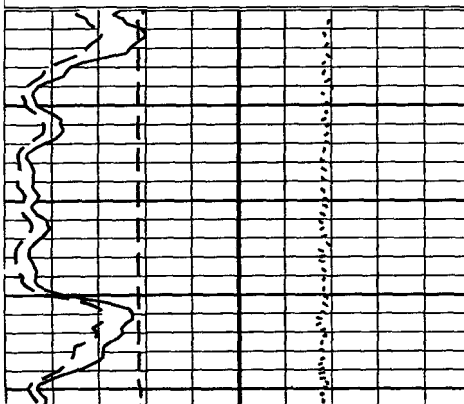
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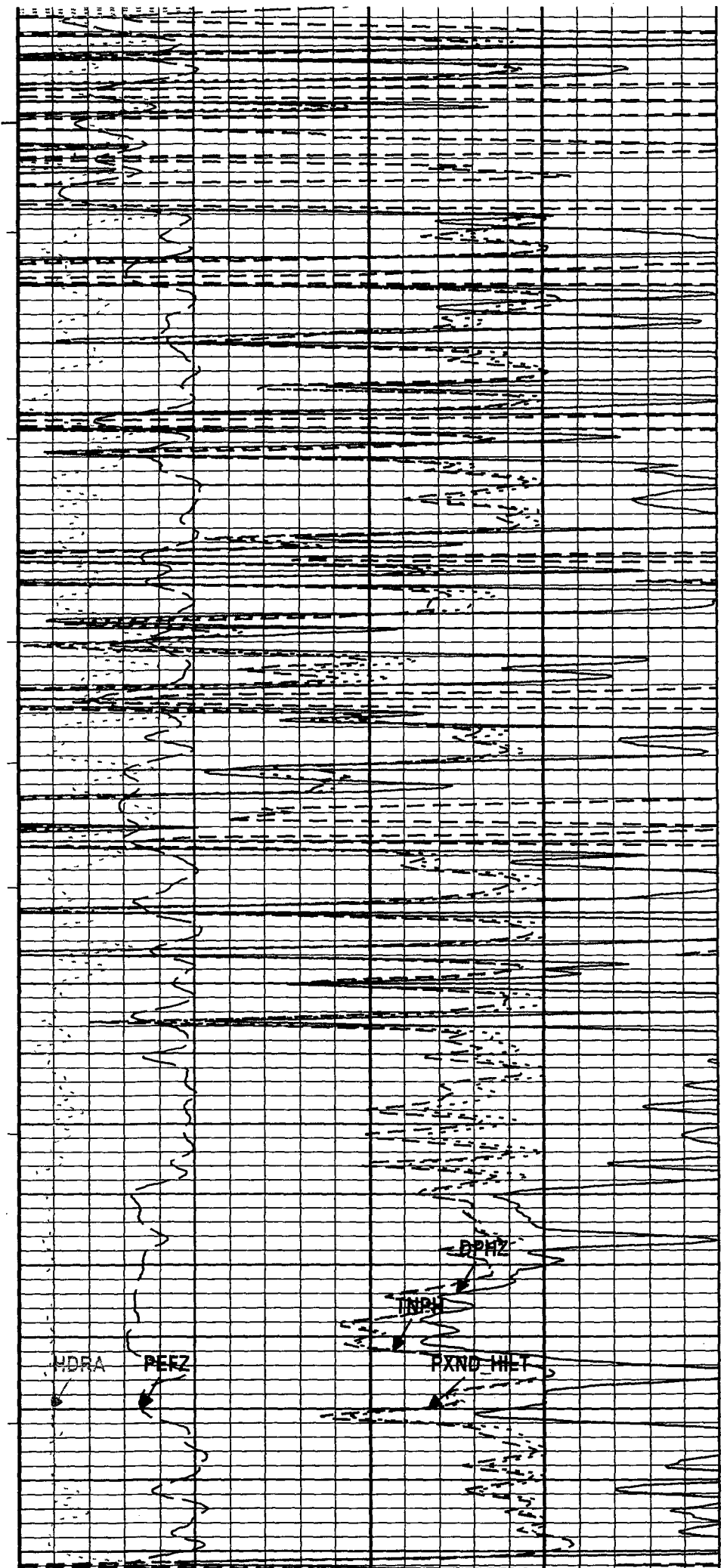
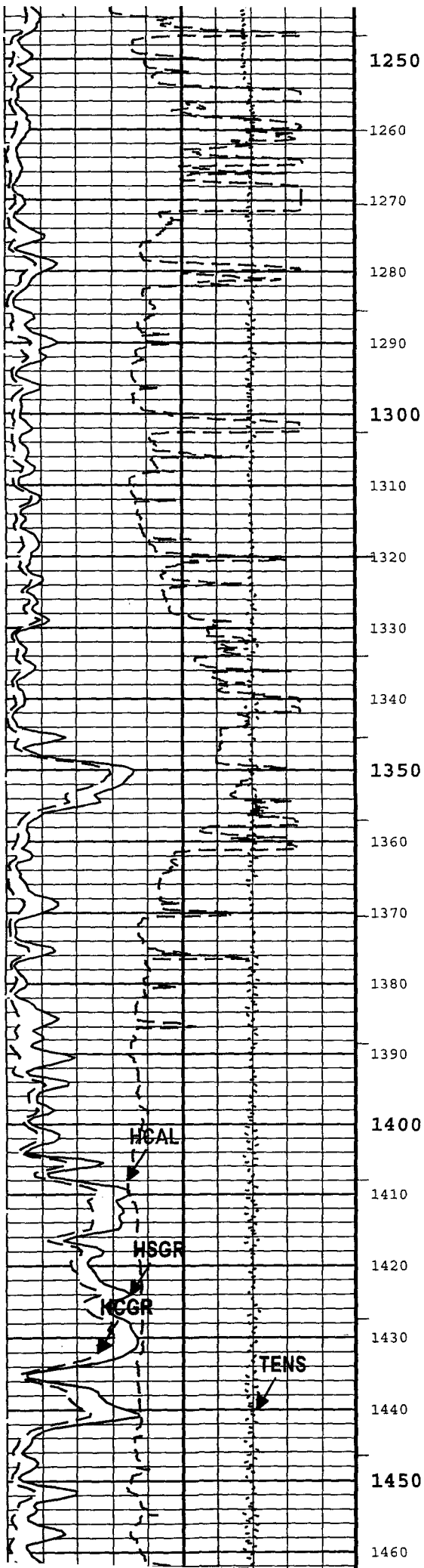
Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS-H

