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LWD REALTIME COMPOSITE LOG

Gamma Ray

Scale: 1:600		Company: Tug Hill Operating, LLC																															
Measured Depth		Well: Heaven Hill 3-8HU ST01																															
Depth Reference:		Field: Marshall																															
Driller's Depth		County: Marshall																															
State: West Virginia		Country: United States																															
Status: Final Print	Surface Location: 039° 48' 31.108" N Latitude: 080° 41' 35.583" W Longitude: Wellborn Surveys	Other Services:																															
API No: 47051019670000	Elevation: 0.00 ft	Elev. KB: N/A																															
Job ID: 109520484	Above P.D.: 26.00 ft	Elev. DF: 1352.00 ft																															
Permanent Datum (P.D.): Ground Level	Magnetic Field Reference:																																
Log Measured From: Rig Floor	Date From: 2018-11-17 To: 2018-11-27																																
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Log Run Summary

Run No.	Dr. Run No.	Bit Size (in)	Bit Type	Bit Gauge Length (in)	Assembly Type	Logged Interval (ft)	Bit Depth Interval (ft)	Date / Time	Circ. Hours
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Crew

Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite	Name	Arrive Wellsite	Depart Wellsite
Charles Finn	2018-11-16	2018-11-20	Gentry Powell	2018-11-16	2018-11-29	Tristan Robert	2018-11-16	2018-11-29
Remite Ops MWD	2018-11-19	2018-11-29	Cody Metz	2018-11-20	2018-11-29	Jedaciah Fields	2018-11-20	2018-11-29

Witness

Name	Run
David Roberts	1, 2

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+ (%)
2018-11-17 18:48	1	10708.00	Synthetic Based Mud	13.9	23	N/A	10.2	82/18	Active Pit	21000	0.00
2018-11-20 11:29	1	12746.00	Synthetic Based Mud	14.3	25	N/A	9.4	85/15	Active Pit	19000	0.00
2018-11-21 11:31	1	15233.00	Synthetic Based Mud	14.7	28	N/A	10.4	85/15	Active Pit	18000	0.00
2018-11-22 11:32	1	16215.00	Synthetic Based Mud	15.0	29	N/A	8.0	85/15	Active Pit	17000	0.00
2018-11-22 18:44	2	16215.00	Synthetic Based Mud	15.0	29	N/A	8.0	85/15	Active Pit	17000	0.00
2018-11-23 11:34	2	16215.00	Synthetic Based Mud	15.0	27	N/A	9.4	87/13	Active Pit	15000	0.00
2018-11-24 11:35	2	17704.00	Synthetic Based Mud	15.0	27	N/A	8.4	87/13	Active Pit	15000	0.00
2018-11-25 11:38	2	19933.00	Synthetic Based Mud	15.0	30	N/A	8.6	88/12	Active Pit	15000	0.00
2018-11-26 11:37	2	20596.00	Synthetic Based Mud	15.0	33	N/A	8.6	86/14	Active Pit	13000	0.00
2018-11-27 11:38	2	21874.00	Synthetic Based Mud	15.0	30	N/A	8.2	89/11	Active Pit	14000	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)
1	AutoTrak Curve Steering Unit	14192922	Near Bit Inclination	5.93	6.93	6.750	4.330
1	AutoTrak Curve Steering Unit	14192922	Near Bit VSS	5.93	6.93	6.750	4.330
1	AutoTrak Curve MWD	14381839	Gamma (single)	2.75	13.10	6.750	3.250
1	AutoTrak Curve MWD	14381838	Directional (mag)	12.27	22.62	6.750	3.250
2	AutoTrak Curve Steering Unit	14292953	Near Bit Inclination	5.93	6.93	6.750	4.330
2	AutoTrak Curve Steering Unit	14292953	Near Bit VSS	5.93	6.93	6.750	4.330
2	AutoTrak Curve MWD	12127531	Gamma (single)	2.20	12.55	6.750	3.250
2	AutoTrak Curve MWD	12127531	Directional (mag)	12.27	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


1. Baker Hughes, a GE Company Runs 1 and 2 utilized 6 3/4 inch NaviGamma services (Gamma Ray and Directional) behind an 8 1/2 inch PDC bit and a rotary steerable assembly from 10708 to 22395 feet (15,487 to 15,687 feet).

2 Depth measurements were obtained from a depth control system not supplied or operated by Baker Hughes, a GE company. Due to the lack of control by Baker Hughes, a GE company logging engineers, depth calibrations and measurements could not be independently verified and the unverified depths supplied to Baker Hughes, a GE company are being used to present logging data.

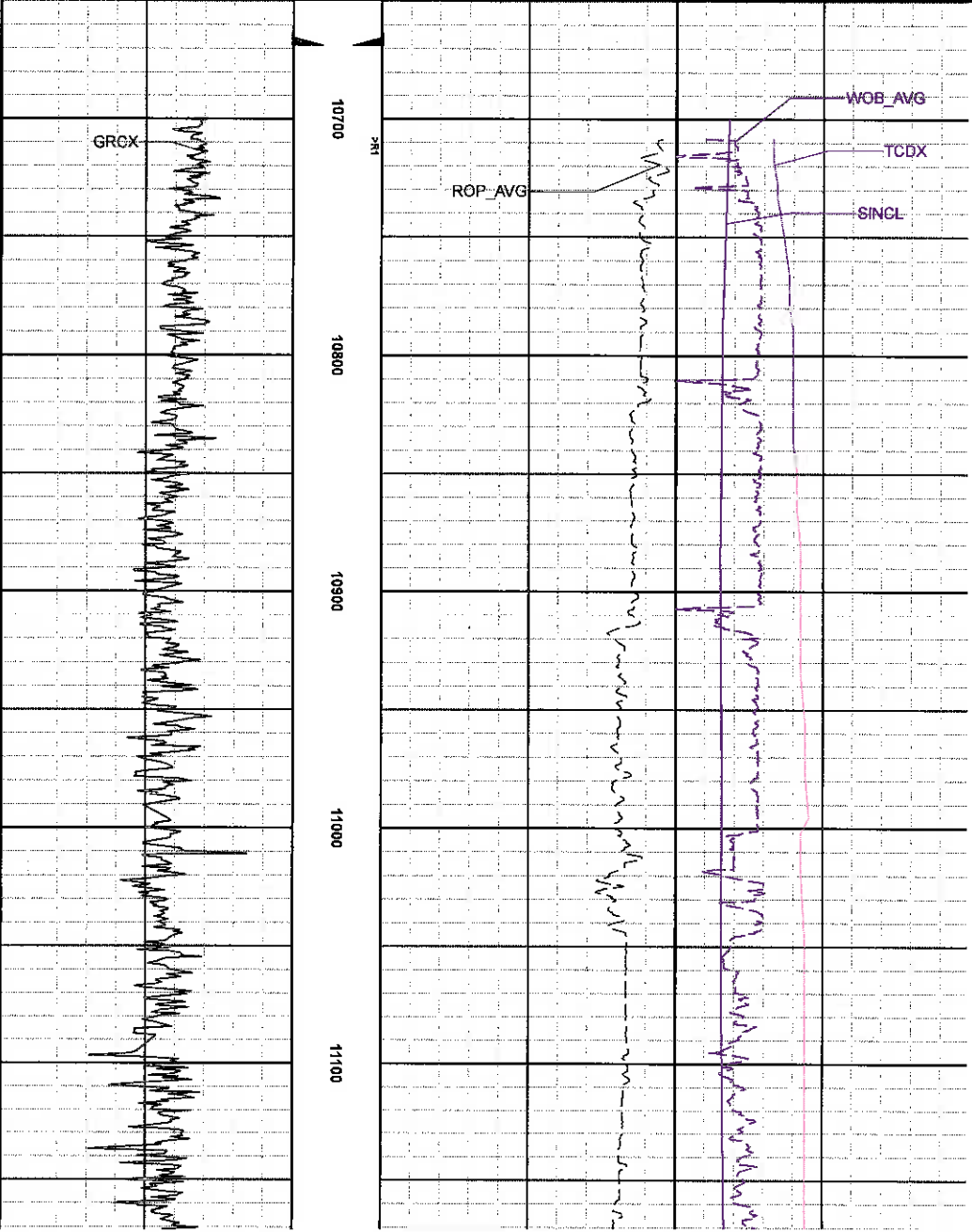
Remarks				
Number	Measured Depth (ft)	Hole Section (in)	Run No.	Remark
1	16203.00	8.500	2	The interval from 16203 to 16216 feet MD (11817 to 11818 feet TVD) was logged up to 25 hours after being drilled due to a failure of the hole for MWD Tool Failure.
2	22382.00	8.500	2	The interval from 22382 to 22395 feet MD (11920 to 11920 feet TVD) was not logged due to sensor to bit offset at well TD.

