UIC - I - ___11___

EPA FALL-OFF TEST

2019

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Wednesday, October 23, 2019 9:29 AM
To: 'Pham, Lisa'; 'Graves, Brian'
Subject: FW: UICI-011 Class I (NH) WDW-2 (30-045-35747) Western Refining SW, Inc.- Bloomfield Terminal: FOT 2019

Lisa and Brian:

FYI: OCD will keep EPA involved and informed.

Thank you.

From: Chavez, Carl J, EMNRD
Sent: Wednesday, October 23, 2019 8:47 AM
To: 'Robinson, Kelly' <KRobinson3@Marathonpetroleum.com>
Cc: Wade, Gabriel, EMNRD <Gabriel.Wade@state.nm.us>; Brancard, Bill, EMNRD <bill.brancard@state.nm.us>; Goetze, Phillip, EMNRD <Phillip.Goetze@state.nm.us>; Powell, Brandon, EMNRD <Brandon.Powell@state.nm.us>
Subject: RE: UICI-011 Class I (NH) WDW-2 (30-045-35747) Western Refining SW, Inc.- Bloomfield Terminal: FOT 2019

Ms. Robinson:

The New Mexico Oil Conservation Division (OCD) is in receipt of the Fall-Off Test (FOT) and your request below for essentially a "Waiver" to the FOT requirement for 2020 based on lack of injection into the above subject well.

OCD recently received a similar request for the Agua Moss, LLC UIC Class I (Non-hazardous) commercial injection well (UICI-5) also located in San Juan County based on lack of injection into the well. OCD recently approved a C-103 Sundry to complete a reservoir pressure test to compare against past annual FOT reservoir pressure data to ensure the reservoir pressure is ok.

OCD has been aware of the facility wastewater management primarily through surface evaporation without the need for injection this year. Therefore, OCD agrees with your request and expects to receive a Sundry Notice of your reservoir pressure procedure for FOT 2019 before September 2020. Since the injection well is equipped with a modern pressure monitoring system under positive pressure, similar to Agua Moss, LLC, OCD requires at least a 5-day reservoir monitoring period to establish the shut-in reservoir pressure.

Since your request is basically a "Waiver" type request to the annual FOT for 2020, OCD is copying Lisa Pham and Brian Graves (EPA Reg. 6) who will also be involved in the review process.

Please contact me if you have questions. Thank you.

Mr. Carl J. Chavez, CHMM (#13099)
New Mexico Oil Conservation Division
Energy Minerals and Natural Resources Department
1220 South St Francis Drive

Santa Fe, New Mexico 87505
Ph. (505) 476-3490
E-mail: CarlJ.Chavez@state.nm.us
"Why not prevent pollution, minimize waste to reduce operating costs, reuse or recycle, and move forward with the rest of the Nation?" (To see how, go to: http://www.emnrd.state.nm.us/OCD and see "Publications")

From: Robinson, Kelly <KRobinson3@Marathonpetroleum.com>
Sent: Friday, September 27, 2019 4:53 PM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Subject: [EXT] RE: FOT 2019

Mr. Chavez,
Thank you so much for talking with me earlier this week regarding the Western Refining Class I Injection Well located at the Bloomfield Terminal (UICI-011). As we discussed earlier, Western Refining completed a Fall-Off-Test of WDW #2 on April 30, 2019. This test was conducted pursuant an extension approval from the New Mexico Oil Conservation Division (NMOCD) dated September 28, 2018. The Fall-Off-Test (FOT) Report was submitted to NMOCD on June 28, 2019. The Report is currently being reviewed by NMOCD.

As of September 2019, since completing the April 2019 FOT activities, no waters have been pumped into WDW #2 except for a 3.5-hour period on June 26th, 2019 where the well was operational solely to collect routine quarterly samples. During this sampling event, a total of 189 barrels of wastewater injected through WDW #2. Therefore, Western Refining is requesting approval from NMOCD to recognize the April 2019 Fall-Off Test to serve as the required Fall-Off Test for 2019. Due to the low wastewater production rates at the Terminal and higher evaporation rates during summer months, the volume and quality of water readily available on-site to conduct Fall-Off Testing activities is minimal. It is common that wastewater volumes stored upstream of the injection well increase slightly at the Terminal during the winter months due to lower evaporation rates, and thus have the higher potential of providing the on-site storage volume needed to be able to operate the well for an extended period of time.

If NMOCD is not in agreement with accepting the April 2019 Fall-Off Test to serve as the annual testing requirements for compliance with UIC-001, Western Refining would appreciate NMOCD's consideration to approve of an alternative means of evaluating the formation pressure by using surface casing pressure measurements in-lieu of installing bottom hole pressure gauges. Current WDW#2 is equipped with a pressure transmitter at the wellhead that transmits real-time injection casing pressure readings to the on-site PLC, where the data is then stored onto a data historian PI server. This type of real-time data tracking allows for the capability using surface pressure data to calculate downhole pressures. Western would be able to utilize continuous pressure readings current on-file or select a specific time duration and future scheduled period of NMOCD's preference to replicate the formation pressures in-leu of downhole direct readings.

Western appreciates NMOCD's consideration of this request. If you would like to discuss this topic in more detail, please feel free to contact me at your convenience. Thank you so much for your time!

Sincerely,

Kelly R. Robinson | **Environmental Supervisor– Pipe Line Division**
Marathon Petroleum / Western Refining | 111 County Road 4990, Bloomfield, NM 87413
Office: 505.632.4166 | Mobile: 505.801.5616 | KRobinson3@MarathonPetroleum.com

From: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Sent: Wednesday, September 25, 2019 9:58 AM
To: Robinson, Kelly <KRobinson3@Marathonpetroleum.com>
Subject: [EXTERNAL] FOT 2019

Kelly:

Good morning. I'm following up with you based on our communication yesterday regarding lack of injection into the well and a possible submittal of a FOT Plan for OCD that does not include the standard FOT.

Please find attached the most recent FOT Plan example from the Agua Moss, LLC Class I (NH) Injection Well.

Please review and contact OCD to communicate on your plans.

Thank you.

Mr. Carl J. Chavez, CHMM (#13099)
New Mexico Oil Conservation Division
Energy Minerals and Natural Resources Department
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Chavez, Carl J, EMNRD

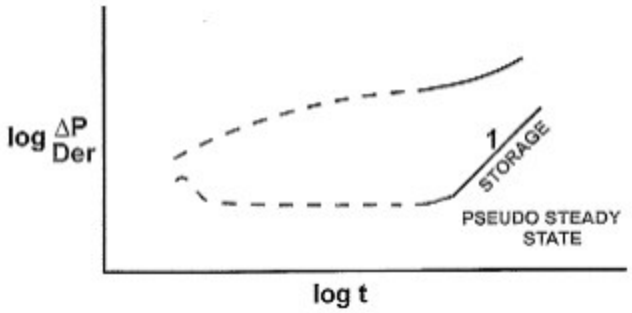
From: Chavez, Carl J, EMNRD
Sent: Wednesday, April 17, 2019 3:39 PM
To: 'Robinson, Kelly'
Cc: Kuehling, Monica, EMNRD; Goetze, Phillip, EMNRD; Jones, William V, EMNRD
Subject: RE: UICI-011 Class I (NH) WDW-2 (30-045-35747) Western Refining SW, Inc.- Bloomfield Terminal Fall-Off Test 2019 Communication - Follow-up
Attachments: FOT 2017.pdf

Kelly:

Hi. Yes, good communication on the FOT 2019 this afternoon.

OCD reviewed the admin. record on the first and only FOT 2017 (new injection well). OCD promised to look into the term "pseudo-steady state" injection rate. OCD observes that a pseudo-steady state injection flow rate condition is not achievable under pressure build-up conditions or FOT (see Fekete Definition below).

Source:
www.fekete.com/san/theoryandequations/.../Pseudo-Steady_State_Flow.htm
Pseudo-Steady State Flow
Pseudo-steady state (PSS) flow occurs during the late time region when the outer boundaries of the reservoir are all no flow boundaries. This includes not only the case when the reservoir boundaries are sealing faults, but also when nearby producing wells cause no flow boundaries to arise. During the PSS flow regime, the reservoir behaves as a tank. The pressure throughout the reservoir decreases at the same, constant rate. PSS flow does not occur during build-up or falloff tests.



The reservoir engineer at the conclusion of the FOT 2017 indicated a radial flow condition is not expected with any test of a reasonable time period. Also, that a "Transient radial flow was observed late in the FOT." The reservoir engineer also stated:

"The early time data exhibits transient linear flow as described in SPEE Monograph 4. The later time data is more reasonably represented with a bilinear flow model. Figure 6.6 of the SPEE monograph describes a bilinear flow regime which has a slope of ¼ of 0.25. The bilinear flow regime is (page 122) "caused by both linear flow in a fracture (with significant pressure drop from fracture tip to wellbore) and by linear flow in the reservoir toward the fracture". The bilinear flow pattern is very near to the flow pattern observed with the drawdown data for Disposal Well #2. As will be discussed later, the flow pattern, while very near to a bilinear flow pattern is better matched with a transient radial flow pattern. The early portion of the test is shown in detail in Figure 3 with pressures from 0 to 36 hours which range from 4396.7 psig to 4110.1 psig. The pressure decline is a smooth decline and is flattening over time as expected."

Consequently, OCD reverts to the achieving a steady injection rate over a period of time when the "transient radial flow" condition is achieved for future FOTs to monitor the injection zone over time. Andeavor indicated today that the well is

not operational on a full-time basis, and is under the current evaporation pond fluid management process coupled with occasional use of the disposal well with current volumes of fluids being easily manageable. Marathon is considering other shallower adjacent formations for future injection potential, and could submit a C-103 for additional work if it determines the need to do so.

OCD concludes that the operator should continue to perform FOTs in the interim using the current FOT Plan or approach. OCD observes a pressure differential of about 286 psi from the steady-state injection rate to end of FOT 2017 monitoring, which indicates the injection zone has capacity. The permitted max. surface injection pressure was not exceeded during the FOT. A FOT is not an MIT, and it is used to monitor the condition over time of the injection zone. It appears under the operator's current well disposal operations and evaporation fluid management process continued operation of the disposal well is an option.

Please contact me if you have questions. Thank you.

Mr. Carl J. Chavez, CHMM (#13099)
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From: Robinson, Kelly <Kelly.Robinson@andeavor.com>
Sent: Wednesday, April 17, 2019 2:48 PM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Subject: [EXT] Bloomfield Terminal Fall-Off Test Discussion - Follow-up

Good afternoon Sir,

I very much appreciated you taking the time to talk with me earlier today regarding the Bloomfield Terminal injection well. As you requested, I am attaching the previous Fall-Off Test Report. Conclusions from the data collected during the testing activities are that transient linear flow was observed early-on in the test, with a transition to transient radial flow in that later part of the test. Radial flow was not observed. Please let me know if you need any additional information for your review.

Thank you, Sir!

Kelly R. Robinson | **Environmental Supervisor– Terminalling, Transportation and Storage**
Andeavor | 111 County Road 4990, Bloomfield, NM 87413
Office: 505.632.4166 | Mobile: 505.801.5616 | Kelly.Robinson@andeavor.com

RUSSELL K. HALL & ASSOCIATES, INC.

Oil and Gas Consultants

201 East Polk Street
Richardson, Texas 75081

(972) 922-8111
E-Mail: brent@Russellkhall.com

June 28, 2019

Mr. Bruce Davis
Western Refining Southwest, Inc.
Bloomfield Terminal
P.O. Box 159
Bloomfield, New Mexico 87413

Re: April 2019 Waste Disposal Well #2 Falloff Test Analysis Report – OGRID No. 267595

Dear Mr. Davis:

Western Refining Southwest, Inc (Western) retained Russell K. Hall & Associates, Inc. to perform the annual bottomhole pressure survey and pressure falloff test analysis on Waste Disposal Well #2 (WDW #2). A pressure falloff test and bottomhole pressure survey were conducted on the well at the Western Refining Bloomfield Terminal facility near Bloomfield, New Mexico. The well tests were conducted in accordance with United States Environmental Protection Agency (USEPA) 40 CFR 146.13 and the State of New Mexico Falloff Test Guidelines, dated December 3, 2007. The 2019 pressure falloff test procedure was conducted in accordance with the USEPA's Region 6 "Pressure Falloff Testing Guidelines, Third Revision", dated August 8, 2002, and required by the State of New Mexico as of December 3, 2007. The pressure falloff test and bottomhole pressure survey performed on WDW #2 also meet the New Mexico Oil Conservation Division (NMOCD) requirements for such testing. Note: There are references made in this report to the permit document on file with the OCD for Western Refining in Bloomfield, New Mexico.

The April 2019 WDW #2 Falloff Test Analysis Report is included below.

In evaluating available information concerning this appraisal, we have excluded from our consideration all matters as to which legal or accounting interpretation, rather than engineering, may be controlling. As in all aspects of oil and gas evaluation, there are uncertainties inherent in the interpretation of engineering data and conclusions necessarily represent only informed professional judgments.

Russell K. Hall & Associates, Inc. is an independent consulting firm. Our compensation is not contingent on the results obtained or reported. This report was prepared by an engineer with more than 30 years of experience in the estimation, assessment, and evaluation of oil and gas production rates and related reservoir properties.

We appreciate the opportunity to be of service to you. If you have questions regarding this report, please contact us.

Sincerely,

Russell K. Hall & Associates, Inc.

Brent W. Hale
Petroleum Engineer

BWH:
Attachments

APRIL 2019 WDW #2 FALLOFF TEST ANALYSIS REPORT

FACILITY INFORMATION

Name: Western Refining Southwest, Inc.
Location: 50 County Road 4990 (PO Box 159)
Bloomfield, New Mexico 87413

WELL INFORMATION

Well Name & No.	OCD UIC or Discharge Plan Permit Number	Well Classification	API Number	Legal Location
WDW #2	UICI-011	Class I Non-hazardous	30-045-35747	2028 FNL, 111 FEL, H Sec 27 T29S R11E

All depths in this report are referenced to ground level (GL) from the drilling rig rotary kelly bushing (RKB), unless the depth is specified as RKB or GL within this document. Appendix A contains the well schematic for Western's WDW #2 and a section of the log covering the perforated interval. Appendix B is a summary of the injection intervals for the well.

The fluid used for the injection test is the terminal treated wastewater (effluent). A current effluent analysis collected on March 29, 2019 is included in Appendix C. A summary of the formation water is also in Appendix C. The formation water analyses taken on January 25, 2017 is included.

Appendix D contains three well logs for WDW #2 ran by Schlumberger on September 5, 2016. They are: 1) Array Induction log, 2) Neutron Litho density log, and 3) Triple Combo log.

REPORT OF EVENTS

- April 15, 2019 9:30 AM – The pre-test injection flow test begins.
- April 17, 2019 6:00 AM – Tefteller, Inc. runs tandem bottomhole pressure gauges in the well to monitor the falloff portion of the test.
- April 17, 2019 12:00 PM – pre-flow period begins.
- April 20, 2019 12:00 PM – well is flowing at 12.67 GPM with an injection pressure of 1,222 PSI and with an average rate of 13.0 GPM for the 72-hour period. Well is shut-in for falloff test.
- April 30, 2019 12:00 PM - falloff test ends after 240.0 hours. A pressure gradient survey is conducted as pressure gauges are retrieved from well.

GENERAL TEST OPERATIONAL CONSIDERATIONS

The falloff testing for WDW #2 was conducted with tandem bottomhole pressure memory gauges with a pre-flow period beginning at 12:00 PM on April 17, 2019 and ending at 12:00 PM on April 20, 2019. The average flow rate for the 72-hour period prior to the beginning of the falloff test was 13.0 GPM with a final flowing rate of 12.67 GPM. On the morning of April 17, 2019, tandem bottom hole pressure memory gauges were lowered into the well and

allowed to stabilize. Lowering the gauges in the well had no impact on rates and a minimal impact on surface injection pressures. The well was shut-in for 240 hours ending at 12:00 PM on April 30, 2019. Field data are included in Appendix E.

At the end of the falloff test, the bottomhole pressure gauges were pulled from the well making gradient stops every 1,000 feet. Key test data are summarized as follows:

Event	Flow Rate GPM	Surface psig	Bottomhole psig	Date/Time
Start of flow	0.0	774.0	N.A.	4/17/2019 12:00 PM
Final flow rate	12.67	1,222.0	4403.05	4/20/2019 12:00 PM
Final falloff pressure	0.0	693.83	3850.24	4/30/2019 12:00 PM
Final surface pressure	0.0	693.83	N.A.	

The memory gauges used are SP-2000 hybrid-quartz gauges provided by Tefteller, Inc. that have a resolution of 0.01 psi and an accuracy of ±0.05 percent of full scale. The pressure range of the gauges were from 0 – 5,000 psi minimum. The gauges were lowered to the top of the injection interval at 7,312 feet. The recording period was set to record pressures at a minimum of every five minutes and more frequently during the early part of the falloff test period. Calibration certificates are included in Appendix F.

GEOLOGY

The injection zone is the Entrada sandstone formation. The formations occur in WDW #2 at the depths shown in the table below. The injection zone is shown in WDW #2 logs in Appendix D.

Injection Zone Formation	Waste Disposal Well #2 (KB elev = 5,550 ft)	
	MD below KB (ft)	SS Depth (ft)
Bluff Sandstone	Not completed	7,031
Entrada Sandstone	7,312 to 7,470	7,308

The Jurassic aged Entrada Sandstone is thought to be one of the best water disposal rock units in the San Juan Basin. The Entrada is the basal formation of the San Rafael Group which also includes the Todilto and Wanakah Formations. The Entrada Sandstone is present throughout the basin's subsurface and crops out along its margin as step cliffs. The Entrada unconformably overlies the Chinle Formation. The Todilto Formation made up of limestone and anhydrite in dense and thought to an impermeable barrier or seal and likely seal for the injection zone.

The Entrada Sandstone consists of mottled reddish-brown very fine to medium grained well-sorted, silica cemented quartz sandstone interbedded with thinner reddish-brown siltstones. The sandstone units are assembled in high-angle, large-scale crossbeds indicating eolian environment deposition and with the siltstones representing interdue and sabkha deposition. The cross-stratified sandstone is competent, laterally persistent and with homogenous reservoir properties. Entrada Sandstone gross thickness ranges from 60 feet to 330 feet across the basin.

At the WDW #2 location the Entrada is 158 feet thick. Based upon the nearby XTO Energy Ashcroft SWD #1 water disposal well density porosities are up to 18 percent with the most porous interval found in the upper 90 feet of the formation where many of the density porosities

are greater than 10 percent. WDW #2 has a density porosity of 12.1 percent. The two intervals with the highest porosity are 20 feet from 7,333 feet to 7,353 feet with 14.1 percent porosity and 26 feet from 7,442 feet to 7,468 feet with 14.3 percent porosity.

Permeability for the well as measured by this falloff test is 1.73 md or less.

PREVIOUS FALLOFF TESTS

This is the second test for this disposal well. The first test report was submitted on December 12, 2017, with a revised final report that was submitted on March 21, 2918 follow receipt of comments from NMOCD. That test included a flow period of 75 hours with a final flow rate of 13.84 GPM and with a final flowing pressure of 4,396.7 psig bottomhole and 1,226.8 psig at the surface. The well was shut-in for 189.5 hours with a final falloff pressure of 4,012.6 psig bottomhole and 861 psig at the surface. The calculated permeability was 4.24 md or less with a radius to the edge of injected fluid of 77 feet.

ANNULUS PRESSURE TESTING

On June 8, 2017, an Annulus Pressure Test (APT) was conducted. The annulus was pressured up to 510 psig and held for 15 minutes. The test was witnessed by the NMOCD and by the operator. The test report and chart recording of the pressure in included in Appendix G and has been reported to the NMOCD using form C-103.

EVALUATION OF THE TEST RESULTS

The raw test data from the test are included in Appendix E with an injection history in Appendix I. This includes details of the build-up portion of the April 2019 test. These falloff data are presented in Figure 1 showing pressure and temperature during the falloff test. The falloff data show no unexpected pressure changes. The pressure drops quickly during the first few minutes and then continues to decline as the pressure in the reservoir adjusts to the no-flow period.

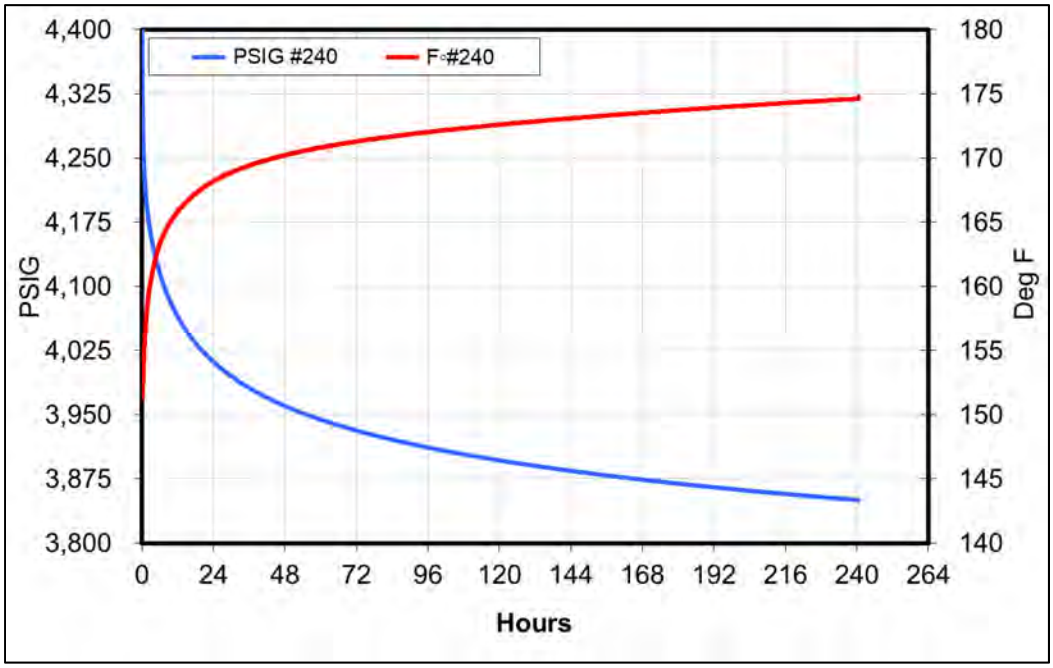


Figure 1 – Falloff Test Pressure and Temperature.

A log-log plot, Figure 2, with a derivative diagnostic plot is used to identify flow regimes as described by Dr. John Lee in chapter 6 of "Estimating Ultimate Recovery of Developed Wells in Low-Permeability Reservoirs" or Monograph 4 published by the Society of Petroleum Evaluation Engineers (SPEE) in 2016. Figure 6.5 of that chapter notes that a slope of ½ is characteristic of transient linear flow. This plot shows a slope over 1.0 for the first 0.15 hours after which the slope of near to 0.25 through 10 hours and then drops to a slope of 0.10 at the end of the test. The early time data exhibits limited storage effects after which bi-linear flow is dominant for about ten hours. The later time data is more reasonably represented with a radial flow model. Figure 6.6 of the SPEE monograph describes a bilinear flow regime which has a slope of ¼ of 0.25. The bilinear flow regime is (page 122) "caused by both linear flow in a fracture (with significant pressure drop from fracture tip to wellbore) and by linear flow in the reservoir toward the fracture". The bilinear flow pattern is very near to the flow pattern observed with the drawdown data for WDW #2 for about ten hours after which radial flow patterns dominate the falloff data.

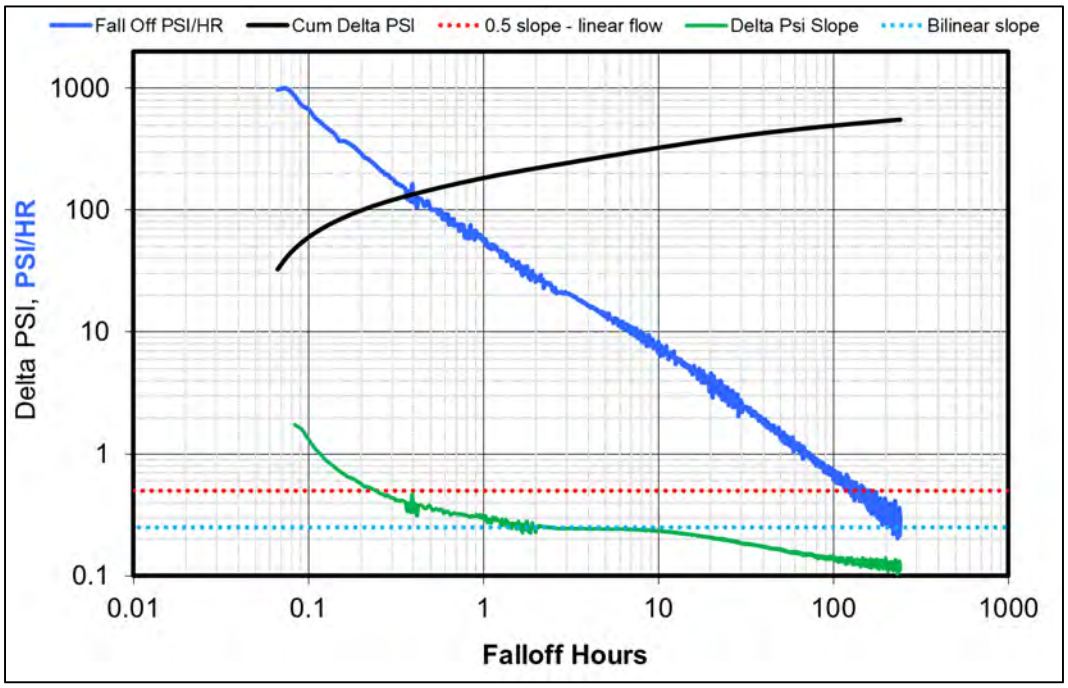


Figure 2 – Flow Regime Identification

The early portion of the test is shown in detail in Figure 3 with pressures from 0 to 36 hours which range from 4,370.45 psig to 3,981.72 psig. The pressure decline is a smooth decline and is flattening over time as expected.

Figure 4 shows the linear characteristics of the falloff test in some detail. It is a plot of falloff pressure versus $\sqrt{t+\Delta t}-\sqrt{\Delta t}$ where t is flow time in hours and Δt is falloff time in hours. Flow time is derived from the total fluid injected and the final flow rate as follows:

- Cumulative injection: 56,196 gallons
- Final flowing rate: 12.67 GPM
- Equivalent flowing time (hours): Gallons/(GPM X 60) = 56,196/(12.67*60)
- Equivalent flowing time (hours): 73.92 hours

The pressure data, Figure 4, are linear beginning at 0.6 on the x axis. Projection of the data to estimated reservoir pressure is shown in Figure 5. This trend extrapolates to 3,700 psig which is the apparent reservoir pressure. The data shows no indication of ending of a linear flow straight line or of reservoir boundaries when the falloff test ends after 240 hours.

Figure 3 – Pressure vs Time for the Early Part of the Falloff Test.

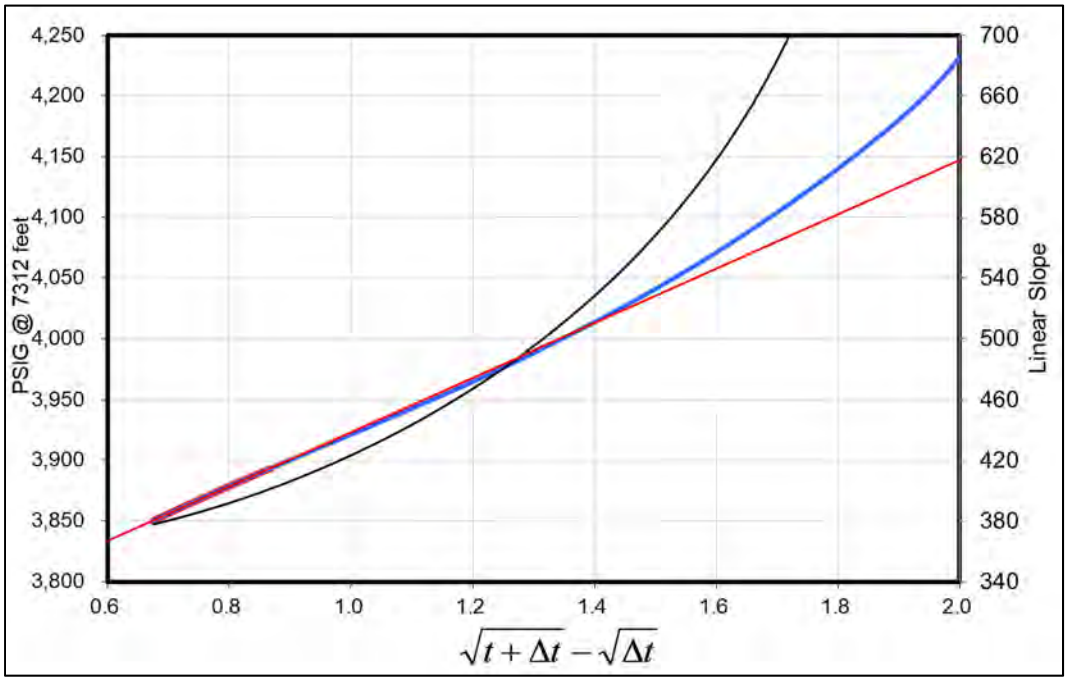


Figure 4 – Pressure vs. $\sqrt{t+\Delta t}-\sqrt{\Delta t}$

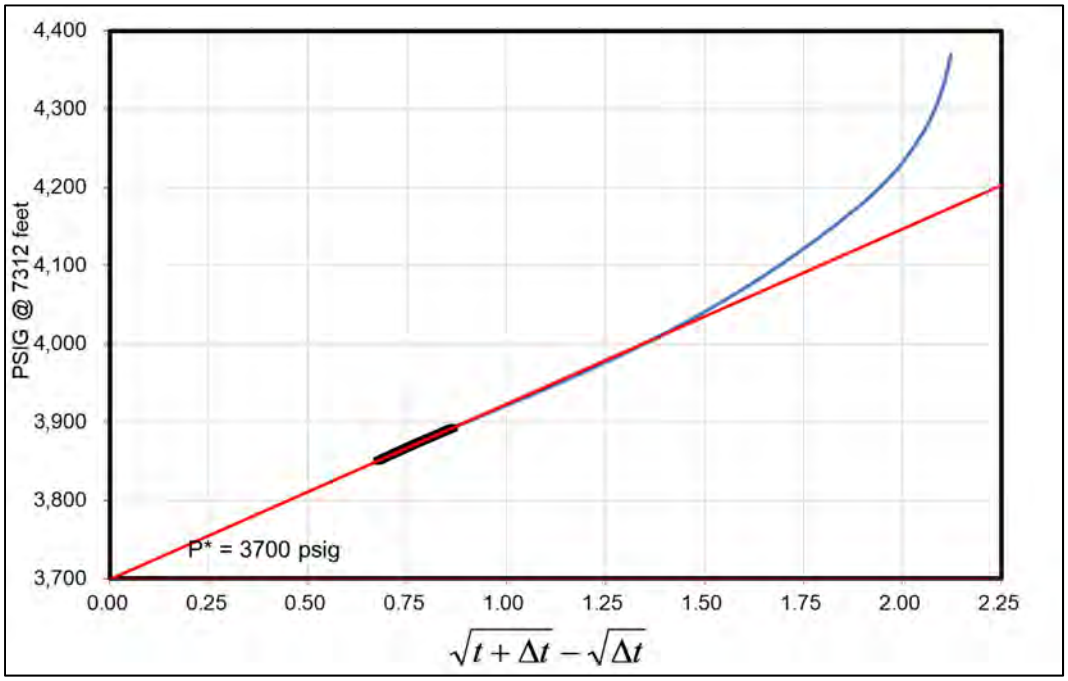


Figure 5 – Pressure vs. $\sqrt{t+\Delta t}-\sqrt{\Delta t}$

A traditional Horner plot, Figure 6, shows an increasing slope throughout the falloff test. When a straight line is obtained on a Horner plot, the slope of the line can be used to determine the permeability as described in "Pressure Buildup and Flow Test in Wells" published by the Society of Petroleum Engineers (SPE) in 1967. Chapter 3 (pages 18 to 34) describes the process. Because of the increasing slope at the end of the test, permeability cannot be directly measured from the test data with standard radial flow techniques. As the slope increases, calculated permeability decreases. The final trend extrapolated to 3,795 psig is the apparent maximum reservoir pressure because of the increasing slope at the end of the test. The slope measured at the end of the falloff on Figure 6 is a minimum slope possible straight-line segment. Because the slope is increasing at the end of the falloff test, it is expected to increase to higher levels had the falloff test been continued for a longer period. At the end of the test, the measured slope becomes the minimum possible Horner slope. This minimum slope yields a maximum permeability with the actual permeability not directly measurable from this test. Figure 7 shows increased detail of the Horner plot data at the end of the falloff test.

To better understand flow regimes and permeability a type curve analysis was prepared using the SPE Monograph 5 "Advances In Well Test Analysis" type curves Figures C.18 and C.19 prepared by Gringarten, Ramey and Raghavan. These type curves provide dimensionless pressure for vertically fractured wells in the center of a closed square with no well bore storage. Figure C.18 addresses infinite-conductivity fractures and Figure C.19 addresses uniform flux fractures. Both address boundary dominated flow with x_e/x_f ratios from 1 to 10 and the uniform flux solution shows boundary ratios to 20. For convenience, the figures are included in this report as Figures 8 and 9. Figure 10 is a composite of the trendlines on from Figures 8 and 9 showing how the uniform flux fracture and the infinite conductivity fracture compare.

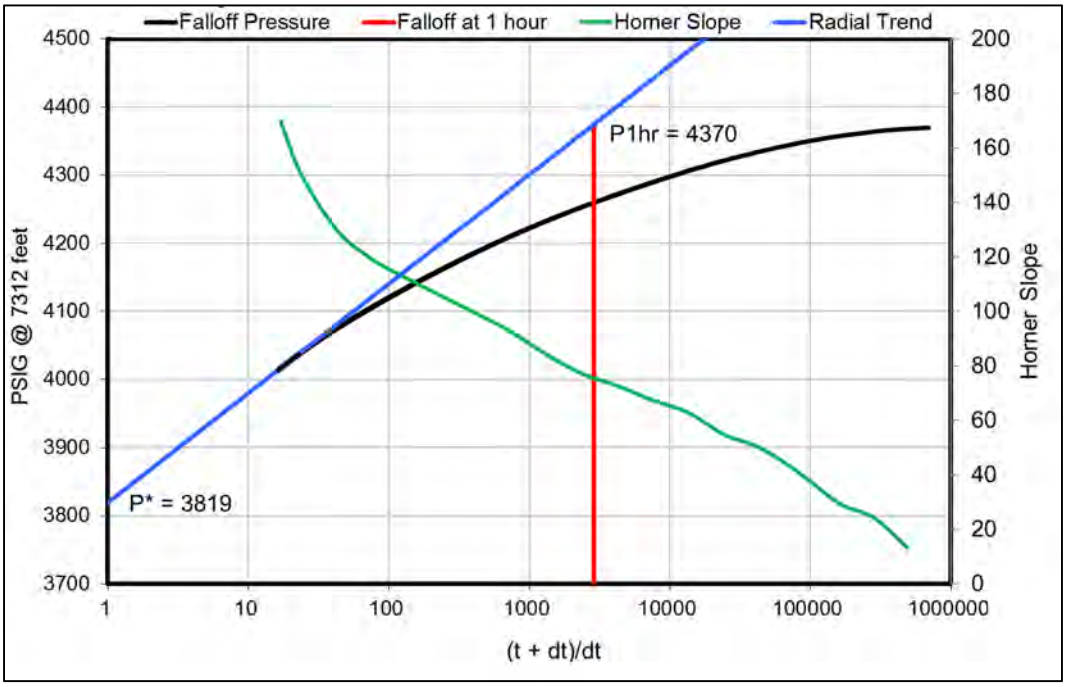


Figure 6 – Traditional Horner Plot

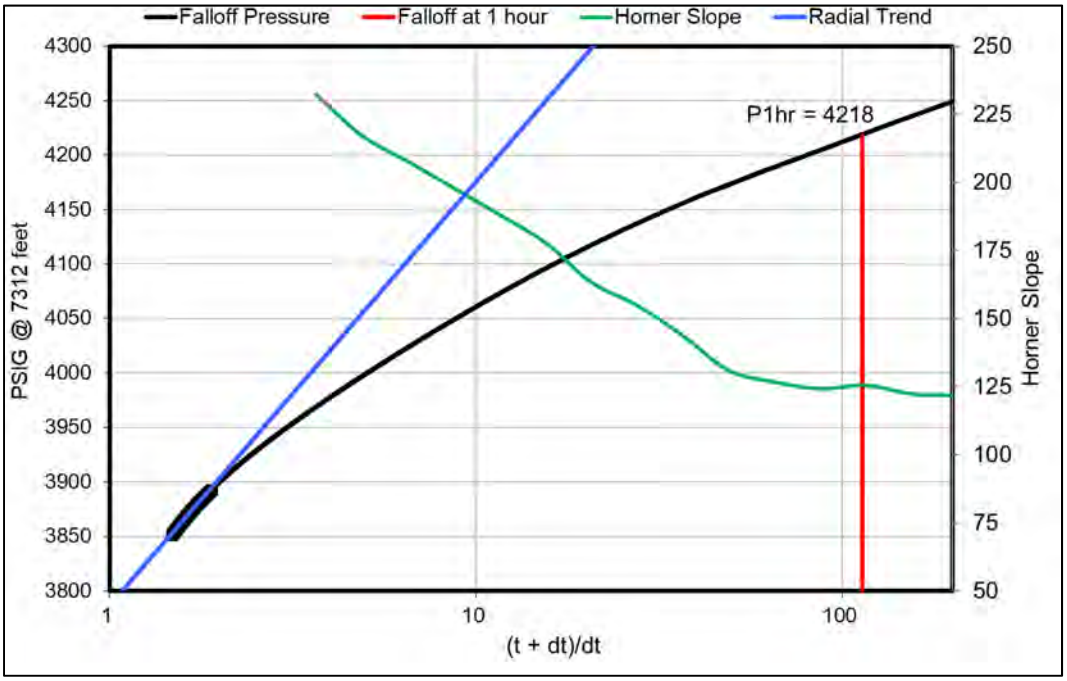


Figure 7 – Detail of Horner Plot at the End of the Falloff Test.

Figures 8 and 9 are both used to better understand the flow regime. During the early segment of the falloff test the data indicated fracture flow with a uniform flux fracture or a fracture with pressure drops in the fracture. During the late portion of the test, the flow is best matched with the infinite conductivity fracture. No signs of reservoir boundaries are seen in drawdown data. The drawdown data show that the fracture has damage near the wellbore and has little or no damage away from the wellbore as is shown in Figure 10.

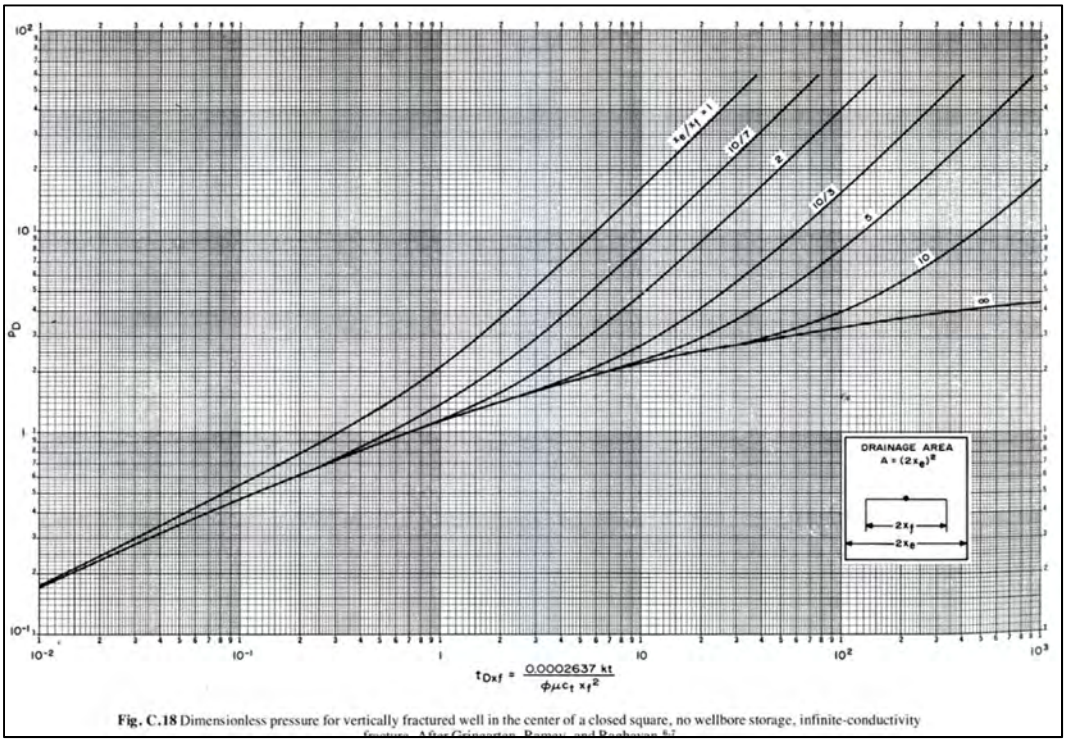


Fig. C.18 Dimensionless pressure for vertically fractured well in the center of a closed square, no wellbore storage, infinite-conductivity

Figure 8 – SPE Monograph 5 Type Curve C.18.

In Figure 10, the delta PSI curve from Figure 2 is imposed on the type curves 8 and 9 which provides a positive match of the data. The falloff test data match the type curve when the horizontal $t_{dxf} = 1.00$ and t = 0.533 hours and when the vertical $P_d = 1.0$ and Delta P = 133.

This match shows that the falloff test is in transient linear flow for about 30 minutes after which the flow regime begins a transition to a transient radial flow regime. At the end of the drawdown's 240 hours, the flow regime is a transient radial flow regime and no reservoir boundaries have been encountered. The absence of observed boundary effects shows that the X_e/X_f ratio for the flow system is 20 or greater. The type curve analysis with the fit noted gives a calculated permeability of 1.76 md and a fracture half-length of 28 feet. The distance to the boundary is known to be more than a factor of 20 times the half-length or more than 563 feet.

Absent the presence of reservoir boundaries, the Horner analysis for radial flow does not provide a reliable reservoir permeability and this was supplemented with linear flow analysis and type curve analysis. The linear flow analysis likewise provides only indications of reservoir properties. For this reason, the type curve permeability of 1.76 md is considered a more reliable measurement than the 1.73 md determined with radial and linear flow analysis. Both are similar in the 2019 test giving some confidence that a reasonable permeability has been calculated.

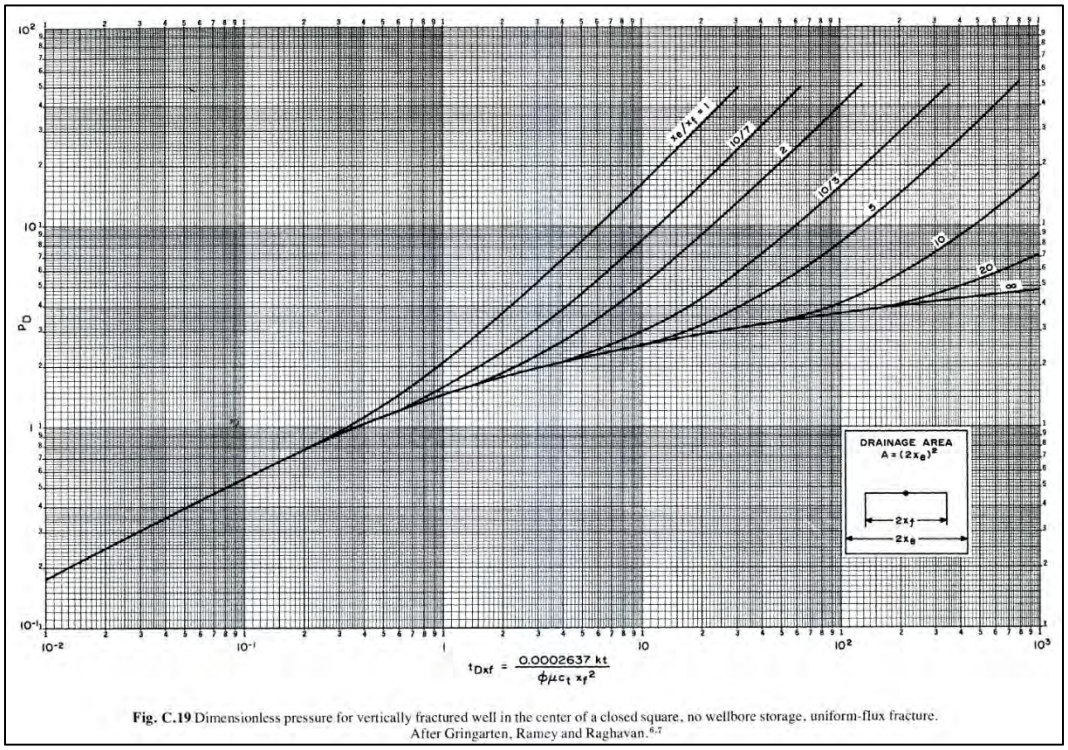


Fig. C.19 Dimensionless pressure for vertically fractured well in the center of a closed square, no wellbore storage, uniform-flux fracture. After Gringarten, Ramey and Raghavan.[6,7]

Figure 9 – SPE Monograph 5 Type Curve C.19.

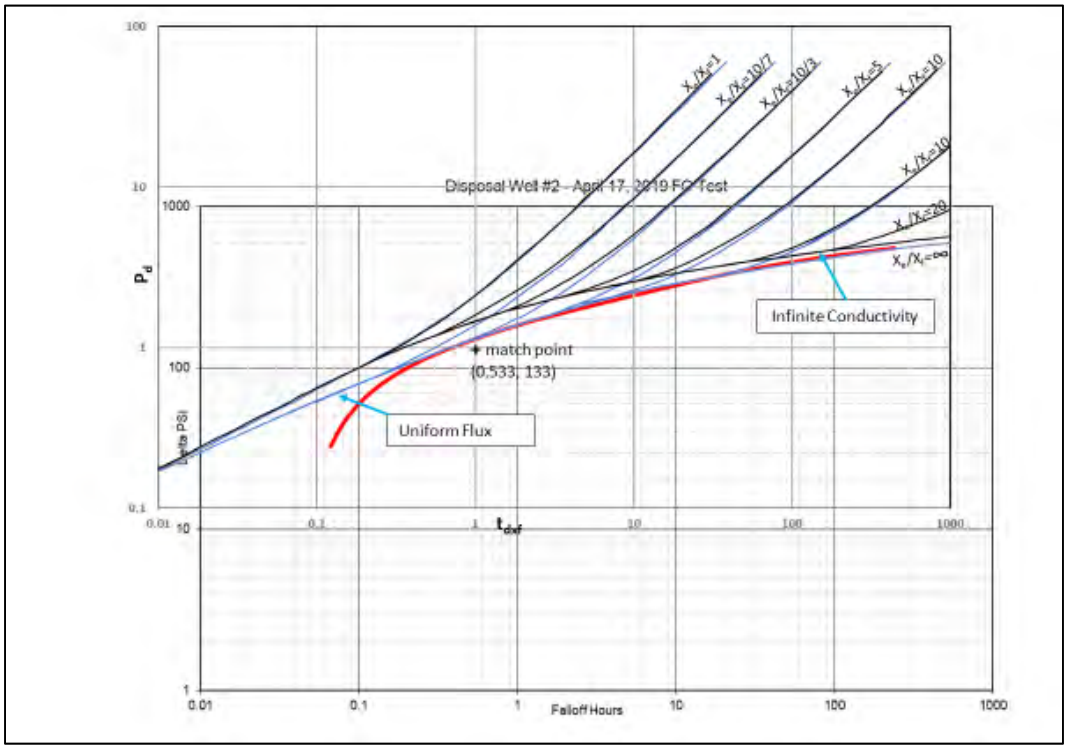


Figure 10 – Type Curve Match.

It is our opinion that during the falloff test, the data transitioned from transient linear flow to transient radial flow and no boundary effects were observed during the 240-hour pressure falloff test.

LONG-TERM PERFORMANCE

Figure 11 is a history of pressures and injection rates. Wellhead injection pressures have been at 1,419 psig or less and are typically less than 1,300 psig. The maximum injection rate is 41.84 GPM with rates in normally from 15 GPM to 35 GPM.

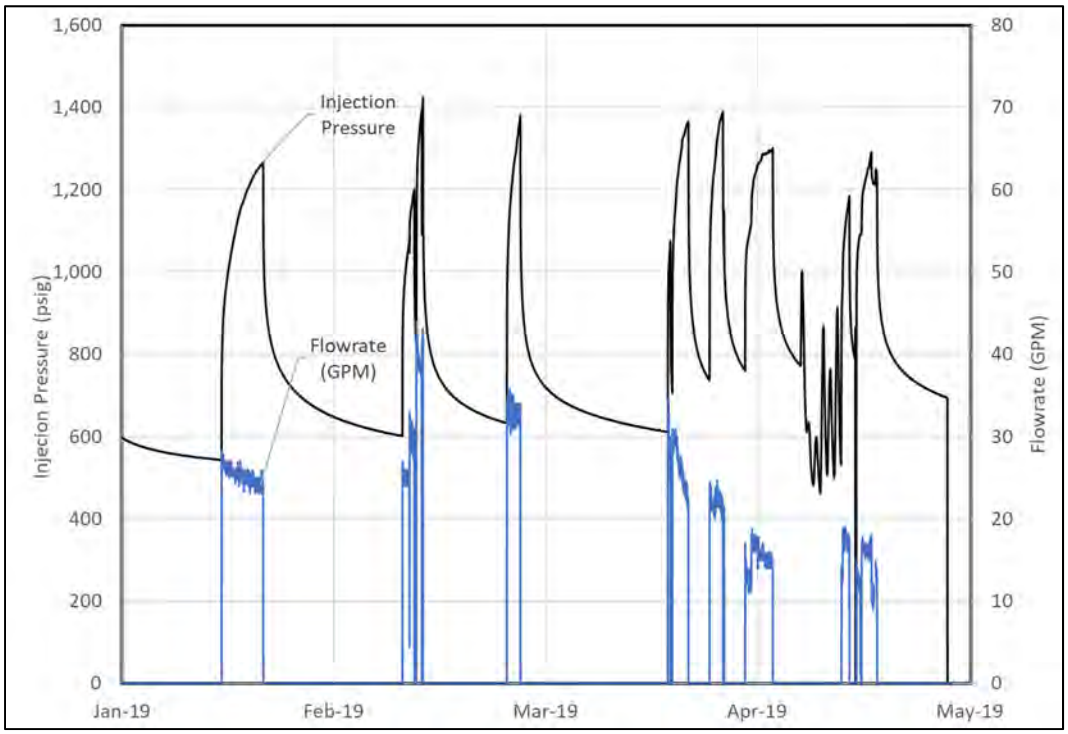


Figure 11 – WDW #2 2019 Pressure History.

Figure 12 shows the stabilized flow period of 72 hours prior to beginning the falloff test. The final flowing rate is 12.67 GPM with a final flowing wellhead pressure of 1,222.0 psig. The injection rates for the pre falloff flow test range from a maximum rate of 19 GPM to a final rate of 12.67 GPM with an average rate of 13.0 GPM.

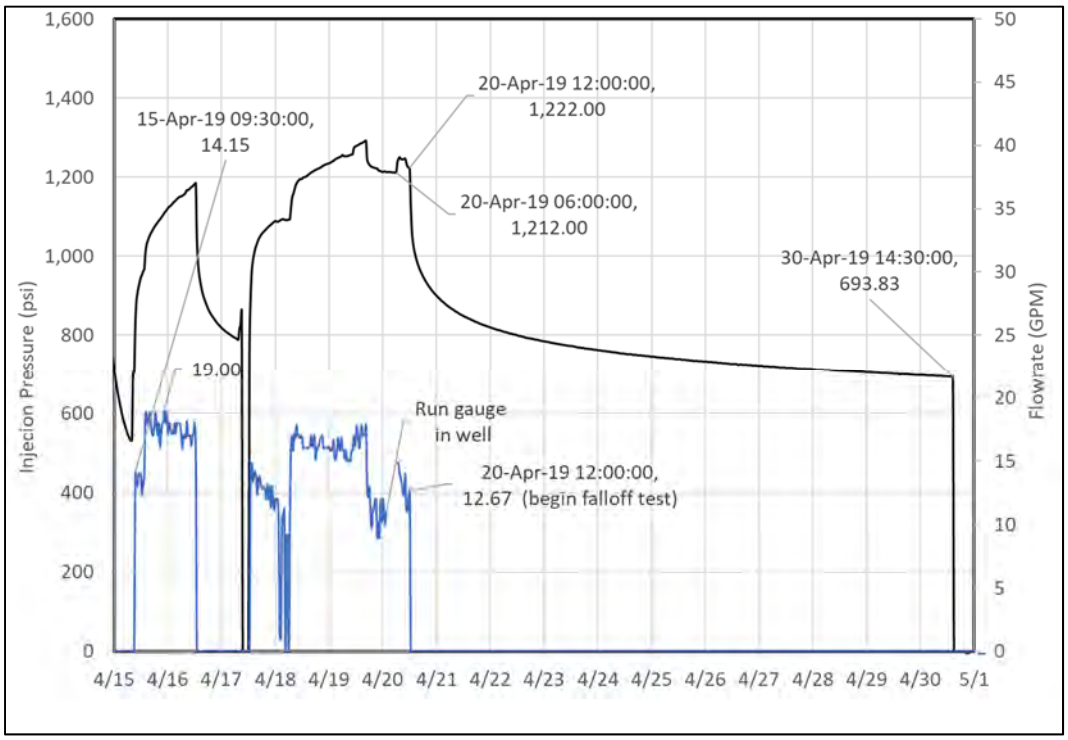


Figure 12 – WDW #2 2019 Pressure History for Stabilized Period Prior to Falloff Test.

CALCULATIONS

Calculations for permeability with an assumed Horner plot straight line, for time for a pressure transient to reach the edge of the injected water, traditional skin factor and for fracture half length are included.

1. Permeability:

$$\frac{kh}{\mu} = \frac{162.6qB}{m}$$

Where:

q = final flowing rate- BOPD
B = formation volume factor
m = slope from Horner plot of pressure vs log((t+dt)/dt)
k = permeability – md
h = net pay – feet perforated
μ = viscosity - cp
q = 12.67 GPM
q = 434 BWPD
B = 1.0
m = 156.46 or more (stabilized slope not observed on test)

$$\frac{kh}{\mu} = \frac{162.6qB}{m} = \frac{(162.6)(12.67)(24)\left(\frac{60}{42}\right)(1.0)}{156} / 156.46 = 451 \text{ md-ft/cp or less}$$

kh = (451*0.47) = 212 md-ft or less
k = 212/123 = 1.73 md or less

2. **Radius to edge of injected fluid:**

$$r_{waste} = \sqrt{\frac{0.13368V}{\pi\phi h}}$$

Where:

V = total volume injected, gallons

ϕ = porosity of injection zone - ratio

h = net pay of injection zone in feet

μ = viscosity in cp

V = 56,196 gallons

ϕ = 0.149 (average of perforated interval)

h = 123 feet (perforated interval)

μ = 0.47 cp

$c_t = s_w c_{ws} + c_f = (0.149)(0.00000230)+0.00000410) = 0.00000444$

$r_{waste} = ((0.13368)(56,196)/(\pi(0.149)(123))^{(0.5)} = 11$ feet

3. **Time to reach edge of injected fluid:**

$$t_{waste} = \frac{948\, c_t \mu r_{waste}^2}{k}$$

Where:

$t_{waste} = (948)\ (0.00000444)\ (0.47)\ (11^2)/1.73 = 0.1$ hours or more

4. **Skin factor (with radial flow):**

$$S = 1.151\left[\frac{p_{wf} - p_{1hr}}{m} - \log\left(\frac{k}{\phi\mu c_t r_w^2}\right) + 3.23\right]$$

Where:

p_{wf} = final flowing pressure, psi

p_{1hr} = projected pressure at 1 hour using radial flow straight line, psi

r_w = wellbore radius - feet

p_{wf} = 4403.05 psig

p_{1hr} = 4217.82 psig

r_w=0.3281feet

S = 1.151[(4403.05-4217.82)/156.46 –
log(1.73/((0.149)(0.47)(0.00000444)$(0.3281)^2$)+3.23]

S = -3.80

5. **Fracture half length:**

$$X_f\sqrt{k} = \frac{4.064qB}{m_L h}\sqrt{\left(\frac{\mu}{\phi c_t}\right)}$$

Where:

m_L = slope from linear flow chart of pressure vs $\sqrt{t+\Delta t} - \sqrt{\Delta t}$

m_L = 223.85

$X_f k^{0.5} = (4.064)(434)(1.0)/((223.85)(123)(0.47/((0.149)(0.00000444)))^{0.5} =$

$= 54$ ft $\sqrt{md}$

$X_f = 54/1.73^{0.5} = 41$ cumulative feet or more

6. Type Curve Analysis:

Where:

$t_{dxf} = 0.0002637kt/(\phi\ \mu c_t X_f^2)$

$\Delta P = 141.2QB\mu P_d/(KH)$

$kh = 141.2QB\mu P_d/(\Delta P\ )$

$X_f^2 = 0.0002637kt/(\ t_{dxf}\ \phi\ \mu c_t)$

Type Curve Match Point ON Figure 7C:

$\Delta P = 133.3$ psi at $P_d = 1.0$

$T = 0.533$ hours at $t_{dxf} = 1.0$

Match points show:

1) early time transient linear flow,
2) late time transient radial flow,
3) no reservoir or drainage boundary,

$kh = 141.2(434)(1.0)(0.47)*(133.33)/(100) = 216.21$ md-ft

$k = 1.76$ md

$X_f^2 = 0.0002637(1.76)(0.533)/(\ (1.0)(0.149)(0.47)(0.00000444) = 793.7\ ft^2$

$X_f = 28$ feet

AREA OF REVIEW (AOR) UPDATE

The area of review is shown on Figure 13 with the data attached as Appendix H which shows all wells known to have been drilled within a one-mile radius of WDW #2. There are 57 wells in the one-mile radius of investigation. One of these fifty-seven wells, Ashcroft SWD #1, penetrates the Entrada injection zone. This well is 0.64 miles from the disposal well and is an active water disposal well. No wells are currently producing form the Entrada injection zone within the AOR.

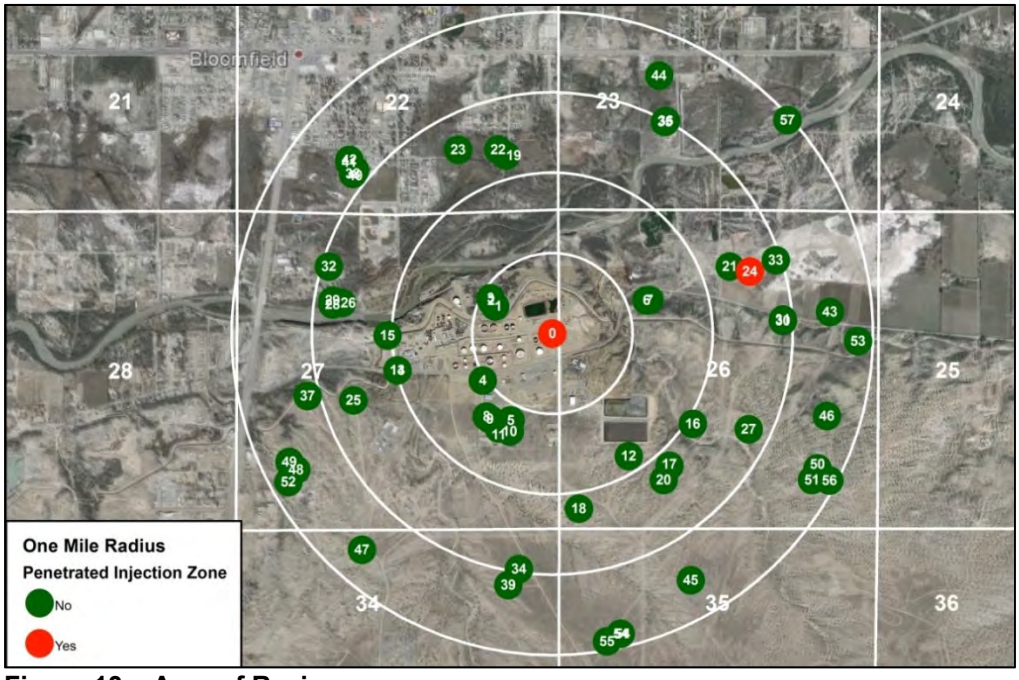


Figure 13 – Area of Review.

CONCLUSIONS

All testing was successful and meets both the OCD and EPA requirements. Western Refining fulfills all analysis and reporting requirement of the USEPA's "Pressure Falloff Testing Guideline, Third Revision", issued by Region 6, and dated August 8, 2002, with the submittal of this report. Pressure falloff and bottomhole pressure testing were conducted according to these guidelines.

LIST OF APPENDICES

- Appendix A: Well bore schematic for Disposal Well #1
- Appendix B: Summary of injection intervals
- Appendix C: Injection and formation fluid analysis
- Appendix D: Well Logs
- Appendix E: April 17, 2019 Falloff test data
- Appendix F: Test gauge calibration certificates
- Appendix G: Mechanical Integrity Test Report (MIT)
- Appendix H: Table of wells in a one-mile radius
- Appendix I: Injection History

APPENDIX A

Well Bore Schematic for Disposal Well #2

Table 2: A wellbore diagram showing the current configuration of the wellbore.

Well/Facility:	SWD #2	Well Status:	Current
Operator:	Western Refinery	Orig Oper:	
Lease/Op Agmt:		Inj Interval:	
Field:	Entrada	API #:	
County:	San Juan	GR/KB:	14.5'
State:	NM	TD:	7525' KB
Spud:	8/15/2016	PBTD:	7490' KB
Comp. Date:		WI:	
1st Prod:		NRI:	
Xmas tree:			
Surface Loc:	2028' fnl & 111' fel		
Sec-Twn-Rge:	Sec 27/T29N/11W		
Comments:	9/7/2017 - Started Injection/Water Disposal Operations		

Geologic Markers	
MD	Formation
Surface	Quaternary Alluv
10'	Nacimiento
515'	Ojo Alamo
625'	Kirtland
1203'	Fruitland
1718'	Pictured Cliffs
1850'	Lewis
2660'	Huerfanito Bentonite
2688'	Chacra
2877'	Lower Lewis
3337'	Cliff House
3389'	Menefee
4045'	Point Lookout
4432'	Mancos Shale
5301'	Niobrara A
5400'	Niobrara B
5526'	Niobrara C
6606'	Gallup
6848'	Juana Lopez
5966'	Carlile
6055'	Greenhorn
6117'	Graneros
6161'	Dakota
6357'	Burro Canyon
6417'	Morrison
7031'	Bluff Sandstone
7150'	Wanakah
7276'	Todilto
7308'	Entrada
7470'	Chinle
7525'	TD

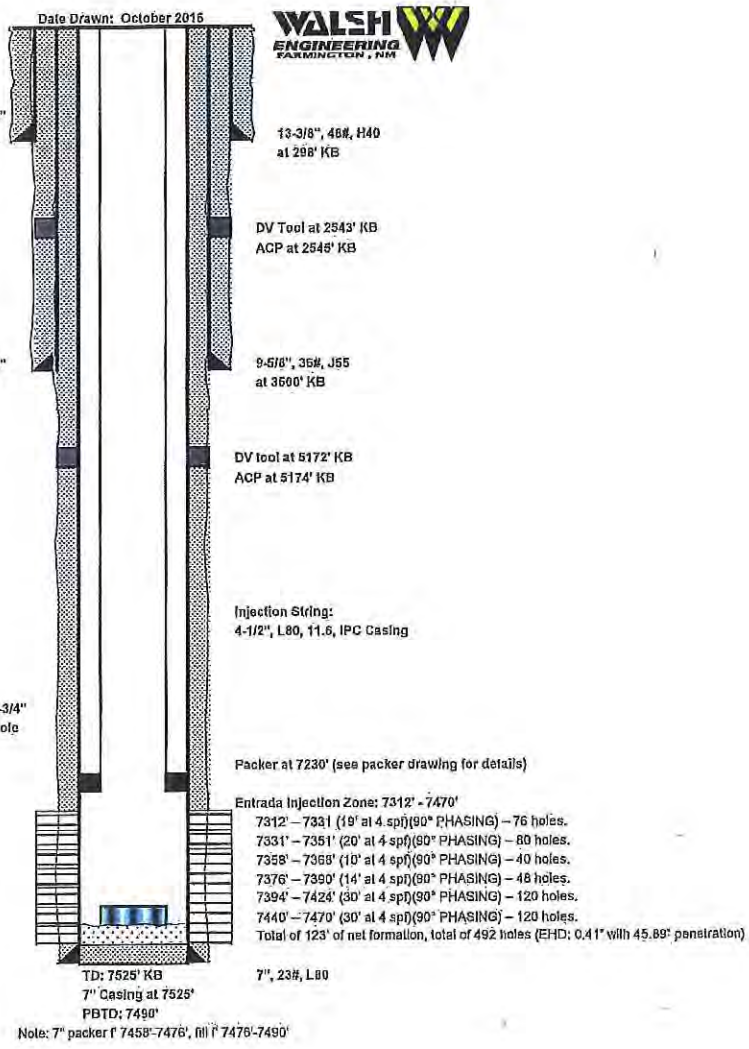
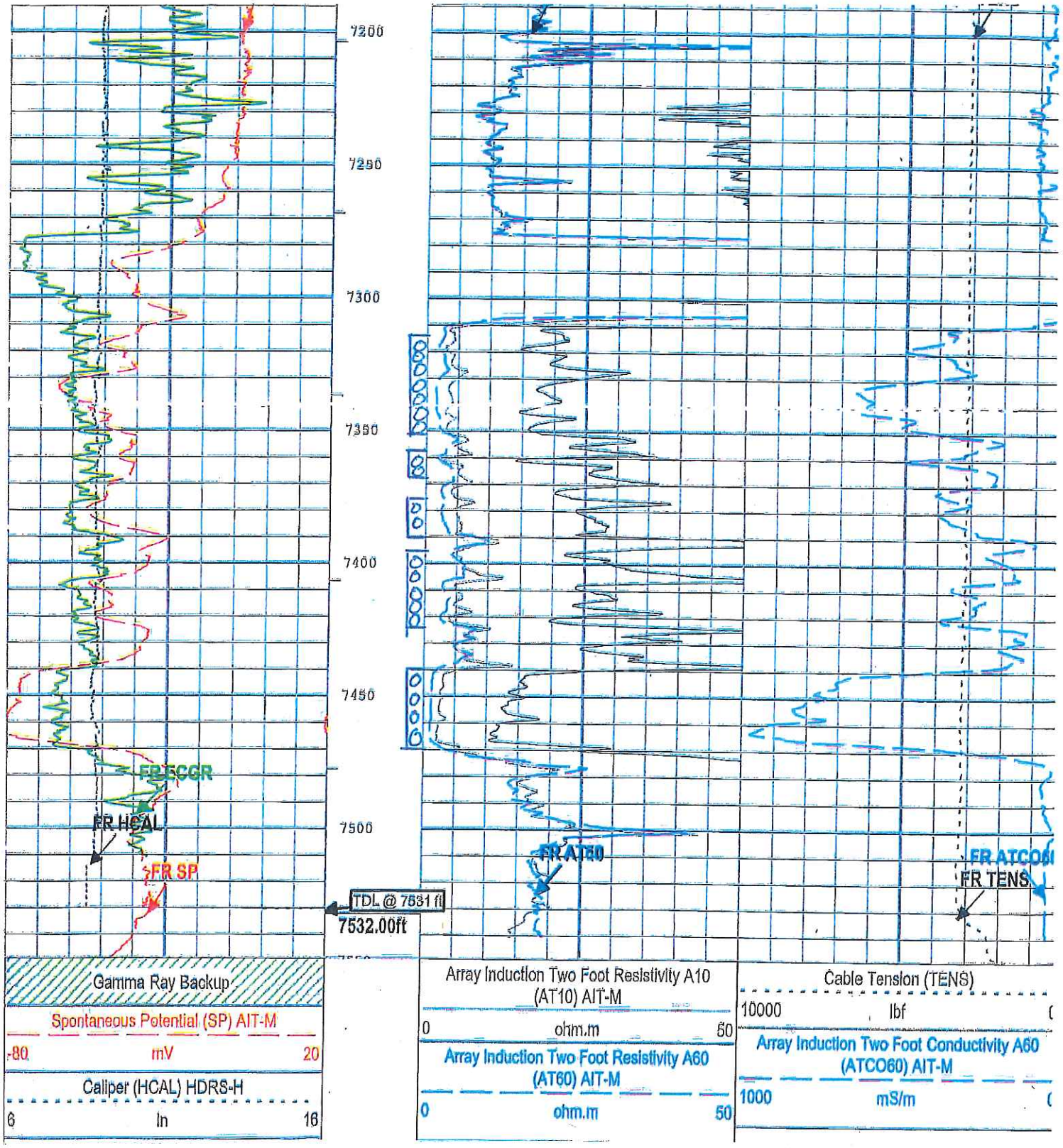


Table 1: A copy of the well log showing the Entrada interval to be tested.



APPENDIX B

Summary of Injection Intervals

Appendix B

Western Refining Southwest, Inc.

Waste Disposal Well #2

Injection Intervals

Formation	Top	Base
Entrada	7312'	7470'

APPENDIX C

Injection and Formation Fluid Analysis

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

February 01, 2017

Kelly Robinson
Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413
TEL: (505) 632-4135
FAX (505) 632-3911

RE: DWD #2

OrderNo.: 1701A75

Dear Kelly Robinson:

Hall Environmental Analysis Laboratory received 1 sample(s) on 1/26/2017 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **1701A75**
Date Reported: **2/1/2017**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: DWD #2
Lab ID: 1701A75-001 **Matrix:** AQUEOUS

Client Sample ID: DWD 2 Formation Water
Collection Date: 1/25/2017 11:00:00 AM
Received Date: 1/26/2017 7:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst: **MRA**	
Fluoride	ND	2.0		mg/L	20	1/26/2017 6:37:17 PM	R40335
Chloride	23000	2500	*	mg/L	5E	1/27/2017 7:20:01 PM	R40361
Bromide	ND	2.0		mg/L	20	1/26/2017 6:37:17 PM	R40335
Phosphorus, Orthophosphate (As P)	ND	10		mg/L	20	1/26/2017 6:37:17 PM	R40335
Sulfate	910	25	*	mg/L	50	1/27/2017 7:07:36 PM	R40361
Nitrate+Nitrite as N	ND	20		mg/L	100	1/27/2017 7:32:26 PM	R40361
SM2510B: SPECIFIC CONDUCTANCE						Analyst: **JRR**	
Conductivity	94000	50		µmhos/cm	50	1/30/2017 1:40:54 PM	R40366
SM2320B: ALKALINITY						Analyst: **JRR**	
Bicarbonate (As CaCO3)	255.3	20.00		mg/L CaCO3	1	1/30/2017 11:39:53 AM	R40366
Carbonate (As CaCO3)	ND	2.000		mg/L CaCO3	1	1/30/2017 11:39:53 AM	R40366
Total Alkalinity (as CaCO3)	255.3	20.00		mg/L CaCO3	1	1/30/2017 11:39:53 AM	R40366
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**	
Total Dissolved Solids	48900	2000	*D	mg/L	1	2/1/2017 3:56:00 PM	29970
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: **pmf**	
Calcium	1700	20		mg/L	20	1/30/2017 10:59:56 AM	29930
Magnesium	200	20		mg/L	20	1/30/2017 10:59:56 AM	29930
Potassium	450	20		mg/L	20	1/30/2017 10:59:56 AM	29930
Sodium	16000	500		mg/L	500	1/30/2017 11:06:12 AM	29930

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

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LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Hall Environmental
Project: Not Indicated
Lab ID: B17011690-001
Client Sample ID: 1701A75-001C DWD 2 Formation Water

Report Date: 01/27/17
Collection Date: 01/25/17 11:00
DateReceived: 01/27/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
CORROSIVITY							
pH	6.46	s.u.		0.10		SW9040C	01/27/17 10:54 / jmg

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

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College Station, TX 888.690.2218 • Gillette, WY 866.686.7175 • Helena, MT 877.472.0711

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Hall Environmental
Project: Not Indicated

Report Date: 01/27/17
Work Order: B17011690

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW9040C							Analytical Run: ORION 720A HZW_170127A		
Lab ID: ICV	Initial Calibration Verification Standard								01/27/17 10:54
pH	8.11	s.u.	0.10	101	98	102			
Method: SW9040C									Batch: R273974
Lab ID: B17011690-001ADUP	Sample Duplicate					Run: ORION 720A HZW_170127A			01/27/17 10:54
pH	8.49	s.u.	0.10				0.5	3	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701A75**

01-Feb-17

Client: Western Refining Southwest, Inc.

Project: DWD #2

Sample ID **MB**	SampType: **mblk**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R40335**	RunNo: **40335**
Prep Date:	Analysis Date: **1/26/2017**	SeqNo: **1264291** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.10								
Bromide	ND	0.10								
Phosphorus, Orthophosphate (As P	ND	0.50								

Sample ID **LCSb**	SampType: **lcs**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R40335**	RunNo: **40335**
Prep Date:	Analysis Date: **1/26/2017**	SeqNo: **1264293** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.52	0.10	0.5000	0	104	90	110			
Bromide	2.4	0.10	2.500	0	96.4	90	110			
Phosphorus, Orthophosphate (As P	4.8	0.50	5.000	0	96.7	90	110			

Sample ID **MB**	SampType: **mblk**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R40361**	RunNo: **40361**
Prep Date:	Analysis Date: **1/27/2017**	SeqNo: **1265117** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								
Sulfate	ND	0.50								
Nitrate+Nitrite as N	ND	0.20								

Sample ID **LCS**	SampType: **lcs**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R40361**	RunNo: **40361**
Prep Date:	Analysis Date: **1/27/2017**	SeqNo: **1265118** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.8	0.50	5.000	0	95.5	90	110			
Sulfate	9.7	0.50	10.00	0	97.2	90	110			
Nitrate+Nitrite as N	3.5	0.20	3.500	0	98.8	90	110			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701A75**

01-Feb-17

Client: Western Refining Southwest, Inc.

Project: DWD #2

Sample ID **MB-29930**	SampType: **MBLK**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **PBW**	Batch ID: **29930**	RunNo: **40375**
Prep Date: **1/27/2017**	Analysis Date: **1/30/2017**	SeqNo: **1265583** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Sodium	ND	1.0								

Sample ID **LCS-29930**	SampType: **LCS**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **LCSW**	Batch ID: **29930**	RunNo: **40375**
Prep Date: **1/27/2017**	Analysis Date: **1/30/2017**	SeqNo: **1265584** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	49	1.0	50.00	0	98.3	80	120			
Magnesium	49	1.0	50.00	0	97.3	80	120			
Potassium	47	1.0	50.00	0	94.9	80	120			
Sodium	48	1.0	50.00	0	95.4	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701A75**

01-Feb-17

Client: Western Refining Southwest, Inc.

Project: DWD #2

Sample ID **mb-1**	SampType: **mblk**	TestCode: **SM2320B: Alkalinity**
Client ID: **PBW**	Batch ID: **R40366**	RunNo: **40366**
Prep Date:	Analysis Date: **1/30/2017**	SeqNo: **1266120** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20.00								

Sample ID **lcs-1**	SampType: **lcs**	TestCode: **SM2320B: Alkalinity**
Client ID: **LCSW**	Batch ID: **R40366**	RunNo: **40366**
Prep Date:	Analysis Date: **1/30/2017**	SeqNo: **1266121** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	78.04	20.00	80.00	0	97.6	90	110			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1701A75**

01-Feb-17

Client: Western Refining Southwest, Inc.

Project: DWD #2

Sample ID **MB-29970**	SampType: **MBLK**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **PBW**	Batch ID: **29970**	RunNo: **40436**
Prep Date: **1/31/2017**	Analysis Date: **2/1/2017**	SeqNo: **1267368** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID **LCS-29970**	SampType: **LCS**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **LCSW**	Batch ID: **29970**	RunNo: **40436**
Prep Date: **1/31/2017**	Analysis Date: **2/1/2017**	SeqNo: **1267369** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1010	20.0	1000	0	101	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank
D	Sample Diluted Due to Matrix	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits
ND	Not Detected at the Reporting Limit	P	Sample pH Not In Range
R	RPD outside accepted recovery limits	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: Western Refining Southw Work Order Number: 1701A75 RcptNo: 1

Received by/date: AT 01/26/17

Logged By: Anne Thorne 1/26/2017 7:05:00 AM Anne Thorne

Completed By: Anne Thorne 1/26/2017 9:13:16 AM Anne Thorne

Reviewed By: 1/26/17

Chain of Custody

1. Custody seals intact on sample bottles?	Yes ☐	No ☐	Not Present ☑
2. Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
3. How was the sample delivered?	Courier		

Log In

4. Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
5. Were all samples received at a temperature of >0° C to 6.0°C	Yes ☑	No ☐	NA ☐
6. Sample(s) in proper container(s)?	Yes ☑	No ☐	
7. Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
8. Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
9. Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
10. VOA vials have zero headspace?	Yes ☐	No ☐	No VOA Vials ☑
11. Were any sample containers received broken?	Yes ☐	No ☑	
12. Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	
13. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
14. Is it clear what analyses were requested?	Yes ☑	No ☐	
15. Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	

# of preserved bottles checked for pH: 2 (<2 or >12 unless noted)

Adjusted? NA

Checked by: LA

Special Handling (if applicable)

16. Was client notified of all discrepancies with this order? Yes ☐ No ☐ NA ☑

Person Notified: Date

By Whom: Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding:

Client Instructions:

17. Additional remarks:

18. **Cooler Information**

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.0	Good	Yes			

Chain-of-Custody Record

Client: Western Refining

Mailing Address: 50 CR 4990
Bloomfield, NM 87413

Phone #: 505-632-4169

email or Fax#:

QA/QC Package:
☒ Standard ☐ Level 4 (Full Validation)

Accreditation
☐ NELAP ☐ Other _____

☐ EDD (Type) _____

Turn-Around Time:
☐ Standard ☒ Rush 2-day

Project Name:
DWD#2

Project #:
PO-12619031-2

Project Manager:
Kelly Robinson

Sampler: Matt Kraklow

On Ice: ☒ Yes ☐ No

Sample Temperature: 1.0

HALL ENVIRONMENTAL ANALYSIS LABORATORY
www.hallenvironmental.com
4901 Hawkins NE - Albuquerque, NM 87109
Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1701475	BTEX + MTBE + TMB's (8021)	BTEX + MTBE + TPH (Gas only)	TPH 8015B (GRO / DRO / MRO)	TPH (Method 418.1)	EDB (Method 504.1)	PAH's (8310 or 8270 SIMS)	RCRA 8 Metals	Anions (F,Cl,NO_3,NO_2,PO_4,SO_4)	8081 Pesticides / 8082 PCB's	8260B (VOA)	8270 (Semi-VOA)	See attachment				Air Bubbles (Y or N)
1-25-17	11:00	H_2O	DWD2 Formation water	1-500ml	Poly	001												X				
				1-500ml	HNO_3	001												X				
				1-125ml	H_2SO_4	001												X				

Remarks:

Date:	Time:	Relinquished by:	Received by:	Date	Time
1/25/17	1447			1/25/17	1447
1/25/17	1806			01/26/17	0705

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

All Anions	EPA Method 300.0	1-500ml unpreserved plastic 1-125 ml H_2SO_4 plastic
Alkalinity	SM2320 B	Volume will come from the 500ml unpreserved plastic
eC	SM 2510B	Volume will come from the 500ml unpreserved plastic
TDS	SM 2540 C	Volume will come from the 500ml unpreserved plastic
Cations	EPA Method 200.7	1-500ml HNO_3 Plastic
pH	EPA Method 9040	Volume will come from the 500ml unpreserved plastic

SM = Standard Methods
EPA Methods 310.1, 150.1, 160.1, 320.1 and 120.1 have been withdrawn by EPA. Most labs ha
We are accredited for all of the tests listed above and we perform these methods regularly for t

We will ship out one bottle set today as listed below. Fill all bottles to the neck and keep the sa
We can rush this work on a 1-2 business day TAT.
1-500ml unpreserved plastic
1-125ml H_2SO_4 Plastic
1-500ml HNO_3 plastic

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505-345-4107
Website: www.hallenvironmental.com

April 18, 2019

Kelly Robinson
Western Refining Southwest, Inc.
#50 CR 4990
Bloomfield, NM 87413
TEL: (505) 632-4135
FAX

RE: Injection Well 2 - 1Q2019 OrderNo.: 1904002

Dear Kelly Robinson:

Hall Environmental Analysis Laboratory received 1 sample(s) on 3/30/2019 for the analyses presented in the following report.

These were analyzed according to EPA procedures or equivalent. To access our accredited tests please go to www.hallenvironmental.com or the state specific web sites. In order to properly interpret your results, it is imperative that you review this report in its entirety. See the sample checklist and/or the Chain of Custody for information regarding the sample receipt temperature and preservation. Data qualifiers or a narrative will be provided if the sample analysis or analytical quality control parameters require a flag. When necessary, data qualifiers are provided on both the sample analysis report and the QC summary report, both sections should be reviewed. All samples are reported, as received, unless otherwise indicated. Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH and residual chlorine are qualified as being analyzed outside of the recommended holding time.

Please don't hesitate to contact HEAL for any additional information or clarifications.