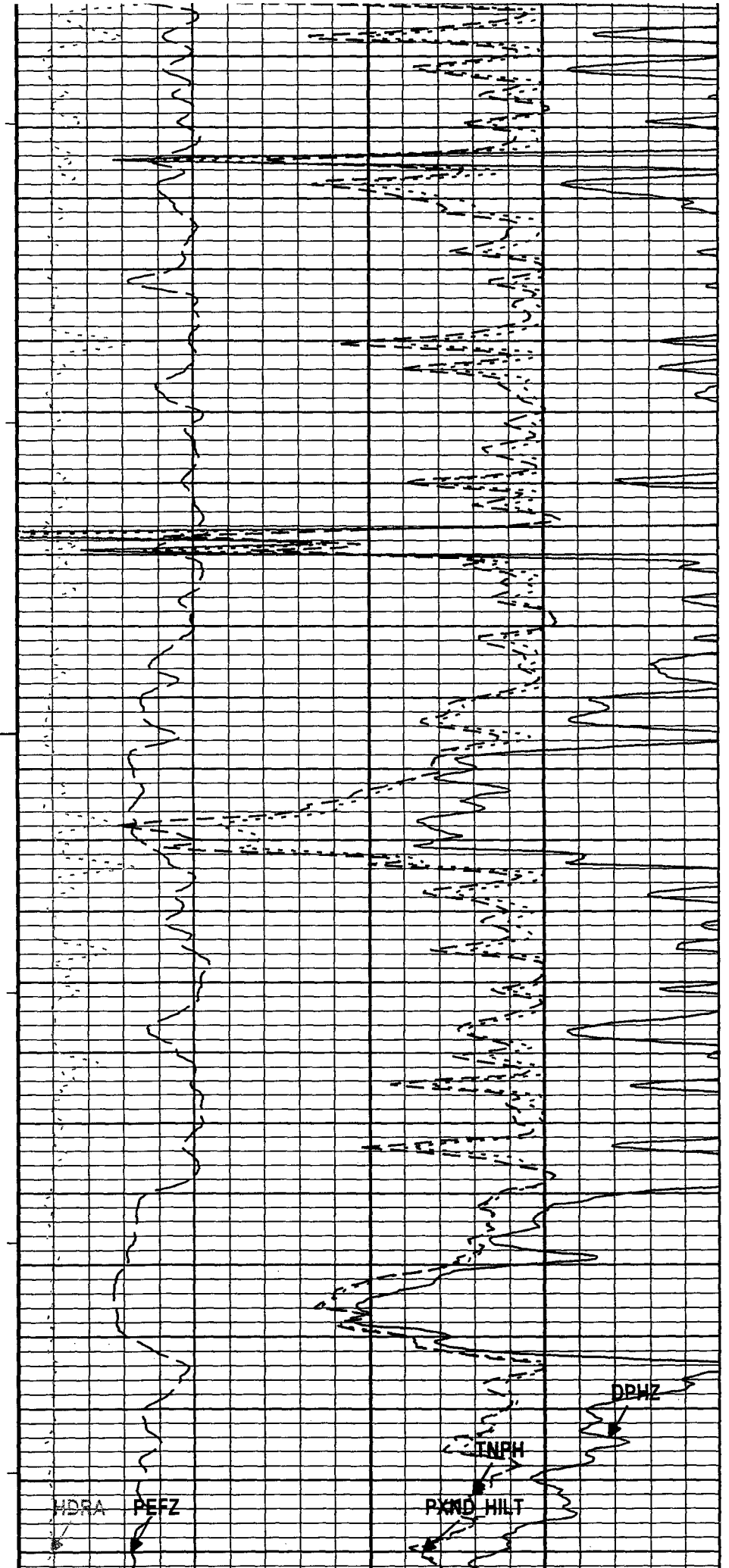
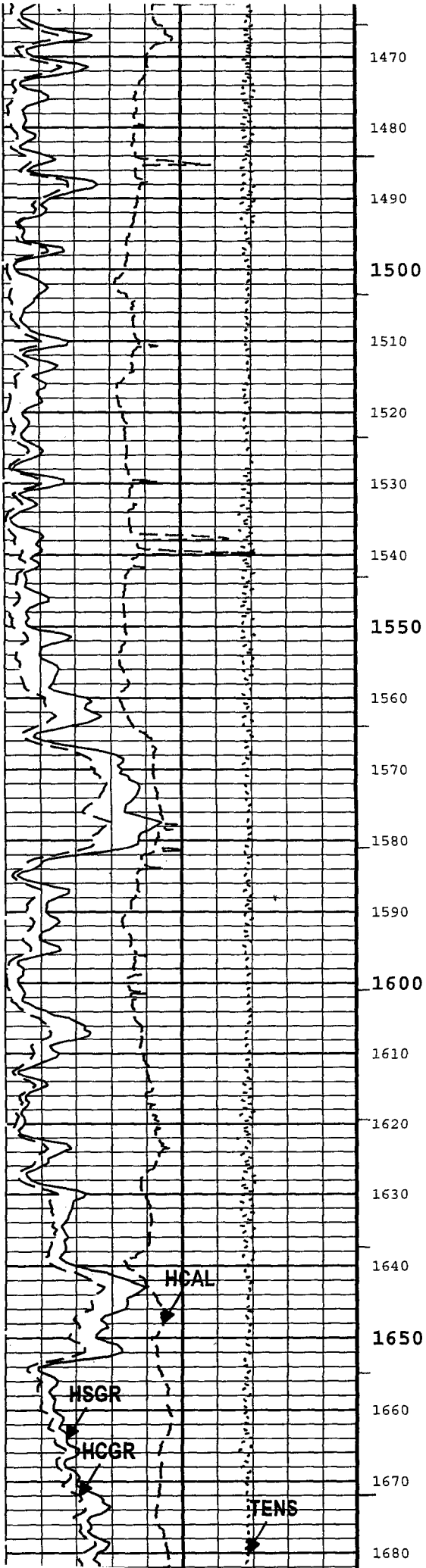
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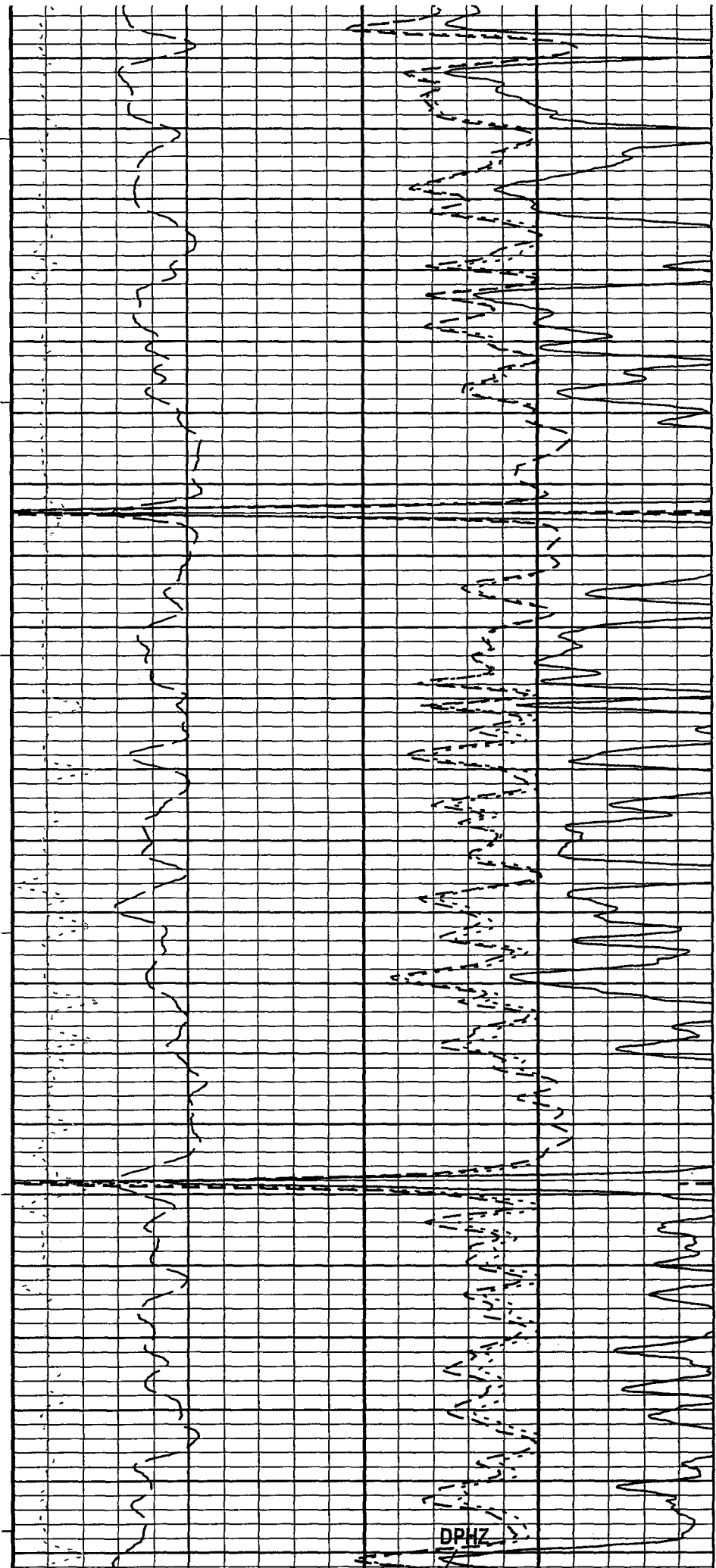
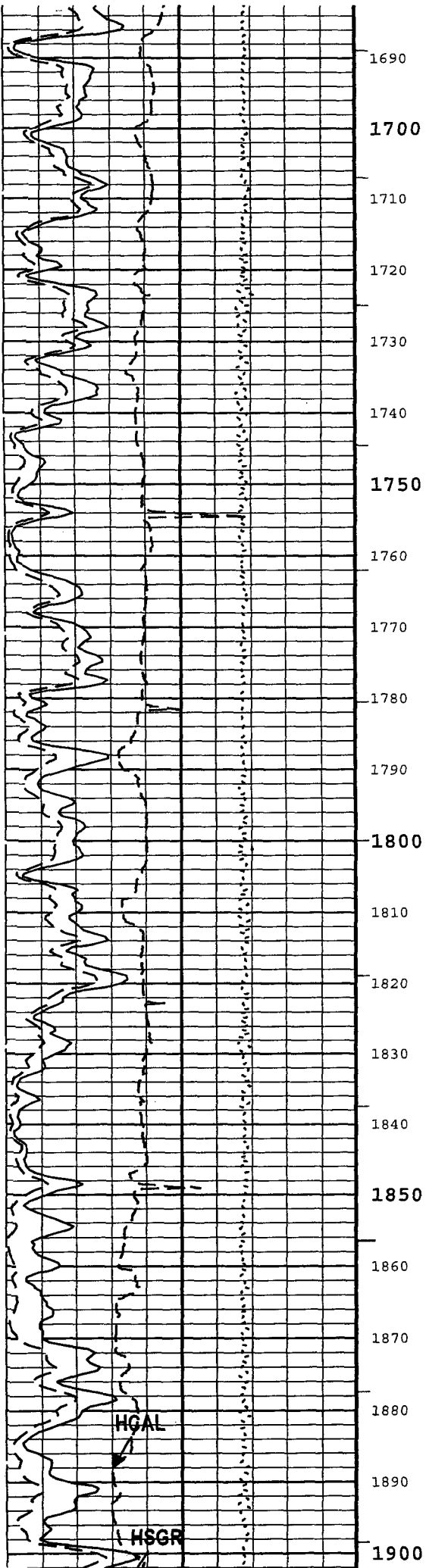
Standard Resolution Density Porosity (DPHZ) HDRS-H

