UIC - I - _11__

ANNUAL REPORTS

Western Refining

WNR LISTED NYSE

June 1, 2018

Carl Chavez
New Mexico Oil Conservation Division
Environmental Bureau
1220 South St. Francis Dr
Santa Fe, NM 87505

UPS Tracking #: 7724 9367 8011

RE: Western Refining Southwest, Inc. - Bloomfield Terminal
2017 Annual Class I Well Report
Non-Hazardous Injection Well
Permit # - UICI-011
API # - 30- 45-35747

Mr. Chavez,

Western Refining Southwest, Inc. – Bloomfield Terminal ("Western") is submitting the *2017 Annual Class I Well Report* documenting the operations of the facility's Class I non-hazardous injection well during 2017.

If you need more information, please contact me at (505) 632-4166.

Sincerely,

Kelly Robinson
Environmental Supervisor
Western Refining Southwest, Inc.

ANNUAL CLASS I WELL REPORT
Waste Disposal Well #2
January – December 2017

Western Refining

Western Refining Southwest, Inc.
Bloomfield Terminal
Bloomfield, New Mexico
Permit # - UICI-011
API # - 30-45-35747

June 1, 2018

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EXECUTIVE SUMMARY

This report provides a summary of activities conducted in 2017 on Waste Disposal Well #2 (WDW-#2) at the Western Refining Bloomfield ("Western") facility. The following is a summary of well operations and well testing activities performed in 2017.

Operational Summary

Injection Volume - The volume injected into the disposal well during 2017 was 3,126,913 gallons. The well was officially brought on-line in March 2017. Table 1 provides a summary of the wells operation in 2017.

Sampling and Chemical Analyses - Injection fluids samples were collected on a quarterly basis for chemical analysis, with the following exception. A quarterly sample was not collected during the fourth quarter of 2017 due to the fact that the injection well pump unexpected failed in December 2017. The well did not return to service until the first quarter of 2018. Quarterly samples were collected during the 1st, 2nd, and 3rd quarters of 2017. Analytical results did not exhibit characteristics of being a hazardous waste. A summary of the analytical results is provided in Table 2. A copy of the analytical laboratory reports, included the Quality Assurance / Quality Control (QA/QC) results area provided in Attachment A.

Braidenhead Tests – On March 8, 2017 and June 8th, 2017, Western Refining conducted the Bradenhead Test with a representative of NMOCD present to observe. The well passed both tests. A copy of the respective Sundry notifications and test results are provided in Attachment B – Sundry Notifications.

Mechanical Integrity Tests – On March 8, 2017 and June 8, 2017 Western Refining conducted the Mechanical Integrity Test with a representative of NMOCD present to observe. The well passed both tests. A copy of the respective Sundry notifications and the test results are provided in Attachment B – Sundry Notifications.

Fall-Off Test – A pressure fall-off test (FOT) and bottom hole pressure survey were conducted between October 2, 2017 and October 13, 2017. The well tests were connected in accordance with United States Enviroonmental protection Agency (USEPA) 40 CFR 146.13 and the State of New Mexico Fall-off Test Guidelines dated December 3, 2007. A Rest Report summarizing the results of the Fall-Off Test and pressure survey was submitted to NMOCD on December 12, 2017. A revised Test Report was submitted March 20, 2018 in response to comments received from NMOCD on February 21, 2018. A copy of the revised 2017n Fall-Off Test Report is provided in Attachment C of this report.

Area of Review (AOR) – Western contracted William M. Cobb & Associates to conduct an Area of Review within a 1-mile radius of WDW #2. The results of this review are provided in Attachment D of this report.

1.0 INTRODUCTION

This report provides a summary of activities conducted during 2017 on Waste Disposal Well #2 (WDW #2). The disposal well was part of the Western Bloomfield Terminal facility operations. The facility is located south of Bloomfield, New Mexico in San Juan County. The physical address of the facility is as follows:

Bloomfield Terminal
#50 County Road 4990
Bloomfield, NM 87413

The Bloomfield Terminal is located on approximately 263 acres. Bordering the facility is a combination of federal and private properties. Public property managed by the Bureau of Land Management lies to the south. The majority of undeveloped land in the vicinity of the facility is used extensively for oil and gas production and, in some instances, grazing. U.S. Highway 550 is located approximately one-half mile west of the facility. The topography of the main portion of the site is generally flat with steep bluffs to the north.

1.1 Well Information

Well Name & Number:	Waste Disposal Well #2
OCD UIC:	UICI-011
Well Classification:	Class I Non-hazardous
API Number:	30-045-35747
Legal Location:	2028 FNL, 111 FEL, H S27 T29N R11W
Physical Address:	#50 Road 4990, Bloomfield, NM 87413

2.0 SUMMARY OF ACTIVITIES

The following list of activities was conducted in 2017 on WDW #2 located at the Bloomfield facility:

- 3/8/2017 Bradenhead, Mechanical Integrity, and High-Pressure Testing
- 3/8/2017 Initial Start-Up of Injection Well Operations
- 03/31/17 1st Quarter 2017 Sampling Event
- 04/22/17 2nd Quarter 2017 Sampling Event
- 5/8/17-6/7/17 Entrada Formation Stimulation Activities
- 6/8/2017 Bradenhead, MIT, and High-Pressure Test
- 09/13/2017 3rd Quarter 2017 Sampling Event
- 10/2 – 10/13 Fall-Off Test with downhole pressure survey

A copy of the Well Schematic is provided in Figure 1.

2.1 Well Operations

The initial start-up of WDW-2 commenced March 8, 2017. Treated wastewaters from the on-site Wastewater Treatment System (WWTS) are transferred from the on-site Aeration Ponds to WDW-2 when the well is operational. When the well pump is not operational, treated wastewaters are transferred to the on-site evaporation ponds, located on the south side of County Road 4990.

Total injected wastewater volumes, well injection pressures, injection flow rates, and annual casing pressures are continuously monitored and stored into a company database. In 2017, operation of the injection well did not exceed the permitted injection pressure limit of 1,465 psi. Refer to Table 1 for a summary of the 2017 operational data.

Monthly total volumes disposed of through the injection well and average injection pressure readings are reported monthly to NMOCD through the on-line C-115 reporting web-link. A total of 3,126,913 gallons of treated wastewaters were injected into WDW-2 in 2017. Copies of these reports are provided as an attachment (Attachment A).

2.2 Quarterly Sampling and Chemical Analysis

Samples were collected of the injection water on a quarterly basis and analyzed for the following pursuant to Permit Condition 2.A. of UICI-011 dated July 20, 2016:

- pH;
- Oxidation Reduction Potential;
- Specific Conductance;
- Specific gravity;
- Temperature;
- Major dissolved cations and anions; and
- EPA RCRA characteristically hazardous constituents.

First quarter samples were collected on March 21, 2017. Second quarter samples were collected on June 22, 2017. Third quarter samples were collected on September 13, 2017. Fourth quarter samples were scheduled to be collected in December 2017. Due to an unexpected mechanical failure of the injection wells pump, injection of waters into the well ceased December 11, 2017 until such time that repairs to the pump could be completed. The well did not resume operation until first quarter 2018. Therefore there was no waters available to sample prior to the end of the 2017. A summary of the analytical results is provided in Table 2.

All quarterly samples collected for laboratory analysis were submitted to Hall Environmental Analysis Laboratory located in Albuquerque, NM. The analytical results conclude that the injected water did not exhibit characteristics of hazardous waste. Copies of the analytical reports are provided in Attachment B.

2.3 Well Testing and Maintenance Activities

In addition to the conducting general preventative maintenance activities on the injection well equipment, the following testing and well maintenance activities were conducted during 2017:

- High-pressure shutdown, Mechanical Integrity Testing (MIT), and Bradenhead Testing.
- Fracture stimulation of the Entrada Formation

All activities were conducted following NMOCD approval and the respective documentation is provided in Attachment C. The following is a brief summary of the well testing and well maintenance activities conducted in 2017.

2.3.1 Mechanical Integrity Testing

A representative of New Mexico Oil Conservation Division (NMOCD) was on-site to witness a High Pressure Shutdown Test, Bradenhead Test, and MIT conducted on two separate occasions in 2017. Prior to the initial start-up of WDW-2, testing was conducted on March 8th, 2017. An additional round of testing was conducted on June 8th, 2017 following the formation stimulation activities. All mechanical integrity testing was witnessed by Monica Kuehling of NMOCD-Aztec. No issues were observed during all mechanical testing activities and therefore the well resumed operation after each testing event. Copies of the respective Sundry Notifications are provided in Attachment C.

2.3.2 Entrada Formation Stimulation

Following start-up of well operations, the rate of which treated wastewaters were able to be pumped into WDW-2 was restricted by the permitted injection pressure limit of 1,465 psi. Therefore on April 7, 2017 Western submitted a Sundry Notification requesting NMOCD approval to stimulate the Entrada Formation in order to enhance the operational efficiency of the well. Formation stimulation activities were conducted between May 8th, 2017 and June 7, 2017. The well returned to normal operations on June 8th, 2017 following the completion of the integrity testing observed by NMOCD. A copy of the respective Sundry Notice for the formation stimulation activities is provided in Attachment C.

3.0 WELL EVALUATION

3.1 Area of Review (AOR)

The Area of Review data was updated in the 2017 Fall-Off Test and Bottom-Hole Pressure Survey Report dated December 12, 2017. The area of review data shows all wells known to have been drilled within a one-mile radius of WDW-1. There are 59 wells in the one-mile radius of investigation. One well, Ashacroft SWD #1, penetrates the Entrada injection zone. This well is 0.64 miles from WDW-2 and is an active water disposal well. No wells are currently producing from the Entrada injection zone within the AOR. A copy of the AOR and list of wells identified within the one mile radius is provided as Attachment D.

3.2 Pressure Fall-Off Test

A pressure Fall-Off Test (FOT) was conducted in 2017. The well test was 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 FOT was conducted with tandem bottom hole pressure memory gauges. The test results indicate a transient linear flow early in the fall-off test, with a transient radial flow later in the testing period. The analysis of the two transient flow regimes provide a good understanding of the reservoir properties. A copy of the revised 2017 Fall-Off Test is provided as Attachment E.

3.3 Bottom-Hole Pressure Survey

A bottom-hole pressure survey was conducted following the completion of the FOT activities. The bottom-hole pressures gauges used for the FOT were pulled from the well making gradient stops every 1,000 feet. The results of the pressure survey are provided in the 2017 Fall-Off Test Report. A copy of the Test Report is provided in Attachment E.

TABLES

TABLE 1

WESTERN REFINING SOUTHWEST, INC. - BLOOMFIELD TERMINAL
P.O. BOX 159
BLOOMFIELD, NEW MEXICO 87413

QUARTERLY INJECTION WELL REPORT
DISCHARGE PERMIT UICI-011 (WDW #2)
U.L: H, SEC 27, T29N, R11W
API #: 30-045-35747

PERIOD 2015	AMOUNT OF WATER FROM RIVER (GALLONS)	AMOUNT FROM WWTP (GALLONS)	TOTALIZER AMOUNT INJECTED (GALLONS)	DOWN-TIME (HRS)	INJECTION PRESSURE MAX (PSIA)	INJECTION PRESSURE MIN (PSIA)	INJECTION PRESSURE AVG (PSIA)	ANNULAR PRESSURE MAX (PSIA)	ANNULAR PRESSURE MIN (PSIA)	ANNULAR PRESSURE AVG (PSIA)	ON-LINE FLOW RATES MAX (GPM)	ON-LINE FLOW RATES MIN (GPM)	ON-LINE FLOW RATES AVG (GPM)
JAN	651	2,335,000	0	744	-	-	-	-	-	-	-	-	-
FEB	0	1,001,000	0	672	-	-	-	-	-	-	-	-	-
MAR	0	989,000	205,380	364	1,451	0	1,103	48	0	14	67	1	14
APR	0	958,000	1,819	612	1,393	774	1,011	45	3	19	47	1	13
MAY	59,178	889,000	18,858	720	1,393	782	959	44	8	23	51	2	13
JUN	3,528	926,000	784,560	263	1,337	555	1,067	106	-5	7	79	5	29
JUL	56,784	989,000	763,938	10	1,379	1,253	1,335	7	1	3	26	13	17
AUG	0	1,195,000	423,906	265	1,388	993	1,244	42	2	13	35	1	15
SEP	1,199	836,000	258,468	400	1,440	906	1,154	51	(1)	20	49	8	14
OCT	1,457	875,000	325,710	312	1,288	838	1,084	55	(2)	16	23	2	13
NOV	229	894,000	258,552	366	1,327	856	1,108	40	(1)	13	18	2	12
DEC	-	961,000	85,722	701	1,385	753	863	90	(5)	53	66	3	37

The total amount injected in 2015 is: **3,126,913** gallons

CERTIFICATION: Kelly Robinson DATE: 1/4/2018

Note: Well officially brought on-line full time March 8, 2017.

TABLE 2

Injection Well
2017 Quarterly Analytical Summary

		Toxicity Characteristics (40 CFR261.24)	WQCC (20.6.2.3103 NMAC)	1st Quarter	2nd Quarter	3rd Quarter
Volatile Organic Compounds *(ug/L)*				3/31/2017	6/22/2017	9/13/2017
D029	1,1-Dichloroethene	700	5	< 5.0	< 5.0	<0.70
D028	1,2-Dichloroethane (EDC)	500	10	< 5.0	< 5.0	<0.5
D027	1,4-Dichlorobenzene	7,500		< 5.0	< 5.0	<7.5
D035	2-Butanone (MEK)	200,000		60	< 50	200
D018	Benzene	500	10	< 5.0	< 5.0	<0.50
D019	Carbon Tetrachloride	500	10	< 5.0	< 5.0	<0.50
D021	Chlorobenzene	100000		< 5.0	< 5.0	<100
D022	Chloroform	6000	100	< 5.0	< 5.0	<6.0
D033	Hexachlorobutadiene	500		< 5.0	< 5.0	<0.50
D039	Tetrachloroethene (PCE)	700	20	< 5.0	< 5.0	<0.70
D040	Trichloroethene (TCE)	500	100	< 5.0	< 5.0	<0.50
D043	Vinyl chloride	200	1	< 5.0	< 5.0	<0.20
Semi-Volatile Organic Compounds *(ug/L)*						
D027	1,4-Dichlorobenzene	7,500		< 10	< 10	<7500
D041	2,4,5-Trichlorophenol	400,000		< 10	< 10	<400,000
D042	2,4,6-Trichlorophenol	2,000		< 10	< 10	<2000
D030	2,4-Dinitrotoluene	130		< 10	< 10	<130
D023	2-Methylphenol (o-Cresol)	200,000		< 10	< 10	<200,000
D024, D025	3+4-Methylphenol (m, p-Cresol)	200,000		< 10	< 10	<200,000
D032	Hexachlorobenzene	130		< 10	< 10	<130
D033	Hexachlorobutadiene	500		< 10	< 10	<500
D034	Hexachloroethane	3,000		< 10	< 10	<3000
D036	Nitrobenzene	2,000		< 10	< 10	<2000
D037	Pentachlorophenol	100,000		< 20	< 20	<100,000
D038	Pyridine	5,000		< 10	< 10	<5,000
General Chemistry *(mg/L unless otherwise stated)*						
	Specific Conductance *(umhos/cm)*			2200	2400	3100
	Bromide			1.7	2	2.3
	Chloride		250 *	**410**	**470**	**600**
	Fluoride			<0.050	<0.050	5.9
	Nitrate + Nitrite as N			<1.0	<0.050	<2.5
	Phosphorus, Orthophosphate (As P)			< 2.5	< 2.5	<2.5
	Sulfate		600 *	59	69	80
	Total Dissolved Solids		10,000	1470	1540	1920
	pH *(pH Units)*			7.32	7.5	7.34
	Bicarbonate (As CaCO3)			415	504.7	499
	Carbonate (As CaCO3)			<2.0	<2.0	<2.0
	Total Alkalinity (as CaCO3)			415	504.7	499
	Oxidation-Reduction Potential (mV)			184	-155.7	
	Specific Gravity			0.9991	1.0010	1.0020
Total Metals *(mg/L)*						
D004	Arsenic	5.0		< 0.020	< 0.020	0.035
D005	Barium	100		0.34	0.35	0.17
D006	Cadmium	1.0		< 0.0020	< 0.0020	< 0.0020
D007	Chromium	5.0		< 0.0060	< 0.0060	< 0.0060
D008	Lead	5.0		< 0.0050	0.0063	< 0.0050
	Magnesium			26	33	43
	Potassium			8.4	10	14
D010	Selenium	1.0		< 0.050	< 0.050	< 0.050
D011	Silver	5.0		< 0.0050	< 0.0050	< 0.0050
	Sodium			340	430	530
D009	Mercury	0.2	0.002	<0.00020	0.00024	< 0.00020
Dissolved Metals *(mg/L)*						
	Calcium		0.01	**100**	**84**	**53**
	Magnesium			26	32	43
	Potassium			8.1	9.9	14
	Sodium			330	370	530
Ignitability, Corrosivity, and Reactivity						
D003	Reactive Cyanide *(mg/L)*			<0.0500	< 0.00500	<0.00500
D003	Reactive Sulfide *(mg/L)*			<20	0.099	0.125
D001	Ignitability *(° F)*	< 140° F		>170	>170	>170
D002	Corrosivity (ph Units)	≤ 2 or ≥ 12.5	6-9	7.32	7.5	7.09
Pesticides (ug/L)						
	Chlordane	30		na	< 5.0	<0.030
Field Parameters						
	Oxidation-Reduction Potential (mV)			67.3	-155.7	-75.6
	Specific Conductance (umhos/cm)			2,161	1,838	3,187
	pH			8.26	7.62	7.02
	Temperature (°C)			21.7	31.5	34.8

Notes:

* = Screening level is to apply to dissolved phase result; therefore comparison is bias high.

1,1-Dichloroethene result was revised from "<7.0" to "<0.70" as reflected in the analytical report.

FIGURES

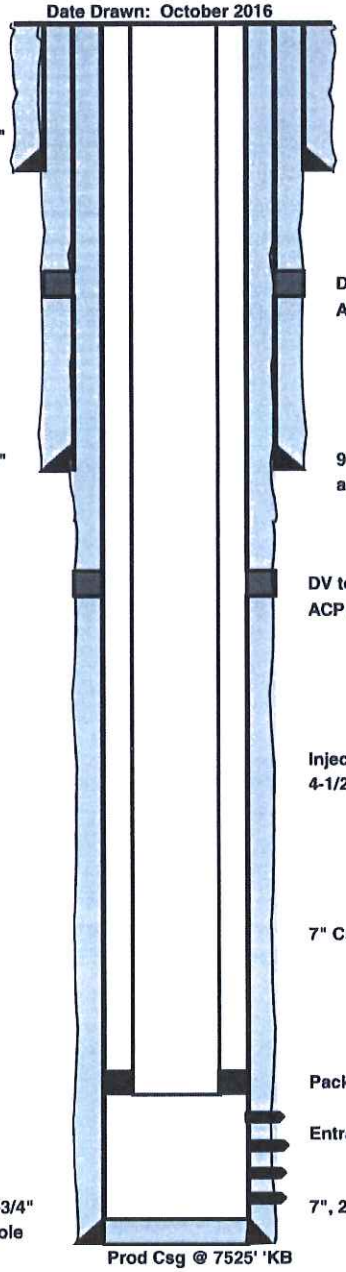
30-045-35747

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:			

Date Drawn: October 2016

WALSH ENGINEERING FARMINGTON . NM

Geologic Markers	
MD	Formation
Surface	Quaternary Alluv
10'	Nacimiento
515'	Ojo Alamo
625'	Kirtland
1203'	Fruitland
1718'	Pictured Cliffs
1880'	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
5606'	Gallup
5848'	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



13-3/8", 48#, H40 at 298' KB

DV Tool at 2543' KB
ACP at 2545' KB

9-5/8", 36#, J55 at 3500' KB

DV tool at 5172' KB
ACP at 5174' KB

Injection String:
4-1/2", L80, 11.6, IPC Casing

7" Csg Marker jt at 7062'

Packer at 7230' (see packer drawing for de

Entrada Injection Zone: 7312' - 7470'

7", 23#, L80

Prod Csg @ 7525' 'KB

FIGURE 1

AV

ATTACHMENT A

Monthly C-115 Reports

District I
1625 North French, Hobbs, NM 88241
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos, Aztec, NM 84710

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South Saint Francis Drive
Santa Fe, NM 87505
OPERATOR'S MONTHLY REPORT

Form C-115 First Page
Revised January 22, 2004
Instruction on Reverse Side
1 ☐ Amended Report

2 Western Refining Southwest, Inc. | 3 OGRID: 267595 | 4 03/2017

5 Address: PO Box 159 Bloomfield, NM 87413 | 6 Page 1 of 4

		INJECTION			PRODUCTION				DISPOSITION OF OIL, GAS, AND WATER							
7 POOL NO. AND NAME Property No. and Name Well No. & U-L-S-T-R API No.	8 CODE 1	9 Volume	10 Pressure	11 CODE 2	12 Barrels of Oil/condensate produced	13 Barrels of water produced	14 MCF Gas Produced	15 Days Produced	16 CODE 3	17 Point of Disposition	18 Gas BTU or Oil API Gravity	19 Oil on hand at beginning of month	20 Volume (Bbls/mcf)	21 Transporter Ogrid	22 CODE 4	23 Oil on hand at end of month
96436 - Entrada 316242 Waste Disposal Well U-H-27-29N-11R 30-045-35747	I	4890	1103	W												

I hereby certify that the information contained in this report is true and complete to the best of my knowledge.

24 Signature	Printed Name & Title	E-Mail Address	Date	Phone Number
Kelly Robinson	Kelly Robinson Env. Supervisor	Kelly.Robinson@wnr.com	5/12/17	505-632-4166

2 Operator	3 OGRID	4 Month/Year	6 Page 2 of 4

Robinson, Kelly

From: OCDOnline@state.nm.us
Sent: Monday, May 15, 2017 8:24 AM
To: Robinson, Kelly; Robinson, Kelly
Subject: OCD C115 Accepted

The following C-115 has been **ACCEPTED** by OCD:

Description: WESTERN REFINING SOUTHWEST, INC. [267595] 03/2017
Date Submitted: 5/12/2017
Operator: 267595
Permit ID: 236211
Highest Production Month: 03/2017 added Monday, May 15, 2017

District I
1625 North French, Hobbs, NM 88241
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos, Aztec, NM 84710

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South Saint Francis Drive
Santa Fe, NM 87505
OPERATOR'S MONTHLY REPORT

Form C-115 First Page
Revised January 22, 2004
Instruction on Reverse Side
1 ☐ Amended Report

2 Western Refining Southwest, Inc.	3 OGRID: 267595	4 04/2017
5 Address: PO Box 159 Bloomfield, NM 87413		6 Page 1 of 4

		INJECTION			PRODUCTION				DISPOSITION OF OIL, GAS, AND WATER							
7 POOL NO. AND NAME Property No. and Name Well No. & U-L-S-T-R API No.	8 CODE 1	9 Volume	10 Pressure	11 CODE 2	12 Barrels of Oil/condensate produced	13 Barrels of water produced	14 MCF Gas Produced	15 Days Produced	16 CODE 3	17 Point of Disposition	18 Gas BTU or Oil API Gravity	19 Oil on hand at beginning of month	20 Volume (Bbls/mcf)	21 Transporter Ogrid	22 CODE 4	23 Oil on hand at end of month
96436 - Entrada 316242 Waste Disposal Well U-H-27-29N-11R 30-045-35747	I	1819	1011	W												

I hereby certify that the information contained in this report is true and complete to the best of my knowledge.

24 Kelly Robinson — Kelly. Robinson Env. Supervisor — Kelly. Robinson@wnr.com — 5/16/17 — 505-632-4166

Signature — Printed Name & Title — E-Mail Address — Date — Phone Number

2 Operator	3 OGRID	4 Month/Year	6 Page 2 of 4

Robinson, Kelly

From: OCDOnline@state.nm.us
Sent: Tuesday, May 16, 2017 12:37 PM
To: Robinson, Kelly; Robinson, Kelly
Subject: OCD C115 Accepted

The following C-115 has been **ACCEPTED** by OCD:

Description: WESTERN REFINING SOUTHWEST, INC. [267595] 04/2017
Date Submitted: 5/16/2017
Operator: 267595
Permit ID: 236338
Highest Production Month: 04/2017 added Tuesday, May 16, 2017

District I
1625 North French, Hobbs, NM 88241
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos, Aztec, NM 84710

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South Saint Francis Drive
Santa Fe, NM 87505
OPERATOR'S MONTHLY REPORT

Submitted 7/5/17

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1 ☐ Amended Report

2 Western Refining Southwest, Inc. | 3 OGRID: 267595 | 4 05/2017
5 Address: PO Box 159 Bloomfield, NM 87413 | 6 Page 1 of 4

7 POOL NO. AND NAME / Property No. and Name / Well No. & U-L-S-T-R / API No.	8 CODE 1	INJECTION 9 Volume	INJECTION 10 Pressure	11 CODE 2	PRODUCTION 12 Barrels of Oil/condensate produced	PRODUCTION 13 Barrels of water produced	PRODUCTION 14 MCF Gas Produced	PRODUCTION 15 Days Produced	16 CODE 3	DISPOSITION OF OIL, GAS, AND WATER 17 Point of Disposition	18 Gas BTU or Oil API Gravity	19 Oil on hand at beginning of month	20 Volume (Bbls/mcf)	21 Transporter Ogrid	22 CODE 4	23 Oil on hand at end of month
96436 - Entrada 316242 Waste Disposal Well U-H-27-29N-11R 30-045-35747	I	449	959	W												

I hereby certify that the information contained in this report is true and complete to the best of my knowledge.

24 Kelly Robinson | Kelly.Robinson Env. Supervisor | Kelly.Robinson@andeavor.com | 7/5/17 | 505-632-4166
Signature | Printed Name & Title | E-Mail Address | Date | Phone Number

2 Operator	3 OGRID	4 Month/Year	6 Page 2 of 4

Robinson, Kelly

From: OCDOnline@state.nm.us
Sent: Thursday, July 06, 2017 8:00 AM
To: Robinson, Kelly; Robinson, Kelly
Subject: OCD C115 Accepted

The following C-115 has been **ACCEPTED** by OCD:

Description: WESTERN REFINING SOUTHWEST, INC. [267595] 05/2017
Date Submitted: 7/5/2017
Operator: 267595
Permit ID: 238521
Highest Production Month: 05/2017 added Thursday, July 06, 2017

District I
1625 North French, Hobbs, NM 88241
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos, Aztec, NM 84710

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South Saint Francis Drive
Santa Fe, NM 87505
OPERATOR'S MONTHLY REPORT

Submitted 7/5/17

Form C-115 First Page
Revised January 22, 2004
Instruction on Reverse Side
1 ☐ Amended Report

2 Western Refining Southwest, Inc.	3 OGRID: 267595	4 06/2017
5 Address: PO Box 159 Bloomfield, NM 87413		6 Page 1 of 4

		INJECTION			PRODUCTION				DISPOSITION OF OIL, GAS, AND WATER							
7 POOL NO. AND NAME Property No. and Name Well No. & U-L-S-T-R API No.	8 CODE 1	9 Volume	10 Pressure	11 CODE 2	12 Barrels of Oil/condensate produced	13 Barrels of water produced	14 MCF Gas Produced	15 Days Produced	16 CODE 3	17 Point of Disposition	18 Gas BTU or Oil API Gravity	19 Oil on hand at beginning of month	20 Volume (Bbls/mcf)	21 Transporter Ogrid	22 CODE 4	23 Oil on hand at end of month
96436 - Entrada 316242 Waste Disposal Well U-H-27-29N-11R 30-045-35747	I	18680	1067	W												

I hereby certify that the information contained in this report is true and complete to the best of my knowledge.

24 Kelly Robinson Kelly Robinson Env. Supervisor Kelly.Robinson@andeavor.com 9/5/17 505.632-4166
Signature | Printed Name & Title | E-Mail Address | Date | Phone Number

2 Operator	3 OGRID	4 Month/Year	6 Page 2 of 4

Robinson, Kelly

From: OCDOnline@state.nm.us
Sent: Thursday, July 06, 2017 8:00 AM
To: Robinson, Kelly; Robinson, Kelly
Subject: OCD C115 Accepted

The following C-115 has been **ACCEPTED** by OCD:

Description: WESTERN REFINING SOUTHWEST, INC. [267595] 06/2017
Date Submitted: 7/5/2017
Operator: 267595
Permit ID: 238522
Highest Production Month: 06/2017 added Thursday, July 06, 2017

District I
1625 North French, Hobbs, NM 88241
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos, Aztec, NM 84710

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION

1220 South Saint Francis Drive
Santa Fe, NM 87505

OPERATOR'S MONTHLY REPORT

Submitted 9/14/17
Confirmation # 241832

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1 ☐ Amended Report

2 Western Refining Southwest, Inc.	3 OGRID: 267595	4 07/2017
5 Address: PO Box 159 Bloomfield, NM 87413		6 Page 1 of 4

		INJECTION			PRODUCTION				DISPOSITION OF OIL, GAS, AND WATER							
7 POOL NO. AND NAME Property No. and Name Well No. & U-L-S-T-R API No.	8 CODE 1	9 Volume	10 Pressure	11 CODE 2	12 Barrels of Oil/condensate produced	13 Barrels of water produced	14 MCF Gas Produced	15 Days Produced	16 CODE 3	17 Point of Disposition	18 Gas BTU or Oil API Gravity	19 Oil on hand at beginning of month	20 Volume (Bbls/mcf)	21 Transporter Ogrid	22 CODE 4	23 Oil on hand at end of month
96436 - Entrada 316242 Waste Disposal Well U-H-27-29N-11R 30-045-35747	I	18189	1335	W												

I hereby certify that the information contained in this report is true and complete to the best of my knowledge.

24

Signature	Printed Name & Title	E-Mail Address	Date	Phone Number
Kelly Robinson	Kelly Robinson Env. Supervisor	Kelly.Robinson@andeavor.com	9/14/17	505-632-4166

Robinson, Kelly

From: OCDOnline@state.nm.us
Sent: Thursday, September 14, 2017 11:28 AM
To: kelly.robinson@wnr.com; kelly.robinson@wnr.com
Subject: OCD C115 Accepted

The following C-115 has been **ACCEPTED** by OCD:

Description: WESTERN REFINING SOUTHWEST, INC. [267595] 07/2017
Date Submitted: 9/14/2017
Operator: 267595
Permit ID: 241832
Highest Production Month: 07/2017 added Thursday, September 14, 2017

District I
1625 North French, Hobbs, NM 88241
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos, Aztec, NM 84710

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION

1220 South Saint Francis Drive
Santa Fe, NM 87505

OPERATOR'S MONTHLY REPORT

Submitted 9/14/17

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Confirmation # 241833

2 Western Refining Southwest, Inc.	3 OGRID: 267595	4 08/2017
5 Address: PO Box 159 Bloomfield, NM 87413		6 Page 1 of 4

		INJECTION			PRODUCTION				DISPOSITION OF OIL, GAS, AND WATER							
7 POOL NO. AND NAME Property No. and Name Well No. & U-L-S-T-R API No.	8 CODE 1	9 Volume	10 Pressure	11 CODE 2	12 Barrels of Oil/condensate produced	13 Barrels of water produced	14 MCF Gas Produced	15 Days Produced	16 CODE 3	17 Point of Disposition	18 Gas BTU or Oil API Gravity	19 Oil on hand at beginning of month	20 Volume (Bbls/mcf)	21 Transporter Ogrid	22 CODE 4	23 Oil on hand at end of month
96436 - Entrada 316242 Waste Disposal Well U-H-27-29N-11R 30-045-35747	I	10093	1244	W												

I hereby certify that the information contained in this report is true and complete to the best of my knowledge.

24

Signature	Printed Name & Title	E-Mail Address	Date	Phone Number
Kelly Robinson	Kelly Robinson Env. Supervisor	Kelly.Robinson@andeavor.com	9/14/17	505-632-4166

Robinson, Kelly

From: OCDOnline@state.nm.us
Sent: Thursday, September 14, 2017 11:28 AM
To: kelly.robinson@wnr.com; kelly.robinson@wnr.com
Subject: OCD C115 Accepted

The following C-115 has been **ACCEPTED** by OCD:

Description: WESTERN REFINING SOUTHWEST, INC. [267595] 08/2017
Date Submitted: 9/14/2017
Operator: 267595
Permit ID: 241833
Highest Production Month: 08/2017 added Thursday, September 14, 2017

District I
1625 North French, Hobbs, NM 88241
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos, Aztec, NM 84710

State of New Mexico
Energy, Minerals & Natural Resources Department

OIL CONSERVATION DIVISION

1220 South Saint Francis Drive
Santa Fe, NM 87505

OPERATOR'S MONTHLY REPORT

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2 Western Refining Southwest, Inc.	3 OGRID: 267595	4 09/2017
5 Address: PO Box 159 Bloomfield, NM 87413		6 Page 1 of 4

		INJECTION			PRODUCTION					DISPOSITION OF OIL, GAS, AND WATER							
7 POOL NO. AND NAME Property No. and Name Well No. & U-L-S-T-R API No.	8 CODE 1	9 Volume	10 Pressure	11 CODE 2	12 Barrels of Oil/condensate produced	13 Barrels of water produced	14 MCF Gas Produced	15 Days Produced	16 CODE 3	17 Point of Disposition	18 Gas BTU or Oil API Gravity	19 Oil on hand at beginning of month	20 Volume (Bbls/mcf)	21 Transporter Ogrid	22 CODE 4	23 Oil on hand at end of month
96436 - Entrada 316242 Waste Disposal Well U-H-27-29N-11R 30-045-35747	I	6154	1154	W												

I hereby certify that the information contained in this report is true and complete to the best of my knowledge.

24 Kelly Robinson — Kelly Robinson — Env. Supervisor — 11/28/17 — 505-632-4166

Signature — Printed Name & Title — E-Mail Address: Kelly.Robinson@andeavor.com — Date — Phone Number

2 Operator	3 OGRID	4 Month/Year	6 Page 2 of 4

Robinson, Kelly

From: OCDOnline@state.nm.us
Sent: Thursday, November 09, 2017 7:15 AM
To: kelly.robinson@wnr.com; kelly.robinson@wnr.com
Subject: OCD C115 Accepted

The following C-115 has been **ACCEPTED** by OCD:

Description: WESTERN REFINING SOUTHWEST, INC. [267595] 09/2017
Date Submitted: 11/8/2017
Operator: 267595
Permit ID: 244366
Highest Production Month: 09/2017 added Thursday, November 09, 2017

District I
1625 North French, Hobbs, NM 88241
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos, Aztec, NM 84710

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South Saint Francis Drive
Santa Fe, NM 87505
OPERATOR'S MONTHLY REPORT

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2 Western Refining Southwest, Inc. | 3 OGRID: 267595 | 4 10/2017
5 Address: PO Box 159 Bloomfield, NM 87413 | 6 Page 1 of 4

	INJECTION			PRODUCTION				DISPOSITION OF OIL, GAS, AND WATER								
7 POOL NO. AND NAME Property No. and Name Well No. & U-L-S-T-R API No.	8 CODE 1	9 Volume	10 Pressure	11 CODE 2	12 Barrels of Oil/condensate produced	13 Barrels of water produced	14 MCF Gas Produced	15 Days Produced	16 CODE 3	17 Point of Disposition	18 Gas BTU or Oil API Gravity	19 Oil on hand at beginning of month	20 Volume (Bbls/mcf)	21 Transporter Ogrid	22 CODE 4	23 Oil on hand at end of month
96436 - Entrada 316242 Waste Disposal Well U-H-27-29N-11R 30-045-35747	I	7755	1084	W												

I hereby certify that the information contained in this report is true and complete to the best of my knowledge.

24 Signature: [signature] | Printed Name & Title: Kelly Robinson Env. Supervisor | E-Mail Address: Kelly.Robinson@andeavor.com | Date: 11/8/2017 | Phone Number: 505-632-4166

2 Operator	3 OGRID	4 Month/Year	6 Page 2 of 4

Robinson, Kelly

From: OCDOnline@state.nm.us
Sent: Thursday, November 09, 2017 7:15 AM
To: kelly.robinson@wnr.com; kelly.robinson@wnr.com
Subject: OCD C115 Accepted

The following C-115 has been **ACCEPTED** by OCD:

Description: WESTERN REFINING SOUTHWEST, INC. [267595] 10/2017
Date Submitted: 11/8/2017
Operator: 267595
Permit ID: 244367
Highest Production Month: 10/2017 added Thursday, November 09, 2017

District I
1625 North French, Hobbs, NM 88241
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos, Aztec, NM 84710

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South Saint Francis Drive
Santa Fe, NM 87505
OPERATOR'S MONTHLY REPORT

Submitted 1/12/2018

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2 Western Refining Southwest, Inc.	3 OGRID: 267595	4 11/2017
5 Address: PO Box 159 Bloomfield, NM 87413		6 Page 1 of 4

		INJECTION			PRODUCTION				DISPOSITION OF OIL, GAS, AND WATER							
7 POOL NO. AND NAME Property No. and Name Well No. & U-L-S-T-R API No.	8 CODE 1	9 Volume	10 Pressure	11 CODE 2	12 Barrels of Oil/condensate produced	13 Barrels of water produced	14 MCF Gas Produced	15 Days Produced	16 CODE 3	17 Point of Disposition	18 Gas BTU or Oil API Gravity	19 Oil on hand at beginning of month	20 Volume (Bbls/mcf)	21 Transporter Ogrid	22 CODE 4	23 Oil on hand at end of month
96436 - Entrada 316242 Waste Disposal Well U-H-27-29N-11R 30-045-35747	I	6156	1108	W												

I hereby certify that the information contained in this report is true and complete to the best of my knowledge.

24 Signature	Printed Name & Title	E-Mail Address	Date	Phone Number
Kelly Robinson	Kelly Robinson Env. Specialist	Kelly.Robinson@andeavor.com	1/12/2018	505-632-4166

2 Operator	3 OGRID	4 Month/Year	6 Page 2 of 4

	INJECTION			PRODUCTION				DISPOSITION OF OIL, GAS, AND WATER						
7	8			11	12				16			19			22	23

Inj. Well

Robinson, Kelly

From: OCDOnline@state.nm.us
Sent: Friday, January 12, 2018 10:51 AM
To: kelly.robinson@wnr.com; kelly.robinson@wnr.com
Subject: OCD C115 Accepted

The following C-115 has been **ACCEPTED** by OCD:

Description: WESTERN REFINING SOUTHWEST, INC. [267595] 11/2017
Date Submitted: 1/12/2018
Operator: 267595
Permit ID: 247042
Highest Production Month: 11/2017 added Friday, January 12, 2018

District I
1625 North French, Hobbs, NM 88241
District II
811 S. First St., Artesia, NM 88210
District III
1000 Rio Brazos, Aztec, NM 84710

State of New Mexico
Energy, Minerals & Natural Resources Department
OIL CONSERVATION DIVISION
1220 South Saint Francis Drive
Santa Fe, NM 87505
OPERATOR'S MONTHLY REPORT

Submitted
1/12/2018

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Revised January 22, 2004
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1 ☐ Amended Report

2 Western Refining Southwest, Inc.	3 OGRID: 267595	4 12/2017
5 Address: PO Box 159 Bloomfield, NM 87413		6 Page 1 of 4

		INJECTION			PRODUCTION				DISPOSITION OF OIL, GAS, AND WATER							
7 POOL NO. AND NAME Property No. and Name Well No. & U-L-S-T-R API No.	8 CODE 1	9 Volume	10 Pressure	11 CODE 2	12 Barrels of Oil/condensate produced	13 Barrels of water produced	14 MCF Gas Produced	15 Days Produced	16 CODE 3	17 Point of Disposition	18 Gas BTU or Oil API Gravity	19 Oil on hand at beginning of month	20 Volume (Bbls/mcf)	21 Transporter Ogrid	22 CODE 4	23 Oil on hand at end of month
96436 - Entrada 316242 Waste Disposal Well U-H-27-29N-11R 30-045-35747	I	2041	863	W												

I hereby certify that the information contained in this report is true and complete to the best of my knowledge.

24 Signature	Printed Name & Title	E-Mail Address	Date	Phone Number
Kelly Robinson	Kelly Robinson Env. Supervisor	Kelly.Robinson@cudeaver.com	1/12/2018	505-632-4166

2 Operator	3 OGRID	4 Month/Year	6 Page 2 of 4

	INJECTION			PRODUCTION				DISPOSITION OF OIL, GAS, AND WATER							
7	8			11	12				16			19			22	23

Inj. Well

Robinson, Kelly

From: OCDOnline@state.nm.us
Sent: Friday, January 12, 2018 10:51 AM
To: kelly.robinson@wnr.com; kelly.robinson@wnr.com
Subject: OCD C115 Accepted

The following C-115 has been **ACCEPTED** by OCD:

Description: WESTERN REFINING SOUTHWEST, INC. [267595] 12/2017
Date Submitted: 1/12/2018
Operator: 267595
Permit ID: 247044
Highest Production Month: 12/2017 added Friday, January 12, 2018

ATTACHMENT B

Analytical Laboratory Reports

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 17, 2017

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

RE: WDW 2 3-31-17 OrderNo.: 1704017

Dear Kelly Robinson:

Hall Environmental Analysis Laboratory received 1 sample(s) on 4/1/2017 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 **1704017**
Date Reported: **4/17/2017**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: WDW 2 3-31-17
Lab ID: 1704017-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 3/31/2017 7:30:00 AM
Received Date: 4/1/2017 11:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
SPECIFIC GRAVITY						Analyst: **LGT**	
Specific Gravity	0.9991	0			1	4/5/2017 4:15:00 PM	R41912
EPA METHOD 300.0: ANIONS						Analyst: **MRA**	
Fluoride	ND	0.50		mg/L	5	4/5/2017 3:48:31 AM	R41868
Chloride	410	25	*	mg/L	50	4/7/2017 3:26:42 AM	A41955
Bromide	1.7	0.50		mg/L	5	4/5/2017 3:48:31 AM	R41868
Phosphorus, Orthophosphate (As P)	ND	2.5	H	mg/L	5	4/5/2017 3:48:31 AM	R41868
Sulfate	59	2.5		mg/L	5	4/5/2017 3:48:31 AM	R41868
Nitrate+Nitrite as N	ND	1.0		mg/L	5	4/5/2017 4:25:46 AM	R41868
SM2510B: SPECIFIC CONDUCTANCE						Analyst: **MRA**	
Conductivity	2200	1.0		µmhos/cm	1	4/11/2017 2:24:41 PM	R42064
SM2320B: ALKALINITY						Analyst: **MRA**	
Bicarbonate (As CaCO3)	415.0	20.00		mg/L CaCO3	1	4/11/2017 2:24:41 PM	R42064
Carbonate (As CaCO3)	ND	2.000		mg/L CaCO3	1	4/11/2017 2:24:41 PM	R42064
Total Alkalinity (as CaCO3)	415.0	20.00		mg/L CaCO3	1	4/11/2017 2:24:41 PM	R42064
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**	
Total Dissolved Solids	1470	100	*D	mg/L	1	4/8/2017 1:38:00 PM	31115
EPA METHOD 7470: MERCURY						Analyst: **MED**	
Mercury	ND	0.00020		mg/L	1	4/5/2017 10:17:21 AM	31063
EPA METHOD 6010B: DISSOLVED METALS						Analyst: **MED**	
Calcium	100	5.0		mg/L	5	4/5/2017 11:02:31 AM	A41903
Magnesium	26	1.0		mg/L	1	4/5/2017 10:57:43 AM	A41903
Potassium	8.1	1.0		mg/L	1	4/5/2017 10:57:43 AM	A41903
Sodium	330	5.0		mg/L	5	4/5/2017 11:02:31 AM	A41903
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: **MED**	
Arsenic	ND	0.020		mg/L	1	4/5/2017 10:34:53 AM	31057
Barium	0.34	0.020		mg/L	1	4/5/2017 10:34:53 AM	31057
Cadmium	ND	0.0020		mg/L	1	4/5/2017 10:34:53 AM	31057
Calcium	100	5.0		mg/L	5	4/5/2017 11:11:34 AM	31057
Chromium	ND	0.0060		mg/L	1	4/5/2017 10:34:53 AM	31057
Lead	ND	0.0050		mg/L	1	4/5/2017 10:34:53 AM	31057
Magnesium	26	1.0		mg/L	1	4/5/2017 10:34:53 AM	31057
Potassium	8.4	1.0		mg/L	1	4/5/2017 10:34:53 AM	31057
Selenium	ND	0.050		mg/L	1	4/5/2017 10:34:53 AM	31057
Silver	ND	0.0050		mg/L	1	4/5/2017 10:34:53 AM	31057
Sodium	340	5.0		mg/L	5	4/5/2017 11:11:34 AM	31057

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

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: WDW 2 3-31-17
Lab ID: 1704017-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 3/31/2017 7:30:00 AM
Received Date: 4/1/2017 11:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **DAM**	
Acenaphthene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Acenaphthylene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Aniline	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Anthracene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Azobenzene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Benz(a)anthracene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Benzo(a)pyrene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Benzo(b)fluoranthene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Benzo(g,h,i)perylene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Benzo(k)fluoranthene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Benzoic acid	ND	20		µg/L	1	4/14/2017 5:19:57 PM	31059
Benzyl alcohol	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Bis(2-chloroethoxy)methane	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Bis(2-chloroethyl)ether	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Bis(2-chloroisopropyl)ether	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Bis(2-ethylhexyl)phthalate	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
4-Bromophenyl phenyl ether	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Butyl benzyl phthalate	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Carbazole	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
4-Chloro-3-methylphenol	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
4-Chloroaniline	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
2-Chloronaphthalene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
2-Chlorophenol	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
4-Chlorophenyl phenyl ether	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Chrysene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Di-n-butyl phthalate	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Di-n-octyl phthalate	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Dibenz(a,h)anthracene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Dibenzofuran	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
1,2-Dichlorobenzene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
1,3-Dichlorobenzene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
1,4-Dichlorobenzene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
3,3'-Dichlorobenzidine	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Diethyl phthalate	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Dimethyl phthalate	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
2,4-Dichlorophenol	ND	20		µg/L	1	4/14/2017 5:19:57 PM	31059
2,4-Dimethylphenol	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
4,6-Dinitro-2-methylphenol	ND	20		µg/L	1	4/14/2017 5:19:57 PM	31059
2,4-Dinitrophenol	ND	20		µg/L	1	4/14/2017 5:19:57 PM	31059

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

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: WDW 2 3-31-17
Lab ID: 1704017-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 3/31/2017 7:30:00 AM
Received Date: 4/1/2017 11:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **DAM**	
2,4-Dinitrotoluene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
2,6-Dinitrotoluene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Fluoranthene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Fluorene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Hexachlorobenzene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Hexachlorobutadiene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Hexachlorocyclopentadiene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Hexachloroethane	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Indeno(1,2,3-cd)pyrene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Isophorone	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
1-Methylnaphthalene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
2-Methylnaphthalene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
2-Methylphenol	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
3+4-Methylphenol	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
N-Nitrosodi-n-propylamine	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
N-Nitrosodimethylamine	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
N-Nitrosodiphenylamine	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Naphthalene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
2-Nitroaniline	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
3-Nitroaniline	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
4-Nitroaniline	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Nitrobenzene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
2-Nitrophenol	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
4-Nitrophenol	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Pentachlorophenol	ND	20		µg/L	1	4/14/2017 5:19:57 PM	31059
Phenanthrene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Phenol	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Pyrene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Pyridine	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
1,2,4-Trichlorobenzene	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
2,4,5-Trichlorophenol	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
2,4,6-Trichlorophenol	ND	10		µg/L	1	4/14/2017 5:19:57 PM	31059
Surr: 2-Fluorophenol	29.5	15-98.1		%Rec	1	4/14/2017 5:19:57 PM	31059
Surr: Phenol-d5	24.3	15-80.7		%Rec	1	4/14/2017 5:19:57 PM	31059
Surr: 2,4,6-Tribromophenol	39.6	15-112		%Rec	1	4/14/2017 5:19:57 PM	31059
Surr: Nitrobenzene-d5	62.8	27.2-90.7		%Rec	1	4/14/2017 5:19:57 PM	31059
Surr: 2-Fluorobiphenyl	47.4	23.3-85.6		%Rec	1	4/14/2017 5:19:57 PM	31059
Surr: 4-Terphenyl-d14	36.6	27.6-107		%Rec	1	4/14/2017 5:19:57 PM	31059
EPA METHOD 8260B: VOLATILES						Analyst: **rde**	

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

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: WDW 2 3-31-17
Lab ID: 1704017-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 3/31/2017 7:30:00 AM
Received Date: 4/1/2017 11:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **rde**	
Benzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Toluene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Ethylbenzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Methyl tert-butyl ether (MTBE)	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,2,4-Trimethylbenzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,3,5-Trimethylbenzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,2-Dichloroethane (EDC)	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,2-Dibromoethane (EDB)	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Naphthalene	ND	10	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1-Methylnaphthalene	ND	20	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
2-Methylnaphthalene	ND	20	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Acetone	860	50	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Bromobenzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Bromodichloromethane	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Bromoform	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Bromomethane	ND	15	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
2-Butanone	60	50	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Carbon disulfide	ND	50	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Carbon Tetrachloride	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Chlorobenzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Chloroethane	ND	10	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Chloroform	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Chloromethane	ND	15	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
2-Chlorotoluene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
4-Chlorotoluene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
cis-1,2-DCE	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
cis-1,3-Dichloropropene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,2-Dibromo-3-chloropropane	ND	20	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Dibromochloromethane	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Dibromomethane	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,2-Dichlorobenzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,3-Dichlorobenzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,4-Dichlorobenzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Dichlorodifluoromethane	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,1-Dichloroethane	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,1-Dichloroethene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,2-Dichloropropane	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,3-Dichloropropane	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
2,2-Dichloropropane	ND	10	D	µg/L	10	4/3/2017 11:35:00 PM	R41854

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Qualifiers:

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D	Sample Diluted Due to Matrix	E	Value above quantitation range
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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, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: WDW 2 3-31-17
Lab ID: 1704017-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 3/31/2017 7:30:00 AM
Received Date: 4/1/2017 11:30:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **rde**	
1,1-Dichloropropene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Hexachlorobutadiene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
2-Hexanone	ND	50	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Isopropylbenzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
4-Isopropyltoluene	190	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
4-Methyl-2-pentanone	ND	50	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Methylene Chloride	ND	15	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
n-Butylbenzene	ND	15	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
n-Propylbenzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
sec-Butylbenzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Styrene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
tert-Butylbenzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,1,1,2-Tetrachloroethane	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,1,2,2-Tetrachloroethane	ND	10	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Tetrachloroethene (PCE)	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
trans-1,2-DCE	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
trans-1,3-Dichloropropene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,2,3-Trichlorobenzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,2,4-Trichlorobenzene	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,1,1-Trichloroethane	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,1,2-Trichloroethane	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Trichloroethene (TCE)	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Trichlorofluoromethane	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
1,2,3-Trichloropropane	ND	10	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Vinyl chloride	ND	5.0	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Xylenes, Total	16	7.5	D	µg/L	10	4/3/2017 11:35:00 PM	R41854
Surr: 1,2-Dichloroethane-d4	86.3	70-130	D	%Rec	10	4/3/2017 11:35:00 PM	R41854
Surr: 4-Bromofluorobenzene	105	70-130	D	%Rec	10	4/3/2017 11:35:00 PM	R41854
Surr: Dibromofluoromethane	103	70-130	D	%Rec	10	4/3/2017 11:35:00 PM	R41854
Surr: Toluene-d8	97.8	70-130	D	%Rec	10	4/3/2017 11:35:00 PM	R41854

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

Qualifiers:

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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

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Hall Environmental
Project: Not Indicated
Lab ID: B17040170-001
Client Sample ID: 1704017-001F,G Injection Well

Report Date: 04/14/17
Collection Date: 03/31/17 07:30
DateReceived: 04/04/17
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
Oxidation-Reduction Potential	184	mV	H			A2580 B	04/12/17 14:52 / dah
IGNITABILITY							
Flash Point (Ignitability)	>200	°F		30		SW1010A	04/14/17 08:44 / dah
CORROSIVITY							
pH	7.32	s.u.		0.10		SW9040C	04/10/17 13:14 / dah
REACTIVITY							
Cyanide, Reactive	ND	mg/kg		0.05	250	SW846 Ch 7	04/13/17 12:25 / mas
Sulfide, Reactive	ND	mg/kg		20	500	SW846 Ch 7	04/11/17 09:00 / dah

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
H - Analysis performed past recommended holding time.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Hall Environmental
Project: Not Indicated

Report Date: 04/14/17
Work Order: B17040170

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2580 B										Batch: R277927
Lab ID: B17040170-001ADUP	Sample Duplicate					Run: ORION 720A HZW_170412A				04/12/17 14:52
Oxidation-Reduction Potential		187	mV					1.5	20	
Lab ID: LCS2	Laboratory Control Sample					Run: ORION 720A HZW_170412A				04/12/17 14:52
Oxidation-Reduction Potential		300	mV		100	97	103			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Hall Environmental
Project: Not Indicated

Report Date: 04/14/17
Work Order: B17040170

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW1010A										Batch: R278069
Lab ID: B17040539-008ADUP	Sample Duplicate					Run: PENSKY MARTEN CLOSED				04/14/17 08:44
Flash Point (Ignitability)		77	°F	30				5.3	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Hall Environmental
Project: Not Indicated

Report Date: 04/14/17
Work Order: B17040170

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW846 Ch 7										Batch: 107762
Lab ID: MB-107762		Method Blank				Run: FIA202-B_170413A				04/13/17 12:24
Cyanide, Reactive		ND	mg/kg	0.05						
Lab ID: B17040591-001DMS		Sample Matrix Spike				Run: FIA202-B_170413A				04/13/17 12:30
Cyanide, Reactive		0.87	mg/kg	0.050	87	80	120			
Lab ID: B17040591-001DMSD		Sample Matrix Spike Duplicate				Run: FIA202-B_170413A				04/13/17 12:31
Cyanide, Reactive		0.87	mg/kg	0.050	87	80	120	0.0	10	
Method: SW846 Ch 7										Batch: 107762
Lab ID: MB-107762		Method Blank				Run: REACTIVE SULFIDE/CYANID				03/24/17 09:40
Sulfide, Reactive		ND	mg/kg	10						
Lab ID: LCS-107762		Laboratory Control Sample				Run: REACTIVE SULFIDE/CYANID				03/24/17 09:40
Sulfide, Reactive		12	mg/kg	20	107	70	130			
Lab ID: B17031461-001BDUP		Sample Duplicate				Run: REACTIVE SULFIDE/CYANID				03/24/17 09:40
Sulfide, Reactive		ND	mg/kg	20					10	
Method: SW846 Ch 7										Batch: 107762
Lab ID: MB-107762		Method Blank				Run: REACTIVE SULFIDE/CYANID				04/11/17 09:00
Sulfide, Reactive		ND	mg/kg	10						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Hall Environmental
Project: Not Indicated

Report Date: 04/14/17
Work Order: B17040170

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW9040C							Analytical Run: ORION 720A HZW_170410B			
Lab ID: ICV	Initial Calibration Verification Standard								04/10/17 13:14	
pH		7.99	s.u.	0.10	100	98	102			
Method: SW9040C									Batch: R277761	
Lab ID: B17040170-001ADUP	Sample Duplicate					Run: ORION 720A HZW_170410B			04/10/17 13:14	
pH		7.38	s.u.	0.10				0.8	3	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QC SUMMARY REPORT

WO#: **1704017**

Hall Environmental Analysis Laboratory, Inc.

17-Apr-17

Client: Western Refining Southwest, Inc.
Project: WDW 2 3-31-17

Sample ID **MB**	SampType: **mblk**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R41868**	RunNo: **41868**
Prep Date:	Analysis Date: **4/4/2017**	SeqNo: **1315703** 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								
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: **R41868**	RunNo: **41868**
Prep Date:	Analysis Date: **4/4/2017**	SeqNo: **1315704** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.51	0.10	0.5000	0	102	90	110			
Bromide	2.4	0.10	2.500	0	95.4	90	110			
Phosphorus, Orthophosphate (As P	5.0	0.50	5.000	0	99.6	90	110			
Sulfate	9.6	0.50	10.00	0	96.2	90	110			
Nitrate+Nitrite as N	3.4	0.20	3.500	0	97.4	90	110			

Sample ID **MB**	SampType: **mblk**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **A41955**	RunNo: **41955**
Prep Date:	Analysis Date: **4/6/2017**	SeqNo: **1317699** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID **LCS**	SampType: **lcs**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **A41955**	RunNo: **41955**
Prep Date:	Analysis Date: **4/6/2017**	SeqNo: **1317700** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.9	0.50	5.000	0	98.9	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#: **1704017**

17-Apr-17

Client: Western Refining Southwest, Inc.

Project: WDW 2 3-31-17

Sample ID **100ng lcs**	SampType: **LCS**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **LCSW**	Batch ID: **R41854**	RunNo: **41854**
Prep Date:	Analysis Date: **4/3/2017**	SeqNo: **1313978** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	22	1.0	20.00	0	109	70	130			
Toluene	21	1.0	20.00	0	104	70	130			
Chlorobenzene	22	1.0	20.00	0	108	70	130			
1,1-Dichloroethene	23	1.0	20.00	0	116	70	130			
Trichloroethene (TCE)	21	1.0	20.00	0	107	70	130			
Surr: 1,2-Dichloroethane-d4	8.5		10.00		85.1	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		103	70	130			
Surr: Dibromofluoromethane	10		10.00		102	70	130			
Surr: Toluene-d8	9.7		10.00		97.3	70	130			

Sample ID **vsb deli**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R41854**	RunNo: **41854**
Prep Date:	Analysis Date: **4/3/2017**	SeqNo: **1313980** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	ND	1.0								
Toluene	ND	1.0								
Ethylbenzene	ND	1.0								
Methyl tert-butyl ether (MTBE)	ND	1.0								
1,2,4-Trimethylbenzene	ND	1.0								
1,3,5-Trimethylbenzene	ND	1.0								
1,2-Dichloroethane (EDC)	ND	1.0								
1,2-Dibromoethane (EDB)	ND	1.0								
Naphthalene	ND	2.0								
1-Methylnaphthalene	ND	4.0								
2-Methylnaphthalene	ND	4.0								
Acetone	ND	10								
Bromobenzene	ND	1.0								
Bromodichloromethane	ND	1.0								
Bromoform	ND	1.0								
Bromomethane	ND	3.0								
2-Butanone	ND	10								
Carbon disulfide	ND	10								
Carbon Tetrachloride	ND	1.0								
Chlorobenzene	ND	1.0								
Chloroethane	ND	2.0								
Chloroform	ND	1.0								
Chloromethane	ND	3.0								
2-Chlorotoluene	ND	1.0								

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

WO#: **1704017**

Hall Environmental Analysis Laboratory, Inc.

17-Apr-17

Client: Western Refining Southwest, Inc.
Project: WDW 2 3-31-17

Sample ID **vsb deli**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**	
Client ID: **PBW**	Batch ID: **R41854**	RunNo: **41854**	
Prep Date:	Analysis Date: **4/3/2017**	SeqNo: **1313980**	Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
4-Chlorotoluene	ND	1.0								
cis-1,2-DCE	ND	1.0								
cis-1,3-Dichloropropene	ND	1.0								
1,2-Dibromo-3-chloropropane	ND	2.0								
Dibromochloromethane	ND	1.0								
Dibromomethane	ND	1.0								
1,2-Dichlorobenzene	ND	1.0								
1,3-Dichlorobenzene	ND	1.0								
1,4-Dichlorobenzene	ND	1.0								
Dichlorodifluoromethane	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
1,2-Dichloropropane	ND	1.0								
1,3-Dichloropropane	ND	1.0								
2,2-Dichloropropane	ND	2.0								
1,1-Dichloropropene	ND	1.0								
Hexachlorobutadiene	ND	1.0								
2-Hexanone	ND	10								
Isopropylbenzene	ND	1.0								
4-Isopropyltoluene	ND	1.0								
4-Methyl-2-pentanone	ND	10								
Methylene Chloride	ND	3.0								
n-Butylbenzene	ND	3.0								
n-Propylbenzene	ND	1.0								
sec-Butylbenzene	ND	1.0								
Styrene	ND	1.0								
tert-Butylbenzene	ND	1.0								
1,1,1,2-Tetrachloroethane	ND	1.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
trans-1,2-DCE	ND	1.0								
trans-1,3-Dichloropropene	ND	1.0								
1,2,3-Trichlorobenzene	ND	1.0								
1,2,4-Trichlorobenzene	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Trichlorofluoromethane	ND	1.0								
1,2,3-Trichloropropane	ND	2.0								

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

WO#: **1704017**

Hall Environmental Analysis Laboratory, Inc.

17-Apr-17

Client: Western Refining Southwest, Inc.
Project: WDW 2 3-31-17

Sample ID **vsb deli**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R41854**	RunNo: **41854**
Prep Date:	Analysis Date: **4/3/2017**	SeqNo: **1313980** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	8.4		10.00		84.5	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		104	70	130			
Surr: Dibromofluoromethane	10		10.00		100	70	130			
Surr: Toluene-d8	9.8		10.00		98.1	70	130			

Qualifiers:

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1704017**

17-Apr-17

Client: Western Refining Southwest, Inc.

Project: WDW 2 3-31-17

Sample ID **1704017-001bms** SampType: **MS** TestCode: **EPA Method 8270C: Semivolatiles**

Client ID: **Injection Well** Batch ID: **31059** RunNo: **42041**

Prep Date: **4/4/2017** Analysis Date: **4/6/2017** SeqNo: **1320412** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	51	10	100.0	0	50.9	18.1	108			
4-Chloro-3-methylphenol	120	10	200.0	0	59.9	15	111			
2-Chlorophenol	120	10	200.0	0	61.4	15	113			
1,4-Dichlorobenzene	34	10	100.0	0	33.5	21	81.3			
2,4-Dinitrotoluene	49	10	100.0	0	49.0	27.4	101			
N-Nitrosodi-n-propylamine	64	10	100.0	13.82	49.8	24.9	107			
4-Nitrophenol	67	10	200.0	0	33.4	15	62.2			
Pentachlorophenol	87	20	200.0	0	43.6	15	96.9			
Phenol	81	10	200.0	3.520	38.6	15	64.7			
Pyrene	51	10	100.0	0	51.4	29.2	111			
1,2,4-Trichlorobenzene	38	10	100.0	0	37.6	22.9	94.8			
Surr: 2-Fluorophenol	90		200.0		45.2	15	98.1			
Surr: Phenol-d5	65		200.0		32.7	15	80.7			
Surr: 2,4,6-Tribromophenol	100		200.0		51.5	15	112			
Surr: Nitrobenzene-d5	59		100.0		59.3	27.2	90.7			
Surr: 2-Fluorobiphenyl	50		100.0		50.3	23.3	85.6			
Surr: 4-Terphenyl-d14	43		100.0		42.9	27.6	107			

Sample ID **1704017-001bmsd** SampType: **MSD** TestCode: **EPA Method 8270C: Semivolatiles**

Client ID: **Injection Well** Batch ID: **31059** RunNo: **42041**

Prep Date: **4/4/2017** Analysis Date: **4/6/2017** SeqNo: **1320413** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	40	10	100.0	0	40.2	18.1	108	23.6	30.5	
4-Chloro-3-methylphenol	98	10	200.0	0	49.0	15	111	19.9	50	
2-Chlorophenol	93	10	200.0	0	46.4	15	113	27.9	36.3	
1,4-Dichlorobenzene	25	10	100.0	0	24.6	21	81.3	30.7	42.1	
2,4-Dinitrotoluene	41	10	100.0	0	40.8	27.4	101	18.2	28.5	
N-Nitrosodi-n-propylamine	52	10	100.0	13.82	38.5	24.9	107	19.4	25.4	
4-Nitrophenol	50	10	200.0	0	25.2	15	62.2	28.1	50	
Pentachlorophenol	72	20	200.0	0	36.1	15	96.9	18.8	50	
Phenol	58	10	200.0	3.520	27.1	15	64.7	33.4	46.1	
Pyrene	45	10	100.0	0	44.7	29.2	111	14.0	34.3	
1,2,4-Trichlorobenzene	29	10	100.0	0	28.9	22.9	94.8	26.0	43.6	
Surr: 2-Fluorophenol	63		200.0		31.7	15	98.1	0	0	
Surr: Phenol-d5	49		200.0		24.4	15	80.7	0	0	
Surr: 2,4,6-Tribromophenol	89		200.0		44.7	15	112	0	0	
Surr: Nitrobenzene-d5	46		100.0		45.7	27.2	90.7	0	0	
Surr: 2-Fluorobiphenyl	42		100.0		41.9	23.3	85.6	0	0	

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#: 1704017

17-Apr-17

Client: Western Refining Southwest, Inc.

Project: WDW 2 3-31-17

Sample ID **1704017-001bmsd** SampType: **MSD** TestCode: **EPA Method 8270C: Semivolatiles**

Client ID: **Injection Well** Batch ID: **31059** RunNo: **42041**

Prep Date: **4/4/2017** Analysis Date: **4/6/2017** SeqNo: **1320413** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Terphenyl-d14	35		100.0		35.2	27.6	107	0	0	

Sample ID **lcs-31059** SampType: **LCS** TestCode: **EPA Method 8270C: Semivolatiles**

Client ID: **LCSW** Batch ID: **31059** RunNo: **42041**

Prep Date: **4/4/2017** Analysis Date: **4/6/2017** SeqNo: **1320415** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	65	10	100.0	0	64.6	42.9	100			
4-Chloro-3-methylphenol	160	10	200.0	0	78.9	36.2	110			
2-Chlorophenol	150	10	200.0	0	74.7	33.4	97.8			
1,4-Dichlorobenzene	58	10	100.0	0	57.6	32.8	79.3			
2,4-Dinitrotoluene	63	10	100.0	0	63.0	34.9	107			
N-Nitrosodi-n-propylamine	83	10	100.0	0	82.8	30.7	111			
4-Nitrophenol	95	10	200.0	0	47.4	15	91.9			
Pentachlorophenol	120	20	200.0	0	58.6	33.3	93.5			
Phenol	110	10	200.0	0	56.0	20.9	86.4			
Pyrene	73	10	100.0	0	73.3	45.6	111			
1,2,4-Trichlorobenzene	60	10	100.0	0	59.9	38.7	88.2			
Surr: 2-Fluorophenol	130		200.0		63.8	15	98.1			
Surr: Phenol-d5	110		200.0		56.2	15	80.7			
Surr: 2,4,6-Tribromophenol	150		200.0		74.8	15	112			
Surr: Nitrobenzene-d5	73		100.0		73.1	27.2	90.7			
Surr: 2-Fluorobiphenyl	69		100.0		68.7	23.3	85.6			
Surr: 4-Terphenyl-d14	64		100.0		63.6	27.6	107			

Sample ID **mb-31059** SampType: **MBLK** TestCode: **EPA Method 8270C: Semivolatiles**

Client ID: **PBW** Batch ID: **31059** RunNo: **42041**

Prep Date: **4/4/2017** Analysis Date: **4/6/2017** SeqNo: **1320416** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	ND	10								
Acenaphthylene	ND	10								
Aniline	ND	10								
Anthracene	ND	10								
Azobenzene	ND	10								
Benz(a)anthracene	ND	10								
Benzo(a)pyrene	ND	10								
Benzo(b)fluoranthene	ND	10								
Benzo(g,h,i)perylene	ND	10								
Benzo(k)fluoranthene	ND	10								

Qualifiers:

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1704017**

17-Apr-17

Client: Western Refining Southwest, Inc.

Project: WDW 2 3-31-17

Sample ID **mb-31059**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **PBW**	Batch ID: **31059**	RunNo: **42041**
Prep Date: **4/4/2017**	Analysis Date: **4/6/2017**	SeqNo: **1320416** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzoic acid	ND	20								
Benzyl alcohol	ND	10								
Bis(2-chloroethoxy)methane	ND	10								
Bis(2-chloroethyl)ether	ND	10								
Bis(2-chloroisopropyl)ether	ND	10								
Bis(2-ethylhexyl)phthalate	ND	10								
4-Bromophenyl phenyl ether	ND	10								
Butyl benzyl phthalate	ND	10								
Carbazole	ND	10								
4-Chloro-3-methylphenol	ND	10								
4-Chloroaniline	ND	10								
2-Chloronaphthalene	ND	10								
2-Chlorophenol	ND	10								
4-Chlorophenyl phenyl ether	ND	10								
Chrysene	ND	10								
Di-n-butyl phthalate	ND	10								
Di-n-octyl phthalate	ND	10								
Dibenz(a,h)anthracene	ND	10								
Dibenzofuran	ND	10								
1,2-Dichlorobenzene	ND	10								
1,3-Dichlorobenzene	ND	10								
1,4-Dichlorobenzene	ND	10								
3,3'-Dichlorobenzidine	ND	10								
Diethyl phthalate	ND	10								
Dimethyl phthalate	ND	10								
2,4-Dichlorophenol	ND	20								
2,4-Dimethylphenol	ND	10								
4,6-Dinitro-2-methylphenol	ND	20								
2,4-Dinitrophenol	ND	20								
2,4-Dinitrotoluene	ND	10								
2,6-Dinitrotoluene	ND	10								
Fluoranthene	ND	10								
Fluorene	ND	10								
Hexachlorobenzene	ND	10								
Hexachlorobutadiene	ND	10								
Hexachlorocyclopentadiene	ND	10								
Hexachloroethane	ND	10								
Indeno(1,2,3-cd)pyrene	ND	10								
Isophorone	ND	10								

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#: **1704017**

17-Apr-17

Client: Western Refining Southwest, Inc.

Project: WDW 2 3-31-17

Sample ID **mb-31059**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **PBW**	Batch ID: **31059**	RunNo: **42041**
Prep Date: **4/4/2017**	Analysis Date: **4/6/2017**	SeqNo: **1320416** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1-Methylnaphthalene	ND	10								
2-Methylnaphthalene	ND	10								
2-Methylphenol	ND	10								
3+4-Methylphenol	ND	10								
N-Nitrosodi-n-propylamine	ND	10								
N-Nitrosodimethylamine	ND	10								
N-Nitrosodiphenylamine	ND	10								
Naphthalene	ND	10								
2-Nitroaniline	ND	10								
3-Nitroaniline	ND	10								
4-Nitroaniline	ND	10								
Nitrobenzene	ND	10								
2-Nitrophenol	ND	10								
4-Nitrophenol	ND	10								
Pentachlorophenol	ND	20								
Phenanthrene	ND	10								
Phenol	ND	10								
Pyrene	ND	10								
Pyridine	ND	10								
1,2,4-Trichlorobenzene	ND	10								
2,4,5-Trichlorophenol	ND	10								
2,4,6-Trichlorophenol	ND	10								
Surr: 2-Fluorophenol	130		200.0		64.7	15	98.1			
Surr: Phenol-d5	92		200.0		45.9	15	80.7			
Surr: 2,4,6-Tribromophenol	160		200.0		80.0	15	112			
Surr: Nitrobenzene-d5	86		100.0		86.4	27.2	90.7			
Surr: 2-Fluorobiphenyl	74		100.0		73.9	23.3	85.6			
Surr: 4-Terphenyl-d14	68		100.0		67.7	27.6	107			

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#: **1704017**

17-Apr-17

Client: Western Refining Southwest, Inc.

