ADVANCED GEOLOGICAL SERVICES

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October 8, 2013
AGS Ref.: 12-289-4

Mr. Steve Snyder
Groundwater Sciences Corporation
2601 Market Street, Suite 310-1
Harrisburg, Pennsylvania

Subject: Borehole Geophysical Investigation Results
Harley Davidson Site
York, Pennsylvania

Dear Mr. Snyder:

Advanced Geological Services (AGS) completed a borehole geophysical investigation for Groundwater Sciences Corporation on June 24-27, 2013, and August 19, 2013 at the Harley Davidson Site in York, Pennsylvania. Geophysical data were collected in four monitoring wells that included MW-136A, MW-137A, MW-139A, MW-140A. The wells were installed to depths of approximately 470 feet, 450 feet, 470 feet, and 417 feet, respectively. These wells were located at various locations throughout the site.

Objectives

The primary objective of this investigation was to locate potential water-bearing fracture zones in the well and to determine the structural orientation of these fractures. The borehole geophysical data provided information regarding the depth and vertical extent of fractures and fracture zones, the dip and azimuth of the fractures, and their relation to the local bedding characteristics.

Geophysical Equipment

AGS used four separate downhole instruments to complete the investigation. These included the Century Geophysical multitool (9041), which records natural gamma ray (GR), 64-inch normal resistivity (64N), 16-inch normal resistivity (16N), 40-inch lateral resistivity (40L), single-point resistance (SPR), fluid resistivity (FR), temperature (T), and differential temperature (DT) in a single run into the well. AGS also used a three-arm caliper to record a continuous log of borehole size, and an optical televiewer (OPTV), which provided azimuth and dip information for fractures and bedding structures. Finally, AGS used a heat-pulse flowmeter at selected depth intervals to provide an indication of the flow direction of fluids within the borehole.

Borehole Geophysical Theory

Gamma Ray Logs

The natural gamma ray probe is a passive device that measures the amount (in counts per second, cps) of naturally-occurring gamma ray emissions that are discharged from sediment/rock units as the instrument is moved in the borehole. The primary objective of the gamma ray instrument is to provide diagnostic lithologic information within the well bore. Potassium, which contains about 0.012 per cent potassium-40, is abundant in feldspars and micas, which readily decompose to clay. Clays also concentrate the heavy radio-elements through the process of ion exchange and adsorption, and therefore exhibit a high gamma ray count during the logging operation. Shales contain a high percentage of clay materials and therefore exhibit high gamma ray responses, as well. Conversely, limestones, sandstones, and other common rock types that do not possess radio-elements within their matrix exhibit low gamma ray count rates. Typically, clay-filled fracture zones can be distinguished from the limestone host rock.

Electric Logs

The electrical resistivity (64-inch, 16-inch, normal devices, 40-inch lateral, and fluid resistivity device) and resistance (single point) measurements record the electrical characteristics (in ohm-meters and ohms, respectively) of the formations and fluids encountered in the borehole. Electrical currents are transmitted into the formations and the apparent electrical resistivity and resistance are determined for each device. The approximate depth of investigation varies for each device as the distance between transmitter and receiver vary. The investigation depths of penetration for the electrical resistivity devices are: 32 inches for the 64-inch normal log, 8 inches for the 16-inch normal log, 20 inches for the 40-inch lateral log, and 1 inch for the fluid resistivity log. The single-point resistance log penetrates several inches into the formation. Within a water-bearing fracture zone, it is typical that the logs exhibit a relative decrease in electrical resistivity and electrical resistance from the surrounding unfractured rocks. This is due to the presence of low-resistivity (or conductive) fluids into the measured area. The fluid resistivity log may exhibit subtle changes in slope that are due to the addition of formation waters whose bulk resistivity is different than borehole fluid bulk resistivity.

Temperature Logs

The temperature and differential temperature logs indicate variations in temperature with depth in the well. The temperature log simply measures the ambient temperature at each depth range (0.1 feet), while the differential temperature is the subtracted difference between

temperature measurements at each depth range. If formation fluids are entering the well through fractures or porous media, a temperature anomaly may be present that indicates their existence. A change in the slope of the temperature curve, or spiked responses from the differential temperature curve may indicate the entrance of formation waters into the well. In addition, the flow direction of the formation fluids may be determined by observing the character of the curves above, and below the fracture.

Caliper Log

The caliper log measures the diameter of the borehole as the instrument is raised in the well. The deviations in borehole size may indicate the presence of fractures, changes in lithology, and physical condition of the borehole walls. Typically, fractured zones are made up of weathered or semi-consolidated rocks, which loosen or break during the drilling process. Therefore, these zones typically exhibit an increase in borehole size.

Optical Televiewer Log

The optical televiewer log provides an oriented, high-resolution, 360-degree photographic image of the borehole. The oriented image of the borehole is presented in unwrapped format on the log. Results from this tool provide location and orientation information of features such as fractures, lithologic contacts and cavities. The OTV digitizes 256 measurements around the borehole every 0.02 feet along the length of the borehole. Since the acquired image is digitized and properly oriented with respect to borehole deviation and tool rotation, it allows data processing to provide accurate strike and dip information of fractures and other structural features.

Heat-Pulse Flowmeter Log

The heat pulse flowmeter measures the vertical flow rates within a borehole. The log may be used to identify contributing fracture zones under natural and pumping conditions. The system operates by heating a wire grid that is located between two thermistors. The heated body of water moves toward one of the thermistors under the effect of the vertical component of flow within the well. Positive and negative values on the log represent upward and downward flow, respectively. The flow is calibrated to gallons/minute (GPM) for the flowmeter tool. The heat pulse flowmeter tool used in this investigation can detect vertical flow rates between 0.03 and 1.0 GPM.

In a formation that has strong interconnectivity between bedding planes or fractures there would be little or no expected head difference or flow between the fractures. However, in a confined rock aquifer there could be upward or downward flow in the well between the

different confined fractures. Under pumping conditions HPFM logs can provide information about the relative interconnectivity between bedding planes or fracture zones.

All instrument responses were compared and correlated for the final report interpretation. Because numerous physical measurements were collected in the wells, the interpretation confidence levels increased substantially, and potential ambiguities that may be present using data from a few measurements only, were minimized by the presence of the remaining data sets.

Logging Procedures

The logging procedures conducted at the site followed typical downhole protocol. Initially, the instrument was attached to a cable head at the end of a 4-conductor wireline. The "zero" depth was established at the appropriate benchmark (top of casing), and the recording mode of operation was initiated. The probe was lowered at approximately 3-12 feet per minute through the total depth of the well. The recording mode was terminated when the probe touched the bottom of the well. Uplog sections were also completed to ensure that geophysical responses were accurate, repeating, and within a close depth tolerance to the down log. Due to the mechanical nature of the caliper instrument, it is only possible to collect uplog data. In the office, the gamma ray data were subjected to a 5-point running average conversion factor to remove unwanted, high frequency noise components from the data set. All logs were plotted together for interpretation and presentation purposes.

Well Construction Information

The upper sections of the wells were constructed of 6" I.D. steel casing. The casing extended to varying depths below top of casing (TOC), which is the typical reference point used by AGS when logging wells. TOC at each well was 2-4 feet above ground surface. Water levels in the wells ranged from approximately 19 feet to 22 feet below TOC.

Results

The geophysical well logs collected in wells MW-136A, MW-137A, MW-139A, and MW-140A are presented in Appendix A of this report. As stated, the depths of all logs are referenced to the top of casing. The data from the wells have been placed in four tracks on the figures, where track 1 contains the caliper and natural gamma ray data, track 2 presents the 16-inch normal resistivity, 64-inch normal resistivity, 40-inch lateral resistivity, and single-point resistance data, track 3 shows the temperature, differential temperature, fluid resistivity, and flow data, and track 4 presents the optical televiewer image data.

We have included a Fracture Category Ranking System description in Appendix B. The Fracture Category Ranking System is used to group acoustic televiewer structures into four categories (1 to 4) that are based on fracture continuity and fracture aperature, or opening size. The larger the category number the more significant the fracture.

The OPTV amplitude log is presented in unwrapped format. It represents a 360 degree view of the borehole cylinder that has been opened vertically, and placed flat on the page. Given this format, any dipping surface such as a fracture plane or bedding interface will be represented by a sine wave. As the dip of the interface increases so does the amplitude of the sine wave. The dip angle is obtained by incorporating the borehole size information from caliper logs. The azimuth is obtained from gyroscope information that is continuously collected during the OPTV logging operation. Typically, AGS will process the OPTV data by fitting a sine curve to an interpreted televiewer fracture to estimate the dip and azimuth of the interface.

Well MW-136A

The following table provides a list of important borehole features that were detected in well MW-136A. The information listed in the tables reflects the log data presented in Appendix A.

Table 1: Well MW-136A Bedrock Structures

Well MW-136A						
Depth (feet)	Azimuth (degrees)	Dip (degrees)	Structural Category (fracture rank)			
			1	2	3	4
280						
298						
350						
360						
381						
395						
439						
455						
461						
467						

The data from WM-136A indicated a few important borehole features or characteristics. Unfortunately, the ACTV data was poor due to an abundance of suspended sediments in the hole at the time of logging. For this reason, AGS picked potential water-bearing fracture zones that were based on caliper responses, four resistivity curves, fluid resistivity, and temperature information only. Specifically, we looked for increased caliper values, low resistivity zones, and changes in the slope of the fluid resisitivity and temperature curves.

Based on this criteria, an interpreted fracture at 360 feet exhibited a slight increase in borehole size, low single-point resistance values, and a marked change in slope of the fluid resistivity curve. These responses suggest that formation water may be present at this depth range. Because the resistivity curves remain high, it appears the formation is still very tight, and flow would be expected to be very low.

A second interpreted fracture was located at a depth of 381 feet below TOC. It exhibits low resistivity values, and notable changes in slope of the fluid resistivity and temperature curves. The caliper data indicates that the borehole is tight here, so formation waters would probably move through micro-fractures in the rock. Several, less notable fractures were detected and presented in Table 1. They were primarily targeted because of the lower resistivity values observed on the logs.

AGS did not observe the presence of any additional, significant fractures or fracture zones in the well. The caliper log remained very constant, the resistivity logs indicated very tight, competent rock, and there were no significant changes in the remaining logs.

<u>Well MW-137A</u>

The following table provides a list of important borehole features that were detected in well MW-137A. The information listed in the tables reflects the log data presented in Appendix A.

Table 2: Well MW-137A Bedrock Structures

Well MW-137A						
Depth (feet)	Azimuth (degrees)	Dip (degrees)	Structural Category (fracture rank)			
			1	2	3	4
283	272	33	X			
283	269	37	X			
284-287	Large Void					X
313	275	20	X			
330	274	9	X			
343	270	20	X			
344	266	16	X			
345-346.5	Vert. Fractures		X			
347	268	14	X			
350	65	66	X			
367	280	16	X			
375	275	16		X		
376	294	14		X		
380	291	18	X			
385	284	20	X			
385	280	16	X			
386	274	20	X			
389	282	16	X			
390	289	16	X			
391	273	16	X			
391	272	18	X			
393	307	18	X			
395	284	18	X			
397	264	20	X			
397	274	18	X			
399	280	22	X			
401	276	31	X			

401	289	20	X			
404	334	4.6	X			
416			X			
423			X			

AGS detected a very large opening or void at a depth range of 284'-287'. The caliper fully opens to a borehole size of greater than 21 inches, the resistivity curves are low, and the OPTV log exhibits a notable anomaly in this range. In addition, the HPFM data indicates strong upward flow, especially during pumping conditions. This feature appears to be the primary water-bearing structure in the well.

A second potential fracture zone is located at a depth range of 375'-387'. The resistivity curves are low and the OPTV data indicates the presence of two bedding plane fractures. The caliper curve remains constant in this zone, as do the fluid resistivity and temperature curves. This suggests that any formation waters would move through very tight micro-fractures rather than a significant opening.

The other fractures observed in the well are very tight, Category 1, bedding plane fractures. The primary reason for including them as fractures were the relatively lower resistivity values and possible temperature anomalies observed on the logs. The Polar Projection Plot indicates the bedding plane fractures are low-angle (10-40 degrees), and dip to the west. The are many very fine, calcite-filled fractures that were observed on the OPTV log, as well.

The remaining data in well MW-137A indicates that no significant water-bearing fractures or fracture zones were present. Similar to MW-136A, the caliper log did not indicate any significant borehole openings, the OTV images did not show the presence of any significant water-bearing fractures, and the HPFM data indicated near "zero flow" fluid conditions. In addition, the resistivity values were very high, suggesting the absence of fluids in the formations, and the fluid resistivity and temperature curves possessed a relatively constant slope. All annotated features are Category 1, which is the least significant fracture/bedding plane designation. Again, the data in MW-137A indicates the presence of very competent, indurated materials with no significant fractures or fracture zones.

<u>Well MW-139A</u>

The following table provides a list of important borehole features that were detected in well MW-139A. The information listed in the tables reflects the log data presented in Appendix A.

Table 3: Well MW-139A Bedrock Structures

Well MW-139A						
Depth (feet)	Azimuth (degrees)	Dip (degrees)	Structural Category (fracture rank)			
			1	2	3	4
272	Poss. Void					X
279	235	31	X			
284	254	26	X			
287	246	26	X			
300	Vert. Fracture		X			
304	51	79	X			
328	64	78	X			
334	318	59	X			
344	283	9	X			
347	264	14	X			
352	279	16	X			
355	281	18	X			
361	134	51	X			
362	117	52	X			
373	7	46	X			
374	178	16	X			
375	176	29	X			
379	127	54	X			
383	77	29	X			
384	118	22	X			
393	56	52	X			
402	254	36	X			
404	193	1	X			
414	279	39	X			
415	269	37	X			
416	248	29	X			
419	275	34	X			

420	266	31	X			
421	276	33	X			
425	136	36	X			
440	250	76	X			
442	258	75	X			

The data in well MW-139A did not indicate the presence of any significant water-bearing fractures or fracture zones. The caliper and OPTV logs showed evidence of a possible void or opening at 272', just below casing, however it may be an artifact of the drilling process. It is not a through-hole feature and it may be the edge of a void space that is 1-foot in vertical extent.

Similar to the other wells, the caliper log did not indicate any significant borehole openings, the OTV images did not show the presence of any significant water-bearing fractures, and the HPFM data indicated near "zero flow" fluid conditions. In addition, the resistivity values were high, and the fluid resistivity and temperature curves possessed a relatively constant slope. All annotated features are Category 1, which is the least significant fracture/bedding plane designation. Again, the data in MW-139A indicates very competent, indurated materials with no significant fractures or fracture zones.

AGS noted the presence of bedding planes throughout the well. The primary dip direction of the bedding plane materials is to the west, between 240-290 degrees, and the dip angles range from 10-30 degrees, as shown in Table 3. The Wulff Plot shows that numerous other fractures are present that exhibit a variety of azimuth and dip angles. Higher angle features tend to dip to the northeast and moderate-angle features tend to dip to the southeast.

Well MW-140A

The following table provides a list of important borehole features that were detected in well MW-140A. The information listed in the tables reflects the log data presented in Appendix A.

Table 4: Well MW-140A Bedrock Structures

Well MW-140A						
Depth (feet)	Azimuth (degrees)	Dip (degrees)	Structural Category (fracture rank)			
			1	2	3	4
201	286	22	X			
207	132	73	X			
212	287	24	X			
219	268	28	X			
220	295	20	X			
223	281	27	X			
228	311	24	X			
235	282	31	X			
246	256	29	X			
248	267	29	X			
252	294	27			X	
254	278	20	X			
256	280	22	X			
262	279	31	X			
263	277	29	X			
264	148	57	X			
265	307	36	X			
271	300	39		X		
272	300	39		X		
273	295	31	X			
277	309	31	X			
280	299	34	X			
282	285	36	X			
284	172	62		X		
287	286	41	X			
312	319	37	X			
315	290	20	X			
322	107	41	X			
325	38	75	X			

326	Sub. vert. Fracture					
330	301	24	X			
344	326	18	X			
350	287	18	X			
351	312	27	X			
351	139	69	X			
356	139	80	X			
358	128	73	X			
361	104	41	X			
362	145	67	X			
368	52	24	X			
376	287	18	X			
382	136	51	X			

The data in well MW-140A again indicates that few significant water-bearing fractures or fracture zones were present. Similar to the other wells, the caliper log did not indicate any significant borehole openings, the OTV image showed the presence of only a few potential water-bearing fractures, and the HPFM data indicated near "zero flow" fluid conditions. Again, the resistivity values were high in most of the well, and there were no significant changes in the fluid resistivity and temperature curves. Most annotated features are Category 1, which is the least significant fracture/bedding plane designation.

AGS noted the presence of a sub-vertical fracture at 326' and a larger upward flow during pumping at 321'. This feature at 326' may be water-producing. The flow at 327' is very minimal, which indicates the fracture at 326' is producing the flow.

AGS noted the presence of bedding planes throughout the well. As was the case in MW-139A, the primary dip direction of the bedding plane materials is to the west/northwest, between 240-290 degrees, and the dip angles range from 10-30 degrees, as shown in Table 4. The Wulff Plot shows that numerous other fractures are present that exhibit a variety of azimuth and dip angles. The higher-angle features tend to dip to the southeast.

Data Quality

The quality of the geophysical logs was very good, the responses were consistent, and the log responses repeated well during test runs for quality control. Unfortunately, usable data could

not be collected with the optical televiewer due to the large amount of suspended sediment in the borehole at the time of logging.

The data collection and interpretation methodologies used in this investigation are consistent with standard practices applied to similar geophysical investigations. The correlation of geophysical responses with probable subsurface features is based on the past results of similar surveys although it is possible that some variation could exist at this site.

If you have any questions, please contact me at 610-722-5500. It was a pleasure working with you on this project, and I look forward to conducting geophysical investigations for you in the future.

Sincerely,

Peter T. Miller, Ph.D., P.G.
Senior Geophysicist

Encl.: Appendix A - Geophysical Well Logs
Appendix B – Fracture Category Ranking

Appendix A
Geophysical Well Logs

ADVANCED GEOLOGICAL SERVICES

Multitool, Caliper, Optical Televiewer

CO: Groundwater Sciences, Inc.
WELL: MW136A
RD: Eden Road
CITY/STATE:York, PA
SITE:Harley Davidson
FILING No

CLIENT Groundwater Sciences, Inc.
WELL ID MW-136A
SITE Harley Davidson
CITY York **STATE** PA

LOCATION

SEC TWP RGE

OTHER SERVICES

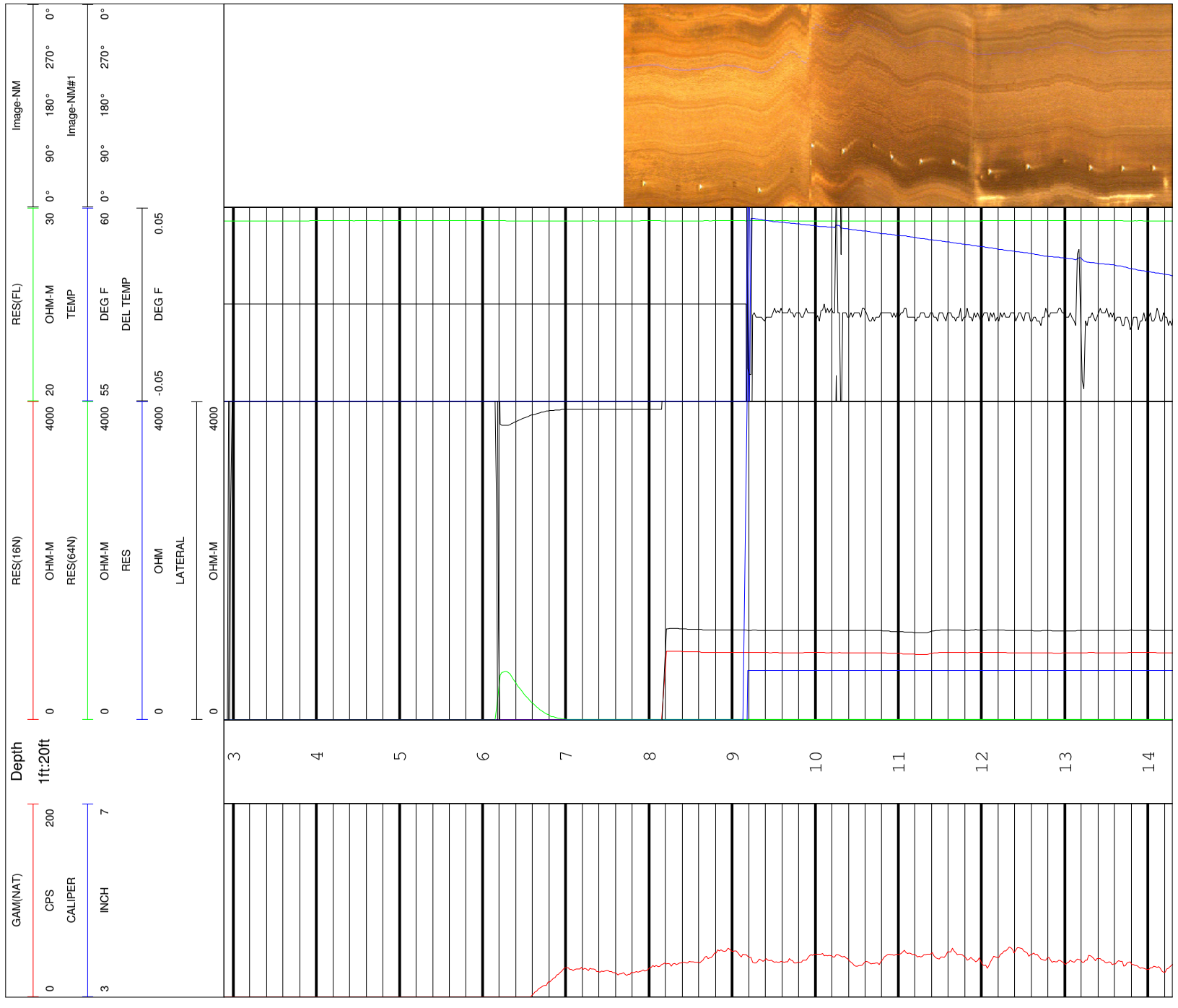
PERMANENT DATUM: ELEVATION K.B.

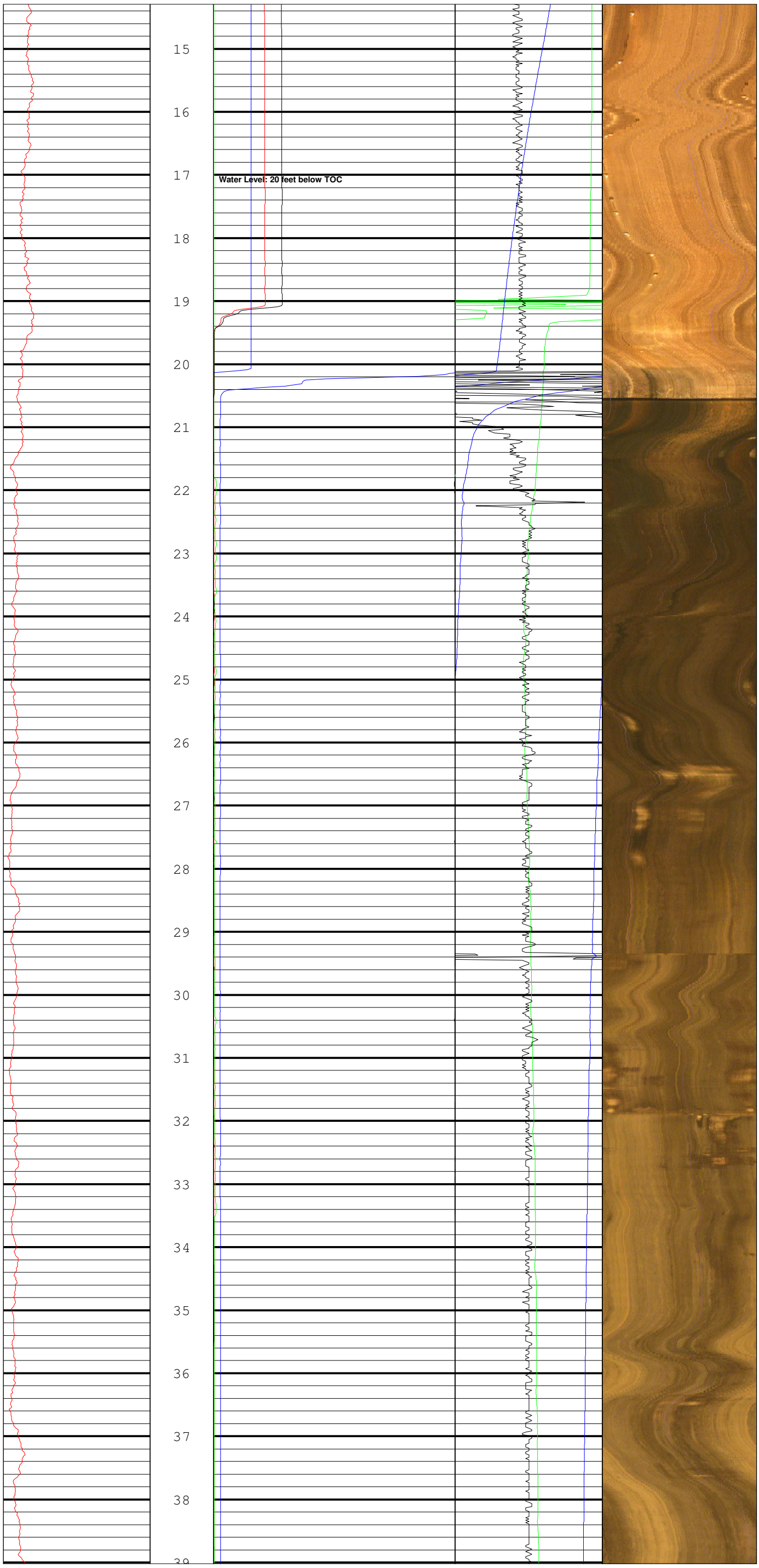
LOG MEAS. FROM: ABOVE PERM. DATUM D.F.

DRILLING MEAS. FROM: G.L.