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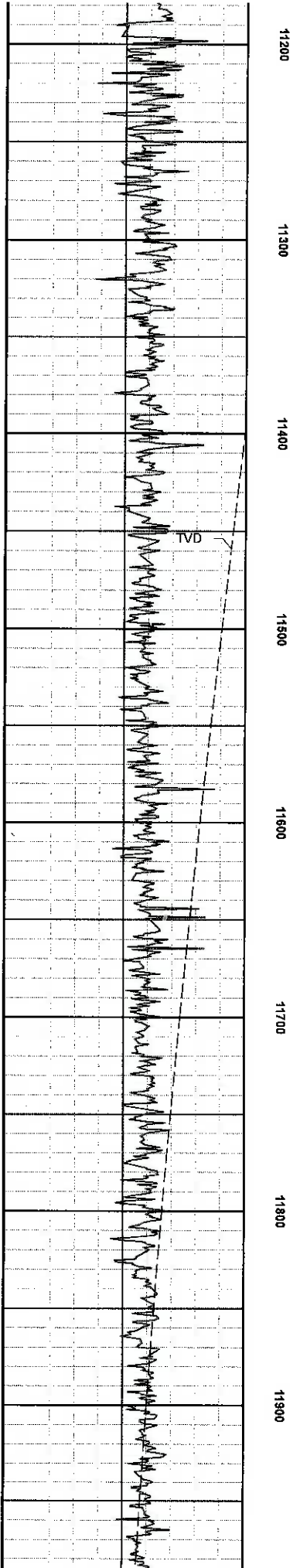
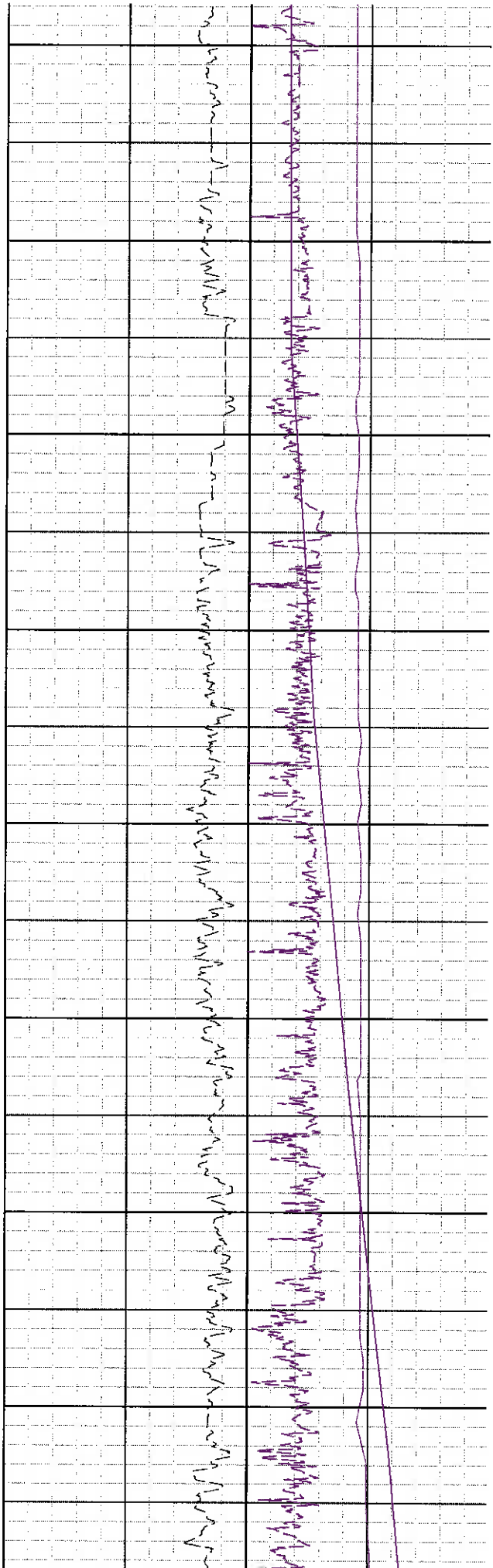
Curve Mnemonics		
Presented Curves	Description	Units
TCDX	Downhole Temperature	degF
ROP_AVG	Depth Averaged ROP 3 ft Average	ft/h
TVD	True Vertical Depth	ft
WOB_AVG	Weight On Bit, Average 1 ft Average	klb
GRCX	Gamma Ray - Hole Size - Mud Weight - Corrected - Real-Time 1 ft Average	API
SINCL	Survey Inclination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

	Company	Tug Hill Operating, LLC	
	Well	Heaven Hill 3-8HU ST01	
	Interval	Date From: 2018-11-17 20:15	Top: 10895.00 ft
	Created	Date To: 2018-11-28 20:08	Bottom: 22382.00 ft
		Created	2018-11-28 20:06:21

