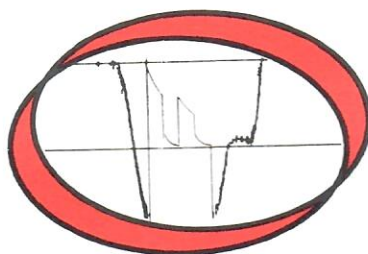
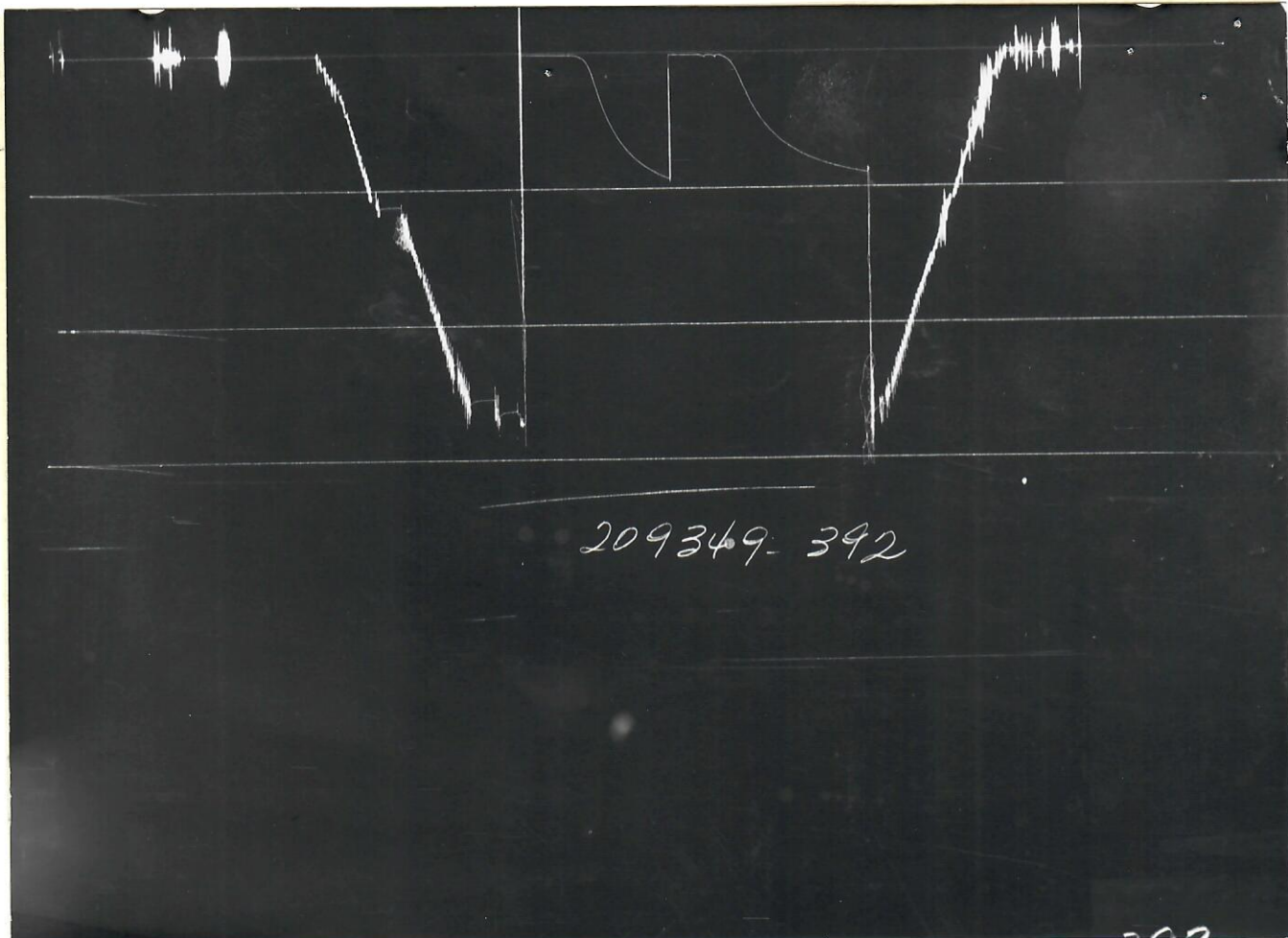