ADHS Cert #AZ0682 -- NMED-DWB Cert #NM9425 -- NMED-Micro Cert #NM0901

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **1904002**
Date Reported: **4/18/2019**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 2 - 1Q2019
Lab ID: 1904002-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well WD#2
Collection Date: 3/29/2019 12:00:00 PM
Received Date: 3/30/2019 9:20:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8081: PESTICIDES TCLP						Analyst: **JME**	
Chlordane	ND	0.030		mg/L	1	4/16/2019 12:47:01 PM	43999
Surr: Decachlorobiphenyl	76.8	29.4-99.8		%Rec	1	4/16/2019 12:47:01 PM	43999
Surr: Tetrachloro-m-xylene	66.0	20.7-100		%Rec	1	4/16/2019 12:47:01 PM	43999
EPA METHOD 8270C TCLP						Analyst: **JDC**	
2-Methylphenol	ND	200		mg/L	1	4/15/2019 5:31:16 PM	44141
3+4-Methylphenol	ND	200		mg/L	1	4/15/2019 5:31:16 PM	44141
2,4-Dinitrotoluene	ND	0.13		mg/L	1	4/15/2019 5:31:16 PM	44141
Hexachlorobenzene	ND	0.13		mg/L	1	4/15/2019 5:31:16 PM	44141
Hexachlorobutadiene	ND	0.50		mg/L	1	4/15/2019 5:31:16 PM	44141
Hexachloroethane	ND	3.0		mg/L	1	4/15/2019 5:31:16 PM	44141
Nitrobenzene	ND	2.0		mg/L	1	4/15/2019 5:31:16 PM	44141
Pentachlorophenol	ND	100		mg/L	1	4/15/2019 5:31:16 PM	44141
Pyridine	ND	5.0		mg/L	1	4/15/2019 5:31:16 PM	44141
2,4,5-Trichlorophenol	ND	400		mg/L	1	4/15/2019 5:31:16 PM	44141
2,4,6-Trichlorophenol	ND	2.0		mg/L	1	4/15/2019 5:31:16 PM	44141
Cresols, Total	ND	200		mg/L	1	4/15/2019 5:31:16 PM	44141
Surr: 2-Fluorophenol	47.5	15-82.5		%Rec	1	4/15/2019 5:31:16 PM	44141
Surr: Phenol-d5	41.8	15-74.2		%Rec	1	4/15/2019 5:31:16 PM	44141
Surr: 2,4,6-Tribromophenol	68.5	18.6-118		%Rec	1	4/15/2019 5:31:16 PM	44141
Surr: Nitrobenzene-d5	66.2	30.4-106		%Rec	1	4/15/2019 5:31:16 PM	44141
Surr: 2-Fluorobiphenyl	54.6	15-104		%Rec	1	4/15/2019 5:31:16 PM	44141
Surr: 4-Terphenyl-d14	50.5	15-133		%Rec	1	4/15/2019 5:31:16 PM	44141
SPECIFIC GRAVITY						Analyst: **JRR**	
Specific Gravity	1.001	0			1	4/3/2019 10:28:00 AM	R58847
EPA METHOD 300.0: ANIONS						Analyst: **MRA**	
Fluoride	ND	10		mg/L	100	4/2/2019 2:05:50 PM	R58843
Chloride	1300	50	*	mg/L	100	4/2/2019 2:05:50 PM	R58843
Bromide	4.2	1.0		mg/L	10	4/2/2019 1:53:26 PM	R58843
Phosphorus, Orthophosphate (As P)	ND	5.0	H	mg/L	10	4/2/2019 1:53:26 PM	R58843
Sulfate	80	5.0		mg/L	10	4/2/2019 1:53:26 PM	R58843
Nitrate+Nitrite as N	ND	1.0		mg/L	5	4/2/2019 6:38:49 PM	R58843
SM2510B: SPECIFIC CONDUCTANCE						Analyst: **JRR**	
Conductivity	4500	5.0		µmhos/c	1	4/3/2019 8:29:31 PM	R58867
SM2320B: ALKALINITY						Analyst: **JRR**	
Bicarbonate (As CaCO3)	430.6	20.00		mg/L Ca	1	4/4/2019 2:17:08 PM	R58958
Carbonate (As CaCO3)	ND	2.000		mg/L Ca	1	4/4/2019 2:17:08 PM	R58958
Total Alkalinity (as CaCO3)	430.6	20.00		mg/L Ca	1	4/4/2019 2:17:08 PM	R58958

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
PQL	Practical Quantitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified at testcode

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 2 - 1Q2019
Lab ID: 1904002-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well WD#2
Collection Date: 3/29/2019 12:00:00 PM
Received Date: 3/30/2019 9:20:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**	
Total Dissolved Solids	3350	200	*D	mg/L	1	4/5/2019 12:59:00 PM	44069
SM4500-H+B / 9040C: PH						Analyst: **JRR**	
pH	6.72		H	pH units	1	4/3/2019 8:29:31 PM	R58867
EPA METHOD 7470: MERCURY						Analyst: **pmf**	
Mercury	ND	0.020		mg/L	1	4/5/2019 12:11:57 PM	44137
EPA METHOD 6010B: DISSOLVED METALS						Analyst: **ELS**	
Calcium	110	20		mg/L	20	4/5/2019 10:53:07 AM	A58923
Magnesium	42	20		mg/L	20	4/5/2019 10:53:07 AM	A58923
Potassium	ND	20		mg/L	20	4/5/2019 10:53:07 AM	A58923
Sodium	790	20		mg/L	20	4/5/2019 10:53:07 AM	A58923
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: **ELS**	
Arsenic	ND	5.0		mg/L	1	4/5/2019 10:56:59 AM	44090
Barium	ND	100		mg/L	1	4/5/2019 10:56:59 AM	44090
Cadmium	ND	1.0		mg/L	1	4/5/2019 10:56:59 AM	44090
Calcium	110	5.0		mg/L	5	4/5/2019 10:27:18 AM	44090
Chromium	ND	5.0		mg/L	1	4/5/2019 10:56:59 AM	44090
Lead	ND	5.0		mg/L	1	4/5/2019 10:56:59 AM	44090
Magnesium	44	1.0		mg/L	1	4/5/2019 10:56:59 AM	44090
Potassium	14	1.0		mg/L	1	4/5/2019 10:56:59 AM	44090
Selenium	ND	1.0		mg/L	1	4/5/2019 10:56:59 AM	44090
Silver	ND	5.0		mg/L	1	4/5/2019 10:56:59 AM	44090
Sodium	830	10		mg/L	10	4/5/2019 11:02:16 AM	44090
TCLP VOLATILES BY 8260B						Analyst: **DJF**	
Benzene	ND	0.50		mg/L	1	4/6/2019 9:17:27 AM	D58957
1,2-Dichloroethane (EDC)	ND	0.50		mg/L	1	4/6/2019 9:17:27 AM	D58957
2-Butanone	ND	200		mg/L	1	4/6/2019 9:17:27 AM	D58957
Carbon Tetrachloride	ND	0.50		mg/L	1	4/6/2019 9:17:27 AM	D58957
Chloroform	ND	6.0		mg/L	1	4/6/2019 9:17:27 AM	D58957
1,4-Dichlorobenzene	ND	7.5		mg/L	1	4/6/2019 9:17:27 AM	D58957
1,1-Dichloroethene	ND	0.70		mg/L	1	4/6/2019 9:17:27 AM	D58957
Tetrachloroethene (PCE)	ND	0.70		mg/L	1	4/6/2019 9:17:27 AM	D58957
Trichloroethene (TCE)	ND	0.50		mg/L	1	4/6/2019 9:17:27 AM	D58957
Vinyl chloride	ND	0.20		mg/L	1	4/6/2019 9:17:27 AM	D58957
Chlorobenzene	ND	100		mg/L	1	4/6/2019 9:17:27 AM	D58957
Surr: 1,2-Dichloroethane-d4	99.1	70-130		%Rec	1	4/6/2019 9:17:27 AM	D58957
Surr: 4-Bromofluorobenzene	92.8	70-130		%Rec	1	4/6/2019 9:17:27 AM	D58957
Surr: Dibromofluoromethane	115	70-130		%Rec	1	4/6/2019 9:17:27 AM	D58957

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 2 - 1Q2019
Lab ID: 1904002-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well WD#2
Collection Date: 3/29/2019 12:00:00 PM
Received Date: 3/30/2019 9:20:00 AM

Analyses	Result	RL	Qual	Units	DF	Date Analyzed	Batch
TCLP VOLATILES BY 8260B						Analyst: **DJF**	
Surr: Toluene-d8	96.8	70-130		%Rec	1	4/6/2019 9:17:27 AM	D58957

Refer to the QC Summary report and sample login checklist for flagged QC data and preservation information.

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode

Wet Chemistry by Method 2580

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	-46.0	T8	1	04/06/2019 11:25	WG1261694

Wet Chemistry by Method 4500 CN E-2011

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Reactive Cyanide	ND		0.00500	1	04/10/2019 10:21	WG1262510

Wet Chemistry by Method 4500H+ B-2011

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
Corrosivity by pH	6.70	T8	1	04/02/2019 17:45	WG1259617

Sample Narrative:
L1084750-01 WG1259617: 6.7 at 15.9C

Wet Chemistry by Method 9034-9030B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Reactive Sulfide	ND		0.0500	1	04/02/2019 18:37	WG1259638

Wet Chemistry by Method D93/1010A

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	deg F			date / time	
Flashpoint	DNF at 170		1	04/06/2019 22:16	WG1261720

L1084668-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1084668-01 04/06/19 11:25 • (DUP) R3399056-2 04/06/19 11:25

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mV	mV		%		%
ORP	192	191	1	0.522		20

Laboratory Control Sample (LCS)

(LCS) R3399096-1 04/06/19 11:25

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mV	mV	%	%	
ORP	228	228	100	85.7-104	

WG1262613

Wet Chemistry by Method 4500 CN E-2011

QUALITY CONTROL SUMMARY

L1084750-01

ONE LAB. NATIONWIDE.

Method Blank (MB)

(MB) R3400146-1 04/10/19 09:49

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Reactive Cyanide	U		0.00180	0.00500

L1084630-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1084600-01 04/10/19 10:03 • (DUP) R3400146-3 04/10/19 10:04

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Reactive Cyanide	ND	0.000	1	0.000		20

L1084710-03 Original Sample (OS) • Duplicate (DUP)

(OS) L1084710-03 04/10/19 10:16 • (DUP) R3400146-6 04/10/19 10:17

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Reactive Cyanide	ND	0.000	1	0.000		20

Laboratory Control Sample (LCS)

(LCS) R3400146-2 04/10/19 09:50

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/l	mg/l	%	%	
Reactive Cyanide	0.100	0.109	109	85.0-115	

L1084630-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1084600-02 04/10/19 10:05 • (MS) R3400146-4 04/10/19 10:06 • (MSD) R3400146-5 04/10/19 10:07

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Reactive Cyanide	0.100	ND	0.102	0.0981	102	98.1	1	75.0-125			3.90	20

L1084710-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1084710-01 04/10/19 10:10 • (MS) R3400146-8 04/10/19 10:11 • (MSD) R3400146-7 04/10/19 10:14

	Spike Amount	Original Result	MS Result	MSD Result	MS Rec.	MSD Rec.	Dilution	Rec. Limits	MS Qualifier	MSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	mg/l	%	%		%			%	%
Reactive Cyanide	0.100	ND	0.0955	0.0968	95.5	96.8	1	75.0-125			1.35	20

ACCOUNT:	PROJECT:	SDG:	DATE/TIME:
Hall Environmental Analysis Laboratory		L1084750	04/10/19 13:28

Laboratory Control Sample (LCS)

(LCS) R3397714-1 04/02/19 17:45

Analyte	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
	su	su	%	%	
Corrosivity by pH	10.0	9.97	99.7	99.0-101	

Sample Narrative:
LCS: 9.97 at 17.6C

WG1259688

Wet Chemistry by Method 9034-9030B

QUALITY CONTROL SUMMARY

L1084750-01

ONE LAB. NATIONWIDE

Method Blank (MB)

(MB) R3397727-1 04/02/19 18:18

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Reactive Sulfide	U		0.00660	0.0500

Laboratory Control Sample (LCS)

(LCS) R3397727-2 04/02/19 18:19

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	mg/l	mg/l	%	%	
Reactive Sulfide	0.500	0.476	95.2	85.0-115	

L1084808-02 Original Sample (OS) • Duplicate (DUP)

(OS) L1084808-02 04/05/19 22:16 • (DUP) R3399058-2 04/05/19 22:16

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	deg F	deg F		%		%
Flashpoint	DNF at 170	DNF at 170	1	0.000		10

L1085800-01 Original Sample (OS) • Duplicate (DUP)

(OS) L1085800-01 04/05/19 22:16 • (DUP) R3399058-3 04/05/19 22:16

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	deg F	deg F		%		%
Flashpoint	DNF at 170	DNF at 170	1	0.000		°C

Laboratory Control Sample (LCS)

(LCS) R3399058-1 04/05/19 22:16

	Spike Amount	LCS Result	LCS Rec.	Rec. Limits	LCS Qualifier
Analyte	deg F	deg F	%	%	
Flashpoint	82.0	81.5	99.5	90.0-124	

GLOSSARY OF TERMS

ONE LAB. NATIONWIDE.

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Abbreviations and Definitions

MDL	Method Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable)
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. The chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier Description

T0	Sample(s) received past/too close to holding time expiration.

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1904002**

18-Apr-19

Client: Western Refining Southwest, Inc.

Project: Injection Well 2 - 1Q2019

Sample ID: **MB**	SampType: **mblk**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R58843**	RunNo: **58843**
Prep Date:	Analysis Date: **4/2/2019**	SeqNo: **1977716** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.10								
Chloride	ND	0.50								
Bromide	ND	0.10								
Phosphorus, Orthophosphate (As P	ND	0.50								
Sulfate	ND	0.50								
Nitrate+Nitrite as N	ND	0.20								

Sample ID: **LCS**	SampType: **lcs**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R58843**	RunNo: **58843**
Prep Date:	Analysis Date: **4/2/2019**	SeqNo: **1977717** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.50	0.10	0.5000	0	99.9	90	110			
Chloride	4.8	0.50	5.000	0	96.8	90	110			
Bromide	2.4	0.10	2.500	0	96.7	90	110			
Phosphorus, Orthophosphate (As P	4.8	0.50	5.000	0	96.5	90	110			
Sulfate	10	0.50	10.00	0	100	90	110			
Nitrate+Nitrite as N	3.5	0.20	3.500	0	100	90	110			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode

QC SUMMARY REPORT

WO#: **1904002**

Hall Environmental Analysis Laboratory, Inc.

18-Apr-19

Client: Western Refining Southwest, Inc.
Project: Injection Well 2 - 1Q2019

Sample ID: **rb2** SampType: **MBLK** TestCode: **TCLP Volatiles by 8260B**
Client ID: **PBW** Batch ID: **D58957** RunNo: **58957**
Prep Date: Analysis Date: **4/5/2019** SeqNo: **1983169** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	0.50								
1,2-Dichloroethane (EDC)	ND	0.50								
2-Butanone	ND	200								
Carbon Tetrachloride	ND	0.50								
Chloroform	ND	6.0								
1,4-Dichlorobenzene	ND	7.5								
1,1-Dichloroethene	ND	0.70								
Tetrachloroethene (PCE)	ND	0.70								
Trichloroethene (TCE)	ND	0.50								
Vinyl chloride	ND	0.20								
Chlorobenzene	ND	100								
Surr: 1,2-Dichloroethane-d4	0.011		0.01000		106	70	130			
Surr: 4-Bromofluorobenzene	0.0095		0.01000		95.5	70	130			
Surr: Dibromofluoromethane	0.012		0.01000		116	70	130			
Surr: Toluene-d8	0.0099		0.01000		99.5	70	130			

Sample ID: **100ng lcs2** SampType: **LCS** TestCode: **TCLP Volatiles by 8260B**
Client ID: **LCSW** Batch ID: **D58957** RunNo: **58957**
Prep Date: Analysis Date: **4/5/2019** SeqNo: **1983170** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.020	0.010	0.02000	0	99.4	70	130			
1,1-Dichloroethene	0.020	0.010	0.02000	0	98.5	70	130			
Trichloroethene (TCE)	0.019	0.010	0.02000	0	92.9	70	130			
Chlorobenzene	0.019	0.010	0.02000	0	97.1	70	130			
Surr: 1,2-Dichloroethane-d4	0.0095		0.01000		95.0	70	130			
Surr: 4-Bromofluorobenzene	0.0087		0.01000		87.5	70	130			
Surr: Dibromofluoromethane	0.011		0.01000		111	70	130			
Surr: Toluene-d8	0.010		0.01000		101	70	130			

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- H Holding times for preparation or analysis exceeded
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix
- E Value above quantitation range
- ND Not Detected at the Reporting Limit
- RL Reporting Detection Limit
- W Sample container temperature is out of limit as specified at testcode

QC SUMMARY REPORT

WO#: **1904002**

Hall Environmental Analysis Laboratory, Inc.

18-Apr-19

Client: Western Refining Southwest, Inc.
Project: Injection Well 2 - 1Q2019

Sample ID: **1904002-001Bms** SampType: **MS** TestCode: **EPA Method 8270C TCLP**
Client ID: **Injection Well WD#2** Batch ID: **44141** RunNo: **59159**
Prep Date: **4/5/2019** Analysis Date: **4/15/2019** SeqNo: **1991569** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2-Methylphenol	0.063	0.010	0.1000	0	62.7	23.9	129			
3+4-Methylphenol	0.12	0.010	0.2000	0	58.0	15	167			
2,4-Dinitrotoluene	0.060	0.010	0.1000	0	59.5	15	147			
Hexachlorobenzene	0.059	0.010	0.1000	0	59.1	41.4	136			
Hexachlorobutadiene	0.035	0.010	0.1000	0	35.0	16.2	134			
Hexachloroethane	0.031	0.010	0.1000	0	31.4	20.6	124			
Nitrobenzene	0.064	0.010	0.1000	0	63.9	39.5	134			
Pentachlorophenol	0.056	0.010	0.1000	0	55.7	15	137			
Pyridine	ND	0.010	0.1000	0	0	15	129			S
2,4,5-Trichlorophenol	0.066	0.010	0.1000	0	66.3	15	158			
2,4,6-Trichlorophenol	0.067	0.010	0.1000	0	66.9	15	153			
Cresols, Total	0.18	0.010	0.3000	0.01346	55.1	10.6	179			
Surr: 2-Fluorophenol	0.093		0.2000		46.5	15	82.5			
Surr: Phenol-d5	0.078		0.2000		39.1	15	74.2			
Surr: 2,4,6-Tribromophenol	0.13		0.2000		67.3	18.6	118			
Surr: Nitrobenzene-d5	0.070		0.1000		69.6	30.4	106			
Surr: 2-Fluorobiphenyl	0.058		0.1000		58.4	15	104			
Surr: 4-Terphenyl-d14	0.052		0.1000		51.8	15	133			

Sample ID: **1904002-001Bmsd** SampType: **MSD** TestCode: **EPA Method 8270C TCLP**
Client ID: **Injection Well WD#2** Batch ID: **44141** RunNo: **59159**
Prep Date: **4/5/2019** Analysis Date: **4/15/2019** SeqNo: **1991570** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2-Methylphenol	0.064	0.010	0.1000	0	63.8	23.9	129	1.74	20	
3+4-Methylphenol	0.11	0.010	0.2000	0	57.4	15	167	1.07	20	
2,4-Dinitrotoluene	0.054	0.010	0.1000	0	53.9	15	147	9.95	23.2	
Hexachlorobenzene	0.056	0.010	0.1000	0	55.5	41.4	136	6.25	20	
Hexachlorobutadiene	0.038	0.010	0.1000	0	37.9	16.2	134	7.90	20	
Hexachloroethane	0.035	0.010	0.1000	0	34.5	20.6	124	9.40	31.3	
Nitrobenzene	0.064	0.010	0.1000	0	63.7	39.5	134	0.282	26.6	
Pentachlorophenol	0.051	0.010	0.1000	0	51.4	15	137	8.11	27.9	
Pyridine	ND	0.010	0.1000	0	0	15	129	0	47.4	S
2,4,5-Trichlorophenol	0.060	0.010	0.1000	0	60.3	15	158	9.54	36.9	
2,4,6-Trichlorophenol	0.062	0.010	0.1000	0	62.2	15	153	7.25	37.2	
Cresols, Total	0.18	0.010	0.3000	0.01346	55.1	10.6	179	0.0783	27.4	
Surr: 2-Fluorophenol	0.094		0.2000		46.9	15	82.5	0	0	
Surr: Phenol-d5	0.078		0.2000		39.2	15	74.2	0	0	
Surr: 2,4,6-Tribromophenol	0.13		0.2000		64.3	18.6	118	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1904002**

18-Apr-19

Client: Western Refining Southwest, Inc.

Project: Injection Well 2 - 1Q2019

Sample ID: **1904002-001Bmsd** SampType: **MSD** TestCode: **EPA Method 8270C TCLP**

Client ID: **Injection Well WD#2** Batch ID: **44141** RunNo: **59159**

Prep Date: **4/5/2019** Analysis Date: **4/15/2019** SeqNo: **1991570** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: Nitrobenzene-d5	0.069		0.1000		68.6	30.4	106	0	0	
Surr: 2-Fluorobiphenyl	0.053		0.1000		52.6	15	104	0	0	
Surr: 4-Terphenyl-d14	0.045		0.1000		45.4	15	133	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1904002**

18-Apr-19

Client: Western Refining Southwest, Inc.

Project: Injection Well 2 - 1Q2019

Sample ID: **ics-1 99.0uS eC** SampType: **LCS** TestCode: **SM2510B: Specific Conductance**

Client ID: **LCSW** Batch ID: **R58867** RunNo: **58867**

Prep Date: Analysis Date: **4/3/2019** SeqNo: **1978677** Units: **µmhos/cm**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Conductivity	99	5.0	99.00	0	100	85	115			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1904002**

18-Apr-19

Client: Western Refining Southwest, Inc.

Project: Injection Well 2 - 1Q2019

Sample ID: **MB-44137**	SampType: **MBLK**	TestCode: **EPA Method 7470: Mercury**
Client ID: **PBW**	Batch ID: **44137**	RunNo: **58933**
Prep Date: **4/4/2019**	Analysis Date: **4/5/2019**	SeqNo: **1981797** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.00020								

Sample ID: **LCS-44137**	SampType: **LCS**	TestCode: **EPA Method 7470: Mercury**
Client ID: **LCSW**	Batch ID: **44137**	RunNo: **58933**
Prep Date: **4/4/2019**	Analysis Date: **4/5/2019**	SeqNo: **1981798** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0043	0.00020	0.005000	0	85.5	80	120			

Sample ID: **LCSD-44137**	SampType: **LCSD**	TestCode: **EPA Method 7470: Mercury**
Client ID: **LCSS02**	Batch ID: **44137**	RunNo: **58933**
Prep Date: **4/4/2019**	Analysis Date: **4/5/2019**	SeqNo: **1981844** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0050	0.00020	0.005000	0	99.7	80	120	15.3	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1904002**

18-Apr-19

Client: Western Refining Southwest, Inc.

Project: Injection Well 2 - 1Q2019

Sample ID: **MB-A**	SampType: **MBLK**	TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **PBW**	Batch ID: **A58923**	RunNo: **58923**
Prep Date:	Analysis Date: **4/5/2019**	SeqNo: **1981510** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Sodium	ND	1.0								

Sample ID: **LCS-A**	SampType: **LCS**	TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **LCSW**	Batch ID: **A58923**	RunNo: **58923**
Prep Date:	Analysis Date: **4/5/2019**	SeqNo: **1981511** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	51	1.0	50.00	0	101	80	120			
Magnesium	50	1.0	50.00	0	100	80	120			
Potassium	49	1.0	50.00	0	98.2	80	120			
Sodium	50	1.0	50.00	0	99.6	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode

QC SUMMARY REPORT

WO#: **1904002**

Hall Environmental Analysis Laboratory, Inc.

18-Apr-19

Client: Western Refining Southwest, Inc.
Project: Injection Well 2 - 1Q2019

Sample ID: **1904002-001EMS** SampType: **MS** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **Injection Well WD#2** Batch ID: **44090** RunNo: **58923**
Prep Date: **4/3/2019** Analysis Date: **4/5/2019** SeqNo: **1981485** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.47	0.020	0.5000	0	94.3	75	125			
Barium	0.89	0.020	0.5000	0.4350	90.9	75	125			
Cadmium	0.52	0.0020	0.5000	0	103	75	125			
Chromium	0.50	0.0060	0.5000	0.002560	98.8	75	125			
Lead	0.51	0.0050	0.5000	0	101	75	125			
Magnesium	90	1.0	50.00	43.62	93.6	75	125			
Potassium	61	1.0	50.00	13.69	94.8	75	125			
Selenium	0.48	0.050	0.5000	0	96.1	75	125			
Silver	0.10	0.0050	0.1000	0.001008	101	75	125			

Sample ID: **1904002-001EMSD** SampType: **MSD** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **Injection Well WD#2** Batch ID: **44090** RunNo: **58923**
Prep Date: **4/3/2019** Analysis Date: **4/5/2019** SeqNo: **1981486** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.49	0.020	0.5000	0	98.1	75	125	3.99	20	
Barium	0.90	0.020	0.5000	0.4350	92.2	75	125	0.732	20	
Cadmium	0.53	0.0020	0.5000	0	105	75	125	1.90	20	
Chromium	0.50	0.0060	0.5000	0.002560	100	75	125	1.45	20	
Lead	0.51	0.0050	0.5000	0	102	75	125	0.955	20	
Magnesium	92	1.0	50.00	43.62	96.7	75	125	1.72	20	
Potassium	62	1.0	50.00	13.69	96.8	75	125	1.68	20	
Selenium	0.49	0.050	0.5000	0	98.5	75	125	2.46	20	
Silver	0.10	0.0050	0.1000	0.001008	101	75	125	0.323	20	

Sample ID: **MB-44090** SampType: **MBLK** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **PBW** Batch ID: **44090** RunNo: **58923**
Prep Date: **4/3/2019** Analysis Date: **4/5/2019** SeqNo: **1981507** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	ND	0.020								
Barium	ND	0.020								
Cadmium	ND	0.0020								
Calcium	ND	1.0								
Chromium	ND	0.0060								
Lead	ND	0.0050								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Selenium	ND	0.050								
Silver	ND	0.0050								

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- E Value above quantitation range
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit
- RL Reporting Detection Limit
- S % Recovery outside of range due to dilution or matrix
- W Sample container temperature is out of limit as specified at testcode

QC SUMMARY REPORT

WO#: **1904002**

Hall Environmental Analysis Laboratory, Inc.

18-Apr-19

Client: Western Refining Southwest, Inc.
Project: Injection Well 2 - 1Q2019

Sample ID: **MB-44090** SampType: **MBLK** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **PBW** Batch ID: **44090** RunNo: **58923**
Prep Date: **4/3/2019** Analysis Date: **4/5/2019** SeqNo: **1981507** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	ND	1.0								

Sample ID: **LCS-44090** SampType: **LCS** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **LCSW** Batch ID: **44090** RunNo: **58923**
Prep Date: **4/3/2019** Analysis Date: **4/5/2019** SeqNo: **1981508** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.50	0.020	0.5000	0	100	80	120			
Barium	0.48	0.020	0.5000	0	97.0	80	120			
Cadmium	0.50	0.0020	0.5000	0	101	80	120			
Calcium	50	1.0	50.00	0	101	80	120			
Chromium	0.50	0.0060	0.5000	0	99.8	80	120			
Lead	0.50	0.0050	0.5000	0	101	80	120			
Magnesium	49	1.0	50.00	0	99.0	80	120			
Potassium	48	1.0	50.00	0	96.7	80	120			
Selenium	0.51	0.050	0.5000	0	102	80	120			
Silver	0.10	0.0050	0.1000	0	99.6	80	120			
Sodium	48	1.0	50.00	0	96.9	80	120			

Sample ID: **1904002-001EMS** SampType: **MS** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **Injection Well WD#2** Batch ID: **44090** RunNo: **58923**
Prep Date: **4/3/2019** Analysis Date: **4/5/2019** SeqNo: **1981524** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	160	5.0	50.00	110.2	90.9	75	125			

Sample ID: **1904002-001EMSD** SampType: **MSD** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **Injection Well WD#2** Batch ID: **44090** RunNo: **58923**
Prep Date: **4/3/2019** Analysis Date: **4/5/2019** SeqNo: **1981525** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	160	5.0	50.00	110.2	97.2	75	125	2.02	20	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	ND	Not Detected at the Reporting Limit
PQL	Practical Quanitative Limit	RL	Reporting Detection Limit
S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified at testcode

QC SUMMARY REPORT

WO#: **1904002**

Hall Environmental Analysis Laboratory, Inc.

18-Apr-19

Client: Western Refining Southwest, Inc.
Project: Injection Well 2 - 1Q2019

Sample ID: **mb-1 alk** SampType: **MBLK** TestCode: **SM2320B: Alkalinity**
Client ID: **PBW** Batch ID: **R58958** RunNo: **58958**
Prep Date: Analysis Date: **4/4/2019** SeqNo: **1983064** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20.00								

Sample ID: **lcs-1 alk** SampType: **LCS** TestCode: **SM2320B: Alkalinity**
Client ID: **LCSW** Batch ID: **R58958** RunNo: **58958**
Prep Date: Analysis Date: **4/4/2019** SeqNo: **1983065** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	76.28	20.00	80.00	0	95.4	90	110			

Sample ID: **mb-2 alk** SampType: **MBLK** TestCode: **SM2320B: Alkalinity**
Client ID: **PBW** Batch ID: **R58958** RunNo: **58958**
Prep Date: Analysis Date: **4/4/2019** SeqNo: **1983094** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	ND	20.00								

Sample ID: **lcs-2 alk** SampType: **LCS** TestCode: **SM2320B: Alkalinity**
Client ID: **LCSW** Batch ID: **R58958** RunNo: **58958**
Prep Date: Analysis Date: **4/4/2019** SeqNo: **1983095** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	77.28	20.00	80.00	0	96.6	90	110			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode

QC SUMMARY REPORT

WO#: **1904002**

Hall Environmental Analysis Laboratory, Inc.

18-Apr-19

Client: Western Refining Southwest, Inc.
Project: Injection Well 2 - 1Q2019

Sample ID: **MB-44069**	SampType: **MBLK**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **PBW**	Batch ID: **44069**	RunNo: **58928**
Prep Date: **4/3/2019**	Analysis Date: **4/5/2019**	SeqNo: **1981702** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	ND	20.0								

Sample ID: **LCS-44069**	SampType: **LCS**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **LCSW**	Batch ID: **44069**	RunNo: **58928**
Prep Date: **4/3/2019**	Analysis Date: **4/5/2019**	SeqNo: **1981703** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1020	20.0	1000	0	102	80	120			

Qualifiers:

*	Value exceeds Maximum Contaminant Level.
H	Holding times for preparation or analysis exceeded
PQL	Practical Quanitative Limit
S	% Recovery outside of range due to dilution or matrix
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
RL	Reporting Detection Limit
W	Sample container temperature is out of limit as specified at testcode

HALL ENVIRONMENTAL ANALYSIS LABORATORY

Hall Environmental Analysis Laboratory
4901 Hawkins NE
Albuquerque, NM 87109
TEL: 505-345-3975 FAX: 505 345 4107
Website: www.hallenvironmental.com

Sample Log-In Check List

Client Name: Western Refining Southw Work Order Number: 1904002 RcptNo: 1

Received By: Anne Thorne 3/30/2019 9:20:00 AM Anne Thorne

Completed By: Victoria Zeller 4/1/2019 8:16:36 AM Victoria Zeller

Reviewed By: ENM 4/1/19

labeled by DAD 4/1/19

Chain of Custody

1. Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2. How was the sample delivered?	Courier		

Log In

3. Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
4. Were all samples received at a temperature of >0° C to 6.0°C	Yes ☑	No ☐	NA ☐
5. Sample(s) in proper container(s)?	Yes ☑	No ☐	
6. Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
7. Are samples (except VOA and ONG) properly preserved?	Yes ☑	No ☐	
8. Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
9. VOA vials have zero headspace?	Yes ☑	No ☐	No VOA Vials ☐
10. Were any sample containers received broken?	Yes ☐	No ☑	
11. Does paperwork match bottle labels? (Note discrepancies on chain of custody)	Yes ☑	No ☐	# of preserved bottles checked for pH: 3, 2 (<2 or >12 unless noted)
12. Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	Adjusted? NO
13. Is it clear what analyses were requested?	Yes ☑	No ☐	4/1/19
14. Were all holding times able to be met? (If no, notify customer for authorization.)	Yes ☑	No ☐	Checked by: DAD 3/~~2~~ DAD 4/1/19

Special Handling (if applicable)

15. Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: _____ Date: _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

16. Additional remarks:

17. Cooler Information

Cooler No	Temp °C	Condition	Seal Intact	Seal No	Seal Date	Signed By
1	1.0	Good	Yes			
2	1.0	Good	Yes			
3	1.0	Good	Yes			

Chain-of-Custody Record

Client: Western Refining

Mailing Address: 50 CR 4990
Bloomfield, NM 87413

Phone #: (505) 632-4166

email or Fax#: kelly.robinson@andeavor.com

QA/QC Package:
X Standard ☐ Level 4 (Full Validation)

Accreditation:
X NELAP ☐ Other

X EDD (Type) Excel

Turn-Around Time:
X Standard ☐ Rush

Project Name: Injection Well #2 - 1Q2019

Project #: PO 4500052484

Project Manager: Kelly Robinson

Sampler: Kelly Robinson

On Ice: ☒ Yes ☐ No

Sample Temperature: 3 coolers C 1.0° cc

HALL ENVIRONMENTAL ANALYSIS LABORATORY

www.hallenvironmental.com

4901 Hawkins NE - Albuquerque, NM 87109

Tel. 505-345-3975 Fax 505-345-4107

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1904003	See Attached Analytical List	Air Bubbles (Y or N)
3/29/2019	12:00	Water	Injection Well WD #2	4-500mL Amber	None	-001	X	
↓	↓	Water	↓	2-500mL Poly	None		X	
↓	↓	Water	↓	3-VOAs	HCl		X	
↓	↓	Water	↓	1-500mL Poly	NaOH		X	
↓	↓	Water	↓	1-500mL Poly	Zn Acetate / NaoH		X	
↓	↓	Water	↓	1-250mL Poly	HNO3		X	
↓	↓	Water	↓	1-125mL Poly	HNO3		X	
↓	↓	Water	↓	1-125mL Poly	H2SO4		X	

Date	Time	Relinquished by	Received by	Date	Time
3/29/19	1449	Kelly Robinson	[signature]	3/29/19	1449
3/29/19	1840	[signature]	[signature]	03/30/19	0920

Remarks:
Analytical List Attached to COC

If necessary, samples submitted to Hall Environmental may be subcontracted to other accredited laboratories. This serves as notice of this possibility. Any sub-contracted data will be clearly notated on the analytical report.

immediately or within a specified time period, or assess a civil penalty, or both (see Section 74-6-10 NMSA 1978). The compliance order may also include a suspension or termination of this Discharge Permit. OCD may also commence a civil action in district court for appropriate relief, including injunctive relief (see Section 74-6-10(A)(2) NMSA 1978). The Permittee may be subject to criminal penalties for discharging a water contaminant without a discharge permit or in violation of a condition of a discharge permit; making any false material statement, representation, certification or omission of material fact in a renewal application, record, report, plan or other document filed, submitted or required to be maintained under the Water Quality Act; falsifying, tampering with or rendering inaccurate any monitoring device, method or record required to be maintained under the Water Quality Act; or failing to monitor, sample or report as required by a Discharge Permit issued pursuant to a state or federal law or regulation (see Section 74-6-10.2 NMSA 1978).

2. GENERAL FACILITY OPERATIONS:

2.A. QUARTERLY MONITORING REQUIREMENTS FOR CLASS I NON-HAZARDOUS WASTE INJECTION WELL: The Permittee shall properly conduct waste management injection operations at its facility by injecting only non-hazardous (RCRA exempt and RCRA non-hazardous, non-exempt) oil field waste fluids. Injected waste fluids shall not exhibit the RCRA characteristics, i.e., ignitability, reactivity, corrosivity, or toxicity under 40 CFR 261 Subpart "C" 261.21 – 261.24 (July 1, 1992), at the point of injection into WDW-2, based upon environmental analytical laboratory testing. Pursuant to 20.6.2.5207B, the Permittee shall provide analyses of the injected fluids at least quarterly to yield data representative of their toxicity characteristic.

The Permittee shall also analyze the injected fluids quarterly for the following characteristics:

- pH (Method 9040);
- Eh;
- Specific conductance;
- Specific gravity;
- Temperature;
- Major dissolved cations and anions, including: fluoride, calcium, potassium, magnesium, sodium bicarbonate, carbonate, chloride, sulfate, bromide, total dissolved solids, and cation/anion balance using the methods specified in 40 CFR 136.3); and,
- EPA RCRA Characteristics for Ignitability (ASTM Methods); Corrosivity (SW-846) and Reactivity (determined through Permittee's application of knowledge or generating process).

The Permittee shall analyze the injected fluids quarterly for the constituents identified in the Quarterly Monitoring List (below) to demonstrate that the injected fluids do not exhibit the characteristic of toxicity using the Toxicity Characteristic Leaching Procedure, EPA SW-846 Test Method 1311 (see Table 1, 40 CFR 261.24(b)).

QUARTERLY MONITORING LIST			
EPA HW No.	Contaminant	SW-846 Methods	Regulatory Level (mg/L)
D004	Arsenic	1311	5.0
D005	Barium	1311	100.0
D018	Benzene	8021B	0.5
D006	Cadmium	1311	1.0
D019	Carbon tetrachloride	8021B 8260B	0.5
D020	Chlordane	8081A	0.03
D021	Chlorobenzene	8021B 8260B	100.0
D022	Chloroform	8021B 8260B	6.0
D007	Chromium	1311	5.0
D023	o-Cresol	8270D	200.0
D024	m-Cresol	8270D	200.0
D025	p-Cresol	8270D	200.0
D026	Cresol	8270D	200.0
D027	1,4-Dichlorobenzene	8021B 8121 8260B 8270D	7.5
D028	1,2-Dichloroethane	8021B 8260B	0.5
D029	1,1-Dichloroethylene	8021B 8260B	0.7
D030	2,4-Dinitrotoluene	8091 8270D	0.13
D032	Hexachlorobenzene	8121	0.13
D033	Hexachlorobutadiene	8021B 8121 8260B	0.5
D034	Hexachloroethane	8121	3.0
D008	Lead	1311	5.0
D009	Mercury	7470A 7471B	0.2
D035	Methyl ethyl ketone	8015B 8260B	200.0
D036	Nitrobenzene	8091 8270D	2.0
D037	Pentrachlorophenol	8041	100.0
D038	Pyridine	8260B 8270D	5.0

8081

D010	Selenium	1311	1.0
D011	Silver	1311	5.0
D039	Tetrachloroethylene	8260B	0.7
D040	Trichloroethylene	8021B 8260B	0.5
D041	2,4,5-Trichlorophenol	8270D	400.0
D042	2,4,6-Trichlorophenol	8041A 8270D	2.0
D043	Vinyl chloride	8021B 8260B	0.2

If o-, m-, and p-cresol concentrations cannot be differentiated, then the total cresol (D026) concentration is used. The regulatory level of total cresol is 200 mg/L.
If the quantitation limit is greater than the regulatory level, then the quantitation limit becomes the regulatory level.
If metals (dissolved), the EPA 1311 TCLP Laboratory Method is required with the exception of Mercury (total).

1. **Monitor and Piezometer Wells:** Groundwater with a total dissolved solids concentration of less than 10,000 mg/L occurs at an estimated depth of approximately 10 - 30 ft. below ground surface at the WDW-2 well (hereafter, "uppermost water-bearing unit"). Groundwater monitoring well (MW) with GW sampling capability shall be installed proximal to and hydrogeologically downgradient from WDW-2 in order to monitor the uppermost water-bearing unit. The MW shall be screened (15 ft. screen with top of screen positioned 5 ft. above water table) into the uppermost water-bearing unit. The Permittee shall propose a monitoring frequency with chemical monitoring parameters in order to detect potential groundwater contamination either associated with or not associated with WDW-2.

2.B. CONTINGENCY PLANS: The Permittee shall implement its proposed contingency plan(s) included in its application to cope with failure of a system(s) in the Discharge Permit.

2.C. CLOSURE: Prior to closure of the facility, the Permittee shall submit for OCD's approval, a closure plan including a completed form C-103 for plugging and abandonment of the waste injection well. The Permittee shall plug and abandon its well pursuant to 20.6.2.5209 NMAC and as specified in Permit Condition 2.D.

1. **Pre-Closure Notification:** Pursuant to 20.6.2.5005A NMAC, the Permittee shall submit a pre-closure notification to OCD's Environmental Bureau at least 30 days prior to the date that it proposes to close or to discontinue operation of WDW-2. Pursuant to 20.6.2.5005B NMAC, OCD's Environmental Bureau must approve all proposed well closure activities before the Permittee may implement its proposed closure plan.

2. **Required Information:** The Permittee shall provide OCD's Environmental Bureau with the following information in the pre-closure notification specified in Permit Condition 2.C.1:

- Name of facility;
- Address of facility;
- Name of Permittee (and owner or operator, if appropriate);

APPENDIX D

Well Log

Schlumberger

Company:	Western Refining, Southwest, Inc.
Well:	WWD #2
Field:	Wildcat
County:	San Juan
State:	New Mexico

Platform Express
Triple Combo

County:	San Juan
Field:	Wildcat
Location:	Sec 27, T29N, R11W
Well:	WWD #2
Company:	Western Refining, Southwest, Inc.

Location:
Sec 27, T29N, R11W
SHL: 2028' FNL X 111' FEL
Lat/Long: 36.6986/-107.97035

Elev.: K.B. 5550.00 ft
G.L. 5535.00 ft
D.F. 5549.00 ft

Permanent Datum:	Ground Level	Elev.:	5535.00 f
Log Measured From:	Kelly Bushing	15.00 ft	above Perm.Datum
Drilling Measured From:	Kelly Bushing		

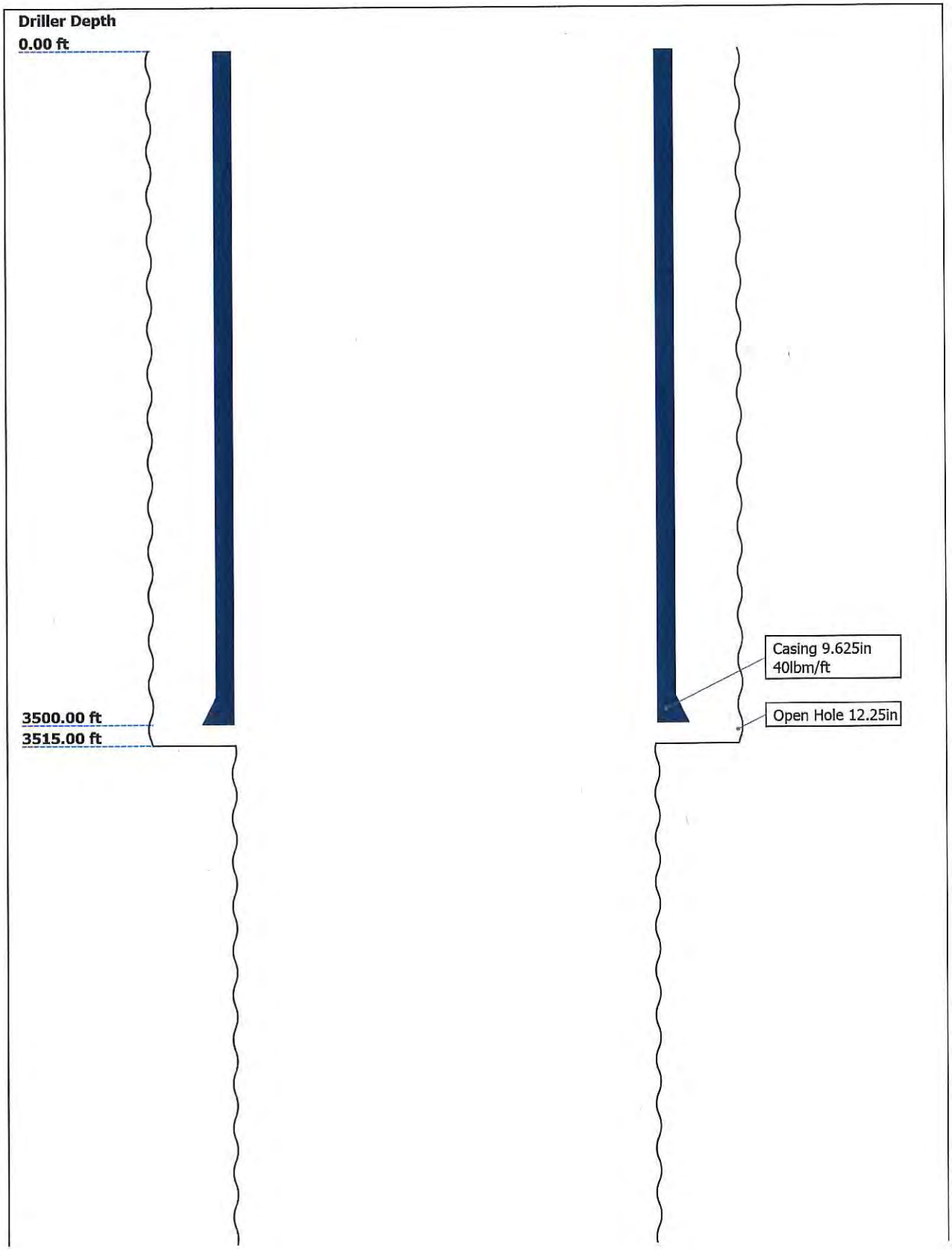
API Serial No.	Section:	Township:	Range:
30-045-35747-0000	27	29N	11W

Logging Date	05-Sep-2016		
Run Number	One		
Depth Driller	7525.00 ft		
Schlumberger Depth	7532.00 ft		
Bottom Log Interval	7532.00 ft		
Top Log Interval	3498.00 ft		
Casing Driller Size @ Depth	9.625 in @	3500.00 ft	
Casing Schlumberger	3498 ft		
Bit Size	8.75 in		
Type Fluid In Hole	WBM		
MUD Density	9.9 lbm/gal	Viscosity	55 s
Fluid Loss	9 cm3	PH	8.6
Source of Sample	Active Tank		
RM @ Meas Temp	1.13 ohm.m @	68 degF	
RMF @ Meas Temp	0.9 ohm.m @	68 degF	
RMC @ Meas Temp	1.4 ohm.m @	68 degF	
Source RMF	Pressed	RMC	Calculated
RM @ BHT	0.46 @ 177	RMF @ BHT	0.37 @ 177
Max Recorded Temperatures	177 degF		
Circulation Stopped	06-Sep-2016	Time	20:25:00
Logger on Bottom	07-Sep-2016	Time	05:00:00
Unit Number	9115	Location:	Ft Morgan, CO
Recorded By	Avery Becker		
Witnessed By	Larry Candelaria		

Disclaimer

Contents

Well Sketch

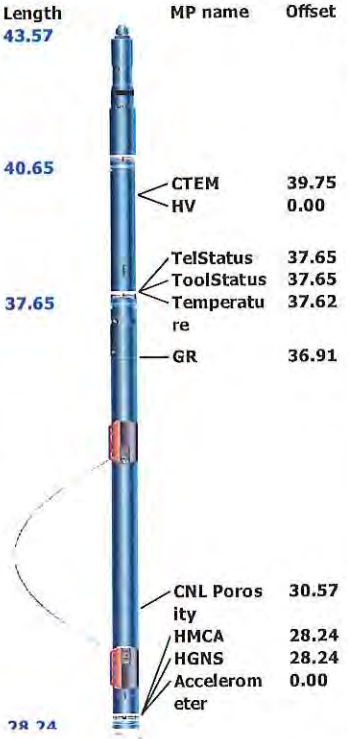

Driller Depth
0.00 ft
3500.00 ft
3515.00 ft
Casing 9.625in
40lbm/ft
Open Hole 12.25in

Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	12.25	8.75				
Top Driller (ft)	0	3515				
Top Logger (ft)	0	3515				
Bottom Driller (ft)	3515	7525				
Bottom Logger (ft)	3515	7532				
Casing						
Size (in)	9.625					
Weight (lbm/ft)	40					
Inner Diameter (in)	8.835					
Grade	N/A					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	3500					
Bottom Logger (ft)	3498					

Remarks and Equipment Summary

One: Toolstring



One: Remarks

Toolstring run as per tool sketch
Matrix: Sandstone (2.65 g/cc)
Log may be affected by 20% LCM in drilling mud
Caliper check in casing=8.87 in, within tolerance
Cement volume calculated using 7 in future casing diameter
Rig: Aztec 920
Crew: Derrick Hunter
Thank you for choosing Schlumberger

6
ECH-MEB:382
8
HRCC-H:48.1
7
HRMS-H:4876
Long Spacing
GPV-Q
HRGD-H:4899
GSR-J:5471
Short Spacing
:27786
Backscatter

AIT-M:50 **16.00**
AMIS:50
AMRM

Lengths are in ft
Maximum Outer Diameter = 5.000 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

Depth Summary

	One		
Depth Measuring Device			
Type	IDW-JA		
Serial Number	6568		
Calibration Date	23-Dec-2015		
Calibrator Serial Number			
Calibration Cable Type	7-46A-XS		
Wheel Correction 1	-1		
Wheel Correction 2	0		
Tension Device			
Type	CMTD-B/A		

Serial Number	147		
Calibration Date	18-Aug-2016		
Calibrator Serial Number	78805A		
Number of Calibration Points	10		
Calibration Root Mean Square Error	7		
Calibration Peak Error	10		

Logging Cable

Type	7-46A-XS		
Serial Number	U715043		
Length	24000.00 ft		
Conveyance Type	Wireline		
Rig Type	Land		

One:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	First run in well depth control procedures followed
Rig Up Length At Surface		IDW used as primary depth device, z-chart used for secondary
Rig Up Length At Bottom		
Rig Up Length Correction		
Stretch Correction		
Tool Zero Check At Surface		

One

5" Triple Combo

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[4]:Up	Up		7548.83 ft	07-Sep-2016 5:52:06 AM		ON	0.00 ft	No

All depths are referenced to toolstring zero

Log

Company:Western Refining, Southwest, Inc. Well:WWD #2

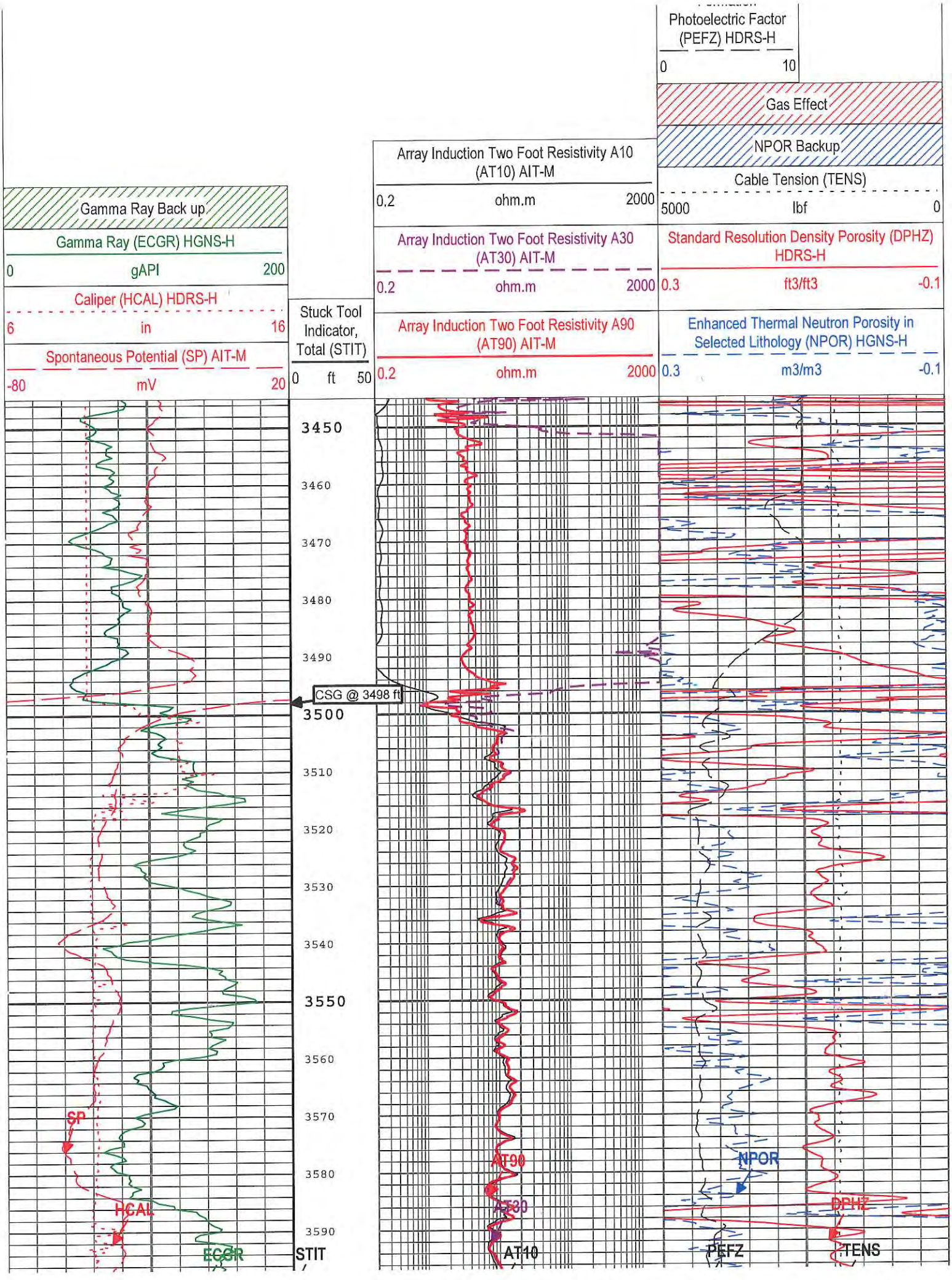
One: Log[4]:Up:S012

Description: HGNS standard resolution porosities for Platform Express Format: Log (TripleCombo-5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:05:13

Channel	Source	Sampling
AT10	AIT-M:AMIS:AMIS	3in
AT30	AIT-M:AMIS:AMIS	3in
AT90	AIT-M:AMIS:AMIS	3in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
DPHZ	HDRS-H:HRMS-H:HRGD-H	2in
GR	HGNS-H:HGNS-H:HGNS-H	6in
NPOR	HGNS-H:HGNS-H:HGNS-H	6in
PEFZ	HDRS-H:HRMS-H:HRGD-H	2in
SP	AIT-M:AMIS:AMIS	6in
STIT	DepthCorrection	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

TIME_1900 - Time Marked every 60.00 (s)

