Petrotek

Technical Report

2013 WELL TESTING AND ORIGINAL RESERVOIR PRESSURE MEASUREMENT
Nichols Ranch ISR Uranium Project
NICH-DW1
WDEQ UIC Permit 10-392
Sec. 17-T43N-R76W

Uranerz Energy Corporation
Johnson County, Wyoming

October 2013

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TECHNICAL REPORT
2013 WELL TESTING AND ORIGINAL RESERVOIR PRESSURE MEASUREMENT
CLASS I NON-HAZARDOUS DEEPWELL

Uranerz Energy Corporation
NICH-DW1; UIC Permit: 10-392

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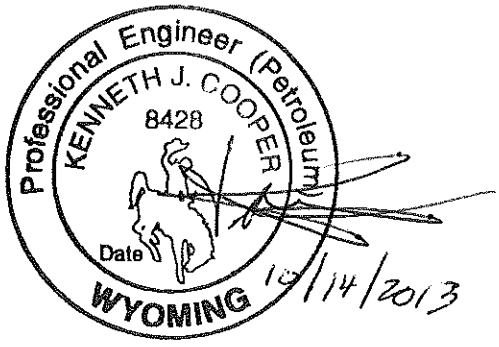
Report prepared by:



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1.0 INTRODUCTION

This report summarizes the September 2013 reservoir testing activities performed on the NICH-DW1 Class I well at the Uranerz Energy Corporation site in Johnson County, Wyoming. The primary objectives of the test included obtaining confirmation of original static reservoir pressure and determination of estimated pressures for operating limitations applicable to the NICH-DW1 well. Efforts were also undertaken to determine formation characteristics and well conditions.

The field operations occurred in multiple stages with data acquired from the individual step-rate tests conducted on each individual formation during the period of August 10-19, 2013 and an injection fall-off test conducted on the entire perforated and stimulated injection interval on September 6-7, 2013. The injection fall-off test was conducted by running the well for a period of approximately 12 hours at a constant rate of 0.5 bpm, followed by a measurement of the pressure fall-off of more than 12 hours.

Results of test analysis are submitted to satisfy the Wyoming Department of Environmental Quality (WDEQ) Water Quality Rules and Regulations (Chapter XIII, among others), and the Class I UIC permit #10-392. Through WDEQ permit reference to the federal UIC statutes, it is noted that applicable regulations prohibit the initiation or propagation of fractures during injection operations, except during permitted well stimulation activities.

The NICH-DW1 disposal well communicates to the Teckla, Teapot, and Parkman Formations via a perforated and hydraulically fractured completion. The current configuration of the well is illustrated in Figures included in the October 2013 completion report documentation. The perforated completion interval is comprised of selected layers over a depth range from 7,656 feet to 8,646 feet KB. Perforation of the casing over a subset of the 990-foot gross thickness injection zone was accomplished with 90 degree phased guns at 4 shots per foot over a net pay of approximately 284 feet. Log analysis indicates that an average porosity of approximately 13 percent is likely effective for the injection interval. Although additional porosity thickness (greater than the perforated interval) may communicate to the well, for the purpose of evaluation the thickness was assigned based only on the best quality layers that comprise the perforated intervals.

Petrotek Engineering Corporation (Petrotek) supervised field data collection activities and evaluated the test data. The pressure data collected in the tests are of sufficient quality to allow confirmation of the original reservoir pressure and estimates of the maximum bottomhole injection pressure suitable for operations. Due to the relatively short duration of the test, only general estimates of permeability-thickness are possible. The test procedures, analytical methods, and results are presented in the following sections.

Analysis of the injection fall-off test data collected in September of 2013 indicates that the injection reservoir in communication to the current completion during the test likely has an effective permeability-thickness of approximately 319 md-ft. with a stimulated completion.

2.0 RESERVOIR TESTING RESULTS AND ANALYSIS

September 2013 Fracture Stimulation Analysis

On August 23, 2013 a fracture stimulation was conducted by injecting fluids into the well at approximately 40 barrels per minute (bpm) to create hydraulic fractures in the Teckla, Teapot, and Parkman injection zones. Proppant was emplaced into the fractures to make the stimulation a useable completion feature during permitted injection activities. Treating pressure is the wellhead pressure recorded during fracture propagation, and thus this pressure changes during a fracture treatment. At the conclusion of the pumping, pressures decay as fluid leaves the wellbore and fractures and continues to bleed off into the pore space in the reservoir rock. As this occurs, the pressure fall-off changes from a trend dominated by the properties of the fractures to a trend dominated by the porous media as the fractures that had been generated during the stimulation close on the proppant that had been emplaced into the fractures created during the stimulation treatment. After flow stops there is no friction, and closure pressure occurs. This closure pressure is the pressure at the formation face which is necessary to hold an existing fracture open. At pressures less than this value fractures will not open. Closure pressure generally is measured instead of opening pressure because it is less affected by the test procedure and easier to observe. Closure pressure is equal to the minimum (usually horizontal) principal stress. For a particular point in the wellbore, closure pressure is less than the fracture propagation pressure, sometimes only slightly less, and sometimes on the order of several hundred psi less than propagation pressure. This closure pressure is referred to as Instantaneous Shut-in Pressure, or ISIP. When detailed step-rate testing data are not available, ISIP is often used to approximate formation fracture pressure. ISIP is evaluated in this report to verify the step-rate injection test results.

The raw treatment data are presented in print-outs included as Attachment 7 of the well completion report. The rate variation during treatment, along with the variable fluid density, viscosity and friction losses that were present during pumping make analysis of the injection portion of the treatment subject to significant uncertainty. However, after pumping is stopped many of the variables no longer impact the data, making it more useful for the estimation of fracture pressure.

Reported wellhead ISIP values for the 4-stage fracture treatment ranged from 1,358 to 1,434 psi. Based on a measurement (reference) depth of 7,642 feet bgs, the fracture gradient from the frac job can be calculated. Based on the reported ISIP values and assumed fluid density based on frac-job records, the calculated bottomhole fracture gradient ranges from 0.614 to 0.624 psi/ft (Table 1).

August 2013 Step-Rate Injection Tests (by Formation)

Individual step-rate tests were conducted on each injection formation (Parkman, Teckla and Teapot) during the completion process to: (1) measure original reservoir pressure and (2)

individually assess fracture and propagation gradients for each injection zone. For each formation, the general SRT procedures were as follows.

1. Run downhole gauges via slickline making static gradient stops to test depth and collect static bottomhole pressure for 1 hour.
2. Rig up pump truck and run 5-hour step-rate injection test with 2% KCl starting at 0.5 bpm increasing the rate at 30-minute increments (0.5 to 5.0 bpm).
3. Monitor fall-off for 5 hours.
4. Pull gauges out of well making static gradient stops to surface.

The testing began with the Parkman which was perforated and swabbed for formation fluid sample collection. A step-rate injection test was then conducted at rates ranging from 0.50 to 5.0 bpm. Results are presented in Figure 1 (BH pressure vs. time) and Figure 2 (BHP vs. rate). Field reports are presented in Appendix 1 of this report.

After testing the Parkman, a plug was set above the Parkman perforations and perforating, swabbing and sample collection conducted in the Teapot Formation. An SRT was performed in Teapot (See Figures 3 and 4) and after this field work was completed, similar procedures were applied to test the Teckla (Figures 5 and 6). The results are summarized in Table 1.

The data collected during the individual formation step-rate testing indicate estimated fracture propagation gradients of 0.588, 0.635, and 0.599 psi/ft for the Parkman, Teapot, and Teckla, respectively. These values were compared to and corroborated by the ISIP data collected during the fracture stimulation included as Attachment 7 of the Drilling, Completion, and MIT Report.

August 2013 Bottomhole Pressure Measurements

As part of the step-rate injection testing, static bottom-hole multiple pressure measurements were recorded with downhole pressure gauges prior to starting each test. Those data, combined with data from fluid levels obtained during/after perforating and swabbing were used to determine original bottomhole pressures for each injection zone. These data are presented as "Static BH Pressure (psi)" in Table 1. Original bottomhole pressure for the commingled completion is estimated as 3,119 psia at a depth of 7,522' BGS, from the injection/falloff test in September 2013.

September 2013 Pressure Transient Data Collection

To conduct the September 2013 injection fall-off test data, equipment was rigged-up and pressure control equipment installed on the wellhead. The tool assembly was then run to the test depth of 7,522 feet RKB. The test was run by injecting into the multi-zone perforated and stimulated Teckla-Teapot-Parkman completion for approximately 12 hours at a rate of 0.5 bpm. The well was shut-in at 21:36 9/6/13 pm and pressure measured for approximately 13 hours. The test data are summarized in Appendix 1.

Pressure Fall-off Test Analysis

A Cartesian plot of the pressure fall-off data is provided as Figure 7. After shut-in, pressure declined as expected in the injection interval. The very early-time data presented in the log-log plot provided as Figure 8 are dominated by wellbore storage before data becomes dominated by non-radial flow consistent with the significant hydraulic fracture completion present in this well.