Project: WDW 2 3-31-17

Sample ID **MB-31063**	SampType: **MBLK**	TestCode: **EPA Method 7470: Mercury**
Client ID: **PBW**	Batch ID: **31063**	RunNo: **41900**
Prep Date: **4/4/2017**	Analysis Date: **4/5/2017**	SeqNo: **1316028** Units: **mg/L**

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

Sample ID **LCS-31063**	SampType: **LCS**	TestCode: **EPA Method 7470: Mercury**
Client ID: **LCSW**	Batch ID: **31063**	RunNo: **41900**
Prep Date: **4/4/2017**	Analysis Date: **4/5/2017**	SeqNo: **1316029** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0049	0.00020	0.005000	0	97.2	80	120			

Sample ID **1704017-001EMS**	SampType: **MS**	TestCode: **EPA Method 7470: Mercury**
Client ID: **Injection Well**	Batch ID: **31063**	RunNo: **41900**
Prep Date: **4/4/2017**	Analysis Date: **4/5/2017**	SeqNo: **1316034** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0051	0.00020	0.005000	.00007989	101	75	125			

Sample ID **1704017-001EMSD**	SampType: **MSD**	TestCode: **EPA Method 7470: Mercury**
Client ID: **Injection Well**	Batch ID: **31063**	RunNo: **41900**
Prep Date: **4/4/2017**	Analysis Date: **4/5/2017**	SeqNo: **1316035** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0053	0.00020	0.005000	.00007989	104	75	125	2.91	20	

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

WO#: **1704017**

Hall Environmental Analysis Laboratory, Inc.

17-Apr-17

Client: Western Refining Southwest, Inc.
Project: WDW 2 3-31-17

Sample ID **MB-A** SampType: **MBLK** TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **PBW** Batch ID: **A41903** RunNo: **41903**
Prep Date: Analysis Date: **4/5/2017** SeqNo: **1316139** 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: **A41903** RunNo: **41903**
Prep Date: Analysis Date: **4/5/2017** SeqNo: **1316140** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	51	1.0	50.00	0	103	80	120			
Magnesium	51	1.0	50.00	0	101	80	120			
Potassium	49	1.0	50.00	0	98.6	80	120			
Sodium	50	1.0	50.00	0	99.3	80	120			

Sample ID **1704017-001DMS** SampType: **MS** TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **Injection Well** Batch ID: **A41903** RunNo: **41903**
Prep Date: Analysis Date: **4/5/2017** SeqNo: **1316151** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	75	1.0	50.00	25.63	99.6	75	125			
Potassium	57	1.0	50.00	8.072	97.1	75	125			

Sample ID **1704017-001DMSD** SampType: **MSD** TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **Injection Well** Batch ID: **A41903** RunNo: **41903**
Prep Date: Analysis Date: **4/5/2017** SeqNo: **1316152** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Magnesium	76	1.0	50.00	25.63	101	75	125	1.17	20	
Potassium	57	1.0	50.00	8.072	98.2	75	125	0.937	20	

Sample ID **1704017-001DMS** SampType: **MS** TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **Injection Well** Batch ID: **A41903** RunNo: **41903**
Prep Date: Analysis Date: **4/5/2017** SeqNo: **1316154** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	360	5.0	250.0	102.6	102	75	125			

Qualifiers:

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

QC SUMMARY REPORT

WO#: **1704017**

Hall Environmental Analysis Laboratory, Inc.

17-Apr-17

Client: Western Refining Southwest, Inc.
Project: WDW 2 3-31-17

Sample ID **1704017-001DMSD**	SampType: **MSD**	TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **Injection Well**	Batch ID: **A41903**	RunNo: **41903**
Prep Date:	Analysis Date: **4/5/2017**	SeqNo: **1316155** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	360	5.0	250.0	102.6	102	75	125	0.0602	20	

Qualifiers:

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1704017**

17-Apr-17

Client: Western Refining Southwest, Inc.

Project: WDW 2 3-31-17

Sample ID **MB-31057**	SampType: **MBLK**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **PBW**	Batch ID: **31057**	RunNo: **41903**
Prep Date: **4/4/2017**	Analysis Date: **4/5/2017**	SeqNo: **1316127** 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								
Sodium	ND	1.0								

Sample ID **LCS-31057**	SampType: **LCS**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **LCSW**	Batch ID: **31057**	RunNo: **41903**
Prep Date: **4/4/2017**	Analysis Date: **4/5/2017**	SeqNo: **1316168** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	1.0	0.040	1.000	0	102	80	120			
Barium	0.98	0.040	1.000	0	98.2	80	120			
Cadmium	0.98	0.0040	1.000	0	98.1	80	120			
Calcium	100	2.0	100.0	0	103	80	120			
Chromium	0.98	0.012	1.000	0	98.2	80	120			
Lead	0.99	0.010	1.000	0	98.9	80	120			
Magnesium	100	2.0	100.0	0	101	80	120			
Potassium	98	2.0	100.0	0	97.6	80	120			
Selenium	1.0	0.10	1.000	0	102	80	120			
Silver	0.20	0.010	0.2000	0	99.9	80	120			
Sodium	99	2.0	100.0	0	99.1	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#: **1704017**

17-Apr-17

Client: Western Refining Southwest, Inc.

Project: WDW 2 3-31-17

Sample ID **mb-1** SampType: **mblk** TestCode: **SM2320B: Alkalinity**
Client ID: **PBW** Batch ID: **R42064** RunNo: **42064**
Prep Date: Analysis Date: **4/11/2017** SeqNo: **1321188** 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 DOC-1 alk MR** SampType: **lcs** TestCode: **SM2320B: Alkalinity**
Client ID: **LCSW** Batch ID: **R42064** RunNo: **42064**
Prep Date: Analysis Date: **4/11/2017** SeqNo: **1321189** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	80.08	20.00	80.00	0	100	90	110			

Sample ID **DOC-2 alk MRA** SampType: **lcs** TestCode: **SM2320B: Alkalinity**
Client ID: **LCSW** Batch ID: **R42064** RunNo: **42064**
Prep Date: Analysis Date: **4/11/2017** SeqNo: **1321190** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	80.76	20.00	80.00	0	101	90	110			

Sample ID **DOC-3 alk MRA** SampType: **lcs** TestCode: **SM2320B: Alkalinity**
Client ID: **LCSW** Batch ID: **R42064** RunNo: **42064**
Prep Date: Analysis Date: **4/11/2017** SeqNo: **1321191** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	80.60	20.00	80.00	0	101	90	110			

Sample ID **DOC-4 alk MRA** SampType: **lcs** TestCode: **SM2320B: Alkalinity**
Client ID: **LCSW** Batch ID: **R42064** RunNo: **42064**
Prep Date: Analysis Date: **4/11/2017** SeqNo: **1321192** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	80.92	20.00	80.00	0	101	90	110			

Qualifiers:

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1704017**

17-Apr-17

Client: Western Refining Southwest, Inc.

Project: WDW 2 3-31-17

Sample ID **MB-31115**	SampType: **MBLK**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **PBW**	Batch ID: **31115**	RunNo: **41978**
Prep Date: **4/6/2017**	Analysis Date: **4/8/2017**	SeqNo: **1318207** 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-31115**	SampType: **LCS**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **LCSW**	Batch ID: **31115**	RunNo: **41978**
Prep Date: **4/6/2017**	Analysis Date: **4/8/2017**	SeqNo: **1318208** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	1030	20.0	1000	0	103	80	120			

Qualifiers:

- * Value exceeds Maximum Contaminant Level.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S % Recovery outside of range due to dilution or matrix
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Detection Limit
- 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: 1704017 RcptNo: 1

Received By: **Lindsay Mangin** 4/1/2017 11:30:00 AM

Completed By: **Anne Thorne** 4/3/2017 12:10:08 PM

Reviewed By: IO 4/3/17

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 ☑ AT 04/03/17	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: 3 2 (<2 or >12 unless noted)

Adjusted? —

Checked by: AT 04/03/17

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	1.2	Good	Yes			

Chain-of-Custody Record

Client: Western Refining

Mailing Address: 50 CR4990
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

Project Name:
WDW#2 3-31-17

Project #:
PO# 1261903I-2

Project Manager:
Kelly Robinson

Sampler: Matt Kraklow

On Ice: ☐ Yes ☐ No

Sample Temperature: 7

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

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1704017	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)					Air Bubbles (Y or N)
3-31-17	7:30	H2O	Injection Well	3-500mL Poly	Cold	-001			See	attached					list							
				1-500mL Poly	NaOH	-001																
				1-500mL Poly	Zn Acetate	-001																
				3-VOAs	HCL	-001																
				2-1 ltr Amb	Cold	-001																
				1-500mL poly	Nitric acid	-001																
				1-125 poly	HNO_3	-001																
				1-125 poly	H_2SO_4	-001																

Date:	Time:	Relinquished by:	Received by:	Date	Time
3/31/17	1206			3/31/17	1200
3/31/17	1800			04/01/17	1130

Remarks: see attached list

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); 9040C B.Winkler
- 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

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);

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

July 28, 2017

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

RE: Injection Well 6-22-17 OrderNo.: 1706D18

Dear Kelly Robinson:

Hall Environmental Analysis Laboratory received 2 sample(s) on 6/23/2017 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 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 #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **1706D18**
Date Reported: **7/28/2017**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17
Lab ID: 1706D18-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 6/22/2017 9:00:00 AM
Received Date: 6/23/2017 7:25:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
SPECIFIC GRAVITY						Analyst: **JRR**	
Specific Gravity	1.001	0			1	6/28/2017 1:27:00 PM	R43862
EPA METHOD 300.0: ANIONS						Analyst: **MRA**	
Fluoride	ND	0.50		mg/L	5	6/23/2017 9:59:34 PM	R43753
Chloride	470	25	*	mg/L	50	7/9/2017 1:44:56 PM	R44088
Nitrogen, Nitrite (As N)	ND	0.50		mg/L	5	6/23/2017 9:59:34 PM	R43753
Bromide	2.0	0.50		mg/L	5	6/23/2017 9:59:34 PM	R43753
Nitrogen, Nitrate (As N)	ND	0.50		mg/L	5	6/23/2017 9:59:34 PM	R43753
Phosphorus, Orthophosphate (As P)	ND	2.5		mg/L	5	6/23/2017 9:59:34 PM	R43753
Sulfate	69	2.5		mg/L	5	6/23/2017 9:59:34 PM	R43753
SM2510B: SPECIFIC CONDUCTANCE						Analyst: **JRR**	
Conductivity	2400	5.0		µmhos/cm	1	6/28/2017 5:27:10 PM	R43890
SM2320B: ALKALINITY						Analyst: **JRR**	
Bicarbonate (As CaCO3)	504.7	20.00		mg/L CaCO3	1	6/28/2017 5:27:10 PM	R43890
Carbonate (As CaCO3)	ND	2.000		mg/L CaCO3	1	6/28/2017 5:27:10 PM	R43890
Total Alkalinity (as CaCO3)	504.7	20.00		mg/L CaCO3	1	6/28/2017 5:27:10 PM	R43890
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**	
Total Dissolved Solids	1540	40.0	*D	mg/L	1	6/27/2017 7:56:00 PM	32502
EPA METHOD 7470: MERCURY						Analyst: **MED**	
Mercury	0.00024	0.00020		mg/L	1	7/12/2017 2:13:50 PM	32756
EPA METHOD 6010B: DISSOLVED METALS						Analyst: **MED**	
Calcium	84	1.0		mg/L	1	7/6/2017 1:15:37 PM	A44027
Magnesium	32	1.0		mg/L	1	7/6/2017 1:15:37 PM	A44027
Potassium	9.9	1.0		mg/L	1	7/6/2017 1:15:37 PM	A44027
Sodium	370	5.0		mg/L	5	7/6/2017 1:17:03 PM	A44027
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: **pmf**	
Arsenic	ND	0.020		mg/L	1	7/10/2017 4:47:53 PM	32492
Barium	0.35	0.020		mg/L	1	7/10/2017 4:47:53 PM	32492
Cadmium	ND	0.0020		mg/L	1	7/10/2017 4:47:53 PM	32492
Calcium	110	5.0		mg/L	5	7/10/2017 4:54:20 PM	32492
Chromium	ND	0.0060		mg/L	1	7/10/2017 4:47:53 PM	32492
Lead	0.0063	0.0050		mg/L	1	7/10/2017 4:47:53 PM	32492
Magnesium	33	1.0		mg/L	1	7/10/2017 4:47:53 PM	32492
Potassium	10	1.0		mg/L	1	7/10/2017 4:47:53 PM	32492
Selenium	ND	0.050		mg/L	1	7/10/2017 6:31:07 PM	32492
Silver	ND	0.0050		mg/L	1	7/10/2017 4:47:53 PM	32492
Sodium	430	10		mg/L	10	7/10/2017 6:36:45 PM	32492

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
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

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17
Lab ID: 1706D18-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 6/22/2017 9:00:00 AM
Received Date: 6/23/2017 7:25:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8081: PESTICIDES						Analyst: **MAB**	
4,4'-DDD	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
4,4'-DDE	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
4,4'-DDT	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
Aldrin	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
alpha-BHC	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
beta-BHC	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
Chlordane	ND	5.0		µg/L	1	7/1/2017 2:37:16 PM	32507
delta-BHC	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
Dieldrin	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
Endosulfan I	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
Endosulfan II	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
Endosulfan sulfate	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
Endrin	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
Endrin aldehyde	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
gamma-BHC	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
Heptachlor	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
Heptachlor epoxide	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
Methoxychlor	ND	0.25		µg/L	1	7/1/2017 2:37:16 PM	32507
Toxaphene	ND	5.0		µg/L	1	7/1/2017 2:37:16 PM	32507
Surr: Decachlorobiphenyl	66.6	36.8-113		%Rec	1	7/1/2017 2:37:16 PM	32507
Surr: Tetrachloro-m-xylene	67.3	34.7-105		%Rec	1	7/1/2017 2:37:16 PM	32507
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **JDC**	
Acenaphthene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Acenaphthylene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Aniline	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Anthracene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Azobenzene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Benz(a)anthracene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Benzo(a)pyrene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Benzo(b)fluoranthene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Benzo(g,h,i)perylene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Benzo(k)fluoranthene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Benzoic acid	40	20	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Benzyl alcohol	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Bis(2-chloroethoxy)methane	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Bis(2-chloroethyl)ether	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Bis(2-chloroisopropyl)ether	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Bis(2-ethylhexyl)phthalate	47	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
4-Bromophenyl phenyl ether	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582

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

Qualifiers:

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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
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S	% Recovery outside of range due to dilution or matrix
W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17
Lab ID: 1706D18-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 6/22/2017 9:00:00 AM
Received Date: 6/23/2017 7:25:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **JDC**	
Butyl benzyl phthalate	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Carbazole	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
4-Chloro-3-methylphenol	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
4-Chloroaniline	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
2-Chloronaphthalene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
2-Chlorophenol	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
4-Chlorophenyl phenyl ether	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Chrysene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Di-n-butyl phthalate	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Di-n-octyl phthalate	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Dibenz(a,h)anthracene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Dibenzofuran	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
1,2-Dichlorobenzene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
1,3-Dichlorobenzene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
1,4-Dichlorobenzene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
3,3'-Dichlorobenzidine	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Diethyl phthalate	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Dimethyl phthalate	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
2,4-Dichlorophenol	ND	20	H	µg/L	1	7/8/2017 8:16:53 AM	32582
2,4-Dimethylphenol	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
4,6-Dinitro-2-methylphenol	ND	20	H	µg/L	1	7/8/2017 8:16:53 AM	32582
2,4-Dinitrophenol	ND	20	H	µg/L	1	7/8/2017 8:16:53 AM	32582
2,4-Dinitrotoluene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
2,6-Dinitrotoluene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Fluoranthene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Fluorene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Hexachlorobenzene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Hexachlorobutadiene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Hexachlorocyclopentadiene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Hexachloroethane	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Indeno(1,2,3-cd)pyrene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Isophorone	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
1-Methylnaphthalene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
2-Methylnaphthalene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
2-Methylphenol	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
3+4-Methylphenol	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
N-Nitrosodi-n-propylamine	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
N-Nitrosodimethylamine	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
N-Nitrosodiphenylamine	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582

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Qualifiers:

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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
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

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17
Lab ID: 1706D18-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 6/22/2017 9:00:00 AM
Received Date: 6/23/2017 7:25:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8270C: SEMIVOLATILES						Analyst: **JDC**	
Naphthalene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
2-Nitroaniline	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
3-Nitroaniline	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
4-Nitroaniline	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Nitrobenzene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
2-Nitrophenol	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
4-Nitrophenol	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Pentachlorophenol	ND	20	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Phenanthrene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Phenol	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Pyrene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Pyridine	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
1,2,4-Trichlorobenzene	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
2,4,5-Trichlorophenol	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
2,4,6-Trichlorophenol	ND	10	H	µg/L	1	7/8/2017 8:16:53 AM	32582
Surr: 2-Fluorophenol	29.9	15-98.1	H	%Rec	1	7/8/2017 8:16:53 AM	32582
Surr: Phenol-d5	25.4	15-80.7	H	%Rec	1	7/8/2017 8:16:53 AM	32582
Surr: 2,4,6-Tribromophenol	43.8	15-112	H	%Rec	1	7/8/2017 8:16:53 AM	32582
Surr: Nitrobenzene-d5	47.0	27.2-90.7	H	%Rec	1	7/8/2017 8:16:53 AM	32582
Surr: 2-Fluorobiphenyl	29.6	23.3-85.6	H	%Rec	1	7/8/2017 8:16:53 AM	32582
Surr: 4-Terphenyl-d14	25.7	27.6-107	HS	%Rec	1	7/8/2017 8:16:53 AM	32582
EPA METHOD 8260B: VOLATILES						Analyst: **RAA**	
Benzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Toluene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Ethylbenzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Methyl tert-butyl ether (MTBE)	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,2,4-Trimethylbenzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,3,5-Trimethylbenzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,2-Dichloroethane (EDC)	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,2-Dibromoethane (EDB)	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Naphthalene	ND	10	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1-Methylnaphthalene	ND	20	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
2-Methylnaphthalene	ND	20	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Acetone	ND	50	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Bromobenzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Bromodichloromethane	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Bromoform	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Bromomethane	ND	15	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
2-Butanone	ND	50	D	µg/L	5	6/26/2017 4:15:00 PM	R43806

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

Qualifiers:

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S	% Recovery outside of range due to dilution or matrix	W	Sample container temperature is out of limit as specified

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17
Lab ID: 1706D18-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 6/22/2017 9:00:00 AM
Received Date: 6/23/2017 7:25:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **RAA**	
Carbon disulfide	ND	50	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Carbon Tetrachloride	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Chlorobenzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Chloroethane	ND	10	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Chloroform	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Chloromethane	ND	15	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
2-Chlorotoluene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
4-Chlorotoluene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
cis-1,2-DCE	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
cis-1,3-Dichloropropene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,2-Dibromo-3-chloropropane	ND	10	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Dibromochloromethane	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Dibromomethane	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,2-Dichlorobenzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,3-Dichlorobenzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,4-Dichlorobenzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Dichlorodifluoromethane	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,1-Dichloroethane	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,1-Dichloroethene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,2-Dichloropropane	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,3-Dichloropropane	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
2,2-Dichloropropane	ND	10	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,1-Dichloropropene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Hexachlorobutadiene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
2-Hexanone	ND	50	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Isopropylbenzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
4-Isopropyltoluene	14	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
4-Methyl-2-pentanone	ND	50	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Methylene Chloride	ND	15	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
n-Butylbenzene	ND	15	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
n-Propylbenzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
sec-Butylbenzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Styrene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
tert-Butylbenzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,1,1,2-Tetrachloroethane	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,1,2,2-Tetrachloroethane	ND	10	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Tetrachloroethene (PCE)	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
trans-1,2-DCE	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
trans-1,3-Dichloropropene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806

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
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

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17
Lab ID: 1706D18-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 6/22/2017 9:00:00 AM
Received Date: 6/23/2017 7:25:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **RAA**	
1,2,3-Trichlorobenzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,2,4-Trichlorobenzene	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,1,1-Trichloroethane	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,1,2-Trichloroethane	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Trichloroethene (TCE)	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Trichlorofluoromethane	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
1,2,3-Trichloropropane	ND	10	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Vinyl chloride	ND	5.0	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Xylenes, Total	9.6	7.5	D	µg/L	5	6/26/2017 4:15:00 PM	R43806
Surr: 1,2-Dichloroethane-d4	93.3	70-130	D	%Rec	5	6/26/2017 4:15:00 PM	R43806
Surr: 4-Bromofluorobenzene	97.5	70-130	D	%Rec	5	6/26/2017 4:15:00 PM	R43806
Surr: Dibromofluoromethane	105	70-130	D	%Rec	5	6/26/2017 4:15:00 PM	R43806
Surr: Toluene-d8	90.7	70-130	D	%Rec	5	6/26/2017 4:15:00 PM	R43806

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
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

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17
Lab ID: 1706D18-002 **Matrix:** AQUEOUS

Client Sample ID: Trip Blank
Collection Date:
Received Date: 6/23/2017 7:25:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **RAA**	
Benzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Toluene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Ethylbenzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Methyl tert-butyl ether (MTBE)	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,2,4-Trimethylbenzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,3,5-Trimethylbenzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,2-Dichloroethane (EDC)	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,2-Dibromoethane (EDB)	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Naphthalene	ND	2.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1-Methylnaphthalene	ND	4.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
2-Methylnaphthalene	ND	4.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Acetone	ND	10		µg/L	1	6/26/2017 5:28:00 PM	R43806
Bromobenzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Bromodichloromethane	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Bromoform	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Bromomethane	ND	3.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
2-Butanone	ND	10		µg/L	1	6/26/2017 5:28:00 PM	R43806
Carbon disulfide	ND	10		µg/L	1	6/26/2017 5:28:00 PM	R43806
Carbon Tetrachloride	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Chlorobenzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Chloroethane	ND	2.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Chloroform	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Chloromethane	ND	3.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
2-Chlorotoluene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
4-Chlorotoluene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
cis-1,2-DCE	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
cis-1,3-Dichloropropene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,2-Dibromo-3-chloropropane	ND	2.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Dibromochloromethane	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Dibromomethane	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,2-Dichlorobenzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,3-Dichlorobenzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,4-Dichlorobenzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Dichlorodifluoromethane	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,1-Dichloroethane	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,1-Dichloroethene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,2-Dichloropropane	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,3-Dichloropropane	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
2,2-Dichloropropane	ND	2.0		µg/L	1	6/26/2017 5:28:00 PM	R43806

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
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

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17
Lab ID: 1706D18-002 **Matrix:** AQUEOUS

Client Sample ID: Trip Blank
Collection Date:
Received Date: 6/23/2017 7:25:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8260B: VOLATILES						Analyst: **RAA**	
1,1-Dichloropropene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Hexachlorobutadiene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
2-Hexanone	ND	10		µg/L	1	6/26/2017 5:28:00 PM	R43806
Isopropylbenzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
4-Isopropyltoluene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
4-Methyl-2-pentanone	ND	10		µg/L	1	6/26/2017 5:28:00 PM	R43806
Methylene Chloride	ND	3.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
n-Butylbenzene	ND	3.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
n-Propylbenzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
sec-Butylbenzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Styrene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
tert-Butylbenzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,1,1,2-Tetrachloroethane	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,1,2,2-Tetrachloroethane	ND	2.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Tetrachloroethene (PCE)	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
trans-1,2-DCE	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
trans-1,3-Dichloropropene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,2,3-Trichlorobenzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,2,4-Trichlorobenzene	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,1,1-Trichloroethane	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,1,2-Trichloroethane	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Trichloroethene (TCE)	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Trichlorofluoromethane	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
1,2,3-Trichloropropane	ND	2.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Vinyl chloride	ND	1.0		µg/L	1	6/26/2017 5:28:00 PM	R43806
Xylenes, Total	ND	1.5		µg/L	1	6/26/2017 5:28:00 PM	R43806
Surr: 1,2-Dichloroethane-d4	96.5	70-130		%Rec	1	6/26/2017 5:28:00 PM	R43806
Surr: 4-Bromofluorobenzene	100	70-130		%Rec	1	6/26/2017 5:28:00 PM	R43806
Surr: Dibromofluoromethane	108	70-130		%Rec	1	6/26/2017 5:28:00 PM	R43806
Surr: Toluene-d8	89.7	70-130		%Rec	1	6/26/2017 5:28:00 PM	R43806

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
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

Wet Chemistry by Method 4500 CN E-2011

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Reactive Cyanide	ND		0.00500	1	06/29/2017 19:47	WG994469

Wet Chemistry by Method 9034-9030B

Analyte	Result mg/l	Qualifier	RDL mg/l	Dilution	Analysis date / time	Batch
Reactive Sulfide	0.0990		0.0500	1	06/28/2017 00:00	WG993615

Wet Chemistry by Method 9040C

Analyte	Result su	Qualifier	Dilution	Analysis date / time	Batch
Corrosivity by pH	7.50	T8	1	06/27/2017 15:55	WG992223

Sample Narrative:

L918788-01 WG992223: 7.50 at 10.5c

Wet Chemistry by Method D93/1010A

Analyte	Result deg F	Qualifier	Dilution	Analysis date / time	Batch
Flashpoint	DNF at 170		1	06/28/2017 15:32	WG993569

Method Blank (MB)

(MB) R3230010-1 06/29/17 19:22

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Reactive Cyanide	U		0.0018	0.00500

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3230010-2 06/29/17 19:23 • (LCSD) R3230010-3 06/29/17 19:24

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Reactive Cyanide	0.100	0.107	0.105	107	105	85-115			2	20

Method Blank (MB)

(MB) R3229272-1 06/27/17 23:58

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Reactive Sulfide	U		0.0065	0.0500

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3229272-2 06/27/17 23:59 • (LCSD) R3229272-3 06/27/17 23:59

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Reactive Sulfide	0.500	0.512	0.507	102	101	85-115			1	20

L918000-04 Original Sample (OS) • Duplicate (DUP)

(OS) L918000-04 06/27/17 15:55 • (DUP) WG992223-3 06/27/17 15:55

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	su	su		%		%
Corrosivity by pH	7.34	7.35	1	0.136	T8	1

Sample Narrative:

OS: 7.34 at 12.1c
DUP: 7.35 at 12.2c

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) WG992223-1 06/27/17 15:55 • (LCSD) WG992223-2 06/27/17 15:55

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	su	su	su	%	%	%			%	%
Corrosivity by pH	6.38	6.33	6.33	99.2	99.2	98.4-102			0.000	1

Sample Narrative:

LCS: 6.33 at 21.0c
LCSD: 6.33 at 21.1c

Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

L918834-03 Original Sample (OS) • Duplicate (DUP)

(OS) L918834-03 06/28/17 15:32 • (DUP) R3229525-3 06/28/17 15:32

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

L918834-07 Original Sample (OS) • Duplicate (DUP)

(OS) L918834-07 06/28/17 15:32 • (DUP) R3229525-4 06/28/17 15:32

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

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3229525-1 06/28/17 15:32 • (LCSD) R3229525-2 06/28/17 15:32

Analyte	Spike Amount deg F	LCS Result deg F	LCSD Result deg F	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Flashpoint	82.0	79.7	80.7	97.0	98.0	96.0-104			1.00	10

GLOSSARY OF TERMS

Abbreviations and Definitions

SDG	Sample Delivery Group.
MDL	Method Detection Limit.
RDL	Reported Detection Limit.
ND	Not detected at the Reporting Limit (or MDL where applicable).
U	Not detected at the Reporting Limit (or MDL where applicable).
RPD	Relative Percent Difference.
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.
Rec.	Recovery.

Qualifier	Description
T8	Sample(s) received past/too close to holding time expiration.

QC SUMMARY REPORT

WO#: **1706D18**

Hall Environmental Analysis Laboratory, Inc.

28-Jul-17

Client: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17

Sample ID **MB** SampType: **mblk** TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW** Batch ID: **R43753** RunNo: **43753**
Prep Date: Analysis Date: **6/23/2017** SeqNo: **1379275** Units: **mg/L**

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

Sample ID **LCS** SampType: **lcs** TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW** Batch ID: **R43753** RunNo: **43753**
Prep Date: Analysis Date: **6/23/2017** SeqNo: **1379276** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.54	0.10	0.5000	0	109	90	110			
Nitrogen, Nitrite (As N)	0.98	0.10	1.000	0	97.5	90	110			
Bromide	2.5	0.10	2.500	0	99.1	90	110			
Nitrogen, Nitrate (As N)	2.5	0.10	2.500	0	102	90	110			
Phosphorus, Orthophosphate (As P	5.0	0.50	5.000	0	99.1	90	110			
Sulfate	9.8	0.50	10.00	0	98.2	90	110			

Sample ID **MB** SampType: **mblk** TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW** Batch ID: **R44088** RunNo: **44088**
Prep Date: Analysis Date: **7/9/2017** SeqNo: **1391240** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID **LCS** SampType: **lcs** TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW** Batch ID: **R44088** RunNo: **44088**
Prep Date: Analysis Date: **7/9/2017** SeqNo: **1391241** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.7	0.50	5.000	0	94.9	90	110			

Qualifiers:

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- 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
- 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

QC SUMMARY REPORT

WO#: **1706D18**

Hall Environmental Analysis Laboratory, Inc.

28-Jul-17

Client: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17

Sample ID **LCS-32507** SampType: **LCS** TestCode: **EPA Method 8081: PESTICIDES**
Client ID: **LCSW** Batch ID: **32507** RunNo: **43950**
Prep Date: **6/27/2017** Analysis Date: **7/1/2017** SeqNo: **1385335** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
4,4'-DDD	0.41	0.050	0.5000	0	81.2	45.7	118			
4,4'-DDE	0.40	0.050	0.5000	0	79.2	44.2	117			
4,4'-DDT	0.46	0.050	0.5000	0	92.6	44.5	115			
Aldrin	0.35	0.050	0.5000	0	69.2	27	124			
alpha-BHC	0.48	0.050	0.5000	0	96.8	19.7	132			
beta-BHC	0.43	0.050	0.5000	0	85.6	20.9	146			
delta-BHC	0.44	0.050	0.5000	0	87.0	27.4	132			
Dieldrin	0.46	0.050	0.5000	0	91.6	44	118			
Endosulfan I	0.40	0.050	0.5000	0	80.8	34.4	116			
Endosulfan II	0.42	0.050	0.5000	0	83.8	38.4	114			
Endosulfan sulfate	0.44	0.050	0.5000	0	87.0	29.3	127			
Endrin	0.46	0.050	0.5000	0	93.0	40.5	120			
Endrin aldehyde	0.45	0.050	0.5000	0	90.0	22.9	129			
gamma-BHC	0.48	0.050	0.5000	0	95.4	24.4	132			
Heptachlor	0.39	0.050	0.5000	0	78.8	31.7	125			
Heptachlor epoxide	0.45	0.050	0.5000	0	89.2	36.6	121			
Methoxychlor	0.49	0.050	0.5000	0	97.6	42.3	129			
Surr: Decachlorobiphenyl	2.4		2.500		95.1	36.8	113			
Surr: Tetrachloro-m-xylene	2.1		2.500		82.2	34.7	105			

Sample ID **LCSD-32507** SampType: **LCSD** TestCode: **EPA Method 8081: PESTICIDES**
Client ID: **LCSS02** Batch ID: **32507** RunNo: **43950**
Prep Date: **6/27/2017** Analysis Date: **7/1/2017** SeqNo: **1385336** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
4,4'-DDD	0.35	0.050	0.5000	0	69.4	45.7	118	15.7	29.2	
4,4'-DDE	0.36	0.050	0.5000	0	72.2	44.2	117	9.25	29.2	
4,4'-DDT	0.38	0.050	0.5000	0	75.6	44.5	115	20.2	32.9	
Aldrin	0.32	0.050	0.5000	0	63.6	27	124	8.43	31.2	
alpha-BHC	0.41	0.050	0.5000	0	82.6	19.7	132	15.8	36	
beta-BHC	0.33	0.050	0.5000	0	66.8	20.9	146	24.7	27.7	
delta-BHC	0.36	0.050	0.5000	0	71.0	27.4	132	20.3	34.3	
Dieldrin	0.37	0.050	0.5000	0	74.6	44	118	20.5	30.5	
Endosulfan I	0.34	0.050	0.5000	0	68.8	34.4	116	16.0	29.5	
Endosulfan II	0.35	0.050	0.5000	0	70.8	38.4	114	16.8	29.8	
Endosulfan sulfate	0.34	0.050	0.5000	0	69.0	29.3	127	23.1	31.2	
Endrin	0.39	0.050	0.5000	0	78.6	40.5	120	16.8	30.6	
Endrin aldehyde	0.36	0.050	0.5000	0	71.2	22.9	129	23.3	28.6	
gamma-BHC	0.40	0.050	0.5000	0	80.6	24.4	132	16.8	33.9	

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
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

QC SUMMARY REPORT

WO#: **1706D18**

Hall Environmental Analysis Laboratory, Inc.

28-Jul-17

Client: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17

Sample ID **LCSD-32507**	SampType: **LCSD**	TestCode: **EPA Method 8081: PESTICIDES**
Client ID: **LCSS02**	Batch ID: **32507**	RunNo: **43950**
Prep Date: **6/27/2017**	Analysis Date: **7/1/2017**	SeqNo: **1385336** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Heptachlor	0.35	0.050	0.5000	0	70.4	31.7	125	11.3	32.7	
Heptachlor epoxide	0.38	0.050	0.5000	0	75.8	36.6	121	16.2	30.5	
Methoxychlor	0.38	0.050	0.5000	0	75.8	42.3	129	25.1	28.9	
Surr: Decachlorobiphenyl	2.0		2.500		78.3	36.8	113	0	20	
Surr: Tetrachloro-m-xylene	1.8		2.500		71.3	34.7	105	0	20	

Sample ID **MB-32507**	SampType: **MBLK**	TestCode: **EPA Method 8081: PESTICIDES**
Client ID: **PBW**	Batch ID: **32507**	RunNo: **43950**
Prep Date: **6/27/2017**	Analysis Date: **7/1/2017**	SeqNo: **1385337** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
4,4'-DDD	ND	0.050								
4,4'-DDE	ND	0.050								
4,4'-DDT	ND	0.050								
Aldrin	ND	0.050								
alpha-BHC	ND	0.050								
beta-BHC	ND	0.050								
Chlordane	ND	1.0								
delta-BHC	ND	0.050								
Dieldrin	ND	0.050								
Endosulfan I	ND	0.050								
Endosulfan II	ND	0.050								
Endosulfan sulfate	ND	0.050								
Endrin	ND	0.050								
Endrin aldehyde	ND	0.050								
gamma-BHC	ND	0.050								
Heptachlor	ND	0.050								
Heptachlor epoxide	ND	0.050								
Methoxychlor	ND	0.050								
Toxaphene	ND	1.0								
Surr: Decachlorobiphenyl	2.0		2.500		81.8	36.8	113			
Surr: Tetrachloro-m-xylene	2.0		2.500		78.0	34.7	105			

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
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

QC SUMMARY REPORT

WO#: **1706D18**

Hall Environmental Analysis Laboratory, Inc.

28-Jul-17

Client: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17

Sample ID **100ng lcs**	SampType: **LCS4**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **BatchQC**	Batch ID: **R43806**	RunNo: **43806**
Prep Date:	Analysis Date: **6/26/2017**	SeqNo: **1380054** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	22	1.0	20.00	0	109	70	130			
Toluene	20	1.0	20.00	0	101	70	130			
Ethylbenzene	20	1.0	20.00	0	102	70	130			
Methyl tert-butyl ether (MTBE)	41	1.0	40.00	0	104	70	130			
1,2,4-Trimethylbenzene	18	1.0	20.00	0	90.7	70	130			
1,3,5-Trimethylbenzene	18	1.0	20.00	0	88.7	70	130			
1,2-Dichloroethane (EDC)	21	1.0	20.00	0	103	62.2	143			
1,2-Dibromoethane (EDB)	19	1.0	20.00	0	97.5	70	130			
Naphthalene	16	2.0	20.00	0	80.6	70	130			
1-Methylnaphthalene	16	4.0	20.00	0	82.5	60	140			
2-Methylnaphthalene	12	4.0	20.00	0	62.2	60	140			
Acetone	42	10	40.00	0	105	60	140			
Bromobenzene	18	1.0	20.00	0	92.2	70	130			
Bromodichloromethane	22	1.0	20.00	0	111	70	130			
Bromoform	20	1.0	20.00	0	100	70	130			
Bromomethane	22	3.0	20.00	0	110	60	140			
2-Butanone	49	10	40.00	0	123	60	140			
Carbon disulfide	41	10	40.00	0	103	60	140			
Carbon Tetrachloride	22	1.0	20.00	0	110	70	130			
Chlorobenzene	21	1.0	20.00	0	104	70	130			
Chloroethane	21	2.0	20.00	0	106	60	140			
Chloroform	22	1.0	20.00	0	111	70	130			
Chloromethane	18	3.0	20.00	0	91.8	60	140			
2-Chlorotoluene	18	1.0	20.00	0	89.2	70	130			
4-Chlorotoluene	18	1.0	20.00	0	89.1	70	130			
cis-1,2-DCE	23	1.0	20.00	0	113	70	130			
cis-1,3-Dichloropropene	20	1.0	20.00	0	98.2	70	130			
1,2-Dibromo-3-chloropropane	17	2.0	20.00	0	87.1	70	130			
Dibromochloromethane	19	1.0	20.00	0	94.8	70	130			
Dibromomethane	22	1.0	20.00	0	109	70	130			
1,2-Dichlorobenzene	18	1.0	20.00	0	89.2	70	130			
1,3-Dichlorobenzene	18	1.0	20.00	0	91.3	70	130			
1,4-Dichlorobenzene	18	1.0	20.00	0	91.2	67.2	141			
Dichlorodifluoromethane	19	1.0	20.00	0	96.2	60	140			
1,1-Dichloroethane	21	1.0	20.00	0	105	52.6	157			
1,1-Dichloroethene	21	1.0	20.00	0	106	70	130			
1,2-Dichloropropane	21	1.0	20.00	0	105	63.7	138			
1,3-Dichloropropane	19	1.0	20.00	0	96.4	70	130			
2,2-Dichloropropane	22	2.0	20.00	0	109	70	130			

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
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

QC SUMMARY REPORT

WO#: **1706D18**

Hall Environmental Analysis Laboratory, Inc.

28-Jul-17

Client: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17

Sample ID **100ng lcs** SampType: **LCS4** TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **BatchQC** Batch ID: **R43806** RunNo: **43806**
Prep Date: Analysis Date: **6/26/2017** SeqNo: **1380054** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
1,1-Dichloropropene	21	1.0	20.00	0	107	70	130			
Hexachlorobutadiene	16	1.0	20.00	0	78.2	70	130			
2-Hexanone	37	10	40.00	0	91.6	60	140			
Isopropylbenzene	20	1.0	20.00	0	101	70	130			
4-Isopropyltoluene	18	1.0	20.00	0	91.3	70	130			
4-Methyl-2-pentanone	40	10	40.00	0	100	60	140			
Methylene Chloride	22	3.0	20.00	0	108	70	130			
n-Butylbenzene	17	3.0	20.00	0	84.0	70	130			
n-Propylbenzene	18	1.0	20.00	0	88.3	70	130			
sec-Butylbenzene	17	1.0	20.00	0	86.6	70	130			
Styrene	20	1.0	20.00	0	101	70	130			
tert-Butylbenzene	18	1.0	20.00	0	89.2	70	130			
1,1,1,2-Tetrachloroethane	20	1.0	20.00	0	101	70	130			
1,1,2,2-Tetrachloroethane	18	2.0	20.00	0	91.4	65.9	133			
Tetrachloroethene (PCE)	21	1.0	20.00	0	106	70	130			
trans-1,2-DCE	22	1.0	20.00	0	108	70	130			
trans-1,3-Dichloropropene	18	1.0	20.00	0	88.4	70	130			
1,2,3-Trichlorobenzene	16	1.0	20.00	0	82.3	70	130			
1,2,4-Trichlorobenzene	16	1.0	20.00	0	80.9	70	130			
1,1,1-Trichloroethane	22	1.0	20.00	0	109	70	130			
1,1,2-Trichloroethane	19	1.0	20.00	0	96.8	70	130			
Trichloroethene (TCE)	21	1.0	20.00	0	106	70	130			
Trichlorofluoromethane	21	1.0	20.00	0	107	70	130			
1,2,3-Trichloropropane	18	2.0	20.00	0	92.1	69.7	129			
Vinyl chloride	20	1.0	20.00	0	100	70	130			
Xylenes, Total	60	1.5	60.00	0	101	70	130			
Surr: 1,2-Dichloroethane-d4	8.6		10.00		85.5	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		101	70	130			
Surr: Dibromofluoromethane	10		10.00		103	70	130			
Surr: Toluene-d8	9.6		10.00		96.0	70	130			

Sample ID **RB** SampType: **MBLK** TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW** Batch ID: **R43806** RunNo: **43806**
Prep Date: Analysis Date: **6/26/2017** SeqNo: **1380057** Units: **µg/L**

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

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
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

QC SUMMARY REPORT

WO#: **1706D18**

Hall Environmental Analysis Laboratory, Inc.

28-Jul-17

Client: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17

Sample ID **RB**	SampType: **MBLK**	TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW**	Batch ID: **R43806**	RunNo: **43806**
Prep Date:	Analysis Date: **6/26/2017**	SeqNo: **1380057** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Methyl tert-butyl ether (MTBE)	ND	1.0								
1,2,4-Trimethylbenzene	ND	1.0								
1,3,5-Trimethylbenzene	ND	1.0								
1,2-Dichloroethane (EDC)	ND	1.0								
1,2-Dibromoethane (EDB)	ND	1.0								
Naphthalene	ND	2.0								
1-Methylnaphthalene	ND	4.0								
2-Methylnaphthalene	ND	4.0								
Acetone	ND	10								
Bromobenzene	ND	1.0								
Bromodichloromethane	ND	1.0								
Bromoform	ND	1.0								
Bromomethane	ND	3.0								
2-Butanone	ND	10								
Carbon disulfide	ND	10								
Carbon Tetrachloride	ND	1.0								
Chlorobenzene	ND	1.0								
Chloroethane	ND	2.0								
Chloroform	ND	1.0								
Chloromethane	ND	3.0								
2-Chlorotoluene	ND	1.0								
4-Chlorotoluene	ND	1.0								
cis-1,2-DCE	ND	1.0								
cis-1,3-Dichloropropene	ND	1.0								
1,2-Dibromo-3-chloropropane	ND	2.0								
Dibromochloromethane	ND	1.0								
Dibromomethane	ND	1.0								
1,2-Dichlorobenzene	ND	1.0								
1,3-Dichlorobenzene	ND	1.0								
1,4-Dichlorobenzene	ND	1.0								
Dichlorodifluoromethane	ND	1.0								
1,1-Dichloroethane	ND	1.0								
1,1-Dichloroethene	ND	1.0								
1,2-Dichloropropane	ND	1.0								
1,3-Dichloropropane	ND	1.0								
2,2-Dichloropropane	ND	2.0								
1,1-Dichloropropene	ND	1.0								
Hexachlorobutadiene	ND	1.0								
2-Hexanone	ND	10								

Qualifiers:

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

QC SUMMARY REPORT

WO#: **1706D18**

Hall Environmental Analysis Laboratory, Inc.

28-Jul-17

Client: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17

Sample ID **RB** SampType: **MBLK** TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **PBW** Batch ID: **R43806** RunNo: **43806**
Prep Date: Analysis Date: **6/26/2017** SeqNo: **1380057** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Isopropylbenzene	ND	1.0								
4-Isopropyltoluene	ND	1.0								
4-Methyl-2-pentanone	ND	10								
Methylene Chloride	ND	3.0								
n-Butylbenzene	ND	3.0								
n-Propylbenzene	ND	1.0								
sec-Butylbenzene	ND	1.0								
Styrene	ND	1.0								
tert-Butylbenzene	ND	1.0								
1,1,1,2-Tetrachloroethane	ND	1.0								
1,1,2,2-Tetrachloroethane	ND	2.0								
Tetrachloroethene (PCE)	ND	1.0								
trans-1,2-DCE	ND	1.0								
trans-1,3-Dichloropropene	ND	1.0								
1,2,3-Trichlorobenzene	ND	1.0								
1,2,4-Trichlorobenzene	ND	1.0								
1,1,1-Trichloroethane	ND	1.0								
1,1,2-Trichloroethane	ND	1.0								
Trichloroethene (TCE)	ND	1.0								
Trichlorofluoromethane	ND	1.0								
1,2,3-Trichloropropane	ND	2.0								
Vinyl chloride	ND	1.0								
Xylenes, Total	ND	1.5								
Surr: 1,2-Dichloroethane-d4	9.2		10.00		92.3	70	130			
Surr: 4-Bromofluorobenzene	10		10.00		101	70	130			
Surr: Dibromofluoromethane	11		10.00		107	70	130			
Surr: Toluene-d8	9.2		10.00		92.0	70	130			

Sample ID **1706d18-001ams** SampType: **MS** TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **Injection Well** Batch ID: **R43806** RunNo: **43806**
Prep Date: Analysis Date: **6/26/2017** SeqNo: **1380063** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	120	5.0	100.0	0	120	70	130			
Toluene	100	5.0	100.0	0.4700	102	70	130			
Chlorobenzene	110	5.0	100.0	0	106	70	130			
1,1-Dichloroethene	130	5.0	100.0	0	127	70	130			
Trichloroethene (TCE)	120	5.0	100.0	0	118	70	130			
Surr: 1,2-Dichloroethane-d4	47		50.00		95.0	70	130			

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
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

QC SUMMARY REPORT

WO#: **1706D18**

Hall Environmental Analysis Laboratory, Inc.

28-Jul-17

Client: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17

Sample ID **1706d18-001ams** SampType: **MS** TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **Injection Well** Batch ID: **R43806** RunNo: **43806**
Prep Date: Analysis Date: **6/26/2017** SeqNo: **1380063** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Bromofluorobenzene	50		50.00		99.0	70	130			
Surr: Dibromofluoromethane	53		50.00		105	70	130			
Surr: Toluene-d8	46		50.00		91.6	70	130			

Sample ID **1706d18-001amsd** SampType: **MSD** TestCode: **EPA Method 8260B: VOLATILES**
Client ID: **Injection Well** Batch ID: **R43806** RunNo: **43806**
Prep Date: Analysis Date: **6/26/2017** SeqNo: **1380064** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	120	5.0	100.0	0	119	70	130	0.759	20	
Toluene	100	5.0	100.0	0.4700	100	70	130	2.30	20	
Chlorobenzene	100	5.0	100.0	0	103	70	130	2.73	20	
1,1-Dichloroethene	120	5.0	100.0	0	124	70	130	2.49	20	
Trichloroethene (TCE)	120	5.0	100.0	0	117	70	130	1.02	20	
Surr: 1,2-Dichloroethane-d4	48		50.00		95.1	70	130	0	0	
Surr: 4-Bromofluorobenzene	49		50.00		97.4	70	130	0	0	
Surr: Dibromofluoromethane	54		50.00		108	70	130	0	0	
Surr: Toluene-d8	46		50.00		91.7	70	130	0	0	

Qualifiers:

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1706D18**

28-Jul-17

Client: Western Refining Southwest, Inc.

Project: Injection Well 6-22-17

Sample ID **mb-32582**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**	
Client ID: **PBW**	Batch ID: **32582**	RunNo: **44069**	
Prep Date: **6/30/2017**	Analysis Date: **7/7/2017**	SeqNo: **1390263**	Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	ND	10								
Acenaphthylene	ND	10								
Aniline	ND	10								
Anthracene	ND	10								
Azobenzene	ND	10								
Benz(a)anthracene	ND	10								
Benzo(a)pyrene	ND	10								
Benzo(b)fluoranthene	ND	10								
Benzo(g,h,i)perylene	ND	10								
Benzo(k)fluoranthene	ND	10								
Benzoic acid	ND	20								
Benzyl alcohol	ND	10								
Bis(2-chloroethoxy)methane	ND	10								
Bis(2-chloroethyl)ether	ND	10								
Bis(2-chloroisopropyl)ether	ND	10								
Bis(2-ethylhexyl)phthalate	ND	10								
4-Bromophenyl phenyl ether	ND	10								
Butyl benzyl phthalate	ND	10								
Carbazole	ND	10								
4-Chloro-3-methylphenol	ND	10								
4-Chloroaniline	ND	10								
2-Chloronaphthalene	ND	10								
2-Chlorophenol	ND	10								
4-Chlorophenyl phenyl ether	ND	10								
Chrysene	ND	10								
Di-n-butyl phthalate	ND	10								
Di-n-octyl phthalate	ND	10								
Dibenz(a,h)anthracene	ND	10								
Dibenzofuran	ND	10								
1,2-Dichlorobenzene	ND	10								
1,3-Dichlorobenzene	ND	10								
1,4-Dichlorobenzene	ND	10								
3,3'-Dichlorobenzidine	ND	10								
Diethyl phthalate	ND	10								
Dimethyl phthalate	ND	10								
2,4-Dichlorophenol	ND	20								
2,4-Dimethylphenol	ND	10								
4,6-Dinitro-2-methylphenol	ND	20								
2,4-Dinitrophenol	ND	20								

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
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

QC SUMMARY REPORT

WO#: **1706D18**

Hall Environmental Analysis Laboratory, Inc.

28-Jul-17

Client: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17

Sample ID **mb-32582**	SampType: **MBLK**	TestCode: **EPA Method 8270C: Semivolatiles**	
Client ID: **PBW**	Batch ID: **32582**	RunNo: **44069**	
Prep Date: **6/30/2017**	Analysis Date: **7/7/2017**	SeqNo: **1390263**	Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2,4-Dinitrotoluene	ND	10								
2,6-Dinitrotoluene	ND	10								
Fluoranthene	ND	10								
Fluorene	ND	10								
Hexachlorobenzene	ND	10								
Hexachlorobutadiene	ND	10								
Hexachlorocyclopentadiene	ND	10								
Hexachloroethane	ND	10								
Indeno(1,2,3-cd)pyrene	ND	10								
Isophorone	ND	10								
1-Methylnaphthalene	ND	10								
2-Methylnaphthalene	ND	10								
2-Methylphenol	ND	10								
3+4-Methylphenol	ND	10								
N-Nitrosodi-n-propylamine	ND	10								
N-Nitrosodimethylamine	ND	10								
N-Nitrosodiphenylamine	ND	10								
Naphthalene	ND	10								
2-Nitroaniline	ND	10								
3-Nitroaniline	ND	10								
4-Nitroaniline	ND	10								
Nitrobenzene	ND	10								
2-Nitrophenol	ND	10								
4-Nitrophenol	ND	10								
Pentachlorophenol	ND	20								
Phenanthrene	ND	10								
Phenol	ND	10								
Pyrene	ND	10								
Pyridine	ND	10								
1,2,4-Trichlorobenzene	ND	10								
2,4,5-Trichlorophenol	ND	10								
2,4,6-Trichlorophenol	ND	10								
Surr: 2-Fluorophenol	110		200.0		53.8	15	98.1			
Surr: Phenol-d5	88		200.0		43.9	15	80.7			
Surr: 2,4,6-Tribromophenol	140		200.0		67.6	15	112			
Surr: Nitrobenzene-d5	80		100.0		80.0	27.2	90.7			
Surr: 2-Fluorobiphenyl	67		100.0		67.3	23.3	85.6			
Surr: 4-Terphenyl-d14	67		100.0		67.3	27.6	107			

Qualifiers:

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1706D18**

28-Jul-17

Client: Western Refining Southwest, Inc.

Project: Injection Well 6-22-17

Sample ID **lcs-32582**	SampType: **LCS**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **LCSW**	Batch ID: **32582**	RunNo: **44069**
Prep Date: **6/30/2017**	Analysis Date: **7/7/2017**	SeqNo: **1390265** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	60	10	100.0	0	60.4	41.2	98.9			
4-Chloro-3-methylphenol	140	10	200.0	0	68.3	29.1	111			
2-Chlorophenol	120	10	200.0	0	57.7	23.3	108			
1,4-Dichlorobenzene	38	10	100.0	0	38.3	29.4	84.5			
2,4-Dinitrotoluene	57	10	100.0	0	57.4	36.6	88.7			
N-Nitrosodi-n-propylamine	70	10	100.0	0	69.5	46.9	106			
4-Nitrophenol	86	10	200.0	0	43.1	15	74.7			
Pentachlorophenol	120	20	200.0	0	62.0	28.1	85.4			
Phenol	77	10	200.0	0	38.7	15	78.2			
Pyrene	85	10	100.0	0	84.8	44.4	96.8			
1,2,4-Trichlorobenzene	48	10	100.0	0	48.1	34.3	89			
Surr: 2-Fluorophenol	92		200.0		45.9	15	98.1			
Surr: Phenol-d5	81		200.0		40.5	15	80.7			
Surr: 2,4,6-Tribromophenol	140		200.0		71.5	15	112			
Surr: Nitrobenzene-d5	72		100.0		71.8	27.2	90.7			
Surr: 2-Fluorobiphenyl	65		100.0		64.7	23.3	85.6			
Surr: 4-Terphenyl-d14	67		100.0		67.1	27.6	107			

Sample ID **lcsd-32582**	SampType: **LCSD**	TestCode: **EPA Method 8270C: Semivolatiles**
Client ID: **LCSS02**	Batch ID: **32582**	RunNo: **44069**
Prep Date: **6/30/2017**	Analysis Date: **7/7/2017**	SeqNo: **1390267** Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Acenaphthene	64	10	100.0	0	64.3	41.2	98.9	6.16	37.4	
4-Chloro-3-methylphenol	130	10	200.0	0	66.8	29.1	111	2.18	26.8	
2-Chlorophenol	130	10	200.0	0	64.8	23.3	108	11.6	30.3	
1,4-Dichlorobenzene	42	10	100.0	0	42.1	29.4	84.5	9.46	32	
2,4-Dinitrotoluene	59	10	100.0	0	58.9	36.6	88.7	2.61	36.7	
N-Nitrosodi-n-propylamine	76	10	100.0	0	75.7	46.9	106	8.51	29.9	
4-Nitrophenol	88	10	200.0	0	43.8	15	74.7	1.59	28.8	
Pentachlorophenol	130	20	200.0	0	64.5	28.1	85.4	3.97	38.2	
Phenol	85	10	200.0	0	42.3	15	78.2	8.79	39.8	
Pyrene	89	10	100.0	0	88.7	44.4	96.8	4.47	28.3	
1,2,4-Trichlorobenzene	52	10	100.0	0	51.8	34.3	89	7.44	39.8	
Surr: 2-Fluorophenol	100		200.0		51.6	15	98.1	0	0	
Surr: Phenol-d5	88		200.0		44.1	15	80.7	0	0	
Surr: 2,4,6-Tribromophenol	150		200.0		76.0	15	112	0	0	
Surr: Nitrobenzene-d5	77		100.0		77.5	27.2	90.7	0	0	
Surr: 2-Fluorobiphenyl	69		100.0		69.3	23.3	85.6	0	0	

Qualifiers:

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

QC SUMMARY REPORT

WO#: **1706D18**

Hall Environmental Analysis Laboratory, Inc.

28-Jul-17

Client: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17

Sample ID **lcsd-32582**	SampType: **LCSD**	TestCode: **EPA Method 8270C: Semivolatiles**	
Client ID: **LCSS02**	Batch ID: **32582**	RunNo: **44069**	
Prep Date: **6/30/2017**	Analysis Date: **7/7/2017**	SeqNo: **1390267**	Units: **µg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: 4-Terphenyl-d14	68		100.0		68.0	27.6	107	0	0	

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
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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1706D18**

28-Jul-17

Client: Western Refining Southwest, Inc.

Project: Injection Well 6-22-17

Sample ID **MB-32756**	SampType: **MBLK**	TestCode: **EPA Method 7470: Mercury**
Client ID: **PBW**	Batch ID: **32756**	RunNo: **44172**
Prep Date: **7/12/2017**	Analysis Date: **7/12/2017**	SeqNo: **1394132** Units: **mg/L**

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

Sample ID **LCS-32756**	SampType: **LCS**	TestCode: **EPA Method 7470: Mercury**
Client ID: **LCSW**	Batch ID: **32756**	RunNo: **44172**
Prep Date: **7/12/2017**	Analysis Date: **7/12/2017**	SeqNo: **1394133** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0049	0.00020	0.005000	0	97.7	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
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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1706D18**

28-Jul-17

Client: Western Refining Southwest, Inc.

Project: Injection Well 6-22-17

Sample ID **LCS-A**	SampType: **LCS**	TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **LCSW**	Batch ID: **A44027**	RunNo: **44027**
Prep Date:	Analysis Date: **7/6/2017**	SeqNo: **1388397** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	49	1.0	50.00	0	99.0	80	120			
Chromium	0.49	0.0060	0.5000	0	97.1	80	120			
Magnesium	49	1.0	50.00	0	98.1	80	120			
Potassium	48	1.0	50.00	0	95.5	80	120			
Sodium	48	1.0	50.00	0	96.2	80	120			

Sample ID **MB-A**	SampType: **MBLK**	TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **PBW**	Batch ID: **A44027**	RunNo: **44027**
Prep Date:	Analysis Date: **7/6/2017**	SeqNo: **1388401** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	ND	1.0								
Chromium	ND	0.0060								
Magnesium	ND	1.0								
Potassium	ND	1.0								
Sodium	ND	1.0								

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
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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1706D18**

28-Jul-17

Client: Western Refining Southwest, Inc.

Project: Injection Well 6-22-17

Sample ID **MB-32492**	SampType: **MBLK**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **PBW**	Batch ID: **32492**	RunNo: **44102**
Prep Date: **6/26/2017**	Analysis Date: **7/10/2017**	SeqNo: **1391517** 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								
Silver	ND	0.0050								
Sodium	ND	1.0								

Sample ID **LCS-32492**	SampType: **LCS**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **LCSW**	Batch ID: **32492**	RunNo: **44102**
Prep Date: **6/26/2017**	Analysis Date: **7/10/2017**	SeqNo: **1391518** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.51	0.020	0.5000	0	103	80	120			
Barium	0.49	0.020	0.5000	0	98.7	80	120			
Cadmium	0.49	0.0020	0.5000	0	99.0	80	120			
Calcium	51	1.0	50.00	0	102	80	120			
Chromium	0.50	0.0060	0.5000	0	99.0	80	120			
Lead	0.50	0.0050	0.5000	0	100	80	120			
Magnesium	52	1.0	50.00	0	103	80	120			
Potassium	50	1.0	50.00	0	100	80	120			
Silver	0.10	0.0050	0.1000	0	102	80	120			
Sodium	51	1.0	50.00	0	101	80	120			

Sample ID **1706D18-001FMS**	SampType: **MS**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **Injection Well**	Batch ID: **32492**	RunNo: **44102**
Prep Date: **6/26/2017**	Analysis Date: **7/10/2017**	SeqNo: **1391522** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.52	0.020	0.5000	0	104	75	125			
Barium	0.83	0.020	0.5000	0.3505	96.4	75	125			
Cadmium	0.50	0.0020	0.5000	0	99.2	75	125			
Chromium	0.50	0.0060	0.5000	0	99.4	75	125			
Lead	0.49	0.0050	0.5000	0.006270	97.5	75	125			
Magnesium	85	1.0	50.00	33.32	103	75	125			
Potassium	61	1.0	50.00	10.28	102	75	125			
Silver	0.10	0.0050	0.1000	0	105	75	125			

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
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

QC SUMMARY REPORT

WO#: **1706D18**

Hall Environmental Analysis Laboratory, Inc.

28-Jul-17

Client: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17

Sample ID **1706D18-001FMSD** SampType: **MSD** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **Injection Well** Batch ID: **32492** RunNo: **44102**
Prep Date: **6/26/2017** Analysis Date: **7/10/2017** SeqNo: **1391523** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.51	0.020	0.5000	0	102	75	125	1.61	20	
Barium	0.83	0.020	0.5000	0.3505	95.9	75	125	0.308	20	
Cadmium	0.49	0.0020	0.5000	0	98.8	75	125	0.374	20	
Chromium	0.50	0.0060	0.5000	0	99.2	75	125	0.203	20	
Lead	0.49	0.0050	0.5000	0.006270	96.1	75	125	1.39	20	
Magnesium	85	1.0	50.00	33.32	103	75	125	0.0518	20	
Potassium	61	1.0	50.00	10.28	102	75	125	0.154	20	
Silver	0.11	0.0050	0.1000	0	105	75	125	0.695	20	

Sample ID **1706D18-001FMS** SampType: **MS** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **Injection Well** Batch ID: **32492** RunNo: **44102**
Prep Date: **6/26/2017** Analysis Date: **7/10/2017** SeqNo: **1391526** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	160	5.0	50.00	106.0	103	75	125			

Sample ID **1706D18-001FMSD** SampType: **MSD** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **Injection Well** Batch ID: **32492** RunNo: **44102**
Prep Date: **6/26/2017** Analysis Date: **7/10/2017** SeqNo: **1391530** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	170	5.0	50.00	106.0	120	75	125	5.22	20	

Sample ID **MB-32492** SampType: **MBLK** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **PBW** Batch ID: **32492** RunNo: **44102**
Prep Date: **6/26/2017** Analysis Date: **7/10/2017** SeqNo: **1391846** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chromium	ND	0.0060								
Selenium	ND	0.050								
Sodium	ND	1.0								

Sample ID **LCS-32492** SampType: **LCS** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **LCSW** Batch ID: **32492** RunNo: **44102**
Prep Date: **6/26/2017** Analysis Date: **7/10/2017** SeqNo: **1391847** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chromium	0.50	0.0060	0.5000	0	100	80	120			
Selenium	0.51	0.050	0.5000	0	102	80	120			
Sodium	51	1.0	50.00	0	103	80	120			

Qualifiers:

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

QC SUMMARY REPORT

WO#: **1706D18**

Hall Environmental Analysis Laboratory, Inc.

28-Jul-17

Client: Western Refining Southwest, Inc.
Project: Injection Well 6-22-17

Sample ID **1706D18-001FMS**	SampType: **MS**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **Injection Well**	Batch ID: **32492**	RunNo: **44102**
Prep Date: **6/26/2017**	Analysis Date: **7/10/2017**	SeqNo: **1391851** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Selenium	0.44	0.050	0.5000	0	87.0	75	125			

Sample ID **1706D18-001FMSD**	SampType: **MSD**	TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **Injection Well**	Batch ID: **32492**	RunNo: **44102**
Prep Date: **6/26/2017**	Analysis Date: **7/10/2017**	SeqNo: **1391852** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Selenium	0.45	0.050	0.5000	0	90.8	75	125	4.31	20	

Qualifiers:

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1706D18**

28-Jul-17

Client: Western Refining Southwest, Inc.

Project: Injection Well 6-22-17

Sample ID **mb-1**	SampType: **mblk**	TestCode: **SM2320B: Alkalinity**							
Client ID: **PBW**	Batch ID: **R43890**	RunNo: **43890**							
Prep Date:	Analysis Date: **6/28/2017**	SeqNo: **1383548**	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: **R43890**	RunNo: **43890**							
Prep Date:	Analysis Date: **6/28/2017**	SeqNo: **1383549**	Units: **mg/L CaCO3**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	77.64	20.00	80.00	0	97.0	90	110			

Sample ID **mb-2**	SampType: **mblk**	TestCode: **SM2320B: Alkalinity**							
Client ID: **PBW**	Batch ID: **R43890**	RunNo: **43890**							
Prep Date:	Analysis Date: **6/28/2017**	SeqNo: **1383572**	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**	SampType: **lcs**	TestCode: **SM2320B: Alkalinity**							
Client ID: **LCSW**	Batch ID: **R43890**	RunNo: **43890**							
Prep Date:	Analysis Date: **6/28/2017**	SeqNo: **1383573**	Units: **mg/L CaCO3**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	78.84	20.00	80.00	0	98.5	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
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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1706D18**

28-Jul-17

Client: Western Refining Southwest, Inc.

Project: Injection Well 6-22-17

Sample ID **MB-32502**	SampType: **MBLK**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **PBW**	Batch ID: **32502**	RunNo: **43839**
Prep Date: **6/26/2017**	Analysis Date: **6/27/2017**	SeqNo: **1381448** 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-32502**	SampType: **LCS**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **LCSW**	Batch ID: **32502**	RunNo: **43839**
Prep Date: **6/26/2017**	Analysis Date: **6/27/2017**	SeqNo: **1381449** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Dissolved Solids	985	20.0	1000	0	98.5	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
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

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: 1706D18 RcptNo: 1

Received By: Anne Thorne 6/23/2017 7:25:00 AM Anne Thorne
Completed By: Anne Thorne 6/23/2017 1:45:52 PM Anne Thorne
Reviewed By: 6/23/17

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: 3,2
(<2 or >12 unless noted)
Adjusted? NO
Checked by:

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	1.1	Good	Yes			

Chain-of-Custody Record

Client: Western Refining

Mailing Address: 50 CR4990
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

Project Name:
Injection Well-6-22-17

Project #:
PO# 12619031-2

Project Manager:
Kelly Robinson

Sampler: Matt Krakow

On Ice: ☒ Yes ☐ No

Sample Temperature: 1

HALL ENVIRONMENTAL ANALYSIS LABORATORY
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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. 1706D18	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)	Air Bubbles (Y or N)
-22-17	9:00am	H2O	Injection Well	3-500mL	Amber	-001			See		Attached							
				3-500mL	Poly	-001												
				3-VOAs	HCL	-001												
				1-500mL	NaOH	-001												
				1-500mL	zn Acetate/ NaOH	-001												
				1-500mL	HNO_3	-001												
				1-120mL	HNO_3	-001												
				1-120mL	H_2SO_4	-001												
			Trip Blank AT 06/23/17			-002												

Date	Time	Relinquished by:	Received by:	Date	Time
6/22/17	1430			6/22/17	1430
6/22/17	1911			06/23/17	0725

Remarks: See Attached

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	[illegible]	5.0
D005	Barium	[illegible]	100.0
D018	Benzene	[illegible]	0.5
D006	Cadmium	[illegible]	1.0
D019	Carbon tetrachloride	[illegible] [illegible]	0.5
D020	Chlordane	[illegible]	0.03
D021	Chlorobenzene	[illegible] [illegible]	100.0
D022	Chloroform	[illegible] [illegible]	6.0
D007	Chromium	[illegible]	5.0
D023	o-Cresol	[illegible]	200.0
D024	m-Cresol	[illegible]	200.0
D025	p-Cresol	[illegible]	200.0
D026	Cresol	[illegible]	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	[illegible]	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

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);

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

October 18, 2017

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

RE: BPT Injection Well 9 13 17 OrderNo.: 1709746

Dear Kelly Robinson:

Hall Environmental Analysis Laboratory received 1 sample(s) on 9/14/2017 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 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 #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **1709746**
Date Reported: **10/18/2017**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17
Lab ID: 1709746-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 9/13/2017 11:20:00 AM
Received Date: 9/14/2017 7:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8081: PESTICIDES TCLP							Analyst: **MAB**
Chlordane	ND	0.030		mg/L	1	9/27/2017 1:41:44 PM	33957
Endrin	ND	0.020		mg/L	1	9/27/2017 1:41:44 PM	33957
gamma-BHC (Lindane)	ND	0.40		mg/L	1	9/27/2017 1:41:44 PM	33957
Heptachlor	ND	0.0080		mg/L	1	9/27/2017 1:41:44 PM	33957
Heptachlor epoxide	ND	0.0080		mg/L	1	9/27/2017 1:41:44 PM	33957
Methoxychlor	ND	10		mg/L	1	9/27/2017 1:41:44 PM	33957
Toxaphene	ND	0.50		mg/L	1	9/27/2017 1:41:44 PM	33957
Surr: Decachlorobiphenyl	85.8	57.8-124		%Rec	1	9/27/2017 1:41:44 PM	33957
Surr: Tetrachloro-m-xylene	81.5	43-114		%Rec	1	9/27/2017 1:41:44 PM	33957
EPA METHOD 8270C TCLP							Analyst: **DAM**
2-Methylphenol	ND	200		mg/L	1	9/27/2017 4:13:14 PM	33908
3+4-Methylphenol	ND	200		mg/L	1	9/27/2017 4:13:14 PM	33908
Phenol	ND	200		mg/L	1	9/27/2017 4:13:14 PM	33908
2,4-Dinitrotoluene	ND	0.13		mg/L	1	9/27/2017 4:13:14 PM	33908
Hexachlorobenzene	ND	0.13		mg/L	1	9/27/2017 4:13:14 PM	33908
Hexachlorobutadiene	ND	0.50		mg/L	1	9/27/2017 4:13:14 PM	33908
Hexachloroethane	ND	3.0		mg/L	1	9/27/2017 4:13:14 PM	33908
Nitrobenzene	ND	2.0		mg/L	1	9/27/2017 4:13:14 PM	33908
Pentachlorophenol	ND	100		mg/L	1	9/27/2017 4:13:14 PM	33908
Pyridine	ND	5.0		mg/L	1	9/27/2017 4:13:14 PM	33908
2,4,5-Trichlorophenol	ND	400		mg/L	1	9/27/2017 4:13:14 PM	33908
2,4,6-Trichlorophenol	ND	2.0		mg/L	1	9/27/2017 4:13:14 PM	33908
Cresols, Total	ND	200		mg/L	1	9/27/2017 4:13:14 PM	33908
Surr: 2-Fluorophenol	44.6	15-124		%Rec	1	9/27/2017 4:13:14 PM	33908
Surr: Phenol-d5	38.8	15-118		%Rec	1	9/27/2017 4:13:14 PM	33908
Surr: 2,4,6-Tribromophenol	65.9	15-148		%Rec	1	9/27/2017 4:13:14 PM	33908
Surr: Nitrobenzene-d5	82.7	40.6-124		%Rec	1	9/27/2017 4:13:14 PM	33908
Surr: 2-Fluorobiphenyl	61.8	35.7-128		%Rec	1	9/27/2017 4:13:14 PM	33908
Surr: 4-Terphenyl-d14	57.0	18.8-115		%Rec	1	9/27/2017 4:13:14 PM	33908
SPECIFIC GRAVITY							Analyst: **JRR**
Specific Gravity	1.002	0			1	9/15/2017 2:17:00 PM	R45658
EPA METHOD 300.0: ANIONS							Analyst: **MRA**
Fluoride	5.9	0.50	*	mg/L	5	9/14/2017 3:12:54 PM	R45644
Chloride	600	25	*	mg/L	50	9/27/2017 4:01:08 PM	R45948
Nitrogen, Nitrite (As N)	ND	0.50		mg/L	5	9/14/2017 3:12:54 PM	R45644
Bromide	2.3	0.50		mg/L	5	9/14/2017 3:12:54 PM	R45644
Nitrogen, Nitrate (As N)	ND	0.50		mg/L	5	9/14/2017 3:12:54 PM	R45644
Phosphorus, Orthophosphate (As P)	ND	2.5		mg/L	5	9/14/2017 3:12:54 PM	R45644

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
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

Analytical Report
Lab Order **1709746**
Date Reported: **10/18/2017**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17
Lab ID: 1709746-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 9/13/2017 11:20:00 AM
Received Date: 9/14/2017 7:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst: **MRA**	
Sulfate	80	2.5		mg/L	5	9/14/2017 3:12:54 PM	R45644
SM2510B: SPECIFIC CONDUCTANCE						Analyst: **JRR**	
Conductivity	3100	5.0		µmhos/cm	1	9/19/2017 2:03:47 PM	R45747
SM2320B: ALKALINITY						Analyst: **JRR**	
Bicarbonate (As CaCO3)	499.0	20.00		mg/L CaCO3	1	9/19/2017 2:03:47 PM	R45747
Carbonate (As CaCO3)	ND	2.000		mg/L CaCO3	1	9/19/2017 2:03:47 PM	R45747
Total Alkalinity (as CaCO3)	499.0	20.00		mg/L CaCO3	1	9/19/2017 2:03:47 PM	R45747
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**	
Total Dissolved Solids	1920	100	*D	mg/L	1	9/22/2017 10:23:00 AM	33959
SM4500-H+B: PH						Analyst: **JRR**	
pH	7.34		H	pH units	1	9/19/2017 2:03:47 PM	R45747
EPA METHOD 7470: MERCURY						Analyst: **MED**	
Mercury	ND	0.00020		mg/L	1	9/27/2017 9:25:56 AM	34071
EPA METHOD 6010B: DISSOLVED METALS						Analyst: **TES**	
Calcium	53	5.0		mg/L	5	9/19/2017 1:02:14 PM	A45714
Magnesium	43	5.0		mg/L	5	9/19/2017 1:02:14 PM	A45714
Potassium	14	5.0		mg/L	5	9/19/2017 1:02:14 PM	A45714
Sodium	530	10		mg/L	10	9/28/2017 1:04:41 PM	A45960
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: **TES**	
Arsenic	0.035	0.020		mg/L	1	9/19/2017 11:57:19 AM	33882
Barium	0.17	0.020		mg/L	1	9/19/2017 11:57:19 AM	33882
Cadmium	ND	0.0020		mg/L	1	9/19/2017 11:57:19 AM	33882
Chromium	ND	0.0060		mg/L	1	9/19/2017 11:57:19 AM	33882
Lead	ND	0.0050		mg/L	1	9/19/2017 11:57:19 AM	33882
Selenium	ND	0.050		mg/L	1	9/19/2017 11:57:19 AM	33882
Silver	ND	0.0050		mg/L	1	9/19/2017 11:57:19 AM	33882
TCLP VOLATILES BY 8260B						Analyst: **RAA**	
Benzene	ND	0.50		mg/L	200	9/15/2017 1:25:00 AM	T45638
1,2-Dichloroethane (EDC)	ND	0.50		mg/L	200	9/15/2017 1:25:00 AM	T45638
2-Butanone	ND	200		mg/L	200	9/15/2017 1:25:00 AM	T45638
Carbon Tetrachloride	ND	0.50		mg/L	200	9/15/2017 1:25:00 AM	T45638
Chloroform	ND	6.0		mg/L	200	9/15/2017 1:25:00 AM	T45638
1,4-Dichlorobenzene	ND	7.5		mg/L	200	9/15/2017 1:25:00 AM	T45638
1,1-Dichloroethene	ND	0.70		mg/L	200	9/15/2017 1:25:00 AM	T45638
Hexachlorobutadiene	ND	0.50		mg/L	200	9/15/2017 1:25:00 AM	T45638

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
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

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17
Lab ID: 1709746-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 9/13/2017 11:20:00 AM
Received Date: 9/14/2017 7:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
TCLP VOLATILES BY 8260B						Analyst: **RAA**	
Tetrachloroethene (PCE)	ND	0.70		mg/L	200	9/15/2017 1:25:00 AM	T45638
Trichloroethene (TCE)	ND	0.50		mg/L	200	9/15/2017 1:25:00 AM	T45638
Vinyl chloride	ND	0.20		mg/L	200	9/15/2017 1:25:00 AM	T45638
Chlorobenzene	ND	100		mg/L	200	9/15/2017 1:25:00 AM	T45638
Surr: 1,2-Dichloroethane-d4	97.4	70-130		%Rec	200	9/15/2017 1:25:00 AM	T45638
Surr: 4-Bromofluorobenzene	95.6	70-130		%Rec	200	9/15/2017 1:25:00 AM	T45638
Surr: Dibromofluoromethane	100	70-130		%Rec	200	9/15/2017 1:25:00 AM	T45638
Surr: Toluene-d8	91.2	70-130		%Rec	200	9/15/2017 1:25:00 AM	T45638

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
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

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	09/21/2017 18:03	WG1023142

Wet Chemistry by Method 9034-9030B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Reactive Sulfide	0.125		0.0500	1	09/18/2017 17:47	WG1021084

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
Corrosivity by pH	7.09	T6	1	09/18/2017 10:32	WG1021485

Sample Narrative:

L936656-01 WG1021485: 7.09 at 15.2c

Wet Chemistry by Method D93/1010A

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	deg F			date / time	
Flashpoint	DNF at 170		1	09/22/2017 15:11	WG1023539

Method Blank (MB)

(MB) R3251293-1 09/21/17 17:54

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Reactive Cyanide	U		0.0018	0.00500

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3251293-2 09/21/17 17:55 • (LCSD) R3251293-3 09/21/17 17:56

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Reactive Cyanide	0.100	0.104	0.104	104	104	85-115			0	20

L936656-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L936656-01 09/21/17 18:03 • (MS) R3251293-4 09/21/17 18:06 • (MSD) R3251293-5 09/21/17 18:07

	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	0.0901	0.0861	86	82	1	75-125			5	20

Method Blank (MB)

(MB) R3250199-1 09/18/17 17:42

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Reactive Sulfide	U		0.0065	0.0500

L934254-02 Original Sample (OS) • Duplicate (DUP)

(OS) L934254-02 09/18/17 17:43 • (DUP) R3250199-4 09/18/17 17:44

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mg/l	mg/l		%		%
Reactive Sulfide	1.06	1.06	2	0		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3250199-2 09/18/17 17:43 • (LCSD) R3250199-3 09/18/17 17:43

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Reactive Sulfide	0.500	0.503	0.511	101	102	85-115			2	20

L936656-01 Original Sample (OS) • Duplicate (DUP)

(OS) L936656-01 09/18/17 10:32 • (DUP) WG1021485-3 09/18/17 10:32

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
Corrosivity by pH	7.09	7.09	1	0.000	T8	1

Sample Narrative:
OS: 7.09 at 15.2c
DUP: 7.09 at 15.2c

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) WG1021485-1 09/18/17 10:32 • (LCSD) WG1021485-2 09/18/17 10:32

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	su	su	su	%	%	%			%	%
Corrosivity by pH	10.0	9.95	9.96	99.5	99.6	98.4-102			0.100	1

Sample Narrative:
LCS: 9.95 at 20.1c
LCSD: 9.96 at 20.0c

L936656-01 Original Sample (OS) • Duplicate (DUP)

(OS) L936656-01 09/22/17 15:11 • (DUP) WG1023539-1 09/22/17 15:11

	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

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3251560-1 09/22/17 15:11 • (LCSD) R3251560-2 09/22/17 15:11

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	deg F	deg F	deg F	%	%	%			%	%
Flashpoint	82.0	80.3	80.6	98.0	98.0	96.0-104			0.000	10

Wet Chemistry by Method 2580

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	mV			date / time	
ORP	71.0		1	09/21/2017 16:57	WG1023075

L937490-01 Original Sample (OS) • Duplicate (DUP)

(OS) L937490-01 09/21/17 16:57 • (DUP) WG1023075-3 09/21/17 16:57

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mV	mV		%		%
ORP	71.0	70.0	1	1.42		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) WG1023075-1 09/21/17 16:57 • (LCSD) WG1023075-2 09/21/17 16:57

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mV	mV	mV	%	%	%			%	%
ORP	228	228	229	100	100	90.0-110			0.438	20

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, 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.
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. This 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
T8	Sample(s) received past/too close to holding time expiration.