Standard Resolution Formation


Photoelectric Factor (PEFZ) HDRS-H
0
10
Gas Effect
NPOR Backup
Cable Tension (TENS)
5000
lbf
0
Array Induction Two Foot Resistivity A10 (AT10) AIT-M
0.2
ohm.m
2000
Array Induction Two Foot Resistivity A30 (AT30) AIT-M
0.2
ohm.m
2000
Array Induction Two Foot Resistivity A90 (AT90) AIT-M
0.2
ohm.m
2000
Standard Resolution Density Porosity (DPHZ) HDRS-H
0.3
ft3/ft3
-0.1
Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H
0.3
m3/m3
-0.1
Gamma Ray Back up
Gamma Ray (ECGR) HGNS-H
0
gAPI
200
Caliper (HCAL) HDRS-H
6
in
16
Spontaneous Potential (SP) AIT-M
-80
mV
20
Stuck Tool Indicator, Total (STIT)
0
ft
50
3450
3460
3470
3480
3490
CSG @ 3498 ft
3500
3510
3520
3530
3540
3550
3560
3570
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SP
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ECGR
STIT
AT90
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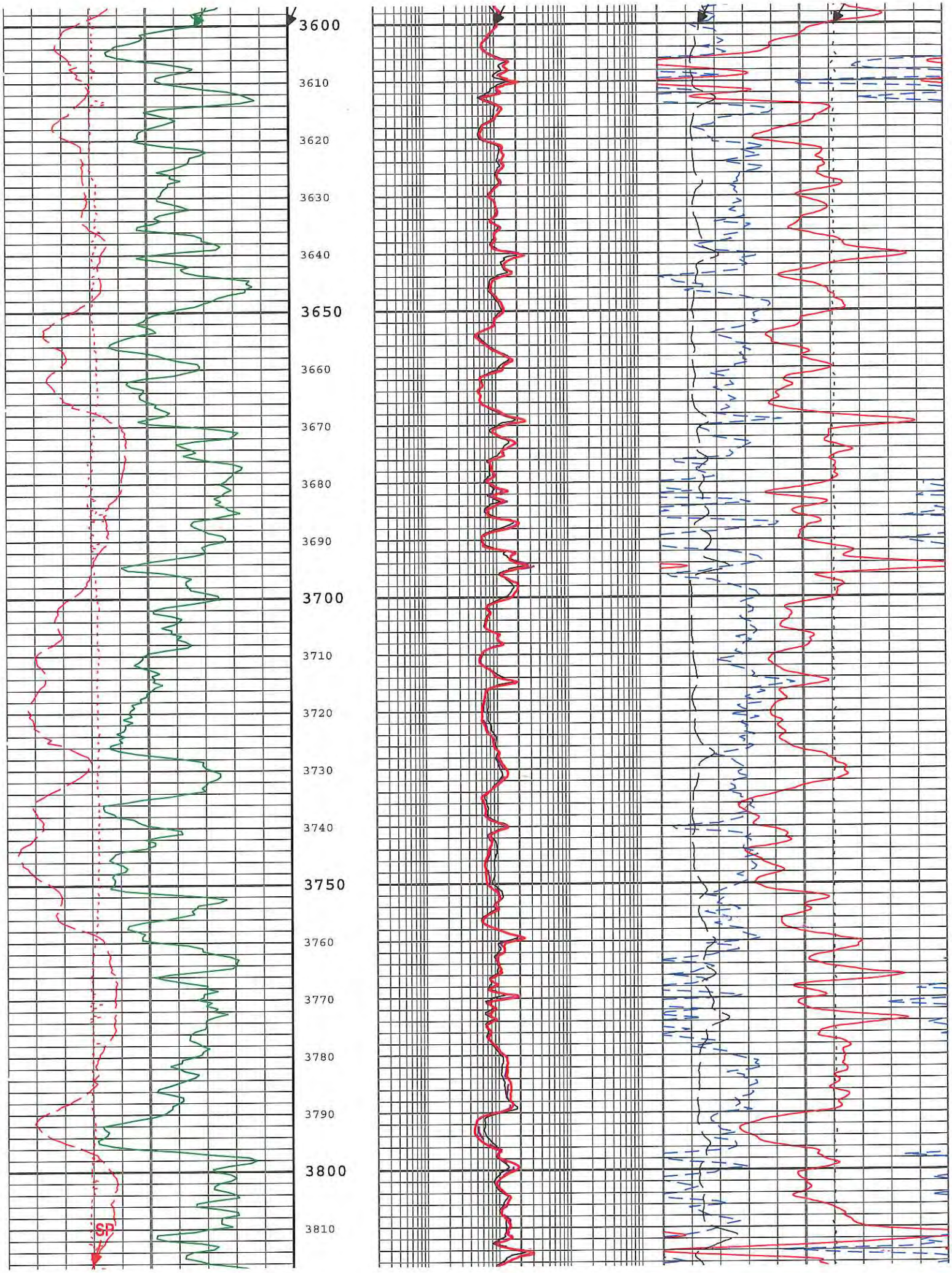
DPHZ
PEFZ
TENS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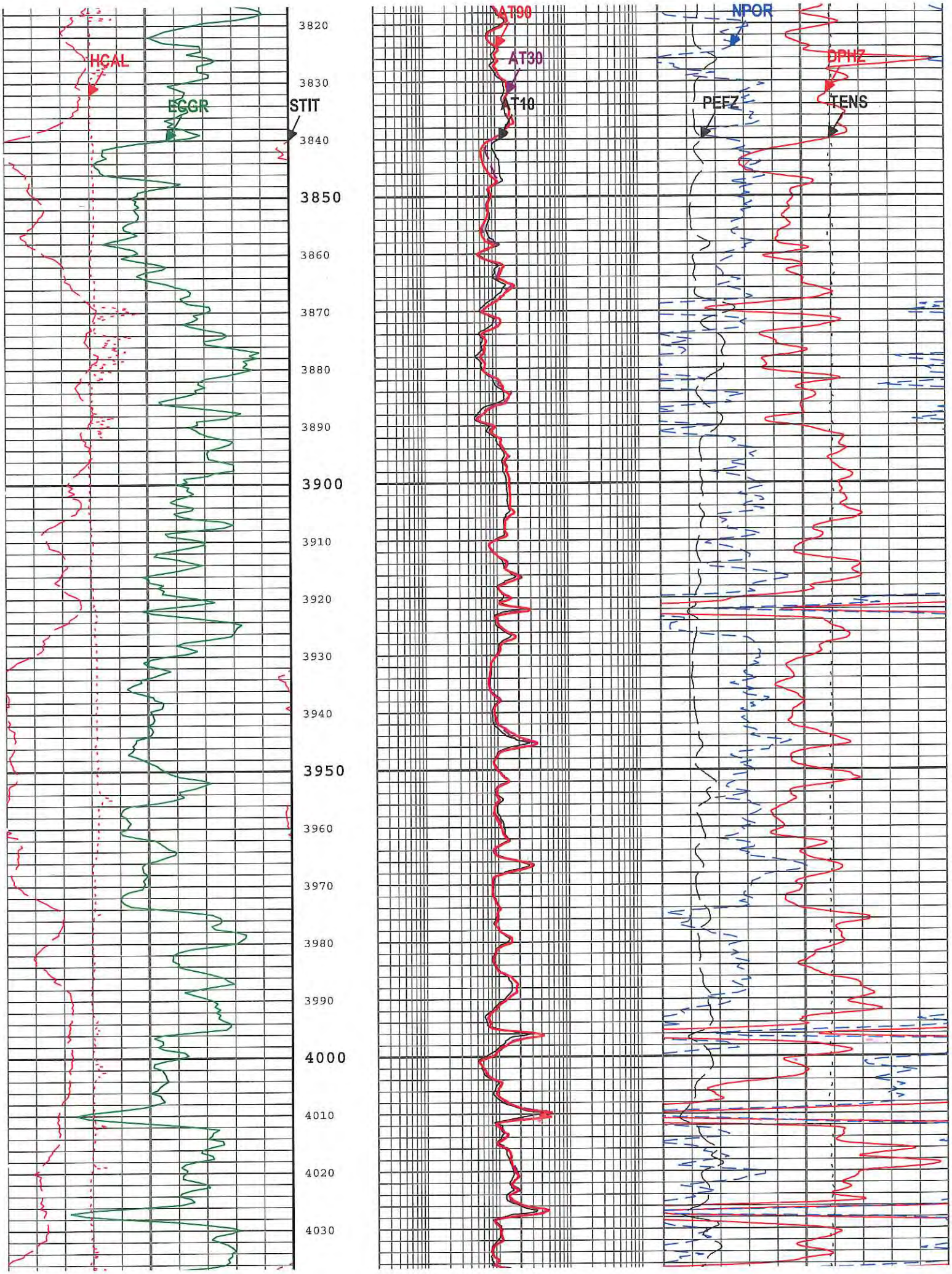
SP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EGGR
STIT
AT90
AT30
AT10
NPOR
DPHZ
PEFZ
TENS
3820
3830
3840
3850
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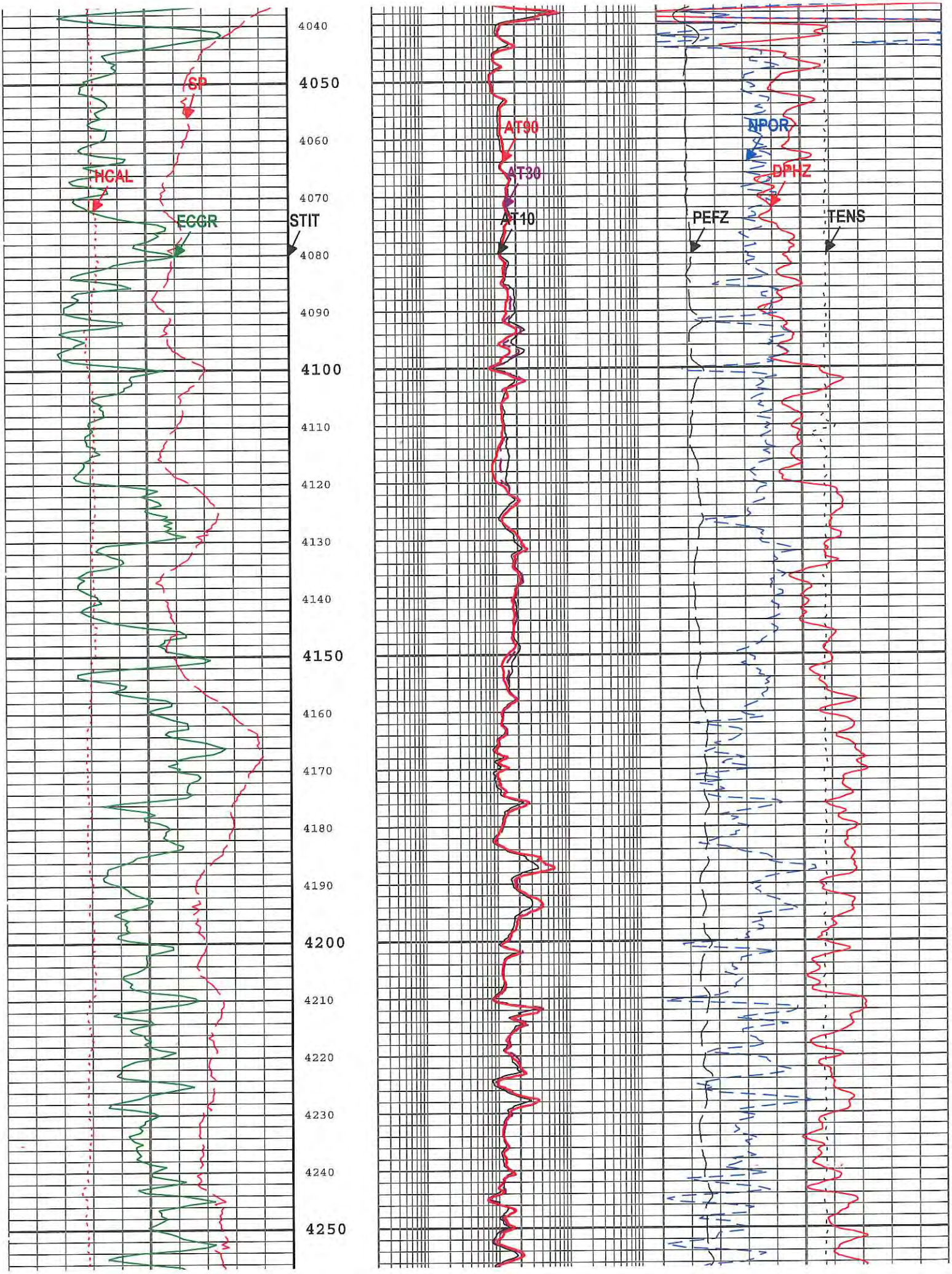
3970
3980
3990
4000
4010
4020
4030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4050
4060
4070
4080
4090
4100
4110
4120
4130
4140
4150
4160
4170
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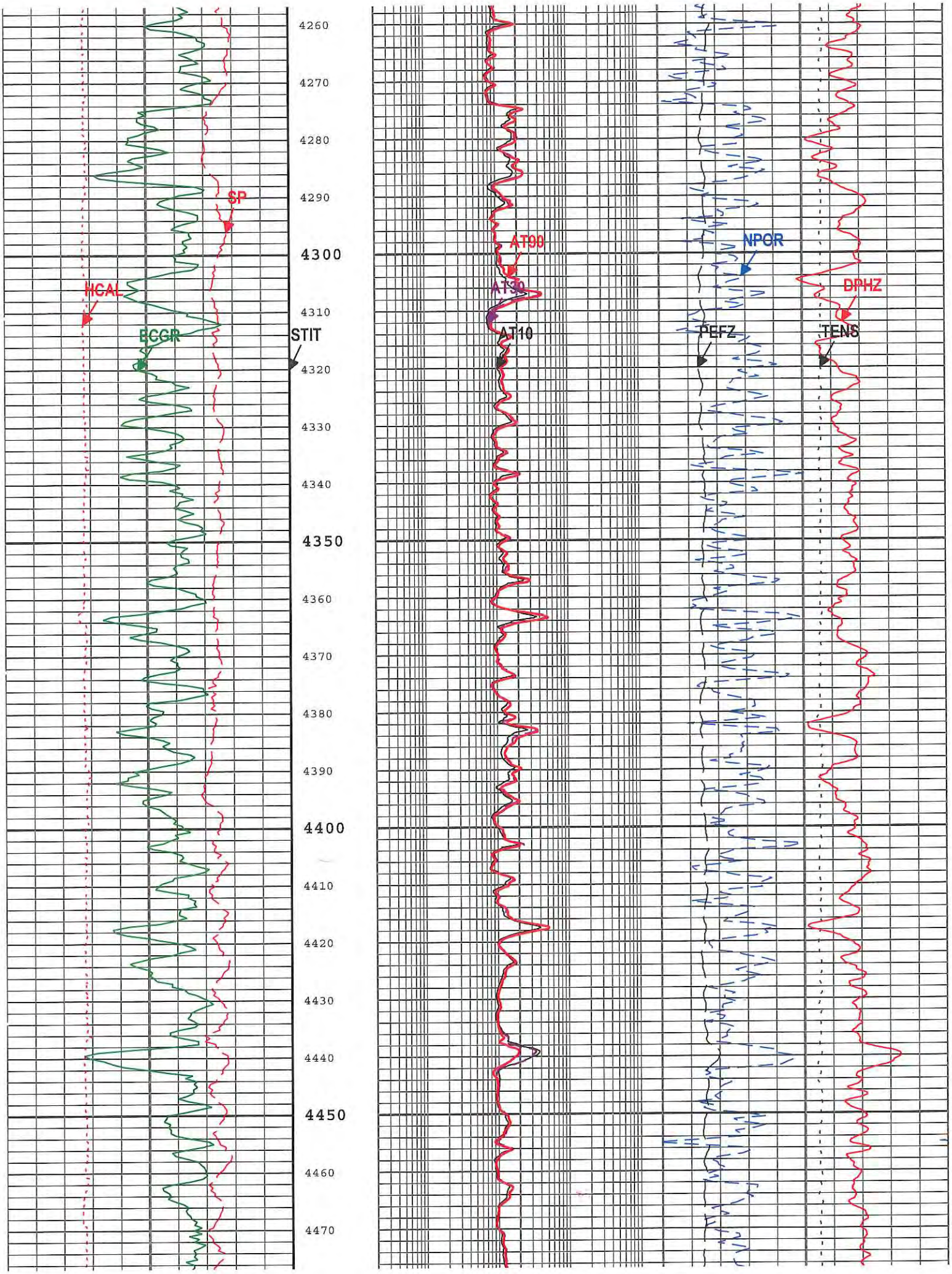
4190
4200
4210
4220
4230
4240
4250
SP
HCAL
ECGR
STIT
AT90
AT30
AT10
NPOR
DPHZ
PEFZ
TENS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SP
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HCAL
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ECGR
STIT
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4390
4400
4410
4420
4430
4440
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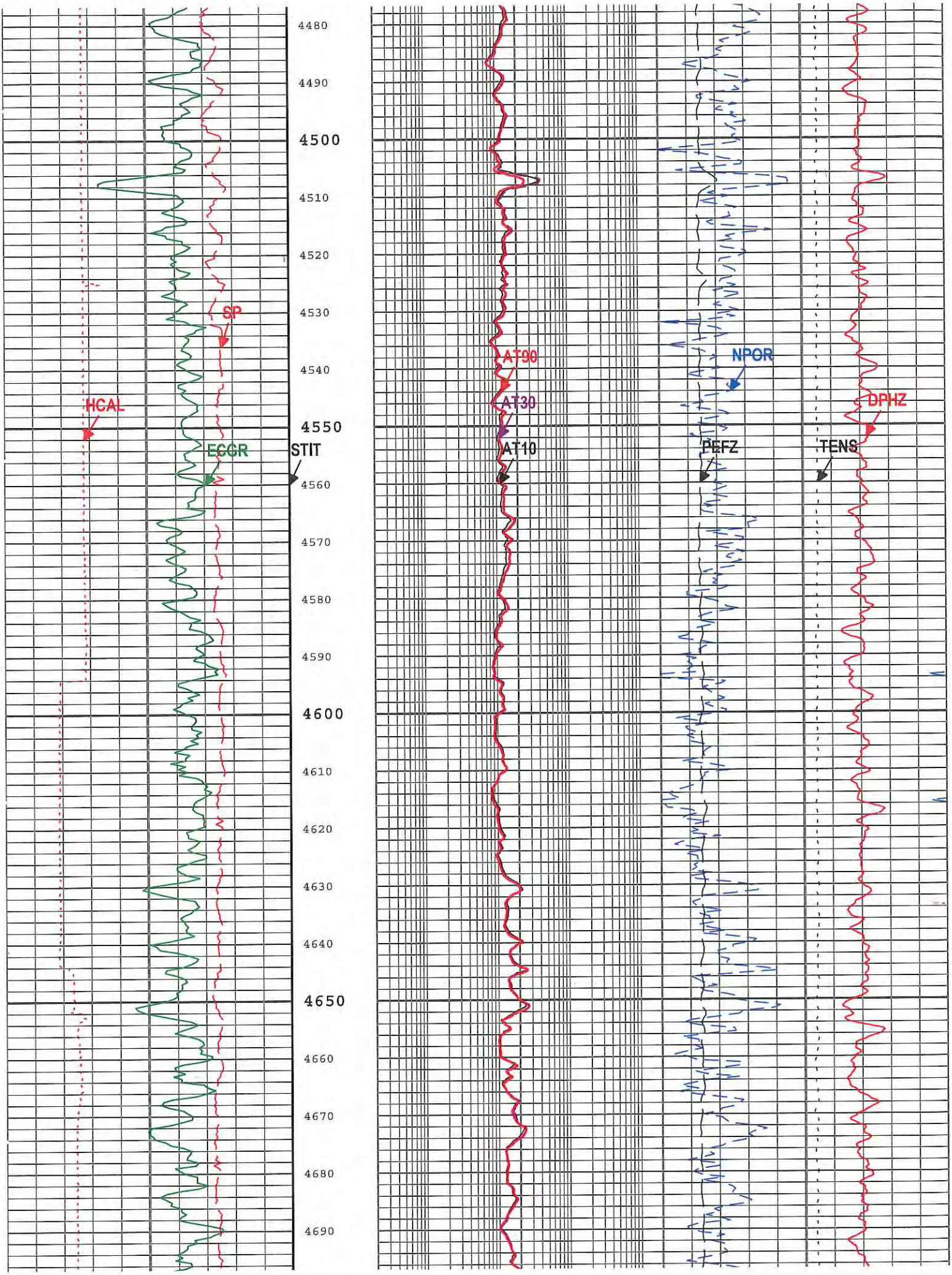
PEFZ
TENS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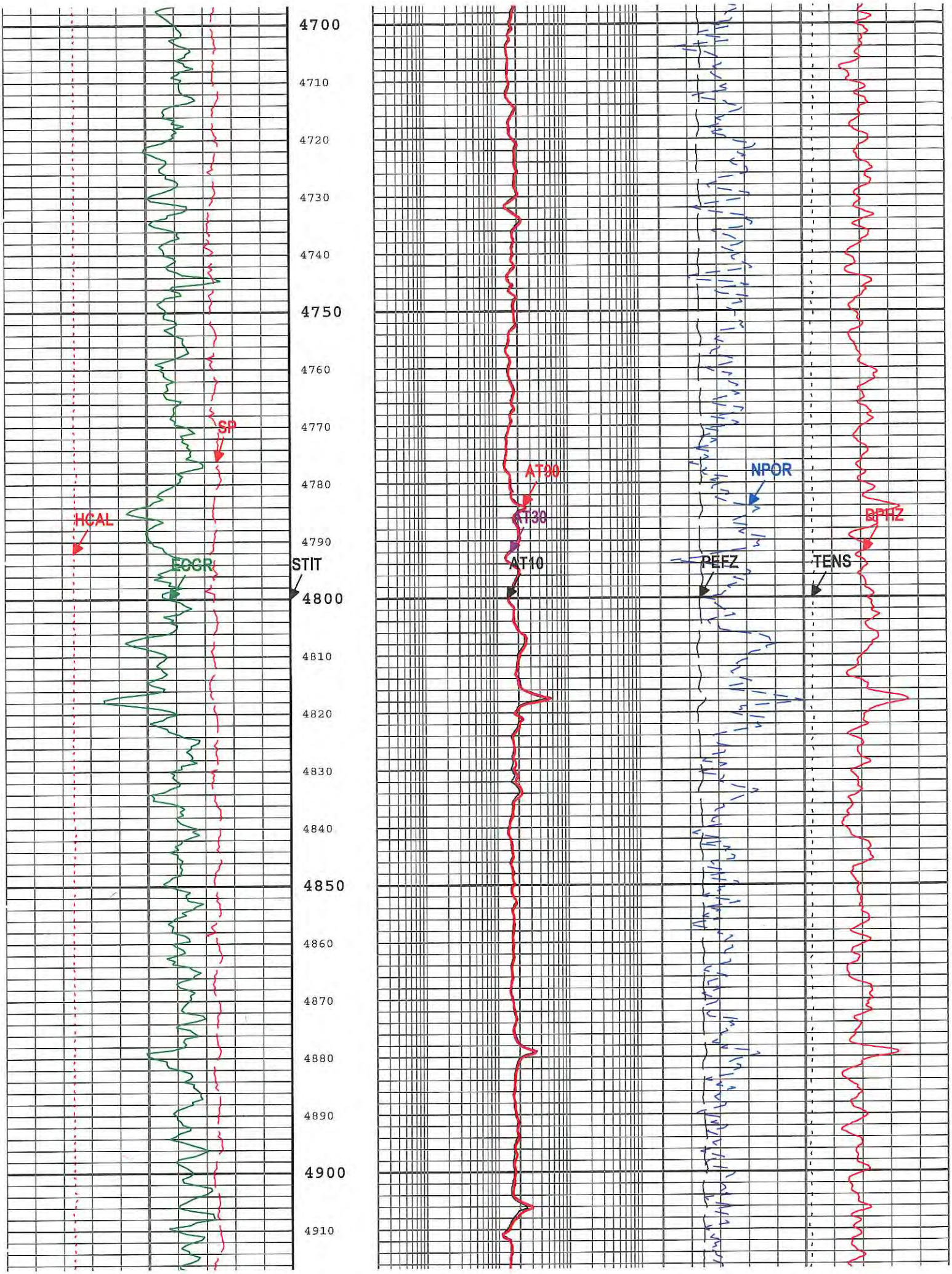
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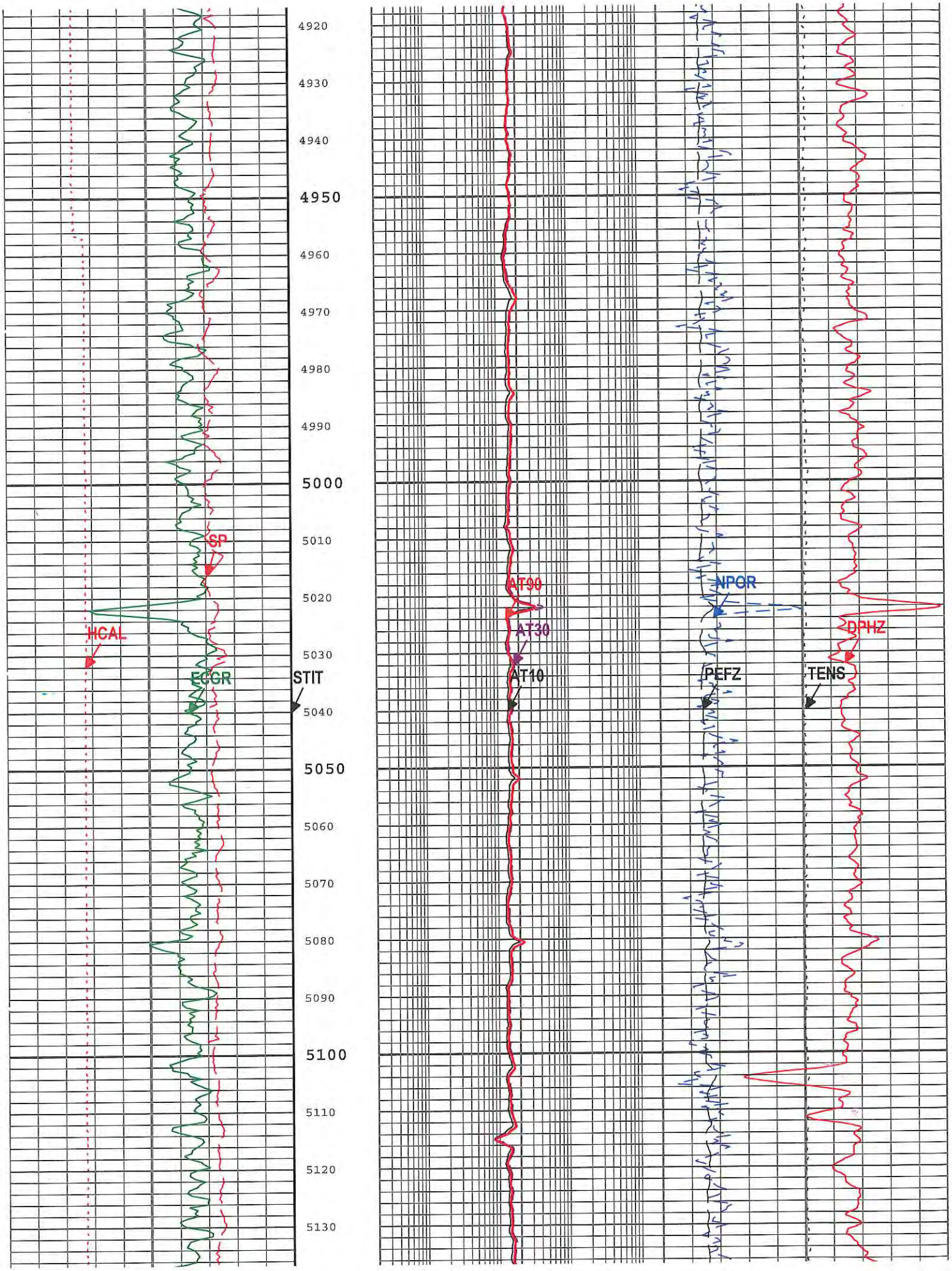
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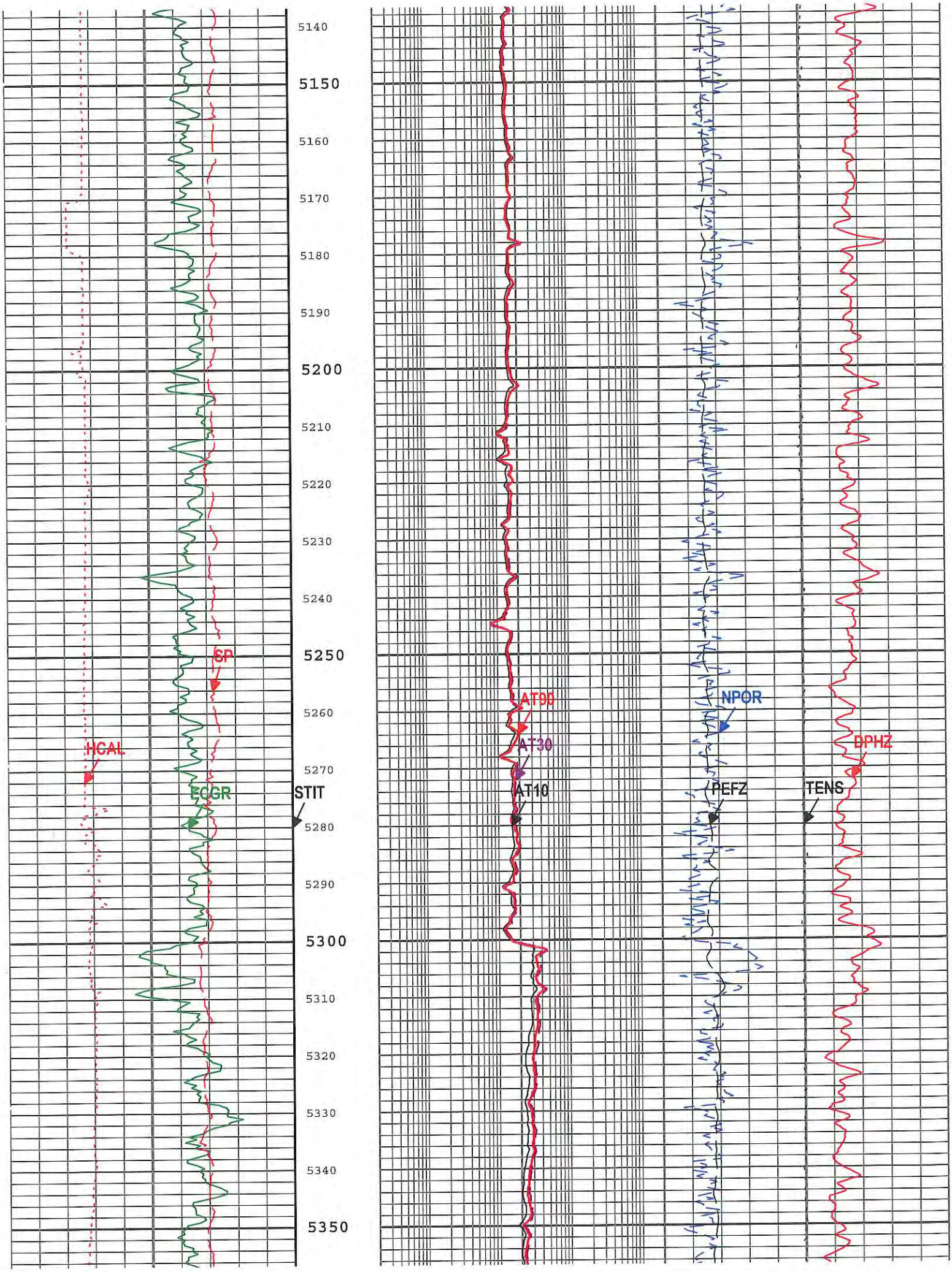
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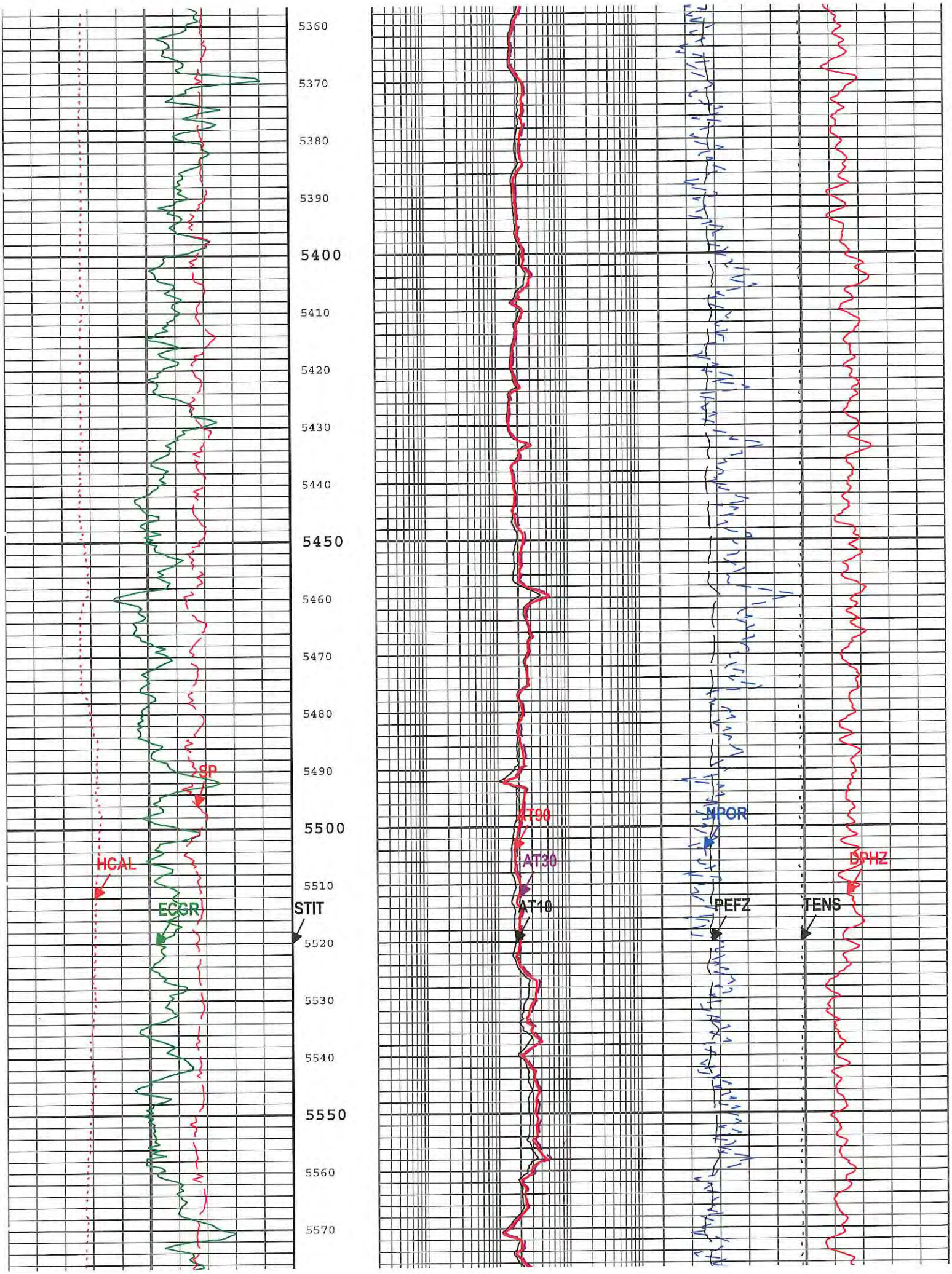
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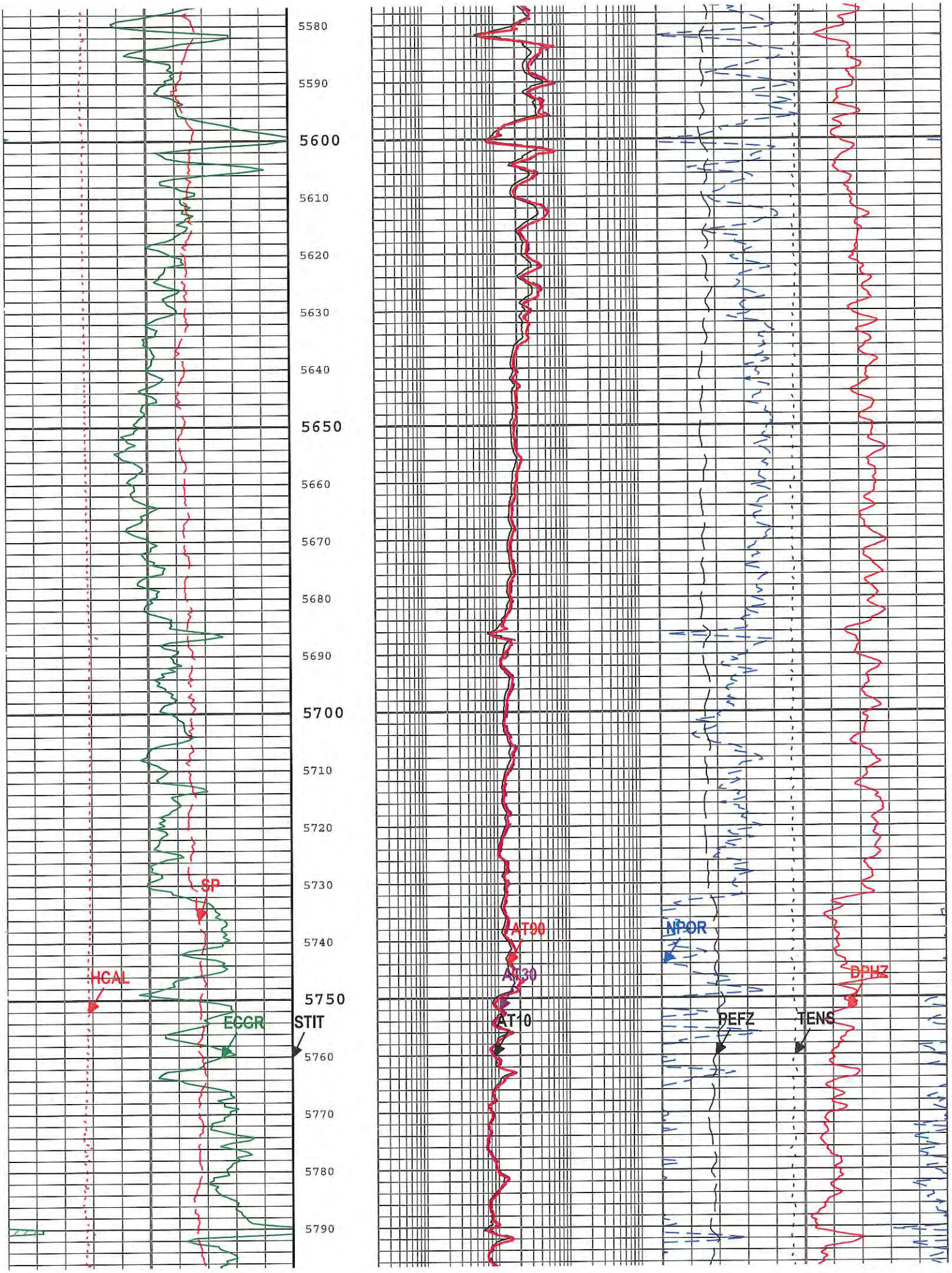
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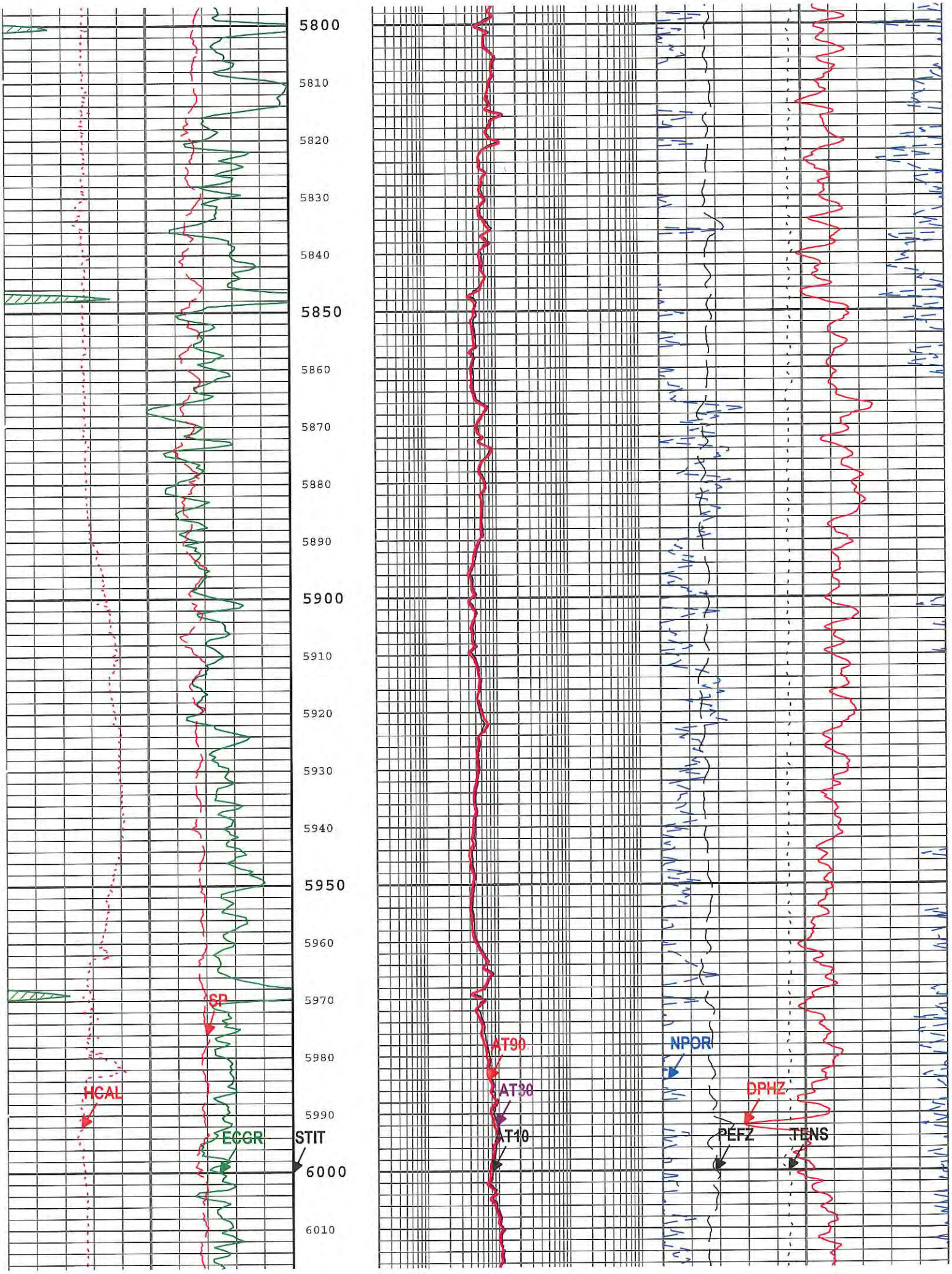
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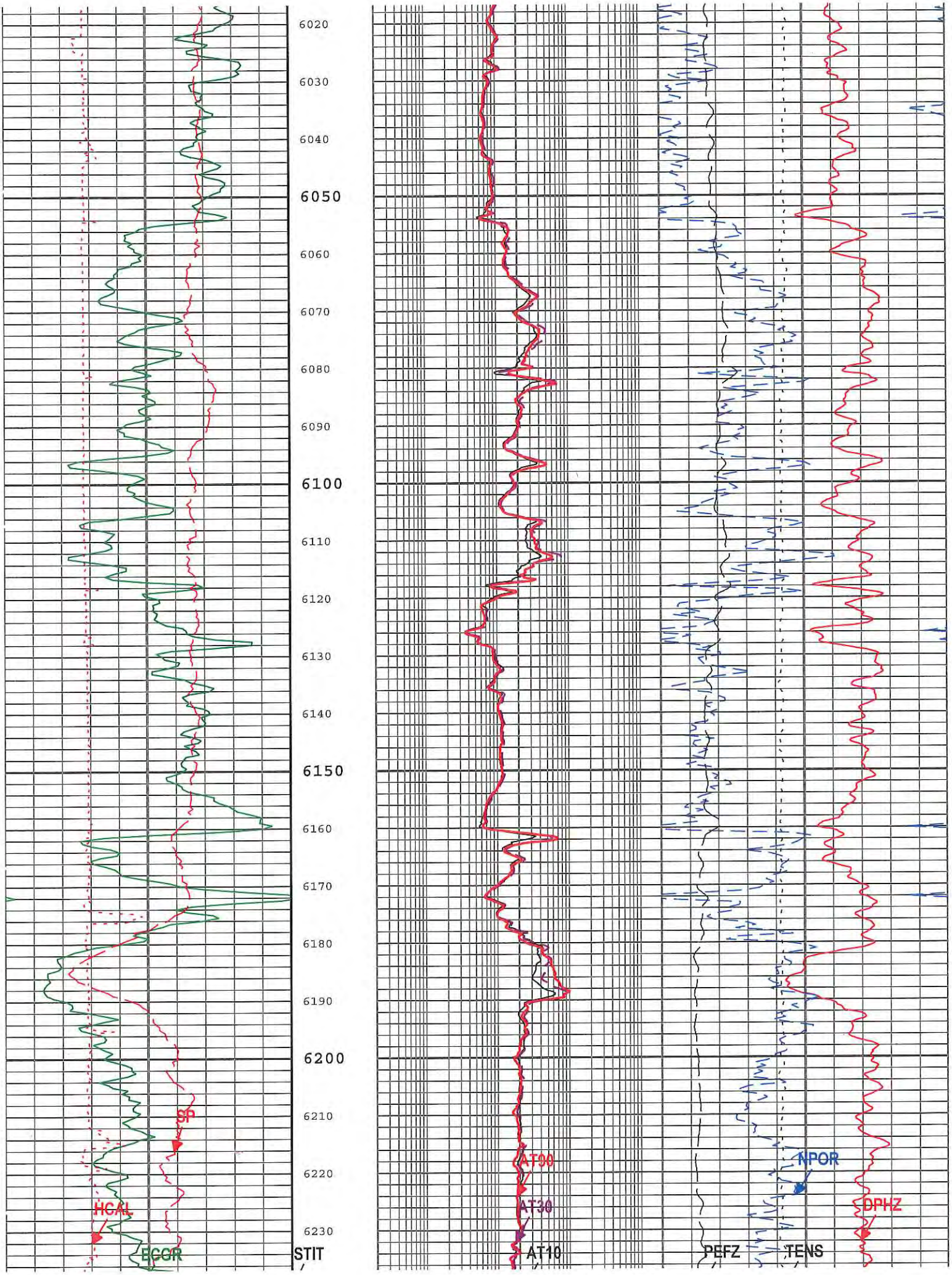
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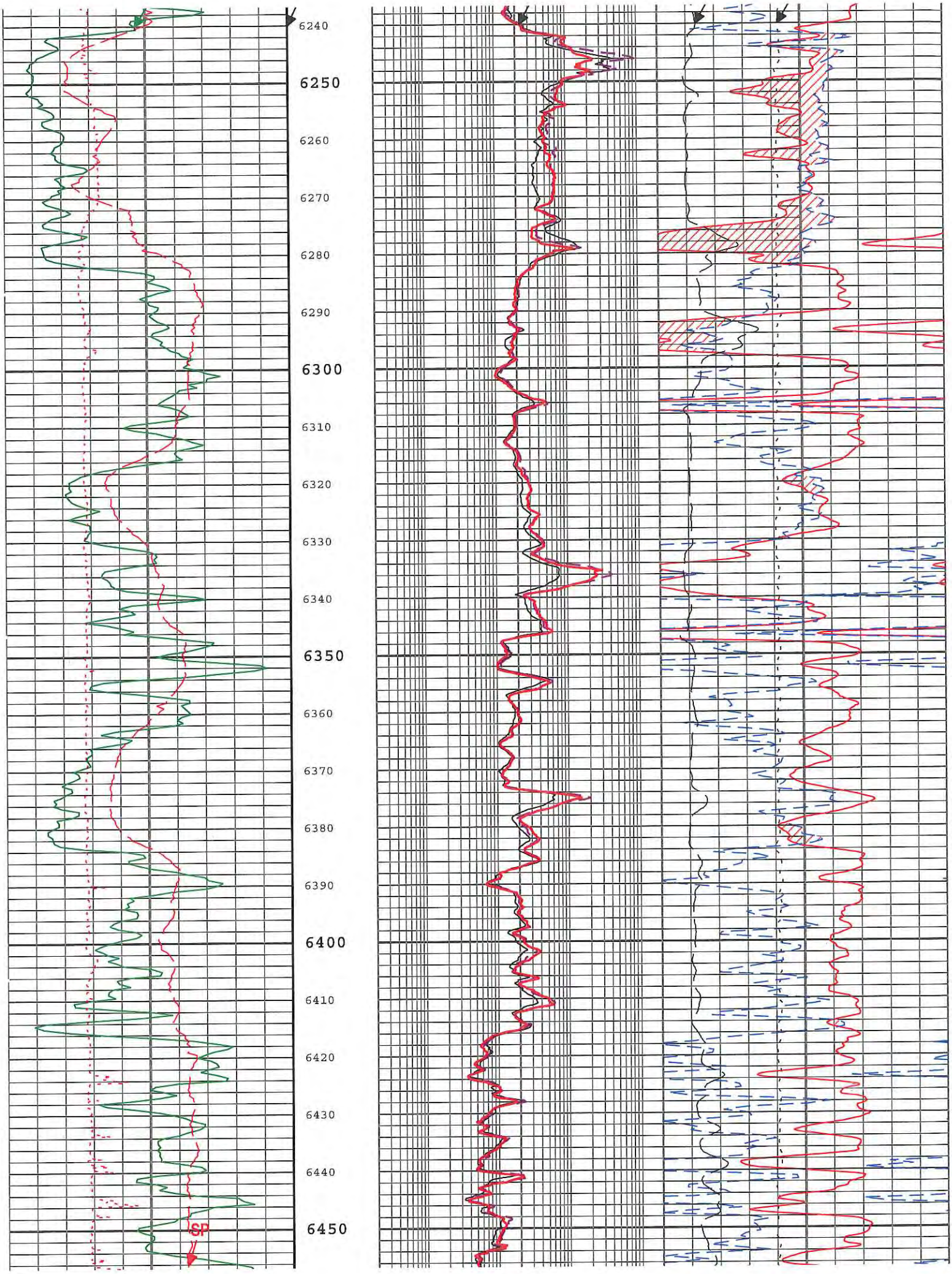
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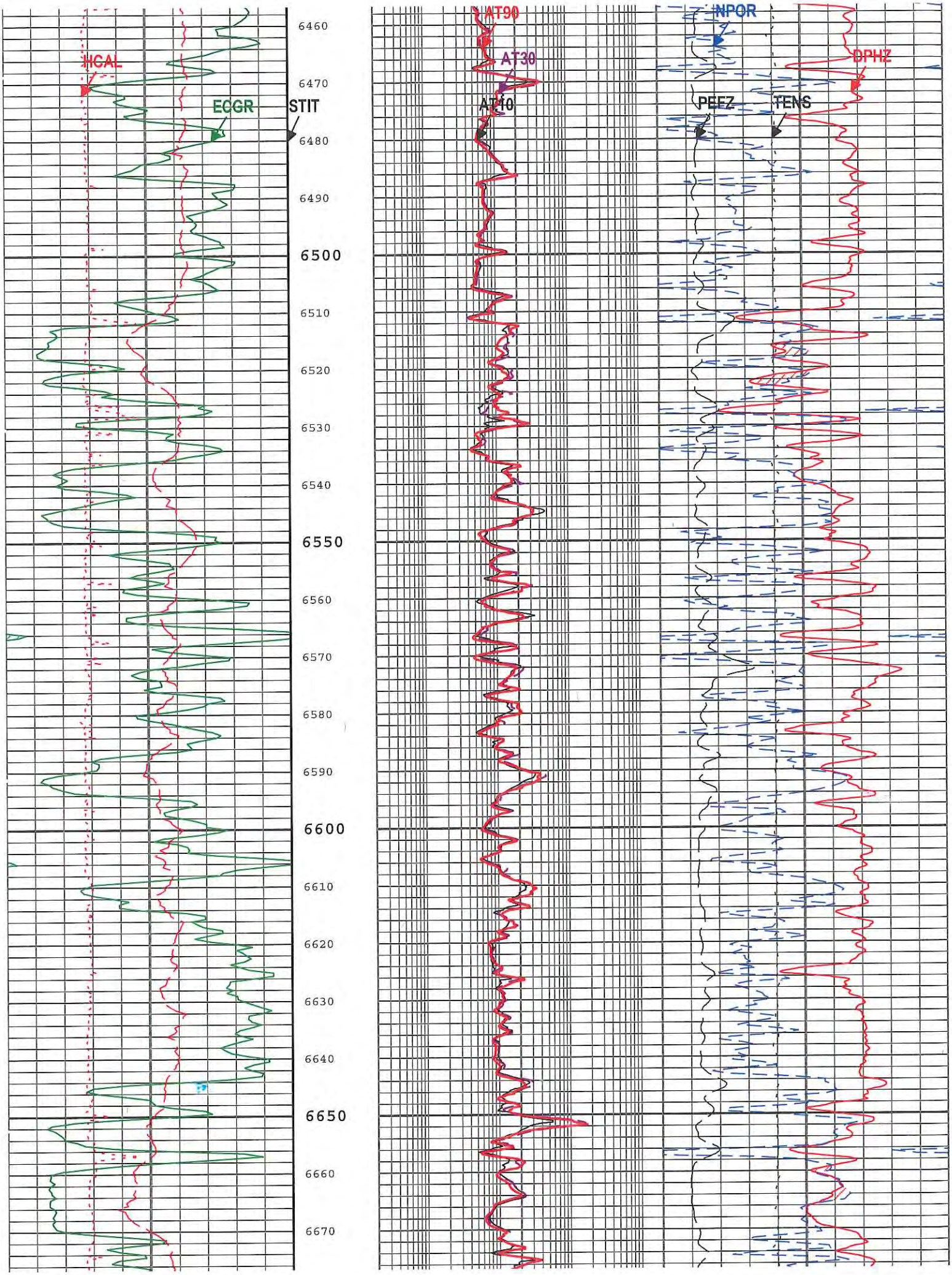
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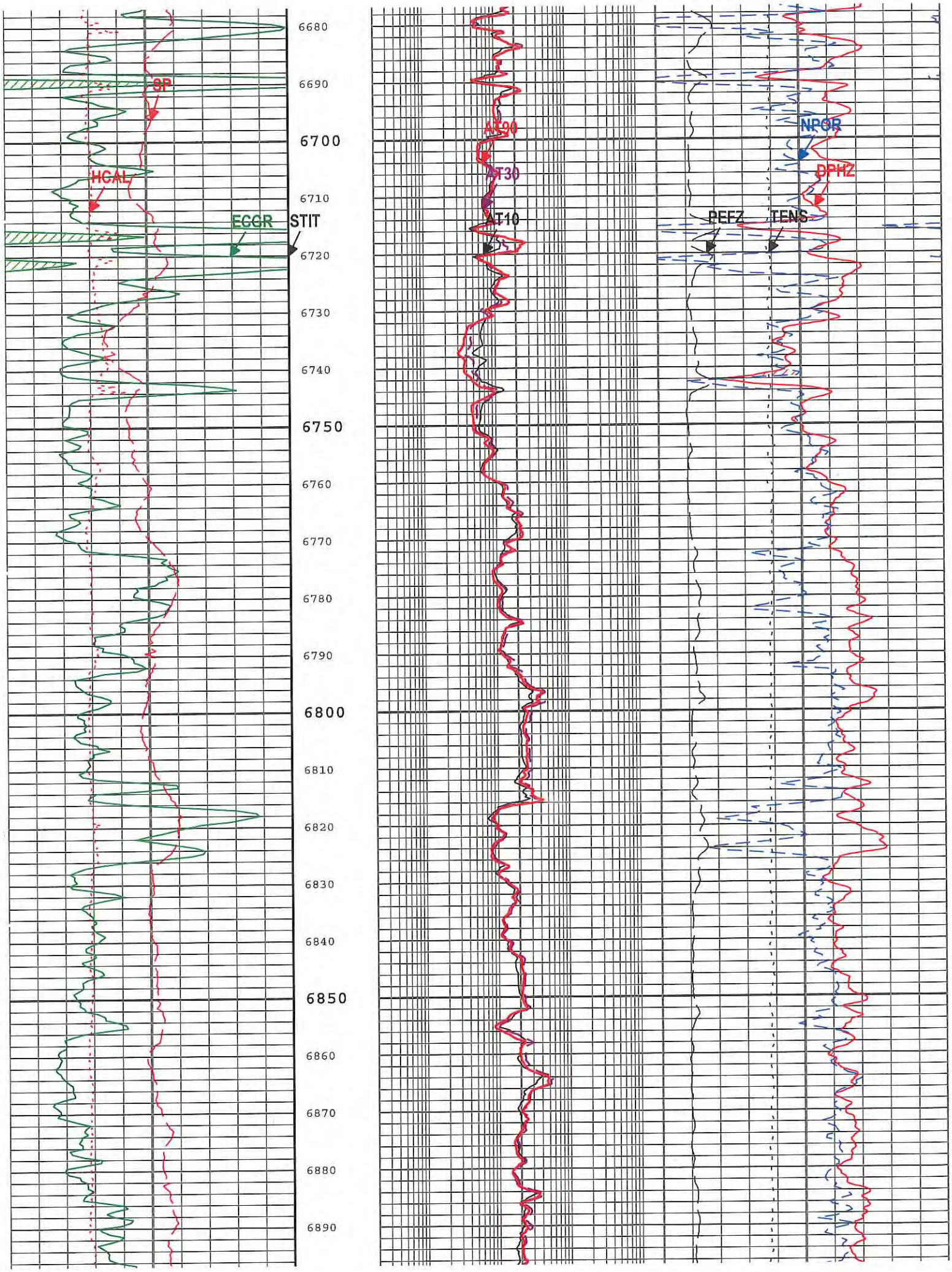
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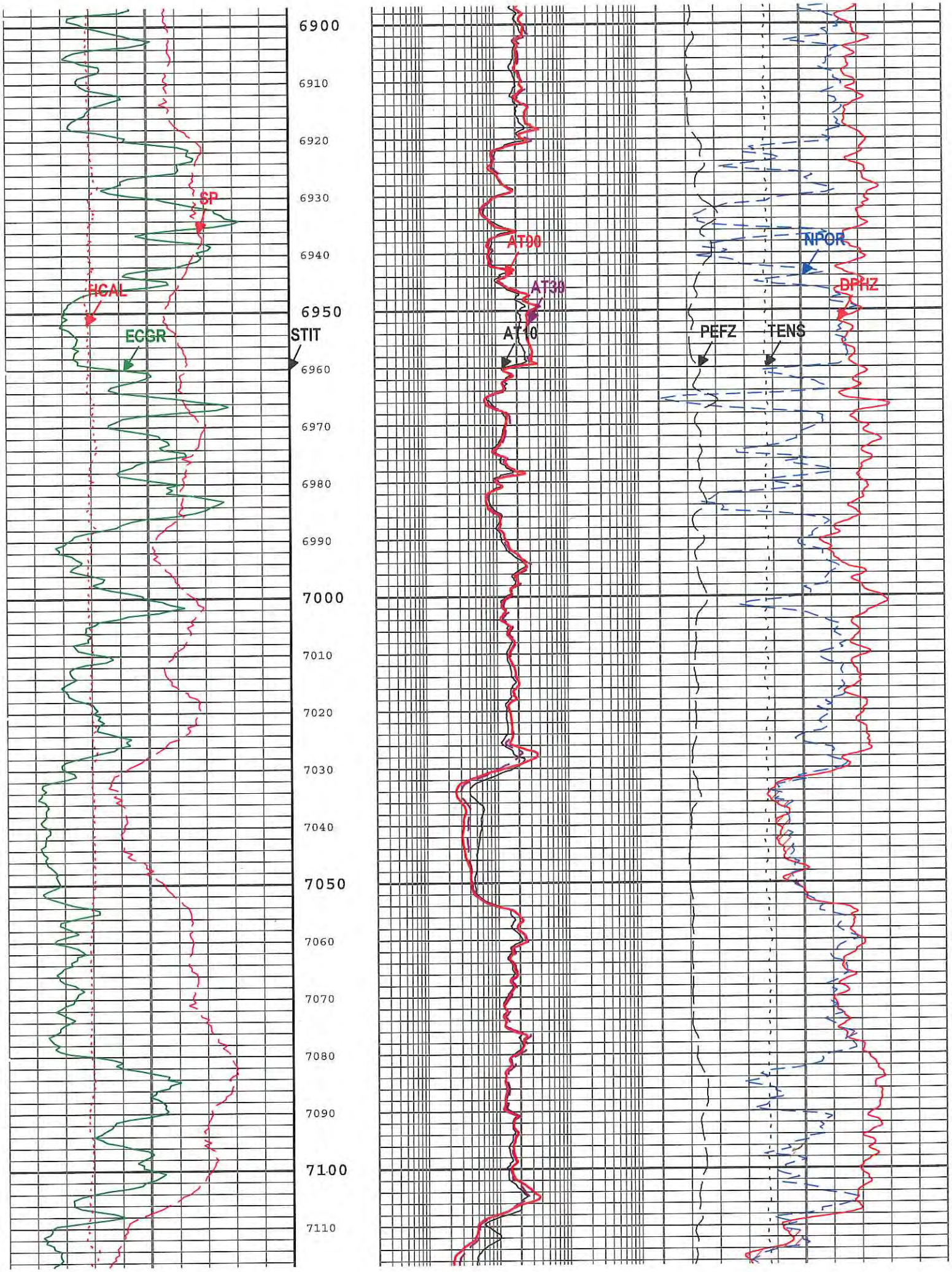
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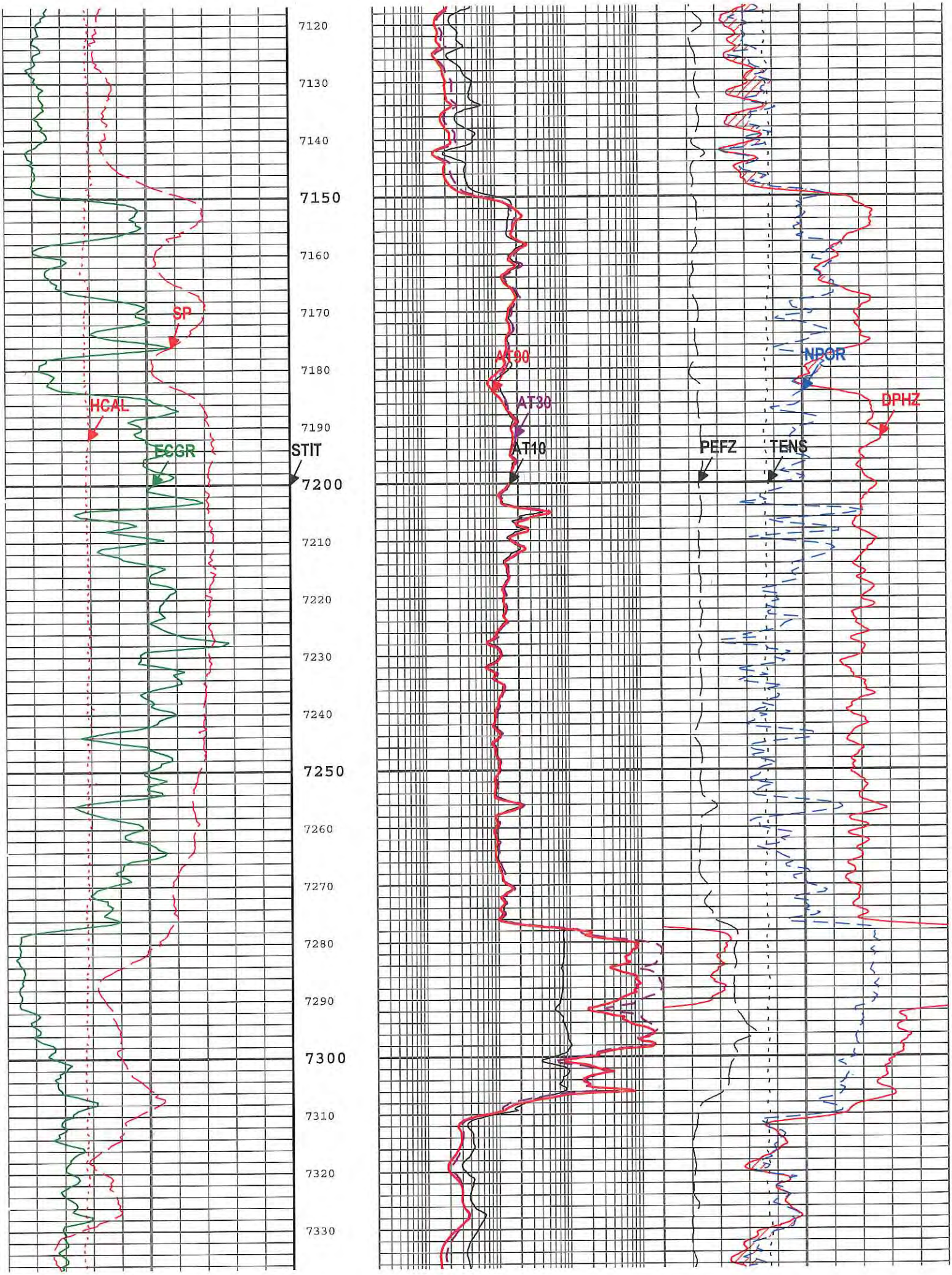
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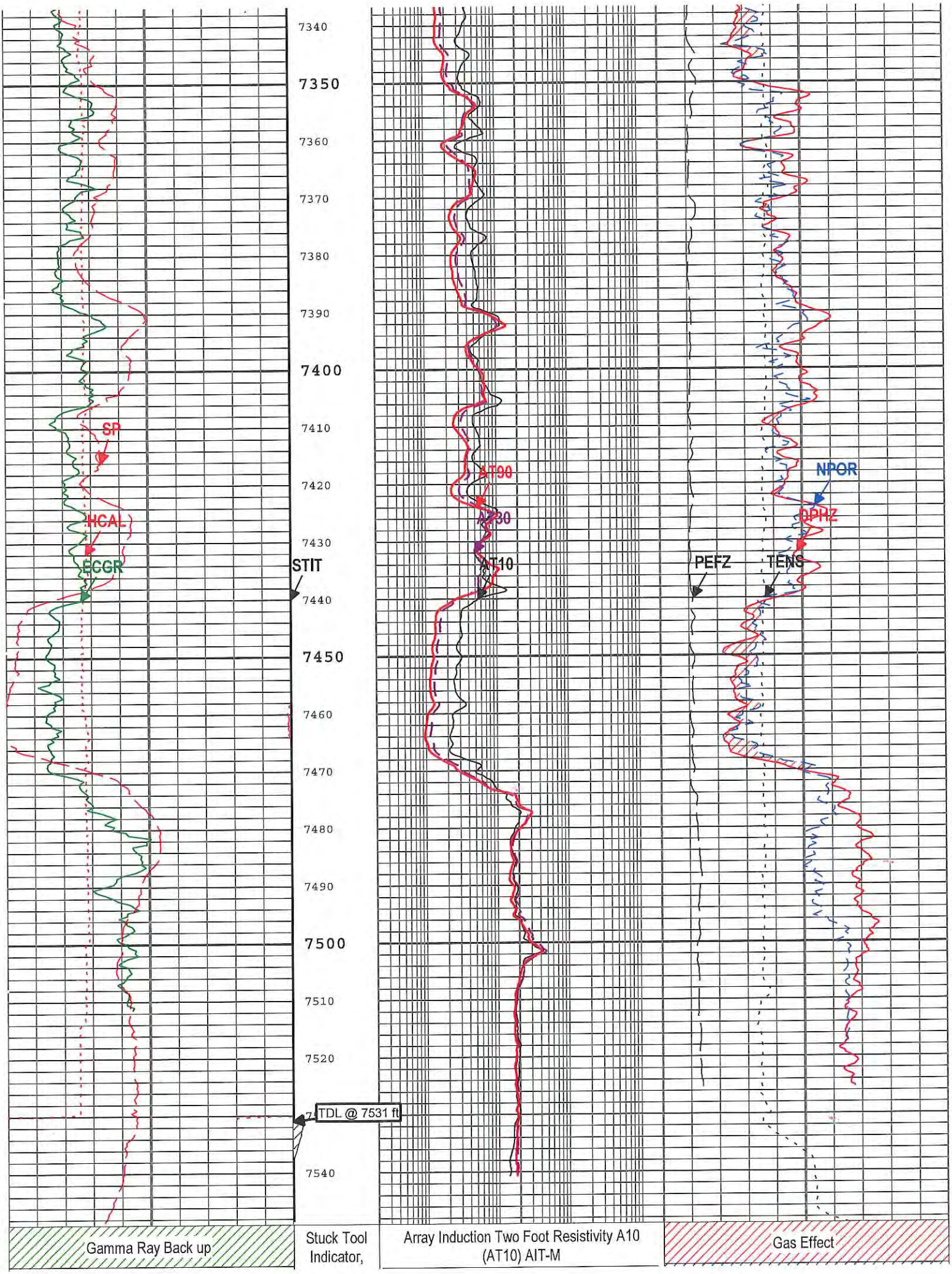
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ECGR
STIT
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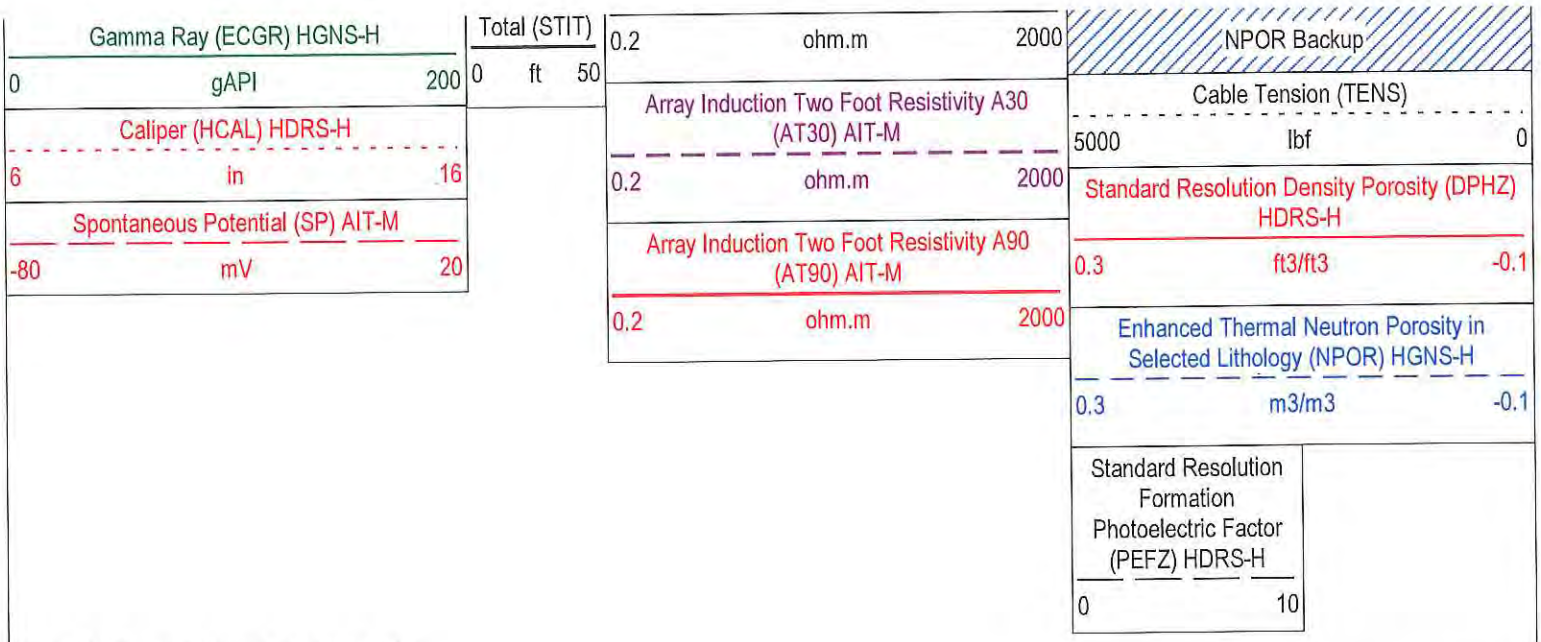
AT30
AT10
NPOR
DPHZ
PEFZ
TENS
TDL @ 7531 ft
Gamma Ray Back up
Stuck Tool Indicator,
Array Induction Two Foot Resistivity A10 (AT10) AIT-M
Gas Effect



TIME_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express Format: Log (TripleCombo-5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:05:13

Channel Processing Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ASTA	Array Induction Tool Standoff	AIT-M	0.6	in
ISSBAR	Barite Mud Presence Flag	Borehole	Yes	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	177	degF
BS	Bit Size	WLSESSION	Depth Zoned	in
BSAL	Borehole Salinity	Borehole	900	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.1	in
CBLO	Casing Bottom (Logger)	WLSESSION	3498	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DFD	Drilling Fluid Density	Borehole	9.9	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DFT_WATER	Drilling Fluid Water Type	Borehole	WBM	
DHC	Density Hole Correction	HDRS-H	Bit Size	
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	AMF	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	SANDSTONE	
MDEN	Matrix Density for Density Porosity	Borehole	2.65	g/cm3
MFST	Mud Filtrate Sample Temperature	Borehole	68	degF
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.9	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft
TD	Total Measured Depth	Borehole	7532	ft

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	12.25		3515
BS	8.75	3515	7532

All depth are actual.

Tool Control Parameters

One: 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	3600	ft/h

One

5" Triple Combo

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[3]:Up	Up	7294.65 ft	7556.27 ft	07-Sep-2016 5:43:06 AM	07-Sep-2016 5:48:19 AM	ON	5.53 ft	No
One	Log[4]:Up	Up		7548.83 ft	07-Sep-2016 5:52:06 AM		ON	0.00 ft	No

All depths are referenced to toolstring zero

Log

Company:Western Refining, Southwest, Inc. Well:WWD #2
One: Log[4]:Up:S012

Description: HGNS standard resolution porosities for Platform Express Format: Log (TripleCombo-5 RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:05:16

TIME_1900 - Time Marked every 60.00 (s)

Main To Repeat
Repeat To Main
Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H
0 10

Main To Repeat
Repeat To Main
Caliper (HCAL) HDRS-H
6 in 16

Main To Repeat
Repeat To Main
Array Induction Two Foot Resistivity A90 (AT90) AIT-M
0.2 ohm.m 2000

Main To Repeat
Repeat To Main
Cable Tension (TENS)
5000 lbf 0

Main To Repeat
Repeat To Main
Spontaneous Potential (SP) AIT-M
-80 mV 20

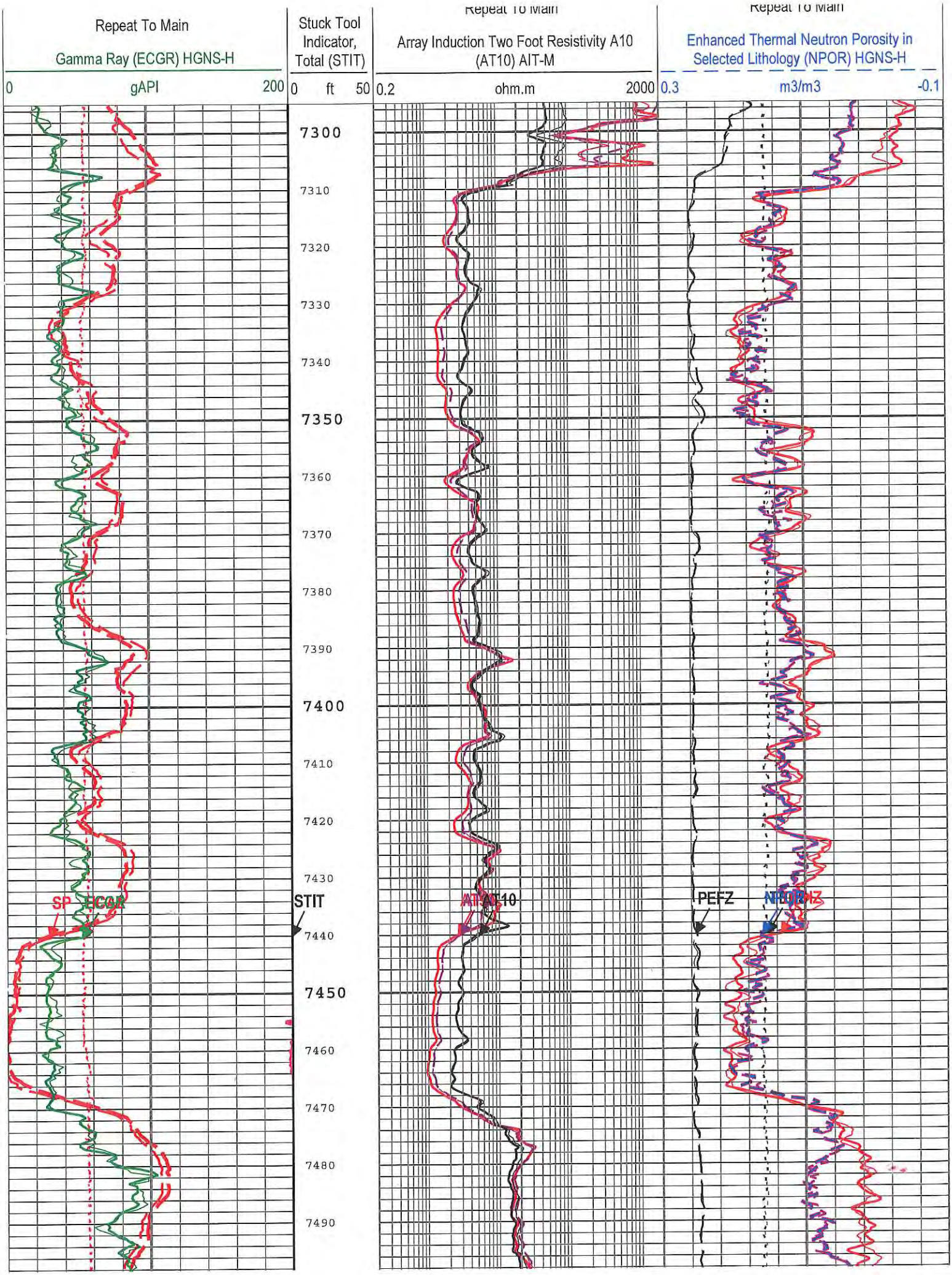
Main To Repeat
Repeat To Main

Main To Repeat
Repeat To Main
Array Induction Two Foot Resistivity A30 (AT30) AIT-M
0.2 ohm.m 2000

Main To Repeat
Repeat To Main
Standard Resolution Density Porosity (DPHZ) HDRS-H
0.3 ft3/ft3 -0.1

Main To Repeat

Main To Repeat


Repeat To Main
Gamma Ray (ECGR) HGNS-H
0
gAPI
200
Stuck Tool Indicator, Total (STIT)
0
ft
50
Repeat To Main
Array Induction Two Foot Resistivity A10 (AT10) AIT-M
0.2
ohm.m
2000
Repeat To Main
Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H
0.3
m3/m3
-0.1
7300
7310
7320
7330
7340
7350
7360
7370
7380
7390
7400
7410
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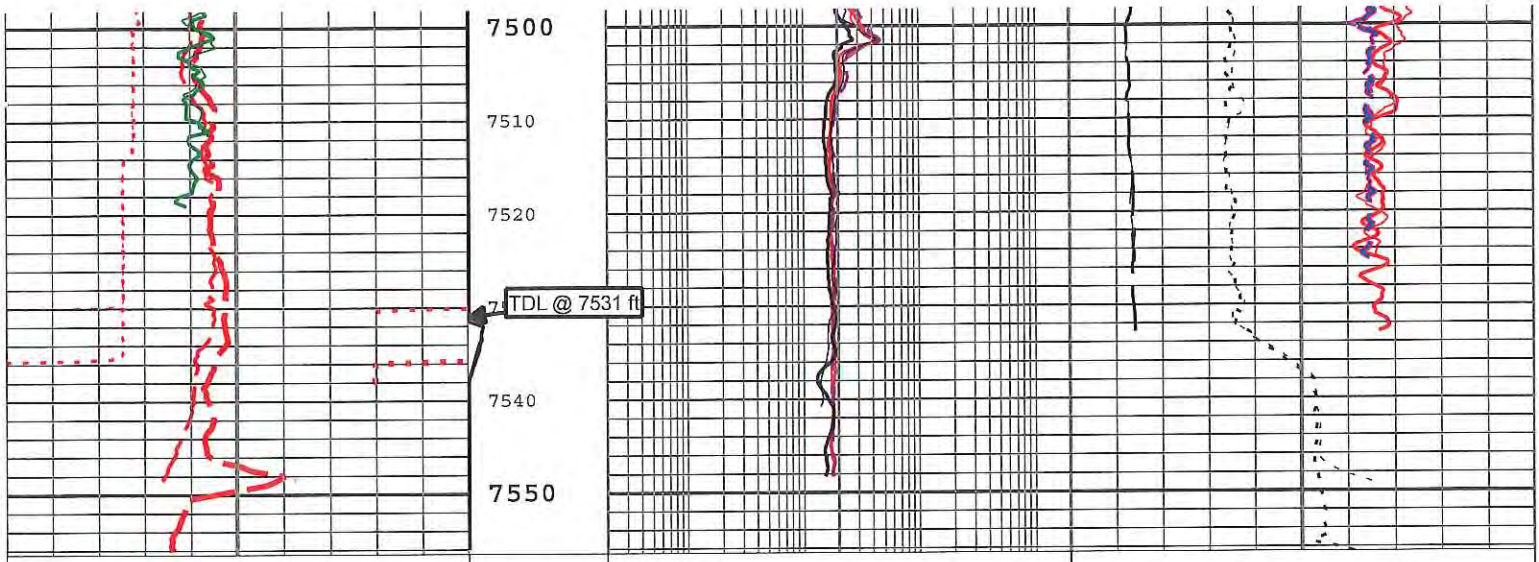
7480
7490
SP
ECGR
STIT
AIT AT10
PEFZ
NPOR HZ



Main To Repeat

Repeat To Main

Caliper (HCAL) HDRS-H

6 in 16

Main To Repeat

Repeat To Main

Spontaneous Potential (SP) AIT-M

-80 mV 20

Main To Repeat

Repeat To Main

Gamma Ray (ECGR) HGNS-H

0 gAPI 200

Main To Repeat

Repeat To Main

Stuck Tool Indicator, Total (STIT)

0 ft 50

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A90 (AT90) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A30 (AT30) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Cable Tension (TENS)

5000 lbf 0

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

Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H

0.3 m3/m3 -0.1

Main To Repeat

Repeat To Main

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

0 10

TIME_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express Format: Log (TripleCombo-5 RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:05:16

Channel Processing Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ASTA	Array Induction Tool Standoff	AIT-M	0.6	in
ISSBAR	Barite Mud Presence Flag	Borehole	Yes	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	

BHT	Bottom Hole Temperature	Borehole	177	degF
BS	Bit Size	WLSESSION	Depth Zoned	in
BSAL	Borehole Salinity	Borehole	900	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.1	in
CBLO	Casing Bottom (Logger)	WLSESSION	3498	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DFD	Drilling Fluid Density	Borehole	9.9	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DFT_WATER	Drilling Fluid Water Type	Borehole	WBM	
DHC	Density Hole Correction	HDRS-H	Bit Size	
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	AMF	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	SANDSTONE	
MDEN	Matrix Density for Density Porosity	Borehole	2.65	g/cm3
MFST	Mud Filtrate Sample Temperature	Borehole	68	degF
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.9	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft
TD	Total Measured Depth	Borehole	7532	ft

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	12.25		3515
BS	8.75	3515	7532

All depth are actual.

Tool Control Parameters

One: 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	3600	ft/h

Calibration Report

AIT-M (Array Induction Tool - M) Calibration - Run One

Primary Equipment :

File code for AIT-MA Sonde Tool Element — AMIS — 50

Auxiliary Equipment :

AITM Rm/SP Bottom Nose — AMRM

AIT Sonde Calibration - Test Loop Gain

Master (EEPROM): 20:19:37 05-Aug-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Test Loop Gain - 0		Master	1.000	0.950	1.013	1.050
Test Loop Phase - 0	deg	Master	0	-3.000	1.893	3.000
Test Loop Gain - 1		Master	1.000	0.950	1.009	1.050
Test Loop Phase - 1	deg	Master	0	-3.000	0.092	3.000
Test Loop Gain - 2		Master	1.000	0.950	1.015	1.050

Test Loop Phase - 2	deg	Master	0	-3.000	-0.008	3.000
Test Loop Gain - 3		Master	1.000	0.950	1.012	1.050
Test Loop Phase - 3	deg	Master	0	-3.000	0.319	3.000
Test Loop Gain - 4		Master	1.000	0.950	0.998	1.050
Test Loop Phase - 4	deg	Master	0	-3.000	0.071	3.000
Test Loop Gain - 5		Master	1.000	0.950	1.022	1.050
Test Loop Phase - 5	deg	Master	0	-3.000	0.391	3.000
Test Loop Gain - 6		Master	1.000	0.950	1.035	1.050
Test Loop Phase - 6	deg	Master	0	-3.000	0.531	3.000
Test Loop Gain - 7		Master	1.000	0.950	1.047	1.050
Test Loop Phase - 7	deg	Master	0	-3.000	0.270	3.000

AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM): 20:19:37 05-Aug-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Sonde Error Correction Real - 0	mS/m	Master	—	-231.000	-97.409	119.000
Sonde Error Correction Quad - 0		Master	—	-2250.000	-596.848	2250.000
Sonde Error Correction Real - 1	mS/m	Master	—	114.000	156.040	204.000
Sonde Error Correction Quad - 1		Master	—	-625.000	-247.744	625.000
Sonde Error Correction Real - 2	mS/m	Master	—	66.000	112.609	156.000
Sonde Error Correction Quad - 2		Master	—	-350.000	120.325	350.000
Sonde Error Correction Real - 3	mS/m	Master	—	39.000	68.195	89.000
Sonde Error Correction Quad - 3		Master	—	-250.000	-161.507	250.000
Sonde Error Correction Real - 4	mS/m	Master	—	15.000	24.223	35.000
Sonde Error Correction Quad - 4		Master	—	-63.000	-0.939	63.000
Sonde Error Correction Real - 5	mS/m	Master	—	4.000	15.665	24.000
Sonde Error Correction Quad - 5		Master	—	-50.000	-27.113	50.000
Sonde Error Correction Real - 6	mS/m	Master	—	5.000	10.064	15.000
Sonde Error Correction Quad - 6		Master	—	-30.000	-6.498	30.000
Sonde Error Correction Real - 7	mS/m	Master	—	-5.000	-1.483	5.000
Sonde Error Correction Quad - 7		Master	—	-30.000	-4.619	30.000

AIT Mud Calibration - Mud Calibration Gain

Master (EEPROM): 20:19:37 05-Aug-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Coarse Gain		Master	1.000	0.800	0.934	1.200
Fine Gain		Master	1.000	0.800	0.938	1.200

AIT Electronics Check - Thru Calibration Check

Master (EEPROM): 20:19:37 05-Aug-2016 Before (Measured): 21:11:27 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Thru Cal Mag - 0	V	Master	—	0.366	0.603	0.854
		Before	—	0.366	0.603	0.854
		Before-Master	—	—	0.000	—
Thru Cal Phase - 0	deg	Master	—	137.000	-165.864	-103.000
		Before	—	137.000	-161.111	-103.000
		Before-Master	—	—	4.753	—
Thru Cal Mag - 1	V	Master	—	0.762	1.237	1.778
		Before	—	0.762	1.237	1.778
		Before-Master	—	—	0.000	—
Thru Cal Phase - 1	deg	Master	—	136.000	-166.823	-104.000
		Before	—	136.000	-162.071	-104.000
		Before-Master	—	—	4.752	—
Thru Cal Mag - 2	V	Master	—	0.372	0.613	0.868
		Before	—	0.372	0.613	0.868
		Before-Master	—	—	0.000	—
Thru Cal Phase - 2	deg	Master	—	132.000	-170.304	-108.000
		Before	—	132.000	-165.578	-108.000
		Before-Master	—	—	4.726	—
Thru Cal Mag - 3	V	Master	—	0.420	0.691	0.980
		Before	—	0.420	0.691	0.980
		Before-Master	—	—	0.000	—
Thru Cal Phase - 3	deg	Master	—	131.000	-171.041	-109.000

		Before	—	131.000	-166.313	-109.000	
		Before-Master	—	—	4.728	—	
Thru Cal Mag - 4	V	Master	—	0.804	1.297	1.876	
		Before	—	0.804	1.296	1.876	
		Before-Master	—	—	-0.001	—	
Thru Cal Phase - 4	deg	Master	—	125.000	-177.009	-115.000	
		Before	—	125.000	-172.279	-115.000	
		Before-Master	—	—	4.730	—	
Thru Cal Mag - 5	V	Master	—	1.176	1.888	2.744	
		Before	—	1.176	1.887	2.744	
		Before-Master	—	—	-0.001	—	
Thru Cal Phase - 5	deg	Master	—	122.000	-178.544	-118.000	
		Before	—	122.000	-173.812	-118.000	
		Before-Master	—	—	4.732	—	
Thru Cal Mag - 6	V	Master	—	1.176	1.887	2.744	
		Before	—	1.176	1.886	2.744	
		Before-Master	—	—	-0.001	—	
Thru Cal Phase - 6	deg	Master	—	121.000	-178.521	-119.000	
		Before	—	121.000	-173.790	-119.000	
		Before-Master	—	—	4.731	—	
Thru Cal Mag - 7	V	Master	—	0.846	1.358	1.974	
		Before	—	0.846	1.353	1.974	
		Before-Master	—	—	-0.005	—	
Thru Cal Phase - 7	deg	Master	—	115.000	-179.305	-125.000	
		Before	—	115.000	-174.661	-125.000	
		Before-Master	—	—	4.644	—	
SPA Zero	mV	Master		-50.000	0.156	50.000	
		Before		-50.000	0.146	50.000	
		Before-Master	—	—	-0.010	—	
SPA Plus	mV	Master		941.000	988.093	1040.000	
		Before		941.000	988.030	1040.000	
		Before-Master	—	—	-0.063	—	
Temperature Zero	V	Master		-0.050	0.000	0.050	
		Before		-0.050	0.000	0.050	
		Before-Master	—	—	0.000	—	
Temperature Plus	V	Master		0.870	0.915	0.960	
		Before		0.870	0.915	0.960	
		Before-Master	—	—	0.000	—	

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

Primary Equipment :

HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	48.17
HILT Resistivity Gamma-Ray Density Device, 150 degC	HRGD-H	4899

Auxiliary Equipment :

HRDD Backscatter Detector	Backscatter	
HRDD Long Spacing Detector	Long Spacing	
HRDD Short Spacing Detector	Short Spacing	27786
Cesium 137 Gamma-Ray Logging Source	GSR-J	5471
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	48.17
HILT High-Resolution Mechanical Sonde, 150 degC	HRMS-H	4876

Calibration Parameter :

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

HDRS Caliper Calibration - Caliper Accumulations

Before (Measured): 21:07:42 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
Small Ring	in	Before	8.00	6.00	7.80	10.00	
Large Ring	in	Before	12.00	9.00	12.20	15.00	

HDRS Density Calibration - Inversion Results

Master (EEPROM): 11:40:40 24-Aug-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Rho Aluminum	g/cm3	Master	2.596	2.586	2.600	2.606
Rho Magnesium	g/cm3	Master	1.686	1.676	1.685	1.696
Pe Aluminum		Master	2.570	2.470	2.571	2.670
Pe Magnesium		Master	2.650	2.550	2.618	2.750

HDRS Density Calibration - Deviation Summary

Master (EEPROM): 11:40:40 24-Aug-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Average Deviation	%	Master	0	-0.6000	0.2221	0.6000
BS Max Deviation	%	Master	0	-1.6000	0.6566	1.6000
SS Average Deviation	%	Master	0	-1.0000	0.2278	1.0000
SS Max Deviation	%	Master	0	-2.5000	0.9144	2.5000
LS Average Deviation	%	Master	0	-1.5000	0.6741	1.5000
LS Max Deviation	%	Master	0	-3.5000	1.7270	3.5000

HDRS Density Calibration - Background Summary

Master (EEPROM): 11:40:40 24-Aug-2016 Before (Measured): 21:08:15 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Window Ratio		Master	1.0000		0.7337	
		Before	0.7337	0.6970	0.7348	0.7704
		Before-Master	—	—	0.0011	—
BS Window Sum	1/s	Master	1		25241	
		Before	25241	23979	25499	26504
		Before-Master	—	—	258	—
SS Window Ratio		Master	1.0000		0.4797	
		Before	0.4797	0.4557	0.4811	0.5037
		Before-Master	—	—	0.0014	—
SS Window Sum	1/s	Master	1		11057	
		Before	11057	10504	11035	11610
		Before-Master	—	—	-22	—
LS Window Ratio		Master	1.0000		0.3012	
		Before	0.3012	0.2861	0.3073	0.3162
		Before-Master	—	—	0.0061	—
LS Window Sum	1/s	Master	1		1233	
		Before	1233	1171	1232	1294
		Before-Master	—	—	-1	—

HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 11:40:40 24-Aug-2016 Before (Measured): 21:08:15 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS PM High Voltage	V	Master		1000	1452	2400
		Before		1000	1449	2400
		Before-Master	—	-100	-3	100
SS PM High Voltage	V	Master		1000	1410	2400
		Before		1000	1411	2400
		Before-Master	—	-100	1	100
LS PM High Voltage	V	Master		1000	1480	2400
		Before		1000	1473	2400
		Before-Master	—	-100	-7	100

HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM): 11:40:40 24-Aug-2016 Before (Measured): 21:08:15 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Crystal Resolution	%	Master		5.00	11.74	25.00
		Before		5.00	11.74	25.00
		Before-Master	—	-1.00	0.00	1.00
SS Crystal Resolution	%	Master		5.00	10.26	20.00
		Before		5.00	10.24	20.00
		Before-Master	—	-1.00	-0.02	1.00
LS Crystal Resolution	%	Master		5.00	8.09	20.00
		Before		5.00	7.85	20.00

		Before-Master	—	-1.00	-0.24	1.00	

HDRS MCFL Calibration - MCFL Accumulations

Before (Measured): 21:10:47 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Main Resistivity	ohm.m	Before	3875	3565	3886	4185
Deep Resistivity	ohm.m	Before	3830	3524	3830	4136
Shallow Resistivity	ohm.m	Before	3830	3524	3839	4136

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

Primary Equipment :

HILT Gamma-Ray and Neutron Sonde, 150 degC	HGNS-H	4817

Auxiliary Equipment :

HGNS Accelerometer, 150 degC	HACCZ-H	6991
AmBe Neutron Logging Source	NSR-F	5068

Calibration Parameter :

Water Temperature	
Housing Size	
JIG-BKG (Jig minus background reference)	165

HGNS Accelerometer Calibration - Accelerometer Accumulations

Before (Measured): 05:14:18 07-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
AZ Vertical Measurement	ft/s2	Before	32.2	31.5	32.0	32.8

HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

Master (EEPROM): 00:00:00 15-May-2007

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	—	—	-4298.000	—
Accelerometer Coefficients - 1		Master	—	—	50.180	—
Accelerometer Coefficients - 2		Master	—	—	-0.002	—
Accelerometer Coefficients - 3		Master	—	—	0.000	—
Accelerometer Coefficients - 4		Master	—	—	2.754	—
Accelerometer Coefficients - 5		Master	—	—	0.000	—
Accelerometer Coefficients - 6		Master	—	—	0.000	—
Accelerometer Coefficients - 7		Master	—	—	0.000	—
Accelerometer Coefficients - 8		Master	—	—	300.500	—
Accelerometer Coefficients - 9		Master	—	—	0.994	—

HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM): 15:25:00 19-Jul-2016 Before (Measured): 21:06:20 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Near Zero Measurement	1/s	Master	0	5.0	27.6	40.0
		Before	0	5.0	28.2	40.0
		Before-Master	—	-4.1	0.6	4.1
Far Zero Measurement	1/s	Master	0	5.0	29.5	40.0
		Before	0	5.0	29.7	40.0
		Before-Master	—	-4.4	0.2	4.4
Near Plus Measurement	1/s	Master	6031.0	4700.0	5290.0	6900.0
		Before	—	—	—	—
		Before-Master	—	—	—	—
Far Plus Measurement	1/s	Master	2793.0	1900.0	2194.0	2900.0
		Before	—	—	—	—
		Before-Master	—	—	—	—
Near Corrected Plus Measurement	1/s	Master		4700.0	5156.0	6900.0
		Before	—	—	—	—
		Before-Master	—	—	—	—

Far Corrected Plus Measurement	1/s	Master		1900.0	2097.0	2900.0	
		Before	—	—	—	—	
		Before-Master	—	—	—	—	

HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

Before (Measured): 21:11:47 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit	
RGR Zero Measurement	gAPI	Before	30.0	0	78.9	120.0	
RGR Plus Measurement	gAPI	Before	185.4	157.1	165.1	206.3	
GR Calibration Gain		Before	0.89	0.80	1.00	1.05	

Platform Express

Triple Combo

Schlumberger

Company: Western Refining, Southwest, Inc.
Well: WWD #2
Field: Wildcat
County: San Juan State: New Mexico

County:	San Juan
Field:	Wildcat
Location:	Sec 27, T29N, R11W
Well:	WWD #2
Company:	Western Refining, Southwest, Inc.

Platform Express
Compensated Neutron
Litho-Density

Location:
Sec 27, T29N, R11W
SHL: 2028' FNL X 111' FEL
Lat/Long: 36.6986/-107.97035

Elev.: K.B. 5550.00 ft
G.L. 5535.00 ft
D.F. 5549.00 ft

Permanent Datum:	Ground Level	Elev.:	5535.00 f
Log Measured From:	Kelly Bushing	15.00 ft	above Perm.Datum
Drilling Measured From:	Kelly Bushing		

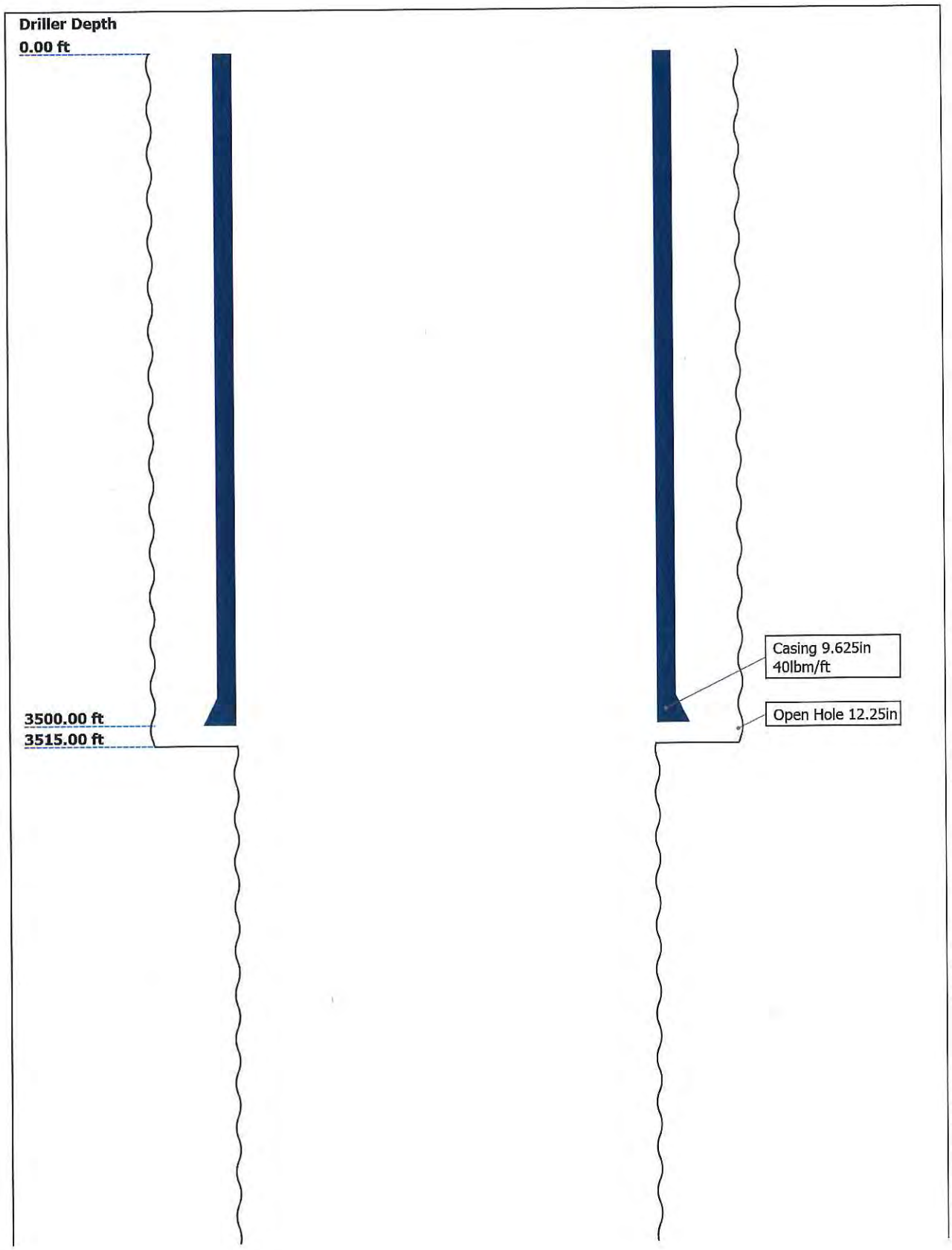
API Serial No.	Section:	Township:	Range:
30-045-35747-0000	27	29N	11W

Logging Date	05-Sep-2016		
Run Number	One		
Depth Driller	7525.00 ft		
Schlumberger Depth	7532.00 ft		
Bottom Log Interval	7532.00 ft		
Top Log Interval	3498.00 ft		
Casing Driller Size @ Depth	9.625 in	@	3500.00 ft
Casing Schlumberger	3498 ft		
Bit Size	8.75 in		
Type Fluid In Hole	WBM		
MUD Density / Viscosity	9.9 lbm/gal		55 s
MUD Fluid Loss / PH	9 cm3		8.6
MUD Source of Sample	Active Tank		
RM @ Meas Temp	1.13 ohm.m	@	68 degF
RMF @ Meas Temp	0.9 ohm.m	@	68 degF
RMC @ Meas Temp	1.4 ohm.m	@	68 degF
Source RMF / RMC	Pressed		Calculated
RM @ BHT / RMF @ BHT	0.46 @ 177		0.37 @ 177
Max Recorded Temperatures	177 degF		
Circulation Stopped / Time	06-Sep-2016		20:25:00
Logger on Bottom / Time	07-Sep-2016		05:00:00
Unit Number / Location:	9115		Ft Morgan, CO
Recorded By	Avery Becker		
Witnessed By	Larry Candelaria		

Disclaimer

Contents

Well Sketch

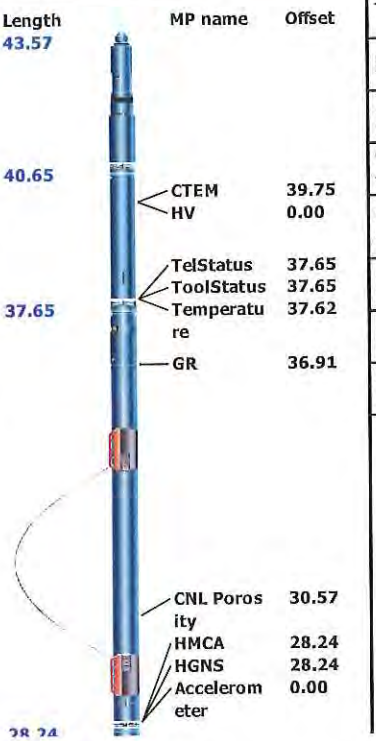

Driller Depth
0.00 ft
3500.00 ft
3515.00 ft
Casing 9.625in
40lbm/ft
Open Hole 12.25in

Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	12.25	8.75				
Top Driller (ft)	0	3515				
Top Logger (ft)	0	3515				
Bottom Driller (ft)	3515	7525				
Bottom Logger (ft)	3515	7532				
Casing						
Size (in)	9.625					
Weight (lbm/ft)	40					
Inner Diameter (in)	8.835					
Grade	N/A					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	3500					
Bottom Logger (ft)	3498					

Remarks and Equipment Summary

One: Toolstring



One: Remarks

Toolstring run as per tool sketch
Matrix: Sandstone (2.65 g/cc)
Log may be affected by 20% LCM in drilling mud
Caliper check in casing=8.87 in, within tolerance
Cement volume calculated using 7 in future casing diameter
Rig: Aztec 920
Crew: Derrick Hunter
Thank you for choosing Schlumberger

Lengths are in ft
Maximum Outer Diameter = 5.000 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

Depth Summary

	One		
Depth Measuring Device			
Type	IDW-JA		
Serial Number	6568		
Calibration Date	23-Dec-2015		
Calibrator Serial Number			
Calibration Cable Type	7-46A-XS		
Wheel Correction 1	-1		
Wheel Correction 2	0		
Tension Device			
Type	CMTD-B/A		

Serial Number	147
Calibration Date	18-Aug-2016
Calibrator Serial Number	78805A
Number of Calibration Points	10
Calibration Root Mean Square Error	7
Calibration Peak Error	10

Logging Cable

Type	7-46A-XS
Serial Number	U715043
Length	24000.00 ft
Conveyance Type	Wireline
Rig Type	Land

One:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	First run in well depth control procedures followed
Rig Up Length At Surface		IDW used as primary depth device, z-chart used for secondary
Rig Up Length At Bottom		
Rig Up Length Correction		
Stretch Correction		
Tool Zero Check At Surface		

One

5" Porosity

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[4]:Up	Up		7548.83 ft	07-Sep-2016 5:52:06 AM		ON	0.00 ft	No

All depths are referenced to toolstring zero

Log

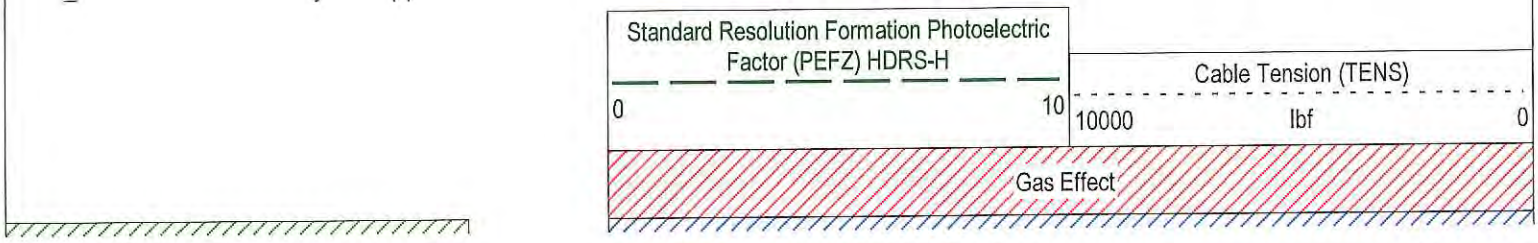
Company:Western Refining, Southwest, Inc. Well:WWD #2

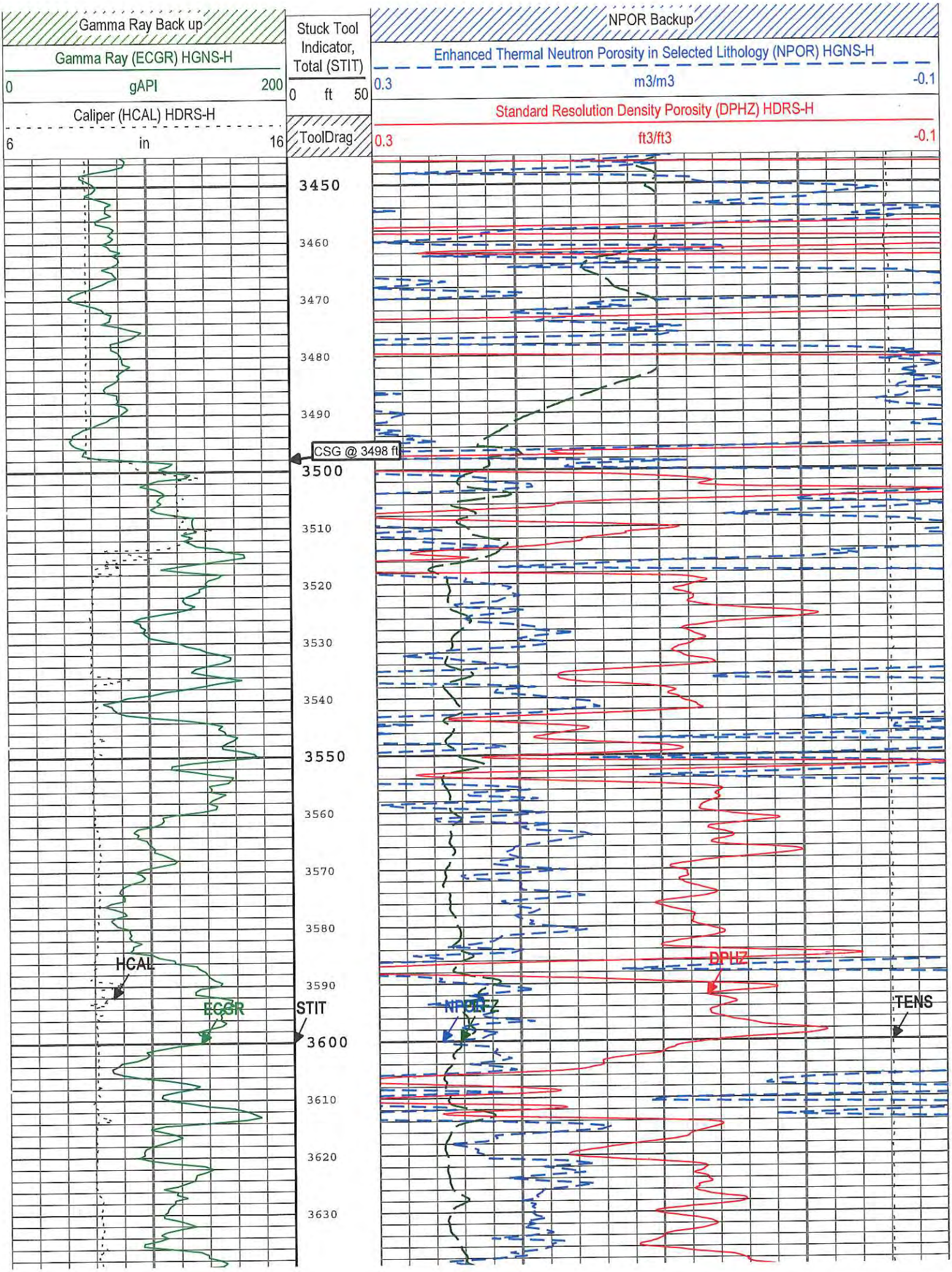
One: Log[4]:Up:S012

Description: HGNS standard resolution porosities for Platform Express Format: Log (Porosity-5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:04:46

Channel	Source	Sampling
CALI	HDRS-H:HRCC-H:HRCC-H	1in
DPHZ	HDRS-H:HRMS-H:HRGD-H	2in
GR	HGNS-H:HGNS-H:HGNS-H	6in
NPOR	HGNS-H:HGNS-H:HGNS-H	6in
PEFZ	HDRS-H:HRMS-H:HRGD-H	2in
STIT	DepthCorrection	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

TIME_1900 - Time Marked every 60.00 (s)