A number of factors are present in this test, including the variation of viscosity in the system with both time and distance from the borehole, wellbore storage, the potential for multi-layer effects, and the recently completed propped hydraulic fracture stimulation. A simulation analysis of the full rate history was conducted using the Fekete Fast Welltest simulator. A Cartesian, derivative, bilinear, and Horner history match are included as Figures 7 through 10. Analysis of these data using a homogenous single-layer fractured wellbore model yield an estimated reservoir permeability-thickness (kh) and skin of approximately 319 md-ft and -5, respectively. For an effective thickness of 284 feet, permeability is calculated to be 1.1 md. This analysis is equivalent to a transmissibility of approximately 625 md-ft/cp for a fluid viscosity of 0.51 cp. A summary of the analyses are provided as Attachment 1.

Based on available completion and geologic data, there is no apparent changing skin factor during the short-term September 2013 injection test and both the build-up and fall-off data appear to be consistent with a hydraulic fracture with a wing-length of approximately 152 feet. It is likely that the majority of the negative skin factor is due to the propped fracture and the radius of investigation of this test was approximately 198 feet. Based on the simulation matches shown in Figures 7 through 10, the simulation solution presented is a simple and representative solution that appears to be reasonably consistent with all available data. The test field report is included in Appendix 2.

3.0 LSIP PROJECTIONS AND SENSITIVITY ANALYSIS

The data collected during the August 2013 step-rate testing were sufficient to allow an estimate of the maximum injection pressure likely to be permitted by WDEQ for the NICH-DW1 well completion. As discussed previously, there are several variables including possible fluid relative permeability, reservoir heterogeneity, formation boundaries and fluid compatibility that may be significant issues concerning both short-term (days-months) and long-term (years) injection capacity. The data from the short-term testing conducted for this completion to date only allow direct observation of parameters over a distance of approximately 200 feet radially around the well. No well test data are available to confirm the nature of the reservoir beyond this distance.

Calculation of Limiting Surface Injection Pressure

WDEQ regulations state that the limiting surface injection pressure shall be a conservative value calculated as 90 percent of the formation fracture pressure. Calculation of the LSIP requires input of the Bottomhole fracture pressure, hydrostatic head due to probable injectate, and friction losses (WDEQ Guidance Document #4; P. 15).

As discussed in Section 2 of this report, a 0.588 psi/ft fracture propagation pressure gradient is conservative based on an average value of 0.619 psi/ft derived by Halliburton for the ISIP observed during the four fracture stages and the average of 0.603 psi/ft estimated from the individual formation step rate testing conducted on the three formations before the well was stimulated. The lowest fracture gradient (0.588 psi/ft average for the Parkman) was used in this calculation at the top perforation (7,264 feet) despite having been estimated for the deepest formation (measured at 8,712 feet). This yields a further degree of conservatism to the calculation.

An example calculation is shown below based on an estimated fracture propagation gradient of 0.588 psi/ft (Parkman Formation) applied at the top perforation of the injection interval (7,656' RKB, 7,642' BGL) with an assumed fluid specific gravity of 1.008 (20,000 ppm) and friction loss based on an injection rate of 50 gpm.

Limiting surface injection pressure (LSIP; psi) = (P - h + T + L) x (0.90)

where: $P = F \times D$

P = Fracture propagation pressure of the receiver
F = Fracture propagation gradient in psi/ft of depth
D = Depth to the top perforation of the receiver

and: $h = G \times D \times 0.433$

h = Hydrostatic head at the top perforation of the receiver
G = Specific Gravity of the injection fluid

D = Depth to the top perforation of the receiver
T = tubing pressure loss (friction loss)

Tubing pressure loss (T) was obtained from standard correlations for 2-7/8" oilfield tubing. The friction loss for a 50 gpm injection rate is approximately 76 psi. Perforation pressure losses (L) were neglected.

As discussed previously, the fracture propagation gradient (F) in the completion is estimated to be approximately 0.588 psi/ft. Based on this value the fracture pressure at the top perforation of the receiver (P) is calculated as:

$$P = 0.588 \times 7{,}642 = 4{,}495 \text{ psig}$$

For an injection fluid with a specific gravity of 1.008, the hydrostatic head (h) is:

$$h = 1.008 \times 7{,}642 \times 0.433 = 3{,}335 \text{ psig}$$

As such, the maximum wellhead injection pressure for the NICH-DW1 at a rate of 50 gpm is calculated without any safety factor as:

$$MSIP \text{ (psi)} = (4{,}495 - 3{,}335 + 76) = 1{,}236 \text{ psig}$$

With a conservative WDEQ safety factor of 10% applied to the wellhead pressure value, the LSIP is calculated as follows:

$$LSIP \text{ (psi)} = (4{,}495 - 3{,}335 + 76) \times (0.90) = 1{,}112 \text{ psig}$$

4.0 CONCLUSIONS

The data collected during the 2013 testing were of sufficient quality to allow the (1) estimation of reservoir pressure; (2) determination of fracture pressure, (3) derivation of LSIP, and (4) useful to derive general estimates of the reservoir and wellbore parameters discussed in this report. Standard industry data collection and analysis procedures were followed with respect to this testing. Graphs of the data are provided that show the relationship of pressure versus time and pressure versus rate.

In summary, analysis of the data indicate that the hydraulic fracture stimulation has been effective and has resulted in a -5 skin factor even under injection at low wellhead pressures. Both classical analysis and simulation of the injection fall-off data were able to be analyzed sufficiently to indicate that the well has a permeability-thickness that is approximately 319 md-ft to water. The reservoir was investigated to a distance of approximately 200 feet and long-term operations and subsequent annual fall-off testing will provide additional data to characterize reservoir behavior over a larger scale.

TABLES

Uranerz Nichols Ranch
Step-rate Injection Test Summary

TABLE 1										
Well	NICH-DW1			Static	Static	Formation				
	KB	KB	Gauge	BH Presure	BH Gradient	Breakdown				
	Perf Top	Perf Bottom	Depth (bgs)	(psia)	(psia/ft)	Pressure	Gradient	ISIP	ISIP Press.	ISIP Grad
Parkman	8380	8646	8712	2935	0.337	5172	0.594	1526	5328	0.612
Teapot	8062	8148	8000	3292.0	0.412	5170	0.646	1599	5091	0.636
Teckla	7656	7784	7264	2735.8	0.377	4570	0.629	1159	4329	0.596
Note: Parkman BHP interpolated with fluid levels and BHP data										
				Static	Static	Fracture				
	KB	KB		BH Presure	BH Gradient	Propagation				
	Perf Top	Perf Bottom	Gauge Depth	(psia)	(psia/ft)	Pressure	Gradient	ISIP	ISIP Press.	ISIP Grad
Parkman 1	8380	8646	8712	2935	0.337	5165	0.593	1526	5328	0.612
Parkman 2	8380	8646	8712	- -	- -	5085	0.584	1526	5328	0.612
Teapot	8062	8148	8000	3292.0	0.378	5080	0.635	1599	5091	0.636
Teckla	7656	7784	7264	2735.8	0.342	4350	0.599	1159	4329	0.596

Top perf =	7642	bgs				Inj. Fluid SG	1.008			
Limit FG =	0.593	Parkman 1								
Limit FG =	0.584	Parkman 2								
Limit FG =	0.614	Frac job				Frac Data		FP @	FG @	
Ave FG =	0.588	Average Parkman 1 & 2				(reported by Halliburton)		7642	7642	
						Frac ISIP				
Inj rate =	50									
						Stage 1	1358	4693.5	0.614	
Friction =	76	C = 130; 7508' tubing				Stage 2	1392	4727.5	0.619	
						Stage 3	1434	4769.5	0.624	
MSIP =	1236	psia				Stage 4	1396	4731.5	0.619	
LSIP =	1112	psia								
Original BHP (psia)	3119	at				7522	bgs			
Limiting (frac) BHP (psia)	4350	at				7522	bgs			
Original BHP (psia)	3171	at				7642	bgs			
Limiting (frac) BHP (psia)	4402	at				7642	bgs			