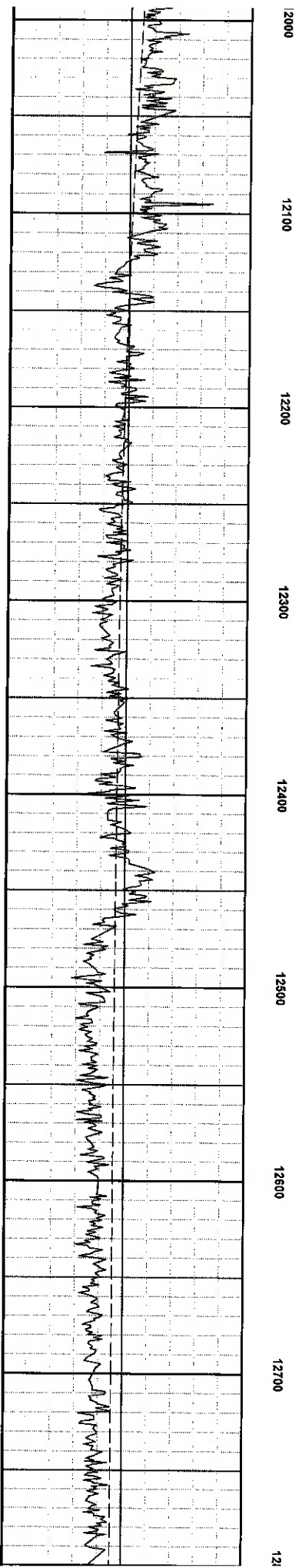
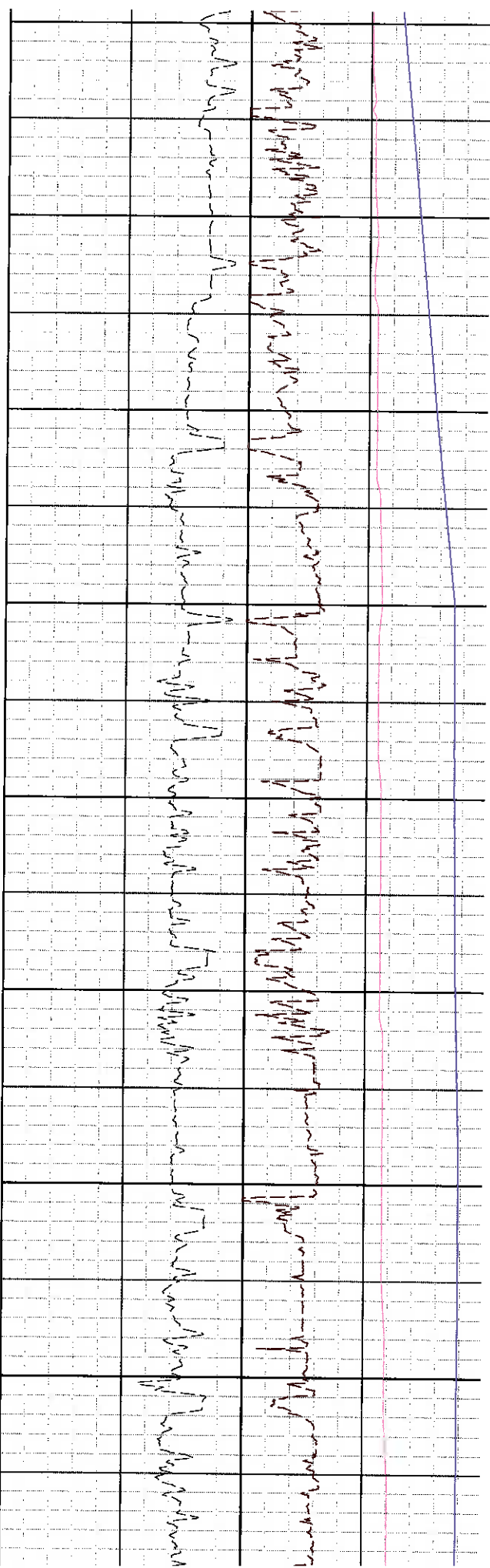
Gamma Ray - Corrected 1 ft Average GRCX	0	200	MD 1:500 Feet	Depth Averaged ROP 3 ft Average ROP_AVG	0	500	Weight On Bit, Average 1 ft Average WOB_AVG	0	100
API	12200	11200		ft/h	klb	degF	deg		
True Vertical Depth TVD	ft			Downhole Temperature TCDX	100	300	Survey Inclination SINCL	0	100



