



LWD REALTIME LOG

Gamma Ray

Scale: 1:600 Measured Depth	Company: Tug Hill Operating Well: Heaven Hill 3N-10HU Field: Marshall						
Driller's Depth	County: Marshall Country: United States State: West Virginia						
Status: Final Print	Surface Location: Latitude: 039° 48' 31.190" N Longitude: 080° 41' 36.053" W						
API No: 47051020160000 Job ID: 109624561A	Other Services: Wellbore Surveys						
Permanent Datum (P.D.): Ground Level Log Measured From: Rig Floor	Elevation: 0.00 ft Elev. KB: 1352.00 ft Elev. DF: 1326.00 ft Above P.D. 26.00 ft Elev. GI: 1326.00 ft						
Dates	Interval Logged Date From: 2018-12-24 Top (ft): 11187.00 Date To: 2018-12-29 Bottom (ft): 19287.00 Spud Date: 2018-12-30						
Magnetic Field Reference Azi Reference North: Grid Dip Angle: (deg) 65.80 Total Magnetic Field Strength: (nT) 52082 Mag to Reference North Correction: (deg) -0.89							
Borehole Record							
Hole Size (in)	From (ft)	To (ft)	Size (in)	Weight (lb/ft)	From (ft)	To (ft)	
8.500	11200.00	19300.00	9.625	47.00	26.00	11199.00	
Mud Record		Deviation Record					
Type	From (ft)	To (ft)	Hole Size (in)	Interval (ft)	Inc Az (Start)	Inc Az (End)	
Synthetic Based Mud	11200.00	19300.00	8.500	8100.00	29.18 183.31	90.96 335.77	
Acquisition System		Software Version		Other			
Baker Hughes Cadence	RT 5.0	Nabors B26		Rig: Nabors Drilling			
PlotStudio	5.0.8260.3	District: Mt. Pleasant		Unit: S2K 12778683			

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Log Run Summary

Run No	Bit Run No	Bit Size (in)	Bit Type	Bit Gauge Length (in)	Assembly Type	Logged Interval		Bit Depth Interval		Date / Time		Circ. Hours (h)
						Top (ft)	Bottom (ft)	From (ft)	To (ft)	Start Logging	End Logging	
10	1	8.500	PDC	4.00	AutoTrak Curve	11187.00	19287.00	11200.00	19300.00	2018-12-24 18:58	2018-12-29 00:18	109.29

Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Ashyar Hidayberdiyev	2018-12-21	2018-12-30	Cruz Bonds	2018-12-21	2018-12-30	Mahdi Abbasi Far	2018-12-21	2018-12-30
MWD Remote Ops	2018-12-21	2018-12-30						

Witness

Name	Run
Dave Freed	10
Jerry Roberts	10

Mud Properties Record

Date / Time	Run No.	Measured Depth (ft)	Mud Type	Density (ppg)	Viscosity (cP)	pH	Fluid Loss (cm3)	Oil / Water	Source	Total Chlorides (ppm)	K+ (%)
2001-12-23 23:58	10	11200.00	Synthetic Based Mud	14.0	23	N/A	6.0	81/19	Active Pit	21000	0.00
2018-12-25 07:00	10	13790.00	Synthetic Based Mud	13.9	27	N/A	6.0	80/20	Active Pit	21000	0.00
2018-12-26 07:02	10	15112.00	Synthetic Based Mud	14.2	30	N/A	6.2	82/18	Active Pit	22000	0.00
2018-12-27 06:50	10	16462.00	Synthetic Based Mud	14.3	31	N/A	6.2	82/18	Active Pit	21000	0.00
2018-12-28 06:54	10	17243.00	Synthetic Based Mud	14.5	30	N/A	6.2	82/17	Active Pit	19000	0.00

Equipment and Service Data

Run No.	Tool	Serial Number	Measurement	Sensor Offset (ft)	Bit Offset (ft)	Max O.D. (in)	Min I.D. (in)
10	AutoTrak Curve Steering Unit	12626650	Near Bit Inclination	5.93	6.93	6.750	4.330
10	AutoTrak Curve Steering Unit	12626650	Near Bit VSS	5.93	6.93	6.750	4.330
10	AutoTrak Curve MWD	13028145	Gamma (single)	2.72	13.10	6.750	3.250
10	AutoTrak Curve MWD	13028145	Directional (mag)	12.24	22.62	6.750	3.250

Service and Tool Mnemonics

Mnemonic	Name	Description
ATC SU	AutoTrak Curve SU	Auto Trak Curve Steering Unit
ATC MWD	AutoTrak Curve MWD	Auto Trak Curve MWD
ATC LCPM	AutoTrak Curve LCPM	Auto Trak Curve LCPM

Comments

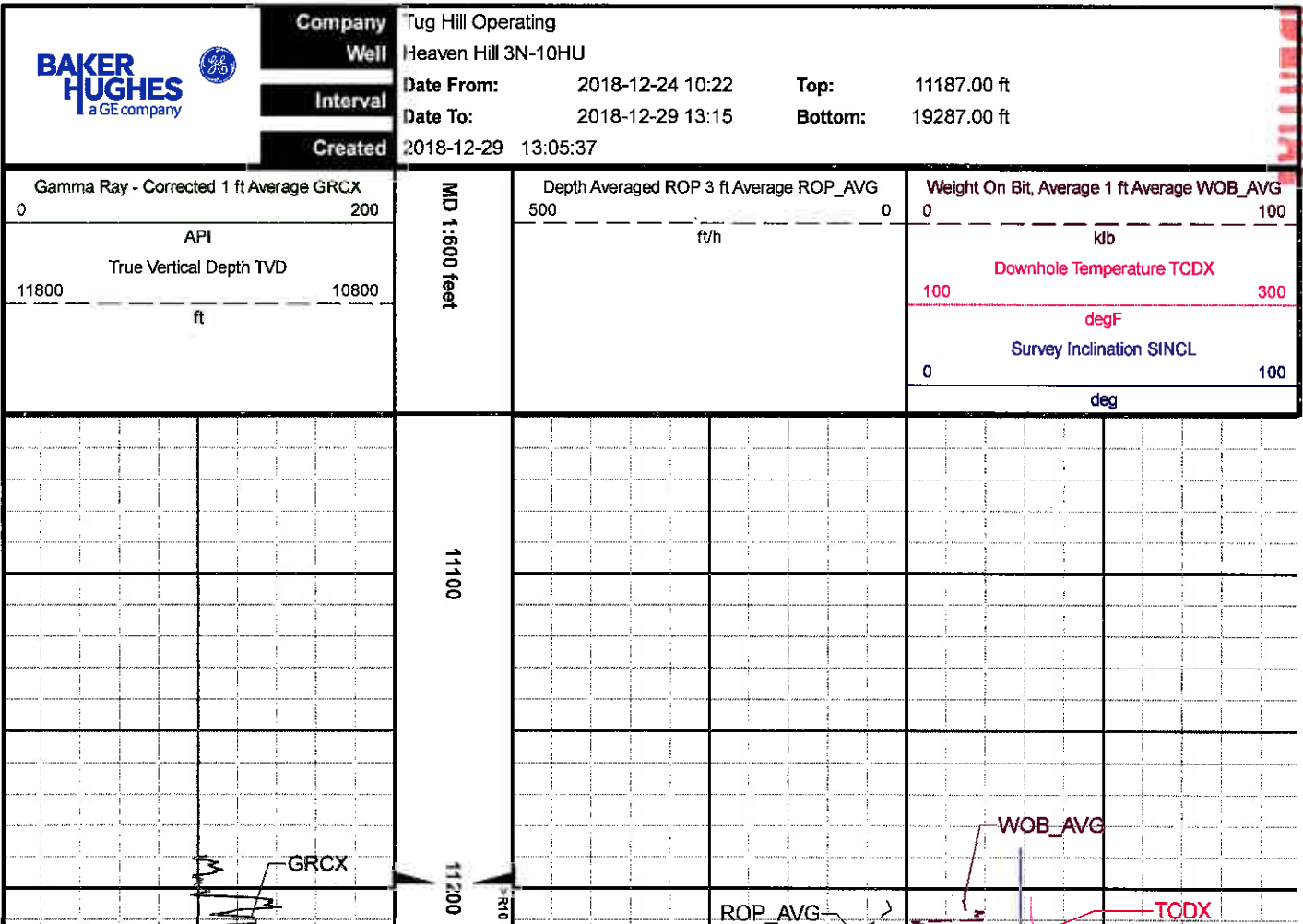
- Baker Hughes, a GE company run 1 utilized 6 1/4 inch NaviGamma services (Gamma Ray and Directional) behind an 8 1/2 inch PDC bit and rotary steerable assembly from 11200 to 19300 feet MD (10633 to 11612 feet TVD).
- Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes, a GE company. Due to a lack of control by Baker Hughes, a GE company logging engineers, depth calibrations and measurements could not be independently verified and the unverified depths as supplied to Baker Hughes, a GE company are being used to present logging data.