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1709746**

18-Oct-17

Client: Western Refining Southwest, Inc.

Project: BPT Injection Well 9 13 17

Sample ID **MB**	SampType: **mblk**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R45644**	RunNo: **45644**
Prep Date:	Analysis Date: **9/14/2017**	SeqNo: **1448506** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.100								
Nitrogen, Nitrite (As N)	ND	0.100								
Bromide	ND	0.100								
Nitrogen, Nitrate (As N)	ND	0.100								
Phosphorus, Orthophosphate (As P	ND	0.500								
Sulfate	ND	0.500								

Sample ID **LCS**	SampType: **lcs**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R45644**	RunNo: **45644**
Prep Date:	Analysis Date: **9/14/2017**	SeqNo: **1448507** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.541	0.100	0.5000	0	108	90	110			
Nitrogen, Nitrite (As N)	0.953	0.100	1.000	0	95.3	90	110			
Bromide	2.45	0.100	2.500	0	97.9	90	110			
Nitrogen, Nitrate (As N)	2.53	0.100	2.500	0	101	90	110			
Phosphorus, Orthophosphate (As P	4.76	0.500	5.000	0	95.1	90	110			
Sulfate	9.84	0.500	10.00	0	98.4	90	110			

Sample ID **MB**	SampType: **mblk**	TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW**	Batch ID: **R45948**	RunNo: **45948**
Prep Date:	Analysis Date: **9/27/2017**	SeqNo: **1460425** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID **LCS**	SampType: **lcs**	TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW**	Batch ID: **R45948**	RunNo: **45948**
Prep Date:	Analysis Date: **9/27/2017**	SeqNo: **1460426** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.7	0.50	5.000	0	93.5	90	110			

Qualifiers:

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

QC SUMMARY REPORT

WO#: **1709746**

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **100ng lcs** SampType: **LCS** TestCode: **TCLP Volatiles by 8260B**
Client ID: **LCSW** Batch ID: **T45638** RunNo: **45638**
Prep Date: Analysis Date: **9/14/2017** SeqNo: **1448337** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.021	0.010	0.02000	0	105	70	130			
1,1-Dichloroethene	0.022	0.010	0.02000	0	110	70	130			
Trichloroethene (TCE)	0.020	0.010	0.02000	0	102	70	130			
Chlorobenzene	0.020	0.010	0.02000	0	99.1	70	130			
Surr: 1,2-Dichloroethane-d4	0.0094		0.01000		94.3	70	130			
Surr: 4-Bromofluorobenzene	0.0097		0.01000		96.6	70	130			
Surr: Dibromofluoromethane	0.0097		0.01000		97.0	70	130			
Surr: Toluene-d8	0.0092		0.01000		91.6	70	130			

Sample ID **rb** SampType: **MBLK** TestCode: **TCLP Volatiles by 8260B**
Client ID: **PBW** Batch ID: **T45638** RunNo: **45638**
Prep Date: Analysis Date: **9/14/2017** SeqNo: **1448338** 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								
Hexachlorobutadiene	ND	0.50								
Tetrachloroethene (PCE)	ND	0.70								
Trichloroethene (TCE)	ND	0.50								
Vinyl chloride	ND	0.20								
Chlorobenzene	ND	100								
Surr: 1,2-Dichloroethane-d4	0.0096		0.01000		95.9	70	130			
Surr: 4-Bromofluorobenzene	0.0096		0.01000		96.2	70	130			
Surr: Dibromofluoromethane	0.0096		0.01000		96.0	70	130			
Surr: Toluene-d8	0.0091		0.01000		91.4	70	130			

Qualifiers:

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

QC SUMMARY REPORT

WO#: **1709746**

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **1709746-001cms** SampType: **MS** TestCode: **EPA Method 8270C TCLP**
Client ID: **Injection Well** Batch ID: **33908** RunNo: **45933**
Prep Date: **9/18/2017** Analysis Date: **9/27/2017** SeqNo: **1460039** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2-Methylphenol	0.069	0.0010	0.1000	0	69.0	23.9	129			
3+4-Methylphenol	0.13	0.0010	0.2000	0	64.6	15	167			
2,4-Dinitrotoluene	0.063	0.0010	0.1000	0	63.3	15	147			
Hexachlorobenzene	0.073	0.0010	0.1000	0	72.5	41.4	136			
Hexachlorobutadiene	0.069	0.0010	0.1000	0	68.5	16.2	134			
Hexachloroethane	0.056	0.0010	0.1000	0	56.5	20.6	124			
Nitrobenzene	0.081	0.0010	0.1000	0	80.8	39.5	134			
Pentachlorophenol	0.028	0.0010	0.1000	0	28.3	15	137			
Pyridine	0.011	0.0010	0.1000	0	11.0	15	129			S
2,4,5-Trichlorophenol	0.080	0.0010	0.1000	0	79.8	15	158			
2,4,6-Trichlorophenol	0.073	0.0010	0.1000	0	72.9	15	153			
Cresols, Total	0.20	0.0010	0.3000	0	66.1	10.6	179			
Surr: 2-Fluorophenol	0.095		0.2000		47.3	15	124			
Surr: Phenol-d5	0.078		0.2000		38.9	15	118			
Surr: 2,4,6-Tribromophenol	0.13		0.2000		66.7	15	148			
Surr: Nitrobenzene-d5	0.085		0.1000		84.7	40.6	124			
Surr: 2-Fluorobiphenyl	0.070		0.1000		69.6	35.7	128			
Surr: 4-Terphenyl-d14	0.059		0.1000		58.7	18.8	115			

Sample ID **1709746-001cmsd** SampType: **MSD** TestCode: **EPA Method 8270C TCLP**
Client ID: **Injection Well** Batch ID: **33908** RunNo: **45933**
Prep Date: **9/18/2017** Analysis Date: **9/27/2017** SeqNo: **1460040** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2-Methylphenol	0.062	0.0010	0.1000	0	62.5	23.9	129	9.98	20	
3+4-Methylphenol	0.12	0.0010	0.2000	0	61.3	15	167	5.28	20	
2,4-Dinitrotoluene	0.056	0.0010	0.1000	0	56.3	15	147	11.7	23.2	
Hexachlorobenzene	0.071	0.0010	0.1000	0	70.8	41.4	136	2.46	20	
Hexachlorobutadiene	0.065	0.0010	0.1000	0	64.5	16.2	134	5.98	20	
Hexachloroethane	0.051	0.0010	0.1000	0	51.5	20.6	124	9.27	31.3	
Nitrobenzene	0.081	0.0010	0.1000	0	80.9	39.5	134	0.124	26.6	
Pentachlorophenol	0.040	0.0010	0.1000	0	40.5	15	137	35.5	27.9	R
Pyridine	0.0090	0.0010	0.1000	0	8.96	15	129	20.8	47.4	S
2,4,5-Trichlorophenol	0.072	0.0010	0.1000	0	71.6	15	158	10.9	36.9	
2,4,6-Trichlorophenol	0.077	0.0010	0.1000	0	77.0	15	153	5.42	37.2	
Cresols, Total	0.18	0.0010	0.3000	0	61.7	10.6	179	6.89	27.4	
Surr: 2-Fluorophenol	0.087		0.2000		43.6	15	124	0	0	
Surr: Phenol-d5	0.074		0.2000		37.0	15	118	0	0	
Surr: 2,4,6-Tribromophenol	0.14		0.2000		68.1	15	148	0	0	

Qualifiers:

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

QC SUMMARY REPORT

WO#: **1709746**

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **1709746-001cmsd** SampType: **MSD** TestCode: **EPA Method 8270C TCLP**
Client ID: **Injection Well** Batch ID: **33908** RunNo: **45933**
Prep Date: **9/18/2017** Analysis Date: **9/27/2017** SeqNo: **1460040** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: Nitrobenzene-d5	0.082		0.1000		81.7	40.6	124	0	0	
Surr: 2-Fluorobiphenyl	0.070		0.1000		69.8	35.7	128	0	0	
Surr: 4-Terphenyl-d14	0.051		0.1000		51.1	18.8	115	0	0	

Qualifiers:

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1709746**

18-Oct-17

Client: Western Refining Southwest, Inc.

Project: BPT Injection Well 9 13 17

Sample ID **MB-34071**	SampType: **MBLK**	TestCode: **EPA Method 7470: Mercury**							
Client ID: **PBW**	Batch ID: **34071**	RunNo: **45912**							
Prep Date: **9/26/2017**	Analysis Date: **9/27/2017**	SeqNo: **1459048**	Units: **mg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	ND	0.00020								

Sample ID **LCS-34071**	SampType: **LCS**	TestCode: **EPA Method 7470: Mercury**							
Client ID: **LCSW**	Batch ID: **34071**	RunNo: **45912**							
Prep Date: **9/26/2017**	Analysis Date: **9/27/2017**	SeqNo: **1459049**	Units: **mg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0049	0.00020	0.005000	0	97.0	80	120			

Sample ID **1709746-001DMS**	SampType: **MS**	TestCode: **EPA Method 7470: Mercury**							
Client ID: **Injection Well**	Batch ID: **34071**	RunNo: **45912**							
Prep Date: **9/26/2017**	Analysis Date: **9/27/2017**	SeqNo: **1459053**	Units: **mg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0050	0.00020	0.005000	.00004788	98.8	75	125			

Sample ID **1709746-001DMSD**	SampType: **MSD**	TestCode: **EPA Method 7470: Mercury**							
Client ID: **Injection Well**	Batch ID: **34071**	RunNo: **45912**							
Prep Date: **9/26/2017**	Analysis Date: **9/27/2017**	SeqNo: **1459054**	Units: **mg/L**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0049	0.00020	0.005000	.00004788	97.9	75	125	0.906	20	

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
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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1709746**

18-Oct-17

Client: Western Refining Southwest, Inc.

Project: BPT Injection Well 9 13 17

Sample ID **MB-A**	SampType: **MBLK**	TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **PBW**	Batch ID: **A45714**	RunNo: **45714**
Prep Date:	Analysis Date: **9/19/2017**	SeqNo: **1452976** 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								

Sample ID **LCS-A**	SampType: **LCS**	TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **LCSW**	Batch ID: **A45714**	RunNo: **45714**
Prep Date:	Analysis Date: **9/19/2017**	SeqNo: **1452977** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	52	1.0	50.00	0	104	80	120			
Magnesium	54	1.0	50.00	0	108	80	120			
Potassium	53	1.0	50.00	0	106	80	120			

Sample ID **MB-A**	SampType: **MBLK**	TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **PBW**	Batch ID: **A45960**	RunNo: **45960**
Prep Date:	Analysis Date: **9/28/2017**	SeqNo: **1461012** Units: **mg/L**

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

Sample ID **LCS-A**	SampType: **LCS**	TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **LCSW**	Batch ID: **A45960**	RunNo: **45960**
Prep Date:	Analysis Date: **9/28/2017**	SeqNo: **1461013** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	51	1.0	50.00	0	102	80	120			

Qualifiers:

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

QC SUMMARY REPORT

Hall Environmental Analysis Laboratory, Inc.

WO#: **1709746**

18-Oct-17

Client: Western Refining Southwest, Inc.

Project: BPT Injection Well 9 13 17

Sample ID **MB-33882** SampType: **MBLK** TestCode: **EPA 6010B: Total Recoverable Metals**

Client ID: **PBW** Batch ID: **33882** RunNo: **45714**

Prep Date: **9/15/2017** Analysis Date: **9/19/2017** SeqNo: **1451478** 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								
Chromium	ND	0.0060								
Lead	ND	0.0050								
Silver	ND	0.0050								

Sample ID **LCS-33882** SampType: **LCS** TestCode: **EPA 6010B: Total Recoverable Metals**

Client ID: **LCSW** Batch ID: **33882** RunNo: **45714**

Prep Date: **9/15/2017** Analysis Date: **9/19/2017** SeqNo: **1451479** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.52	0.020	0.5000	0	103	80	120			
Barium	0.49	0.020	0.5000	0	98.6	80	120			
Cadmium	0.49	0.0020	0.5000	0	98.8	80	120			
Chromium	0.49	0.0060	0.5000	0	98.1	80	120			
Lead	0.48	0.0050	0.5000	0	95.7	80	120			
Silver	0.10	0.0050	0.1000	0	103	80	120			

Sample ID **MB-33882** SampType: **MBLK** TestCode: **EPA 6010B: Total Recoverable Metals**

Client ID: **PBW** Batch ID: **33882** RunNo: **45714**

Prep Date: **9/15/2017** Analysis Date: **9/19/2017** SeqNo: **1451496** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Selenium	ND	0.050								

Sample ID **LCS-33882** SampType: **LCS** TestCode: **EPA 6010B: Total Recoverable Metals**

Client ID: **LCSW** Batch ID: **33882** RunNo: **45714**

Prep Date: **9/15/2017** Analysis Date: **9/19/2017** SeqNo: **1451497** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Selenium	0.49	0.050	0.5000	0	98.4	80	120			

Qualifiers:

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

QC SUMMARY REPORT

WO#: **1709746**

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **mb-1** SampType: **MBLK** TestCode: **SM2320B: Alkalinity**
Client ID: **PBW** Batch ID: **R45747** RunNo: **45747**
Prep Date: Analysis Date: **9/19/2017** SeqNo: **1452652** 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: **R45747** RunNo: **45747**
Prep Date: Analysis Date: **9/19/2017** SeqNo: **1452653** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	80.40	20.00	80.00	0	101	90	110			

Sample ID **mb-2** SampType: **MBLK** TestCode: **SM2320B: Alkalinity**
Client ID: **PBW** Batch ID: **R45747** RunNo: **45747**
Prep Date: Analysis Date: **9/19/2017** SeqNo: **1452675** 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** SampType: **LCS** TestCode: **SM2320B: Alkalinity**
Client ID: **LCSW** Batch ID: **R45747** RunNo: **45747**
Prep Date: Analysis Date: **9/19/2017** SeqNo: **1452676** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	80.92	20.00	80.00	0	101	90	110			

Sample ID **mb-3** SampType: **MBLK** TestCode: **SM2320B: Alkalinity**
Client ID: **PBW** Batch ID: **R45747** RunNo: **45747**
Prep Date: Analysis Date: **9/19/2017** SeqNo: **1452699** 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-3** SampType: **LCS** TestCode: **SM2320B: Alkalinity**
Client ID: **LCSW** Batch ID: **R45747** RunNo: **45747**
Prep Date: Analysis Date: **9/19/2017** SeqNo: **1452700** Units: **mg/L CaCO3**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	80.84	20.00	80.00	0	101	90	110			

Qualifiers:

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

QC SUMMARY REPORT

WO#: **1709746**

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **1709746-001EDUP**	SampType: **DUP**			TestCode: **Specific Gravity**						
Client ID: **Injection Well**	Batch ID: **R45658**			RunNo: **45658**						
Prep Date:	Analysis Date: **9/15/2017**			SeqNo: **1449109**		Units:				
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Specific Gravity	1.001	0						0.110	20	

Qualifiers:

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

QC SUMMARY REPORT

WO#: **1709746**

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **MB-33959**	SampType: **MBLK**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **PBW**	Batch ID: **33959**	RunNo: **45804**
Prep Date: **9/20/2017**	Analysis Date: **9/22/2017**	SeqNo: **1455608** 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-33959**	SampType: **LCS**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **LCSW**	Batch ID: **33959**	RunNo: **45804**
Prep Date: **9/20/2017**	Analysis Date: **9/22/2017**	SeqNo: **1455609** 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.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Detection Limit
- 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: **1709746** RcptNo: **1**

Received By: **Isaiah Ortiz** **9/14/2017 7:05:00 AM**

Completed By: **Ashley Gallegos** **9/14/2017 9:01:05 AM**

Reviewed By: ENM 9/14/17

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 (<2 or >12 unless noted)

Adjusted? NO

Checked by: RE

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

Project Name:
BPT - Injection Well - 9-13-17

Project #:
PO# 12621258

Project Manager:
Kelly Robinson

Sampler: Matt Krakow

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

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1709746	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)					Air Bubbles (Y or N)
9-13-17	11:20	H2O	Injection Well	3-1L	Amber	-001				See	Analyte		List									
				3-VOAs	HCL																	
				1-120mL	HNO_3																	
				1-250mL	HNO_3																	
				2-500mL	Poly																	
				1-500mL	NaOH																	
				1-500mL	Zn Acetate NaOH																	

Date:	Time:	Relinquished by:	Received by	Date	Time
9/13/17	1600			9/13/17	1600
Date:	Time:	Relinquished by:	Received by:	Date	Time
9/13/17	1811			9/14/17	0705

Remarks:
See analyte list

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)).

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);

ATTACHMENT C

Sundry Notification Reports

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 X

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 Waste Water Disposal Well

8. Well Number WDW #2

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

OIL CONS. DIV DIST. 3

9. OGRID Number 267595

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

MAR 0 2 2017

10. Pool name or Wildcat
SWD; Entrada

4. Well Location
Unit Letter H : 2028 feet from the North line and 111' feet from the East line
Section 27 Township 29N Range 11W NMPM San Juan County

11. Elevation *(Show whether DR, RKB, RT, GR, etc.)*
5535' GL

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:	X MIT, Kill Switch test & BH tests			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.

Western Refining Southwest, Inc. intends to perform a "kill switch" test on the injection pump as well as a mechanical integrity test (MIT) on the 7"x4-1/2" annulus and packer. At the request of the NMOCD Aztec office, bradenhead tests will also be performed at the same time. The test(s) have been scheduled with Monica Kueling to take place on March 7, 2017.

Notify NMOCD 24 hrs prior to beginning operations

Spud Date: 8/15/2016 Rig Release Date: 9/9/2016

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

SIGNATURE [signature] TITLE Engineer/Agent DATE 3/1/2017

Type or print name John Thompson E-mail address: john@walsheng.net PHONE: 505-320-1748

For State Use Only

APPROVED BY: [signature] TITLE Deputy Oil & Gas Inspector, District #3 DATE 3-2-17

Conditions of Approval (if any):

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/3distric.htm

BRADENHEAD TEST REPORT

(submit 1 copy to above address)

Date of Test 3-8-19 Operator Western Refining SW Inc API #30-0 45-35747

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

Well Status (Shut-In or Producing) Initial PSI: Tubing 305 Intermediate 0 Casing 0 Bradenhead 1.5

OPEN BRADENHEAD AND INTERMEDIATE TO ATMOSPHERE INDIVIDUALLY FOR 15 MINUTES EACH

PRESSURE

Testing	Bradenhead BH	Bradenhead Int	Bradenhead Csg	INTERM Int	INTERM Csg
TIME 5 min	0	0	0	0	0
10 min	0	0	0	0	0
15 min	0	0	0	0	0
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 - Nothing when opened - Nothing when opened after 5 min shut in Int - Nothing when opened - Nothing when opened after 5 min shut in -

By [signature] Witness Monica Cadena

(Position)

E-mail address _____

NEW MEXICO ENERGY, MINERALS and NATURAL RESOURCES DEPARTMENT

MECHANICAL INTEGRITY TEST REPORT

(TA OR UIC)

Date of Test 3-8-17 Operator Western Refining SW Inc API # 30-0 45-35747

Property Name Water Disposal 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. 306
Int. Casing Pres. 0

Pressured annulus up to 500 psi. for 30 mins. Test passed/failed

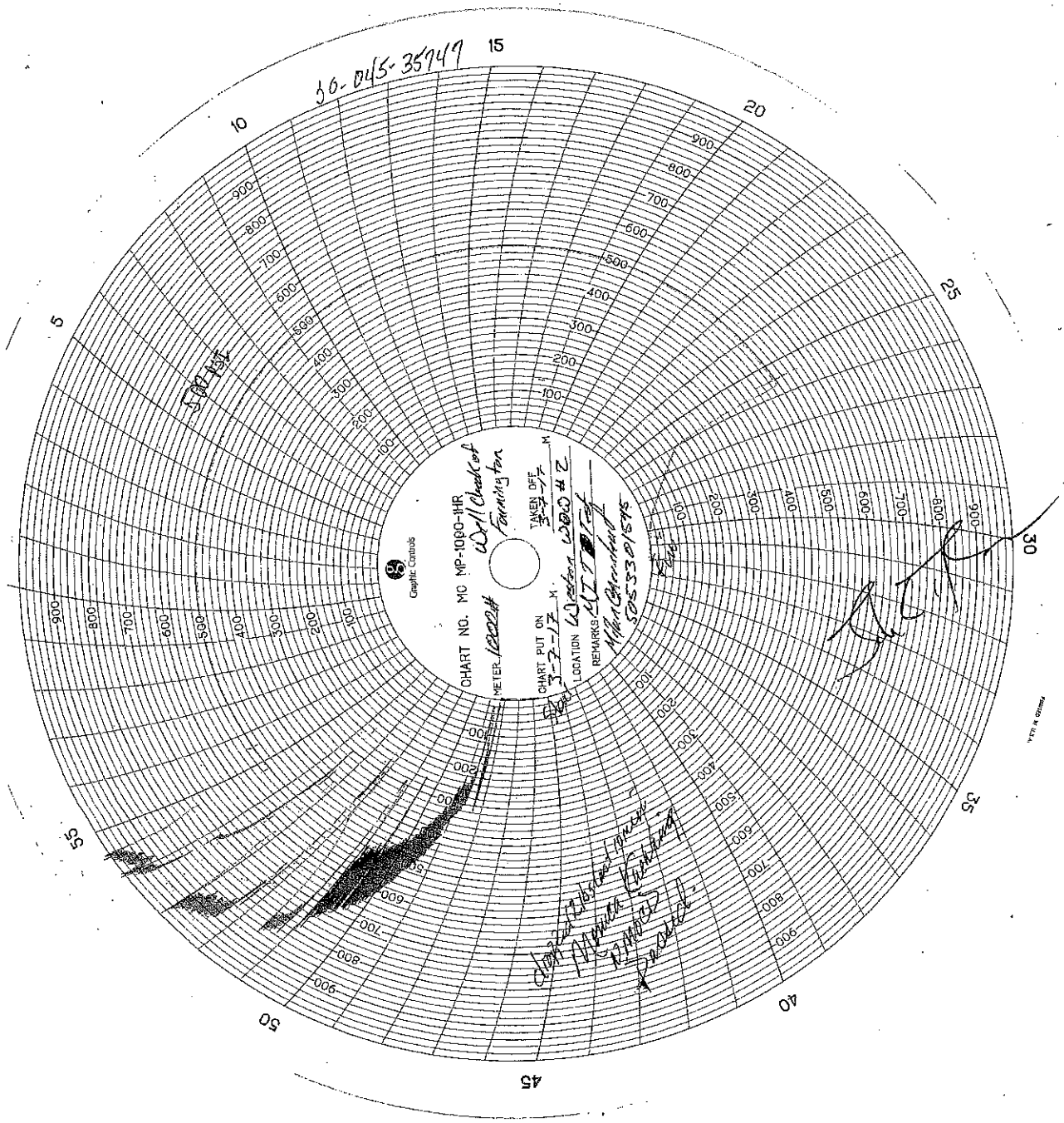
REMARKS:
Packer set 7230
top Perf 7312
drop Pressure to 498 last 10 minutes.

By John E. Thomas (Operator Representative)

Witness Monica Kuehling (NMOCD)

(Position)

Revised 02-11-02


30-045-35749
CHART NO. MC MP-1080-HR
METER
CHART PUT ON
TAKEN OFF
LOCATION
REMARKS
Graphic Controls

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
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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 X

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 Waste Water 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
SWD; Entrada

4. Well Location
Unit Letter H : 2028 feet from the North line and 111' feet from the East line
Section 27 Township 29N Range 11W NMPM San Juan County

11. Elevation *(Show whether DR, RKB, RT, GR, etc.)*
5535' GL

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:				OTHER:	X	MIT, Kill Switch test & BH tests	

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.

On 3/7/2017 Western Refining Southwest, Inc. performed bradenhead tests on the bradenhead and intermediate casing strings. Also performed a mechanical integrity test (MIT) on the 7"x4-1/2" annulus and packer to 500 psi – held for 30 min (with a 2 psi drop off after 30 mins). Also, performed a "kill switch" test on the injection pump which was set at 1200 psi – tested good. All tests passed and were witness by Monica Kueling with the NMOCD Aztec office. Ms. Kueling kept all charts and paperwork related to the tests. Ms. Kueling also authorized for water injection to begin on 3/7/2017.

OIL CONS. DIV DIST. 3
MAR 13 2017

Spud Date: 8/15/2016 Rig Release Date: 9/9/2016

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

SIGNATURE [signature] TITLE Engineer/Agent DATE 3/7/2017

Type or print name John Thompson E-mail address: john@walsheng.net PHONE: 505-320-1748

For State Use Only

APPROVED BY: Monica Kueling TITLE Deputy Oil & Gas Inspector DATE 3-22-17
Conditions of Approval (if any): AV

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 X	
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 SWD; Entrada
4. Well Location Unit Letter H : 2028 feet from the North line and 111' feet from the East line Section 27 Township 29N Range 11W NMPM San Juan County	
	11. Elevation *(Show whether DR, RKB, RT, GR, etc.)* 5535' GL

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:		OTHER: X : MIT, Bradenhead, and High Pressure Shutdown Tests	

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.

On June 8th, 2017, Western Refining Southwest, Inc. ("Western") conducted the following tests were performed on WDW #2:

- **Braden Head Test:** The Bradenhead Test was performed on the bradenhead and intermediate casing strings.
- **Mechanical Integrity Test (MIT):** The MIT was performed on the 7"x4-1/2" annulus and packer to 500 psi. The pressure was held for 30 minutes.
- **High-Pressure Shutdown:** The high-pressure shutdown setting was tested on the injection pump.

All were witness by Monica Kueling with the NMOCD Aztec office. All tests passed. A copy of the test reports are attached for reference. At the end of testing, Ms. Kueling witnessed the start-up of the injection well pump and provided approval for full operation. Normal full-time operation of the WDW#2 resumed by approximately 2:20pm on June 8th, 2017.

OIL CONS. DIV DIST. 3
JUN 12 2017

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 6/9/2017

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

For State Use Only

APPROVED BY: Bob Ball TITLE Deputy Oil & Gas Inspector, District #3 DATE 7/3/17

Conditions of Approval (if any): PV

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 X	
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.) 1. Type of Well: Oil Well ☐ Gas Well ☐ Other: Wastewater Disposal Well	7. Lease Name or Unit Agreement Name 8. Well Number WDW #2
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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:				OTHER: X : MIT, Bradenhead, and High Pressure Shutdown Tests			

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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 6/9/2017

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

For State Use Only

APPROVED BY: Carl J. Chavez TITLE Environmental Engineer DATE 6/9/2017
Conditions of Approval (if any):

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

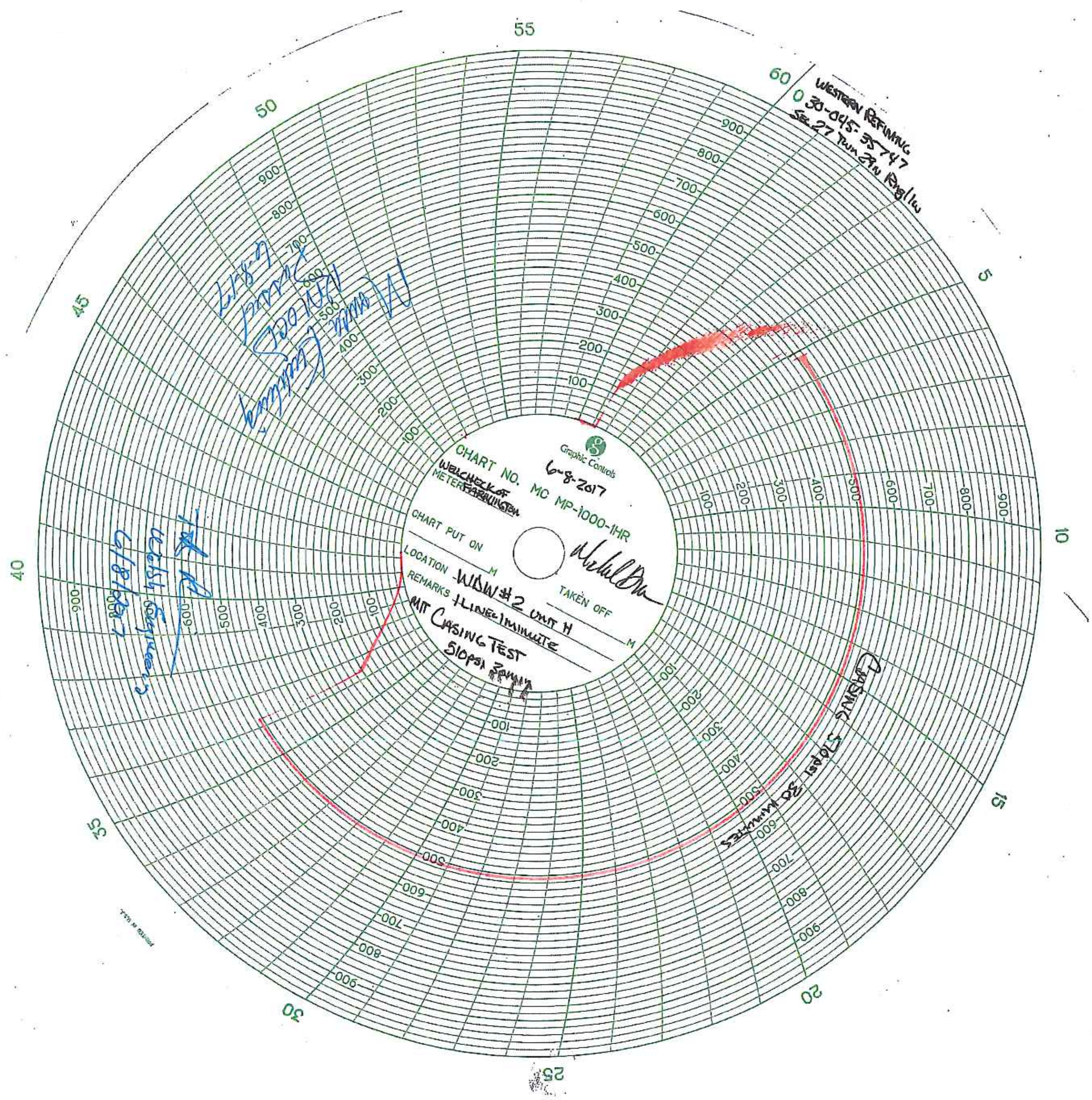
Pressured annulus up to 510 psi. for 30 mins. Test passed/failed

REMARKS:
Packer Set 7230
Top Perf 7312 - 7470
dropped to 505 held last 15 min.

By Tim R (Walsh Engineering) Witness Monica Kuehling
(Operator Representative) (NMOCD)

(Position)

Revised 02-11-02



WESTERN REFINING
30-045-35747
Sec 27 Twn 29N Rng 11W
Graphic Controls
CHART NO. MC MP-1000-1HR
6-8-2017
METER WELCHECK OF FARMINGTON
CHART PUT ON
LOCATION WDW #2 UNIT H
REMARKS 1 LINE=1 MINUTE
MIT CASING TEST
510 psi
TAKEN OFF
CASING 510 psi 30 MINUTES
Welsh Engineering
6/8/2017
NMOCD
6-8-17

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/3distric.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 _____

Submit 1 Copy To Appropriate District Office
District I – (575) 393-6161
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State of New Mexico
Energy, Minerals and Natural Resources

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1220 South St. Francis Dr.
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Form C-103
Revised July 18, 2013

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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 6/9/2017

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

For State Use Only

APPROVED BY: Carl J. Chavez TITLE Environmental Engineer DATE 6/9/2017
Conditions of Approval (if any):

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State of New Mexico
Energy, Minerals and Natural Resources

OIL CONSERVATION DIVISION
1220 South St. Francis Dr.
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Form C-103
Revised July 18, 2013

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PULL OR ALTER CASING	☐	MULTIPLE COMPL	☐	CASING/CEMENT JOB	☐		
DOWNHOLE COMMINGLE	☐						
CLOSED-LOOP SYSTEM	☐						
OTHER:				OTHER: X Fracture Stimulate Entrada			

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Western Refining Southwest, Inc. intends to fracture stimulate the Entrada through the existing perforations (7312' – 7470') w/ 246,000 lbs of premium white sand in a 23 lb cross linked gel system at rates of ~ 50 bpm. Please see attachments for details.

Spud Date: 8/15/2016 Rig Release Date: 9/9/2016

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

SIGNATURE _____ TITLE Engineer/Agent DATE 4/7/2017

Type or print name John Thompson E-mail address: john@walsheng.net PHONE: 505-320-1748

For State Use Only

APPROVED BY: _____ TITLE Environmental Engineer DATE 4/24/2017

Conditions of Approval (if any):

Western Refining Southwest, Inc. (UICI-011)
UIC Class I (Non-hazardous) Injection
Well WDW-2 (API #: 30-045-35747)

C-103 "Fracture Stimulate Entrada"
OCD Santa Fe and Aztec District
Conditions of Approval (4/26/2017)

1) The operator shall submit a "Net Pressure Plot" from fracture stimulation within 30-days of well work completion. The plot shall verify that any or all fracturing occurred within the Entrada Formation.

2) The Oil and Gas Act applies to all UIC Class II operations on all lands within the state of New Mexico including federal lands. OCD Rule 19.15.16 NMAC was amended pursuant to the Oil and Gas Act and hydraulic fracturing fluid disclosure form requirements became effective February 12, 2012. 19.15.16.19(A) NMAC requires that "within 20 days after the completion of a well drilled under oil or gas laws, or the recompletion of a well into a different common source of supply, the operator shall file a completion report with the division . . .[disclosing] whether the well has been hydraulically fractured." Rule 19.15.16.19(B) NMAC requires that "for a hydraulically fractured well, the operator shall also complete and file the OCD's hydraulic fracturing disclosure form within 45 days after completion of the well." Disclosure on FracFocus is not a substitute for the Rule 19.15.16.19 NMAC disclosure requirements. Operators who have not complied with Rule 19.15.16 NMAC disclosure requirements and do not submit the OCD's hydraulic fracturing disclosure form will be considered in violation of 19.15.16 NMAC and the Oil and Gas Act.

3) The operator shall comply with the applicable provisions of the OCD approved Discharge Permit, i.e., MITs after well workovers.

Please be advised that OCD approval does not relieve Western Refining Southwest, Inc. from responsibility should its operations pose a threat or impact to groundwater, human health or the environment. In such event, OCD may order the operator to plug and abandon its well pursuant to the Water Quality Control Commission Regulations. In addition, OCD approval does not relieve Western Refining Southwest, Inc. of responsibility for compliance with any other federal, state, or local laws and/or regulations.

4/26/2017

Western Refining, Southwest - WDW #2

2028' fnl & 111' fse SECTION 27,T29N, R11W
SAN JUAN COUNTY, NEW MEXICO
API #: 30-045-35747

ENTRADA STIMULATION PROCEDURE

See WBD for wellbore information

1. All personal must check in at Western office prior to entering location.
2. Spot 8 ea. 400 bbl frac tanks and fill with 2% KCl water (may use water from refinery if chemical tests show that water is compatible with Halliburton Delta 200 system).
3. RU slick line company and RIH w/ 2.81" blanking plug and set in XN Profile Nipple in Weatherford packer that is set at 7230' KB.
4. MOL & RU service rig. ND WH & NU BOPE. Set pipe racks for laying down/picking up casing.
5. TOH, laying down 4-1/2" IPC casing string and seal assembly.
6. Install seal assembly with 3-1/2" change over. PU and RIH w/ 3-1/2" casing
7. Space out & land in WH with tubing hanger. NU WH & 10K frac valve.
8. RD rig & related equipment & MOL. Have slick line pull blanking plug from packer. SD operations until frac crew is available.
9. RU Halliburton Frac crew. PT pumps & lines to 9000 psi. Note: Max STP for job is 8100 psi
10. Note: Refer to Halliburton Procedure for Frac Details. Frac Entrada with 246,000# 20/40 Premium White sand In 107,900 gal of 23# X-linked gel water@ 50 BPM. Bottom hole pressure to be monitored by computer van. All sand to be tagged w/ 0.40 mci/1000# Ir-192 tracer. Anticipated surface pressure= 2350 psi. Max pressure = 3500 psi. Frac using the following schedule:

STAGE	Clean Volume (GALS.)	Sand (lbs)
Pad	20,000	-------
1.0 ppg	19,500	19,500
2.0 ppg	18,500	37,000
3.0 ppg	17,500	52,500
4.0 ppg	25,000	100,000
5.0 ppg	7400	37,000
Flush	3121	-------
Totals	111,021	246,000#

11. Make all sand is displaced below packer. RD & Release frac crew. Consolidate frac water and release frac tanks. RU slick line & RIH w/ 2.81" blanking plug and set in XN profile nipple in packer.
12. MOL & RU. Remove frac valve & NU WH & BOPE. Set pipe racks for laying down/picking up casing.

13. Lay down 3-1/2" frac string & haul back to Cave Tubulars.

14. RIH w/ seal assembly and 4-1/2" IPC casing. Circulate "packer fluid" and land in packer/wellhead as before. Pressure up one 4-1/2" & 7" annulus to 500 psi and make sure it holds and will pass MIT test.

15. RU slickline & RIH. Retrieve blanking plug from profile nipple in packer.

16. Monitor well for pressure, which will determine if flowback will be necessary or clean operations can begin.

17. After flowback, PU 2-3/8" work string w/ 1-1/4" tail pipe to clean through and below 7" packer.

18. Reverse out down to PBTD (7476'). Once, sand inflows have diminished TOH, laying down 2-3/8" work string and tailpipe.

19. Set blanking plug in packer w/ slick line (if necessary). ND BOP & related equipment. NU WH and manifold flowlines back in place.

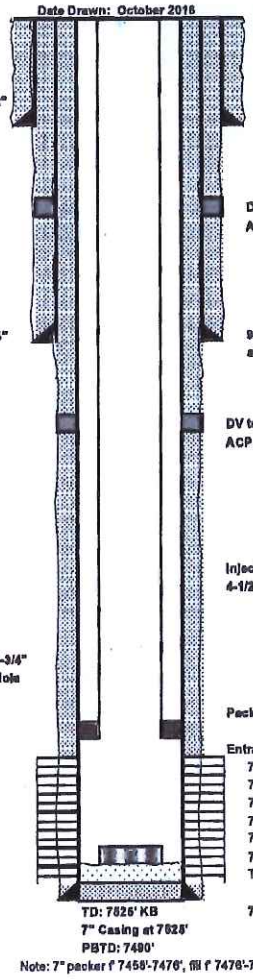
20. Remove blanking plug from packer. Return well to injection status. Schedule MIT w/ NMOCD.

John Thompson
Engineer
Walsh Engineering & Production Corp.

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:	9/15/2016	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:	3/7/2017 - Started Injection/Water Disposal Operations		

Date Drawn: October 2016

WALSH ENGINEERING FARMINGTON, NM

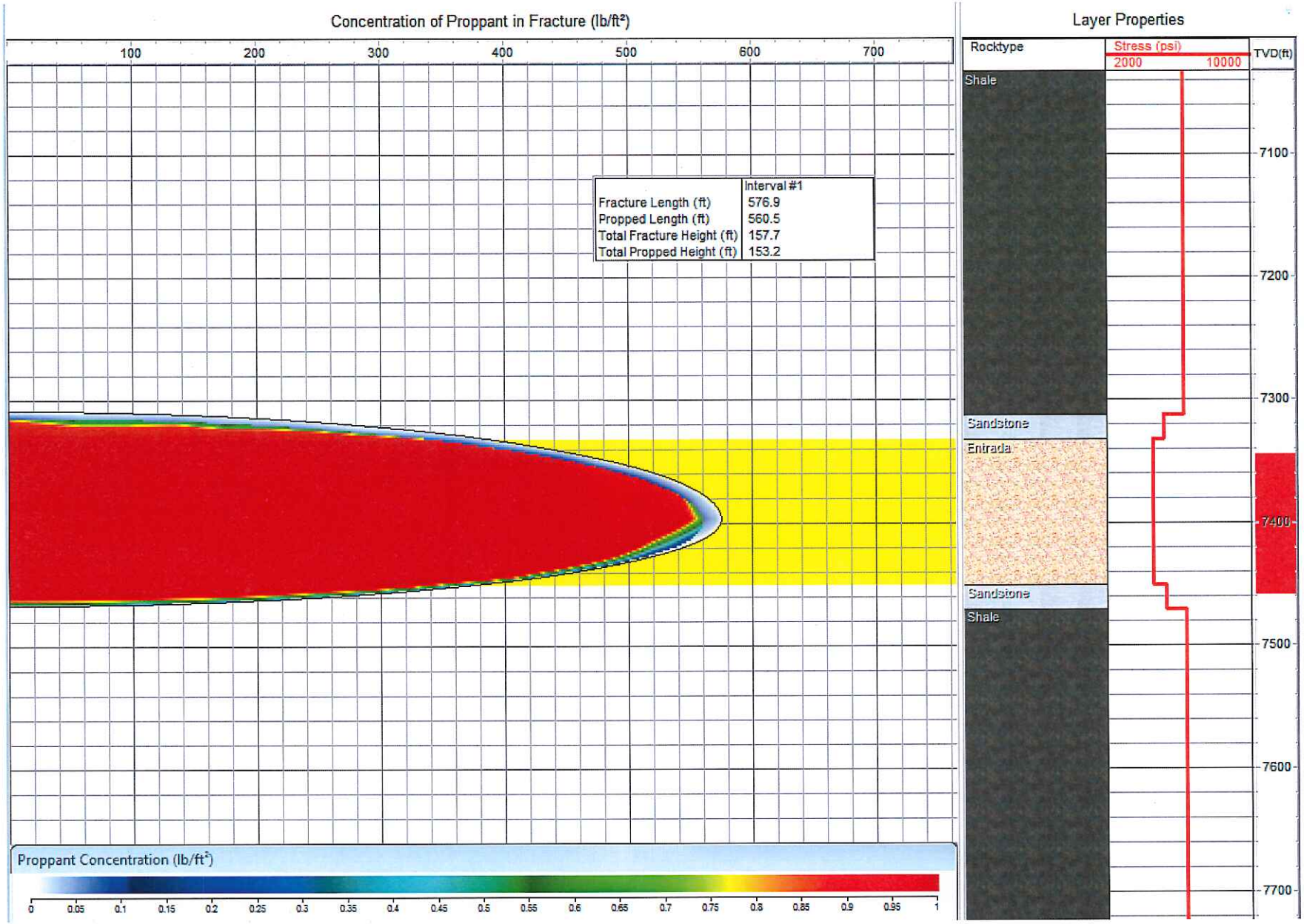


Note: 7" packer f' 7455'-7476', fill f' 7476'-7490'

Geologic Markers	
MD	Formation
Surface	Quaternary Alluv
10'	Nacimiento
516'	Ojo Alamo
625'	Kirtland
1203'	Fruitland
1716'	Pictured Cliffs
1880'	Lewis
2660'	Huerfanito Bentonite
2686'	Chacra
2877'	Lower Lewis
3337'	Cliff House
3389'	Menefee
4045'	Point Lookout
4432'	Mancos Shale
5301'	Niobrara A
5400'	Niobrara B
5526'	Niobrara C
5606'	Gallup
5848'	Juana Lopez
5986'	Carlile
6085'	Greenhorn
6117'	Graneros
6161'	Dakota
6357'	Burro Canyon
6417'	Morrison
7031'	Bluff Sandstone
7150'	Wanakah
7276'	Todilto
7306'	Entrada
7475'	Chinle
7525'	TD

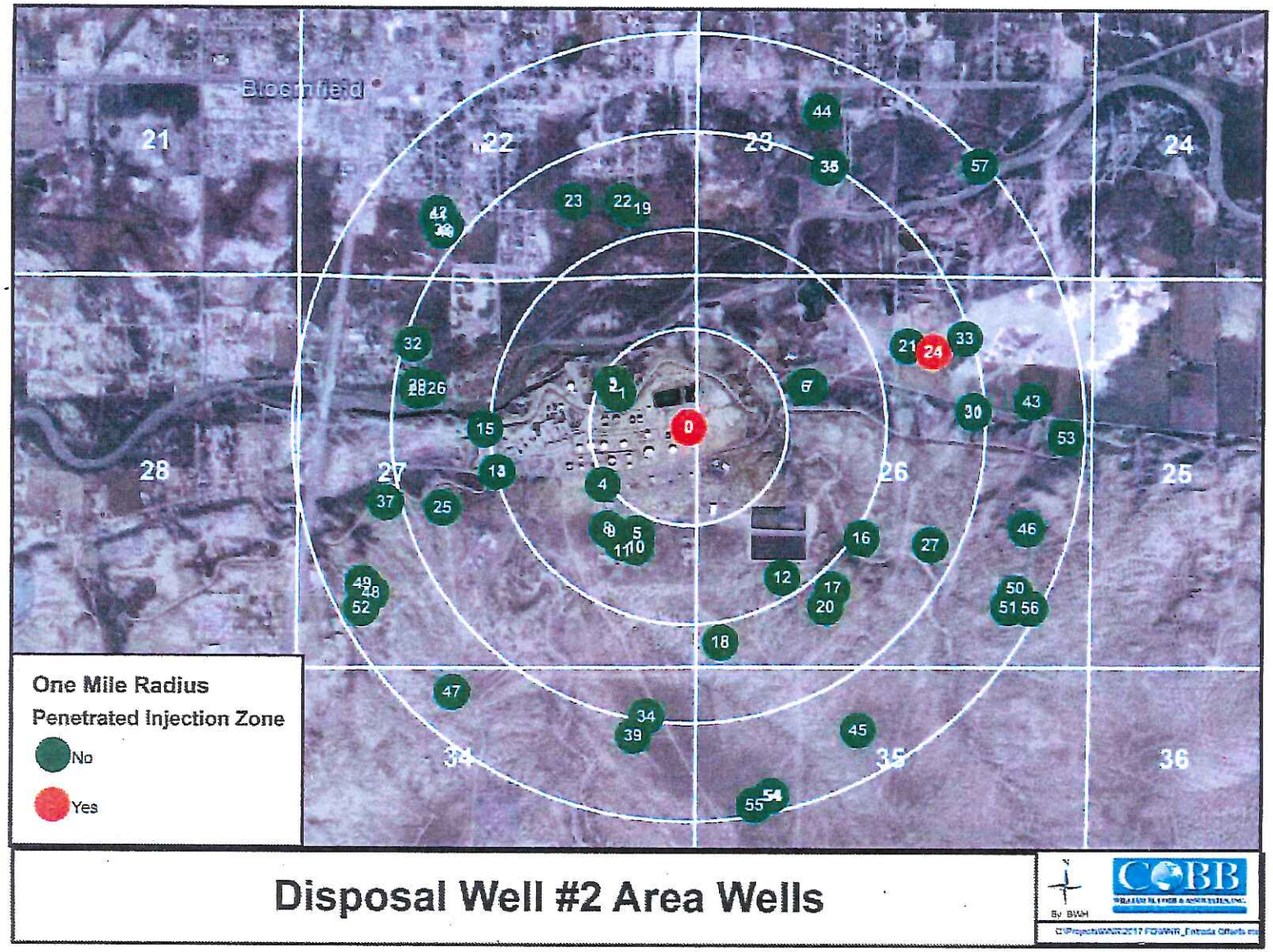
HALLIBURTON
Production Enhancement

Western Refinery SWD #2



ATTACHMENT D

Area of Review



Disposal Well #2 Area Wells

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

ATTACHEMNT E

2017 Fall-Off Test and Down-Hole Pressure Survey Report

Western Refining

March 20, 2018

Mr. Carl Chavez
New Mexico Oil Conservation Division, Environmental Bureau
1220 South St. Frances Drive
Santa Fe, New Mexico 87505

FedEx Tracking #: 7718 0112 0174

RE: Western Refining Southwest, Inc. – Bloomfield Terminal
2017 Fall-Off Test Response to Comments dated February 21, 2018
Permit #: UIC-CL-011

Mr. Chavez,

Western Refining Southwest, Inc. ("Western") received comments from the New Mexico Oil Conservation Division ("NMOCD") on February 21, 2018 via e-mail regarding the 2017 Class 1 Non-Hazardous Injection Well Fall-Off Test conducted at the Bloomfield Terminal. This letter and enclosed updated Fall-Off Test Report address NMOCD's comments and provide the additional clarification requested:

- The updated reservoir analysis better addresses the flow regimes which are:
  - Transient linear flow early in the falloff test,
  - Transient radial flow late in the falloff test,
  - Radial flow was not observed on the test, and
  - Radial flow is not expected with any test of a reasonable time period.
- Analysis of the two transient flow regimes gives a good understanding of the reservoir properties.
- All testing was successful and meets both the OCD and EPA requirements.

If you have any questions or additional requests for information, please feel free to contact me at your convenience at (505) 632-4166.

Sincerely,

Kelly Robinson

Kelly R. Robinson
Environmental Supervisor
Western Refining Southwest, Inc.

cc: B. Powell – NMOCD (Aztec District Office) via e-mail
J. Griswold – NMOCD (Santa Fe Office) via e-mail
B. Davis – Western Refining (Albuquerque)
T. Roberts – Western Refining (Bloomfield)
A. Hains – Western Refining (El Paso)

WILLIAM M. COBB & ASSOCIATES, INC.

Worldwide Petroleum Consultants

12770 Coit Road, Suite 907
Dallas, Texas 75251

(972) 385-0354
Fax: (972) 788-5165
E-Mail: office@wmcobb.com

March 19, 2018

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

Re: Waste Disposal Well #2
October 2017 Falloff Test
OGRID No. 267595
Update to December 12, 2017 report

Dear Mr. Davis:

Western Refining retained William M Cobb & Associates, Inc to perform the annual bottomhole pressure survey and pressure falloff test analysis on Waste Disposal Well #2. A pressure fall-off test (FOT) 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 2017 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 Waste Disposal Well No. 2 also met the New Mexico Oil Conservation Division's (NMOCD's) 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.

FACILITY INFORMATION

Name: Western Refining Southwest, Inc.
Location: 50 County Road 4990 (PO Box 159)
Bloomfield, New Mexico 874 13

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 Waste Disposal Well No. 2 (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 waste water (effluent). A current waste water (effluent) analysis collected on September 13, 2017 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 long, and 3) Triple Combo log.

REPORT OF EVENTS

October 2, 2017 8:00 AM – The pre-test injection flow test begins.

October 3, 2017 9:02 AM – Tefteller, Inc. runs tandem bottomhole pressure gauges in the well to monitor the falloff portion of the test.

October 3, 2017 9:36 AM – pre-flow period begins.

October 5, 2017 11:08 AM – well is flowing at 13.84 GPM with an average rate of 14.1 GPM for the 75 hour period. Well is shut-in for falloff test.

October 13, 2017 8:39 AM - falloff test ends after 189.5 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 8:00 AM on October 2, 2017 and ending at 8:39 AM on October 13, 2017. The average flow rate for the 75 hour period prior to the beginning of the falloff test was 14.1 GPM with a final flowing rate of 13.84 GPM. On the morning of October 3, 2017, 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 189.5 hours ending at 8:39 AM on October 13, 2017. 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	1040.3	N.A.	10/2/2017 8:00 AM
Final flow rate	13.84	1226.8	4396.7	10/5/2017 11:08 AM
Final falloff pressure	0.0	861	4012.6	10/13/2017 8:39 AM

Final surface pressure	0.0	861	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 Waste Disposal Well No. 2 at the depths shown in the table below. The injection zone is shown in Waste Disposal Well No.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	7031
Entrada Sandstone	7312 to 7470	7308

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 the it's margin as step cliffs. The Entrada unconformably overlies the Chinle Formation. The overlying Todilto Formation made up of limestone and anhydrite in dense and thought to an impermeable barrier or seal.

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 60 feet to 330 feet across the basin.

At the Water Disposal Well #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 the majority of the density porosities are more than 10 percent. Water Disposal Well #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 3.29 md or less.

PREVIOUS FALLOFF TESTS

This is a new disposal well. There are no previous falloff tests.

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 J. This includes details of the build-up portion of the October 2017 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.

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 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 of near to 0.50 through 0.17 hours and then drops to a slope of 0.20 at the end of the test. 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.

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:	2,391,224 gallons
Final flowing rate:	13.84 GPM
Equivalent flowing time (hours):	Gallons/(GPM X 60) = 2,391,224/(13.84*60)
Equivalent flowing time (hours):	3,079 hours

The pressure data, Figure 4, are linear beginning at 9.5 on the x axis. Projection of the data to estimated reservoir pressure is shown in Figure 5. This trend extrapolates to 3,406 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 189 hours.

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 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. As the slope increases, calculated permeability decreases. The final trend extrapolated to 3,819 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 of time. 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 FOT.

To better understand flow regimes 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 Gingarten, 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 3.19 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 7A and 7B. Figure 7C is a composite of the trendlines on from Figures 7A and 7B showing how the uniform flux fracture and the infinite conductivity fracture compare.

Figures 7A and 7B or both used to better understand the flow regime. During the early segment of the drawdown 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 7C.

In Figure 7C, the delta PSI curve from Figure 2 is imposed on the type curves 7A and 7B which provides a positive match of the data. The falloff test data match the type curve when the horizontal $t_{dxf} = 1.00$ and $t = 1.2$ hours and when the vertical $P_d = 1.0$ and Delta $P = 100$.

This match shows that the falloff test is in transient linear flow for about 10 minutes after which the flow regime begins a transition to a transient radial flow regime. At the end of the drawdown's 189.5 hours, the flow regime is a transient radial flow regime and no reservoir boundaries have been encountered. The absence of observed boundary effects show 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 2.56 md and a fracture half-length of 51 feet. The distance to the boundary is known to be more than a factor of 20 times the half-length or more than 1020 feet.

Absent the presence of reservoir boundaries, the Horner analysis for radial flow does not provide a reliable reservoir permeability. The linear flow analysis likewise provides only indications of reservoir properties. For this reason, the type curve permeability of 2.56 md is considered a more reliable measurement than the 4.24 md determined with radial and linear flow analysis.

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 189.5 hour pressure falloff test.

LONG-TERM PERFORMANCE

Figure 8 is a history of pressures and injection rates. Wellhead injection pressures have been at 1465psig or less and are typically less than 1400 psig. The maximum injection rate is 77 GPM with rates in near 13 GPM being the most common rate.

Figure 9 shows the stabilized flow period of 75 hours prior to beginning the FOT test. The final flowing rate is 13.84 GPM with a final flowing wellhead pressure of 1226.8 psig. The injection rates for the pre falloff flow test range maximum rate of 23 GPM to a final rate of 13.84 GPM with an average rate of 14.1 GPM.

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
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 = 13.84 GPM
q = 475 BWPD
B = 1.0
m = 69.61 or more (stabilized slope not observed on test)

$\frac{kh}{\mu} = \frac{162.6qB}{m} = (162.6)(14.1)(24)(60/42)(1.0)/69.61$ = 1,108 md-ft/cp or less

kh = (1,108*0.47) = 521 md-ft or less
k = 521/123 = 4.24 md or less

2. Radius to edge of injected fluid:

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

V = total volume injected, gallons
ϕ = porosity of injection zone
h = net pay of injection zone in feet

μ = viscosity in cp
V = 2,556,452 gallons
ϕ = 0.149 (average of perforated interval)
H = 123 feet (perforated interval)
μ = 0.47 cp
$c_t = S_w c_{ws} + c_f = (0.149)(0.00000230)+0.00000410) = 0.00000444$
$r_{waste} = ((0.13368)(2,556,452)/(\pi(0.149)(123))^{(0.5)} = 77$ feet

3. Time to reach edge of injected fluid:

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

$t_{waste} = (948)(0.00000444)(0.47)(75^2)/4.24 = 2.8$ hours or more

4. Skin factor (with radial flow)

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

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} = 4376.7 psig
p_{1hr} = 4370 psig
r_w=0.3281feet
S = 1.151[(4376.7-4370)/69.6 – log(4.24/((0.149)(0.47)(0.00000444)(0.3281)^2)+3.23]
S = -5.17

5. Fracture half length

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

m_L = slope from linear flow chart of pressure vs $\sqrt{t+\Delta t} - \sqrt{\Delta t}$
m_L = 70.628
$X_f k^{0.5} = (4.064)(475)(1.0)/((70.628)(123)(0.47/((0.149)(0.00000444)))^{0.5} = = 187$ ft$\sqrt{md}$
$X_f = 187/4.24^{0.5} = 91$ cumulative feet or more

6. Type Curve Analysis

$t_{dxf} = 0.0002637kt/(\Phi\mu c_t X_f^2)$
$\Delta P = 141.2QB\mu P_d/(KH)$
$KH = 141.2QB\mu P_d/(\Delta P)$
$X_f^2 = 0.0002637kt/(t_{dxf}\,\Phi\mu c_t)$
Type Curve Match Point ON Figure 7C:
ΔP = 100 psi at P_d = 1.0
T = 1.2 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,

$KH = 141.2(475)(1.0)(0.47)*(1.0)/(100) = 314.91$ md-ft
$K = 2.56$ md
$X_f^2 = 0.0002637(2.56)(1.2)/((1.0)(0.149)(0.47)(0.00000444) = 2{,}601$ ft^2
$X_f = 51$ feet

AREA OF REVIEW (AOR) UPDATE

The area of review data is attached as Appendix H which shows all wells known to have been drilled within a one mile radius of Water Disposal Well #2. There are 57 wells in the one mile radius of investigation. One of these fifty-nine 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.

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.

OTHER

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.

William M. Cobb & 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,

WILLIAM M. COBB & ASSOCIATES, INC.