Gamma Ray Back up
Gamma Ray (ECGR) HGNS-H
0
gAPI
200
Caliper (HCAL) HDRS-H
6
in
16
Stuck Tool Indicator, Total (STIT)
0
ft
50
ToolDrag
NPOR Backup
Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H
0.3
m3/m3
-0.1
Standard Resolution Density Porosity (DPHZ) HDRS-H
0.3
ft3/ft3
-0.1
3450
3460
3470
3480
3490
CSG @ 3498 ft
3500
3510
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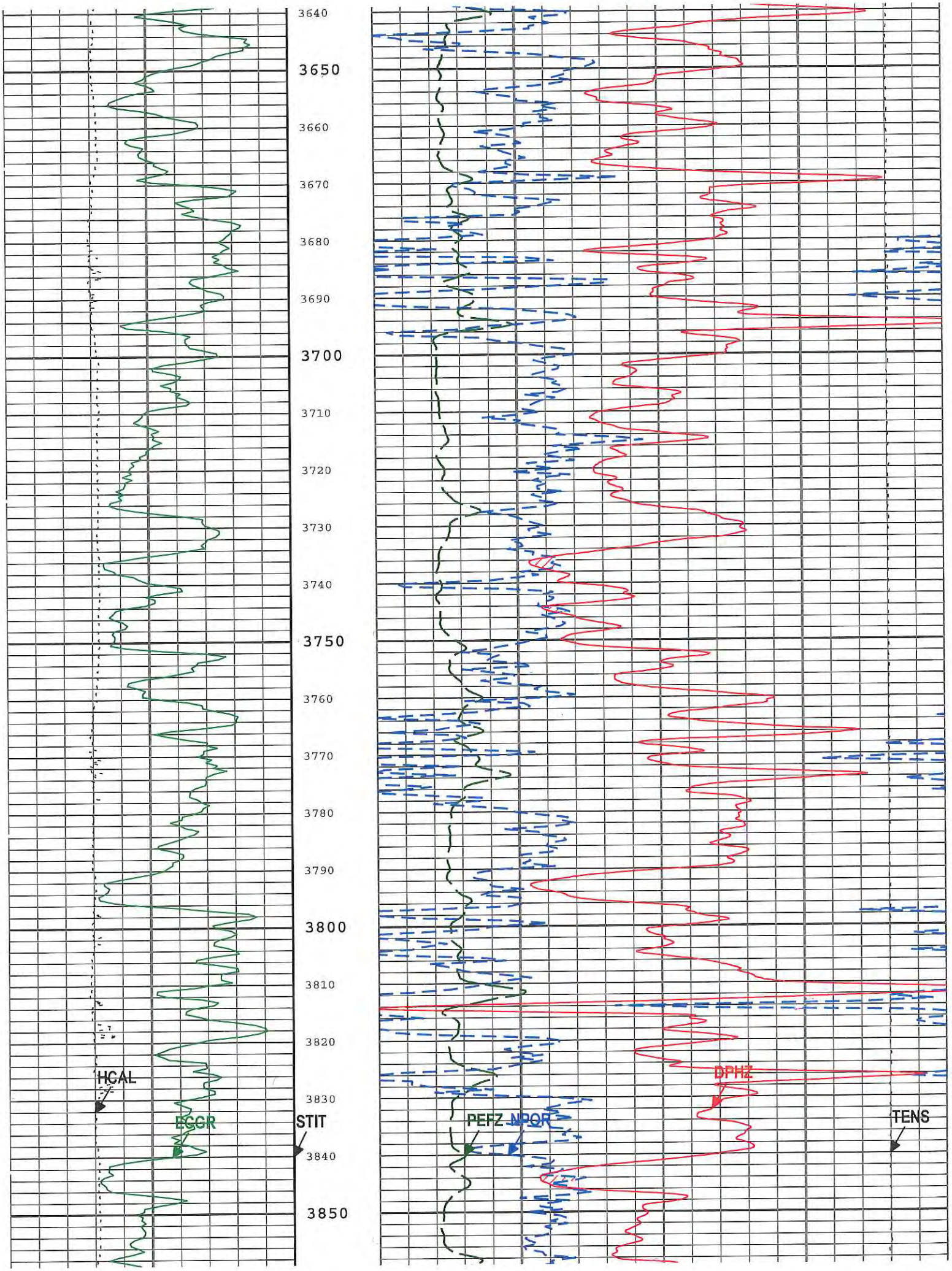
HCAL
ECGR
STIT
NPOLFZ
DPHZ
TENS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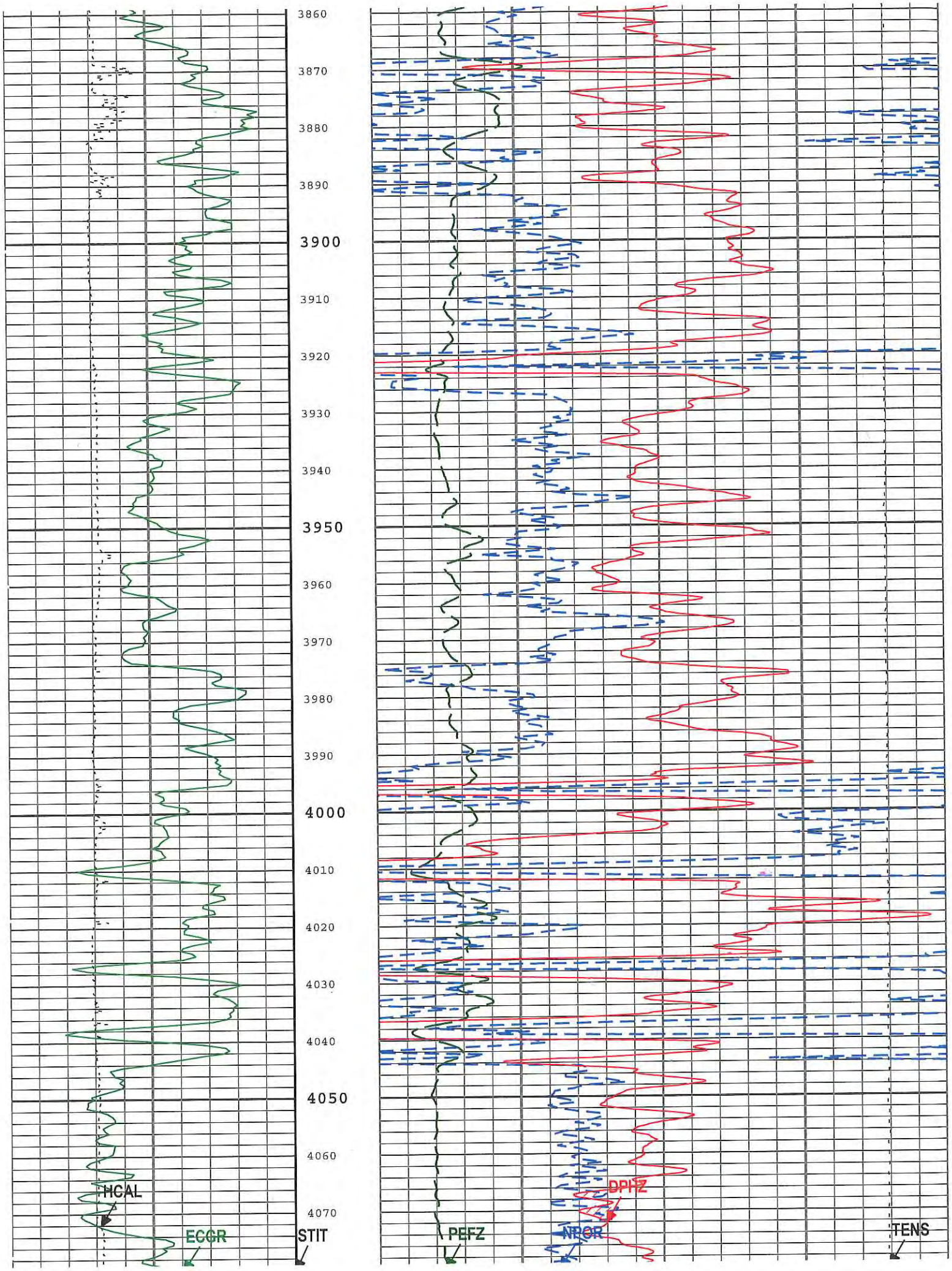
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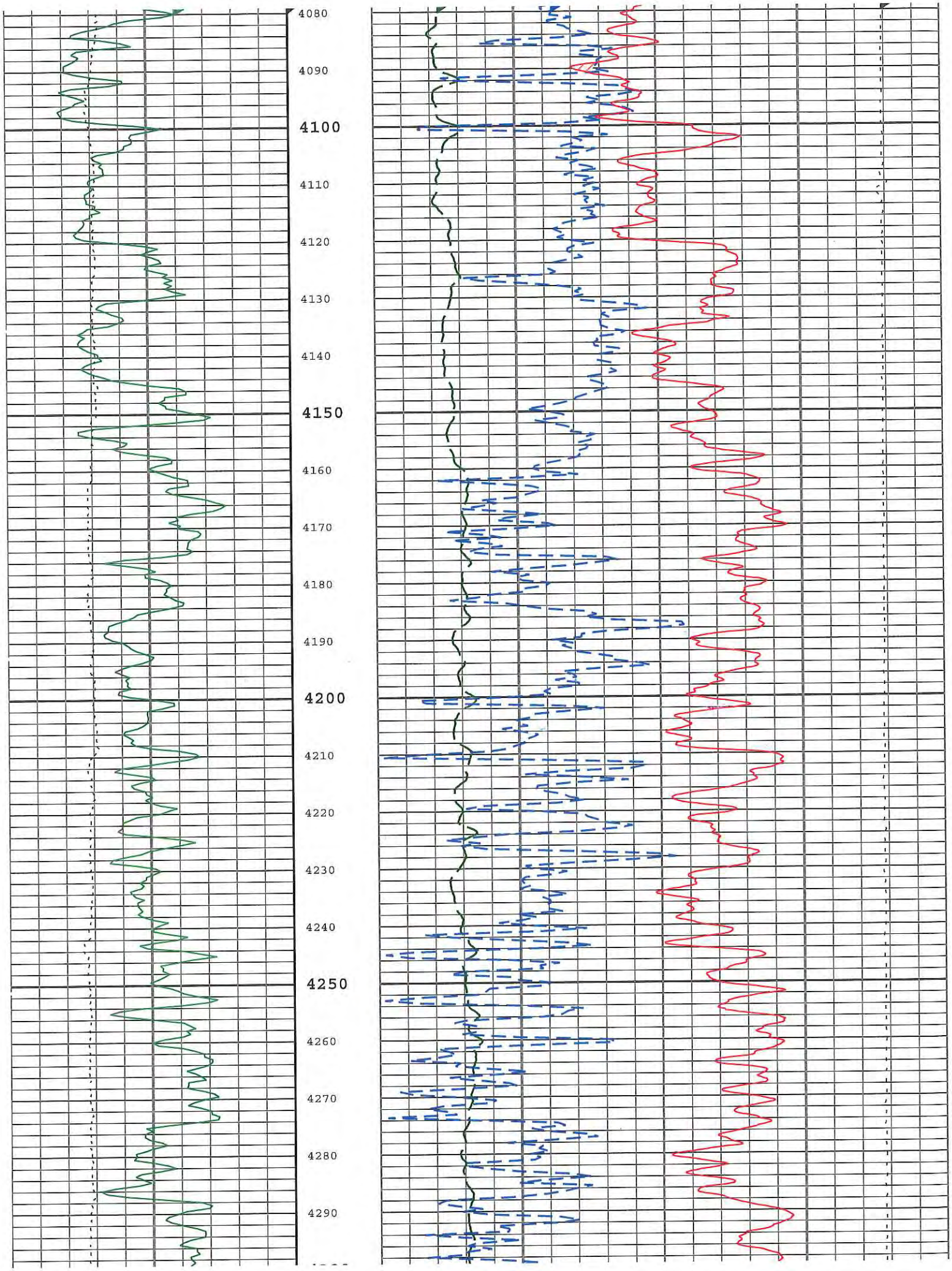
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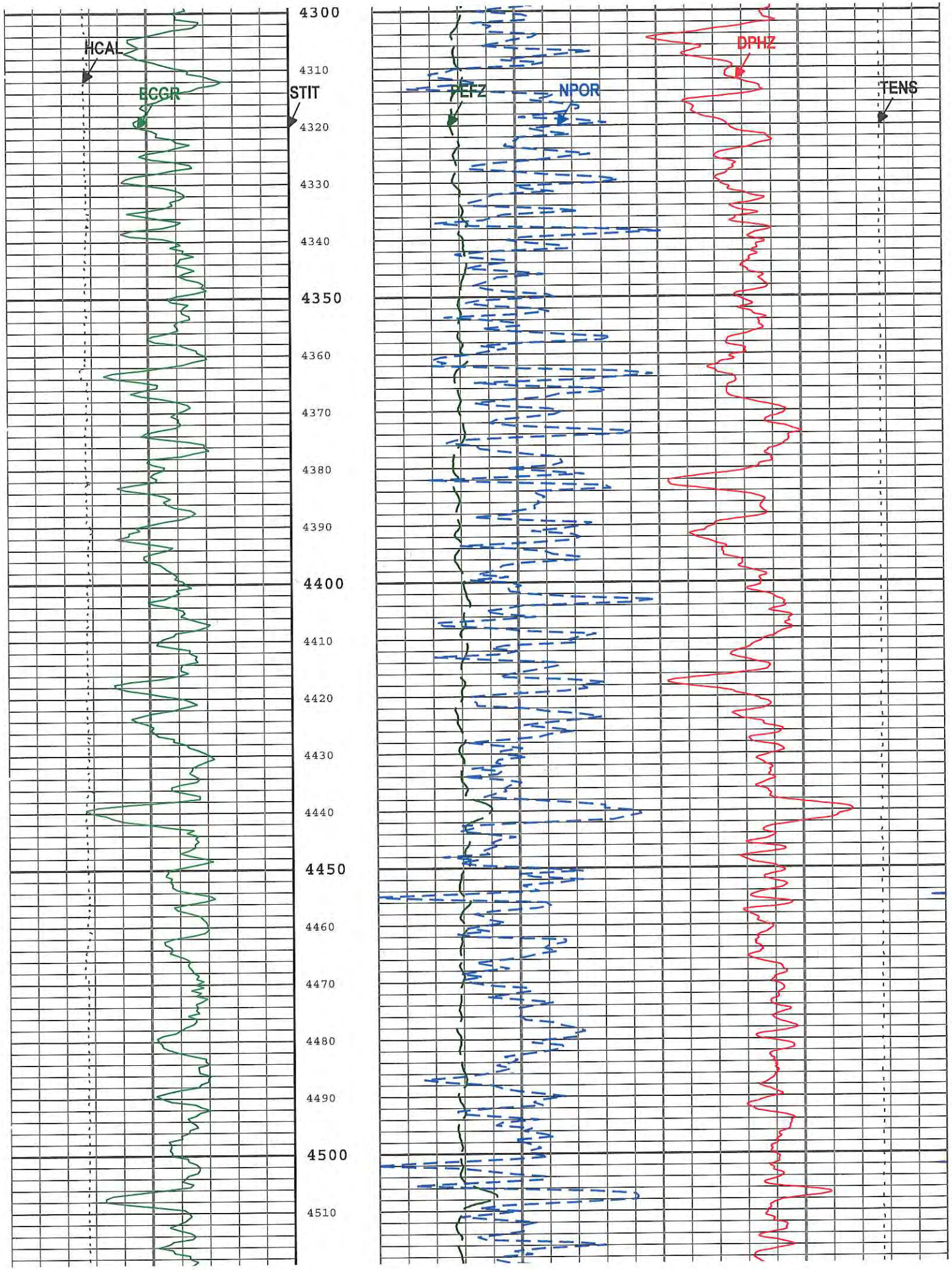
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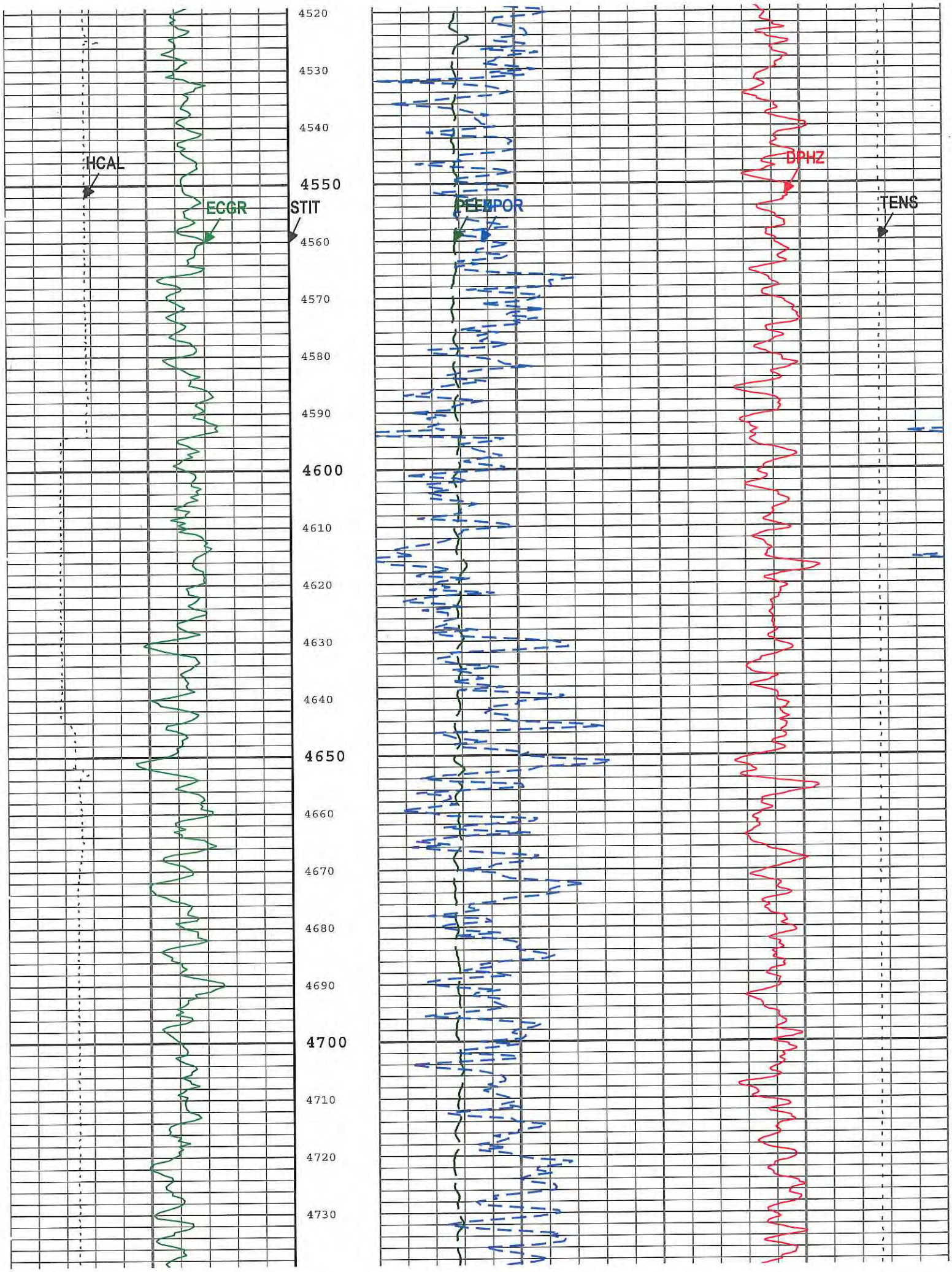
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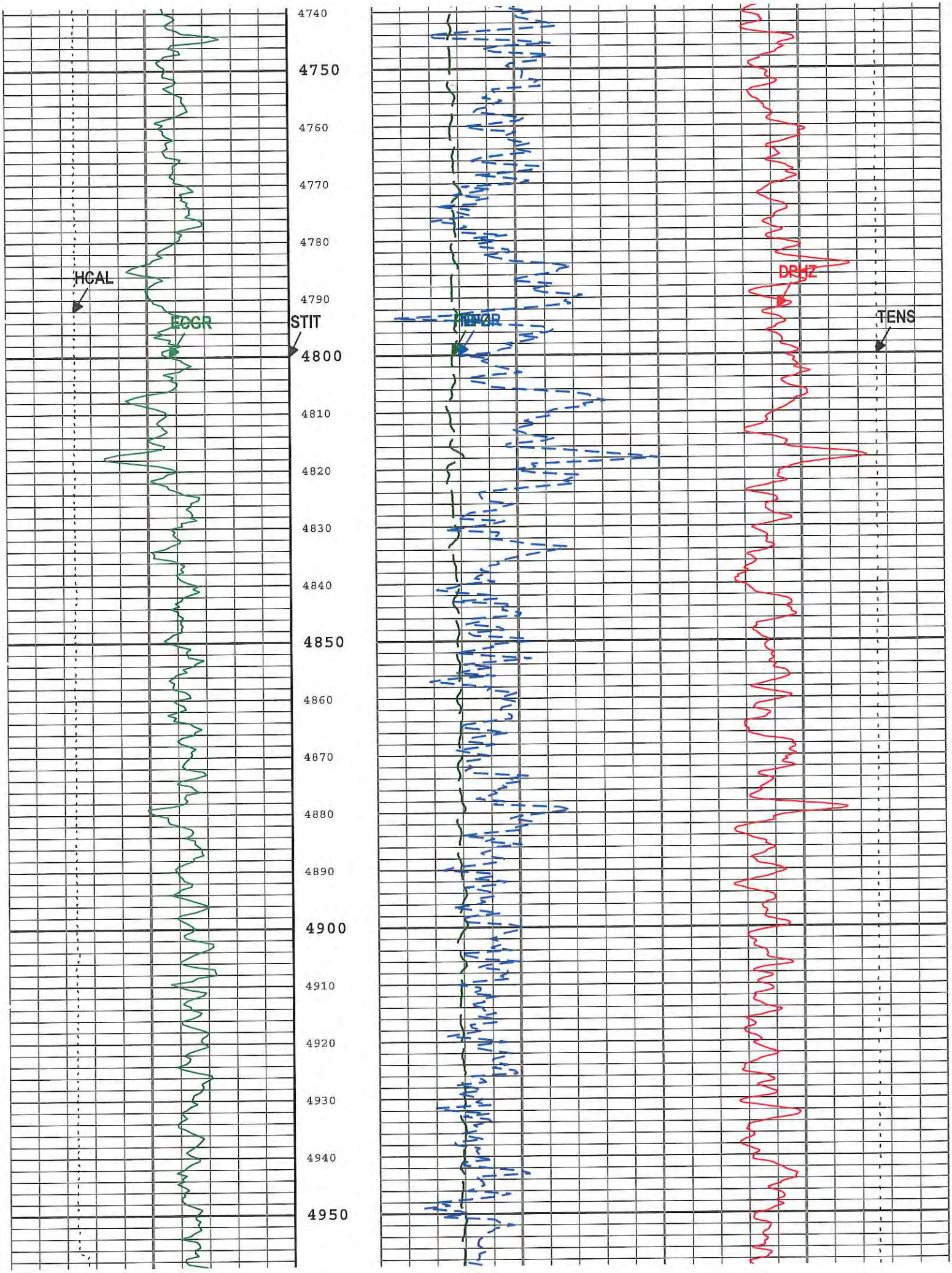
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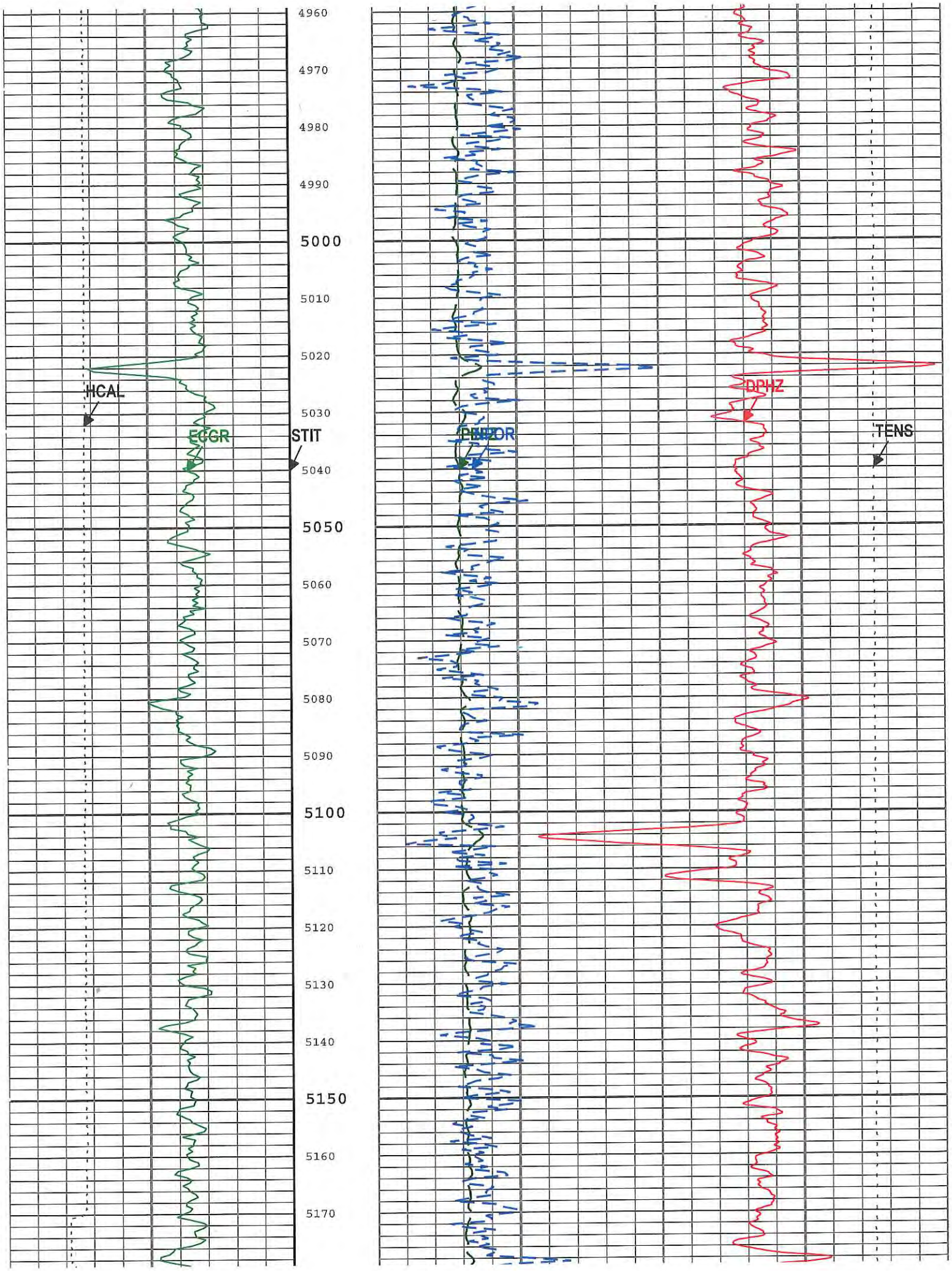
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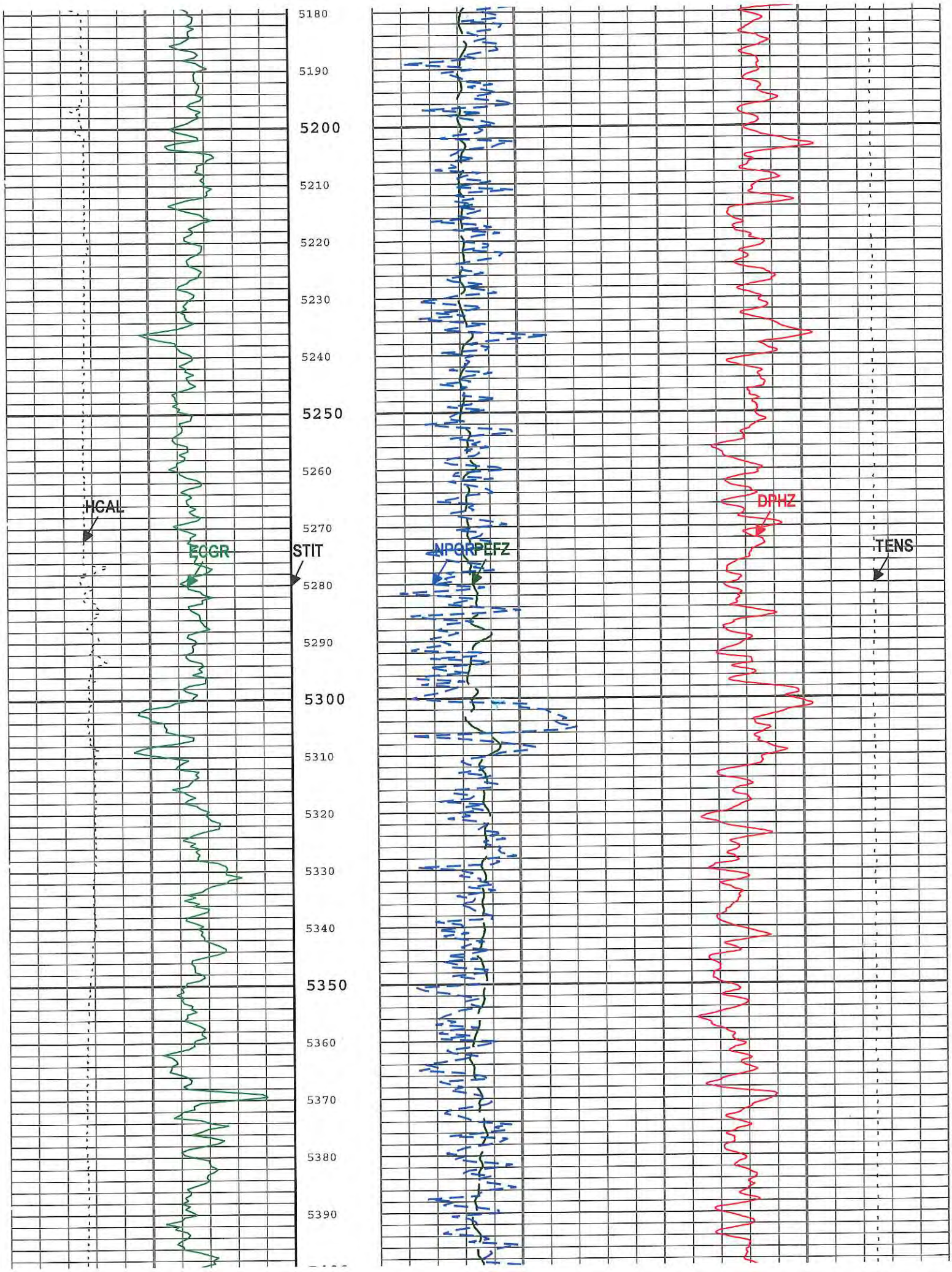
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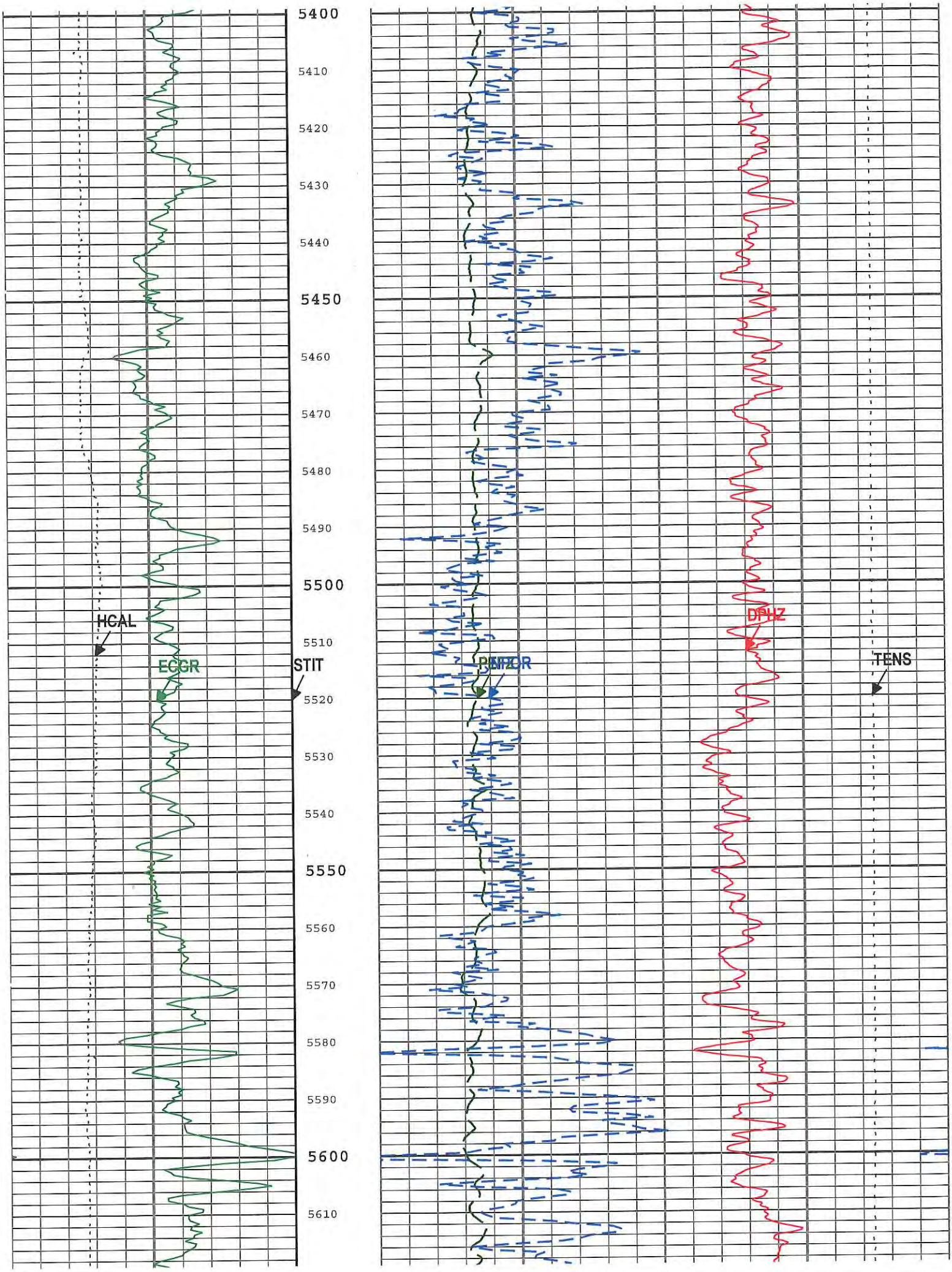
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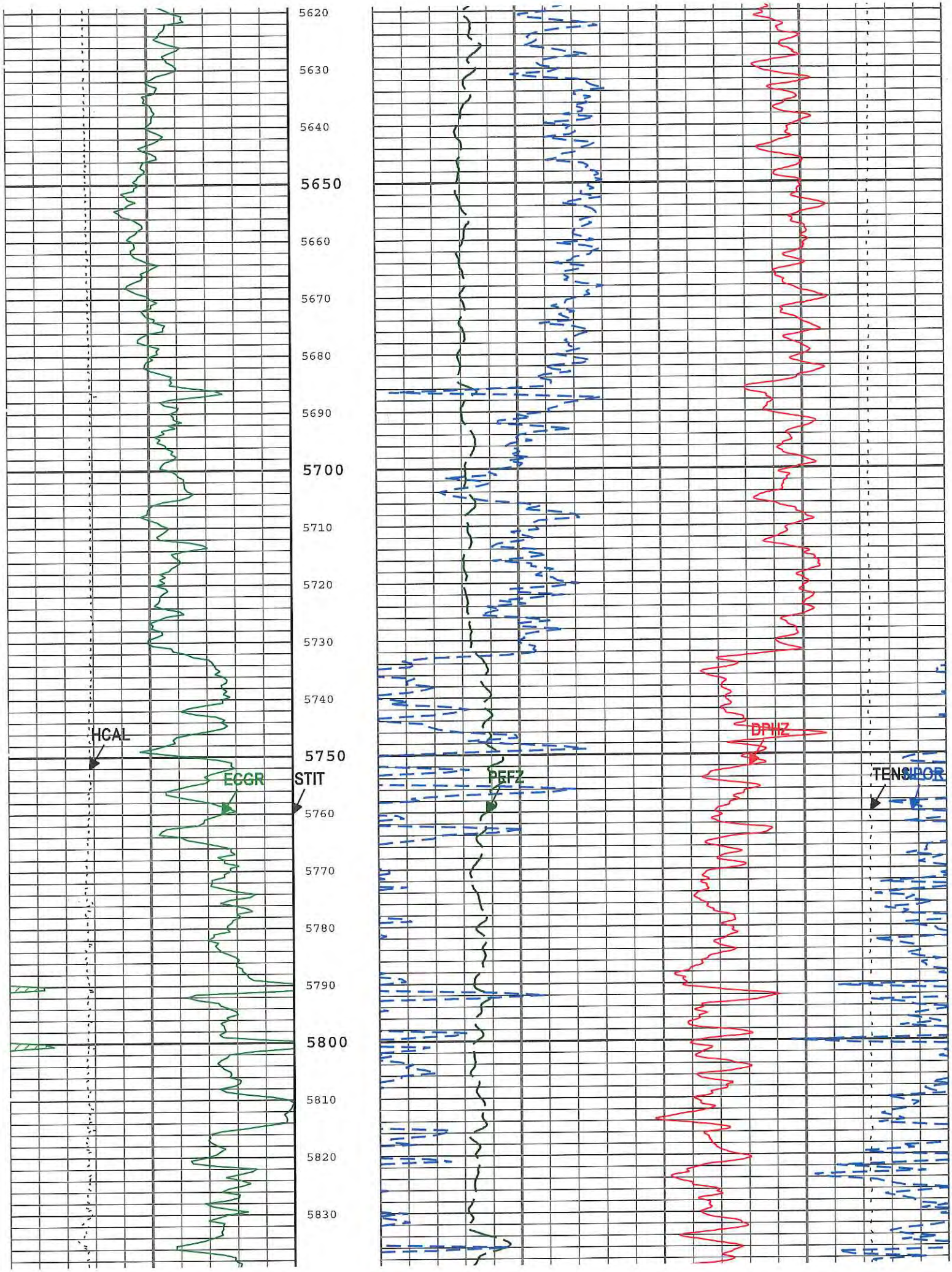
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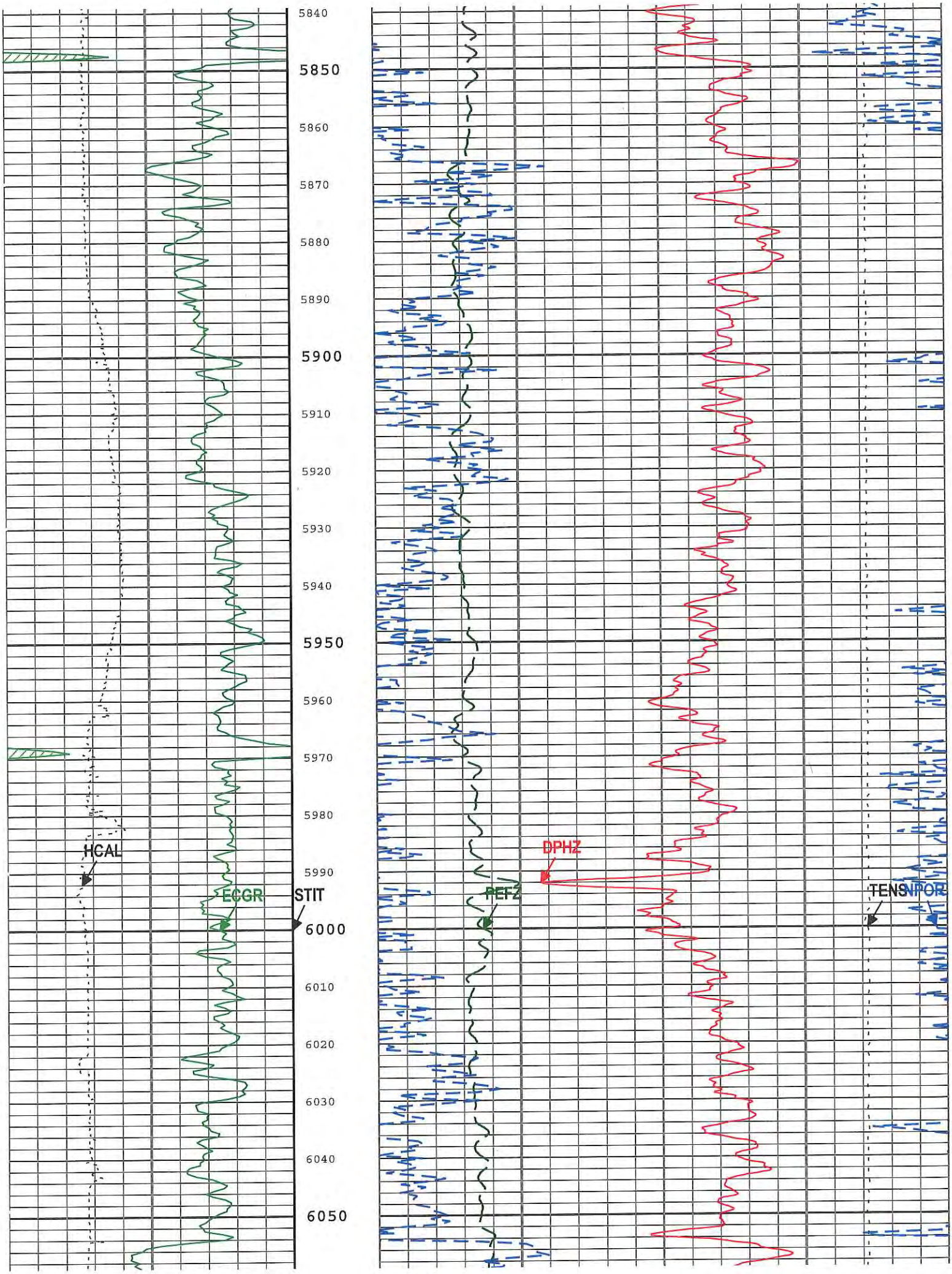
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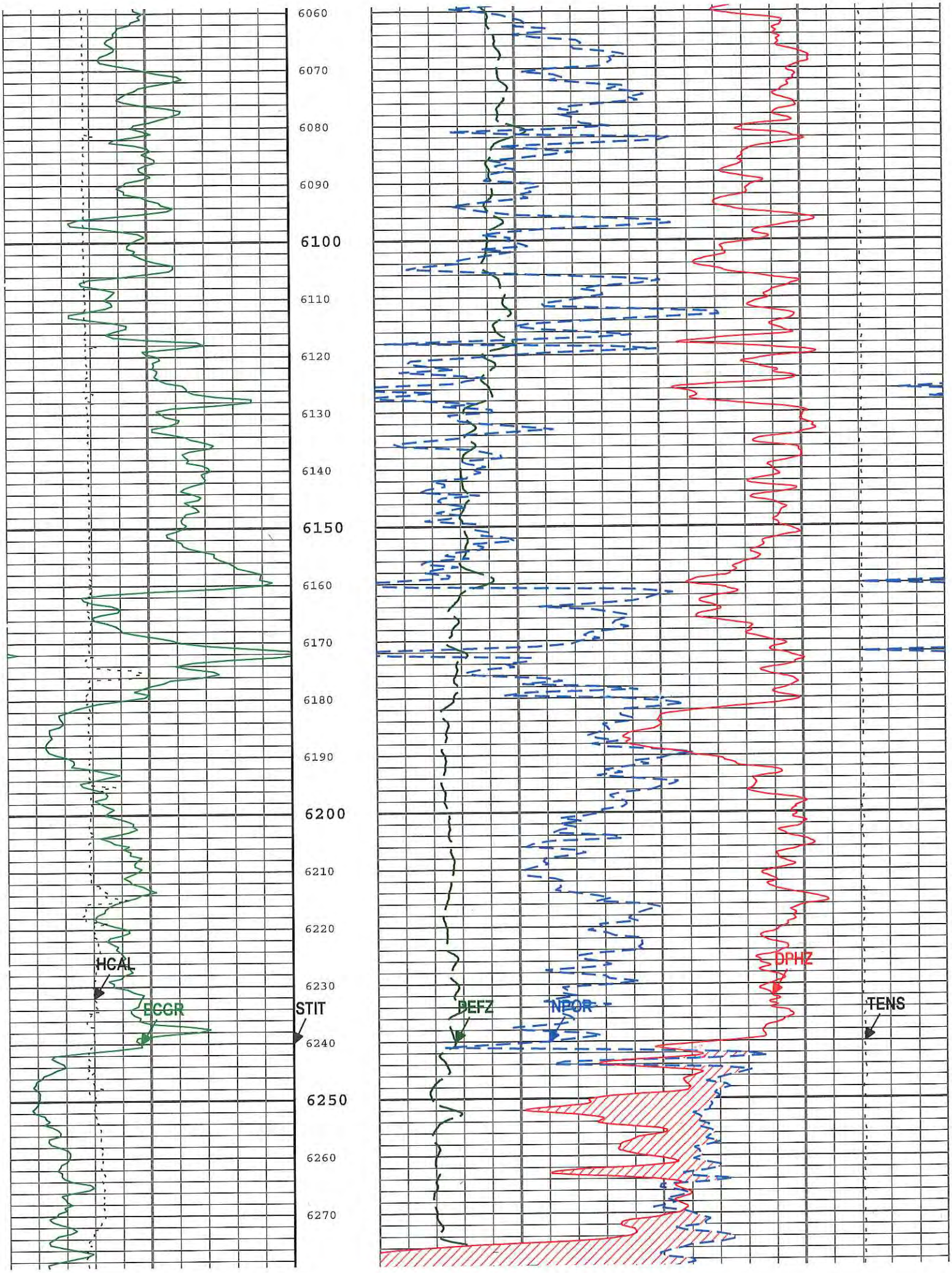
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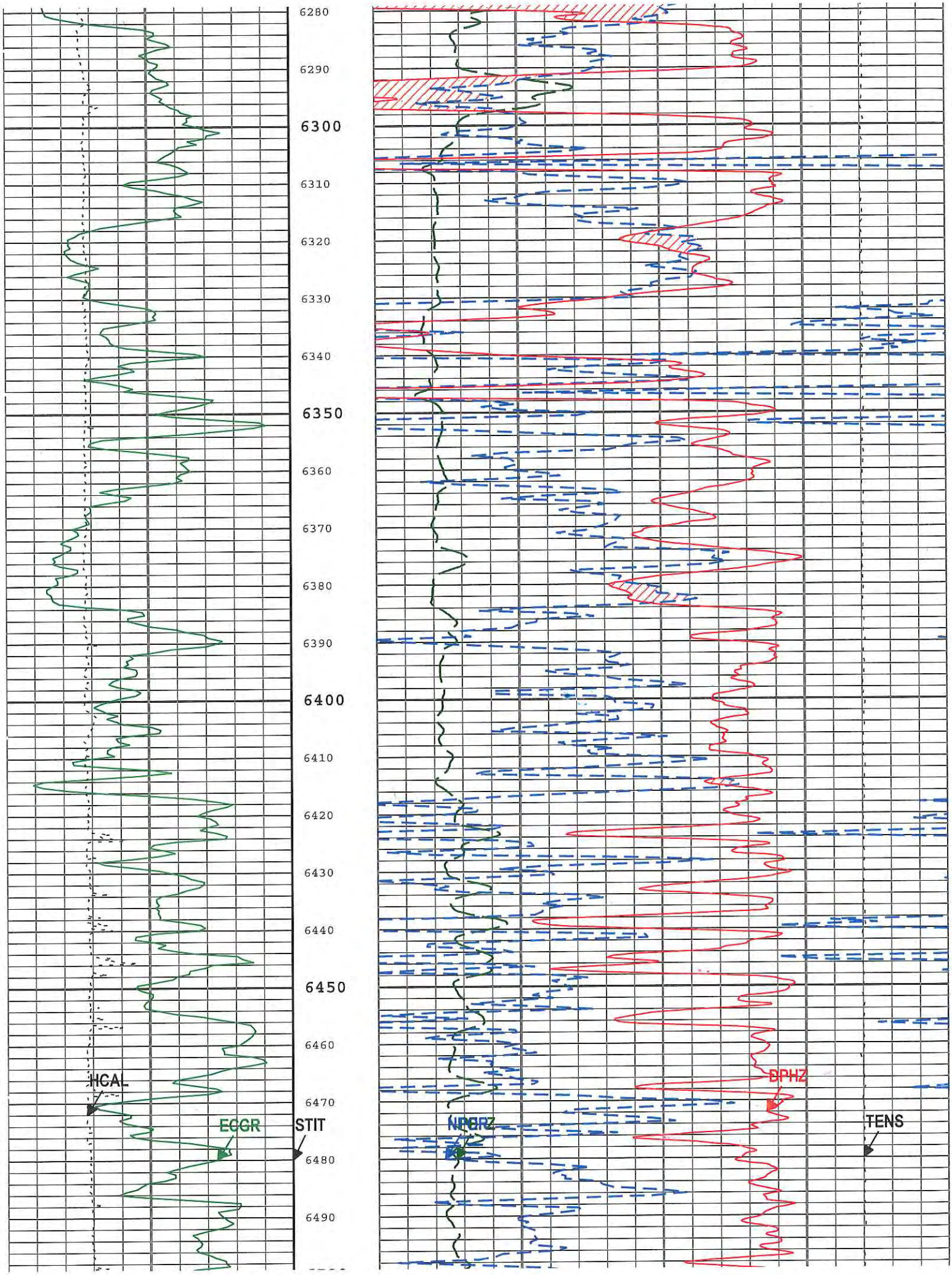
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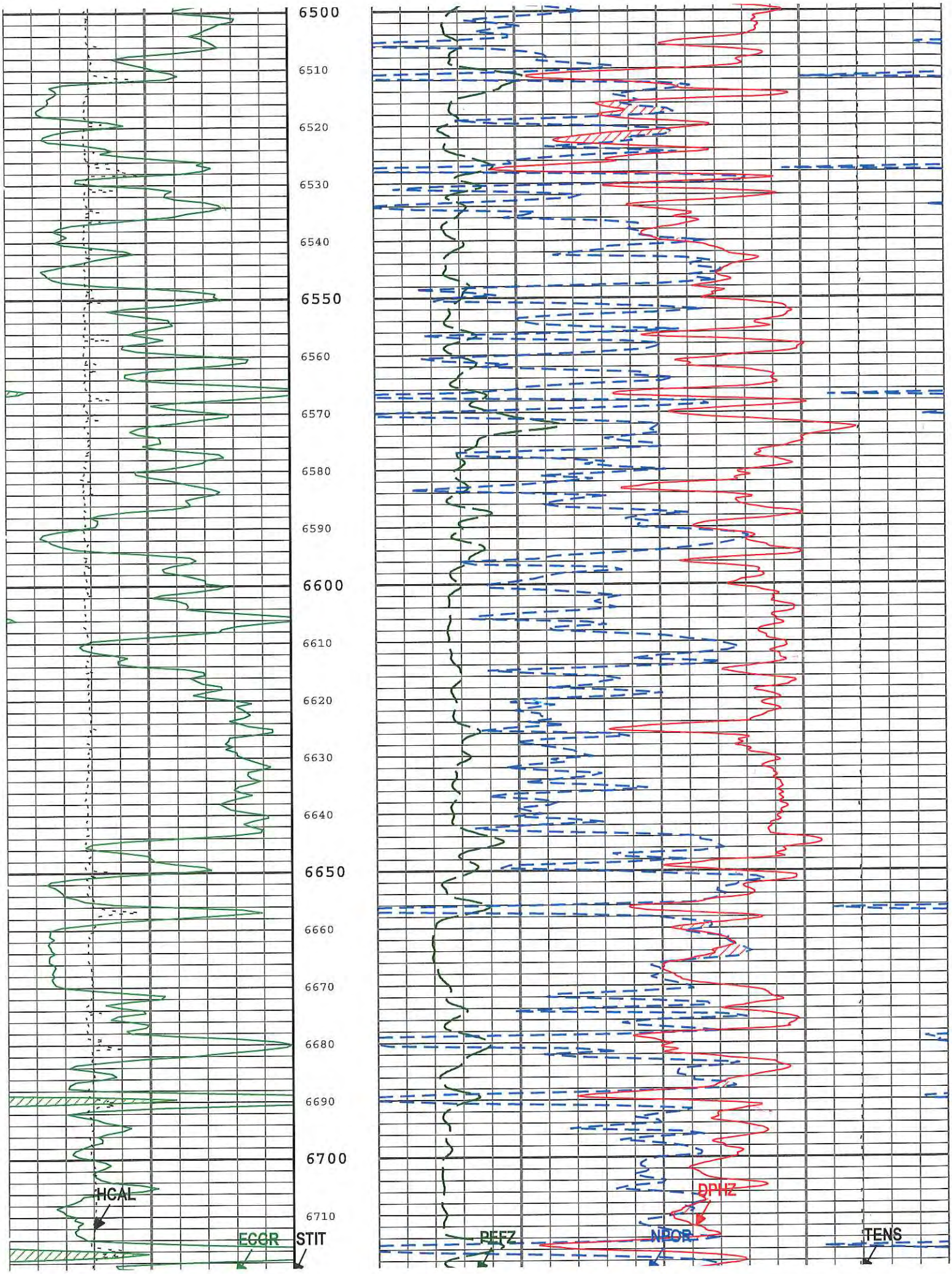
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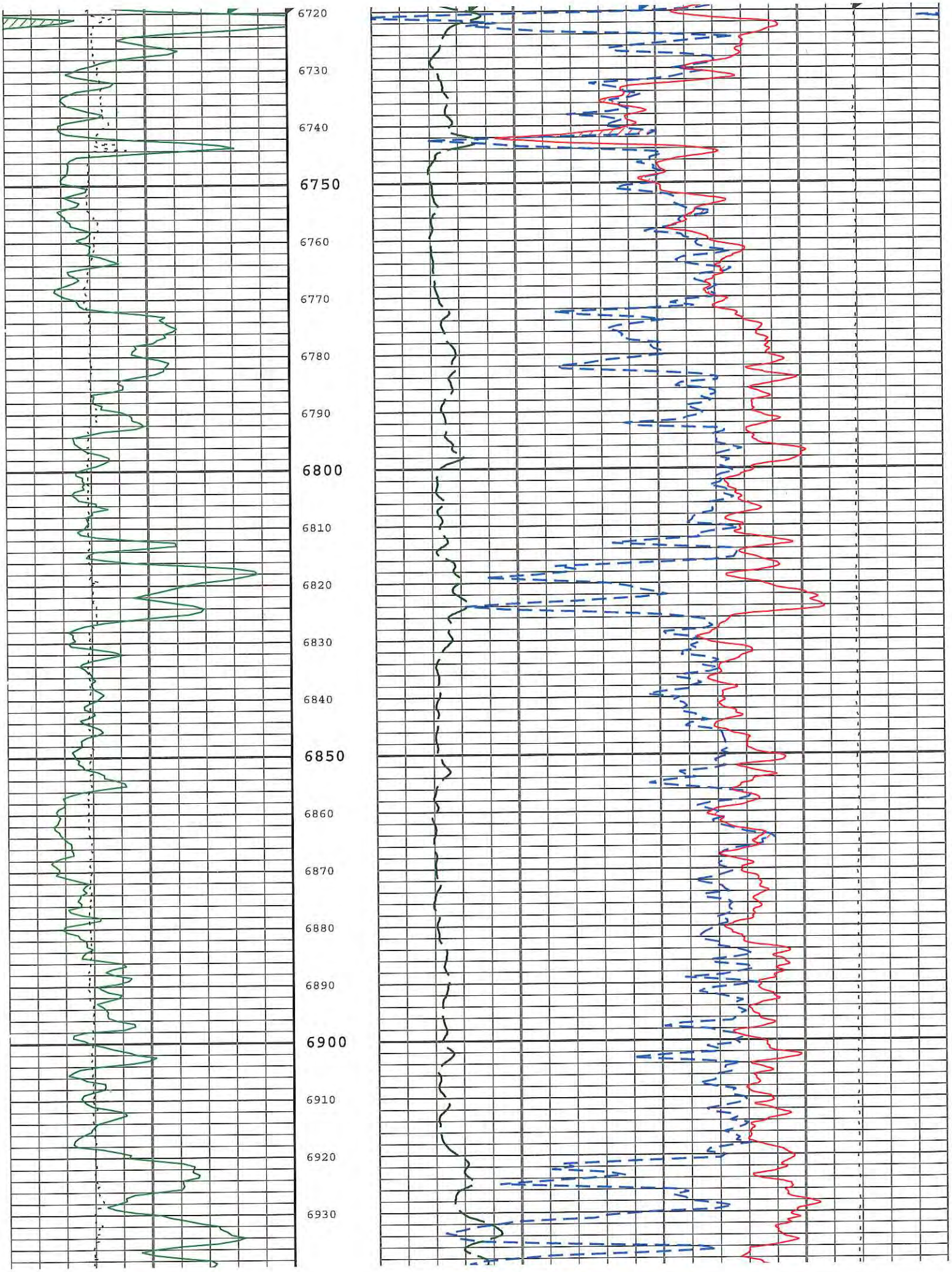
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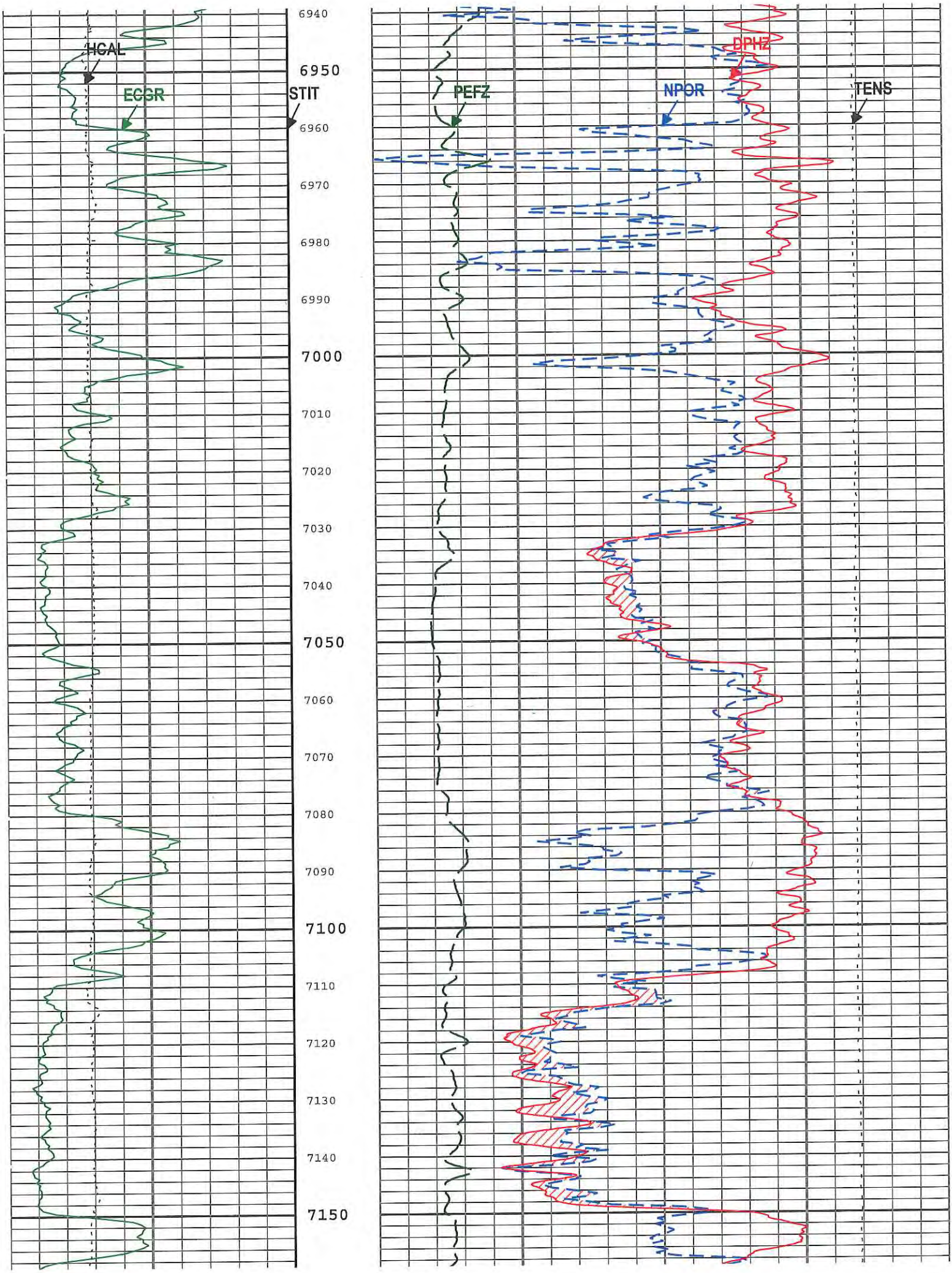
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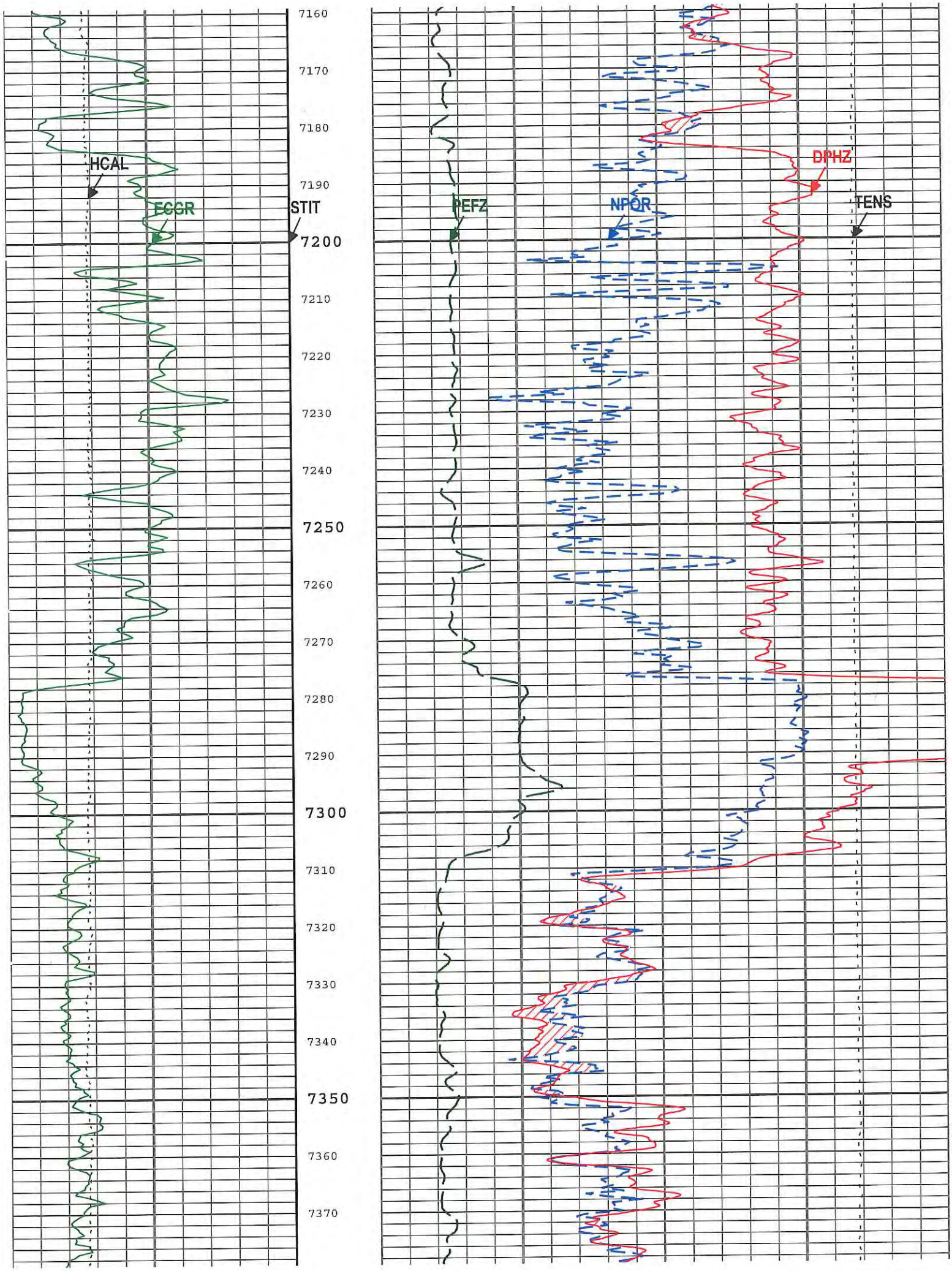
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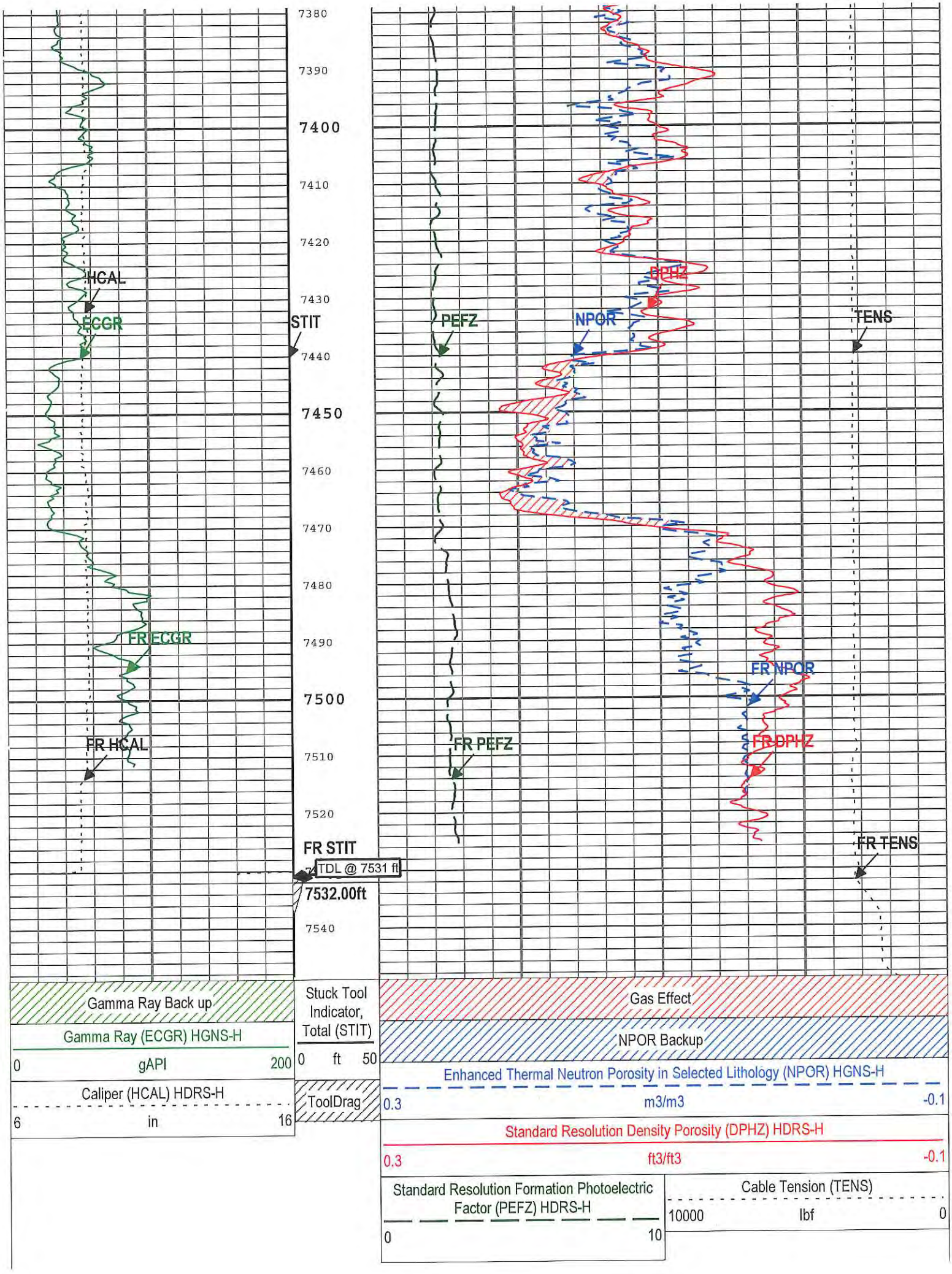
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FR ECGR
FR HCAL
FR NPOR
FR DPHZ
FR PEFZ
FR TENS
FR STIT
TDL @ 7531 ft
7532.00ft
Gamma Ray Back up
Gamma Ray (ECGR) HGNS-H
0 gAPI 200
Caliper (HCAL) HDRS-H
6 in 16
Stuck Tool Indicator, Total (STIT)
0 ft 50
ToolDrag
Gas Effect
NPOR Backup
Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H
0.3 m3/m3 -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
Cable Tension (TENS)
10000 lbf 0

TIME_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express Format: Log (Porosity-5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:04:46

Channel Processing Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	Yes	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	177	degF
BS	Bit Size	WLSESSION	Depth Zoned	in
BSAL	Borehole Salinity	Borehole	900	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.1	in
CBLO	Casing Bottom (Logger)	WLSESSION	3498	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DFD	Drilling Fluid Density	Borehole	9.9	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DFT_WATER	Drilling Fluid Water Type	Borehole	WBM	
DHC	Density Hole Correction	HDRS-H	Bit Size	
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	AMF	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	SANDSTONE	
MDEN	Matrix Density for Density Porosity	Borehole	2.65	g/cm3
MFST	Mud Filtrate Sample Temperature	Borehole	68	degF
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.9	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
TD	Total Measured Depth	Borehole	7532	ft

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	12.25		3515
BS	8.75	3515	7532

All depth are actual.

Tool Control Parameters

One: 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	3600	ft/h

One

5" Porosity

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include

									Parallel Data
One	Log[3]:Up	Up	7294.65 ft	7556.27 ft	07-Sep-2016 5:43:06 AM	07-Sep-2016 5:48:19 AM	ON	5.53 ft	No
One	Log[4]:Up	Up		7548.83 ft	07-Sep-2016 5:52:06 AM		ON	0.00 ft	No

All depths are referenced to toolstring zero

Log

Company:Western Refining, Southwest, Inc. Well:WWD #2

One: Log[4]:Up:S012

Description: HGNS standard resolution porosities for Platform Express Format: Log (Porosity-5 RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:04:49

TIME_1900 - Time Marked every 60.00 (s)

Main To Repeat

Repeat To Main

Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H

0 10

Main To Repeat

Repeat To Main

Cable Tension (TENS)

10000 lbf 0

Main To Repeat

Repeat To Main

Caliper (HCAL) HDRS-H

6 in 16

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 (ECGR) HGNS-H

0 gAPI 200

Main To Repeat

Repeat To Main

Stuck Tool Indicator, Total (STIT)

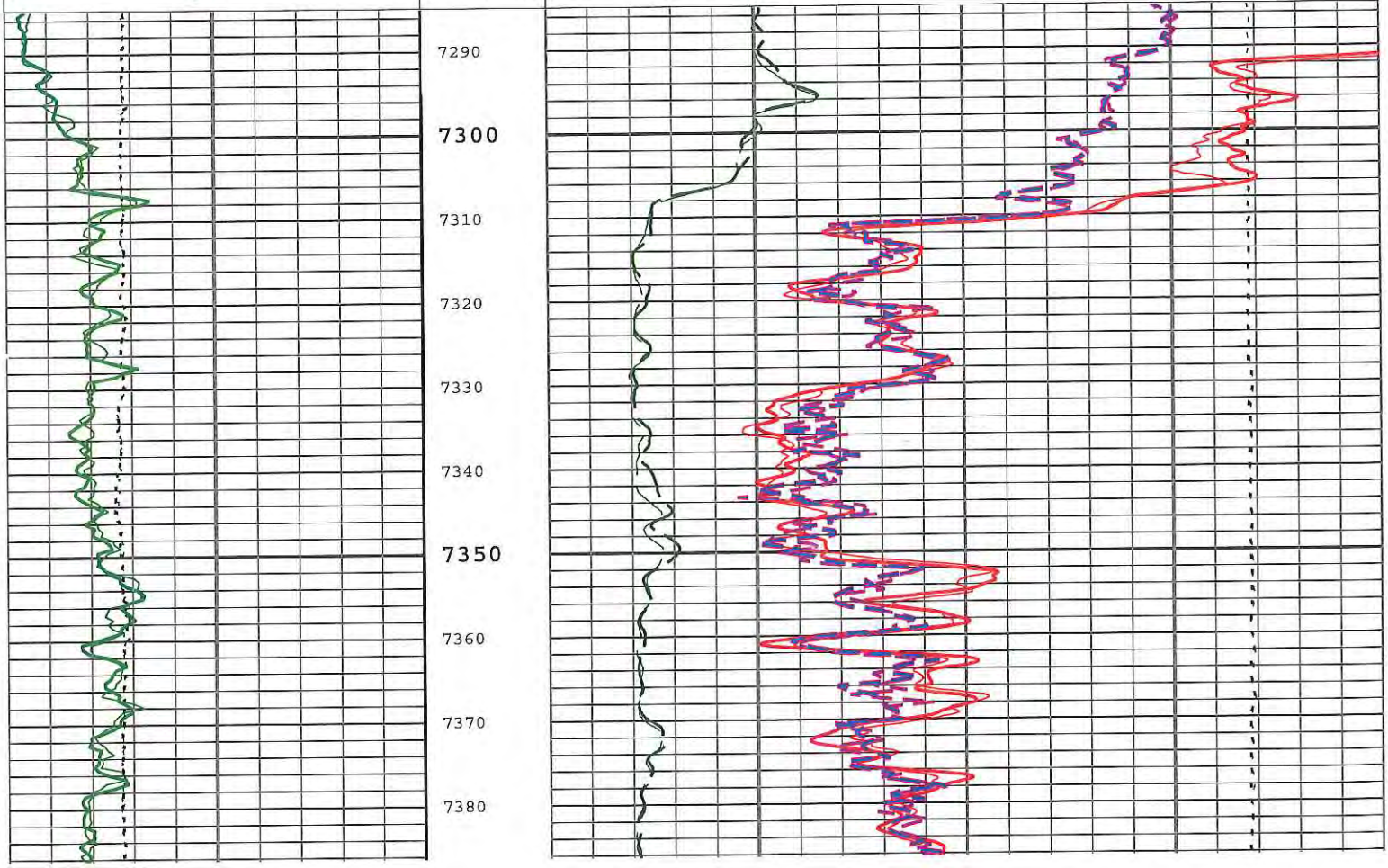
0 ft 50

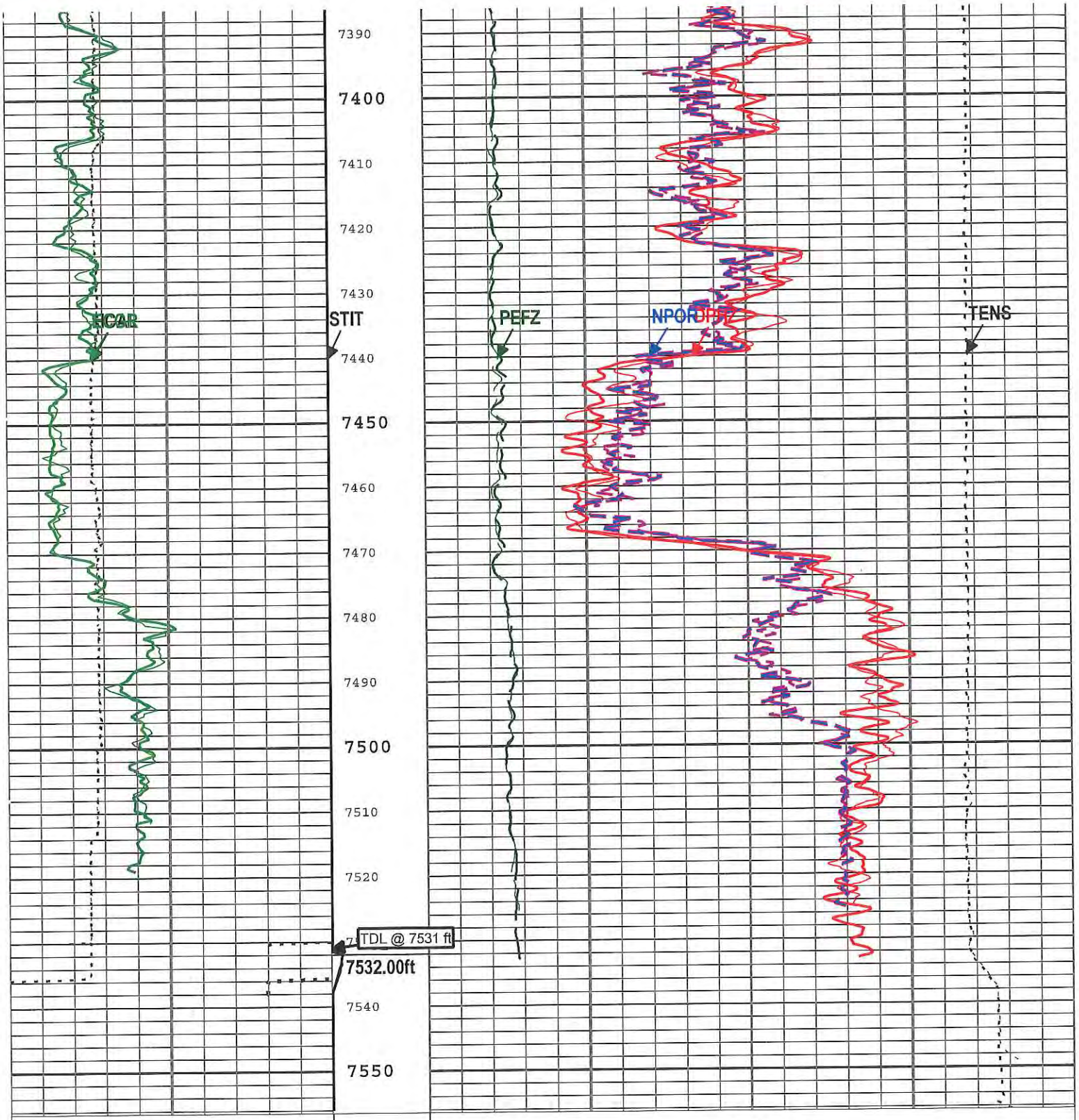
Main To Repeat

Repeat To Main

Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H

0.3 m3/m3 -0.1





Main To Repeat Repeat To Main Caliper (HCAL) HDRS-H 6 in 16	Main To Repeat Repeat To Main Stuck Tool Indicator, Total (STIT) 0 ft 50	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 (ECGR) HGNS-H 0 gAPI 200		Main To Repeat Repeat To Main Enhanced Thermal Neutron Porosity in Selected Lithology (NPOR) HGNS-H 0.3 m3/m3 -0.1

Main To Repeat	Main To Repeat
Repeat To Main	Repeat To Main
Standard Resolution Formation Photoelectric Factor (PEFZ) HDRS-H	Cable Tension (TENS)
0 10	10000 lbf 0

TIME_1900 - Time Marked every 60.00 (s)

Description: HGNS standard resolution porosities for Platform Express Format: Log (Porosity-5 RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:04:49

Channel Processing Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
ISSBAR	Barite Mud Presence Flag	Borehole	Yes	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BHT	Bottom Hole Temperature	Borehole	177	degF
BS	Bit Size	WLSESSION	Depth Zoned	in
BSAL	Borehole Salinity	Borehole	900	ppm
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.1	in
CBLO	Casing Bottom (Logger)	WLSESSION	3498	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
DFD	Drilling Fluid Density	Borehole	9.9	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
DFT_WATER	Drilling Fluid Water Type	Borehole	WBM	
DHC	Density Hole Correction	HDRS-H	Bit Size	
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	AMF	
GTSE	Generalized Temperature Selection, from Measured or Computed Temperature	Borehole	CTEM	
HSCO	Hole Size Correction Option	HGNS-H	Yes	
MATR	Rock Matrix for Neutron Porosity Corrections	Borehole	SANDSTONE	
MDEN	Matrix Density for Density Porosity	Borehole	2.65	g/cm3
MFST	Mud Filtrate Sample Temperature	Borehole	68	degF
RMFS	Resistivity of Mud Filtrate Sample	Borehole	0.9	ohm.m
SOCO	Standoff Correction Option	HGNS-H	Yes	
TD	Total Measured Depth	Borehole	7532	ft

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	12.25		3515
BS	8.75	3515	7532

All depth are actual.