FIGURES

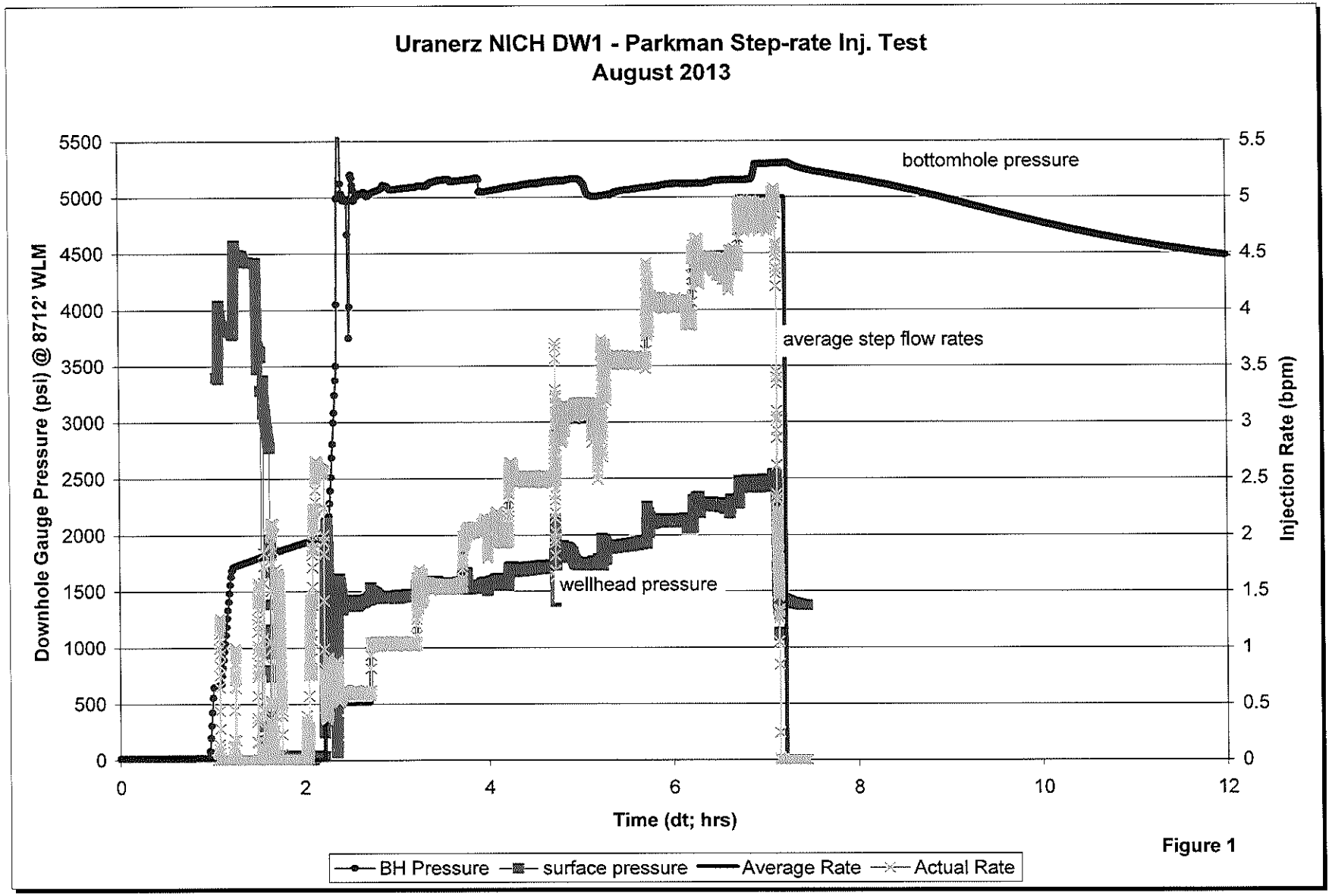

Uranerz NICH DW1 - Parkman Step-rate Inj. Test
August 2013
Downhole Gauge Pressure (psi) @ 8712' WLM
Injection Rate (bpm)
Time (dt; hrs)
bottomhole pressure
average step flow rates
wellhead pressure
BH Pressure
surface pressure
Average Rate
Actual Rate