Brent W. Hale

Brent W. Hale
Vice President

BWH: ar
Attachments
P/2017 WNR WDW2 2017 FO Report 121217

Figure 1

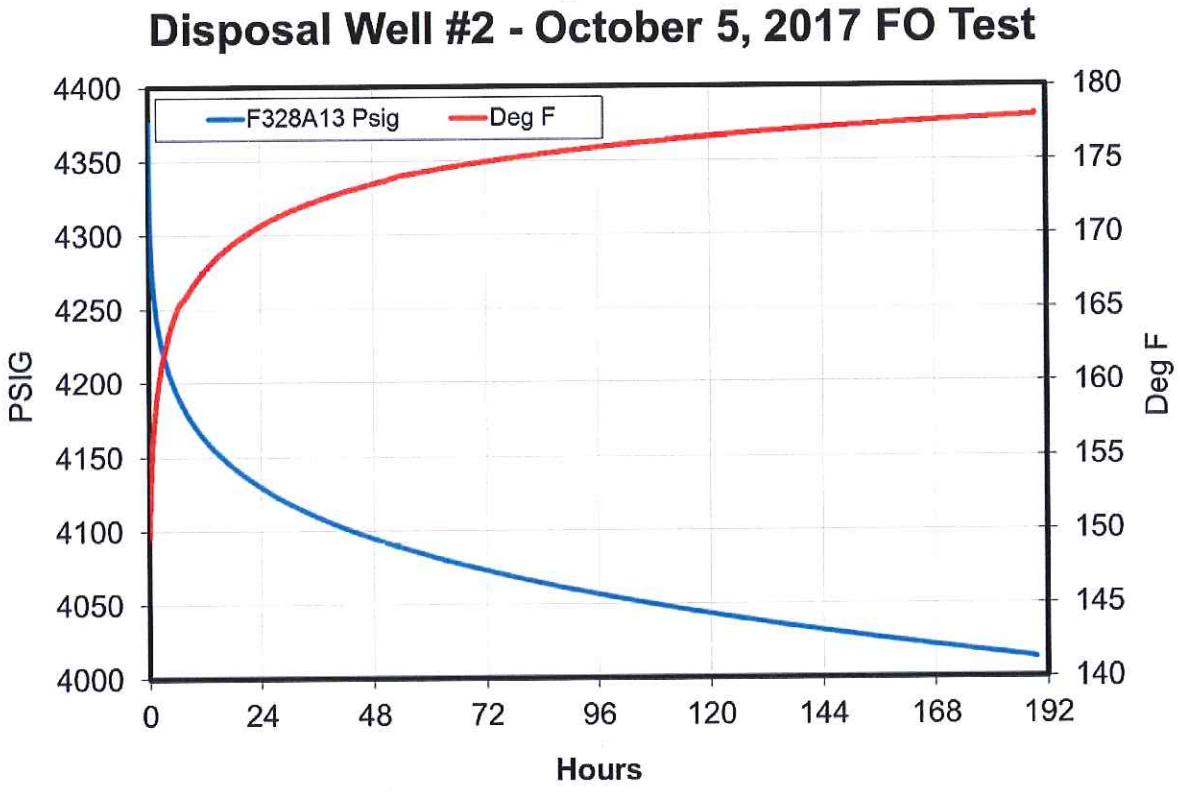


Figure 2

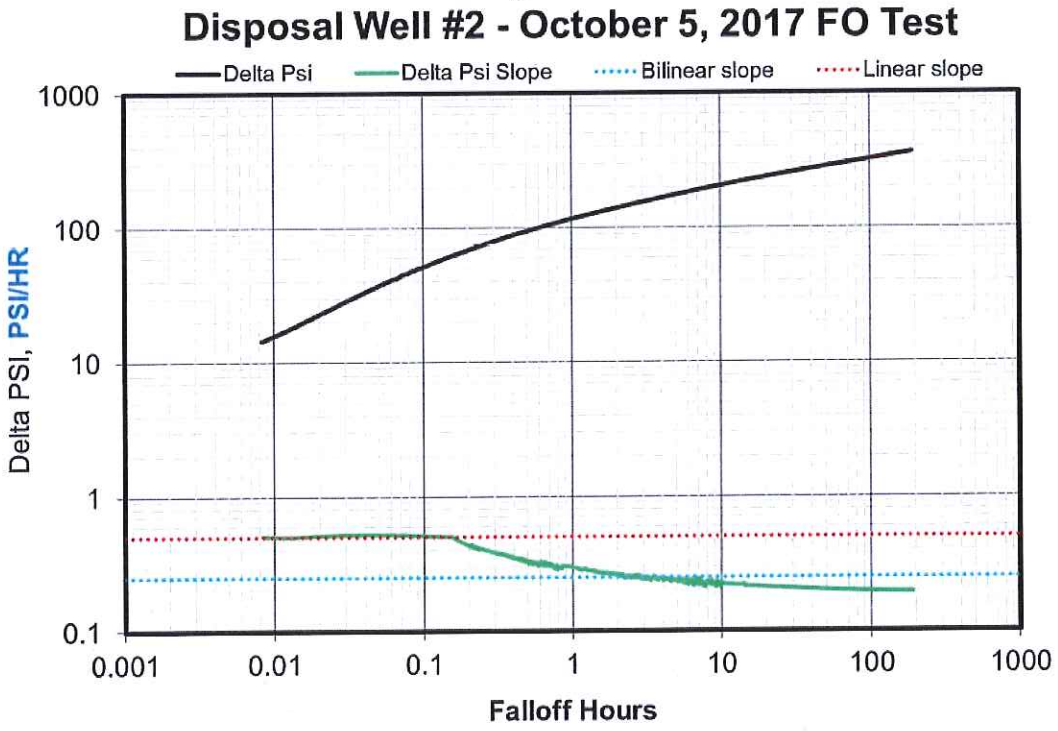


Figure 3

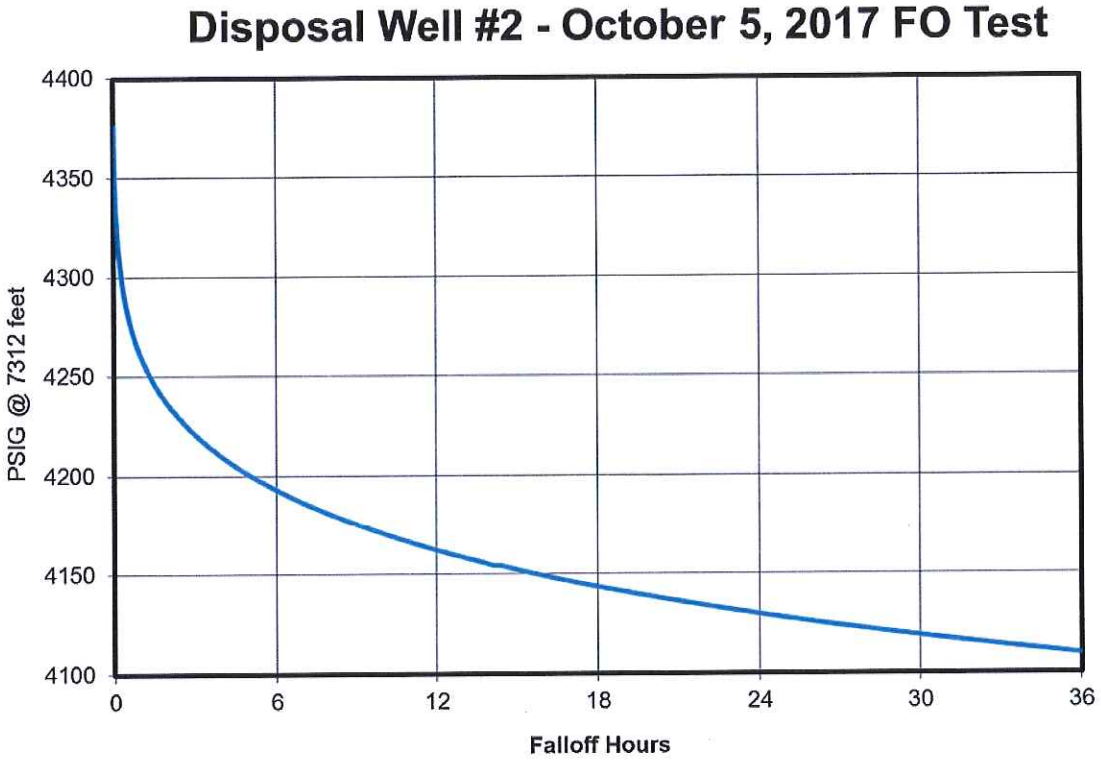


Figure 4

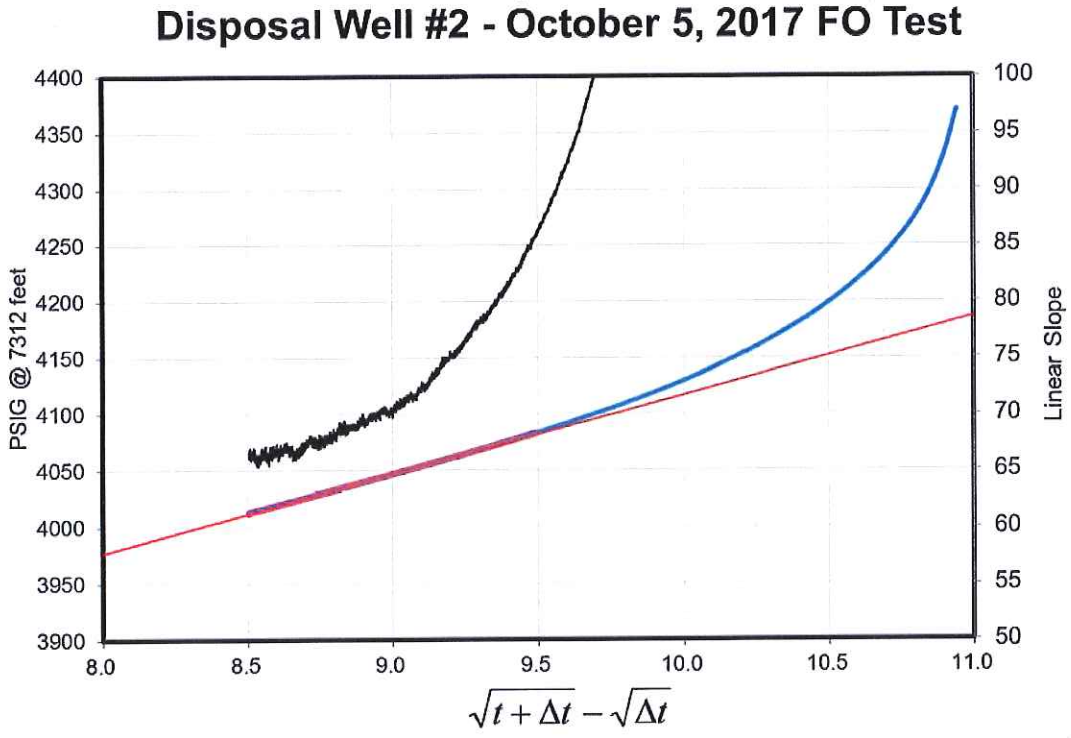


Figure 5

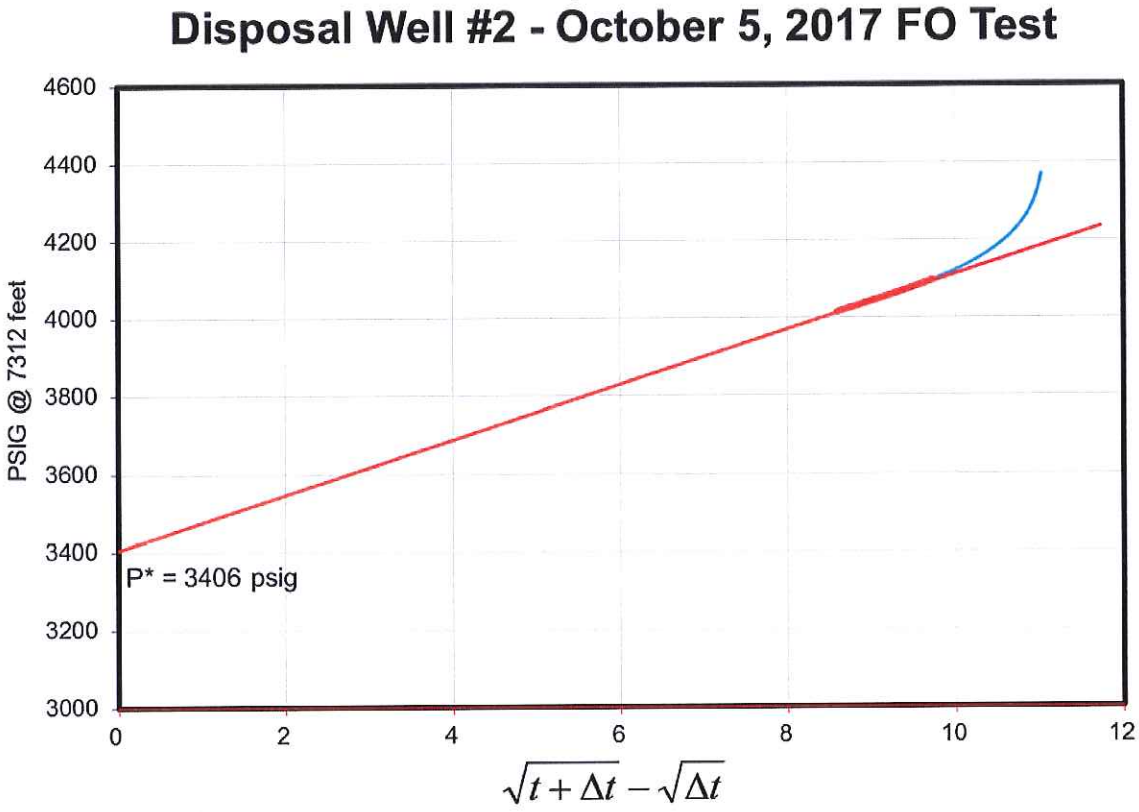


Figure 6

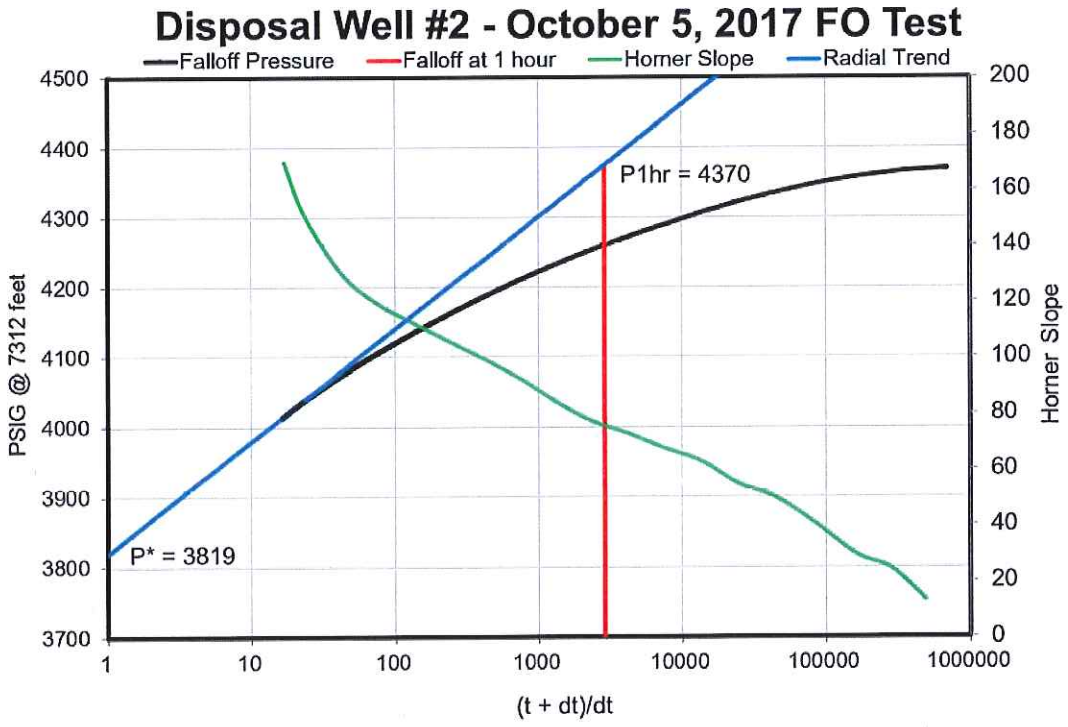


Figure 7

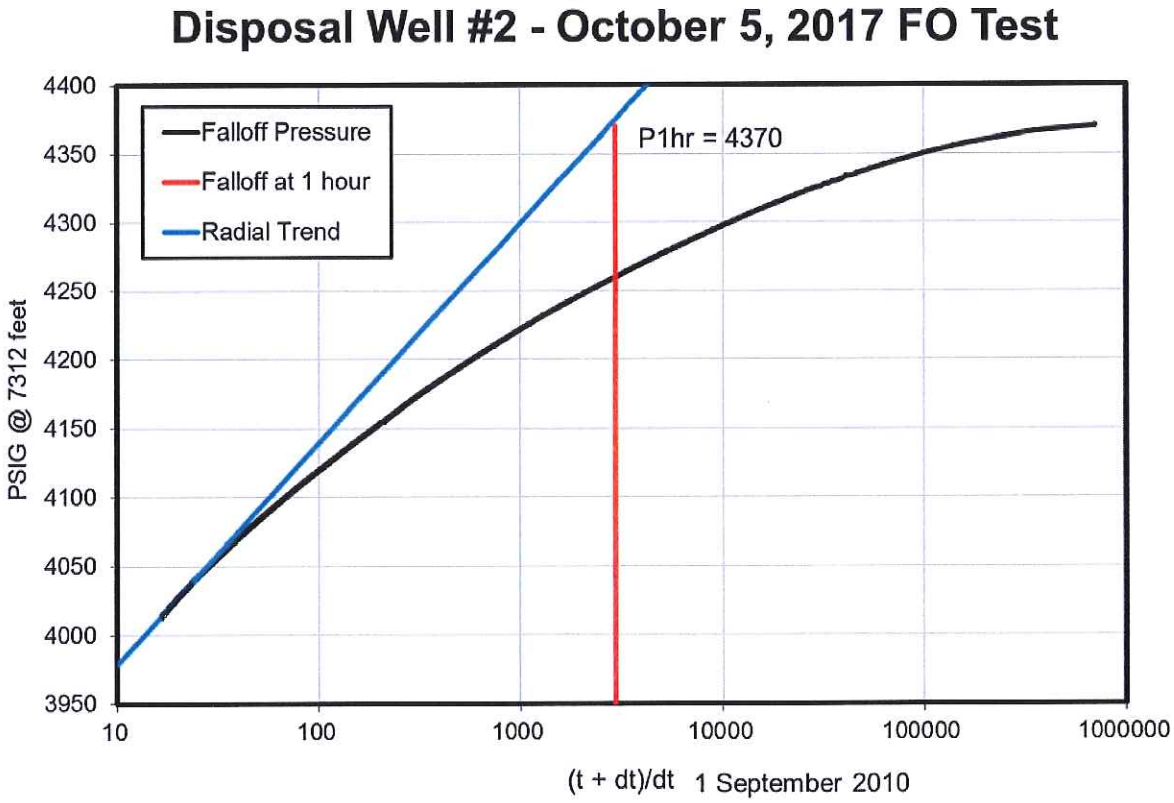


Figure 7A

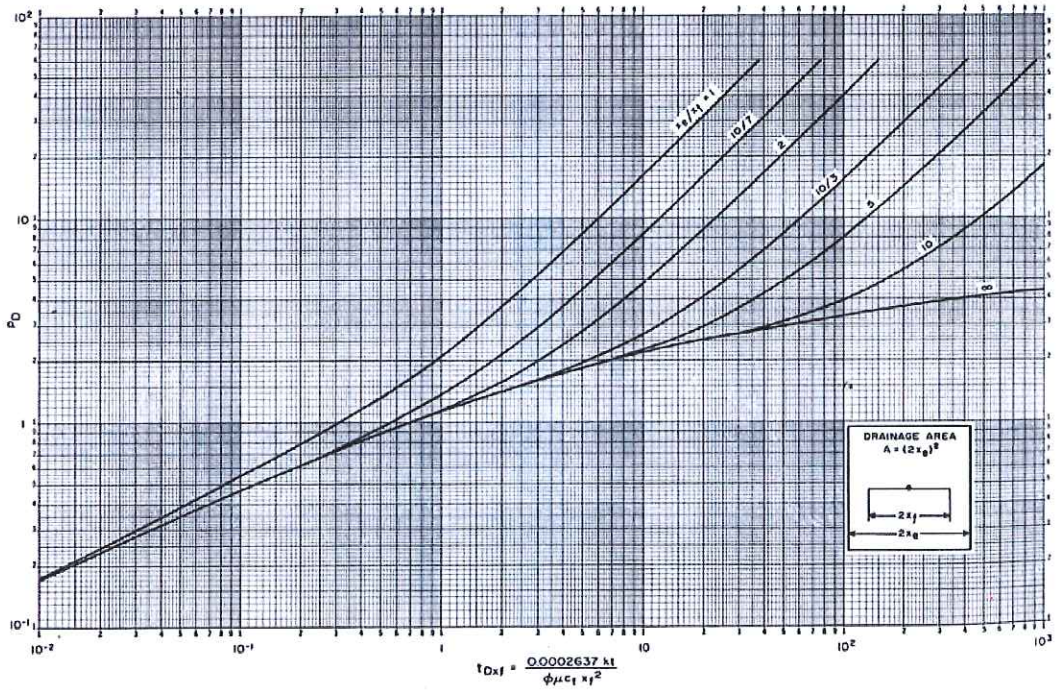


Fig. C.18 Dimensionless pressure for vertically fractured well in the center of a closed square, no wellbore storage, infinite-conductivity

Figure 7B

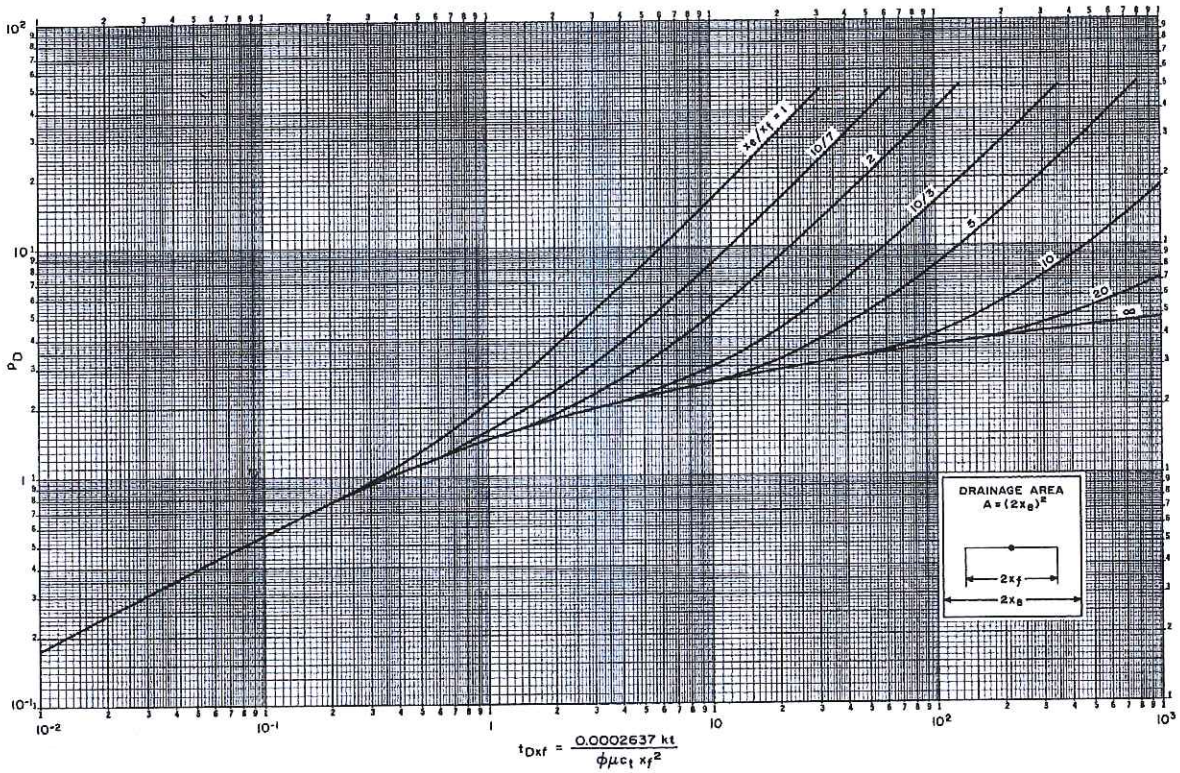


Fig. C.19 Dimensionless pressure for vertically fractured well in the center of a closed square, no wellbore storage, uniform-flux fracture. After Gringarten, Ramey and Raghavan.[6,7]

Figure 7C

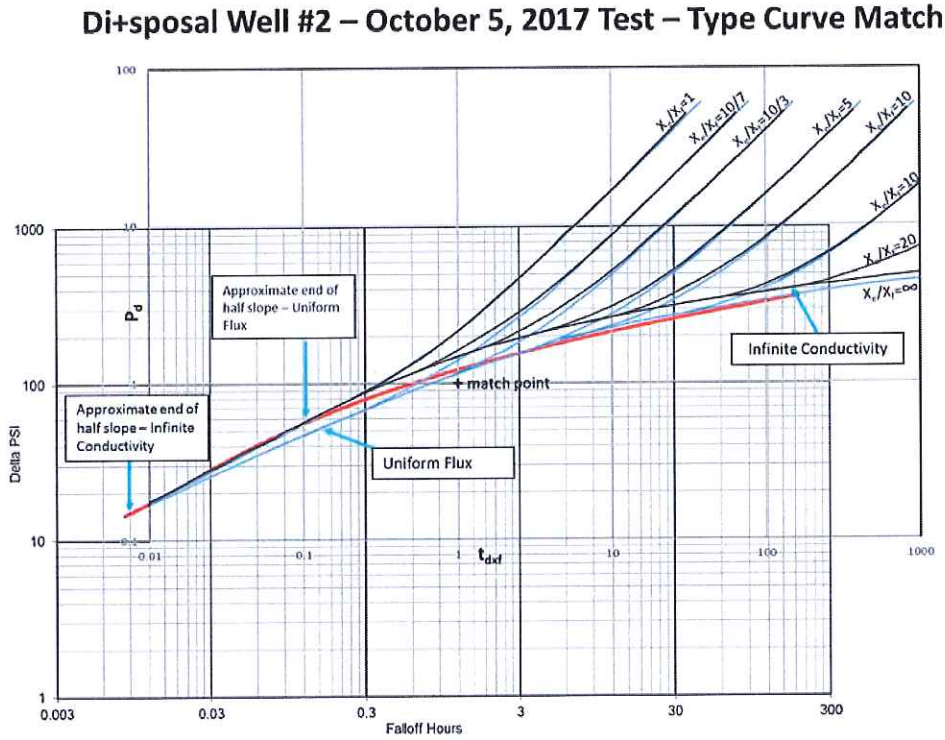


Figure 8

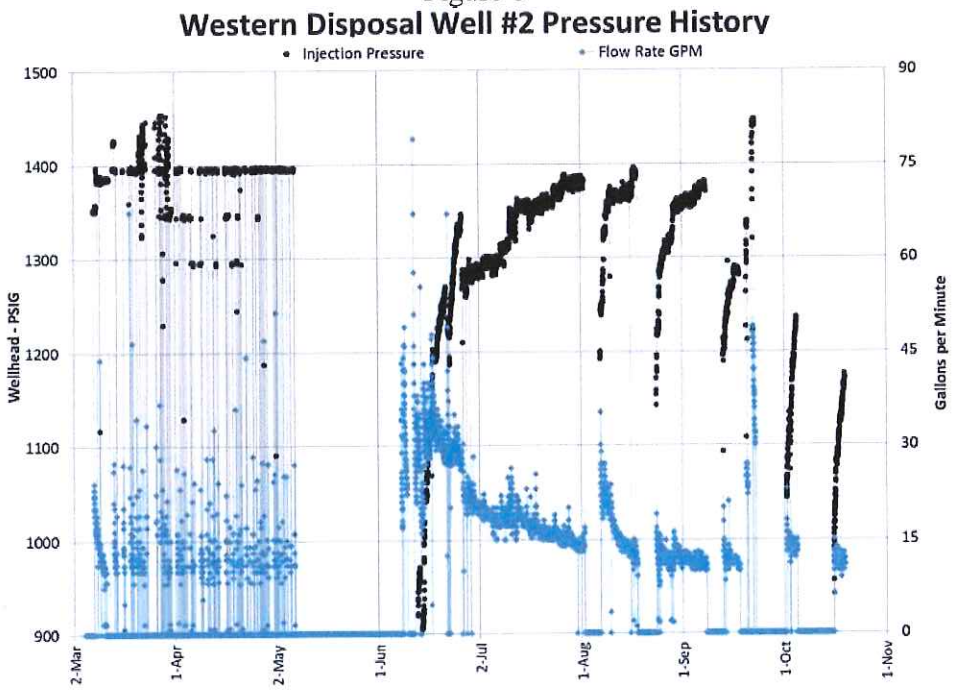


Figure 9

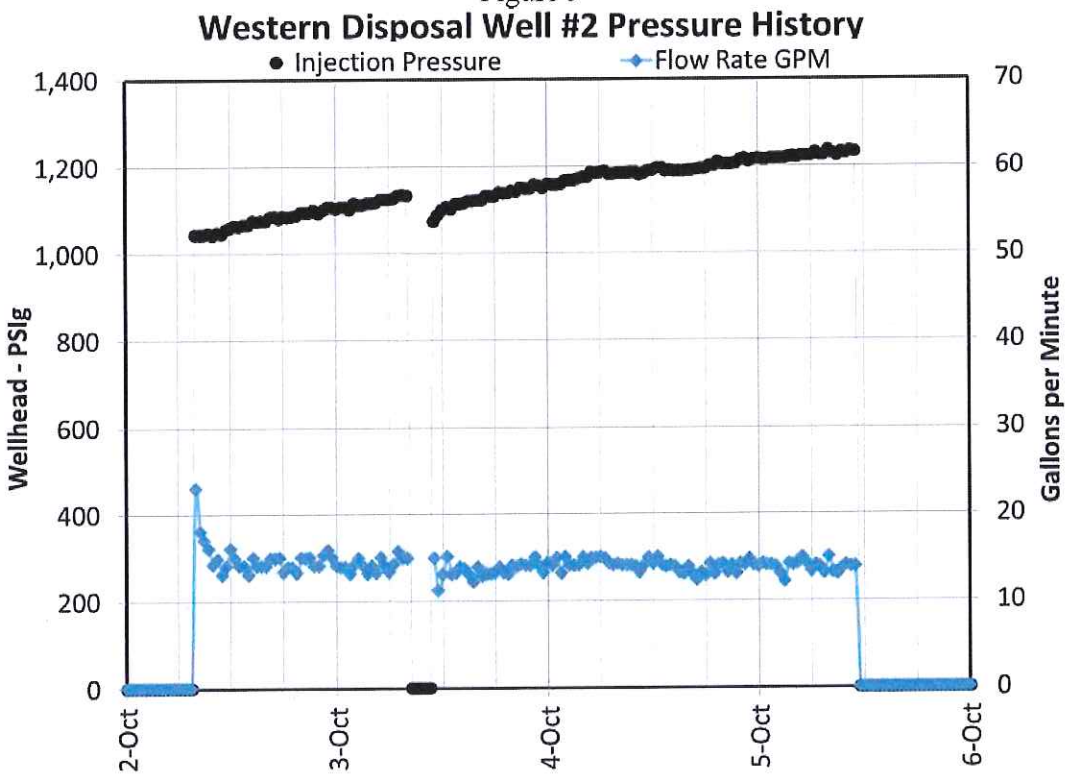
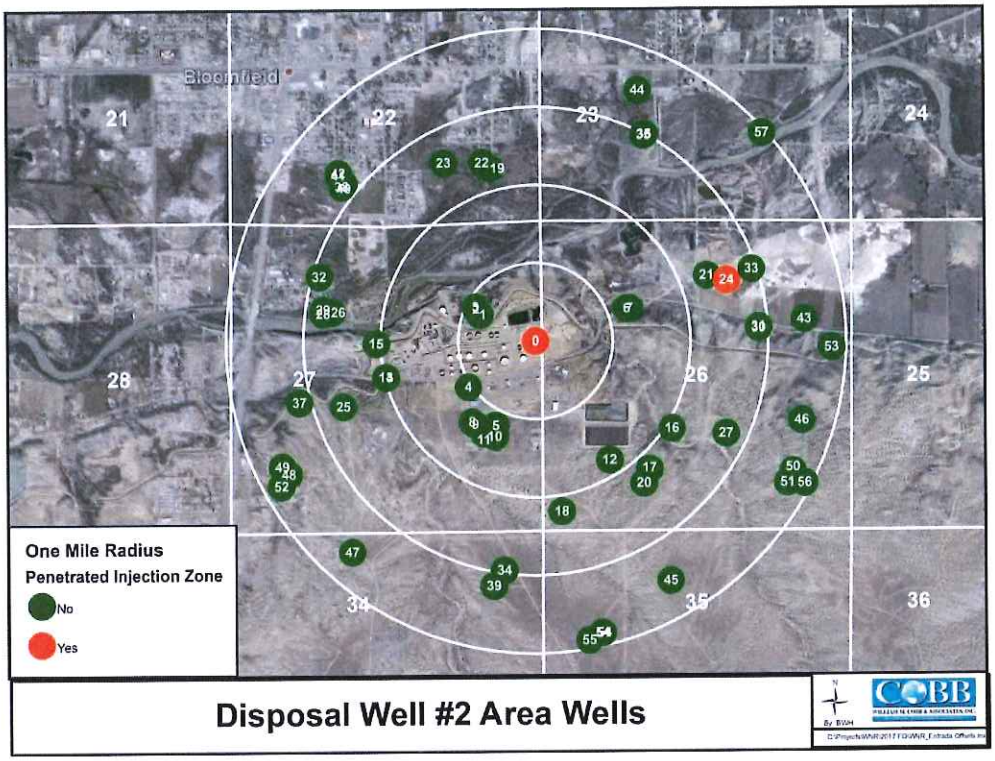


Figure 10


Bloomfield
21
22
23
24
26
27
28
25
34
35
36
One Mile Radius
Penetrated Injection Zone
No
Yes
Disposal Well #2 Area Wells
CBB

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: October 5, 2017 Falloff test data

Appendix F: Test gauge calibration certificates

Appendix G: Mechanical Integrity Test Report (MIT)

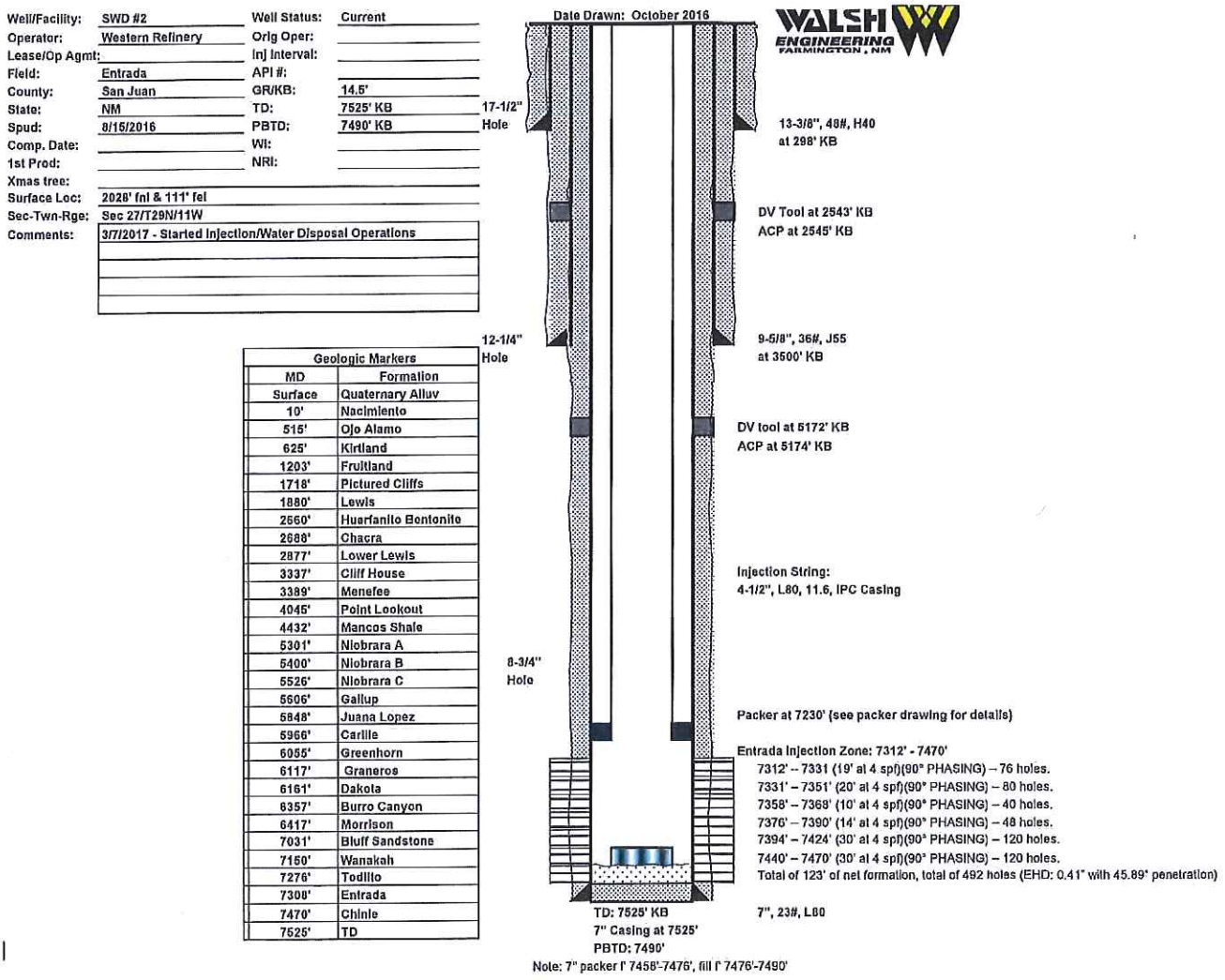
Appendix H: Table of wells in a one mile radius

Appendix I: Injection History

Appendix A

Well bore schematic for Disposal Well #1

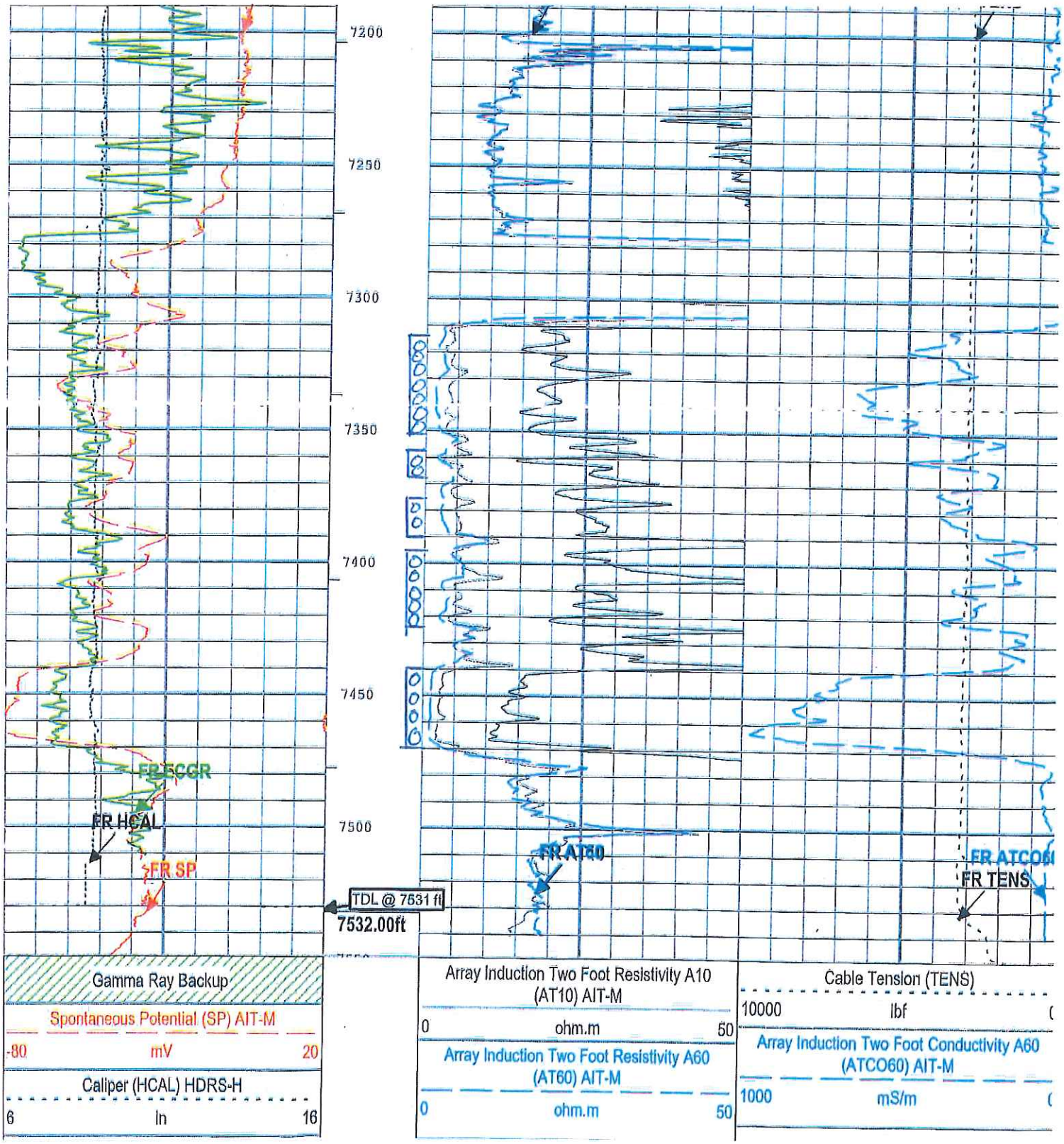
Table 2: A wellbore diagram showing the current configuration of the wellbore.



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:	3/7/2017 - Started Injection/Water Disposal Operations		

Geologic Markers	
MD	Formation
Surface	Quaternary Alluv
10'	Nacimiento
515'	Ojo Alamo
625'	Kirtland
1203'	Fruitland
1718'	Pictured Cliffs
1880'	Lewis
2560'	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
5606'	Gallup
5848'	Juana Lopez
5966'	Carlile
6055'	Greenhorn
6117'	Graneros
6161'	Dakota
6357'	Burro Canyon
6417'	Morrison
7031'	Bluff Sandstone
7150'	Wanakah
7276'	Todilto
7300'	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

October 18, 2017

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

RE: BPT Injection Well 9 13 17

OrderNo.: 1709746

Dear Kelly Robinson:

Hall Environmental Analysis Laboratory received 1 sample(s) on 9/14/2017 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 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 #NM0190

Sincerely,

Andy Freeman
Laboratory Manager
4901 Hawkins NE
Albuquerque, NM 87109

Analytical Report
Lab Order **1709746**
Date Reported: **10/18/2017**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17
Lab ID: 1709746-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 9/13/2017 11:20:00 AM
Received Date: 9/14/2017 7:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 8081: PESTICIDES TCLP							Analyst: **MAB**
Chlordane	ND	0.030		mg/L	1	9/27/2017 1:41:44 PM	33957
Endrin	ND	0.020		mg/L	1	9/27/2017 1:41:44 PM	33957
gamma-BHC (Lindane)	ND	0.40		mg/L	1	9/27/2017 1:41:44 PM	33957
Heptachlor	ND	0.0080		mg/L	1	9/27/2017 1:41:44 PM	33957
Heptachlor epoxide	ND	0.0080		mg/L	1	9/27/2017 1:41:44 PM	33957
Methoxychlor	ND	10		mg/L	1	9/27/2017 1:41:44 PM	33957
Toxaphene	ND	0.50		mg/L	1	9/27/2017 1:41:44 PM	33957
Surr: Decachlorobiphenyl	85.8	57.8-124		%Rec	1	9/27/2017 1:41:44 PM	33957
Surr: Tetrachloro-m-xylene	81.5	43-114		%Rec	1	9/27/2017 1:41:44 PM	33957
EPA METHOD 8270C TCLP							Analyst: **DAM**
2-Methylphenol	ND	200		mg/L	1	9/27/2017 4:13:14 PM	33908
3+4-Methylphenol	ND	200		mg/L	1	9/27/2017 4:13:14 PM	33908
Phenol	ND	200		mg/L	1	9/27/2017 4:13:14 PM	33908
2,4-Dinitrotoluene	ND	0.13		mg/L	1	9/27/2017 4:13:14 PM	33908
Hexachlorobenzene	ND	0.13		mg/L	1	9/27/2017 4:13:14 PM	33908
Hexachlorobutadiene	ND	0.50		mg/L	1	9/27/2017 4:13:14 PM	33908
Hexachloroethane	ND	3.0		mg/L	1	9/27/2017 4:13:14 PM	33908
Nitrobenzene	ND	2.0		mg/L	1	9/27/2017 4:13:14 PM	33908
Pentachlorophenol	ND	100		mg/L	1	9/27/2017 4:13:14 PM	33908
Pyridine	ND	5.0		mg/L	1	9/27/2017 4:13:14 PM	33908
2,4,5-Trichlorophenol	ND	400		mg/L	1	9/27/2017 4:13:14 PM	33908
2,4,6-Trichlorophenol	ND	2.0		mg/L	1	9/27/2017 4:13:14 PM	33908
Cresols, Total	ND	200		mg/L	1	9/27/2017 4:13:14 PM	33908
Surr: 2-Fluorophenol	44.6	15-124		%Rec	1	9/27/2017 4:13:14 PM	33908
Surr: Phenol-d5	38.8	15-118		%Rec	1	9/27/2017 4:13:14 PM	33908
Surr: 2,4,6-Tribromophenol	65.9	15-148		%Rec	1	9/27/2017 4:13:14 PM	33908
Surr: Nitrobenzene-d5	82.7	40.6-124		%Rec	1	9/27/2017 4:13:14 PM	33908
Surr: 2-Fluorobiphenyl	61.8	35.7-128		%Rec	1	9/27/2017 4:13:14 PM	33908
Surr: 4-Terphenyl-d14	57.0	18.8-115		%Rec	1	9/27/2017 4:13:14 PM	33908
SPECIFIC GRAVITY							Analyst: **JRR**
Specific Gravity	1.002	0			1	9/15/2017 2:17:00 PM	R45658
EPA METHOD 300.0: ANIONS							Analyst: **MRA**
Fluoride	5.9	0.50	*	mg/L	5	9/14/2017 3:12:54 PM	R45644
Chloride	600	25	*	mg/L	50	9/27/2017 4:01:08 PM	R45948
Nitrogen, Nitrite (As N)	ND	0.50		mg/L	5	9/14/2017 3:12:54 PM	R45644
Bromide	2.3	0.50		mg/L	5	9/14/2017 3:12:54 PM	R45644
Nitrogen, Nitrate (As N)	ND	0.50		mg/L	5	9/14/2017 3:12:54 PM	R45644
Phosphorus, Orthophosphate (As P)	ND	2.5		mg/L	5	9/14/2017 3:12:54 PM	R45644

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
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

Analytical Report
Lab Order **1709746**
Date Reported: **10/18/2017**

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17
Lab ID: 1709746-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 9/13/2017 11:20:00 AM
Received Date: 9/14/2017 7:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
EPA METHOD 300.0: ANIONS						Analyst: **MRA**	
Sulfate	80	2.5		mg/L	5	9/14/2017 3:12:54 PM	R45644
SM2510B: SPECIFIC CONDUCTANCE						Analyst: **JRR**	
Conductivity	3100	5.0		µmhos/cm	1	9/19/2017 2:03:47 PM	R45747
SM2320B: ALKALINITY						Analyst: **JRR**	
Bicarbonate (As CaCO3)	499.0	20.00		mg/L CaCO3	1	9/19/2017 2:03:47 PM	R45747
Carbonate (As CaCO3)	ND	2.000		mg/L CaCO3	1	9/19/2017 2:03:47 PM	R45747
Total Alkalinity (as CaCO3)	499.0	20.00		mg/L CaCO3	1	9/19/2017 2:03:47 PM	R45747
SM2540C MOD: TOTAL DISSOLVED SOLIDS						Analyst: **KS**	
Total Dissolved Solids	1920	100	*D	mg/L	1	9/22/2017 10:23:00 AM	33959
SM4500-H+B: PH						Analyst: **JRR**	
pH	7.34		H	pH units	1	9/19/2017 2:03:47 PM	R45747
EPA METHOD 7470: MERCURY						Analyst: **MED**	
Mercury	ND	0.00020		mg/L	1	9/27/2017 9:25:56 AM	34071
EPA METHOD 6010B: DISSOLVED METALS						Analyst: **TES**	
Calcium	53	5.0		mg/L	5	9/19/2017 1:02:14 PM	A45714
Magnesium	43	5.0		mg/L	5	9/19/2017 1:02:14 PM	A45714
Potassium	14	5.0		mg/L	5	9/19/2017 1:02:14 PM	A45714
Sodium	530	10		mg/L	10	9/28/2017 1:04:41 PM	A45960
EPA 6010B: TOTAL RECOVERABLE METALS						Analyst: **TES**	
Arsenic	0.035	0.020		mg/L	1	9/19/2017 11:57:19 AM	33882
Barium	0.17	0.020		mg/L	1	9/19/2017 11:57:19 AM	33882
Cadmium	ND	0.0020		mg/L	1	9/19/2017 11:57:19 AM	33882
Chromium	ND	0.0060		mg/L	1	9/19/2017 11:57:19 AM	33882
Lead	ND	0.0050		mg/L	1	9/19/2017 11:57:19 AM	33882
Selenium	ND	0.050		mg/L	1	9/19/2017 11:57:19 AM	33882
Silver	ND	0.0050		mg/L	1	9/19/2017 11:57:19 AM	33882
TCLP VOLATILES BY 8260B						Analyst: **RAA**	
Benzene	ND	0.50		mg/L	200	9/15/2017 1:25:00 AM	T45638
1,2-Dichloroethane (EDC)	ND	0.50		mg/L	200	9/15/2017 1:25:00 AM	T45638
2-Butanone	ND	200		mg/L	200	9/15/2017 1:25:00 AM	T45638
Carbon Tetrachloride	ND	0.50		mg/L	200	9/15/2017 1:25:00 AM	T45638
Chloroform	ND	6.0		mg/L	200	9/15/2017 1:25:00 AM	T45638
1,4-Dichlorobenzene	ND	7.5		mg/L	200	9/15/2017 1:25:00 AM	T45638
1,1-Dichloroethene	ND	0.70		mg/L	200	9/15/2017 1:25:00 AM	T45638
Hexachlorobutadiene	ND	0.50		mg/L	200	9/15/2017 1:25:00 AM	T45638

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
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

Hall Environmental Analysis Laboratory, Inc.

CLIENT: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17
Lab ID: 1709746-001 **Matrix:** AQUEOUS

Client Sample ID: Injection Well
Collection Date: 9/13/2017 11:20:00 AM
Received Date: 9/14/2017 7:05:00 AM

Analyses	Result	PQL	Qual	Units	DF	Date Analyzed	Batch
TCLP VOLATILES BY 8260B						Analyst: **RAA**	
Tetrachloroethene (PCE)	ND	0.70		mg/L	200	9/15/2017 1:25:00 AM	T45638
Trichloroethene (TCE)	ND	0.50		mg/L	200	9/15/2017 1:25:00 AM	T45638
Vinyl chloride	ND	0.20		mg/L	200	9/15/2017 1:25:00 AM	T45638
Chlorobenzene	ND	100		mg/L	200	9/15/2017 1:25:00 AM	T45638
Surr: 1,2-Dichloroethane-d4	97.4	70-130		%Rec	200	9/15/2017 1:25:00 AM	T45638
Surr: 4-Bromofluorobenzene	95.6	70-130		%Rec	200	9/15/2017 1:25:00 AM	T45638
Surr: Dibromofluoromethane	100	70-130		%Rec	200	9/15/2017 1:25:00 AM	T45638
Surr: Toluene-d8	91.2	70-130		%Rec	200	9/15/2017 1:25:00 AM	T45638

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
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

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	09/21/2017 18:03	WG1023142

Wet Chemistry by Method 9034-9030B

Analyte	Result	Qualifier	RDL	Dilution	Analysis	Batch
	mg/l		mg/l		date / time	
Reactive Sulfide	0.125		0.0500	1	09/18/2017 17:47	WG1021084

Wet Chemistry by Method 9040C

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	su			date / time	
Corrosivity by pH	7.09	T8	1	09/18/2017 10:32	WG1021485

Sample Narrative:
L936656-01 WG1021485: 7.09 at 15.2c

Wet Chemistry by Method D93/1010A

Analyte	Result	Qualifier	Dilution	Analysis	Batch
	deg F			date / time	
Flashpoint	DNF at 170		1	09/22/2017 15:11	WG1023539

Method Blank (MB)

(MB) R3251293-1 09/21/17 17:54

	MB Result	MB Qualifier	MB MDL	MB RDL
Analyte	mg/l		mg/l	mg/l
Reactive Cyanide	U		0.0018	0.00500

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3251293-2 09/21/17 17:55 • (LCSD) R3251293-3 09/21/17 17:56

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mg/l	mg/l	mg/l	%	%	%			%	%
Reactive Cyanide	0.100	0.104	0.104	104	104	85-115			0	20

L936656-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L936656-01 09/21/17 18:03 • (MS) R3251293-4 09/21/17 18:06 • (MSD) R3251293-5 09/21/17 18:07

	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	0.0901	0.0861	86	82	1	75-125			5	20

Tc
Ss
Cn
Sr
Qc
Gl
Al
Sc

Method Blank (MB)

(MB) R3250199-1 09/18/17 17:42

Analyte	MB Result	MB Qualifier	MB MDL	MB RDL
	mg/l		mg/l	mg/l
Reactive Sulfide	U		0.0065	0.0500

L934254-02 Original Sample (OS) • Duplicate (DUP)

(OS) L934254-02 09/18/17 17:43 • (DUP) R3250199-4 09/18/17 17:44

Analyte	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
	mg/l	mg/l		%		%
Reactive Sulfide	1.06	1.06	2	0		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3250199-2 09/18/17 17:43 • (LCSD) R3250199-3 09/18/17 17:43

Analyte	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
	mg/l	mg/l	mg/l	%	%	%			%	%
Reactive Sulfide	0.500	0.503	0.511	101	102	85-115			2	20

L936656-01 Original Sample (OS) • Duplicate (DUP)

(OS) L936656-01 09/18/17 10:32 • (DUP) WG1021485-3 09/18/17 10:32

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	su	su		%		%
Corrosivity by pH	7.09	7.09	1	0.000	T8	1

Sample Narrative:
OS: 7.09 at 15.2c
DUP: 7.09 at 15.2c

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) WG1021485-1 09/18/17 10:32 • (LCSD) WG1021485-2 09/18/17 10:32

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	su	su	su	%	%	%			%	%
Corrosivity by pH	10.0	9.95	9.96	99.5	99.6	98.4-102			0.100	1

Sample Narrative:
LCS: 9.95 at 20.1c
LCSD: 9.96 at 20.0c

L936656-01 Original Sample (OS) • Duplicate (DUP)

(OS) L936656-01 09/22/17 15:11 • (DUP) WG1023539-1 09/22/17 15:11

	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

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R3251560-1 09/22/17 15:11 • (LCSD) R3251560-2 09/22/17 15:11

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	deg F	deg F	deg F	%	%	%			%	%
Flashpoint	82.0	80.3	80.6	98.0	98.0	96.0-104			0.000	10

Wet Chemistry by Method 2580

Analyte	Result	Qualifier	Dilution	Analysis date / time	Batch
ORP	71.0		1	09/21/2017 16:57	WG1023075

L937490-01 Original Sample (OS) • Duplicate (DUP)

(OS) L937490-01 09/21/17 16:57 • (DUP) WG1023075-3 09/21/17 16:57

	Original Result	DUP Result	Dilution	DUP RPD	DUP Qualifier	DUP RPD Limits
Analyte	mV	mV		%		%
ORP	71.0	70.0	1	1.42		20

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) WG1023075-1 09/21/17 16:57 • (LCSD) WG1023075-2 09/21/17 16:57

	Spike Amount	LCS Result	LCSD Result	LCS Rec.	LCSD Rec.	Rec. Limits	LCS Qualifier	LCSD Qualifier	RPD	RPD Limits
Analyte	mV	mV	mV	%	%	%			%	%
ORP	228	228	229	100	100	90.0-110			0.438	20

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, 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.
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. This 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
T8	Sample(s) received past/too close to holding time expiration.

QC SUMMARY REPORT

WO#: **1709746**

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **MB** SampType: **mblk** TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW** Batch ID: **R45644** RunNo: **45644**
Prep Date: Analysis Date: **9/14/2017** SeqNo: **1448506** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	ND	0.100								
Nitrogen, Nitrite (As N)	ND	0.100								
Bromide	ND	0.100								
Nitrogen, Nitrate (As N)	ND	0.100								
Phosphorus, Orthophosphate (As P	ND	0.500								
Sulfate	ND	0.500								

Sample ID **LCS** SampType: **lcs** TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW** Batch ID: **R45644** RunNo: **45644**
Prep Date: Analysis Date: **9/14/2017** SeqNo: **1448507** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Fluoride	0.541	0.100	0.5000	0	108	90	110			
Nitrogen, Nitrite (As N)	0.953	0.100	1.000	0	95.3	90	110			
Bromide	2.45	0.100	2.500	0	97.9	90	110			
Nitrogen, Nitrate (As N)	2.53	0.100	2.500	0	101	90	110			
Phosphorus, Orthophosphate (As P	4.76	0.500	5.000	0	95.1	90	110			
Sulfate	9.84	0.500	10.00	0	98.4	90	110			

Sample ID **MB** SampType: **mblk** TestCode: **EPA Method 300.0: Anions**
Client ID: **PBW** Batch ID: **R45948** RunNo: **45948**
Prep Date: Analysis Date: **9/27/2017** SeqNo: **1460425** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	ND	0.50								

Sample ID **LCS** SampType: **lcs** TestCode: **EPA Method 300.0: Anions**
Client ID: **LCSW** Batch ID: **R45948** RunNo: **45948**
Prep Date: Analysis Date: **9/27/2017** SeqNo: **1460426** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Chloride	4.7	0.50	5.000	0	93.5	90	110			

Qualifiers:

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

QC SUMMARY REPORT

WO#: **1709746**

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **100ng lcs**	SampType: **LCS**	TestCode: **TCLP Volatiles by 8260B**
Client ID: **LCSW**	Batch ID: **T45638**	RunNo: **45638**
Prep Date:	Analysis Date: **9/14/2017**	SeqNo: **1448337** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Benzene	0.021	0.010	0.02000	0	105	70	130			
1,1-Dichloroethene	0.022	0.010	0.02000	0	110	70	130			
Trichloroethene (TCE)	0.020	0.010	0.02000	0	102	70	130			
Chlorobenzene	0.020	0.010	0.02000	0	99.1	70	130			
Surr: 1,2-Dichloroethane-d4	0.0094		0.01000		94.3	70	130			
Surr: 4-Bromofluorobenzene	0.0097		0.01000		96.6	70	130			
Surr: Dibromofluoromethane	0.0097		0.01000		97.0	70	130			
Surr: Toluene-d8	0.0092		0.01000		91.6	70	130			

Sample ID **rb**	SampType: **MBLK**	TestCode: **TCLP Volatiles by 8260B**
Client ID: **PBW**	Batch ID: **T45638**	RunNo: **45638**
Prep Date:	Analysis Date: **9/14/2017**	SeqNo: **1448338** 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								
Hexachlorobutadiene	ND	0.50								
Tetrachloroethene (PCE)	ND	0.70								
Trichloroethene (TCE)	ND	0.50								
Vinyl chloride	ND	0.20								
Chlorobenzene	ND	100								
Surr: 1,2-Dichloroethane-d4	0.0096		0.01000		95.9	70	130			
Surr: 4-Bromofluorobenzene	0.0096		0.01000		96.2	70	130			
Surr: Dibromofluoromethane	0.0096		0.01000		96.0	70	130			
Surr: Toluene-d8	0.0091		0.01000		91.4	70	130			

Qualifiers:

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

QC SUMMARY REPORT

WO#: 1709746

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **1709746-001cms** SampType: **MS** TestCode: **EPA Method 8270C TCLP**
Client ID: **Injection Well** Batch ID: **33908** RunNo: **45933**
Prep Date: **9/18/2017** Analysis Date: **9/27/2017** SeqNo: **1460039** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2-Methylphenol	0.069	0.0010	0.1000	0	69.0	23.9	129			
3+4-Methylphenol	0.13	0.0010	0.2000	0	64.6	15	167			
2,4-Dinitrotoluene	0.063	0.0010	0.1000	0	63.3	15	147			
Hexachlorobenzene	0.073	0.0010	0.1000	0	72.5	41.4	136			
Hexachlorobutadiene	0.069	0.0010	0.1000	0	68.5	16.2	134			
Hexachloroethane	0.056	0.0010	0.1000	0	56.5	20.6	124			
Nitrobenzene	0.081	0.0010	0.1000	0	80.8	39.5	134			
Pentachlorophenol	0.028	0.0010	0.1000	0	28.3	15	137			
Pyridine	0.011	0.0010	0.1000	0	11.0	15	129			S
2,4,5-Trichlorophenol	0.080	0.0010	0.1000	0	79.8	15	158			
2,4,6-Trichlorophenol	0.073	0.0010	0.1000	0	72.9	15	153			
Cresols, Total	0.20	0.0010	0.3000	0	66.1	10.6	179			
Surr: 2-Fluorophenol	0.095		0.2000		47.3	15	124			
Surr: Phenol-d5	0.078		0.2000		38.9	15	118			
Surr: 2,4,6-Tribromophenol	0.13		0.2000		66.7	15	148			
Surr: Nitrobenzene-d5	0.085		0.1000		84.7	40.6	124			
Surr: 2-Fluorobiphenyl	0.070		0.1000		69.6	35.7	128			
Surr: 4-Terphenyl-d14	0.059		0.1000		58.7	18.8	115			

Sample ID **1709746-001cmsd** SampType: **MSD** TestCode: **EPA Method 8270C TCLP**
Client ID: **Injection Well** Batch ID: **33908** RunNo: **45933**
Prep Date: **9/18/2017** Analysis Date: **9/27/2017** SeqNo: **1460040** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
2-Methylphenol	0.062	0.0010	0.1000	0	62.5	23.9	129	9.98	20	
3+4-Methylphenol	0.12	0.0010	0.2000	0	61.3	15	167	5.28	20	
2,4-Dinitrotoluene	0.056	0.0010	0.1000	0	56.3	15	147	11.7	23.2	
Hexachlorobenzene	0.071	0.0010	0.1000	0	70.8	41.4	136	2.46	20	
Hexachlorobutadiene	0.065	0.0010	0.1000	0	64.5	16.2	134	5.98	20	
Hexachloroethane	0.051	0.0010	0.1000	0	51.5	20.6	124	9.27	31.3	
Nitrobenzene	0.081	0.0010	0.1000	0	80.9	39.5	134	0.124	26.6	
Pentachlorophenol	0.040	0.0010	0.1000	0	40.5	15	137	35.5	27.9	R
Pyridine	0.0090	0.0010	0.1000	0	8.96	15	129	20.8	47.4	S
2,4,5-Trichlorophenol	0.072	0.0010	0.1000	0	71.6	15	158	10.9	36.9	
2,4,6-Trichlorophenol	0.077	0.0010	0.1000	0	77.0	15	153	5.42	37.2	
Cresols, Total	0.18	0.0010	0.3000	0	61.7	10.6	179	6.89	27.4	
Surr: 2-Fluorophenol	0.087		0.2000		43.6	15	124	0	0	
Surr: Phenol-d5	0.074		0.2000		37.0	15	118	0	0	
Surr: 2,4,6-Tribromophenol	0.14		0.2000		68.1	15	148	0	0	

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
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

QC SUMMARY REPORT

WO#: **1709746**

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **1709746-001cmsd** SampType: **MSD** TestCode: **EPA Method 8270C TCLP**
Client ID: **Injection Well** Batch ID: **33908** RunNo: **45933**
Prep Date: **9/18/2017** Analysis Date: **9/27/2017** SeqNo: **1460040** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Surr: Nitrobenzene-d5	0.082		0.1000		81.7	40.6	124	0	0	
Surr: 2-Fluorobiphenyl	0.070		0.1000		69.8	35.7	128	0	0	
Surr: 4-Terphenyl-d14	0.051		0.1000		51.1	18.8	115	0	0	

Qualifiers:

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

QC SUMMARY REPORT

WO#: 1709746

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **MB-34071** SampType: **MBLK** TestCode: **EPA Method 7470: Mercury**
Client ID: **PBW** Batch ID: **34071** RunNo: **45912**
Prep Date: **9/26/2017** Analysis Date: **9/27/2017** SeqNo: **1459048** Units: **mg/L**

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

Sample ID **LCS-34071** SampType: **LCS** TestCode: **EPA Method 7470: Mercury**
Client ID: **LCSW** Batch ID: **34071** RunNo: **45912**
Prep Date: **9/26/2017** Analysis Date: **9/27/2017** SeqNo: **1459049** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0049	0.00020	0.005000	0	97.0	80	120			

Sample ID **1709746-001DMS** SampType: **MS** TestCode: **EPA Method 7470: Mercury**
Client ID: **Injection Well** Batch ID: **34071** RunNo: **45912**
Prep Date: **9/26/2017** Analysis Date: **9/27/2017** SeqNo: **1459053** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0050	0.00020	0.005000	.00004788	98.8	75	125			

Sample ID **1709746-001DMSD** SampType: **MSD** TestCode: **EPA Method 7470: Mercury**
Client ID: **Injection Well** Batch ID: **34071** RunNo: **45912**
Prep Date: **9/26/2017** Analysis Date: **9/27/2017** SeqNo: **1459054** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Mercury	0.0049	0.00020	0.005000	.00004788	97.9	75	125	0.906	20	

Qualifiers:

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

QC SUMMARY REPORT

WO#: **1709746**

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **MB-A** SampType: **MBLK** TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **PBW** Batch ID: **A45714** RunNo: **45714**
Prep Date: Analysis Date: **9/19/2017** SeqNo: **1452976** 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								

Sample ID **LCS-A** SampType: **LCS** TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **LCSW** Batch ID: **A45714** RunNo: **45714**
Prep Date: Analysis Date: **9/19/2017** SeqNo: **1452977** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Calcium	52	1.0	50.00	0	104	80	120			
Magnesium	54	1.0	50.00	0	108	80	120			
Potassium	53	1.0	50.00	0	106	80	120			

Sample ID **MB-A** SampType: **MBLK** TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **PBW** Batch ID: **A45960** RunNo: **45960**
Prep Date: Analysis Date: **9/28/2017** SeqNo: **1461012** Units: **mg/L**

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

Sample ID **LCS-A** SampType: **LCS** TestCode: **EPA Method 6010B: Dissolved Metals**
Client ID: **LCSW** Batch ID: **A45960** RunNo: **45960**
Prep Date: Analysis Date: **9/28/2017** SeqNo: **1461013** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Sodium	51	1.0	50.00	0	102	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
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

QC SUMMARY REPORT

WO#: **1709746**

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **MB-33882** SampType: **MBLK** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **PBW** Batch ID: **33882** RunNo: **45714**
Prep Date: **9/15/2017** Analysis Date: **9/19/2017** SeqNo: **1451478** 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								
Chromium	ND	0.0060								
Lead	ND	0.0050								
Silver	ND	0.0050								

Sample ID **LCS-33882** SampType: **LCS** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **LCSW** Batch ID: **33882** RunNo: **45714**
Prep Date: **9/15/2017** Analysis Date: **9/19/2017** SeqNo: **1451479** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Arsenic	0.52	0.020	0.5000	0	103	80	120			
Barium	0.49	0.020	0.5000	0	98.6	80	120			
Cadmium	0.49	0.0020	0.5000	0	98.8	80	120			
Chromium	0.49	0.0060	0.5000	0	98.1	80	120			
Lead	0.48	0.0050	0.5000	0	95.7	80	120			
Silver	0.10	0.0050	0.1000	0	103	80	120			

Sample ID **MB-33882** SampType: **MBLK** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **PBW** Batch ID: **33882** RunNo: **45714**
Prep Date: **9/15/2017** Analysis Date: **9/19/2017** SeqNo: **1451496** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Selenium	ND	0.050								

Sample ID **LCS-33882** SampType: **LCS** TestCode: **EPA 6010B: Total Recoverable Metals**
Client ID: **LCSW** Batch ID: **33882** RunNo: **45714**
Prep Date: **9/15/2017** Analysis Date: **9/19/2017** SeqNo: **1451497** Units: **mg/L**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Selenium	0.49	0.050	0.5000	0	98.4	80	120			

Qualifiers:

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

QC SUMMARY REPORT

WO#: **1709746**

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **mb-1**	SampType: **MBLK**	TestCode: **SM2320B: Alkalinity**							
Client ID: **PBW**	Batch ID: **R45747**	RunNo: **45747**							
Prep Date:	Analysis Date: **9/19/2017**	SeqNo: **1452652**	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: **R45747**	RunNo: **45747**							
Prep Date:	Analysis Date: **9/19/2017**	SeqNo: **1452653**	Units: **mg/L CaCO3**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	80.40	20.00	80.00	0	101	90	110			

Sample ID **mb-2**	SampType: **MBLK**	TestCode: **SM2320B: Alkalinity**							
Client ID: **PBW**	Batch ID: **R45747**	RunNo: **45747**							
Prep Date:	Analysis Date: **9/19/2017**	SeqNo: **1452675**	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**	SampType: **LCS**	TestCode: **SM2320B: Alkalinity**							
Client ID: **LCSW**	Batch ID: **R45747**	RunNo: **45747**							
Prep Date:	Analysis Date: **9/19/2017**	SeqNo: **1452676**	Units: **mg/L CaCO3**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	80.92	20.00	80.00	0	101	90	110			

Sample ID **mb-3**	SampType: **MBLK**	TestCode: **SM2320B: Alkalinity**							
Client ID: **PBW**	Batch ID: **R45747**	RunNo: **45747**							
Prep Date:	Analysis Date: **9/19/2017**	SeqNo: **1452699**	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-3**	SampType: **LCS**	TestCode: **SM2320B: Alkalinity**							
Client ID: **LCSW**	Batch ID: **R45747**	RunNo: **45747**							
Prep Date:	Analysis Date: **9/19/2017**	SeqNo: **1452700**	Units: **mg/L CaCO3**						
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Total Alkalinity (as CaCO3)	80.84	20.00	80.00	0	101	90	110			

Qualifiers:

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

QC SUMMARY REPORT

WO#: **1709746**

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **1709746-001EDUP** SampType: **DUP** TestCode: **Specific Gravity**
Client ID: **Injection Well** Batch ID: **R45658** RunNo: **45658**
Prep Date: Analysis Date: **9/15/2017** SeqNo: **1449109** Units:

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	%RPD	RPDLimit	Qual
Specific Gravity	1.001	0						0.110	20	

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
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

QC SUMMARY REPORT

WO#: **1709746**

Hall Environmental Analysis Laboratory, Inc.

18-Oct-17

Client: Western Refining Southwest, Inc.
Project: BPT Injection Well 9 13 17

Sample ID **MB-33959**	SampType: **MBLK**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **PBW**	Batch ID: **33959**	RunNo: **45804**
Prep Date: **9/20/2017**	Analysis Date: **9/22/2017**	SeqNo: **1455608** 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-33959**	SampType: **LCS**	TestCode: **SM2540C MOD: Total Dissolved Solids**
Client ID: **LCSW**	Batch ID: **33959**	RunNo: **45804**
Prep Date: **9/20/2017**	Analysis Date: **9/22/2017**	SeqNo: **1455609** 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.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- PQL Practical Quanitative Limit
- S % Recovery outside of range due to dilution or matrix
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Detection Limit
- 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: 1709746 RcptNo: 1

Received By: Isaiah Ortiz 9/14/2017 7:05:00 AM

Completed By: Ashley Gallegos 9/14/2017 9:01:05 AM

Reviewed By: ENM 9/14/17

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 (<2 or >12 unless noted)

Adjusted? ND

Checked by: RL

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 CR4990
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

Project Name:
BPT-Injection Well-9-13-17

Project #:
PO# 12621258

Project Manager:
Kelly Robinson

Sampler: Matt Krakow

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

Analysis Request

Date	Time	Matrix	Sample Request ID	Container Type and #	Preservative Type	HEAL No. 1709746	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)					Air Bubbles (Y or N)
9-13-17	11:20	H2O	Injection Well	3-1L	Amber	-001																
				3-VOAs	HCL					See		Analyte				List						
				1 120mL	HNO_3																	
				1-250mL	HNO_3																	
				2-500mL	Poly																	
				1-500mL	NaOH																	
				1-500mL	Zn Acetate NaOH																	

Date:	Time:	Relinquished by:	Received by	Date	Time
9/13/17	1600			9/13/17	1600
Date:	Time:	Relinquished by:	Received by:	Date	Time
9/13/17	1811			9/14/17	0705

Remarks:
See analyte list

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)).

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);

Field Parameters									
Site	Sp. Cond. (uS/cm)	TDS (g/L)	DO (mg/L)	ORP (mV)	pH (Units)	Temp. (F)	Date	Time	Sampler
DWD#2	68,017	44,200	1.33	211.9	5.13	52.3	1/25/2017	11:00 AM	Matt Krakow

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: R273874	
Lab ID: B17011690-001ADUP	Sample Duplicate					Run: ORION 720A HZW_170127A		01/27/17 10:54	
pH	6.49	s.u.	0.10				0.5	3	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QC SUMMARY REPORT

WO#: 1701A75

Hall Environmental Analysis Laboratory, Inc.

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

QC SUMMARY REPORT

WO#: 1701A75

Hall Environmental Analysis Laboratory, Inc.

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

QC SUMMARY REPORT

WO#: **1701A75**

Hall Environmental Analysis Laboratory, Inc.

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

WO#: **1701A75**

Hall Environmental Analysis Laboratory, Inc.