Remarks

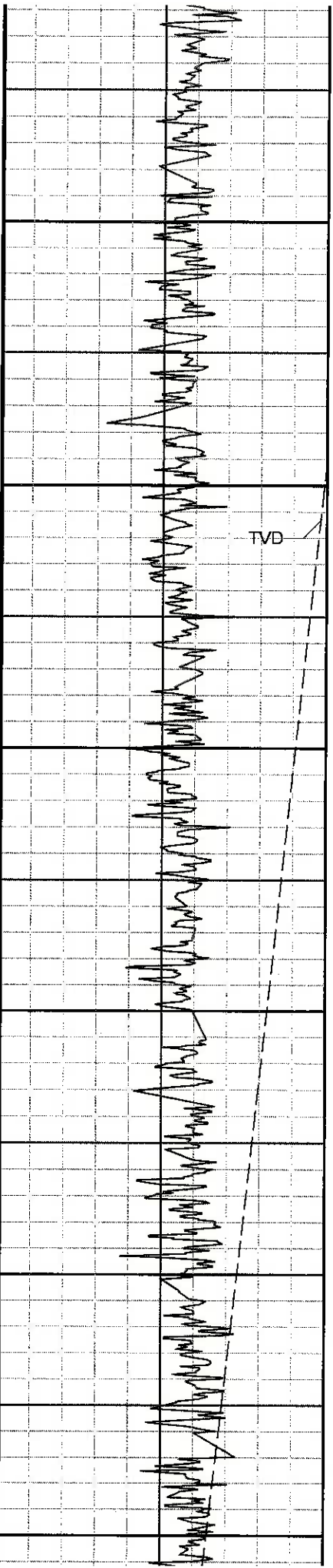
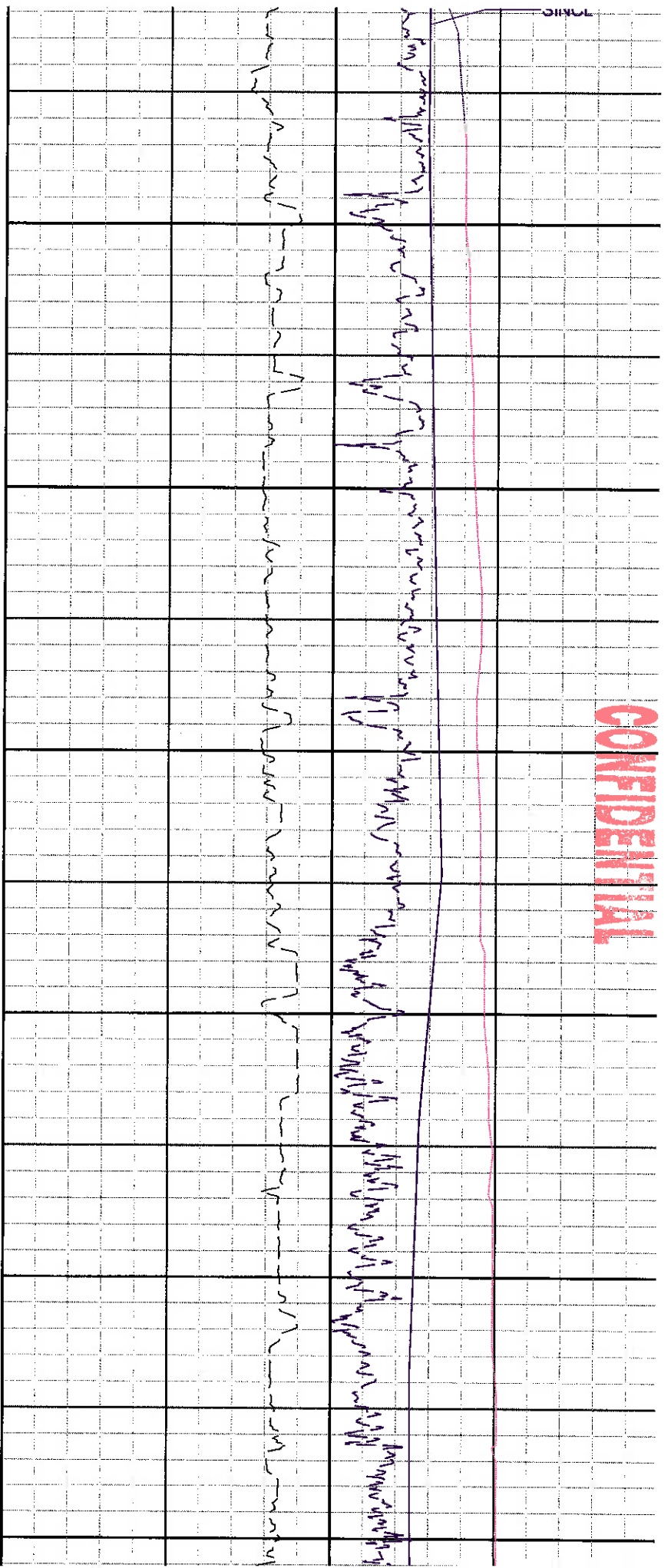
Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	19287.00	8.500	10	The interval from 19287 to 19300 feet MD (11612 to 11612 feet TVD) was not logged due to sensor to bit offset at well TD.

Curve Mnemonics

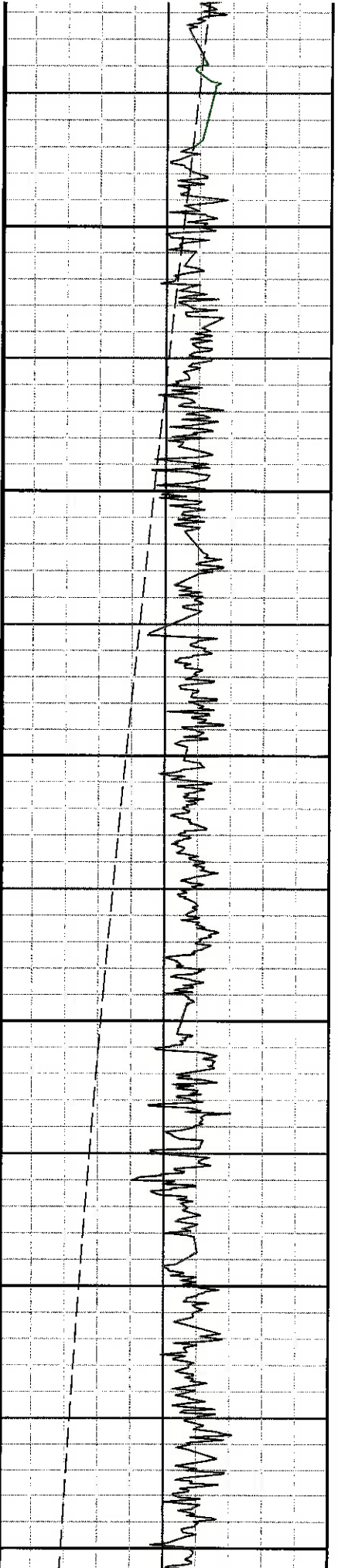
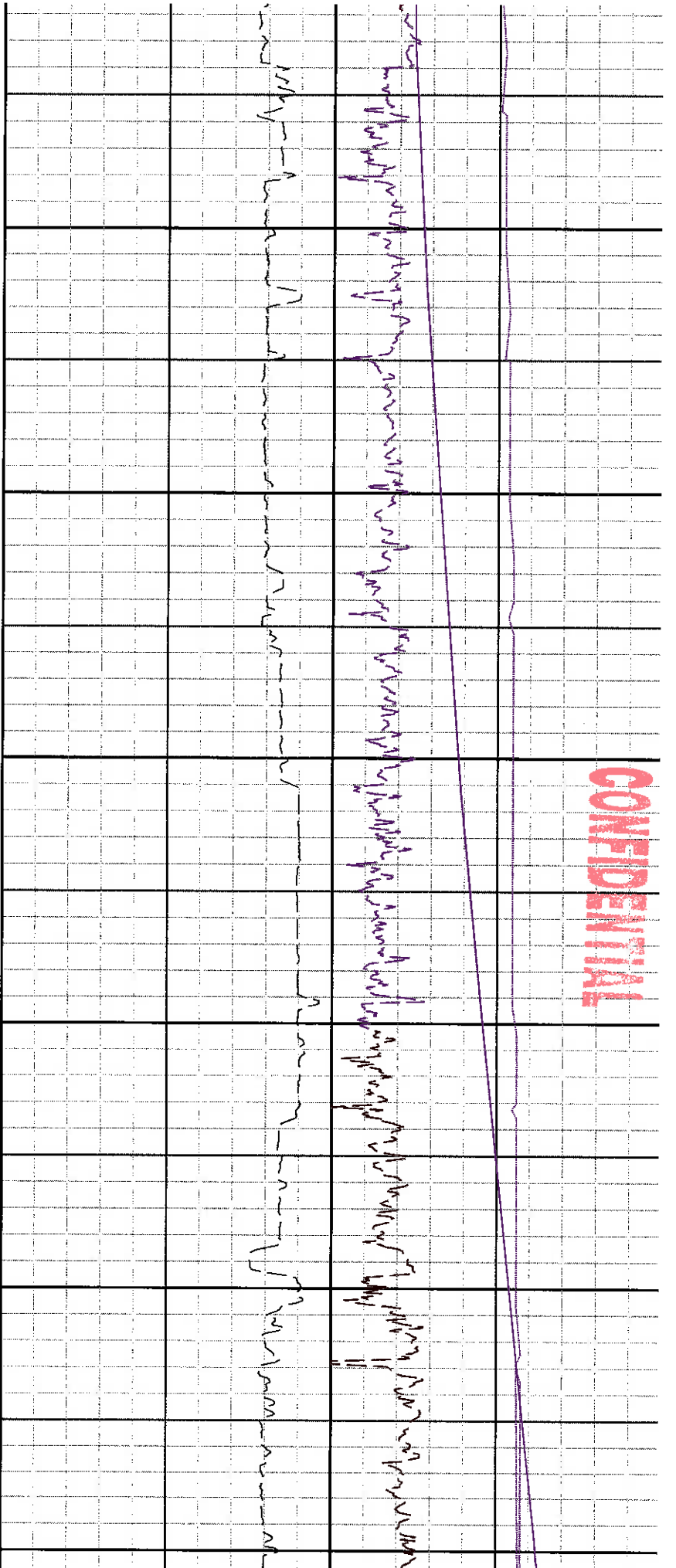
Presented Curves	Description	Units
TCDX	Downhole Temperature	degF
ROP_AVG	Depth Averaged ROP 3 ft Average	ft/h
TVD	True Vertical Depth	ft
WOB_AVG	Weight On Bit, Average 1 ft Average	klb
GRCX	Gamma Ray - Hole Size - Mud Weight - Corrected - Real-Time 1 ft Average	API
SINCL	Survey Inclination	deg