Tool Control Parameters

One: 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	3600	ft/h

Calibration Report

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

Primary Equipment :

HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	48.17
HILT Resistivity Gamma-Ray Density Device, 150 degC	HRGD-H	4899

Auxiliary Equipment :

HRDD Backscatter Detector	Backscatter	
HRDD Long Spacing Detector	Long Spacing	
HRDD Short Spacing Detector	Short Spacing	27786
Cesium 137 Gamma-Ray Logging Source	GSR-J	5471
HILT High-Resolution Control Cartridge, 150 degC	HRCC-H	48.17
HILT High-Resolution Mechanical Sonde, 150 degC	HRMS-H	4876

Calibration Parameter :

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

HDRS Caliper Calibration - Caliper Accumulations

Before (Measured): 21:07:42 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Small Ring	in	Before	8.00	6.00	7.80	10.00
Large Ring	in	Before	12.00	9.00	12.20	15.00

HDRS Density Calibration - Inversion Results

Master (EEPROM): 11:40:40 24-Aug-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Rho Aluminum	g/cm3	Master	2.596	2.586	2.600	2.606
Rho Magnesium	g/cm3	Master	1.686	1.676	1.685	1.696
Pe Aluminum		Master	2.570	2.470	2.571	2.670
Pe Magnesium		Master	2.650	2.550	2.618	2.750

HDRS Density Calibration - Deviation Summary

Master (EEPROM): 11:40:40 24-Aug-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Average Deviation	%	Master	0	-0.6000	0.2221	0.6000
BS Max Deviation	%	Master	0	-1.6000	0.6566	1.6000
SS Average Deviation	%	Master	0	-1.0000	0.2278	1.0000
SS Max Deviation	%	Master	0	-2.5000	0.9144	2.5000
LS Average Deviation	%	Master	0	-1.5000	0.6741	1.5000
LS Max Deviation	%	Master	0	-3.5000	1.7270	3.5000

HDRS Density Calibration - Background Summary

Master (EEPROM): 11:40:40 24-Aug-2016 Before (Measured): 21:08:15 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Window Ratio		Master	1.0000		0.7337	
		Before	0.7337	0.6970	0.7348	0.7704
		Before-Master	---	---	0.0011	---
BS Window Sum	1/s	Master	1		25241	
		Before	25241	23979	25499	26504
		Before-Master	---	---	258	---
SS Window Ratio		Master	1.0000		0.4797	
		Before	0.4797	0.4557	0.4811	0.5037
		Before-Master	---	---	0.0014	---
SS Window Sum	1/s	Master	1		11057	
		Before	11057	10504	11035	11610
		Before-Master	---	---	-22	---
LS Window Ratio		Master	1.0000		0.3012	
		Before	0.3012	0.2861	0.3073	0.3162
		Before-Master	---	---	0.0061	---

LS Window Sum	1/s	Master	1		1233		
		Before	1233	1171	1232	1294	
		Before-Master	—	—	-1	—	

HDRS Density Calibration - Photo-multiplier High Voltages

Master (EEPROM): 11:40:40 24-Aug-2016 Before (Measured): 21:08:15 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS PM High Voltage	V	Master		1000	1452	2400
		Before		1000	1449	2400
		Before-Master	—	-100	-3	100
SS PM High Voltage	V	Master		1000	1410	2400
		Before		1000	1411	2400
		Before-Master	—	-100	1	100
LS PM High Voltage	V	Master		1000	1480	2400
		Before		1000	1473	2400
		Before-Master	—	-100	-7	100

HDRS Density Calibration - Crystal Quality Resolutions

Master (EEPROM): 11:40:40 24-Aug-2016 Before (Measured): 21:08:15 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
BS Crystal Resolution	%	Master		5.00	11.74	25.00
		Before		5.00	11.74	25.00
		Before-Master	—	-1.00	0.00	1.00
SS Crystal Resolution	%	Master		5.00	10.26	20.00
		Before		5.00	10.24	20.00
		Before-Master	—	-1.00	-0.02	1.00
LS Crystal Resolution	%	Master		5.00	8.09	20.00
		Before		5.00	7.85	20.00
		Before-Master	—	-1.00	-0.24	1.00

HDRS MCFL Calibration - MCFL Accumulations

Before (Measured): 21:10:47 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Main Resistivity	ohm.m	Before	3875	3565	3886	4185
Deep Resistivity	ohm.m	Before	3830	3524	3830	4136
Shallow Resistivity	ohm.m	Before	3830	3524	3839	4136

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

Primary Equipment :

HILT Gamma-Ray and Neutron Sonde, 150 degC	HGNS-H	4817

Auxiliary Equipment :

HGNS Accelerometer, 150 degC	HACCZ-H	6991
AmBe Neutron Logging Source	NSR-F	5068

Calibration Parameter :

Water Temperature	
Housing Size	
JIG-BKG (Jig minus background reference)	165

HGNS Accelerometer Calibration - Accelerometer Accumulations

Before (Measured): 05:14:18 07-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
AZ Vertical Measurement	ft/s2	Before	32.2	31.5	32.0	32.8

HGNS Accelerometer EEPROM - Accelerometer EEPROM Read

Master (EEPROM): 00:00:00 15-May-2007

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	—	—	-4298.000	—
Accelerometer Coefficients - 1		Master	—	—	50.180	—

Accelerometer Coefficients - 2		Master	—	—	-0.002	—	
Accelerometer Coefficients - 3		Master	—	—	0.000	—	
Accelerometer Coefficients - 4		Master	—	—	2.754	—	
Accelerometer Coefficients - 5		Master	—	—	0.000	—	
Accelerometer Coefficients - 6		Master	—	—	0.000	—	
Accelerometer Coefficients - 7		Master	—	—	0.000	—	
Accelerometer Coefficients - 8		Master	—	—	300.500	—	
Accelerometer Coefficients - 9		Master	—	—	0.994	—	

HGNS Neutron Calibration - HGNS Neutron Accumulations

Master (EEPROM): 15:25:00 19-Jul-2016 Before (Measured): 21:06:20 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Near Zero Measurement	1/s	Master	0	5.0	27.6	40.0
		Before	0	5.0	28.2	40.0
		Before-Master	—	-4.1	0.6	4.1
Far Zero Measurement	1/s	Master	0	5.0	29.5	40.0
		Before	0	5.0	29.7	40.0
		Before-Master	—	-4.4	0.2	4.4
Near Plus Measurement	1/s	Master	6031.0	4700.0	5290.0	6900.0
		Before	—	—	—	—
		Before-Master	—	—	—	—
Far Plus Measurement	1/s	Master	2793.0	1900.0	2194.0	2900.0
		Before	—	—	—	—
		Before-Master	—	—	—	—
Near Corrected Plus Measurement	1/s	Master		4700.0	5156.0	6900.0
		Before	—	—	—	—
		Before-Master	—	—	—	—
Far Corrected Plus Measurement	1/s	Master		1900.0	2097.0	2900.0
		Before	—	—	—	—
		Before-Master	—	—	—	—

HGNS Gamma-Ray Calibration - Gamma-Ray Accumulations

Before (Measured): 21:11:47 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
RGR Zero Measurement	gAPI	Before	30.0	0	78.9	120.0
RGR Plus Measurement	gAPI	Before	185.4	157.1	165.1	206.3
GR Calibration Gain		Before	0.89	0.80	1.00	1.05

Company:	Western Refining, Southwest, Inc.
Well:	WWD #2
Field:	Wildcat
County:	San Juan
State:	New Mexico

Schlumberger

Platform Express
Compensated Neutron
Litho-Density

Schlumberger

Company: Western Refining, Southwest, Inc.

Well: WWD #2

Field: Wildcat

County: San Juan State: New Mexico

County: San Juan
Field: Wildcat
Location: Sec 27, T29N, R11W
Well: WWD #2
Company: Western Refining, Southwest, Inc.

Platform Expres

Array Induction

with Linear Correlation

Location:				
Sec 27, T29N, R11W SHL: 2028' FNL X 111' FEL Lat/Long: 36.6986/-107.97035		Elev.:	K.B. 5550.00 ft G.L. 5535.00 ft D.F. 5549.00 ft	
Permanent Datum:	Ground Level	Elev.:	5535.00 f	
Log Measured From:	Kelly Bushing	15.00 ft	above Perm.Datum	
Drilling Measured From:	Kelly Bushing			

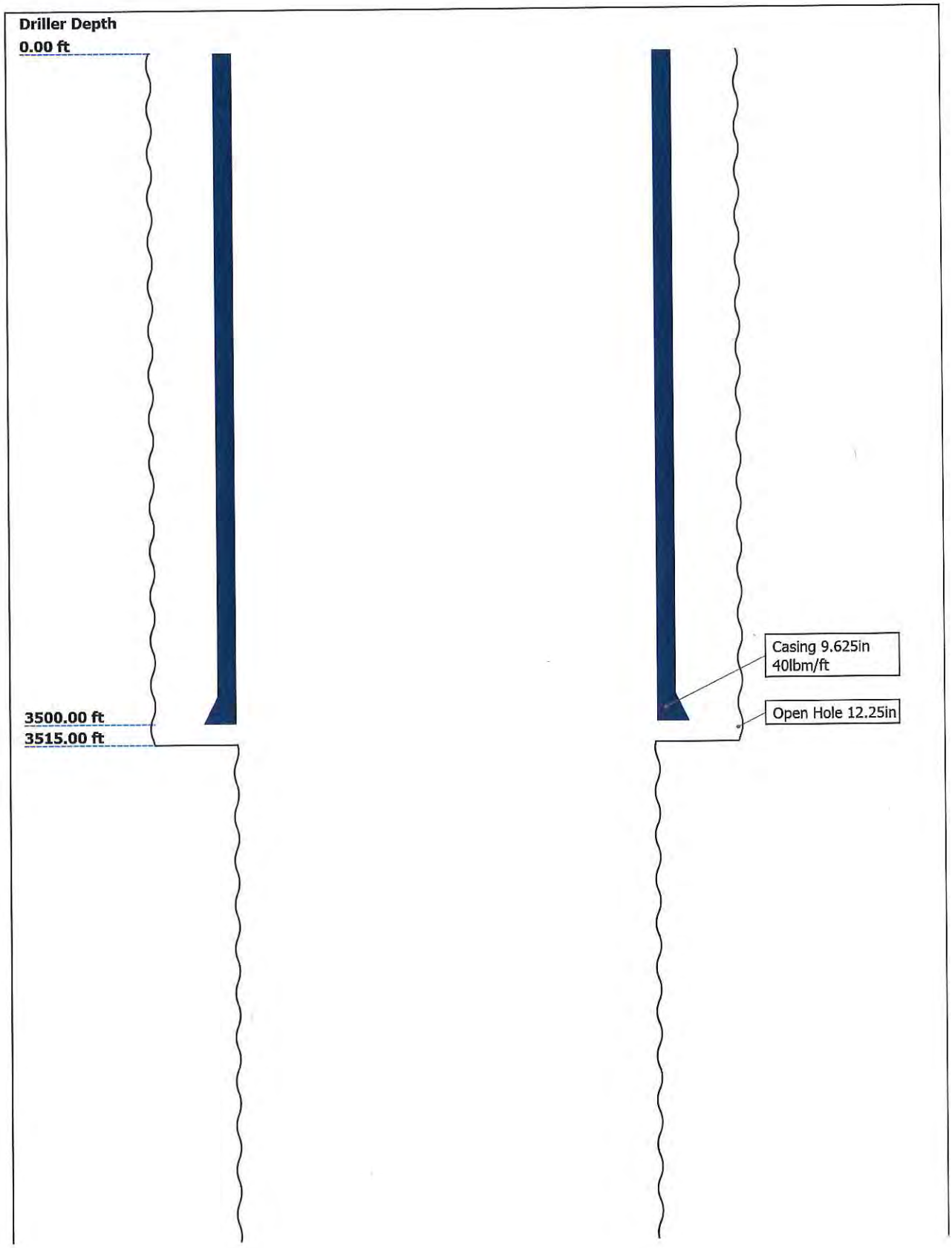
API Serial No.	Section:	Township:	Range:
30-045-35747-0000	27	29N	11W

Logging Date		05-Sep-2016		
Run Number		One		
Depth Driller		7525.00 ft		
Schlumberger Depth		7532.00 ft		
Bottom Log Interval		7532.00 ft		
Top Log Interval		3498.00 ft		
Casing Driller Size @ Depth		9.625 in @ 3500.00 ft		
Casing Schlumberger		3498 ft		
Bit Size		8.75 in		
Type Fluid In Hole		WBM		
MUD Density	Viscosity	9.9 lbm/gal	55 s	
Fluid Loss	PH	9 cm3	8.6	
Source of Sample		Active Tank		
RM @ Meas Temp		1.13 ohm.m @ 68 degF		
RMF @ Meas Temp		0.9 ohm.m @ 68 degF		
RMC @ Meas Temp		1.4 ohm.m @ 68 degF		
Source RMF	RMC	Pressed	Calculated	
RM @ BHT	RMF @ BHT	0.46 @ 177	0.37 @ 177	
Max Recorded Temperatures		177 degF		
Circulation Stopped	Time	06-Sep-2016	20:25:00	
Logger on Bottom	Time	07-Sep-2016	05:00:00	
Unit Number	Location:	9115	Ft Morgan, CO	
Recorded By		Avery Becker		
Witnessed By		Larry Candelaria		

Disclaimer

Contents

Well Sketch

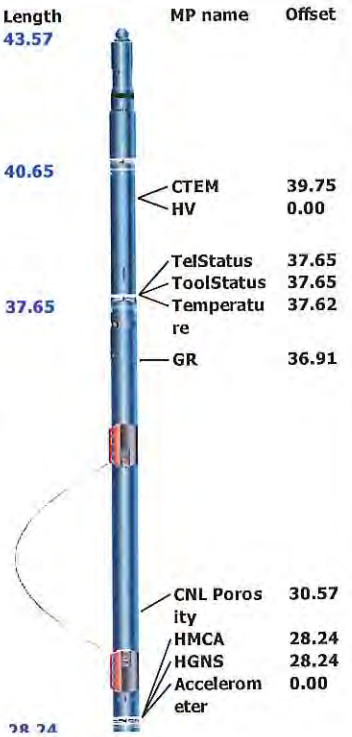


Borehole Size/Casing/Tubing Record

Bit						
Bit Size (in)	12.25	8.75				
Top Driller (ft)	0	3515				
Top Logger (ft)	0	3515				
Bottom Driller (ft)	3515	7525				
Bottom Logger (ft)	3515	7532				
Casing						
Size (in)	9.625					
Weight (lbm/ft)	40					
Inner Diameter (in)	8.835					
Grade	N/A					
Top Driller (ft)	0					
Top Logger (ft)	0					
Bottom Driller (ft)	3500					
Bottom Logger (ft)	3498					

Remarks and Equipment Summary

One: Toolstring



One: Remarks

Toolstring run as per tool sketch
Matrix: Sandstone (2.65 g/cc)
Log may be affected by 20% LCM in drilling mud
Caliper check in casing=8.87 in, within tolerance
Cement volume calculated using 7 in future casing diameter
Rig: Aztec 920
Crew: Derrick Hunter
Thank you for choosing Schlumberger

6
ECH-MEB:382
8
HRCC-H:48.1
7
HRMS-H:4876
Long Spacing
GPV-Q
HRGD-H:4899
GSR-J:5471
Short Spacing
:27786
Backscatter

AIT-M:50 **16.00**
AMIS:50
AMRM

Lengths are in ft
Maximum Outer Diameter = 5.000 in
Line: Sensor Location, Value: Gating Offset
All measurements are relative to TOOL_ZERO

Depth Summary

	One		
Depth Measuring Device			
Type	IDW-JA		
Serial Number	6568		
Calibration Date	23-Dec-2015		
Calibrator Serial Number			
Calibration Cable Type	7-46A-XS		
Wheel Correction 1	-1		
Wheel Correction 2	0		
Tension Device			
Type	CMTD-B/A		

Serial Number	147		
Calibration Date	18-Aug-2016		
Calibrator Serial Number	78805A		
Number of Calibration Points	10		
Calibration Root Mean Square Error	7		
Calibration Peak Error	10		

Logging Cable

Type	7-46A-XS		
Serial Number	U715043		
Length	24000.00 ft		
Conveyance Type	Wireline		
Rig Type	Land		

One:Depth Control Parameters		Depth Control Remarks
Log Sequence	First Log In the Well	First run in well depth control procedures followed
Rig Up Length At Surface		IDW used as primary depth device, z-chart used for secondary
Rig Up Length At Bottom		
Rig Up Length Correction		
Stretch Correction		
Tool Zero Check At Surface		

One

2" Induction

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	623.08	ft3

Software Version

Acquisition System	Version
Maxwell 2016 SP2	6.2.68624.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[4]:Up	Up		7548.83 ft	07-Sep-2016 5:52:06 AM		ON	0.00 ft	No

All depths are referenced to toolstring zero

Log

Company:Western Refining, Southwest, Inc. Well:WWD #2

One: Log[4]:Up:S012

Description: AIT Basic Log Two Format: Log (Induction-2) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:04:12

Channel	Source	Sampling
AT10	AIT-M:AMIS:AMIS	3in
AT60	AIT-M:AMIS:AMIS	3in
ATCO60	AIT-M:AMIS:AMIS	3in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
GR	HGNS-H:HGNS-H:HGNS-H	6in
ICV	Borehole	6in - RT
SP	AIT-M:AMIS:AMIS	6in
TENS	WL Workflow	6in

TIME_1900 WLWorkflow 0.1in

TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

Gamma Ray Backup

Spontaneous Potential (SP) AIT-M

-80 mV 20

Caliper (HCAL) HDRS-H

6 in 16

Gamma Ray (ECGR) HGNS-H

0 gAPI 200

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0 ohm.m 50

Array Induction Two Foot Resistivity A60 (AT60) AIT-M

0 ohm.m 50

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

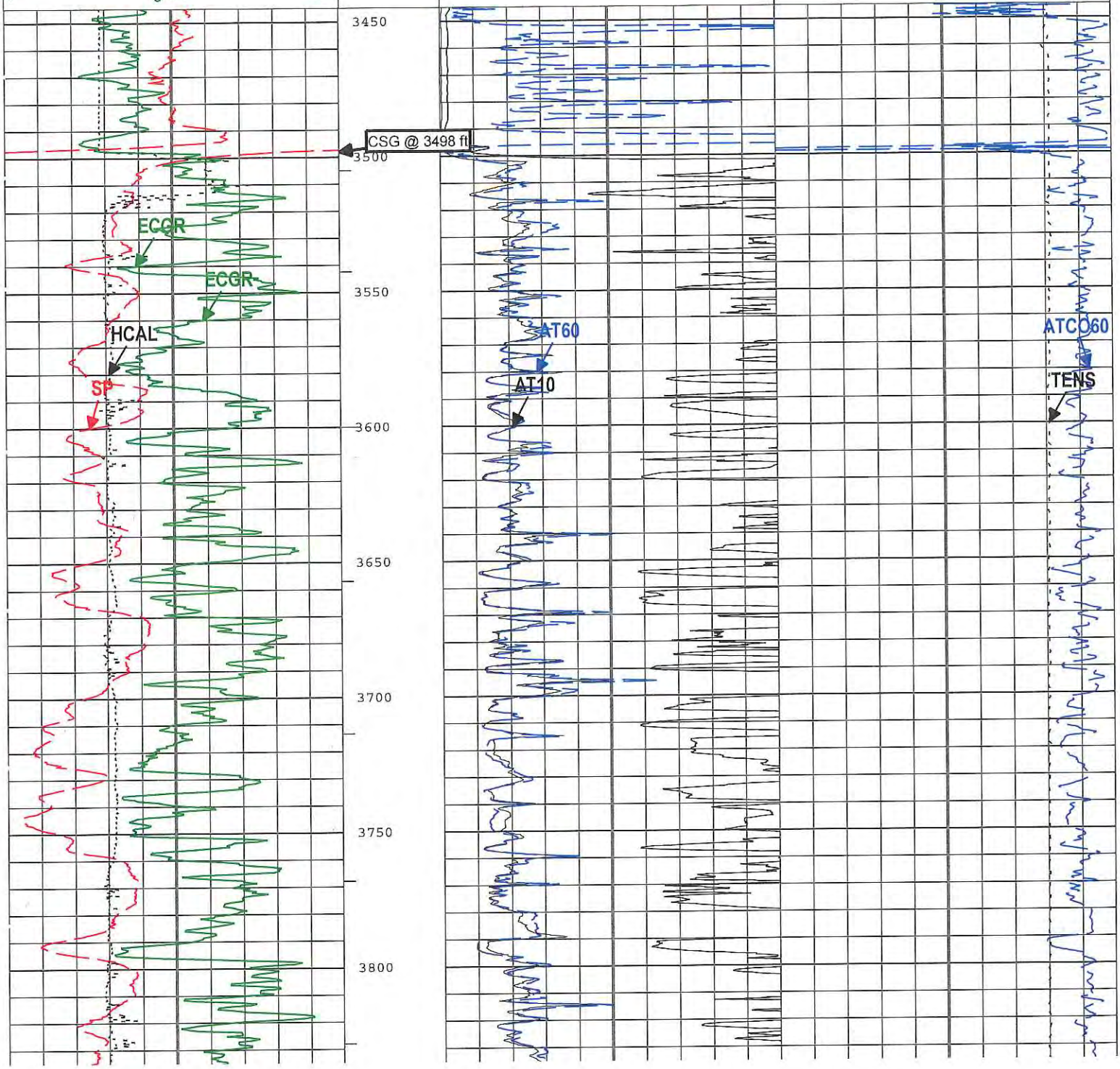
0 ohm.m 10

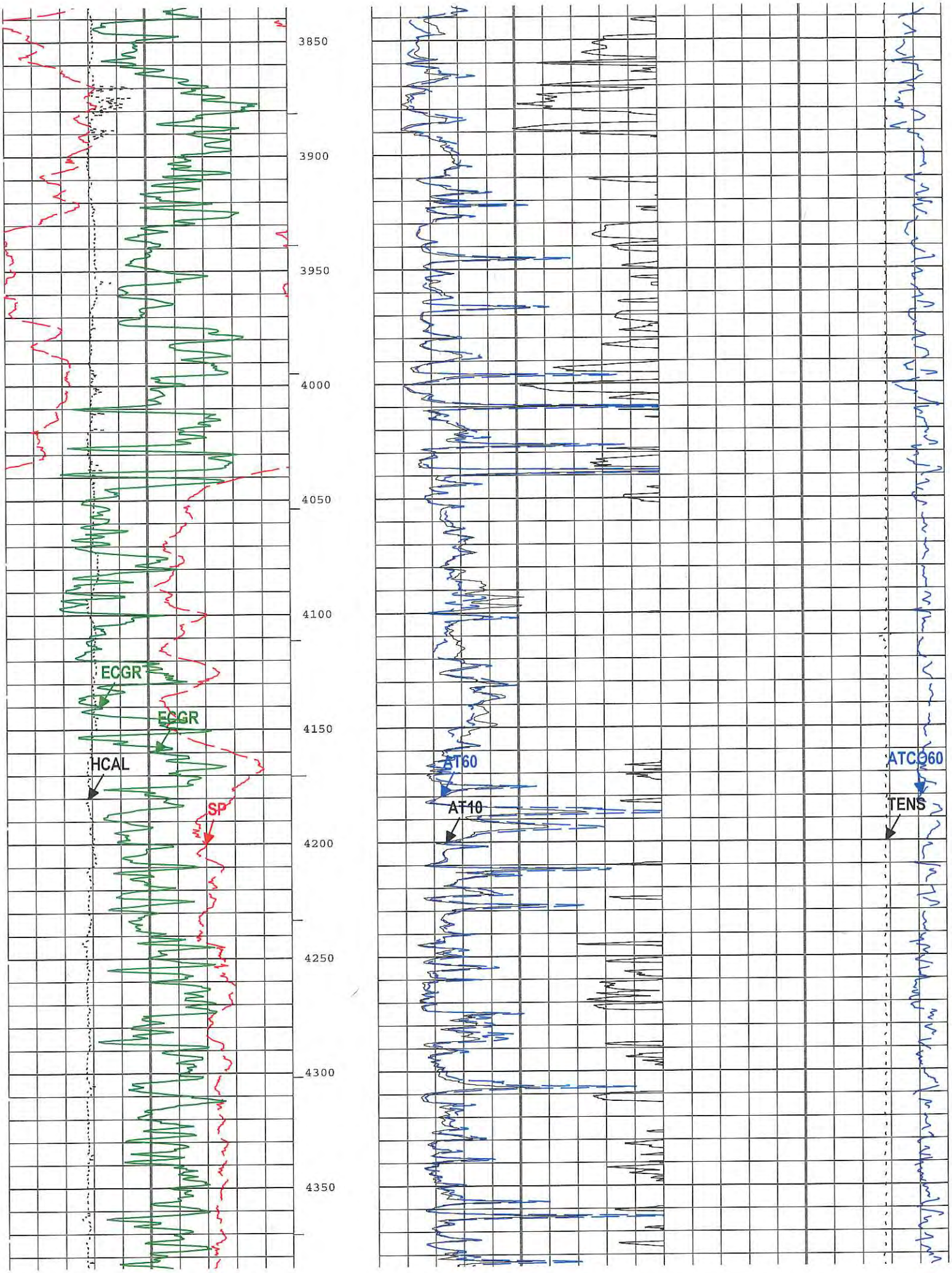
Cable Tension (TENS)

10000 lbf 0

Array Induction Two Foot Conductivity A60 (ATCO60) AIT-M

1000 mS/m 0

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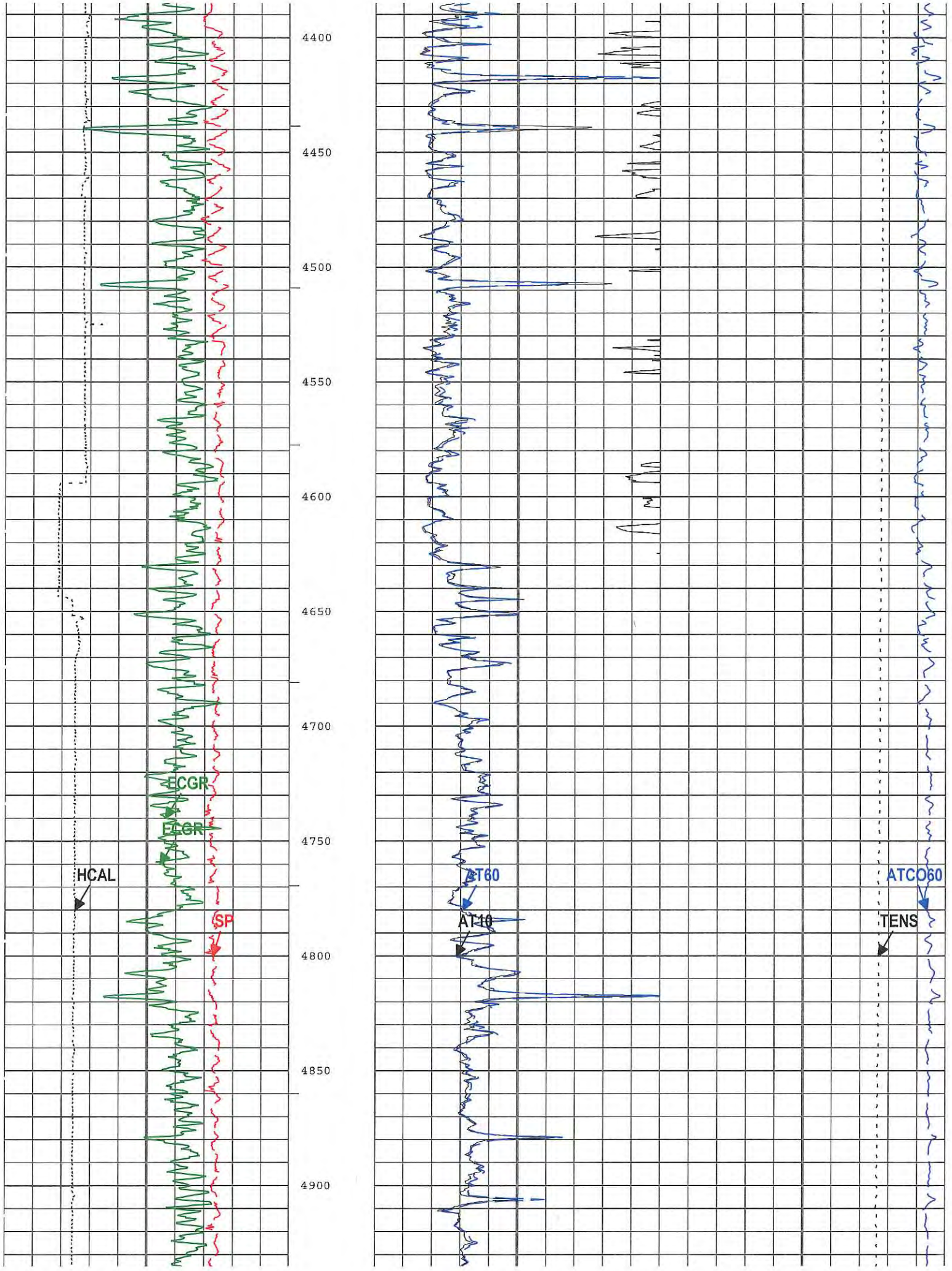
TENS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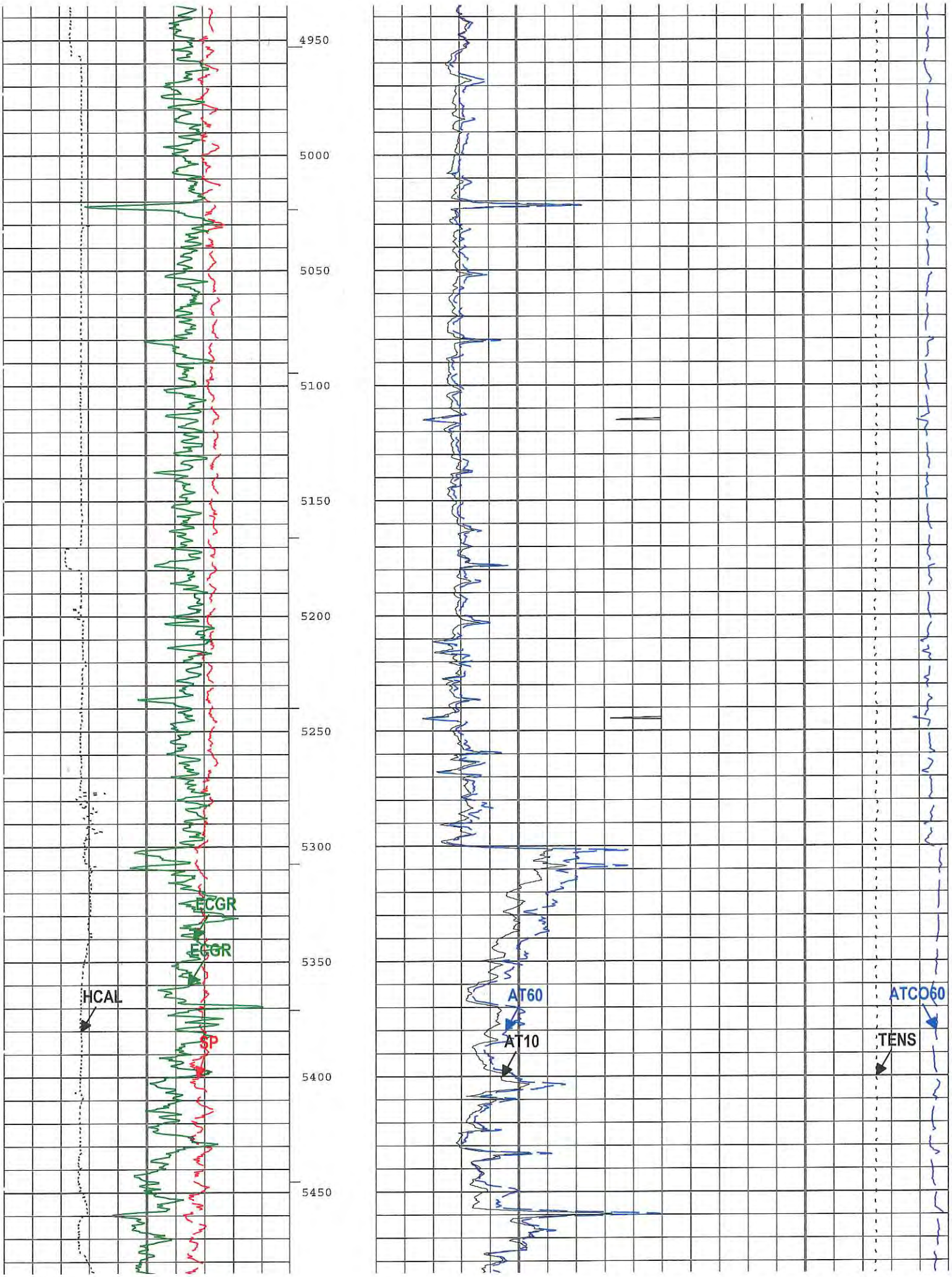
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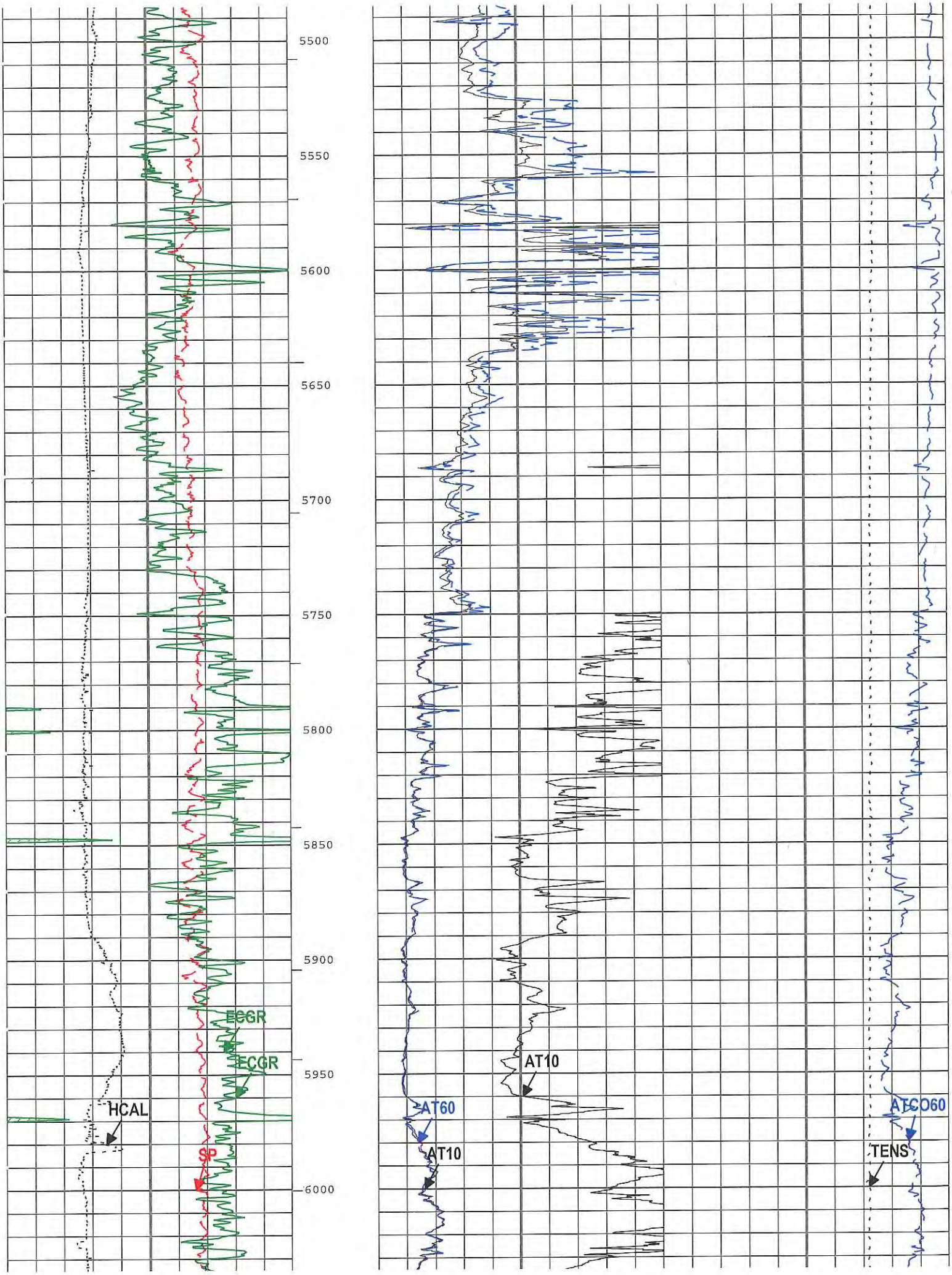
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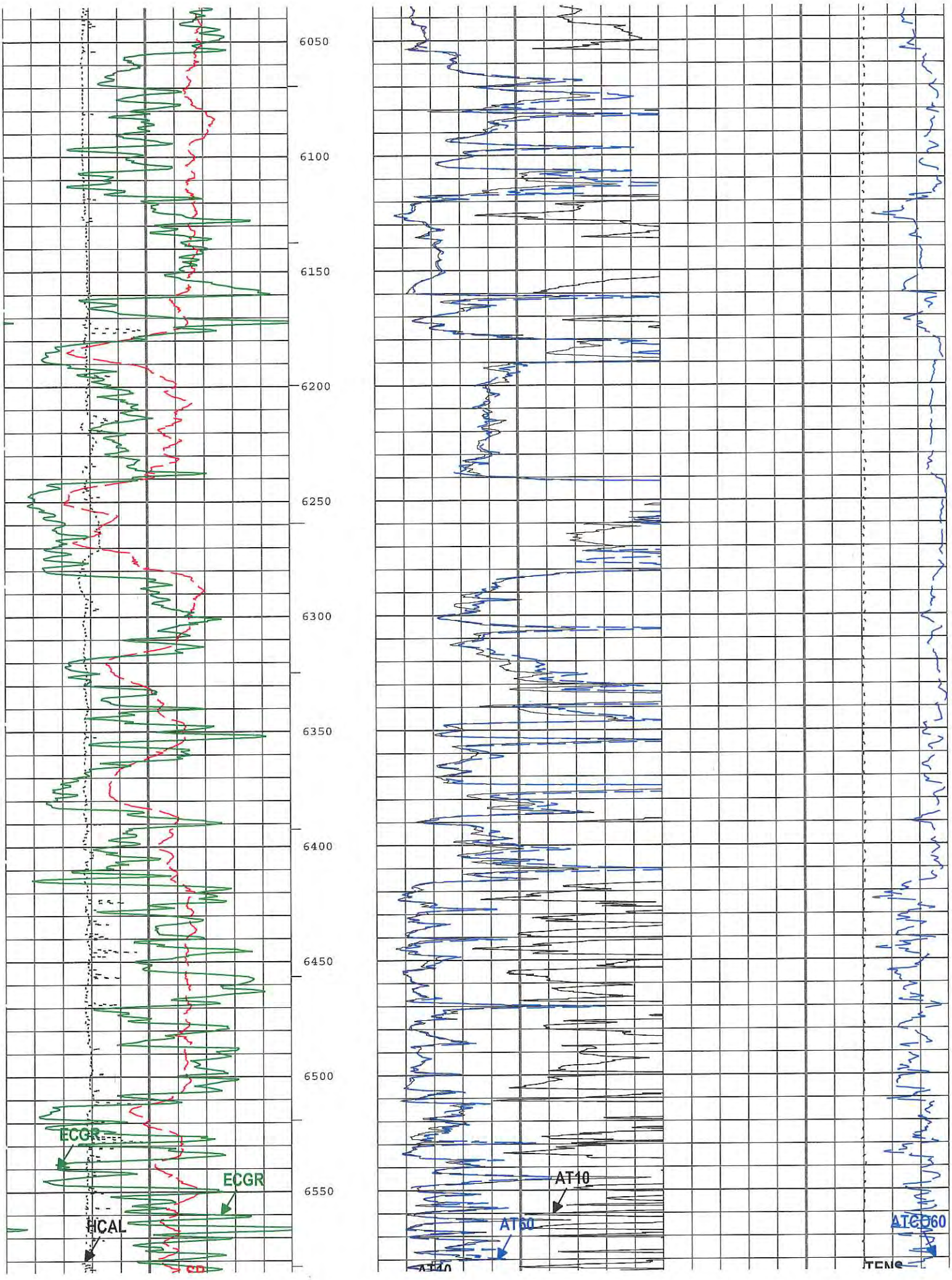
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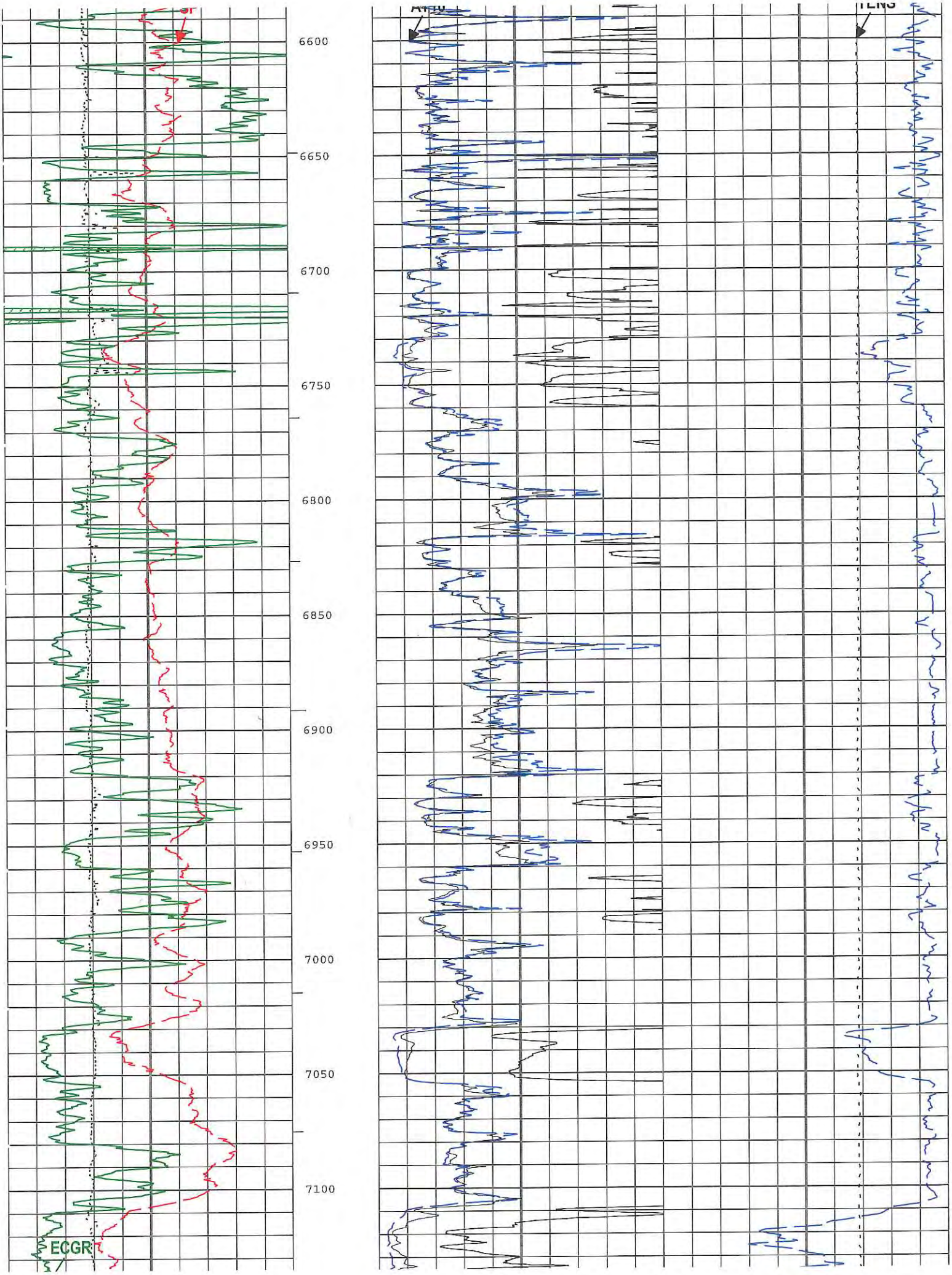
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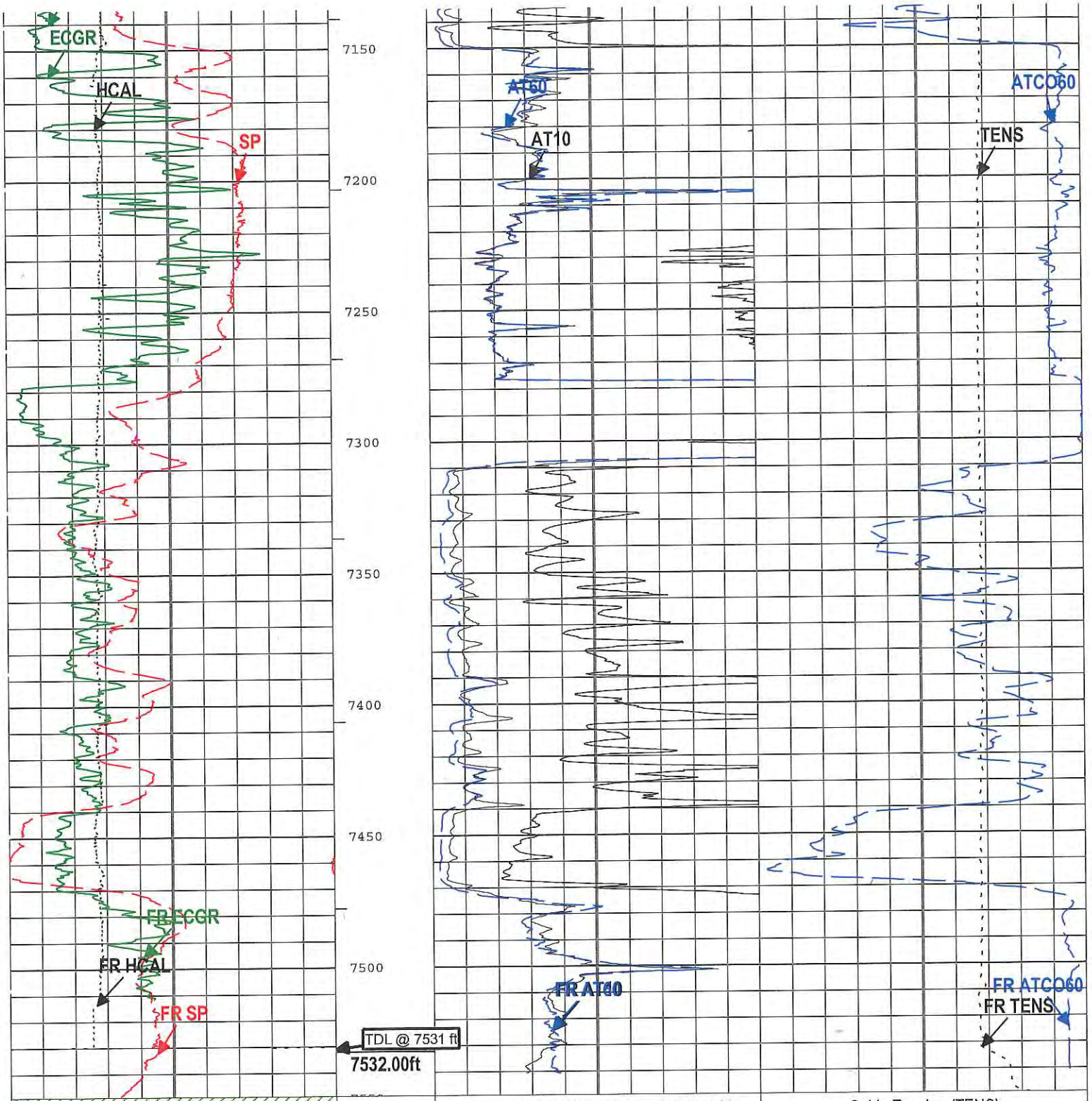


Gamma Ray Backup

Spontaneous Potential (SP) AIT-M

-80 mV 20

Caliper (HCAL) HDRS-H

6 in 16

Gamma Ray (ECGR) HGNS-H

0 gAPI 200

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0 ohm.m 50

Array Induction Two Foot Resistivity A60 (AT60) AIT-M

0 ohm.m 50

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0 ohm.m 10

Cable Tension (TENS)

10000 lbf 0

Array Induction Two Foot Conductivity A60 (ATCO60) AIT-M

1000 mS/m 0

ICV - Integrated Cement Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

TIME 1000 - Time Marked every 60.00 (s)

TIME_1900 - Time Marked every 60.00 (s)

Description: AIT Basic Log Two Format: Log (Induction-2) Index Scale: 2 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:04:12

Channel Processing Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ASTA	Array Induction Tool Standoff	AIT-M	0.6	in
ISSBAR	Barite Mud Presence Flag	Borehole	Yes	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	Depth Zoned	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.1	in
CBLO	Casing Bottom (Logger)	WLSESSION	3498	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	9.625	in
DFD	Drilling Fluid Density	Borehole	9.9	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
FCD	Future Casing (Outer) Diameter	WLSESSION	7	in
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	AMF	
SOCO	Standoff Correction Option	HGNS-H	Yes	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	12.25		3515
BS	8.75	3515	7532

All depth are actual.

Tool Control Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h

One

5" Induction

Integration Summary

Output Channel(s)	Output Description	Input Parameter	Output Value	Unit
ICV	Integrated Cement Volume	GCSE_UP_PASS, FCD	623.08	ft3
IHV	Integrated Hole Volume	GCSE_UP_PASS	1705.5	ft3

Software Version

Acquisition System	Version
Maxwell 2016 SP2	6.2.68624.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[4]:Up	Up		7548.83 ft	07-Sep-2016 5:52:06 AM		ON	0.00 ft	No

All depths are referenced to toolstring zero

All depths are referenced to toolstring zero

Log

Company:Western Refining, Southwest, Inc. Well:WWD #2

One: Log[4]:Up:S012

Description: AIT Basic Log Two Format: Log (Induction-5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:04:14

Channel	Source	Sampling
AT10	AIT-M:AMIS:AMIS	3in
AT20	AIT-M:AMIS:AMIS	3in
AT30	AIT-M:AMIS:AMIS	3in
AT60	AIT-M:AMIS:AMIS	3in
AT90	AIT-M:AMIS:AMIS	3in
CALI	HDRS-H:HRCC-H:HRCC-H	1in
GR	HGNS-H:HGNS-H:HGNS-H	6in
ICV	Borehole	6in - RT
IHV	Borehole	6in - RT
SP	AIT-M:AMIS:AMIS	6in
TENS	WLWorkflow	6in
TIME_1900	WLWorkflow	0.1in

IHV - Integrated Hole Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

ICV - Integrated Cement Volume every 100.00 (ft3)

TIME_1900 - Time Marked every 60.00 (s)

Cable Tension (TENS)