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.
- D Sample Diluted Due to Matrix
- H Holding times for preparation or analysis exceeded
- ND Not Detected at the Reporting Limit
- R RPD outside accepted recovery limits
- S % Recovery outside of range due to dilution or matrix
- B Analyte detected in the associated Method Blank
- E Value above quantitation range
- J Analyte detected below quantitation limits
- P Sample pH Not In Range
- RL Reporting Detection Limit
- 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? NB

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-1261903I-2

Project Manager:
Kelly Robinson

Sampler: Matt Krakow

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

Analysis Request

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				

Date:	Time:	Relinquished by:	Received by:	Date	Time	Remarks:
1/25/17	1447		Christine Walls	1/25/17	1447	
1/25/17	1804	Christine Walls		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

Appendix D

Well Logs

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

Triple Combo

Location:				
Sec 27, T29N, R11W		Elev.:	K.B.	5550.00 ft
SHL: 2028' FNL X 111' FEL			G.L.	5535.00 ft
Lat/Long: 36.6986/-107.97035			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

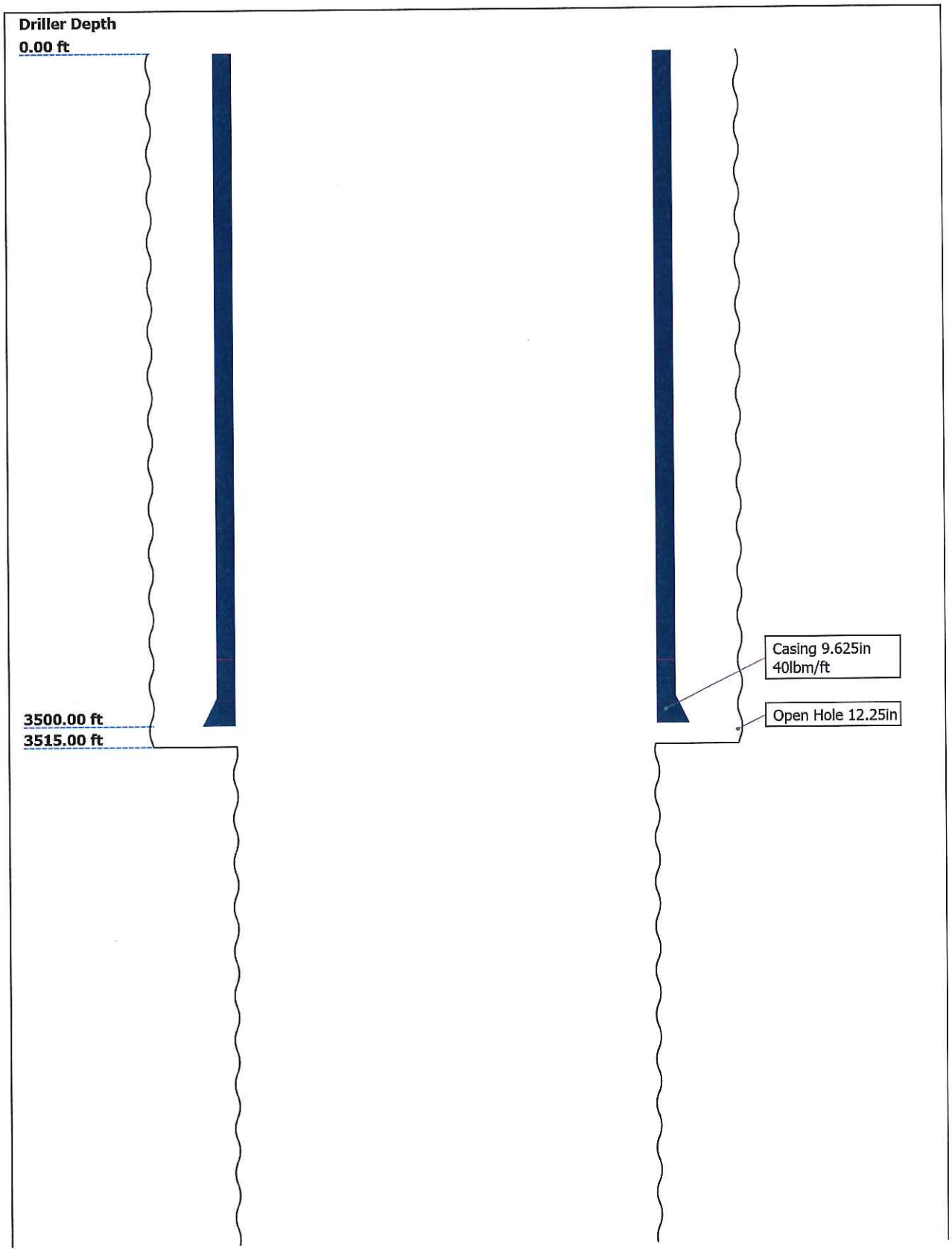
Logging Date		05-Sep-2016				
Run Number		One				
Depth Driller		7525.00 ft				
Schlumberger Depth		7532.00 ft				
Bottom Log Interval		7532.00 ft				
Top Log Interval		3498.00 ft				
Casing Driller Size @ Depth		9.625 in @ 3500.00 ft				
Casing Schlumberger		3498 ft				
Bit Size		8.75 in				
Type Fluid 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				

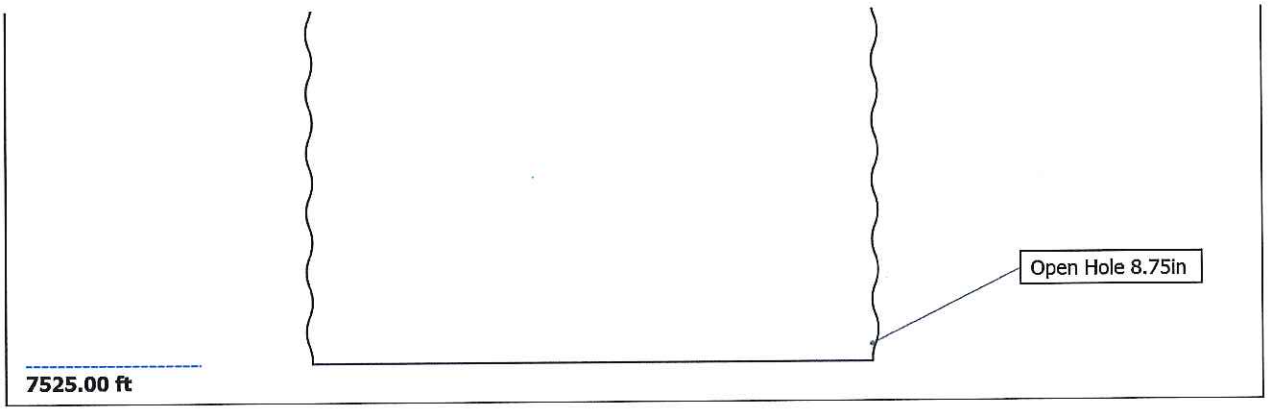
Disclaimer

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

Contents

Well Sketch


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

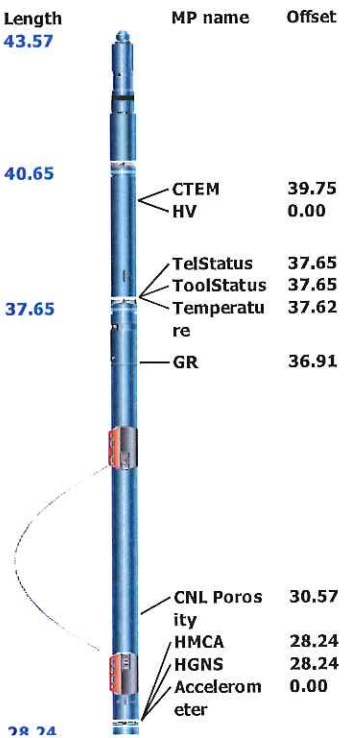


Borehole Size/Casing/Tubing Record

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" 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

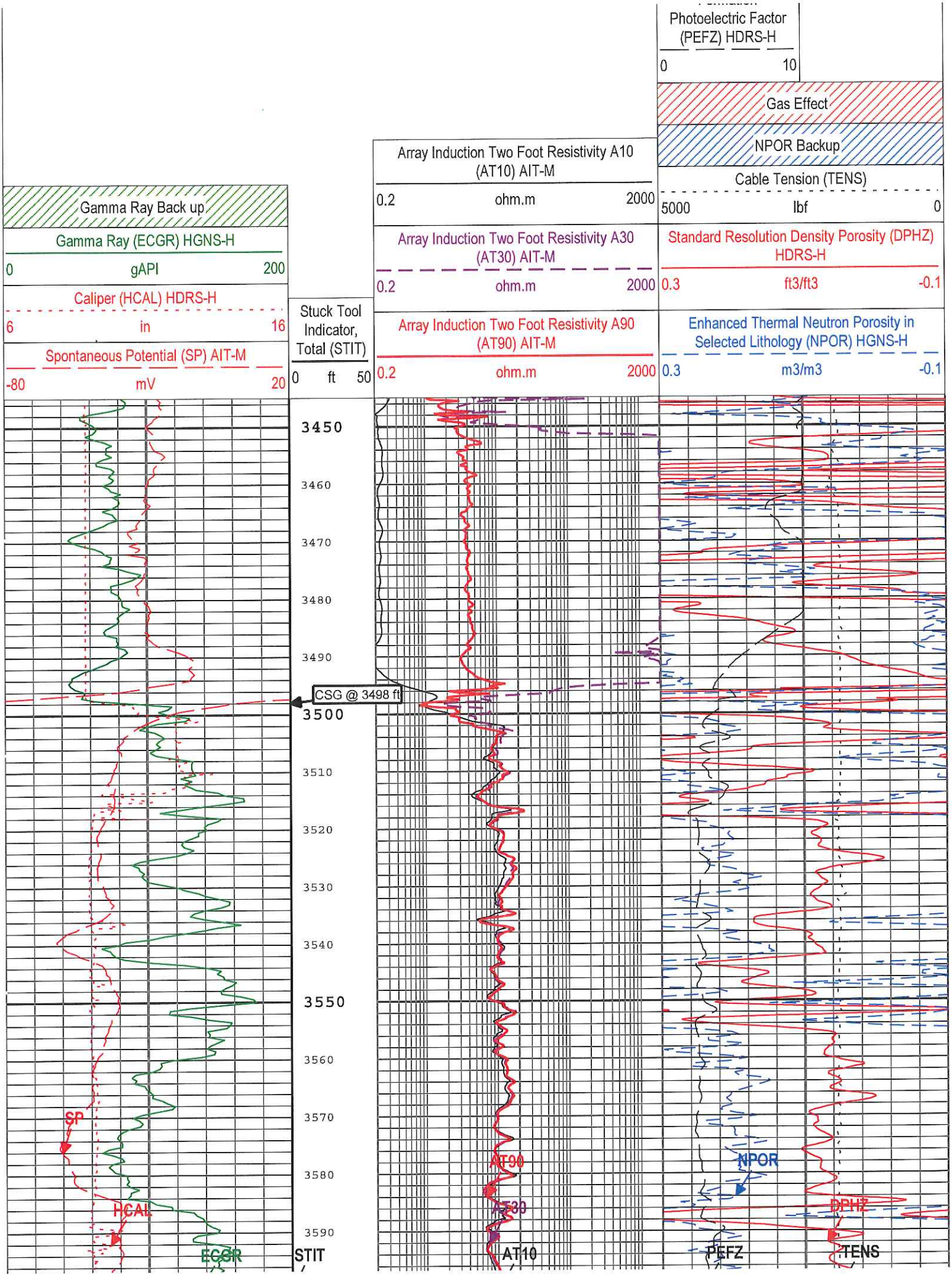
One: Log[4]:Up:S012

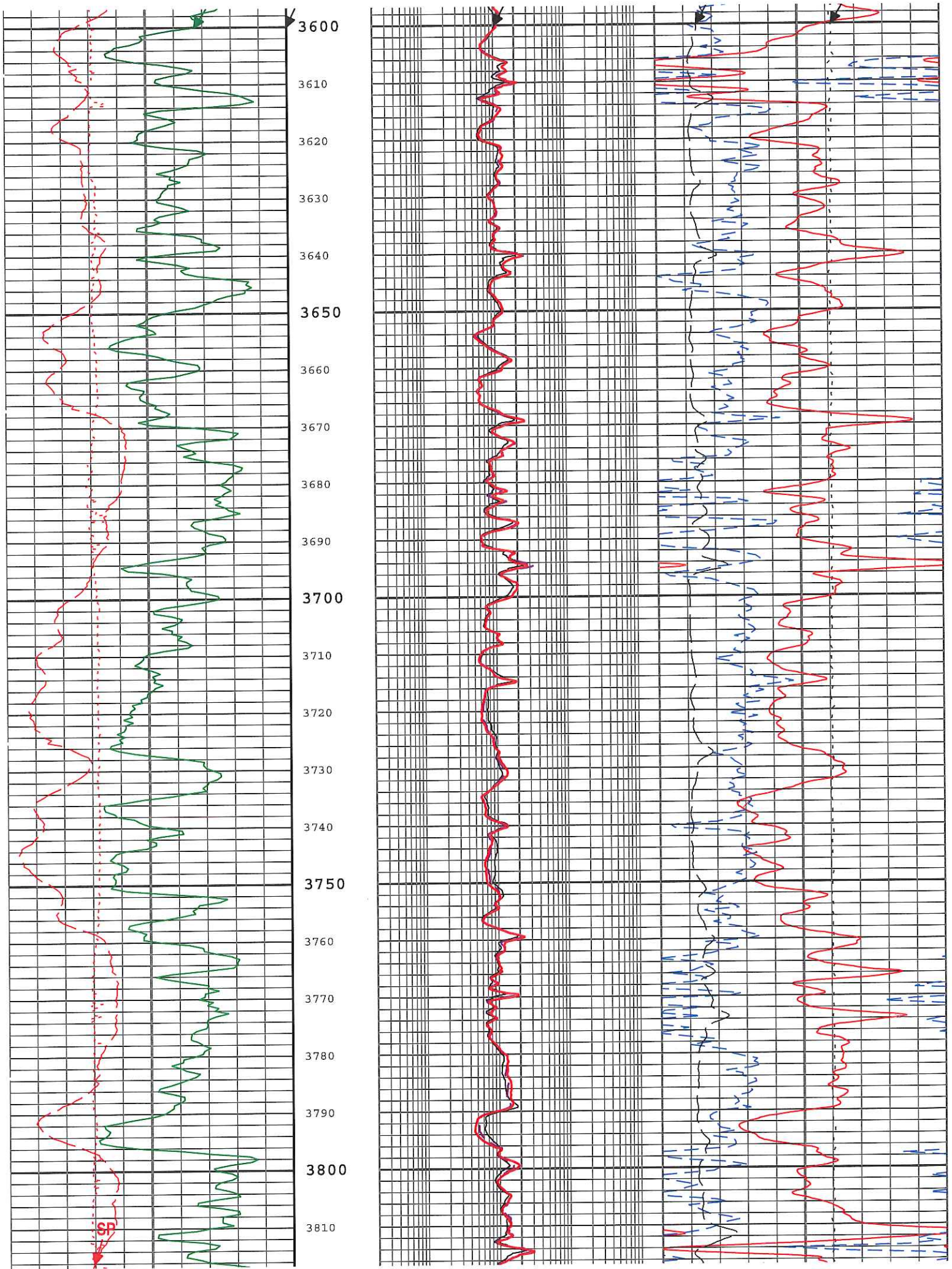
Description: HGNS standard resolution porosities for Platform Express Format: Log (TripleCombo-5) Index Scale: 5 in per 100 ft Index Unit: ft Index Type: Measured Depth Creation Date: 07-Sep-2016 07:05:13

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
3580
3590
SP
HCAL
ECGR
STIT
AT90
AT30
AT10
NPOR
DPHZ
PEFZ
TENS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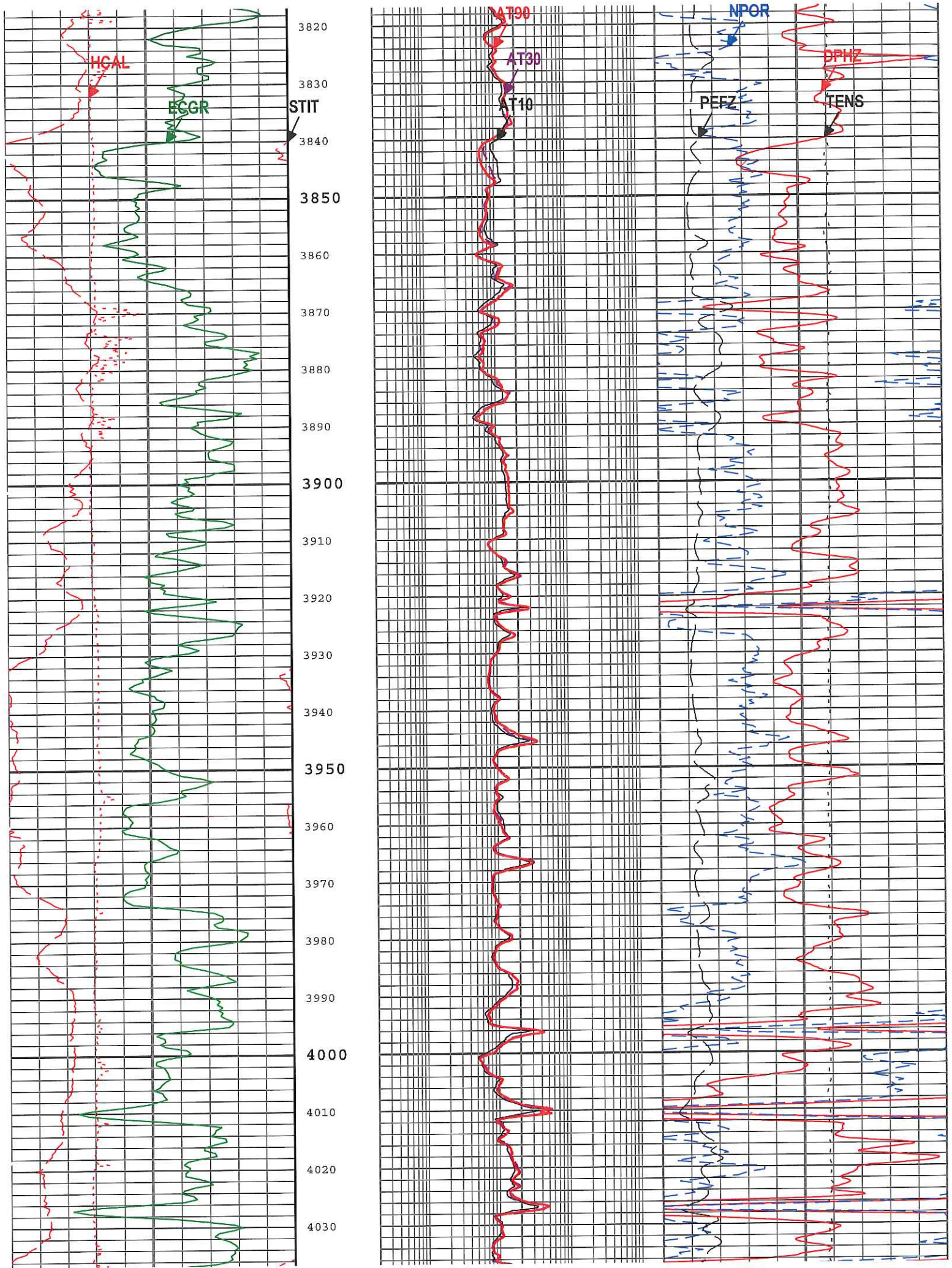
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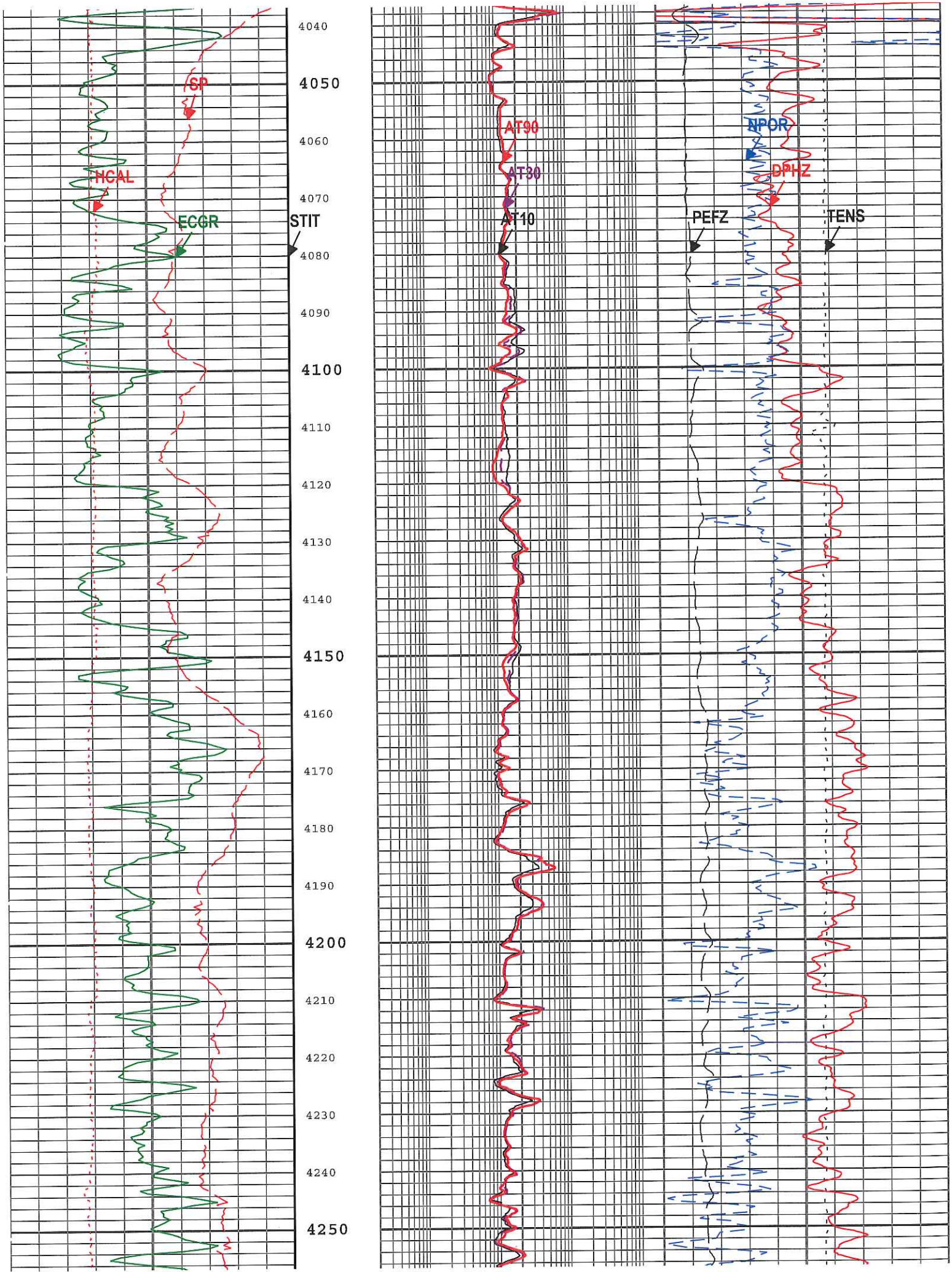
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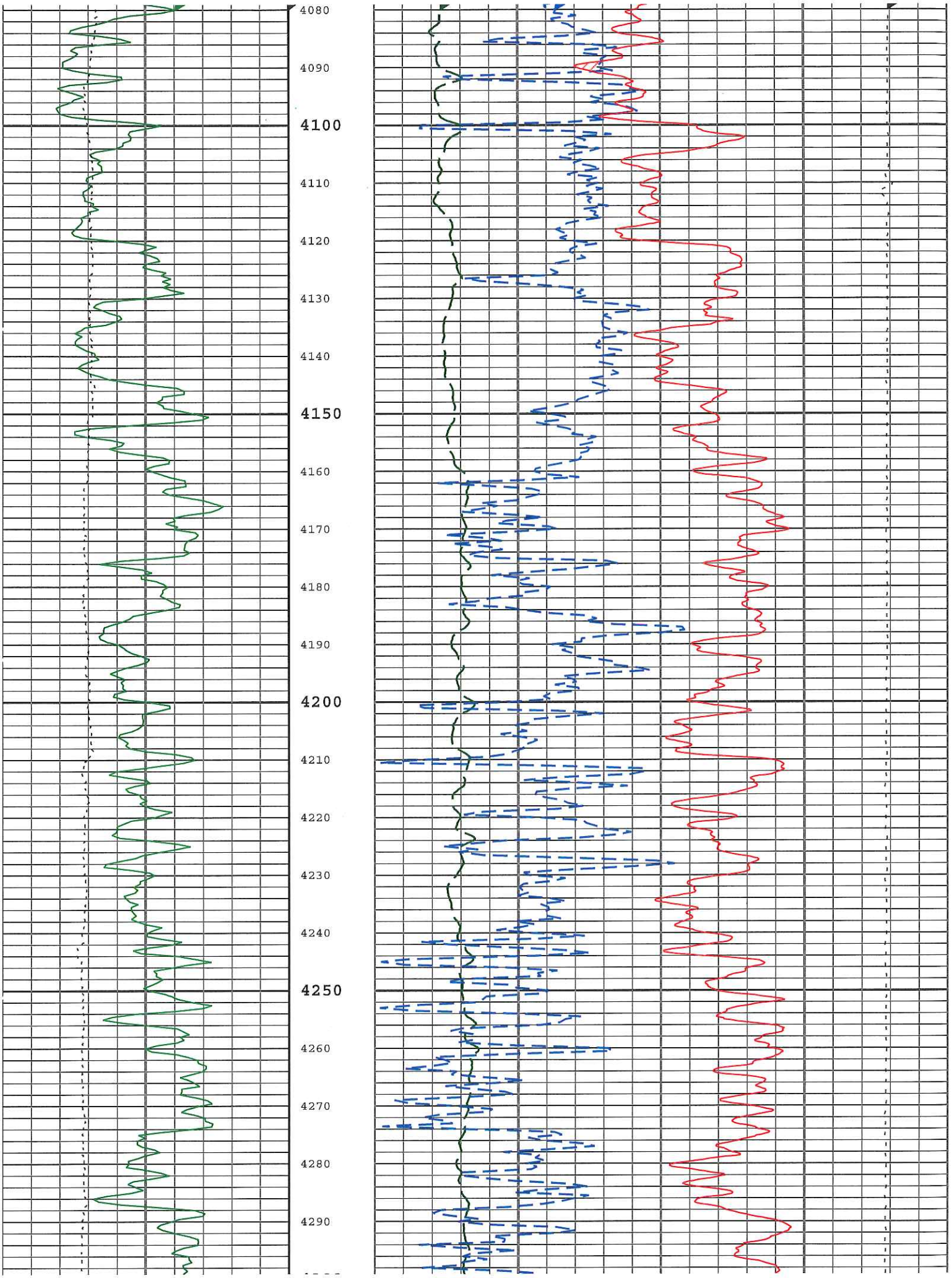
TENS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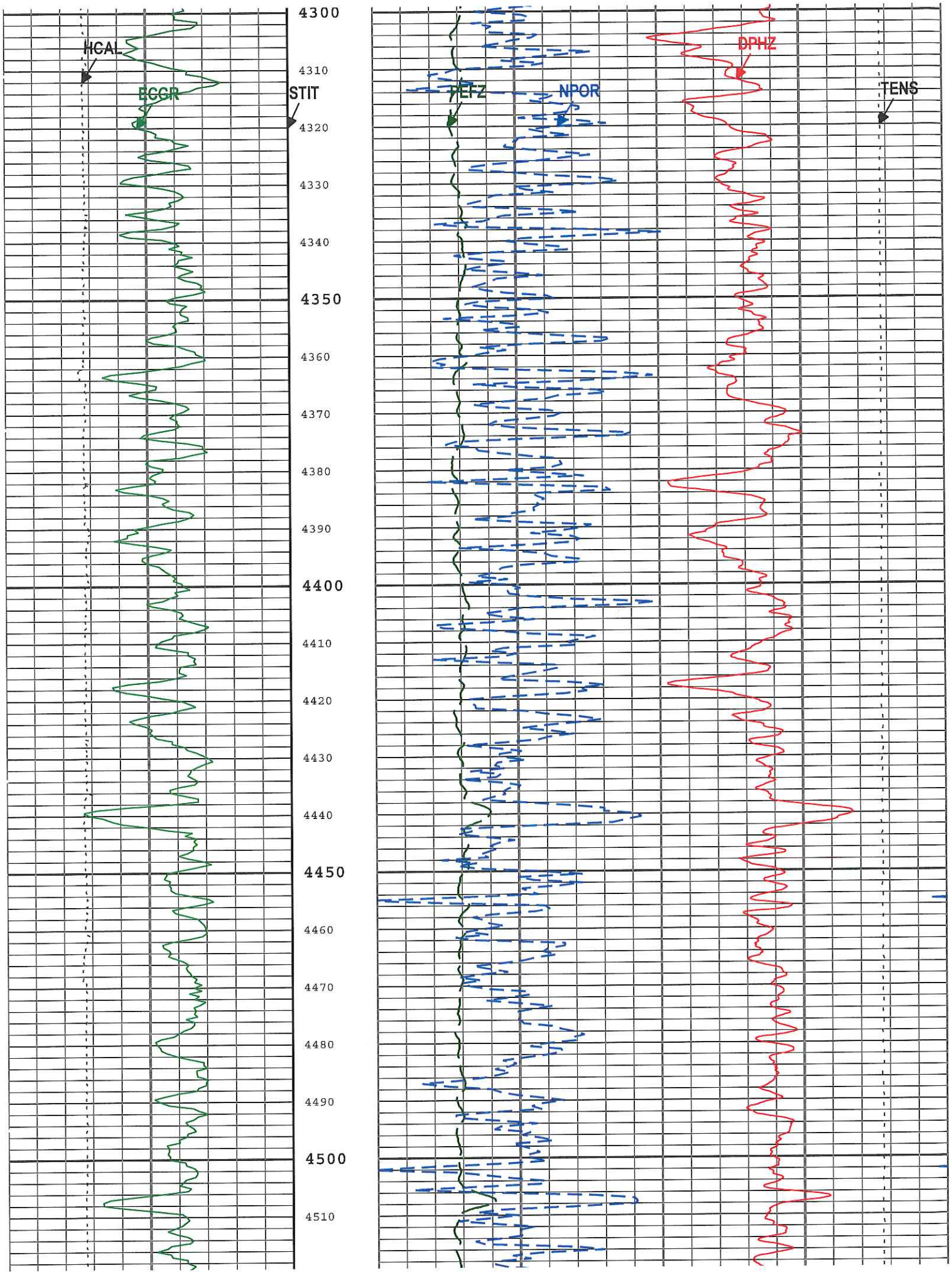
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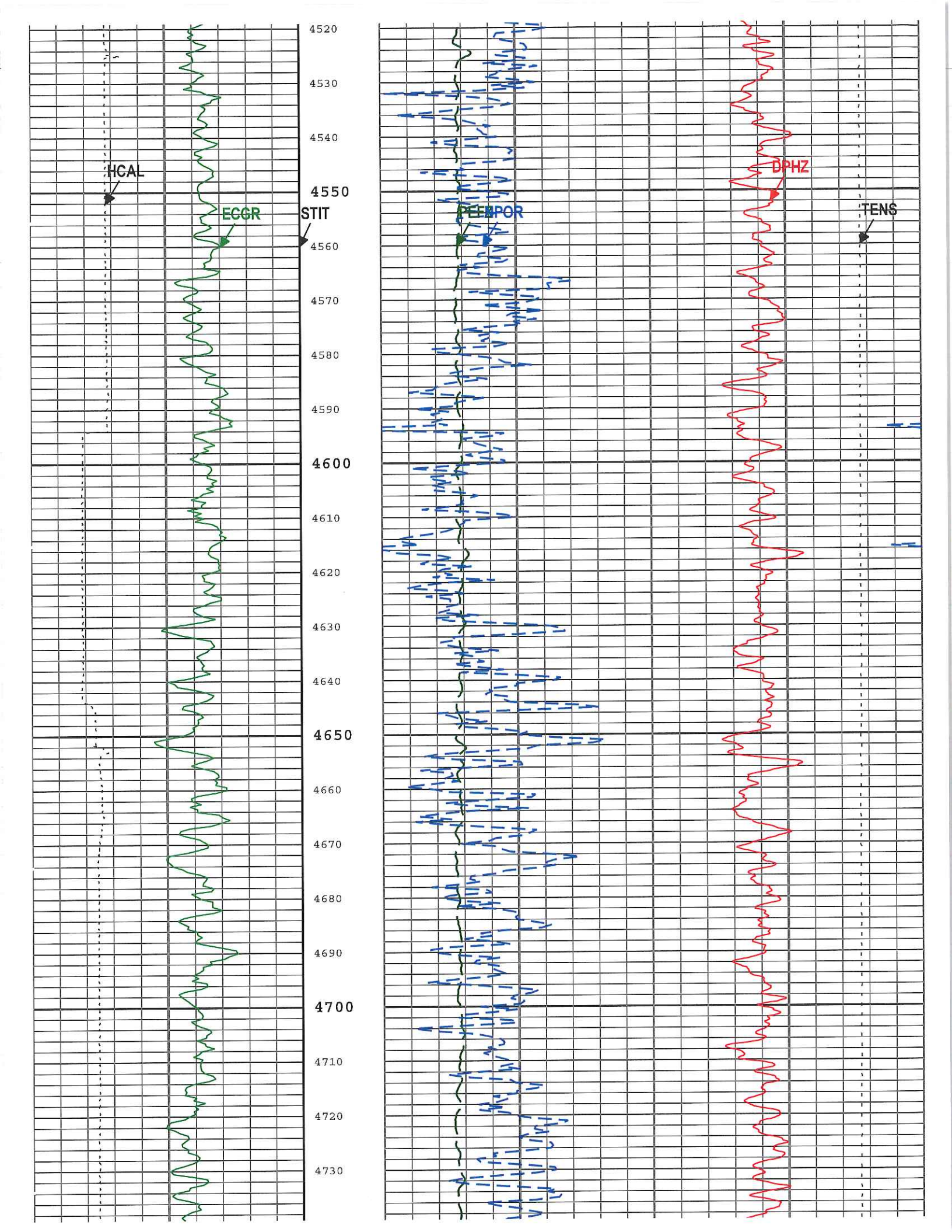
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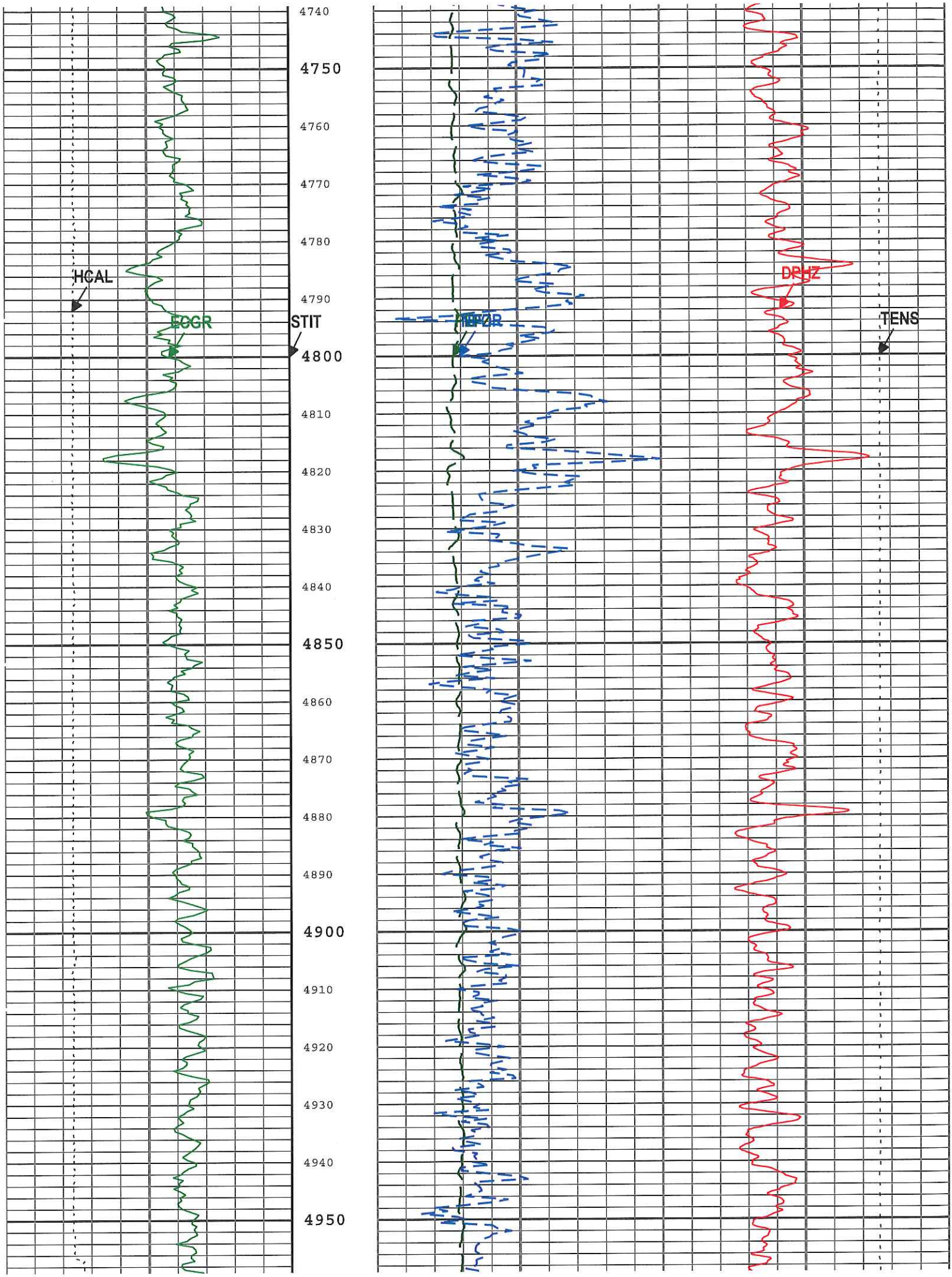
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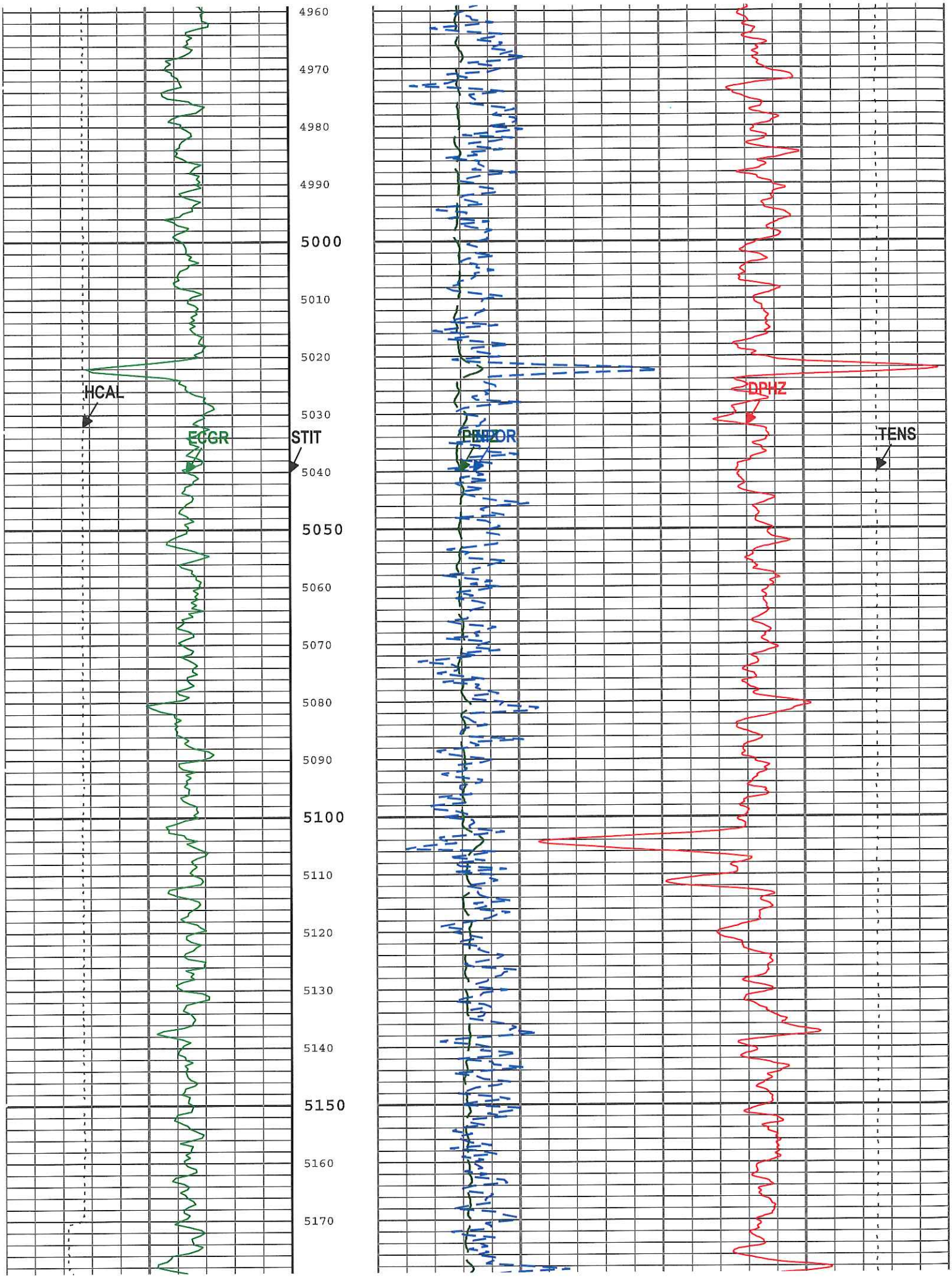
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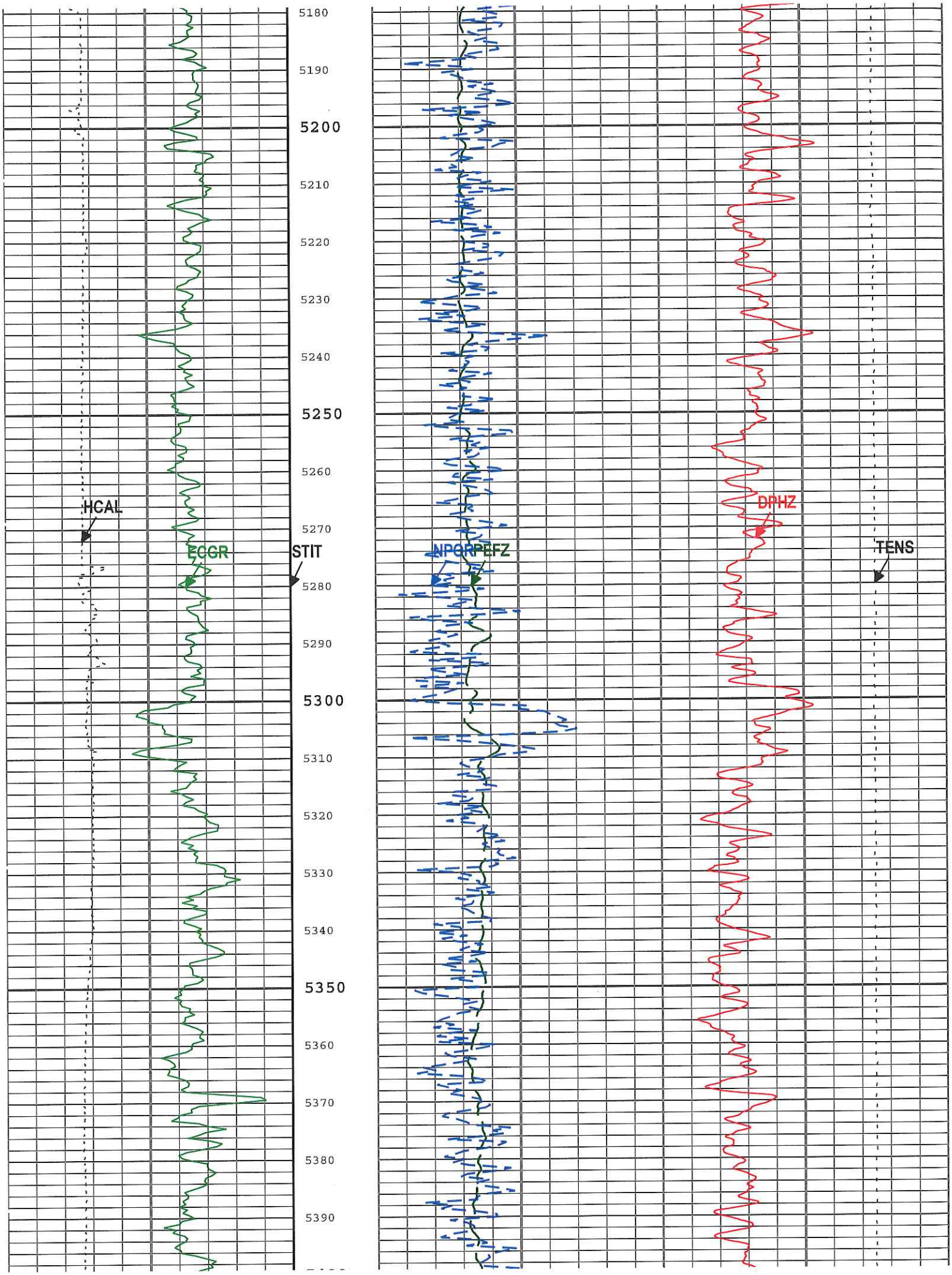
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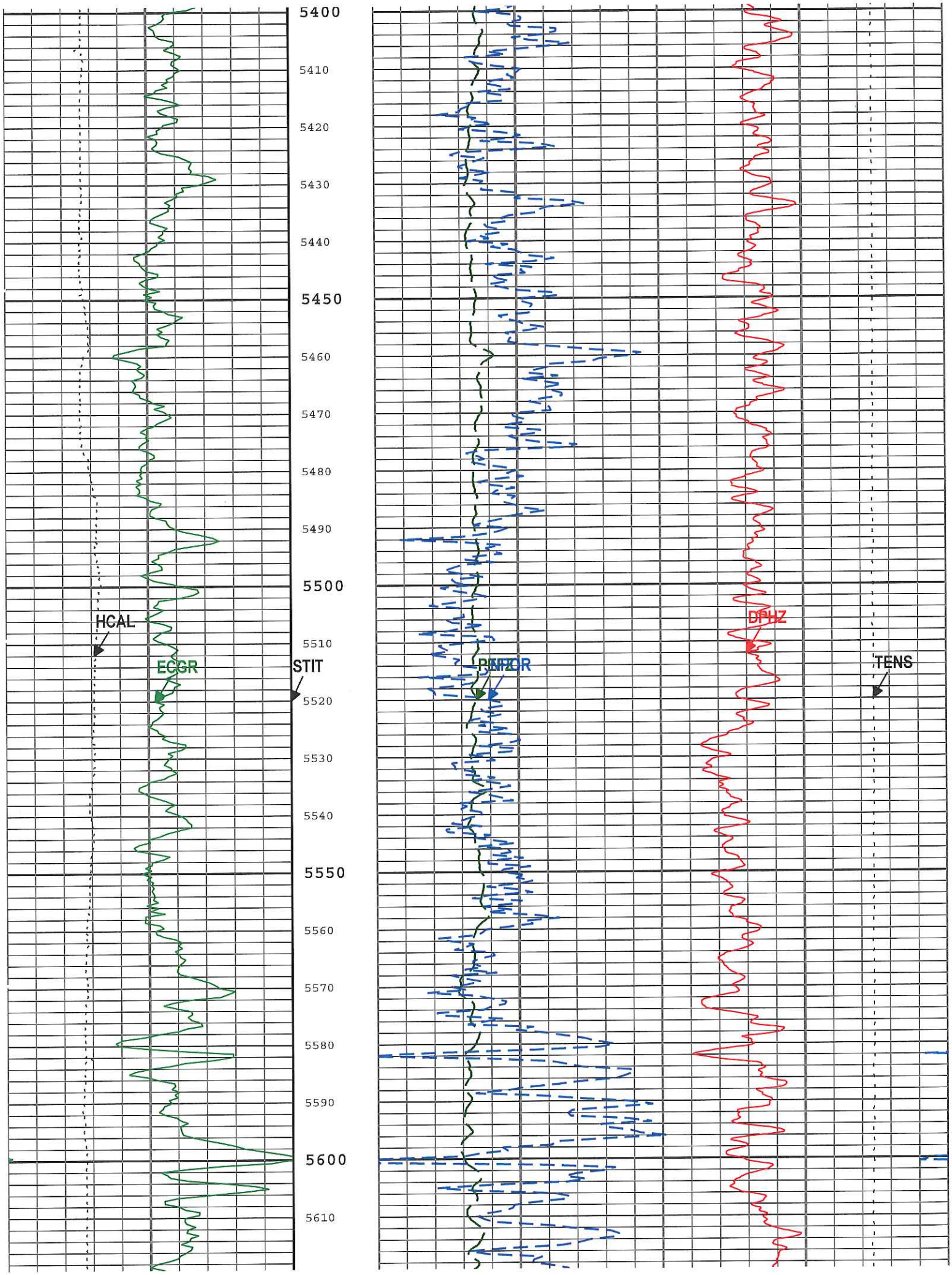
TENS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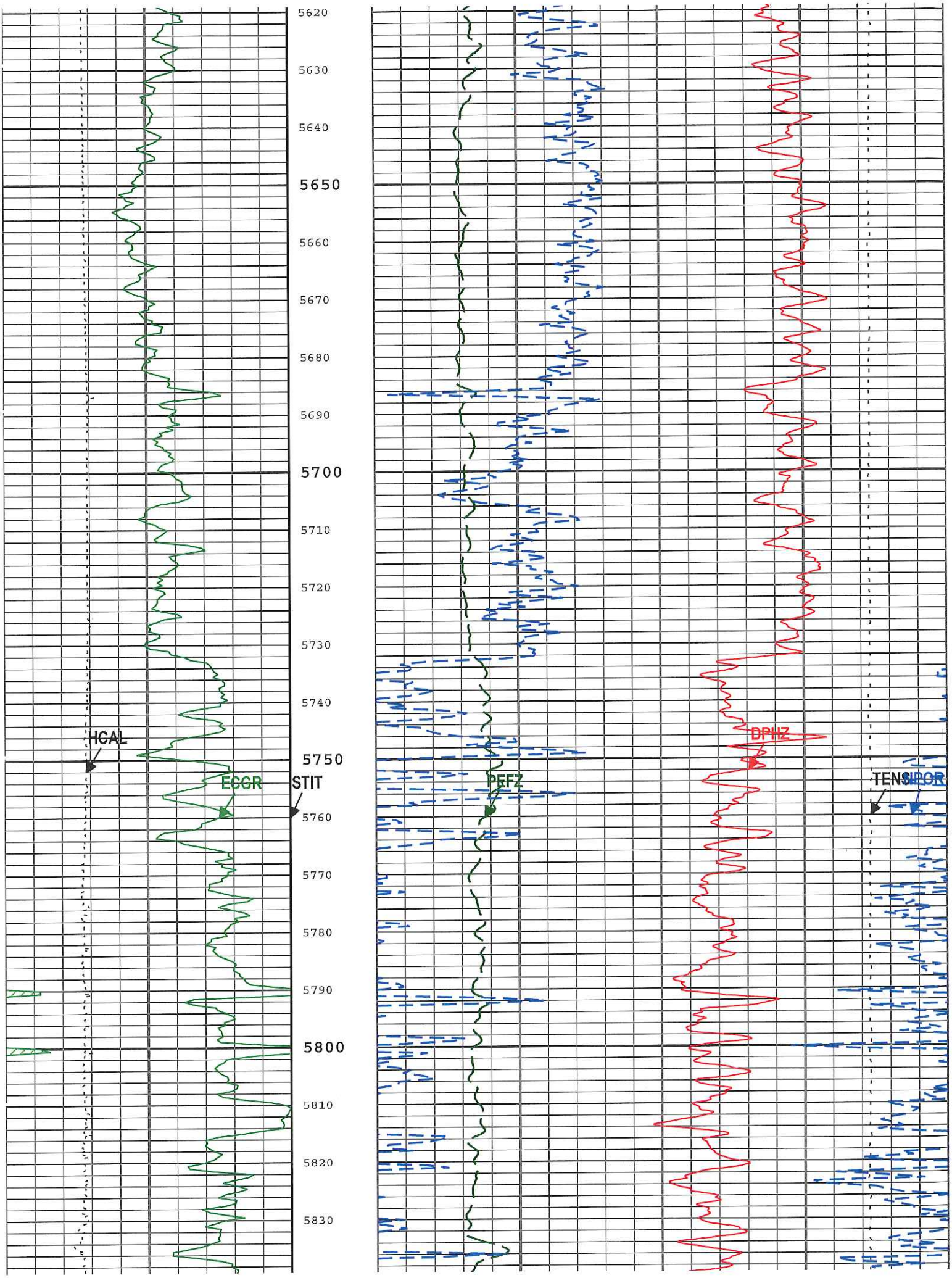
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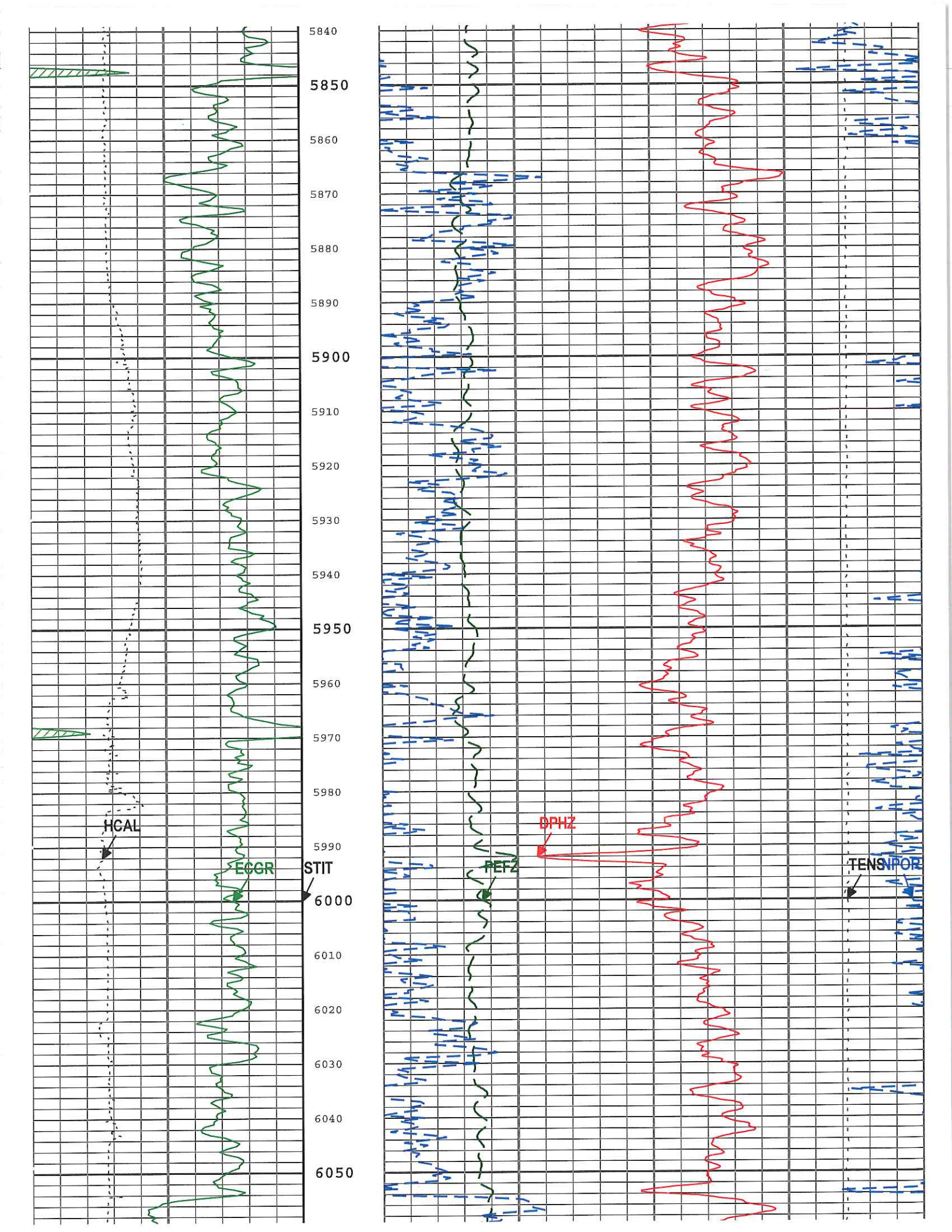
TENSION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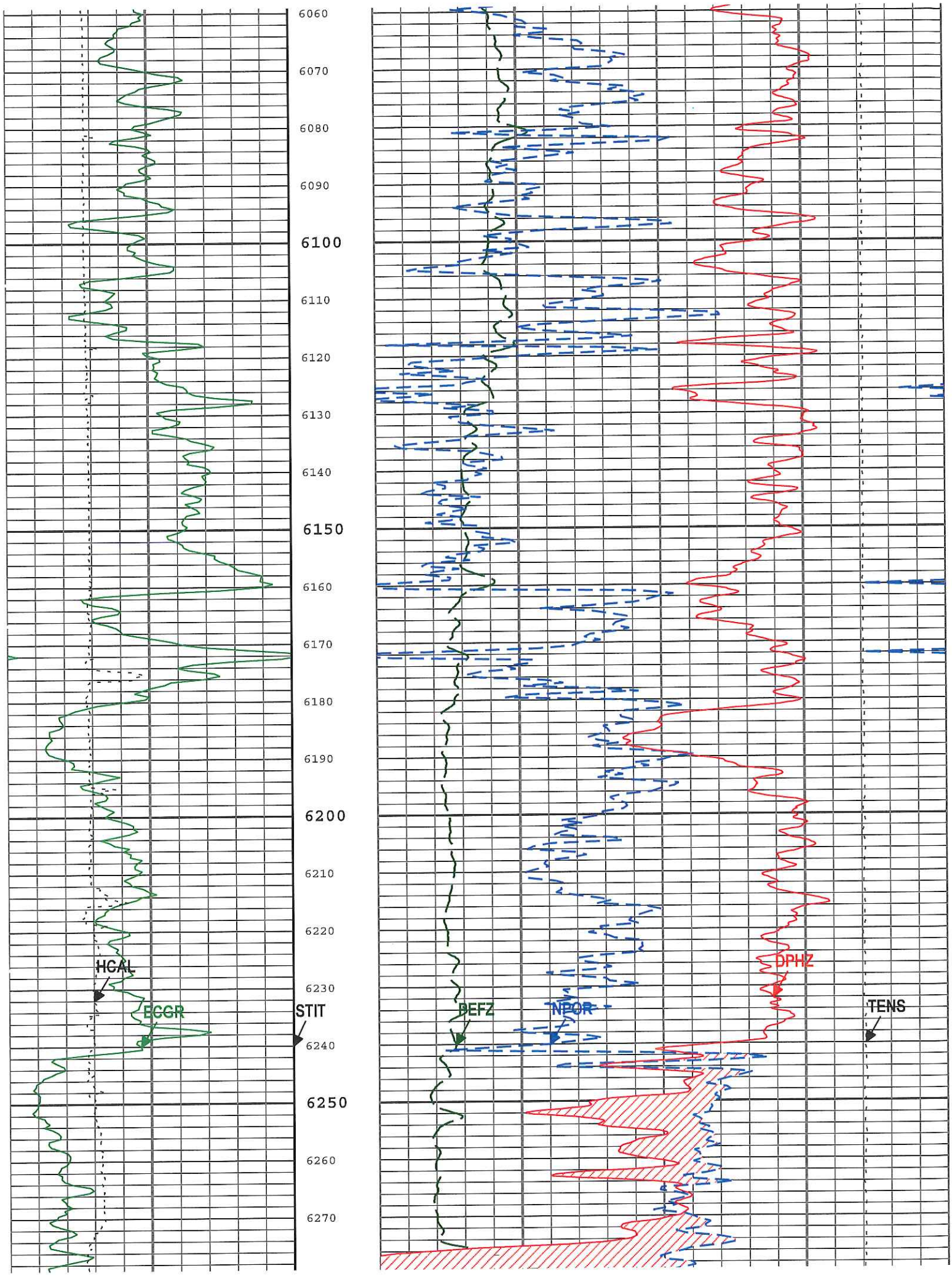
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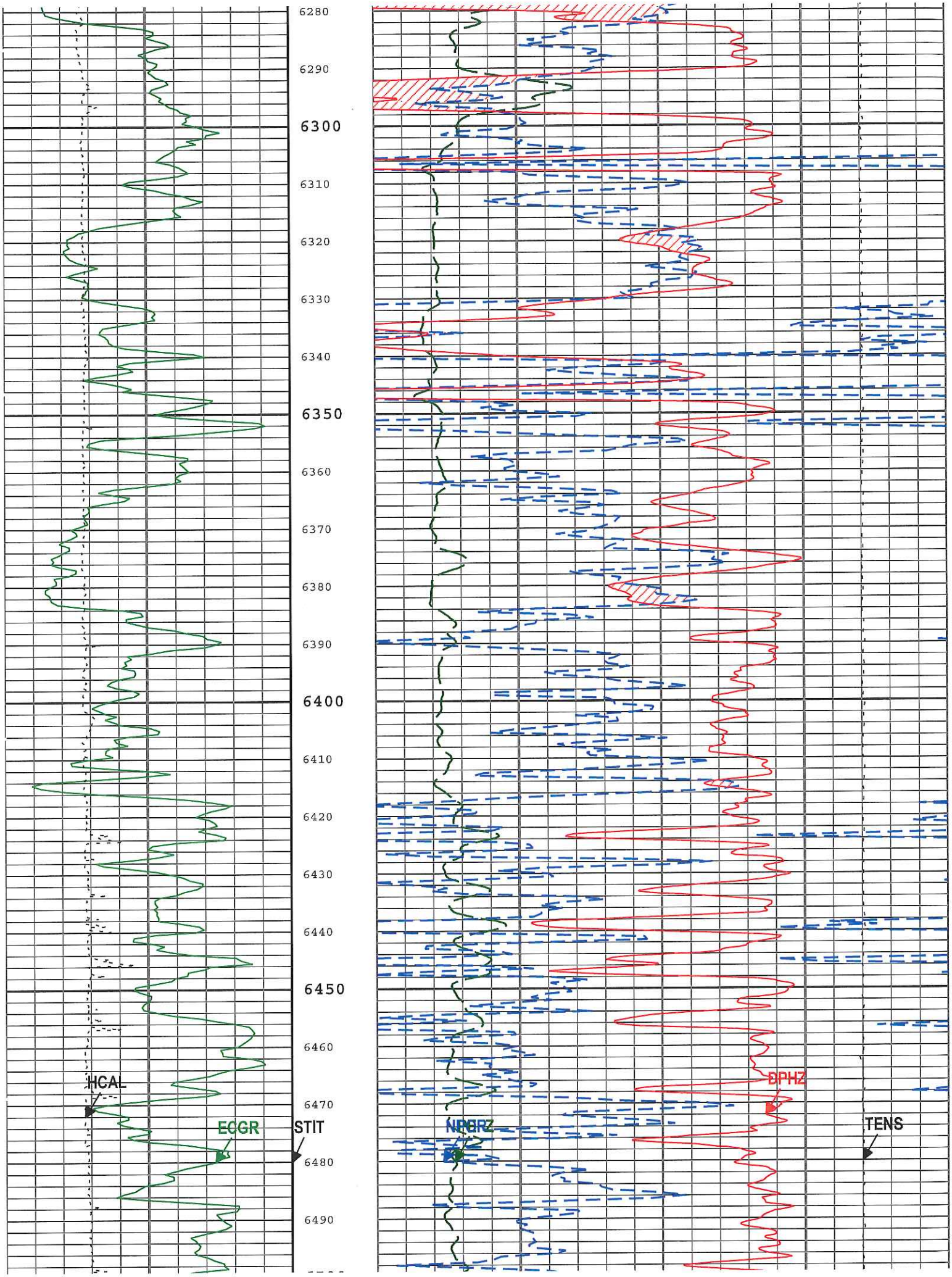
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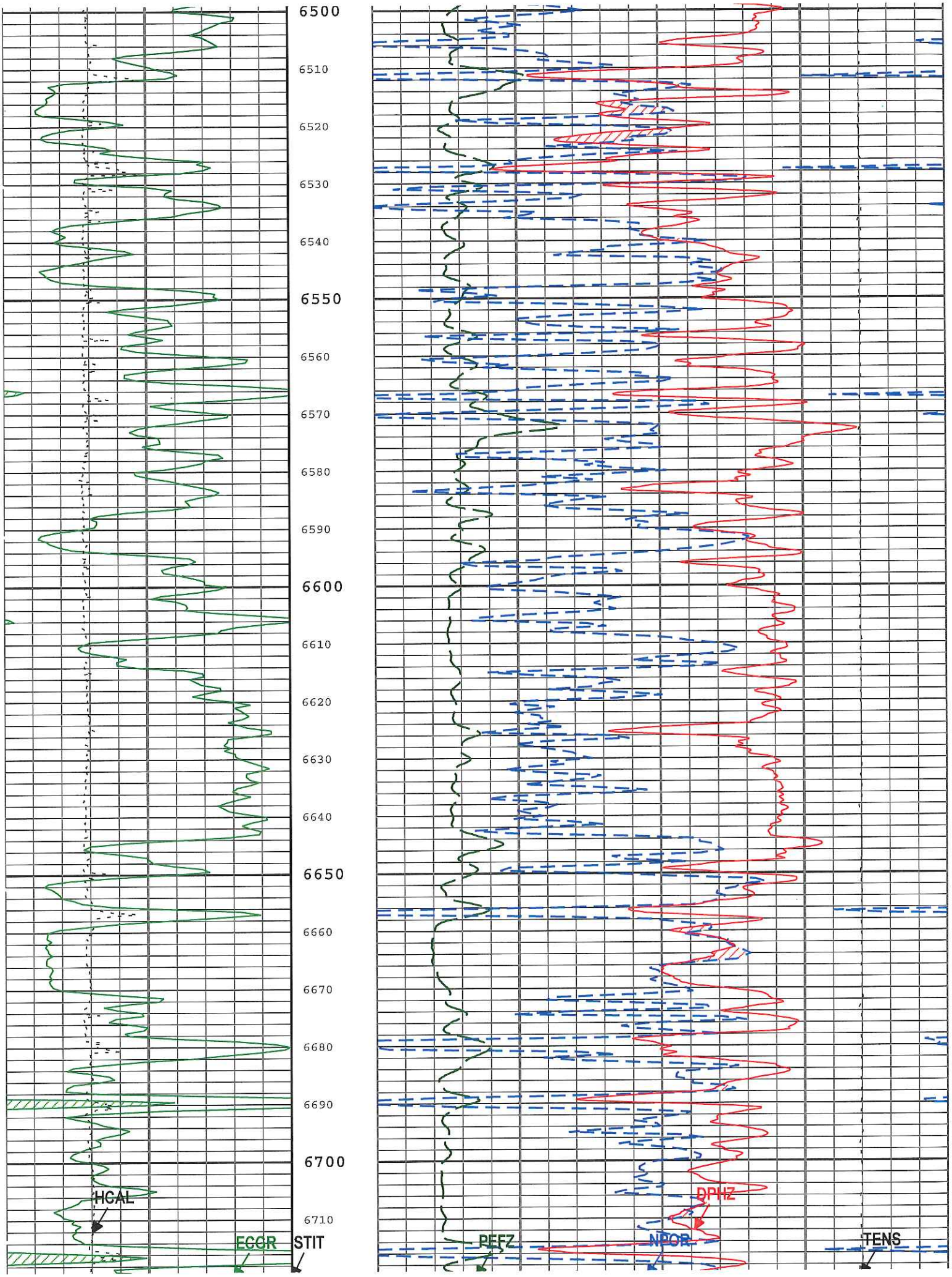
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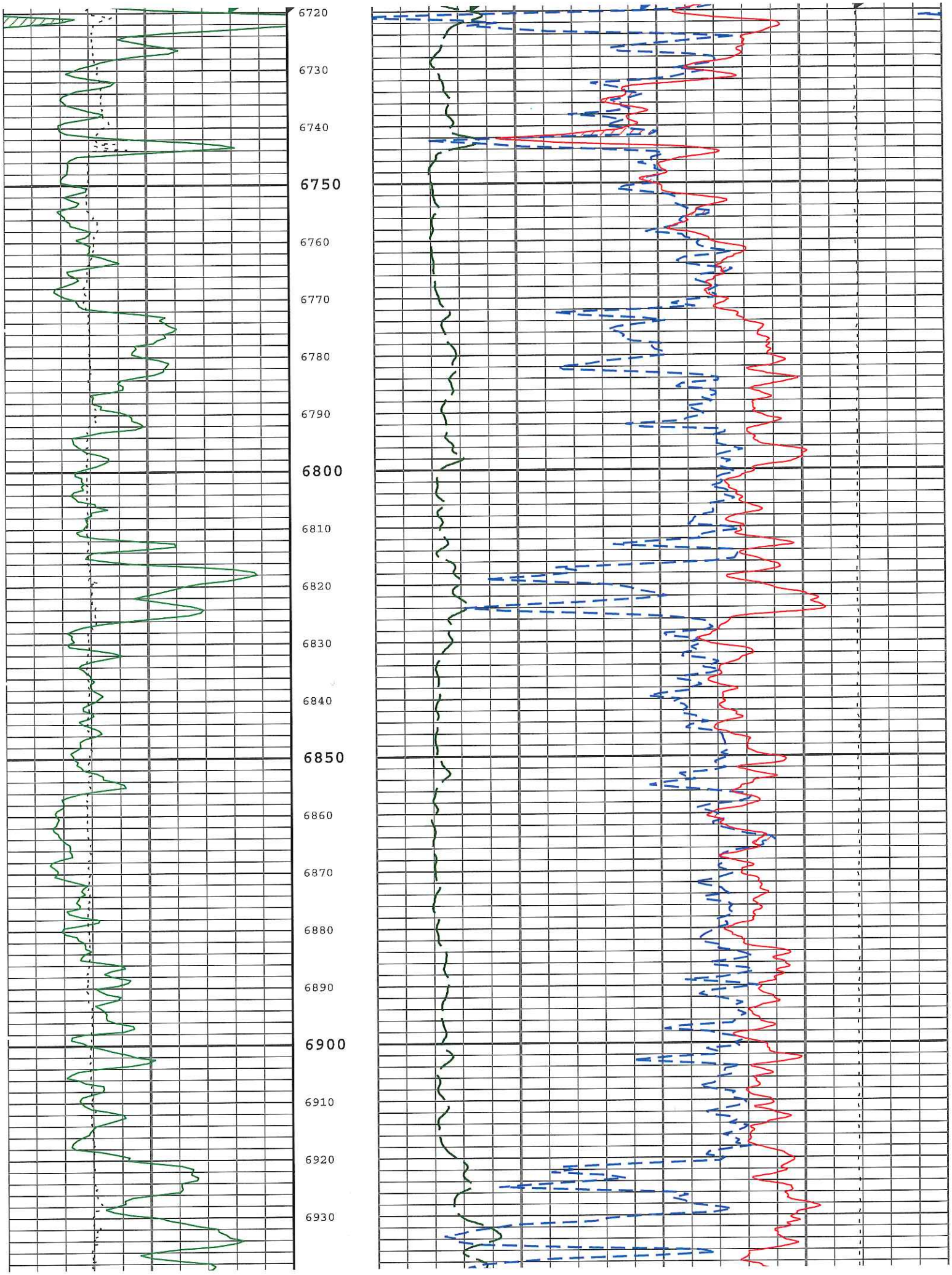
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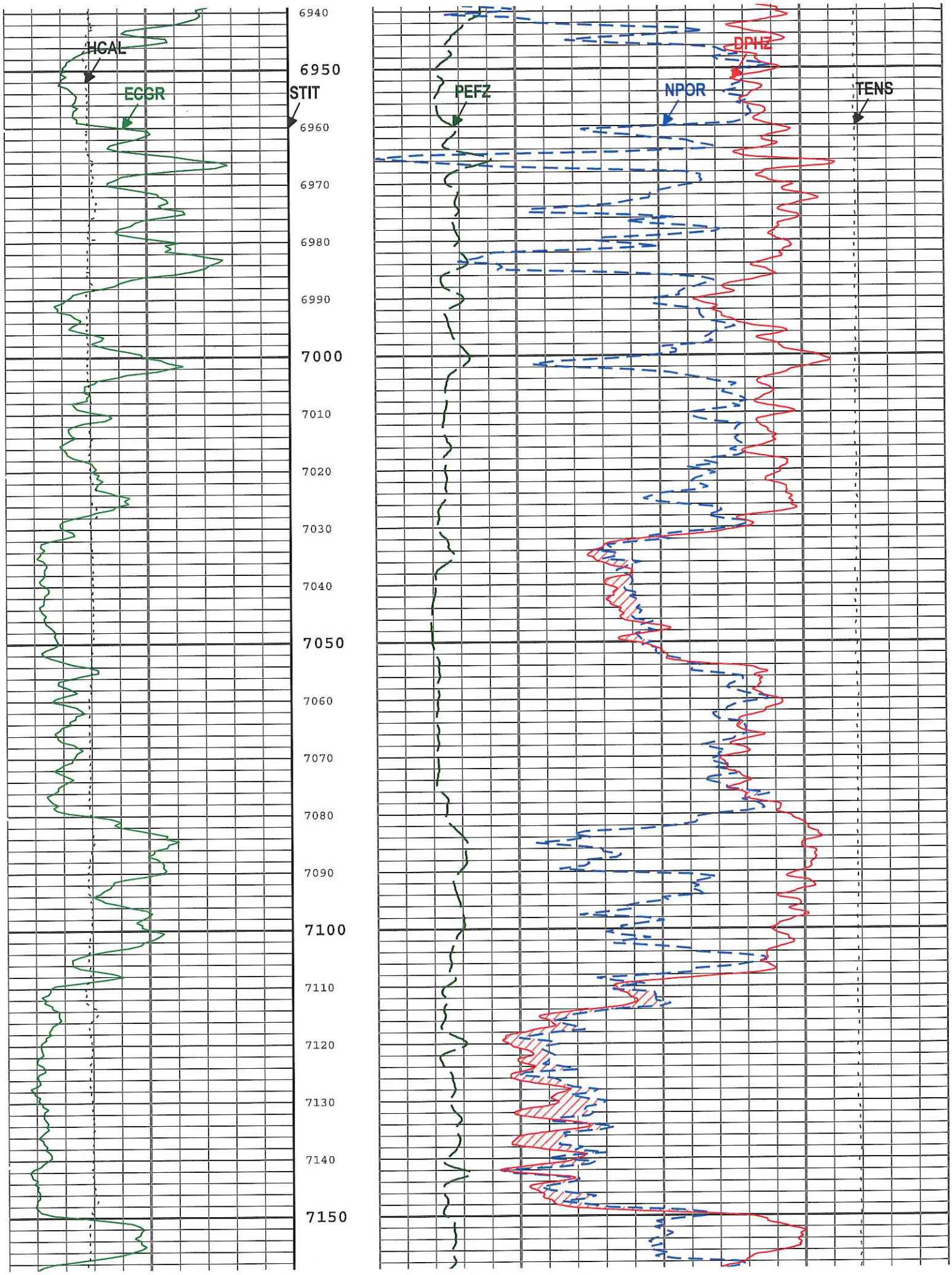
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DPHZ
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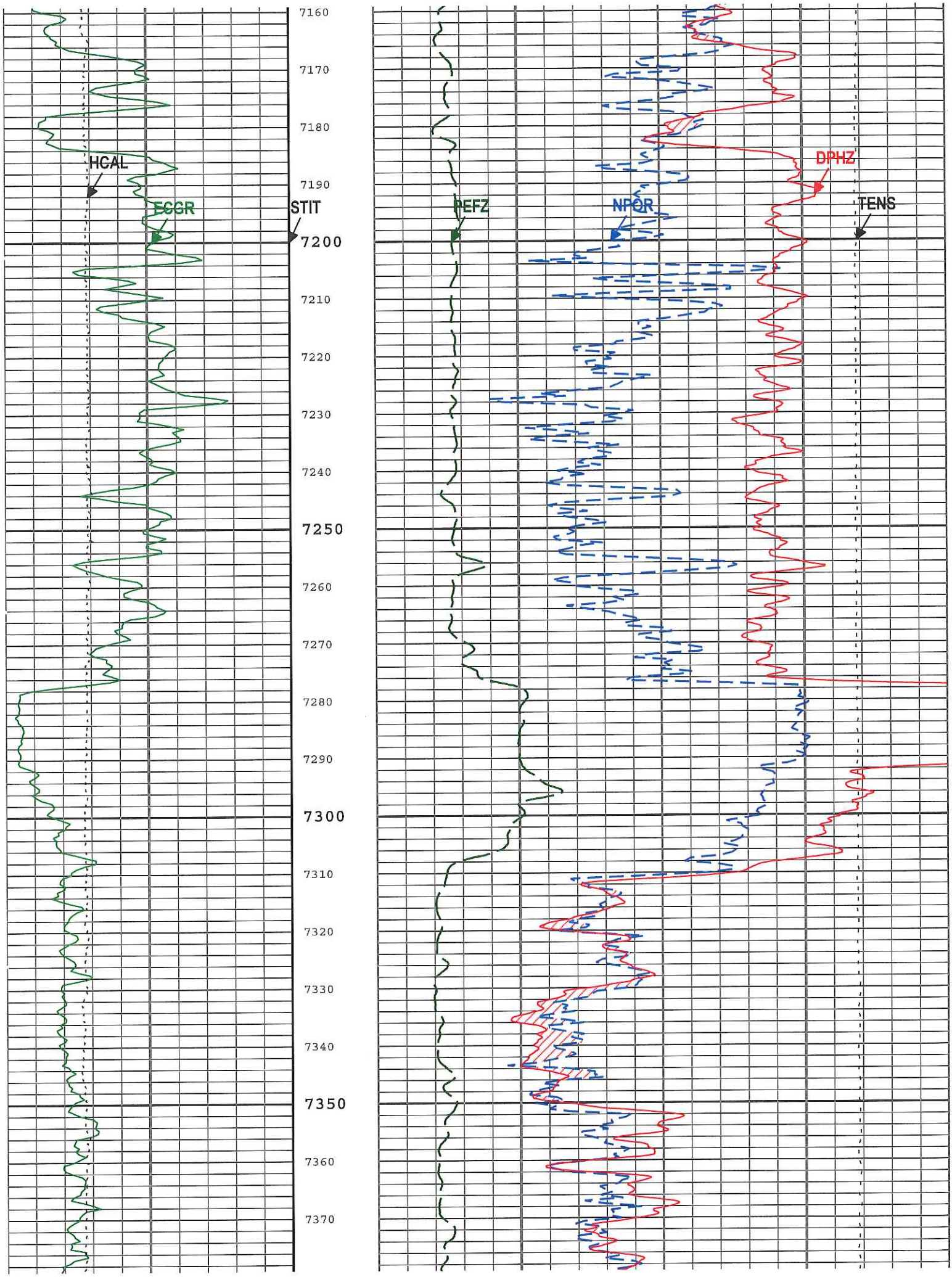
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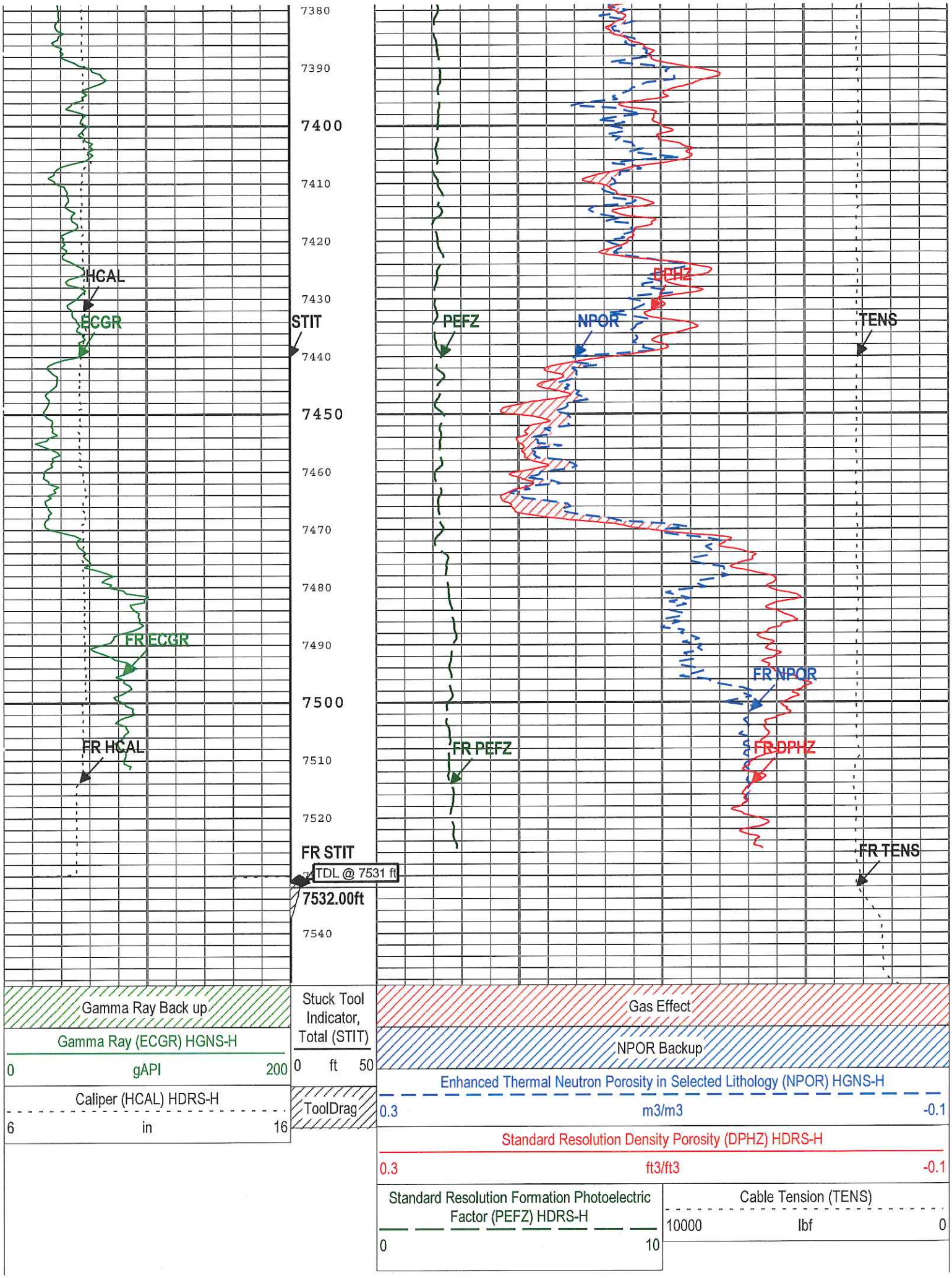
ECGR
STIT
PEFZ
NPOR
DPHZ
TENS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7520
7532.00ft
7540
HCAL
ECGR
STIT
FR ECGR
FR HCAL
FR STIT
TDL @ 7531 ft
PEFZ
NPOR
DPHZ
TENS
FR NPOR
FR PEFZ
FR DPHZ
FR TENS
Gamma Ray Back up
Gamma Ray (ECGR) HGNS-H
0 gAPI 200
Caliper (HCAL) HDRS-H
6 in 16
Stuck Tool 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)