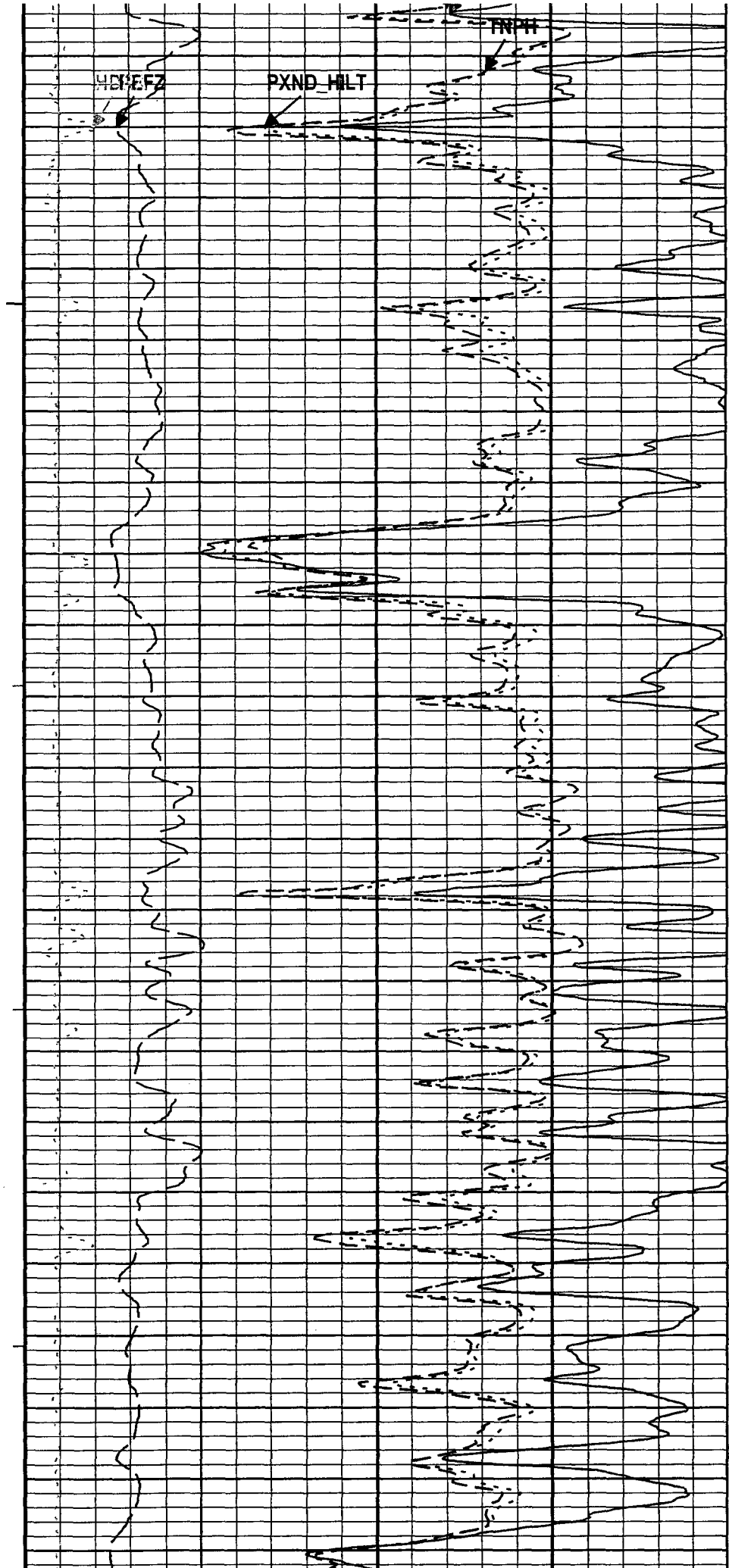
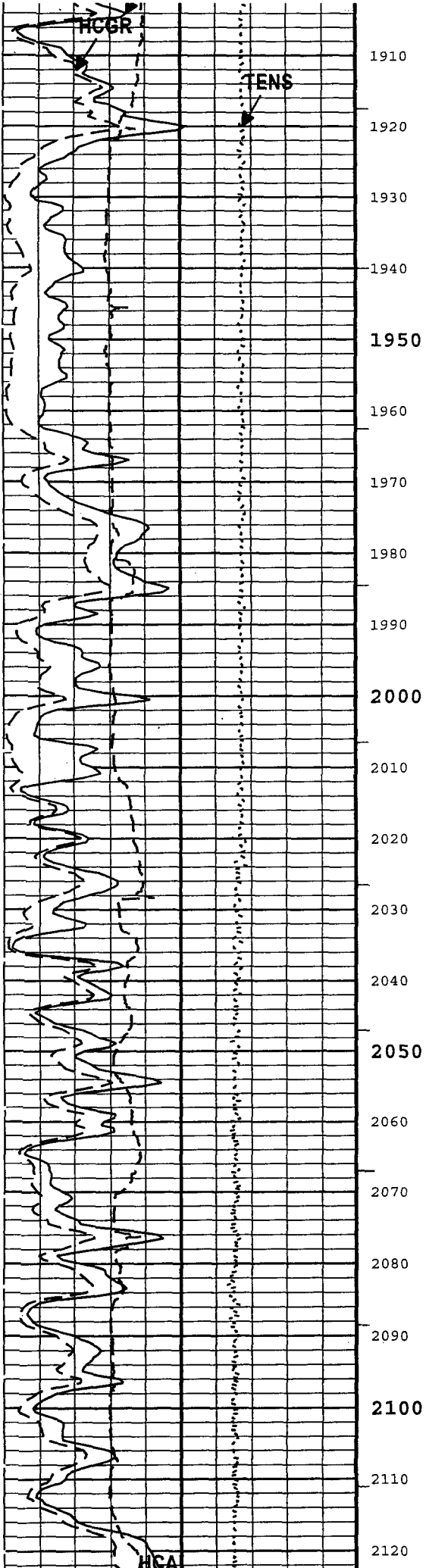
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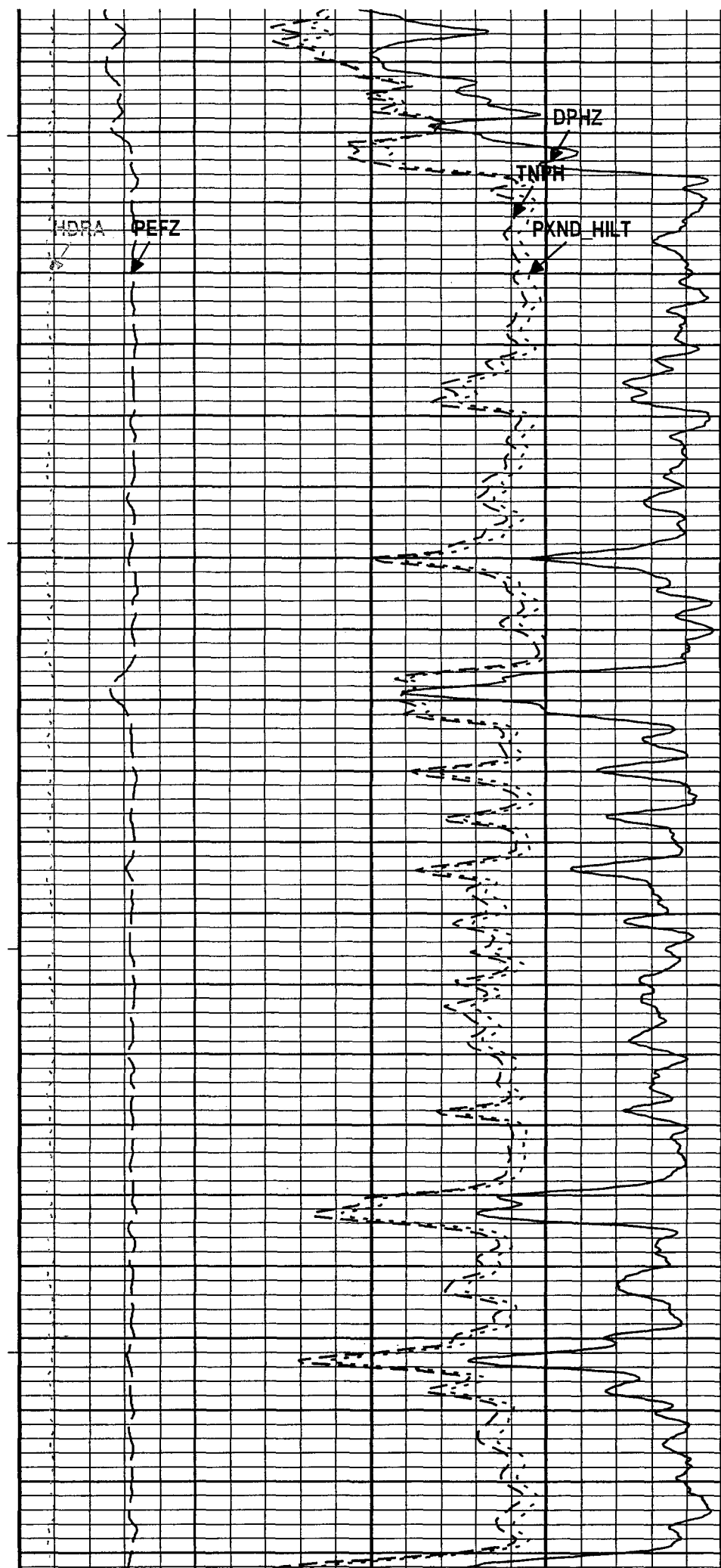
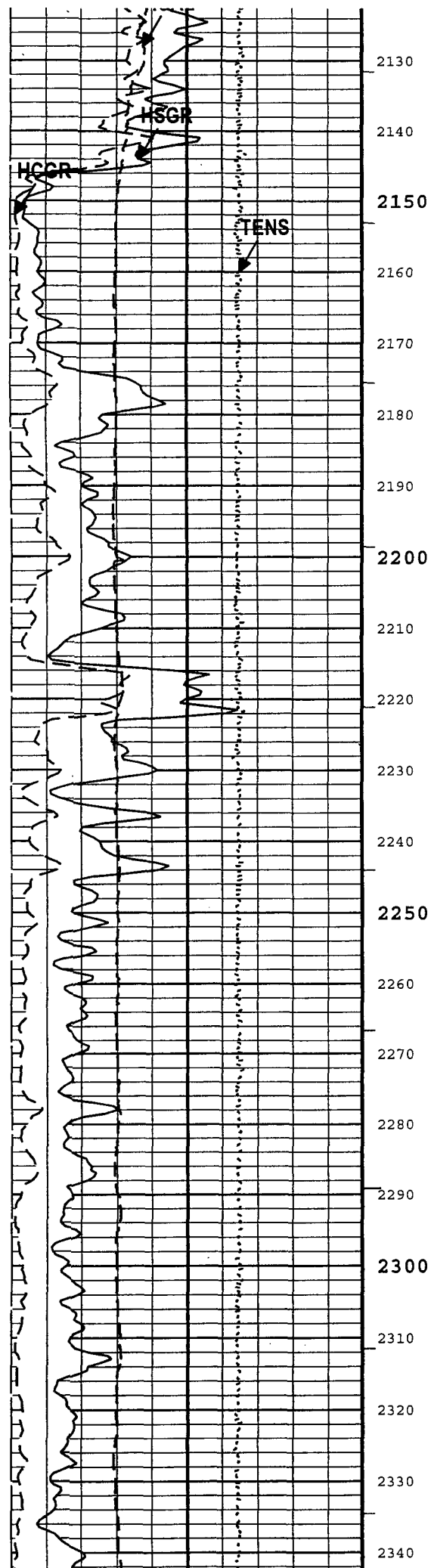


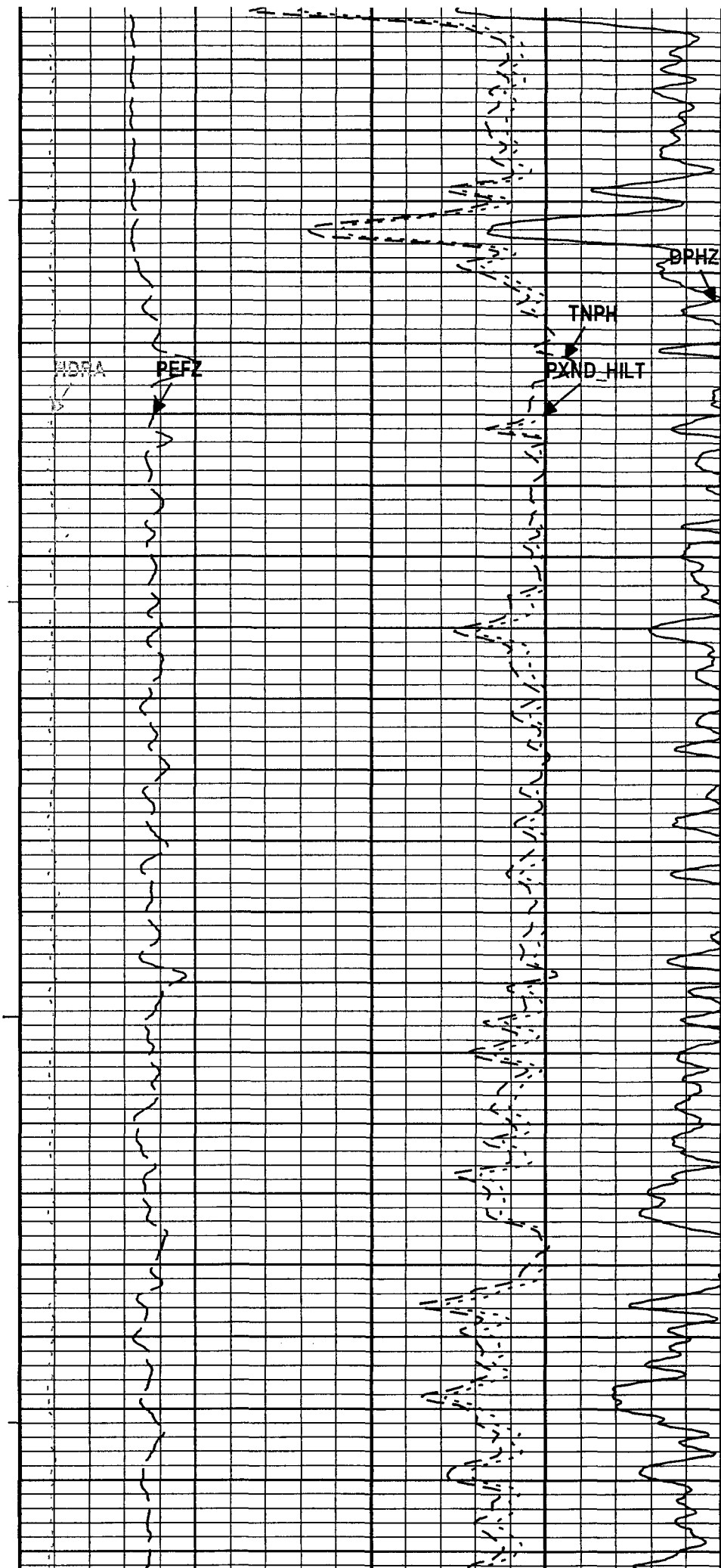
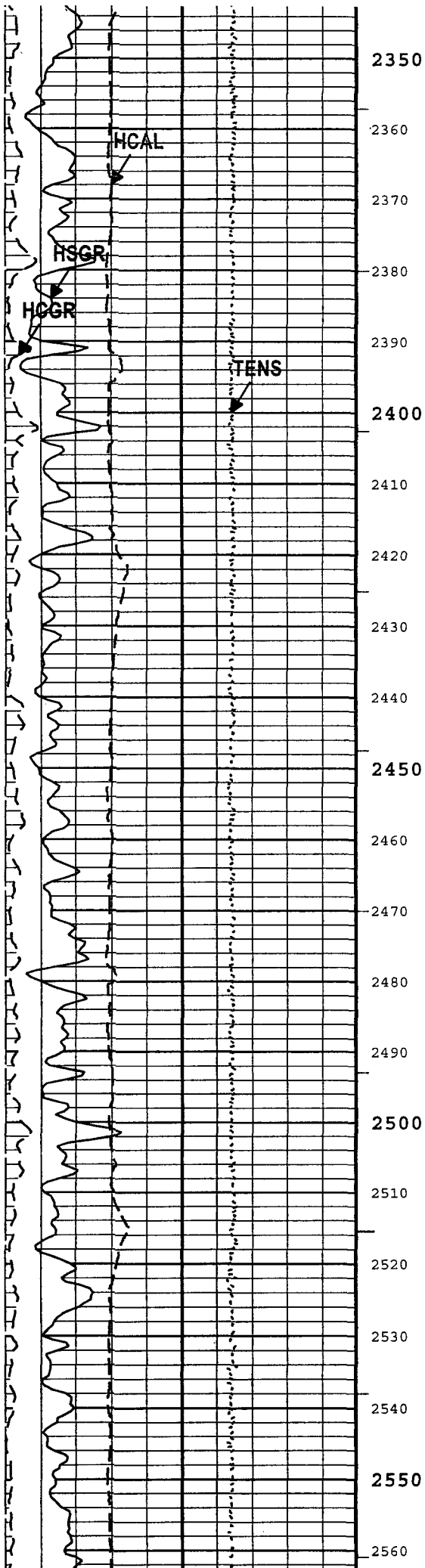