10000 lbf 0

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A20 (AT20) AIT-M

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A30 (AT30) AIT-M

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A60 (AT60) AIT-M

0.2 ohm.m 2000

Array Induction Two Foot Resistivity A90 (AT90) AIT-M

0.2 ohm.m 2000

Gamma Ray Backup

Spontaneous Potential (SP) AIT-M

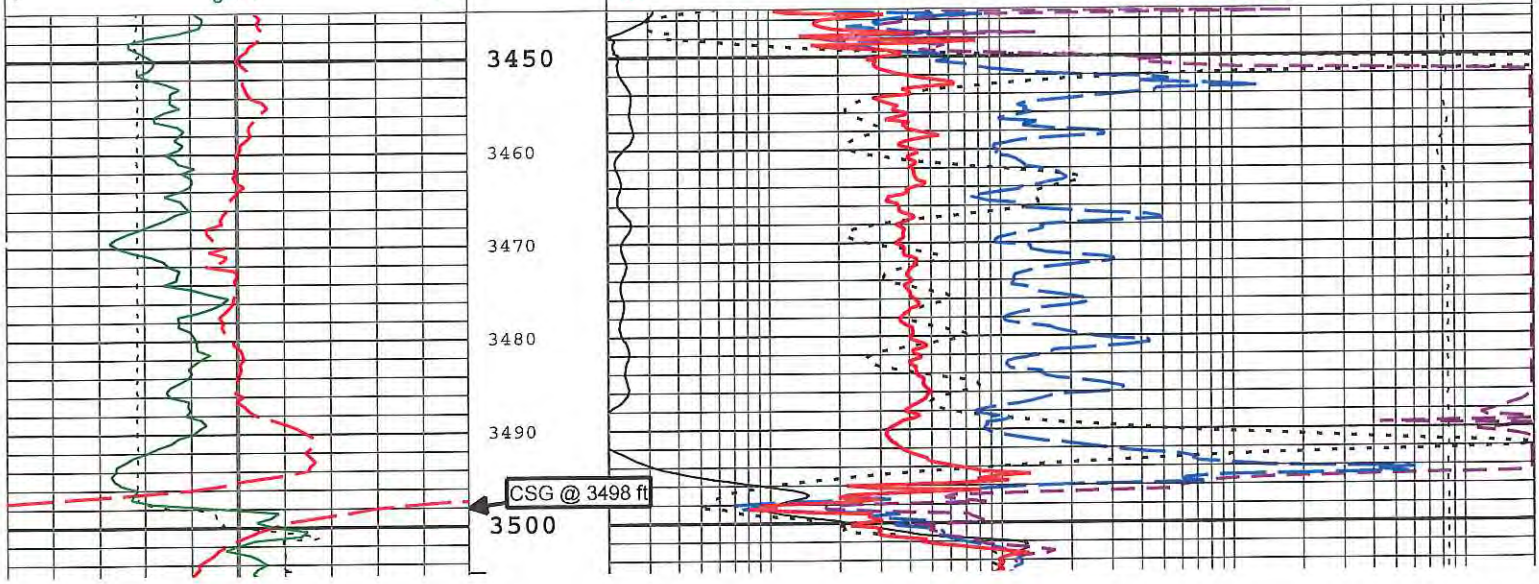
-80 mV 20

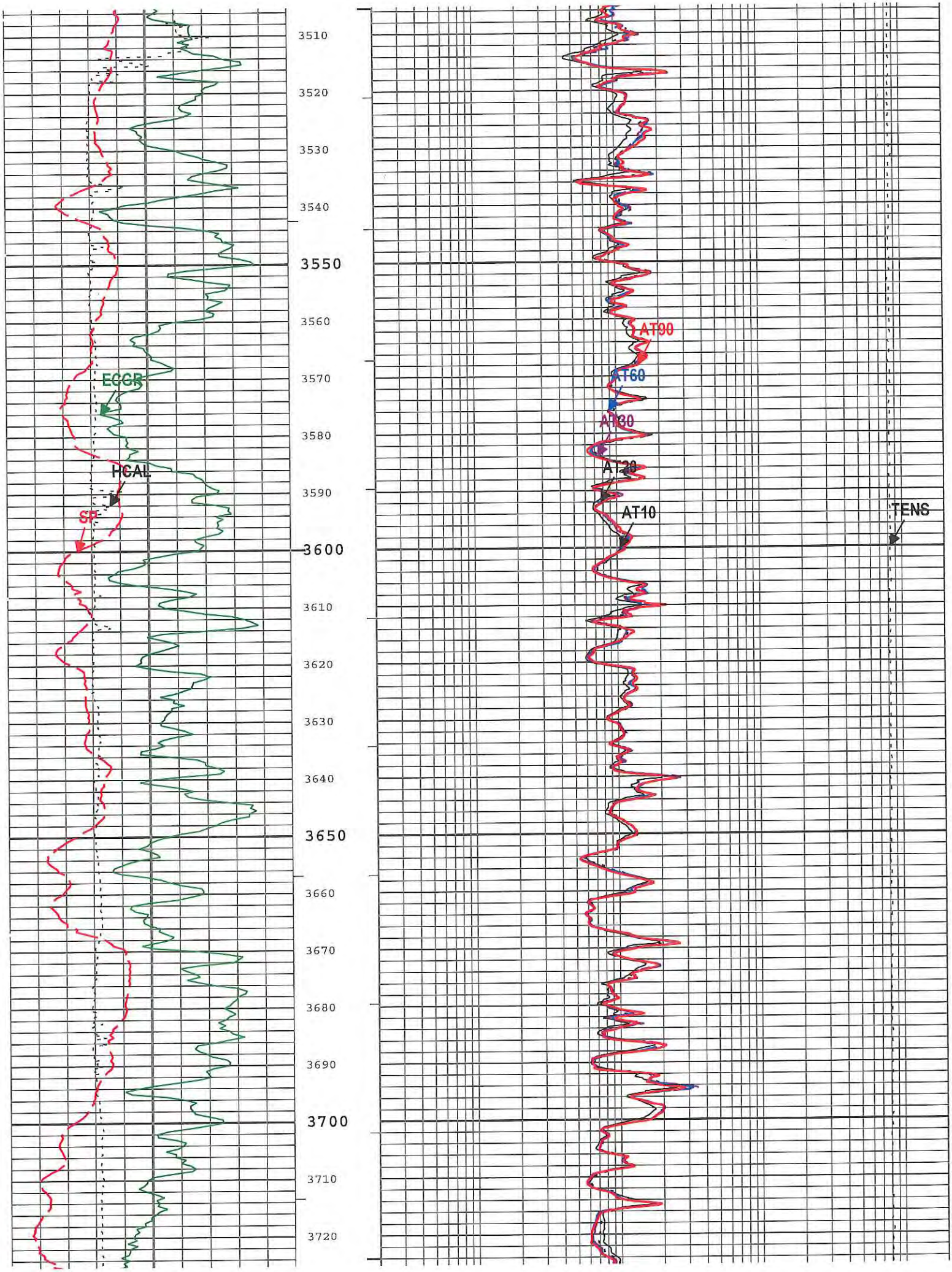
Caliper (HCAL) HDRS-H

6 in 16

Gamma Ray (ECGR) HGNS-H

0 gAPI 200

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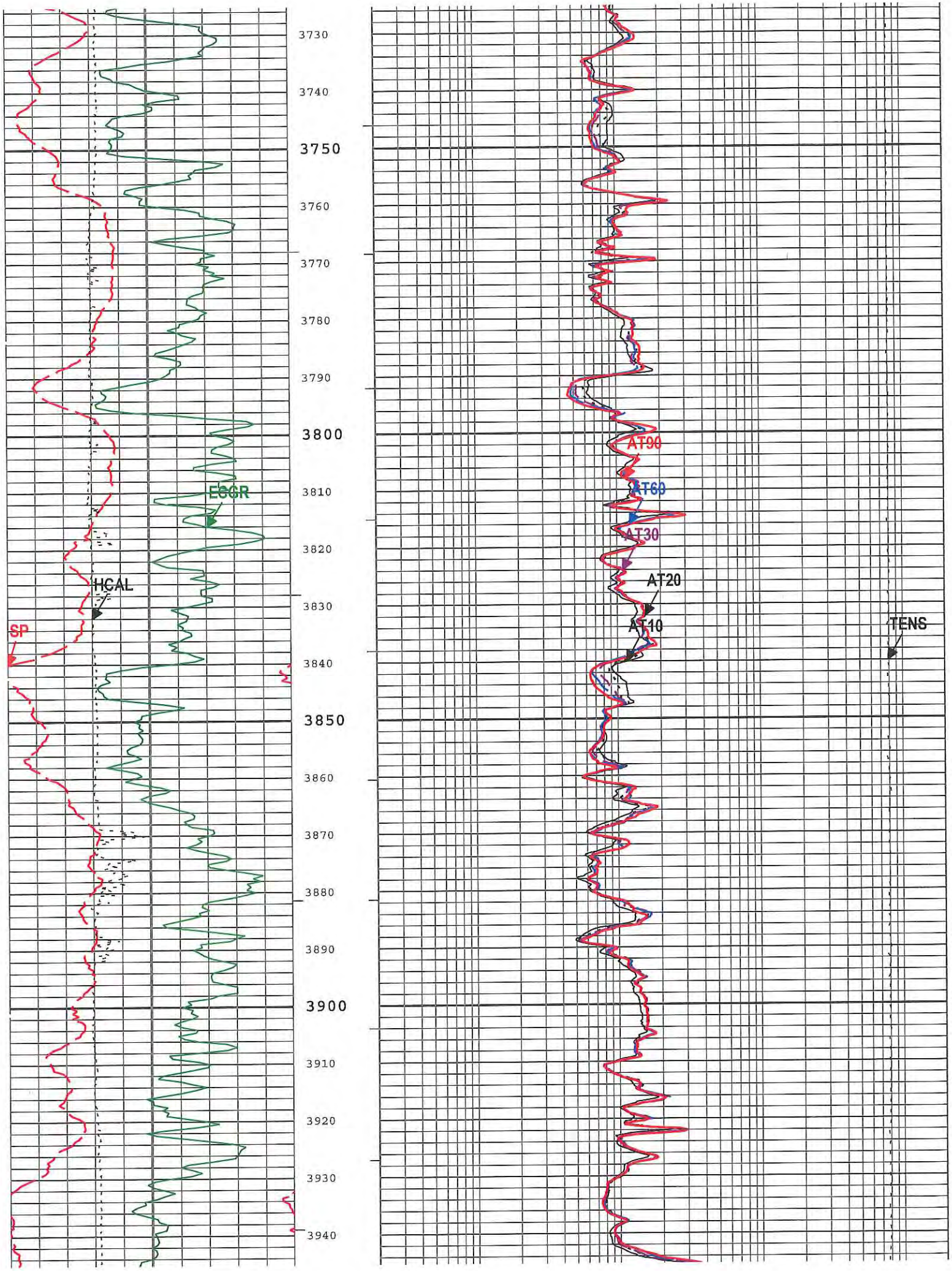
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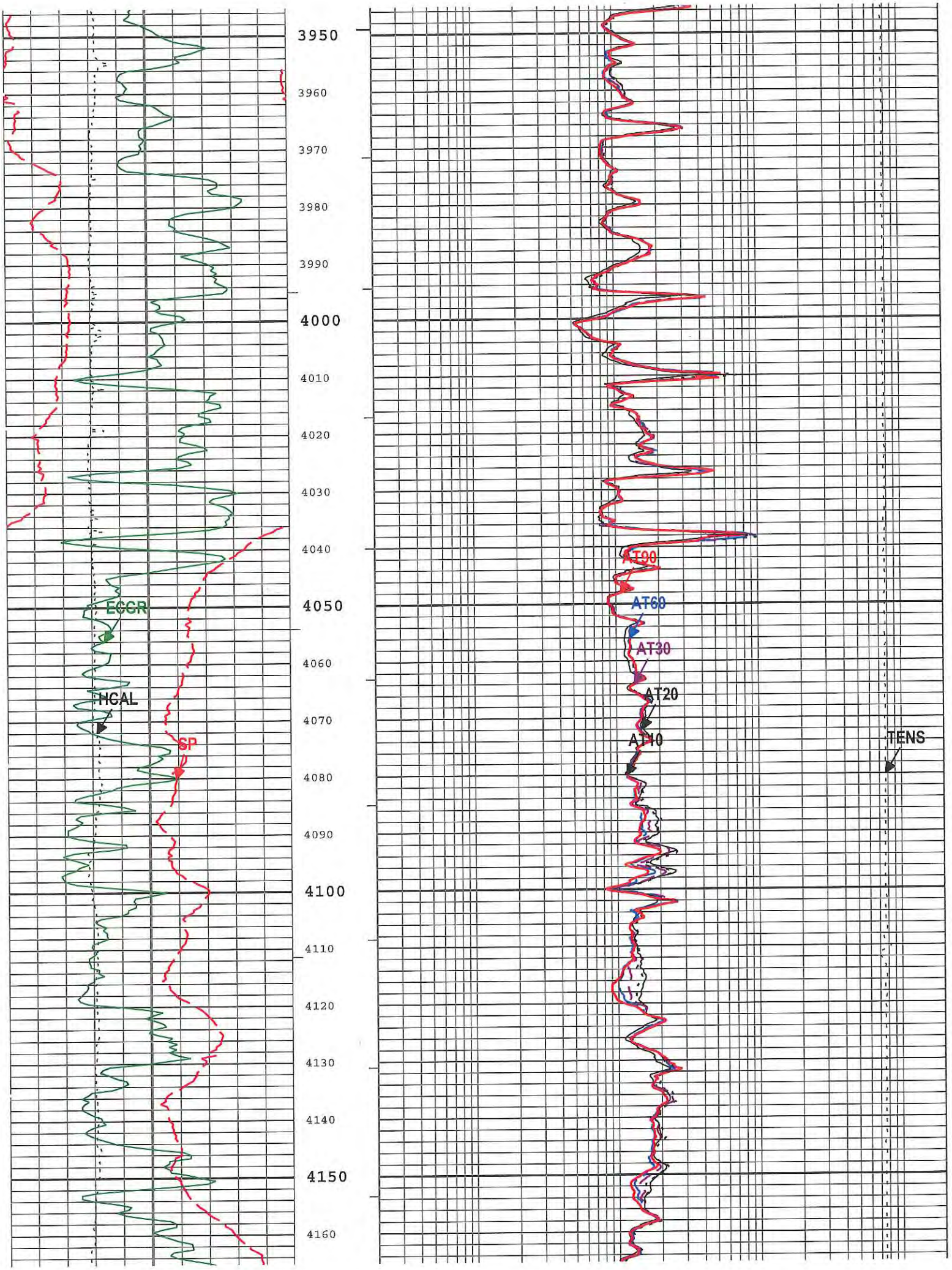
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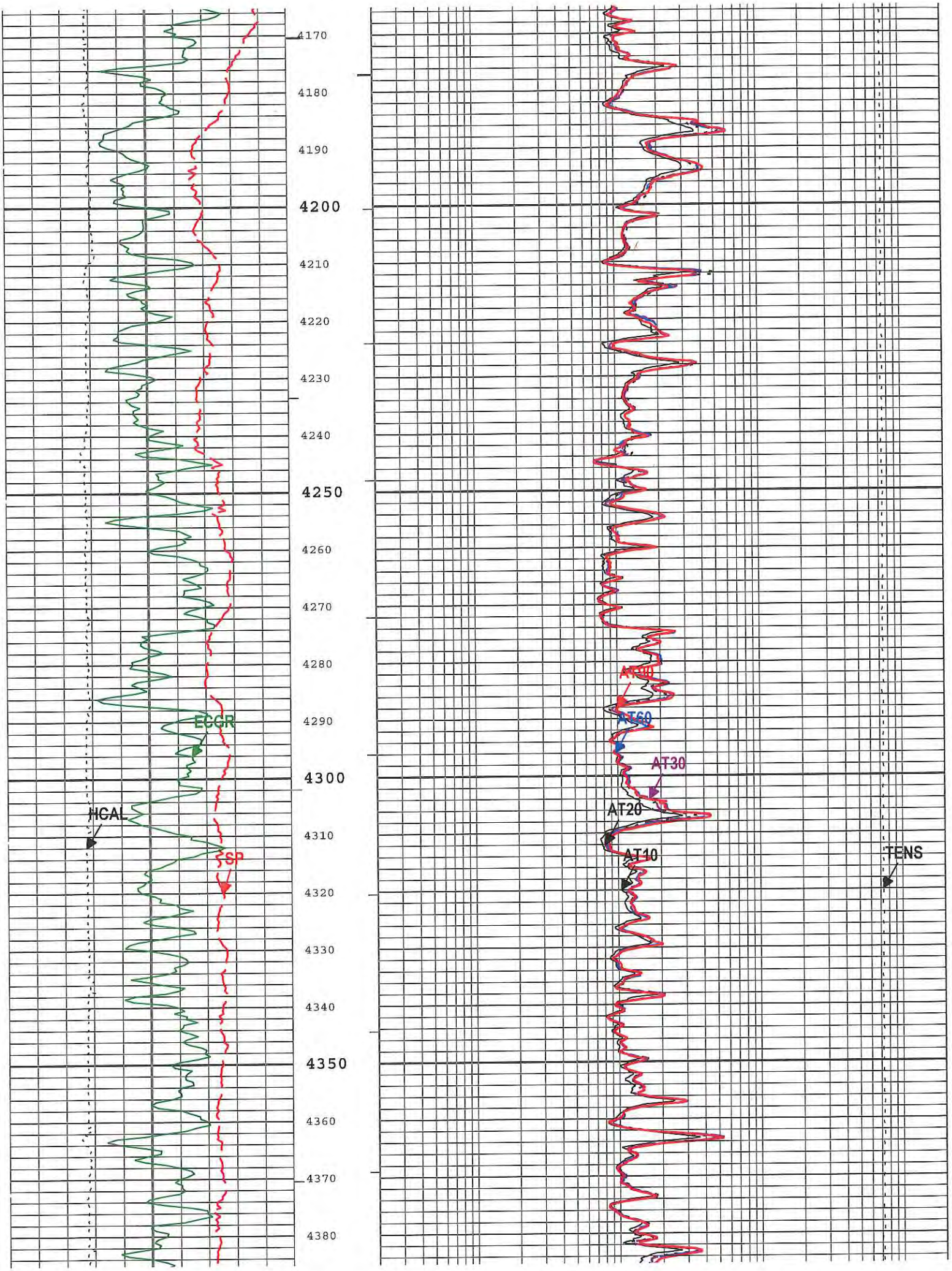
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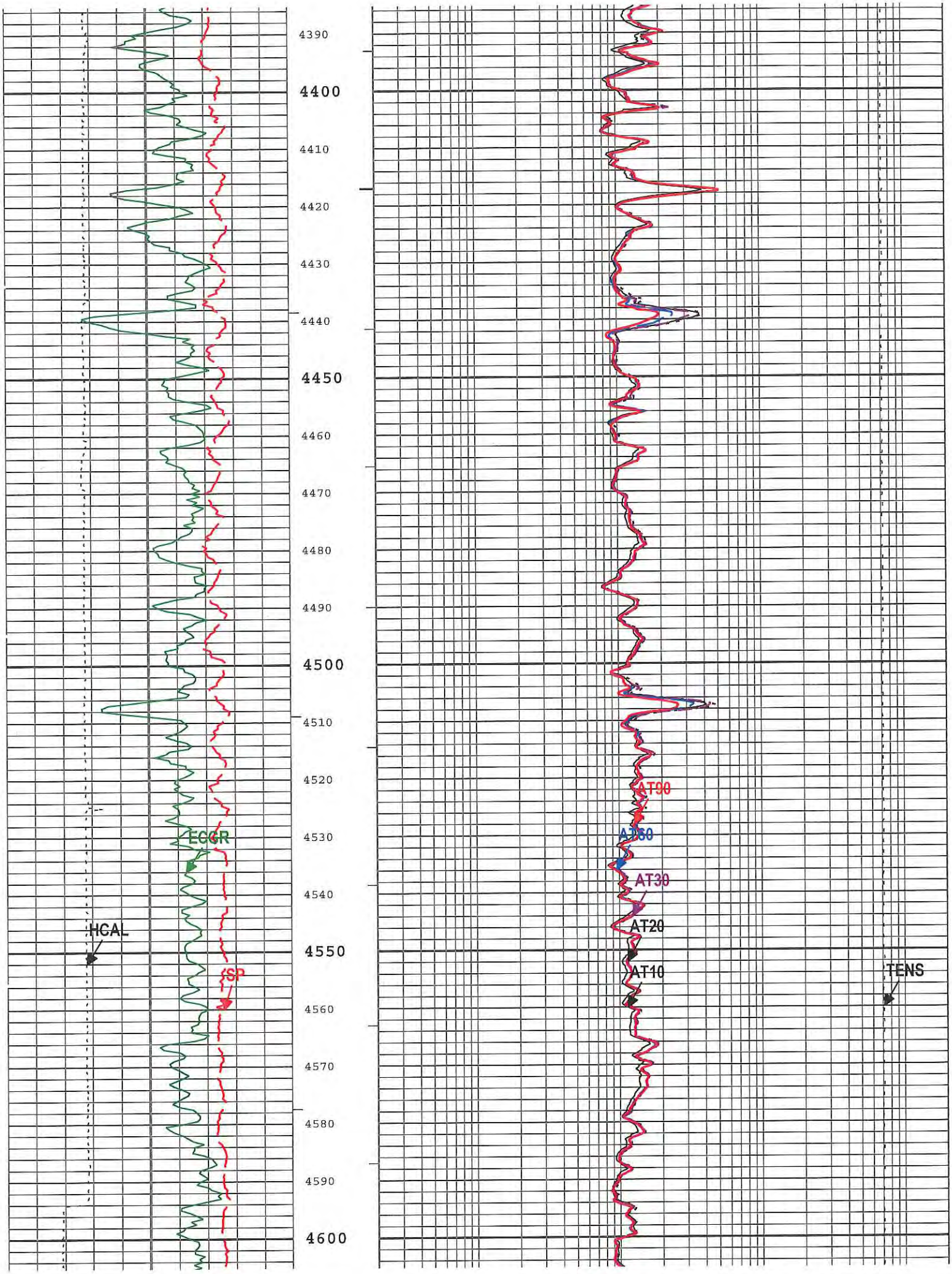
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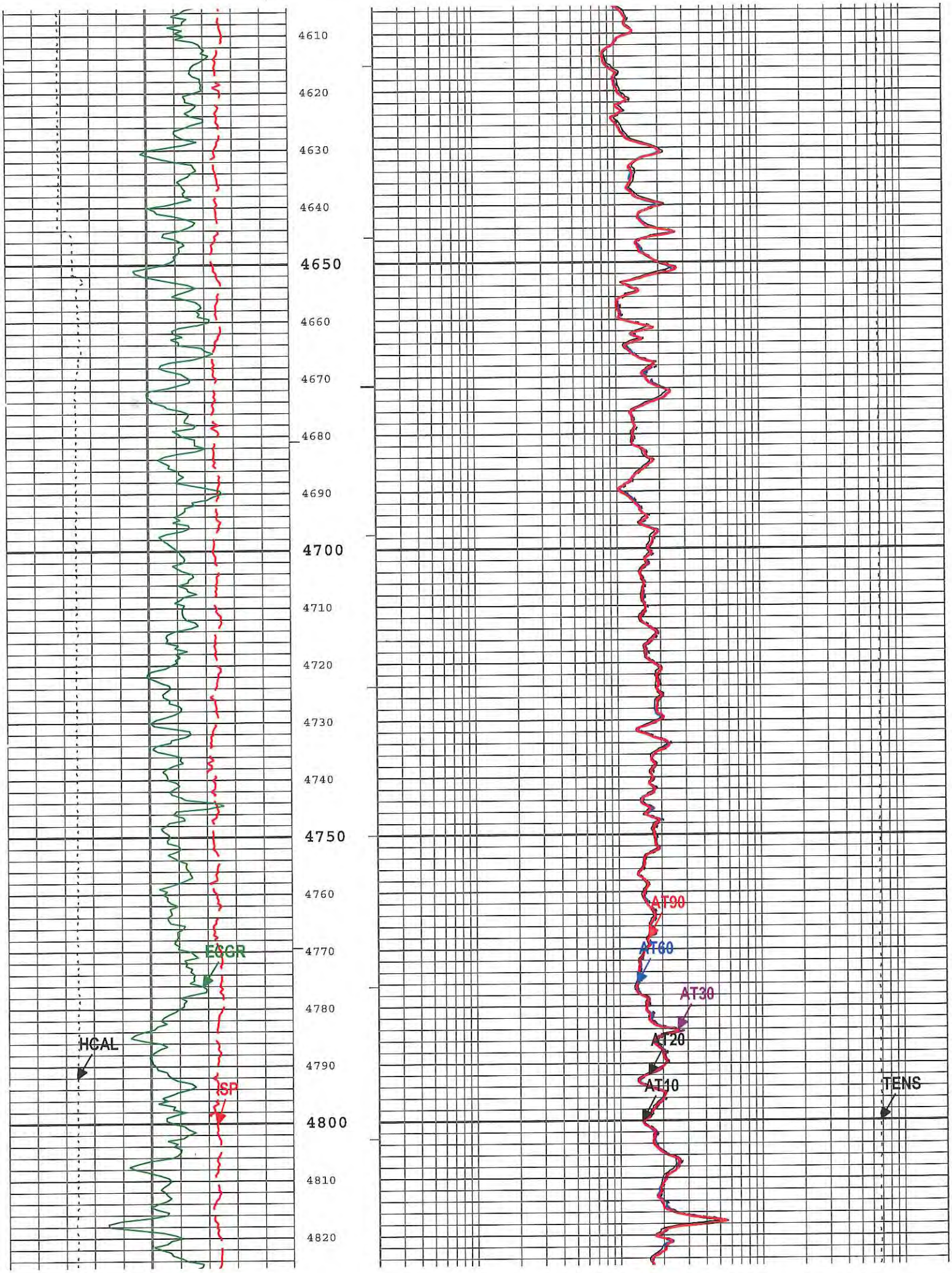
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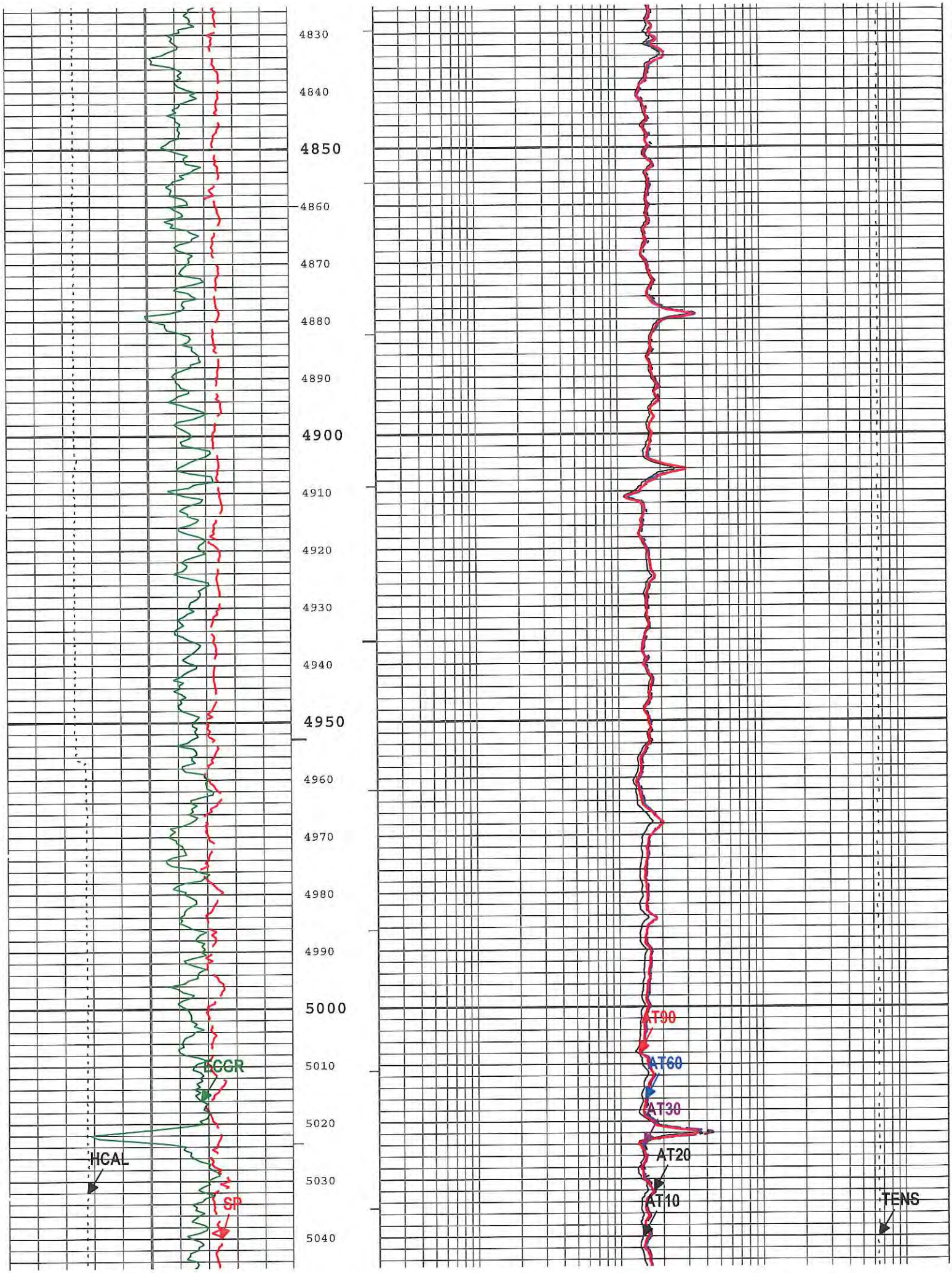
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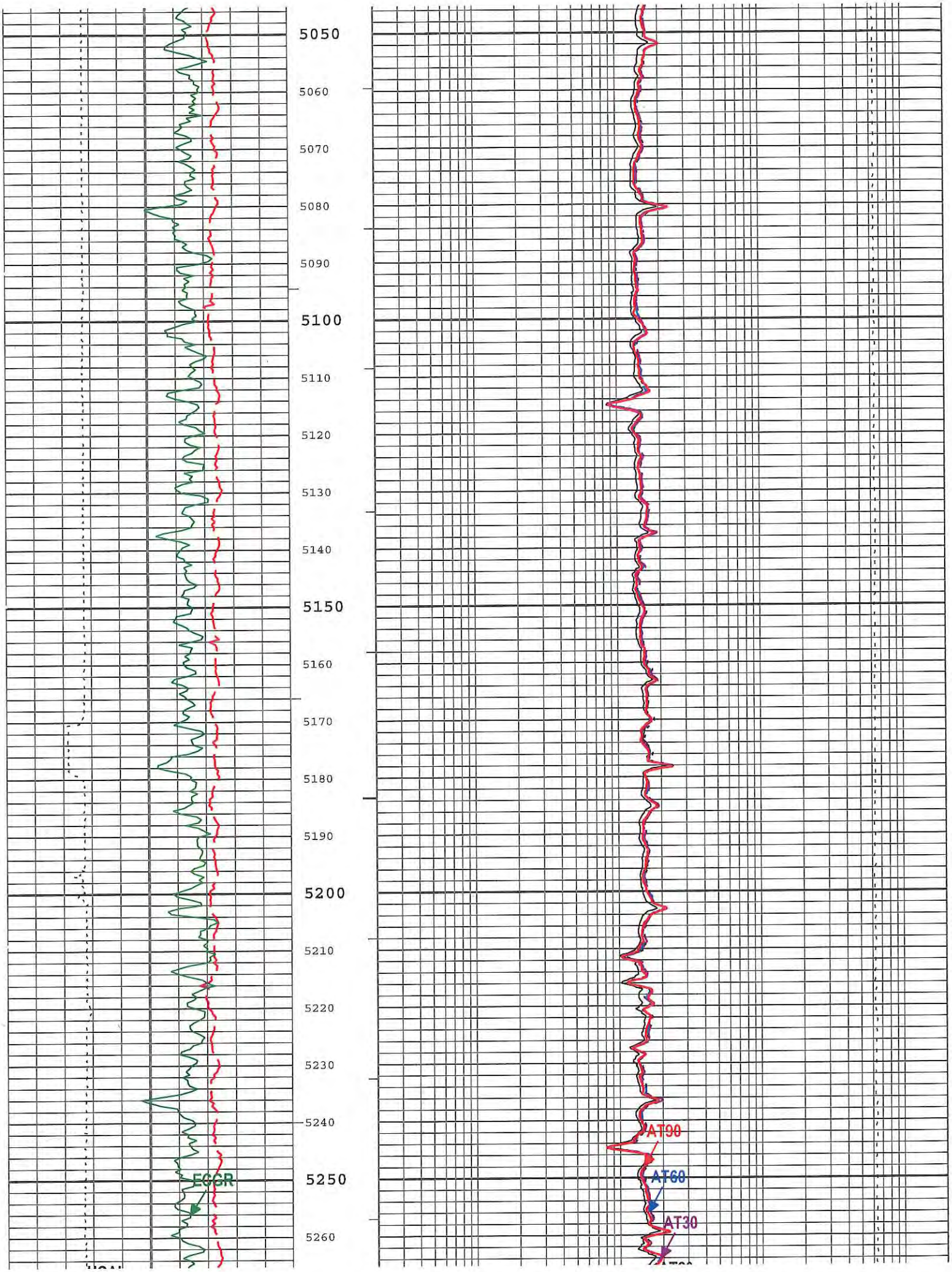
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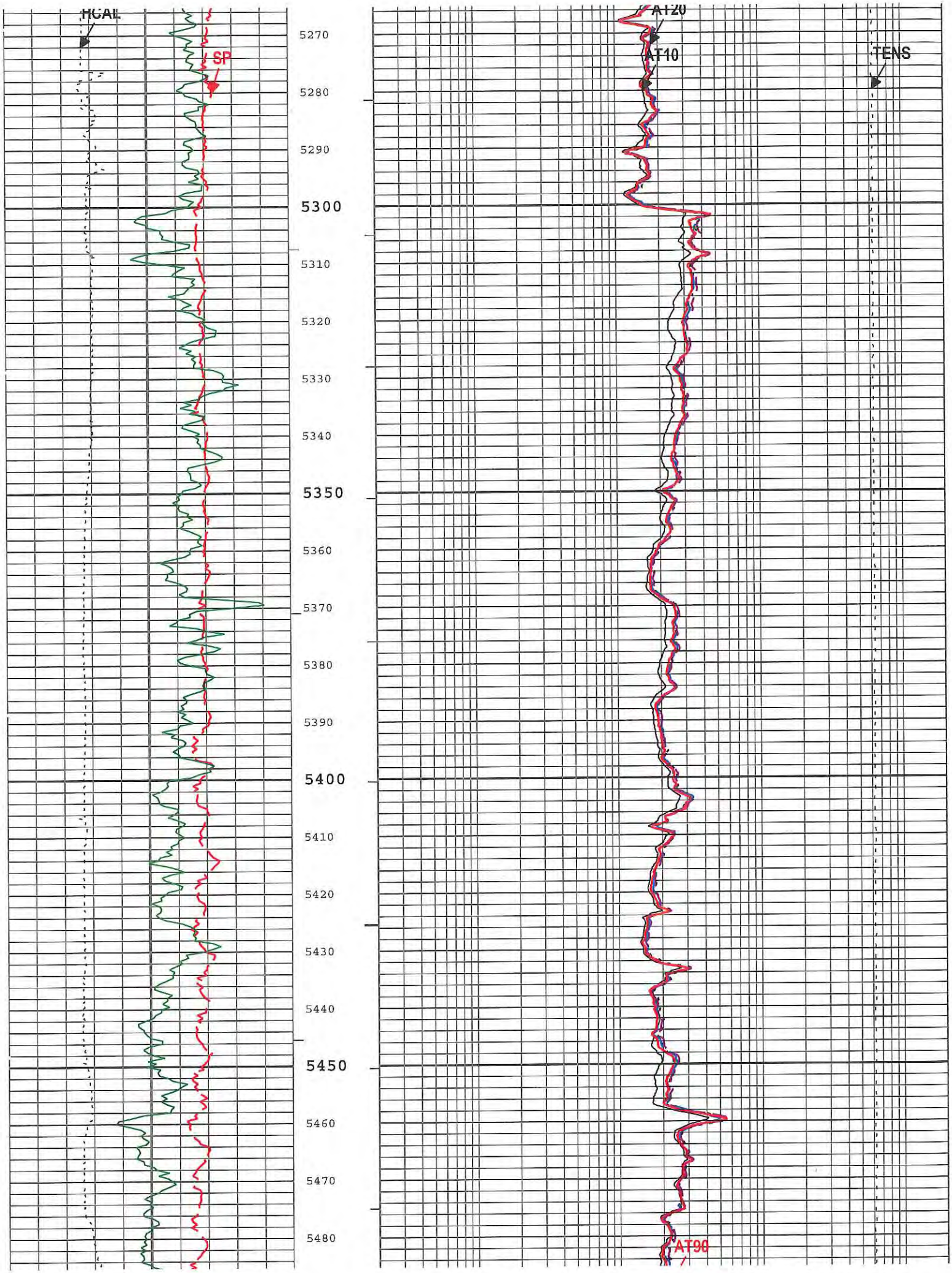
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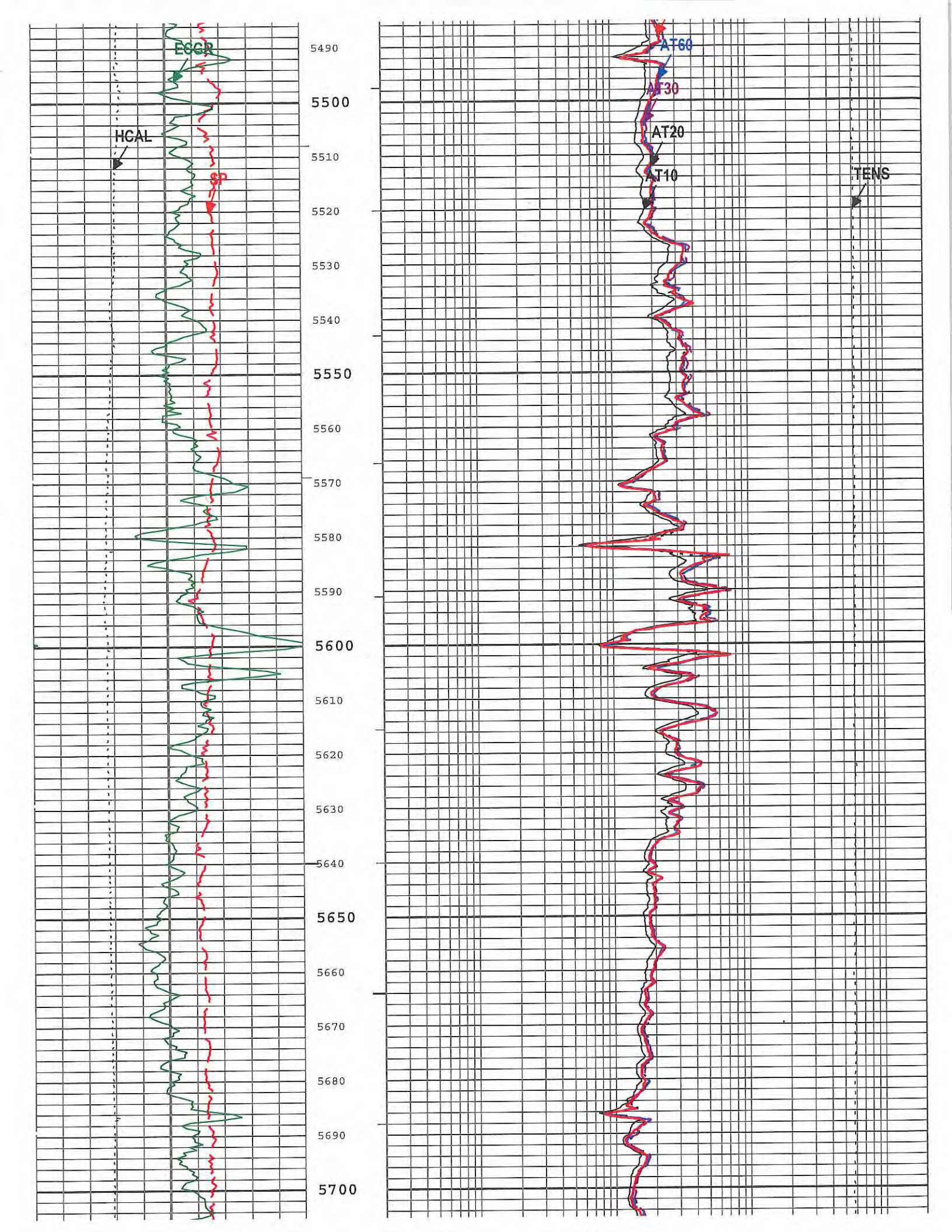
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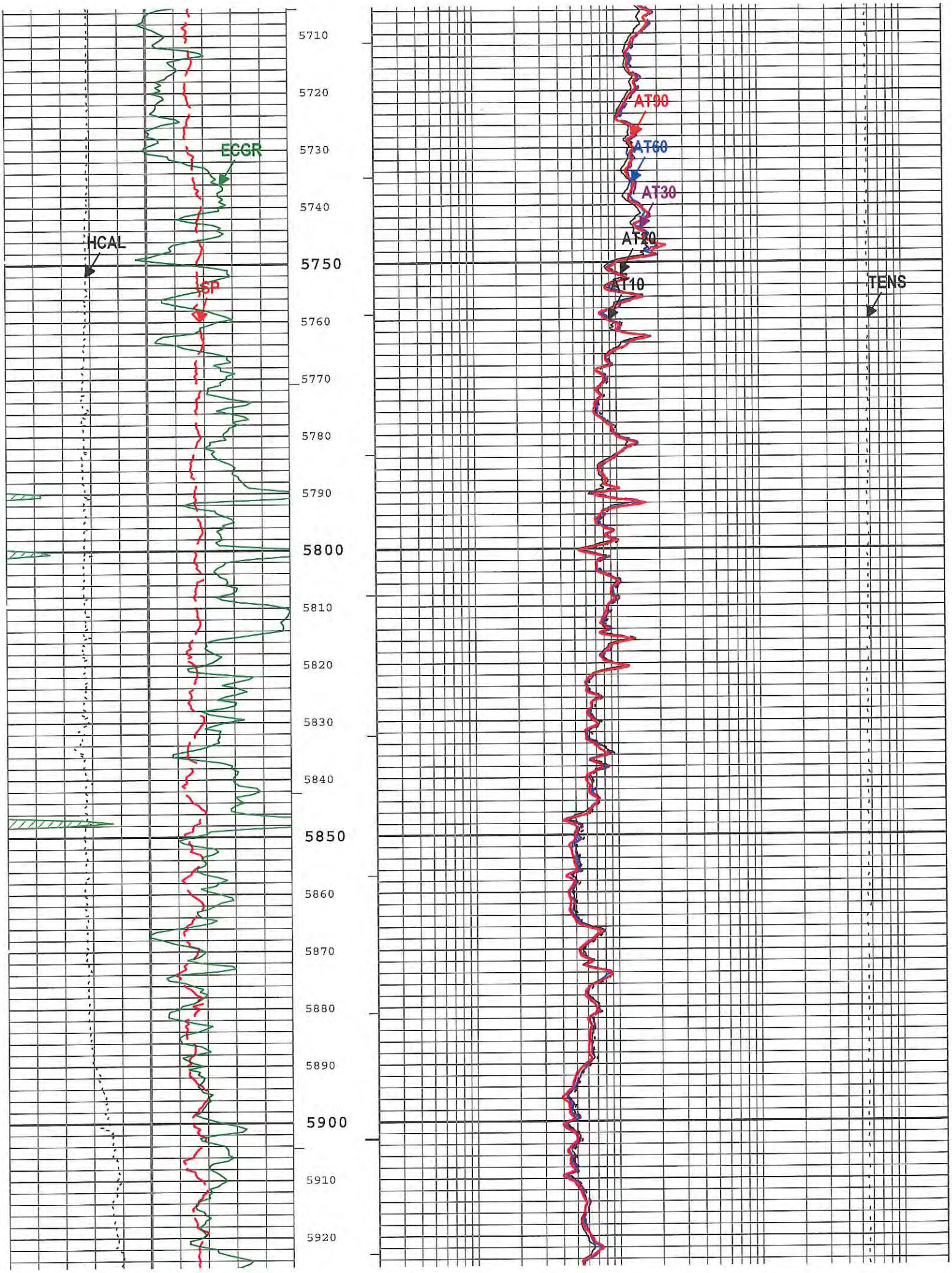
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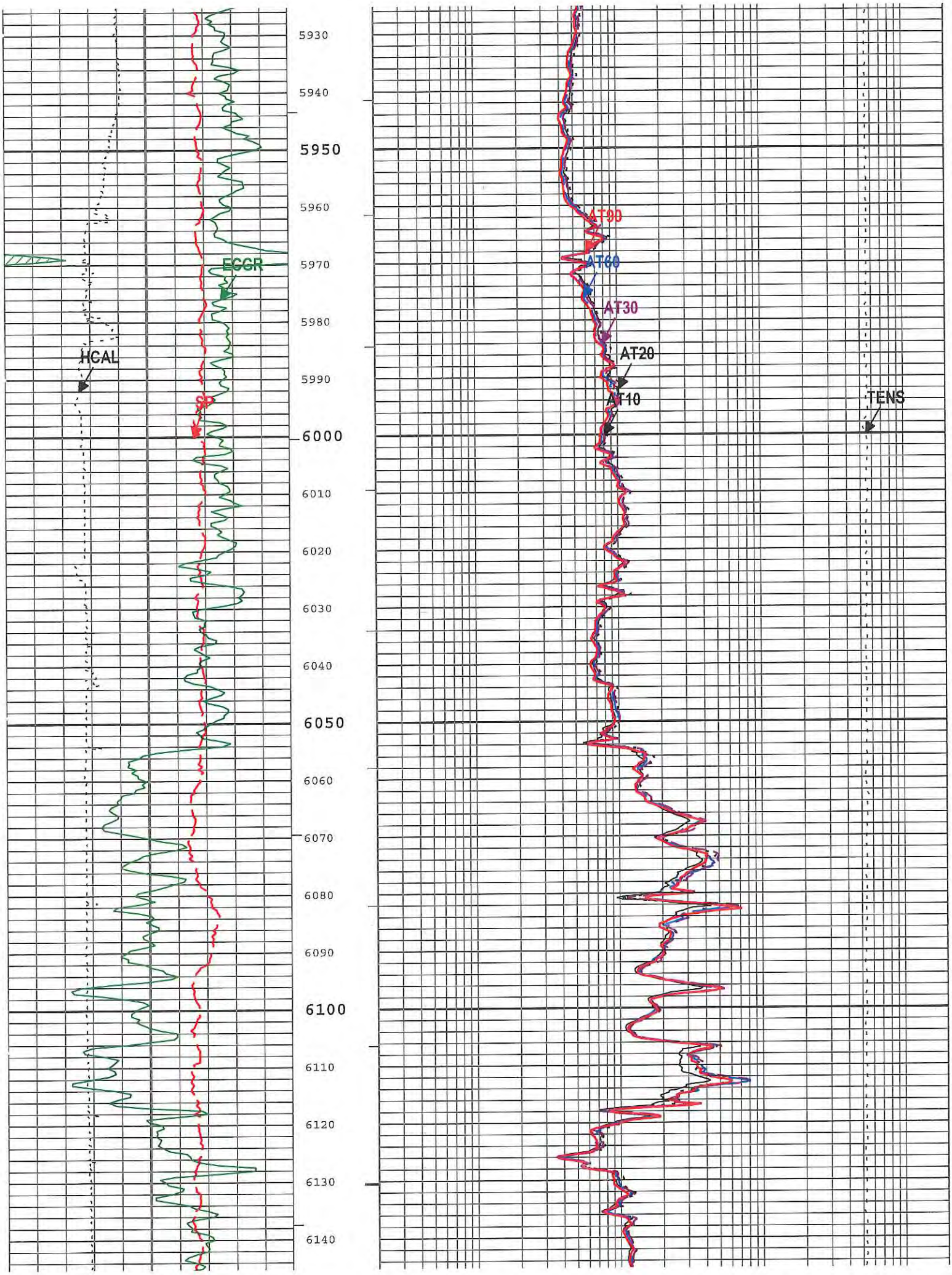
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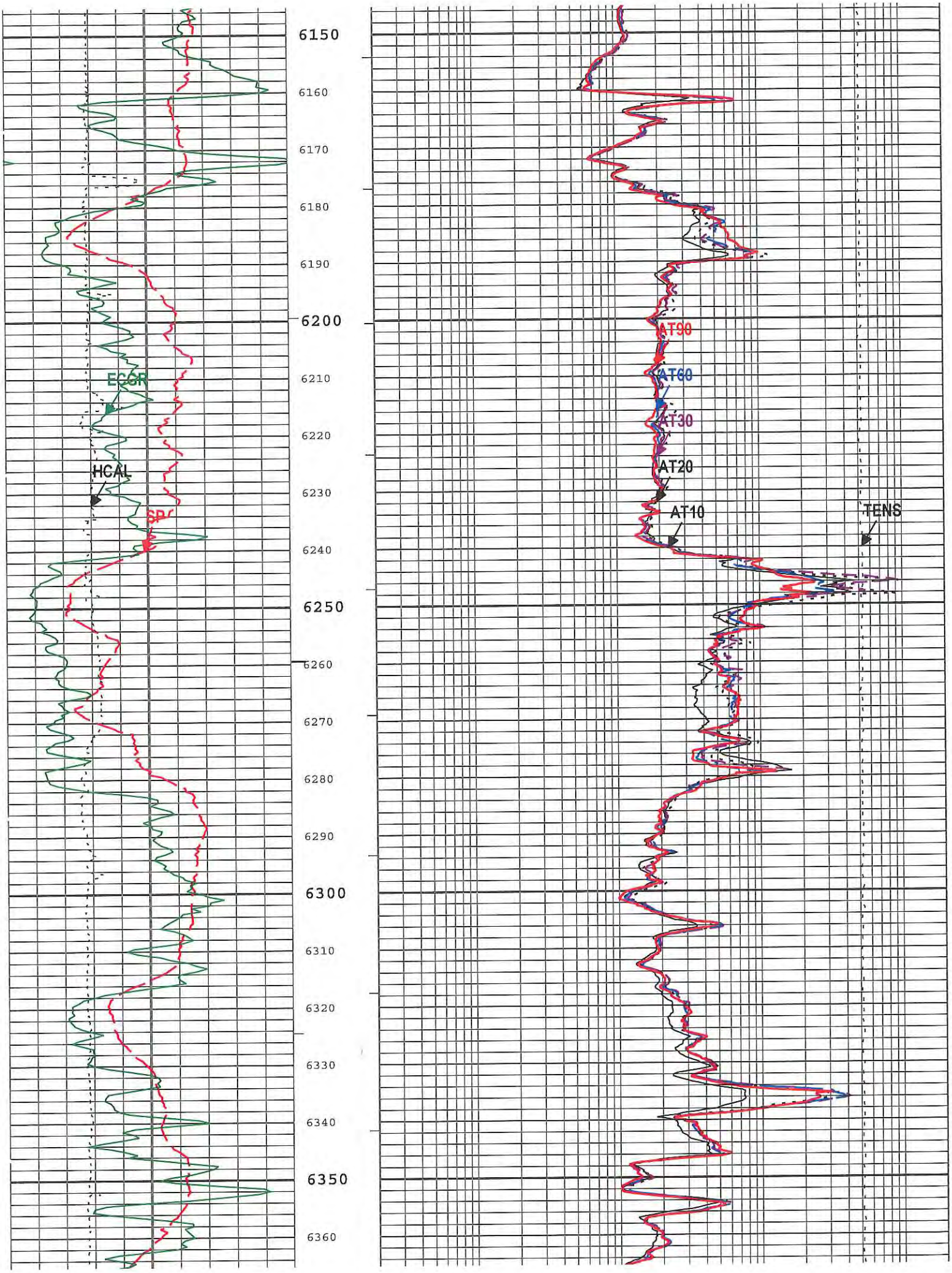
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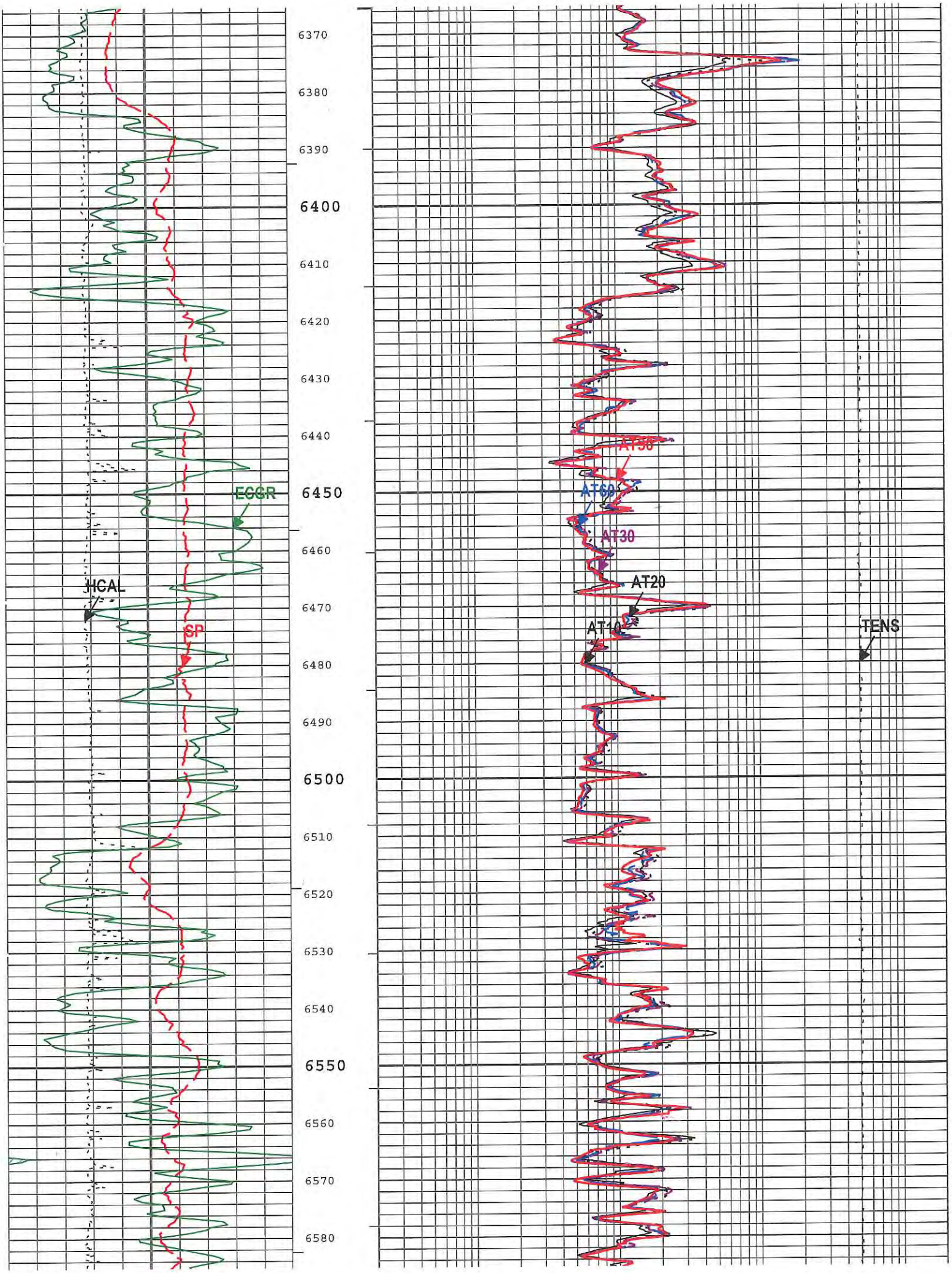
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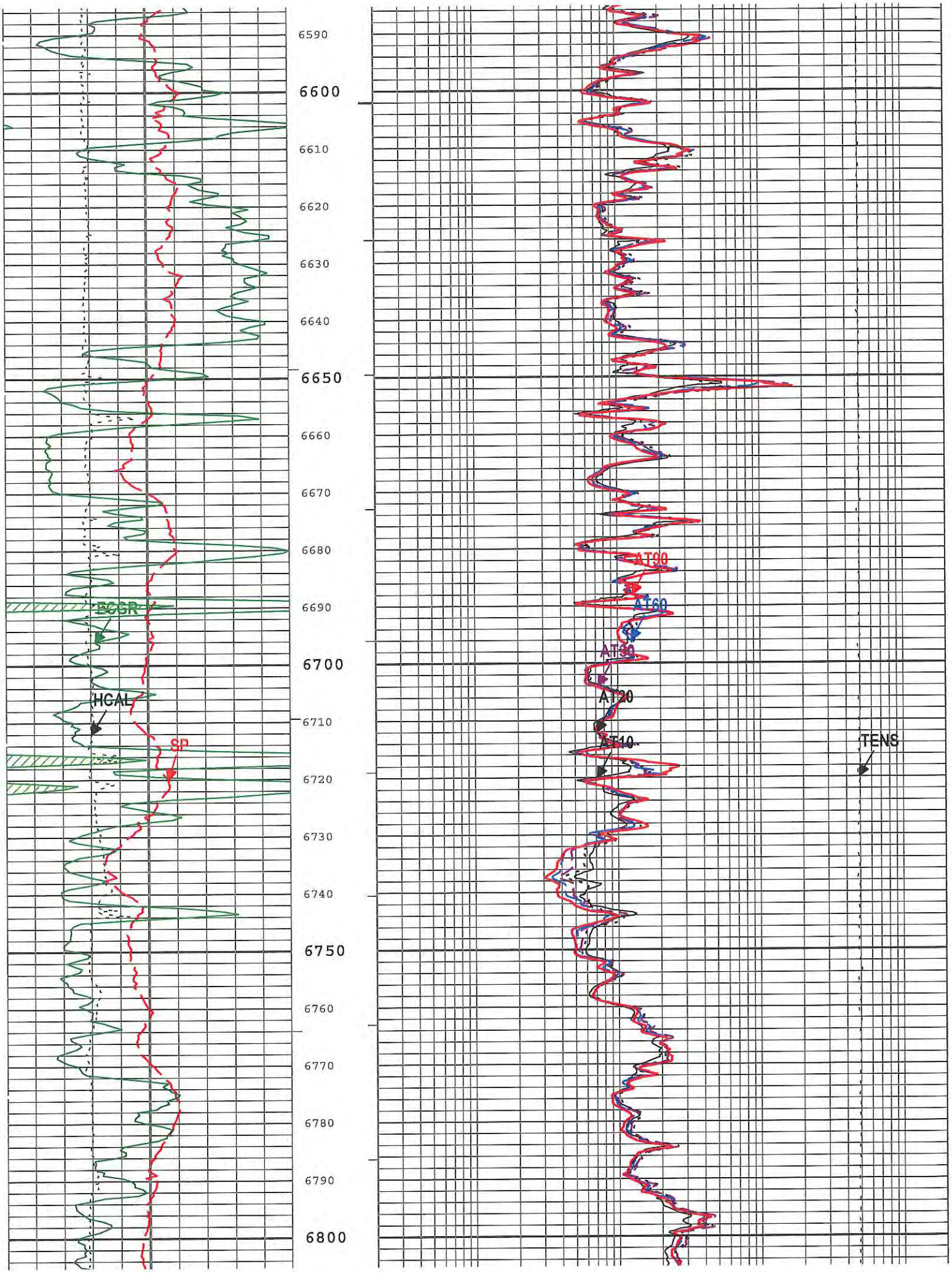
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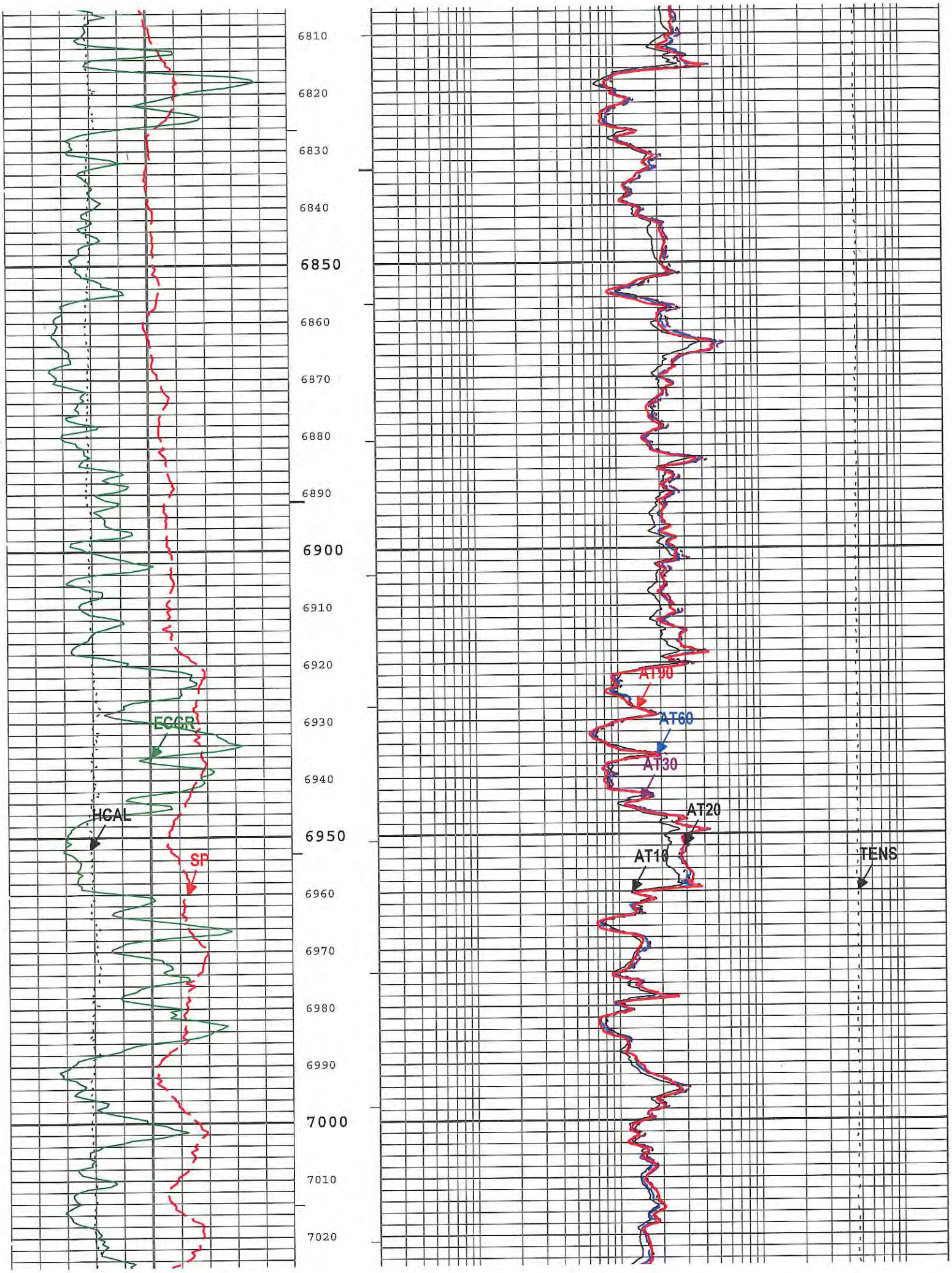
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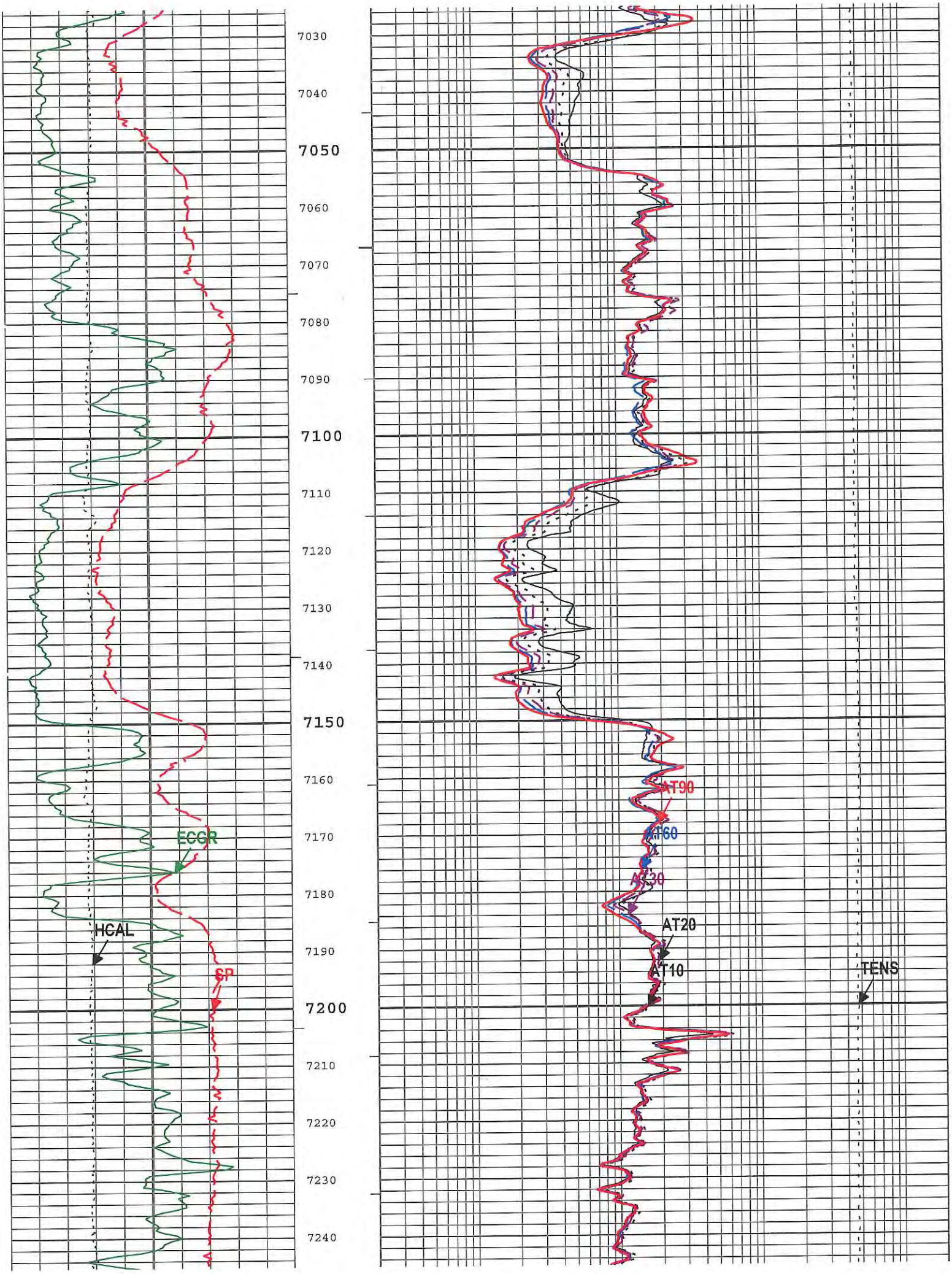
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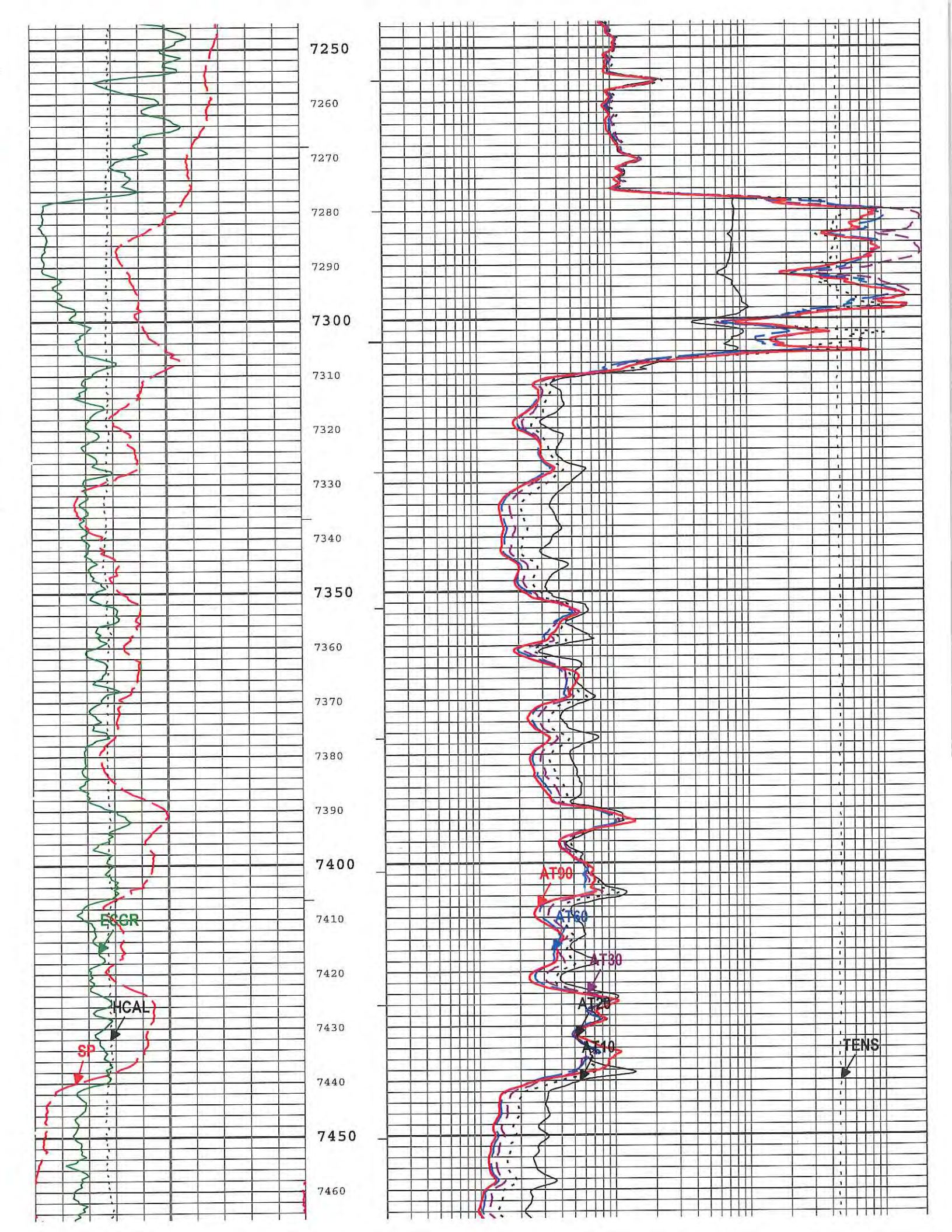
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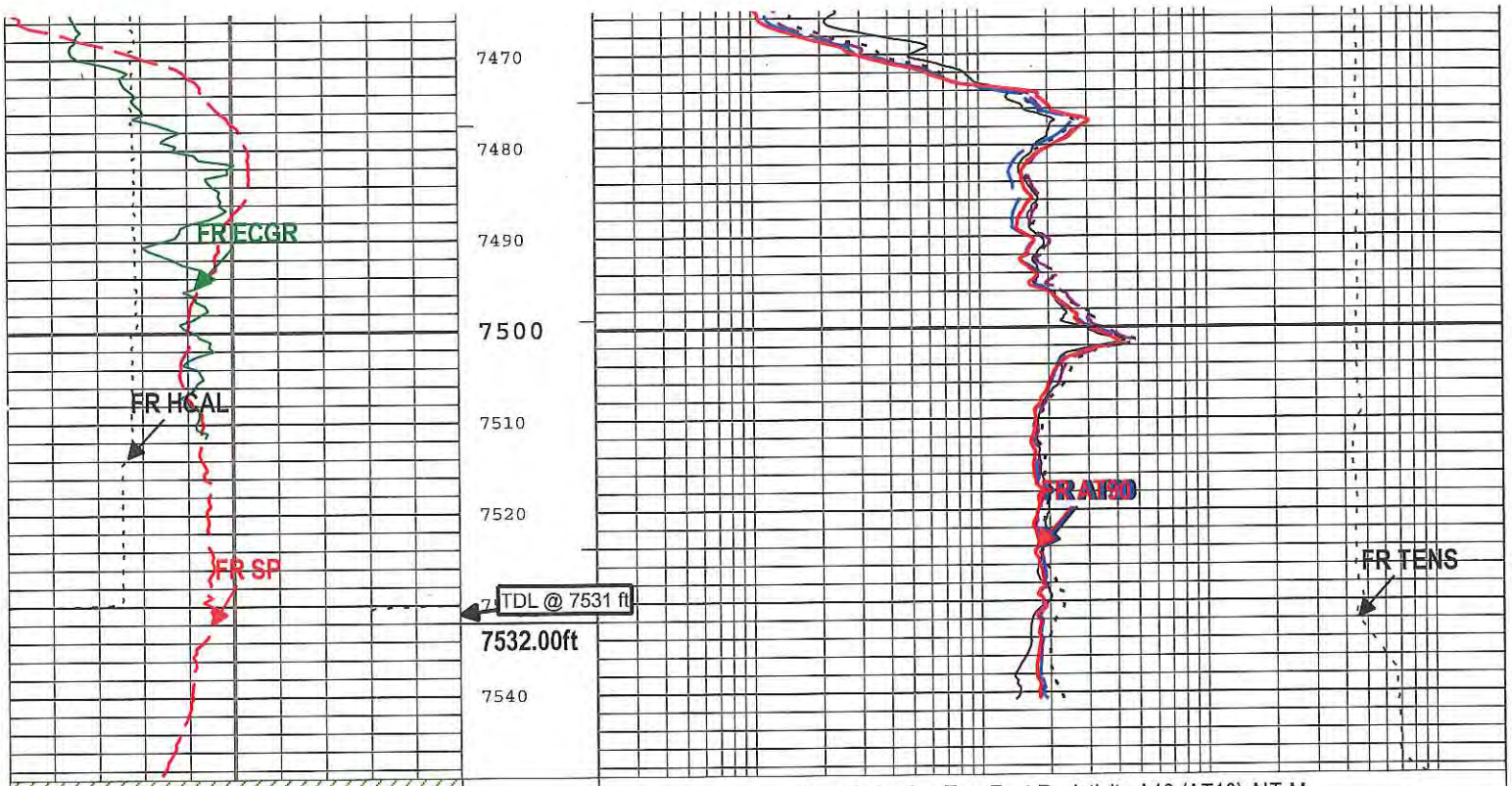


Gamma Ray Backup

Spontaneous Potential (SP) AIT-M
-80 mV 20

Caliper (HCAL) HDRS-H
6 in 16

Gamma Ray (ECGR) HGNS-H
0 gAPI 200

Array Induction Two Foot Resistivity A10 (AT10) AIT-M
0.2 ohm.m 2000

Array Induction Two Foot Resistivity A20 (AT20) AIT-M
0.2 ohm.m 2000

Array Induction Two Foot Resistivity A30 (AT30) AIT-M
0.2 ohm.m 2000

Array Induction Two Foot Resistivity A60 (AT60) AIT-M
0.2 ohm.m 2000

Array Induction Two Foot Resistivity A90 (AT90) AIT-M
0.2 ohm.m 2000

Cable Tension (TENS)
10000 lbf 0

TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

Description: AIT Basic Log Two Format: Log (Induction-5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:04:14

Channel Processing Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ASTA	Array Induction Tool Standoff	AIT-M	0.6	in
ISSBAR	Barite Mud Presence Flag	Borehole	Yes	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	Depth Zoned	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.1	in

CBLO	Casing Bottom (Logger)	WLSESSION	3498	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	9.625	in
DFD	Drilling Fluid Density	Borehole	9.9	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
FCD	Future Casing (Outer) Diameter	WLSESSION	7	in
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	AMF	
SOCO	Standoff Correction Option	HGNS-H	Yes	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	12.25		3515
BS	8.75	3515	7532

All depth are actual.

Tool Control Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h

One

5" Induction

Software Version

Acquisition System	Version
Maxwell 2016 SP2	6.2.68624.3100

Pass Summary

Run Name	Pass Objective	Direction	Top	Bottom	Start	Stop	DSC Mode	Depth Shift	Include Parallel Data
One	Log[3]:Up	Up	7294.65 ft	7556.27 ft	07-Sep-2016 5:43:06 AM	07-Sep-2016 5:48:19 AM	ON	5.53 ft	No
One	Log[4]:Up	Up		7548.83 ft	07-Sep-2016 5:52:06 AM		ON	0.00 ft	No

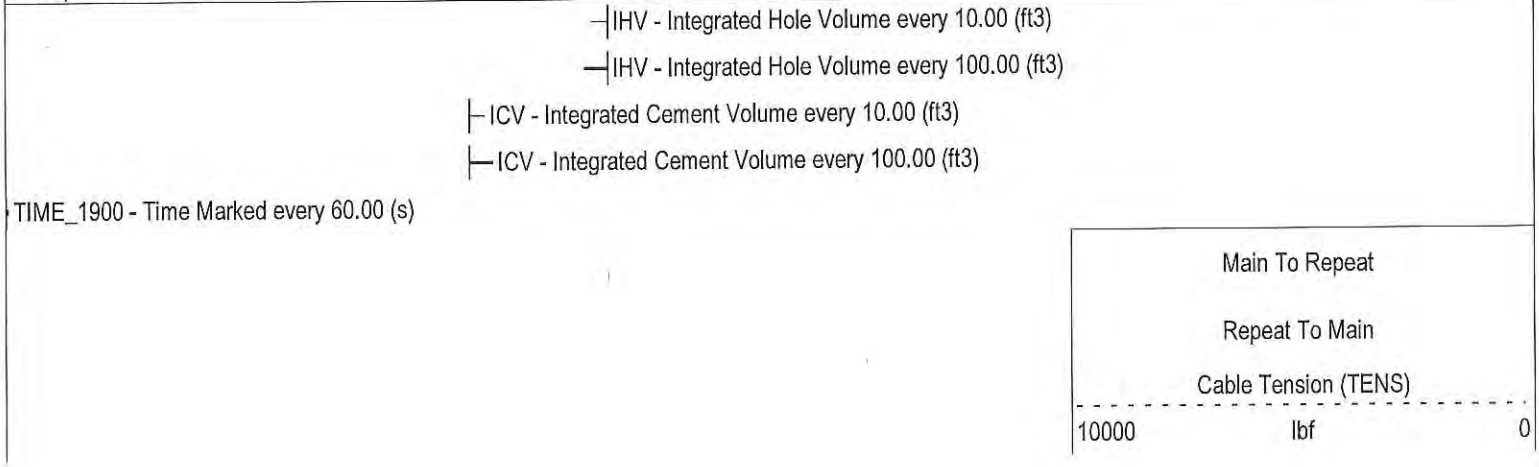
All depths are referenced to toolstring zero

Log

Company:Western Refining, Southwest, Inc. Well:WWD #2

One: Log[4]:Up:S012

Description: AIT Basic Log Two Format: Log (Induction-5 RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:04:18



Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A90 (AT90) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Caliper (HCAL) HDRS-H

6 in 16

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A60 (AT60) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Spontaneous Potential (SP) AIT-M

-80 mV 20

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A30 (AT30) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Gamma Ray (ECGR) HGNS-H

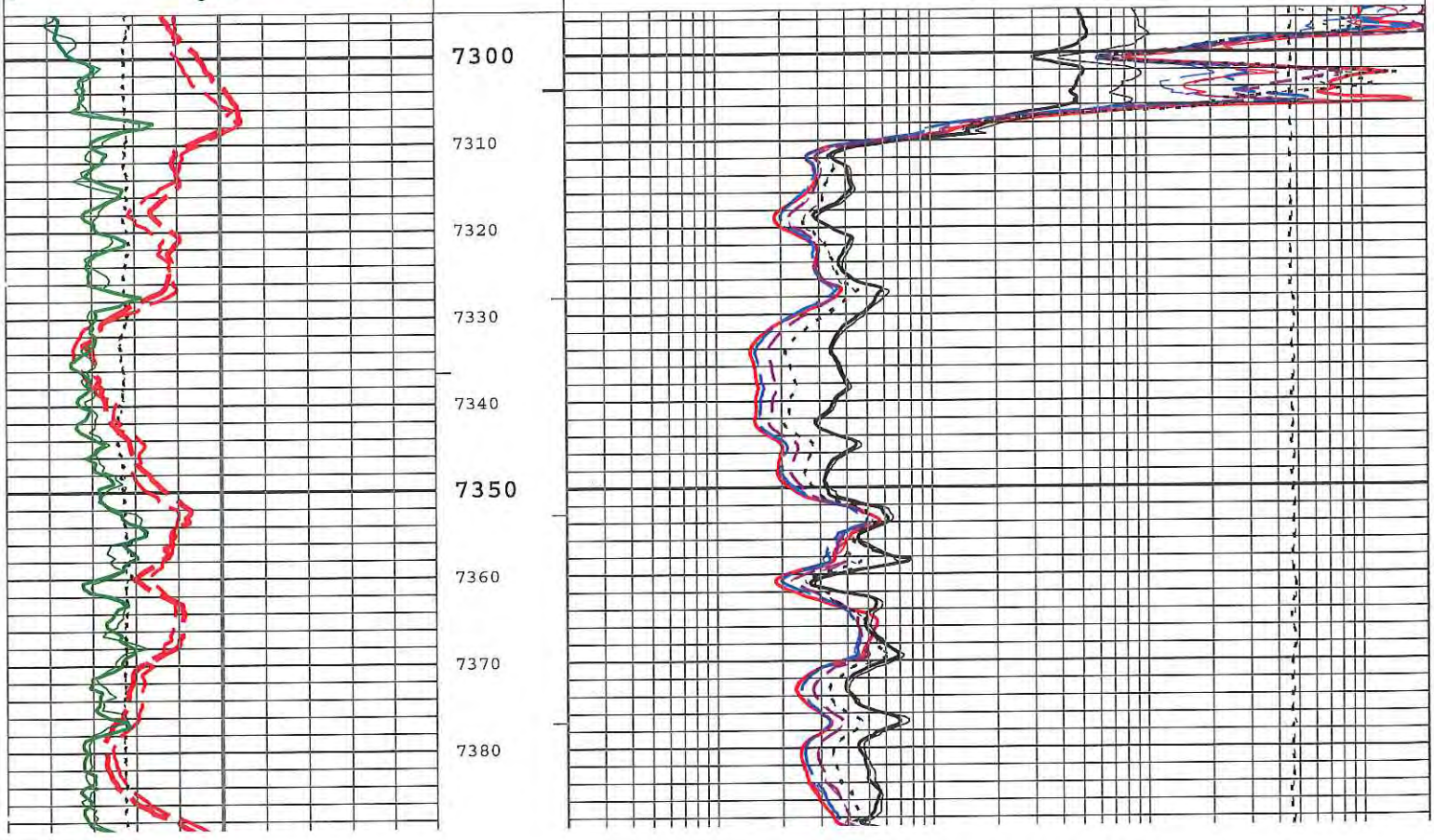
0 gAPI 200

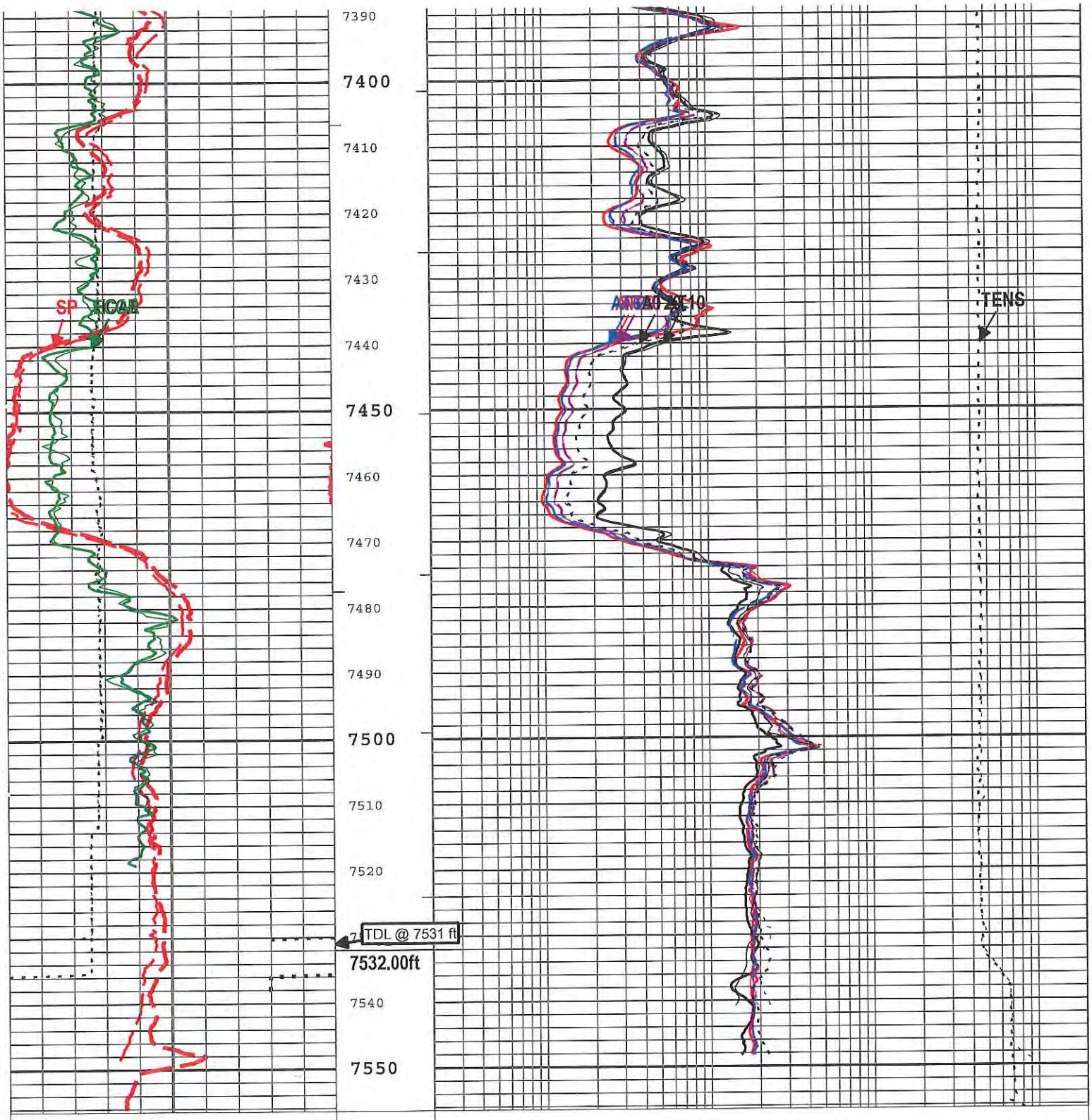
Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A20 (AT20) AIT-M

0.2 ohm.m 2000





Main To Repeat

Repeat To Main

Caliper (HCAL) HDRS-H

6 in 16

Main To Repeat

Repeat To Main

Spontaneous Potential (SP) AIT-M

-80 mV 20

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A90 (AT90) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A10 (AT10) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Gamma Ray (ECGR) HGNS-H

0 gAPI 200

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A60 (AT60) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A30 (AT30) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Array Induction Two Foot Resistivity A20 (AT20) AIT-M

0.2 ohm.m 2000

Main To Repeat

Repeat To Main

Cable Tension (TENS)

10000 lbf 0

TIME_1900 - Time Marked every 60.00 (s)

ICV - Integrated Cement Volume every 100.00 (ft3)

ICV - Integrated Cement Volume every 10.00 (ft3)

IHV - Integrated Hole Volume every 100.00 (ft3)

IHV - Integrated Hole Volume every 10.00 (ft3)

Description: AIT Basic Log Two Format: Log (Induction-5 RA) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:04:18

Channel Processing Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
ABHM	Array Induction Borehole Correction Mode	AIT-M	Compute Standoff	
ASTA	Array Induction Tool Standoff	AIT-M	0.6	in
ISSBAR	Barite Mud Presence Flag	Borehole	Yes	
BHS	Borehole Status (Open or Cased Hole)	Borehole	Open	
BS	Bit Size	WLSESSION	Depth Zoned	in
CALI_SHIFT	CALI Supplementary Offset	HDRS-H	0.1	in
CBLO	Casing Bottom (Logger)	WLSESSION	3498	ft
CDEN	Cement Density	HGNS-H	2	g/cm3
CSODDRL	Casing Outer Diameter - Zoned along driller depths	WLSESSION	9.625	in
DFD	Drilling Fluid Density	Borehole	9.9	lbm/gal
DFT	Drilling Fluid Type	Borehole	Water	
FCD	Future Casing (Outer) Diameter	WLSESSION	7	in
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	AMF	
SOCO	Standoff Correction Option	HGNS-H	Yes	
SPDR	SP Drift Per Foot	AIT-M	0	mV/ft

Depth Zone Parameters

Parameter	Value	Start (ft)	Stop (ft)
BS	12.25		3515
BS	8.75	3515	7532

All depth are actual.

Tool Control Parameters

One: Parameters

Parameter	Description	Tool	Value	Unit
MAX_LOG_SPEED	Toolstring Maximum Logging Speed	WLSESSION	3600	ft/h

Calibration Report

AIT-M (Array Induction Tool - M) Calibration - Run One

Primary Equipment :

File code for AIT-MA Sonde Tool Element — AMIS — 50

Auxiliary Equipment :

AITM Rm/SP Bottom Nose — AMRM

AIT Sonde Calibration - Test Loop Gain

Master (EEPROM): 20:19:37 05-Aug-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Test Loop Gain - 0		Master	1.000	0.950	1.013	1.050
Test Loop Phase - 0	deg	Master	0	-3.000	1.893	3.000
Test Loop Gain - 1		Master	1.000	0.950	1.009	1.050
Test Loop Phase - 1	deg	Master	0	-3.000	0.092	3.000
Test Loop Gain - 2		Master	1.000	0.950	1.015	1.050
Test Loop Phase - 2	deg	Master	0	-3.000	-0.008	3.000
Test Loop Gain - 3		Master	1.000	0.950	1.012	1.050
Test Loop Phase - 3	deg	Master	0	-3.000	0.319	3.000
Test Loop Gain - 4		Master	1.000	0.950	0.998	1.050
Test Loop Phase - 4	deg	Master	0	-3.000	0.071	3.000
Test Loop Gain - 5		Master	1.000	0.950	1.022	1.050
Test Loop Phase - 5	deg	Master	0	-3.000	0.391	3.000
Test Loop Gain - 6		Master	1.000	0.950	1.035	1.050
Test Loop Phase - 6	deg	Master	0	-3.000	0.531	3.000
Test Loop Gain - 7		Master	1.000	0.950	1.047	1.050
Test Loop Phase - 7	deg	Master	0	-3.000	0.270	3.000

AIT Sonde Calibration - Sonde Error Correction

Master (EEPROM): 20:19:37 05-Aug-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Sonde Error Correction Real - 0	mS/m	Master	—	-231.000	-97.409	119.000
Sonde Error Correction Quad - 0		Master	—	-2250.000	-596.848	2250.000
Sonde Error Correction Real - 1	mS/m	Master	—	114.000	156.040	204.000
Sonde Error Correction Quad - 1		Master	—	-625.000	-247.744	625.000
Sonde Error Correction Real - 2	mS/m	Master	—	66.000	112.609	156.000
Sonde Error Correction Quad - 2		Master	—	-350.000	120.325	350.000
Sonde Error Correction Real - 3	mS/m	Master	—	39.000	68.195	89.000
Sonde Error Correction Quad - 3		Master	—	-250.000	-161.507	250.000
Sonde Error Correction Real - 4	mS/m	Master	—	15.000	24.223	35.000
Sonde Error Correction Quad - 4		Master	—	-63.000	-0.939	63.000
Sonde Error Correction Real - 5	mS/m	Master	—	4.000	15.665	24.000
Sonde Error Correction Quad - 5		Master	—	-50.000	-27.113	50.000
Sonde Error Correction Real - 6	mS/m	Master	—	5.000	10.064	15.000
Sonde Error Correction Quad - 6		Master	—	-30.000	-6.498	30.000
Sonde Error Correction Real - 7	mS/m	Master	—	-5.000	-1.483	5.000
Sonde Error Correction Quad - 7		Master	—	-30.000	-4.619	30.000

AIT Mud Calibration - Mud Calibration Gain

AIT Mud Calibration - Mud Calibration Gain

Master (EEPROM): 20:19:37 05-Aug-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Coarse Gain		Master	1.000	0.800	0.934	1.200
Fine Gain		Master	1.000	0.800	0.938	1.200

AIT Electronics Check - Thru Calibration Check

Master (EEPROM): 20:19:37 05-Aug-2016 Before (Measured): 21:11:27 05-Sep-2016

Measurement	Unit	Phase	Nominal	Low Limit	Actual	High Limit
Thru Cal Mag - 0	V	Master	—	0.366	0.603	0.854
		Before	—	0.366	0.603	0.854
		Before-Master	—	—	0.000	—
Thru Cal Phase - 0	deg	Master	—	137.000	-165.864	-103.000
		Before	—	137.000	-161.111	-103.000
		Before-Master	—	—	4.753	—
Thru Cal Mag - 1	V	Master	—	0.762	1.237	1.778
		Before	—	0.762	1.237	1.778
		Before-Master	—	—	0.000	—
Thru Cal Phase - 1	deg	Master	—	136.000	-166.823	-104.000
		Before	—	136.000	-162.071	-104.000
		Before-Master	—	—	4.752	—
Thru Cal Mag - 2	V	Master	—	0.372	0.613	0.868
		Before	—	0.372	0.613	0.868
		Before-Master	—	—	0.000	—
Thru Cal Phase - 2	deg	Master	—	132.000	-170.304	-108.000
		Before	—	132.000	-165.578	-108.000
		Before-Master	—	—	4.726	—
Thru Cal Mag - 3	V	Master	—	0.420	0.691	0.980
		Before	—	0.420	0.691	0.980
		Before-Master	—	—	0.000	—
Thru Cal Phase - 3	deg	Master	—	131.000	-171.041	-109.000
		Before	—	131.000	-166.313	-109.000
		Before-Master	—	—	4.728	—
Thru Cal Mag - 4	V	Master	—	0.804	1.297	1.876
		Before	—	0.804	1.296	1.876
		Before-Master	—	—	-0.001	—
Thru Cal Phase - 4	deg	Master	—	125.000	-177.009	-115.000
		Before	—	125.000	-172.279	-115.000
		Before-Master	—	—	4.730	—
Thru Cal Mag - 5	V	Master	—	1.176	1.888	2.744
		Before	—	1.176	1.887	2.744
		Before-Master	—	—	-0.001	—
Thru Cal Phase - 5	deg	Master	—	122.000	-178.544	-118.000
		Before	—	122.000	-173.812	-118.000
		Before-Master	—	—	4.732	—
Thru Cal Mag - 6	V	Master	—	1.176	1.887	2.744
		Before	—	1.176	1.886	2.744
		Before-Master	—	—	-0.001	—
Thru Cal Phase - 6	deg	Master	—	121.000	-178.521	-119.000
		Before	—	121.000	-173.790	-119.000
		Before-Master	—	—	4.731	—
Thru Cal Mag - 7	V	Master	—	0.846	1.358	1.974
		Before	—	0.846	1.353	1.974
		Before-Master	—	—	-0.005	—
Thru Cal Phase - 7	deg	Master	—	115.000	-179.305	-125.000
		Before	—	115.000	-174.661	-125.000
		Before-Master	—	—	4.644	—
SPA Zero	mV	Master		-50.000	0.156	50.000
		Before		-50.000	0.146	50.000
		Before-Master	—	—	-0.010	—
SPA Plus	mV	Master		941.000	988.093	1040.000
		Before		941.000	988.030	1040.000
		Before-Master	—	—	-0.063	—
Temperature Zero	V	Master		-0.050	0.000	0.050

		Before		-0.050	0.000	0.050	
		Before-Master	—	—	0.000	—	
Temperature Plus	V	Master		0.870	0.915	0.960	
		Before		0.870	0.915	0.960	
		Before-Master	—	—	0.000	—	

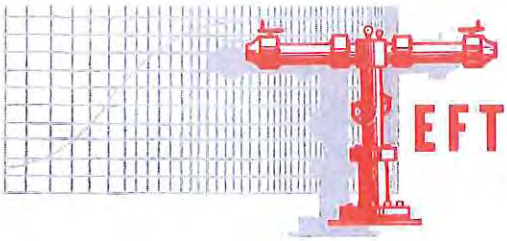
Company:	Western Refining, Southwest, Inc.
Well:	WWD #2
Field:	Wildcat
County:	San Juan
State:	New Mexico

Schlumberger

Platform Expres
Array Induction
with Linear Correlation

APPENDIX E

Fall-Off Test Report – April 17, 2019



BHP • BU • PI • DD • GWT • RFS • GOR • FL • TS

EFTELLER, INC.

reservoir engineering

FARMINGTON, NEW MEXICO/
GRAND JUNCTION, COLORADO

P. O. Box 1198
Farmington, New Mexico 87499
(505) 325-1731
Fax (505) 325-1148

2332 Interstate Ave.
Grand Junction, CO 81505
(970) 241-0403
Fax (970) 241-7634

WESTERN REFINING SOUTHWEST, INC.

WATER DISPOSAL WELL NO. 2

APRIL 17 – 30, 2019

Serving the Rocky Mountains and the Western Slope

Customer	WESTERN REFINING SOUTHWEST, INC.
Street	P.O. BOX 159
City/State.....	BLOOMFIELD, NM 87413
Country	USA
Service Company	TEFTELLER, INC.
Well Name	WATER DISPOSAL WELL NO. 2 (TOP INST.)
Well Location	SAN JUAN COUNTY, NEW MEXICO
Field / Pool	ENTRADA FIELD
Status (Oil, Gas, Other)	WATER DISPOSAL
Test Type	INJECTION FALL-OFF TEST
Date of Test	4-17-19
Producing Interval	
Recorder Depth	7312'
Recorder Position	7312'
Shut In Date ..... Start:	4-17-2019
Stop:	4-30-2019
Duration:	315 TANDEM ELEC. MEMORY INST. TIME
Bottom Hole Temperature	186 DEGREES @ 7312'

Gauge Identification

Gauge Manufacturer	MICRO-SMART SYSTEMS
Serial Number	240
Model Number	SP2000
Pressure Range	
Battery Type	
Calibration I.D.	
Last Calibration	2/23/18

Gauge Setup Parameters

Probe Set Up Time	4/17/19 11:24: 0
Time Delay to First Reading	
Test Type Selection	INJECTION FALL-OFF TEST
Test Duration Selection	315 HRS. TANDEM ELEC. MEMORY INST. TIME

COMPANY: WESTERN REFINING SOUTHWEST, INC. PAGE 1 OF 11

WELL NAME : WATER DISPOSAL WELL NO. 2 (TOP INST.) DATE : 05/02/19

WELL LOCATION : SAN JUAN COUNTY, NEW MEXICO FILE REF: F240501.RED

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/17	11:24:00	.0000	.01	77.97		
04/17	11:34:00	10.0000	.01	74.72	.00	
04/17	12:04:00	40.0000	14.59	75.37	14.58	PRESSURED UP LUBRICATOR
04/17	12:04:30	40.5000	776.21	75.37	761.63	
04/17	12:09:00	45.0000	770.50	72.22	-5.71	
04/17	12:11:30	47.5000	776.31	70.35	5.81	SURFACE STOP
04/17	12:12:00	48.0000	802.59	69.85	26.28	TRIPPED IN WELL WITH TANDEM ELEC. INST.
04/17	12:12:30	48.5000	816.27	69.35	13.67	
04/17	12:13:00	49.0000	860.79	68.85	44.52	
04/17	12:13:30	49.5000	900.48	68.36	39.69	
04/17	12:14:00	50.0000	923.28	67.85	22.80	
04/17	12:14:30	50.5000	966.46	67.36	43.18	
04/17	12:15:00	51.0000	1009.11	66.86	42.65	
04/17	12:15:30	51.5000	1061.81	66.36	52.71	
04/17	12:16:00	52.0000	1120.69	65.86	58.88	
04/17	12:16:30	52.5000	1180.62	65.50	59.92	
04/17	12:17:00	53.0000	1242.43	66.15	61.81	
04/17	12:17:30	53.5000	1267.61	66.81	25.18	
04/17	12:18:00	54.0000	1295.08	67.46	27.46	
04/17	12:18:30	54.5000	1334.75	68.12	39.67	
04/17	12:19:00	55.0000	1378.30	68.77	43.56	
04/17	12:19:30	55.5000	1411.79	69.43	33.49	
04/17	12:20:00	56.0000	1447.29	70.09	35.50	
04/17	12:20:30	56.5000	1484.53	70.74	37.24	
04/17	12:21:00	57.0000	1534.11	71.40	49.57	
04/17	12:21:30	57.5000	1591.06	72.06	56.95	
04/17	12:22:00	58.0000	1670.81	72.71	79.75	
04/17	12:22:30	58.5000	1731.66	74.21	60.84	
04/17	12:23:00	59.0000	1788.20	76.07	56.55	
04/17	12:23:30	59.5000	1843.51	77.95	55.31	
04/17	12:24:00	60.0000	1887.01	79.81	43.49	
04/17	12:24:30	60.5000	1942.40	81.69	55.40	
04/17	12:25:00	61.0000	1992.55	83.57	50.15	
04/17	12:25:30	61.5000	2024.84	85.44	32.29	
04/17	12:26:00	62.0000	2080.44	87.32	55.60	
04/17	12:26:30	62.5000	2135.20	89.21	54.77	
04/17	12:27:00	63.0000	2192.23	91.08	57.02	
04/17	12:27:30	63.5000	2276.04	92.97	83.81	
04/17	12:28:00	64.0000	2359.02	94.86	82.98	
04/17	12:28:30	64.5000	2441.12	96.55	82.10	
04/17	12:29:00	65.0000	2524.22	99.24	83.10	
04/17	12:29:30	65.5000	2598.69	101.93	74.47	
04/17	12:30:00	66.0000	2693.34	104.63	94.65	
04/17	12:30:30	66.5000	2771.86	107.33	78.52	
04/17	12:31:00	67.0000	2846.84	110.04	74.98	
04/17	12:31:30	67.5000	2918.69	112.74	71.85	
04/17	12:32:00	68.0000	2987.14	115.45	68.45	
04/17	12:32:30	68.5000	3067.73	118.17	80.58	
04/17	12:33:00	69.0000	3143.84	120.89	76.11	
04/17	12:33:30	69.5000	3219.23	123.61	75.39	
04/17	12:34:00	70.0000	3290.95	126.34	71.72	
04/17	12:34:30	70.5000	3377.71	129.55	86.76	
04/17	12:35:00	71.0000	3464.28	132.95	86.57	
04/17	12:35:30	71.5000	3573.53	136.35	109.24	
04/17	12:36:00	72.0000	3669.44	139.76	95.91	
04/17	12:36:30	72.5000	3758.33	143.17	88.89	
04/17	12:37:00	73.0000	3841.27	146.59	82.94	
04/17	12:37:30	73.5000	3896.76	150.01	55.49	
04/17	12:38:00	74.0000	3935.52	153.44	38.76	
04/17	12:38:30	74.5000	3940.07	156.87	4.56	
04/17	12:39:00	75.0000	3939.44	160.31	-.64	
04/17	12:39:30	75.5000	3938.55	163.75	-.88	
04/17	12:40:00	76.0000	3936.78	167.20	-1.77	
04/17	12:44:30	80.5000	3937.26	170.40	.48	TANDEM INST. @ 7312'
04/17	12:50:30	86.5000	3943.82	171.41	6.56	STARTED INJECTION PUMP

Date MM/DD	Time hh:mm:ss	Test Time mmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/17	12:51:00	87.0000	3968.75	171.43	24.92	
04/17	12:51:30	87.5000	3984.34	171.45	15.59	
04/17	12:52:00	88.0000	3996.06	171.47	11.72	
04/17	12:53:00	89.0000	4012.24	172.00	16.18	
04/17	12:53:30	89.5000	4018.48	172.45	6.24	
04/17	12:56:00	92.0000	4040.47	174.69	21.99	
04/17	12:56:30	92.5000	4043.91	175.14	3.44	
04/17	13:00:00	96.0000	4064.03	177.82	20.12	
04/17	13:00:30	96.5000	4066.79	178.09	2.76	
04/17	13:06:30	102.5000	4087.99	180.37	21.20	
04/17	13:07:00	103.0000	4089.42	180.43	1.43	
04/17	13:17:30	113.5000	4110.99	180.28	21.58	
04/17	13:18:00	114.0000	4111.89	180.24	.90	
04/17	13:33:30	129.5000	4133.94	178.77	22.06	
04/17	13:34:00	130.0000	4134.51	178.72	.56	
04/17	13:56:30	152.5000	4156.41	176.81	21.90	
04/17	13:57:00	153.0000	4156.90	176.77	.49	
04/17	14:34:30	190.5000	4179.11	174.07	22.21	
04/17	14:35:00	191.0000	4179.28	174.04	.17	
04/17	15:14:00	230.0000	4195.17	171.59	15.89	
04/17	15:52:00	268.0000	4207.00	169.60	11.83	
04/17	16:30:00	306.0000	4217.62	167.93	10.62	
04/17	17:08:00	344.0000	4224.33	166.53	6.71	
04/17	17:46:00	382.0000	4231.03	165.49	6.69	
04/17	18:24:00	420.0000	4236.05	164.56	5.02	
04/17	19:02:00	458.0000	4239.33	163.78	3.29	
04/17	19:40:00	496.0000	4243.36	163.15	4.03	
04/17	20:18:00	534.0000	4247.42	162.60	4.06	
04/17	20:56:00	572.0000	4251.34	161.96	3.92	
04/17	21:34:00	610.0000	4254.43	161.40	3.10	
04/17	22:12:00	648.0000	4257.80	160.93	3.37	
04/17	22:50:00	686.0000	4261.63	160.49	3.83	
04/17	23:28:00	724.0000	4264.54	160.05	2.91	
04/18	00:06:00	762.0000	4265.37	159.69	.83	
04/18	00:44:00	800.0000	4266.02	159.48	.65	
04/18	01:22:00	838.0000	4265.94	159.37	-.08	
04/18	02:00:00	876.0000	4267.93	159.26	1.98	
04/18	02:38:00	914.0000	4270.01	159.15	2.08	
04/18	03:16:00	952.0000	4271.24	159.06	1.24	
04/18	03:54:00	990.0000	4270.73	158.97	-.51	
04/18	04:32:00	1028.0000	4270.42	159.02	-.31	
04/18	05:10:00	1066.0000	4269.52	159.07	-.90	
04/18	05:48:00	1104.0000	4270.40	159.10	.87	
04/18	06:26:00	1142.0000	4271.22	159.10	.83	
04/18	06:57:00	1173.0000	4291.16	159.10	19.94	
04/18	06:57:30	1173.5000	4293.70	159.10	2.54	
04/18	07:11:00	1187.0000	4315.95	158.63	22.25	
04/18	07:11:30	1187.5000	4316.46	158.60	.52	
04/18	07:50:00	1226.0000	4333.83	156.47	17.37	
04/18	08:28:00	1264.0000	4343.06	155.18	9.23	
04/18	09:06:00	1302.0000	4358.96	153.82	15.91	
04/18	09:44:00	1340.0000	4366.53	152.80	7.56	
04/18	10:22:00	1378.0000	4372.20	152.01	5.68	
04/18	11:00:00	1416.0000	4376.32	151.41	4.12	
04/18	11:38:00	1454.0000	4376.85	150.88	.53	
04/18	12:16:00	1492.0000	4379.35	150.47	2.50	
04/18	12:54:00	1530.0000	4381.90	150.09	2.54	
04/18	13:32:00	1568.0000	4381.87	149.87	-.02	
04/18	14:10:00	1606.0000	4385.16	149.65	3.29	
04/18	14:48:00	1644.0000	4387.63	149.38	2.47	
04/18	15:26:00	1682.0000	4389.98	149.15	2.36	
04/18	16:04:00	1720.0000	4392.91	148.91	2.93	
04/18	16:42:00	1758.0000	4395.30	148.75	2.39	
04/18	17:20:00	1796.0000	4398.06	148.56	2.75	
04/18	17:58:00	1834.0000	4399.79	148.39	1.73	

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/18	18:36:00	1872.0000	4401.97	148.26	2.18	
04/18	19:14:00	1910.0000	4402.79	148.19	.82	STOP @ 2000'
04/18	19:52:00	1948.0000	4404.53	148.10	1.73	
04/18	20:30:00	1986.0000	4406.70	148.00	2.17	
04/18	21:08:00	2024.0000	4409.46	147.90	2.77	
04/18	21:46:00	2062.0000	4412.15	147.83	2.69	
04/18	22:24:00	2100.0000	4413.34	147.75	1.19	
04/18	23:02:00	2138.0000	4414.31	147.69	.97	
04/18	23:40:00	2176.0000	4415.83	147.67	1.52	
04/19	00:18:00	2214.0000	4417.00	147.63	1.17	
04/19	00:56:00	2252.0000	4419.46	147.57	2.46	
04/19	01:34:00	2290.0000	4421.97	147.38	2.51	
04/19	02:12:00	2328.0000	4424.50	147.18	2.53	
04/19	02:50:00	2366.0000	4427.19	147.01	2.69	
04/19	03:28:00	2404.0000	4428.67	146.91	1.48	
04/19	04:06:00	2442.0000	4430.68	146.81	2.01	
04/19	04:44:00	2480.0000	4433.10	146.70	2.42	
04/19	05:22:00	2518.0000	4434.77	146.64	1.67	
04/19	06:00:00	2556.0000	4437.52	146.57	2.75	
04/19	06:38:00	2594.0000	4435.13	146.56	-2.39	
04/19	07:16:00	2632.0000	4434.99	146.68	-.15	
04/19	07:54:00	2670.0000	4436.08	146.76	1.09	
04/19	08:32:00	2708.0000	4436.26	146.83	.18	
04/19	09:10:00	2746.0000	4438.18	146.88	1.92	
04/19	09:48:00	2784.0000	4439.19	146.91	1.01	
04/19	10:26:00	2822.0000	4440.05	146.91	.86	
04/19	11:04:00	2860.0000	4455.79	146.78	15.74	
04/19	11:42:00	2898.0000	4460.10	146.02	4.31	
04/19	12:20:00	2936.0000	4463.15	145.63	3.05	
04/19	12:58:00	2974.0000	4464.26	145.40	1.10	
04/19	13:36:00	3012.0000	4466.77	145.20	2.51	
04/19	14:14:00	3050.0000	4468.10	145.06	1.33	
04/19	14:52:00	3088.0000	4469.53	144.94	1.44	
04/19	15:30:00	3126.0000	4471.50	144.80	1.97	
04/19	16:08:00	3164.0000	4473.79	144.68	2.29	
04/19	16:35:00	3191.0000	4452.45	144.60	-21.34	
04/19	16:35:30	3191.5000	4450.84	144.61	-1.61	
04/19	16:55:30	3211.5000	4428.51	145.34	-22.32	
04/19	16:56:00	3212.0000	4428.33	145.36	-.18	
04/19	17:34:00	3250.0000	4417.29	146.74	-11.04	
04/19	18:12:00	3288.0000	4411.92	147.68	-5.37	
04/19	18:50:00	3326.0000	4408.74	148.34	-3.18	
04/19	19:28:00	3364.0000	4406.71	148.81	-2.02	
04/19	20:06:00	3402.0000	4405.33	149.20	-1.39	
04/19	20:44:00	3440.0000	4404.23	149.50	-1.10	
04/19	21:22:00	3478.0000	4402.99	149.76	-1.24	
04/19	22:00:00	3516.0000	4398.94	150.03	-4.05	
04/19	22:38:00	3554.0000	4396.54	150.45	-2.40	
04/19	23:16:00	3592.0000	4395.63	150.73	-.91	
04/19	23:54:00	3630.0000	4394.55	150.98	-1.08	
04/20	00:32:00	3668.0000	4395.15	151.21	.61	
04/20	01:10:00	3706.0000	4394.76	151.36	-.40	
04/20	01:48:00	3744.0000	4394.02	151.52	-.74	
04/20	02:26:00	3782.0000	4393.67	151.67	-.35	
04/20	03:04:00	3820.0000	4393.91	151.80	.24	
04/20	03:42:00	3858.0000	4393.72	151.90	-.19	
04/20	04:20:00	3896.0000	4392.61	152.04	-1.10	
04/20	04:58:00	3934.0000	4392.21	152.16	-.41	
04/20	05:36:00	3972.0000	4392.10	152.27	-.10	
04/20	06:14:00	4010.0000	4391.92	152.32	-.18	
04/20	06:18:30	4014.5000	4412.37	152.35	20.44	
04/20	06:19:00	4015.0000	4414.50	152.35	2.14	
04/20	06:58:00	4054.0000	4427.00	151.29	12.50	
04/20	07:36:00	4092.0000	4433.60	150.59	6.60	
04/20	08:14:00	4130.0000	4427.02	150.26	-6.58	

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/20	08:52:00	4168.0000	4426.99	150.24	-.03	
04/20	09:30:00	4206.0000	4427.43	150.17	.45	
04/20	10:08:00	4244.0000	4428.33	150.14	.90	
04/20	10:18:00	4254.0000	4428.24	150.12	-.09	
04/20	10:20:00	4256.0000	4458.70	150.12	30.45	
04/20	10:21:00	4257.0000	4438.90	150.13	-19.80	
04/20	10:21:30	4257.5000	4435.82	150.13	-3.08	
04/20	10:37:00	4273.0000	4413.62	150.18	-22.20	
04/20	10:37:30	4273.5000	4413.44	150.19	-.17	
04/20	11:16:00	4312.0000	4406.77	150.79	-6.68	
04/20	11:54:00	4350.0000	4404.11	151.15	-2.65	
04/20	12:20:00	4376.0000	4403.04	151.37	-1.07	INJECTION STOPPED
04/20	12:22:00	4378.0000	4370.45	151.39	-32.59	BEGAN FALL-OFF
04/20	12:23:30	4379.5000	4348.88	151.46	-21.57	
04/20	12:24:00	4380.0000	4343.25	151.48	-5.63	
04/20	12:26:30	4382.5000	4322.72	151.59	-20.53	
04/20	12:27:00	4383.0000	4319.63	151.61	-3.09	
04/20	12:31:30	4387.5000	4297.35	151.92	-22.28	
04/20	12:32:00	4388.0000	4295.44	151.97	-1.91	
04/20	12:39:30	4395.5000	4273.15	152.67	-22.30	
04/20	12:40:00	4396.0000	4272.54	152.72	-.60	
04/20	12:51:30	4407.5000	4250.55	153.94	-22.00	
04/20	12:52:00	4408.0000	4249.71	153.99	-.84	
04/20	13:10:00	4426.0000	4227.35	155.54	-22.36	
04/20	13:10:30	4426.5000	4226.85	155.58	-.49	
04/20	13:37:00	4453.0000	4204.83	157.13	-22.03	
04/20	13:37:30	4453.5000	4204.32	157.16	-.51	
04/20	14:15:30	4491.5000	4183.55	158.81	-20.77	
04/20	14:54:00	4530.0000	4167.83	159.92	-15.71	
04/20	15:32:00	4568.0000	4154.89	160.76	-12.94	
04/20	16:10:00	4606.0000	4143.89	161.51	-11.01	
04/20	16:48:00	4644.0000	4134.16	162.15	-9.72	
04/20	17:26:00	4682.0000	4125.50	162.71	-8.67	
04/20	18:04:00	4720.0000	4117.69	163.18	-7.80	
04/20	18:42:00	4758.0000	4110.31	163.58	-7.38	
04/20	19:20:00	4796.0000	4103.88	163.95	-6.44	
04/20	19:58:00	4834.0000	4097.68	164.26	-6.20	
04/20	20:36:00	4872.0000	4091.88	164.54	-5.80	
04/20	21:14:00	4910.0000	4086.60	164.80	-5.28	
04/20	21:52:00	4948.0000	4081.30	165.05	-5.30	
04/20	22:30:00	4986.0000	4076.79	165.28	-4.51	
04/20	23:08:00	5024.0000	4072.24	165.49	-4.55	
04/20	23:46:00	5062.0000	4067.96	165.69	-4.28	
04/21	00:24:00	5100.0000	4063.95	165.88	-4.01	
04/21	01:02:00	5138.0000	4060.10	166.05	-3.85	
04/21	01:40:00	5176.0000	4056.37	166.22	-3.73	
04/21	02:18:00	5214.0000	4052.88	166.38	-3.49	
04/21	02:56:00	5252.0000	4049.54	166.54	-3.33	
04/21	03:34:00	5290.0000	4046.30	166.68	-3.24	
04/21	04:12:00	5328.0000	4043.20	166.82	-3.10	
04/21	04:50:00	5366.0000	4040.19	166.96	-3.01	
04/21	05:28:00	5404.0000	4037.37	167.09	-2.83	
04/21	06:06:00	5442.0000	4034.56	167.21	-2.80	
04/21	06:44:00	5480.0000	4032.02	167.33	-2.55	
04/21	07:22:00	5518.0000	4029.30	167.44	-2.71	
04/21	08:00:00	5556.0000	4026.84	167.55	-2.46	
04/21	08:38:00	5594.0000	4024.58	167.65	-2.26	
04/21	09:16:00	5632.0000	4022.23	167.76	-2.35	
04/21	09:54:00	5670.0000	4019.89	167.85	-2.34	
04/21	10:32:00	5708.0000	4017.68	167.95	-2.21	
04/21	11:10:00	5746.0000	4015.35	168.04	-2.32	
04/21	11:48:00	5784.0000	4013.47	168.13	-1.88	
04/21	12:26:00	5822.0000	4011.42	168.21	-2.05	
04/21	13:04:00	5860.0000	4009.38	168.29	-2.04	
04/21	13:42:00	5898.0000	4007.50	168.37	-1.88	