DATE	08/19/13	TYPE FLUID IN HOLE	
RUN No		SALINITY	
TYPE LOG		DENSITY	
DEPTH-DRILLER		LEVEL	
DEPTH-LOGGER		MAX. REC. TEMP.	
BTM LOGGED INTERVAL			
TOP LOGGED INTERVAL			
OPERATING RIG TIME			
RECORDED BY	DJ		
WITNESSED BY			

REMARKS:

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Water Level: 20 feet below TOC
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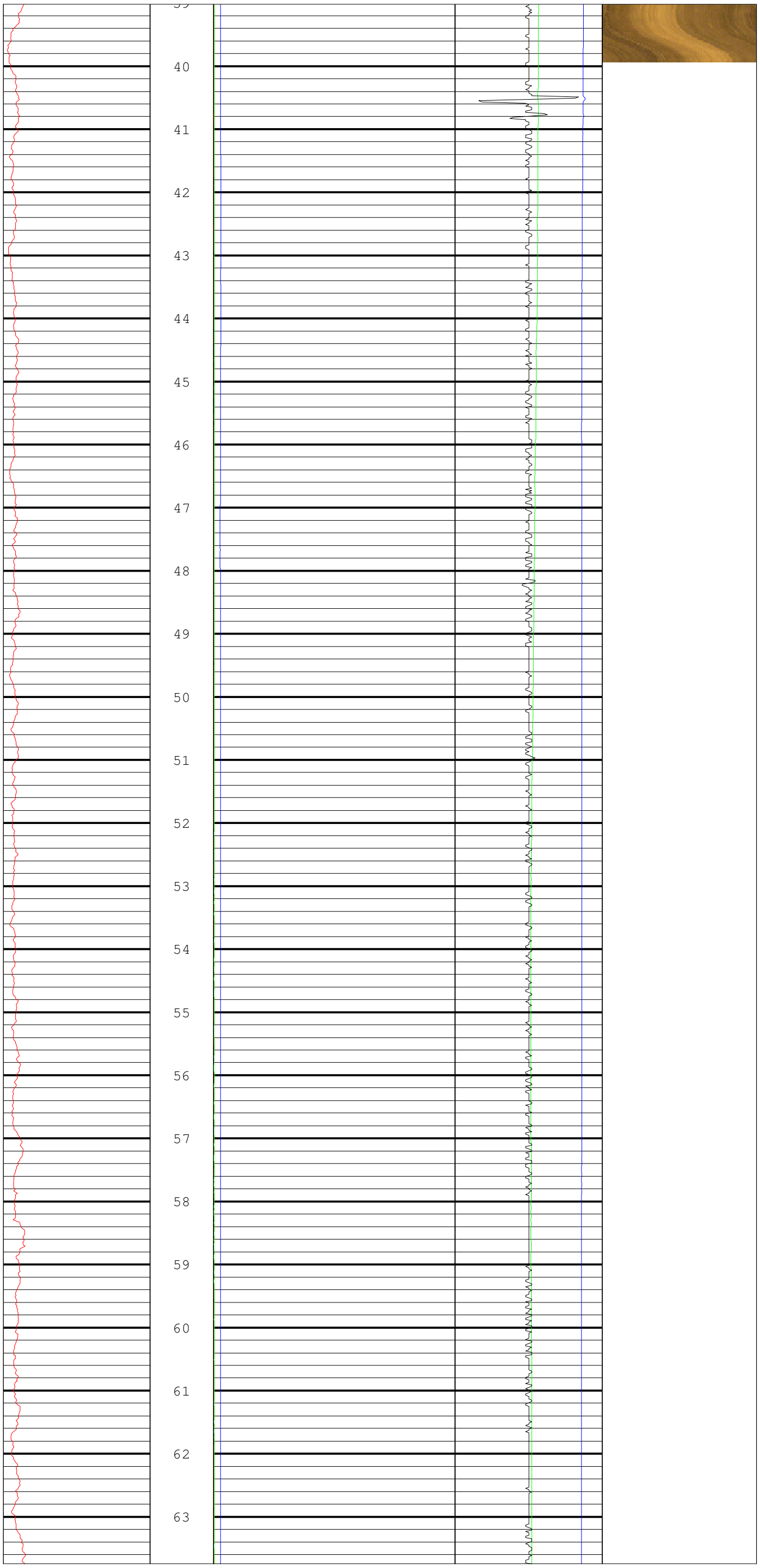
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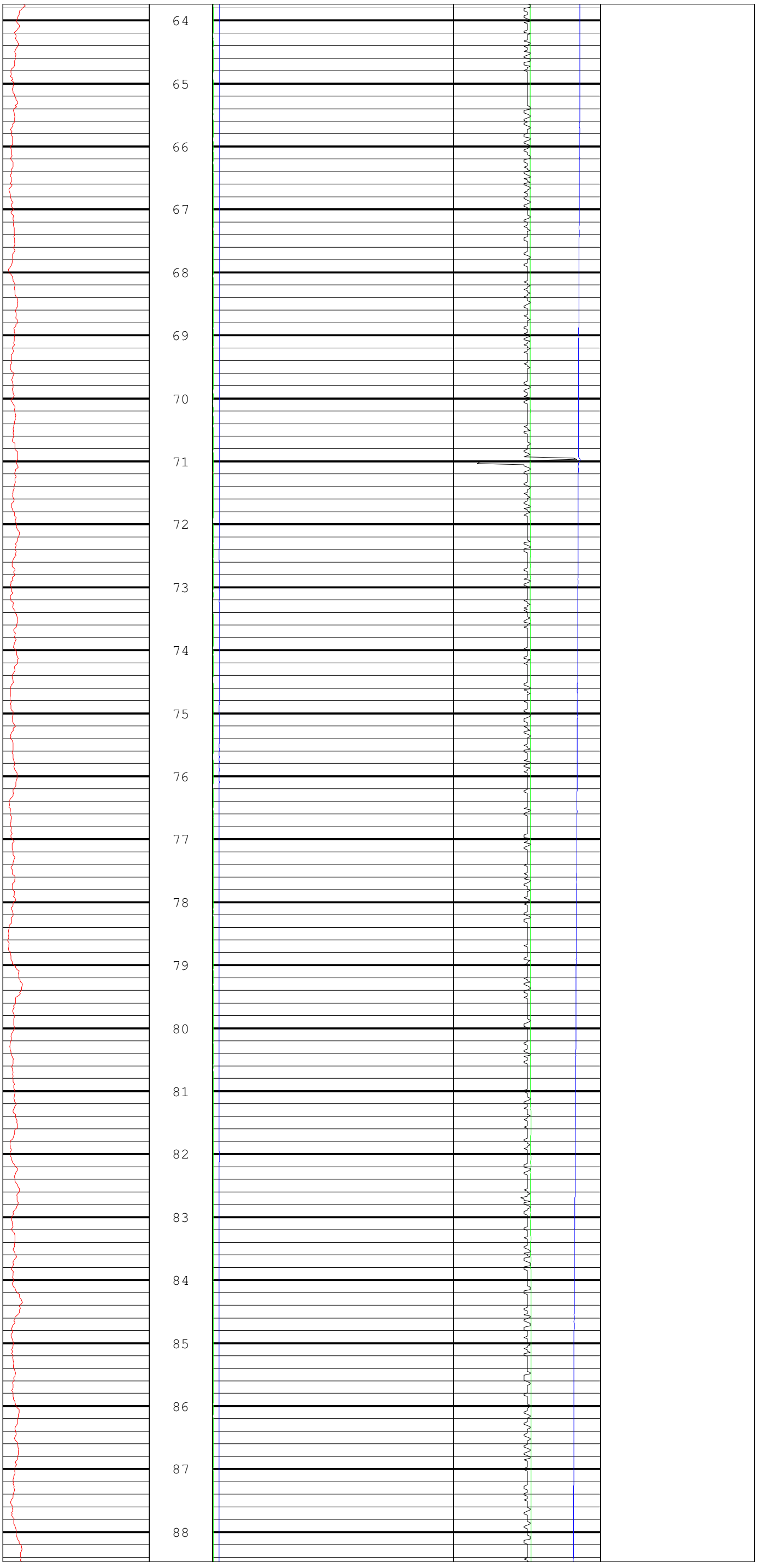
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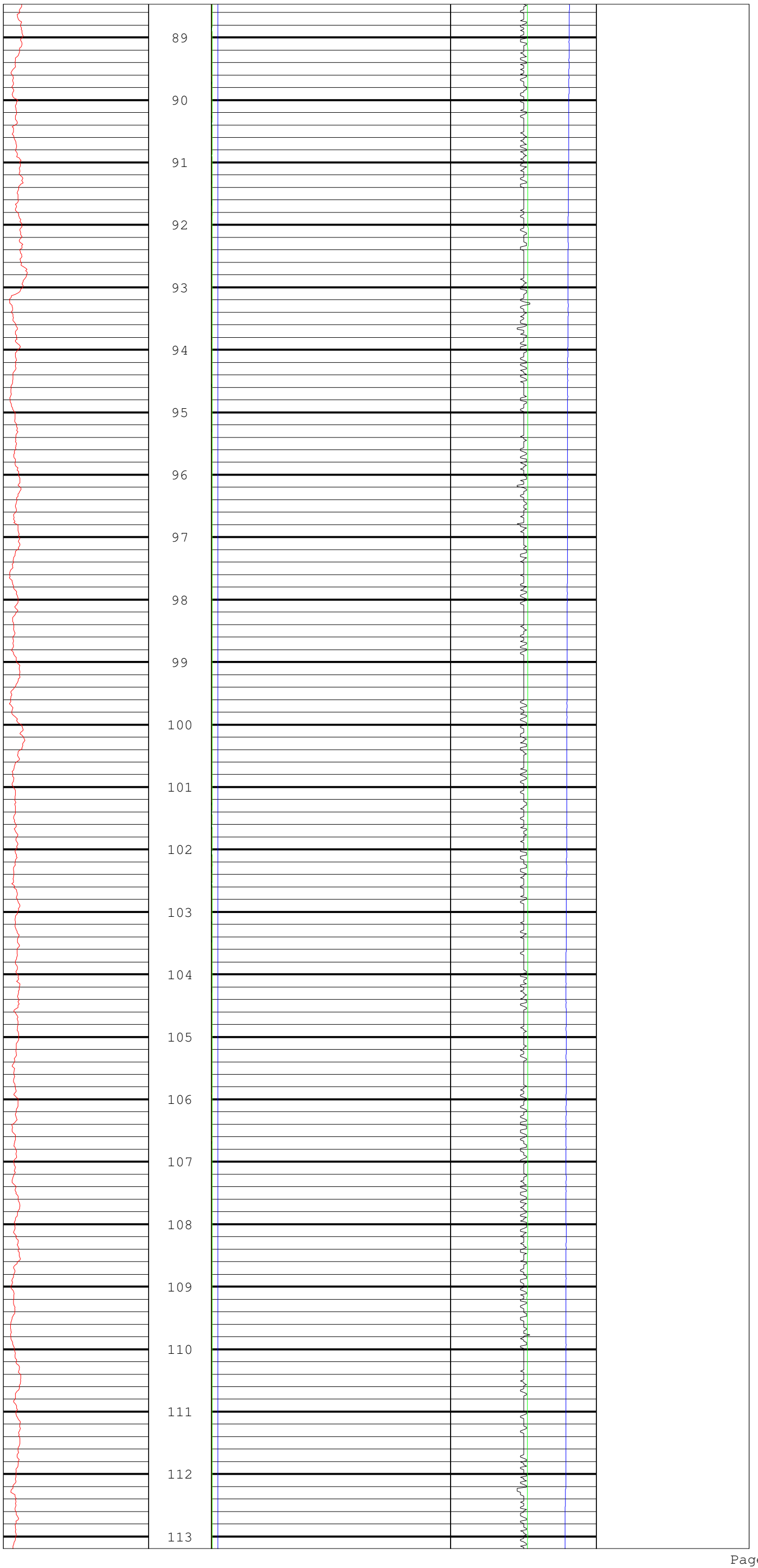
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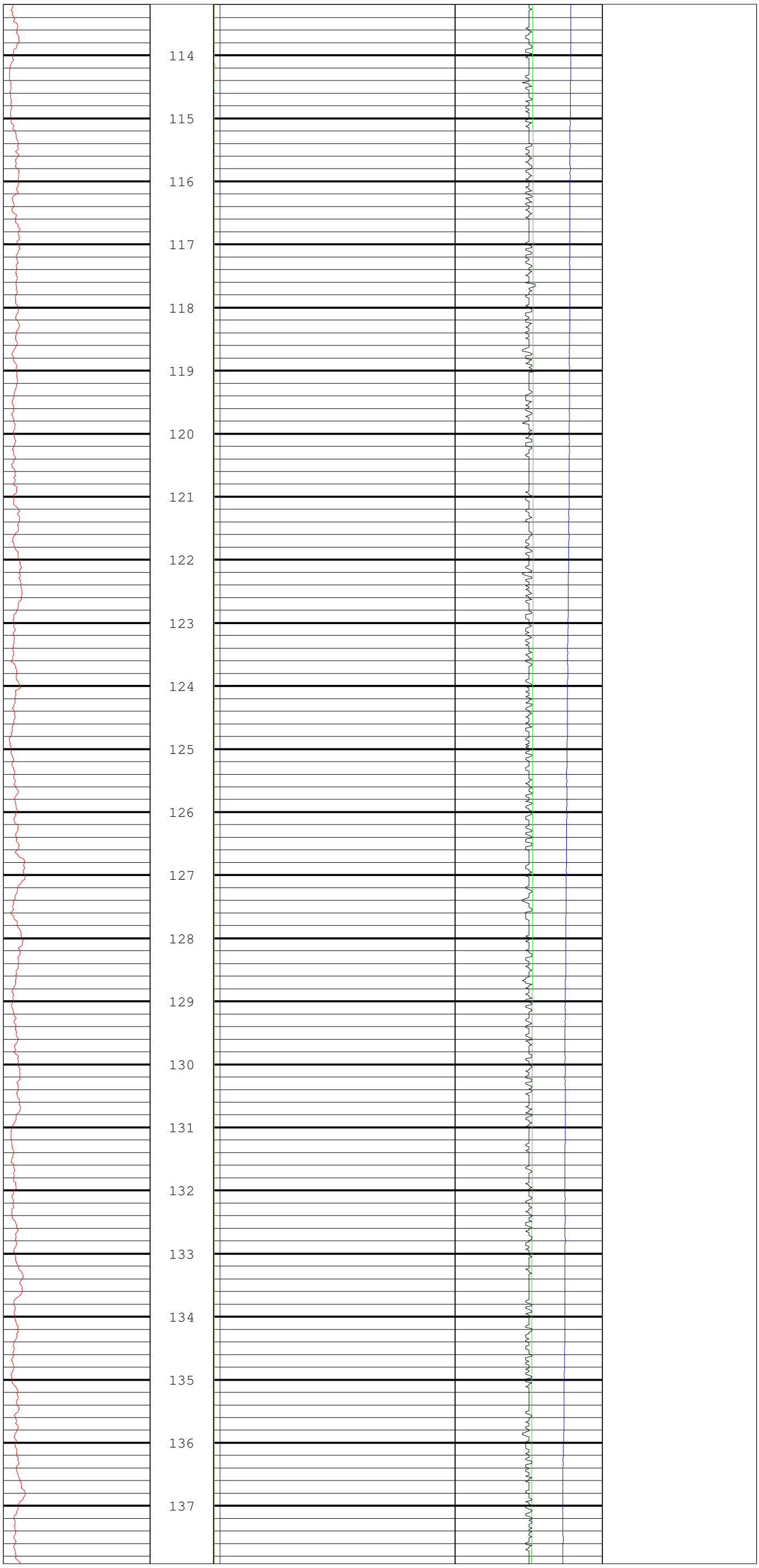
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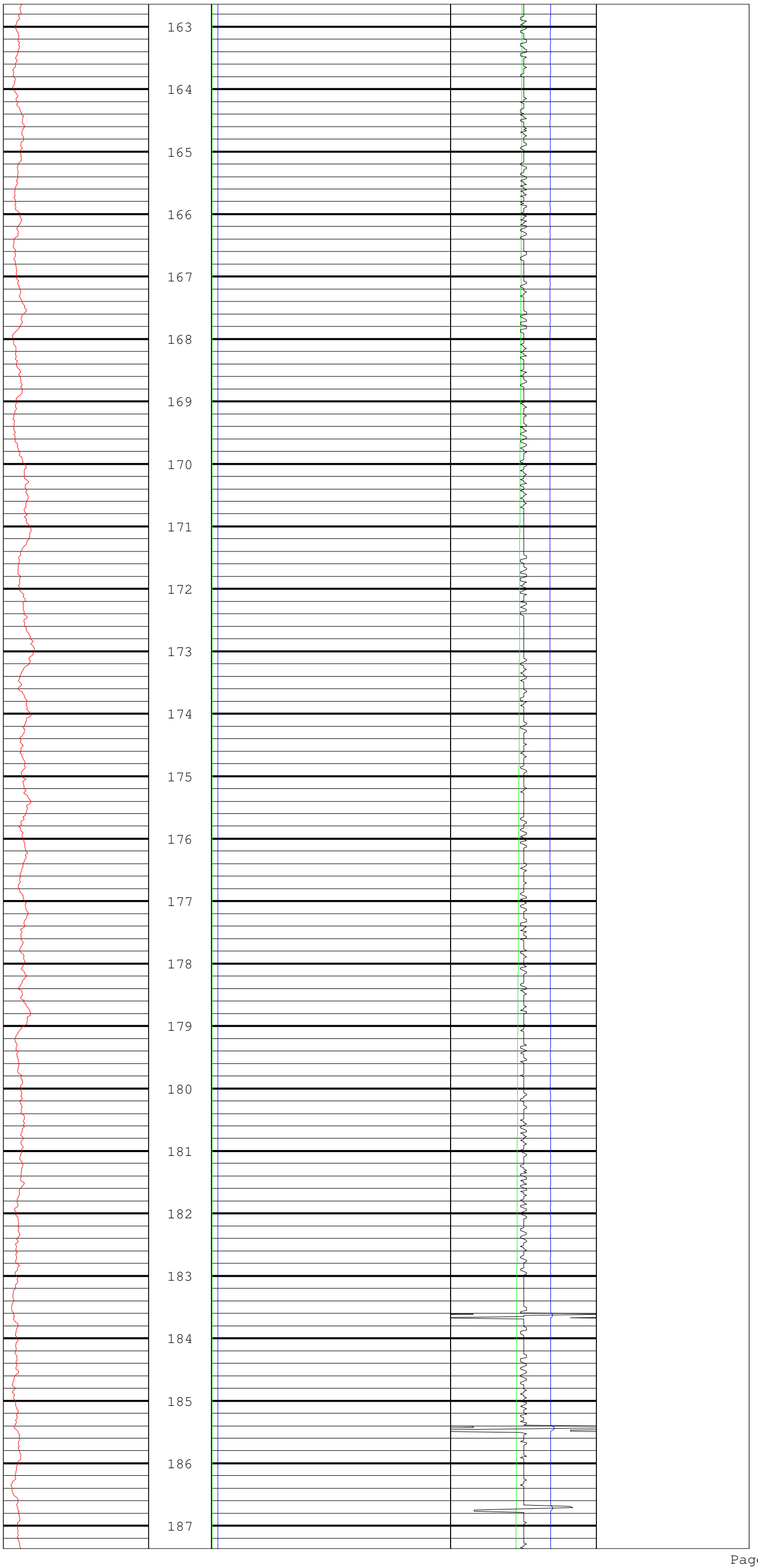
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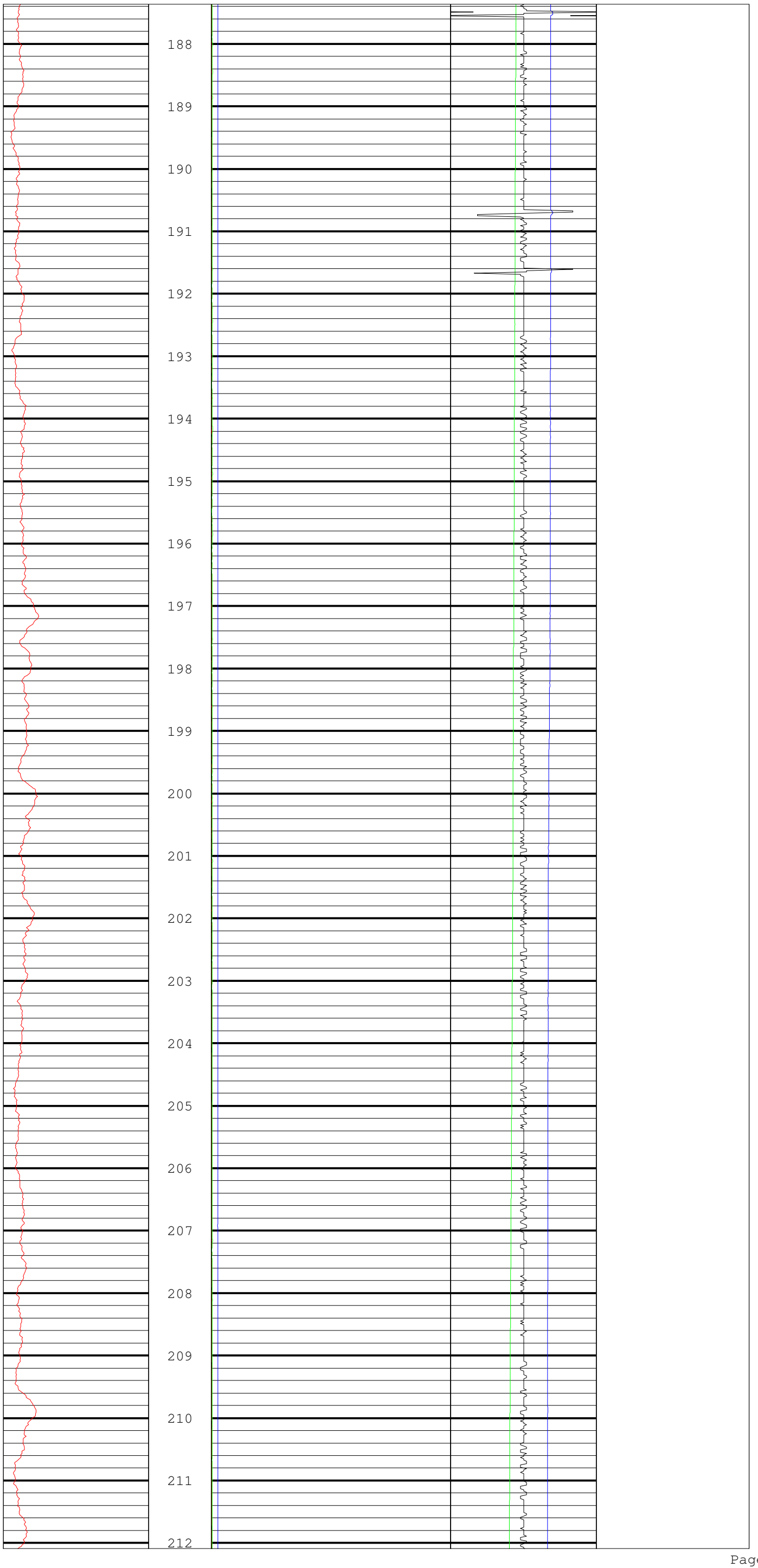
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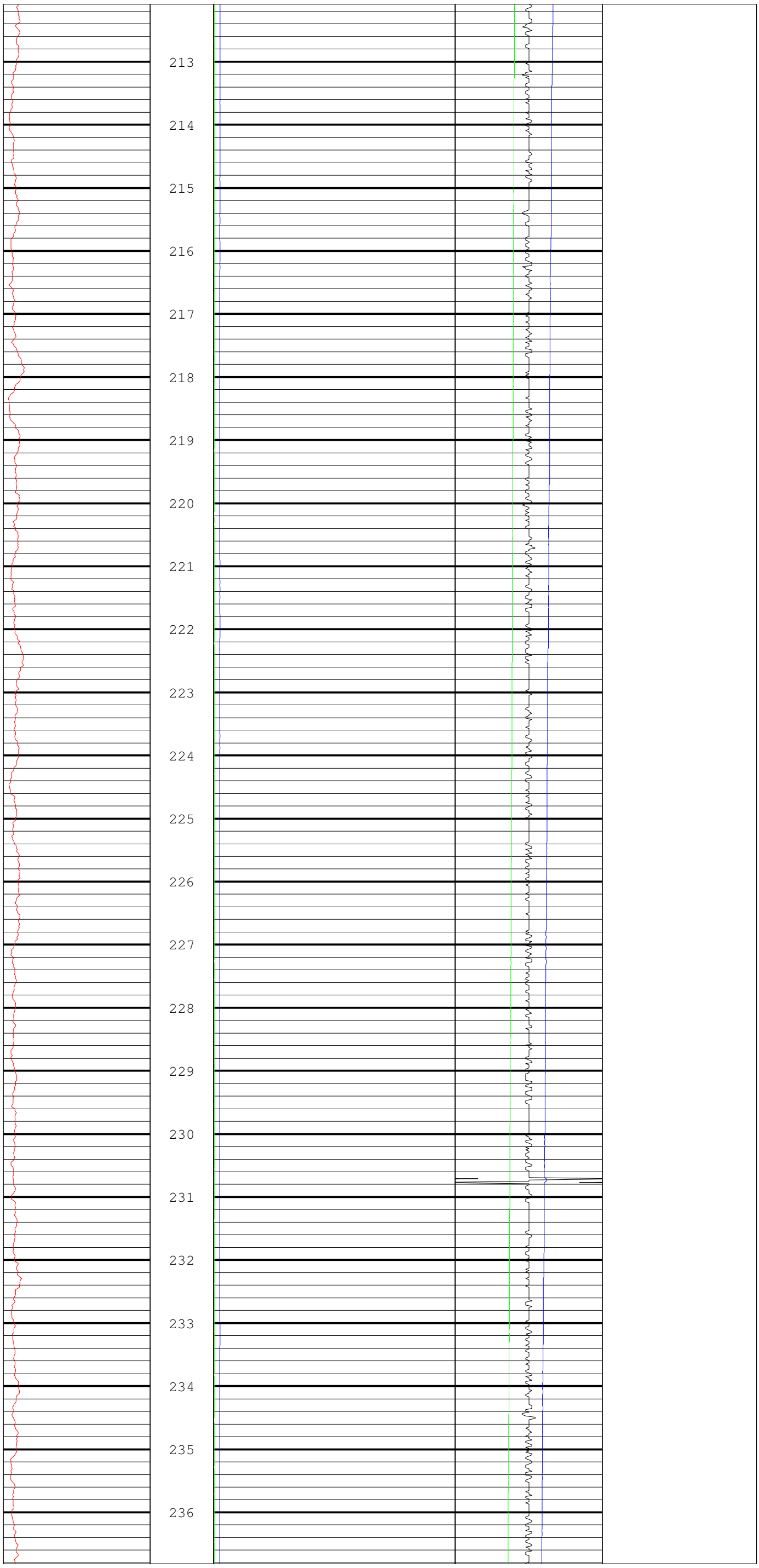
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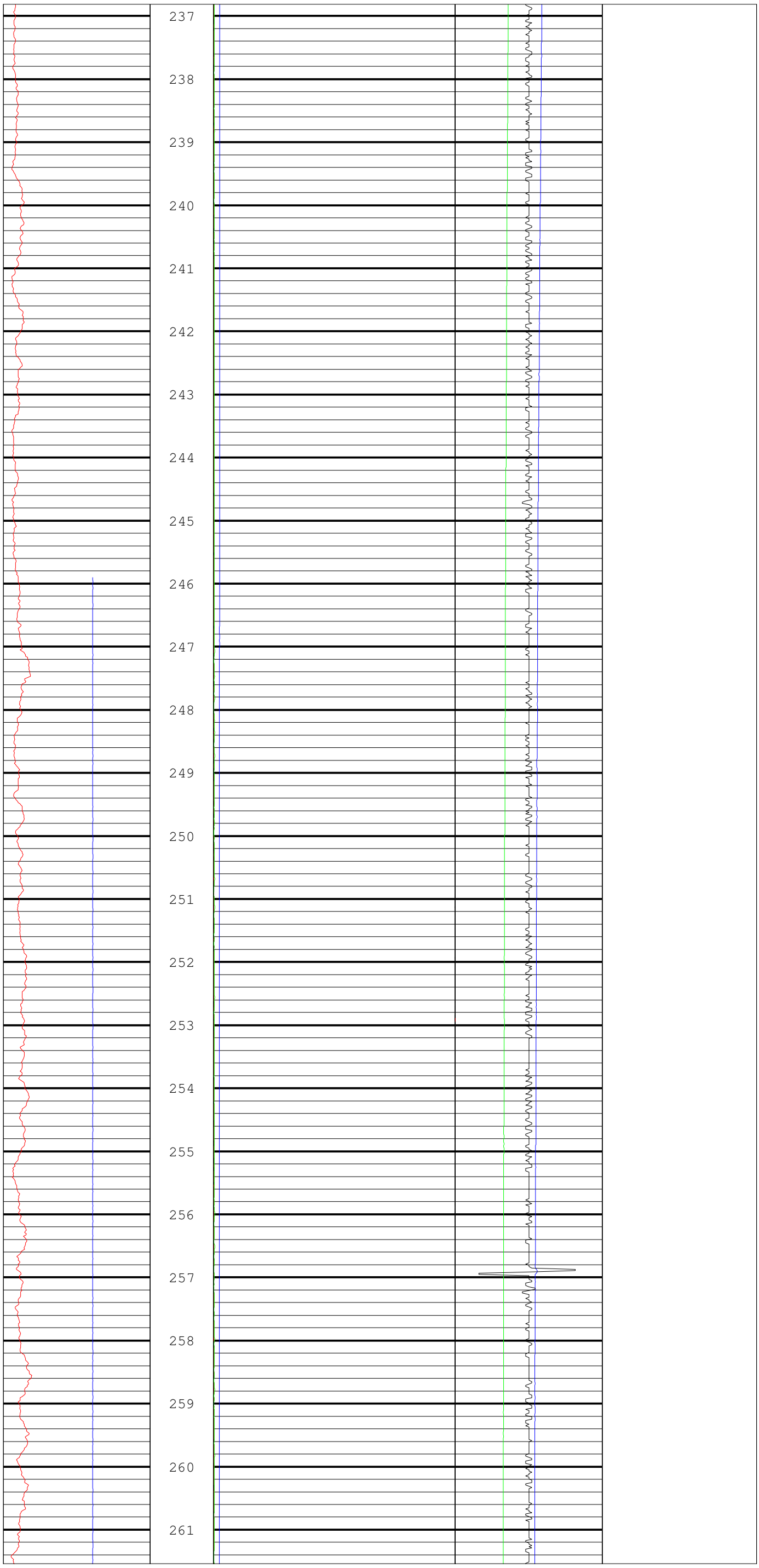
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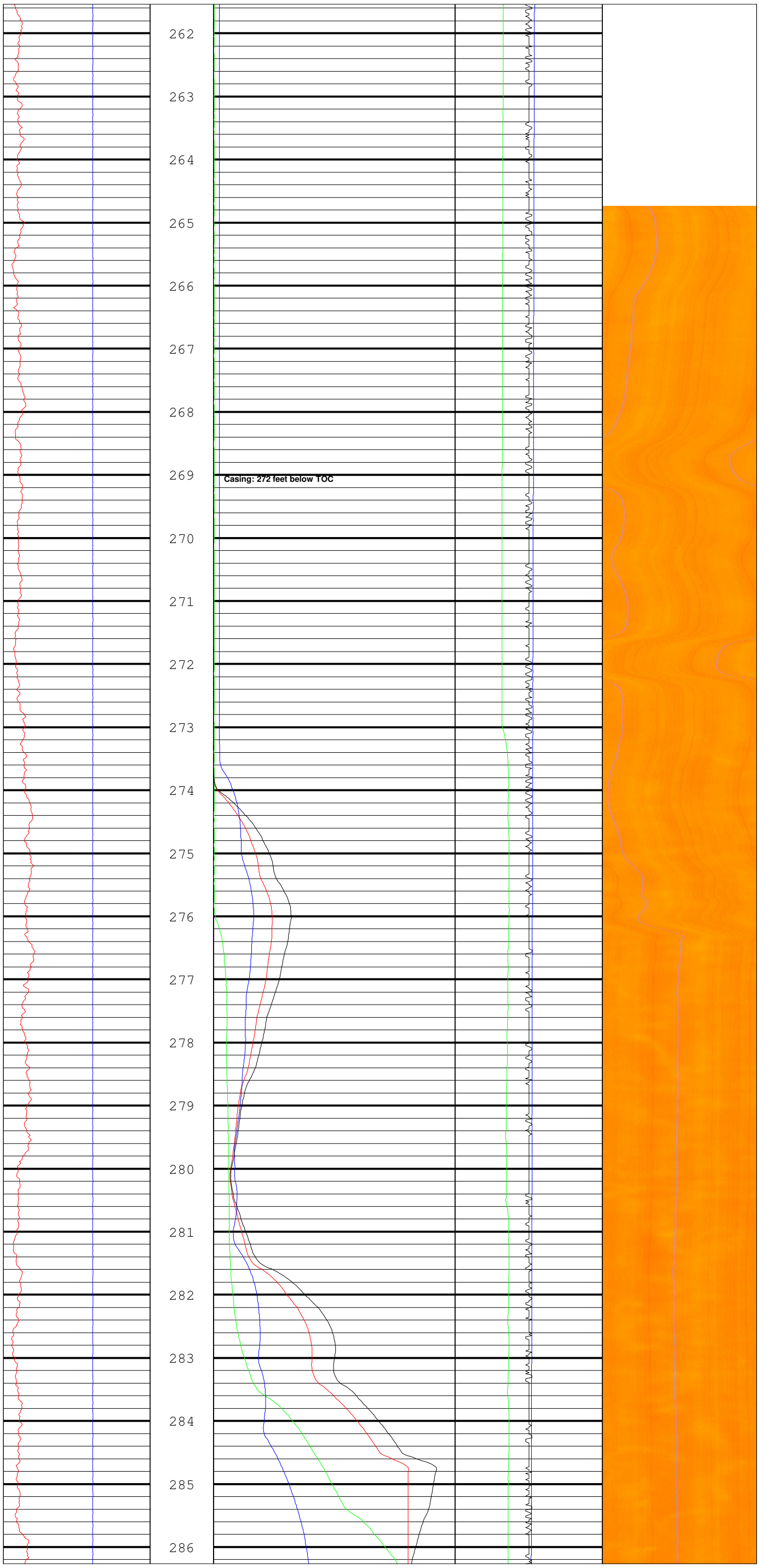