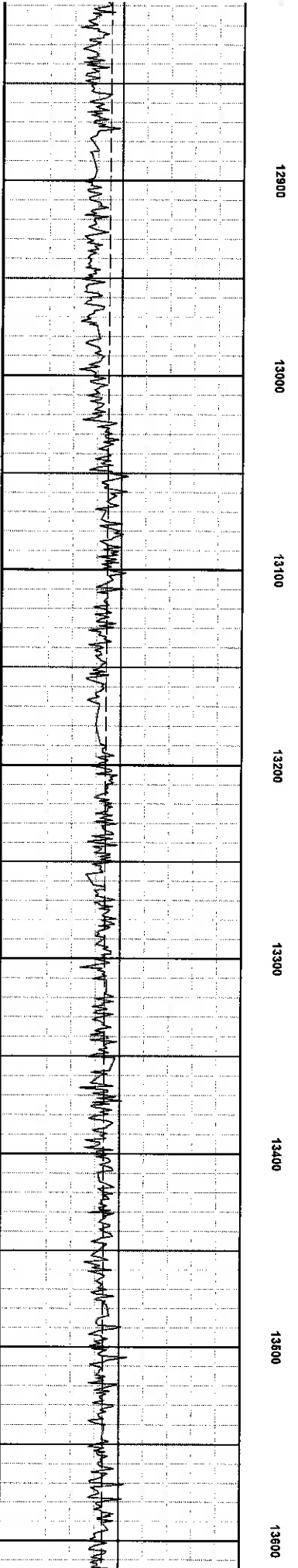
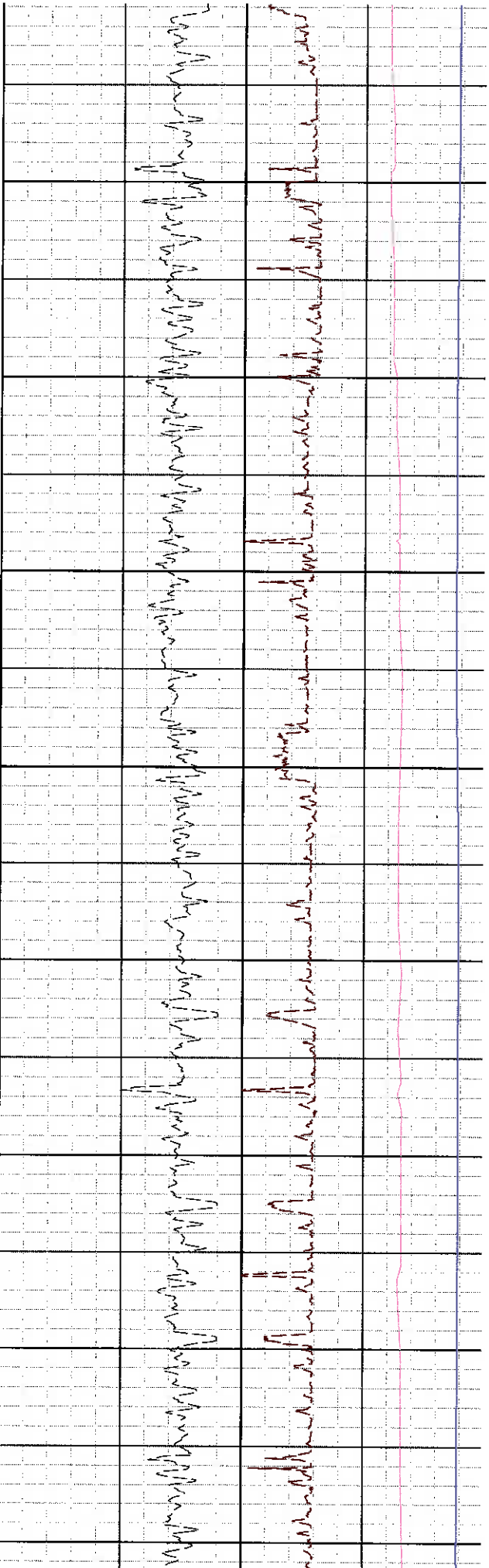
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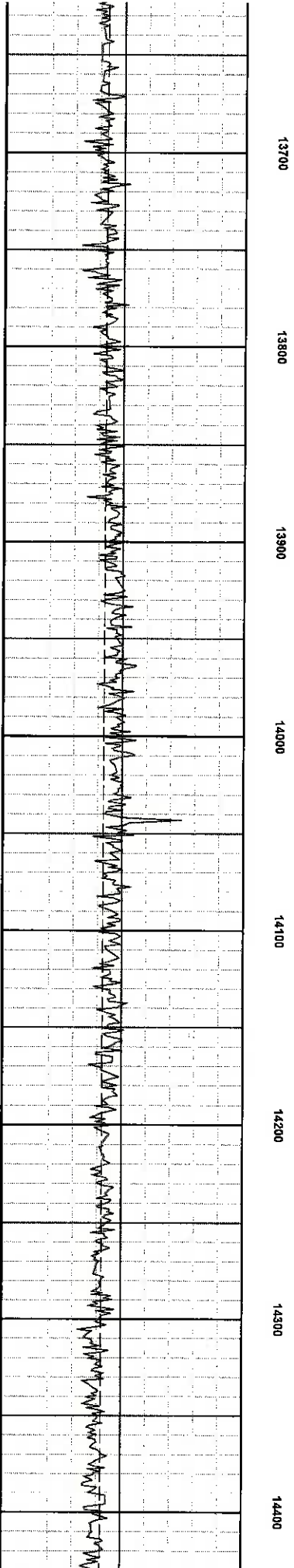
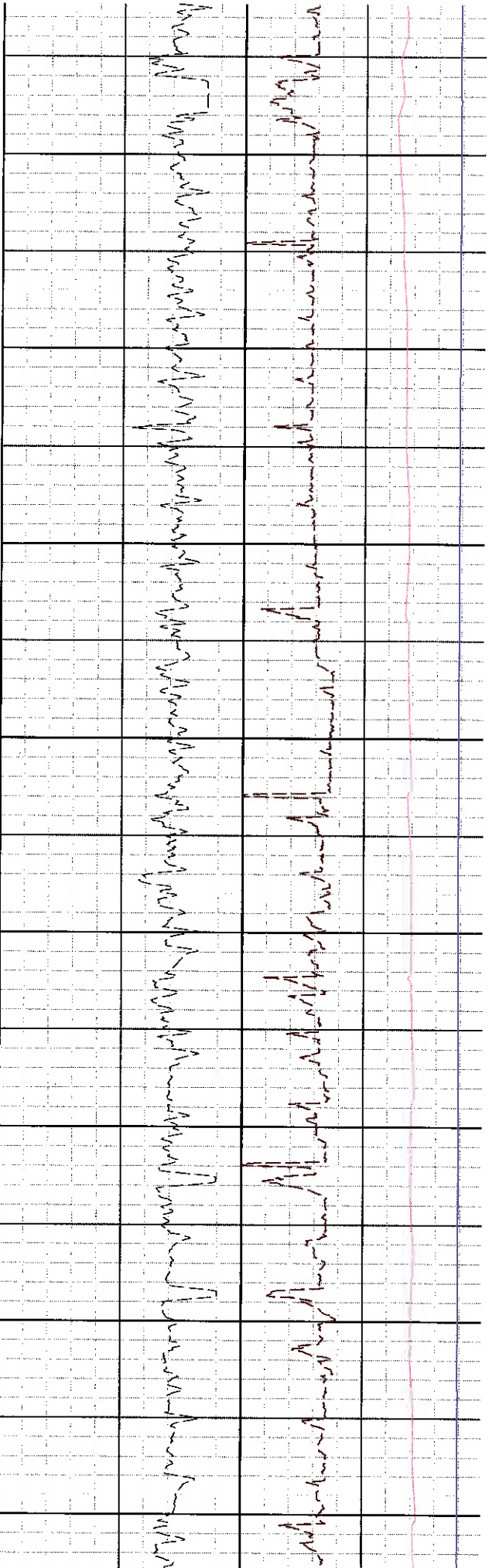
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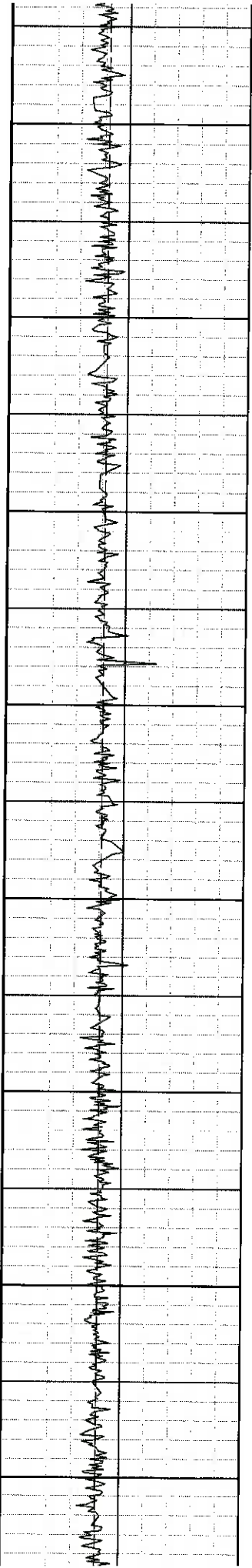
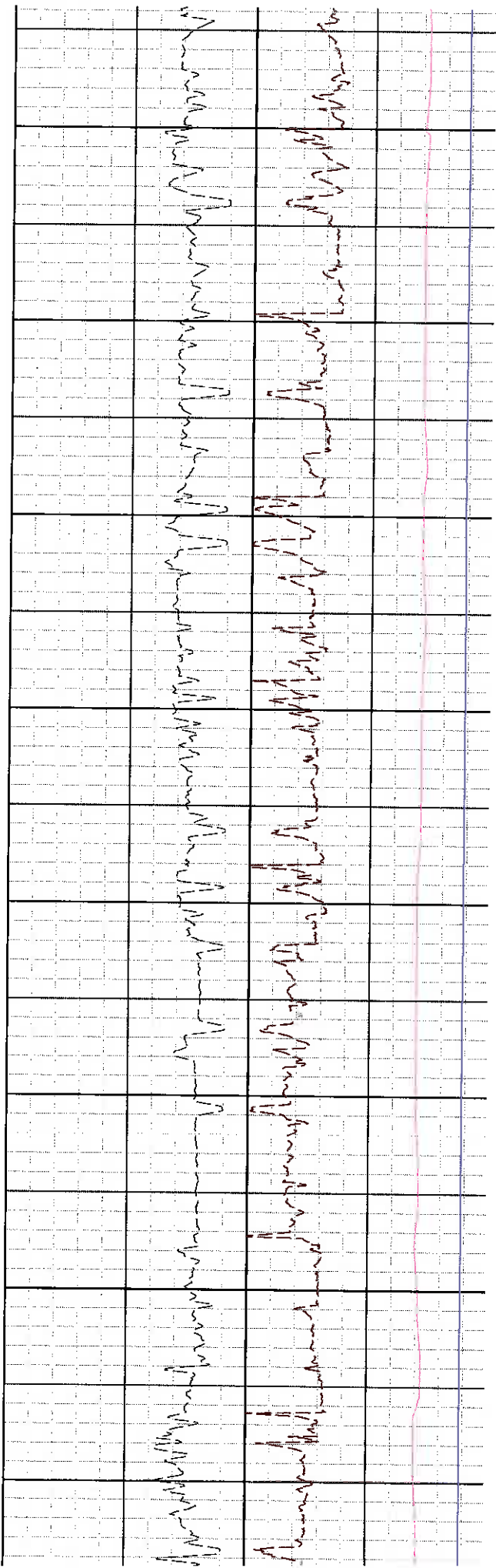
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14500