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/21	14:20:00	5936.0000	4005.67	168.45	-1.83	
04/21	14:58:00	5974.0000	4003.83	168.54	-1.83	
04/21	15:36:00	6012.0000	4002.06	168.62	-1.78	
04/21	16:14:00	6050.0000	4000.32	168.69	-1.73	
04/21	16:52:00	6088.0000	3998.71	168.73	-1.61	
04/21	17:30:00	6126.0000	3997.01	168.79	-1.70	
04/21	18:08:00	6164.0000	3995.39	168.86	-1.62	
04/21	18:46:00	6202.0000	3993.82	168.93	-1.57	
04/21	19:24:00	6240.0000	3992.31	168.98	-1.51	
04/21	20:02:00	6278.0000	3990.80	169.05	-1.51	
04/21	20:40:00	6316.0000	3989.33	169.10	-1.47	
04/21	21:18:00	6354.0000	3987.87	169.16	-1.46	
04/21	21:56:00	6392.0000	3986.44	169.22	-1.43	
04/21	22:34:00	6430.0000	3985.10	169.27	-1.34	
04/21	23:12:00	6468.0000	3983.68	169.32	-1.42	
04/21	23:50:00	6506.0000	3982.36	169.38	-1.32	
04/22	00:28:00	6544.0000	3981.05	169.43	-1.31	
04/22	01:06:00	6582.0000	3979.74	169.48	-1.31	
04/22	01:44:00	6620.0000	3978.52	169.53	-1.22	
04/22	02:22:00	6658.0000	3977.24	169.58	-1.28	
04/22	03:00:00	6696.0000	3976.06	169.62	-1.18	
04/22	03:38:00	6734.0000	3974.83	169.67	-1.23	
04/22	04:16:00	6772.0000	3973.68	169.72	-1.15	
04/22	04:54:00	6810.0000	3972.45	169.77	-1.23	
04/22	05:32:00	6848.0000	3971.39	169.79	-1.06	
04/22	06:10:00	6886.0000	3970.29	169.85	-1.10	
04/22	06:48:00	6924.0000	3969.19	169.90	-1.10	
04/22	07:26:00	6962.0000	3968.12	169.92	-1.07	
04/22	08:04:00	7000.0000	3967.03	169.97	-1.08	
04/22	08:42:00	7038.0000	3966.02	170.01	-1.01	
04/22	09:20:00	7076.0000	3964.97	170.04	-1.05	
04/22	09:58:00	7114.0000	3963.96	170.09	-1.01	
04/22	10:36:00	7152.0000	3962.98	170.12	-.98	
04/22	11:14:00	7190.0000	3961.96	170.16	-1.01	
04/22	11:52:00	7228.0000	3960.96	170.20	-1.01	
04/22	12:30:00	7266.0000	3960.00	170.24	-.95	
04/22	13:08:00	7304.0000	3959.04	170.27	-.96	
04/22	13:46:00	7342.0000	3958.13	170.31	-.91	
04/22	14:24:00	7380.0000	3957.22	170.34	-.91	
04/22	15:02:00	7418.0000	3956.30	170.38	-.92	
04/22	15:40:00	7456.0000	3955.44	170.40	-.87	
04/22	16:18:00	7494.0000	3954.51	170.44	-.93	
04/22	16:56:00	7532.0000	3953.65	170.47	-.86	
04/22	17:34:00	7570.0000	3952.85	170.51	-.80	
04/22	18:12:00	7608.0000	3952.03	170.53	-.82	
04/22	18:50:00	7646.0000	3951.18	170.56	-.85	
04/22	19:28:00	7684.0000	3950.31	170.59	-.87	
04/22	20:06:00	7722.0000	3949.56	170.63	-.76	
04/22	20:44:00	7760.0000	3948.80	170.65	-.76	
04/22	21:22:00	7798.0000	3947.96	170.68	-.84	
04/22	22:00:00	7836.0000	3947.21	170.72	-.75	
04/22	22:38:00	7874.0000	3946.37	170.74	-.85	
04/22	23:16:00	7912.0000	3945.61	170.77	-.76	
04/22	23:54:00	7950.0000	3944.87	170.80	-.74	
04/23	00:32:00	7988.0000	3944.11	170.83	-.76	
04/23	01:10:00	8026.0000	3943.40	170.86	-.71	
04/23	01:48:00	8064.0000	3942.66	170.88	-.74	
04/23	02:26:00	8102.0000	3941.90	170.91	-.76	
04/23	03:04:00	8140.0000	3941.19	170.94	-.72	
04/23	03:42:00	8178.0000	3940.46	170.97	-.73	
04/23	04:20:00	8216.0000	3939.79	170.98	-.67	
04/23	04:58:00	8254.0000	3939.11	171.01	-.67	
04/23	05:36:00	8292.0000	3938.46	171.03	-.66	
04/23	06:14:00	8330.0000	3937.79	171.06	-.67	
04/23	06:52:00	8368.0000	3937.08	171.08	-.70	

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/23	07:30:00	8406.0000	3936.46	171.11	-.62	
04/23	08:08:00	8444.0000	3935.74	171.13	-.72	
04/23	08:46:00	8482.0000	3935.13	171.16	-.62	
04/23	09:24:00	8520.0000	3934.49	171.19	-.63	
04/23	10:02:00	8558.0000	3933.86	171.21	-.63	
04/23	10:40:00	8596.0000	3933.20	171.22	-.67	
04/23	11:18:00	8634.0000	3932.57	171.26	-.62	
04/23	11:56:00	8672.0000	3931.92	171.27	-.65	
04/23	12:34:00	8710.0000	3931.38	171.30	-.55	
04/23	13:12:00	8748.0000	3930.70	171.32	-.68	
04/23	13:50:00	8786.0000	3930.10	171.35	-.60	
04/23	14:28:00	8824.0000	3929.50	171.36	-.60	
04/23	15:06:00	8862.0000	3928.89	171.38	-.62	
04/23	15:44:00	8900.0000	3928.27	171.41	-.62	
04/23	16:22:00	8938.0000	3927.72	171.43	-.55	
04/23	17:00:00	8976.0000	3927.18	171.45	-.55	
04/23	17:38:00	9014.0000	3926.61	171.47	-.57	
04/23	18:16:00	9052.0000	3926.02	171.49	-.59	
04/23	18:54:00	9090.0000	3925.45	171.52	-.57	
04/23	19:32:00	9128.0000	3924.91	171.53	-.55	
04/23	20:10:00	9166.0000	3924.38	171.55	-.53	
04/23	20:48:00	9204.0000	3923.88	171.57	-.50	
04/23	21:26:00	9242.0000	3923.32	171.59	-.55	
04/23	22:04:00	9280.0000	3922.81	171.61	-.51	
04/23	22:42:00	9318.0000	3922.27	171.63	-.55	
04/23	23:20:00	9356.0000	3921.75	171.65	-.52	
04/23	23:58:00	9394.0000	3921.21	171.67	-.55	
04/24	00:36:00	9432.0000	3920.68	171.68	-.53	
04/24	01:14:00	9470.0000	3920.16	171.71	-.52	
04/24	01:52:00	9508.0000	3919.67	171.73	-.49	
04/24	02:30:00	9546.0000	3919.16	171.75	-.51	
04/24	03:08:00	9584.0000	3918.61	171.76	-.55	
04/24	03:46:00	9622.0000	3918.14	171.78	-.48	
04/24	04:24:00	9660.0000	3917.67	171.79	-.47	
04/24	05:02:00	9698.0000	3917.19	171.82	-.48	
04/24	05:40:00	9736.0000	3916.67	171.85	-.51	
04/24	06:18:00	9774.0000	3916.21	171.85	-.46	
04/24	06:56:00	9812.0000	3915.75	171.88	-.46	
04/24	07:34:00	9850.0000	3915.24	171.90	-.51	
04/24	08:12:00	9888.0000	3914.80	171.90	-.44	
04/24	08:50:00	9926.0000	3914.28	171.93	-.51	
04/24	09:28:00	9964.0000	3913.86	171.95	-.42	
04/24	10:06:00	10002.0000	3913.35	171.96	-.51	
04/24	10:44:00	10040.0000	3912.89	171.98	-.46	
04/24	11:22:00	10078.0000	3912.41	172.00	-.48	
04/24	12:00:00	10116.0000	3912.01	172.01	-.40	
04/24	12:38:00	10154.0000	3911.53	172.03	-.48	
04/24	13:16:00	10192.0000	3911.10	172.05	-.44	
04/24	13:54:00	10230.0000	3910.63	172.06	-.47	
04/24	14:32:00	10268.0000	3910.19	172.08	-.44	
04/24	15:10:00	10306.0000	3909.73	172.10	-.46	
04/24	15:48:00	10344.0000	3909.27	172.12	-.46	
04/24	16:26:00	10382.0000	3908.84	172.13	-.43	
04/24	17:04:00	10420.0000	3908.44	172.15	-.41	
04/24	17:42:00	10458.0000	3908.00	172.16	-.44	
04/24	18:20:00	10496.0000	3907.60	172.18	-.40	
04/24	18:58:00	10534.0000	3907.15	172.18	-.45	
04/24	19:36:00	10572.0000	3906.76	172.21	-.40	
04/24	20:14:00	10610.0000	3906.33	172.23	-.43	
04/24	20:52:00	10648.0000	3905.91	172.23	-.42	
04/24	21:30:00	10686.0000	3905.55	172.26	-.36	
04/24	22:08:00	10724.0000	3905.12	172.26	-.43	
04/24	22:46:00	10762.0000	3904.74	172.28	-.37	
04/24	23:24:00	10800.0000	3904.36	172.30	-.38	
04/25	00:02:00	10838.0000	3903.95	172.32	-.41	

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/25	00:40:00	10876.0000	3903.54	172.33	-.41	
04/25	01:18:00	10914.0000	3903.12	172.34	-.42	
04/25	01:56:00	10952.0000	3902.74	172.37	-.38	
04/25	02:34:00	10990.0000	3902.35	172.37	-.39	
04/25	03:12:00	11028.0000	3901.98	172.39	-.37	
04/25	03:50:00	11066.0000	3901.57	172.40	-.42	
04/25	04:28:00	11104.0000	3901.20	172.42	-.37	
04/25	05:06:00	11142.0000	3900.82	172.42	-.38	
04/25	05:44:00	11180.0000	3900.43	172.45	-.40	
04/25	06:22:00	11218.0000	3900.07	172.46	-.36	
04/25	07:00:00	11256.0000	3899.70	172.48	-.37	
04/25	07:38:00	11294.0000	3899.36	172.49	-.34	
04/25	08:16:00	11332.0000	3899.00	172.51	-.36	
04/25	08:54:00	11370.0000	3898.63	172.52	-.38	
04/25	09:32:00	11408.0000	3898.27	172.53	-.36	
04/25	10:10:00	11446.0000	3897.92	172.55	-.35	
04/25	10:48:00	11484.0000	3897.53	172.56	-.39	
04/25	11:26:00	11522.0000	3897.11	172.59	-.41	
04/25	12:04:00	11560.0000	3896.84	172.59	-.27	
04/25	12:42:00	11598.0000	3896.46	172.61	-.38	
04/25	13:20:00	11636.0000	3896.10	172.62	-.36	
04/25	13:58:00	11674.0000	3895.72	172.63	-.38	
04/25	14:36:00	11712.0000	3895.36	172.65	-.36	
04/25	15:14:00	11750.0000	3895.01	172.67	-.35	
04/25	15:52:00	11788.0000	3894.69	172.67	-.32	
04/25	16:30:00	11826.0000	3894.38	172.69	-.30	
04/25	17:08:00	11864.0000	3893.97	172.71	-.41	
04/25	17:46:00	11902.0000	3893.64	172.72	-.33	
04/25	18:24:00	11940.0000	3893.28	172.73	-.36	
04/25	19:02:00	11978.0000	3892.95	172.75	-.33	
04/25	19:40:00	12016.0000	3892.66	172.75	-.29	
04/25	20:18:00	12054.0000	3892.28	172.77	-.37	
04/25	20:56:00	12092.0000	3892.00	172.78	-.29	
04/25	21:34:00	12130.0000	3891.71	172.80	-.28	
04/25	22:12:00	12168.0000	3891.34	172.81	-.37	
04/25	22:50:00	12206.0000	3891.02	172.82	-.32	
04/25	23:28:00	12244.0000	3890.66	172.84	-.36	
04/26	00:06:00	12282.0000	3890.36	172.85	-.31	
04/26	00:44:00	12320.0000	3890.08	172.86	-.28	
04/26	01:22:00	12358.0000	3889.73	172.87	-.35	
04/26	02:00:00	12396.0000	3889.40	172.89	-.33	
04/26	02:38:00	12434.0000	3889.13	172.90	-.27	
04/26	03:16:00	12472.0000	3888.84	172.91	-.29	
04/26	03:54:00	12510.0000	3888.48	172.92	-.36	
04/26	04:32:00	12548.0000	3888.17	172.93	-.30	
04/26	05:10:00	12586.0000	3887.87	172.95	-.30	
04/26	05:48:00	12624.0000	3887.54	172.96	-.33	
04/26	06:26:00	12662.0000	3887.25	172.97	-.30	
04/26	07:04:00	12700.0000	3886.92	172.99	-.33	
04/26	07:42:00	12738.0000	3886.62	173.00	-.30	
04/26	08:20:00	12776.0000	3886.28	173.01	-.34	
04/26	08:58:00	12814.0000	3886.01	173.03	-.27	
04/26	09:36:00	12852.0000	3885.70	173.04	-.30	
04/26	10:14:00	12890.0000	3885.43	173.05	-.27	
04/26	10:52:00	12928.0000	3885.17	173.06	-.26	
04/26	11:30:00	12966.0000	3884.91	173.08	-.26	
04/26	12:08:00	13004.0000	3884.59	173.09	-.32	
04/26	12:46:00	13042.0000	3884.21	173.11	-.38	
04/26	13:24:00	13080.0000	3883.96	173.11	-.26	
04/26	14:02:00	13118.0000	3883.65	173.13	-.30	
04/26	14:40:00	13156.0000	3883.35	173.14	-.30	
04/26	15:18:00	13194.0000	3883.09	173.15	-.27	
04/26	15:56:00	13232.0000	3882.75	173.16	-.34	
04/26	16:34:00	13270.0000	3882.49	173.17	-.26	
04/26	17:12:00	13308.0000	3882.19	173.19	-.29	

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/26	17:50:00	13346.0000	3881.94	173.20	-.26	
04/26	18:28:00	13384.0000	3881.59	173.21	-.35	
04/26	19:06:00	13422.0000	3881.36	173.21	-.23	
04/26	19:44:00	13460.0000	3881.07	173.22	-.29	
04/26	20:22:00	13498.0000	3880.77	173.24	-.30	
04/26	21:00:00	13536.0000	3880.49	173.25	-.28	
04/26	21:38:00	13574.0000	3880.21	173.26	-.28	
04/26	22:16:00	13612.0000	3879.97	173.27	-.24	
04/26	22:54:00	13650.0000	3879.70	173.28	-.27	
04/26	23:32:00	13688.0000	3879.48	173.30	-.22	
04/27	00:10:00	13726.0000	3879.14	173.31	-.34	
04/27	00:48:00	13764.0000	3878.85	173.32	-.29	
04/27	01:26:00	13802.0000	3878.64	173.33	-.20	
04/27	02:04:00	13840.0000	3878.33	173.35	-.31	
04/27	02:42:00	13878.0000	3878.04	173.36	-.30	
04/27	03:20:00	13916.0000	3877.83	173.37	-.20	
04/27	03:58:00	13954.0000	3877.60	173.38	-.23	
04/27	04:36:00	13992.0000	3877.31	173.38	-.29	
04/27	05:14:00	14030.0000	3876.99	173.40	-.32	
04/27	05:52:00	14068.0000	3876.74	173.41	-.25	
04/27	06:30:00	14106.0000	3876.48	173.43	-.26	
04/27	07:08:00	14144.0000	3876.22	173.43	-.26	
04/27	07:46:00	14182.0000	3875.97	173.44	-.25	
04/27	08:24:00	14220.0000	3875.70	173.46	-.27	
04/27	09:02:00	14258.0000	3875.52	173.47	-.18	
04/27	09:40:00	14296.0000	3875.21	173.48	-.31	
04/27	10:18:00	14334.0000	3874.99	173.49	-.22	
04/27	10:56:00	14372.0000	3874.69	173.51	-.30	
04/27	11:34:00	14410.0000	3874.45	173.52	-.24	
04/27	12:12:00	14448.0000	3874.19	173.53	-.27	
04/27	12:50:00	14486.0000	3873.94	173.53	-.25	
04/27	13:28:00	14524.0000	3873.67	173.55	-.26	
04/27	14:06:00	14562.0000	3873.40	173.56	-.27	
04/27	14:44:00	14600.0000	3873.18	173.57	-.22	
04/27	15:22:00	14638.0000	3872.95	173.58	-.23	
04/27	16:00:00	14676.0000	3872.67	173.59	-.27	
04/27	16:38:00	14714.0000	3872.41	173.60	-.26	
04/27	17:16:00	14752.0000	3872.18	173.61	-.23	
04/27	17:54:00	14790.0000	3871.93	173.62	-.25	
04/27	18:32:00	14828.0000	3871.71	173.63	-.23	
04/27	19:10:00	14866.0000	3871.44	173.64	-.27	
04/27	19:48:00	14904.0000	3871.21	173.66	-.23	
04/27	20:26:00	14942.0000	3870.96	173.66	-.25	
04/27	21:04:00	14980.0000	3870.76	173.68	-.20	
04/27	21:42:00	15018.0000	3870.47	173.69	-.29	
04/27	22:20:00	15056.0000	3870.23	173.69	-.24	
04/27	22:58:00	15094.0000	3870.05	173.71	-.17	
04/27	23:36:00	15132.0000	3869.79	173.72	-.26	
04/28	00:14:00	15170.0000	3869.58	173.73	-.21	
04/28	00:52:00	15208.0000	3869.33	173.74	-.25	
04/28	01:30:00	15246.0000	3869.10	173.74	-.23	
04/28	02:08:00	15284.0000	3868.93	173.76	-.18	
04/28	02:46:00	15322.0000	3868.69	173.77	-.24	
04/28	03:24:00	15360.0000	3868.48	173.78	-.21	
04/28	04:02:00	15398.0000	3868.19	173.79	-.29	
04/28	04:40:00	15436.0000	3867.98	173.80	-.21	
04/28	05:18:00	15474.0000	3867.70	173.81	-.28	
04/28	05:56:00	15512.0000	3867.57	173.82	-.13	
04/28	06:34:00	15550.0000	3867.30	173.83	-.27	
04/28	07:12:00	15588.0000	3867.06	173.84	-.24	
04/28	07:50:00	15626.0000	3866.81	173.85	-.25	
04/28	08:28:00	15664.0000	3866.64	173.86	-.17	
04/28	09:06:00	15702.0000	3866.43	173.88	-.21	
04/28	09:44:00	15740.0000	3866.15	173.88	-.28	
04/28	10:22:00	15778.0000	3865.97	173.90	-.18	

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/28	11:00:00	15816.0000	3865.77	173.90	-.20	
04/28	11:38:00	15854.0000	3865.51	173.92	-.26	
04/28	12:16:00	15892.0000	3865.26	173.93	-.25	
04/28	12:54:00	15930.0000	3865.02	173.93	-.24	
04/28	13:32:00	15968.0000	3864.82	173.94	-.20	
04/28	14:10:00	16006.0000	3864.60	173.96	-.22	
04/28	14:48:00	16044.0000	3864.39	173.96	-.21	
04/28	15:26:00	16082.0000	3864.23	173.97	-.16	
04/28	16:04:00	16120.0000	3863.99	173.98	-.24	
04/28	16:42:00	16158.0000	3863.78	173.99	-.21	
04/28	17:20:00	16196.0000	3863.53	174.00	-.25	
04/28	17:58:00	16234.0000	3863.26	174.01	-.27	
04/28	18:36:00	16272.0000	3863.10	174.02	-.16	
04/28	19:14:00	16310.0000	3862.81	174.03	-.29	
04/28	19:52:00	16348.0000	3862.71	174.04	-.10	
04/28	20:30:00	16386.0000	3862.43	174.05	-.27	
04/28	21:08:00	16424.0000	3862.26	174.06	-.17	
04/28	21:46:00	16462.0000	3862.06	174.07	-.21	
04/28	22:24:00	16500.0000	3861.80	174.07	-.25	
04/28	23:02:00	16538.0000	3861.60	174.08	-.20	
04/28	23:40:00	16576.0000	3861.41	174.09	-.19	
04/29	00:18:00	16614.0000	3861.24	174.10	-.17	
04/29	00:56:00	16652.0000	3861.01	174.11	-.23	
04/29	01:34:00	16690.0000	3860.85	174.12	-.16	
04/29	02:12:00	16728.0000	3860.59	174.13	-.26	
04/29	02:50:00	16766.0000	3860.43	174.14	-.16	
04/29	03:28:00	16804.0000	3860.20	174.15	-.23	
04/29	04:06:00	16842.0000	3860.03	174.16	-.17	
04/29	04:44:00	16880.0000	3859.80	174.17	-.23	
04/29	05:22:00	16918.0000	3859.62	174.18	-.18	
04/29	06:00:00	16956.0000	3859.45	174.18	-.17	
04/29	06:38:00	16994.0000	3859.22	174.20	-.22	
04/29	07:16:00	17032.0000	3859.00	174.21	-.23	
04/29	07:54:00	17070.0000	3858.79	174.21	-.20	
04/29	08:32:00	17108.0000	3858.64	174.23	-.16	
04/29	09:10:00	17146.0000	3858.39	174.24	-.25	
04/29	09:48:00	17184.0000	3858.20	174.24	-.19	
04/29	10:26:00	17222.0000	3858.02	174.26	-.18	
04/29	11:04:00	17260.0000	3857.80	174.27	-.22	
04/29	11:42:00	17298.0000	3857.60	174.28	-.20	
04/29	12:20:00	17336.0000	3857.41	174.29	-.19	
04/29	12:58:00	17374.0000	3857.21	174.29	-.20	
04/29	13:36:00	17412.0000	3857.03	174.30	-.18	
04/29	14:14:00	17450.0000	3856.84	174.32	-.19	
04/29	14:52:00	17488.0000	3856.61	174.32	-.23	
04/29	15:30:00	17526.0000	3856.47	174.32	-.14	
04/29	16:08:00	17564.0000	3856.27	174.33	-.20	
04/29	16:46:00	17602.0000	3856.10	174.35	-.17	
04/29	17:24:00	17640.0000	3855.91	174.35	-.20	
04/29	18:02:00	17678.0000	3855.68	174.37	-.22	
04/29	18:40:00	17716.0000	3855.49	174.38	-.19	
04/29	19:18:00	17754.0000	3855.37	174.38	-.12	
04/29	19:56:00	17792.0000	3855.11	174.39	-.26	
04/29	20:34:00	17830.0000	3854.91	174.40	-.20	
04/29	21:12:00	17868.0000	3854.77	174.41	-.14	
04/29	21:50:00	17906.0000	3854.53	174.41	-.23	
04/29	22:28:00	17944.0000	3854.30	174.43	-.23	
04/29	23:06:00	17982.0000	3854.17	174.43	-.13	
04/29	23:44:00	18020.0000	3853.99	174.44	-.18	
04/30	00:22:00	18058.0000	3853.76	174.45	-.23	
04/30	01:00:00	18096.0000	3853.58	174.46	-.19	
04/30	01:38:00	18134.0000	3853.43	174.46	-.15	
04/30	02:16:00	18172.0000	3853.26	174.48	-.16	
04/30	02:54:00	18210.0000	3853.09	174.49	-.17	
04/30	03:32:00	18248.0000	3852.90	174.49	-.19	

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/30	04:10:00	18286.0000	3852.75	174.50	-.15	
04/30	04:48:00	18324.0000	3852.53	174.51	-.22	
04/30	05:26:00	18362.0000	3852.39	174.52	-.14	
04/30	06:04:00	18400.0000	3852.19	174.53	-.20	
04/30	06:42:00	18438.0000	3852.04	174.54	-.16	
04/30	07:20:00	18476.0000	3851.85	174.55	-.19	
04/30	07:58:00	18514.0000	3851.68	174.56	-.17	
04/30	08:36:00	18552.0000	3851.51	174.57	-.17	
04/30	09:14:00	18590.0000	3851.27	174.57	-.24	
04/30	09:52:00	18628.0000	3851.14	174.58	-.13	
04/30	10:30:00	18666.0000	3850.97	174.59	-.17	
04/30	11:08:00	18704.0000	3850.77	174.60	-.20	
04/30	11:46:00	18742.0000	3850.63	174.60	-.14	
04/30	12:24:00	18780.0000	3850.44	174.62	-.18	
04/30	13:01:00	18817.0000	3842.15	176.20	-8.29	TANDEM INST. OFF BOTTOM
04/30	13:01:30	18817.5000	3823.58	177.00	-18.57	
04/30	13:02:00	18818.0000	3802.69	177.80	-20.89	
04/30	13:02:30	18818.5000	3781.54	178.60	-21.15	
04/30	13:03:00	18819.0000	3760.12	179.41	-21.42	
04/30	13:03:30	18819.5000	3738.31	180.21	-21.81	
04/30	13:05:30	18821.5000	3716.77	183.41	-21.54	
04/30	13:12:00	18828.0000	3703.60	185.71	-13.17	STOP @ 7000'
04/30	13:12:30	18828.5000	3662.70	185.74	-40.90	
04/30	13:13:00	18829.0000	3621.15	185.04	-41.54	
04/30	13:13:30	18829.5000	3579.88	184.34	-41.28	
04/30	13:14:00	18830.0000	3537.67	183.64	-42.21	
04/30	13:14:30	18830.5000	3495.85	182.94	-41.81	
04/30	13:15:00	18831.0000	3453.50	182.24	-42.35	
04/30	13:15:30	18831.5000	3412.76	181.54	-40.75	
04/30	13:16:00	18832.0000	3372.54	180.84	-40.22	
04/30	13:16:30	18832.5000	3340.04	180.14	-32.49	
04/30	13:17:00	18833.0000	3308.48	179.44	-31.56	
04/30	13:19:00	18835.0000	3288.37	175.97	-20.11	
04/30	13:21:30	18837.5000	3287.68	172.52	-.69	
04/30	13:24:00	18840.0000	3288.79	169.08	1.11	STOP @ 6000'
04/30	13:24:30	18840.5000	3253.62	166.83	-35.18	
04/30	13:25:00	18841.0000	3212.82	167.74	-40.80	
04/30	13:25:30	18841.5000	3172.14	166.65	-40.67	
04/30	13:26:00	18842.0000	3130.93	165.56	-41.21	
04/30	13:26:30	18842.5000	3087.85	164.47	-43.08	
04/30	13:27:00	18843.0000	3044.10	163.38	-43.75	
04/30	13:27:30	18843.5000	3000.34	162.29	-43.76	
04/30	13:28:00	18844.0000	2956.17	161.20	-44.17	
04/30	13:28:30	18844.5000	2914.53	160.12	-41.64	
04/30	13:29:00	18845.0000	2876.35	159.03	-38.17	
04/30	13:30:30	18846.5000	2858.24	155.19	-18.11	
04/30	13:32:30	18848.5000	2857.06	152.03	-1.18	
04/30	13:34:30	18850.5000	2857.68	148.88	.63	STOP @ 5000'
04/30	13:35:30	18851.5000	2858.17	147.30	.49	
04/30	13:36:00	18852.0000	2835.01	146.52	-23.16	
04/30	13:36:30	18852.5000	2789.92	146.22	-45.09	
04/30	13:37:00	18853.0000	2745.24	145.20	-44.68	
04/30	13:37:30	18853.5000	2700.29	144.17	-44.95	
04/30	13:38:00	18854.0000	2652.26	143.15	-48.03	
04/30	13:38:30	18854.5000	2602.76	142.12	-49.50	
04/30	13:39:00	18855.0000	2553.38	141.10	-49.38	
04/30	13:39:30	18855.5000	2504.13	140.07	-49.25	
04/30	13:40:00	18856.0000	2464.89	139.06	-39.24	
04/30	13:40:30	18856.5000	2437.27	138.03	-27.62	
04/30	13:42:00	18858.0000	2426.29	134.97	-10.98	
04/30	13:44:00	18860.0000	2426.00	131.94	-.29	
04/30	13:47:00	18863.0000	2426.50	128.45	.50	
04/30	13:49:00	18865.0000	2411.94	126.21	-14.55	STOP @ 4000'
04/30	13:49:30	18865.5000	2361.45	125.34	-50.49	
04/30	13:50:00	18866.0000	2307.21	124.46	-54.24	

WELL NAME : WATER DISPOSAL WELL NO. 2 (TOP INST.) DATE : 05/02/19

WELL LOCATION : SAN JUAN COUNTY, NEW MEXICO FILE REF: F240501.RED

Date MM/DD	Time hh:mm:ss	Test Time mmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/30	13:50:30	18866.5000	2251.90	123.59	-55.32	
04/30	13:51:00	18867.0000	2197.11	122.72	-54.79	
04/30	13:51:30	18867.5000	2141.64	121.85	-55.46	
04/30	13:52:00	18868.0000	2087.78	120.97	-53.86	
04/30	13:52:30	18868.5000	2038.59	120.11	-49.19	
04/30	13:53:00	18869.0000	1995.82	119.23	-42.77	
04/30	13:54:30	18870.5000	1993.39	115.85	-2.42	
04/30	13:57:00	18873.0000	1993.25	112.24	-.14	
04/30	13:59:30	18875.5000	1993.98	108.63	.74	SROP @ 3000'
04/30	14:00:00	18876.0000	1978.45	107.90	-15.53	
04/30	14:00:30	18876.5000	1924.36	107.64	-54.09	
04/30	14:01:00	18877.0000	1867.67	106.89	-56.69	
04/30	14:01:30	18877.5000	1809.90	106.14	-57.77	
04/30	14:02:00	18878.0000	1752.27	105.38	-57.63	
04/30	14:02:30	18878.5000	1694.63	104.64	-57.65	
04/30	14:03:00	18879.0000	1636.05	103.88	-58.58	
04/30	14:03:30	18879.5000	1583.21	103.13	-52.83	
04/30	14:04:00	18880.0000	1559.82	102.38	-23.39	
04/30	14:06:30	18882.5000	1560.10	98.40	.28	
04/30	14:10:00	18886.0000	1560.18	95.27	.08	
04/30	14:11:00	18887.0000	1541.61	94.38	-18.57	
04/30	14:11:30	18887.5000	1497.18	93.93	-44.43	
04/30	14:12:00	18888.0000	1447.11	93.49	-50.07	
04/30	14:12:30	18888.5000	1395.82	93.11	-51.30	
04/30	14:13:00	18889.0000	1343.24	91.80	-52.58	
04/30	14:13:30	18889.5000	1289.70	90.49	-53.53	
04/30	14:14:00	18890.0000	1235.08	89.18	-54.62	
04/30	14:14:30	18890.5000	1180.72	87.87	-54.36	
04/30	14:15:00	18891.0000	1126.73	86.57	-53.98	
04/30	14:16:30	18892.5000	1124.27	82.65	-2.47	
04/30	14:18:00	18894.0000	1124.80	78.75	.53	
04/30	14:21:00	18897.0000	1124.95	75.45	.15	STOP @ 1000'
04/30	14:23:00	18899.0000	1107.66	73.62	-17.29	
04/30	14:23:30	18899.5000	1065.01	73.15	-42.65	
04/30	14:24:00	18900.0000	1022.62	72.69	-42.39	
04/30	14:24:30	18900.5000	979.53	72.32	-43.09	
04/30	14:25:00	18901.0000	935.59	71.63	-43.94	
04/30	14:25:30	18901.5000	891.64	70.95	-43.95	
04/30	14:26:00	18902.0000	844.88	70.26	-46.77	
04/30	14:26:30	18902.5000	796.09	69.58	-48.79	
04/30	14:27:00	18903.0000	746.90	68.89	-49.19	
04/30	14:27:30	18903.5000	709.38	68.20	-37.52	
04/30	14:28:00	18904.0000	688.49	67.52	-20.89	
04/30	14:28:30	18904.5000	686.78	66.84	-1.71	
04/30	14:32:30	18908.5000	686.17	65.43	-.60	SURFACE STOP
04/30	14:33:00	18909.0000	.01	65.60	-686.16	
04/30	14:58:00	18934.0000	.01	70.21	.00	
04/30	15:04:00	18940.0000	.01	74.24	.00	

EVENT SUMMARY

COMPANY : WESTERN REFINING SOUTHWEST, INC.

PAGE : B1

WELL NAME : WATER DISPOSAL WELL NO. 2 (TOP INST.)

DATE : 05/02/19

WELL LOCATION : SAN JUAN COUNTY, NEW MEXICO

FILE REF: F240501.RED

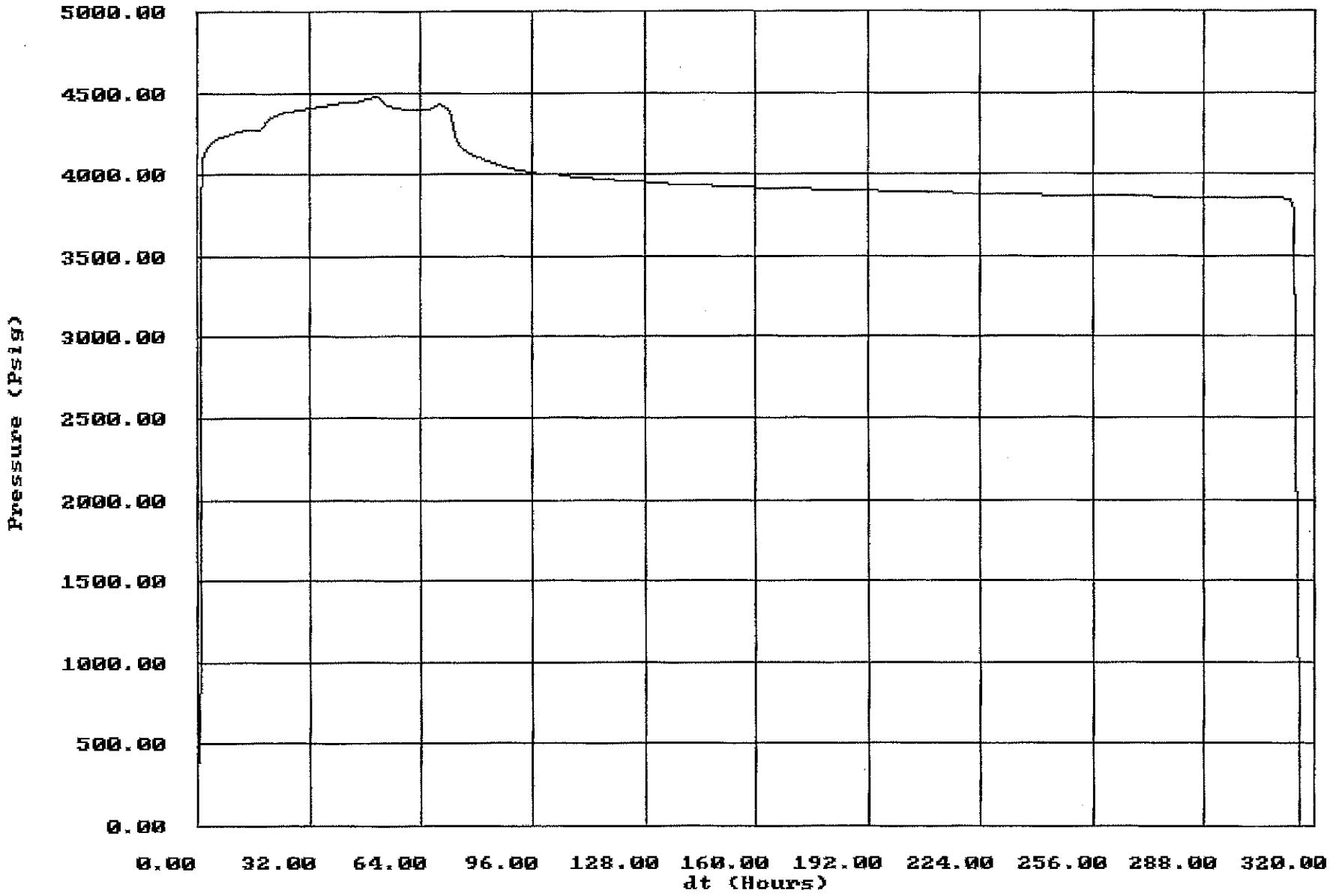
Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Key Event	Pressure Psig	Temp Deg F
04/17	12:04:00	40.0000	PRESSURED UP LUBRICATOR	14.59	75.37
04/17	12:11:30	47.5000	SURFACE STOP	776.31	70.35
04/17	12:12:00	48.0000	TRIPPED IN WELL WITH TANDEM ELEC. INST.	802.59	69.85
04/17	12:44:30	80.5000	TANDEM INST. @ 7312'	3937.26	170.40
04/17	12:50:30	86.5000	STARTED INJECTION PUMP	3943.82	171.41
04/18	19:14:00	1910.0000	STOP @ 2000'	4402.79	148.19
04/20	12:20:00	4376.0000	INJECTION STOPPED	4403.04	151.37
04/20	12:22:00	4378.0000	BEGAN FALL-OFF	4370.45	151.39
04/30	13:01:00	18817.0000	TANDEM INST. OFF BOTTOM	3842.15	176.20
04/30	13:12:00	18828.0000	STOP @ 7000'	3703.60	185.71
04/30	13:24:00	18840.0000	STOP @ 6000'	3288.79	169.08
04/30	13:34:30	18850.5000	STOP @ 5000'	2857.68	148.88
04/30	13:49:00	18865.0000	STOP @ 4000'	2411.94	126.21
04/30	13:59:30	18875.5000	SROP @ 3000'	1993.98	108.63
04/30	14:21:00	18897.0000	STOP @ 1000'	1124.95	75.45
04/30	14:32:30	18908.5000	SURFACE STOP	686.17	65.43

WESTERN REFINING SOUTHWEST, INC.

Pressure vs dt

WATER DISPOSAL WELL NO. 2 (TOP INST.)
SAN JUAN COUNTY, NM
F240501.RED

TEFTELLER, INC.
4-17-19
INJECTION FALL-OFF TEST



Company: WESTERN REFINING SOUTHWEST, INC.
Well: WATER DISPOSAL WELL NO. 2
Field: ENTRADA
Engineer: NEIL TEFTELLER
Gauge Type: ELECTRONIC MEMORY
Gauge Range: 0 - 5000
Gauge Depth: 7312 ft
Serial No.: 240 (TOP INST.)

County: SAN JUAN
State: NEW MEXICO
Date: 04/17/2019
Well Type: WATER DISPOSAL
Test Type: GRADIENT
Status: SHUT IN
File Name:

Tubing: 4" TO
Tubing: TO
Casing: 7" TO
Perfs.:

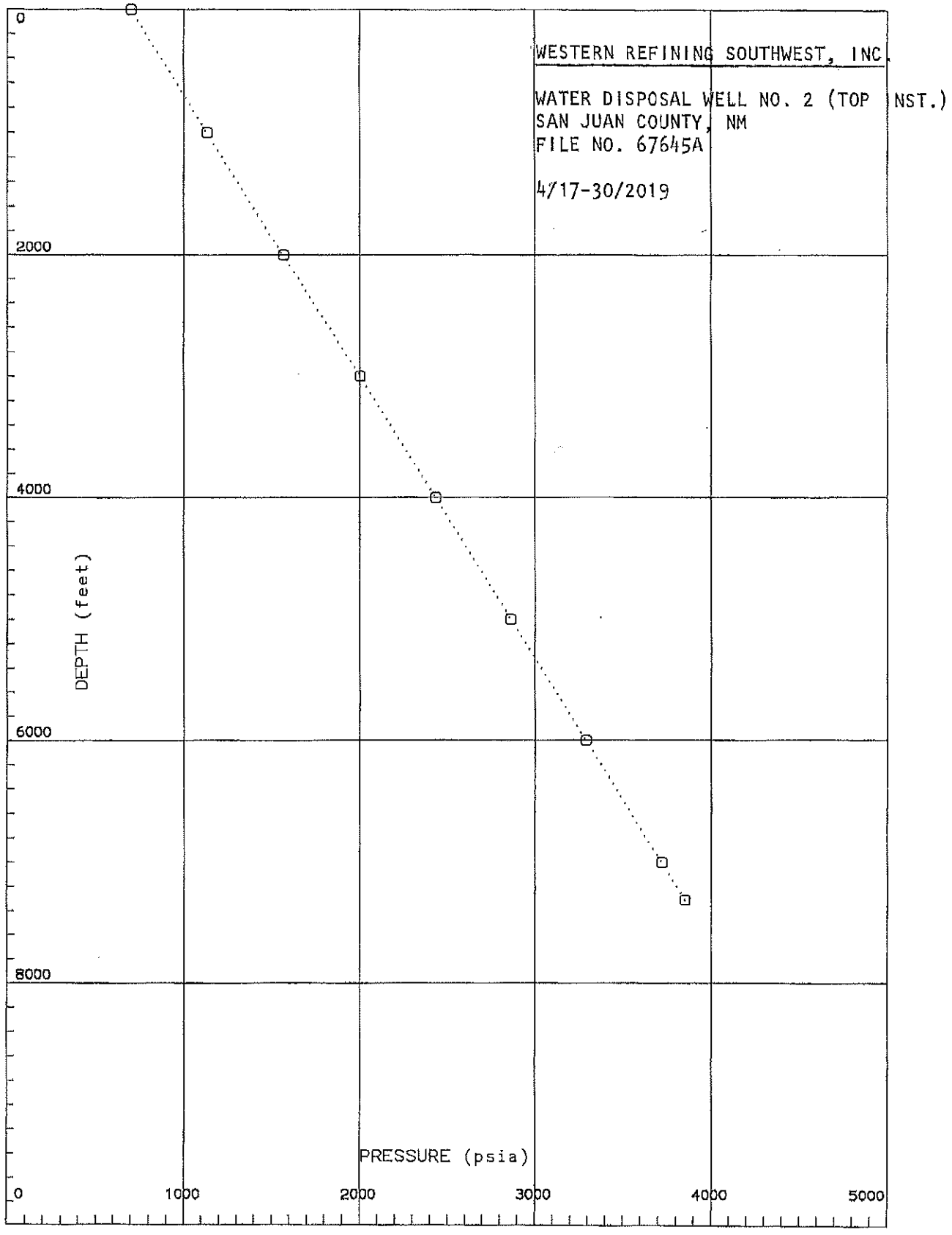
Oil Level
H2O Level

Shut-in BHP 3852 @ 7312 ft
Shut-in WHP 700

Shut-in BHT 186 F @ 7312 ft
Shut-in WHT 0 F

[Tefteller Incorporated]

#	MD	TVD	PRESSURE	PSI/ft
1	7312	7312	3852.00	
2	7000	7000	3716.00	0.436
3	6000	6000	3291.00	0.425
4	5000	5000	2863.00	0.428
5	4000	4000	2432.00	0.431
6	3000	3000	1999.00	0.433
7	2000	2000	1565.00	0.434
8	1000	1000	1131.00	0.434
9	0	0	700.00	0.431


WESTERN REFINING SOUTHWEST, INC.
WATER DISPOSAL WELL NO. 2 (TOP NST.)
SAN JUAN COUNTY, NM
FILE NO. 67645A
4/17-30/2019
DEPTH (feet)
0
2000
4000
6000
8000
PRESSURE (psia)
0
1000
2000
3000
4000
5000

File Reference F262501.RED

Customer	WESTERN REFINING SOUTHWEST, INC.
Street	P.O. BOX 159
City/State	BLOOMFIELD, NM 87413
Country	USA
Service Company	TEFTELLER, INC.
Well Name	WATER DISPOSAL WELL NO. 2 (BOTTOM INST.
Well Location	SAN JUAN COUNTY, NEW MEXICO
Field / Pool	ENTRADA FIELD
Status (Oil, Gas, Other)	WATER DISPOSAL
Test Type	INJECTION FALL-OFF TEST
Date of Test	4-17-19
Producing Interval	
Recorder Depth	7312'
Recorder Position	7312'
Shut In Date Start:	4-17-2019
Stop:	4-30-2019
Duration:	315 HRS. TANDEM ELEC. MEMORY INST. TIME
Bottom Hole Temperature	186 DEGREES @ 7312'

Gauge Identification

Gauge Manufacturer	MICRO-SMART SYSTEMS
Serial Number	262
Model Number	SP2000
Pressure Range	
Battery Type	
Calibration I.D.	
Last Calibration	5/15/18

Gauge Setup Parameters

Probe Set Up Time	4/17/19 11:24: 0
Time Delay to First Reading	
Test Type Selection	INJECTION FALL-OFF TEST
Test Duration Selection	315 HRS. TANDEM ELEC. MEMORY INST. TIME

COMPANY: WESTERN REFINING SOUTHWEST, INC.

WELL NAME : WATER DISPOSAL WELL NO. 2 (BOTTOM INST.)

DATE : 05/02/19

WELL LOCATION : SAN JUAN COUNTY, NEW MEXICO

FILE REF: P362501.RED

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/30	11:24:00	.0000	.01	65.11		
04/17	12:00:00	36.0000	.01	68.17	.00	
04/17	12:04:15	40.2500	21.99	68.49	21.98	PRESSURED UP LUBRICATOR
04/17	12:04:30	40.5000	88.35	68.46	66.36	
04/17	12:04:45	40.7500	746.65	68.42	658.30	
04/17	12:05:00	41.0000	771.51	68.39	24.87	
04/17	12:12:00	48.0000	787.97	67.54	16.46	SURFACE STOP
04/17	12:12:15	48.2500	806.37	67.53	18.40	TRIPPED IN WELL WITH TANDEM ELEC. INST.
04/17	12:12:45	48.7500	817.01	67.50	10.65	
04/17	12:13:00	49.0000	843.03	67.49	26.02	
04/17	12:13:15	49.2500	870.69	67.33	27.66	
04/17	12:13:30	49.5000	893.04	67.15	22.36	
04/17	12:13:45	49.7500	904.33	66.97	11.29	
04/17	12:14:00	50.0000	916.64	66.79	12.30	
04/17	12:14:15	50.2500	927.79	66.61	11.15	
04/17	12:14:30	50.5000	953.45	66.43	25.67	
04/17	12:14:45	50.7500	977.40	66.24	23.95	
04/17	12:15:00	51.0000	995.74	66.06	18.34	
04/17	12:15:15	51.2500	1016.67	65.88	20.93	
04/17	12:15:30	51.5000	1042.35	65.69	25.68	
04/17	12:15:45	51.7500	1070.33	65.51	27.98	
04/17	12:16:00	52.0000	1098.60	65.33	28.27	
04/17	12:16:15	52.2500	1129.42	65.21	30.83	
04/17	12:16:30	52.5000	1157.13	65.30	27.71	
04/17	12:16:45	52.7500	1188.87	65.37	31.74	
04/17	12:17:00	53.0000	1219.31	65.46	30.44	
04/17	12:17:15	53.2500	1246.59	65.53	27.28	
04/17	12:17:30	53.5000	1257.62	65.61	11.03	
04/17	12:17:45	53.7500	1271.23	65.69	13.62	
04/17	12:18:00	54.0000	1286.15	65.77	14.91	
04/17	12:18:15	54.2500	1297.89	65.85	11.75	
04/17	12:18:30	54.5000	1317.84	65.93	19.94	
04/17	12:18:45	54.7500	1339.36	66.01	21.52	
04/17	12:19:00	55.0000	1360.31	66.09	20.95	
04/17	12:19:15	55.2500	1383.60	66.36	23.29	
04/17	12:19:30	55.5000	1400.19	66.79	16.59	
04/17	12:19:45	55.7500	1417.78	67.21	17.59	
04/17	12:20:00	56.0000	1436.37	67.64	18.59	
04/17	12:20:15	56.2500	1449.22	68.07	12.84	
04/17	12:20:30	56.5000	1465.65	68.50	16.43	
04/17	12:20:45	56.7500	1488.54	68.94	22.89	
04/17	12:21:00	57.0000	1511.15	69.37	22.61	
04/17	12:21:15	57.2500	1539.79	69.80	28.64	
04/17	12:21:30	57.5000	1570.01	70.23	30.22	
04/17	12:21:45	57.7500	1598.21	70.66	28.20	
04/17	12:22:00	58.0000	1642.79	71.09	44.58	
04/17	12:22:15	58.2500	1675.03	71.71	32.25	
04/17	12:22:30	58.5000	1707.16	72.51	32.13	
04/17	12:22:45	58.7500	1734.55	73.31	27.38	
04/17	12:23:00	59.0000	1763.50	74.12	28.95	
04/17	12:23:15	59.2500	1790.29	74.92	26.79	
04/17	12:23:30	59.5000	1816.50	75.72	26.21	
04/17	12:23:45	59.7500	1846.01	76.53	29.50	
04/17	12:24:00	60.0000	1867.32	77.33	21.32	
04/17	12:24:15	60.2500	1889.35	78.13	22.03	
04/17	12:24:30	60.5000	1913.52	78.94	24.17	
04/17	12:24:45	60.7500	1943.29	79.74	29.77	
04/17	12:25:00	61.0000	1971.03	80.55	27.74	
04/17	12:25:15	61.2500	1990.79	81.49	19.76	
04/17	12:25:30	61.5000	2009.71	82.38	18.93	
04/17	12:25:45	61.7500	2023.18	83.27	13.47	
04/17	12:26:00	62.0000	2049.40	84.17	26.22	
04/17	12:26:15	62.2500	2082.36	85.06	32.95	
04/17	12:26:30	62.5000	2108.13	85.96	25.77	
04/17	12:26:45	62.7500	2137.05	86.85	28.92	

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/17	12:27:00	63.0000	2161.37	87.75	24.32	
04/17	12:27:15	63.2500	2198.44	88.64	37.07	
04/17	12:27:30	63.5000	2240.22	89.54	41.78	
04/17	12:27:45	63.7500	2281.70	90.44	41.48	
04/17	12:28:00	64.0000	2318.30	91.33	36.60	
04/17	12:28:15	64.2500	2368.09	92.19	49.79	
04/17	12:28:30	64.5000	2408.40	93.26	40.31	
04/17	12:28:45	64.7500	2446.40	94.34	38.00	
04/17	12:29:00	65.0000	2486.52	95.43	40.13	
04/17	12:29:15	65.2500	2528.78	96.50	42.26	
04/17	12:29:30	65.5000	2563.29	97.58	34.51	
04/17	12:29:45	65.7500	2603.36	98.67	40.07	
04/17	12:30:00	66.0000	2650.87	99.74	47.51	
04/17	12:30:15	66.2500	2698.78	100.82	47.91	
04/17	12:30:30	66.5000	2737.65	101.91	38.87	
04/17	12:30:45	66.7500	2775.94	102.99	38.29	
04/17	12:31:00	67.0000	2812.64	104.07	36.70	
04/17	12:31:15	67.2500	2852.00	105.37	39.36	
04/17	12:31:30	67.5000	2886.39	106.77	34.39	
04/17	12:31:45	67.7500	2922.46	108.19	36.07	
04/17	12:32:00	68.0000	2955.23	109.60	32.77	
04/17	12:32:15	68.2500	2991.12	111.01	35.89	
04/17	12:32:30	68.5000	3034.12	112.42	43.00	
04/17	12:32:45	68.7500	3072.09	113.84	37.97	
04/17	12:33:00	69.0000	3108.90	115.25	36.81	
04/17	12:33:15	69.2500	3148.25	116.67	39.35	
04/17	12:33:30	69.5000	3189.00	118.09	40.75	
04/17	12:33:45	69.7500	3222.45	119.51	33.45	
04/17	12:34:00	70.0000	3257.45	120.92	35.00	
04/17	12:34:15	70.2500	3295.45	122.45	38.00	
04/17	12:34:30	70.5000	3337.50	124.18	42.05	
04/17	12:34:45	70.7500	3382.07	125.91	44.57	
04/17	12:35:00	71.0000	3426.60	127.64	44.53	
04/17	12:35:15	71.2500	3475.23	129.37	48.62	
04/17	12:35:30	71.5000	3529.21	131.11	53.98	
04/17	12:35:45	71.7500	3577.18	132.84	47.97	
04/17	12:36:00	72.0000	3625.38	134.58	48.20	
04/17	12:36:15	72.2500	3673.84	136.31	48.46	
04/17	12:36:30	72.5000	3717.55	138.05	43.72	
04/17	12:36:45	72.7500	3759.81	139.79	42.26	
04/17	12:37:00	73.0000	3805.44	141.53	45.63	
04/17	12:37:15	73.2500	3838.58	143.48	33.14	
04/17	12:37:30	73.5000	3866.34	145.02	27.76	
04/17	12:37:45	73.7500	3895.18	146.58	28.84	
04/17	12:38:00	74.0000	3918.75	148.14	23.57	
04/17	12:38:30	74.5000	3933.10	151.25	14.35	
04/17	12:39:00	75.0000	3934.36	154.37	1.26	
04/17	12:39:30	75.5000	3935.01	157.49	.66	
04/17	12:40:00	76.0000	3934.79	160.61	-.22	
04/17	12:41:30	77.5000	3936.53	163.98	1.73	TANDEM INST. @ 7312'
04/17	12:43:15	79.2500	3935.68	167.24	-.85	
04/17	12:50:00	86.0000	3935.10	169.91	-.57	STARTED INJECTION PUMP
04/17	12:51:00	87.0000	3959.31	170.01	24.21	
04/17	12:51:30	87.5000	3977.58	170.10	18.27	
04/17	12:51:45	87.7500	3984.57	170.15	6.98	
04/17	12:52:45	88.7500	4004.16	170.40	19.59	
04/17	12:53:00	89.0000	4008.04	170.46	3.88	
04/17	12:55:00	91.0000	4029.27	171.43	21.23	
04/17	12:55:15	91.2500	4031.14	171.63	1.87	
04/17	12:58:45	94.7500	4052.56	174.78	21.42	
04/17	13:02:30	98.5000	4071.98	177.80	19.42	
04/17	13:10:15	106.2500	4093.94	180.41	21.96	
04/17	13:10:30	106.5000	4094.54	180.44	.61	
04/17	13:22:45	118.7500	4116.69	180.25	22.14	
04/17	13:23:00	119.0000	4117.12	180.24	.44	

COMPANY: WESTERN REFINING SOUTHWEST, INC.

DATE : 05/02/19

WELL NAME : WATER DISPOSAL WELL NO. 2 (BOTTOM INST.)

FILE REF: F262501.RED

WELL LOCATION : SAN JUAN COUNTY, NEW MEXICO

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/17	13:40:30	136.5000	4139.41	178.77	22.29	
04/17	13:40:45	136.7500	4139.69	178.76	.28	
04/17	14:08:00	164.0000	4162.01	176.71	22.32	
04/17	14:09:00	165.0000	4162.61	176.63	.60	
04/17	14:47:00	203.0000	4182.93	174.11	20.32	
04/17	15:25:00	241.0000	4197.64	171.98	14.71	
04/17	16:03:00	279.0000	4209.04	170.13	11.40	
04/17	16:41:00	317.0000	4218.77	168.57	9.73	
04/17	17:19:00	355.0000	4225.48	167.29	6.70	
04/17	17:57:00	393.0000	4231.85	166.23	6.38	
04/17	18:35:00	431.0000	4236.56	165.43	4.71	
04/17	19:13:00	469.0000	4239.53	164.70	2.97	
04/17	19:51:00	507.0000	4243.95	164.09	4.42	
04/17	20:29:00	545.0000	4248.16	163.54	4.22	
04/17	21:07:00	583.0000	4251.91	162.92	3.75	
04/17	21:45:00	621.0000	4255.00	162.42	3.09	
04/17	22:23:00	659.0000	4258.78	161.96	3.78	
04/17	23:01:00	697.0000	4262.74	161.54	3.96	
04/17	23:39:00	735.0000	4265.00	161.13	2.26	
04/18	00:17:00	773.0000	4265.20	160.80	.20	
04/18	00:55:00	811.0000	4265.63	160.62	.43	
04/18	01:33:00	849.0000	4266.50	160.49	.87	
04/18	02:11:00	887.0000	4268.62	160.37	2.12	
04/18	02:49:00	925.0000	4270.37	160.26	1.75	
04/18	03:27:00	963.0000	4272.05	160.17	1.68	
04/18	04:05:00	1001.0000	4270.53	160.10	-1.52	
04/18	04:43:00	1039.0000	4270.38	160.13	-.15	
04/18	05:21:00	1077.0000	4270.00	160.18	-.37	
04/18	05:59:00	1115.0000	4270.80	160.18	.80	
04/18	06:37:00	1153.0000	4271.68	160.16	.88	
04/18	06:57:45	1173.7500	4293.99	160.16	22.31	
04/18	06:58:00	1174.0000	4294.98	160.16	.99	
04/18	07:12:15	1188.2500	4317.16	159.67	22.18	
04/18	07:12:30	1188.5000	4317.55	159.65	.38	
04/18	07:51:00	1227.0000	4334.58	157.61	17.04	
04/18	08:29:00	1265.0000	4344.28	156.33	9.70	
04/18	09:07:00	1303.0000	4359.62	154.95	15.34	
04/18	09:45:00	1341.0000	4367.37	153.96	7.75	
04/18	10:23:00	1379.0000	4373.07	153.15	5.70	
04/18	11:01:00	1417.0000	4377.10	152.54	4.03	
04/18	11:39:00	1455.0000	4377.76	152.04	.65	
04/18	12:17:00	1493.0000	4380.20	151.64	2.45	
04/18	12:55:00	1531.0000	4382.92	151.26	2.71	
04/18	13:33:00	1569.0000	4382.91	151.04	-.00	
04/18	14:11:00	1607.0000	4386.20	150.81	3.29	
04/18	14:49:00	1645.0000	4388.76	150.58	2.56	
04/18	15:27:00	1683.0000	4390.92	150.36	2.16	
04/18	16:05:00	1721.0000	4394.17	150.13	3.25	
04/18	16:43:00	1759.0000	4396.46	149.94	2.29	
04/18	17:21:00	1797.0000	4399.17	149.77	2.71	
04/18	17:59:00	1835.0000	4400.94	149.59	1.77	
04/18	18:37:00	1873.0000	4403.14	149.46	2.19	
04/18	19:15:00	1911.0000	4403.94	149.36	.80	
04/18	19:53:00	1949.0000	4405.60	149.30	1.67	
04/18	20:31:00	1987.0000	4407.86	149.21	2.25	
04/18	21:09:00	2025.0000	4410.72	149.07	2.86	
04/18	21:47:00	2063.0000	4413.37	148.99	2.65	
04/18	22:25:00	2101.0000	4414.47	148.89	1.11	
04/18	23:03:00	2139.0000	4415.46	148.84	.99	
04/18	23:41:00	2177.0000	4416.99	148.82	1.53	
04/19	00:19:00	2215.0000	4418.28	148.77	1.29	
04/19	00:57:00	2253.0000	4420.70	148.70	2.43	
04/19	01:35:00	2291.0000	4423.23	148.54	2.52	
04/19	02:13:00	2329.0000	4425.67	148.38	2.45	
04/19	02:51:00	2367.0000	4428.49	148.24	2.82	

COMPANY: WESTERN REFINING SOUTHWEST, INC.

WELL NAME : WATER DISPOSAL WELL NO. 2 (BOTTOM INST.)

DATE : 05/02/19

WELL LOCATION : SAN JUAN COUNTY, NEW MEXICO

FILE REF: F262501.RED

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/19	03:29:00	2405.0000	4429.96	148.14	1.47	
04/19	04:07:00	2443.0000	4432.04	148.02	2.07	
04/19	04:45:00	2481.0000	4434.45	147.92	2.41	
04/19	05:23:00	2519.0000	4436.07	147.85	1.62	
04/19	06:01:00	2557.0000	4438.92	147.75	2.85	
04/19	06:39:00	2595.0000	4436.45	147.76	-2.47	
04/19	07:17:00	2633.0000	4436.25	147.86	-.20	
04/19	07:55:00	2671.0000	4437.43	147.93	1.18	
04/19	08:33:00	2709.0000	4437.62	147.97	.18	
04/19	09:11:00	2747.0000	4439.54	148.02	1.92	
04/19	09:49:00	2785.0000	4440.62	148.03	1.08	
04/19	10:27:00	2823.0000	4441.40	148.03	.78	
04/19	11:05:00	2861.0000	4457.33	147.85	15.93	
04/19	11:43:00	2899.0000	4461.57	147.17	4.24	
04/19	12:21:00	2937.0000	4464.53	146.79	2.96	
04/19	12:59:00	2975.0000	4465.82	146.54	1.29	
04/19	13:37:00	3013.0000	4468.25	146.35	2.42	
04/19	14:15:00	3051.0000	4469.71	146.18	1.46	
04/19	14:53:00	3089.0000	4471.09	146.05	1.38	
04/19	15:31:00	3127.0000	4473.02	145.92	1.93	
04/19	16:09:00	3165.0000	4475.42	145.80	2.40	
04/19	16:35:15	3191.2500	4453.66	145.75	-21.76	
04/19	16:35:30	3191.5000	4452.89	145.75	-.77	
04/19	16:54:00	3210.0000	4431.03	146.31	-21.86	
04/19	16:55:00	3211.0000	4430.49	146.35	-.54	
04/19	17:33:00	3249.0000	4419.17	147.81	-11.31	
04/19	18:11:00	3287.0000	4413.25	148.72	-5.92	
04/19	18:49:00	3325.0000	4410.23	149.39	-3.02	
04/19	19:27:00	3363.0000	4408.08	149.87	-2.15	
04/19	20:05:00	3401.0000	4406.74	150.26	-1.34	
04/19	20:43:00	3439.0000	4405.59	150.57	-1.15	
04/19	21:21:00	3477.0000	4404.27	150.85	-1.32	
04/19	21:59:00	3515.0000	4400.28	151.10	-4.00	
04/19	22:37:00	3553.0000	4397.88	151.47	-2.39	
04/19	23:15:00	3591.0000	4396.98	151.76	-.90	
04/19	23:53:00	3629.0000	4395.73	152.01	-1.25	
04/20	00:31:00	3667.0000	4396.35	152.21	.62	
04/20	01:09:00	3705.0000	4396.00	152.35	-.36	
04/20	01:47:00	3743.0000	4395.36	152.52	-.64	
04/20	02:25:00	3781.0000	4395.00	152.66	-.36	
04/20	03:03:00	3819.0000	4395.10	152.78	.10	
04/20	03:41:00	3857.0000	4395.06	152.89	-.05	
04/20	04:19:00	3895.0000	4393.91	153.02	-1.14	
04/20	04:57:00	3933.0000	4393.52	153.13	-.40	
04/20	05:35:00	3971.0000	4393.36	153.24	-.16	
04/20	06:13:00	4009.0000	4393.25	153.30	-.11	
04/20	06:19:00	4015.0000	4415.46	153.31	22.21	
04/20	06:19:15	4015.2500	4416.71	153.31	1.25	
04/20	06:58:00	4054.0000	4428.37	152.31	11.65	
04/20	07:36:00	4092.0000	4434.92	151.62	6.55	
04/20	08:14:00	4130.0000	4428.38	151.26	-6.54	
04/20	08:52:00	4168.0000	4428.40	151.24	.03	
04/20	09:30:00	4206.0000	4428.89	151.19	.49	
04/20	10:08:00	4244.0000	4429.69	151.14	.81	
04/20	10:19:00	4255.0000	4429.69	151.12	-.00	
04/20	10:20:00	4256.0000	4460.21	151.13	30.51	
04/20	10:21:15	4257.2500	4438.52	151.12	-21.68	
04/20	10:21:30	4257.5000	4437.25	151.12	-1.28	
04/20	10:37:00	4273.0000	4415.08	151.15	-22.17	
04/20	10:38:00	4274.0000	4414.54	151.16	-.54	
04/20	11:16:00	4312.0000	4408.20	151.75	-6.34	
04/20	11:54:00	4350.0000	4405.40	152.12	-2.80	
04/20	12:21:15	4377.2500	4388.18	152.34	-17.22	INJECTION STOPPED
04/20	12:21:30	4377.5000	4382.23	152.34	-5.95	BEGAN FALL-OFF
04/20	12:22:30	4378.5000	4363.21	152.36	-19.02	

COMPANY: WESTERN REFINING SOUTHWEST, INC.

WELL NAME : WATER DISPOSAL WELL NO. 2 (BOTTOM INST.)

DATE : 05/02/19

WELL LOCATION : SAN JUAN COUNTY, NEW MEXICO

FILE REF: P262501.RED

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/20	12:22:45	4378.7500	4359.52	152.36	-3.69	
04/20	12:24:45	4380.7500	4337.37	152.39	-22.15	
04/20	12:25:00	4381.0000	4335.37	152.40	-2.00	
04/20	12:28:15	4384.2500	4313.67	152.52	-21.70	
04/20	12:28:30	4384.5000	4312.37	152.54	-1.30	
04/20	12:34:00	4390.0000	4290.18	152.92	-22.19	
04/20	12:34:15	4390.2500	4289.38	152.94	-.80	
04/20	12:42:45	4398.7500	4267.44	153.65	-21.94	
04/20	12:43:00	4399.0000	4266.93	153.66	-.52	
04/20	12:56:15	4412.2500	4244.77	154.58	-22.16	
04/20	12:56:30	4412.5000	4244.52	154.60	-.25	
04/20	13:16:30	4432.5000	4222.33	155.82	-22.20	
04/20	13:16:45	4432.7500	4222.10	155.83	-.22	
04/20	13:46:00	4462.0000	4200.31	157.25	-21.79	
04/20	13:47:00	4463.0000	4199.70	157.29	-.62	
04/20	14:25:00	4501.0000	4180.30	158.65	-19.39	
04/20	15:03:00	4539.0000	4165.37	159.63	-14.93	
04/20	15:41:00	4577.0000	4152.83	160.39	-12.54	
04/20	16:19:00	4615.0000	4142.36	161.01	-10.47	
04/20	16:57:00	4653.0000	4132.89	161.55	-9.47	
04/20	17:35:00	4691.0000	4124.46	162.02	-8.43	
04/20	18:13:00	4729.0000	4116.68	162.46	-7.79	
04/20	18:51:00	4767.0000	4109.70	162.82	-6.97	
04/20	19:29:00	4805.0000	4103.11	163.14	-6.59	
04/20	20:07:00	4843.0000	4097.05	163.45	-6.06	
04/20	20:45:00	4881.0000	4091.34	163.72	-5.71	
04/20	21:23:00	4919.0000	4086.14	163.98	-5.21	
04/20	22:01:00	4957.0000	4081.17	164.21	-4.97	
04/20	22:39:00	4995.0000	4076.39	164.42	-4.78	
04/20	23:17:00	5033.0000	4072.02	164.62	-4.37	
04/20	23:55:00	5071.0000	4067.74	164.81	-4.29	
04/21	00:33:00	5109.0000	4063.78	164.99	-3.96	
04/21	01:11:00	5147.0000	4059.92	165.16	-3.86	
04/21	01:49:00	5185.0000	4056.28	165.32	-3.63	
04/21	02:27:00	5223.0000	4052.82	165.46	-3.47	
04/21	03:05:00	5261.0000	4049.44	165.61	-3.38	
04/21	03:43:00	5299.0000	4046.29	165.74	-3.15	
04/21	04:21:00	5337.0000	4043.17	165.88	-3.13	
04/21	04:59:00	5375.0000	4040.25	166.01	-2.92	
04/21	05:37:00	5413.0000	4037.36	166.15	-2.89	
04/21	06:15:00	5451.0000	4034.78	166.21	-2.58	
04/21	06:53:00	5489.0000	4032.17	166.29	-2.62	
04/21	07:31:00	5527.0000	4029.58	166.42	-2.59	
04/21	08:09:00	5565.0000	4027.00	166.53	-2.58	
04/21	08:47:00	5603.0000	4024.51	166.63	-2.49	
04/21	09:25:00	5641.0000	4022.23	166.72	-2.28	
04/21	10:03:00	5679.0000	4019.97	166.81	-2.26	
04/21	10:41:00	5717.0000	4017.72	166.91	-2.24	
04/21	11:19:00	5755.0000	4015.59	166.99	-2.13	
04/21	11:57:00	5793.0000	4013.53	167.07	-2.07	
04/21	12:35:00	5831.0000	4011.47	167.15	-2.06	
04/21	13:13:00	5869.0000	4009.50	167.23	-1.97	
04/21	13:51:00	5907.0000	4007.61	167.30	-1.88	
04/21	14:29:00	5945.0000	4005.77	167.38	-1.84	
04/21	15:07:00	5983.0000	4003.95	167.46	-1.82	
04/21	15:45:00	6021.0000	4002.16	167.53	-1.79	
04/21	16:23:00	6059.0000	4000.50	167.59	-1.66	
04/21	17:01:00	6097.0000	3998.76	167.67	-1.74	
04/21	17:39:00	6135.0000	3997.16	167.74	-1.60	
04/21	18:17:00	6173.0000	3995.61	167.79	-1.55	
04/21	18:55:00	6211.0000	3994.02	167.85	-1.59	
04/21	19:33:00	6249.0000	3992.52	167.90	-1.50	
04/21	20:11:00	6287.0000	3991.03	167.96	-1.49	
04/21	20:49:00	6325.0000	3989.52	168.03	-1.51	
04/21	21:27:00	6363.0000	3988.11	168.08	-1.42	

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/21	22:05:00	6401.0000	3986.69	168.14	-1.42	
04/21	22:43:00	6439.0000	3985.30	168.19	-1.39	
04/21	23:21:00	6477.0000	3983.96	168.24	-1.34	
04/21	23:59:00	6515.0000	3982.58	168.29	-1.38	
04/22	00:37:00	6553.0000	3981.31	168.34	-1.27	
04/22	01:15:00	6591.0000	3980.06	168.38	-1.25	
04/22	01:53:00	6629.0000	3978.79	168.44	-1.27	
04/22	02:31:00	6667.0000	3977.54	168.48	-1.25	
04/22	03:09:00	6705.0000	3976.35	168.53	-1.19	
04/22	03:47:00	6743.0000	3975.13	168.58	-1.23	
04/22	04:25:00	6781.0000	3973.98	168.63	-1.14	
04/22	05:03:00	6819.0000	3972.82	168.66	-1.17	
04/22	05:41:00	6857.0000	3971.70	168.71	-1.13	
04/22	06:19:00	6895.0000	3970.60	168.75	-1.10	
04/22	06:57:00	6933.0000	3969.52	168.79	-1.09	
04/22	07:35:00	6971.0000	3968.43	168.83	-1.09	
04/22	08:13:00	7009.0000	3967.38	168.87	-1.05	
04/22	08:51:00	7047.0000	3966.38	168.91	-1.01	
04/22	09:29:00	7085.0000	3965.33	168.95	-1.05	
04/22	10:07:00	7123.0000	3964.28	168.99	-1.05	
04/22	10:45:00	7161.0000	3963.32	169.02	-.96	
04/22	11:23:00	7199.0000	3962.30	169.06	-1.02	
04/22	12:01:00	7237.0000	3961.32	169.10	-.99	
04/22	12:39:00	7275.0000	3960.33	169.13	-.98	
04/22	13:17:00	7313.0000	3959.38	169.18	-.95	
04/22	13:55:00	7351.0000	3958.39	169.21	-.99	
04/22	14:33:00	7389.0000	3957.53	169.23	-.85	
04/22	15:11:00	7427.0000	3956.62	169.27	-.91	
04/22	15:49:00	7465.0000	3955.67	169.31	-.95	
04/22	16:27:00	7503.0000	3954.72	169.34	-.95	
04/22	17:05:00	7541.0000	3953.88	169.38	-.85	
04/22	17:43:00	7579.0000	3953.04	169.41	-.83	
04/22	18:21:00	7617.0000	3952.17	169.44	-.88	
04/22	18:59:00	7655.0000	3951.26	169.47	-.91	
04/22	19:37:00	7693.0000	3950.36	169.51	-.90	
04/22	20:15:00	7731.0000	3949.48	169.53	-.88	
04/22	20:53:00	7769.0000	3948.46	169.57	-1.02	
04/22	21:31:00	7807.0000	3947.40	169.60	-1.06	
04/22	22:09:00	7845.0000	3947.08	169.63	-.31	
04/22	22:47:00	7883.0000	3947.08	169.66	-.01	
04/22	23:25:00	7921.0000	3946.90	169.70	-.18	
04/23	00:03:00	7959.0000	3946.45	169.72	-.45	
04/23	00:41:00	7997.0000	3945.48	169.76	-.97	
04/23	01:19:00	8035.0000	3944.57	169.78	-.91	
04/23	01:57:00	8073.0000	3943.72	169.81	-.85	
04/23	02:35:00	8111.0000	3942.87	169.83	-.85	
04/23	03:13:00	8149.0000	3942.14	169.87	-.73	
04/23	03:51:00	8187.0000	3941.42	169.91	-.72	
04/23	04:29:00	8225.0000	3940.68	169.93	-.74	
04/23	05:07:00	8263.0000	3939.94	169.95	-.74	
04/23	05:45:00	8301.0000	3939.24	169.98	-.70	
04/23	06:23:00	8339.0000	3938.58	170.01	-.66	
04/23	07:01:00	8377.0000	3937.94	170.03	-.64	
04/23	07:39:00	8415.0000	3937.22	170.06	-.72	
04/23	08:17:00	8453.0000	3936.55	170.09	-.67	
04/23	08:55:00	8491.0000	3935.89	170.12	-.67	
04/23	09:33:00	8529.0000	3935.18	170.14	-.71	
04/23	10:11:00	8567.0000	3934.59	170.16	-.59	
04/23	10:49:00	8605.0000	3933.96	170.19	-.64	
04/23	11:27:00	8643.0000	3933.30	170.23	-.66	
04/23	12:05:00	8681.0000	3932.74	170.24	-.55	
04/23	12:43:00	8719.0000	3932.00	170.27	-.74	
04/23	13:21:00	8757.0000	3931.44	170.30	-.56	
04/23	13:59:00	8795.0000	3930.83	170.32	-.61	
04/23	14:37:00	8833.0000	3930.25	170.34	-.58	

COMPANY: WESTERN REFINING SOUTHWEST, INC.

WELL NAME : WATER DISPOSAL WELL NO. 2 (BOTTOM INST.)

DATE : 05/02/19

WELL LOCATION : SAN JUAN COUNTY, NEW MEXICO

FILE REF: F262501.RED

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/23	15:15:00	8871.0000	3929.61	170.36	-.64	
04/23	15:53:00	8909.0000	3929.04	170.39	-.57	
04/23	16:31:00	8947.0000	3928.45	170.41	-.60	
04/23	17:09:00	8985.0000	3927.89	170.44	-.56	
04/23	17:47:00	9023.0000	3927.33	170.46	-.56	
04/23	18:25:00	9061.0000	3926.77	170.49	-.56	
04/23	19:03:00	9099.0000	3926.23	170.51	-.54	
04/23	19:41:00	9137.0000	3925.69	170.53	-.54	
04/23	20:19:00	9175.0000	3925.14	170.55	-.55	
04/23	20:57:00	9213.0000	3924.66	170.57	-.48	
04/23	21:35:00	9251.0000	3924.09	170.59	-.57	
04/23	22:13:00	9289.0000	3923.51	170.62	-.58	
04/23	22:51:00	9327.0000	3922.98	170.64	-.53	
04/23	23:29:00	9365.0000	3922.48	170.66	-.51	
04/24	00:07:00	9403.0000	3921.94	170.68	-.54	
04/24	00:45:00	9441.0000	3921.46	170.70	-.47	
04/24	01:23:00	9479.0000	3921.01	170.73	-.45	
04/24	02:01:00	9517.0000	3920.43	170.75	-.50	
04/24	02:39:00	9555.0000	3919.89	170.77	-.54	
04/24	03:17:00	9593.0000	3919.39	170.80	-.50	
04/24	03:55:00	9631.0000	3918.94	170.82	-.45	
04/24	04:33:00	9669.0000	3918.49	170.83	-.45	
04/24	05:11:00	9707.0000	3917.92	170.85	-.57	
04/24	05:49:00	9745.0000	3917.44	170.87	-.47	
04/24	06:27:00	9783.0000	3916.88	170.90	-.56	
04/24	07:05:00	9821.0000	3916.51	170.92	-.37	
04/24	07:43:00	9859.0000	3916.00	170.94	-.51	
04/24	08:21:00	9897.0000	3915.62	170.96	-.38	
04/24	08:59:00	9935.0000	3915.06	170.98	-.56	
04/24	09:37:00	9973.0000	3914.65	171.01	-.41	
04/24	10:15:00	10011.0000	3914.12	171.02	-.53	
04/24	10:53:00	10049.0000	3913.65	171.04	-.47	
04/24	11:31:00	10087.0000	3913.21	171.06	-.44	
04/24	12:09:00	10125.0000	3912.79	171.08	-.41	
04/24	12:47:00	10163.0000	3912.29	171.10	-.50	
04/24	13:25:00	10201.0000	3911.85	171.11	-.44	
04/24	14:03:00	10239.0000	3911.39	171.14	-.46	
04/24	14:41:00	10277.0000	3910.96	171.16	-.43	
04/24	15:19:00	10315.0000	3910.52	171.17	-.44	
04/24	15:57:00	10353.0000	3910.06	171.19	-.46	
04/24	16:35:00	10391.0000	3909.66	171.21	-.41	
04/24	17:13:00	10429.0000	3909.23	171.24	-.43	
04/24	17:51:00	10467.0000	3908.81	171.24	-.42	
04/24	18:29:00	10505.0000	3908.45	171.26	-.36	
04/24	19:07:00	10543.0000	3907.99	171.29	-.46	
04/24	19:45:00	10581.0000	3907.64	171.30	-.36	
04/24	20:23:00	10619.0000	3907.18	171.32	-.45	
04/24	21:01:00	10657.0000	3906.80	171.33	-.38	
04/24	21:39:00	10695.0000	3906.32	171.35	-.48	
04/24	22:17:00	10733.0000	3905.97	171.37	-.35	
04/24	22:55:00	10771.0000	3905.64	171.39	-.34	
04/24	23:33:00	10809.0000	3905.19	171.40	-.45	
04/25	00:11:00	10847.0000	3904.78	171.42	-.41	
04/25	00:49:00	10885.0000	3904.39	171.44	-.40	
04/25	01:27:00	10923.0000	3903.99	171.45	-.40	
04/25	02:05:00	10961.0000	3903.64	171.47	-.35	
04/25	02:43:00	10999.0000	3903.25	171.49	-.39	
04/25	03:21:00	11037.0000	3902.85	171.51	-.40	
04/25	03:59:00	11075.0000	3902.45	171.53	-.40	
04/25	04:37:00	11113.0000	3902.06	171.54	-.38	
04/25	05:15:00	11151.0000	3901.73	171.56	-.33	
04/25	05:53:00	11189.0000	3901.35	171.57	-.38	
04/25	06:31:00	11227.0000	3900.91	171.59	-.44	
04/25	07:09:00	11265.0000	3900.63	171.61	-.28	
04/25	07:47:00	11303.0000	3900.26	171.63	-.38	

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/25	08:25:00	11341.0000	3899.86	171.64	-.39	
04/25	09:03:00	11379.0000	3899.55	171.66	-.31	
04/25	09:41:00	11417.0000	3899.12	171.68	-.43	
04/25	10:19:00	11455.0000	3898.83	171.69	-.29	
04/25	10:57:00	11493.0000	3898.45	171.71	-.38	
04/25	11:35:00	11531.0000	3898.06	171.73	-.40	
04/25	12:13:00	11569.0000	3897.65	171.74	-.41	
04/25	12:51:00	11607.0000	3897.34	171.76	-.31	
04/25	13:29:00	11645.0000	3896.97	171.77	-.38	
04/25	14:07:00	11683.0000	3896.67	171.79	-.30	
04/25	14:45:00	11721.0000	3896.24	171.81	-.43	
04/25	15:23:00	11759.0000	3895.90	171.82	-.34	
04/25	16:01:00	11797.0000	3895.53	171.84	-.37	
04/25	16:39:00	11835.0000	3895.27	171.85	-.25	
04/25	17:17:00	11873.0000	3894.91	171.87	-.36	
04/25	17:55:00	11911.0000	3894.53	171.88	-.38	
04/25	18:33:00	11949.0000	3894.23	171.90	-.30	
04/25	19:11:00	11987.0000	3893.83	171.92	-.39	
04/25	19:49:00	12025.0000	3893.57	171.93	-.26	
04/25	20:27:00	12063.0000	3893.25	171.94	-.32	
04/25	21:05:00	12101.0000	3892.95	171.95	-.31	
04/25	21:43:00	12139.0000	3892.60	171.98	-.34	
04/25	22:21:00	12177.0000	3892.25	171.99	-.35	
04/25	22:59:00	12215.0000	3891.94	172.00	-.31	
04/25	23:37:00	12253.0000	3891.65	172.02	-.29	
04/26	00:15:00	12291.0000	3891.29	172.03	-.36	
04/26	00:53:00	12329.0000	3890.98	172.05	-.31	
04/26	01:31:00	12367.0000	3890.71	172.06	-.27	
04/26	02:09:00	12405.0000	3890.34	172.08	-.36	
04/26	02:47:00	12443.0000	3890.06	172.09	-.28	
04/26	03:25:00	12481.0000	3889.68	172.11	-.38	
04/26	04:03:00	12519.0000	3889.42	172.12	-.26	
04/26	04:41:00	12557.0000	3889.08	172.13	-.34	
04/26	05:19:00	12595.0000	3888.79	172.15	-.29	
04/26	05:57:00	12633.0000	3888.43	172.16	-.36	
04/26	06:35:00	12671.0000	3888.23	172.17	-.20	
04/26	07:13:00	12709.0000	3887.86	172.18	-.36	
04/26	07:51:00	12747.0000	3887.61	172.21	-.25	
04/26	08:29:00	12785.0000	3887.26	172.22	-.35	
04/26	09:07:00	12823.0000	3886.95	172.23	-.30	
04/26	09:45:00	12861.0000	3886.68	172.25	-.27	
04/26	10:23:00	12899.0000	3886.39	172.26	-.30	
04/26	11:01:00	12937.0000	3886.11	172.27	-.28	
04/26	11:39:00	12975.0000	3885.76	172.29	-.35	
04/26	12:17:00	13013.0000	3885.45	172.30	-.31	
04/26	12:55:00	13051.0000	3885.20	172.32	-.25	
04/26	13:33:00	13089.0000	3884.86	172.33	-.34	
04/26	14:11:00	13127.0000	3884.58	172.35	-.27	
04/26	14:49:00	13165.0000	3884.24	172.35	-.34	
04/26	15:27:00	13203.0000	3883.96	172.37	-.28	
04/26	16:05:00	13241.0000	3883.75	172.38	-.21	
04/26	16:43:00	13279.0000	3883.41	172.40	-.34	
04/26	17:21:00	13317.0000	3883.11	172.41	-.29	
04/26	17:59:00	13355.0000	3882.86	172.42	-.25	
04/26	18:37:00	13393.0000	3882.58	172.43	-.28	
04/26	19:15:00	13431.0000	3882.28	172.45	-.30	
04/26	19:53:00	13469.0000	3882.04	172.46	-.24	
04/26	20:31:00	13507.0000	3881.70	172.47	-.35	
04/26	21:09:00	13545.0000	3881.45	172.48	-.25	
04/26	21:47:00	13583.0000	3881.18	172.50	-.27	
04/26	22:25:00	13621.0000	3880.90	172.50	-.27	
04/26	23:03:00	13659.0000	3880.68	172.52	-.23	
04/26	23:41:00	13697.0000	3880.41	172.53	-.27	
04/27	00:19:00	13735.0000	3880.09	172.54	-.32	
04/27	00:57:00	13773.0000	3879.84	172.55	-.25	

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/27	01:35:00	13811.0000	3879.55	172.57	-.30	
04/27	02:13:00	13849.0000	3879.35	172.58	-.19	
04/27	02:51:00	13887.0000	3879.07	172.59	-.29	
04/27	03:29:00	13925.0000	3878.77	172.60	-.29	
04/27	04:07:00	13963.0000	3878.54	172.62	-.23	
04/27	04:45:00	14001.0000	3878.28	172.63	-.26	
04/27	05:23:00	14039.0000	3878.03	172.63	-.25	
04/27	06:01:00	14077.0000	3877.71	172.66	-.32	
04/27	06:39:00	14115.0000	3877.47	172.66	-.24	
04/27	07:17:00	14153.0000	3877.23	172.68	-.24	
04/27	07:55:00	14191.0000	3876.96	172.68	-.27	
04/27	08:33:00	14229.0000	3876.72	172.70	-.24	
04/27	09:11:00	14267.0000	3876.44	172.71	-.28	
04/27	09:49:00	14305.0000	3876.22	172.72	-.22	
04/27	10:27:00	14343.0000	3875.91	172.73	-.31	
04/27	11:05:00	14381.0000	3875.65	172.74	-.25	
04/27	11:43:00	14419.0000	3875.39	172.76	-.27	
04/27	12:21:00	14457.0000	3875.18	172.77	-.21	
04/27	12:59:00	14495.0000	3874.90	172.78	-.28	
04/27	13:37:00	14533.0000	3874.65	172.79	-.25	
04/27	14:15:00	14571.0000	3874.42	172.80	-.23	
04/27	14:53:00	14609.0000	3874.18	172.82	-.23	
04/27	15:31:00	14647.0000	3873.94	172.82	-.25	
04/27	16:09:00	14685.0000	3873.66	172.84	-.27	
04/27	16:47:00	14723.0000	3873.44	172.85	-.23	
04/27	17:25:00	14761.0000	3873.20	172.86	-.24	
04/27	18:03:00	14799.0000	3872.95	172.87	-.24	
04/27	18:41:00	14837.0000	3872.74	172.88	-.22	
04/27	19:19:00	14875.0000	3872.48	172.89	-.26	
04/27	19:57:00	14913.0000	3872.23	172.90	-.25	
04/27	20:35:00	14951.0000	3871.99	172.92	-.24	
04/27	21:13:00	14989.0000	3871.74	172.92	-.25	
04/27	21:51:00	15027.0000	3871.54	172.93	-.19	
04/27	22:29:00	15065.0000	3871.31	172.94	-.24	
04/27	23:07:00	15103.0000	3871.05	172.96	-.26	
04/27	23:45:00	15141.0000	3870.85	172.97	-.20	
04/28	00:23:00	15179.0000	3870.57	172.98	-.28	
04/28	01:01:00	15217.0000	3870.33	172.99	-.24	
04/28	01:39:00	15255.0000	3870.14	173.00	-.20	
04/28	02:17:00	15293.0000	3869.90	173.02	-.24	
04/28	02:55:00	15331.0000	3869.69	173.02	-.21	
04/28	03:33:00	15369.0000	3869.49	173.04	-.20	
04/28	04:11:00	15407.0000	3869.26	173.05	-.23	
04/28	04:49:00	15445.0000	3869.02	173.07	-.24	
04/28	05:27:00	15483.0000	3868.78	173.07	-.24	
04/28	06:05:00	15521.0000	3868.60	173.08	-.18	
04/28	06:43:00	15559.0000	3868.34	173.10	-.26	
04/28	07:21:00	15597.0000	3868.12	173.10	-.22	
04/28	07:59:00	15635.0000	3867.88	173.12	-.25	
04/28	08:37:00	15673.0000	3867.65	173.13	-.23	
04/28	09:15:00	15711.0000	3867.43	173.14	-.22	
04/28	09:53:00	15749.0000	3867.16	173.15	-.27	
04/28	10:31:00	15787.0000	3866.97	173.16	-.19	
04/28	11:09:00	15825.0000	3866.78	173.17	-.19	
04/28	11:47:00	15863.0000	3866.58	173.18	-.20	
04/28	12:25:00	15901.0000	3866.27	173.20	-.31	
04/28	13:03:00	15939.0000	3866.15	173.21	-.11	
04/28	13:41:00	15977.0000	3865.91	173.21	-.25	
04/28	14:19:00	16015.0000	3865.70	173.23	-.21	
04/28	14:57:00	16053.0000	3865.46	173.24	-.24	
04/28	15:35:00	16091.0000	3865.28	173.25	-.18	
04/28	16:13:00	16129.0000	3865.04	173.25	-.24	
04/28	16:51:00	16167.0000	3864.83	173.26	-.21	
04/28	17:29:00	16205.0000	3864.62	173.27	-.21	
04/28	18:07:00	16243.0000	3864.39	173.28	-.23	

COMPANY: WESTERN REFINING SOUTHWEST, INC.