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Casing: 272 feet below TOC
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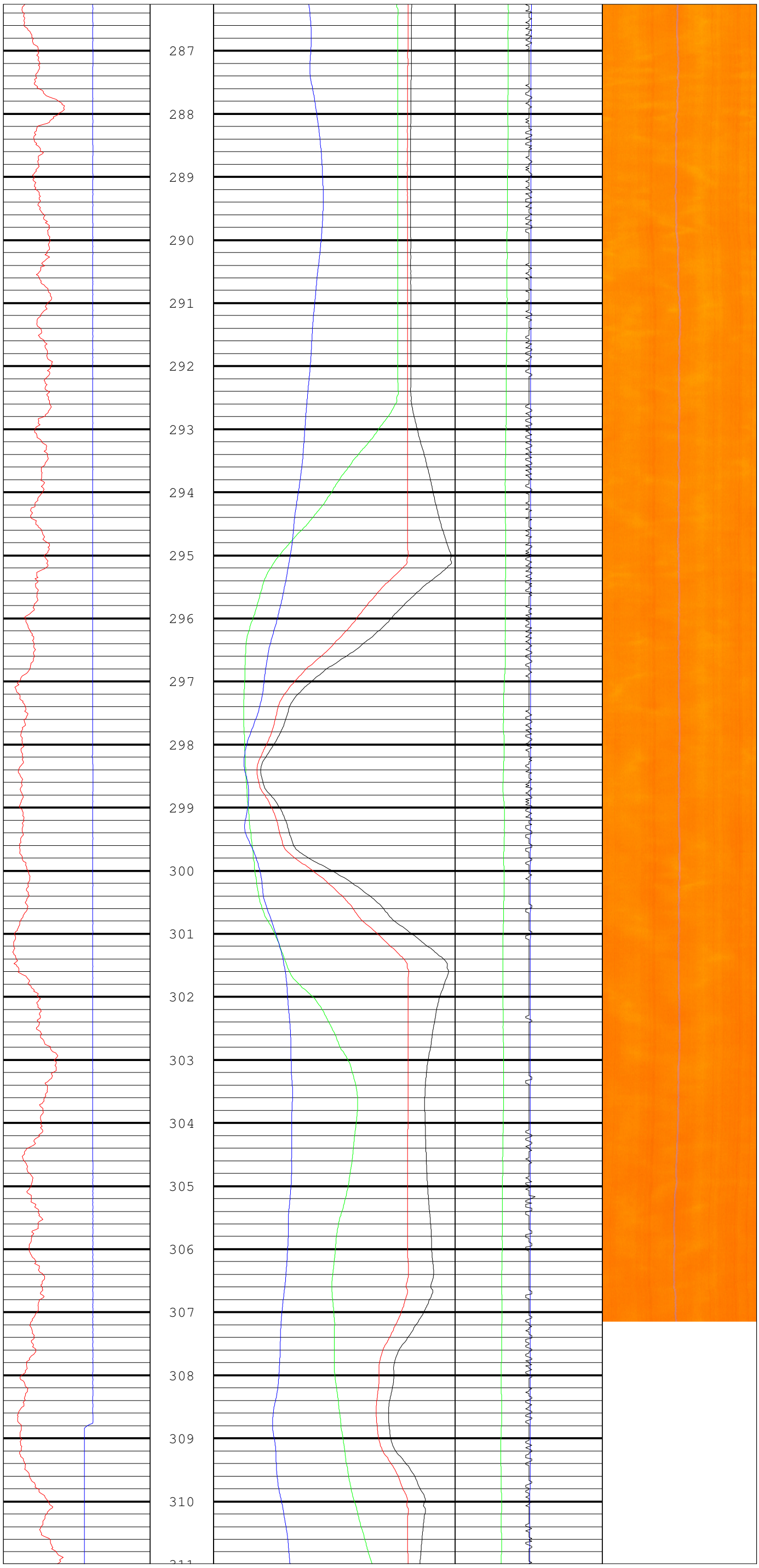
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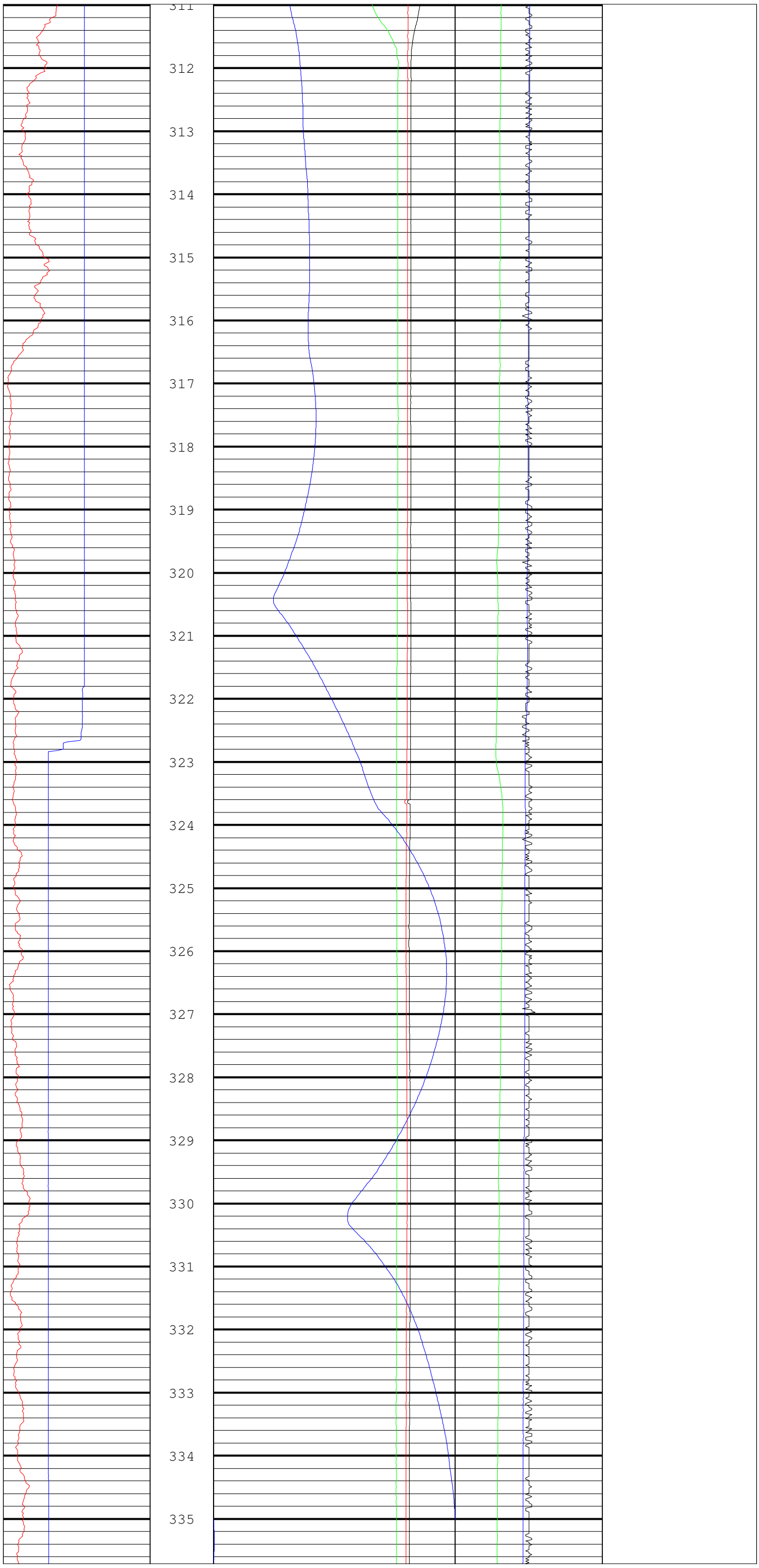
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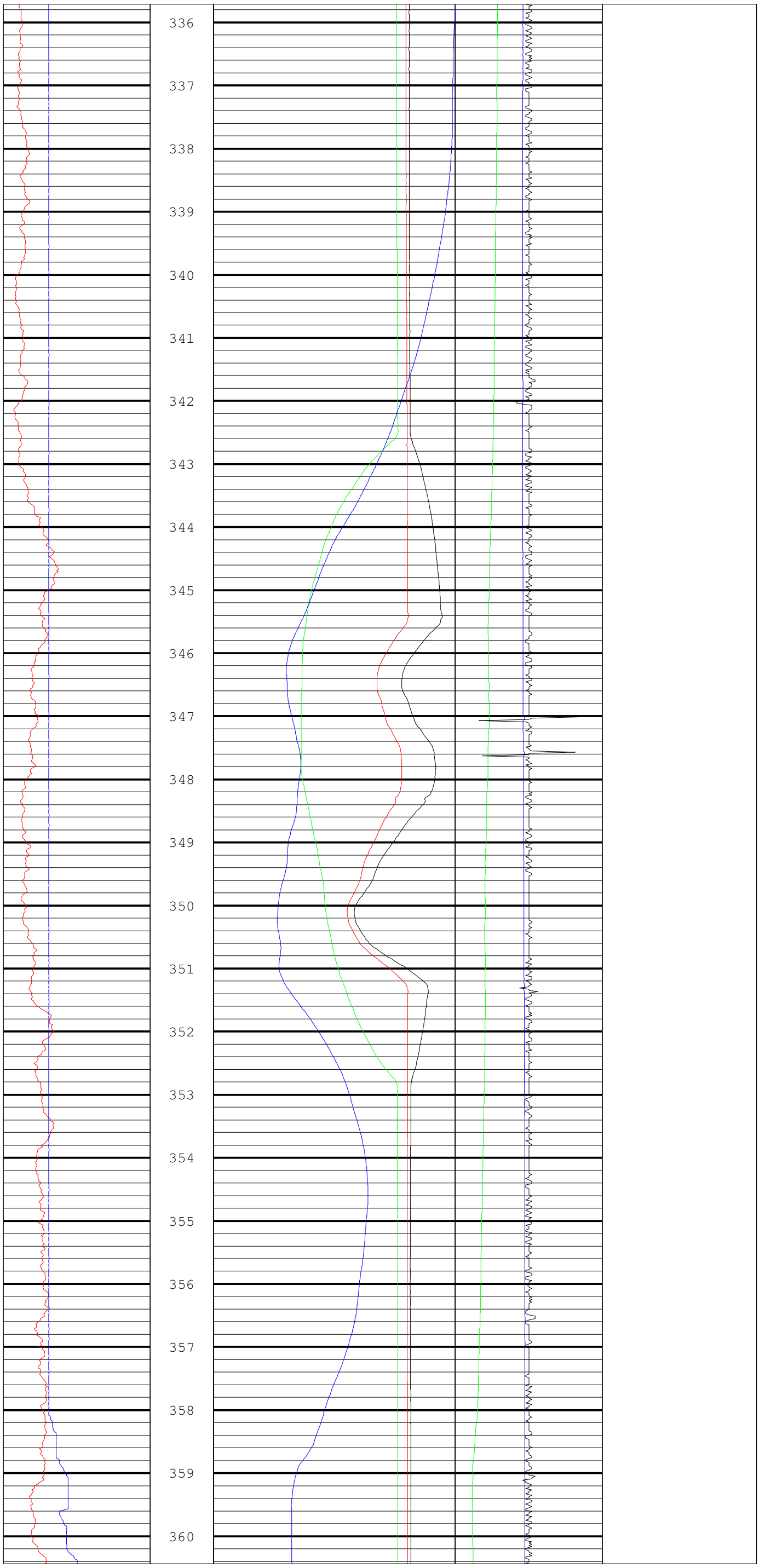
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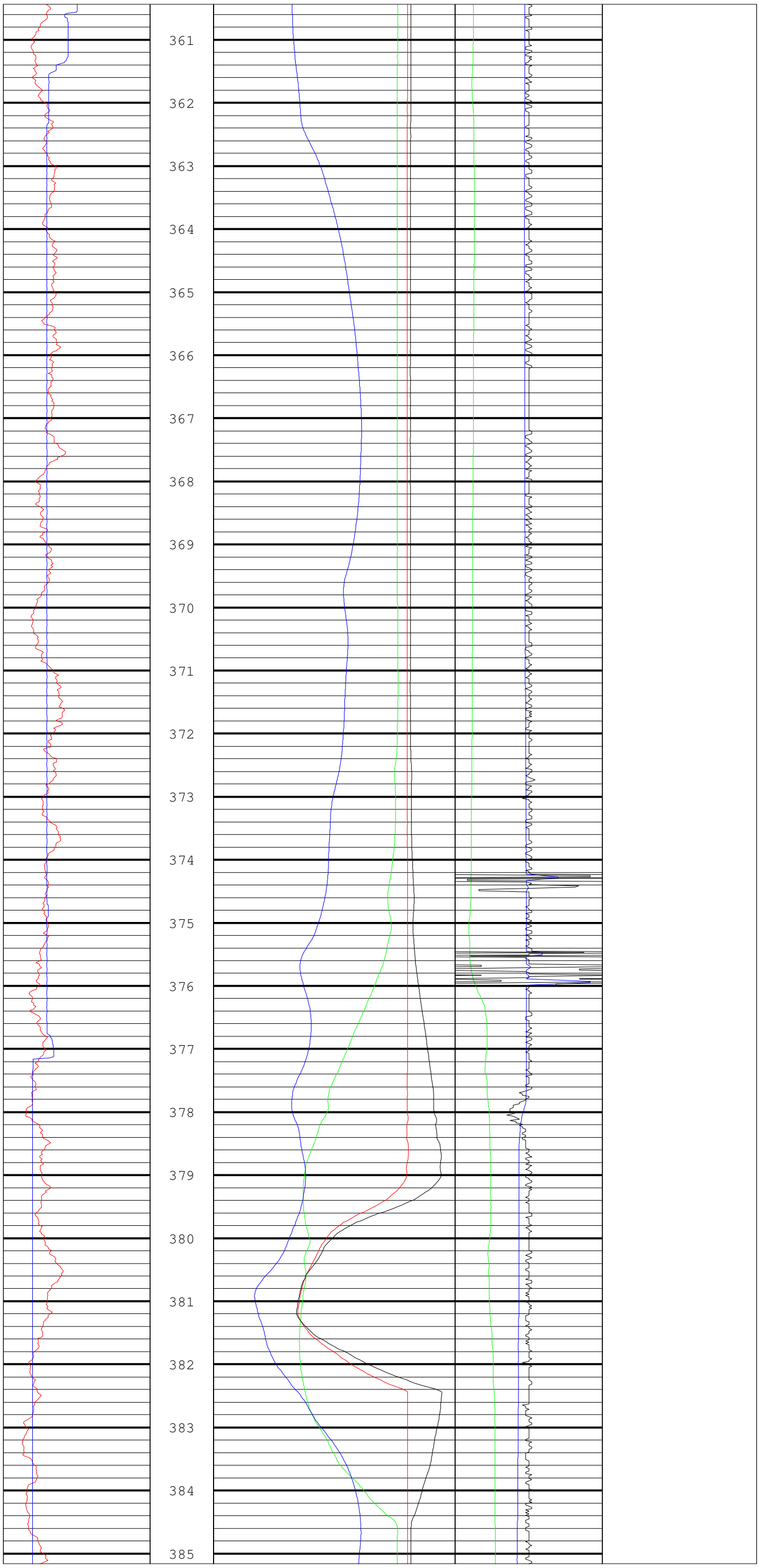
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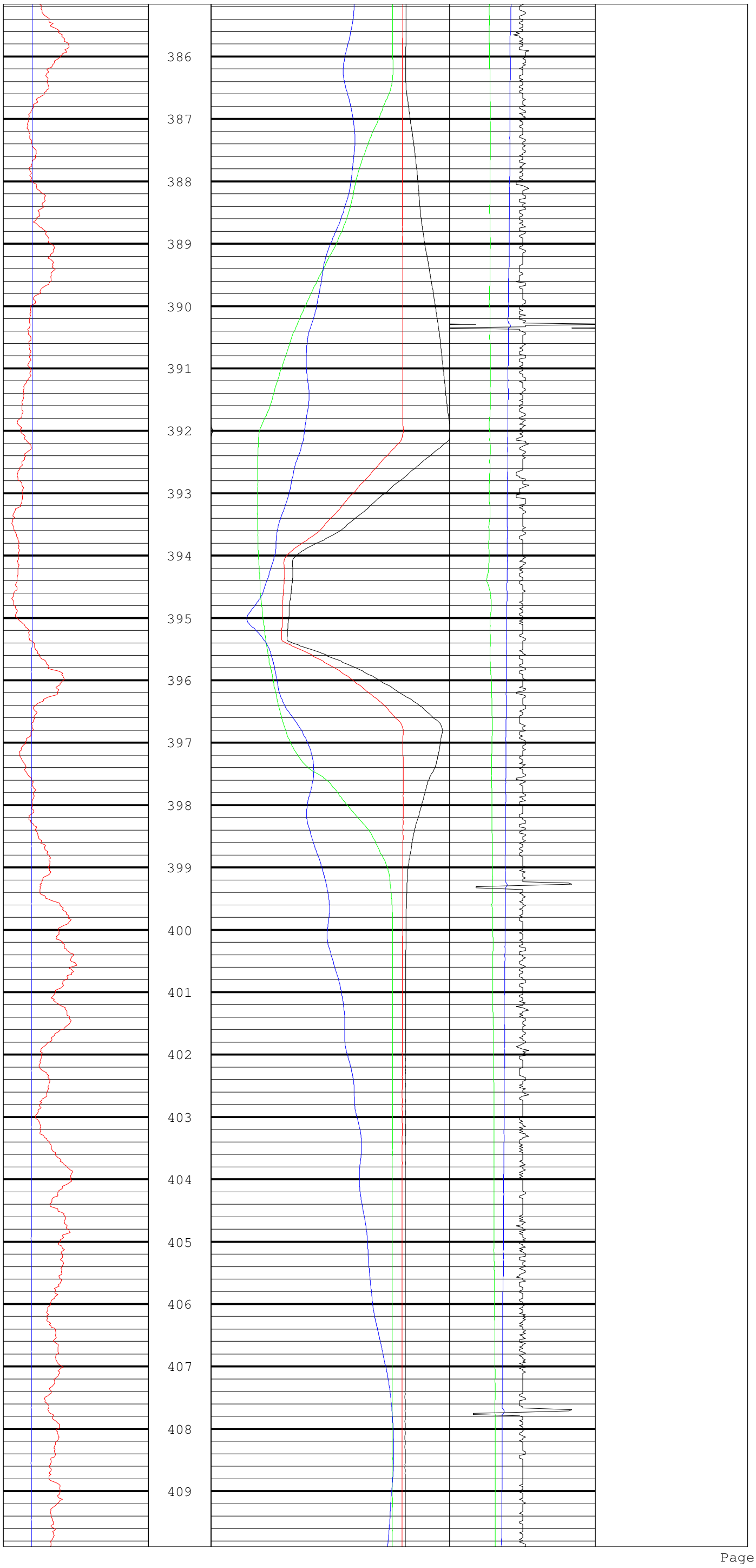
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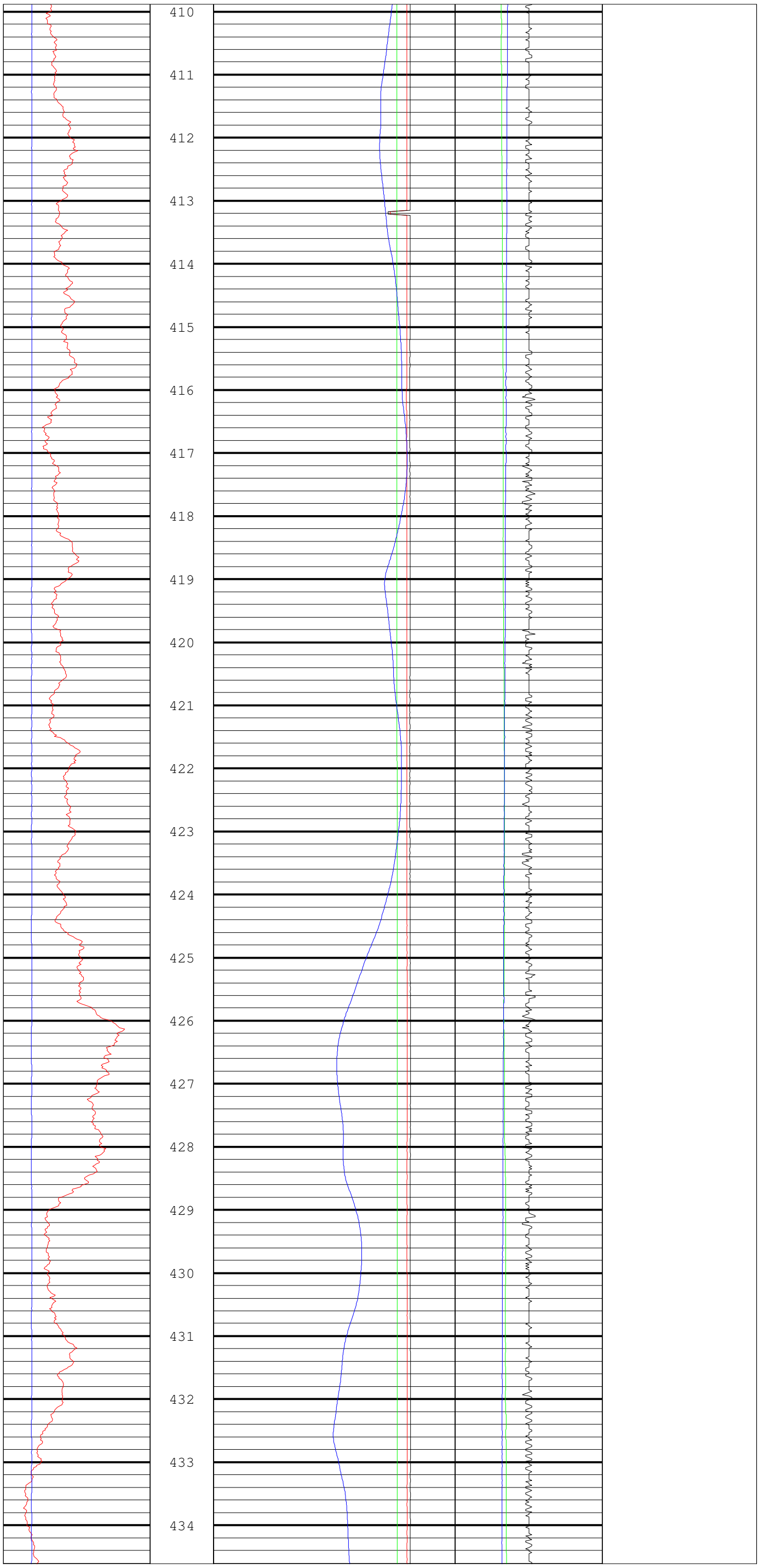
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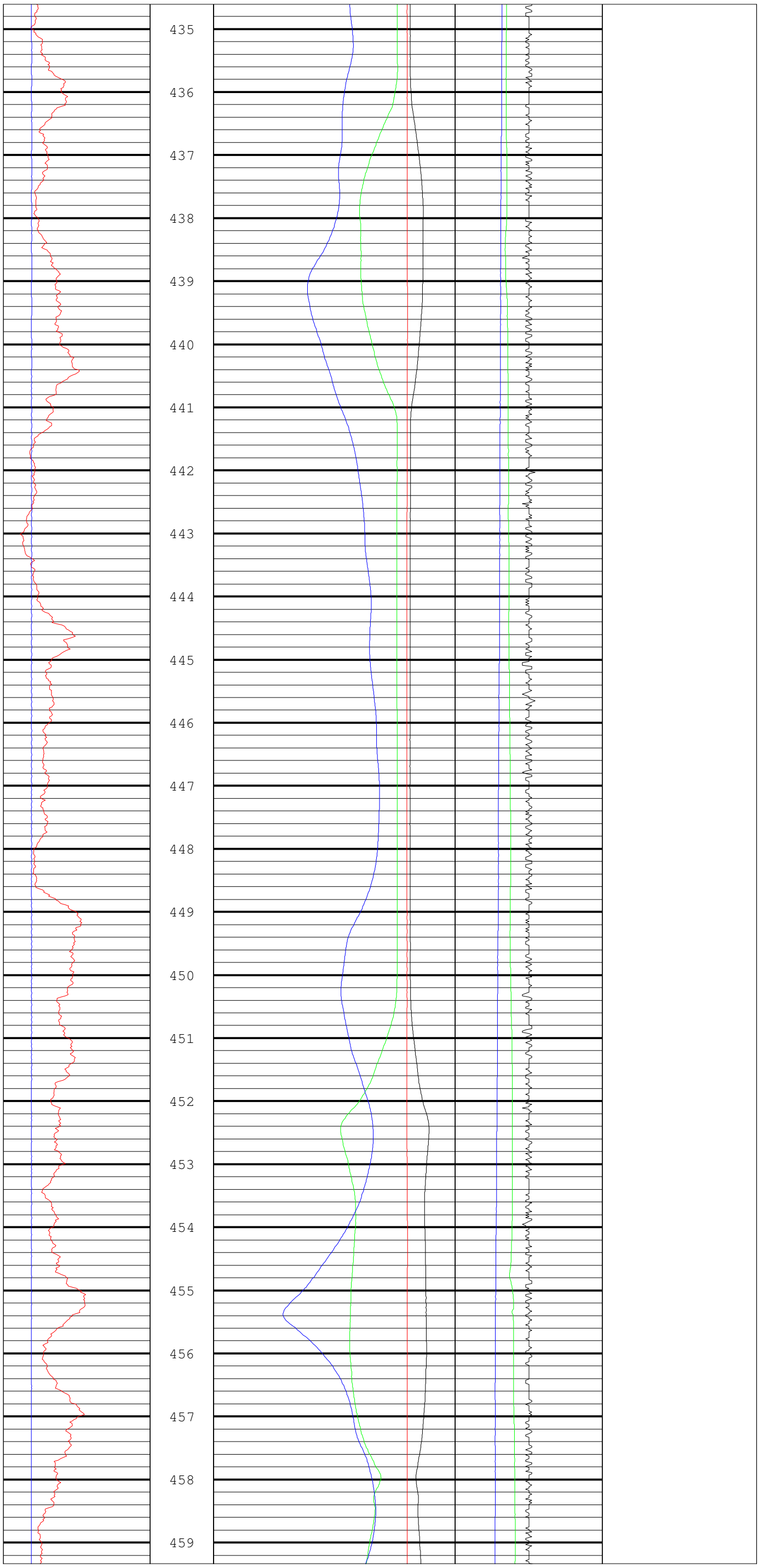
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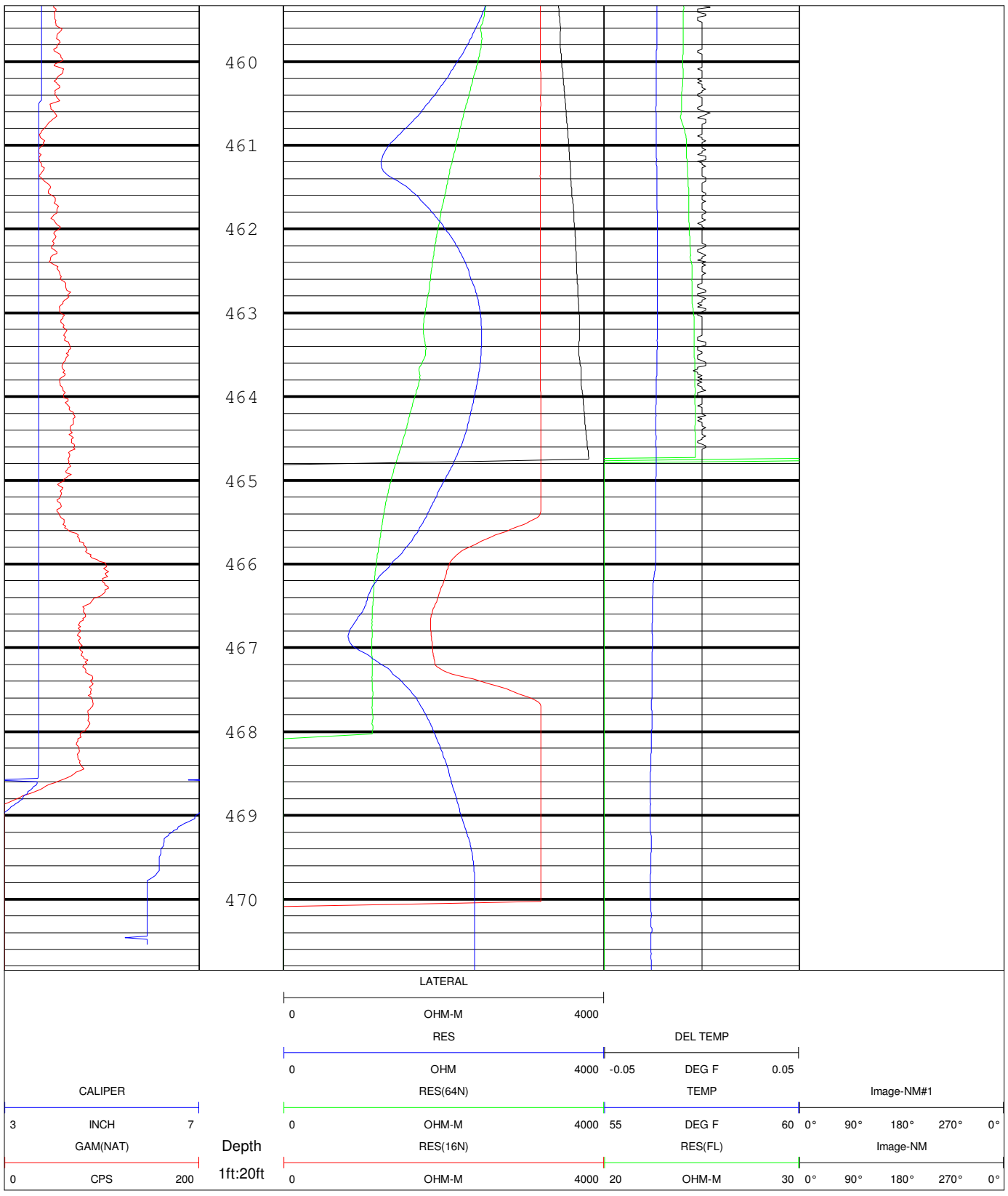
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470
LATERAL
0
OHM-M
4000
RES
0
OHM
4000
DEL TEMP
-0.05
DEG F
0.05
CALIPER
3
INCH
7
RES(64N)
0
OHM-M
4000
TEMP
55
DEG F
60
Image-NM#1
0°
90°
180°
270°
0°
GAM(NAT)
0
CPS
200
Depth
1ft:20ft
RES(16N)
0
OHM-M
4000
RES(FL)
20
OHM-M
30
Image-NM
0°
90°
180°
270°
0°