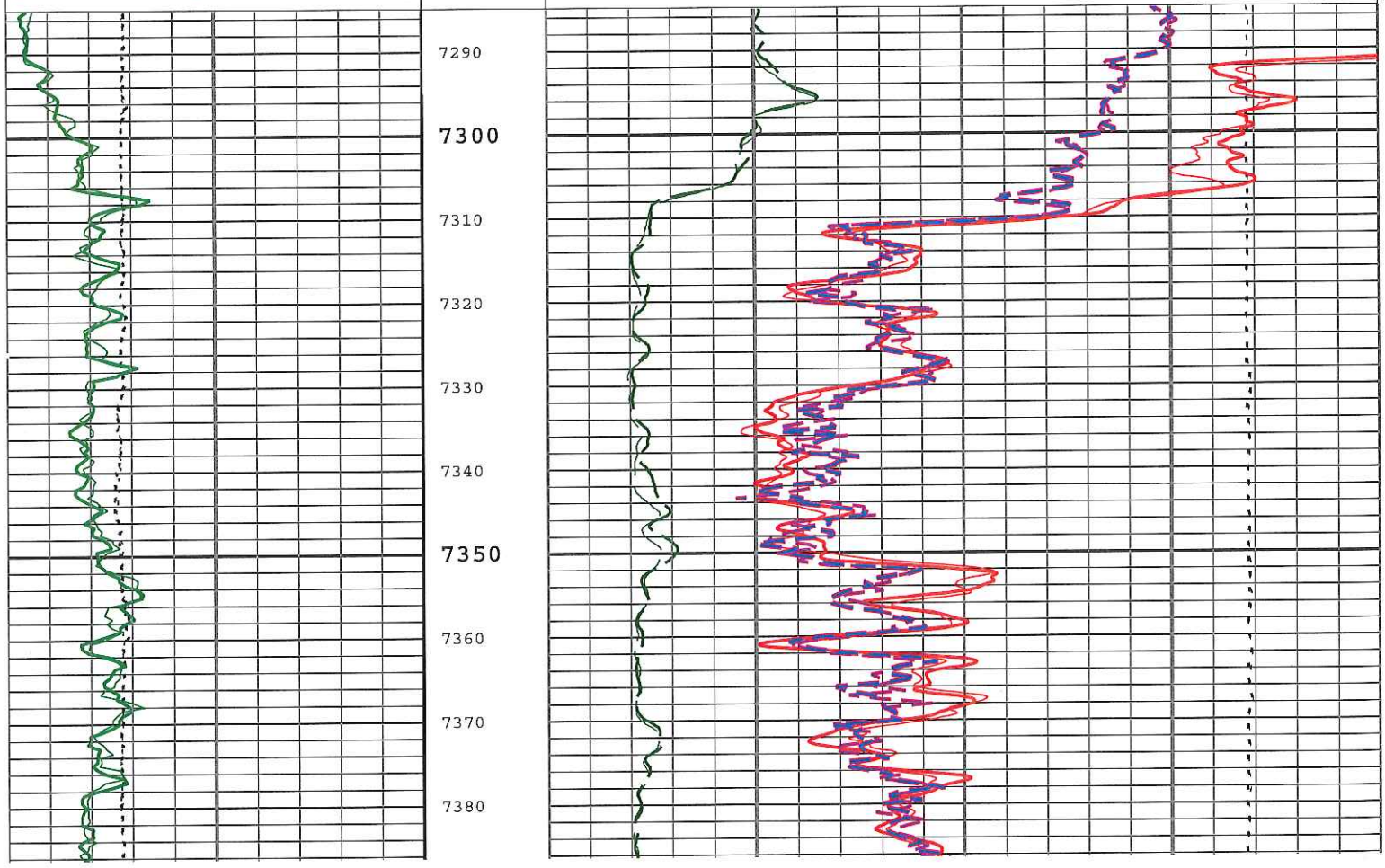
0 ft 50

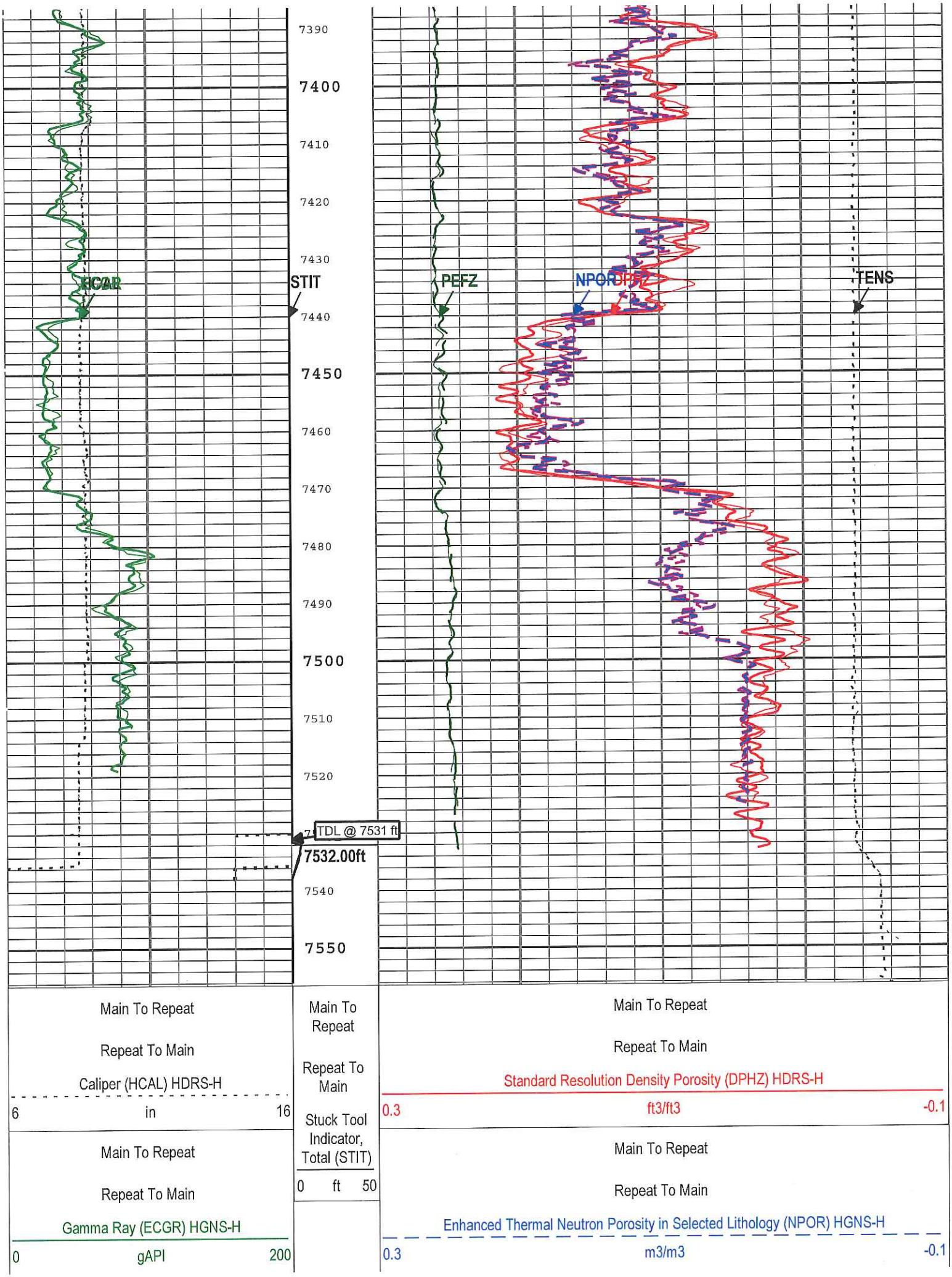
Main To Repeat

Repeat To Main

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

0.3 m3/m3 -0.1

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7540
7550
HCAL
STIT
PEFZ
NPOR
TENS
TDL @ 7531 ft
7532.00ft
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

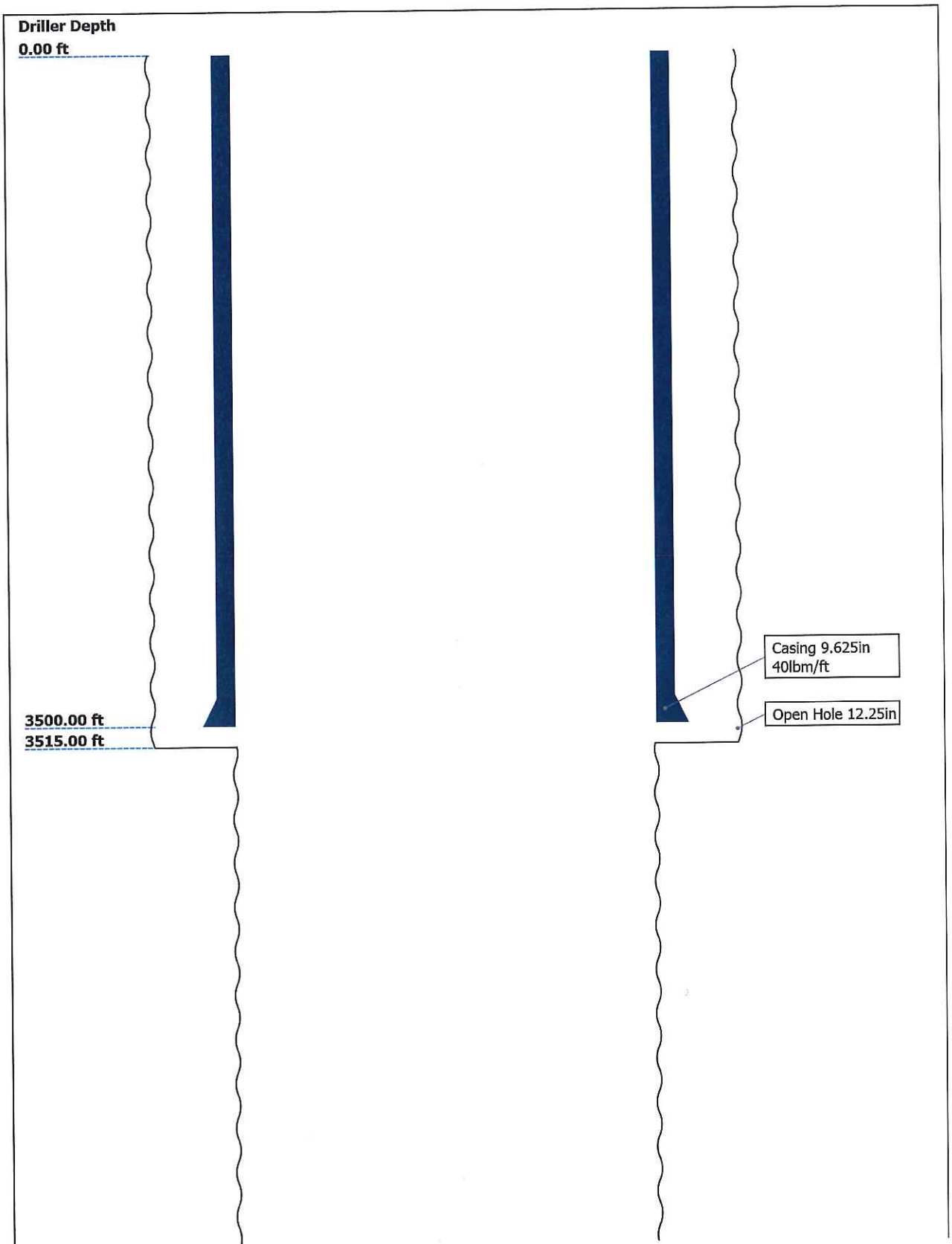
Logging Date	05-Sep-2016		
Run Number	One		
Depth Driller	7525.00 ft		
Schlumberger Depth	7532.00 ft		
Bottom Log Interval	7532.00 ft		
Top Log Interval	3498.00 ft		
Casing Driller Size @ Depth	9.625 in @ 3500.00 ft		
Casing Schlumberger	3498 ft		
Bit Size	8.75 in		
Type Fluid In Hole	WBM		
MUD Density / 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

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

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

Equip name	Length
LEH-QT	**43.57**
LEH-QT	
DTC-H:8980	**40.65**
ECH-KC:10053	
DTC-H:8980	
HGNS-H:4817	**37.65**
HGNH:4865	
NPV-N	
NSR-F:5068	
HGNS-H:4817	
HACCZ-H:6991	
HMCA-H	

MP name	Offset
CTEM	**39.75**
HV	**0.00**
TelStatus	**37.65**
ToolStatus	**37.65**
Temperature	**37.62**
GR	**36.91**
CNL Porosity	**30.57**
HMCA	**28.24**
HGNS	**28.24**
Accelerometer	**0.00**

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

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

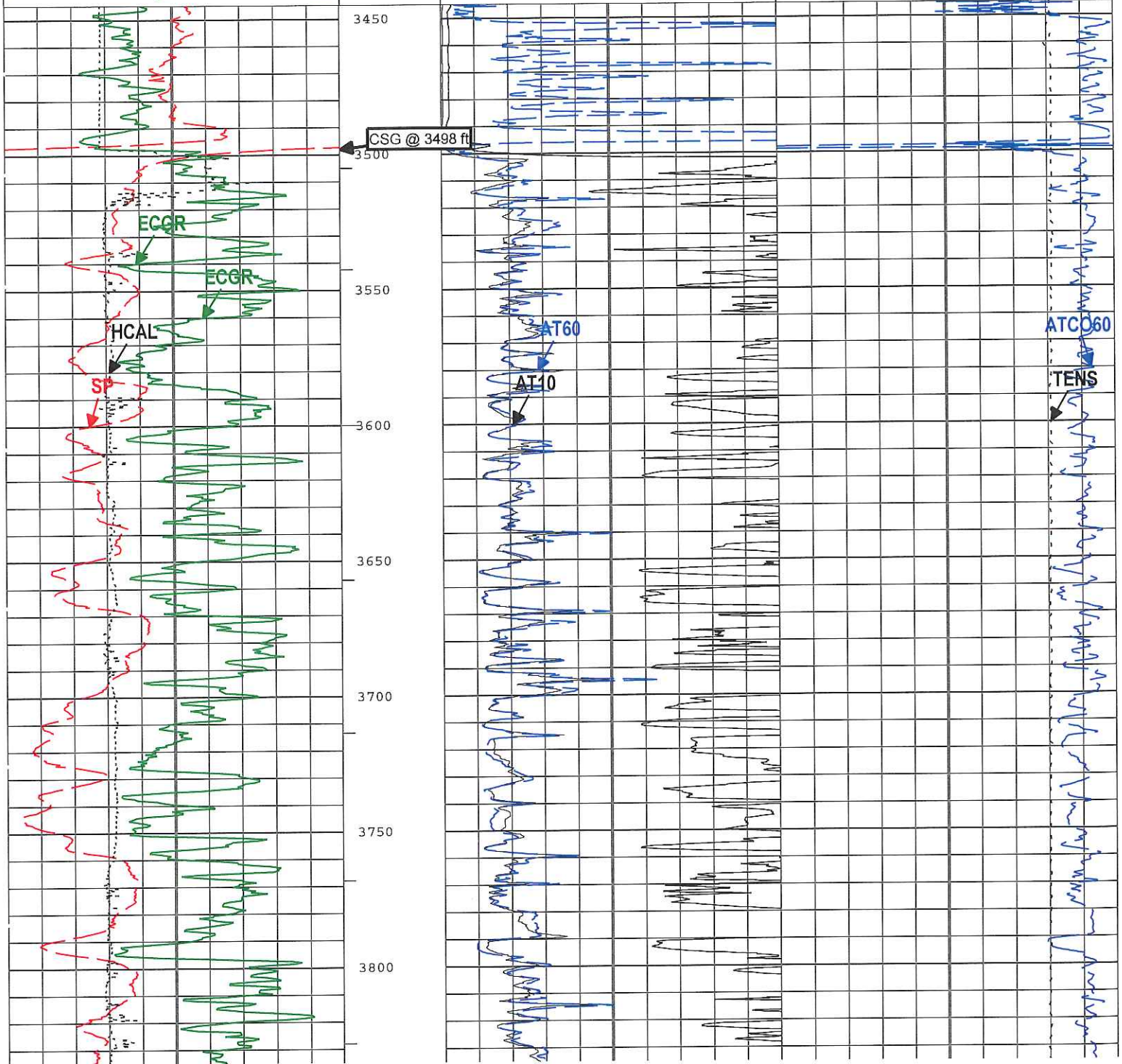
0 ohm.m 10

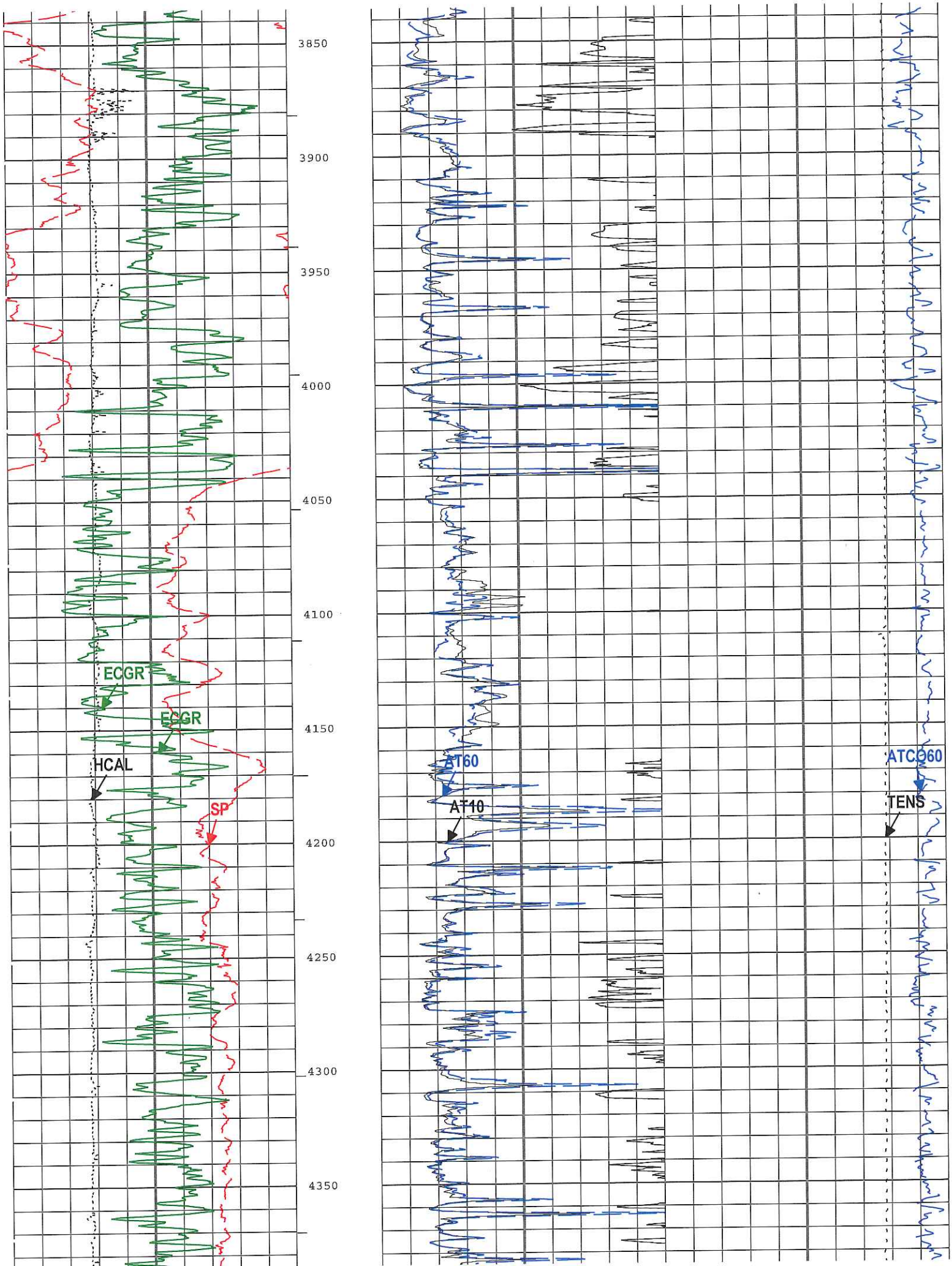
Cable Tension (TENS)

10000 lbf 0

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

1000 mS/m 0

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4350
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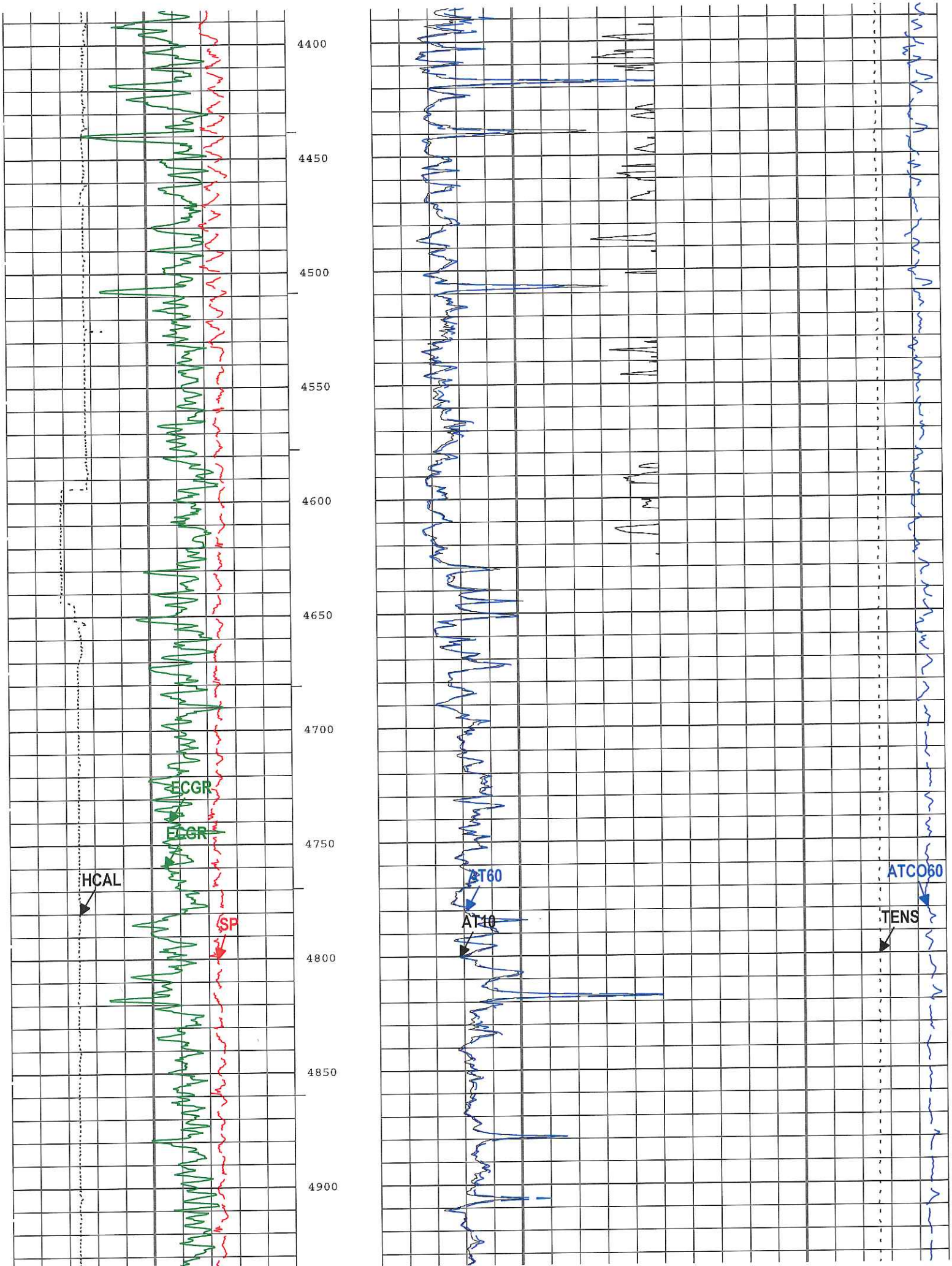
ECGR
HCAL
SP
AT60
AT10
ATC060
TENS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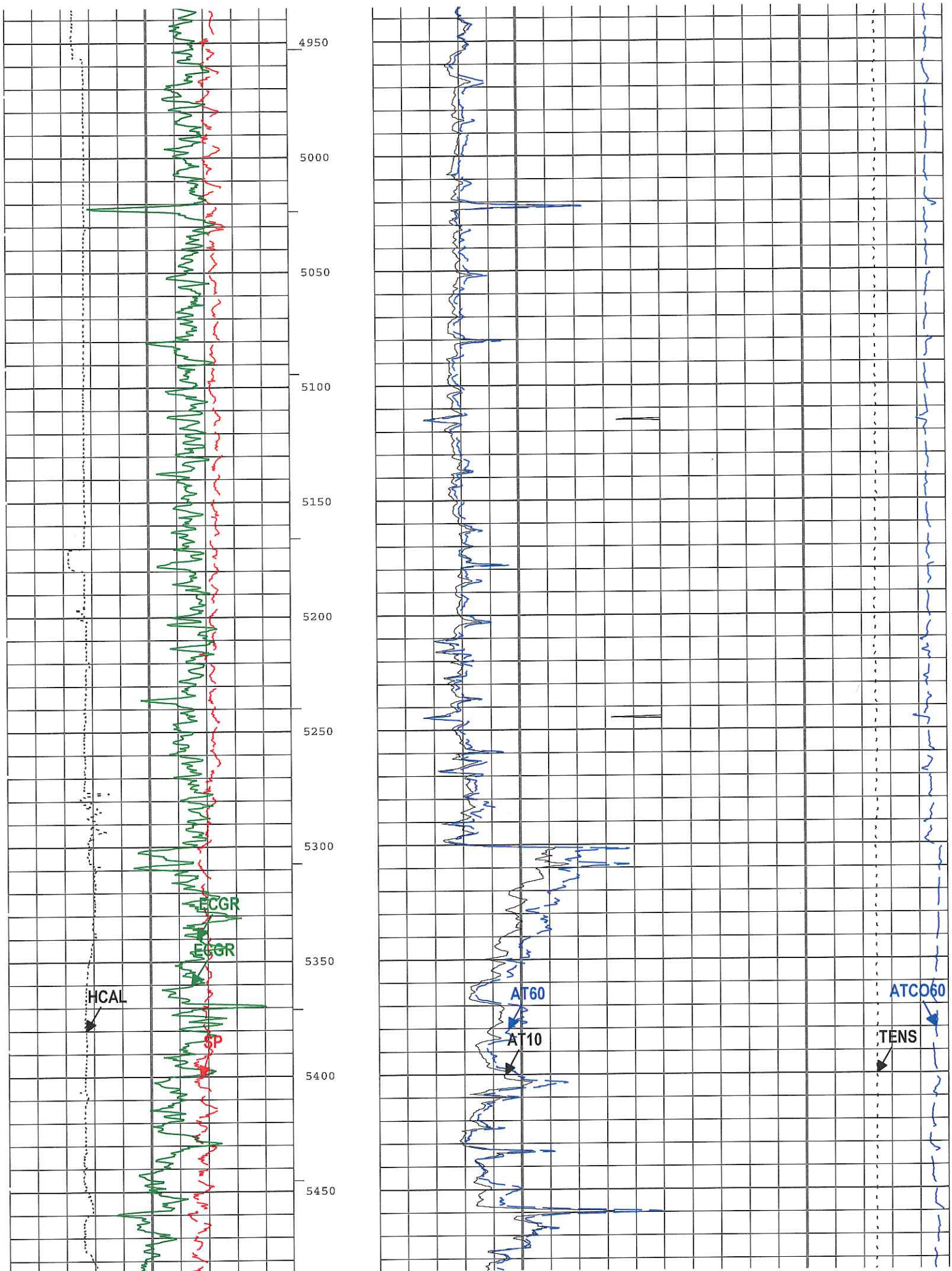
ATCO60
TENS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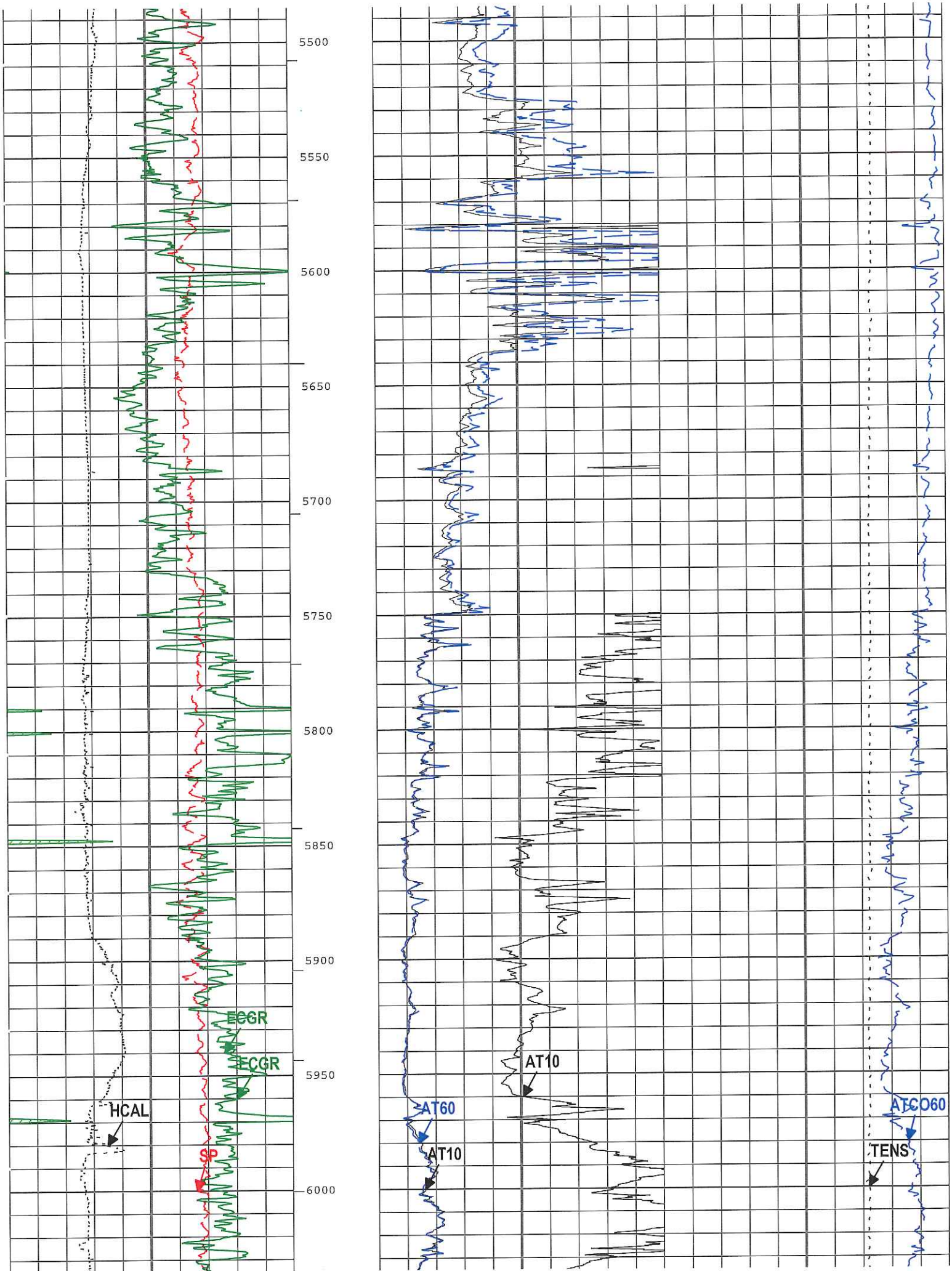
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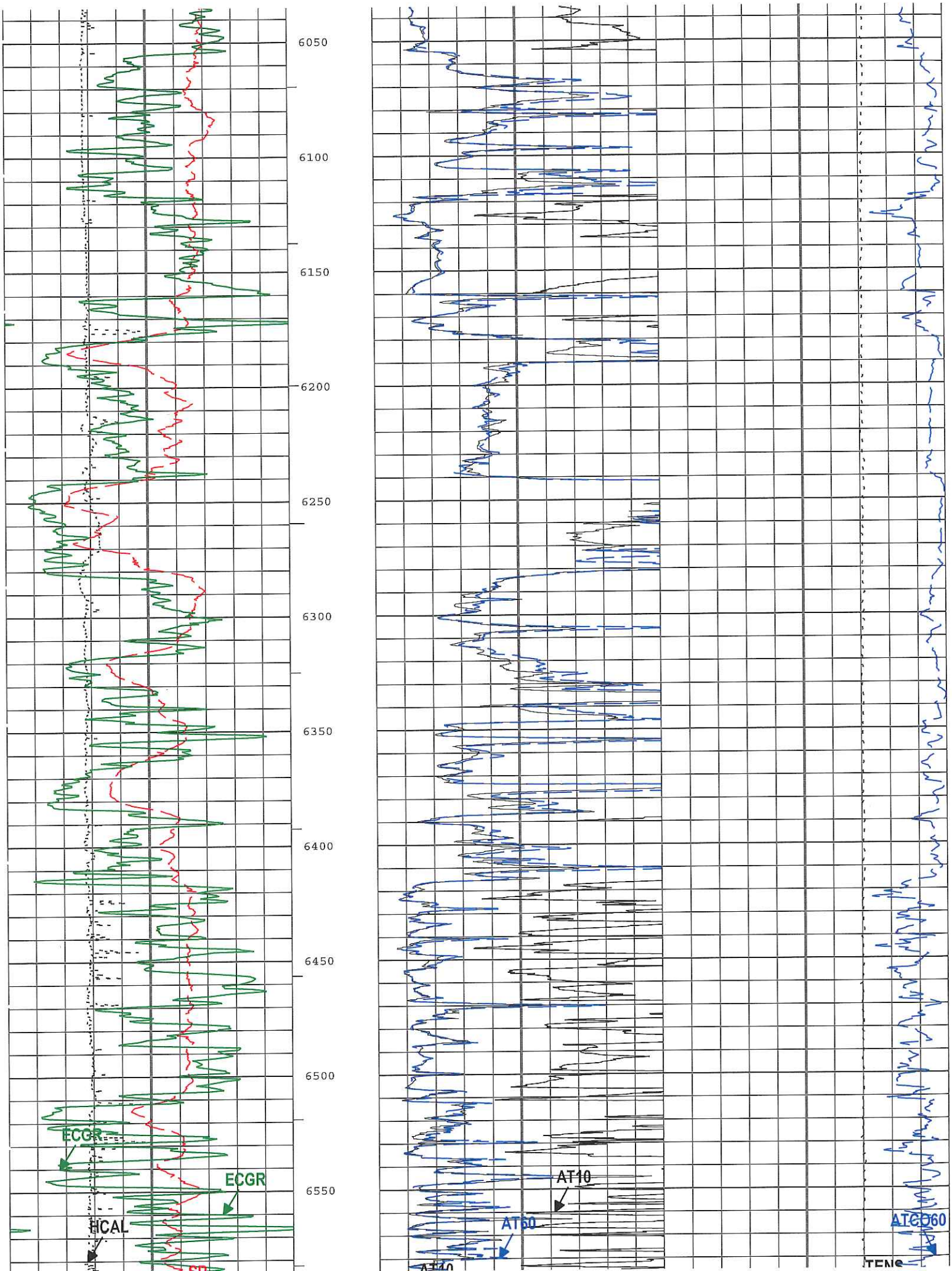
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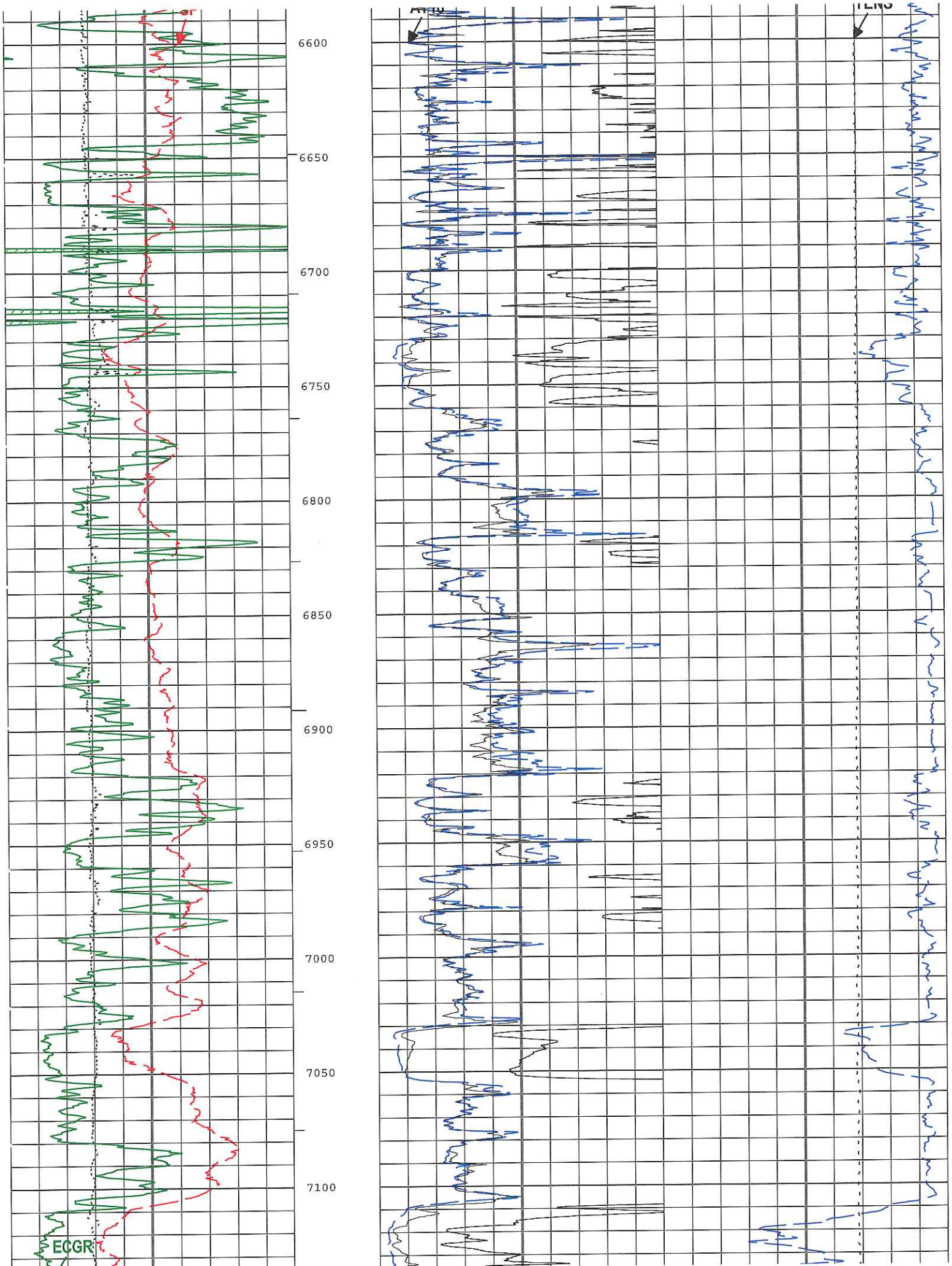
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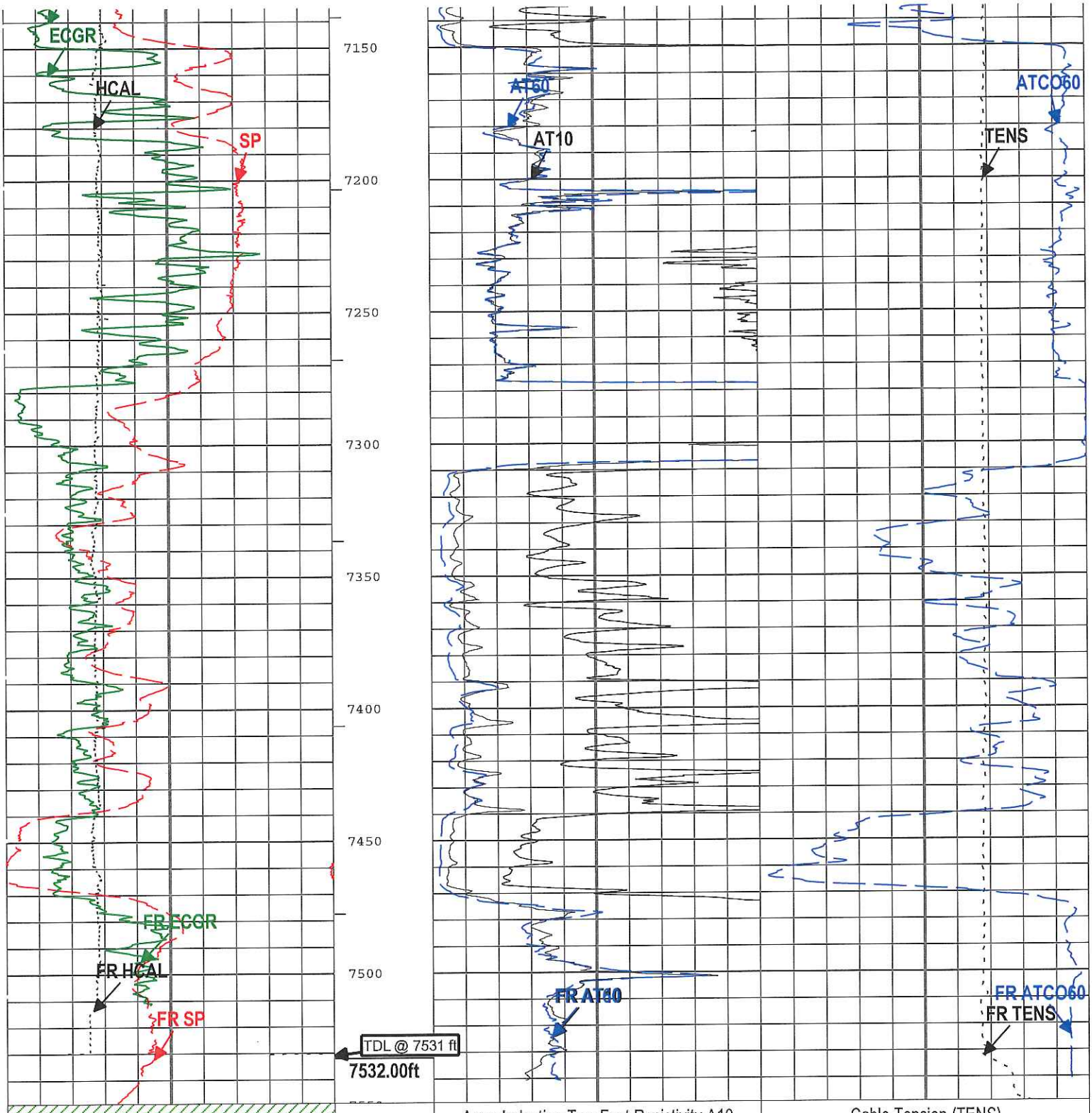


Gamma Ray Backup

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_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