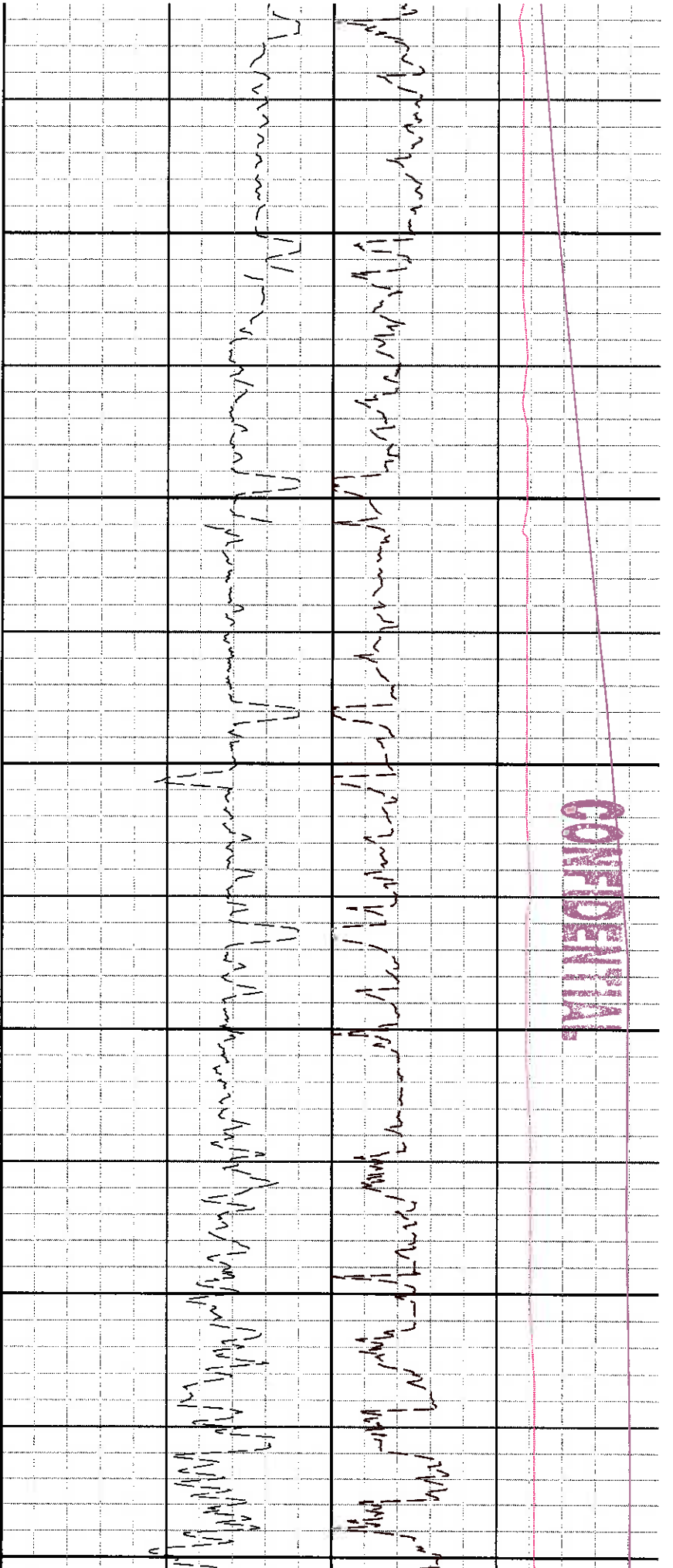
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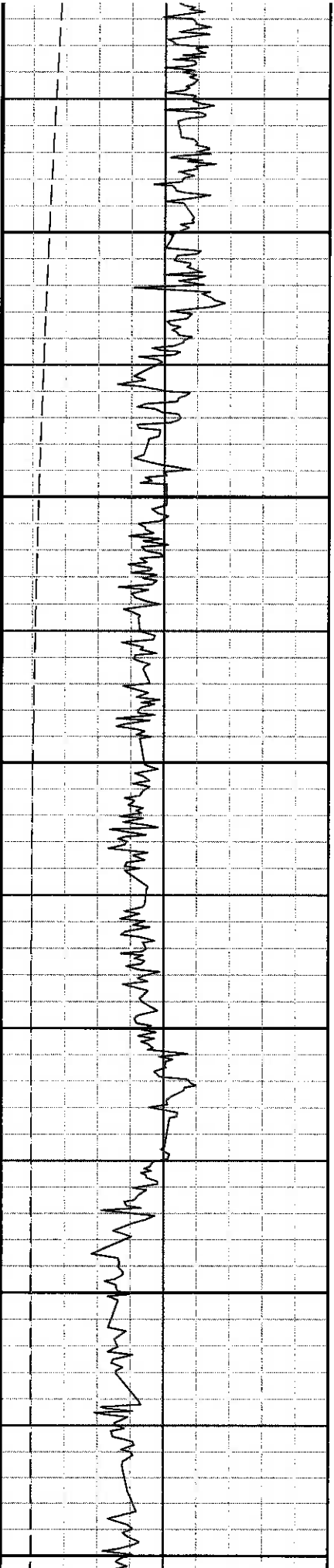
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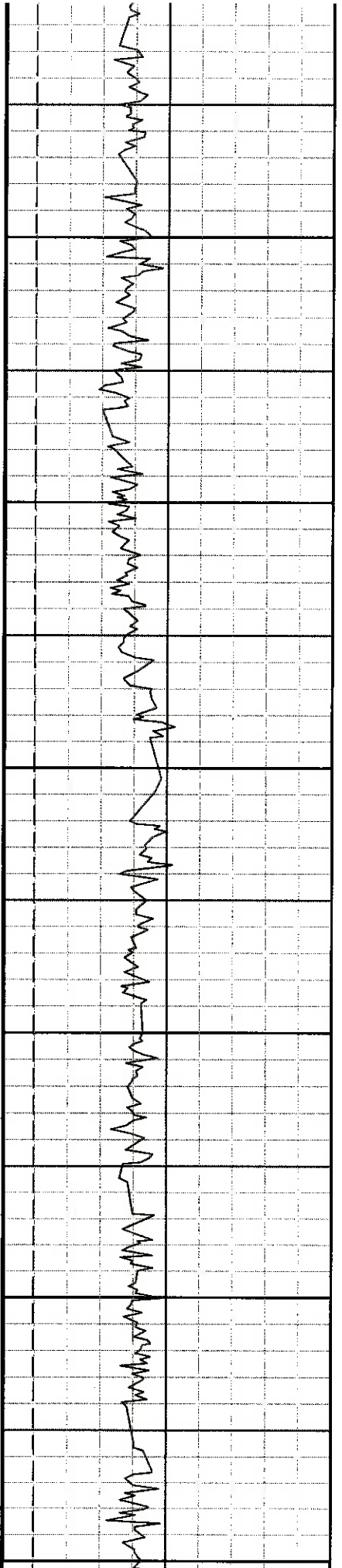