ADVANCED GEOLOGICAL SERVICES

3 Mystic Lane
Malvern. PA 19355
610-722-5500
610-722-0250 fax

Multitool, Caliper, Optical Televiewer, Flow Logs

CO:Groundwater Sciences, Inc.
WELL: MW137A
RD: Eden Road
CITY/STATE:York, PA
SITE:Harley Davidson
FILING No

CLIENT Groundwater Sciences, Inc.
WELL ID MW137A
SITE Harley Davidson
CITY York **STATE** PA

LOCATION
SEC TWP RGE

OTHER SERVICES

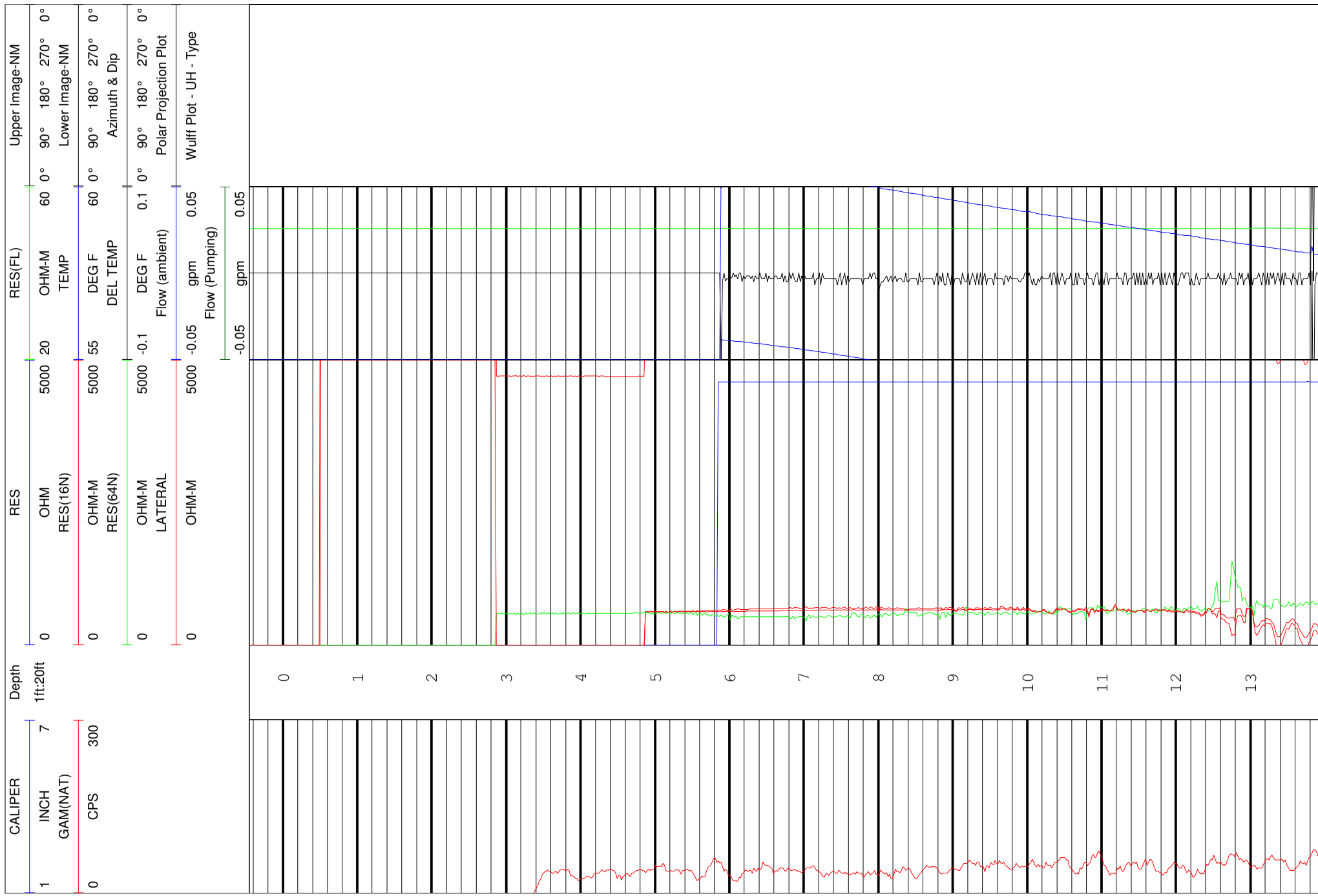
PERMANENT DATUM: ELEVATION K.B.

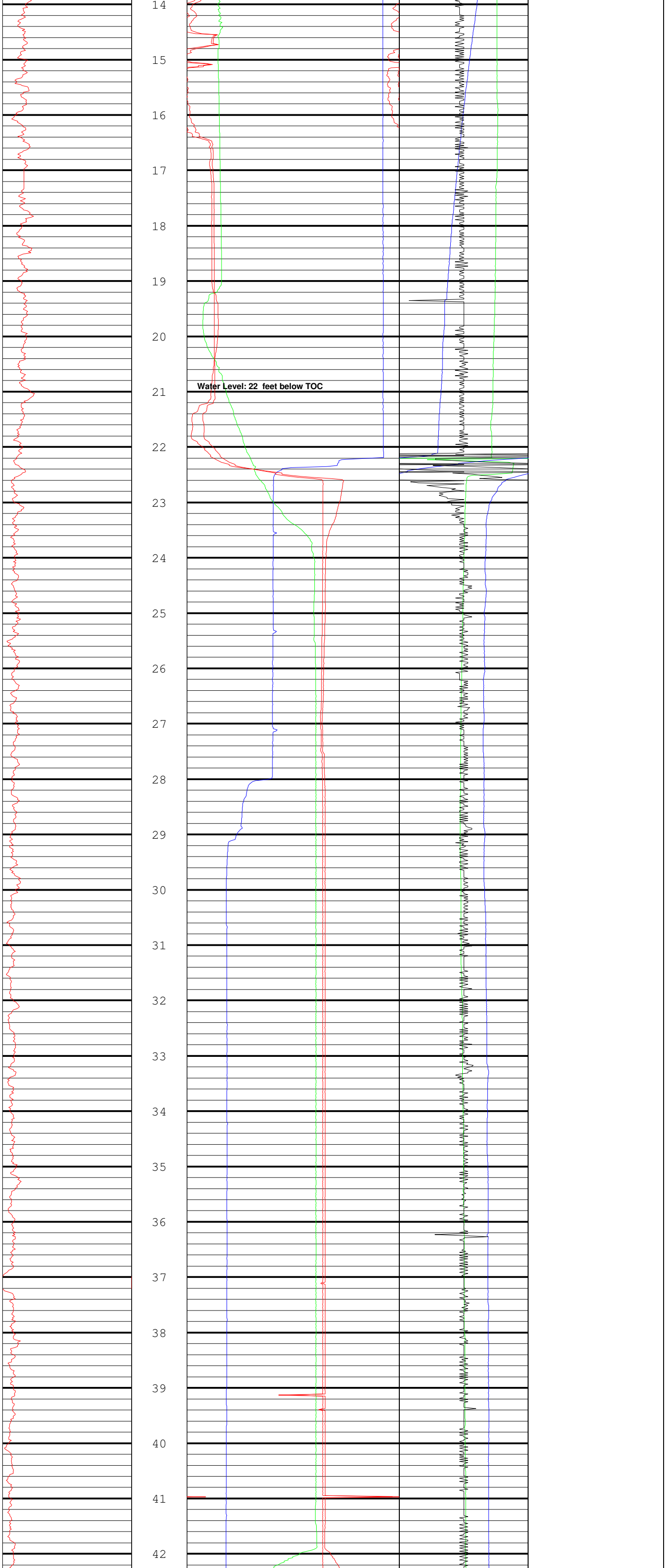
LOG MEAS. FROM: Top of Casing ABOVE PERM. DATUM D.F.

DRILLING MEAS. FROM: G.L.

DATE	June 27, 2013	TYPE FLUID IN HOLE	
RUN No	1	SALINITY	
TYPE LOG		DENSITY	
DEPTH-DRILLER		LEVEL	
DEPTH-LOGGER		MAX. REC. TEMP.	
BTM LOGGED INTERVAL	450 feet		
TOP LOGGED INTERVAL	5 feet		
OPERATING RIG TIME			
RECORDED BY	P. Miller		
WITNESSED BY			

REMARKS:

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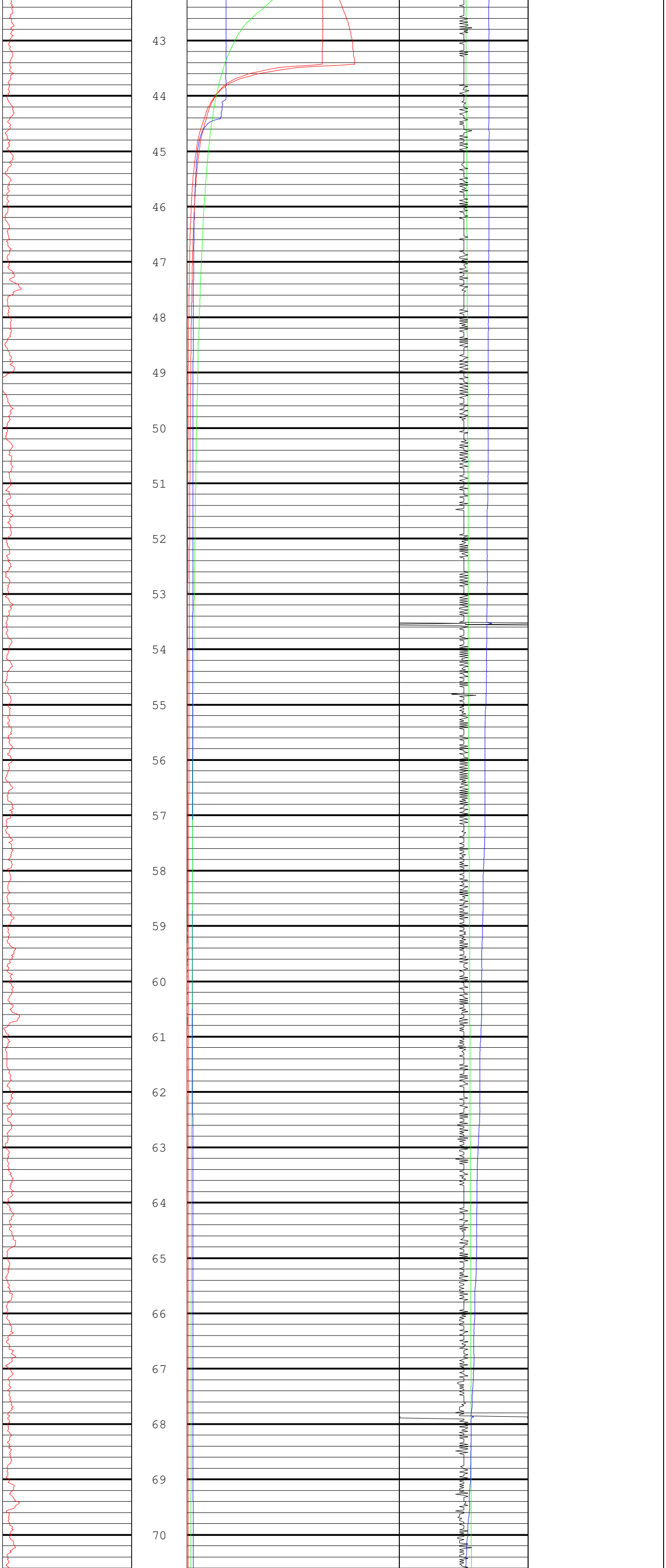
Water Level: 22 feet below TOC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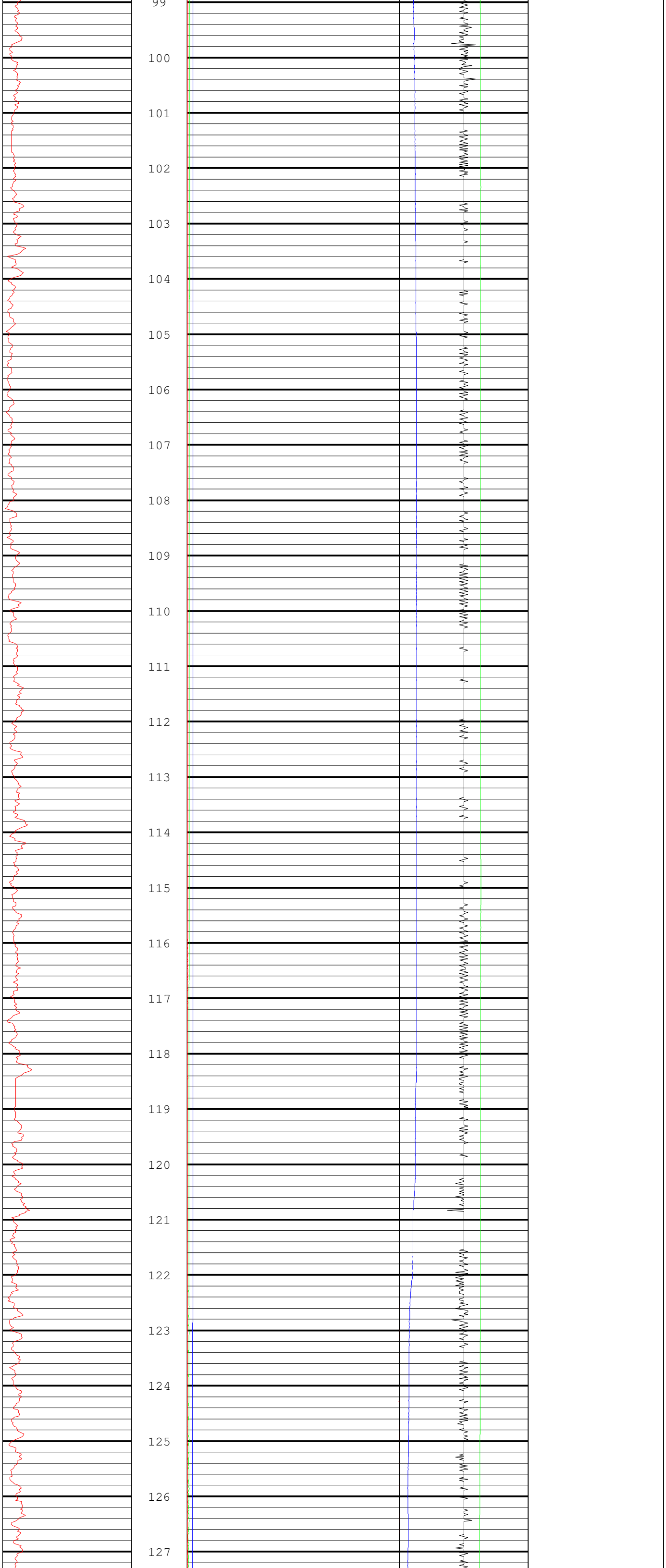
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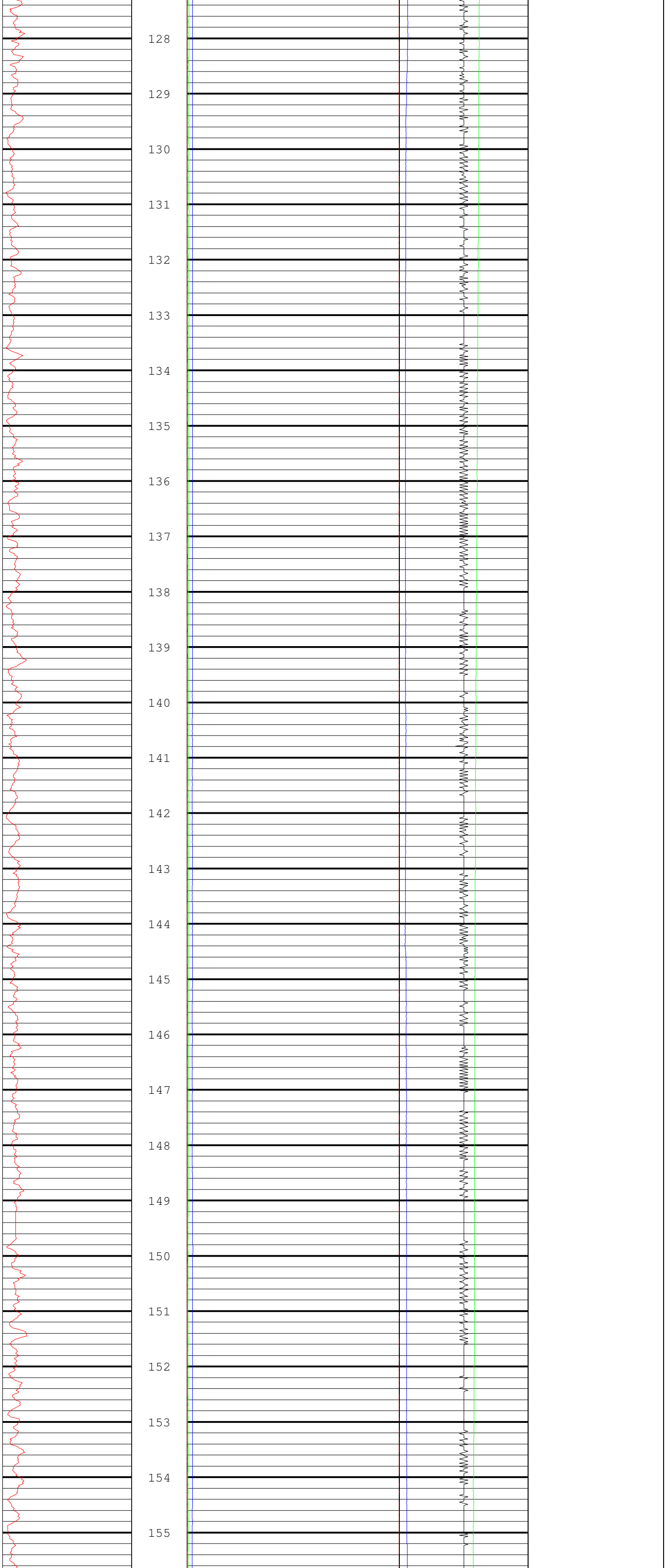
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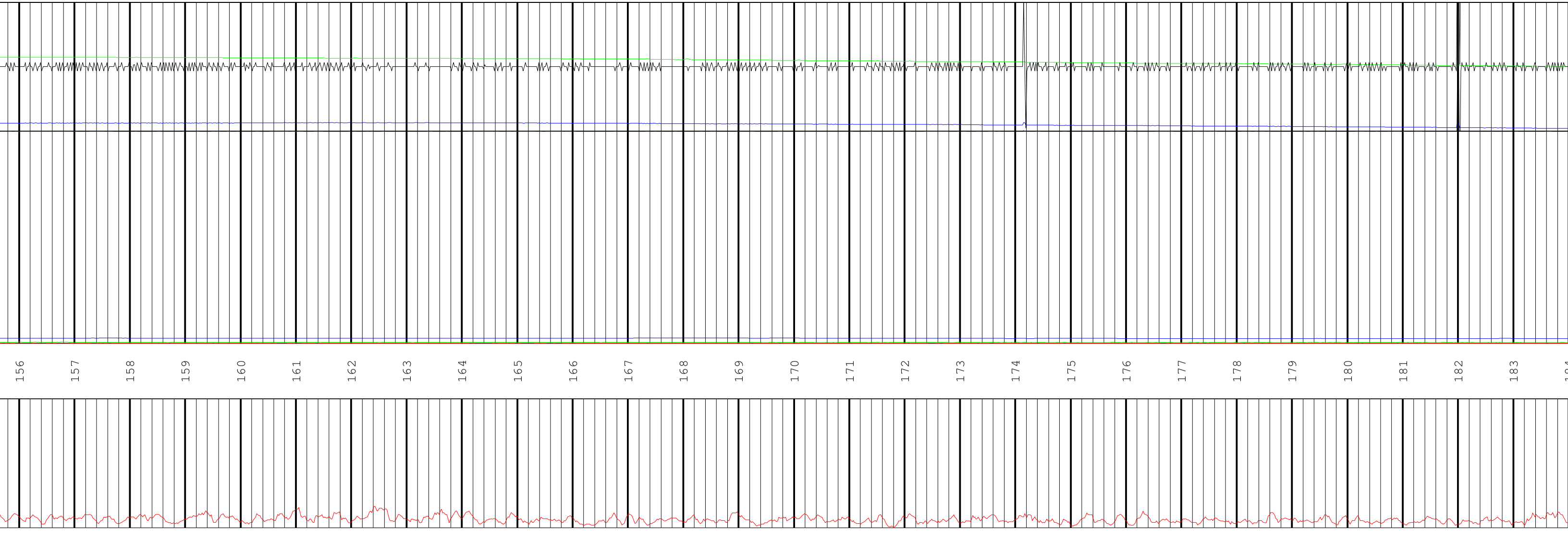
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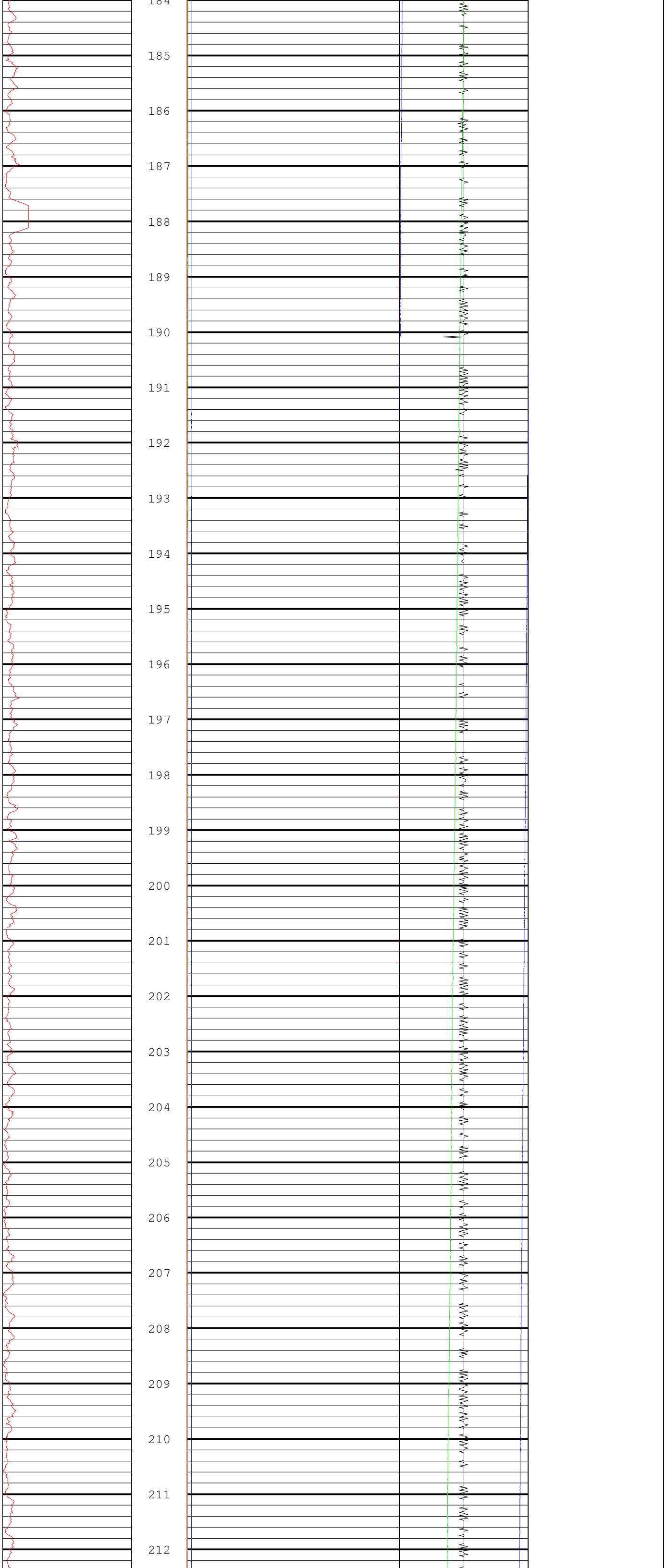
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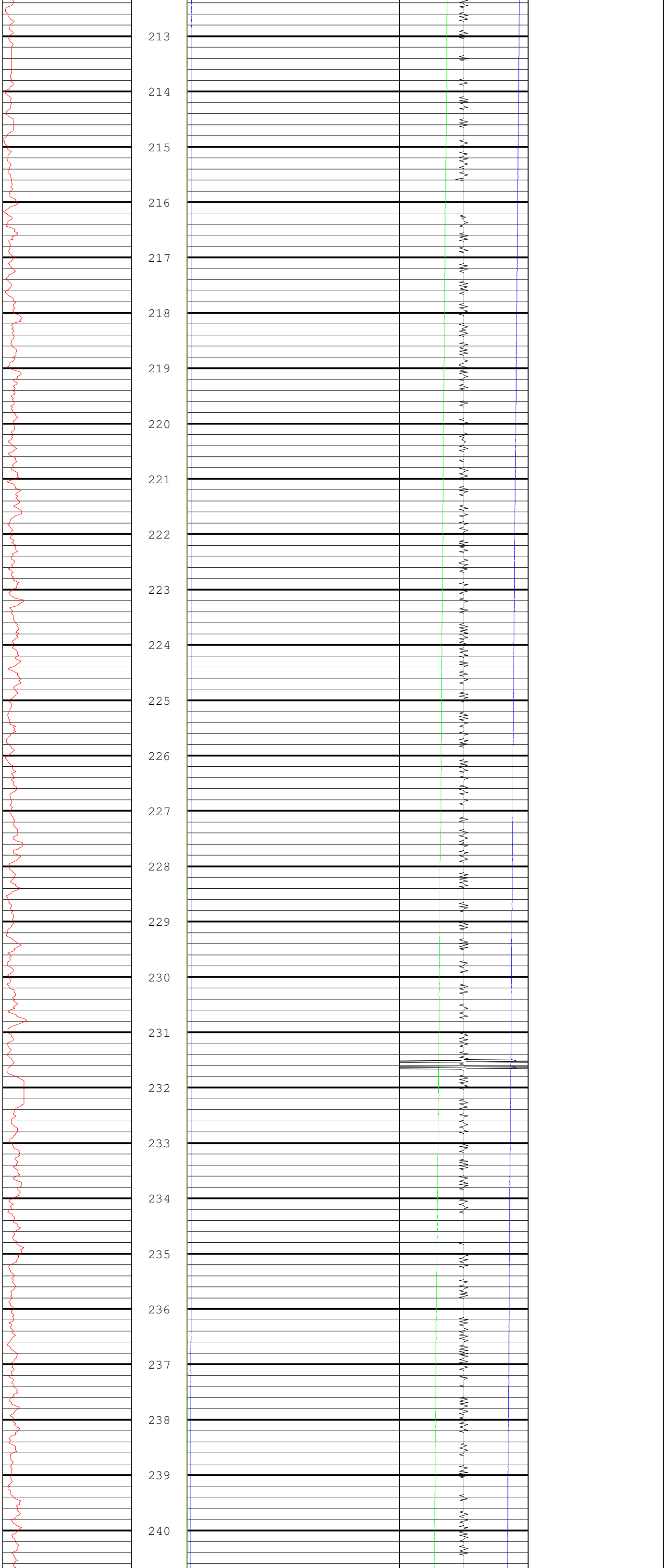
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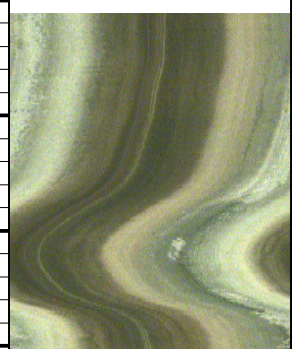

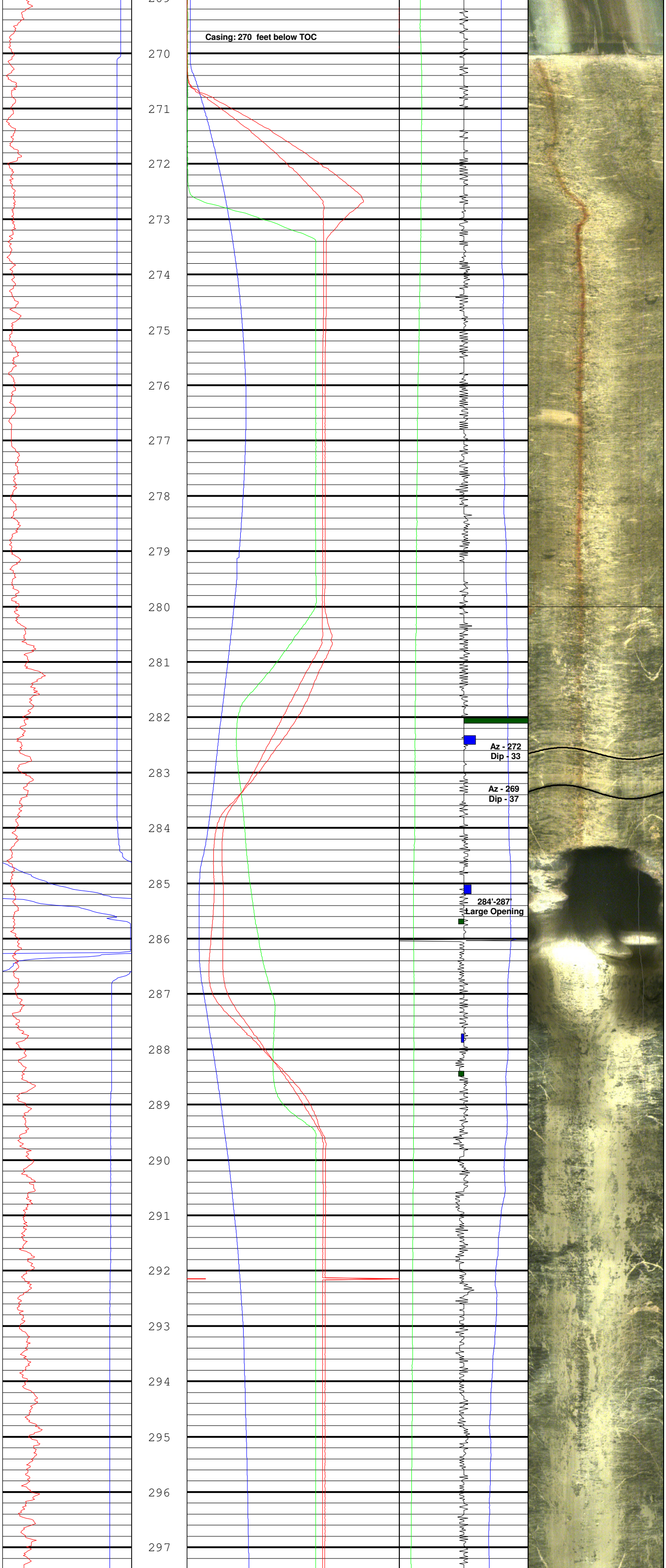
Casing: 270 feet below TOC
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Az - 272
Dip - 33
Az - 269
Dip - 37
284'-287'
Large Opening

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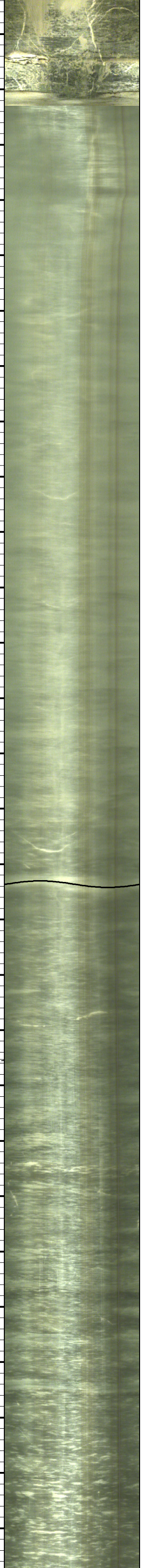
299'
Change in
Hole Diameter

Az - 275
Dip - 20



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Az - 274
Dip - 9

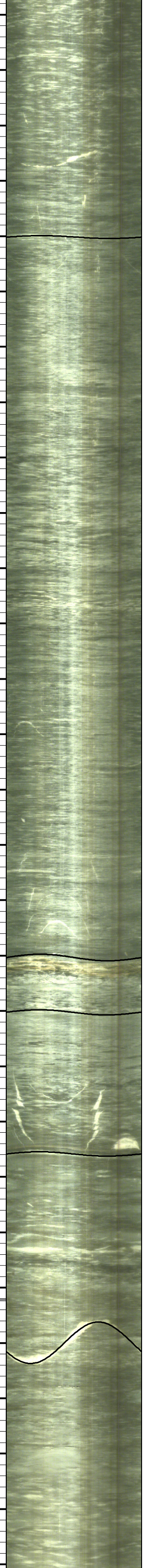
Az - 270
Dip - 20

Az - 266
Dip - 16

345'-346'
Vert Fract.
Calcite-filled

Az - 268
Dip - 14

Az - 65
Dip - 66



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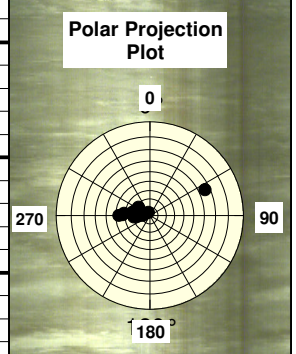
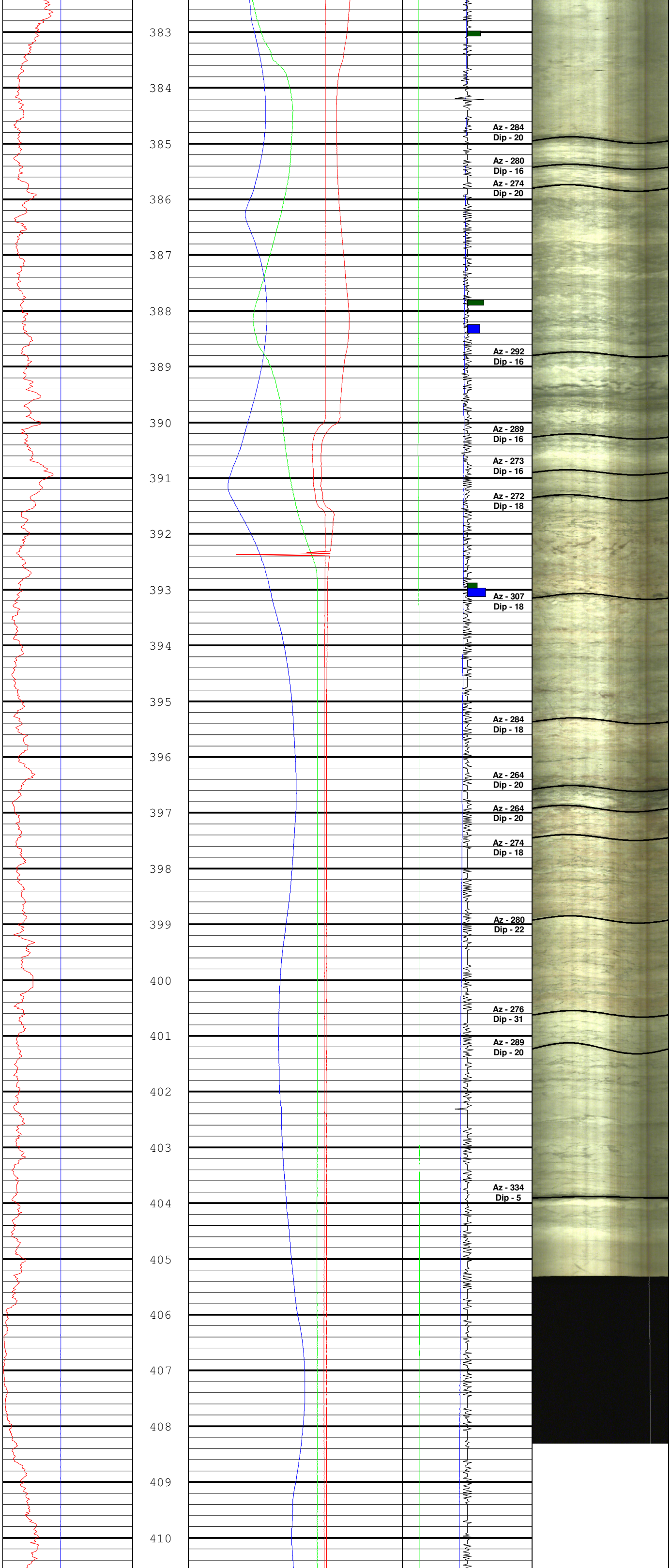


Az - 280
Dip - 16

Az - 275
Dip - 16

Az - 294
Dip - 14

Az - 291
Dip - 18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Az - 284
Dip - 20
Az - 280
Dip - 16
Az - 274
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Az - 276
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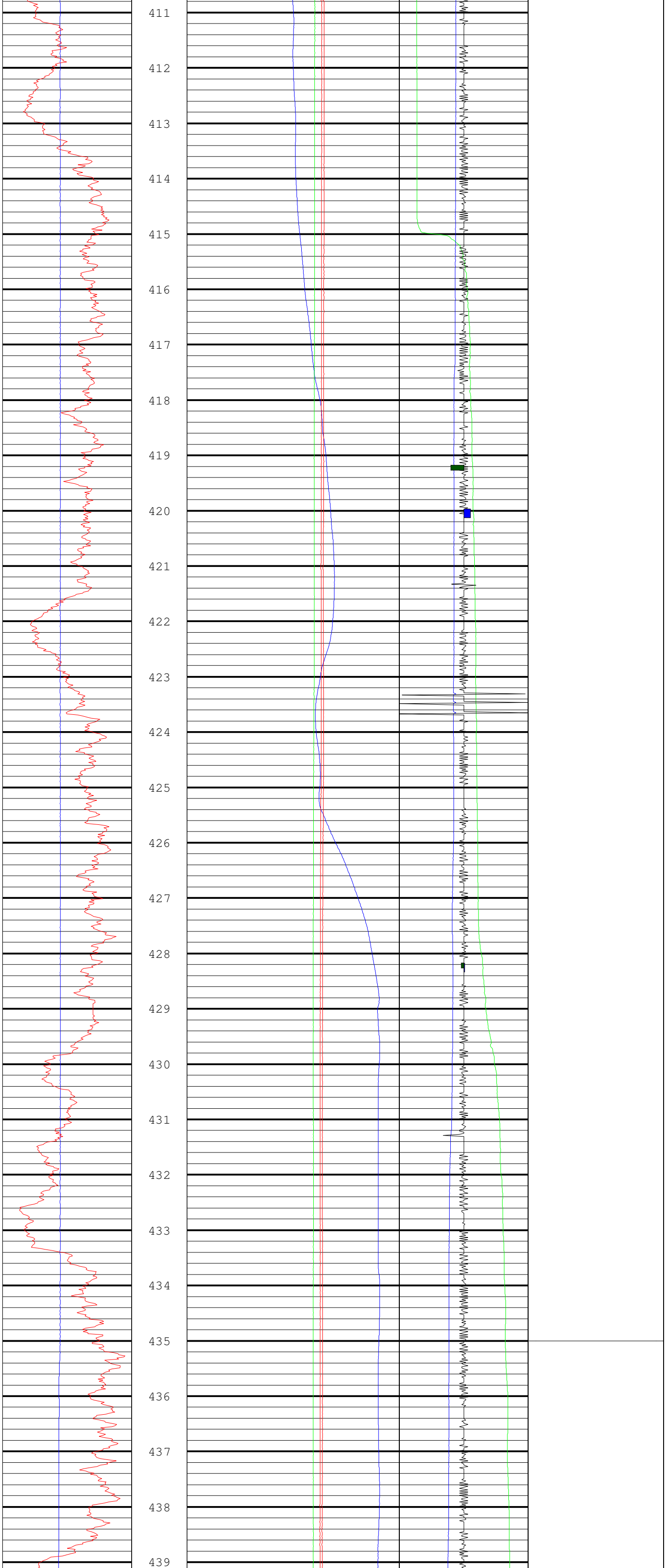
Az - 289
Dip - 20
Az - 334
Dip - 5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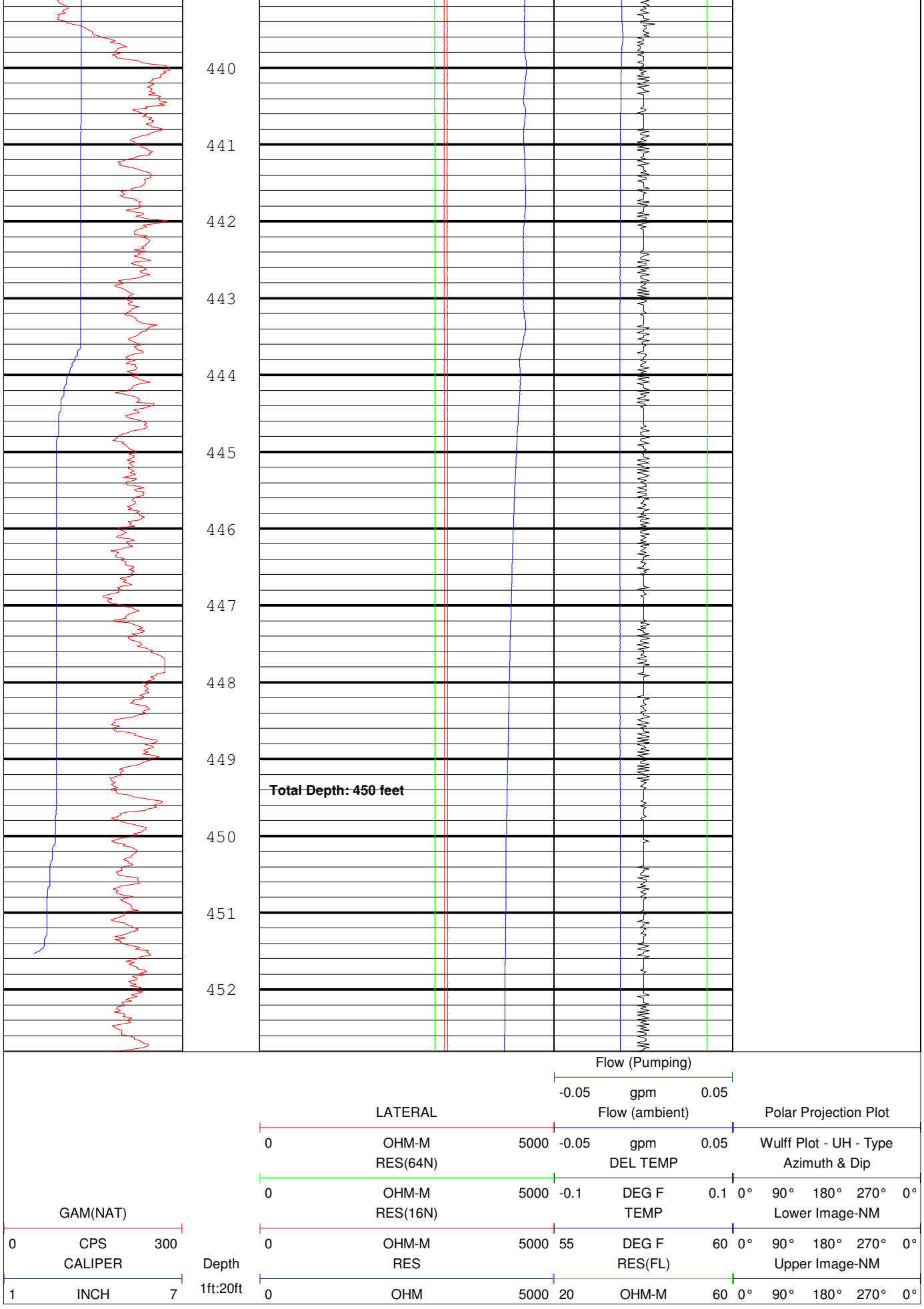
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Total Depth: 450 feet
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Flow (Pumping)
-0.05 gpm 0.05
LATERAL
Flow (ambient)
Polar Projection Plot
0 OHM-M 5000
-0.05 gpm 0.05
Wulff Plot - UH - Type
RES(64N)
DEL TEMP
Azimuth & Dip
0 OHM-M 5000
-0.1 DEG F 0.1
0° 90° 180° 270° 0°
GAM(NAT)
RES(16N)
TEMP
Lower Image-NM
0 CPS 300
0 OHM-M 5000
55 DEG F 60
0° 90° 180° 270° 0°
CALIPER
Depth
RES
RES(FL)
Upper Image-NM
1 INCH 7
1ft:20ft
0 OHM 5000
20 OHM-M 60
0° 90° 180° 270° 0°