Gamma Ray Backup

Spontaneous Potential (SP) AIT-M

-80 mV 20

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

0.2 ohm.m 2000

Caliper (HCAL) HDRS-H

6 in 16

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

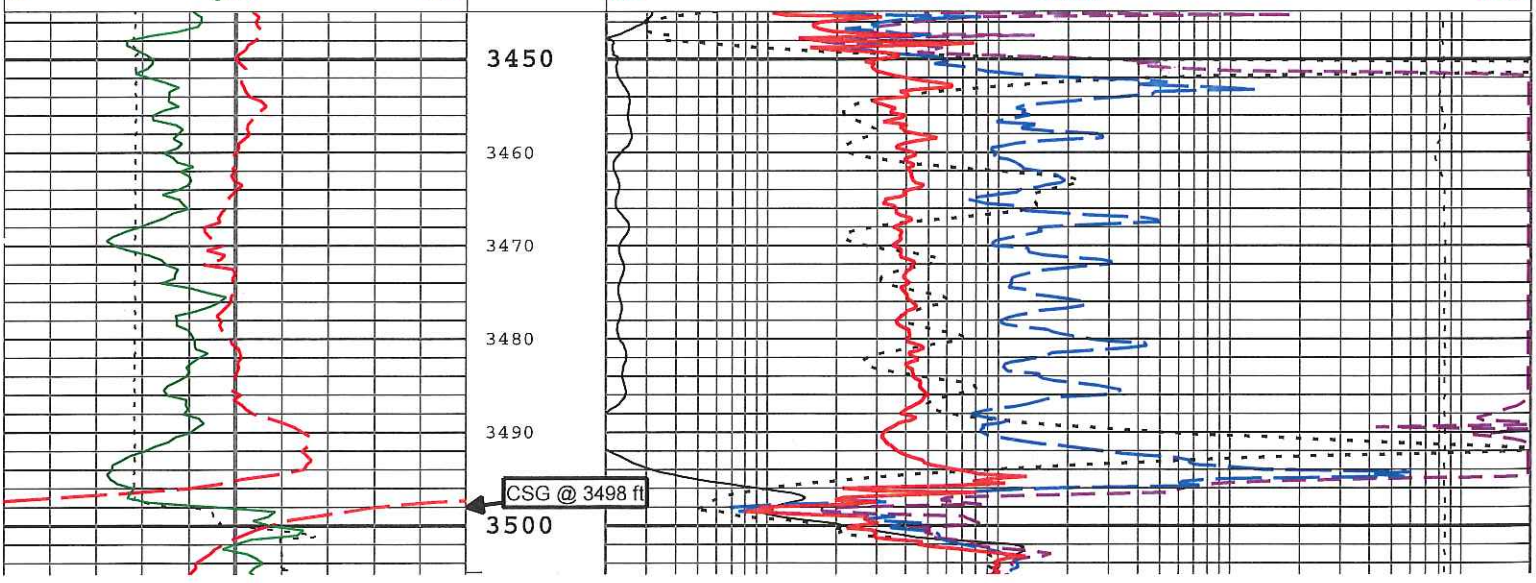
0.2 ohm.m 2000

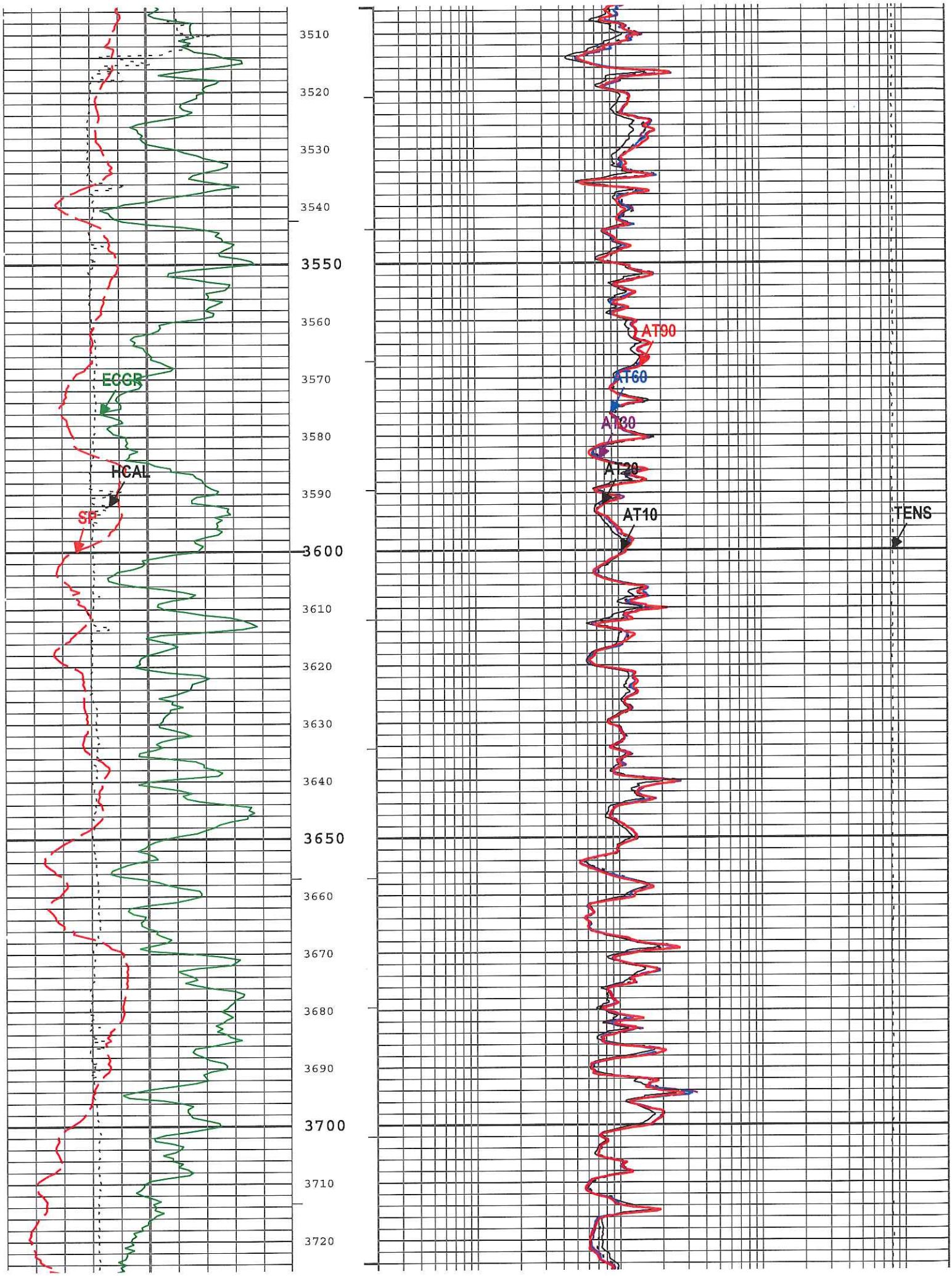
Gamma Ray (ECGR) HGNS-H

0 gAPI 200

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

0.2 ohm.m 2000

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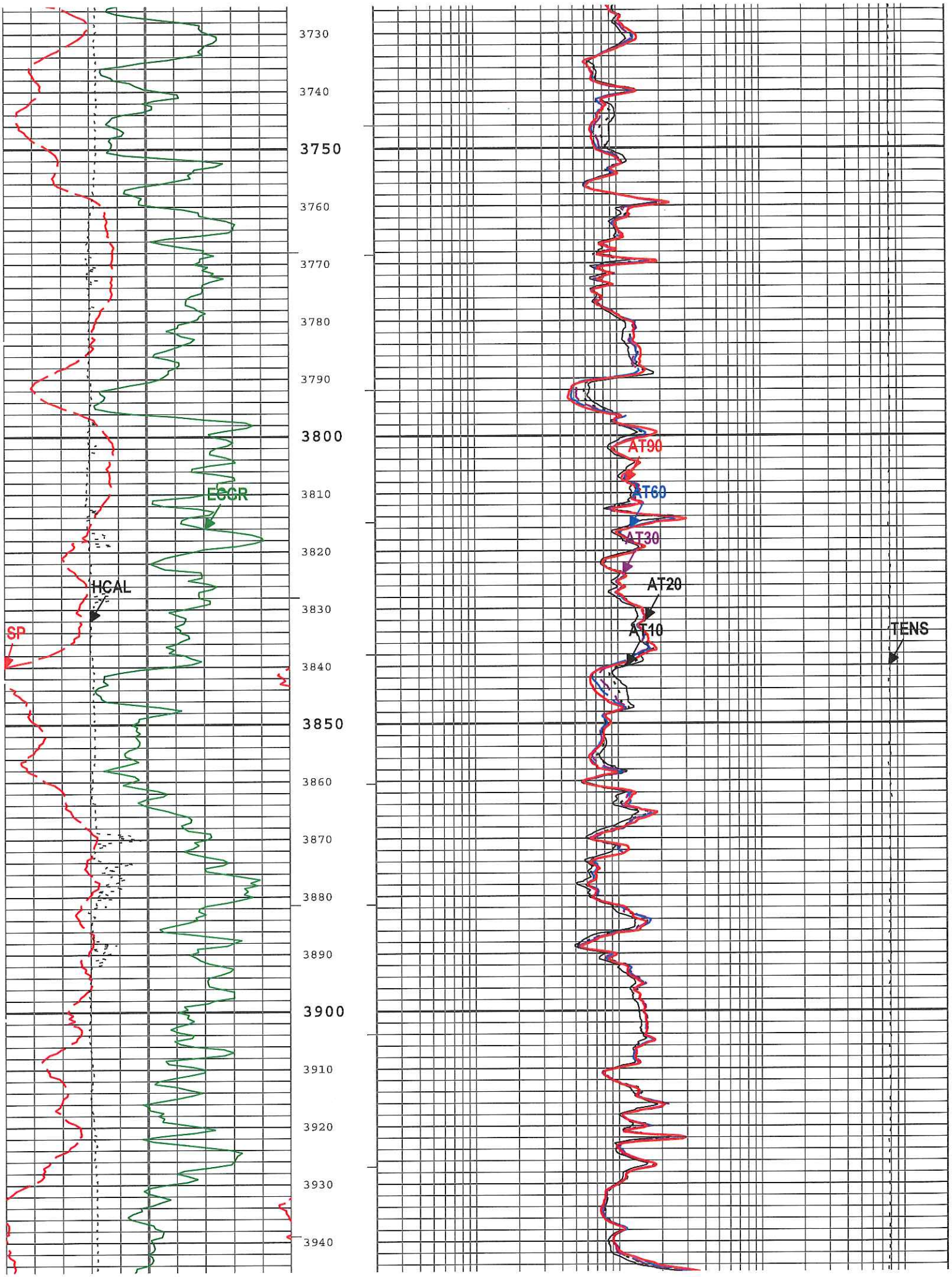
TENS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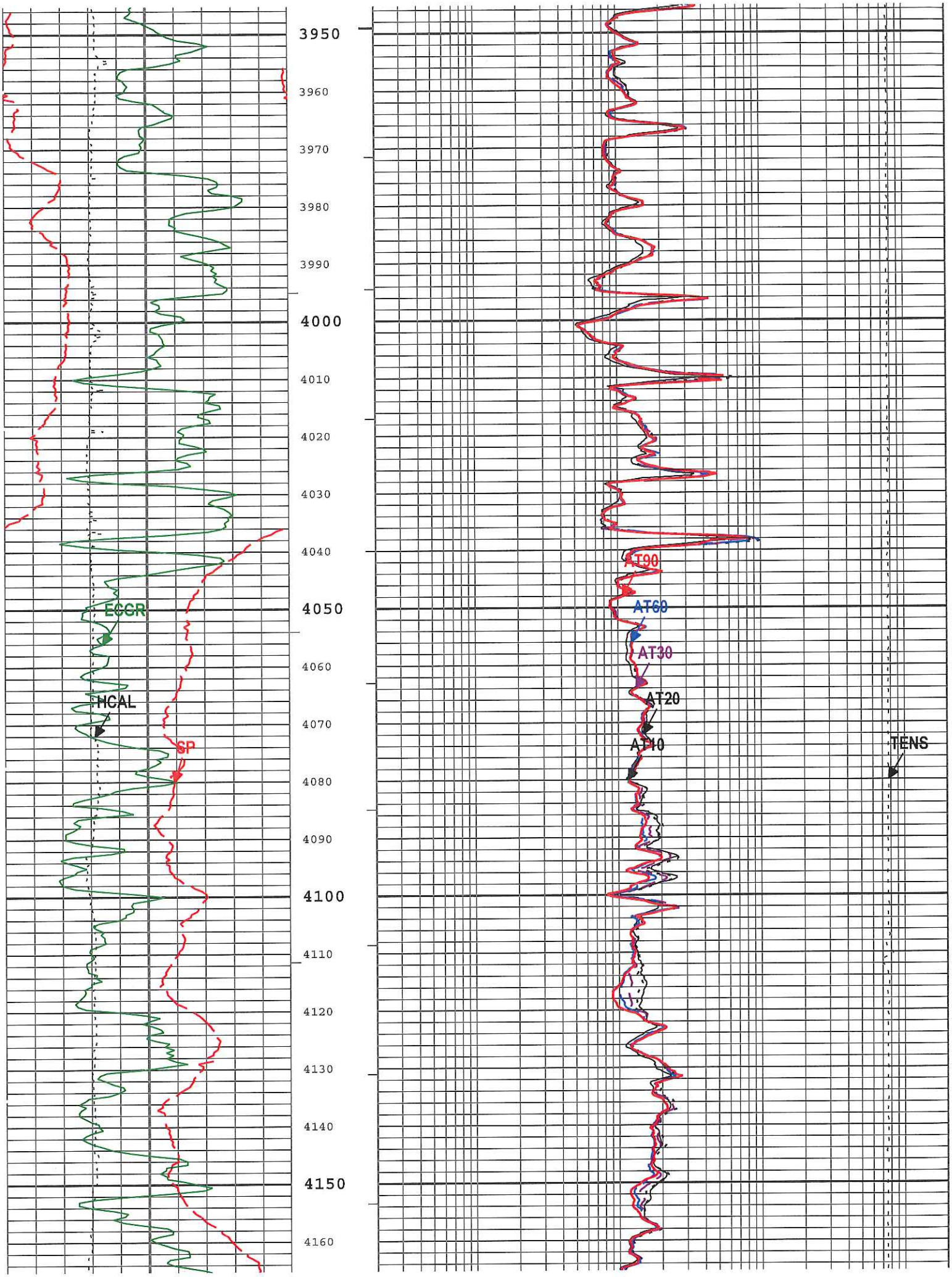
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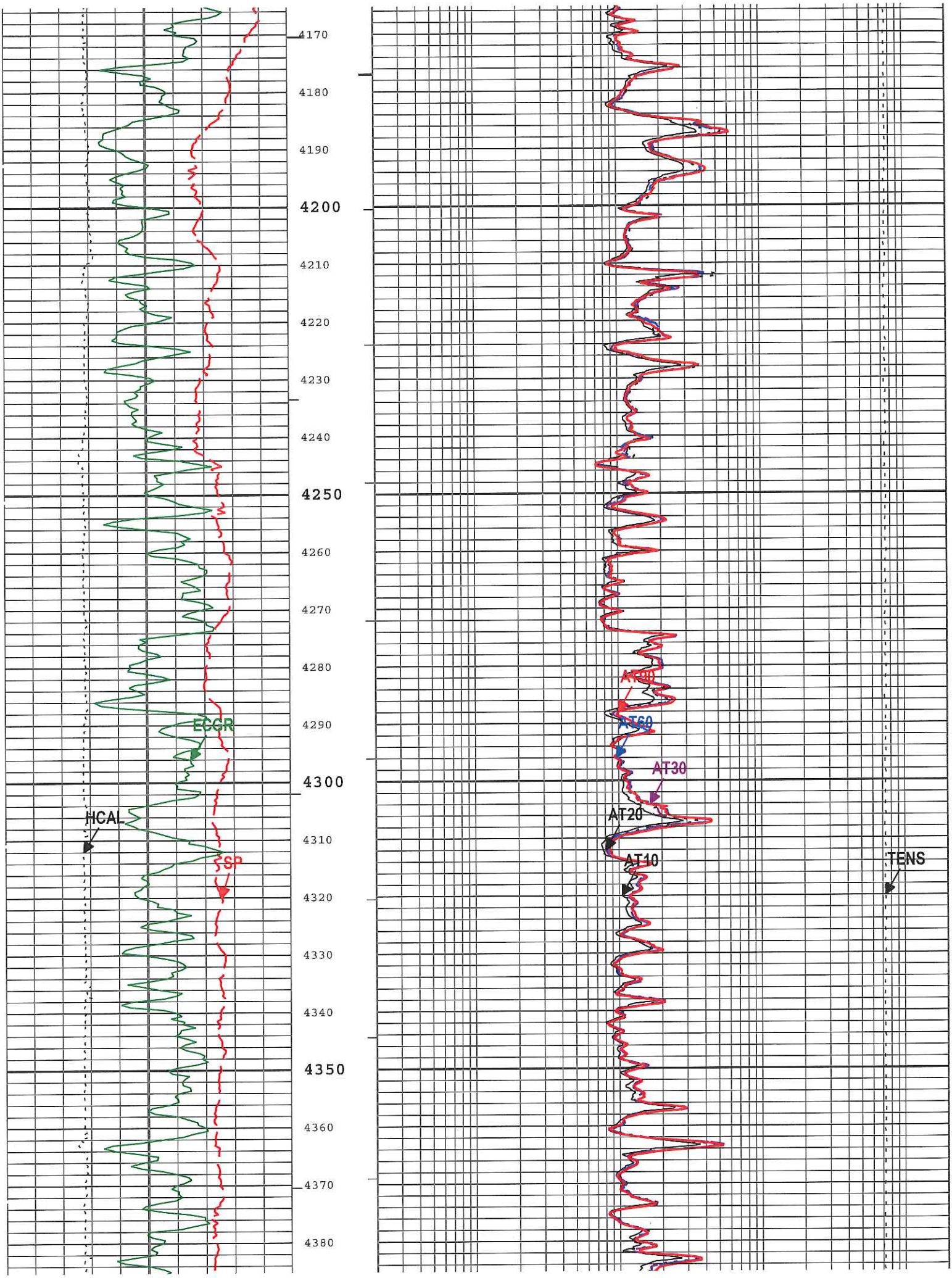
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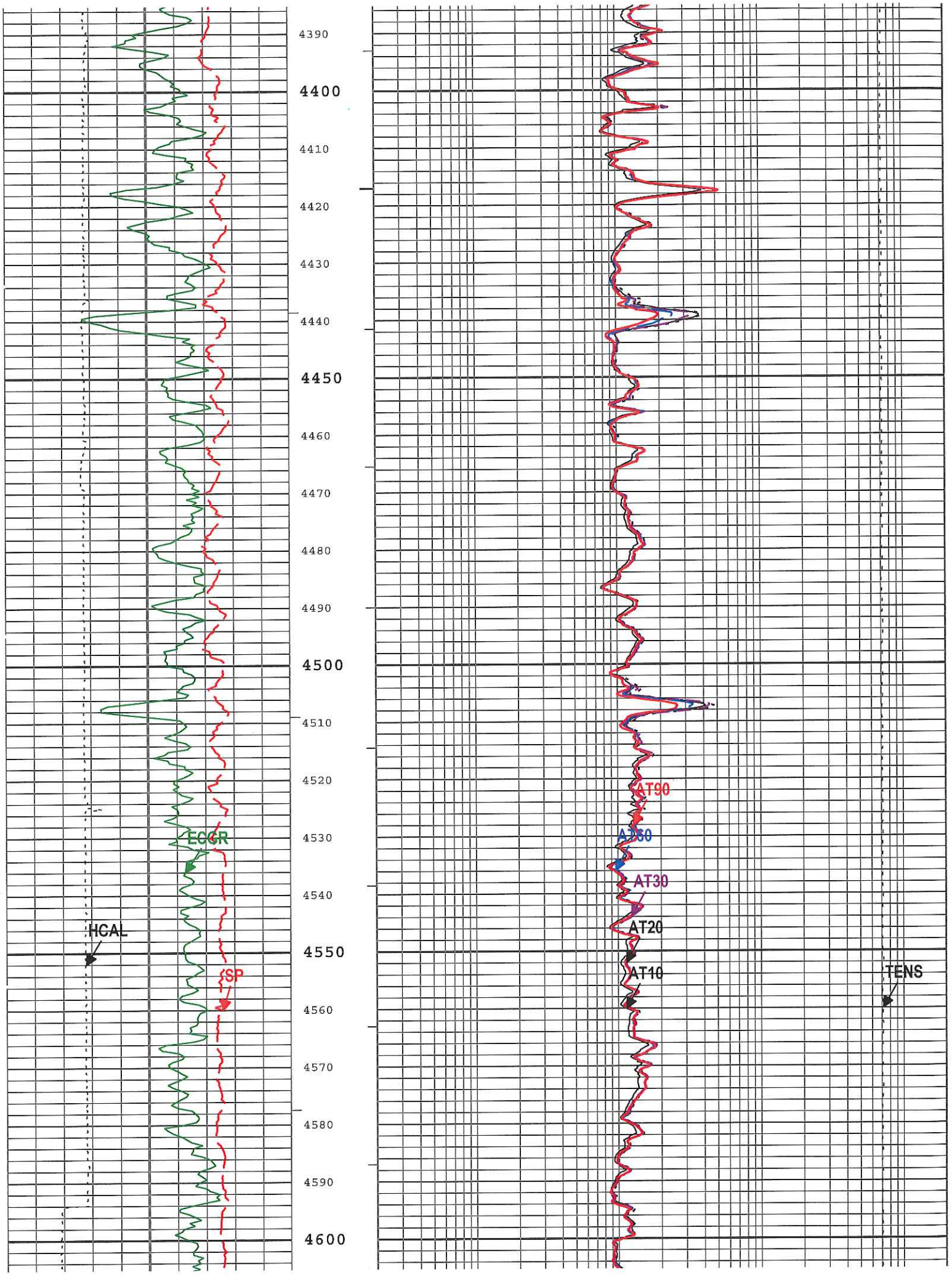
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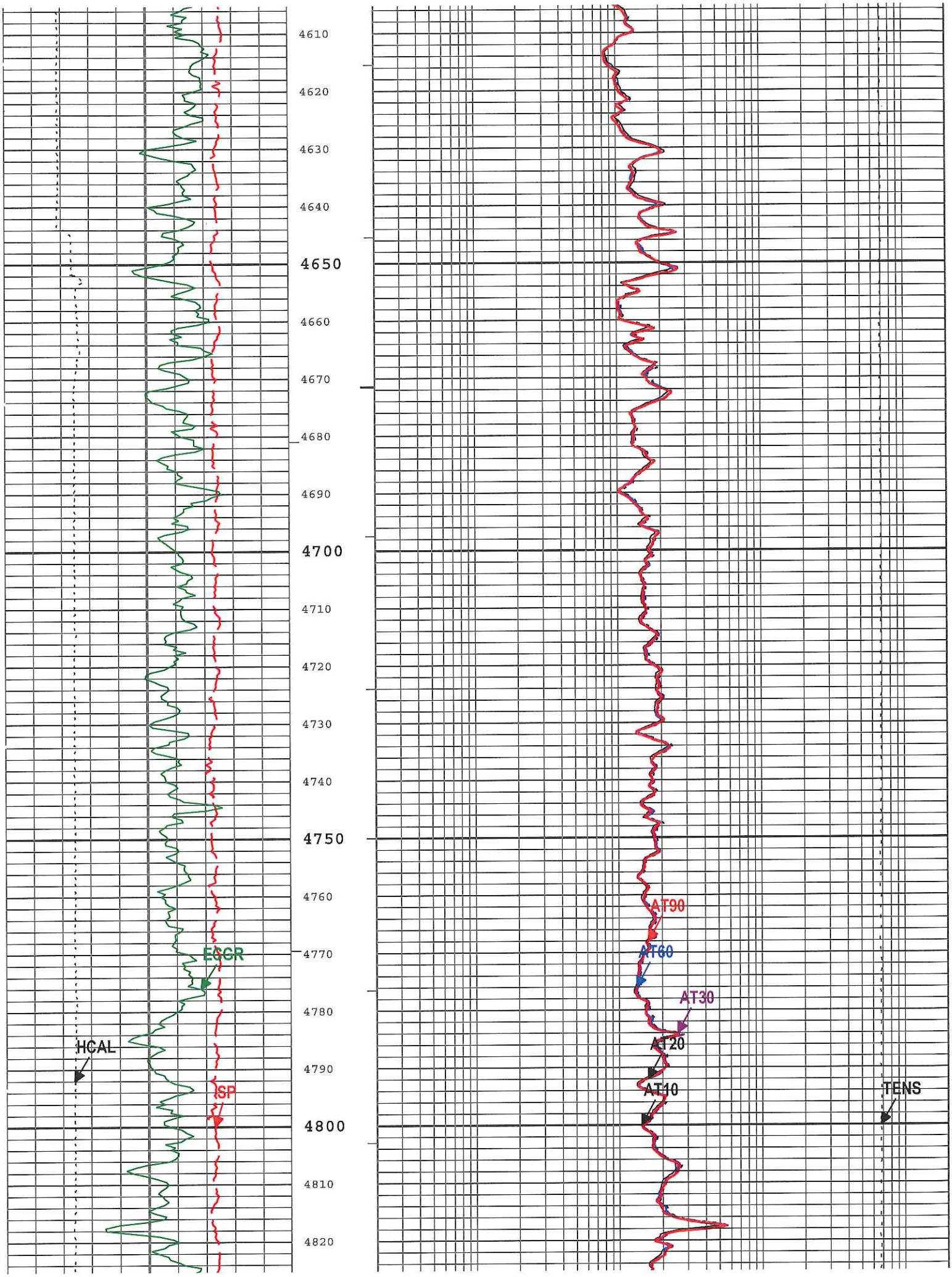
TENS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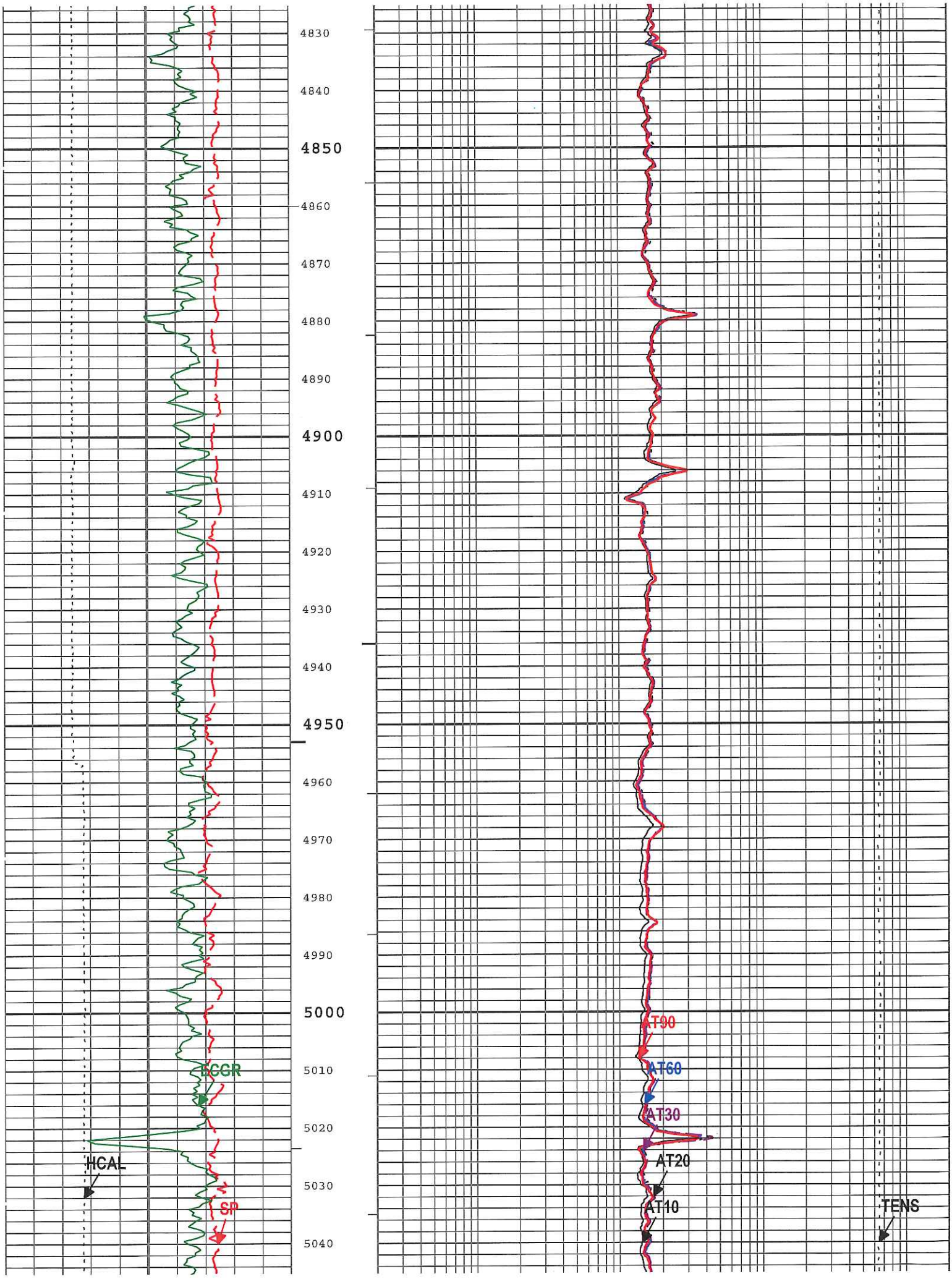
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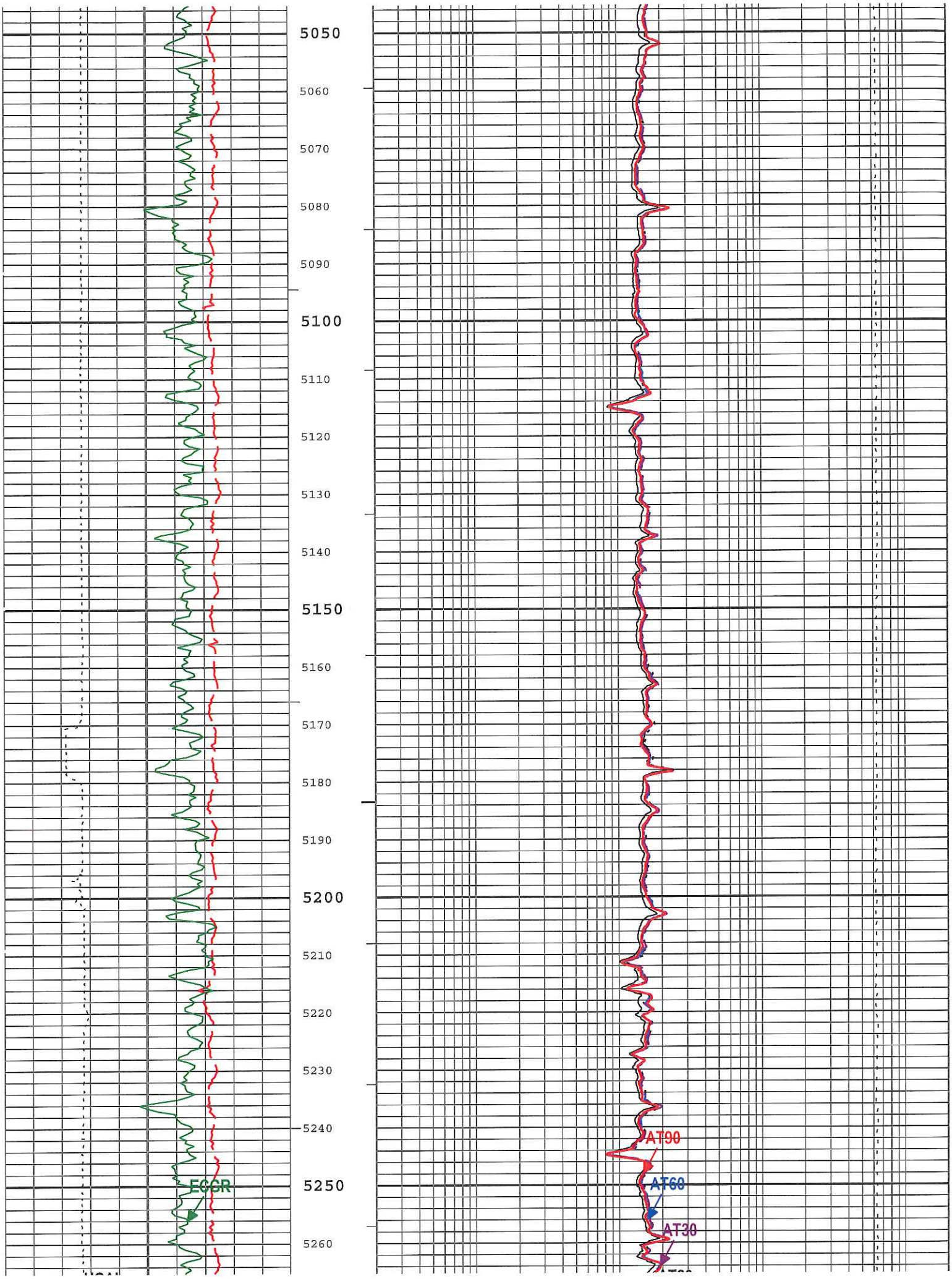
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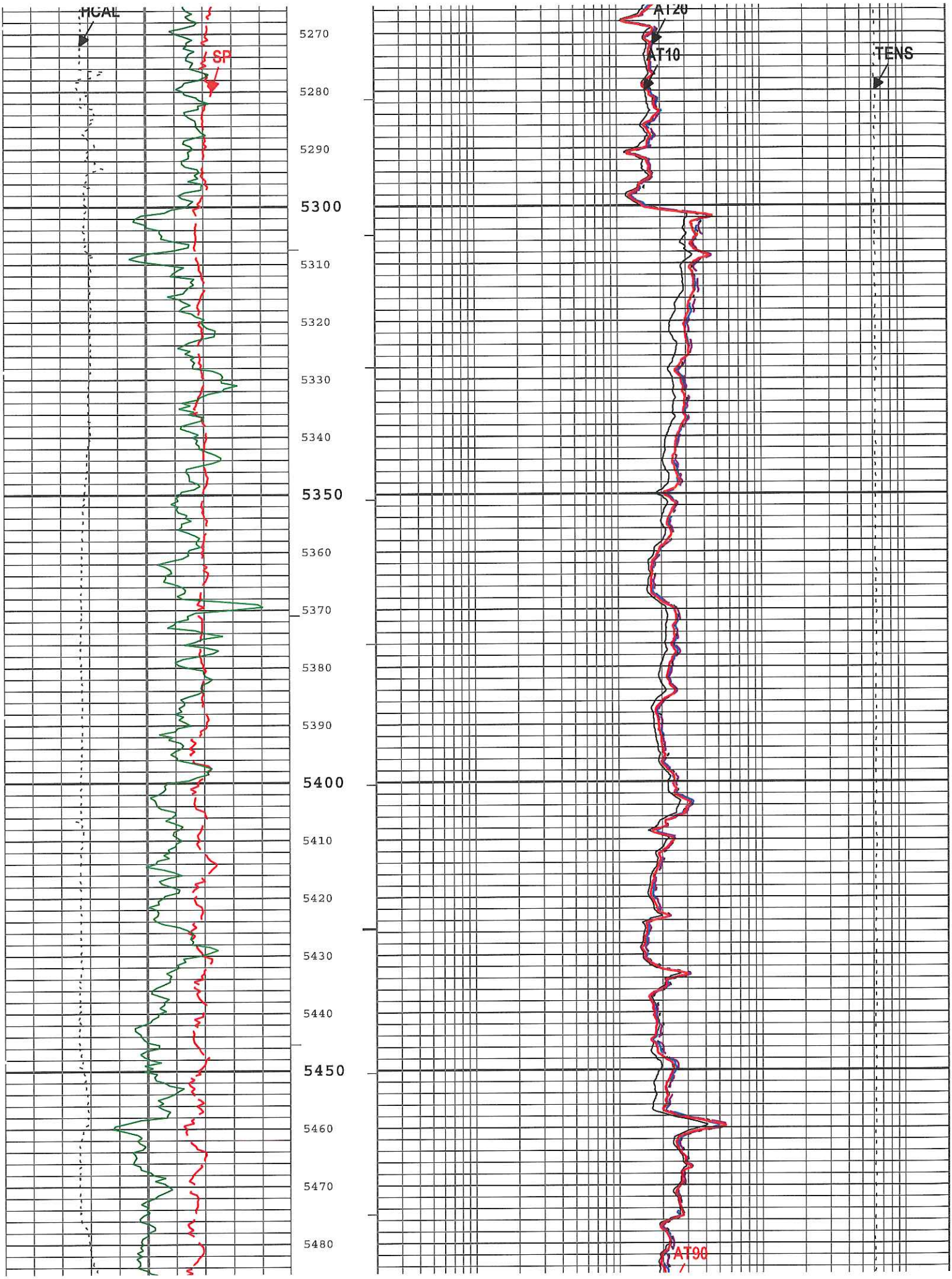
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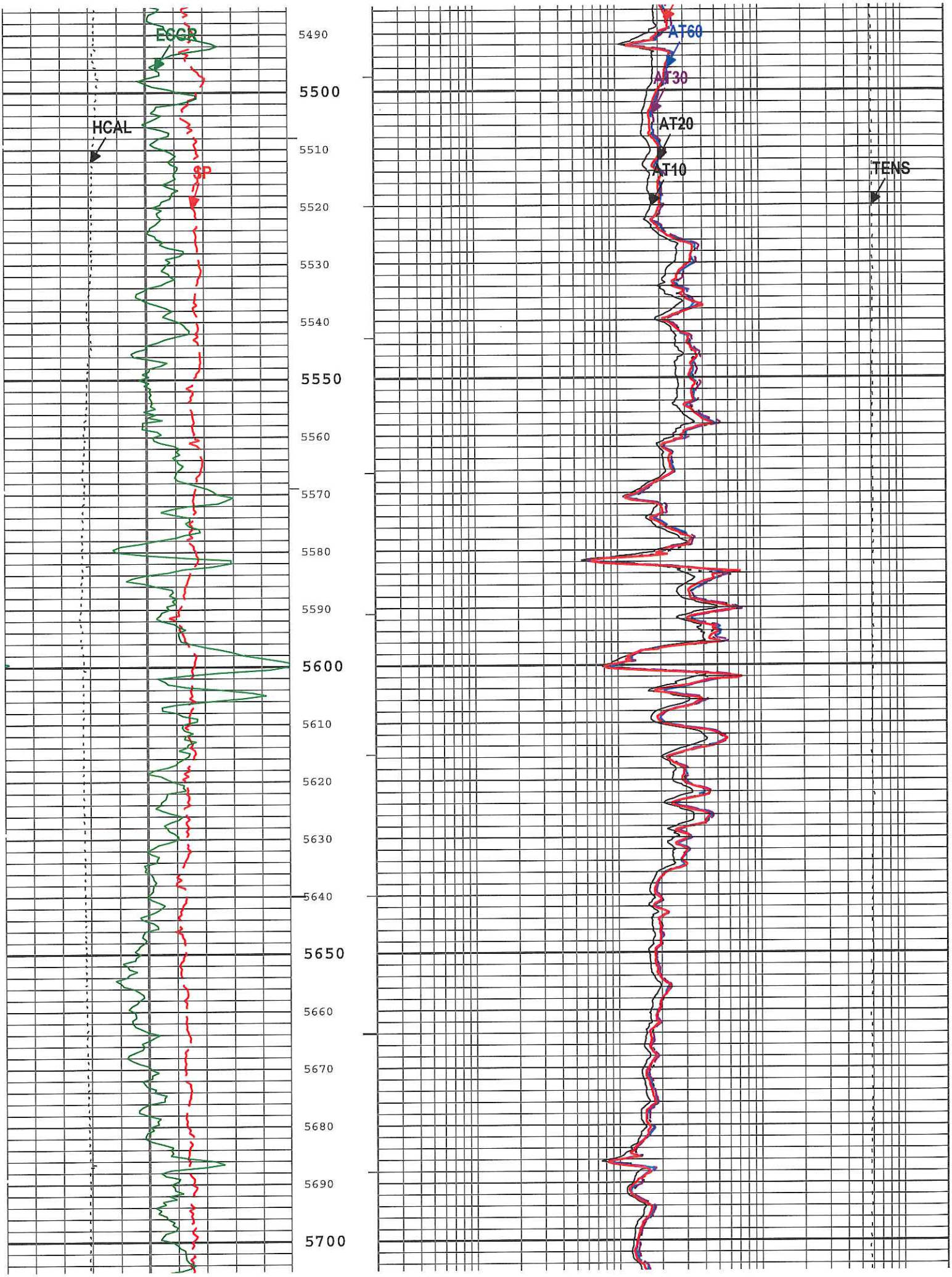
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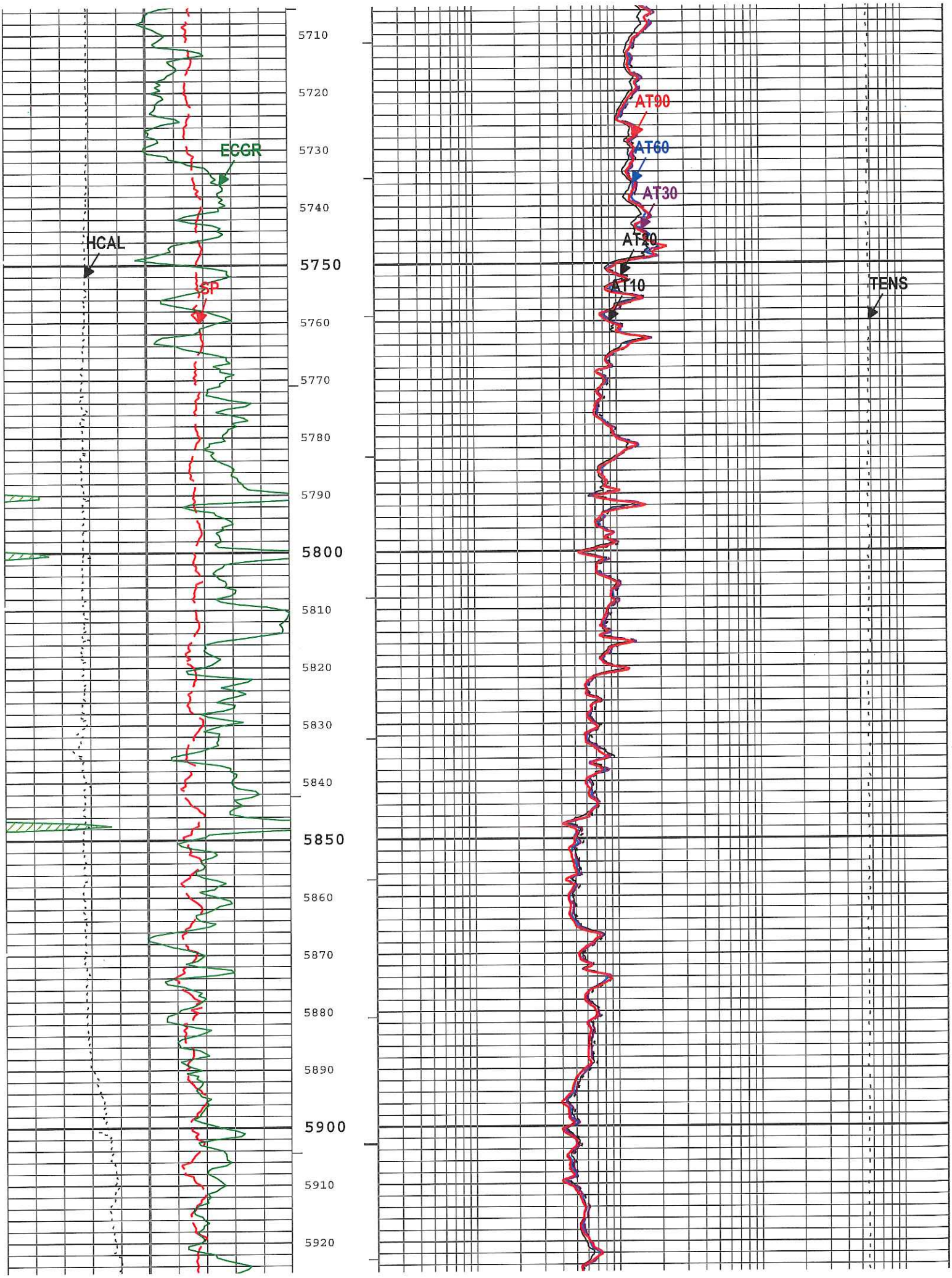
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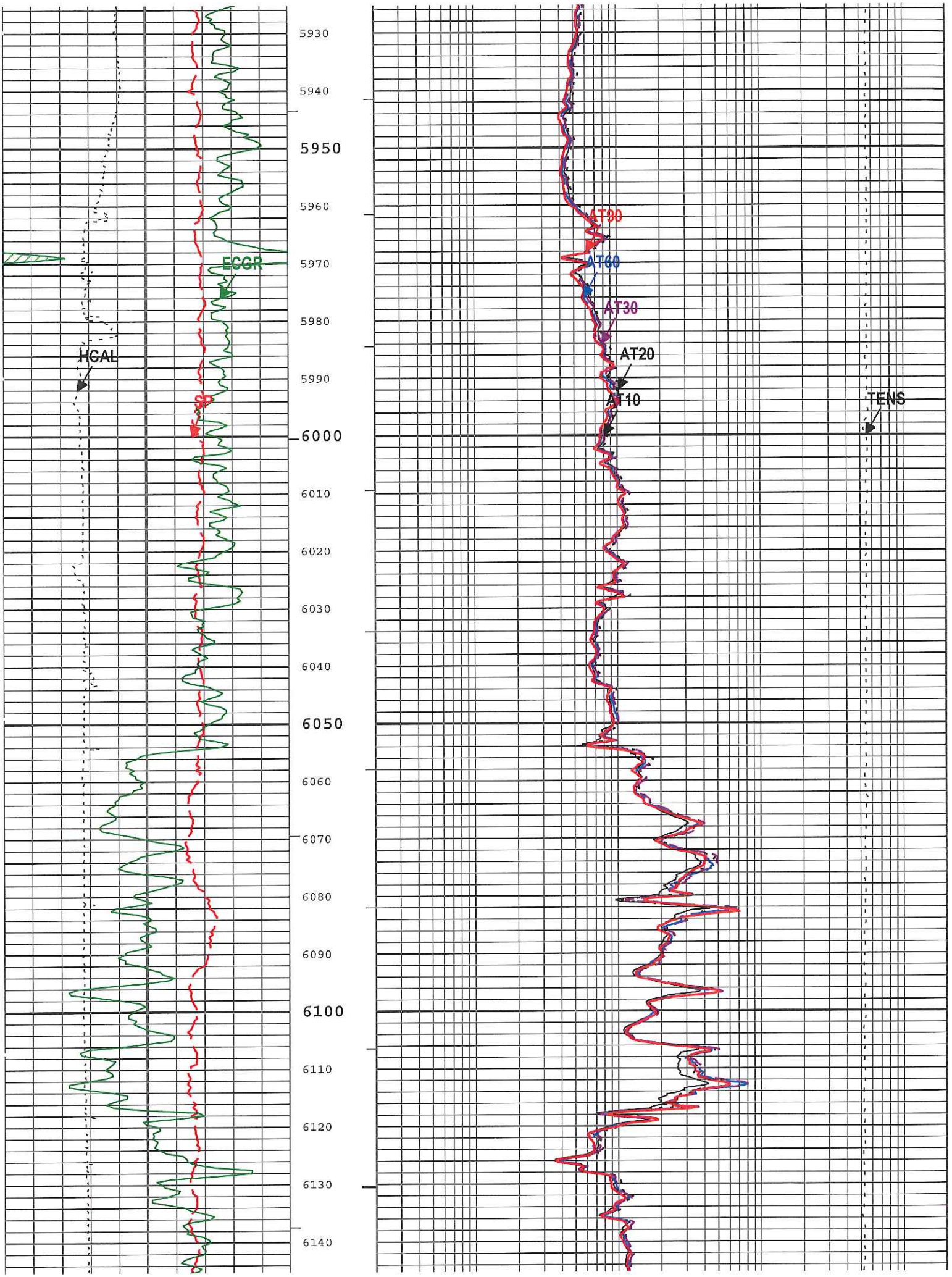
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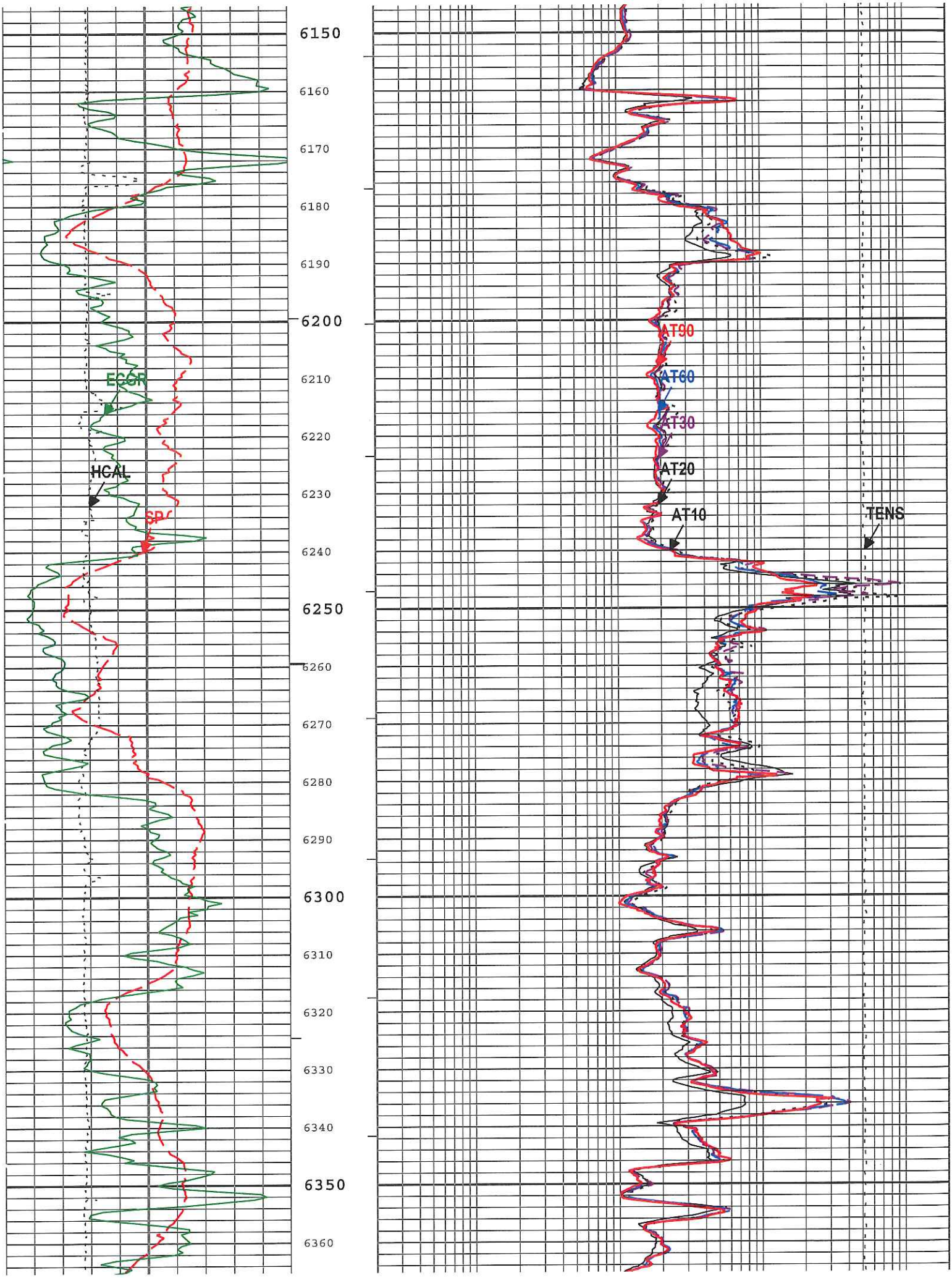
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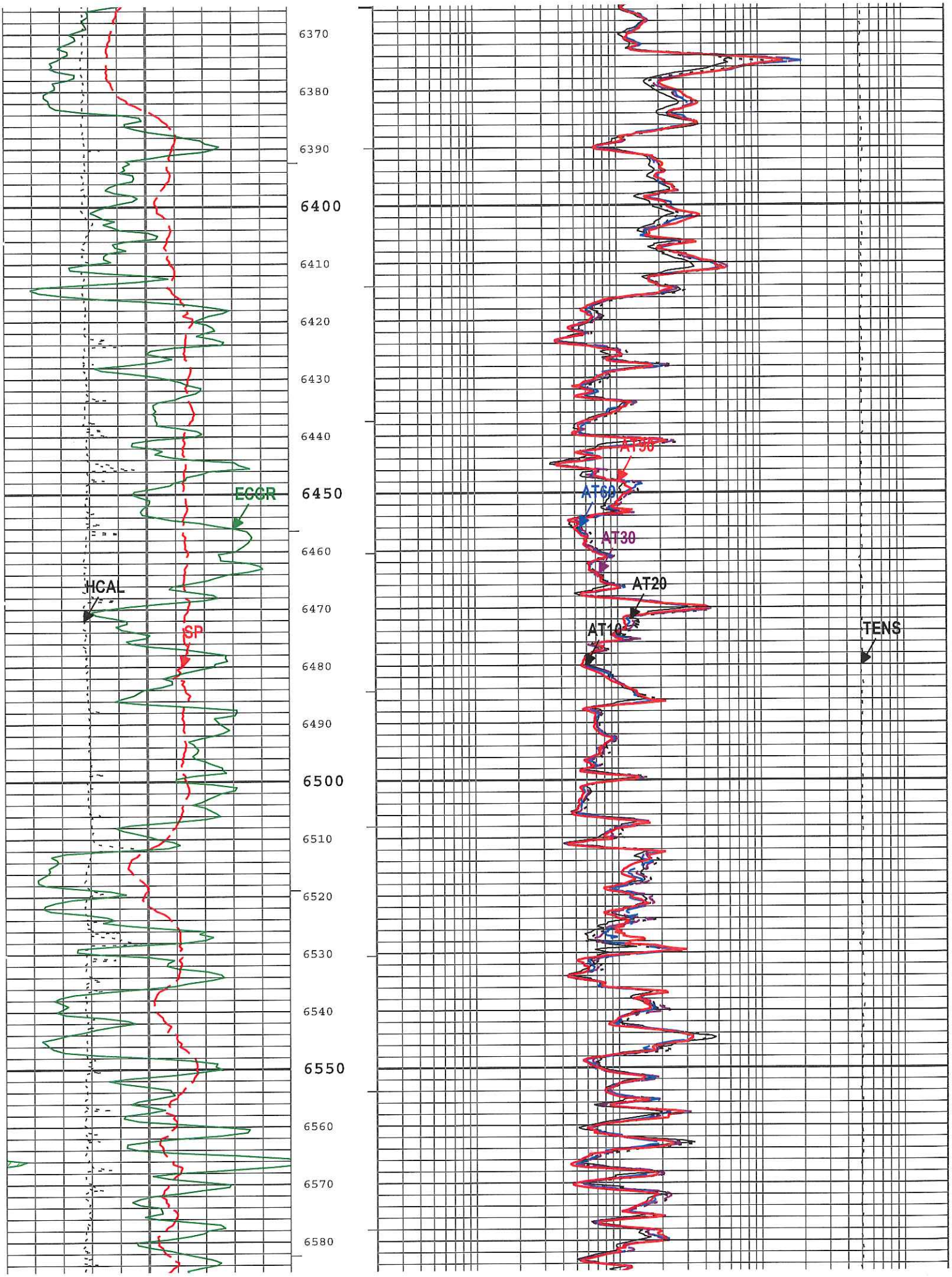
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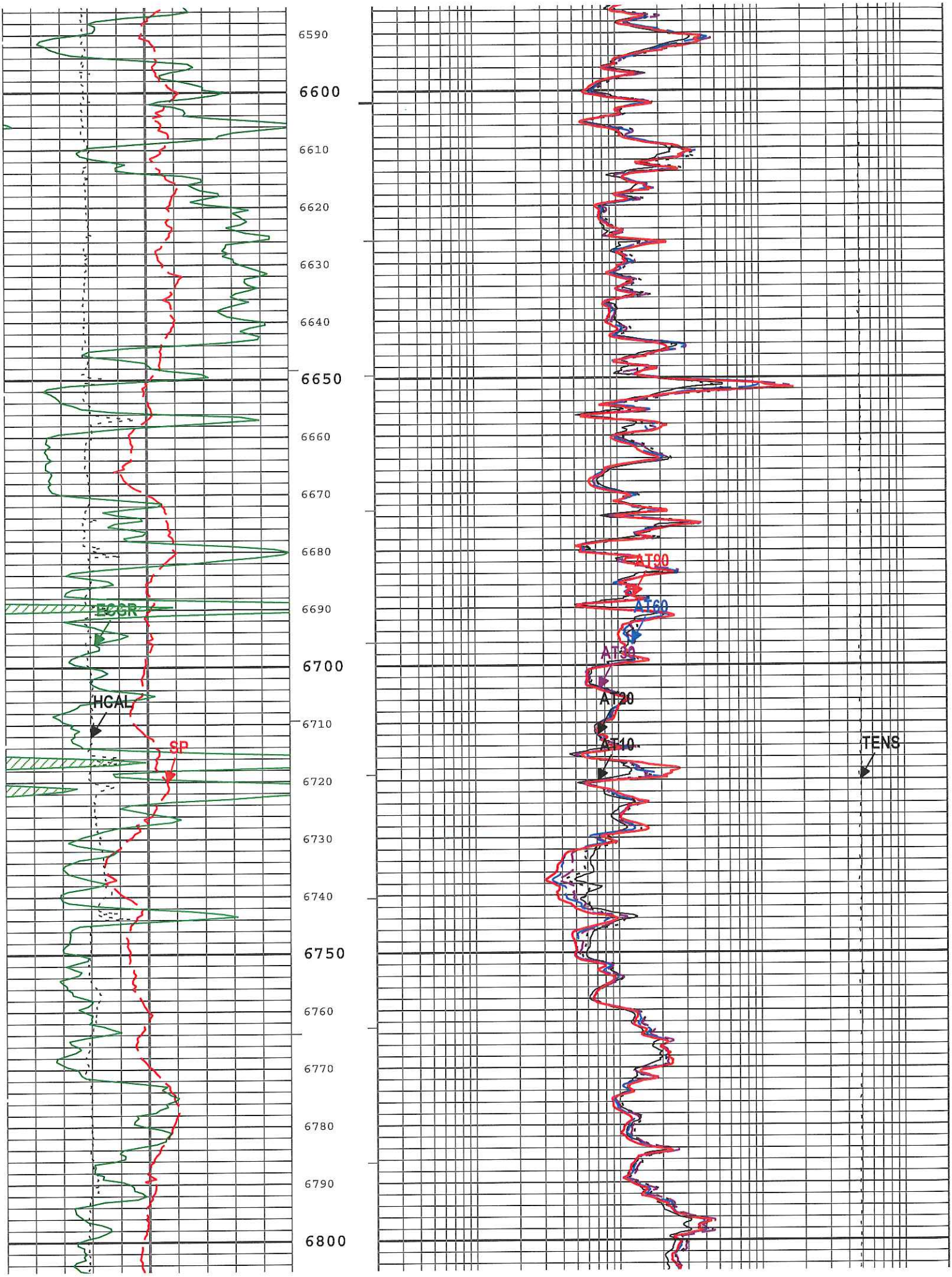
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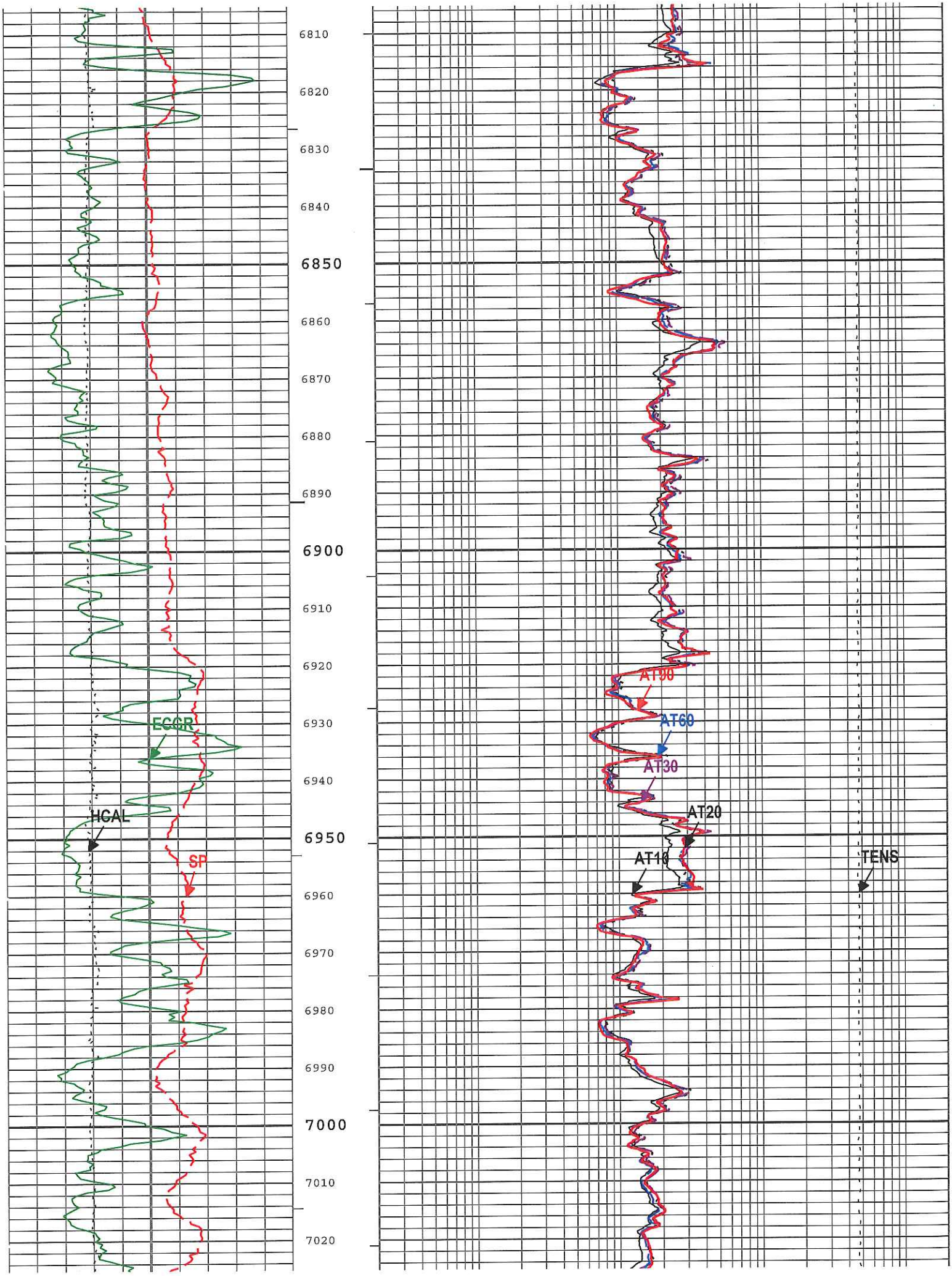
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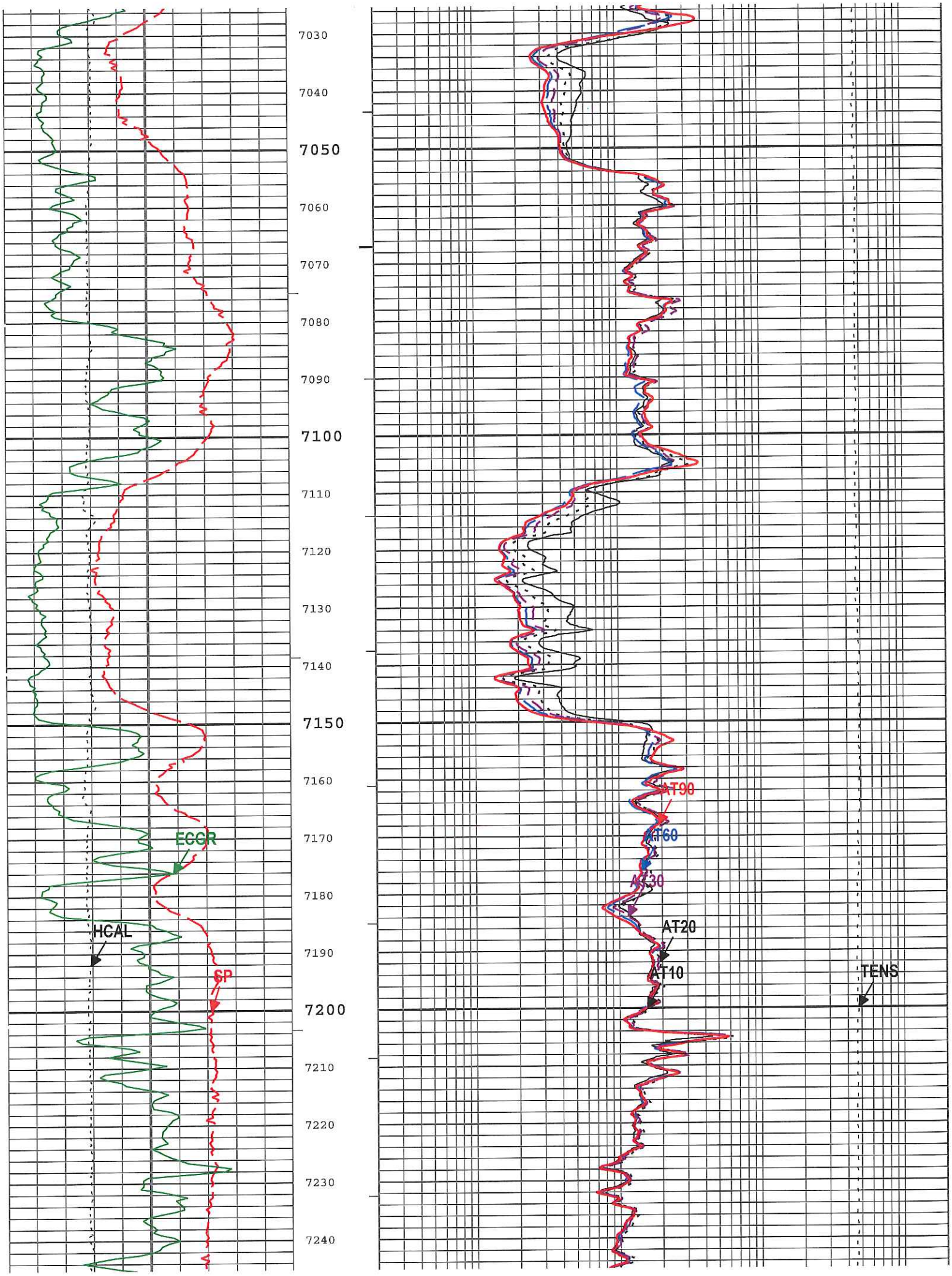
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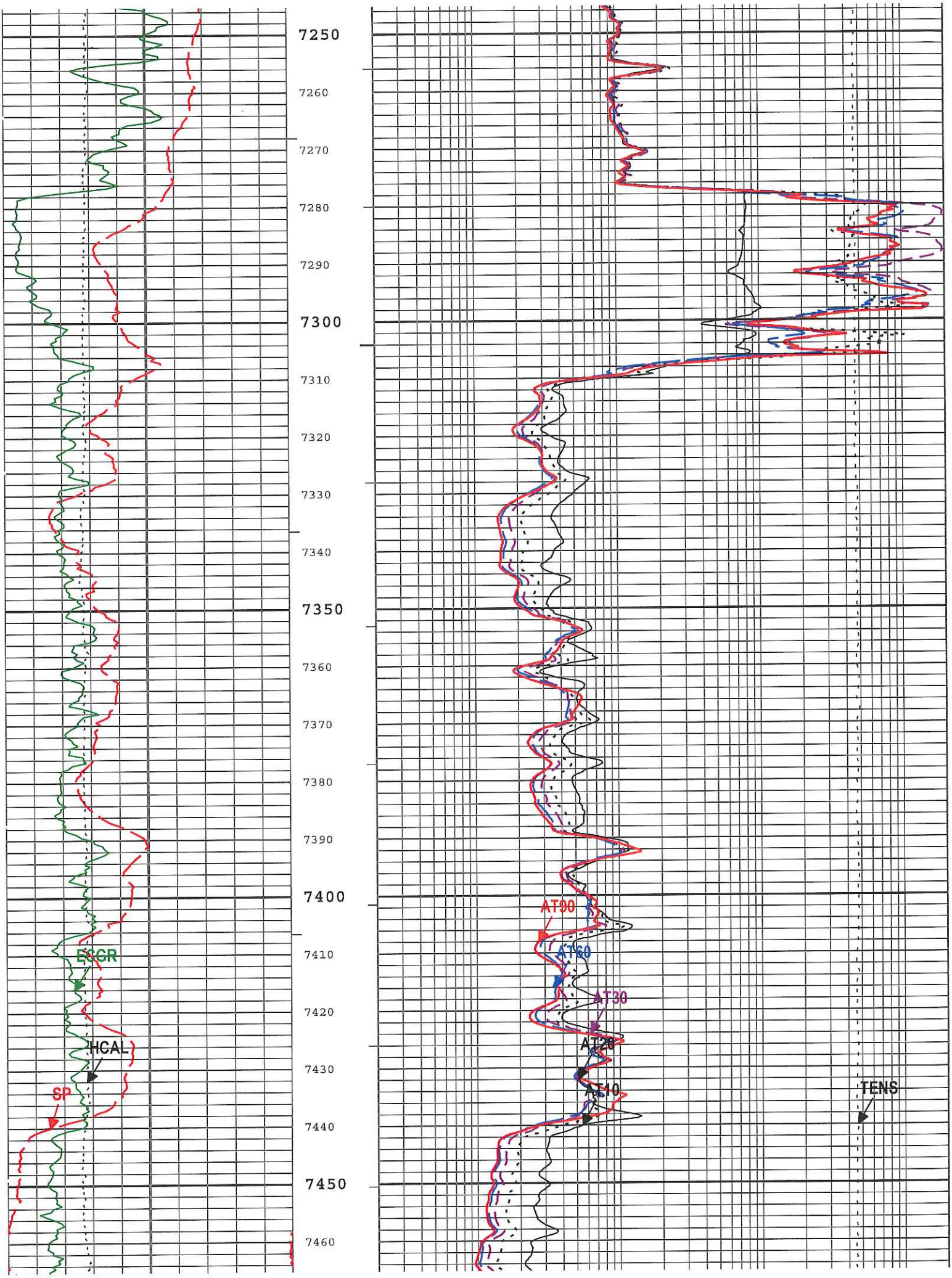
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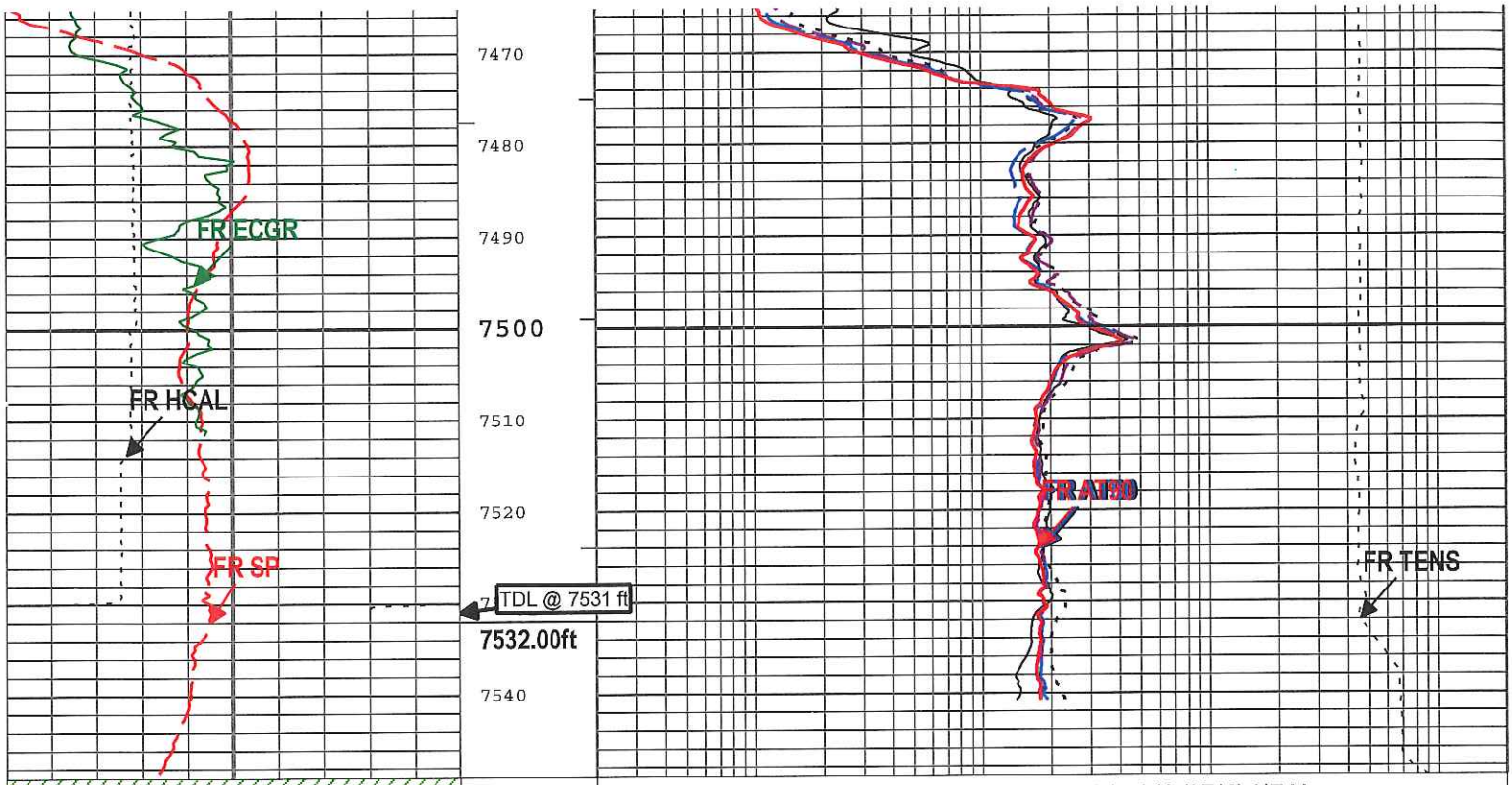


Gamma Ray Backup

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

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)

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

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

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

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

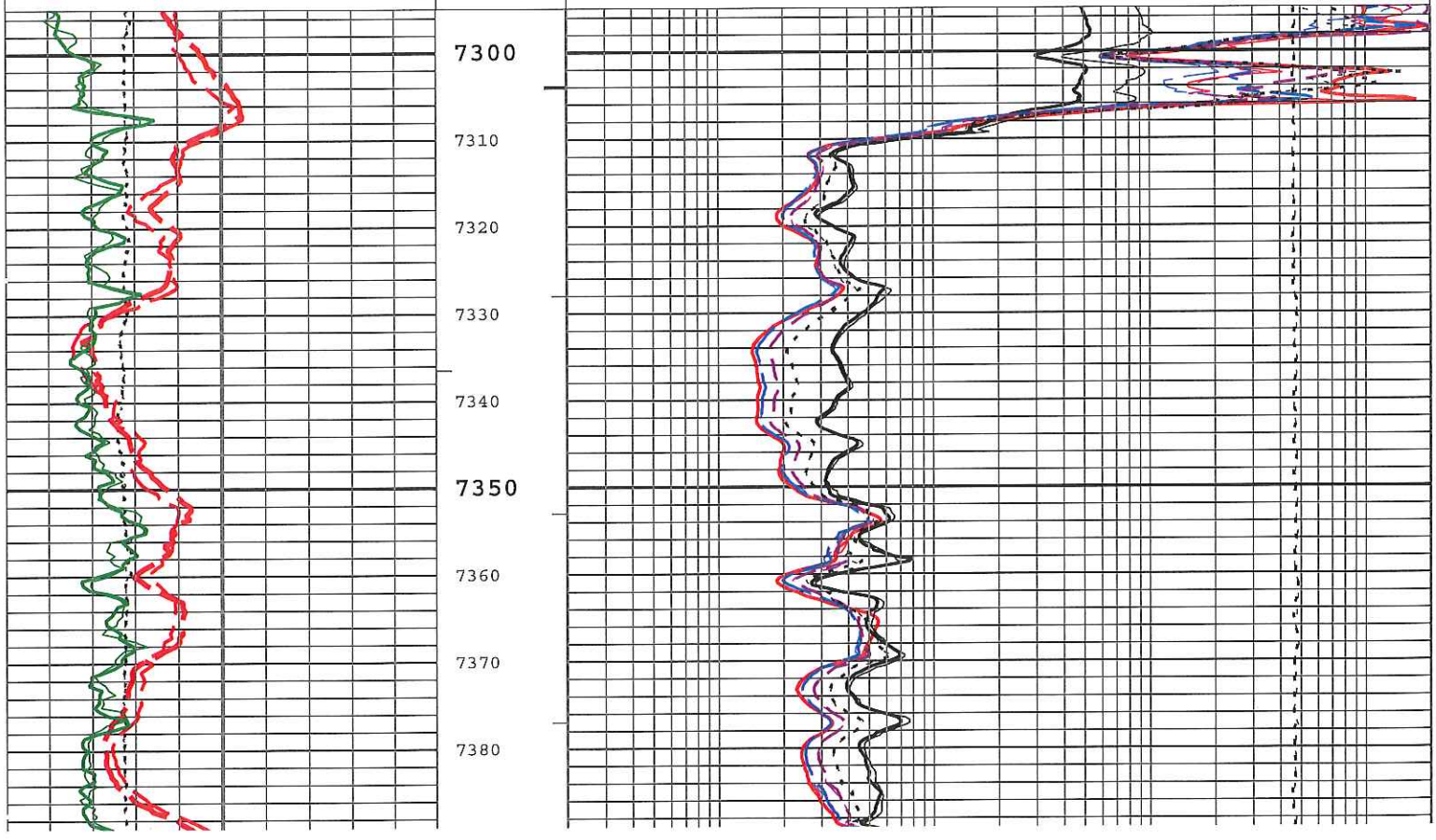
0.2 ohm.m 2000

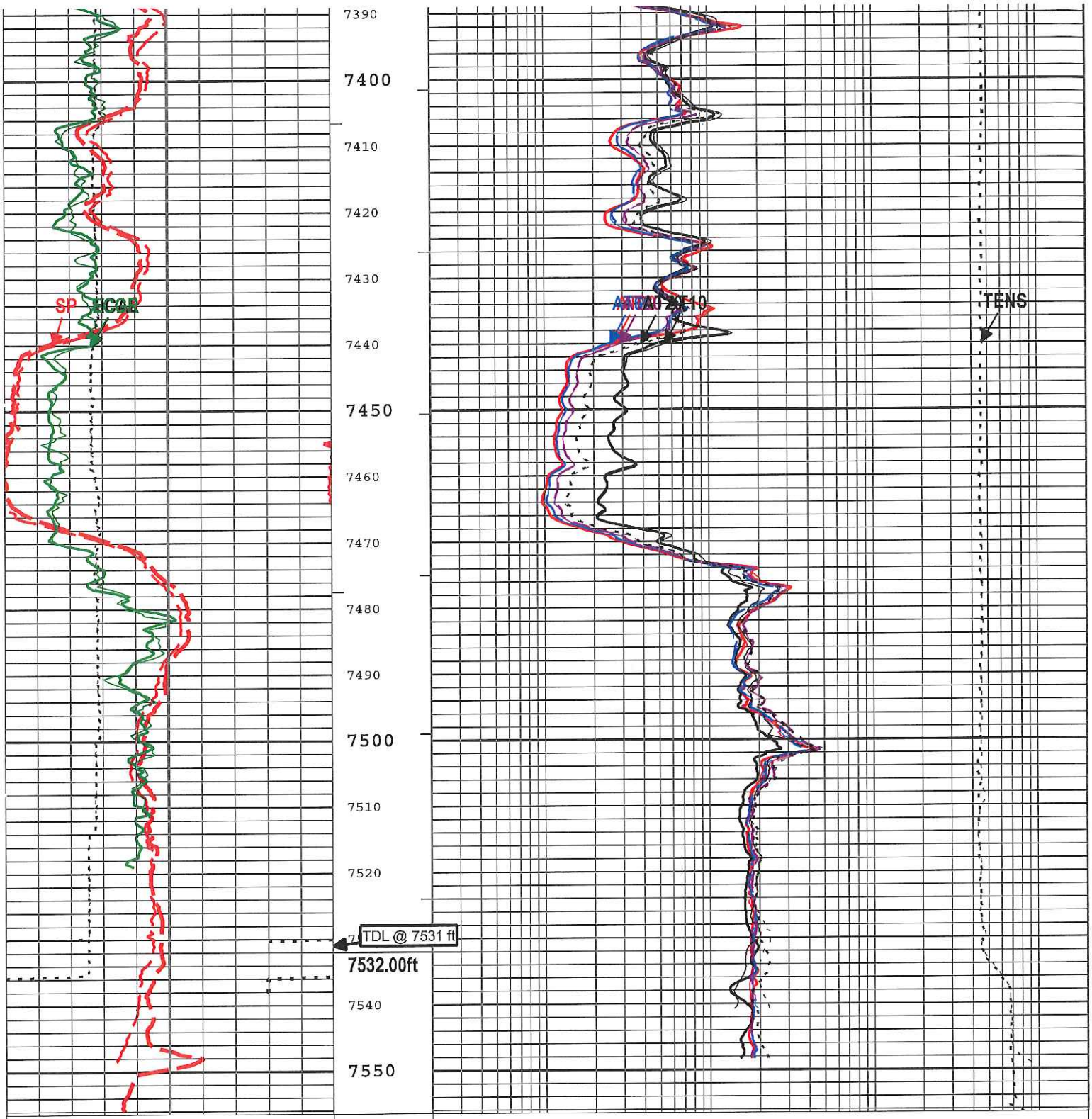
Main To Repeat

Repeat To Main

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

0.2 ohm.m 2000





Main To Repeat

Repeat To Main

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

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

October 5, 2017 Falloff test data

Appendix E FO Test Raw Data

F162A13.RAW G162204.CAL 15612

Date	Days	Minutes	F162A13 Psig	F162A 13 Deg F
10/3/17 8:58:00	0.00	0.0	0.0	60.0
10/3/17 9:47:15	0.03	49.3	985.4	60.5
10/3/17 10:02:15	0.04	64.3	976.6	66.0
10/3/17 10:17:15	0.06	79.3	3,313.8	100.2
10/3/17 10:32:15	0.07	94.3	4,144.1	160.6
10/3/17 10:53:15	0.08	115.3	4,224.2	165.2
10/3/17 11:12:00	0.09	134.0	4,239.4	165.3
10/3/17 11:36:45	0.11	158.8	4,249.5	163.9
10/3/17 12:12:00	0.13	194.0	4,255.9	162.4
10/3/17 12:54:00	0.16	236.0	4,266.7	160.9
10/3/17 13:36:00	0.19	278.0	4,271.9	159.7
10/3/17 14:18:00	0.22	320.0	4,277.3	158.9
10/3/17 15:00:00	0.25	362.0	4,282.9	158.2
10/3/17 15:42:00	0.28	404.0	4,288.3	157.7
10/3/17 16:37:30	0.32	459.5	4,292.8	157.0
10/3/17 17:24:00	0.35	506.0	4,293.4	156.5
10/3/17 18:06:00	0.38	548.0	4,298.6	156.0
10/3/17 18:48:00	0.41	590.0	4,303.8	155.7
10/3/17 19:47:15	0.45	649.3	4,309.9	155.2
10/3/17 20:30:00	0.48	692.0	4,309.2	154.7
10/3/17 21:12:00	0.51	734.0	4,314.5	154.3
10/3/17 22:12:00	0.55	794.0	4,314.4	154.0
10/3/17 22:54:00	0.58	836.0	4,319.9	153.6
10/3/17 23:43:30	0.61	885.5	4,324.3	153.4
10/4/17 0:36:00	0.65	938.0	4,324.5	153.0
10/4/17 1:35:15	0.69	997.3	4,330.7	152.9
10/4/17 2:18:00	0.72	1,040.0	4,329.8	152.5
10/4/17 3:00:00	0.75	1,082.0	4,334.9	152.2
10/4/17 3:48:45	0.79	1,130.8	4,340.0	152.0
10/4/17 4:42:00	0.82	1,184.0	4,339.5	151.5
10/4/17 5:24:00	0.85	1,226.0	4,345.0	151.1
10/4/17 6:06:00	0.88	1,268.0	4,350.1	150.7
10/4/17 7:06:00	0.92	1,328.0	4,350.1	150.4
10/4/17 8:06:00	0.96	1,388.0	4,350.3	150.4
10/4/17 8:54:00	1.00	1,436.0	4,350.8	150.5
10/4/17 9:48:00	1.03	1,490.0	4,350.2	150.6
10/4/17 10:48:00	1.08	1,550.0	4,350.3	150.8
10/4/17 11:30:00	1.11	1,592.0	4,355.5	150.7
10/4/17 12:30:00	1.15	1,652.0	4,354.4	150.7
10/4/17 13:30:00	1.19	1,712.0	4,354.8	150.8
10/4/17 14:30:00	1.23	1,772.0	4,354.9	150.9
10/4/17 15:25:00	1.27	1,827.0	4,354.7	151.1
10/4/17 16:20:00	1.31	1,882.0	4,354.9	151.2

F328A13.RAW G328711.CAL 15612

Date	Days	Minutes	F328A13 Psig	F328A 13 Deg F
10/3/17 9:02:00	0.00	0.0	0.0	61.2
10/3/17 9:47:30	0.03	45.5	990.2	62.2
10/3/17 10:02:30	0.04	60.5	984.8	67.7
10/3/17 10:17:30	0.05	75.5	3,423.5	106.0
10/3/17 10:32:30	0.06	90.5	4,147.0	162.3
10/3/17 10:55:45	0.08	113.8	4,226.4	165.7
10/3/17 11:14:30	0.09	132.5	4,242.1	165.5
10/3/17 11:43:00	0.11	161.0	4,252.9	164.0
10/3/17 12:25:00	0.14	203.0	4,258.1	162.4
10/3/17 13:07:00	0.17	245.0	4,269.4	160.9
10/3/17 13:49:00	0.20	287.0	4,274.2	159.8
10/3/17 14:31:00	0.23	329.0	4,279.3	159.0
10/3/17 15:13:00	0.26	371.0	4,285.0	158.3
10/3/17 15:55:00	0.29	413.0	4,290.3	157.8
10/3/17 16:40:00	0.32	458.0	4,295.5	157.3
10/3/17 17:37:00	0.36	515.0	4,298.0	156.7
10/3/17 18:19:00	0.39	557.0	4,300.7	156.2
10/3/17 19:01:00	0.42	599.0	4,305.7	155.8
10/3/17 19:28:00	0.45	647.8	4,310.5	155.4
10/3/17 20:10:00	0.49	701.0	4,310.9	154.9
10/3/17 20:53:30	0.52	743.0	4,316.1	154.4
10/3/17 21:52:00	0.56	799.3	4,321.0	154.2
10/3/17 22:34:00	0.59	845.0	4,321.0	153.8
10/3/17 23:34:00	0.62	887.0	4,326.2	153.6
10/4/17 0:16:00	0.66	947.0	4,326.2	153.2
10/4/17 1:16:00	0.69	995.8	4,331.3	153.1
10/4/17 1:58:00	0.73	1,049.0	4,331.1	152.7
10/4/17 2:40:00	0.76	1,091.0	4,336.6	152.4
10/4/17 3:40:00	0.79	1,133.0	4,341.5	152.1
10/4/17 4:22:00	0.82	1,184.8	4,346.4	151.8
10/4/17 5:04:00	0.86	1,235.0	4,346.6	151.3
10/4/17 5:47:30	0.89	1,277.0	4,351.5	150.9
10/4/17 6:46:00	0.93	1,337.0	4,352.3	150.6
10/4/17 7:46:00	0.97	1,397.0	4,351.9	150.6
10/4/17 8:46:00	1.00	1,434.5	4,351.6	150.7
10/4/17 9:19:00	1.03	1,490.0	4,351.7	150.8
10/4/17 10:19:00	1.08	1,550.0	4,351.7	151.1
10/4/17 11:07:45	1.11	1,592.0	4,356.6	151.0
10/4/17 12:01:00	1.15	1,652.0	4,356.5	151.0
10/4/17 13:01:00	1.19	1,712.0	4,356.6	151.1
10/4/17 14:01:00	1.23	1,772.0	4,356.5	151.2
10/4/17 14:56:00	1.27	1,827.0	4,356.3	151.4
10/4/17 15:51:00	1.31	1,882.0	4,356.3	151.5

Appendix E FO Test Raw Data

F162A13.RAW G162204.CAL 15612

Date	Days	Minutes	F162A13 Psig	F162A 13 Deg F
10/4/17 16:57:00	1.33	1,919.0	4,357.8	151.3
10/4/17 17:52:00	1.37	1,974.0	4,357.6	151.3
10/4/17 18:29:00	1.40	2,011.0	4,365.1	151.2
10/4/17 19:08:15	1.42	2,050.3	4,369.8	150.9
10/4/17 20:02:00	1.46	2,104.0	4,369.9	150.5
10/4/17 20:57:00	1.50	2,159.0	4,369.8	150.4
10/4/17 21:43:45	1.53	2,205.8	4,374.7	150.4
10/4/17 22:29:00	1.56	2,251.0	4,377.0	150.1
10/4/17 23:24:00	1.60	2,306.0	4,378.9	150.0
10/5/17 0:19:00	1.64	2,361.0	4,379.4	149.9
10/5/17 1:14:00	1.68	2,416.0	4,382.3	149.8
10/5/17 2:09:00	1.72	2,471.0	4,382.3	149.8
10/5/17 3:00:15	1.75	2,522.3	4,380.9	149.8
10/5/17 3:23:00	1.77	2,545.0	4,387.5	149.7
10/5/17 4:18:00	1.81	2,600.0	4,387.2	149.6
10/5/17 4:55:00	1.83	2,637.0	4,390.1	149.5
10/5/17 5:50:00	1.87	2,692.0	4,393.3	149.3
10/5/17 6:45:00	1.91	2,747.0	4,393.3	149.2
10/5/17 7:40:00	1.95	2,802.0	4,395.1	149.2
10/5/17 8:35:00	1.98	2,857.0	4,395.6	149.1
10/5/17 9:27:45	2.02	2,909.8	4,401.1	149.2
10/5/17 10:12:00	2.05	2,954.0	4,395.3	149.2
10/5/17 11:02:00	2.09	3,004.0	4,395.5	149.3
10/5/17 11:03:00	2.09	3,005.0	4,395.5	149.3
10/5/17 11:04:00	2.09	3,006.0	4,395.4	149.3
10/5/17 11:05:00	2.09	3,007.0	4,395.2	149.3
10/5/17 11:06:00	2.09	3,008.0	4,395.4	149.3
10/5/17 11:07:00	**2.09**	**3,009.0**	**4,395.4**	**149.3**
10/5/17 11:08:00	2.09	3,010.0	4,384.7	149.3
10/5/17 11:08:15	2.09	3,010.3	4,375.9	149.3
10/5/17 11:08:30	2.09	3,010.5	4,370.4	149.3
10/5/17 11:08:45	2.09	3,010.8	4,365.6	149.3
10/5/17 11:11:15	2.09	3,013.3	4,339.6	149.4
10/5/17 11:13:45	2.09	3,015.8	4,326.7	149.6
10/5/17 11:16:15	2.10	3,018.3	4,317.3	149.9
10/5/17 11:18:45	2.10	3,020.8	4,310.2	150.2
10/5/17 11:33:45	2.11	3,035.8	4,284.9	152.0
10/5/17 11:54:00	2.12	3,056.0	4,266.6	154.0
10/5/17 12:54:00	2.16	3,116.0	4,238.6	158.0
10/5/17 13:54:00	2.21	3,176.0	4,222.0	160.5
10/5/17 14:54:00	2.25	3,236.0	4,210.0	162.4
10/5/17 15:54:00	2.29	3,296.0	4,200.5	163.7
10/5/17 16:54:00	2.33	3,356.0	4,192.6	164.9