Figure 1

Uranerz
NICH DW #1, Parkman
August 2013 Injection Step Rate Test

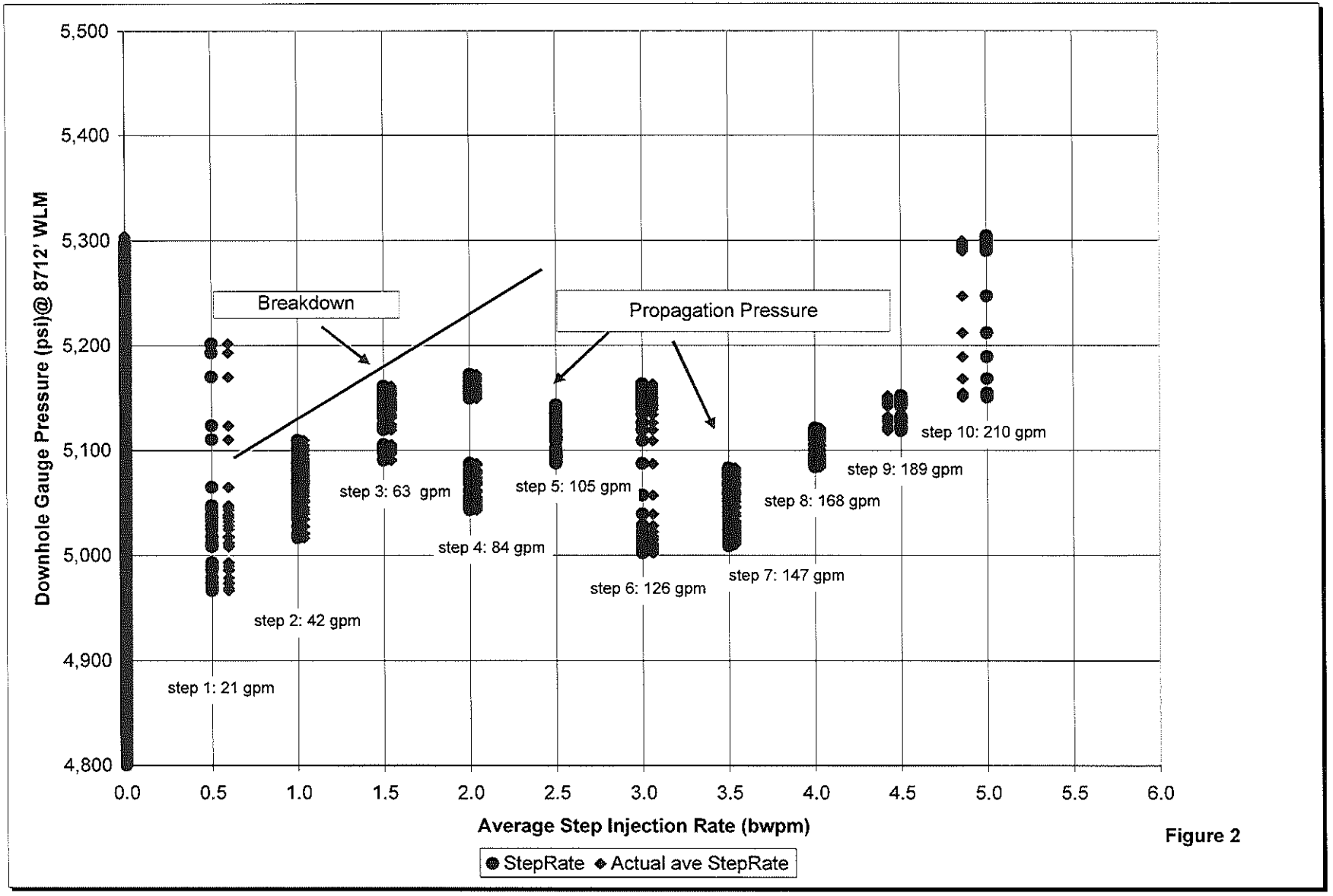


Figure 2

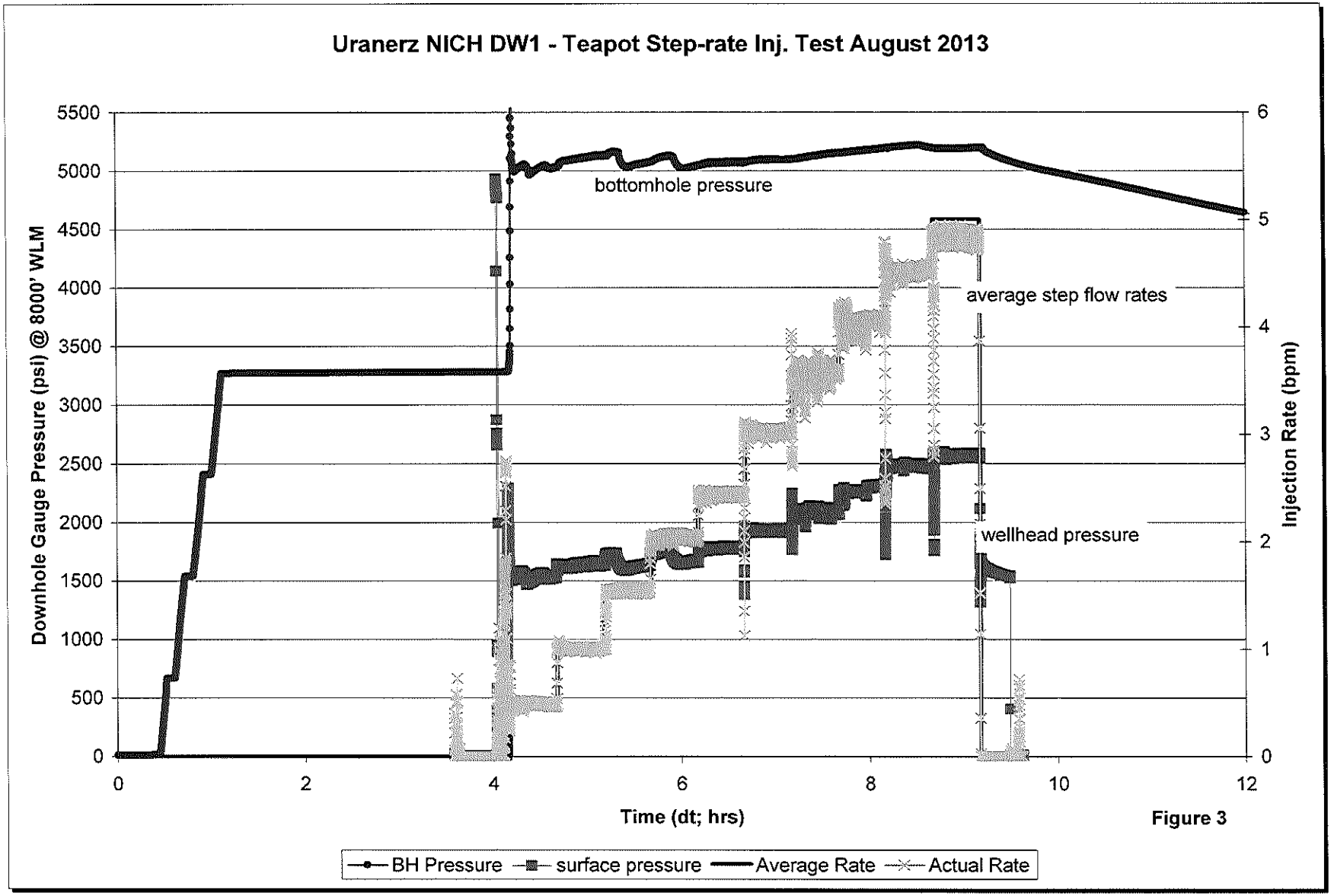

Uranerz NICH DW1 - Teapot Step-rate Inj. Test August 2013
Downhole Gauge Pressure (psi) @ 8000' WLM
Injection Rate (bpm)
Time (dt; hrs)
bottomhole pressure
average step flow rates
wellhead pressure
BH Pressure
surface pressure
Average Rate
Actual Rate
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
6
5
4
3
2
1
0
0
2
4
6
8
10
12

Figure 3

Uranerz
DW #1, Teapot
August 2013 Injection Step Rate Test

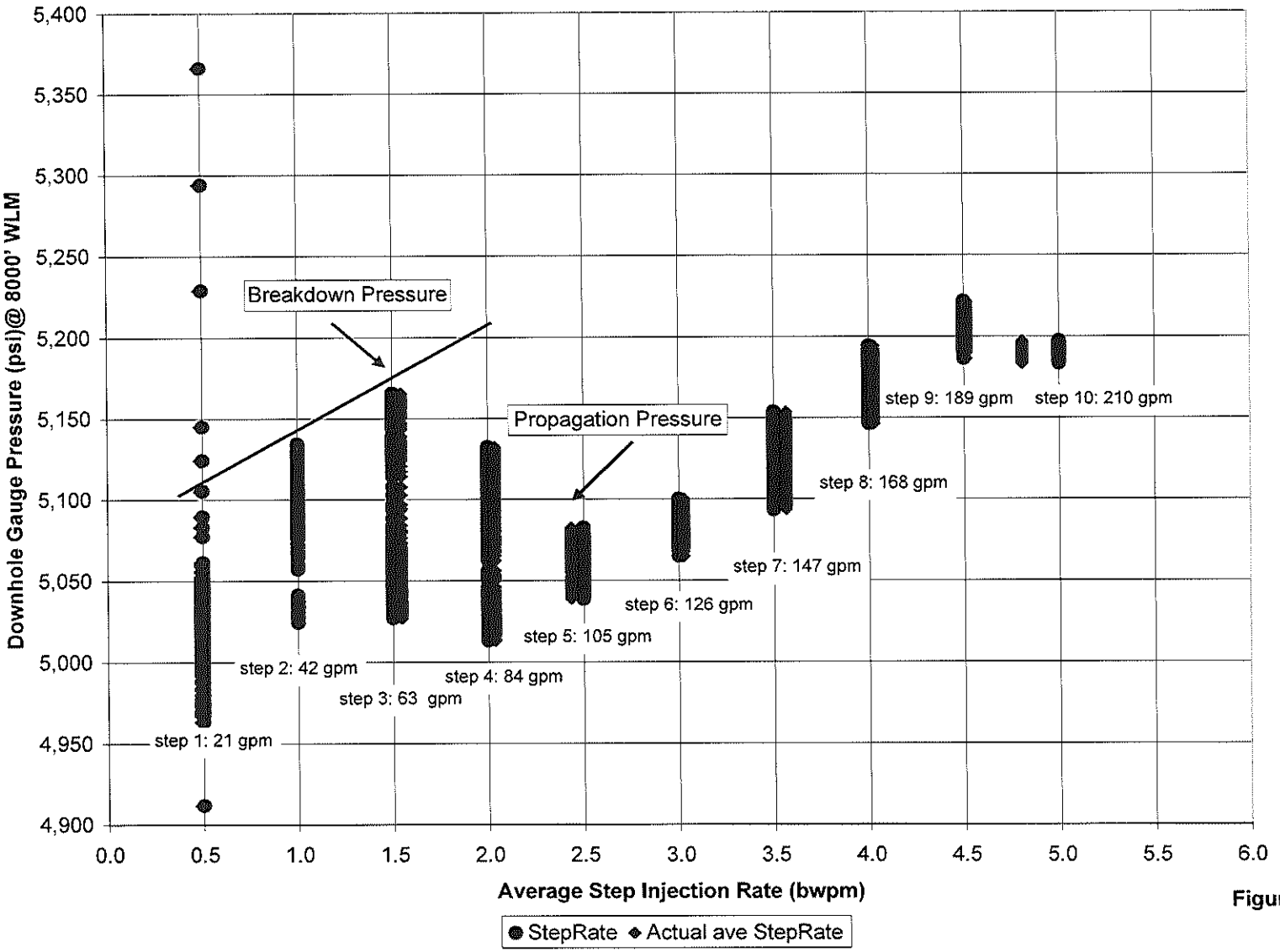


Figure 4

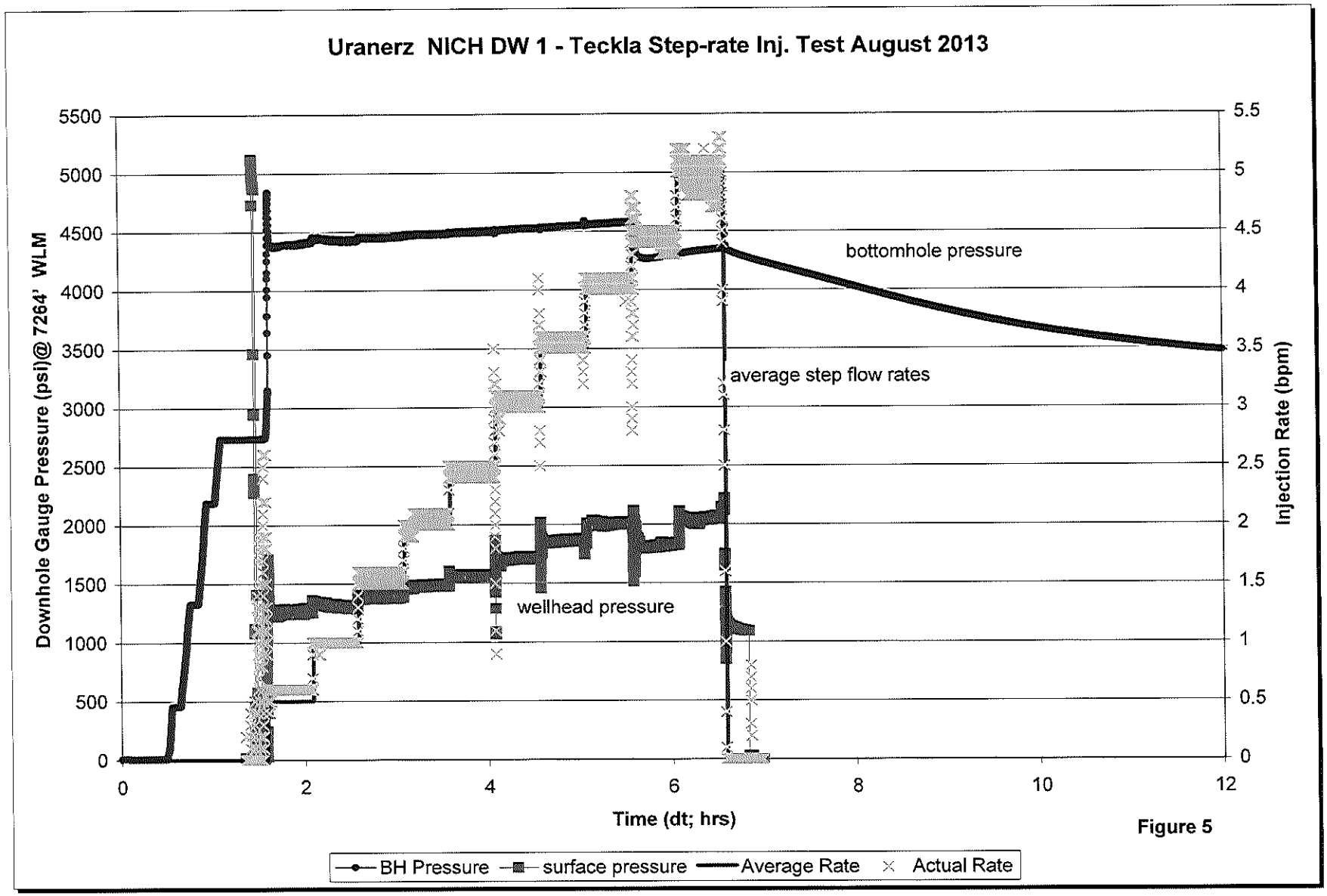

Uranerz NICH DW 1 - Teckla Step-rate Inj. Test August 2013
Downhole Gauge Pressure (psi)@ 7264' WLM
Injection Rate (bpm)
Time (dt; hrs)
bottomhole pressure
average step flow rates
wellhead pressure
BH Pressure
surface pressure
Average Rate
Actual Rate