ADVANCED GEOLOGICAL SERVICES

3 Mystic Lane
Malvern, PA 19355
610-722-5500
610-722-0250 fax

Multitool, Caliper, Optical Televiewer, Flow Logs

CO:Groundwater Sciences, Inc.
WELL: MW139A
RD: Eden Road
CITY/STATE:York, PA
SITE:Harley Davidson
FILING No

CLIENT Groundwater Sciences, Inc.
WELL ID MW139A
SITE Harley Davidson
CITY York **STATE** PA

LOCATION

SEC TWP RGE

OTHER SERVICES

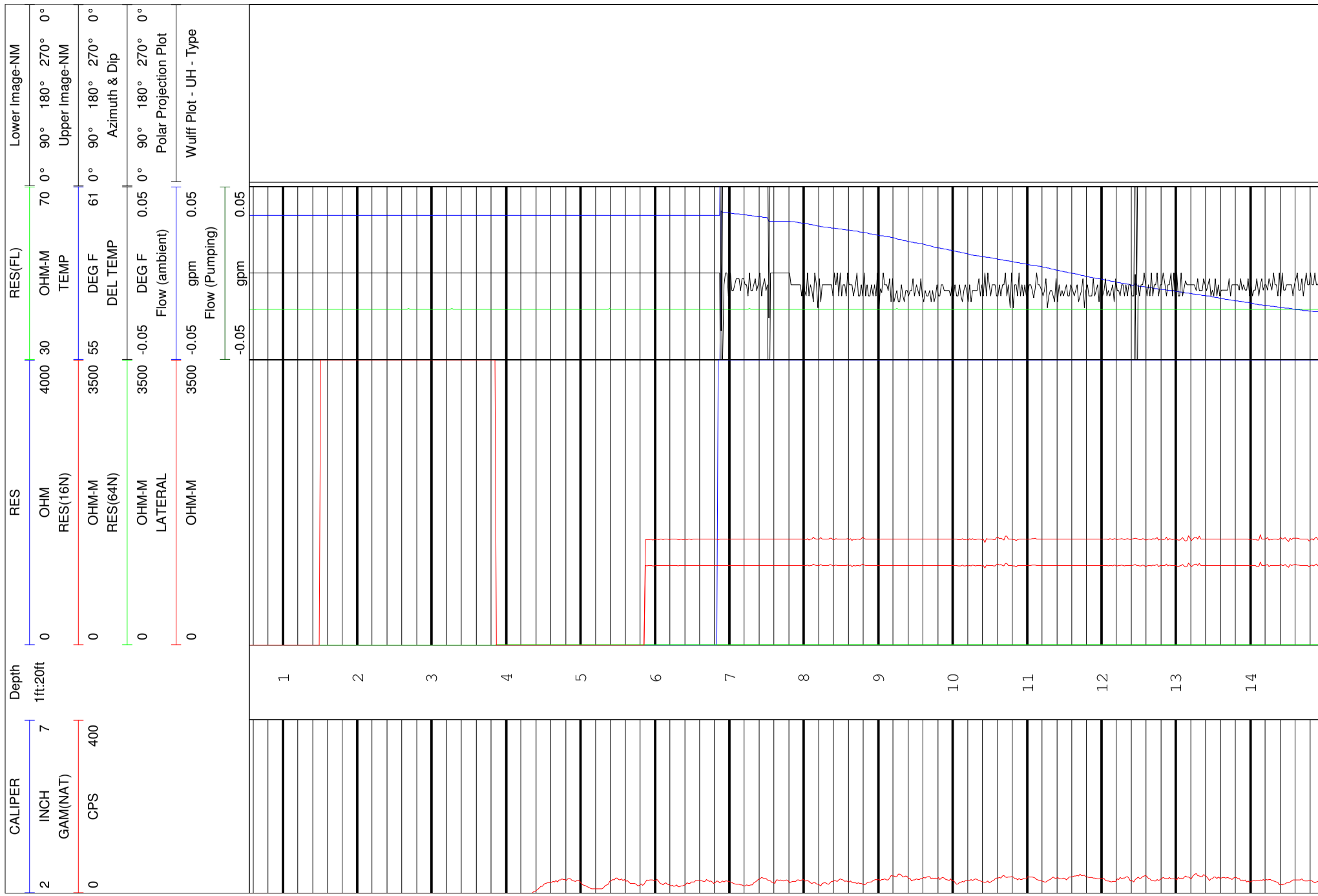
PERMANENT DATUM: ELEVATION K.B.

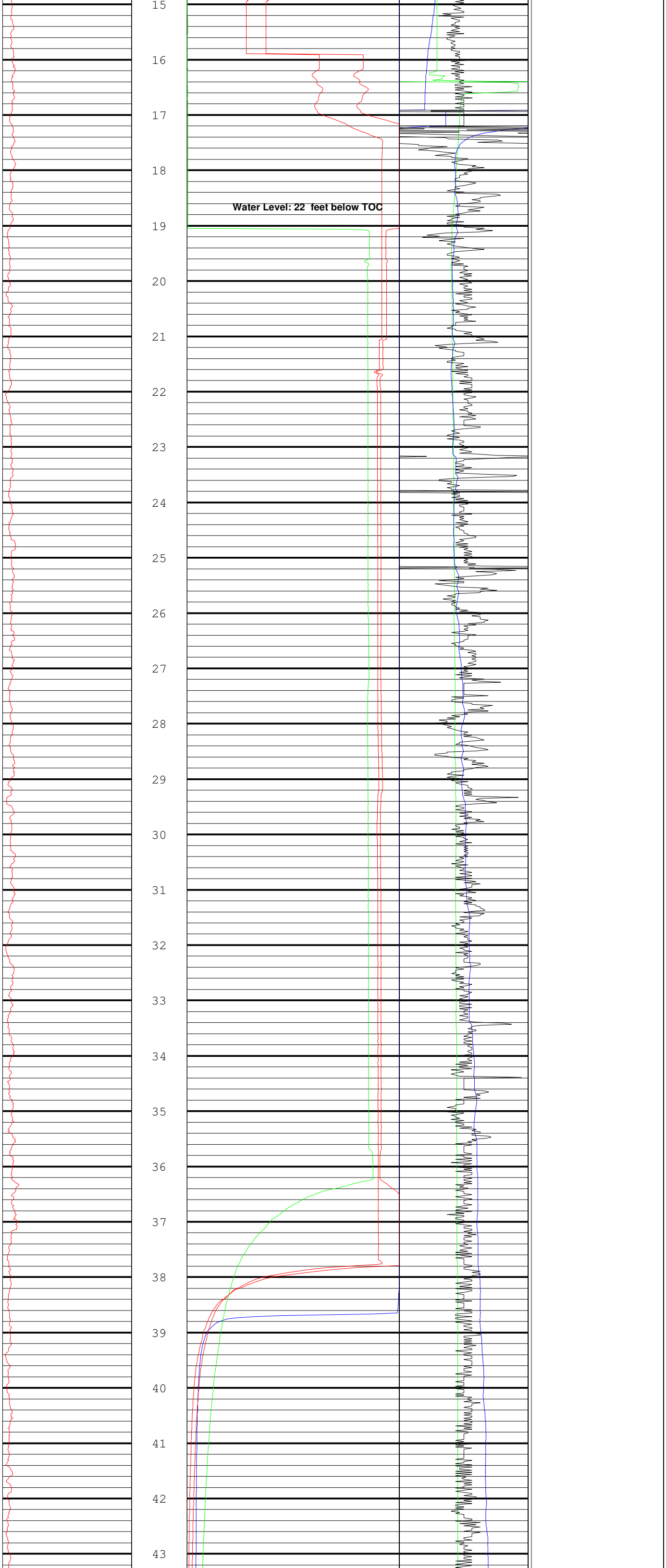
LOG MEAS. FROM: Top of Casing ABOVE PERM. DATUM D.F.

DRILLING MEAS. FROM: G.L.

DATE	June 27, 2013	TYPE FLUID IN HOLE	
RUN No	1	SALINITY	
TYPE LOG		DENSITY	
DEPTH-DRILLER		LEVEL	
DEPTH-LOGGER		MAX. REC. TEMP.	
BTM LOGGED INTERVAL	470 feet		
TOP LOGGED INTERVAL	5 feet		
OPERATING RIG TIME			
RECORDED BY	P. Miller		
WITNESSED BY			

REMARKS:

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Water Level: 22 feet below TOC
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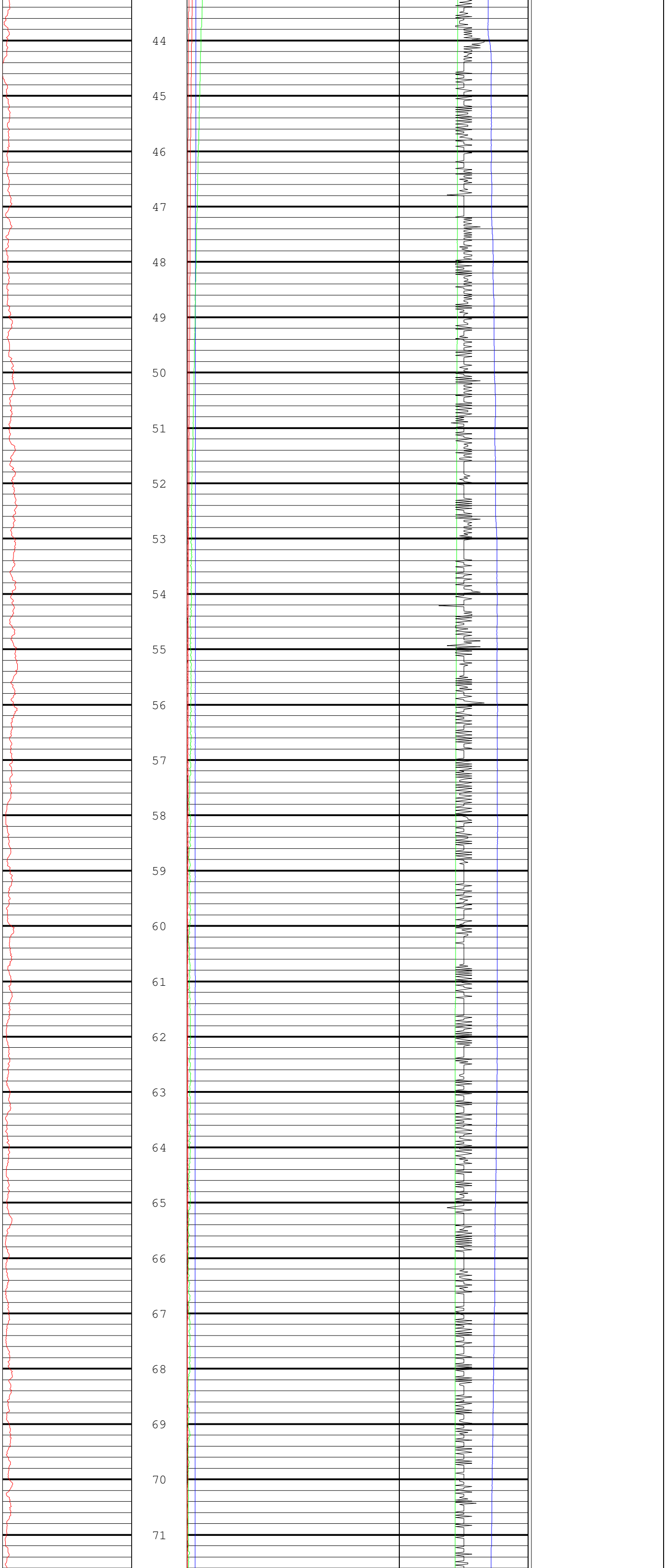
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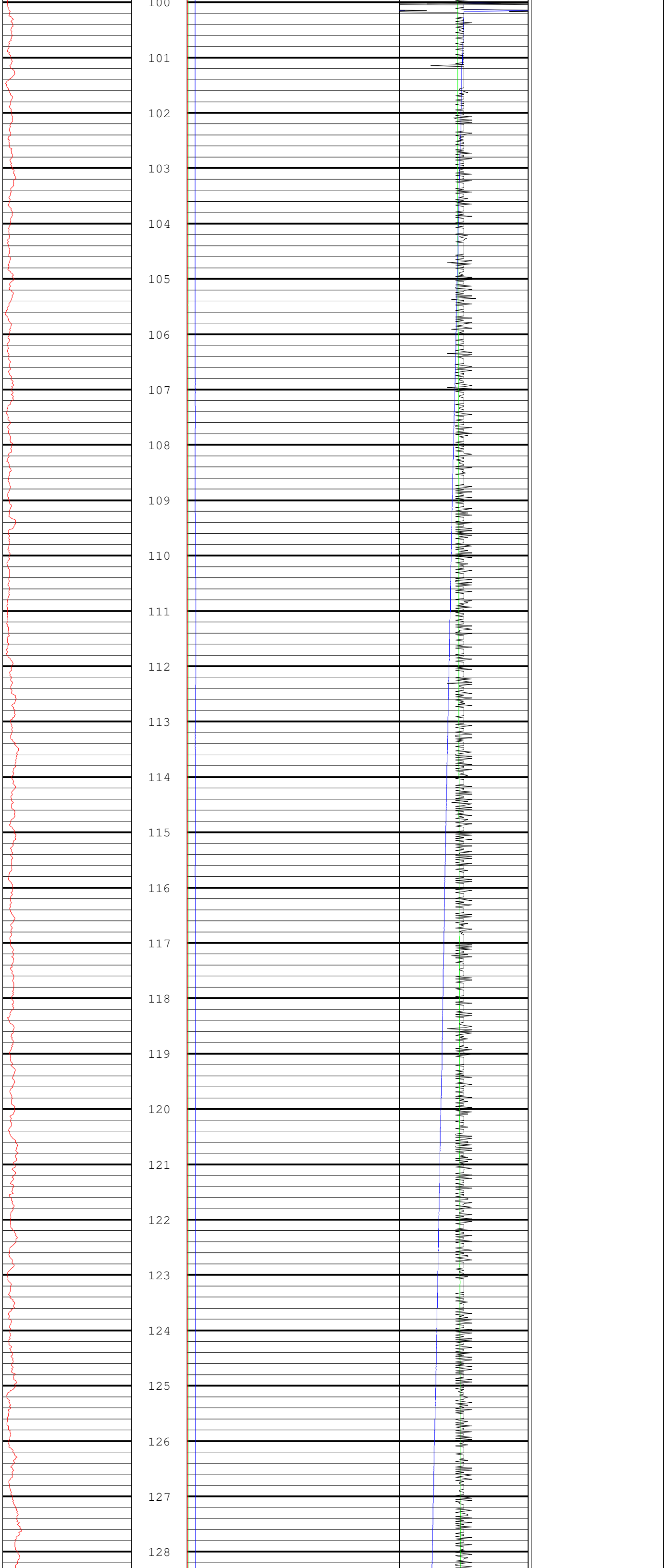
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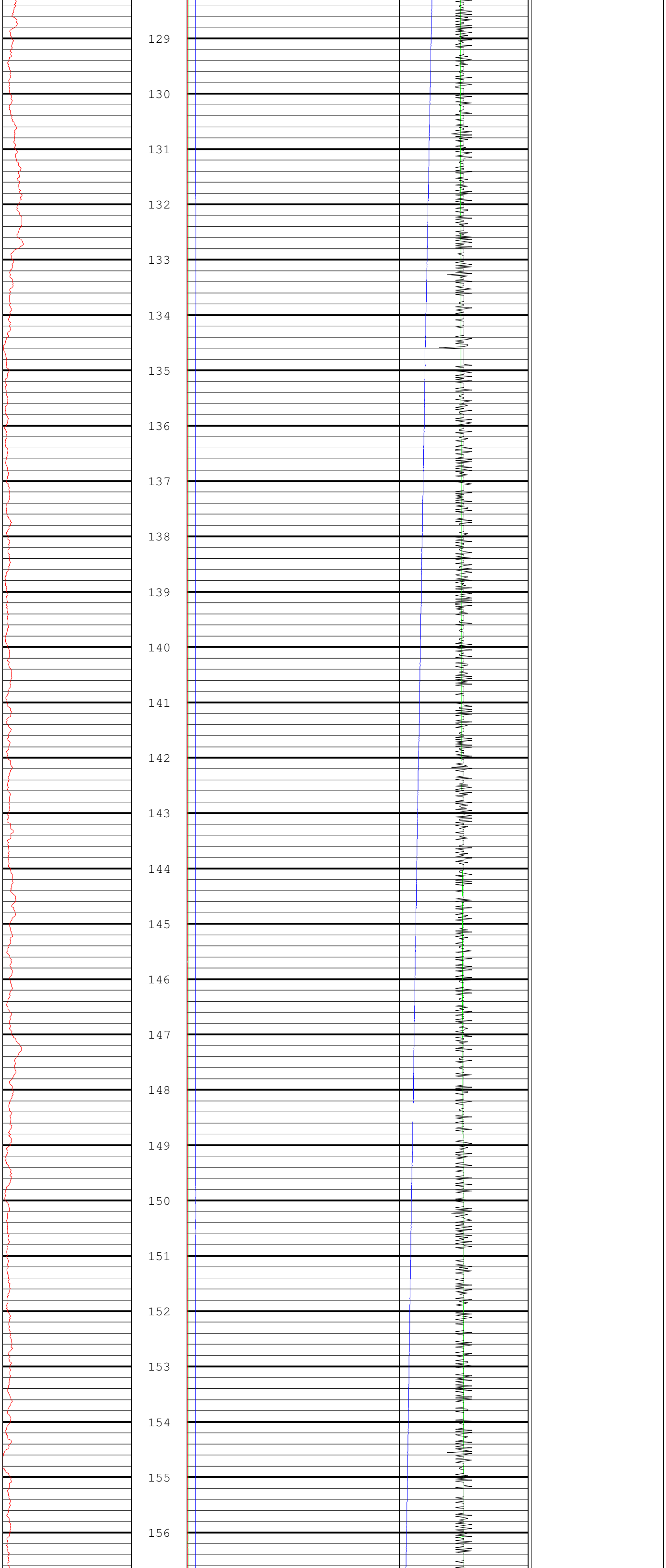
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Casing: 177 feet below TOC
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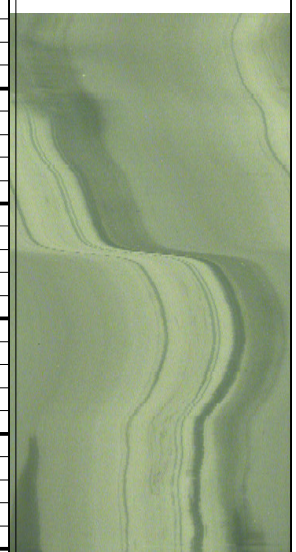
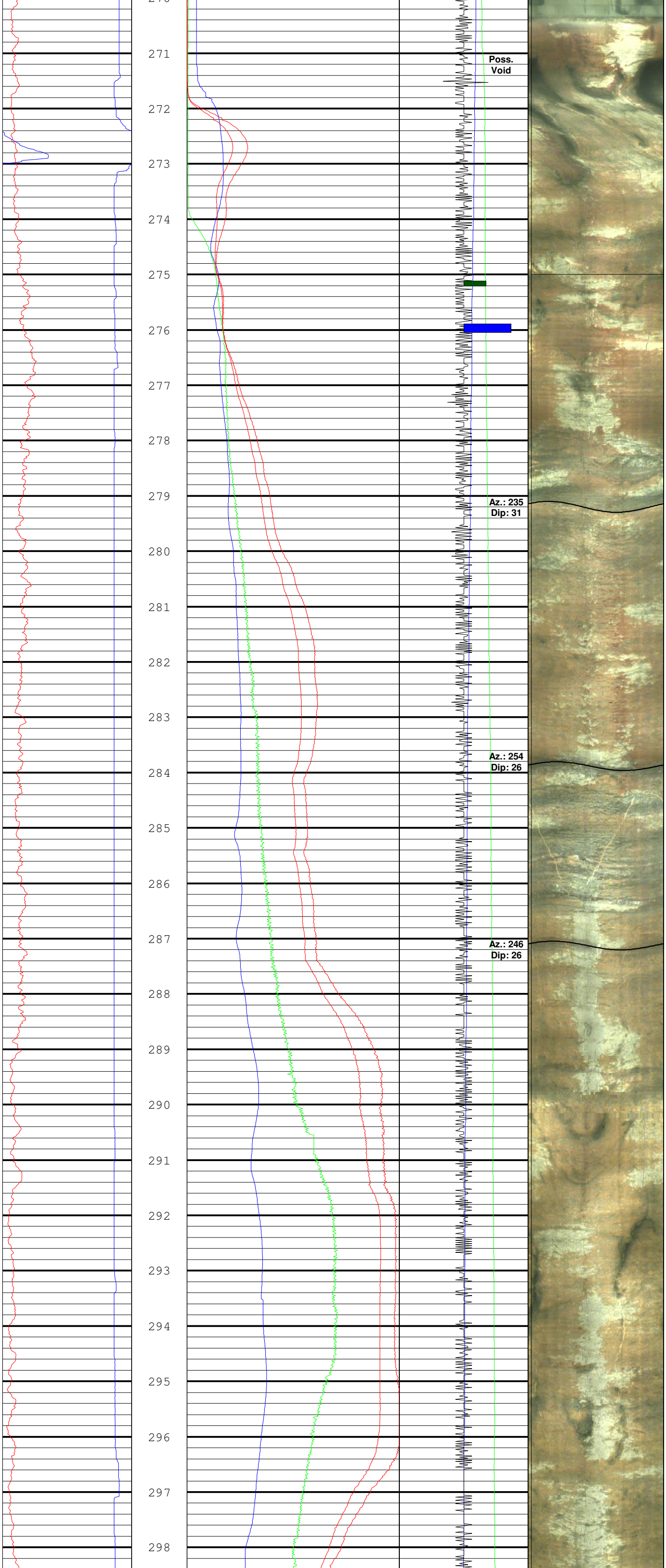
Casing: 270 feet