14600

14700

14800

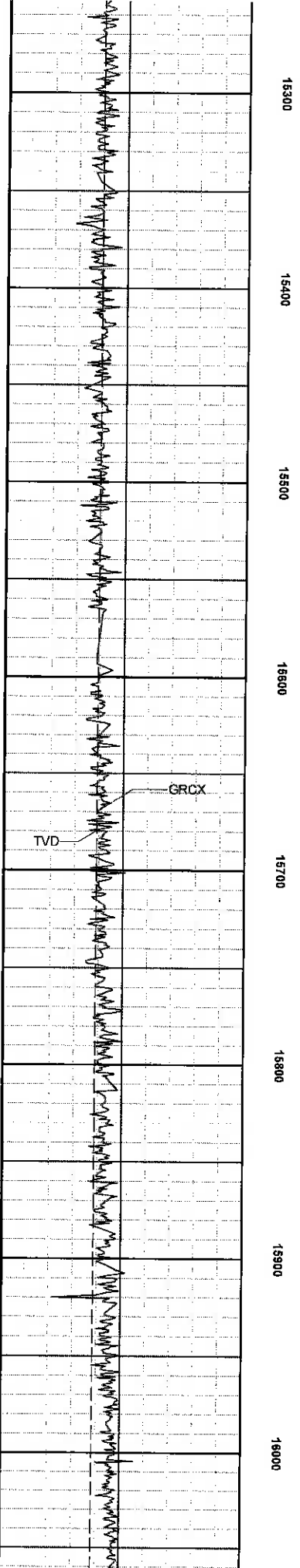
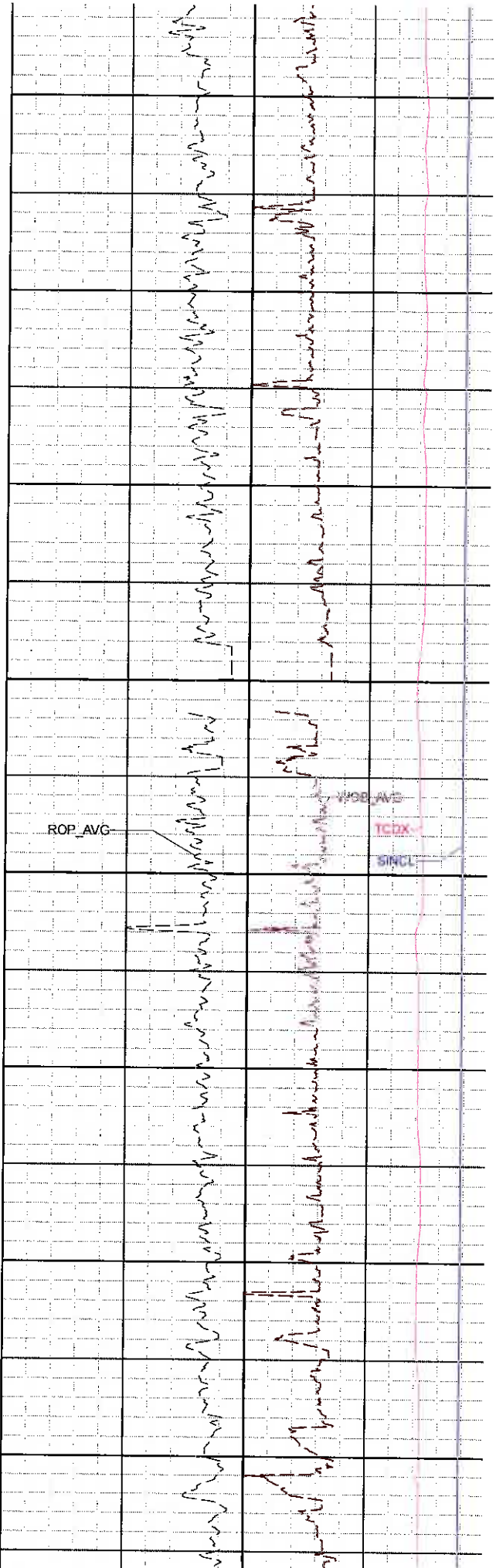
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15000