Figure 5

Uranerz
NICH DW #1, Teckla
August 2013 Injection Step Rate Test

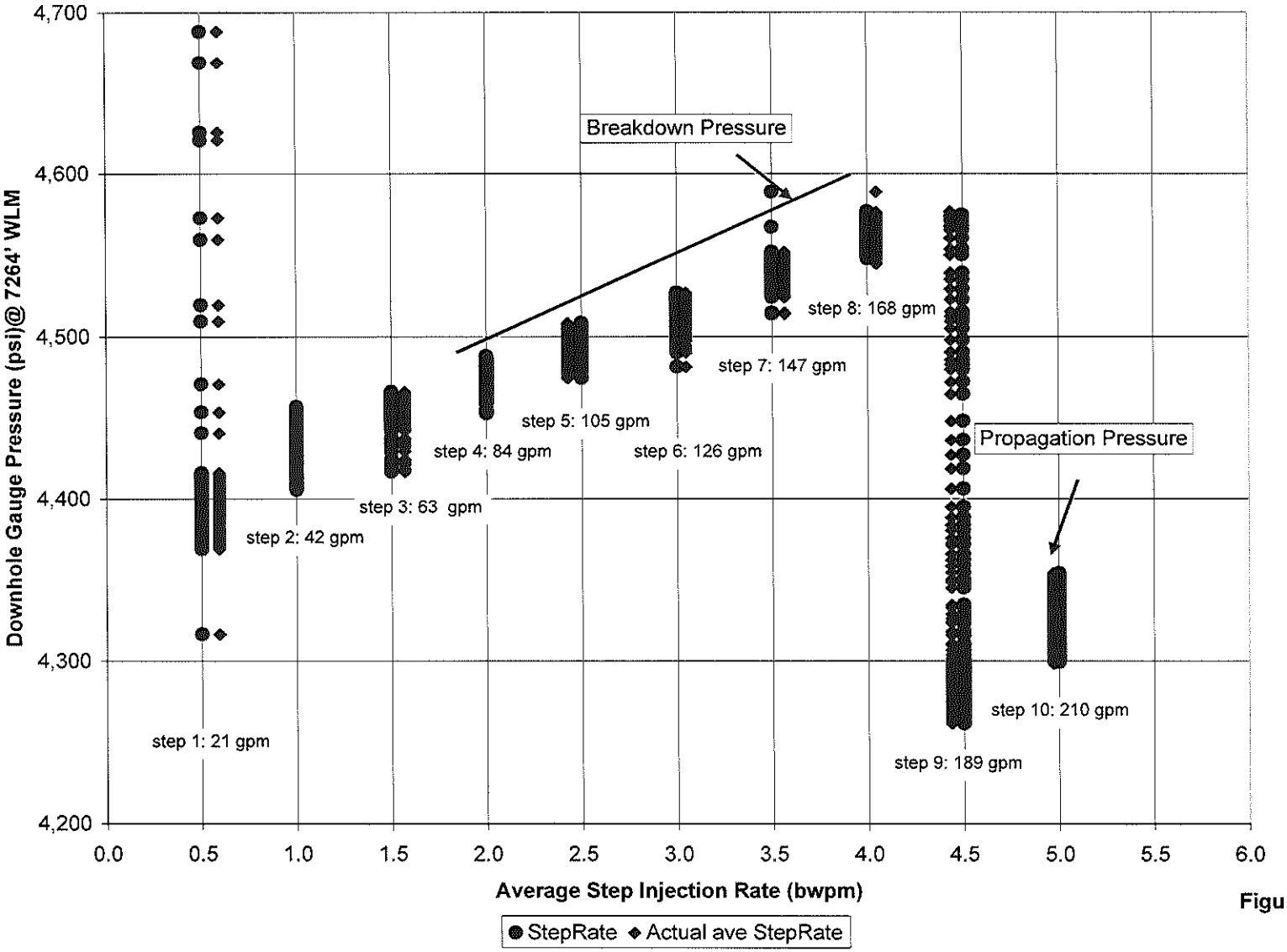


Figure 6

Uranerz Energy
NICH-DW #1
Constant Rate Injection/Falloff Test
September 06-07, 2013

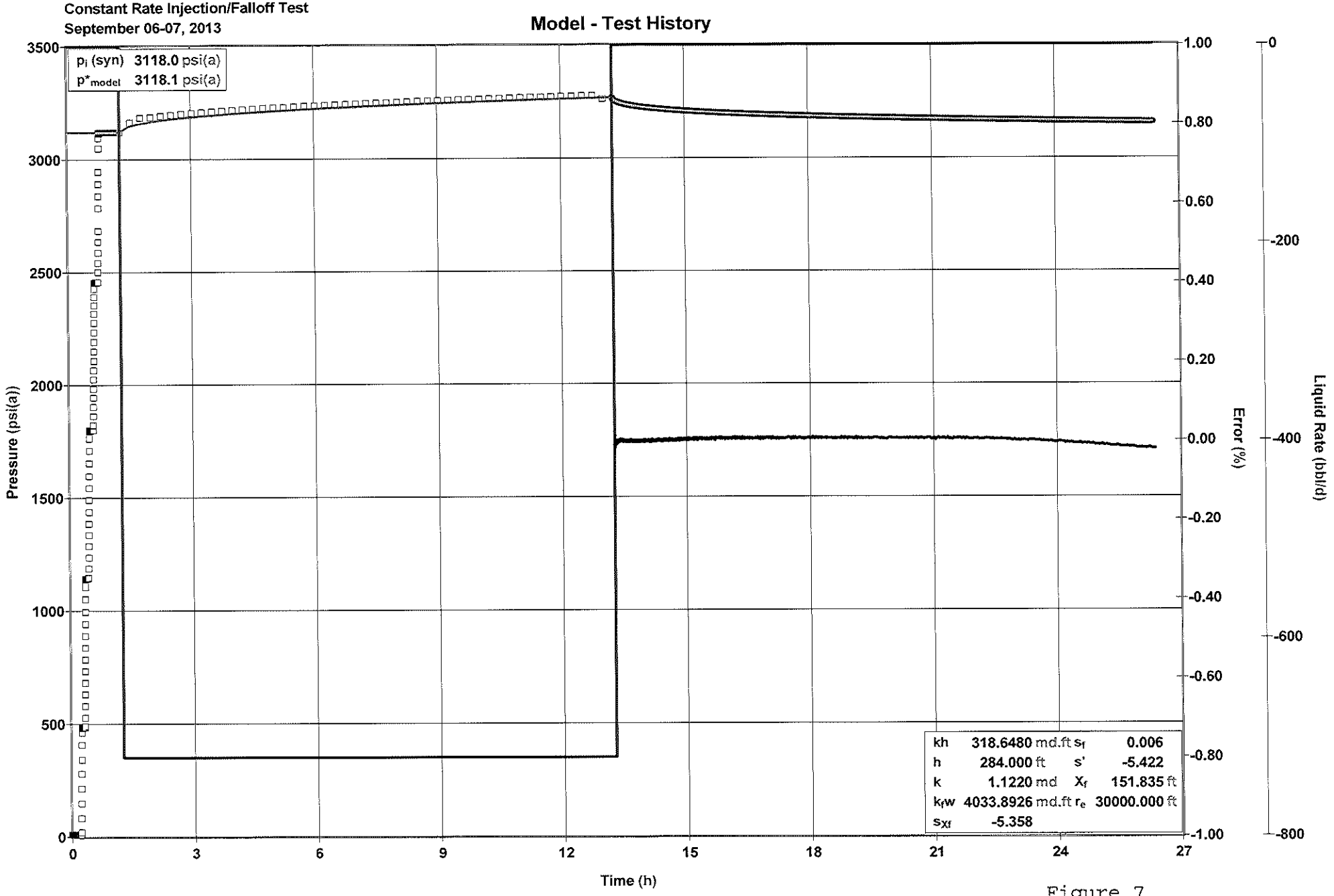


Figure 7

Uranerz Energy
NICH-DW #1
Constant Rate Injection/Falloff Test
September 06-07, 2013