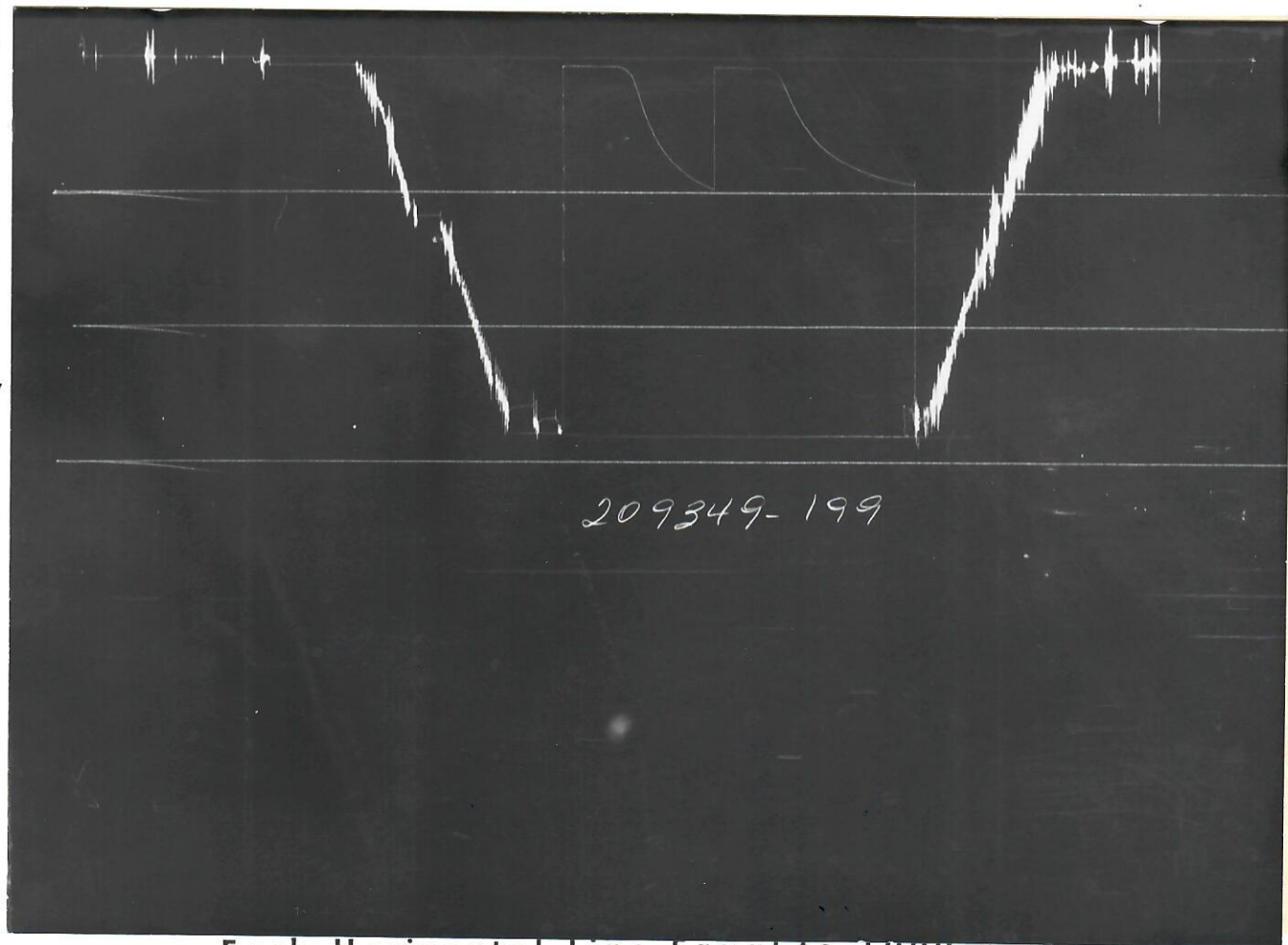
# ***Formation Testing Service Report***



— PRESSURE —  
↓



— TIME —→



Each Horizontal Line Equal to 1000 p.s.i.



FROTSCHNER

33-13

2

5342' - 5412'

UNION PACIFIC RAILROAD - NATURAL  
LEASE OWNER/COMPANY NATURAL RESOURCES DIVISIONLegal Location  
Sec. - Twp. - Rng.