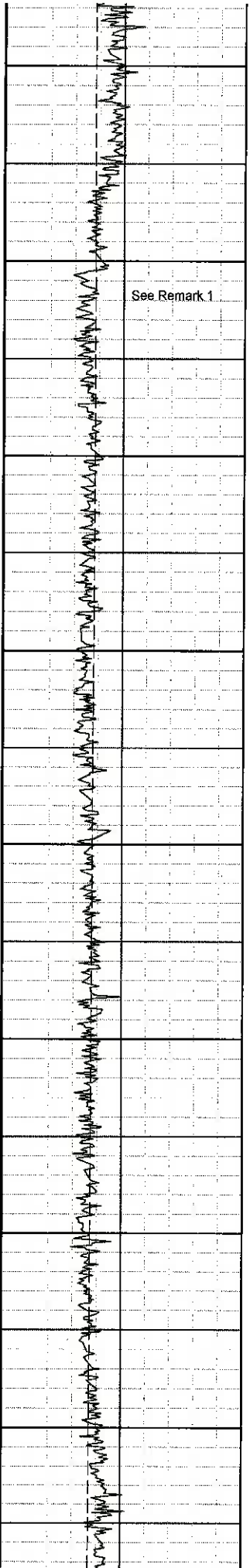
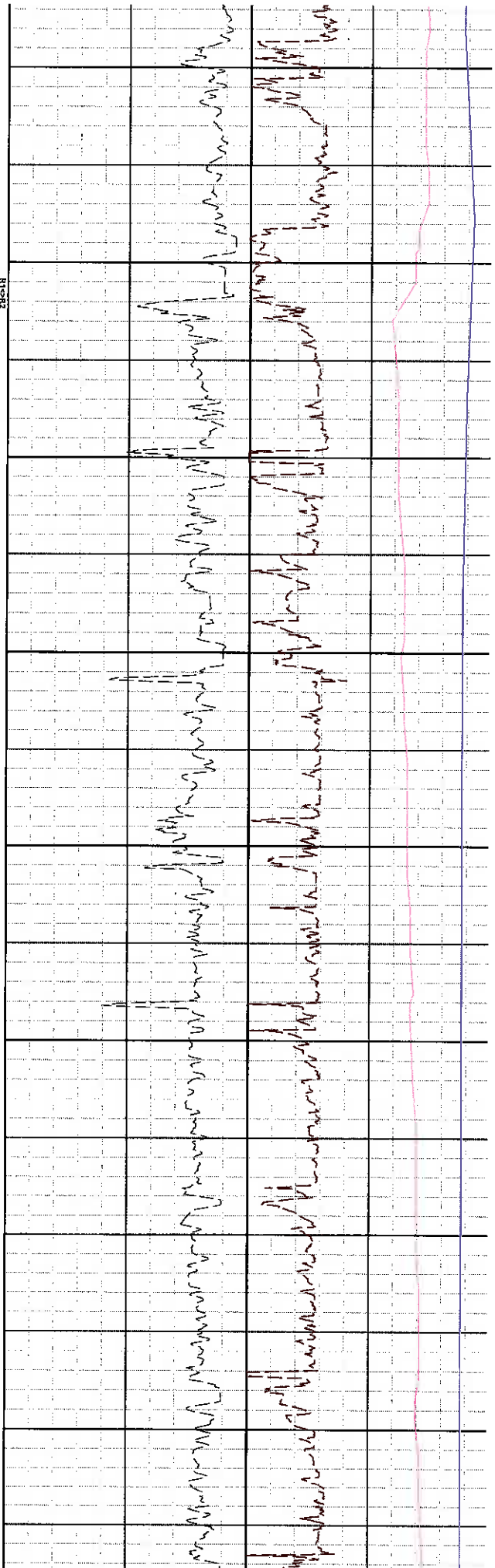
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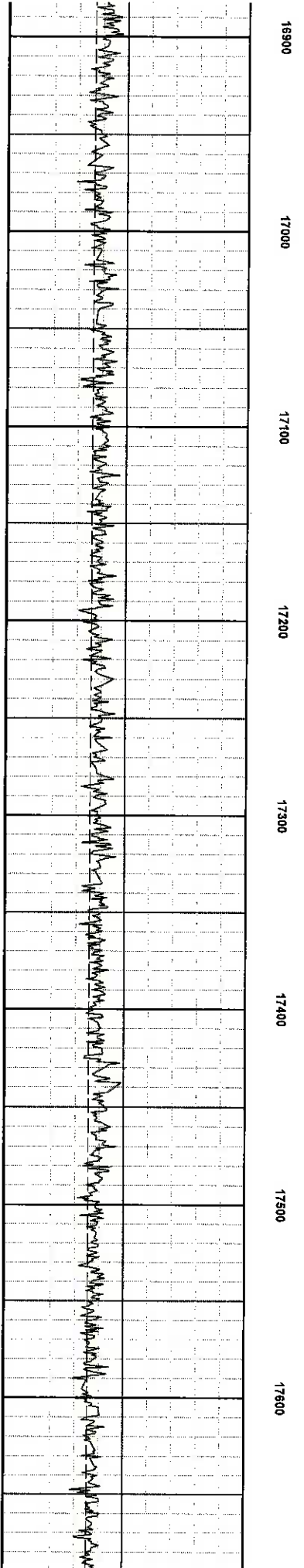
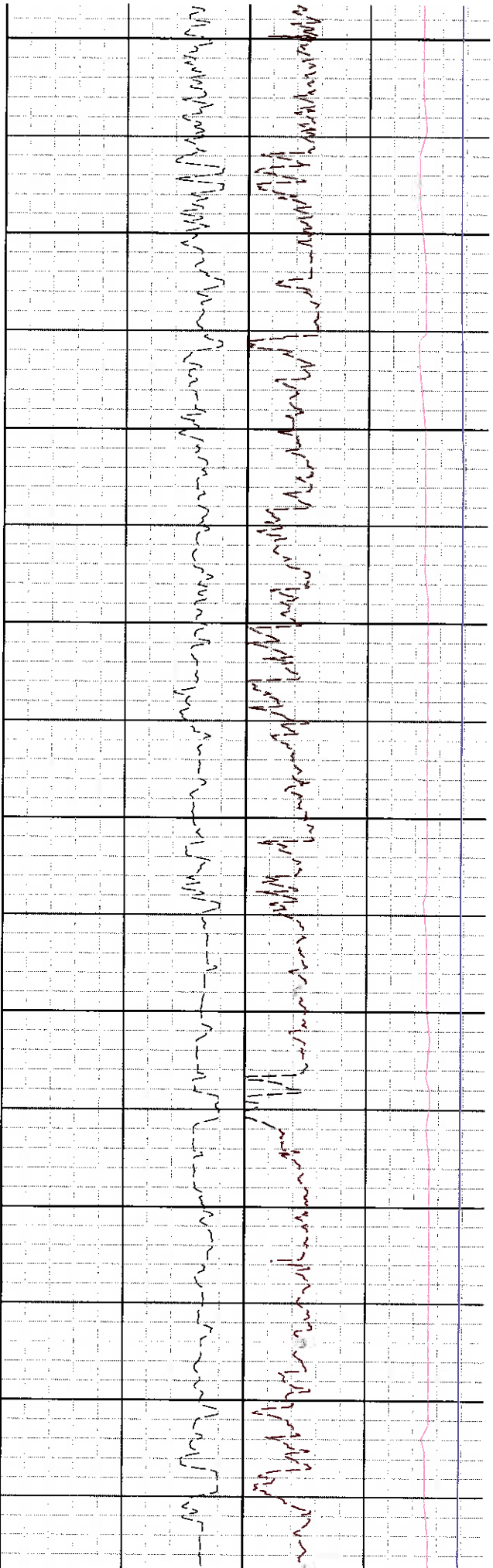
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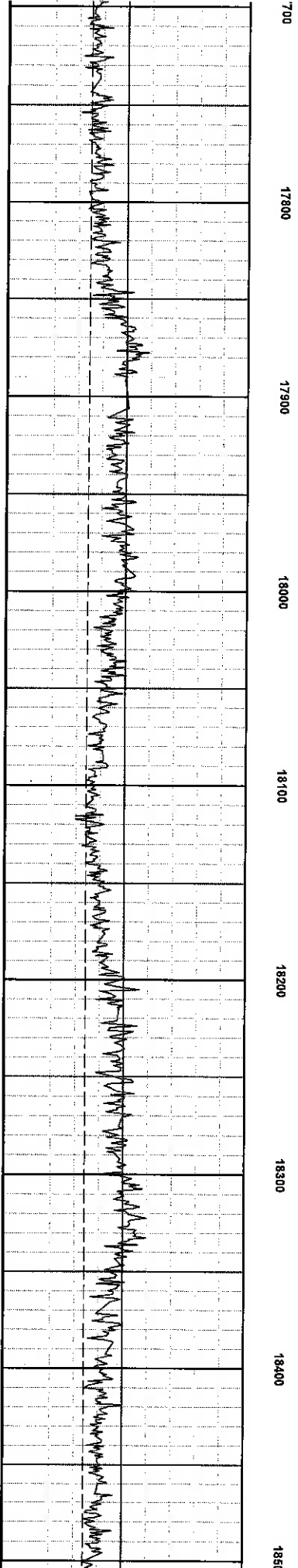
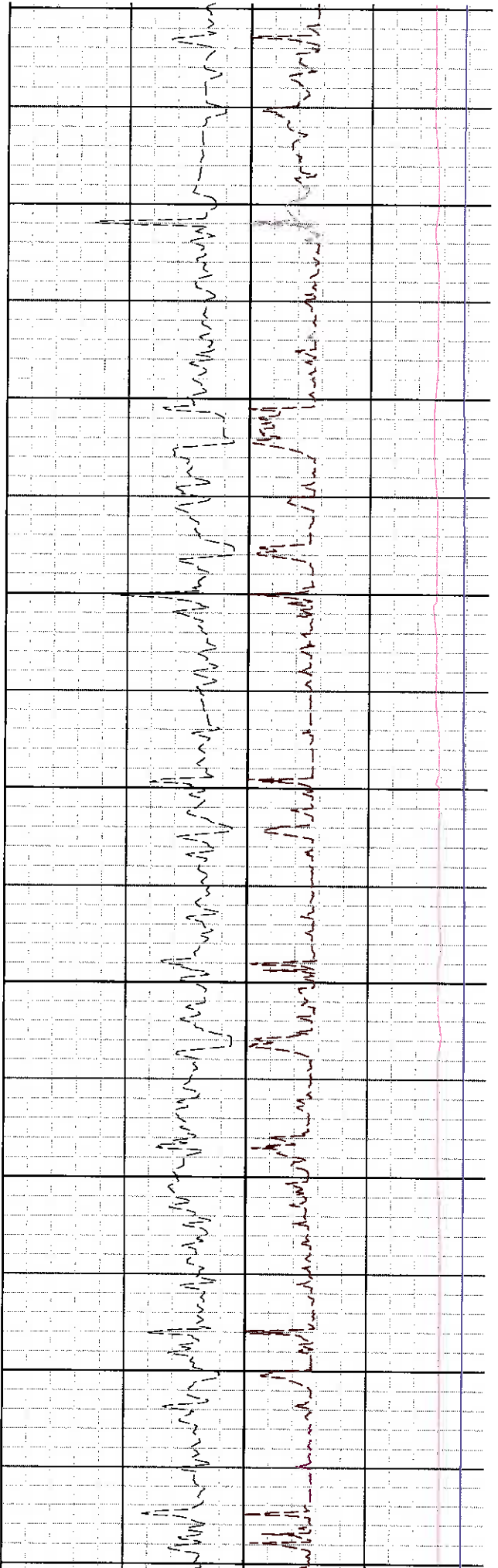