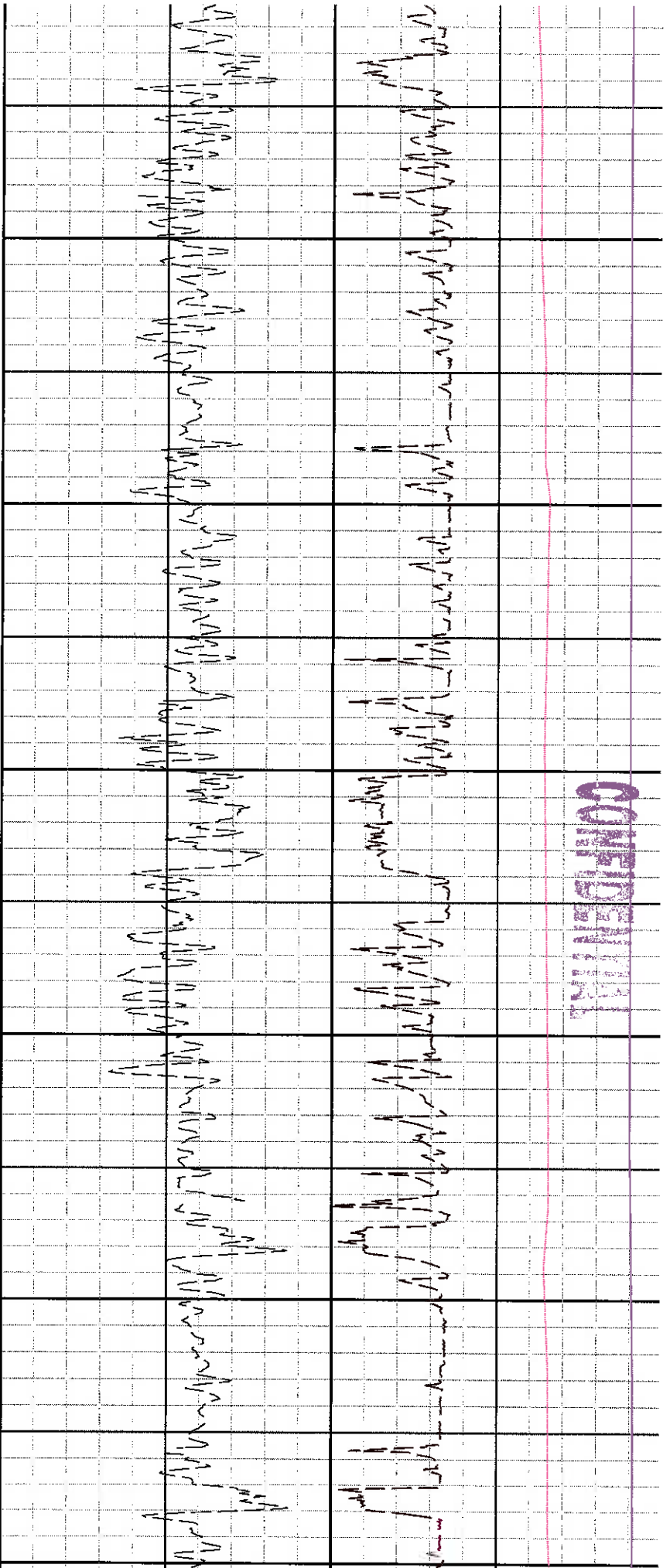
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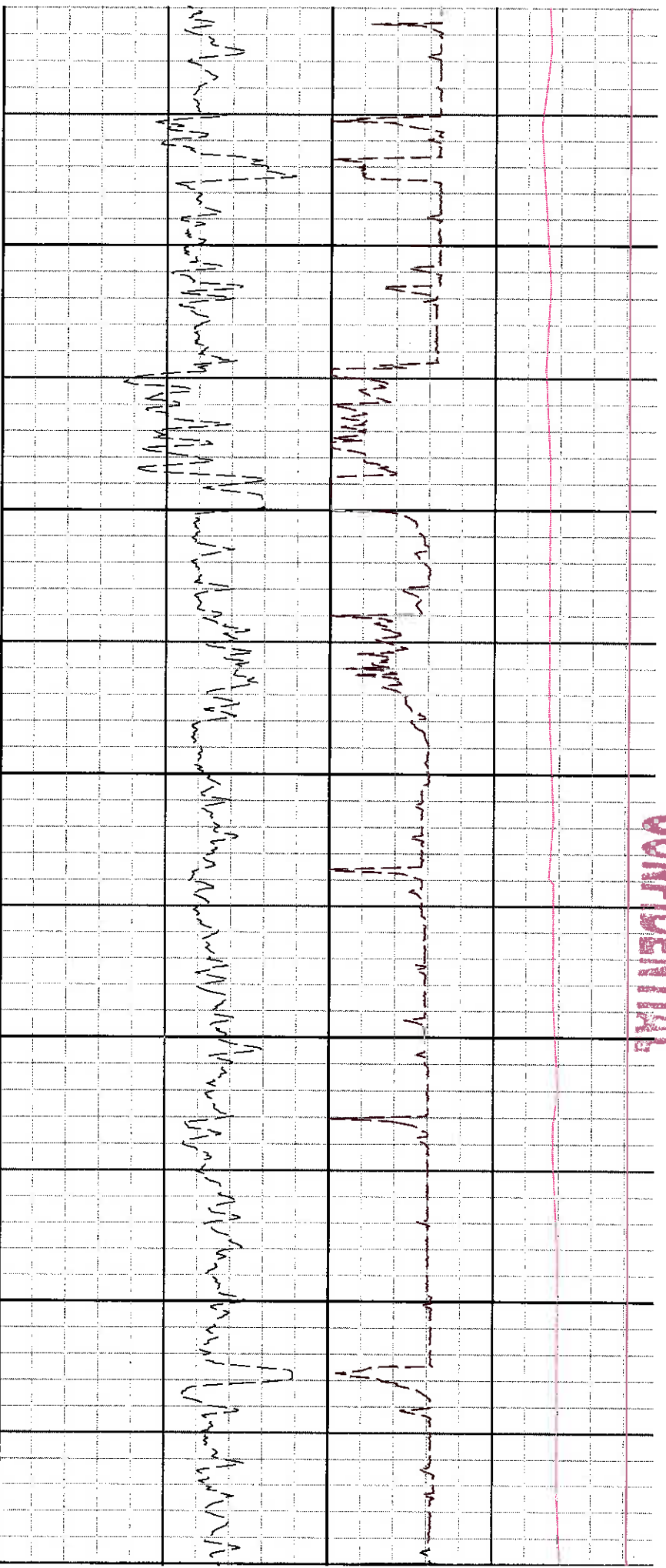
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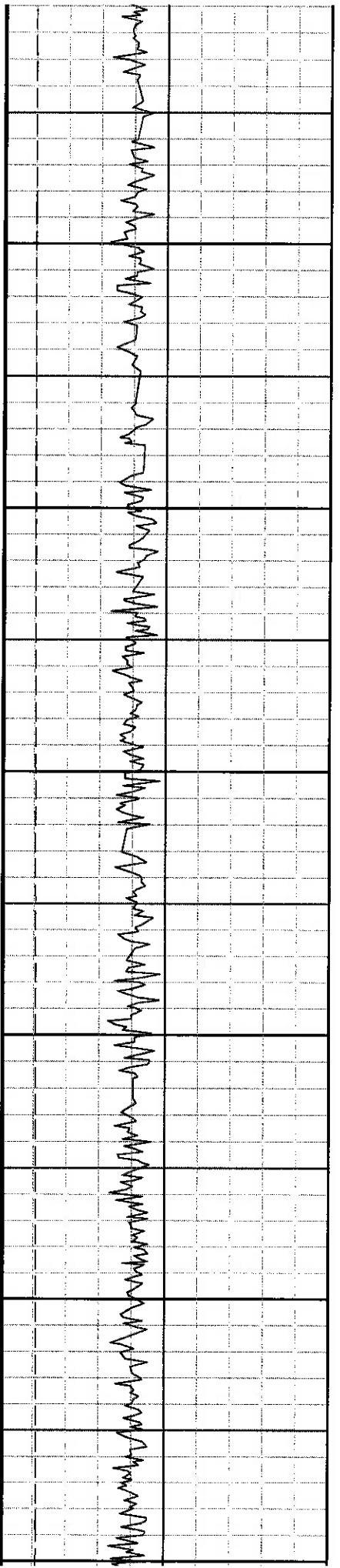