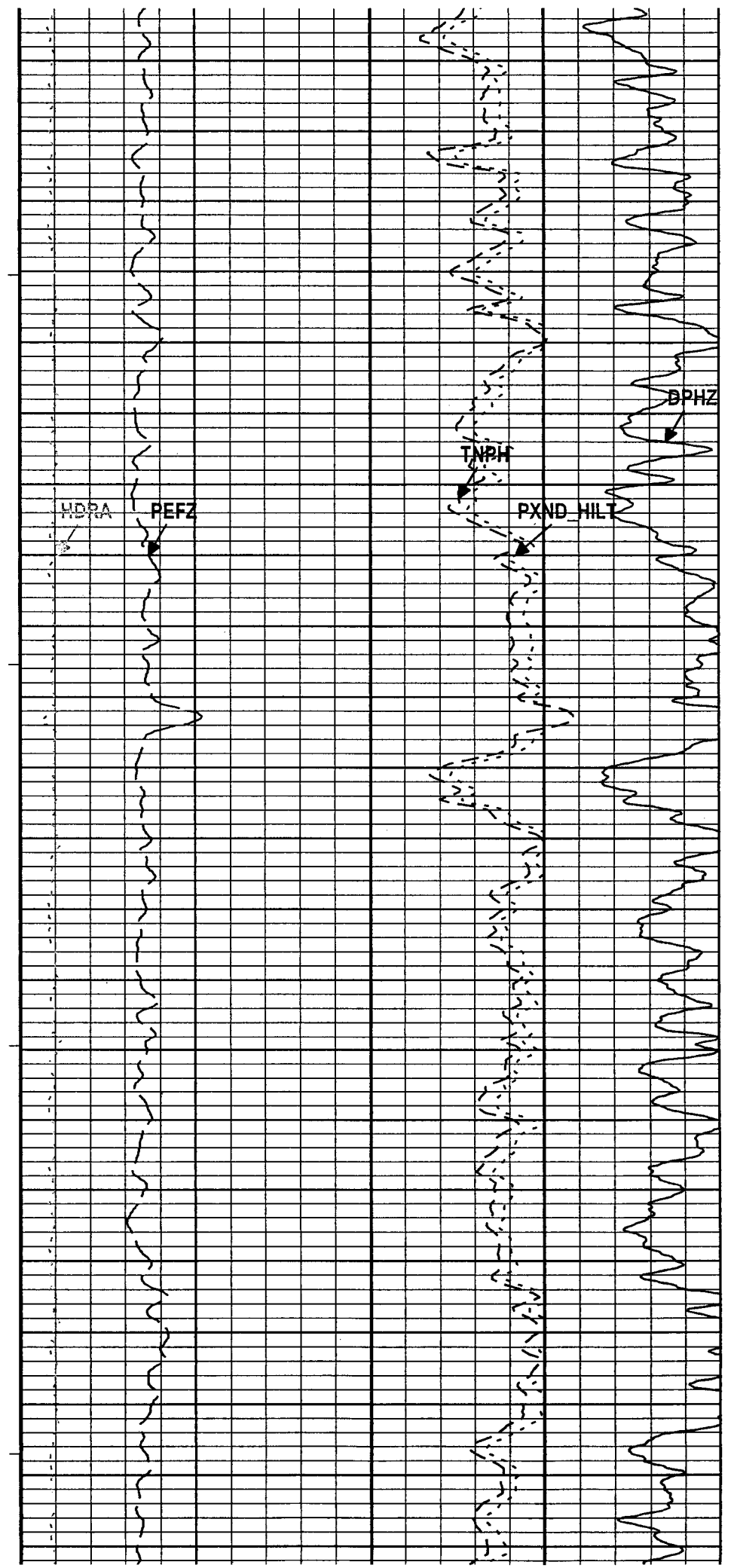
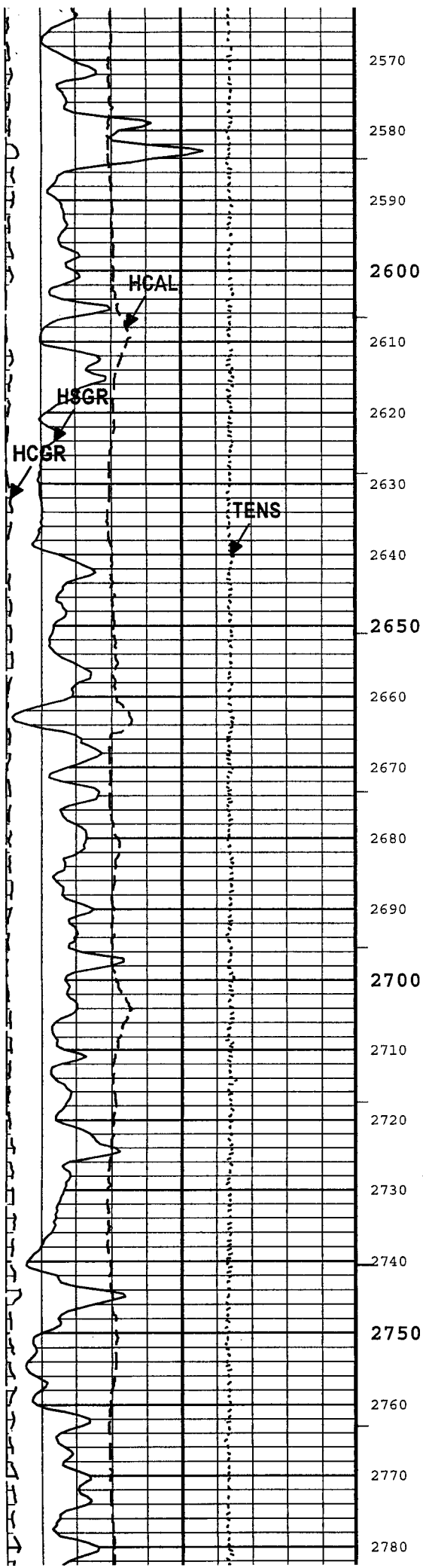


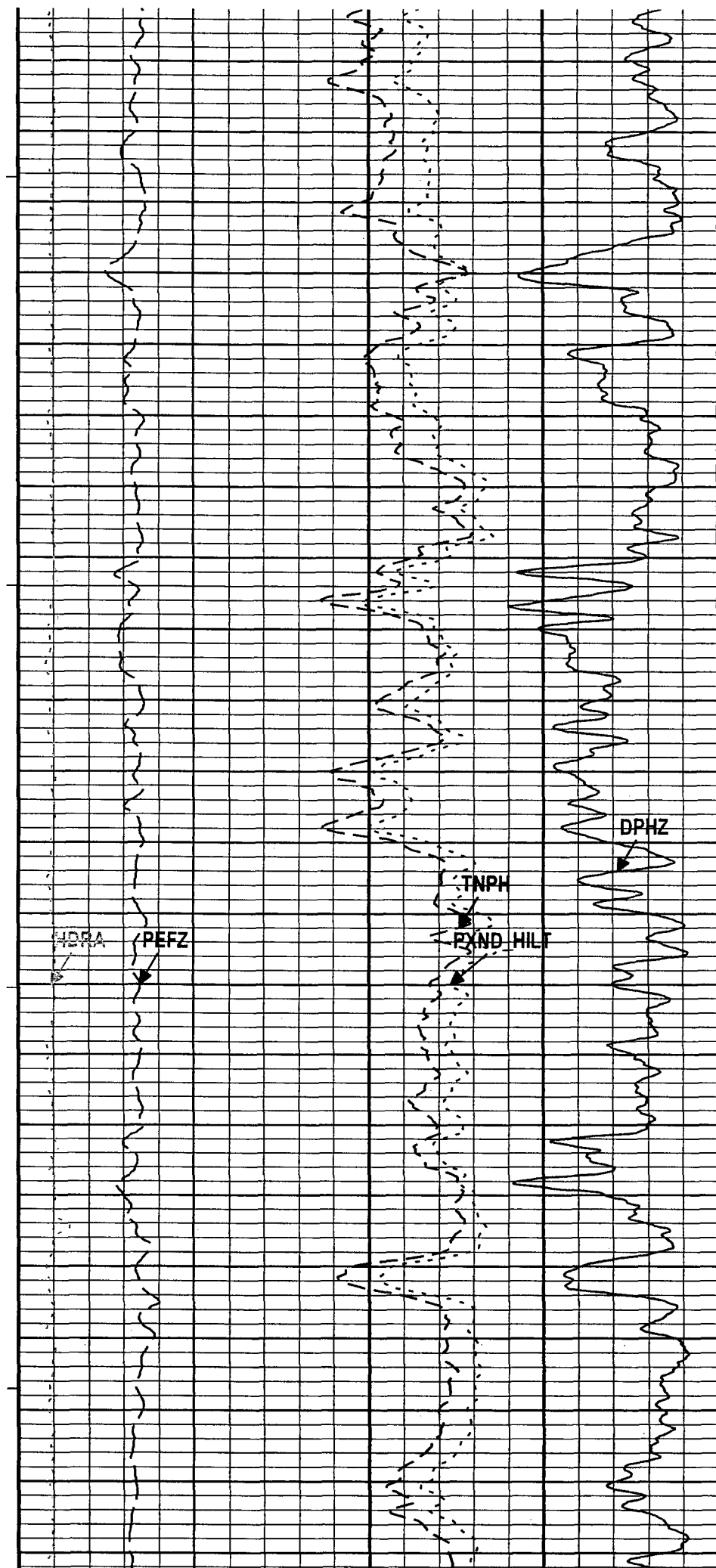
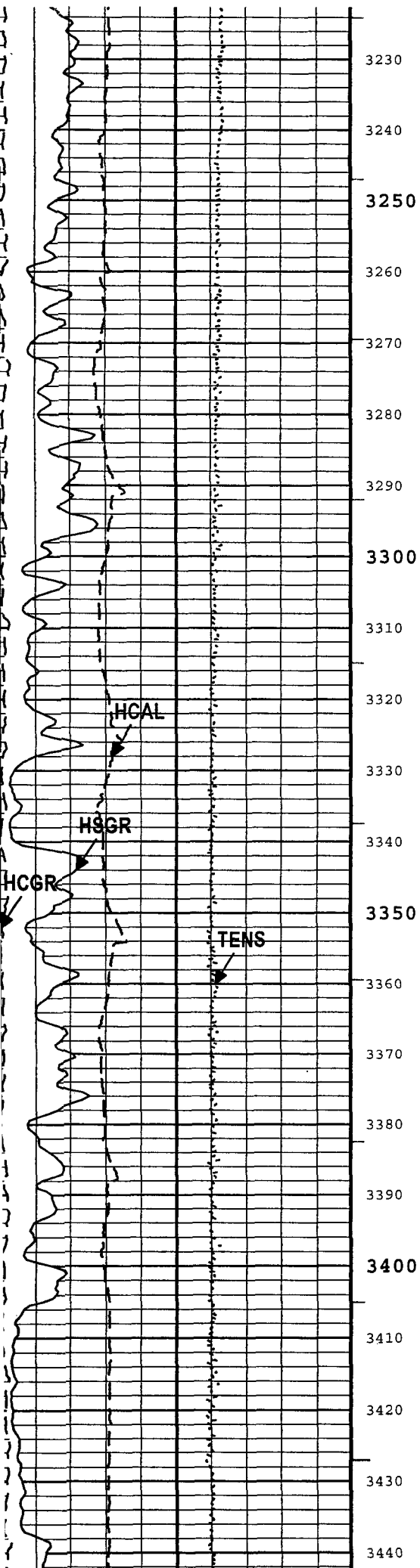