WELL NAME : WATER DISPOSAL WELL NO. 2 (BOTTOM INST.)

DATE : 05/02/19

WELL LOCATION : SAN JUAN COUNTY, NEW MEXICO

FILE REF: F262501.RED

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/28	18:45:00	16281.0000	3864.21	173.29	-.19	
04/28	19:23:00	16319.0000	3863.97	173.30	-.24	
04/28	20:01:00	16357.0000	3863.76	173.32	-.21	
04/28	20:39:00	16395.0000	3863.55	173.33	-.21	
04/28	21:17:00	16433.0000	3863.34	173.33	-.21	
04/28	21:55:00	16471.0000	3863.13	173.34	-.20	
04/28	22:33:00	16509.0000	3862.95	173.35	-.19	
04/28	23:11:00	16547.0000	3862.67	173.37	-.27	
04/28	23:49:00	16585.0000	3862.51	173.37	-.17	
04/29	00:27:00	16623.0000	3862.31	173.38	-.20	
04/29	01:05:00	16661.0000	3862.11	173.39	-.20	
04/29	01:43:00	16699.0000	3861.96	173.40	-.14	
04/29	02:21:00	16737.0000	3861.70	173.42	-.27	
04/29	02:59:00	16775.0000	3861.53	173.42	-.17	
04/29	03:37:00	16813.0000	3861.33	173.43	-.20	
04/29	04:15:00	16851.0000	3861.14	173.45	-.20	
04/29	04:53:00	16889.0000	3860.96	173.46	-.17	
04/29	05:31:00	16927.0000	3860.77	173.47	-.19	
04/29	06:09:00	16965.0000	3860.56	173.48	-.21	
04/29	06:47:00	17003.0000	3860.35	173.50	-.21	
04/29	07:25:00	17041.0000	3860.16	173.50	-.20	
04/29	08:03:00	17079.0000	3859.93	173.50	-.22	
04/29	08:41:00	17117.0000	3859.77	173.52	-.16	
04/29	09:19:00	17155.0000	3859.56	173.52	-.21	
04/29	09:57:00	17193.0000	3859.35	173.53	-.21	
04/29	10:35:00	17231.0000	3859.14	173.55	-.21	
04/29	11:13:00	17269.0000	3858.95	173.56	-.19	
04/29	11:51:00	17307.0000	3858.78	173.57	-.18	
04/29	12:29:00	17345.0000	3858.56	173.57	-.22	
04/29	13:07:00	17383.0000	3858.39	173.59	-.17	
04/29	13:45:00	17421.0000	3858.20	173.59	-.18	
04/29	14:23:00	17459.0000	3858.03	173.60	-.18	
04/29	15:01:00	17497.0000	3857.81	173.60	-.22	
04/29	15:39:00	17535.0000	3857.65	173.61	-.16	
04/29	16:17:00	17573.0000	3857.46	173.63	-.19	
04/29	16:55:00	17611.0000	3857.25	173.63	-.21	
04/29	17:33:00	17649.0000	3857.06	173.64	-.20	
04/29	18:11:00	17687.0000	3856.89	173.65	-.17	
04/29	18:49:00	17725.0000	3856.68	173.65	-.21	
04/29	19:27:00	17763.0000	3856.51	173.66	-.17	
04/29	20:05:00	17801.0000	3856.28	173.68	-.23	
04/29	20:43:00	17839.0000	3856.10	173.69	-.18	
04/29	21:21:00	17877.0000	3855.90	173.70	-.20	
04/29	21:59:00	17915.0000	3855.70	173.71	-.20	
04/29	22:37:00	17953.0000	3855.54	173.73	-.16	
04/29	23:15:00	17991.0000	3855.36	173.73	-.19	
04/29	23:53:00	18029.0000	3855.21	173.74	-.15	
04/30	00:31:00	18067.0000	3854.99	173.75	-.22	
04/30	01:09:00	18105.0000	3854.80	173.75	-.19	
04/30	01:47:00	18143.0000	3854.64	173.76	-.15	
04/30	02:25:00	18181.0000	3854.47	173.77	-.18	
04/30	03:03:00	18219.0000	3854.27	173.79	-.19	
04/30	03:41:00	18257.0000	3854.10	173.79	-.17	
04/30	04:19:00	18295.0000	3853.94	173.81	-.16	
04/30	04:57:00	18333.0000	3853.74	173.81	-.20	
04/30	05:35:00	18371.0000	3853.59	173.82	-.16	
04/30	06:13:00	18409.0000	3853.38	173.83	-.21	
04/30	06:51:00	18447.0000	3853.24	173.84	-.14	
04/30	07:29:00	18485.0000	3853.01	173.84	-.23	
04/30	08:07:00	18523.0000	3852.86	173.85	-.15	
04/30	08:45:00	18561.0000	3852.65	173.87	-.21	
04/30	09:23:00	18599.0000	3852.49	173.87	-.17	
04/30	10:01:00	18637.0000	3852.31	173.88	-.18	
04/30	10:39:00	18675.0000	3852.09	173.89	-.22	
04/30	11:17:00	18713.0000	3851.95	173.90	-.14	

COMPANY: WESTERN REFINING SOUTHWEST, INC.

WELL NAME : WATER DISPOSAL WELL NO. 2 (BOTTOM INST.)

DATE : 05/02/19

WELL LOCATION : SAN JUAN COUNTY, NEW MEXICO

FILE REF: F262501.RED

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/30	11:55:00	18751.0000	3851.77	173.92	-.19	
04/30	12:33:00	18789.0000	3851.58	173.92	-.18	
04/30	13:00:30	18816.5000	3835.41	175.65	-16.17	ENDED FALL-OFF/TANDEM INST. OFF BOTTOM
04/30	13:00:45	18816.7500	3824.77	175.94	-10.65	
04/30	13:01:15	18817.2500	3803.61	176.52	-21.15	
04/30	13:01:30	18817.5000	3792.53	176.82	-11.08	
04/30	13:02:00	18818.0000	3771.11	177.40	-21.42	
04/30	13:02:15	18818.2500	3760.07	177.90	-11.04	
04/30	13:02:45	18818.7500	3738.05	178.75	-22.03	
04/30	13:03:00	18819.0000	3727.38	179.18	-10.66	
04/30	13:04:45	18820.7500	3715.67	182.18	-11.72	
04/30	13:08:30	18824.5000	3716.24	185.23	.58	
04/30	13:11:15	18827.2500	3706.35	186.07	-9.89	STOP @ 7000'
04/30	13:11:30	18827.5000	3687.13	186.03	-19.22	
04/30	13:11:45	18827.7500	3666.23	185.98	-20.90	
04/30	13:12:00	18828.0000	3644.61	185.94	-21.62	
04/30	13:12:15	18828.2500	3624.13	185.90	-20.49	
04/30	13:12:30	18828.5000	3603.51	185.85	-20.62	
04/30	13:12:45	18828.7500	3582.88	185.81	-20.63	
04/30	13:13:00	18829.0000	3561.68	185.77	-21.19	
04/30	13:13:15	18829.2500	3540.50	185.72	-21.18	
04/30	13:13:30	18829.5000	3519.59	185.68	-20.91	
04/30	13:13:45	18829.7500	3498.69	185.63	-20.90	
04/30	13:14:00	18830.0000	3477.49	185.59	-21.19	
04/30	13:14:15	18830.2500	3456.65	185.37	-20.84	
04/30	13:14:30	18830.5000	3435.88	184.96	-20.77	
04/30	13:14:45	18830.7500	3416.51	184.56	-19.37	
04/30	13:15:00	18831.0000	3396.85	184.16	-19.66	
04/30	13:15:15	18831.2500	3376.91	183.76	-19.94	
04/30	13:15:30	18831.5000	3359.77	183.36	-17.13	
04/30	13:15:45	18831.7500	3344.20	182.95	-15.58	
04/30	13:16:00	18832.0000	3328.61	182.55	-15.59	
04/30	13:16:15	18832.2500	3313.01	182.15	-15.59	
04/30	13:16:30	18832.5000	3298.40	181.75	-14.61	
04/30	13:18:15	18834.2500	3292.00	178.40	-6.40	
04/30	13:20:00	18836.0000	3291.66	174.91	-.34	
04/30	13:22:45	18838.7500	3291.18	171.77	-.48	
04/30	13:23:30	18839.5000	3279.60	171.04	-11.58	STOP @ 6000'
04/30	13:23:45	18839.7500	3259.15	170.77	-20.45	
04/30	13:24:00	18840.0000	3238.55	170.51	-20.60	
04/30	13:24:15	18840.2500	3218.09	170.25	-20.46	
04/30	13:24:30	18840.5000	3197.63	169.99	-20.46	
04/30	13:24:45	18840.7500	3177.31	169.73	-20.32	
04/30	13:25:00	18841.0000	3156.85	169.47	-20.46	
04/30	13:25:15	18841.2500	3136.24	169.21	-20.61	
04/30	13:25:30	18841.5000	3115.35	168.95	-20.89	
04/30	13:25:45	18841.7500	3093.63	168.68	-21.73	
04/30	13:26:00	18842.0000	3071.60	168.42	-22.02	
04/30	13:26:15	18842.2500	3049.91	167.97	-21.69	
04/30	13:26:30	18842.5000	3028.56	167.33	-21.35	
04/30	13:26:45	18842.7500	3007.06	166.69	-21.50	
04/30	13:27:00	18843.0000	2985.54	166.05	-21.52	
04/30	13:27:15	18843.2500	2963.76	165.41	-21.78	
04/30	13:27:30	18843.5000	2941.38	164.78	-22.38	
04/30	13:27:45	18843.7500	2922.26	164.14	-19.13	
04/30	13:28:00	18844.0000	2903.40	163.51	-18.86	
04/30	13:28:15	18844.2500	2884.69	162.87	-18.71	
04/30	13:29:30	18845.5000	2864.32	159.59	-20.37	
04/30	13:30:45	18846.7500	2863.90	156.48	-.42	
04/30	13:32:00	18848.0000	2863.66	153.38	-.24	
04/30	13:34:15	18850.2500	2862.99	150.28	-.67	STOP @ 5000'
04/30	13:35:15	18851.2500	2842.54	149.07	-20.45	
04/30	13:35:30	18851.5000	2820.46	148.76	-22.09	
04/30	13:35:45	18851.7500	2797.79	148.46	-22.67	
04/30	13:36:00	18852.0000	2775.27	148.15	-22.52	

COMPANY: WESTERN REFINING SOUTHWEST, INC.

WELL NAME : WATER DISPOSAL WELL NO. 2 (BOTTOM INST.)

DATE : 05/02/19

WELL LOCATION : SAN JUAN COUNTY, NEW MEXICO

FILE REF: F262501.RED

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/30	13:36:15	18852.2500	2752.88	147.85	-22.39	
04/30	13:36:30	18852.5000	2730.64	147.54	-22.24	
04/30	13:36:45	18852.7500	2708.24	147.24	-22.40	
04/30	13:37:00	18853.0000	2684.30	146.93	-23.95	
04/30	13:37:15	18853.2500	2660.48	146.63	-23.82	
04/30	13:37:30	18853.5000	2636.24	146.32	-24.24	
04/30	13:37:45	18853.7500	2611.43	146.02	-24.81	
04/30	13:38:00	18854.0000	2586.62	145.71	-24.81	
04/30	13:38:15	18854.2500	2562.23	145.25	-24.40	
04/30	13:38:30	18854.5000	2537.93	144.67	-24.30	
04/30	13:38:45	18854.7500	2513.50	144.09	-24.43	
04/30	13:39:00	18855.0000	2489.33	143.50	-24.17	
04/30	13:39:15	18855.2500	2473.11	142.91	-16.22	
04/30	13:39:30	18855.5000	2459.72	142.32	-13.39	
04/30	13:39:45	18855.7500	2445.89	141.74	-13.83	
04/30	13:40:00	18856.0000	2435.19	141.15	-10.70	
04/30	13:41:30	18857.5000	2433.91	137.69	-1.28	
04/30	13:43:15	18859.2500	2432.91	134.28	-1.00	
04/30	13:45:30	18861.5000	2432.43	131.16	-.48	
04/30	13:48:15	18864.2500	2419.90	128.75	-12.53	STOP @ 4000'
04/30	13:48:30	18864.5000	2395.72	128.58	-24.18	
04/30	13:48:45	18864.7500	2369.56	128.40	-26.16	
04/30	13:49:00	18865.0000	2342.39	128.23	-27.17	
04/30	13:49:15	18865.2500	2315.23	128.06	-27.17	
04/30	13:49:30	18865.5000	2288.06	127.89	-27.17	
04/30	13:49:45	18865.7500	2260.03	127.72	-28.02	
04/30	13:50:00	18866.0000	2232.71	127.56	-27.32	
04/30	13:50:15	18866.2500	2205.21	127.27	-27.51	
04/30	13:50:30	18866.5000	2177.89	126.72	-27.31	
04/30	13:50:45	18866.7500	2150.72	126.16	-27.17	
04/30	13:51:00	18867.0000	2122.69	125.61	-28.03	
04/30	13:51:15	18867.2500	2097.21	125.05	-25.48	
04/30	13:51:30	18867.5000	2073.01	124.49	-24.20	
04/30	13:51:45	18867.7500	2048.94	123.94	-24.07	
04/30	13:52:00	18868.0000	2024.58	123.38	-24.35	
04/30	13:52:15	18868.2500	2005.06	122.83	-19.53	
04/30	13:52:30	18868.5000	2000.90	122.27	-4.16	
04/30	13:54:00	18870.0000	2000.99	118.70	.09	
04/30	13:55:30	18871.5000	2000.23	115.20	-.76	
04/30	13:57:30	18873.5000	1999.44	112.06	-.80	
04/30	13:59:15	18875.2500	1986.38	109.96	-13.06	STOP @ 3000'
04/30	13:59:30	18875.5000	1961.55	109.77	-24.83	
04/30	13:59:45	18875.7500	1933.14	109.58	-28.41	
04/30	14:00:00	18876.0000	1904.74	109.38	-28.40	
04/30	14:00:15	18876.2500	1876.20	109.18	-28.54	
04/30	14:00:30	18876.5000	1847.37	108.98	-28.83	
04/30	14:00:45	18876.7500	1818.25	108.78	-29.12	
04/30	14:01:00	18877.0000	1789.27	108.58	-28.98	
04/30	14:01:15	18877.2500	1760.43	108.39	-28.84	
04/30	14:01:30	18877.5000	1731.73	108.19	-28.70	
04/30	14:01:45	18877.7500	1702.90	107.99	-28.84	
04/30	14:02:00	18878.0000	1673.91	107.80	-28.99	
04/30	14:02:15	18878.2500	1644.55	107.51	-29.36	
04/30	14:02:30	18878.5000	1615.44	107.04	-29.11	
04/30	14:02:45	18878.7500	1591.18	106.57	-24.26	
04/30	14:03:00	18879.0000	1571.47	106.11	-19.71	
04/30	14:03:15	18879.2500	1565.47	105.64	-6.00	
04/30	14:05:00	18881.0000	1566.41	102.38	.94	
04/30	14:07:00	18883.0000	1565.51	99.30	-.90	
04/30	14:10:00	18886.0000	1565.11	96.10	-.40	STOP @ 2000'
04/30	14:10:15	18886.2500	1549.30	95.89	-15.81	
04/30	14:10:30	18886.5000	1527.54	95.68	-21.76	
04/30	14:10:45	18886.7500	1505.06	95.48	-22.47	
04/30	14:11:00	18887.0000	1481.01	95.27	-24.05	
04/30	14:11:15	18887.2500	1455.24	95.07	-25.77	

COMPANY: WESTERN REFINING SOUTHWEST, INC.

DATE : 05/02/19

WELL NAME : WATER DISPOSAL WELL NO. 2 (BOTTOM INST.)

FILE REF: P262501.RED

WELL LOCATION : SAN JUAN COUNTY, NEW MEXICO

Date MM/DD	Time hh:mm:ss	Test Time mmmmmm.mmmm	Pressure Psig	Temp Deg F	deltaP Psi	Comment Ga. Press Ref. to 14.7 Psi Atm.
04/30	14:11:30	18887.5000	1430.00	94.69	-25.24	
04/30	14:11:45	18887.7500	1404.61	94.30	-25.39	
04/30	14:12:00	18888.0000	1378.51	93.91	-26.10	
04/30	14:12:15	18888.2500	1352.25	93.53	-26.25	
04/30	14:12:30	18888.5000	1326.14	93.14	-26.12	
04/30	14:12:45	18888.7500	1299.45	92.74	-26.68	
04/30	14:13:00	18889.0000	1272.19	92.36	-27.27	
04/30	14:13:15	18889.2500	1245.06	91.97	-27.12	
04/30	14:13:30	18889.5000	1218.65	91.58	-26.41	
04/30	14:13:45	18889.7500	1191.37	91.20	-27.28	
04/30	14:14:00	18890.0000	1163.66	90.81	-27.71	
04/30	14:14:15	18890.2500	1137.08	90.17	-26.59	
04/30	14:15:30	18891.5000	1132.60	86.74	-4.48	
04/30	14:16:45	18892.7500	1132.19	83.32	-.41	
04/30	14:18:30	18894.5000	1131.23	79.91	-.96	
04/30	14:20:30	18896.5000	1130.83	76.79	-.40	STOP @ 1000'
04/30	14:22:15	18898.2500	1115.75	75.16	-15.08	
04/30	14:22:30	18898.5000	1094.19	74.93	-21.55	
04/30	14:22:45	18898.7500	1072.91	74.69	-21.28	
04/30	14:23:00	18899.0000	1051.79	74.46	-21.13	
04/30	14:23:15	18899.2500	1030.65	74.24	-21.14	
04/30	14:23:30	18899.5000	1009.40	73.94	-21.25	
04/30	14:23:45	18899.7500	988.02	73.62	-21.38	
04/30	14:24:00	18900.0000	966.20	73.31	-21.82	
04/30	14:24:15	18900.2500	944.38	73.00	-21.82	
04/30	14:24:30	18900.5000	922.70	72.69	-21.68	
04/30	14:24:45	18900.7500	901.02	72.38	-21.68	
04/30	14:25:00	18901.0000	878.48	72.07	-22.54	
04/30	14:25:15	18901.2500	854.64	71.76	-23.84	
04/30	14:25:30	18901.5000	830.36	71.45	-24.27	
04/30	14:25:45	18901.7500	805.95	71.13	-24.41	
04/30	14:26:00	18902.0000	781.67	70.83	-24.28	
04/30	14:26:15	18902.2500	756.99	70.43	-24.67	
04/30	14:26:30	18902.5000	732.15	70.09	-24.84	
04/30	14:26:45	18902.7500	717.94	69.73	-14.21	
04/30	14:27:00	18903.0000	705.02	69.38	-12.92	
04/30	14:29:15	18905.2500	697.51	66.37	-7.51	
04/30	14:31:45	18907.7500	707.87	65.66	10.36	SURFACE STOP
04/30	14:32:00	18908.0000	.01	65.59	-707.86	
04/30	14:47:00	18923.0000	.01	68.60	.00	
04/30	15:00:00	18936.0000	.01	71.61	.00	
04/30	15:06:00	18942.0000	.01	75.18	.00	

EVENT SUMMARY

COMPANY : WESTERN REFINING SOUTHWEST, INC.

WELL NAME : WATER DISPOSAL WELL NO. 2 (BOTTOM INST.)

WELL LOCATION : SAN JUAN COUNTY, NEW MEXICO

DATE : 05/02/19

FILE REF: F262501.RED

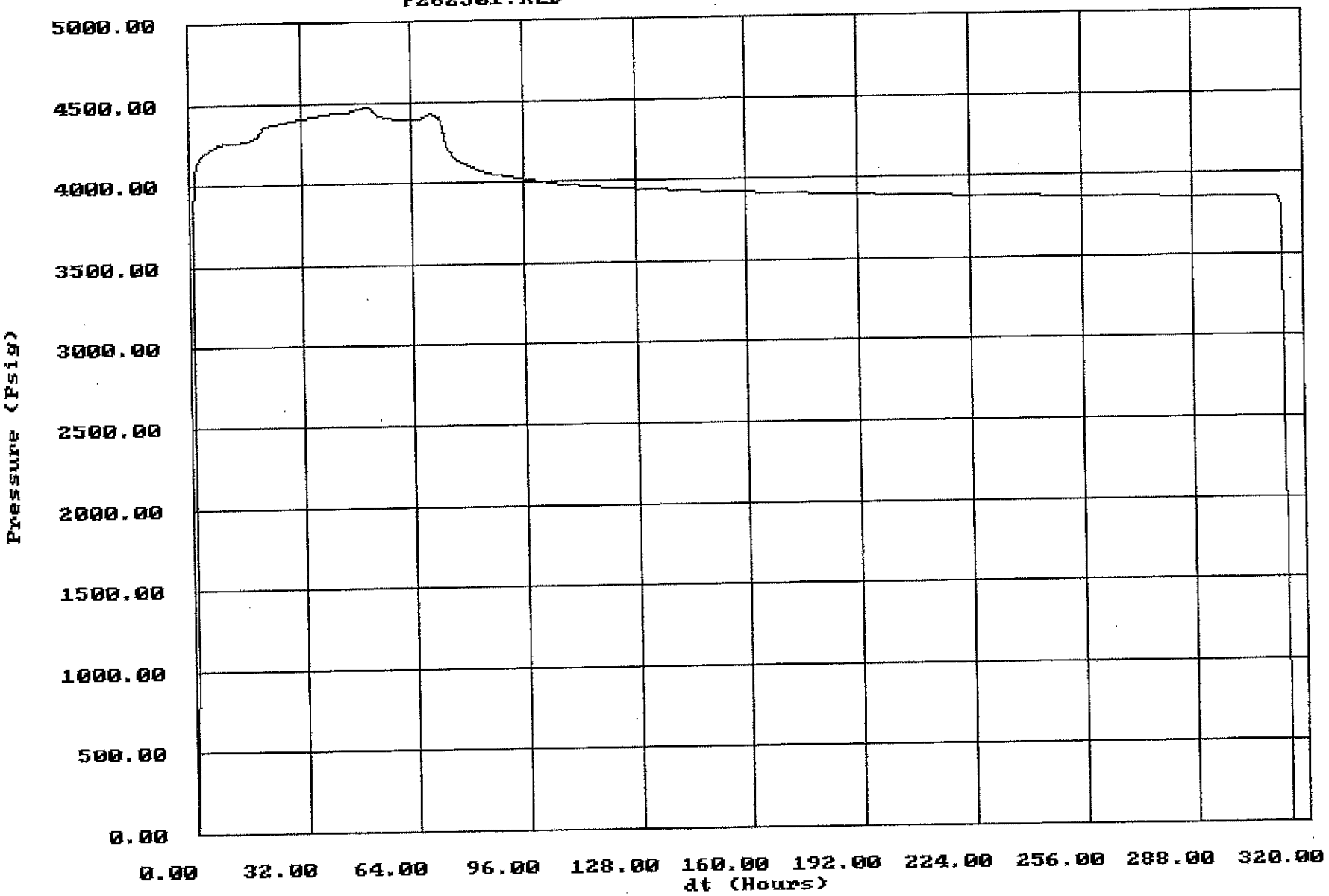
Date MM/DD	Time hh:mm:ss	Test Time mmmmm.mmm	Key Event	Pressure Psig	Temp Deg F
04/17	12:04:15	40.2500	PRESSURED UP LUBRICATOR	21.99	68.49
04/17	12:12:00	48.0000	SURFACE STOP	787.97	67.54
04/17	12:12:15	48.2500	TRIPPED IN WELL WITH TANDEM ELEC. INST.	806.37	67.53
04/17	12:41:30	77.5000	TANDEM INST. @ 7312'	3936.53	163.98
04/17	12:50:00	86.0000	STARTED INJECTION PUMP	3935.10	169.91
04/20	12:21:15	4377.2500	INJECTION STOPPED	4388.18	152.34
04/20	12:21:30	4377.5000	BEGAN FALL-OFF	4382.23	152.34
04/30	13:00:30	18816.5000	ENDED FALL-OFF/TANDEM INST. OFF BOTTOM	3835.41	175.65
04/30	13:11:15	18827.2500	STOP @ 7000'	3706.35	186.07
04/30	13:23:30	18839.5000	STOP @ 6000'	3279.60	171.04
04/30	13:34:15	18850.2500	STOP @ 5000'	2862.99	150.28
04/30	13:48:15	18864.2500	STOP @ 4000'	2419.90	128.75
04/30	13:59:15	18875.2500	STOP @ 3000'	1986.38	109.96
04/30	14:10:00	18886.0000	STOP @ 2000'	1565.11	96.10
04/30	14:20:30	18896.5000	STOP @ 1000'	1130.83	76.79
04/30	14:31:45	18907.7500	SURFACE STOP	707.87	65.66

WESTERN REFINING SOUTHWEST, INC.

Pressure vs dt

WATER DISPOSAL WELL NO. 2 (BOTTOM INST)
SAN JUAN COUNTY, NM
F262501.RED

TEFTELLER, INC.
4-17-19
INJECTION FALL-OFF TEST



Company: WESTERN REFINING SOUTHWEST, INC.
Well: WATER DISPOSAL WELL NO. 2
Field: ENTRADA
Engineer: NEIL TEFTELLER
Gauge Type: ELECTRONIC MEMORY
Gauge Range: 0 - 5000
Gauge Depth: 7312 ft
Serial No.: 262 (BOTTOM INSTRUMENT)

County: SAN JUAN
State: NEW MEXICO
Date: 04/17/2019
Well Type: WATER DISPOSAL
Test Type: GRADIENT
Status: SHUT IN
File Name: 67645B

Tubing: 4" TO
Tubing: TO
Casing: 7" TO
Perfs.:

Packer Depth 7230 ft

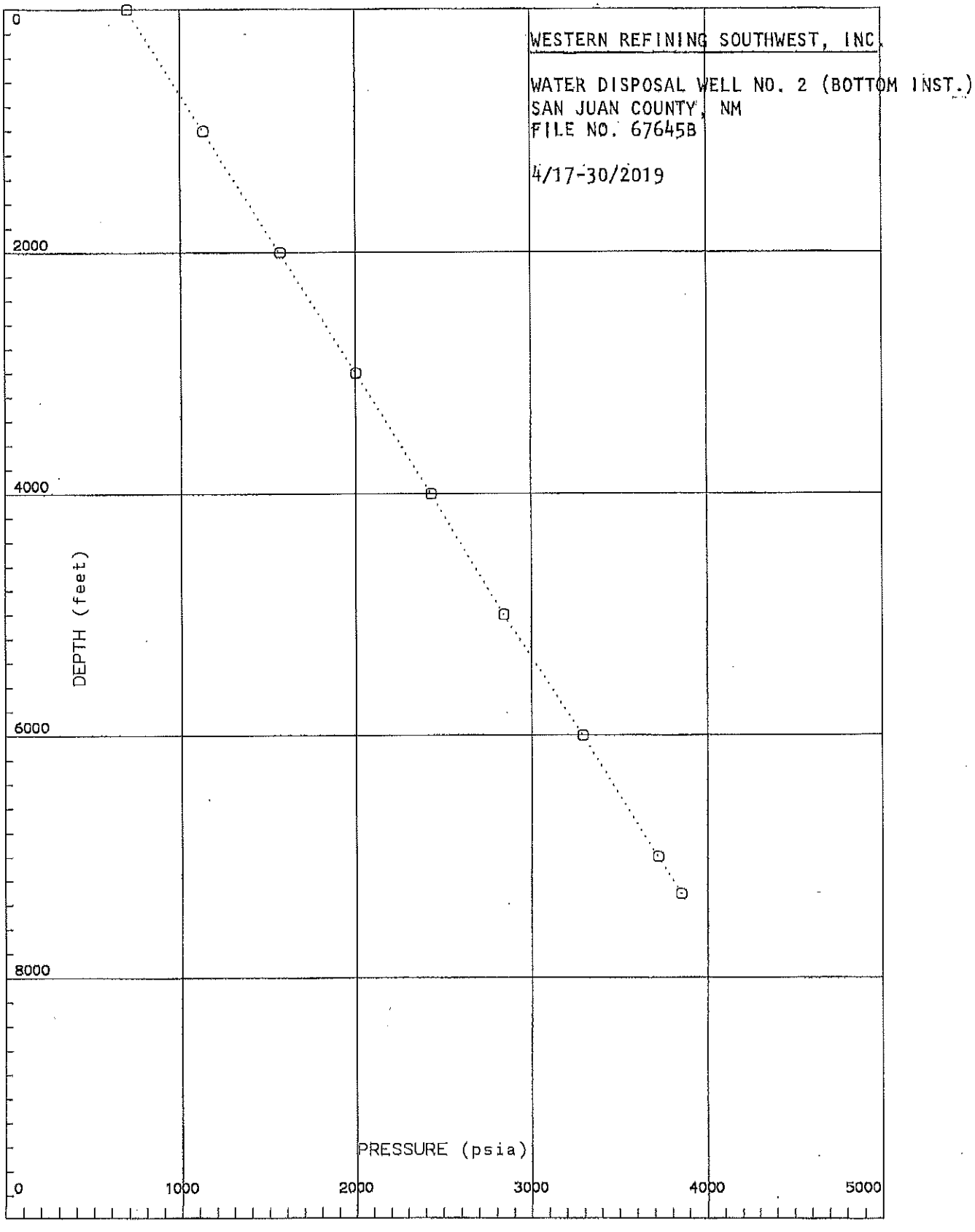
Oil Level
H2O Level

Shut-in BHP 3852 @ 7312 ft
Shut-in WHP 700

Shut-in BHT 186 F @ 7312 ft
Shut-in WHT 0 F

[Tefteller Incorporated]

#	MD	TVD	PRESSURE	PSI/ft
1	7312	7312	3852.00	
2	7000	7000	3716.00	0.436
3	6000	6000	3291.00	0.425
4	5000	5000	2843.00	0.448
5	4000	4000	2432.00	0.411
6	3000	3000	1999.00	0.433
7	2000	2000	1565.00	0.434
8	1000	1000	1131.00	0.434
9	0	0	700.00	0.431


WESTERN REFINING SOUTHWEST, INC.
WATER DISPOSAL WELL NO. 2 (BOTTOM INST.)
SAN JUAN COUNTY, NM
FILE NO. 67645B
4/17-30/2019
DEPTH (feet)
0
2000
4000
6000
8000
PRESSURE (psia)
0
1000
2000
3000
4000
5000

APPENDIX F

Test Gauge Calibration Certificates

ACCURACY VERIFICATION

23-February-2018

Gauge Model	SP-2000	Pressure Range	5 K
Gauge S/N	262	Accuracy 0.05%	Full Scale

Applied Pressure psig	Recorded Pressure psig	Difference psi	Difference Percent (%)
0.01	1.27	1.26	0.0252%
774.08	775.05	0.97	0.0194%
1498.24	1498.48	0.24	0.0048%
2222.36	2222.51	0.15	0.0030%
2946.53	2946.99	0.46	0.0092%
3670.66	3671.93	1.27	0.0254%
4394.87	4396.59	1.72	0.0344%
5119.00	5120.35	1.35	0.0270%
4394.87	4397.28	2.41	0.0482%
3670.66	3673.03	2.37	0.0474%
2946.53	2948.40	1.87	0.0374%
2222.36	2223.94	1.58	0.0316%
1498.24	1499.88	1.64	0.0328%
774.08	776.24	2.16	0.0432%
0.01	2.10	2.09	0.0418%

Oven Temperature: **179.7** °F Probe Temperature: **179.4** °F

Smart Gauge Calibration accuracy is confirmed.

Calibrated with RUSKA Pressure Standard, model # 2451-700-00
Serial #26618, Mass Set Serial #25608
Compensated to local acceleration due to gravity

Verified by: CM

ACCURACY VERIFICATION

23-February-2018

Gauge Model SP-2000
Gauge S/N 262

Pressure Range 5 K
Accuracy 0.05% Full Scale

Applied Pressure psig	Recorded Pressure psig	Difference psi	Difference Percent (%)
0.01	1.40	1.39	0.0278%
774.08	774.85	0.77	0.0154%
1498.24	1499.96	1.72	0.0344%
2222.36	2222.84	0.48	0.0096%
2946.53	2947.01	0.48	0.0096%
3670.66	3671.21	0.55	0.0110%
4394.87	4395.43	0.56	0.0112%
5119.00	5119.62	0.62	0.0124%
4394.87	4395.86	0.99	0.0198%
3670.66	3671.85	1.19	0.0238%
2946.53	2947.82	1.29	0.0258%
2222.36	2223.50	1.14	0.0228%
1498.24	1499.51	1.27	0.0254%
774.08	775.37	1.29	0.0258%
0.01	1.52	1.51	0.0302%

Oven Temperature: **253.9** °F Probe Temperature: **253.7** °F

Smart Gauge Calibration accuracy is confirmed.

Calibrated with RUSKA Pressure Standard, model # 2451-700-00
Serial #26618, Mass Set Serial #25608
Compensated to local acceleration due to gravity

Verified by: CM

ACCURACY VERIFICATION

23-February-2018

Gauge Model SP-2000
Gauge S/N 262

Pressure Range 5 K
Accuracy 0.05% Full Scale

Applied Pressure psig	Recorded Pressure psig	Difference psi	Difference Percent (%)
0.01	1.40	1.39	0.0278%
774.08	774.85	0.77	0.0154%
1498.24	1499.96	1.72	0.0344%
2222.36	2222.84	0.48	0.0095%
2946.53	2947.01	0.48	0.0096%
3670.66	3671.21	0.55	0.0110%
4394.87	4395.43	0.56	0.0112%
5119.00	5119.62	0.62	0.0124%
4394.87	4395.86	0.99	0.0198%
3670.66	3671.85	1.19	0.0238%
2946.53	2947.82	1.29	0.0258%
2222.36	2223.52	1.16	0.0232%
1498.24	1499.51	1.27	0.0254%
774.08	775.37	1.29	0.0258%
0.01	1.52	1.51	0.0302%

Oven Temperature: **274.3** °F Probe Temperature: **274.4** °F

Smart Gauge Calibration accuracy is confirmed.

Calibrated with RUSKA Pressure Standard, model # 2451-700-00
Serial #26618, Mass Set Serial #25608
Compensated to local acceleration due to gravity

Verified by: CM

ACCURACY VERIFICATION

23-February-2018

Gauge Model	SP-2000	Pressure Range	5 K
Gauge S/N	262	Accuracy 0.05%	Full Scale

Applied Pressure psig	Recorded Pressure psig	Difference psi	Difference Percent (%)
0.01	1.27	1.26	0.0252%
774.08	775.05	0.97	0.0194%
1498.24	1498.48	0.24	0.0048%
2222.36	2222.51	0.15	0.0030%
2946.53	2946.99	0.46	0.0092%
3670.66	3671.93	1.27	0.0254%
4394.87	4396.59	1.72	0.0344%
5119.00	5120.35	1.35	0.0270%
4394.87	4397.28	2.41	0.0482%
3670.66	3673.03	2.37	0.0474%
2946.53	2948.40	1.87	0.0374%
2222.36	2223.94	1.58	0.0316%
1498.24	1499.88	1.64	0.0328%
774.08	776.24	2.16	0.0432%
0.01	2.11	2.10	0.0420%

Oven Temperature: **168.2** °F Probe Temperature: **168.1** °F

Smart Gauge Calibration accuracy is confirmed.

Calibrated with RUSKA Pressure Standard, model # 2451-700-00
Serial #26618, Mass Set Serial #25608
Compensated to local acceleration due to gravity

Verified by: CM

ACCURACY VERIFICATION

15-May-2018

Gauge Model	SP-2000	Pressure Range	5 K
Gauge S/N	240	Accuracy 0.05%	Full Scale

Applied Pressure psig	Recorded Pressure psig	Difference psi	Difference Percent (%)
0.01	0.01	0.00	0.0000%
774.08	772.99	-1.09	-0.0218%
1498.24	1496.97	-1.27	-0.0254%
2222.36	2221.20	-1.16	-0.0232%
2946.53	2945.44	-1.09	-0.0218%
3670.66	3669.59	-1.07	-0.0214%
4394.87	4393.80	-1.07	-0.0214%
5119.00	5118.00	-1.00	-0.0200%
4394.87	4393.83	-1.04	-0.0207%
3670.66	3669.56	-1.10	-0.0220%
2946.53	2945.51	-1.02	-0.0204%
2222.36	2221.22	-1.14	-0.0228%
1498.24	1496.99	-1.25	-0.0250%
774.08	772.81	-1.27	-0.0254%
0.01	0.01	0.00	0.0000%

Oven Temperature: **179.1** °F Probe Temperature: **179.9** °F

Smart Gauge Calibration accuracy is confirmed.

Calibrated with RUSKA Pressure Standard, model # 2451-700-00
Serial #26618, Mass Set Serial #25608
Compensated to local acceleration due to gravity

Verified by: CM

ACCURACY VERIFICATION

15-May-2018

Gauge Model	SP-2000	Pressure Range	5 K
Gauge S/N	240	Accuracy 0.05%	Full Scale

Applied Pressure psig	Recorded Pressure psig	Difference psi	Difference Percent (%)
0.01	2.38	2.37	0.0474%
774.08	776.30	2.22	0.0444%
1498.24	1500.18	1.94	0.0388%
2222.36	2224.29	1.93	0.0386%
2946.53	2948.24	1.71	0.0342%
3670.66	3672.19	1.53	0.0305%
4394.87	4396.25	1.38	0.0276%
5119.00	5120.28	1.28	0.0256%
4394.87	4396.11	1.24	0.0248%
3670.66	3671.87	1.21	0.0242%
2946.53	2947.80	1.27	0.0254%
2222.36	2223.57	1.21	0.0242%
1498.24	1499.16	0.92	0.0184%
774.08	775.38	1.30	0.0260%
0.01	1.83	1.82	0.0364%

Oven Temperature: **254.1** °F Probe Temperature: **253.4** °F

Smart Gauge Calibration accuracy is confirmed.

Calibrated with RUSKA Pressure Standard, model # 2451-700-00
Serial #26618, Mass Set Serial #25608
Compensated to local acceleration due to gravity

Verified by: CM

APPENDIX G

Mechanical Integrity Test Report (MIT)

NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

MECHANICAL INTEGRITY TEST REPORT

(TA OR UIC)

Date of Test 6-8-17 Operator Western Ref. SW Inc API # 30-0 45-35747

Property Name Waste Disp. Well Well # 2 Location: Unit H Sec 27 Twn 29 Rge 11

Land Type:
- State ____
- Federal ____
- Private ✓
- Indian ____

Well Type:
- Water Injection ____
- Salt Water Disposal ✓
- Gas Injection ____
- Producing Oil/Gas ____
- Pressure obervation ____

Temporarily Abandoned Well (Y/N): (N) TA Expires: ____

Casing Pres. 0 Tbg. SI Pres. ____ Max. Inj. Pres. ____

Bradenhead Pres. 0 Tbg. Inj. Pres. ____

Tubing Pres. 610

Int. Casing Pres. 0

Pressured annulus up to 510 psi. for 30 mins. Test passed/failed

REMARKS:

Packer Set 7230

Top Perf 7312 - 7470

dropped to 505 held last 15 min.

By Tuff (Welsh Engineering) Witness Monica Kuehling

(Operator Representative) (NMOCD)

(Position)

Revised 02-11-02

NEW MEXICO ENERGY, MINERALS & NATURAL RESOURCES DEPARTMENT

OIL CONSERVATION DIVISION
AZTEC DISTRICT OFFICE
1000 RIO BRAZOS ROAD
AZTEC NM 87410
(505) 334-6178 FAX: (505) 334-6170
http://emnrd.state.nm.us/ocd/District III/3district.htm

BRADENHEAD TEST REPORT

(submit 1 copy to above address)

Date of Test 6-8-17 Operator Western Ref. API #30-0 45-35747

Property Name Waste Disp. Well Well No. 2 Location: Unit H Section 27 Township 29 Range 11

Well Status(Shut-In or Producing) Initial PSI: Tubing 600 Intermediate 0 Casing 100 Bradenhead 0

OPEN BRADENHEAD AND INTERMEDIATE TO ATMOSPHERE INDIVIDUALLY FOR 15 MINUTES EACH

PRESSURE

Testing	Bradenhead			INTERM	
	BH	Int	Csg	Int	Csg
TIME 5 min	0	0	100	0	100
10 min	0	0	100	0	100
15 min	0	0	100	0	100
20 min					
25 min					
30 min					

FLOW CHARACTERISTICS

	BRADENHEAD	INTERMEDIATE
Steady Flow		
Surges		
Down to Nothing	✓	✓
Nothing		
Gas	✓	✓
Gas & Water		
Water		

If bradenhead flowed water, check all of the descriptions that apply below:

CLEAR____ FRESH____ SALTY____ SULFUR____ BLACK____

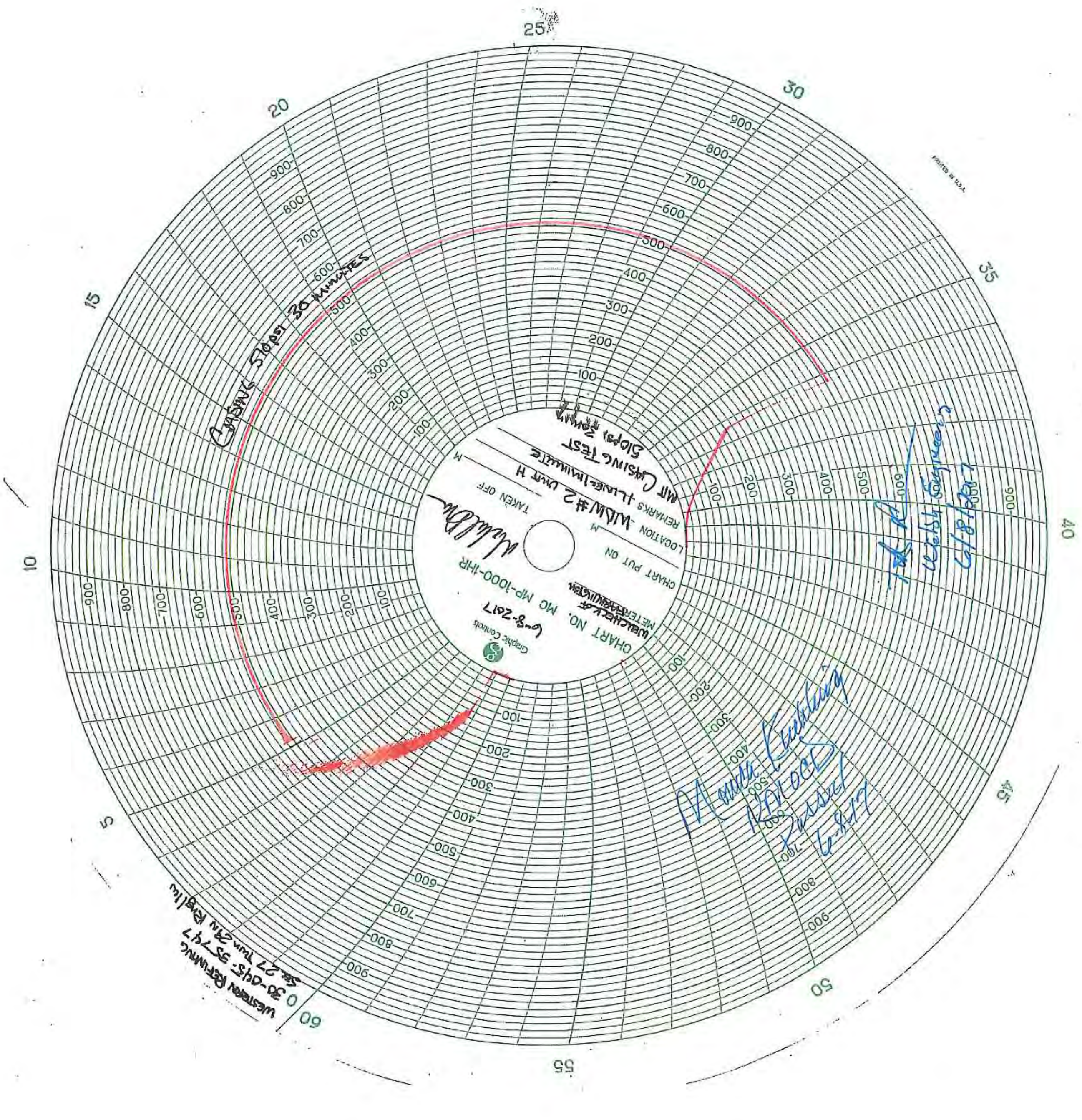
5 MINUTE SHUT-IN PRESSURE BRADENHEAD 0 INTERMEDIATE 0

REMARKS: BH- Puff when opened. Nothing when opened after 5 min Shut in. Int. light blow to dead at 5 seconds. Nothing when opened after 5 min Shut in

By [signature] Witness Monica Kuehling

Site Supervisor
(Position)

E-mail address ____



Casing 510psi 30 minutes
CHART NO. MC MP-1000-1HR
6-8-2017
Graphic Controls
CHART PUT ON
LOCATION WDW #2 Unit H
REMARKS +Line-1minute
MIT Casing Test
510psi
TAKEN OFF
Western Refining
30-045-35747
PRINTED IN U.S.A.

APPENDIX H

Table of Wells in a One-Mile Radius

Disposal Well #2 and Area Wells

Map Seq	Miles to DW2	Wellname	#	API No	Perf Top	Perf Bottom	Total Depth	P&A Date	ULSTR	Operator	Reservoir	Status	Pne Inj Zone
0	**-**	**Waste Disposal Well**	**2**	**30-045-35747**	**7312**	**7470**	**7470**		**H-27-29N-11W**	**WESTERN REFINING**	**ENTRADA**	**ACTIVE INJ**	**Yes**
1	0.20	JACQUE	2	30-045-34409	1483	1689	1689		H-27-29N-11W	HOLCOMB OIL& GAS	FRUITLAND COAL	ACTIVE	No
2	0.22	DAVIS GAS COM F	1E	30-045-24084	2701	2810	6262		H-27-29N-11W	XTO ENERGY, INC.	CHACRA	ACTIVE	No
2	0.22	DAVIS GAS COM F	1E	30-045-24084	6163	6262	6262		H-27-29N-11W	XTO ENERGY, INC.	DAKOTA	ACTIVE	No
3	0.22	PRE-ONGARD WELL	0	30-045-07883			1759		H-27-29N-11W	PRE-ONGARD WELL	Unknown	INACTIVE	No
4	0.26	DISPOSAL	1	30-045-29002	3276	3514	3514	P & A	I-27-29N-11W	SAN JUAN REFINING	MESAVERDE	P & A	No
5	0.30	DAVIS GAS COM F	1R	30-045-30833	5314	5646	6177		I-27-29N-11W	XTO ENERGY, INC.	GALLUP	ACTIVE	No
5	0.30	DAVIS GAS COM F	1R	30-045-30833	6177	6308	6177		I-27-29N-11W	XTO ENERGY, INC.	DAKOTA	ACTIVE	No
6	0.31	DAVIS GAS COM J	1	30-045-25329	3970	4030	4030	P & A	F-26-29N-11W	BP AMERICA	MESAVERDE	P & A	No
6	0.31	DAVIS GAS COM J	1	30-045-25329	1462	1645	4030		F-26-29N-11W	HOLCOMB OIL& GAS	FRUITLAND COAL	ACTIVE	No
6	0.31	DAVIS GAS COM J	1	30-045-25329	2631	2772	4030	P & A	F-26-29N-11W	XTO ENERGY, INC.	CHACRA	P & A	No
7	0.32	SULLIVAN GAS COM D	1E	30-045-24083	6086	6242	6242		F-26-29N-11W	XTO ENERGY, INC.	DAKOTA	ACTIVE	No
8	0.33	DAVIS GAS COM F	1	30-045-07825	6157	6298	6298	P & A	I-27-29N-11W	BP AMERICA	DAKOTA	P & A	No
9	0.33	DAVIS GAS COM G	1	30-045-23554	2827	2839	2839	P & A	I-27-29N-11W	XTO ENERGY, INC.	CHACRA	P & A	No
10	0.33	JACQUE	1	30-045-34463	1543	1714	1714		I-27-29N-11W	HOLCOMB OIL& GAS	FRUITLAND COAL	ACTIVE	No
11	0.34	PRE-ONGARD WELL	1	30-045-07812	1692*	1746*	1804	P & A	I-27-29N-11W	PRE-ONGARD WELL	PICTURED CLIFFS	P & A	No
12	0.45	CALVIN	1	30-045-12003	6176	6348	6348		M-26-29N-11W	HILCORP ENERGY	DAKOTA	ACTIVE	No
13	0.49	LAUREN KELLY	1	30-045-02133	1474*	1679*	3028*		-27-29N-11W	(N/A)	FRUITLAND COAL	INACTIVE	No
14	0.49	GARLAND B	1	30-045-02134	1474*	1679*	3028*		-27-29N-11W	(N/A)	PICTURED CLIFFS	INACTIVE	No
15	0.51	MANGUM	1S	30-045-34266	1474*	1679*	1850		F-27-29N-11W	HOLCOMB OIL& GAS	FRUITLAND COAL	INACTIVE	No
16	0.52	CALVIN	3	30-045-25612	5295	5870	5870		K-26-29N-11W	HILCORP ENERGY	GALLUP	ACTIVE	No
17	0.55	CALVIN	100	30-045-31118	1468	1760	1760		N-26-29N-11W	HILCORP ENERGY	FRUITLAND COAL	ACTIVE	No
18	0.55	PRE-ONGARD WELL	0	30-045-07776					M-26-29N-11W	PRE-ONGARD WELL	(N/A)	INACTIVE	No
19	0.57	NANCY HARTMAN	2	30-045-26721	2627	2754	2754		P-22-29N-11W	MANANA GAS INC	CHACRA	ACTIVE	No
20	0.57	CONGRESS	9	30-045-24572	2746	2869	2869		N-26-29N-11W	SOUTHLAND ROYALTY	CHACRA	ACTIVE	No
21	0.59	SULLIVAN GAS COM D	1	30-045-07733	6047	6160	6160		B-26-29N-11W	XTO ENERGY, INC.	DAKOTA	ACTIVE	No
22	0.60	HARTMAN	1	30-045-07961	6072	6274	6274	P & A	P-22-29N-11W	MANANA GAS INC	DAKOTA	P & A	No
23	0.64	GRACE PEARCE	1	30-045-07959	1380	1466	1466	P & A	O-22-29N-11W	JOHN C PICKETT	FRUITLAND SAND	P & A	No
24	0.64	ASHCROFT SWD	1	30-045-30788	6952	7070	7382		B-26-29N-11W	XTO ENERGY, INC.	Morrison Bluff Entrada	ACTIVE INJ	Yes
24	0.64	ASHCROFT SWD	1	30-045-30788	7224	7382	7382		B-26-29N-11W	XTO ENERGY, INC.	ENTRADA	ACTIVE INJ	Yes
25	0.65	CONGRESS	18	30-045-25673	1680	1770	5808		K-27-29N-11W	HILCORP ENERGY	PICTURED CLIFFS	ACTIVE	No
25	0.65	CONGRESS	18	30-045-25673	5419	5808	5808		K-27-29N-11W	HILCORP ENERGY	GALLUP	ACTIVE	No
26	0.66	MANGUM	1E	30-045-24673	6024	6160	6160		F-27-29N-11W	HILCORP ENERGY	DAKOTA	ACTIVE	No
27	0.68	CALVIN	1F	30-045-33093	6172	6430	6430		J-26-29N-11W	HILCORP ENERGY	DAKOTA	ACTIVE	No
28	0.69	MARIAN S	1	30-045-27365	2578	2710	2710		F-27-29N-11W	MANANA GAS INC	CHACRA	ACTIVE	No
29	0.69	LAUREN KELLY	1	30-045-27361	1326	1354	1354		F-27-29N-11W	MANANA GAS INC	FRUITLAND SAND	ACTIVE	No
30	0.72	PRE-ONGARD WELL	1X	30-045-29107	1474*	1679*	3028*	P & A	G-26-29N-11W	PRE-ONGARD WELL	PICTURED CLIFFS	P & A	No
31	0.72	PRE-ONGARD WELL	X	30-045-07870	1692*	1746*	1442	P & A	G-26-29N-11W	PRE-ONGARD WELL	PICTURED CLIFFS	P & A	No
32	0.72	PRE-ONGARD WELL	0	30-045-07896					G-27-29N-11W	PRE-ONGARD WELL	(N/A)	INACTIVE	No
33	0.73	EARL B SULLIVAN	1	30-045-23163	2750	2761	2761		B-26-29N-11W	XTO ENERGY, INC.	CHACRA	ACTIVE	No
34	0.74	CONGRESS	16	30-045-25657	6086	6148	6148		A-34-29N-11W	HILCORP ENERGY	GALLUP	ACTIVE	No
35	0.75	STATE GAS COM BS	1	30-045-23550	1470	1648	2761		K-23-29N-11W	HOLCOMB OIL& GAS	FRUITLAND COAL	ACTIVE	No

Disposal Well #2 and Area Wells

Map Seq	Miles to DW2	Wellname	#	API No	Perf Top	Perf Bottom	Total Depth	P&A Date	ULSTR	Operator	Reservoir	Status	Pne Inj Zone
35	0.75	STATE GAS COM BS	1	30-045-23550	2746	2761	2761		K-23-29N-11W	HOLCOMB OIL& GAS	CHACRA	INACTIVE	No
36	0.75	PEARCE GAS COM	1	30-045-07985	6154	6182	6182	P & A	K-23-29N-11W	BP AMERICA	DAKOTA	P & A	No
37	0.78	MANGUM	1	30-045-07835	6102	6214	6214	P & A	L-27-29N-11W	BURLINGTON	DAKOTA	P & A	No
37	0.78	MANGUM	1	30-045-07835	1388	1661	6214		L-27-29N-11W	HOLCOMB OIL& GAS	FRUITLAND COAL	ACTIVE	No
38	0.79	MARY JANE	1	30-045-26731	2622	2732	2732		N-22-29N-11W	MANANA GAS INC	CHACRA	ACTIVE	No
39	0.80	SUMMIT	9	30-045-24574	2747	2857	2857		A-34-29N-11W	HILCORP ENERGY	CHACRA	INACTIVE	No
40	0.80	ROYAL FLUSH	1	30-045-34312	1440	1608	1608		N-22-29N-11W	MANANA GAS INC	FRUITLAND COAL	ACTIVE	No
41	0.83	COOK	1	30-045-07940	6052	6226	6226		N-22-29N-11W	MANANA GAS INC	DAKOTA	ACTIVE	No
42	0.83	COOK	2	30-045-13089	1390	1410	1410		N-22-29N-11W	MANANA GAS INC	FRUITLAND SAND	ACTIVE	No
43	0.87	SULLIVAN	2	30-045-07868	1444	1478	1478		H-26-29N-11W	HOLCOMB OIL& GAS	FRUITLAND SAND	ACTIVE	No
44	0.87	PRE-ONGARD WELL	1	30-045-08009	1443	1468	1468	P & A	K-23-29N-11W	PRE-ONGARD WELL	FRUITLAND SAND	P & A	No
45	0.88	CONGRESS	15	30-045-25675	5369	5943	5943		C-35-29N-11W	HILCORP ENERGY	GALLUP	ACTIVE	No
46	0.89	DELO	10	30-045-21457	2852	2856	2856		I-26-29N-11W	SOUTHLAND ROYALTY	CHACRA	ACTIVE	No
47	0.90	SUMMIT	15	30-045-25707	5326	5970	5970		C-34-29N-11W	SOUTHLAND ROYALTY	GALLUP	ACTIVE	No
48	0.90	PRE-ONGARD WELL	1	30-045-07903	1664	1747	1747	P & A	M-27-29N-11W	PRE-ONGARD WELL	PICTURED CLIFFS	P & A	No
49	0.91	GARLAND	3	30-045-24573	2668	2790	2790		M-27-29N-11W	SOUTHLAND ROYALTY	CHACRA	ACTIVE	No
50	0.93	CALVIN	2	30-045-25195	5346	5530	5530		P-26-29N-11W	HILCORP ENERGY	GALLUP	ACTIVE	No
51	0.93	CALVIN	1E	30-045-24772	6209	6363	6363		P-26-29N-11W	HILCORP ENERGY	DAKOTA	ACTIVE	No
52	0.94	GARLAND B	1R	30-045-21732	1648	1678	1678	P & A	M-27-29N-11W	BURLINGTON	PICTURED CLIFFS	P & A	No
53	0.95	EARL B SULLIVAN	2	30-045-25621	1535	1706	5622		H-26-29N-11W	HOLCOMB OIL& GAS	FRUITLAND COAL	ACTIVE	No
53	0.95	EARL B SULLIVAN	2	30-045-25621	5264	5622	5622		H-26-29N-11W	HOLCOMB OIL& GAS	GALLUP	INACTIVE	No
54	0.96	CONGRESS	4E	30-045-24837	2784	2906	6328		E-35-29N-11W	HILCORP ENERGY	CHACRA	ACTIVE	No
54	0.96	CONGRESS	4E	30-045-24837	6216	6328	6328		E-35-29N-11W	HILCORP ENERGY	DAKOTA	ACTIVE	No
55	0.97	LEA ANN	1	30-045-20752	1776	1790	1790	P & A	E-35-29N-11W	CHAPARRAL ENERGY	PICTURED CLIFFS	P & A	No
56	0.98	DELO	11	30-045-22639	940	945	945	P & A	P-26-29N-11W	GENERAL MINERALS	FARMINGTON	P & A	No
57	0.99	PEARCE GAS COM	1E	30-045-24082	6078	6263	6263		J-23-29N-11W	XTO ENERGY, INC.	DAKOTA	ACTIVE	No
57	0.99	PEARCE GAS COM	1E	30-045-24082	6078	6263	6263		J-23-29N-11W	XTO ENERGY, INC.	MANCOS	INACTIVE	No
57	0.99	PEARCE GAS COM	1E	30-045-24082	6078	6263	6263		J-23-29N-11W	XTO ENERGY, INC.	CHACRA	INACTIVE	No

* Estimated for area

APPENDIX I

Injection History

Appendix I
Western Disposal Well #2 Injection History

Date	Flow Rate GPM	Average Casing Pressure	Minimum Injection Pressure	Average Injection Pressure	Maximum Injection Pressure	Totalizer BBLS	Gallons Injected	Flow Rate bbl/min
1/1/2019	0.00	70.38	598.00	603.19	609.17	105444.10	0	0.00
1/2/2019	0.00	59.52	588.00	592.50	597.00	105444.10	0	0.00
1/3/2019	0.00	48.77	581.00	584.31	588.00	105444.10	0	0.00
1/4/2019	0.00	46.94	575.00	577.75	581.00	105444.10	0	0.00
1/5/2019	0.00	46.88	570.00	572.38	575.00	105444.10	0	0.00
1/6/2019	0.00	51.27	566.00	568.02	570.00	105444.10	0	0.00
1/7/2019	0.00	54.69	562.00	563.98	566.00	105444.10	0	0.00
1/8/2019	0.00	54.31	559.00	560.40	562.00	105444.10	0	0.00
1/9/2019	0.00	54.33	556.00	557.56	559.00	105444.10	0	0.00
1/10/2019	0.00	55.19	554.00	554.77	556.00	105444.10	0	0.00
1/11/2019	0.00	56.48	551.00	552.38	554.00	105444.10	0	0.00
1/12/2019	0.00	56.81	549.00	550.06	551.00	105444.10	0	0.00
1/13/2019	0.00	56.16	547.00	548.10	549.00	105444.10	0	0.00
1/14/2019	0.00	56.83	545.00	546.12	547.00	105444.10	0	0.00
1/15/2019	0.00	57.42	544.00	544.48	545.00	105444.10	0	0.00
1/16/2019	17.41	21.79	543.00	769.45	964.00	106037.94	24941	0.41
1/17/2019	25.95	(2.40)	966.00	1021.59	1070.00	106927.94	37380	0.62
1/18/2019	25.42	(1.94)	1072.00	1112.59	1149.00	107805.94	36876	0.61
1/19/2019	25.13	(2.00)	1150.00	1173.99	1197.00	108670.10	36295	0.60
1/20/2019	24.79	(2.00)	1198.00	1216.78	1235.00	109516.10	35532	0.59
1/21/2019	24.18	(2.00)	1236.00	1248.22	1259.00	110350.94	35063	0.58
1/22/2019	8.07	2.87	873.00	1051.11	1267.00	110641.10	12187	0.19
1/23/2019	0.00	17.83	795.17	827.91	871.00	110641.10	0	0.00
1/24/2019	0.00	29.10	755.00	773.30	794.00	110641.10	0	0.00
1/25/2019	0.00	38.67	728.17	740.81	755.00	110641.10	0	0.00
1/26/2019	0.00	47.20	708.00	717.80	728.00	110641.10	0	0.00
1/27/2019	0.00	55.00	693.00	700.17	708.00	110641.10	0	0.00
1/28/2019	0.00	62.02	680.00	685.93	693.00	110641.10	0	0.00
1/29/2019	0.00	68.40	669.00	674.05	680.00	110641.10	0	0.00
1/30/2019	0.00	74.08	659.00	663.88	669.00	110641.10	0	0.00
1/31/2019	0.00	79.33	651.00	655.10	659.00	110641.10	0	0.00
2/1/2019	0.00	84.31	644.00	647.38	651.00	110641.10	0	0.00
2/2/2019	0.00	88.81	638.00	640.61	644.00	110641.10	0	0.00
2/3/2019	0.00	93.19	632.00	634.42	637.00	110641.10	0	0.00
2/4/2019	0.00	96.69	626.00	628.89	632.00	110641.10	0	0.00
2/5/2019	0.00	100.33	622.00	623.83	626.00	110641.10	0	0.00
2/6/2019	0.00	103.00	617.00	619.29	621.16	110641.10	0	0.00
2/7/2019	0.00	105.40	613.00	614.92	617.00	110641.10	0	0.00
2/8/2019	0.00	107.85	609.00	610.98	613.00	110641.10	0	0.00
2/9/2019	0.00	110.58	606.00	607.35	609.00	110641.10	0	0.00

Appendix I
Western Disposal Well #2 Injection History

Date	Flow Rate GPM	Average Casing Pressure	Minimum Injection Pressure	Average Injection Pressure	Maximum Injection Pressure	Totalizer BBLS	Gallons Injected	Flow Rate bbl/min
2/10/2019	0.00	112.92	602.00	603.98	606.00	110641.10	0	0.00
2/11/2019	16.97	41.79	601.00	845.22	1033.00	111212.93	24017	0.40
2/12/2019	27.62	(2.07)	1036.00	1123.28	1197.00	112169.10	40159	0.66
2/13/2019	27.66	(1.00)	823.00	1171.70	1376.00	113098.92	39052	0.66
2/14/2019	10.14	2.58	842.00	1048.65	1424.00	113447.10	14624	0.24
2/15/2019	0.00	20.41	767.00	797.68	840.00	113447.10	0	0.00
2/16/2019	0.00	34.33	731.00	747.15	766.00	113447.10	0	0.00
2/17/2019	0.00	45.46	708.00	719.02	731.00	113447.10	0	0.00
2/18/2019	0.00	55.02	692.00	699.69	708.00	113447.10	0	0.00
2/19/2019	0.00	63.14	679.00	685.11	692.00	113447.10	0	0.00
2/20/2019	0.00	69.92	669.00	673.53	679.00	113447.10	0	0.00
2/21/2019	0.00	76.27	660.00	663.94	668.00	113447.10	0	0.00
2/22/2019	0.00	81.81	652.00	655.68	659.00	113447.10	0	0.00
2/23/2019	0.00	86.25	645.00	648.42	652.00	113447.10	0	0.00
2/24/2019	0.00	90.25	639.00	642.10	645.00	113447.10	0	0.00
2/25/2019	0.00	94.38	634.00	636.56	639.00	113447.10	0	0.00
2/26/2019	22.01	33.23	632.00	947.29	1202.00	114194.94	31409	0.52
2/27/2019	32.87	(3.00)	1206.00	1277.18	1343.00	115320.93	47292	0.78
2/28/2019	8.84	3.45	847.00	1050.74	1381.00	115647.10	13699	0.21
3/1/2019	0.00	22.46	774.00	803.67	844.00	115647.10	0	0.00
3/2/2019	0.00	37.02	740.00	755.15	773.00	115647.10	0	0.00
3/3/2019	0.00	48.52	718.00	728.07	739.00	115647.10	0	0.00
3/4/2019	0.00	57.92	702.00	709.61	718.00	115647.10	0	0.00
3/5/2019	0.00	65.67	690.00	695.57	702.00	115647.10	0	0.00
3/6/2019	0.00	72.58	680.00	684.28	689.00	115647.10	0	0.00
3/7/2019	0.00	78.42	671.00	674.94	679.00	115647.10	0	0.00
3/8/2019	0.00	83.40	663.84	667.00	671.00	115647.10	0	0.00
3/9/2019	0.00	87.75	657.00	659.94	663.00	115647.10	0	0.00
3/10/2019	0.00	91.78	651.00	653.90	657.00	115647.10	0	0.00
3/11/2019	0.00	95.48	646.00	648.35	651.00	115647.10	0	0.00
3/12/2019	0.00	98.58	641.00	643.34	646.00	115647.10	0	0.00
3/13/2019	0.00	101.00	636.00	638.83	641.00	115647.10	0	0.00
3/14/2019	0.00	103.73	632.00	634.22	636.00	115647.10	0	0.00
3/15/2019	0.00	106.77	628.00	630.27	632.00	115647.10	0	0.00
3/16/2019	0.00	109.13	625.00	626.46	628.00	115647.10	0	0.00
3/17/2019	0.00	111.63	621.00	622.98	625.00	115647.10	0	0.00
3/18/2019	0.00	113.77	618.00	619.75	621.00	115647.10	0	0.00
3/19/2019	0.00	115.79	615.00	616.54	618.00	115647.10	0	0.00
3/20/2019	0.00	117.65	612.00	613.67	615.00	115647.10	0	0.00
3/21/2019	11.43	57.27	611.00	792.14	1075.00	116044.10	16674	0.27

Appendix I
Western Disposal Well #2 Injection History

Date	Flow Rate GPM	Average Casing Pressure	Minimum Injection Pressure	Average Injection Pressure	Maximum Injection Pressure	Totalizer BBLS	Gallons Injected	Flow Rate bbl/min
3/22/2019	26.06	0.75	706.16	1103.63	1247.18	116935.92	37456	0.62
3/23/2019	25.26	(1.81)	1252.00	1306.64	1348.00	117796.10	36128	0.60
3/24/2019	9.48	3.48	884.00	1132.61	1367.00	118133.10	14154	0.23
3/25/2019	0.00	23.02	790.00	827.30	880.00	118133.10	0	0.00
3/26/2019	0.00	38.33	749.00	767.09	789.00	118133.10	0	0.00
3/27/2019	12.02	23.98	737.00	963.83	1230.00	118543.10	17220	0.29
3/28/2019	22.31	0.00	1235.00	1309.04	1368.00	119304.94	31997	0.53
3/29/2019	8.56	5.25	904.00	1139.47	1390.00	119596.10	12229	0.20
3/30/2019	0.00	24.66	816.00	851.11	901.00	119596.10	0	0.00
3/31/2019	0.00	38.08	775.00	793.13	814.00	119596.10	0	0.00
4/1/2019	5.96	30.46	760.00	887.00	1079.00	119795.93	8393	0.14
4/2/2019	14.97	2.42	1082.00	1160.06	1237.17	120304.93	21378	0.36
4/3/2019	16.10	1.00	1238.00	1261.76	1284.00	120859.10	23275	0.38
4/4/2019	15.16	1.00	1285.00	1288.19	1296.00	121381.93	21959	0.36
4/5/2019	7.89	3.94	943.00	1164.17	1302.00	121662.10	11767	0.19
4/6/2019	0.00	20.98	850.00	886.47	939.00	121662.10	0	0.00
4/7/2019	0.00	32.85	809.00	826.83	849.00	121662.10	0	0.00
4/8/2019	0.00	41.87	782.00	794.40	808.00	121662.10	0	0.00
4/9/2019	0.00	49.31	772.00	844.29	1002.00	121662.10	0	0.00
4/10/2019	0.00	55.50	540.00	638.80	815.18	121662.10	0	0.00
4/11/2019	0.00	60.50	482.00	536.31	598.00	121662.10	0	0.00
4/12/2019	0.00	65.44	462.00	631.01	869.17	121662.10	0	0.00
4/13/2019	0.00	70.10	506.00	635.61	763.00	121662.10	0	0.00
4/14/2019	0.00	74.21	500.00	679.58	914.00	121662.10	0	0.00
4/15/2019	10.01	37.53	531.00	863.10	1117.00	121993.10	13902	0.24
4/16/2019	9.35	6.56	822.00	1028.80	1185.00	122320.10	13734	0.22
4/17/2019	5.98	19.98	(3.84)	908.53	1087.00	122518.10	8316	0.14
4/18/2019	13.85	2.88	1087.00	1170.70	1234.00	122978.10	19320	0.33
4/19/2019	14.72	1.88	1214.00	1250.43	1292.00	123477.10	20958	0.35
4/20/2019	5.25	6.41	903.00	1099.74	1250.17	123664.10	7854	0.12
4/21/2019	0.00	25.41	821.00	853.26	900.00	123664.10	0	0.00
4/22/2019	0.00	38.00	785.00	801.02	820.00	123664.10	0	0.00
4/23/2019	0.00	46.89	763.00	773.02	785.00	123664.10	0	0.00
4/24/2019	0.00	54.55	746.00	753.79	762.00	123664.10	0	0.00
4/25/2019	0.00	61.13	733.00	739.31	746.00	123664.10	0	0.00
4/26/2019	0.00	66.52	722.00	727.50	733.00	123664.10	0	0.00
4/27/2019	0.00	71.71	714.00	717.67	722.00	123664.10	0	0.00
4/28/2019	0.00	75.83	705.00	709.09	713.00	123664.10	0	0.00
4/29/2019	0.00	79.14	698.00	701.56	705.00	123664.10	0	0.00
4/30/2019	0.00	82.10	(5.00)	433.67	698.00	123664.10	0	0.00

Chavez, Carl J, EMNRD

From: Chavez, Carl J, EMNRD
Sent: Friday, April 5, 2019 1:46 PM
To: 'Robinson, Kelly'
Cc: Powell, Brandon, EMNRD; Kuehling, Monica, EMNRD; Roberts, Tommy D; Dooling, Frank; Griswold, Jim, EMNRD
Subject: RE: Sundry Notifications for Class 1 Injection Well Testing - Bloomfield Terminal

Kelly, received.

Thank you.

Mr. Carl J. Chavez, CHMM (#13099)
New Mexico Oil Conservation Division
Energy Minerals and Natural Resources Department
1220 South St Francis Drive
Santa Fe, New Mexico 87505
Ph. (505) 476-3490
E-mail: CarlJ.Chavez@state.nm.us
"Why not prevent pollution, minimize waste to reduce operating costs, reuse or recycle, and move forward with the rest of the Nation?" (To see how, go to: http://www.emnrd.state.nm.us/OCD and see "Publications")

From: Robinson, Kelly <Kelly.Robinson@andeavor.com>
Sent: Friday, April 5, 2019 1:12 PM
To: Chavez, Carl J, EMNRD <CarlJ.Chavez@state.nm.us>
Cc: Powell, Brandon, EMNRD <Brandon.Powell@state.nm.us>; Kuehling, Monica, EMNRD <monica.kuehling@state.nm.us>; Roberts, Tommy D <Tommy.D.Roberts@andeavor.com>; Dooling, Frank <Frank.F.Dooling@andeavor.com>
Subject: [EXT] Sundry Notifications for Class 1 Injection Well Testing - Bloomfield Terminal

Good Afternoon Sir!

Pursuant to Permit Condition 3.D.1 of Discharge Permit UICI-011, Western Refining is submitted the attached protocols to conduct the Braden Head Test and Fall-Off Test, respectively. As stated in the attached protocols, Western will coordinate the schedule for conducting the field tests with the New Mexico Oil Conservation Division Aztec District Office to provide opportunity for them to observe the testing activities. If you have any questions regarding these protocols, please feel free to contact me at your convenience. A hard copy of these notifications will be submitted to Aztec District Office and Santa Fe District Office as previously requested.

Thank you so much for your time!

Sincerely,

Kelly R. Robinson | **Environmental Supervisor– Terminalling, Transportation and Storage**
Andeavor | 111 County Road 4990, Bloomfield, NM 87413
Office: 505.632.4166 | Mobile: 505.801.5616 | Kelly.Robinson@andeavor.com

Submit 1 Copy To Appropriate District Office
District I – (575) 393-6161
1625 N. French Dr., Hobbs, NM 88240
District II – (575) 748-1283
811 S. First St., Artesia, NM 88210
District III – (505) 334-6178
1000 Rio Brazos Rd., Aztec, NM 87410
District IV – (505) 476-3460
1220 S. St. Francis Dr., Santa Fe, NM 87505

State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
Santa Fe, NM 87505

Form C-103
Revised July 18, 2013

WELL API NO.
30-045-35747

5. Indicate Type of Lease
STATE ☐ FEE ☒

6. State Oil & Gas Lease No.

SUNDRY NOTICES AND REPORTS ON WELLS
(DO NOT USE THIS FORM FOR PROPOSALS TO DRILL OR TO DEEPEN OR PLUG BACK TO A DIFFERENT RESERVOIR. USE "APPLICATION FOR PERMIT" (FORM C-101) FOR SUCH PROPOSALS.)

7. Lease Name or Unit Agreement Name

1. Type of Well: Oil Well ☐ Gas Well ☒ Other Wastewater Disposal Well

8. Well Number: WDW #2

2. Name of Operator
Western Refining Southwest,,Inc.

9. OGRID Number 267595

3. Address of Operator
50 County Road 4990 (PO Box 159) Bloomfield, NM 87413

10. Pool name or Wildcat
Entrada

4. Well Location
Unit Letter H : 2028 feet from the North line and East feet from the line
Section 27 Township 29N Range 11W NMPM San Juan County

11. Elevation *(Show whether DR, RKB, RT, GR, etc.)*

12. Check Appropriate Box to Indicate Nature of Notice, Report or Other Data

NOTICE OF INTENTION TO:				SUBSEQUENT REPORT OF:			
PERFORM REMEDIAL WORK	☐	PLUG AND ABANDON	☐	REMEDIAL WORK	☐	ALTERING CASING	☐
TEMPORARILY ABANDON	☐	CHANGE PLANS	☐	COMMENCE DRILLING OPNS.	☐	P AND A	☐
PULL OR ALTER CASING	☐	MULTIPLE COMPL	☐	CASING/CEMENT JOB	☐		
DOWNHOLE COMMINGLE	☐						
CLOSED-LOOP SYSTEM	☐						
OTHER: Braden Head Test	☒			OTHER:	☐		

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Pursuant to Condition 3.D.1 of the Bloomfield Terminal Injection Well Discharge Permit (UICI-011), Western Refming Southwest, Inc. intends to perform a Braden Head Test prior to conducting the Fall-Off Test. The test will be performed on the Braden Head and intermediate casing. The test will consist of blocking-in the Braden Head and Intermediate casing valves independently for at least 24-hour prior to conducing the test. The discharge of each casing valve will be a pressure gauge on the down-hole side of the valve to measure the casing pressure. With a representative of NMOCD on-site to witness the test, the Braden Head and Intermediate casing valves will be opened for a minimum of 15-minutes to witness any discharge of fluids. Once the test is completed, the Fall-Off Testing activities will begin (procedures are to be submitted as a separate Sundry Notice for Agency Review).

Upon receipt of NMOCD's approval of the testing protocol, Western will coordinate with NMOCD Aztec District Office to schedule the field activities that best work their availability.

Spud Date: Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Kelly Robinson TITLE Environmental Supervisor DATE 4-5-19

Type or print name Kelly Robinson E-mail address: Kelly.Robinson@andeavor.com PHONE: 505-632-4166

For State Use Only

APPROVED BY: TITLE DATE

Conditions of Approval (if any):

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PULL OR ALTER CASING	☐	MULTIPLE COMPL	☐	CASING/CEMENT JOB	☐		
DOWNHOLE COMMINGLE	☐						
CLOSED-LOOP SYSTEM	☐						
OTHER: Fall Off Test	☒			OTHER:			☐

13. Describe proposed or completed operations. (Clearly state all pertinent details, and give pertinent dates, including estimated date of starting any proposed work). SEE RULE 19.15.7.14 NMAC. For Multiple Completions: Attach wellbore diagram of proposed completion or recompletion.

Pursuant to the Bloomfield Terminal Injection Well Discharge Permit (UICI-011), Western Refming Southwest, Inc. intends to perform a Fall-Off Test (FOT). The fall-off test will consist of three phases:

- Phase 1: Build-Up
- Phase 2: Pressure Fall-Off Monitoring
- Phase 3: Post Monitoring Operations

Phase 1: Build-Up

The Build-Up Phase involves the injection of the Terminal's wastewaters into the well for 72 hours or until the injection pressure reaches the high-pressure set-point of 1,400 psi, whichever occurs first. A stabilized injection rate will be established using the dedicated injection well pump. Following the 24-hour stable injection period, tandem memory gauges will be installed through the crown valve and lubricator using a slick-line unit. The gauges will be positioned at 7,312 ft below grade (reflective to the top of the injection interval) while maintaining a stable injection rate. The memory gauges to be used are SP-2000 hybrid-quartz gauges provided by Tefteller, Inc. that will have a resolution of 0.01 psi and an accuracy of $\pm$ 0.05% of full scale. The pressure range of the gauges will be 0-5,000 psi minimum. The stable injection rate will continue for a minimum of 48-hours following the placement of the tandem memory gauges to allow the gauges to stabilize. During this time, down-hole pressure readings will be recorded. Once the stabilization time has elapsed, the injection well pump will be shut down and the well will be blocked-in by closing the valve at the wellhead and in the pump room (double-block).

Phase 2: Pressure Fall-Off Monitoring

With the well blocked-in, bottom-hole readings will be recorded for a minimum of 3 days and up to 14 days. The recording period will be set to record pressures at a minimum of 5-minute intervals, with readings collected more frequently during the early part of the Fall-Off Test period.

Phase 3: Post Monitoring Operations

Following completion of the fall-off monitoring, the gauges will be pulled while making 5-minute stops at each 1,000 ft interval starting at 7,000 ft to collect pressure gradient readings. After removal of the gauges, the well will return to normal operation.

Spud Date: | Rig Release Date:

I hereby certify that the information above is true and complete to the best of my knowledge and belief.

SIGNATURE Kelly Robinson TITLE Environmental Supervisor DATE 4/5/19

Type or print name Kelly Robinson E-mail address: Kelly.RobinsonCandeavor.com PHONE: (505)632-4166

For State Use Only

APPROVED BY: TITLE DATE

Conditions of Approval (if any):