Model - Derivative

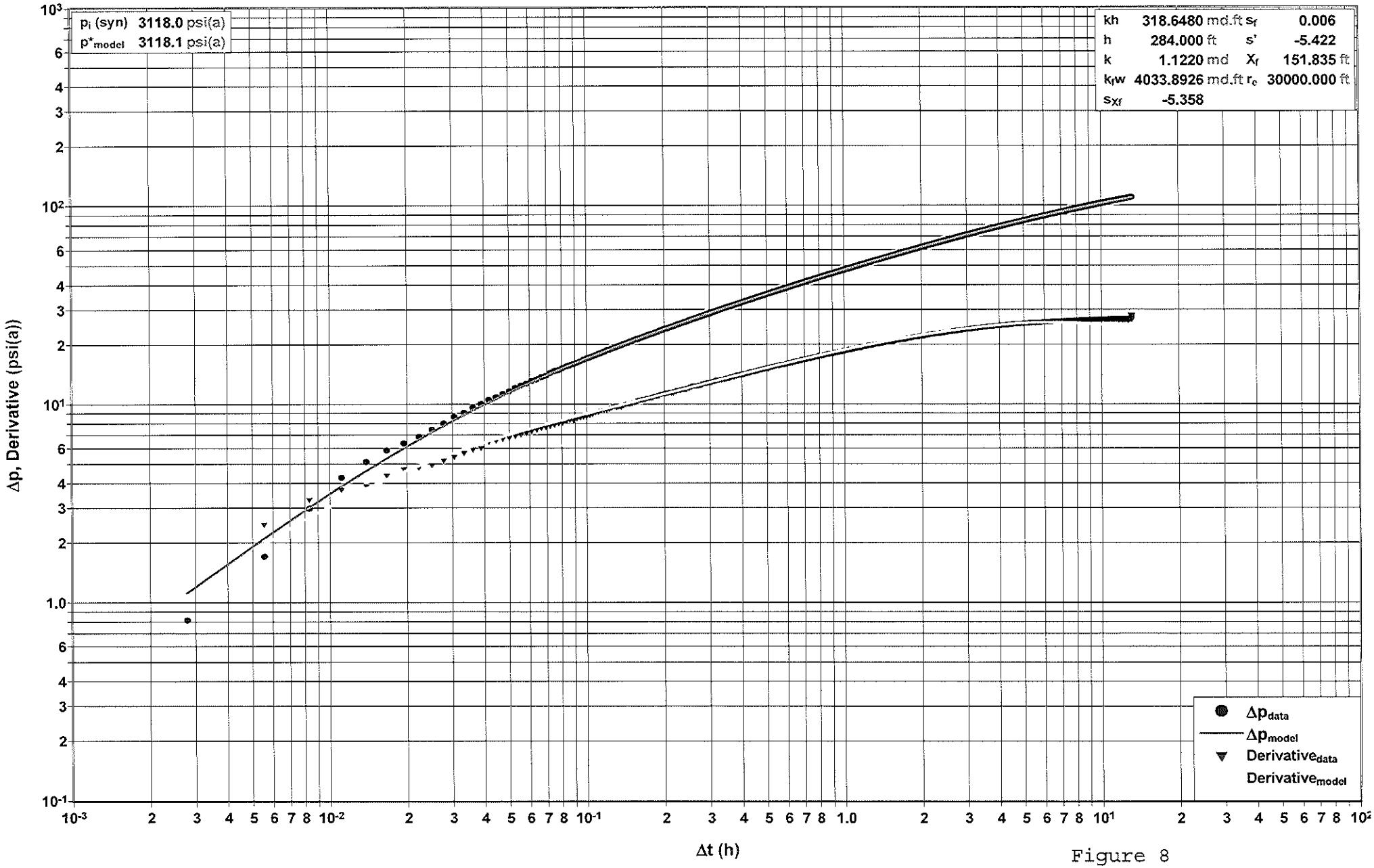


Figure 8

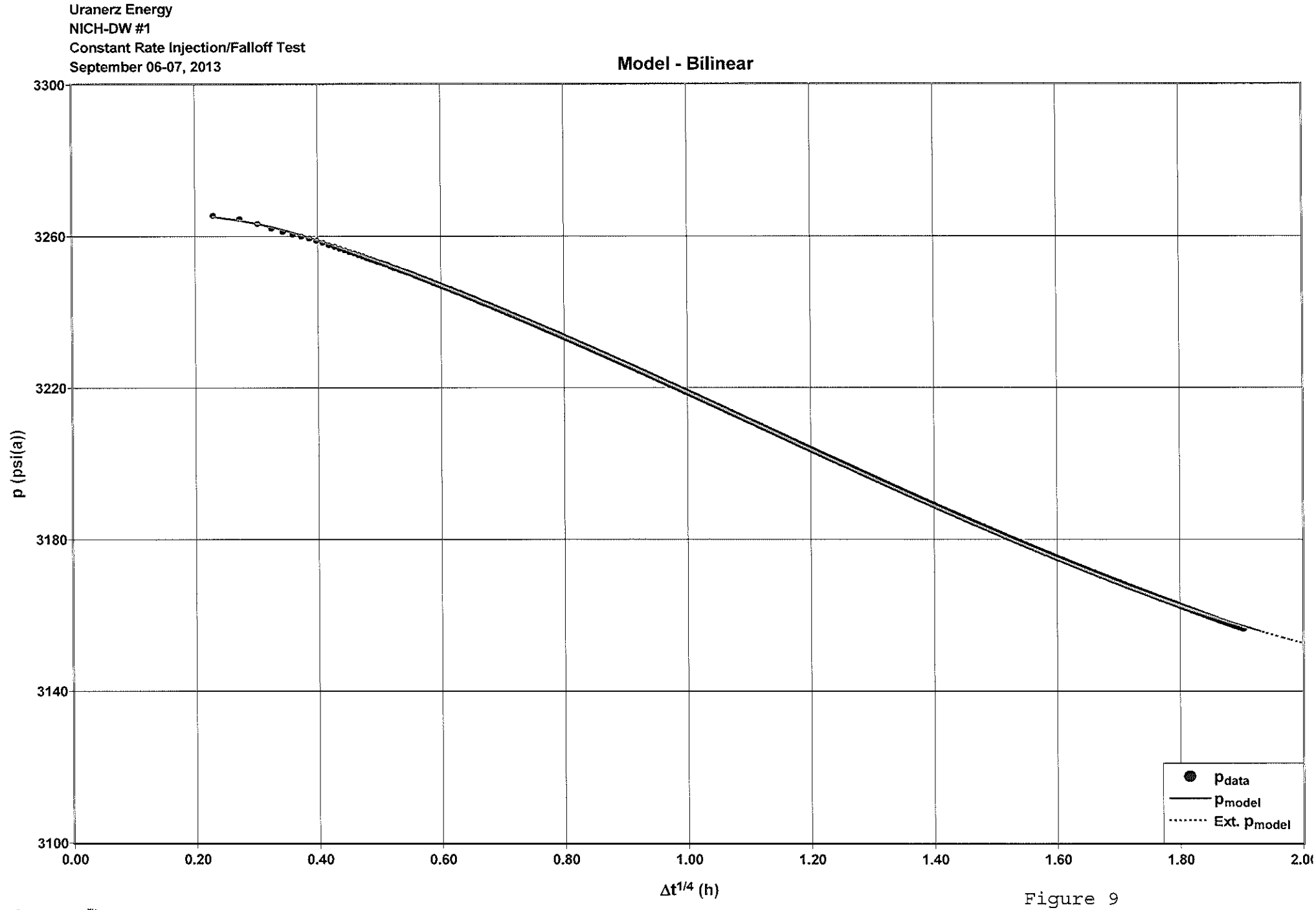

Uranerz Energy
NICH-DW #1
Constant Rate Injection/Falloff Test
September 06-07, 2013
Model - Bilinear
3300
3260
3220
3180
3140
3100
p (psi(a))
0.00
0.20
0.40
0.60
0.80
1.00
1.20
1.40
1.60
1.80
2.0
Δt^1/4 (h)
p_data
p_model
Ext. p_model
WellTest32™ Ver 7.7.0.132
C:\Petrotek\Analysis\NICH DW #1 WTA.FKT 11-Sep-13

Figure 9

Uranerz Energy
NICH-DW #1
Constant Rate Injection/Falloff Test
September 06-07, 2013