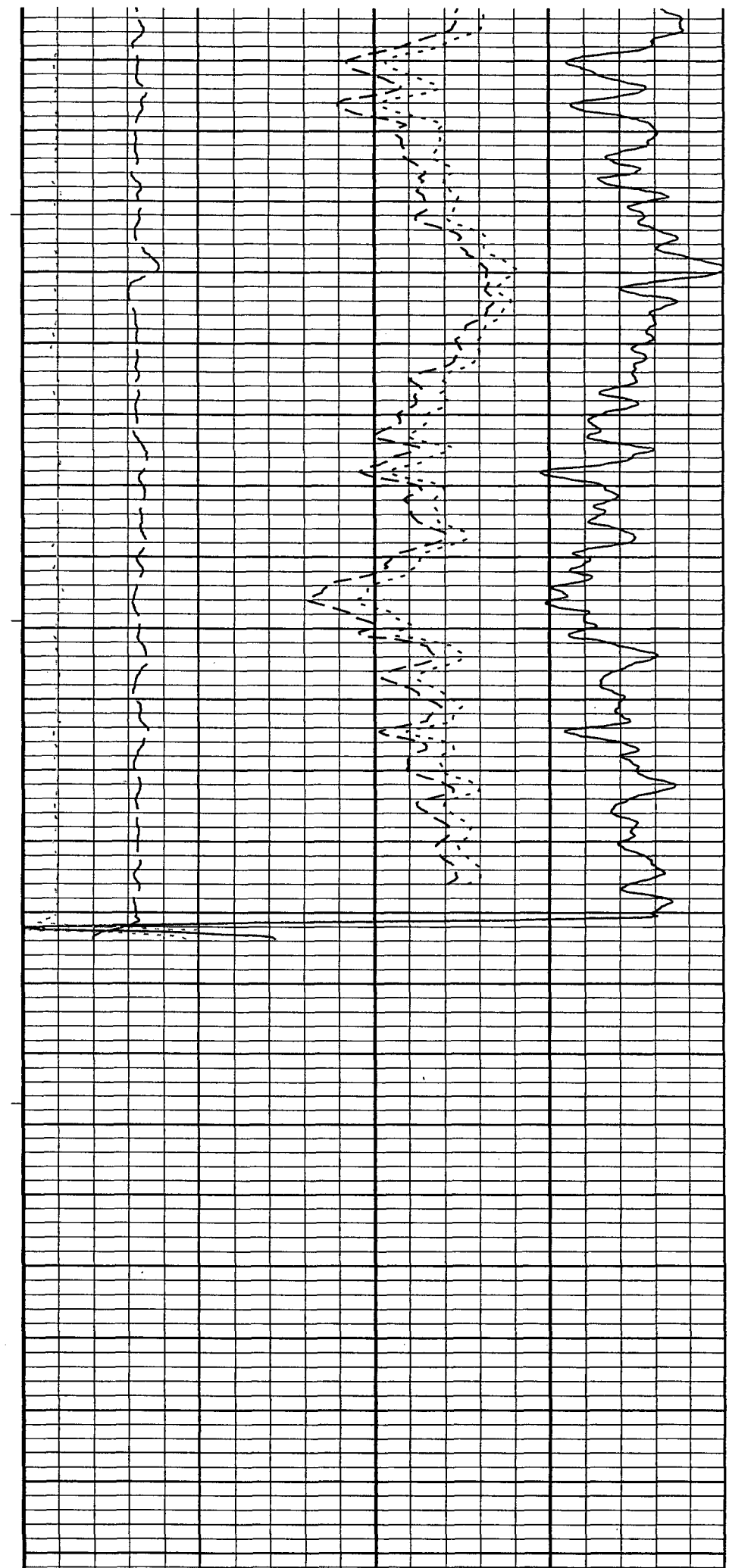
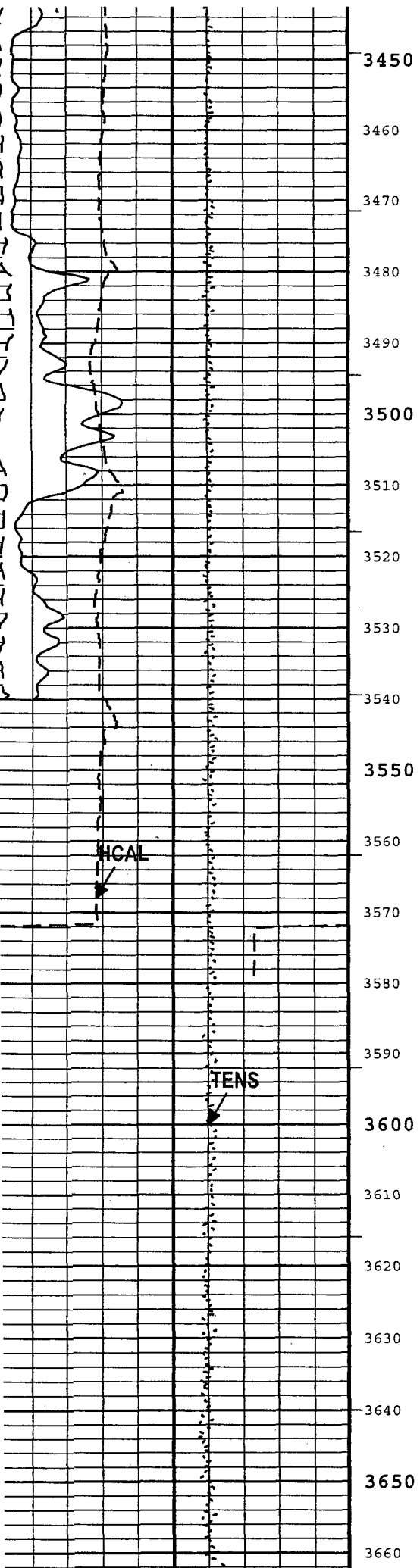












Uranium Indicator		
Cable Tension (TENS)		
10000	lbf	0
Gamma Ray Contribution from Thorium and Potassium (HCGR) HNGS-BA		
0	gAPI	150
Spectroscopy Gamma Ray (HSGR) HNGS-BA		
0	gAPI	150
Caliper (HCAL) HDRS-H		
6	in	16

Crossplot Porosity for Neutron-Density (PXND_HILT)		
0.3	ft3/ft3	-0.1
Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS-H		
0.3	ft3/ft3	-0.1
Standard Resolution Density Porosity (DPHZ) HDRS-H		
0.3	ft3/ft3	-0.1
Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H		
0		10
Density Standoff Correction (HDRA) HDRS-H		
-0.05	g/cm3	0.2

TIME_1900 - Time Marked every 60.00 (s)

—ICV - Integrated Cement Volume every 10.00 (ft3)

—ICV - Integrated Cement Volume every 100.00 (ft3)

—IHV - Integrated Hole Volume every 10.00 (ft3)

—IHV - Integrated Hole Volume every 100.00 (ft3)

Description: HRLT BASIC LOG Format: Log (Porosity_5_Inch) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 20-Oct-2017 16:55:58

Channel Processing Parameters				
1A: Parameters				
Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	No	
BHK	Drilling Fluid Potassium Concentration	Borehole	0	%
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	90	degF
BS	Bit Size	WLSESSION	8.75	in
BSAL	Borehole Salinity	Borehole	42000	ppm
CALL_SHIFT	CALI Supplementary Offset	HDRS-H	0.2	in
CBLO	Casing Bottom (Logger)	WLSESSION	1244	ft
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	9.625	in
DBCC	Barite Constant Correction Flag	HNGS-BA	None	
DC_MODE	Depth Correction Mode	DepthCorrection	Real-time	
DFD	Drilling Fluid Density	Borehole	9.5	lbm/gal
DFT_CATEGORY	Drilling Fluid Type	Borehole	Water	
DFT_WATER	Drilling Fluid Water Type	Borehole	Salt Brine	
DHC	Density Hole Correction	HDRS-H	Bit Size	
FCD	Future Casing (Outer) Diameter	WLSESSION	7	in
FD	Fluid Density	Borehole	1	g/cm3
FSAL	Formation Salinity	Borehole	0	ppm
GCSE_DOWN_PASS	Generalized Caliper Selection for WL Log Down Passes	Borehole	BS(RT)	
GCSE_UP_PASS	Generalized Caliper Selection for WL Log Up Passes	Borehole	CALI	
GRSE	Generalized Mud Resistivity Selection, from Measured or Computed Mud Resistivity	Borehole	MRES	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HCRB	Apply Borehole Potassium Correction	HNGS-BA	None	
HEMA	Hematite Presence Flag	Borehole	No	

PROCRM	Mud Resistivity Select	HRLT-B	HRLT Compute	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
KFAC_HRLT	HRLT Geometrical Factor Option	HRLT-B	Sonde	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	LIMESTONE	
MDEN	Matrix Density for Density Porosity	Borehole	2.71	g/cm3
MFST	Mud Filtrate Sample Temperature	Borehole	74.3	degF
PROCMSO	Mechanical Standoff Size	HRLT-B	1.5	in
PROCSP0	Sonde Position	HRLT-B	Eccentered	
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.12	ohm.m
SGRC	Standard Gamma Ray Correction Flag	HNGS-BA	Yes	
SOCO	Standoff Correction Option	HGNS-H	Yes	

Tool Control Parameters

1A: Parameters

Parameter	Description	Tool	Value	Unit
HMCA_BOARD_TYPE	HMCA Board Type	HGNS-H	1	
HRGD_BOARD_TYPE	HRGD Board Type	HDRS-H	WITH_HET	
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	900	ft/h

1A

Repeat Pass 5" = 100'

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1A	Log[4]:Up	Up	2767.36 ft	3114.28 ft	29-Oct-2017 11:28:30 AM	29-Oct-2017 11:56:17 AM	ON	2.34 ft	No
1A	Log[6]:Up	Up	131.82 ft	3663.70 ft	29-Oct-2017 12:04:32 PM	29-Oct-2017 3:10:45 PM	ON	3.39 ft	No

All depths are referenced to toolstring zero

Log

Company:COG Operating LLC

Well:Malco 23 Federal Com 13H

1A: Log[4]:Up:S003

Description: HRLT BASIC LOG Format: Log (Porosity_5_Inch RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 29-Oct-2017 16:56:01

— IHV - Integrated Hole Volume every 100.00 (ft3)

— IHV - Integrated Hole Volume every 10.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

— ICV - Integrated Cement Volume every 100.00 (ft3)

— ICV - Integrated Cement Volume every 10.00 (ft3)

Main To Repeat

Repeat To Main

Density Standoff
Correction (HDRA)