13 - 15 - 45

Field Area

LADDER CREEK

County

CHEYENNE

State

COLORADO

FLUID SAMPLER DATA				Date 1-14-71		Ticket Number 209349	
Sampler Pressure 5 P.S.I.G. at Surface				Kind of Job OPEN HOLE		Halliburton District LIBERAL	
Recovery: Cu. Ft. Gas _____				Tester MR. THOMAS		Witness MR. STUBBLEFIELD	
cc. Oil _____				Drilling Contractor L & F DRILLING COMPANY IC S			
cc. Water _____				EQUIPMENT & HOLE DATA			
cc. Mud 2200				Formation Tested Spurgin & St. Louis			
Tot. Liquid cc. 2200				Elevation 4344' Ft.			
Gravity _____ ° API @ _____ °F.				Net Productive Interval 70' Ft.			
Gas/Oil Ratio _____ cu. ft./bbl.				All Depths Measured From Kelly Bushing			
RESISTIVITY _____ CHLORIDE CONTENT _____				Total Depth 5412' Ft.			
Recovery Water _____ @ _____ °F. _____ ppm				Main Hole/Casing Size 7 7/8"			
Recovery Mud _____ @ _____ °F.				Drill Collar Length 586' I.D. 2.25"			
Recovery Mud Filtrate _____ @ _____ °F. _____ ppm				Drill Pipe Length 3965' I.D. 3.826"			
Mud Pit Sample _____ @ _____ °F.				Packer Depth(s) 5336' - 5342' Ft.			
Mud Pit Sample Filtrate _____ @ _____ °F. _____ ppm				Depth Tester Valve 5316' Ft.			
Mud Weight 9.1 vis 45 cp							
TYPE		AMOUNT		Depth Back Pres. Valve		Surface Choke	
Cushion		-		-		1/4" Bottom Choke 5/8"	
Recovered		30 Feet of		Drilling mud			
Recovered		Feet of		<div style="text-align: center;"> <b>RECEIVED</b>  <b>FEB -3 1971</b>  <b>COLO. OIL &amp; GAS CONS. COMM.</b> </div>			
Recovered		Feet of					
Recovered		Feet of					
Recovered		Feet of					
Recovered		Feet of					
Remarks Opened tool for 32 minute first flow with a very weak blow throughout test.							
Closed tool for 58 minute initial closed in pressure. Reopened tool for 31 minute							
second flow with no blow throughout flow period. Closed tool for 89 minute							
second closed in pressure.							
TEMPERATURE		Gauge No. 392		Gauge No. 199		Gauge No.	
Depth: 5320' Ft.		Depth: 5408' Ft.		Depth: Ft.		TIME	
Est. 160 °F.		12 Hour Clock		12 Hour Clock		Hour Clock	
Blanked Off NO		Blanked Off YES		Blanked Off		Tool A.M.	
Actual °F.		Pressures		Pressures		Tool A.M.	
		Field Office		Field Office		Closed 9:38 X.M.	
Initial Hydrostatic		2615 2635		- 2675		Reported Computed	
Flow Initial		19 15		- 54		Minutes Minutes	
Flow Final		19 19		- 54		30 32	
Closed in		946 933		- 972		60 58	
Flow Initial		19 24		- 62		30 31	
Flow Final		19 22		- 58		90 89	
Closed in		909 896		- 935			
Flow Initial							
Flow Final							
Closed in							
Final Hydrostatic		2615 2626		- 2668			



Gauge No. 392			Depth 5320'		Clock No. 6524			12 hour		Ticket No. 209349					
First Flow Period			First Closed In Pressure			Second Flow Period		Second Closed In Pressure			Third Flow Period		Third Closed In Pressure		
	Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	$\text{Log} \frac{t + \theta}{\theta}$	PSIG Temp. Corr.	Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	$\text{Log} \frac{t + \theta}{\theta}$	PSIG Temp. Corr.	Time Defl. .000"	PSIG Temp. Corr.	Time Defl. .000"	$\text{Log} \frac{t + \theta}{\theta}$	PSIG Temp. Corr.
0	.000	15	.000		19	.000	24	.000		22					
1	.211	19	.0402		45	.205	22	.060		111					
2			.0804		176			.120		349					
3			.1206		404			.180		531					
4			.1608		564			.240		642					
5			.2010		681			.300		722					
6			.2412		766			.360		777					
7			.2814		826			.420		820					
8			.3216		874			.480		852					
9			.3618		911			.540		878					
10			.3890		933*			.593		896**					
11															
12															
13															
14															
15															