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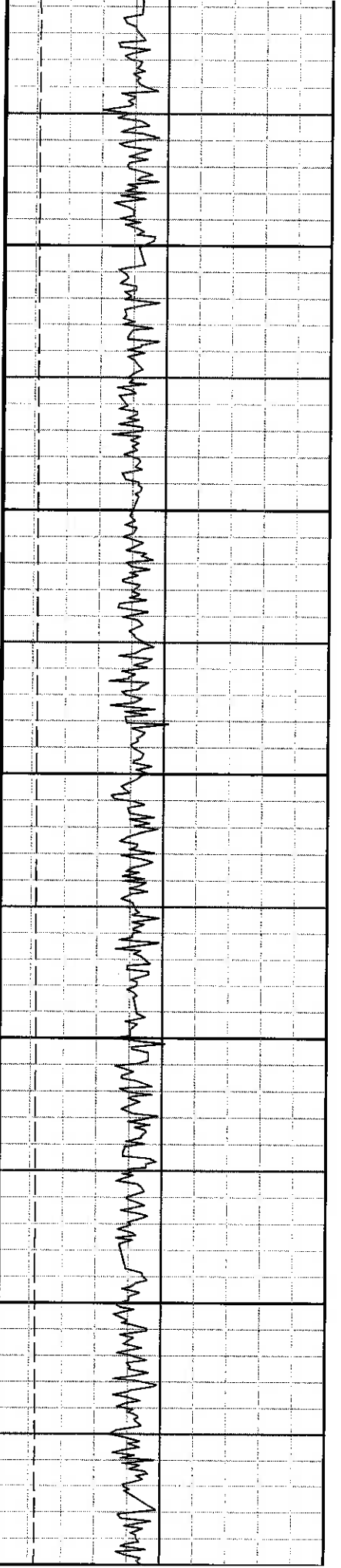
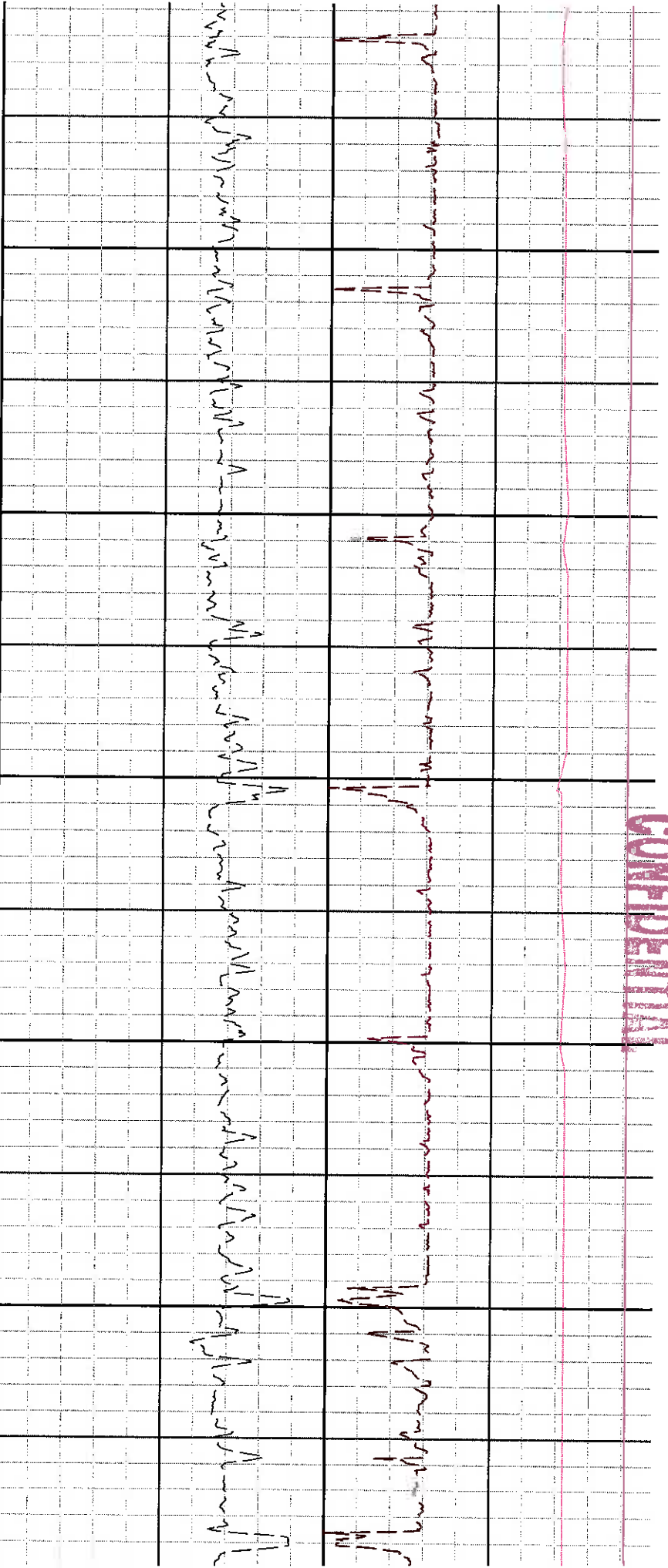
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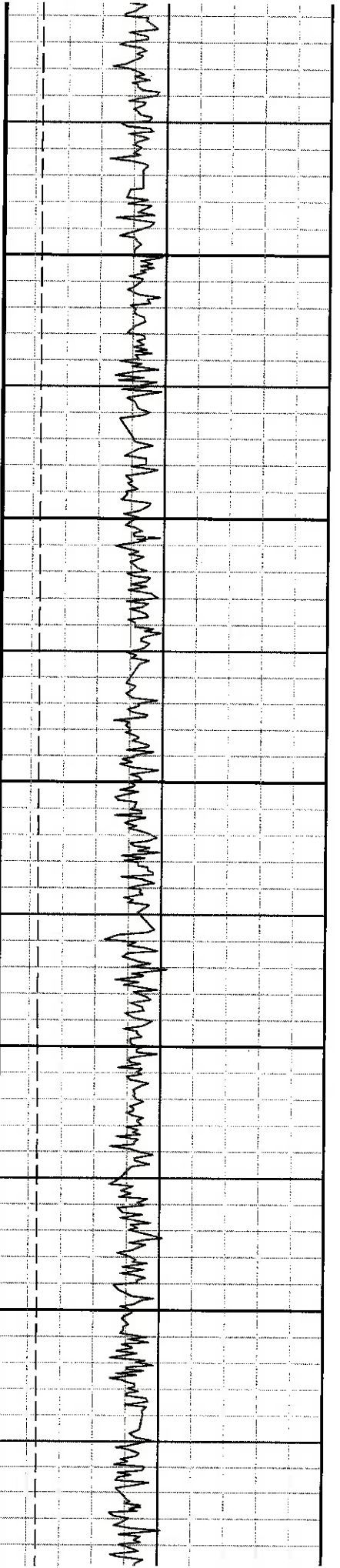
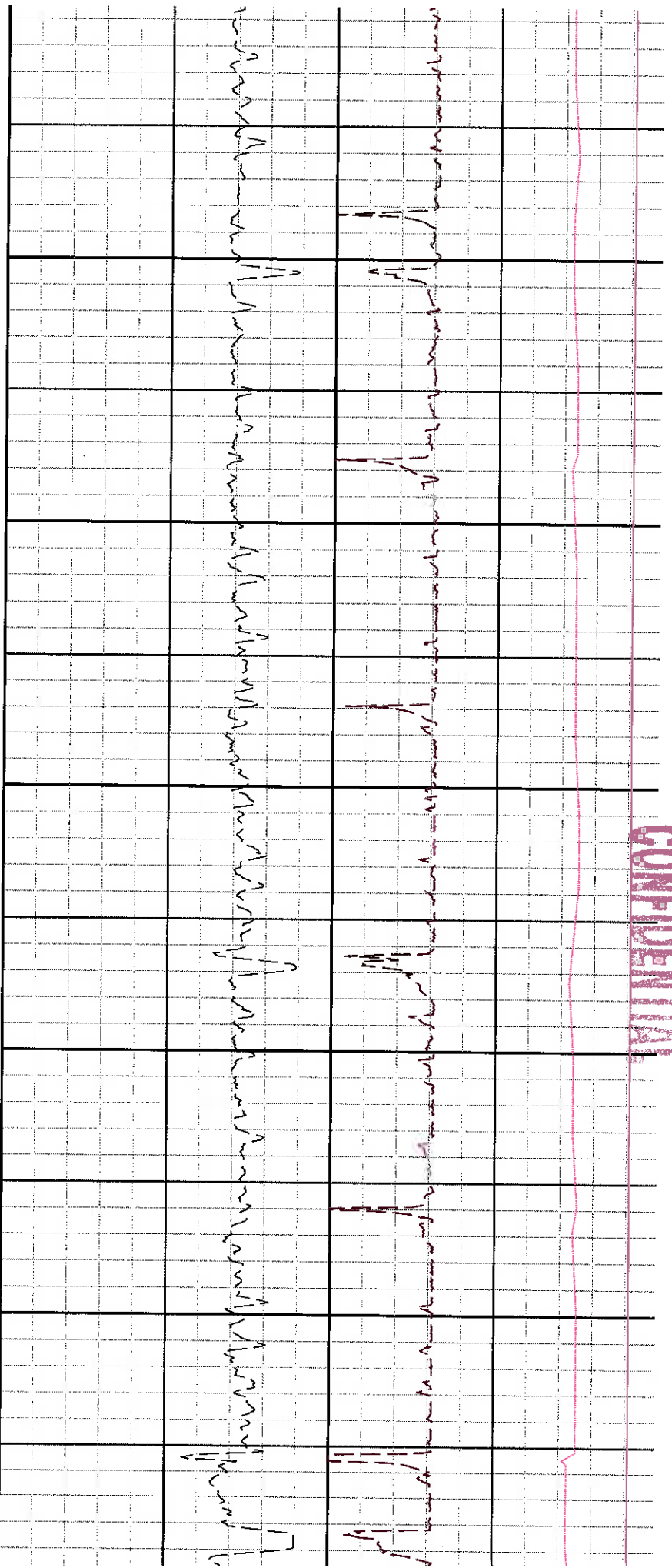