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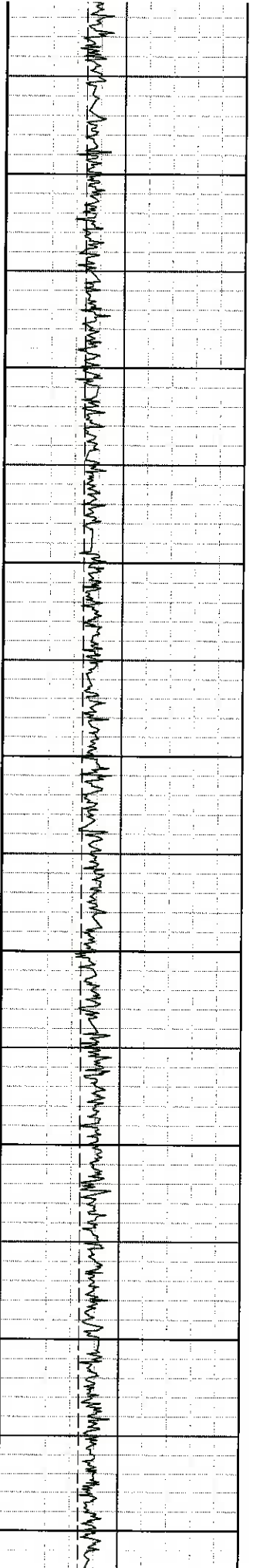
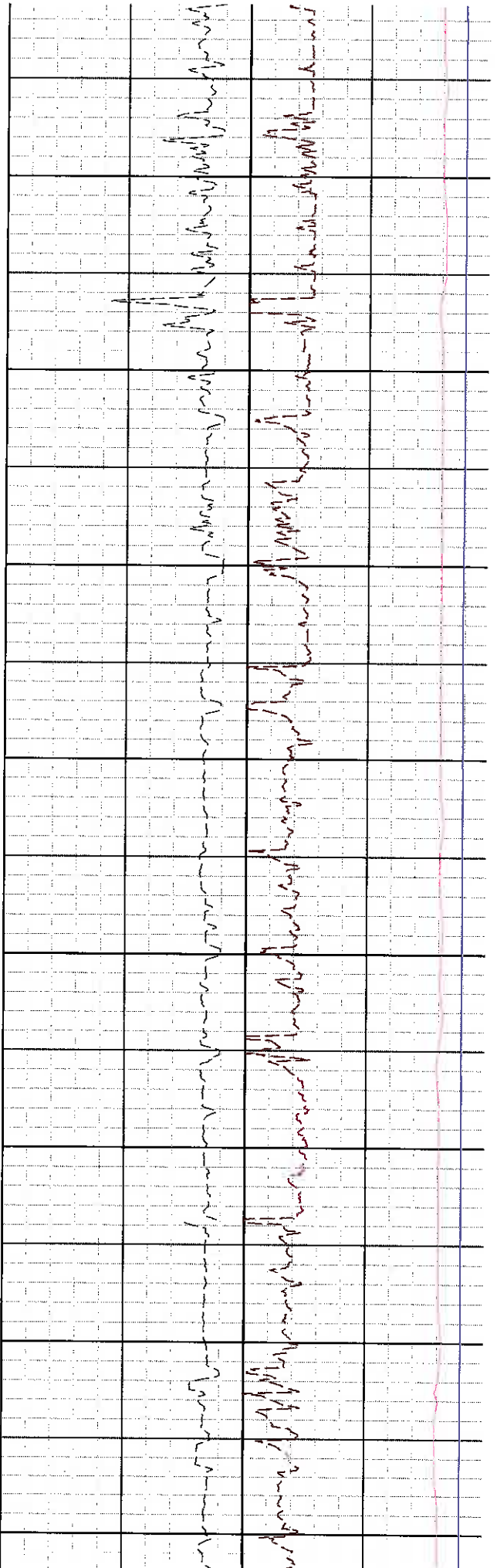
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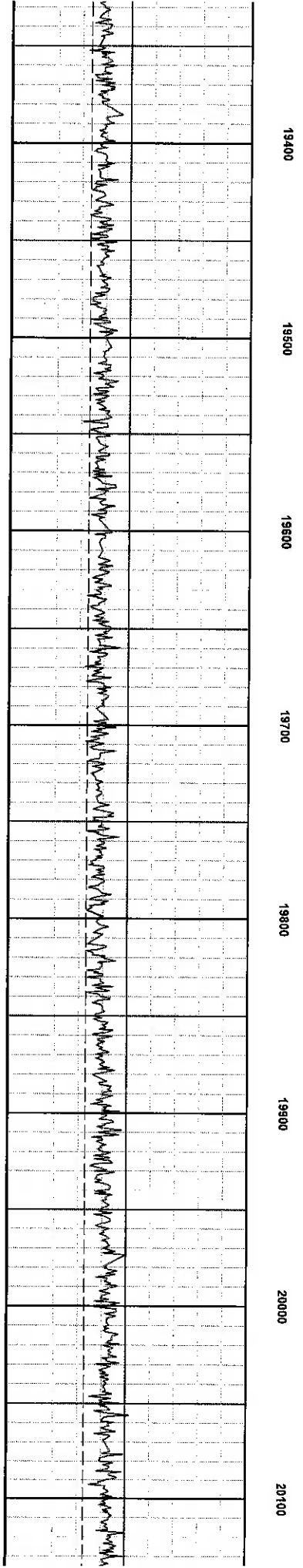
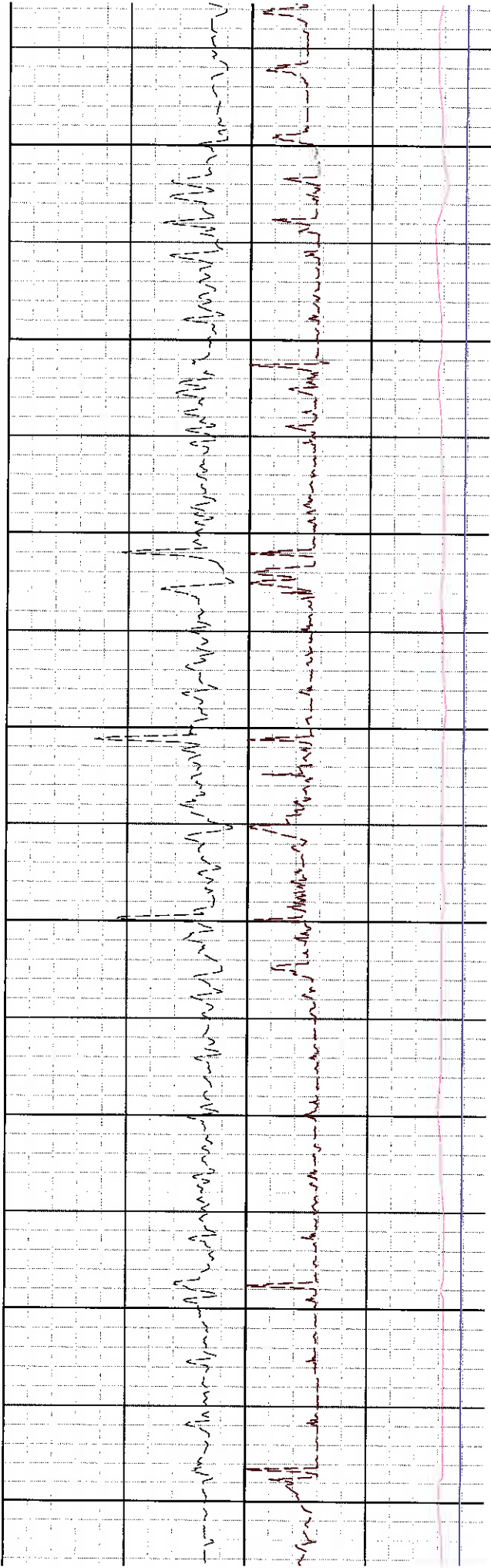
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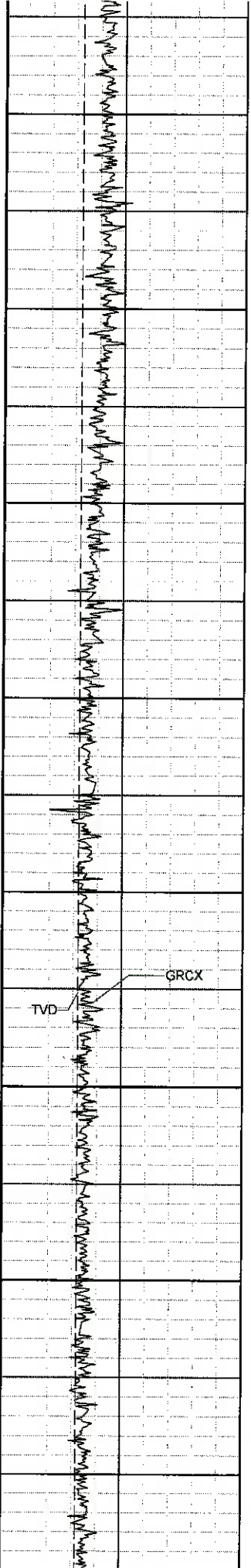
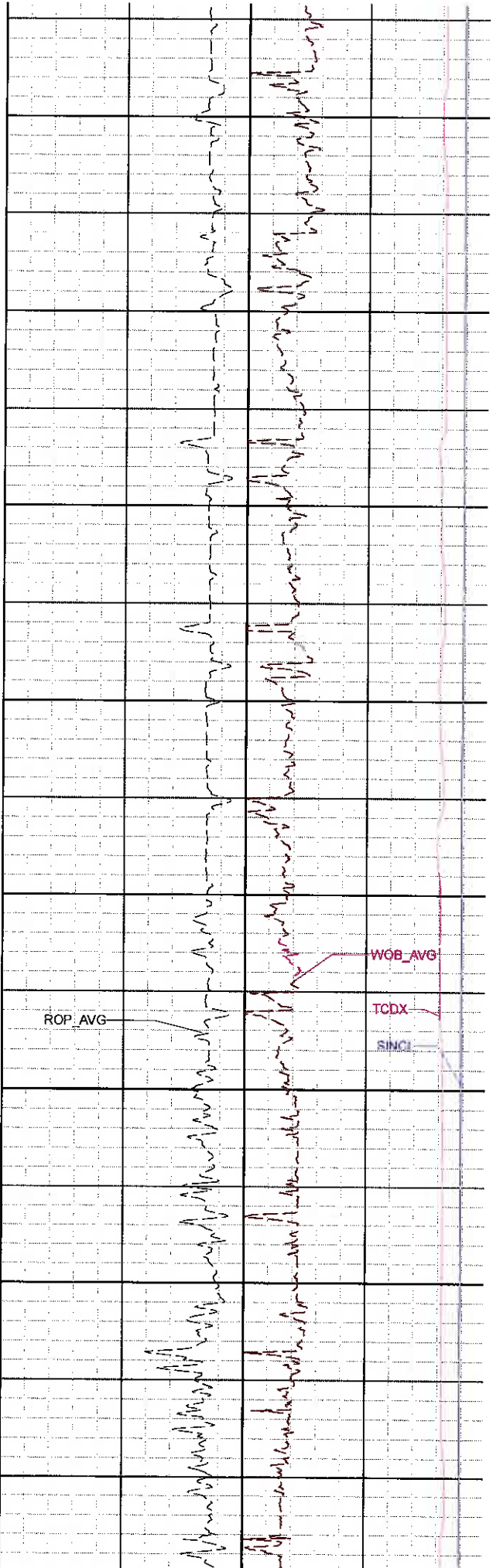