Gauge No.			199		Depth		5408'		Clock No.		3443		12		hour		
0	.000	54	.000		54	.000	62	.000		58							
1	.218	54	.0409		84	.209	58	.0612		146							
2			.0818		226			.1224		385							
3			.1227		450			.1836		566							
4			.1636		611			.2448		682							
5			.2045		725			.3060		759							
6			.2454		804			.3672		817							
7			.2863		867			.4284		858							
8			.3272		914			.4896		892							
9			.3681		951			.5508		918							
10			.3950		972*			.6060		935**							
11																	
12																	
13																	
14																	
15																	
Reading Interval			6						9						Minutes		

REMARKS: \*Last interval equal to 4 minutes \*\*Last interval equal to 8 minutes





	O. D.	I. D.	LENGTH	DEPTH
Reversing Sub .....	5"	2.12"	1'	
Water Cushion Valve .....				
Drill Pipe .....	4 1/2"	3.826"	3965'	
Drill Collars .....	6 1/4"	2.25"	586'	
Handling Sub & Choke Assembly .....				
Dual CIP Valve .....				
Dual CIP Sampler .....	5"	.87"	7'	
Hydro-Spring Tester .....	5"	.75"	5'	5316'
Multiple CIP Sampler .....				
Extension Joint .....				
AP Running Case .....	5"	3.06"	4'	5320'
Hydraulic Jar .....	5"	.87"	5'	
VR Safety Joint .....	5"	1"	2.75'	
Pressure Equalizing Crossover .....				
Packer Assembly .....	5"	1.53"	6'	5336'
Distributor .....				
Packer Assembly .....	5"	1.53"	6'	5342'
Flush Joint Anchor .....				
Pressure Equalizing Tube .....				
Blanked-Off B.T. Running Case .....				
Drill Collars .....				
Anchor Pipe Safety Joint .....				
Packer Assembly .....				
Packer Assembly .....				
Anchor Pipe Safety Joint .....				
Side Wall Anchor .....				
Drill Collars .....	6 1/4"	2.25"	28'	
Flush Joint Anchor .....	5"	3.46"	33'	
Blanked-Off B.T. Running Case .....	5"	3.16"	4'	5408'

## NOMENCLATURE

<b>b</b>	= Approximate Radius of Investigation	Feet
<b>b<sub>1</sub></b>	= Approximate Radius of Investigation (Net Pay Zone h <sub>1</sub> )	Feet
<b>D.R.</b>	= Damage Ratio	—
<b>EI</b>	= Elevation	Feet
<b>GD</b>	= B.T. Gauge Depth (From Surface Reference)	Feet
<b>h</b>	= Interval Tested	Feet
<b>h<sub>1</sub></b>	= Net Pay Thickness	Feet
<b>K</b>	= Permeability	md
<b>K<sub>1</sub></b>	= Permeability (From Net Pay Zone h <sub>1</sub> )	md
<b>m</b>	= Slope Extrapolated Pressure Plot (Psi <sup>2</sup> /cycle Gas)	psi/cycle
<b>OF<sub>1</sub></b>	= Maximum Indicated Flow Rate	MCF/D
<b>OF<sub>2</sub></b>	= Minimum Indicated Flow Rate	MCF/D
<b>OF<sub>3</sub></b>	= Theoretical Open Flow Potential with/Damage Removed Max.	MCF/D
<b>OF<sub>4</sub></b>	= Theoretical Open Flow Potential with/Damage Removed Min.	MCF/D
<b>P<sub>s</sub></b>	= Extrapolated Static Pressure	Psig.
<b>P<sub>f</sub></b>	= Final Flow Pressure	Psig.
<b>P<sub>ot</sub></b>	= Potentiometric Surface (Fresh Water *)	Feet
<b>Q</b>	= Average Adjusted Production Rate During Test	bbls/day
<b>Q<sub>1</sub></b>	= Theoretical Production w/Damage Removed	bbls/day
<b>Q<sub>g</sub></b>	= Measured Gas Production Rate	MCF/D
<b>R</b>	= Corrected Recovery	bbls
<b>r<sub>w</sub></b>	= Radius of Well Bore	Feet
<b>t</b>	= Flow Time	Minutes
<b>t<sub>o</sub></b>	= Total Flow Time	Minutes
<b>T</b>	= Temperature Rankine	°R
<b>Z</b>	= Compressibility Factor	—
<b>μ</b>	= Viscosity Gas or Liquid	CP
<b>Log</b>	= Common Log	

\* Potentiometric Surface Reference to Rotary Table When Elevation Not Given,  
Fresh Water Corrected to 100° F.