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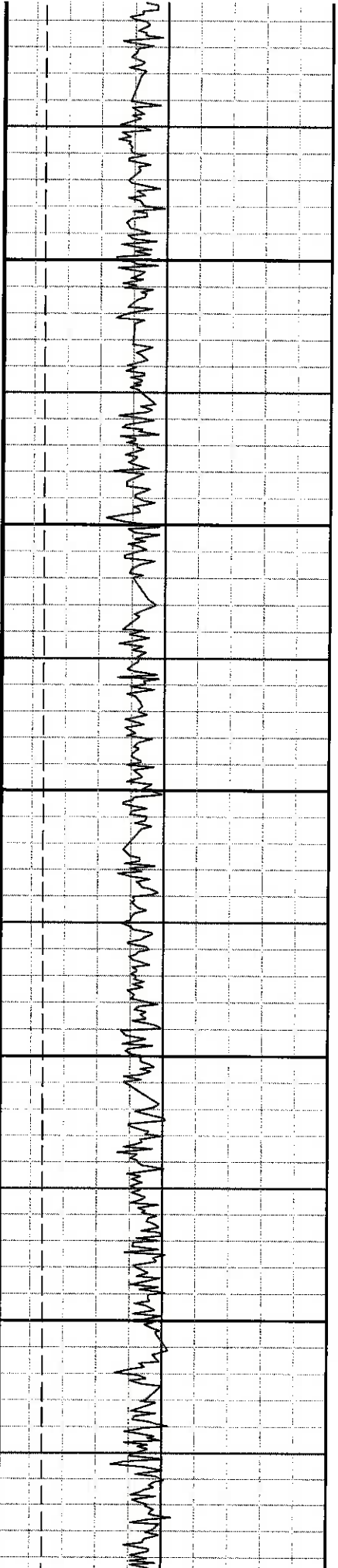
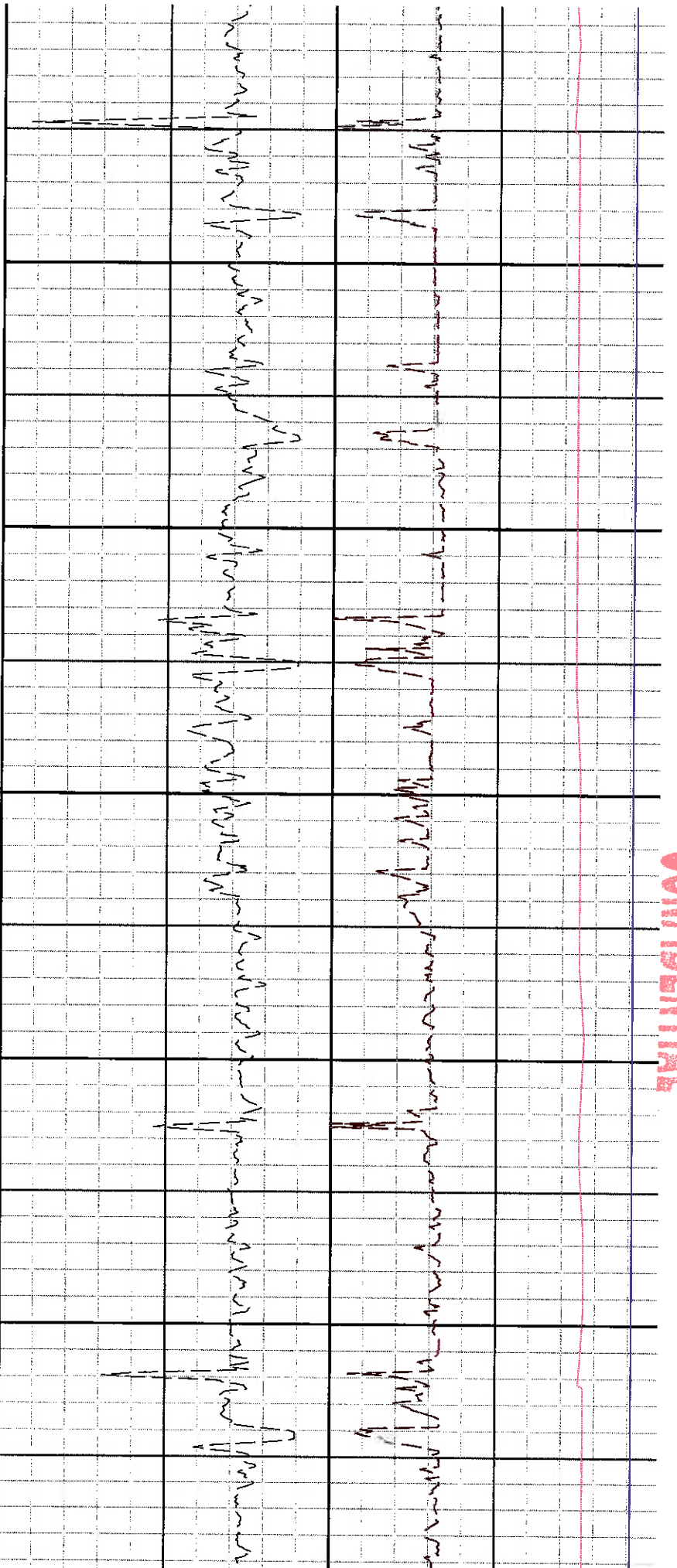
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0 14900 15000 15100 15200 15300 15