F328A13.RAW G328711.CAL 15612

Date	Days	Minutes	F328A13 Psig	F328A 13 Deg F
10/4/17 16:37:45	1.33	1,919.0	4,359.2	151.5
10/4/17 17:23:00	1.37	1,974.0	4,359.1	151.6
10/4/17 18:11:15	1.40	2,011.0	4,366.2	151.3
10/4/17 18:55:00	1.42	2,048.0	4,371.4	151.1
10/4/17 19:33:00	1.46	2,104.0	4,371.3	150.7
10/4/17 20:28:00	1.50	2,159.0	4,371.5	150.6
10/4/17 21:23:00	1.53	2,202.8	4,376.7	150.5
10/4/17 22:00:00	1.55	2,233.0	4,378.5	150.3
10/4/17 22:37:00	1.59	2,288.0	4,378.4	150.2
10/4/17 23:21:30	1.61	2,325.0	4,380.7	150.1
10/5/17 0:09:00	1.64	2,365.0	4,383.5	150.1
10/5/17 0:46:00	1.68	2,417.0	4,383.6	149.9
10/5/17 1:41:00	1.71	2,460.8	4,383.9	150.0
10/5/17 2:18:00	1.74	2,509.0	4,383.1	150.0
10/5/17 3:01:00	1.76	2,528.0	4,388.2	150.0
10/5/17 3:32:00	1.79	2,583.0	4,388.6	149.8
10/5/17 4:24:45	1.82	2,620.0	4,391.5	149.7
10/5/17 5:04:00	1.85	2,660.8	4,394.7	149.6
10/5/17 5:41:00	1.88	2,712.0	4,394.9	149.4
10/5/17 6:36:00	1.92	2,767.0	4,394.8	149.4
10/5/17 7:21:15	1.95	2,804.0	4,396.7	149.3
10/5/17 8:13:00	1.99	2,864.0	4,396.8	149.3
10/5/17 9:03:00	2.02	2,907.3	4,396.2	149.4
10/5/17 9:04:00	2.02	2,907.5	4,396.5	149.4
10/5/17 9:05:00	2.02	2,907.8	4,397.0	149.4
10/5/17 9:06:00	2.02	2,908.0	4,397.1	149.4
10/5/17 9:07:00	2.02	2,908.3	4,397.2	149.4
10/5/17 9:08:00	**2.02**	**2,908.5**	**4,397.2**	**149.4**
10/5/17 9:09:00	2.02	2,908.8	4,396.8	149.4
10/5/17 9:10:00	2.02	2,909.0	4,397.0	149.4
10/5/17 9:11:00	2.02	2,909.3	4,396.9	149.4
10/5/17 9:12:00	2.02	2,909.5	4,396.9	149.4
10/5/17 9:22:00	2.02	2,912.0	4,396.9	149.4
10/5/17 9:28:15	2.03	2,916.0	4,396.9	149.4
10/5/17 9:30:45	2.03	2,926.0	4,396.6	149.4
10/5/17 9:33:15	2.04	2,936.0	4,396.8	149.4
10/5/17 10:25:00	2.08	2,996.0	4,396.9	149.5
10/5/17 11:12:15	2.10	3,018.5	4,306.8	151.5
10/5/17 11:27:15	2.11	3,033.5	4,284.1	154.0
10/5/17 11:42:15	2.12	3,048.5	4,270.6	155.7
10/5/17 11:57:15	2.14	3,083.0	4,251.5	158.0
10/5/17 12:52:00	2.18	3,143.0	4,231.2	160.3
10/5/17 13:52:00	2.22	3,203.0	4,217.3	161.9

Appendix E FO Test Raw Data

F162A13.RAW G162204.CAL 15612

Date	Days	Minutes	F162A13 Psig	F162A 13 Deg F
10/5/17 17:54:00	2.37	3,416.0	4,185.8	165.9
10/5/17 18:54:00	2.41	3,476.0	4,179.8	166.7
10/5/17 19:54:00	2.46	3,536.0	4,174.5	167.5
10/5/17 20:54:00	2.50	3,596.0	4,169.7	168.2
10/5/17 21:54:00	2.54	3,656.0	4,165.3	168.7
10/5/17 22:54:00	2.58	3,716.0	4,161.3	169.3
10/5/17 23:54:00	2.62	3,776.0	4,157.6	169.8
10/6/17 0:54:00	2.66	3,836.0	4,154.0	170.2
10/6/17 1:54:00	2.71	3,896.0	4,150.8	170.6
10/6/17 2:54:00	2.75	3,956.0	4,147.7	171.0
10/6/17 3:54:00	2.79	4,016.0	4,144.8	171.3
10/6/17 4:54:00	2.83	4,076.0	4,142.1	171.6
10/6/17 5:54:00	2.87	4,136.0	4,139.5	171.9
10/6/17 6:54:00	2.91	4,196.0	4,137.1	172.2
10/6/17 7:54:00	2.96	4,256.0	4,134.7	172.4
10/6/17 8:54:00	3.00	4,316.0	4,132.4	172.7
10/6/17 9:54:00	3.04	4,376.0	4,130.2	172.9
10/6/17 10:54:00	3.08	4,436.0	4,128.1	173.1
10/6/17 11:54:00	3.12	4,496.0	4,126.1	173.3
10/6/17 12:54:00	3.16	4,556.0	4,124.1	173.5
10/6/17 13:54:00	3.21	4,616.0	4,122.2	173.6
10/6/17 14:54:00	3.25	4,676.0	4,120.5	173.8
10/6/17 15:54:00	3.29	4,736.0	4,118.8	173.9
10/6/17 16:54:00	3.33	4,796.0	4,117.1	174.1
10/6/17 17:54:00	3.37	4,856.0	4,115.5	174.2
10/6/17 18:54:00	3.41	4,916.0	4,113.8	174.4
10/6/17 19:54:00	3.46	4,976.0	4,112.3	174.5
10/6/17 20:54:00	3.50	5,036.0	4,110.8	174.6
10/6/17 21:54:00	3.54	5,096.0	4,109.2	174.7
10/6/17 22:54:00	3.58	5,156.0	4,107.8	174.8
10/6/17 23:54:00	3.62	5,216.0	4,106.4	174.9
10/7/17 0:54:00	3.66	5,276.0	4,105.0	175.0
10/7/17 1:54:00	3.71	5,336.0	4,103.7	175.1
10/7/17 2:54:00	3.75	5,396.0	4,102.4	175.2
10/7/17 3:54:00	3.79	5,456.0	4,101.1	175.3
10/7/17 4:54:00	3.83	5,516.0	4,099.8	175.4
10/7/17 5:54:00	3.87	5,576.0	4,098.6	175.5
10/7/17 6:54:00	3.91	5,636.0	4,097.4	175.6
10/7/17 7:54:00	3.96	5,696.0	4,096.4	175.6
10/7/17 8:54:00	4.00	5,756.0	4,095.2	175.7
10/7/17 9:54:00	4.04	5,816.0	4,094.0	175.8
10/7/17 10:54:00	4.08	5,876.0	4,092.8	175.9
10/7/17 11:54:00	4.12	5,936.0	4,091.7	175.9

F328A13.RAW G328711.CAL 15612

Date	Days	Minutes	F328A13 Psig	F328A 13 Deg F
10/5/17 14:52:00	2.27	3,263.0	4,206.8	163.2
10/5/17 15:52:00	2.31	3,323.0	4,198.1	164.2
10/5/17 16:52:00	2.35	3,383.0	4,190.8	165.0
10/5/17 17:52:00	2.39	3,443.0	4,184.5	165.6
10/5/17 18:52:00	2.43	3,503.0	4,178.9	166.0
10/5/17 19:52:00	2.47	3,563.0	4,173.8	166.5
10/5/17 20:52:00	2.52	3,623.0	4,169.2	166.9
10/5/17 21:52:00	2.56	3,683.0	4,165.0	167.3
10/5/17 22:52:00	2.60	3,743.0	4,161.1	167.7
10/5/17 23:52:00	2.64	3,803.0	4,157.4	168.1
10/6/17 0:52:00	2.68	3,863.0	4,154.2	168.4
10/6/17 1:52:00	2.72	3,923.0	4,151.2	168.7
10/6/17 2:52:00	2.77	3,983.0	4,148.2	169.0
10/6/17 3:52:00	2.81	4,043.0	4,145.3	169.2
10/6/17 4:52:00	2.85	4,103.0	4,142.7	169.5
10/6/17 5:52:00	2.89	4,163.0	4,140.1	169.7
10/6/17 6:52:00	2.93	4,223.0	4,137.7	169.9
10/6/17 7:52:00	2.97	4,283.0	4,135.4	170.1
10/6/17 8:52:00	3.02	4,343.0	4,133.2	170.3
10/6/17 9:52:00	3.06	4,403.0	4,131.0	170.5
10/6/17 10:52:00	3.10	4,463.0	4,128.9	170.7
10/6/17 11:52:00	3.14	4,523.0	4,127.0	170.9
10/6/17 12:52:00	3.18	4,583.0	4,125.0	171.0
10/6/17 13:52:00	3.22	4,643.0	4,123.2	171.2
10/6/17 14:52:00	3.27	4,703.0	4,121.5	171.3
10/6/17 15:52:00	3.31	4,763.0	4,119.8	171.5
10/6/17 16:52:00	3.35	4,823.0	4,118.2	171.6
10/6/17 17:52:00	3.39	4,883.0	4,116.6	171.8
10/6/17 18:52:00	3.43	4,943.0	4,115.0	171.9
10/6/17 19:52:00	3.47	5,003.0	4,113.4	172.0
10/6/17 20:52:00	3.52	5,063.0	4,112.0	172.1
10/6/17 21:52:00	3.56	5,123.0	4,110.5	172.2
10/6/17 22:52:00	3.60	5,183.0	4,109.0	172.4
10/6/17 23:52:00	3.64	5,243.0	4,107.7	172.5
10/7/17 0:52:00	3.68	5,303.0	4,106.3	172.6
10/7/17 1:52:00	3.72	5,363.0	4,104.9	172.7
10/7/17 2:52:00	3.77	5,423.0	4,103.7	172.8
10/7/17 3:52:00	3.81	5,483.0	4,102.5	172.9
10/7/17 4:52:00	3.85	5,543.0	4,101.2	173.0
10/7/17 5:52:00	3.89	5,603.0	4,100.1	173.1
10/7/17 6:52:00	3.93	5,663.0	4,098.9	173.1
10/7/17 7:52:00	3.97	5,723.0	4,097.7	173.2
10/7/17 8:52:00	4.02	5,783.0	4,096.6	173.3

Appendix E FO Test Raw Data

F162A13.RAW G162204.CAL 15612

Date	Days	Minutes	F162A13 Psig	F162A 13 Deg F
10/7/17 12:54:00	4.16	5,996.0	4,090.6	176.0
10/7/17 13:54:00	4.21	6,056.0	4,089.6	176.1
10/7/17 14:54:00	4.25	6,116.0	4,088.5	176.1
10/7/17 15:54:00	4.29	6,176.0	4,087.5	176.2
10/7/17 16:54:00	4.33	6,236.0	4,086.5	176.2
10/7/17 17:54:00	4.37	6,296.0	4,085.6	176.3
10/7/17 18:54:00	4.41	6,356.0	4,084.6	176.3
10/7/17 19:54:00	4.46	6,416.0	4,083.6	176.4
10/7/17 20:54:00	4.50	6,476.0	4,082.6	176.4
10/7/17 21:54:00	4.54	6,536.0	4,081.6	176.5
10/7/17 22:54:00	4.58	6,596.0	4,080.8	176.5
10/7/17 23:54:00	4.62	6,656.0	4,079.8	176.6
10/8/17 0:54:00	4.66	6,716.0	4,079.0	176.7
10/8/17 1:54:00	4.71	6,776.0	4,078.1	176.7
10/8/17 2:54:00	4.75	6,836.0	4,077.2	176.8
10/8/17 3:54:00	4.79	6,896.0	4,076.3	176.8
10/8/17 4:54:00	4.83	6,956.0	4,075.5	176.9
10/8/17 5:54:00	4.87	7,016.0	4,074.7	176.9
10/8/17 6:54:00	4.91	7,076.0	4,073.9	177.0
10/8/17 7:54:00	4.96	7,136.0	4,073.0	177.0
10/8/17 8:54:00	5.00	7,196.0	4,072.2	177.1
10/8/17 9:54:00	5.04	7,256.0	4,071.5	177.1
10/8/17 10:54:00	5.08	7,316.0	4,070.7	177.2
10/8/17 11:54:00	5.12	7,376.0	4,069.9	177.2
10/8/17 12:54:00	5.16	7,436.0	4,069.1	177.2
10/8/17 13:54:00	5.21	7,496.0	4,068.3	177.3
10/8/17 14:54:00	5.25	7,556.0	4,067.6	177.3
10/8/17 15:54:00	5.29	7,616.0	4,066.8	177.4
10/8/17 16:54:00	5.33	7,676.0	4,066.1	177.4
10/8/17 17:54:00	5.37	7,736.0	4,065.4	177.4
10/8/17 18:54:00	5.41	7,796.0	4,064.7	177.5
10/8/17 19:54:00	5.46	7,856.0	4,063.9	177.5
10/8/17 20:54:00	5.50	7,916.0	4,063.2	177.6
10/8/17 21:54:00	5.54	7,976.0	4,062.5	177.6
10/8/17 22:54:00	5.58	8,036.0	4,061.8	177.6
10/8/17 23:54:00	5.62	8,096.0	4,061.1	177.7
10/9/17 0:54:00	5.66	8,156.0	4,060.4	177.7
10/9/17 1:54:00	5.71	8,216.0	4,059.7	177.7
10/9/17 2:54:00	5.75	8,276.0	4,059.1	177.8
10/9/17 3:54:00	5.79	8,336.0	4,058.5	177.8
10/9/17 4:54:00	5.83	8,396.0	4,057.8	177.8
10/9/17 5:54:00	5.87	8,456.0	4,057.1	177.9
10/9/17 6:54:00	5.91	8,516.0	4,056.5	177.9

F328A13.RAW G328711.CAL 15612

Date	Days	Minutes	F328A13 Psig	F328A 13 Deg F
10/7/17 9:52:00	4.06	5,843.0	4,095.5	173.4
10/7/17 10:52:00	4.10	5,903.0	4,094.4	173.5
10/7/17 11:52:00	4.14	5,963.0	4,093.2	173.6
10/7/17 12:52:00	4.18	6,023.0	4,092.2	173.6
10/7/17 13:52:00	4.22	6,083.0	4,091.2	173.7
10/7/17 14:52:00	4.27	6,143.0	4,090.2	173.8
10/7/17 15:52:00	4.31	6,203.0	4,089.2	174.0
10/7/17 16:52:00	4.35	6,263.0	4,088.2	174.0
10/7/17 17:52:00	4.39	6,323.0	4,087.2	174.1
10/7/17 18:52:00	4.43	6,383.0	4,086.3	174.1
10/7/17 19:52:00	4.47	6,443.0	4,085.4	174.2
10/7/17 20:52:00	4.52	6,503.0	4,084.4	174.2
10/7/17 21:52:00	4.56	6,563.0	4,083.5	174.3
10/7/17 22:52:00	4.60	6,623.0	4,082.5	174.4
10/7/17 23:52:00	4.64	6,683.0	4,081.6	174.4
10/8/17 0:52:00	4.68	6,743.0	4,080.7	174.5
10/8/17 1:52:00	4.72	6,803.0	4,079.9	174.5
10/8/17 2:52:00	4.77	6,863.0	4,079.1	174.6
10/8/17 3:52:00	4.81	6,923.0	4,078.2	174.6
10/8/17 4:52:00	4.85	6,983.0	4,077.4	174.7
10/8/17 5:52:00	4.89	7,043.0	4,076.6	174.7
10/8/17 6:52:00	4.93	7,103.0	4,075.8	174.8
10/8/17 7:52:00	4.97	7,163.0	4,075.0	174.8
10/8/17 8:52:00	5.02	7,223.0	4,074.2	174.9
10/8/17 9:52:00	5.06	7,283.0	4,073.4	174.9
10/8/17 10:52:00	5.10	7,343.0	4,072.6	174.9
10/8/17 11:52:00	5.14	7,403.0	4,071.8	175.0
10/8/17 12:52:00	5.18	7,463.0	4,071.1	175.0
10/8/17 13:52:00	5.22	7,523.0	4,070.3	175.1
10/8/17 14:52:00	5.27	7,583.0	4,069.6	175.1
10/8/17 15:52:00	5.31	7,643.0	4,068.8	175.2
10/8/17 16:52:00	5.35	7,703.0	4,068.1	175.2
10/8/17 17:52:00	5.39	7,763.0	4,067.4	175.3
10/8/17 18:52:00	5.43	7,823.0	4,066.7	175.3
10/8/17 19:52:00	5.47	7,883.0	4,066.1	175.3
10/8/17 20:52:00	5.52	7,943.0	4,065.4	175.4
10/8/17 21:52:00	5.56	8,003.0	4,064.6	175.4
10/8/17 22:52:00	5.60	8,063.0	4,063.9	175.5
10/8/17 23:52:00	5.64	8,123.0	4,063.2	175.5
10/9/17 0:52:00	5.68	8,183.0	4,062.6	175.5
10/9/17 1:52:00	5.72	8,243.0	4,061.9	175.6
10/9/17 2:52:00	5.77	8,303.0	4,061.3	175.6
10/9/17 3:52:00	5.81	8,363.0	4,060.6	175.6

Appendix E FO Test Raw Data

F162A13.RAW G162204.CAL 15612

Date	Days	Minutes	F162A13 Psig	F162A 13 Deg F
10/9/17 7:54:00	5.96	8,576.0	4,055.9	177.9
10/9/17 8:54:00	6.00	8,636.0	4,055.3	178.0
10/9/17 9:54:00	6.04	8,696.0	4,054.7	178.0
10/9/17 10:54:00	6.08	8,756.0	4,054.1	178.0
10/9/17 11:54:00	6.12	8,816.0	4,053.5	178.0
10/9/17 12:54:00	6.16	8,876.0	4,052.8	178.1
10/9/17 13:54:00	6.21	8,936.0	4,052.2	178.1
10/9/17 14:54:00	6.25	8,996.0	4,051.6	178.1
10/9/17 15:54:00	6.29	9,056.0	4,051.0	178.2
10/9/17 16:54:00	6.33	9,116.0	4,050.4	178.2
10/9/17 17:54:00	6.37	9,176.0	4,049.9	178.2
10/9/17 18:54:00	6.41	9,236.0	4,049.2	178.2
10/9/17 19:54:00	6.46	9,296.0	4,048.7	178.3
10/9/17 20:54:00	6.50	9,356.0	4,048.2	178.3
10/9/17 21:54:00	6.54	9,416.0	4,047.6	178.3
10/9/17 22:54:00	6.58	9,476.0	4,047.0	178.3
10/9/17 23:54:00	6.62	9,536.0	4,046.4	178.4
10/10/17 0:54:00	6.66	9,596.0	4,045.8	178.4
10/10/17 1:54:00	6.71	9,656.0	4,045.3	178.4
10/10/17 2:54:00	6.75	9,716.0	4,044.7	178.4
10/10/17 3:54:00	6.79	9,776.0	4,044.2	178.5
10/10/17 4:54:00	6.83	9,836.0	4,043.7	178.5
10/10/17 5:54:00	6.87	9,896.0	4,043.1	178.5
10/10/17 6:54:00	6.91	9,956.0	4,042.6	178.5
10/10/17 7:54:00	6.96	10,016.0	4,042.0	178.6
10/10/17 8:54:00	7.00	10,076.0	4,041.5	178.6
10/10/17 9:54:00	7.04	10,136.0	4,041.1	178.6
10/10/17 10:54:00	7.08	10,196.0	4,040.5	178.6
10/10/17 11:54:00	7.12	10,256.0	4,040.0	178.7
10/10/17 12:54:00	7.16	10,316.0	4,039.5	178.7
10/10/17 13:54:00	7.21	10,376.0	4,039.0	178.7
10/10/17 14:54:00	7.25	10,436.0	4,038.4	178.7
10/10/17 15:54:00	7.29	10,496.0	4,037.9	178.7
10/10/17 16:54:00	7.33	10,556.0	4,037.4	178.8
10/10/17 17:54:00	7.37	10,616.0	4,037.0	178.8
10/10/17 18:54:00	7.41	10,676.0	4,036.5	178.8
10/10/17 19:54:00	7.46	10,736.0	4,036.0	178.8
10/10/17 20:54:00	7.50	10,796.0	4,035.5	178.8
10/10/17 21:54:00	7.54	10,856.0	4,035.0	178.9
10/10/17 22:54:00	7.58	10,916.0	4,034.5	178.9
10/10/17 23:54:00	7.62	10,976.0	4,034.0	178.9
10/11/17 0:54:00	7.66	11,036.0	4,033.5	178.9
10/11/17 1:54:00	7.71	11,096.0	4,033.0	178.9

F328A13.RAW G328711.CAL 15612

Date	Days	Minutes	F328A13 Psig	F328A 13 Deg F
10/9/17 4:52:00	5.85	8,423.0	4,060.0	175.7
10/9/17 5:52:00	5.89	8,483.0	4,059.4	175.7
10/9/17 6:52:00	5.93	8,543.0	4,058.8	175.7
10/9/17 7:52:00	5.97	8,603.0	4,058.2	175.8
10/9/17 8:52:00	6.02	8,663.0	4,057.6	175.8
10/9/17 9:52:00	6.06	8,723.0	4,057.0	175.9
10/9/17 10:52:00	6.10	8,783.0	4,056.4	175.9
10/9/17 11:52:00	6.14	8,843.0	4,055.7	175.9
10/9/17 12:52:00	6.18	8,903.0	4,055.2	176.0
10/9/17 13:52:00	6.22	8,963.0	4,054.5	176.0
10/9/17 14:52:00	6.27	9,023.0	4,053.9	176.0
10/9/17 15:52:00	6.31	9,083.0	4,053.3	176.1
10/9/17 16:52:00	6.35	9,143.0	4,052.8	176.1
10/9/17 17:52:00	6.39	9,203.0	4,052.2	176.1
10/9/17 18:52:00	6.43	9,263.0	4,051.7	176.2
10/9/17 19:52:00	6.47	9,323.0	4,051.1	176.2
10/9/17 20:52:00	6.52	9,383.0	4,050.5	176.2
10/9/17 21:52:00	6.56	9,443.0	4,049.9	176.2
10/9/17 22:52:00	6.60	9,503.0	4,049.4	176.3
10/9/17 23:52:00	6.64	9,563.0	4,048.8	176.3
10/10/17 0:52:00	6.68	9,623.0	4,048.2	176.3
10/10/17 1:52:00	6.72	9,683.0	4,047.7	176.4
10/10/17 2:52:00	6.77	9,743.0	4,047.2	176.4
10/10/17 3:52:00	6.81	9,803.0	4,046.6	176.4
10/10/17 4:52:00	6.85	9,863.0	4,046.1	176.4
10/10/17 5:52:00	6.89	9,923.0	4,045.6	176.5
10/10/17 6:52:00	6.93	9,983.0	4,045.1	176.5
10/10/17 7:52:00	6.97	10,043.0	4,044.5	176.5
10/10/17 8:52:00	7.02	10,103.0	4,044.0	176.5
10/10/17 9:52:00	7.06	10,163.0	4,043.5	176.6
10/10/17 10:52:00	7.10	10,223.0	4,043.0	176.6
10/10/17 11:52:00	7.14	10,283.0	4,042.5	176.6
10/10/17 12:52:00	7.18	10,343.0	4,042.0	176.6
10/10/17 13:52:00	7.22	10,403.0	4,041.5	176.7
10/10/17 14:52:00	7.27	10,463.0	4,041.0	176.7
10/10/17 15:52:00	7.31	10,523.0	4,040.4	176.7
10/10/17 16:52:00	7.35	10,583.0	4,039.9	176.8
10/10/17 17:52:00	7.39	10,643.0	4,039.5	176.8
10/10/17 18:52:00	7.43	10,703.0	4,039.1	176.8
10/10/17 19:52:00	7.47	10,763.0	4,038.5	176.8
10/10/17 20:52:00	7.52	10,823.0	4,038.1	176.9
10/10/17 21:52:00	7.56	10,883.0	4,037.5	176.9
10/10/17 22:52:00	7.60	10,943.0	4,037.1	176.9

Appendix E FO Test Raw Data

F162A13.RAW G162204.CAL 15612

Date	Days	Minutes	F162A13 Psig	F162A 13 Deg F
10/11/17 2:54:00	7.75	11,156.0	4,032.5	179.0
10/11/17 3:54:00	7.79	11,216.0	4,032.0	179.0
10/11/17 4:54:00	7.83	11,276.0	4,031.6	179.0
10/11/17 5:54:00	7.87	11,336.0	4,031.1	179.0
10/11/17 6:54:00	7.91	11,396.0	4,030.6	179.0
10/11/17 7:54:00	7.96	11,456.0	4,030.2	179.0
10/11/17 8:54:00	8.00	11,516.0	4,029.8	179.1
10/11/17 9:54:00	8.04	11,576.0	4,029.3	179.1
10/11/17 10:54:00	8.08	11,636.0	4,028.8	179.1
10/11/17 11:54:00	8.12	11,696.0	4,028.4	179.1
10/11/17 12:54:00	8.16	11,756.0	4,028.0	179.1
10/11/17 13:54:00	8.21	11,816.0	4,027.5	179.2
10/11/17 14:54:00	8.25	11,876.0	4,027.0	179.2
10/11/17 15:54:00	8.29	11,936.0	4,026.5	179.2
10/11/17 16:54:00	8.33	11,996.0	4,026.1	179.2
10/11/17 17:54:00	8.37	12,056.0	4,025.7	179.2
10/11/17 18:54:00	8.41	12,116.0	4,025.3	179.2
10/11/17 19:54:00	8.46	12,176.0	4,024.8	179.3
10/11/17 20:54:00	8.50	12,236.0	4,024.3	179.3
10/11/17 21:54:00	8.54	12,296.0	4,024.0	179.3
10/11/17 22:54:00	8.58	12,356.0	4,023.5	179.3
10/11/17 23:54:00	8.62	12,416.0	4,023.1	179.3
10/12/17 0:54:00	8.66	12,476.0	4,022.7	179.3
10/12/17 1:54:00	8.71	12,536.0	4,022.2	179.4
10/12/17 2:54:00	8.75	12,596.0	4,021.8	179.4
10/12/17 3:54:00	8.79	12,656.0	4,021.4	179.4
10/12/17 4:54:00	8.83	12,716.0	4,020.9	179.4
10/12/17 5:54:00	8.87	12,776.0	4,020.6	179.4
10/12/17 6:54:00	8.91	12,836.0	4,020.2	179.4
10/12/17 7:54:00	8.96	12,896.0	4,019.7	179.4
10/12/17 8:54:00	9.00	12,956.0	4,019.3	179.5
10/12/17 9:54:00	9.04	13,016.0	4,018.9	179.5
10/12/17 10:54:00	9.08	13,076.0	4,018.5	179.5
10/12/17 11:54:00	9.12	13,136.0	4,018.1	179.5
10/12/17 12:54:00	9.16	13,196.0	4,017.6	179.5
10/12/17 13:54:00	9.21	13,256.0	4,017.2	179.5
10/12/17 14:54:00	9.25	13,316.0	4,016.8	179.6
10/12/17 15:54:00	9.29	13,376.0	4,016.4	179.6
10/12/17 16:54:00	9.33	13,436.0	4,016.0	179.6
10/12/17 17:54:00	9.37	13,496.0	4,015.7	179.6
10/12/17 18:54:00	9.41	13,556.0	4,015.3	179.6
10/12/17 19:54:00	9.46	13,616.0	4,014.9	179.6
10/12/17 20:54:00	9.50	13,676.0	4,014.5	179.6

F328A13.RAW G328711.CAL 15612

Date	Days	Minutes	F328A13 Psig	F328A 13 Deg F
10/10/17 23:52:00	7.64	11,003.0	4,036.6	176.9
10/11/17 0:52:00	7.68	11,063.0	4,036.1	176.9
10/11/17 1:52:00	7.72	11,123.0	4,035.6	177.0
10/11/17 2:52:00	7.77	11,183.0	4,035.1	177.0
10/11/17 3:52:00	7.81	11,243.0	4,034.6	177.0
10/11/17 4:52:00	7.85	11,303.0	4,034.2	177.0
10/11/17 5:52:00	7.89	11,363.0	4,033.8	177.1
10/11/17 6:52:00	7.93	11,423.0	4,033.3	177.1
10/11/17 7:52:00	7.97	11,483.0	4,032.9	177.1
10/11/17 8:52:00	8.02	11,543.0	4,032.5	177.1
10/11/17 9:52:00	8.06	11,603.0	4,032.0	177.1
10/11/17 10:52:00	8.10	11,663.0	4,031.5	177.2
10/11/17 11:52:00	8.14	11,723.0	4,031.1	177.2
10/11/17 12:52:00	8.18	11,783.0	4,030.7	177.2
10/11/17 13:52:00	8.22	11,843.0	4,030.3	177.2
10/11/17 14:52:00	8.27	11,903.0	4,029.9	177.2
10/11/17 15:52:00	8.31	11,963.0	4,029.4	177.3
10/11/17 16:52:00	8.35	12,023.0	4,028.9	177.3
10/11/17 17:52:00	8.39	12,083.0	4,028.5	177.3
10/11/17 18:52:00	8.43	12,143.0	4,028.1	177.3
10/11/17 19:52:00	8.47	12,203.0	4,027.6	177.3
10/11/17 20:52:00	8.52	12,263.0	4,027.2	177.3
10/11/17 21:52:00	8.56	12,323.0	4,026.8	177.4
10/11/17 22:52:00	8.60	12,383.0	4,026.3	177.4
10/11/17 23:52:00	8.64	12,443.0	4,025.9	177.4
10/12/17 0:52:00	8.68	12,503.0	4,025.5	177.4
10/12/17 1:52:00	8.72	12,563.0	4,025.1	177.4
10/12/17 2:52:00	8.77	12,623.0	4,024.7	177.5
10/12/17 3:52:00	8.81	12,683.0	4,024.2	177.5
10/12/17 4:52:00	8.85	12,743.0	4,023.9	177.5
10/12/17 5:52:00	8.89	12,803.0	4,023.5	177.5
10/12/17 6:52:00	8.93	12,863.0	4,023.0	177.5
10/12/17 7:52:00	8.97	12,923.0	4,022.6	177.6
10/12/17 8:52:00	9.02	12,983.0	4,022.2	177.6
10/12/17 9:52:00	9.06	13,043.0	4,021.7	177.6
10/12/17 10:52:00	9.10	13,103.0	4,021.4	177.6
10/12/17 11:52:00	9.14	13,163.0	4,021.1	177.6
10/12/17 12:52:00	9.18	13,223.0	4,020.7	177.6
10/12/17 13:52:00	9.22	13,283.0	4,020.2	177.7
10/12/17 14:52:00	9.27	13,343.0	4,019.9	177.7
10/12/17 15:52:00	9.31	13,403.0	4,019.5	177.7
10/12/17 16:52:00	9.35	13,463.0	4,019.0	177.7
10/12/17 17:52:00	9.39	13,523.0	4,018.7	177.7

Appendix E FO Test Raw Data

F162A13.RAW G162204.CAL 15612

Date	Days	Minutes	F162A13 Psig	F162A 13 Deg F
10/12/17 21:54:00	9.54	13,736.0	4,014.1	179.6
10/12/17 22:54:00	9.58	13,796.0	4,013.7	179.7
10/12/17 23:54:00	9.62	13,856.0	4,013.4	179.7
10/13/17 0:54:00	9.66	13,916.0	4,013.0	179.7
10/13/17 1:54:00	9.71	13,976.0	4,012.6	179.7
10/13/17 2:54:00	9.75	14,036.0	4,012.2	179.7
10/13/17 3:54:00	9.79	14,096.0	4,011.8	179.7
10/13/17 4:54:00	9.83	14,156.0	4,011.4	179.7
10/13/17 5:54:00	9.87	14,216.0	4,011.0	179.8
10/13/17 6:54:00	9.91	14,276.0	4,010.7	179.8
10/13/17 7:04:00	9.92	14,286.0	4,010.6	179.8
10/13/17 7:14:00	9.93	14,296.0	4,010.5	179.8
10/13/17 7:24:00	9.93	14,306.0	4,010.4	179.8
10/13/17 7:34:00	9.94	14,316.0	4,010.4	179.8
10/13/17 7:44:00	9.95	14,326.0	4,010.3	179.8
10/13/17 7:54:00	9.96	14,336.0	4,010.3	179.8
10/13/17 8:04:00	9.96	14,346.0	4,010.2	179.8
10/13/17 8:14:00	9.97	14,356.0	4,010.1	179.8
10/13/17 8:24:00	9.98	14,366.0	4,010.1	179.8
10/13/17 8:34:00	9.98	14,376.0	4,009.7	179.9
10/13/17 8:35:00	9.98	14,377.0	4,009.7	179.9
10/13/17 8:36:00	9.98	14,378.0	4,009.8	179.9
10/13/17 8:37:00	9.99	14,379.0	4,009.7	179.9
10/13/17 8:38:00	9.99	14,380.0	4,009.7	180.0
10/13/17 8:39:00	**9.99**	**14,381.0**	**3,981.2**	**180.0**
10/13/17 8:39:15	9.99	14,381.3	3,968.2	180.0
10/13/17 8:39:30	9.99	14,381.5	3,954.9	180.1
10/13/17 8:39:45	9.99	14,381.8	3,941.1	180.2
10/13/17 8:42:15	9.99	14,384.3	3,876.3	181.3
10/13/17 8:44:45	9.99	14,386.8	3,876.9	181.5
10/13/17 8:47:15	9.99	14,389.3	3,682.3	180.9
10/13/17 8:49:45	9.99	14,391.8	3,456.8	177.2
10/13/17 8:52:15	10.00	14,394.3	3,456.8	172.2
10/13/17 8:54:45	10.00	14,396.8	3,455.5	168.1
10/13/17 8:57:15	10.00	14,399.3	3,213.1	165.1
10/13/17 8:59:45	10.00	14,401.8	3,031.9	158.0
10/13/17 9:02:15	10.00	14,404.3	3,030.1	151.6
10/13/17 9:04:45	10.00	14,406.8	3,027.7	147.2
10/13/17 9:07:15	10.01	14,409.3	2,692.5	143.0
10/13/17 9:09:45	10.01	14,411.8	2,600.7	137.2
10/13/17 9:12:15	10.01	14,414.3	2,599.4	131.5
10/13/17 9:14:45	10.01	14,416.8	2,597.3	128.1
10/13/17 9:17:15	10.01	14,419.3	2,213.1	124.3

F328A13.RAW G328711.CAL 15612

Date	Days	Minutes	F328A13 Psig	F328A 13 Deg F
10/12/17 18:52:00	9.43	13,583.0	4,018.3	177.7
10/12/17 19:52:00	9.47	13,643.0	4,018.0	177.8
10/12/17 20:52:00	9.52	13,703.0	4,017.5	177.8
10/12/17 21:52:00	9.56	13,763.0	4,017.1	177.8
10/12/17 22:52:00	9.60	13,823.0	4,016.7	177.8
10/12/17 23:52:00	9.64	13,883.0	4,016.3	177.8
10/13/17 0:52:00	9.68	13,943.0	4,016.0	177.8
10/13/17 1:52:00	9.72	14,003.0	4,015.6	177.8
10/13/17 2:52:00	9.77	14,063.0	4,015.3	177.9
10/13/17 3:52:00	9.81	14,123.0	4,014.9	177.9
10/13/17 4:02:00	9.81	14,133.0	4,014.8	177.9
10/13/17 4:12:00	9.82	14,143.0	4,014.8	177.9
10/13/17 4:22:00	9.83	14,153.0	4,014.7	177.9
10/13/17 4:32:00	9.84	14,163.0	4,014.6	177.9
10/13/17 4:42:00	9.84	14,173.0	4,014.5	177.9
10/13/17 4:52:00	9.85	14,183.0	4,014.4	177.9
10/13/17 5:02:00	9.86	14,193.0	4,014.4	177.9
10/13/17 5:12:00	9.86	14,203.0	4,014.3	177.9
10/13/17 5:22:00	9.87	14,213.0	4,014.3	177.9
10/13/17 5:32:00	9.88	14,223.0	4,014.2	177.9
10/13/17 5:33:00	9.88	14,224.0	4,014.2	177.9
10/13/17 5:34:00	9.88	14,225.0	4,014.2	177.9
10/13/17 5:35:00	9.88	14,226.0	4,014.2	177.9
10/13/17 5:36:00	9.88	14,227.0	4,014.2	177.9
10/13/17 5:37:00	9.88	14,228.0	4,014.2	177.9
10/13/17 5:38:00	9.88	14,229.0	4,014.2	177.9
10/13/17 5:39:00	**9.88**	**14,230.0**	**4,014.2**	**177.9**
10/13/17 5:40:00	9.88	14,231.0	4,014.2	177.9
10/13/17 5:50:00	9.89	14,241.0	4,014.1	177.9
10/13/17 6:00:00	9.90	14,251.0	4,014.1	177.9
10/13/17 6:10:00	9.90	14,261.0	4,014.0	177.9
10/13/17 6:20:00	9.91	14,271.0	4,013.9	177.9
10/13/17 6:30:00	9.92	14,281.0	4,013.8	177.9
10/13/17 6:40:00	9.92	14,291.0	4,013.8	177.9
10/13/17 6:50:00	9.93	14,301.0	4,013.8	177.9
10/13/17 7:00:00	9.94	14,311.0	4,013.7	177.9
10/13/17 7:10:00	9.95	14,321.0	4,013.6	177.9
10/13/17 7:20:00	9.95	14,331.0	4,013.5	177.9
10/13/17 7:30:00	9.96	14,341.0	4,013.5	177.9
10/13/17 7:40:00	9.97	14,351.0	4,013.4	177.9
10/13/17 7:50:00	9.97	14,361.0	4,013.3	177.9
10/13/17 8:00:00	9.98	14,371.0	4,012.7	178.0
10/13/17 8:10:00	9.99	14,378.8	3,971.3	178.4

Appendix E FO Test Raw Data

F162A13.RAW G162204.CAL 15612

Date	Days	Minutes	F162A13 Psig	F162A 13 Deg F
10/13/17 9:19:45	10.02	14,421.8	1,739.4	117.0
10/13/17 9:22:15	10.02	14,424.3	1,737.7	108.5
10/13/17 9:24:45	10.02	14,426.8	1,735.2	101.6
10/13/17 9:27:15	10.02	14,429.3	1,447.6	97.0
10/13/17 9:29:45	10.02	14,431.8	1,302.5	90.0
10/13/17 9:32:15	10.02	14,434.3	1,300.3	84.1
10/13/17 9:34:45	10.03	14,436.8	1,298.0	80.1
10/13/17 9:37:15	10.03	14,439.3	957.7	76.6
10/13/17 9:39:45	10.03	14,441.8	866.5	72.0
10/13/17 9:42:15	10.03	14,444.3	866.2	66.8
10/13/17 9:44:45	10.03	14,446.8	864.6	63.6
10/13/17 9:47:15	10.03	14,449.3	857.7	61.9
10/13/17 9:49:45	10.04	14,451.8	856.9	61.3
10/13/17 9:53:00	10.04	14,455.0	0.0	61.3
10/13/17 9:55:30	10.04	14,457.5	0.0	61.7
10/13/17 9:58:00	10.04	14,460.0	0.0	62.1
10/13/17 10:00:30	10.04	14,462.5	0.0	62.2
10/13/17 10:09:00	10.05	14,471.0	0.0	60.5

F328A13.RAW G328711.CAL 15612

Date	Days	Minutes	F328A13 Psig	F328A 13 Deg F
10/13/17 8:20:00	9.99	14,381.3	3,878.9	180.1
10/13/17 8:30:00	9.99	14,383.8	3,879.4	181.1
10/13/17 8:40:00	9.99	14,386.3	3,751.8	181.2
10/13/17 8:42:30	9.99	14,388.8	3,469.9	178.4
10/13/17 8:45:00	9.99	14,391.3	3,460.2	173.7
10/13/17 8:47:30	10.00	14,393.8	3,458.0	169.4
10/13/17 8:50:00	10.00	14,396.3	3,290.2	166.3
10/13/17 8:52:30	10.00	14,398.8	3,032.7	160.0
10/13/17 8:55:00	10.00	14,401.3	3,032.6	153.2
10/13/17 8:57:30	10.00	14,403.8	3,030.4	148.3
10/13/17 9:00:00	10.00	14,406.3	2,783.1	144.2
10/13/17 9:02:30	10.01	14,408.8	2,602.2	138.9
10/13/17 9:05:00	10.01	14,411.3	2,600.4	132.8
10/13/17 9:07:30	10.01	14,413.8	2,598.8	129.0
10/13/17 9:10:00	10.01	14,416.3	2,310.8	125.7
10/13/17 9:12:30	10.01	14,418.8	1,810.6	119.0
10/13/17 9:15:00	10.01	14,421.3	1,740.5	110.5
10/13/17 9:17:30	10.02	14,423.8	1,736.9	103.1
10/13/17 9:20:00	10.02	14,426.3	1,543.0	98.3
10/13/17 9:22:30	10.02	14,428.8	1,303.9	91.9
10/13/17 9:25:00	10.02	14,431.3	1,303.8	85.8
10/13/17 9:27:30	10.02	14,433.8	1,301.6	81.5
10/13/17 9:30:00	10.03	14,436.3	1,054.4	78.1
10/13/17 9:32:30	10.03	14,438.8	869.2	73.9
10/13/17 9:35:00	10.03	14,441.3	870.3	67.9
10/13/17 9:37:30	10.03	14,443.8	869.9	63.3
10/13/17 9:40:00	10.03	14,446.3	864.8	60.7
10/13/17 9:42:30	10.03	14,448.8	860.7	60.2
10/13/17 9:45:00	10.04	14,451.3	859.3	60.6
10/13/17 9:47:30	10.04	14,453.8	0.0	61.4
10/13/17 9:50:00	10.04	14,456.3	0.9	62.3
10/13/17 9:52:30	10.04	14,458.8	0.8	63.1
10/13/17 9:55:00	10.05	14,468.0	2.5	60.7
10/13/17 9:57:30	10.05	14,478.0	2.5	60.3

Appendix F

Test gauge calibration certificates

ACCURACY VERIFICATION

5-February-2014

Gauge Model	SP-2000	Pressure Range	5 K
Gauge S/N	162	Accuracy 0.05%	Full Scale

Applied Pressure psig	Recorded Pressure psig	Difference psi	Percent (%)
0.01	0.01	0.00	0.0000%
774.08	772.83	-1.25	-0.0250%
1498.24	1497.46	-0.78	-0.0156%
2222.36	2220.75	-1.61	-0.0322%
2946.53	2944.89	-1.64	-0.0328%
3670.66	3669.06	-1.60	-0.0320%
4394.87	4393.46	-1.41	-0.0283%
5119.00	5117.54	-1.46	-0.0292%
4394.87	4393.90	-0.97	-0.0195%
3670.66	3669.82	-0.84	-0.0168%
2946.53	2945.67	-0.86	-0.0173%
2222.36	2221.50	-0.86	-0.0172%
1498.24	1497.46	-0.78	-0.0156%
774.08	773.32	-0.76	-0.0151%
0.01	0.01	0.00	0.0000%

Oven Temperature: 273.3 °F Probe Temperature: 273.5 °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

5-February-2014

Gauge Model	SP-2000	Pressure Range	5 K
Gauge S/N	162	Accuracy 0.05%	Full Scale

Applied Pressure psig	Recorded Pressure psig	Difference psi	Difference Percent (%)
0.01	0.71	0.70	0.0139%
774.08	774.96	0.88	0.0177%
1498.24	1499.12	0.88	0.0176%
2222.36	2222.99	0.63	0.0126%
2946.53	2947.04	0.51	0.0102%
3670.66	3671.23	0.57	0.0113%
4394.87	4395.53	0.66	0.0133%
5119.00	5119.94	0.94	0.0187%
4394.87	4396.16	1.29	0.0258%
3670.66	3671.99	1.33	0.0265%
2946.53	2947.97	1.44	0.0287%
2222.36	2223.84	1.48	0.0296%
1498.24	1499.73	1.49	0.0299%
774.08	775.18	1.10	0.0220%
0.01	0.25	0.24	0.0049%

Oven Temperature: 144.7 °F Probe Temperature: 144.7 °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

5-February-2014

Gauge Model	SP-2000	Pressure Range	5 K
Gauge S/N	162	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	773.90	-0.19	-0.0037%
1498.24	1497.87	-0.38	-0.0075%
2222.36	2221.81	-0.55	-0.0110%
2946.53	2945.90	-0.63	-0.0126%
3670.66	3669.99	-0.67	-0.0134%
4394.87	4394.44	-0.43	-0.0087%
5119.00	5118.94	-0.06	-0.0012%
4394.87	4394.97	0.10	0.0019%
3670.66	3670.88	0.22	0.0045%
2946.53	2946.76	0.23	0.0046%
2222.36	2222.61	0.25	0.0050%
1498.24	1498.39	0.15	0.0031%
774.08	774.11	0.03	0.0007%
0.01	0.01	0.00	0.0000%

Oven Temperature: **179.7 °F** Probe Temperature: **179.6 °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

5-February-2014

Gauge Model	SP-2000	Pressure Range	5 K
Gauge S/N	162	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	773.21	-0.87	-0.0175%
1498.24	1497.32	-0.92	-0.0185%
2222.36	2221.23	-1.14	-0.0227%
2946.53	2945.55	-0.98	-0.0196%
3670.66	3669.54	-1.12	-0.0224%
4394.87	4394.04	-0.83	-0.0166%
5119.00	5118.21	-0.79	-0.0158%
4394.87	4394.41	-0.47	-0.0093%
3670.66	3670.40	-0.26	-0.0053%
2946.53	2945.98	-0.55	-0.0109%
2222.36	2222.05	-0.31	-0.0061%
1498.24	1497.93	-0.31	-0.0062%
774.08	773.76	-0.32	-0.0064%
0.01	0.01	0.00	0.0000%

Oven Temperature: **253.9** °F Probe Temperature: **253.8** °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

11-July-2017

Gauge Model	SP-2000	Pressure Range	5K
Gauge S/N	328	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	773.67	-0.41	-0.0082%
1498.24	1497.45	-0.79	-0.0158%
2222.36	2221.56	-0.80	-0.0160%
2946.53	2946.12	-0.41	-0.0082%
3670.66	3670.01	-0.65	-0.0130%
4394.87	4394.33	-0.54	-0.0108%
5119.00	5118.90	-0.10	-0.0020%
4394.87	4395.08	0.21	0.0042%
3670.66	3671.10	0.44	0.0088%
2946.53	2947.05	0.52	0.0104%
2222.36	2222.82	0.46	0.0092%
1498.24	1498.64	0.40	0.0080%
774.08	774.48	0.40	0.0080%
0.01	0.62	0.61	0.0122%

Oven Temperature: **178.8** °F Probe Temperature: **177.9** °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

11-July-2017

Gauge Model	SP-2000	Pressure Range	5K
Gauge S/N	328	Accuracy	+/-0.05% Full Scale

Applied Pressure psig	Recorded Pressure psig	Difference psi	Difference Percent (%)
0.01	0.11	0.10	0.0020%
774.08	773.86	-0.22	-0.0044%
1498.24	1497.71	-0.53	-0.0106%
2222.36	2221.44	-0.92	-0.0184%
2946.53	2945.47	-1.06	-0.0212%
3670.66	3669.65	-1.01	-0.0202%
4394.87	4393.92	-0.95	-0.0190%
5119.00	5118.53	-0.47	-0.0094%
4394.87	4394.68	-0.19	-0.0038%
3670.66	3670.46	-0.20	-0.0040%
2946.53	2946.75	0.22	0.0044%
2222.36	2222.81	0.45	0.0090%
1498.24	1499.02	0.78	0.0156%
774.08	775.17	1.09	0.0218%
0.01	0.01	0.00	0.0000%

Oven Temperature: **218.7** °F Probe Temperature: **218.6** °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 Jeff (Walsh Engineering) (Operator Representative) Witness Monica Kuehling (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 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

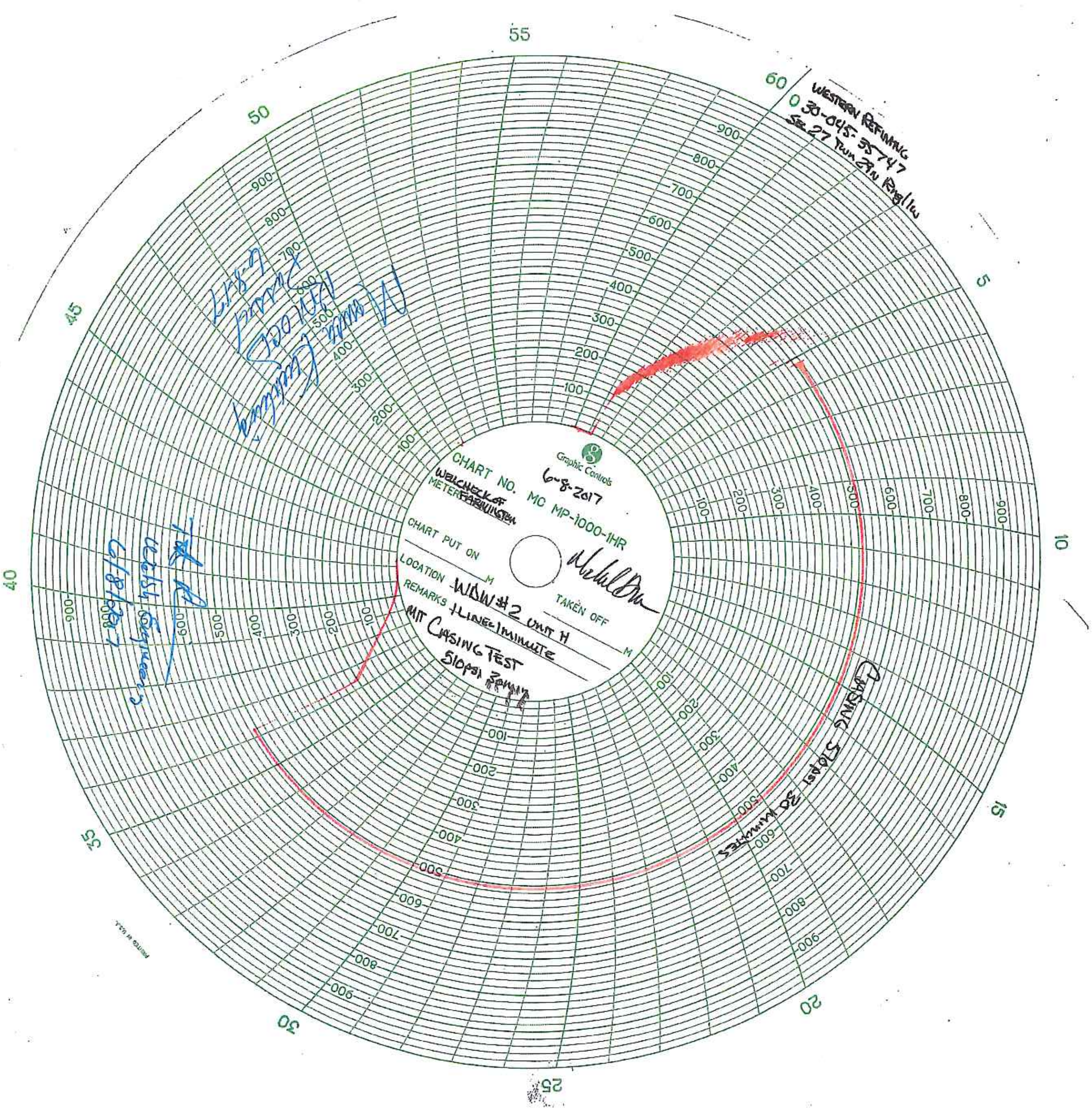
REMARKS: BH- Puff when opened. Nothing when opened after 5 min Shut in. Int. light blow to dead at 5 seconds. Nothing when opened after 5 min Shut in

By DDR

site Supervisor
(Position)

Witness Monica Kuehling

E-mail address _____



WESTERN REFINING
30-045-35747
Sec 27 Twn 29N Rng 11W
CHART NO. MC MP-1000-1HR
Graphic Controls
6-8-2017
METER WELLCHECK OF FARMINGTON
CHART PUT ON
LOCATION WDW #2 UNIT H
TAKEN OFF
REMARKS 1 LINE = 1 MINUTE
MIT CASING TEST
510psi
CASING 510psi 30 MINUTES

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

WDW #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
6-Mar-17								
7-Mar-17								
8-Mar-17	20.63		-	1,353	1,353	1,018	42,756	0.49
9-Mar-17	16.17		-	1,289	1,392	1,570	65,933	0.39
10-Mar-17	13.63	1.00	1,310	1,380	1,383	2,010	84,413	0.32
11-Mar-17	10.19	1.00	1,381	1,382	1,383	2,344	98,448	0.24
12-Mar-17	6.75	2.22	1,382	1,382	1,383	2,391	100,422	0.16
13-Mar-17		9.43	957	1,135	1,383	2,391	100,422	
14-Mar-17	15.68	14.92	888	1,116	1,423	2,601	109,235	0.37
15-Mar-17	11.01	7.06	957	1,195	1,423	2,703	113,526	0.26
16-Mar-17		24.48	845	891	953	2,703	113,526	
17-Mar-17	12.35	18.83	813	1,061	1,393	2,869	120,498	0.29
18-Mar-17		25.14	814	863	940	2,869	120,498	
19-Mar-17	18.76	25.24	777	1,001	1,393	3,044	127,848	0.45
20-Mar-17	15.50	11.82	867	1,057	1,392	3,166	132,972	0.37
21-Mar-17	15.43	16.85	825	1,028	1,393	3,303	138,726	0.37
22-Mar-17	12.19	10.91	852	1,153	1,429	3,503	147,126	0.29
23-Mar-17	10.98	9.86	897	1,202	1,442	3,647	153,174	0.26
24-Mar-17	20.30	13.25	910	1,017	1,442	3,720	156,240	0.48
25-Mar-17		29.08	808	849	906	3,720	156,240	
26-Mar-17		40.00	758	781	807	3,720	156,240	
27-Mar-17	20.44	25.46	746	898	1,443	3,817	160,314	0.49
28-Mar-17	17.96	21.81	757	1,030	1,451	4,003	168,126	0.43
29-Mar-17	14.06	6.75	904	1,133	1,451	4,177	175,434	0.33
30-Mar-17	12.65	8.97	862	1,172	1,447	4,341	182,322	0.30
31-Mar-17	9.55	5.29	977	1,258	1,428	4,453	187,026	0.23
1-Apr-17		13.50	888	1,046	1,351	4,452	186,984	
2-Apr-17	13.05	19.65	830	1,073	1,393	4,563	191,646	0.31
3-Apr-17	13.65	8.62	915	1,148	1,393	4,601	193,242	0.32
4-Apr-17	12.81	9.62	912	1,146	1,393	4,713	197,946	0.30
5-Apr-17	15.08	11.63	905	1,072	1,343	4,735	198,870	0.36
6-Apr-17	10.50	20.38	838	981	1,342	4,779	200,718	0.25
7-Apr-17	12.17	14.03	881	1,048	1,393	4,848	203,616	0.29
8-Apr-17		29.00	805	845	914	4,848	203,616	
9-Apr-17	12.78	28.26	774	988	1,393	4,945	207,690	0.30
10-Apr-17	10.32	15.17	842	996	1,393	4,997	209,874	0.25
11-Apr-17	14.44	23.03	793	1,004	1,393	5,100	214,200	0.34
12-Apr-17	11.88	14.06	873	1,015	1,392	5,170	217,140	0.28
13-Apr-17	13.40	14.96	837	1,109	1,393	5,298	222,516	0.32
14-Apr-17	13.13	15.02	878	1,020	1,393	5,340	224,280	0.31
15-Apr-17	13.94	18.27	856	1,014	1,393	5,384	226,128	0.33
16-Apr-17		35.33	790	819	856	5,385	226,170	

WDW #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
17-Apr-17	12.38	19.65	776	1,108	1,392	5,492	230,664	0.29
18-Apr-17	11.35	18.98	850	966	1,393	5,538	232,596	0.27
19-Apr-17	11.90	21.83	819	988	1,392	5,590	234,780	0.28
20-Apr-17	14.86	21.26	826	1,010	1,392	5,669	238,098	0.35
21-Apr-17	10.98	12.15	889	1,126	1,393	5,763	242,046	0.26
22-Apr-17	9.68	19.04	861	995	1,392	5,798	243,516	0.23
23-Apr-17	18.02	23.16	825	1,000	1,393	5,850	245,700	0.43
24-Apr-17	11.40	26.15	825	905	1,393	5,879	246,918	0.27
25-Apr-17	14.02	23.94	800	972	1,393	5,950	249,900	0.33
26-Apr-17	14.77	20.50	818	981	1,392	6,025	253,050	0.35
27-Apr-17	12.57	18.41	819	1,040	1,393	6,125	257,250	0.30
28-Apr-17	14.99	14.69	866	1,067	1,393	6,205	260,610	0.36
29-Apr-17	12.51	16.48	862	1,015	1,393	6,272	263,424	0.30
30-Apr-17		28.58	803	847	927	6,272	263,424	
1-May-17	15.36	23.69	784	1,023	1,392	6,371	267,582	0.37
2-May-17	16.68	15.60	859	1,046	1,392	6,443	270,606	0.40
3-May-17	11.94	19.11	846	954	1,392	6,485	272,370	0.28
4-May-17	13.15	20.95	842	972	1,393	6,555	275,310	0.31
5-May-17	15.83	26.90	817	908	1,392	6,598	277,116	0.38
6-May-17	12.06	24.98	795	940	1,392	6,669	280,098	0.29
7-May-17	13.26	29.74	782	917	1,393	6,721	282,282	0.32
8-May-17		29.38	809	829	853	6,721	282,282	
9-May-17						6,721	282,282	
10-May-17						6,721	282,282	
11-May-17						6,721	282,282	
12-May-17						6,721	282,282	
13-May-17						6,721	282,282	
14-May-17						6,721	282,282	
15-May-17						6,721	282,282	
16-May-17						6,721	282,282	
17-May-17						6,721	282,282	
18-May-17						6,721	282,282	
19-May-17						6,721	282,282	
20-May-17						6,721	282,282	
21-May-17						6,721	282,282	
22-May-17						6,721	282,282	
23-May-17						6,721	282,282	
24-May-17						6,721	282,282	
25-May-17						6,721	282,282	
26-May-17						6,721	282,282	
27-May-17						6,721	282,282	
28-May-17						6,721	282,282	

WDW #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
29-May-17						6,721	282,282	
30-May-17						6,721	282,282	
31-May-17						6,721	282,282	
1-Jun-17						6,721	282,282	
2-Jun-17						6,721	282,282	
3-Jun-17						6,721	282,282	
4-Jun-17						6,721	282,282	
5-Jun-17						6,721	282,282	
6-Jun-17						6,721	282,282	
7-Jun-17		103.72	560	561	563	6,721	282,282	
8-Jun-17	24.63	115.97	555	606	694	7,063	296,646	0.59
9-Jun-17	36.48	3.00	613	746	847	7,897	331,667	0.87
10-Jun-17	25.00	8.05	703	788	848	8,308	348,936	0.60
11-Jun-17		26.74	653	674	701	8,308	348,936	
12-Jun-17	36.52	39.78	640	749	847	8,973	376,866	0.87
13-Jun-17	28.85		844	901	957	9,968	418,649	0.69
14-Jun-17	24.21	2.33	819	898	966	10,555	443,303	0.58
15-Jun-17	29.41		909	982	1,042	11,569	485,891	0.70
16-Jun-17	31.20		1,038	1,066	1,092	12,632	530,537	0.74
17-Jun-17	32.36		1,060	1,115	1,158	13,713	575,939	0.77
18-Jun-17	35.60		1,158	1,185	1,192	14,938	627,389	0.85
19-Jun-17	31.60		1,188	1,200	1,218	16,020	672,832	0.75
20-Jun-17	31.12		1,213	1,228	1,242	17,084	717,521	0.74
21-Jun-17	29.22		1,237	1,247	1,257	18,085	759,563	0.70
22-Jun-17	32.05	3.44	1,072	1,189	1,262	18,741	787,122	0.76
23-Jun-17	27.95	1.09	1,149	1,224	1,248	19,653	825,426	0.67
24-Jun-17	29.04	1.00	1,252	1,271	1,295	20,642	866,964	0.69
25-Jun-17	29.54		1,294	1,310	1,326	21,658	909,629	0.70
26-Jun-17	27.60	1.00	1,322	1,326	1,335	22,604	949,361	0.66
27-Jun-17	22.91	2.40	1,183	1,271	1,337	23,237	975,954	0.55
28-Jun-17	21.34	1.81	1,214	1,271	1,278	23,953	1,006,026	0.51
29-Jun-17	21.17	1.48	1,242	1,277	1,288	24,678	1,036,469	0.50
30-Jun-17	20.91	1.58	1,274	1,279	1,284	25,386	1,066,212	0.50
1-Jul-17	20.11	1.73	1,277	1,281	1,284	26,075	1,095,150	0.48
2-Jul-17	19.54	2.00	1,279	1,281	1,285	26,741	1,123,122	0.47
3-Jul-17	19.53	1.73	1,278	1,287	1,293	27,416	1,151,465	0.46
4-Jul-17	19.06	2.00	1,288	1,291	1,293	28,071	1,178,982	0.45
5-Jul-17	18.46	2.17	1,288	1,291	1,293	28,709	1,205,771	0.44
6-Jul-17	18.14	2.77	1,278	1,290	1,293	29,331	1,231,902	0.43
7-Jul-17	17.63	3.00	1,278	1,290	1,293	29,935	1,257,270	0.42
8-Jul-17	18.10	3.00	1,289	1,295	1,307	30,556	1,283,345	0.43
9-Jul-17	18.08	2.85	1,289	1,304	1,308	31,178	1,309,476	0.43

WDW #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
10-Jul-17	18.46	3.02	1,304	1,307	1,313	31,793	1,335,299	0.44
11-Jul-17	20.50	2.54	1,308	1,325	1,342	32,482	1,364,237	0.49
12-Jul-17	18.51	2.58	1,328	1,332	1,343	33,116	1,390,865	0.44
13-Jul-17	18.62	2.88	1,319	1,338	1,353	33,761	1,417,955	0.44
14-Jul-17	18.71	3.00	1,349	1,351	1,355	34,401	1,444,842	0.45
15-Jul-17	17.66	3.00	1,348	1,351	1,353	35,004	1,470,168	0.42
16-Jul-17	17.78	3.02	1,347	1,350	1,353	35,588	1,494,696	0.42
17-Jul-17	17.06	3.37	1,330	1,344	1,354	36,152	1,518,377	0.41
18-Jul-17	17.08	3.57	1,339	1,347	1,353	36,714	1,541,981	0.41
19-Jul-17	17.31	3.60	1,347	1,351	1,353	37,282	1,565,844	0.41
20-Jul-17	16.04	4.00	1,348	1,351	1,354	37,831	1,588,902	0.38
21-Jul-17	16.11	4.00	1,348	1,354	1,359	38,383	1,612,079	0.38
22-Jul-17	15.77	4.00	1,353	1,356	1,358	38,925	1,634,850	0.38
23-Jul-17	15.72	3.88	1,354	1,356	1,358	39,465	1,657,530	0.37
24-Jul-17	15.81	4.00	1,354	1,360	1,368	40,007	1,680,287	0.38
25-Jul-17	15.70	4.00	1,362	1,366	1,369	40,542	1,702,757	0.37
26-Jul-17	14.99	4.20	1,364	1,366	1,370	41,054	1,724,261	0.36
27-Jul-17	15.18	4.48	1,365	1,372	1,379	41,573	1,746,059	0.36
28-Jul-17	15.27	4.89	1,374	1,376	1,378	42,086	1,767,612	0.36
29-Jul-17	14.96	4.27	1,373	1,376	1,379	42,603	1,789,319	0.36
30-Jul-17	14.39	4.17	1,374	1,376	1,379	43,097	1,810,074	0.34
31-Jul-17	14.06	4.38	1,374	1,376	1,378	43,580	1,830,353	0.33
1-Aug-17	14.31	4.46	1,374	1,376	1,378	44,069	1,850,898	0.34
2-Aug-17	14.21	6.89	1,185	1,316	1,379	44,381	1,864,002	0.34
3-Aug-17		18.85	1,118	1,146	1,183	44,381	1,864,002	
4-Aug-17		25.67	1,078	1,097	1,117	44,381	1,864,002	
5-Aug-17		30.54	1,048	1,062	1,078	44,381	1,864,002	
6-Aug-17		34.56	1,023	1,035	1,048	44,381	1,864,002	
7-Aug-17	23.70	20.40	1,013	1,128	1,241	44,805	1,881,803	0.56
8-Aug-17	21.81	2.63	1,245	1,283	1,322	45,546	1,912,932	0.52
9-Aug-17	21.33	2.15	1,323	1,339	1,352	46,277	1,943,626	0.51
10-Aug-17	19.08	2.88	1,276	1,355	1,363	46,931	1,971,095	0.45
11-Aug-17	16.75	3.00	1,358	1,361	1,363	47,508	1,995,336	0.40
12-Aug-17	15.38	3.38	1,359	1,361	1,364	48,033	2,017,386	0.37
13-Aug-17	14.20	4.00	1,359	1,361	1,363	48,522	2,037,924	0.34
14-Aug-17	13.88	4.31	1,360	1,365	1,369	49,000	2,058,000	0.33
15-Aug-17	13.49	4.77	1,364	1,366	1,369	49,466	2,077,565	0.32
16-Aug-17	12.92	5.00	1,304	1,365	1,368	49,909	2,096,178	0.31
17-Aug-17	12.63	5.00	1,366	1,378	1,388	50,346	2,114,525	0.30
18-Aug-17	11.05	7.96	1,176	1,307	1,388	50,556	2,123,352	0.26
19-Aug-17		20.27	1,110	1,138	1,174	50,556	2,123,352	
20-Aug-17		26.99	1,071	1,089	1,108	50,556	2,123,352	

WDW #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
21-Aug-17		31.58	1,043	1,056	1,070	50,556	2,123,352	
22-Aug-17		35.75	1,019	1,030	1,042	50,556	2,123,352	
23-Aug-17		39.38	999	1,009	1,019	50,556	2,123,352	
24-Aug-17	12.29	19.73	993	1,131	1,218	50,817	2,134,314	0.29
25-Aug-17	12.19	5.26	1,216	1,263	1,288	51,178	2,149,476	0.29
26-Aug-17	12.28	4.94	1,286	1,296	1,303	51,600	2,167,200	0.29
27-Aug-17	11.92	5.33	1,301	1,308	1,310	52,009	2,184,378	0.28
28-Aug-17	10.87	5.87	1,306	1,314	1,318	52,386	2,200,212	0.26
29-Aug-17	12.14	5.67	1,315	1,330	1,349	52,806	2,217,852	0.29
30-Aug-17	13.21	5.35	1,345	1,350	1,354	53,255	2,236,710	0.31
31-Aug-17	12.19	6.00	1,349	1,352	1,354	53,674	2,254,308	0.29
1-Sep-17	11.95	6.19	1,349	1,355	1,359	54,089	2,271,738	0.28
2-Sep-17	11.98	6.40	1,355	1,356	1,358	54,496	2,288,832	0.29
3-Sep-17	11.43	6.81	1,354	1,356	1,359	54,885	2,305,170	0.27
4-Sep-17	11.26	7.04	1,354	1,358	1,362	55,266	2,321,165	0.27
5-Sep-17	11.67	7.00	1,359	1,364	1,370	55,667	2,338,007	0.28
6-Sep-17	11.37	7.00	1,364	1,369	1,374	56,054	2,354,268	0.27
7-Sep-17	11.09	7.00	1,370	1,372	1,374	56,430	2,370,060	0.26
8-Sep-17	10.80	12.77	1,131	1,237	1,374	56,548	2,375,016	0.26
9-Sep-17		24.83	1,076	1,100	1,129	56,548	2,375,016	
10-Sep-17		30.85	1,043	1,058	1,075	56,548	2,375,016	
11-Sep-17		35.54	1,018	1,029	1,042	56,548	2,375,016	
12-Sep-17		39.42	997	1,007	1,017	56,548	2,375,016	
13-Sep-17	12.91	24.00	989	1,112	1,209	56,798	2,385,516	0.31
14-Sep-17	11.39	7.04	1,209	1,231	1,244	57,178	2,401,476	0.27
15-Sep-17	12.32	5.06	1,248	1,260	1,291	57,597	2,419,074	0.29
16-Sep-17	11.34	5.00	1,262	1,270	1,284	57,987	2,435,447	0.27
17-Sep-17	11.35	5.00	1,278	1,283	1,286	58,376	2,451,792	0.27
18-Sep-17	10.71	10.45	1,065	1,169	1,283	58,514	2,457,588	0.26
19-Sep-17		24.35	1,018	1,038	1,064	58,514	2,457,588	
20-Sep-17	24.90	15.89	1,005	1,143	1,331	58,842	2,471,364	0.59
21-Sep-17		21.25	1,001	1,026	1,070	58,842	2,471,364	#VALUE!
22-Sep-17	40.71	23.54	991	1,284	1,439	59,781	2,510,802	0.97
23-Sep-17	30.17	11.86	1,052	1,123	1,440	59,837	2,513,154	0.72
24-Sep-17		24.73	1,008	1,027	1,051	59,837	2,513,154	
25-Sep-17		32.10	981	993	1,007	59,837	2,513,154	
26-Sep-17		37.31	961	970	980	59,837	2,513,154	
27-Sep-17		41.25	944	952	960	59,837	2,513,154	
28-Sep-17		44.67	930	937	944	59,837	2,513,154	
29-Sep-17		47.83	918	924	930	59,837	2,513,154	
30-Sep-17		50.23	907	912	918	59,837	2,513,154	
1-Oct-17		52.96	896	901	906	59,837	2,513,154	

WDW #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-Oct-17	14.89	22.80	893	1,012	1,103	60,176	2,527,392	0.35
3-Oct-17	13.74	3.63	1,068	1,120	1,152	60,598	2,545,116	0.33
4-Oct-17	13.97	2.54	1,155	1,184	1,211	61,079	2,565,311	0.33
5-Oct-17	13.79	6.73	1,002	1,125	1,228	61,307	2,574,894	0.33
6-Oct-17		23.17	954	973	1,000	61,307	2,574,894	
7-Oct-17		32.42	928	940	953	61,307	2,574,894	
8-Oct-17		38.14	910	919	928	61,307	2,574,894	
9-Oct-17		42.13	896	903	910	61,307	2,574,894	
10-Oct-17		37.25	884	890	895	61,307	2,574,894	
11-Oct-17		37.48	873	878	883	61,307	2,574,894	
12-Oct-17		40.44	864	868	873	61,307	2,574,894	
13-Oct-17		42.56	856	860	864	61,307	2,574,894	
14-Oct-17		44.52	848	852	856	61,307	2,574,894	
15-Oct-17		45.96	841	844	848	61,307	2,574,894	
16-Oct-17	11.45	21.94	838	946	1,047	61,542	2,584,757	0.27
17-Oct-17	11.77	1.00	1,057	1,084	1,108	61,941	2,601,515	0.28
18-Oct-17	11.30		1,106	1,124	1,143	62,328	2,617,769	0.27
19-Oct-17	11.37		1,140	1,155	1,169	62,637	2,630,747	0.27