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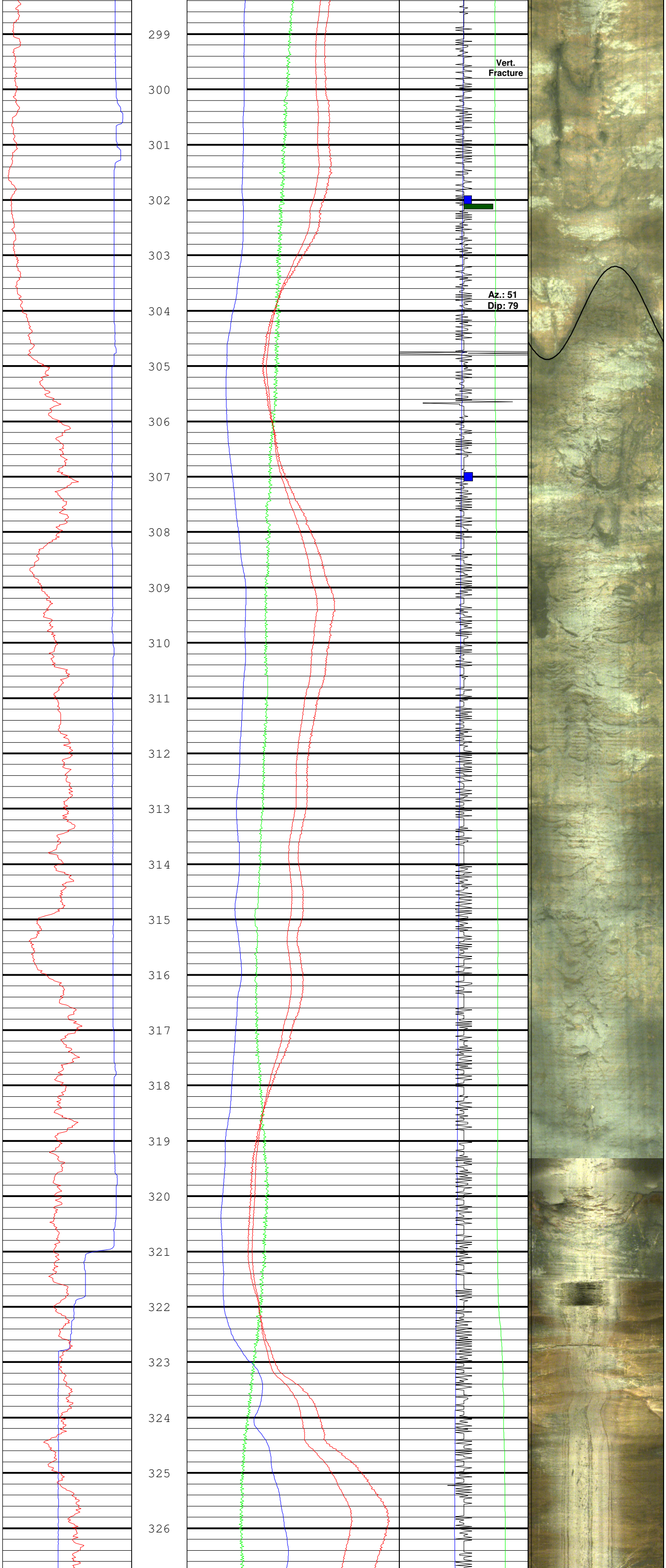
Poss.
Void
Az.: 235
Dip: 31
Az.: 254
Dip: 26
Az.: 246
Dip: 26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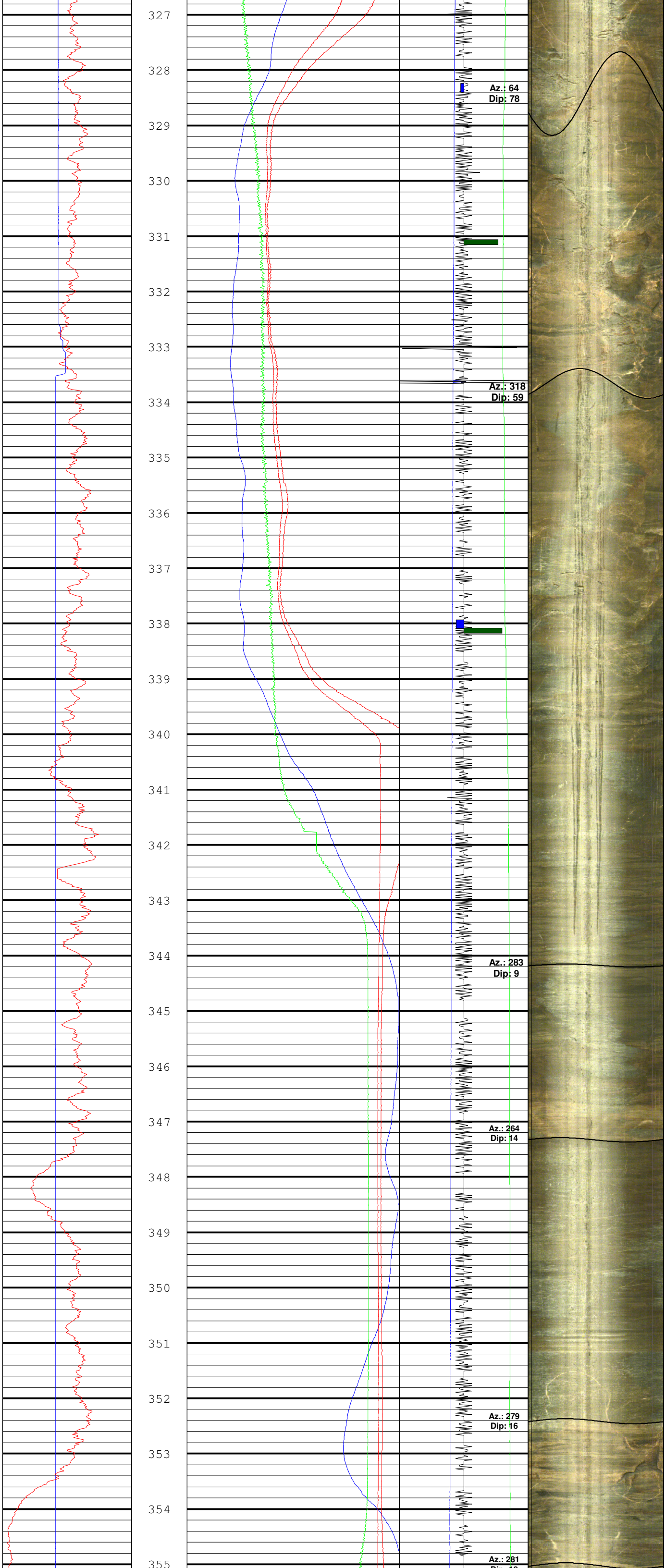
Vert.
Fracture
Az.: 51
Dip: 79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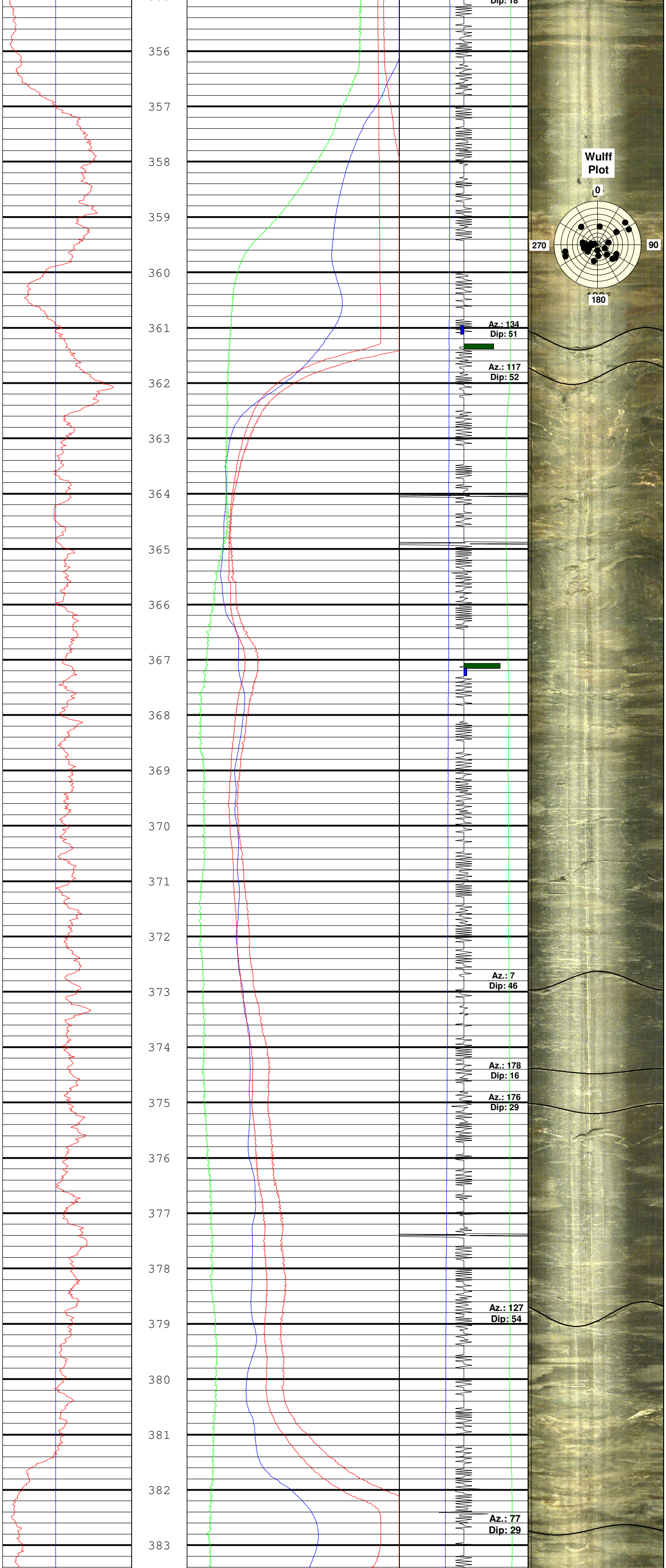
Az.: 64
Dip: 78
Az.: 318
Dip: 59
Az.: 283
Dip: 9
Az.: 264
Dip: 14
Az.: 279
Dip: 16
Az.: 281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Az.: 134
Dip: 51
Az.: 117
Dip: 52
Az.: 7
Dip: 46
Az.: 178
Dip: 16
Az.: 176
Dip: 29
Az.: 127
Dip: 54
Az.: 77
Dip: 29
Wulff
Plot
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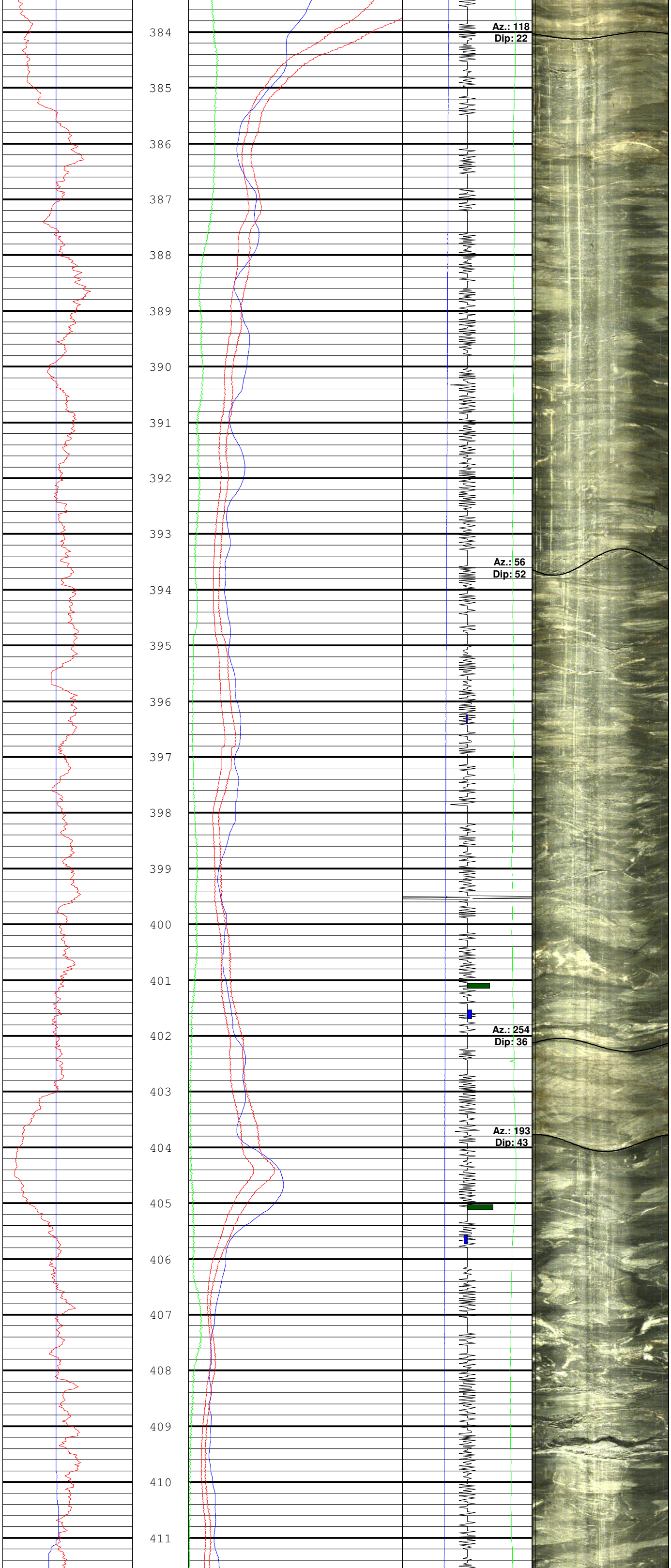
90
180
270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Az.: 118
Dip: 22
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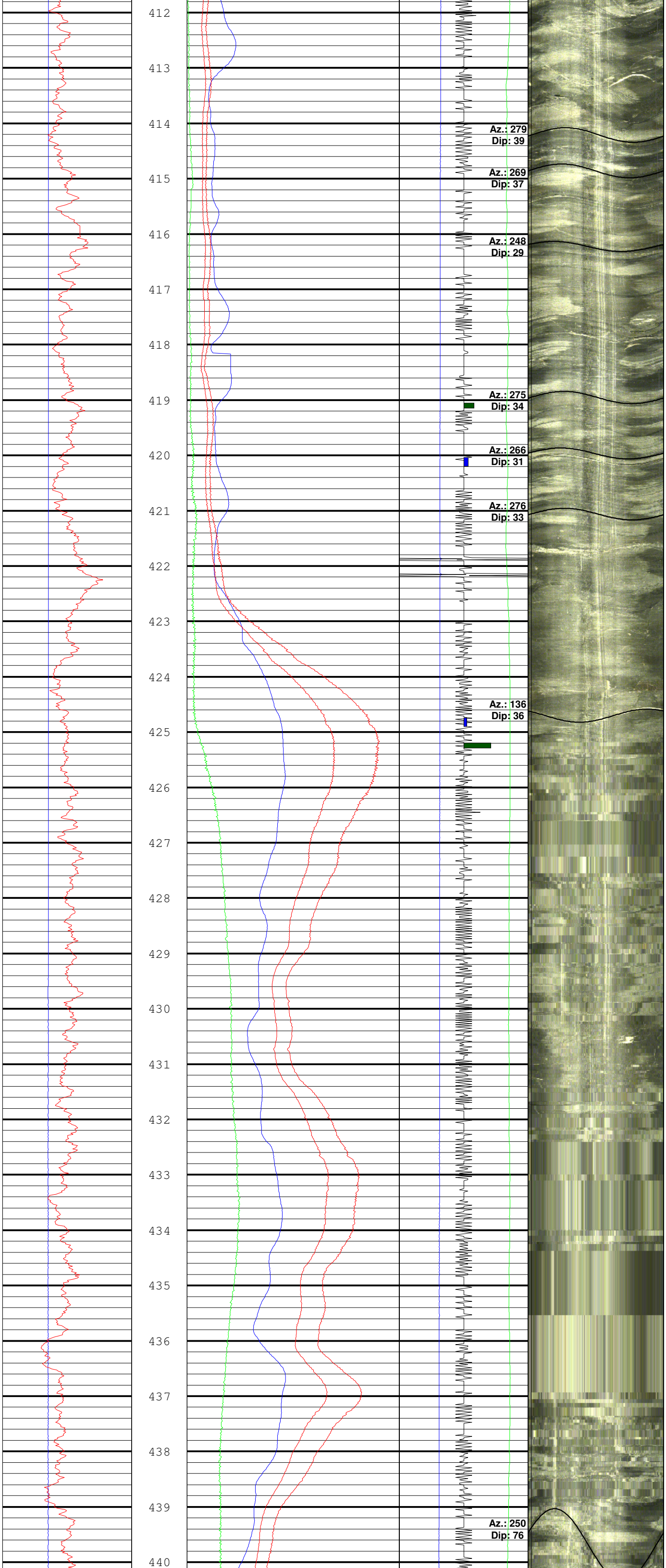
Dip: 36
Az.: 193
Dip: 43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Dip: 39
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Dip: 37
Az.: 248
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Az.: 275
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Az.: 266
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Dip: 33
Az.: 136
Dip: 36
Az.: 250
Dip: 76

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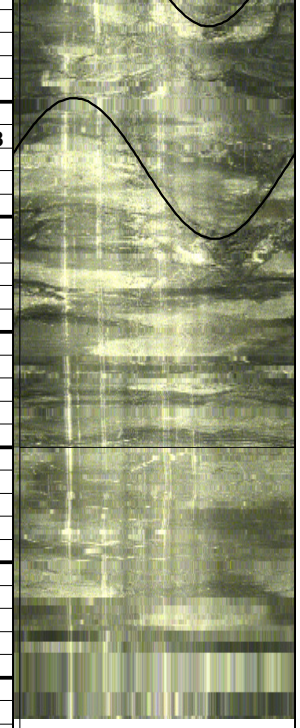


Total Depth: 470 feet

Flow (Pumping)

-0.05 gpm 0.05

LATERAL — Flow (ambient) — Polar Projection Plot

0 OHM-M 3500 -0.05 gpm 0.05 Wulff Plot - UH - Type

RES(64N) — DEL TEMP — Azimuth & Dip

0 OHM-M 3500 -0.05 DEG F 0.05 0° 90° 180° 270° 0°

GAM(NAT) — RES(16N) — TEMP — Upper Image-NM

0 CPS 400 0 OHM-M 3500 55 DEG F 61 0° 90° 180° 270° 0°

CALIPER — Depth — RES — RES(FL) — Lower Image-NM

2 INCH 7 1ft:20ft 0 OHM 4000 30 OHM-M 70 0° 90° 180° 270° 0°

ADVANCED GEOLOGICAL SERVICES

3 Mystic Lane
Malvern. PA 19355
610-722-5500
610-722-0250 fax

Multitool, Caliper, Optical Televiewer, Flow Logs

CO:Groundwater Sciences, Inc.
WELL: MW140A
RD: Eden Road
CITY/STATE:York, PA
SITE:Harley Davidson
FILING No

CLIENT Groundwater Sciences, Inc.
WELL ID MW140A
SITE Harley Davidson
CITY York **STATE** PA

LOCATION
SEC TWP RGE

OTHER SERVICES

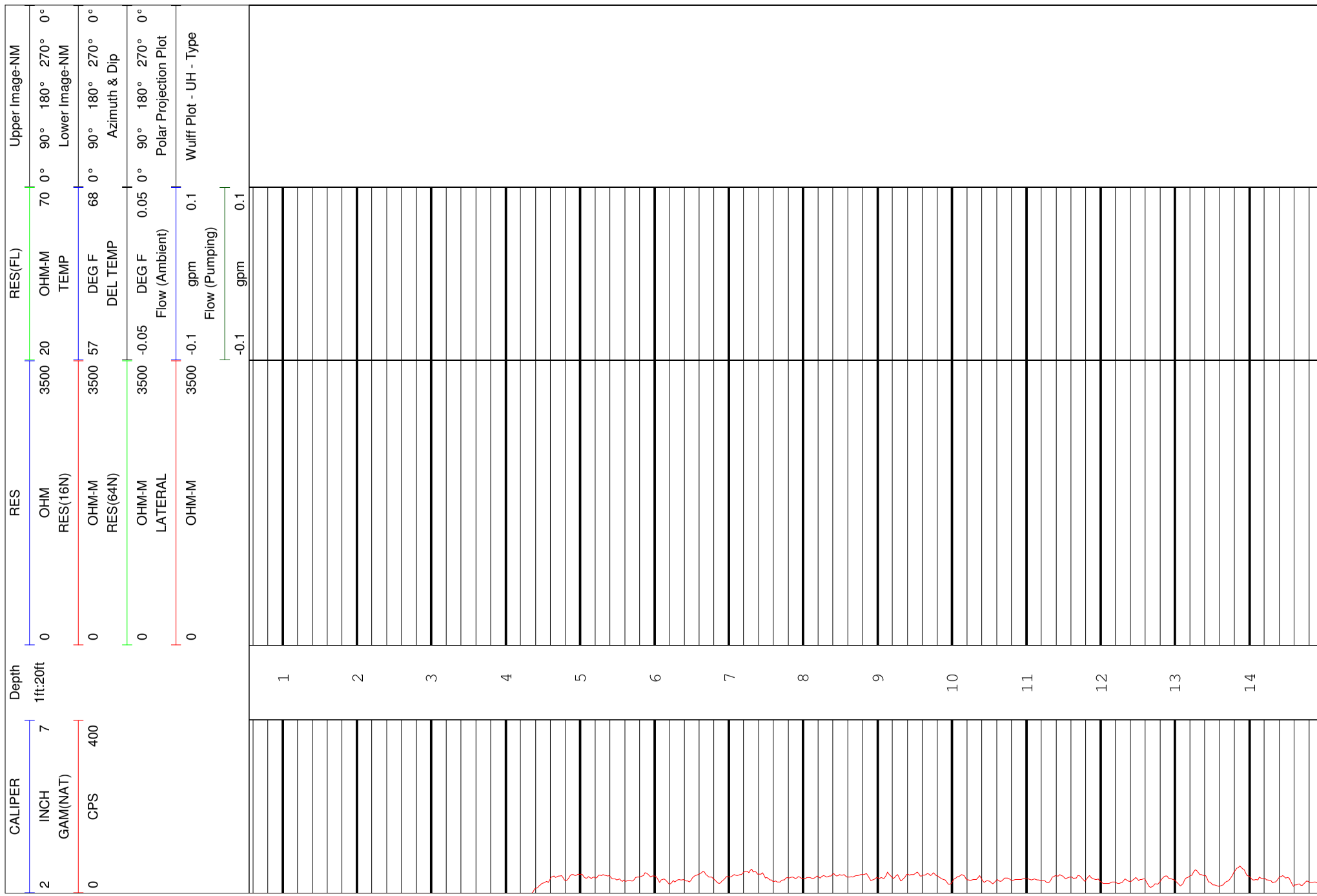
PERMANENT DATUM: ELEVATION K.B.

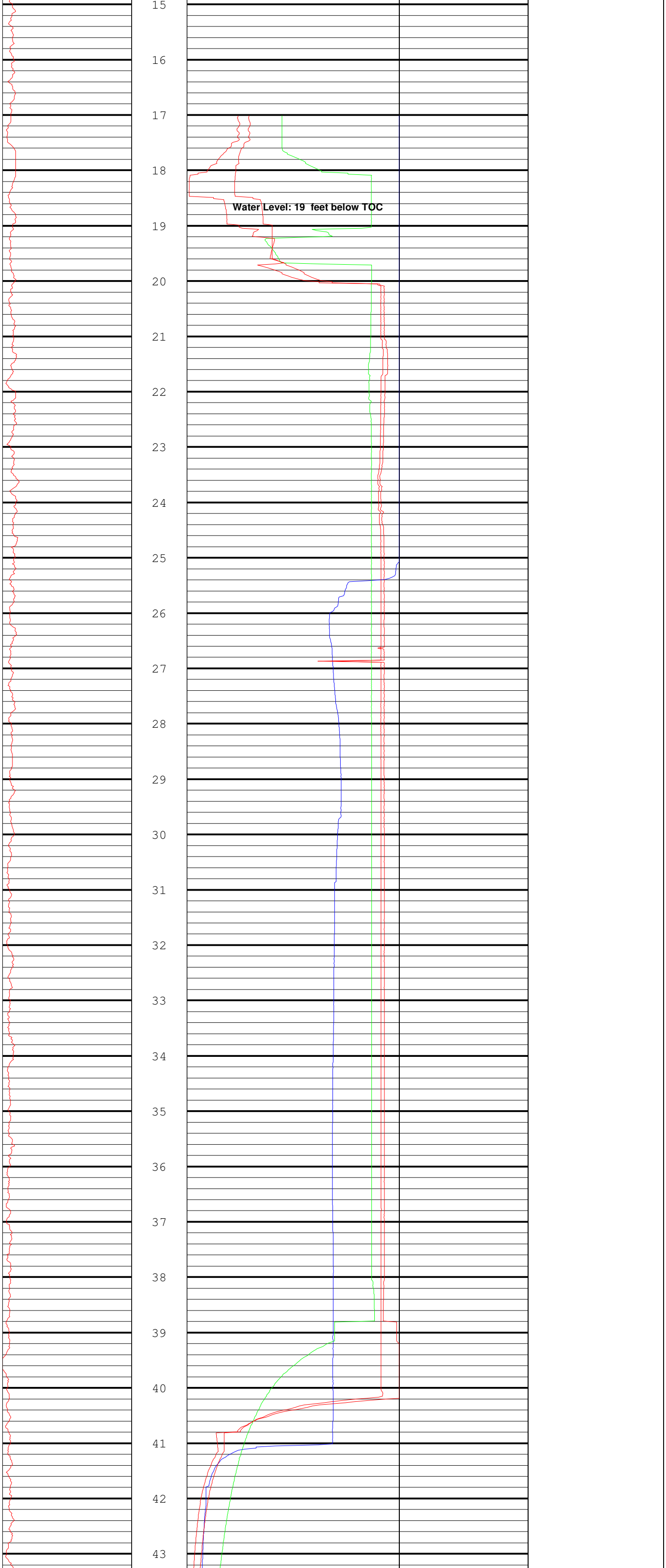
LOG MEAS. FROM: Top of Casing ABOVE PERM. DATUM D.F.

DRILLING MEAS. FROM: G.L.