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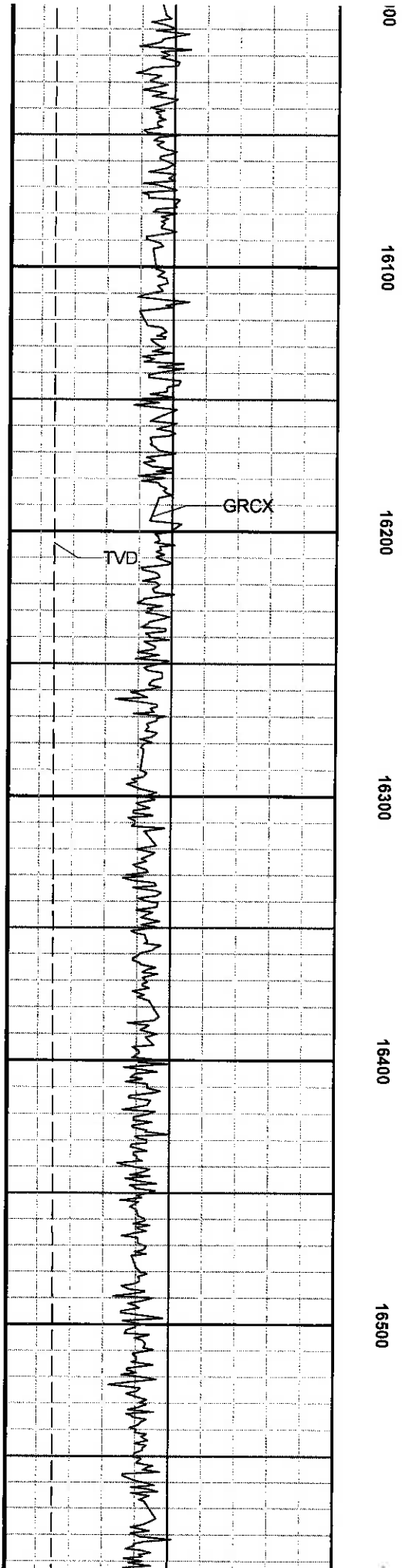
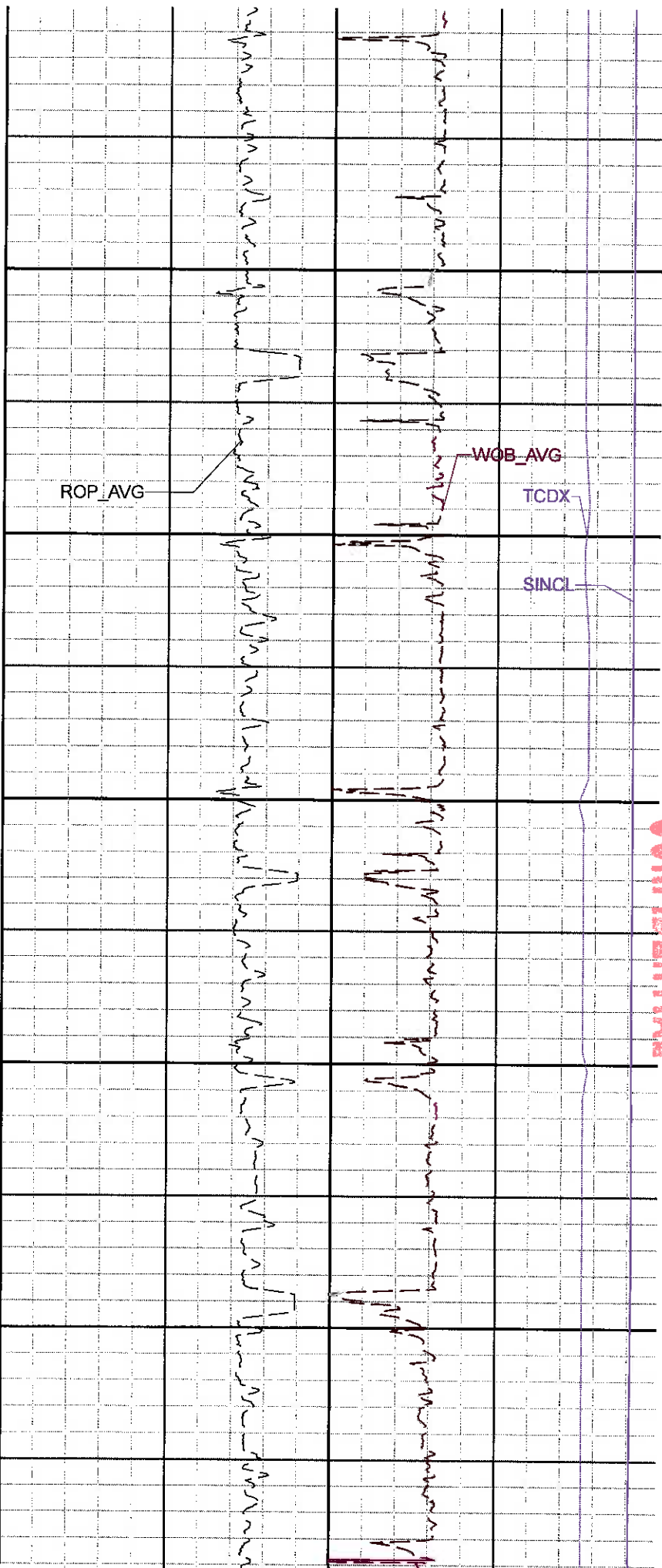
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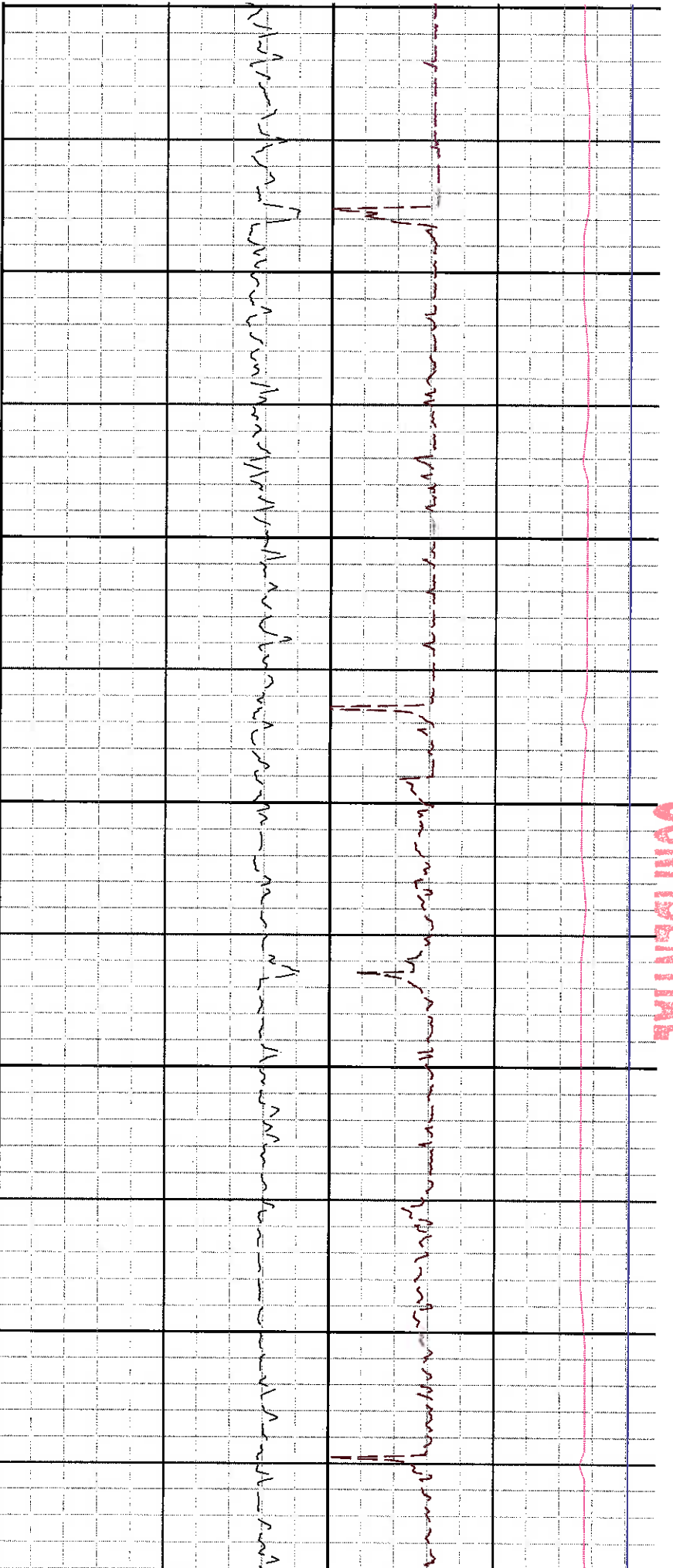
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600