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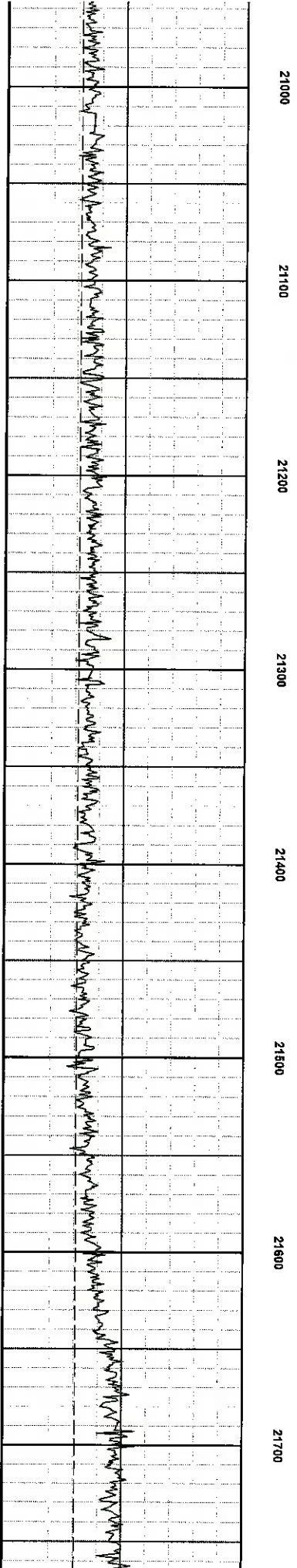
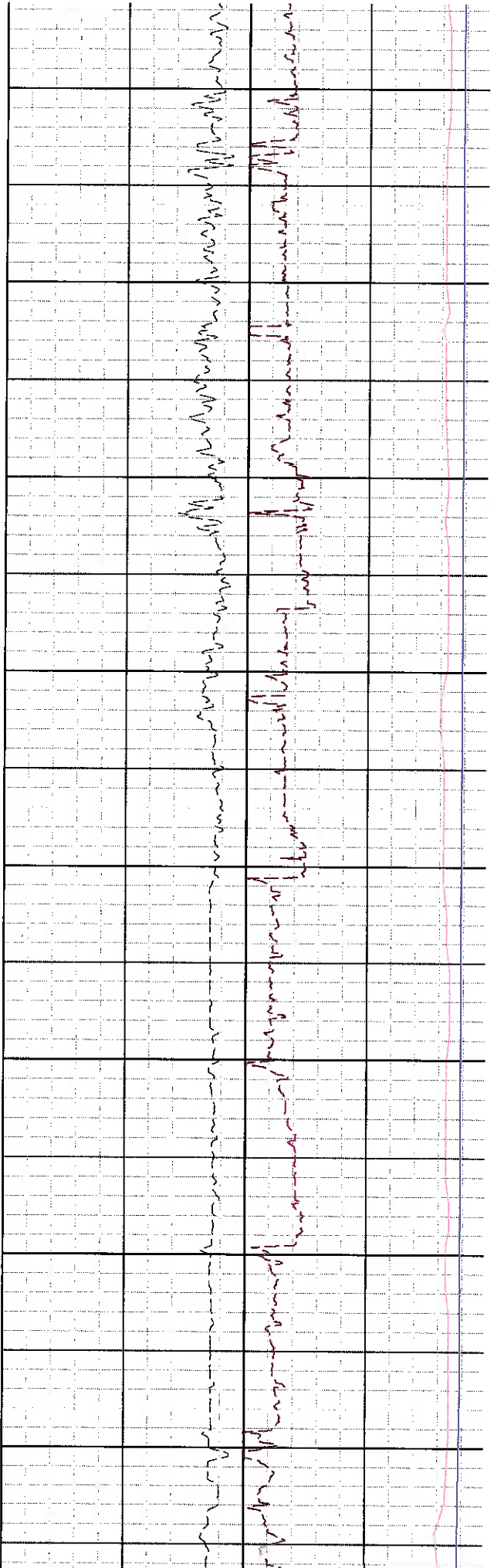


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