HDRS-H

-0.05 g/cm3 0.2

Main To Repeat

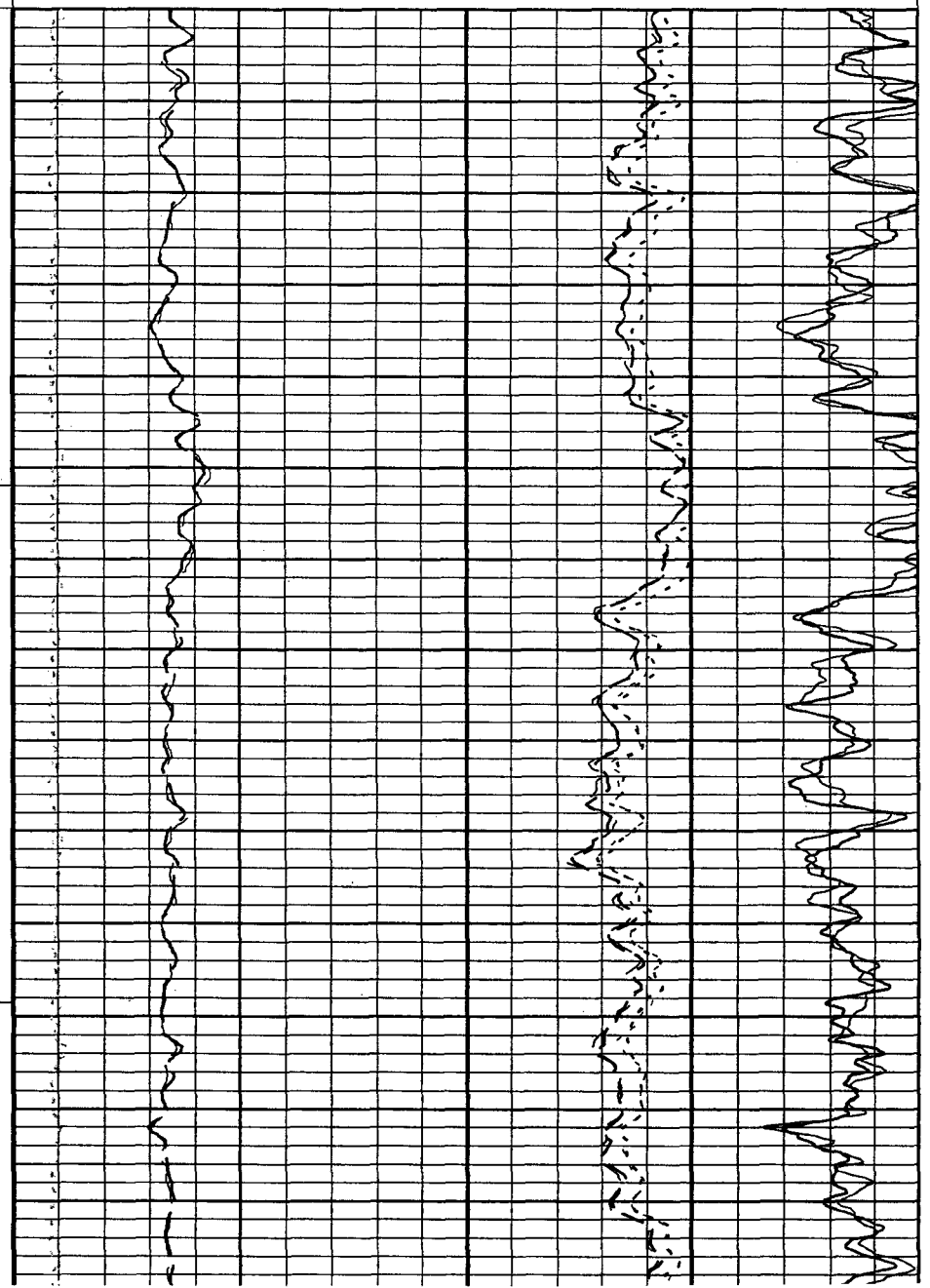
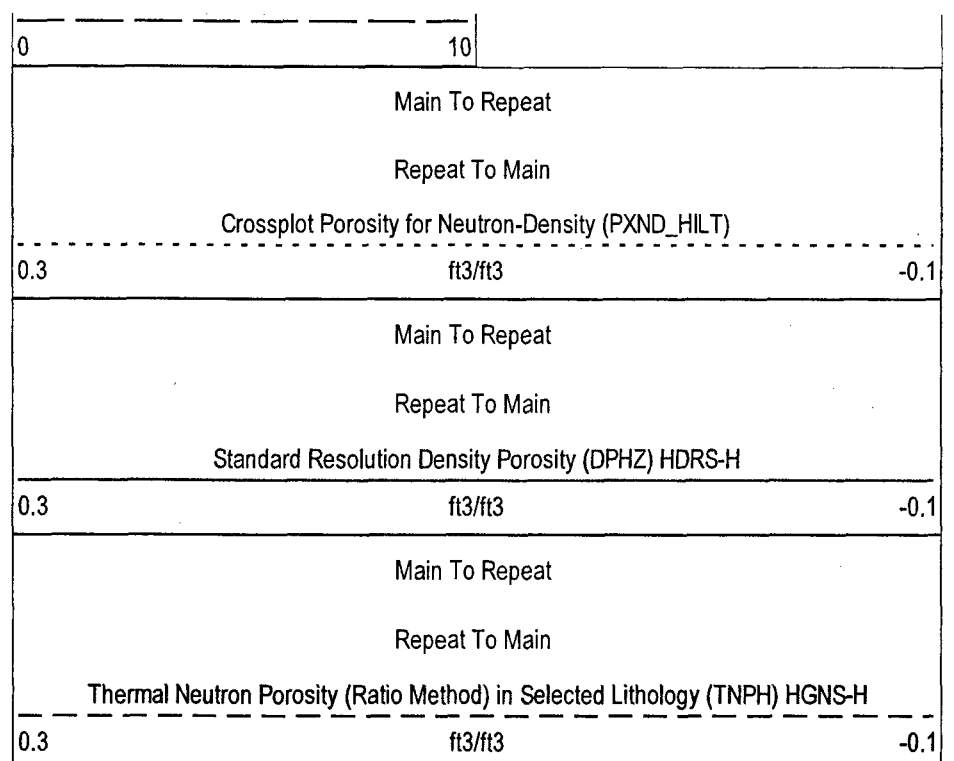
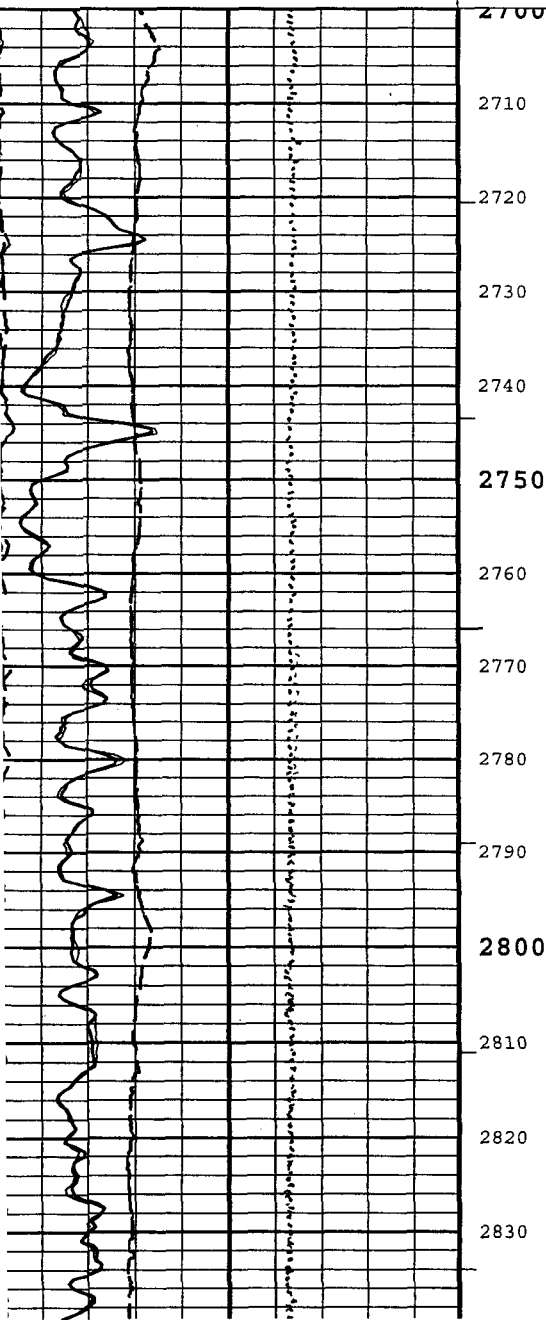
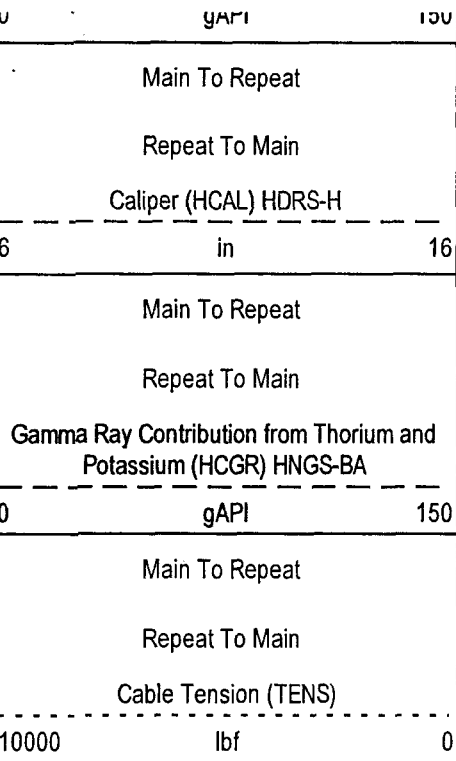
Repeat To Main