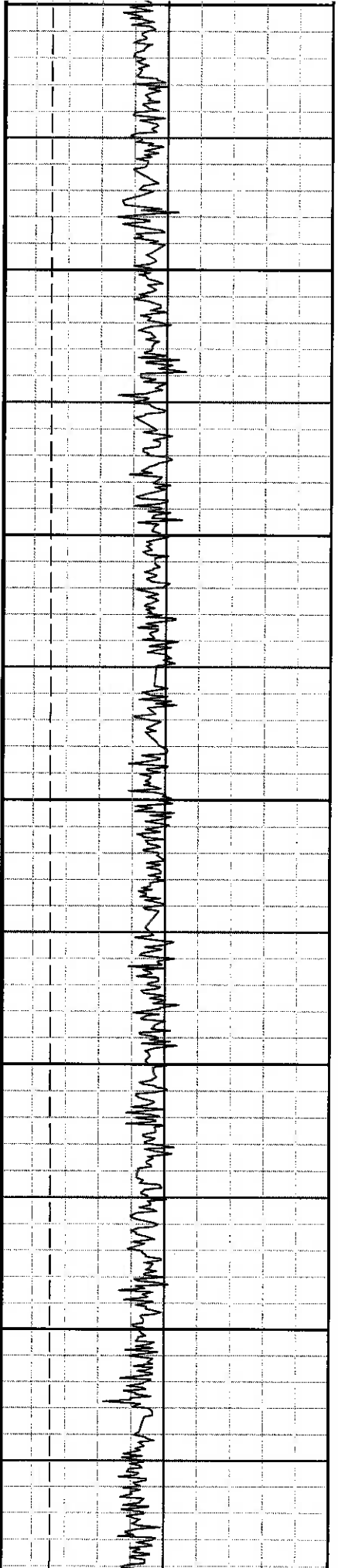
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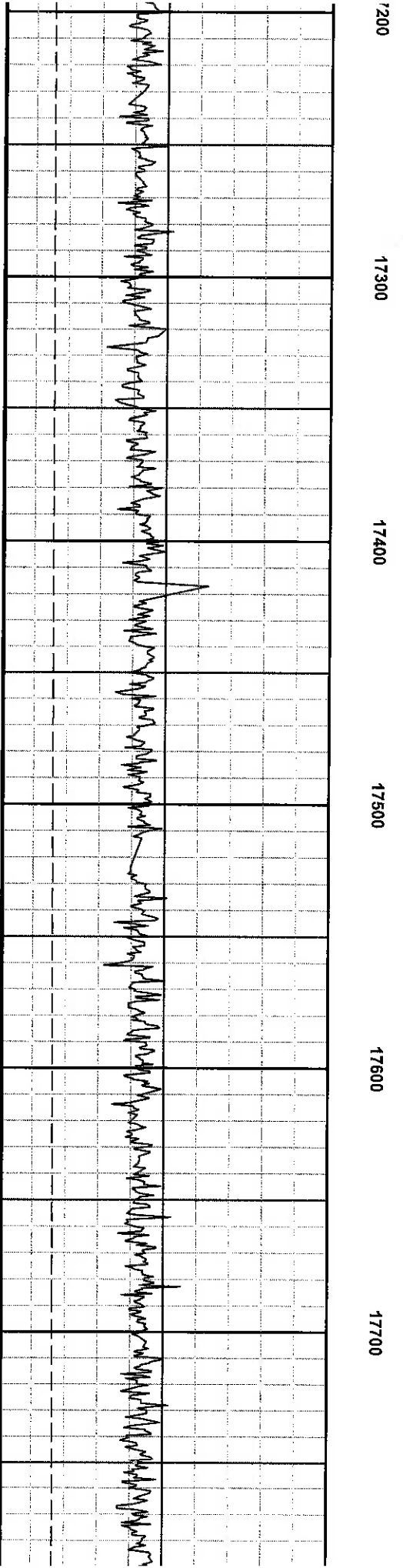
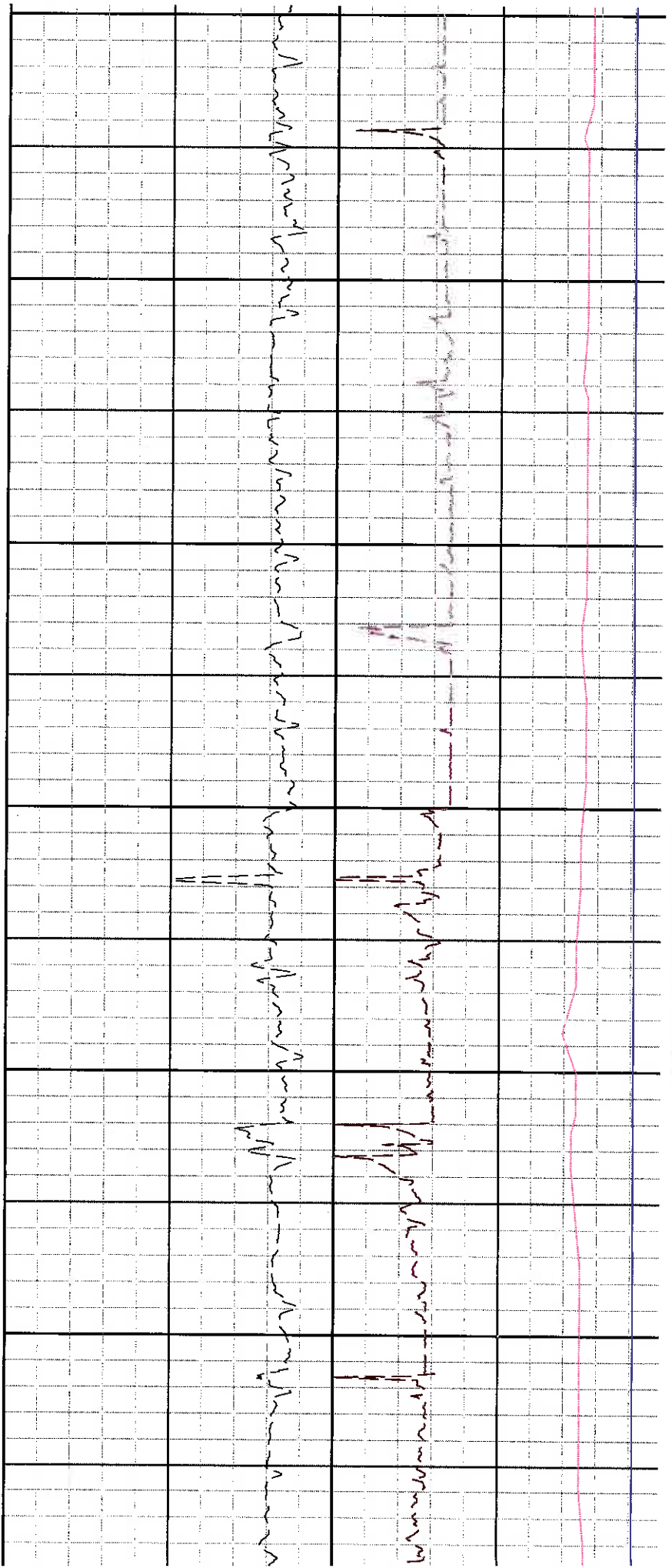
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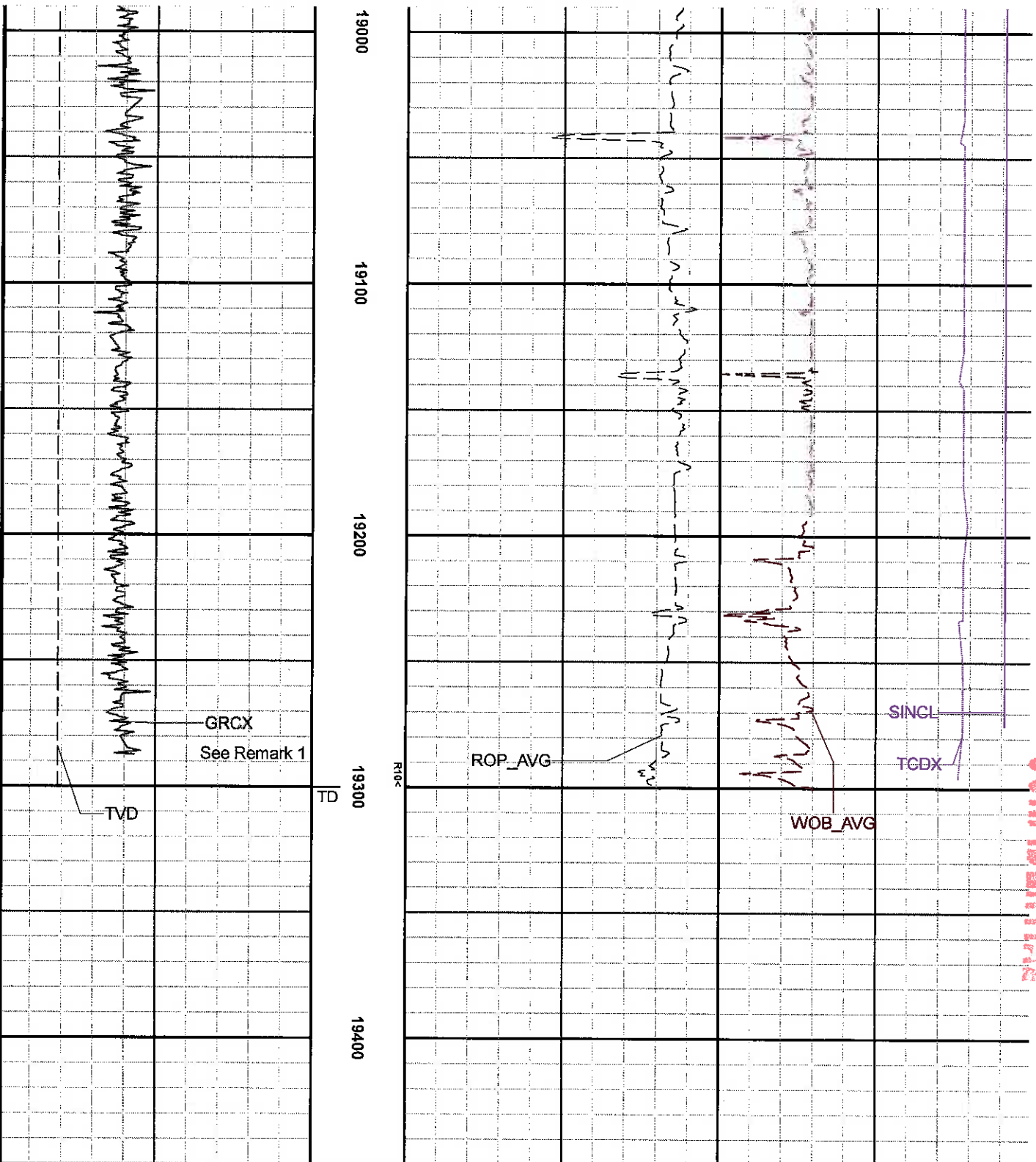
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Gamma Ray - Corrected 1 ft Average GRCX 0 200 API True Vertical Depth TVD 11800 10800 ft	MD 1:600 feet	Depth Averaged ROP 3 ft Average ROP_AVG 500 0 ft/h Weight On Bit, Average 1 ft Average WOB_AVG 0 100 klb Downhole Temperature TCDX 100 300 degF Survey Inclination SINCL 0 100 deg
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