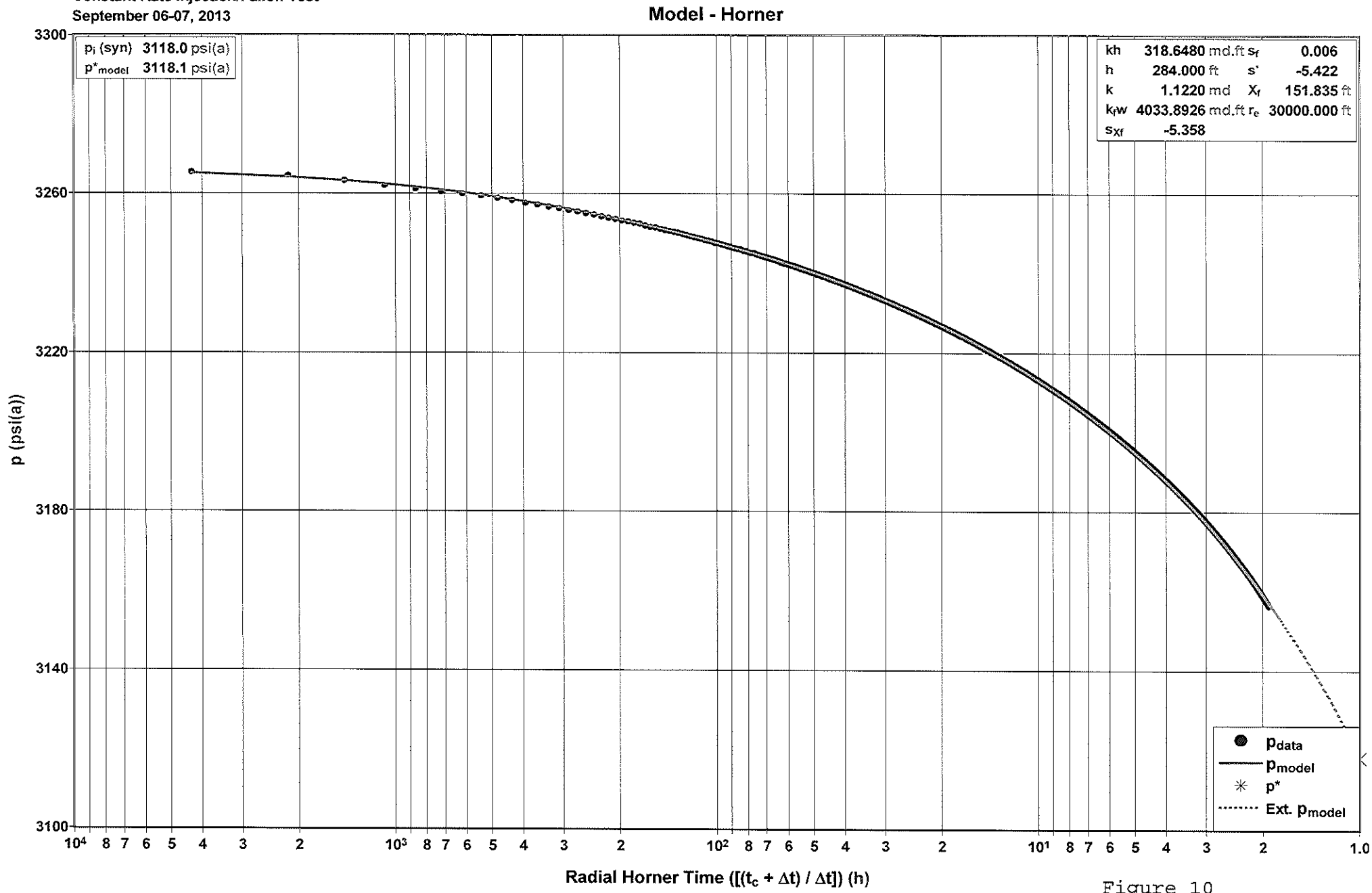


Figure 10

ATTACHMENTS

Attachment 1
September 2013 Fall-off Test Analysis Summary

Petrotek

Water Well Test - Falloff

Bilinear Flow Analysis

Analysis Results

Number of Fractures (n_f)	1	Slope (m)	73.70 psi/cycle
Fracture Flow Capacity (k_fw)	709.7062 md.ft	$n_f^2k_fw(sqrt(k))$	950.93 $md^{3/2}ft$
Effective Permeability (k)	1.7953 md	$k_fw(sqrt(k))$	950.93 $md^{3/2}ft$
Dimensionless Fracture Conductivity (F_{CD})		Fracture Half-Length (X_f)	ft

Reservoir Parameters

Net Pay (h)	284.000 ft
Total Porosity (ϕ_t)	13.00 %
Gas Saturation (S_g)	0.00 %
Oil Saturation (S_o)	0.00 %
Water Saturation (S_w)	100.00 %
Formation Compressibility (c_f)	4.3607e-06 1/psi
Total Compressibility (c_t)	6.0000e-06 1/psi
Wellbore Radius (r_w)	0.328 ft

Pressures

Extrapolated Pressure (p*)	psi(a)
Final Flowing Pressure (p_{wfo})	3266.3 psi(a)
Final Measured Pressure (p_{last})	3156.5 psi(a)

Fluid Properties

Reservoir Temperature (T_{resv})	167.0 °F
Reservoir Pressure (p_{resv})	3119.0 psi(a)
Water Specific Gravity (γ_w)	1.000
Water Viscosity (μ_w)	0.5100 cP
Water Compressibility (c_w)	2.9468e-06 1/psi
Water Formation Volume Factor (B_w)	1.001
Solution Gas Ratio (R_{sw})	0.0 scf/bbl

Production and Times

Corrected Time (t_c)	11.98 h
Total Cumulative Production Water (Cum_{water})	-0.36 Mbbl
Final Water Rate ($q_{w\ final}$)	-720.0 bbl/d

Water Well Test - Falloff
Radial Flow Analysis

Analysis Results

Flow Capacity (kh)	450.6 md.ft
Effective Permeability (k)	1.5867 md
Effective Gas Permeability (k_g)	md
Effective Oil Permeability (k_o)	md
Effective Water Permeability (k_w)	1.5867 md
Total Fluid Rate (in situ) ($(q\beta)_t$)	-720.7 rbbl/d
Total Mobility ($(k/\mu)_t$)	3.11 md/cP
Total Transmissivity ($(kh/\mu)_t$)	883.58 mdft/cP
Slope (m)	132.63 psi/cycle

Total Skin (s')	-4.957
Skin Due to Damage (s_d)	-4.957
Skin Due To Inclination (s_{inc})	
Skin Due To Partial Penetration (s_{PP})	
Pressure Drop Due to Total Skin (Δp_{skin})	psi(a)
Damage Ratio (DR)	0.205
Flow Efficiency (FE)	4.879

Reservoir Parameters

Net Pay (h)	284.000 ft
Total Porosity (ϕ_t)	13.00 %
Gas Saturation (S_g)	0.00 %
Oil Saturation (S_o)	0.00 %
Water Saturation (S_w)	100.00 %
Formation Compressibility (c_f)	4.3607e-06 1/psi
Total Compressibility (c_t)	6.0000e-06 1/psi
Wellbore Radius (r_w)	0.328 ft

Pressures

Extrapolated Pressure (p*)	3118.9 psi(a)
Final Flowing Pressure (p_{wfo})	3266.3 psi(a)
Final Measured Pressure (p_{last})	3156.5 psi(a)

Fluid Properties

Reservoir Temperature (T_{resv})	167.0 °F
Reservoir Pressure (p_{resv})	3119.0 psi(a)
Water Specific Gravity (γ_w)	1.000
Water Viscosity (μ_w)	0.5100 cP
Water Compressibility (c_w)	2.9468e-06 1/psi
Water Formation Volume Factor (B_w)	1.001
Solution Gas Ratio (R_{sw})	0.0 scf/bbl

Production and Times

Corrected Time (t_c)	11.98 h
Total Cumulative Production Water (Cum_{water})	-0.36 Mbbl
Final Water Rate ($q_{w\,final}$)	-720.0 bbl/d

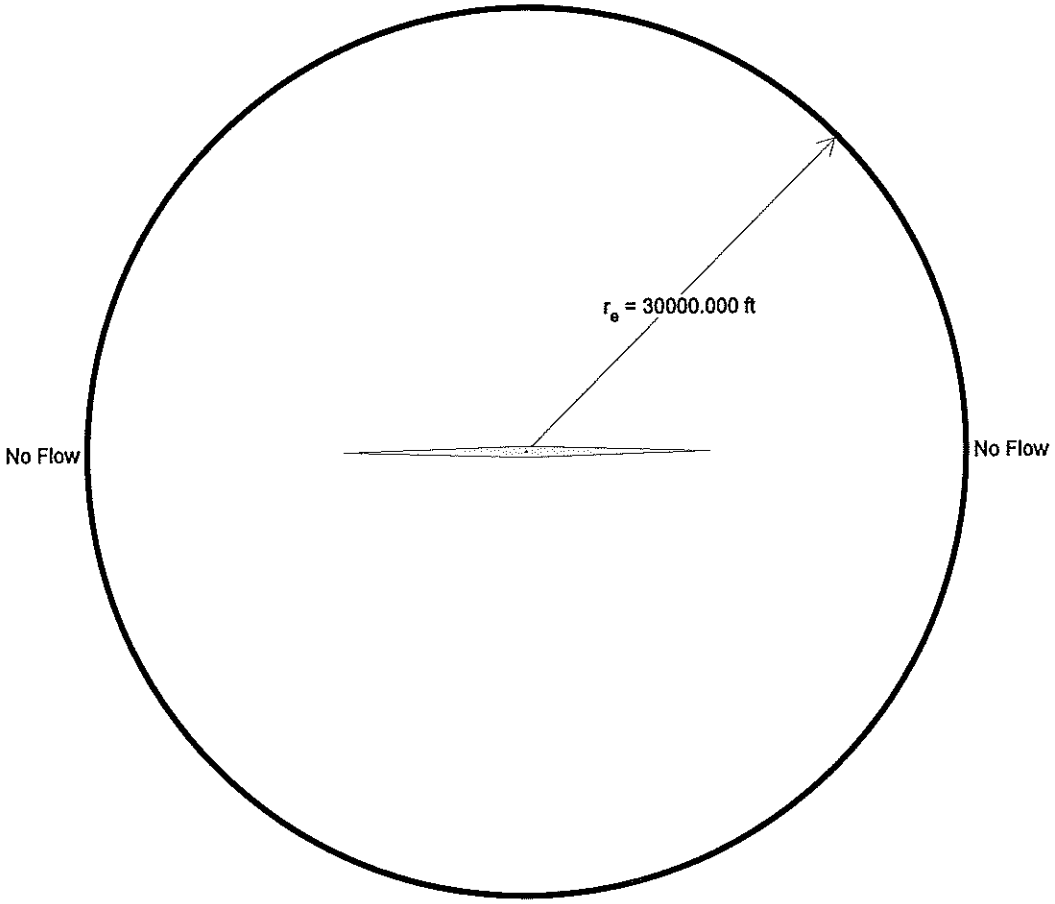
Fin. Cond. Frac. 1

[illegible] erz Energy
[illegible]-DW #1
Constant Rate Injection/Falloff Test
September 06-07, 2013