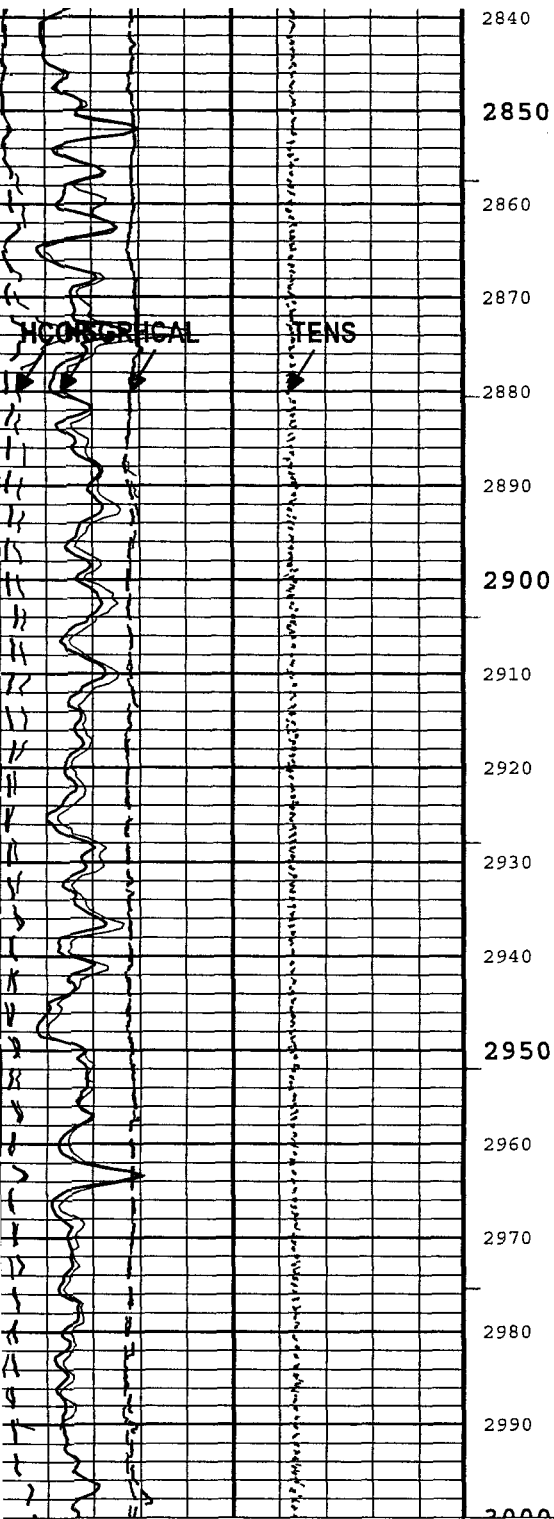
Spectroscopy Gamma Ray (HSGR) HNGS-BA

Main To Repeat

Repeat To Main

Standard Resolution Formation Photoelectric
Factor (PEFZ) HDRS-H





Main To Repeat

Repeat To Main

Spectroscopy Gamma Ray (HSGR) HNGS-BA

0 gAPI 150

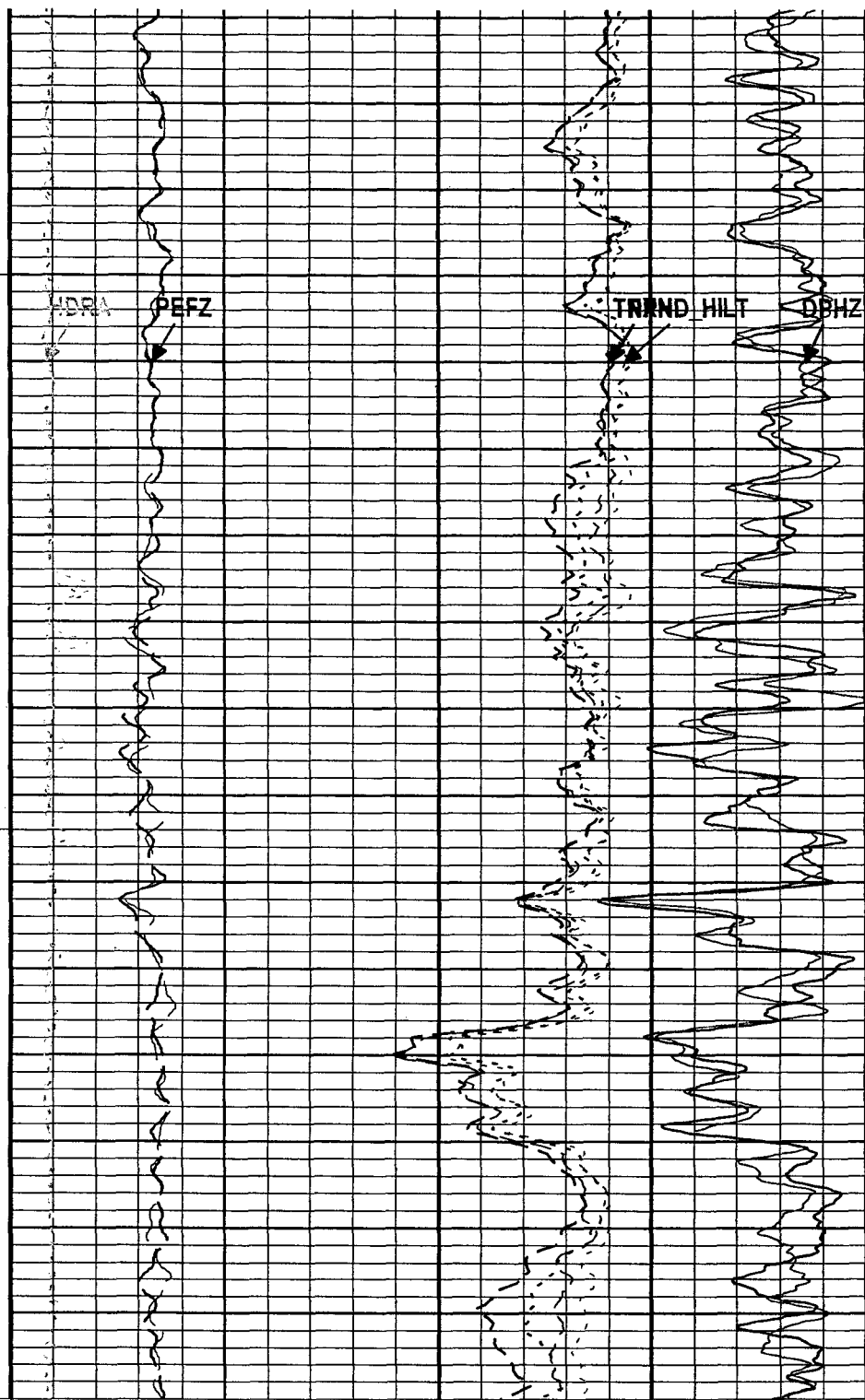
Main To Repeat

Repeat To Main

Caliper (HCAL) HDRS-H

6 in 16

Main To Repeat



Main To Repeat

Repeat To Main

Crossplot Porosity for Neutron-Density (PXND_HILT)

0.3 ft3/ft3 -0.1

Main To Repeat

Repeat To Main

Standard Resolution Density Porosity (DPHZ) HDRS-H

0.3 ft3/ft3 -0.1

Main To Repeat

Repeat To Main

Gamma Ray Contribution from Thorium and Potassium (HCGR) HGNS-BA

0gAPI150

Main To Repeat

Repeat To Main

Cable Tension (TENS)

10000lbf0

Repeat To Main

Thermal Neutron Porosity (Ratio Method) in Selected Lithology (TNPH) HGNS-H

0.3ft3/ft3-0.1

Main To Repeat

Repeat To Main

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

010

Main To Repeat

Repeat To Main

Density Standoff Correction (HDRA) HDRS-H

-0.05g/cm30.2

—ICV - Integrated Cement Volume every 10.00 (ft3)

—ICV - Integrated Cement Volume every 100.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

—IHV - Integrated Hole Volume every 10.00 (ft3)

—IHV - Integrated Hole Volume every 100.00 (ft3)

Description: HRLT BASIC LOG Format: Log (Porosity_5_Inch RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 29-Oct-2017 16:56:01

Calibration Report

HDRS-H (HILT Density and Rxo Sonde, 150 degC) Calibration - Run 1A

Primary Equipment :

HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	
HILT Resistivity Gamma-Ray Density Device, 150 degC	HRGD-H	5720

Auxiliary Equipment :

HRDD Backscatter Detector	Backscatter	
HRDD Long Spacing Detector	Long Spacing	
HRDD Short Spacing Detector	Short Spacing	
Cesium 137 Gamma-Ray Logging Source	GSR-J	5407
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	
HILT High-Resolution Mechanical Sonde, 150 degC	HRMS-H	

Calibration Parameter :

Small Ring Size (Caliper Calibration Small Ring)	8.00
Large Ring Size (Caliper Calibration Large Ring)	12.00

HDRS Density Calibration - Inversion Results

Master (EEPROM): 11:01:40 27-Oct-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Rho Aluminum	g/cm3	Master	2.596	2.586	2.598	2.606	
Rho Magnesium	g/cm3	Master	1.686	1.676	1.688	1.696	
Pe Aluminum		Master	2.570	2.470	2.556	2.670	
Pe Magnesium		Master	2.650	2.550	2.616	2.750	

HDRS Density Calibration - Deviation Summary

Master (EEPROM): 11:01:40 27-Oct-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Rho Aluminum	g/cm3	Master	2.596	2.586	2.598	2.606	
Rho Magnesium	g/cm3	Master	1.686	1.676	1.688	1.696	
Pe Aluminum		Master	2.570	2.470	2.556	2.670	
Pe Magnesium		Master	2.650	2.550	2.616	2.750	

BS Average Deviation	%	Master	0	-0.0000	0.2839	0.0000	
BS Max Deviation	%	Master	0	-1.6000	0.5830	1.6000	
SS Average Deviation	%	Master	0	-1.0000	0.3509	1.0000	
SS Max Deviation	%	Master	0	-2.5000	1.0975	2.5000	
LS Average Deviation	%	Master	0	-1.5000	0.4049	1.5000	
LS Max Deviation	%	Master	0	-3.5000	0.9003	3.5000	

HDRS Density Calibration - Background Summary

Master (EEPROM): 11:01:40 27-Oct-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Window Ratio		Master	1.0000		0.7824		
BS Window Sum	1/s	Master	1		28303		
SS Window Ratio		Master	1.0000		0.4845		
SS Window Sum	1/s	Master	1		11055		
LS Window Ratio		Master	1.0000		0.3015		
LS Window Sum	1/s	Master	1		1253		

HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 11:01:40 27-Oct-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS PM High Voltage	V	Master		1000	1492	2400	
SS PM High Voltage	V	Master		1000	1820	2400	
LS PM High Voltage	V	Master		1000	1337	2400	

HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM): 11:01:40 27-Oct-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
BS Crystal Resolution	%	Master		5.00	10.64	25.00	
SS Crystal Resolution	%	Master		5.00	9.46	20.00	
LS Crystal Resolution	%	Master		5.00	7.88	20.00	

HGNS-H (HILT Gamma-Ray and Neutron Sonde, 150 degC) Calibration - Run 1A

Primary Equipment :

HILT Gamma-Ray and Neutron Sonde, 150 degC HGNS-H

Auxiliary Equipment :

HGNS Accelerometer, 150 degC HACCZ-H 5879

AmBe Neutron Logging Source NSR-F 5194

Calibration Parameter :

Water Temperature (Calibration Tank Water Temperature) 89.7

Housing Size (Thermal Housing Size) 3.38

JIG-BKG

HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

Master (EEPROM): 00:00:00 15-Dec-2006

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Accelerometer Manufacturer		Master			QAT_160		
Accelerometer Reference Temperature	degF	Master		30.2	77.0	122.0	
Accelerometer Coefficients - 0		Master	---	---	3233.000	---	
Accelerometer Coefficients - 1		Master	---	---	18.780	---	
Accelerometer Coefficients - 2		Master	---	---	-0.023	---	
Accelerometer Coefficients - 3		Master	---	---	0.000	---	
Accelerometer Coefficients - 4		Master	---	---	2.738	---	
Accelerometer Coefficients - 5		Master	---	---	0.000	---	
Accelerometer Coefficients - 6		Master	---	---	0.000	---	
Accelerometer Coefficients - 7		Master	---	---	0.000	---	
Accelerometer Coefficients - 8		Master	---	---	298.700	---	
Accelerometer Coefficients - 9		Master	---	---	1.000	---	

HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM): 12:30:24 03-Aug-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
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Near Zero Measurement	1/s	Master	0	5.0	25.9	40.0	
Far Zero Measurement	1/s	Master	0	5.0	26.3	40.0	
Near Plus Measurement	1/s	Master	6031.0	4700.0	5327.0	6900.0	
Far Plus Measurement	1/s	Master	2793.0	1900.0	2235.0	2900.0	
Near Corrected Plus Measurement	1/s	Master		4700.0	5264.0	6900.0	
Far Corrected Plus Measurement	1/s	Master		1900.0	2186.0	2900.0	

HNGS-BA (Hostile-environment Natural Gamma-ray Sonde) Calibration - Run 1A

Primary Equipment :

HNGS Sonde Element

HNGS-BA

99

Auxiliary Equipment :

HNGS Housing Element

HEH-K

102

0

Calibration History - Calibration History

Master:

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
- 0		Master	—	—	—	—	

HNGS Background and Na22 Set Point Determination - Detector 1 Check

Master (EEPROM): 23:49:26 20-Sep-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Location		Master	40.000	37.500	40.726	42.500	
Na 511 Peak Resolution	%	Master	15.500	12.000	17.016	19.000	
High Voltage DAC Value	V	Master			1280.119		
Na 1785 Peak Location		Master	142.650	135.000	147.837	150.300	
Na 1785 Peak Resolution	%	Master	8.500	6.500	9.521	11.000	
Temperature - 0	degF	Master	—	—	—	—	
Na Count Rate	CPS	Master	45.000	10.000	23.178	100.000	

HNGS Background and Na22 Set Point Determination - Detector 2 Check

Master (EEPROM): 23:49:26 20-Sep-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Location		Master	40.000	37.500	38.824	42.500	
Na 511 Peak Resolution	%	Master	15.500	12.000	15.985	19.000	
High Voltage DAC Value	V	Master			1273.091		
Na 1785 Peak Location		Master	142.650	135.000	139.510	150.300	
Na 1785 Peak Resolution	%	Master	8.500	6.500	8.599	11.000	
Temperature - 0	degF	Master	—	—	—	—	
Na Count Rate	CPS	Master	45.000	10.000	23.501	100.000	

HNGS Background and Na22 Set Point Determination - Ratio of Detector 1 to Detector 2

Master (EEPROM): 23:49:26 20-Sep-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Coincidence Count Rate Ratio		Master			0.997		