DATE	June 27, 2013	TYPE FLUID IN HOLE	
RUN No	1	SALINITY	
TYPE LOG		DENSITY	
DEPTH-DRILLER		LEVEL	
DEPTH-LOGGER		MAX. REC. TEMP.	
BTM LOGGED INTERVAL	417 feet		
TOP LOGGED INTERVAL	5 feet		
OPERATING RIG TIME			
RECORDED BY	P. Miller		
WITNESSED BY			

REMARKS:

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Water Level: 19 feet below TOC


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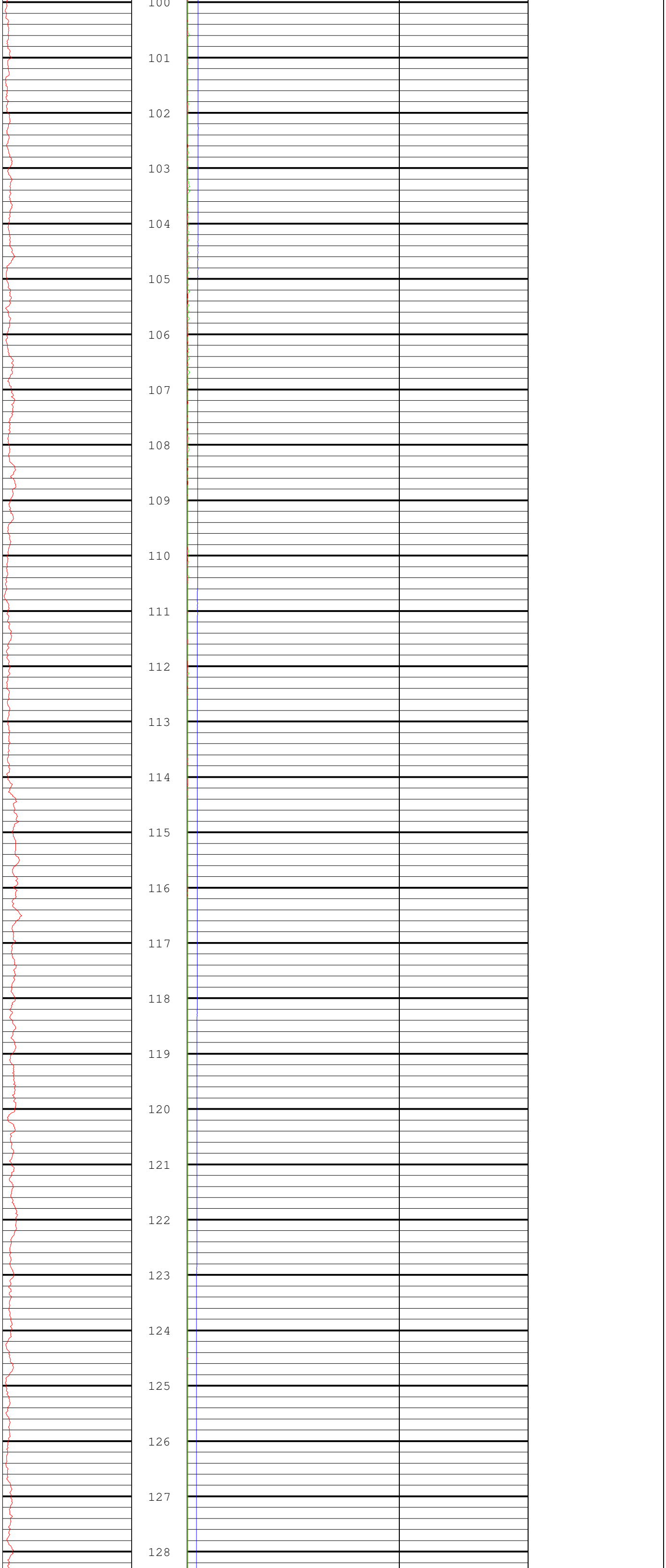
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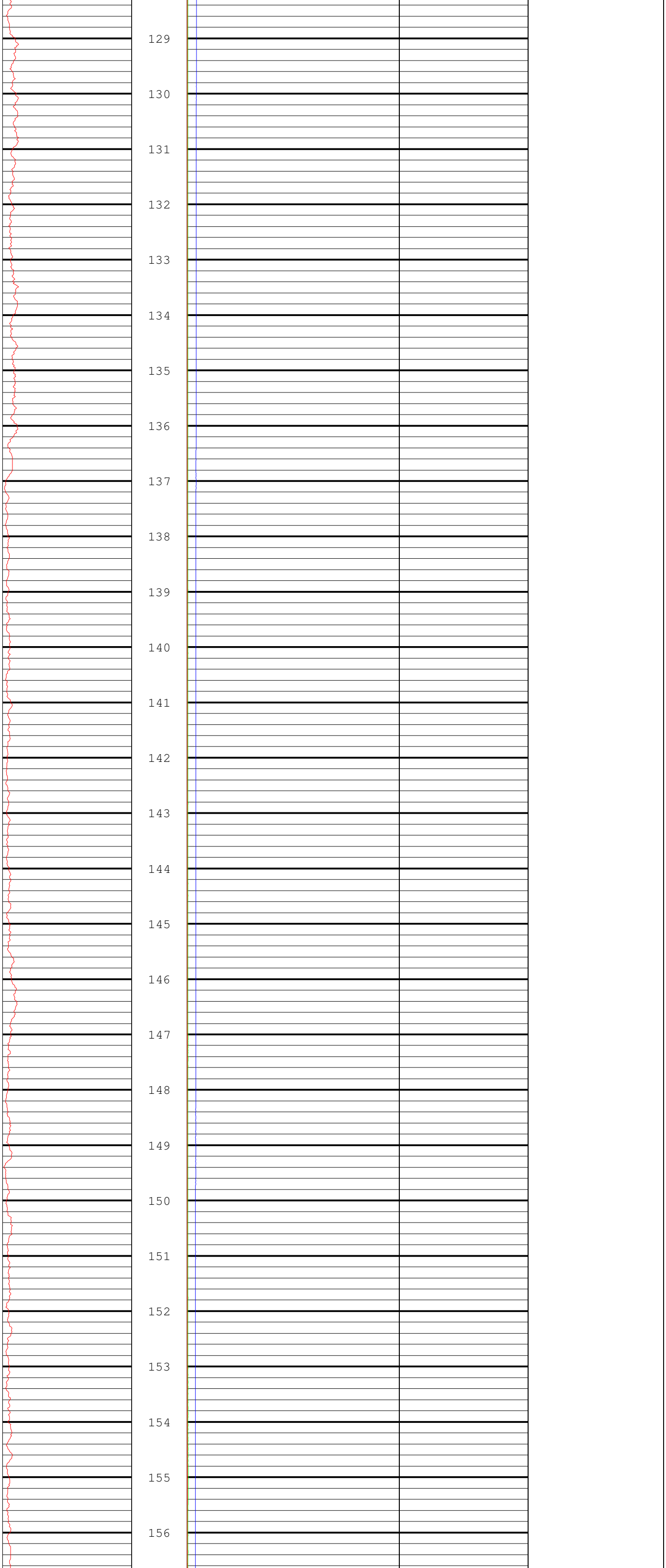
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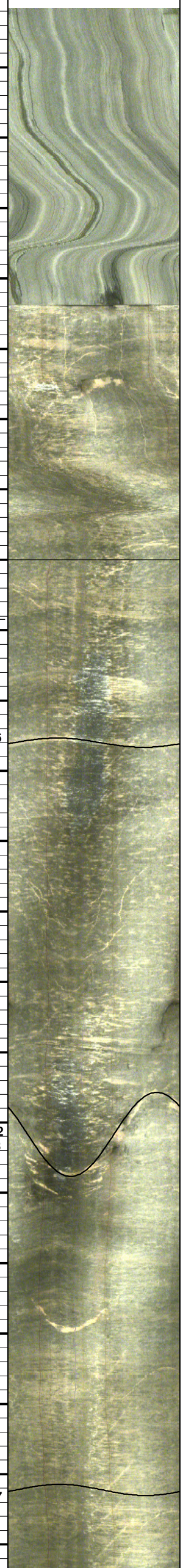
Casing: 195 feet below TOC

Az.: 286
Dip: 22

Az.: 132
Dip: 73

Az.: 287
Dip: 24



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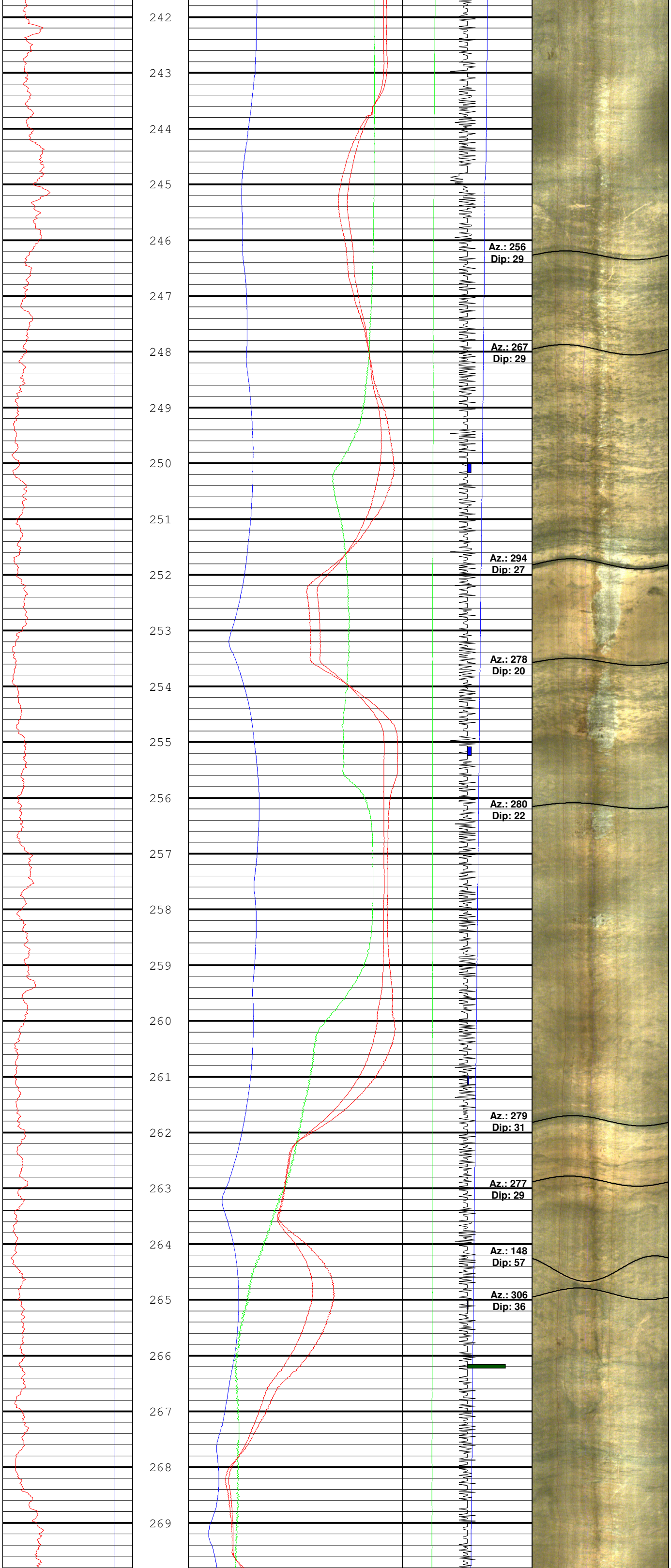
Az.: 268
Dip: 28

Az.: 295
Dip: 20

Az.: 281
Dip: 27

Az.: 311
Dip: 24

Az.: 282
Dip: 31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Az.: 148
Dip: 57
Az.: 306
Dip: 36

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Az.: 300
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Az.: 300
Dip: 39
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Az.: 295
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Az.: 172
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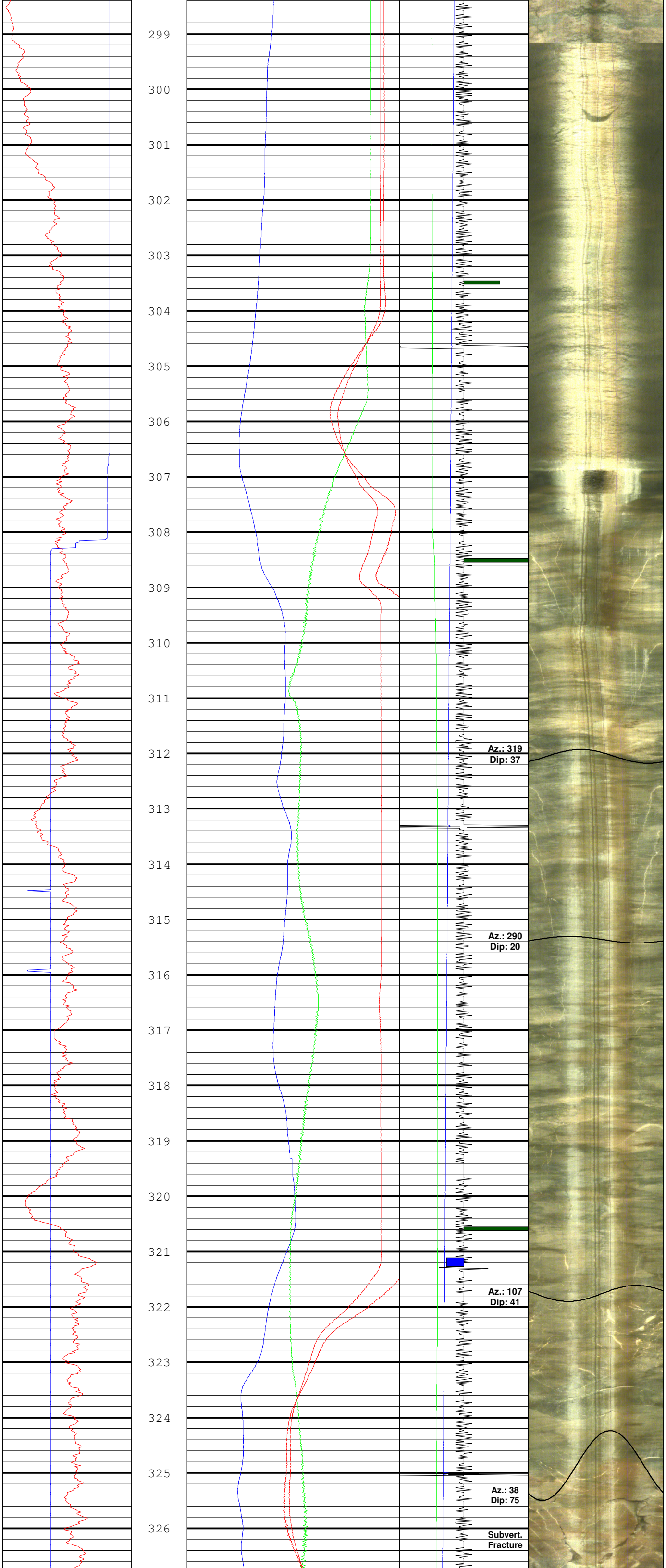
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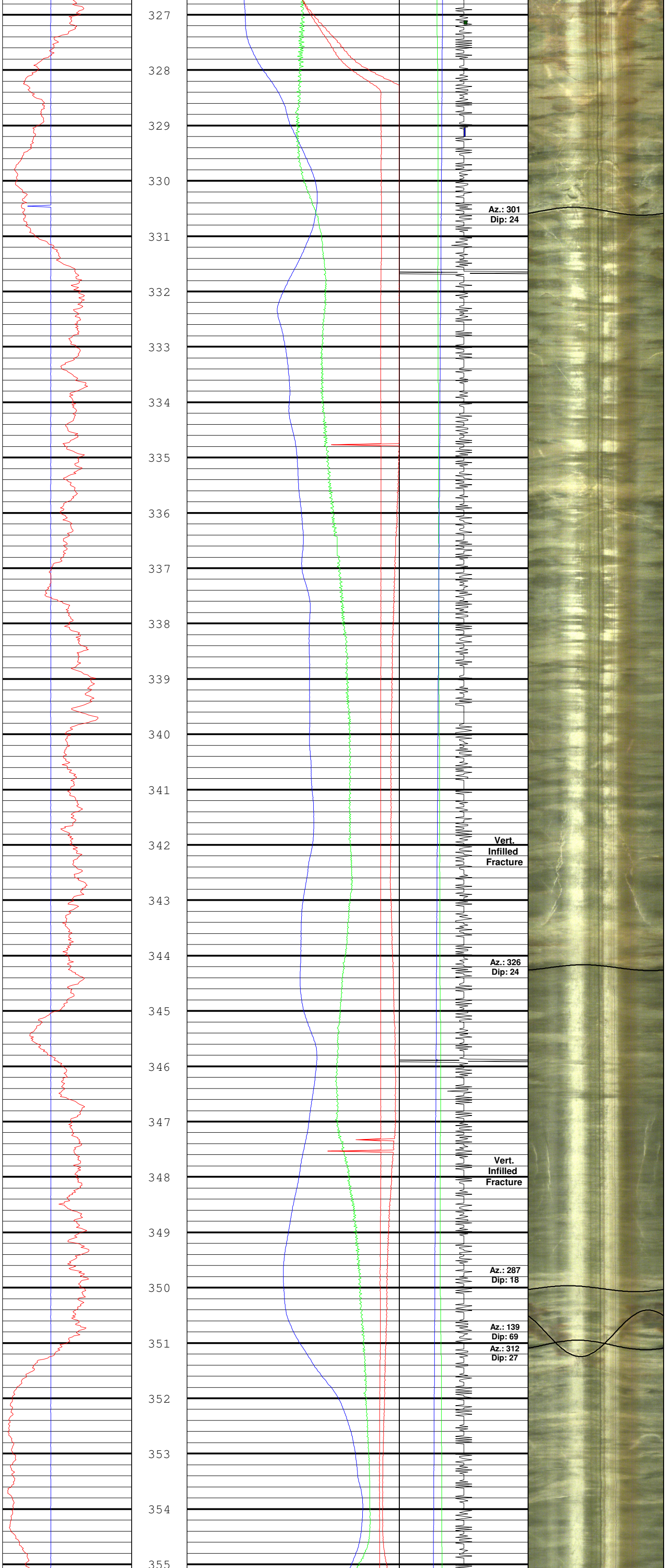
Az.: 319
Dip: 37
Az.: 290
Dip: 20
Az.: 107
Dip: 41
Az.: 38
Dip: 75
Subvert.
Fracture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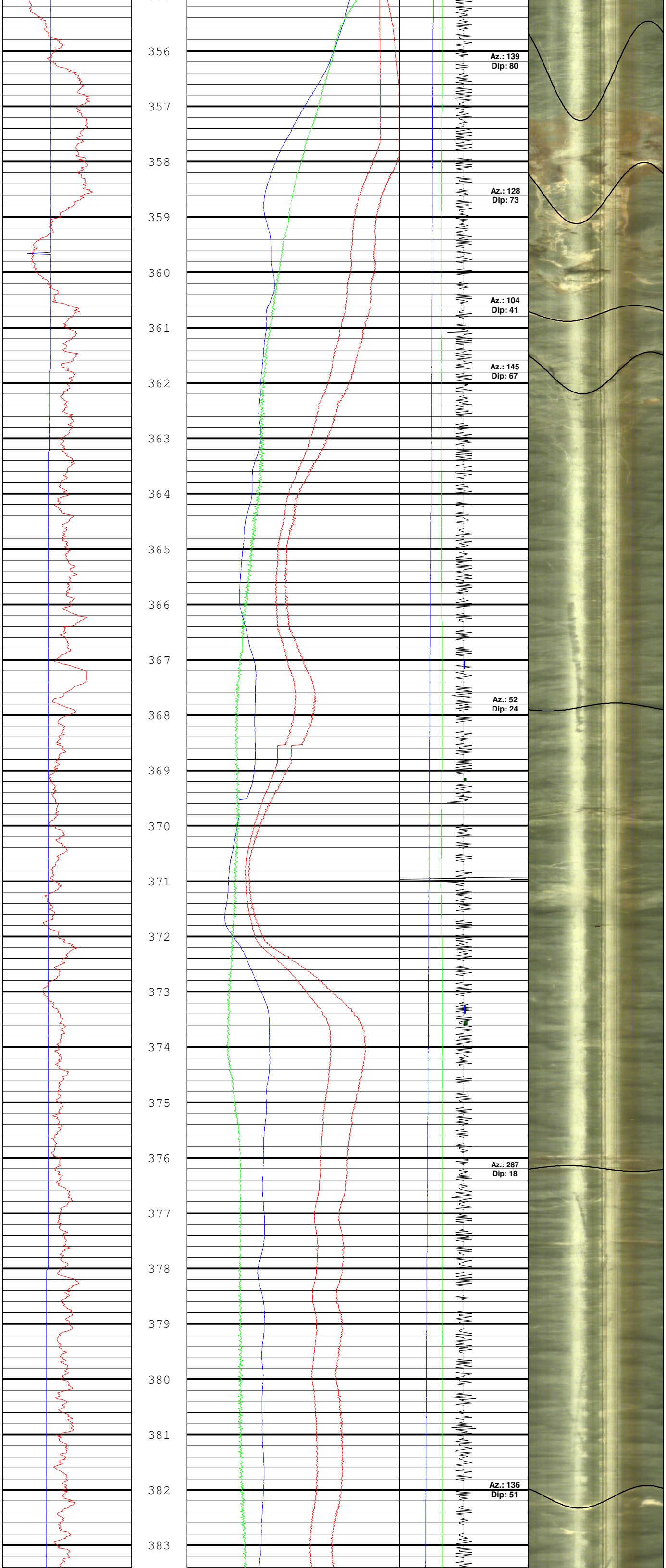
Az.: 301
Dip: 24
Vert.
Infilled
Fracture
Az.: 326
Dip: 24
Vert.
Infilled
Fracture
Az.: 287
Dip: 18
Az.: 139
Dip: 69
Az.: 312
Dip: 27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Az.: 139
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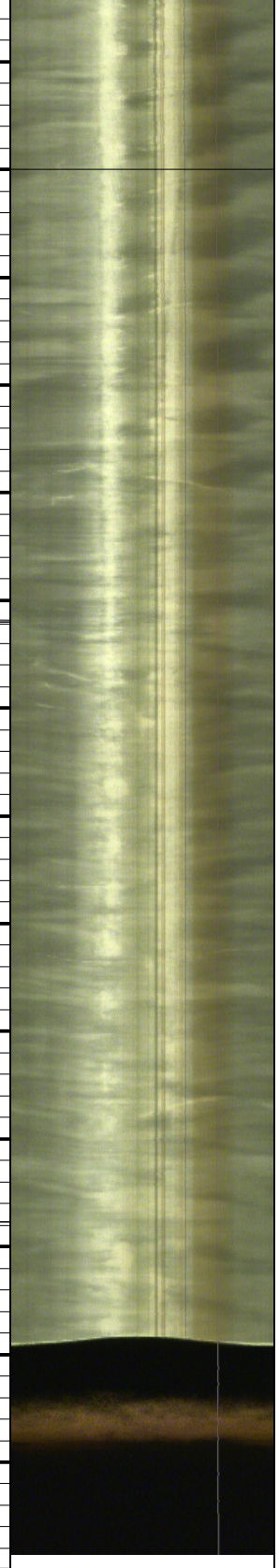

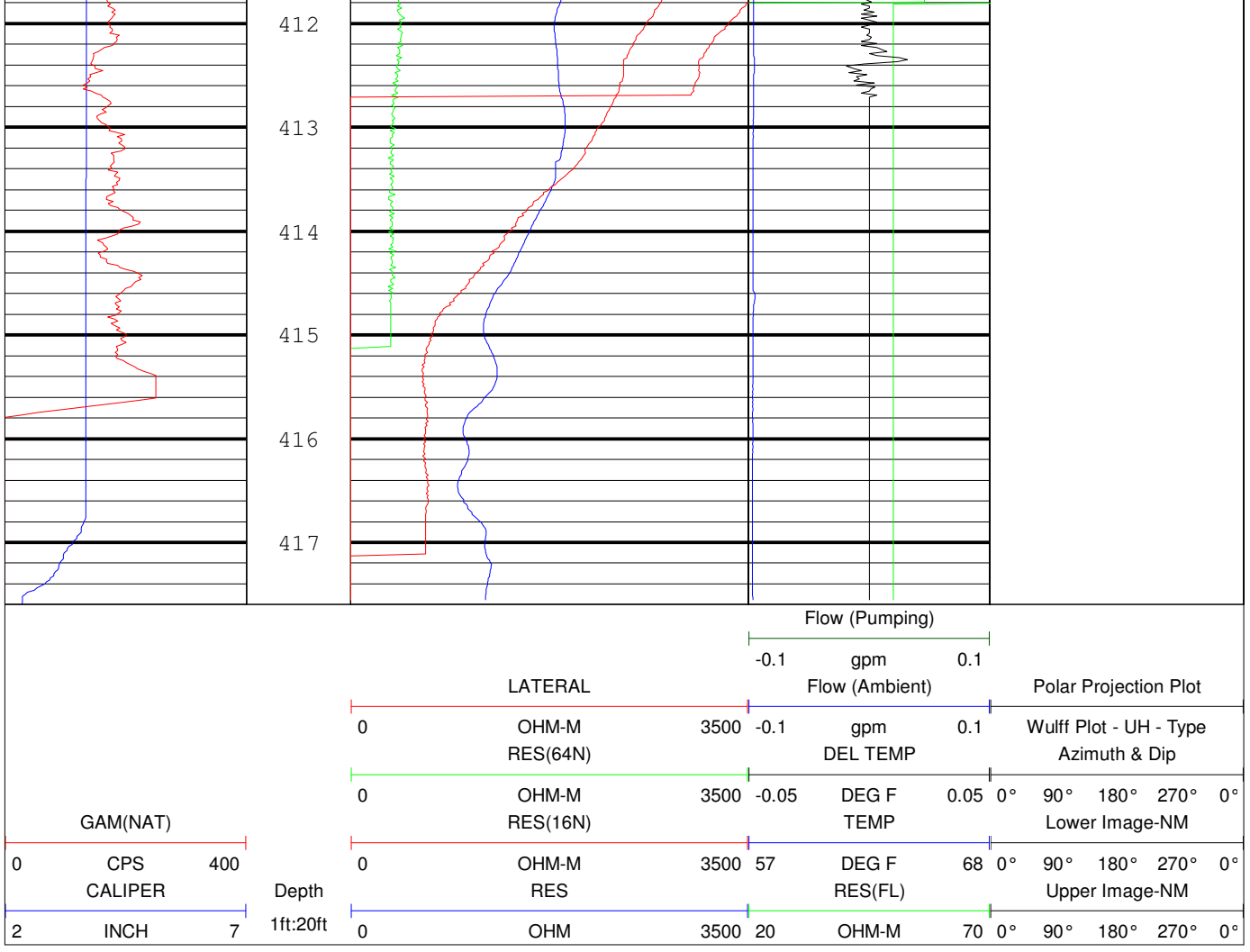
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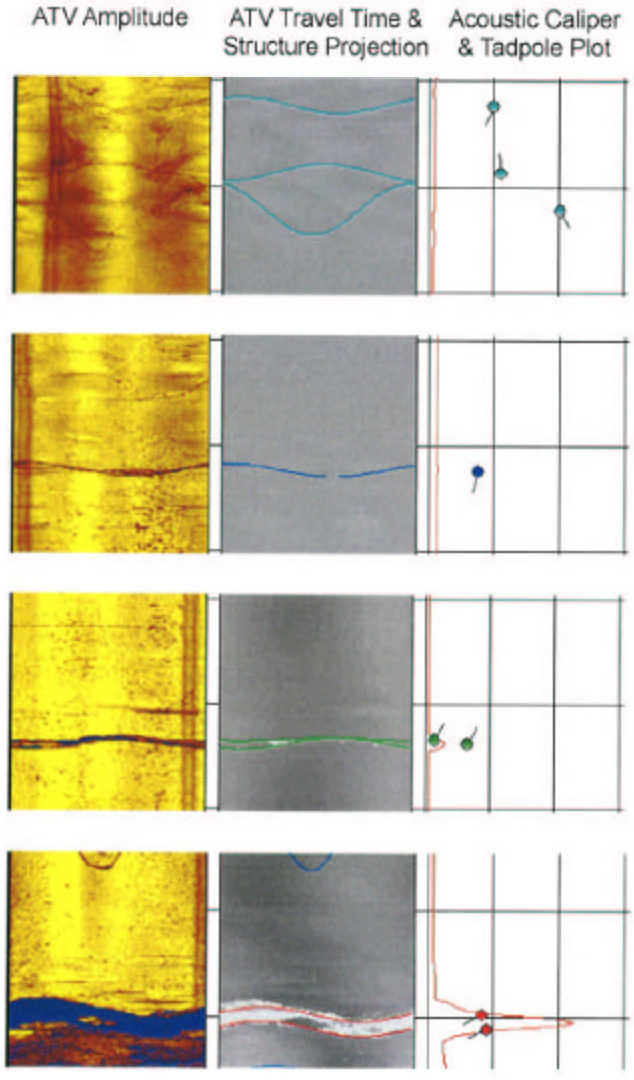
Flow (Pumping)
-0.1 gpm 0.1
LATERAL
Flow (Ambient)
Polar Projection Plot
0 OHM-M 3500
-0.1 gpm 0.1
Wulff Plot - UH - Type
RES(64N)
DEL TEMP
Azimuth & Dip
0 OHM-M 3500
-0.05 DEG F 0.05
0° 90° 180° 270° 0°
GAM(NAT)
RES(16N)
TEMP
Lower Image-NM
0 CPS 400
0 OHM-M 3500
57 DEG F 68
0° 90° 180° 270° 0°
CALIPER
Depth
RES
RES(FL)
Upper Image-NM
2 INCH 7
1ft:20ft
0 OHM 3500
20 OHM-M 70
0° 90° 180° 270° 0°

Appendix B



Structure Type (Symbol Color)	Observation
Fracture Rank 1 (Light Blue)	Minor Fracture (may not be continuous around the borehole)
Fracture Rank 2 (Dark Blue)	Intermediate Fracture (distinct and continuous around the borehole)
Fracture Rank 3 (Green)	Intermediate Fracture (distinct, continuous, and some aperture)
Fracture Rank 4 (Red)	Major Fracture (distinct, continuous, and significant aperture)