HNGS Background and Na22 Set Point Determination - Detector 1 Calibration

Master (EEPROM): 23:49:26 20-Sep-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Th Peak Location		Master	209.630	201.000	210.887	218.250	
Th Peak Resolution	%	Master	7.000	5.000	8.274	9.000	
Background Count Rate	CPS	Master			76.212		
Gain Ratio		Master	1.000	0.940	0.985	1.060	

HNGS Background and Na22 Set Point Determination - Detector 2 Calibration

Master (EEPROM): 23:49:26 20-Sep-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Th Peak Location		Master	209.630	201.000	207.247	218.250	
Th Peak Resolution	%	Master	7.000	5.000	6.850	9.000	
Background Count Rate	CPS	Master			77.729		
Gain Ratio		Master	1.000	0.940	1.015	1.060	

HNGS Background and Na22 Set Point Determination - Detector 1 Calibration

HNGS Background and Na22 Set Point Determination - Detector 1 Calibration

Master (EEPROM): 23:49:26 20-Sep-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Set Point		Master	40.000	38.000	42.000	43.500	

HNGS Background and Na22 Set Point Determination - Detector 2 Calibration

Master (EEPROM): 23:49:26 20-Sep-2017

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Na 511 Peak Set Point		Master	40.000	38.000	40.000	43.500	

Company: COG Operating LLC

Schlumberger

Well: Malco 23 Federal Com 13H

Field: Empire - Glorieta Yeso

County: Eddy

State: New Mexico

Platform Express

Compensated Neutron Log

Three Detector Litho-Density

1A

Main Pass 1" = 100'

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
1A	Log[6]:Up	Up	131.82 ft	3663.70 ft	29-Oct-2017 12:04:32 PM	29-Oct-2017 3:10:45 PM	ON	3.39 ft	No

All depths are referenced to toolstring zero

Log

Company: COG Operating LLC

Well: Malco 23 Federal Com 13H

1A: Log[6]:Up:S003

Description: HRLT BASIC LOG Format: Log (Porosity 1 inch General) Index Scale: 1 in per 100 ft
 Index Unit: ft Index Type: Measured Depth Creation Date: 29-Oct-2017 16:56:04

Channel	Source	Sampling
CALI	HDRS-H:HRCC-H:HRCC-H	1in
CGR	HNGS-BA:HNGS-BA:HNGS-BA	6in
RHOZ	HDRS-H:HRMS-H:HRGD-H	2in
SGR	HNGS-BA:HNGS-BA:HNGS-BA	6in
TENS	WLWorkflow	1in
TIME_1900	WLWorkflow	0.1in
TNPH	HGNS-H:HGNS-H:HGNS-H	6in

TIME_1900 - Time Marked every 60.00 (s)

Cable Tension (TENS)

10000 lbf 0

Gamma Ray
Contribution from
Thorium and
Potassium (HCGR)
HNGS-BA

0 gAPI 150

Spectroscopy Gamma
Ray (HSGR) HNGS-BA

0 gAPI 150

Caliper (HCAL)
HDRS-H

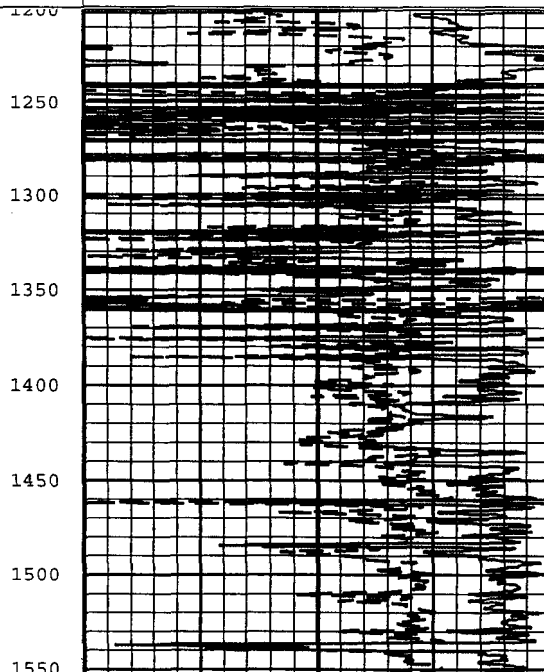
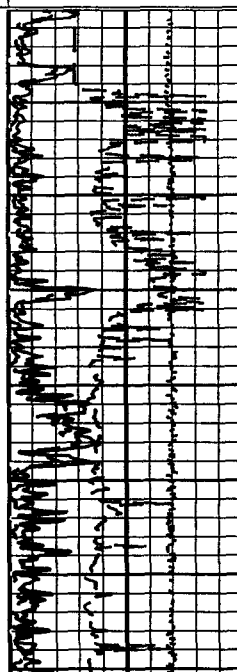
6 in 16

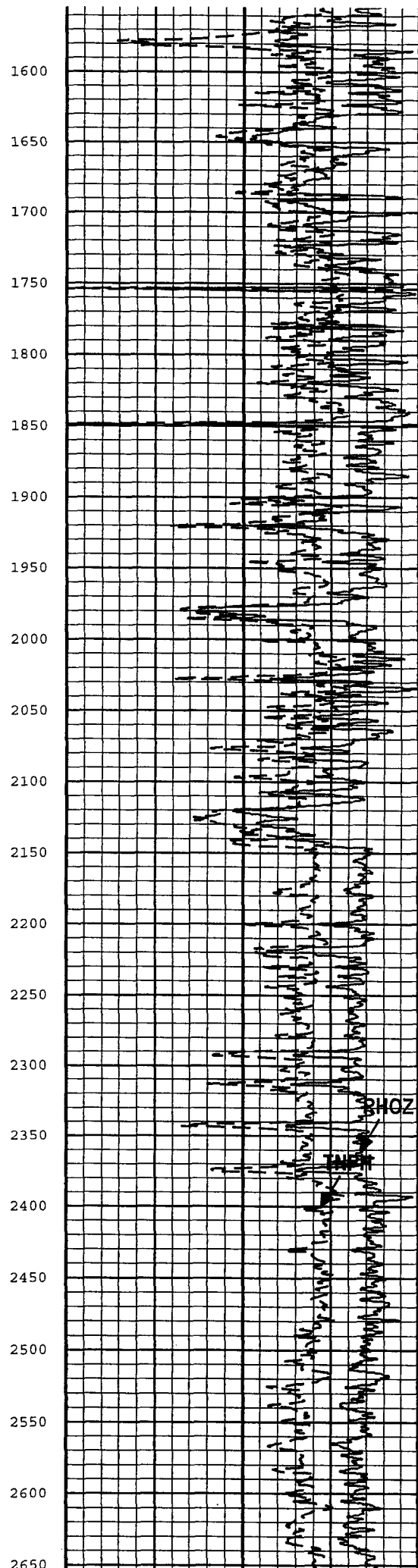
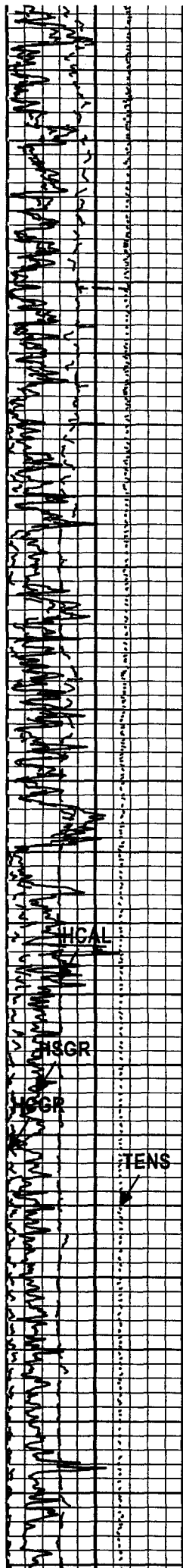
Thermal Neutron Porosity (Ratio Method) in
Selected Lithology (TNPH) HGNS-H

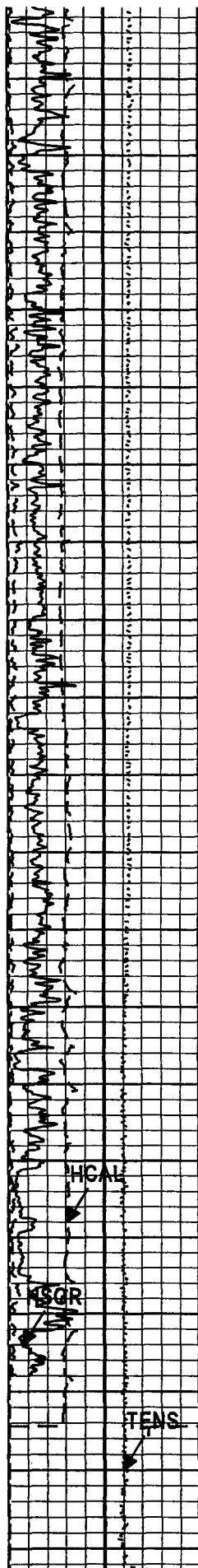
0.3 ft3/ft3 -0.1

Standard Resolution Formation Density
(RHOZ) HDRS-H

2 g/cm3 3



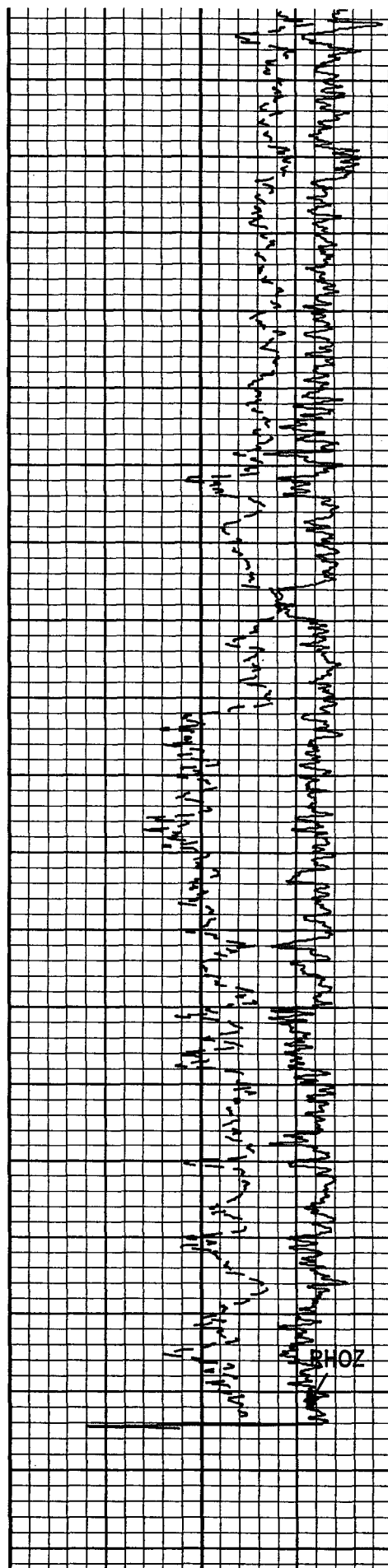




Cable Tension (TENS)
10000 lbf 0

Gamma Ray
Contribution from

2700
2750
2800
2850
2900
2950
3000
3050
3100
3150
3200
3250
3300
3350
3400
3450
3500
3550
3600
3650



Thermal Neutron Porosity (Ratio Method) in
Selected Lithology (TNPH) HGNS-H

0.3 ft3/ft3 -0.1

Standard Resolution Formation Density

Thorium and Potassium (HCGR) HNGS-BA		
0	gAPI	150
Spectroscopy Gamma Ray (HSGR) HNGS-BA		
0	gAPI	150
Caliper (HCAL) HDRS-H		
6	in	16

Standard Resolution Formation Density (RHOZ) HDRS-H		
2	g/cm3	3

TIME_1900 - Time Marked every 60.00 (s)

Description: HRLT BASIC LOG Format: Log (Porosity 1 inch General) Index Scale: 1 in per 100 ft
Index Unit: ft Index Type: Measured Depth Creation Date: 29-Oct-2017 16:56:04