k = 1.1220 md
s_f = 0.006
k_fw = 4033.8926 md.ft

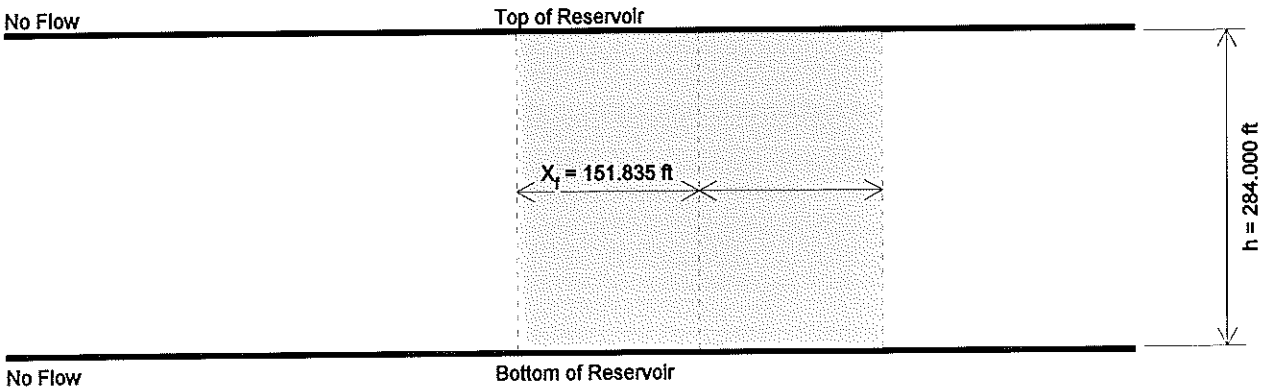
Plan View

(Not to scale)



Side View

(Not to scale)



Water Model - Fin. Cond. Frac. 1

Analysis Results

Effective Water Permeability (k_w)	1.1220 md
Total Mobility ($(k/\mu)_t$)	2.20 md/cP
Total Transmissivity ($(kh/\mu)_t$)	624.80 mdft/cP
Total Skin (s')	-5.422
Fracture Face Skin (s_f)	0.006
Skin Equivalent to X_f (s_{Xf})	-5.358
Wellbore Volume (V_w)	23343 bbl
Dim. Wellbore Storage Constant (C_D)	2579.210
Fracture Flow Capacity (k_fw)	4034 md.ft
Fracture Half-Length (X_f)	151.835 ft
Exterior Radius (r_e)	30000.000 ft

Reservoir Parameters

Net Pay (h)	284.000 ft
Total Porosity (ϕ_t)	13.00 %
Gas Saturation (S_g)	0.00 %
Oil Saturation (S_o)	0.00 %
Water Saturation (S_w)	100.00 %
Formation Compressibility (c_f)	4.3607e-06 1/psi
Total Compressibility (c_t)	6.0000e-06 1/psi
Wellbore Radius (r_w)	0.328 ft

Production and Pressures

Total Fluid Rate (in situ) ($(q\beta)_t$)	-720.7 rbbl/d
Final Gas Rate ($q_{g\ final}$)	0.000 MMscfd
Final Water Rate ($q_{w\ final}$)	-720.0 bbl/d
Total Cumulative Production Water (Cum_{water})	-0.36 Mbbl
Final Flowing Pressure (p_{wfo})	3266.3 psi(a)
Final Measured Pressure (p_{last})	3156.5 psi(a)

Fluid Properties

Reservoir Temperature (T_{resv})	167.0 °F
Reservoir Pressure (p_{resv})	3119.0 psi(a)
Water Specific Gravity (γ_w)	1.000
Water Viscosity (μ_w)	0.5100 cP
Water Compressibility (c_w)	2.9468e-06 1/psi
Water Formation Volume Factor (B_w)	1.001
Solution Gas Ratio (R_{sw})	0.0 scf/bbl

Synthesis Results

Average Error (E_{avg})	0.00 %
Synthetic Initial Pressure (p_i (syn))	3118.0 psi(a)
Extrapolated Model Pressure (p^*_{model})	3118.1 psi(a)
Pressure Drop Due to Total Skin (Δp_{skin})	1.6 psi(a)
Flow Efficiency (FE)	0.989
Damage Ratio (DR)	1.011

Forecasts

Forecast Flowing Pressure (Report) (p_{flow})	3266.3 psi(a)
Forecast Rate at 3 Months and Current Skin ($q_{@\ 3\ Months}$)	-201.3 bbl/d
Forecast Rate at 6 Months and Current Skin ($q_{@\ 6\ Months}$)	-182.1 bbl/d
Constant Rate Forecast Flow Time (Report) (t_{flow})	12.00 month
Forecast Rate at Specified Time and Current Skin ($q_{@\ Current\ Skin}$)	-166.1 bbl/d
Stabilized Injectivity Index @ Current Skin (II_{Actual})	1.229 (bbl/d)/psi
Forecast Rate at Specified Time and Skin = 0 ($q_{@\ 0\ Skin}$)	-166.5 bbl/d
Stabilized Injectivity Index @ Skin = 0 (II_{Ideal})	1.232 (bbl/d)/psi
Forecast Rate at Specified Time and Skin = -4 ($q_{@\ -4\ Skin}$)	bbl/d

Appendices

Appendix 1
August 2013 Step-rate Injection Test
(Field Data Reports)

Petrotek

SPARTEK SYSTEMS
GEOPHYSICAL INSTRUMENTATION

Pressure Survey Report

Petrotek

NICH-DW1

Set August 10, 2013
Pulled August 12, 2013

JOB INFORMATION SHEET

Company Information	
Company Name:	Petrotek
Address:	5935 South Zang Street, Suite 200 Littleton, Colorado USA 80127

Well Information	
Well Name:	Nichdw 1
Location:	NA
Field – Pool:	Parkman
Status:	Shut In

Test Information	
Type of Test:	Injectivity test
Gauge Depth:	8712 ft
Production Interval:	NA
Production Through:	Parkman
Tubing Pressure:	101.35psi
Casing Pressure:	NA
Shut In Time	NA
Status:	Shut In
Temperature @ Run Depth	185.7 degF
Surface Temperature:	58.13 degF

Gauge Information	Top Recorder	Bottom Recorder
Serial Number:	77464	77477
Calibration Date:	10/29/12	7/16/12
Pressure Range:	6000 psi	6003 psi

Comments

Set gauges @ 8350' WLM @ 10:09:00 AM on 08/10/2013
When they started pumping on the well the brake on the trailer slipped letting out gauges get pumped down to 8712' WLM. So the gauges were actually at 8712' WLM for the duration of the step rate tests till we pulled them on 08/12/2013.
When we pulled out of the hole we made gradient stops @ 8350', 6,000', 4,000',and 2,000' WLM.
Fluid Level was 166.58 ft from surface.
There was 101.35 PSI on the tubing when we pulled the gauges.

Petrotek
5935 South Zang Street, Suite 200
Littleton, Colorado USA 80127

WELL INFORMATION SHEET

Well:	Nich-dw-1
Well License:	NA
Company:	Petrotek
Partner:	NA
Field	NA

Type Production (EUB Code):	2	
Producing Status (EUB Code):	0	
Type of Well (EUB Code):	0	
Well Type	v	(H) orizontal, (V)ertical, or (D)eviated

Open Hole Completion?	N/A	(Y)es or (N)o
Casing Liner Present?	N/A	(Y)es or (N)o
Flow Regime	N/A	(T)ubing, (A)nnular, or (C)asing

Total Depth:	8712 ' WLM	ID Borehole:	N/A
Packer Depth:	N/A	ID Production Casing:	N/A
Depth of whipstock:	N/A	OD Production Tubing:	N/A
Depth at which casing is landed:	N/A	ID Production Tubing:	N/A
Depth at which tubing is landed:	N/A	ID Drill Pipe:	N/A

Wood Wireline Service, Inc. (307) 682-0143

Gradient Data Report

Petrotek
Nich-DW-1

Gradient Data Table

Depth Ft (WLM)	Pressure psi	Temperature degF	Gradient psi/ft
0.00	101.35	69.76	0.0000
2000.00	889.24	97.69	0.3939
4000.00	1767.15	125.17	0.4390
6000.00	2641.94	150.89	0.4374
8350.00	3662.16	178.56	0.4341
8712.00	3813.15	185.70	0.4171

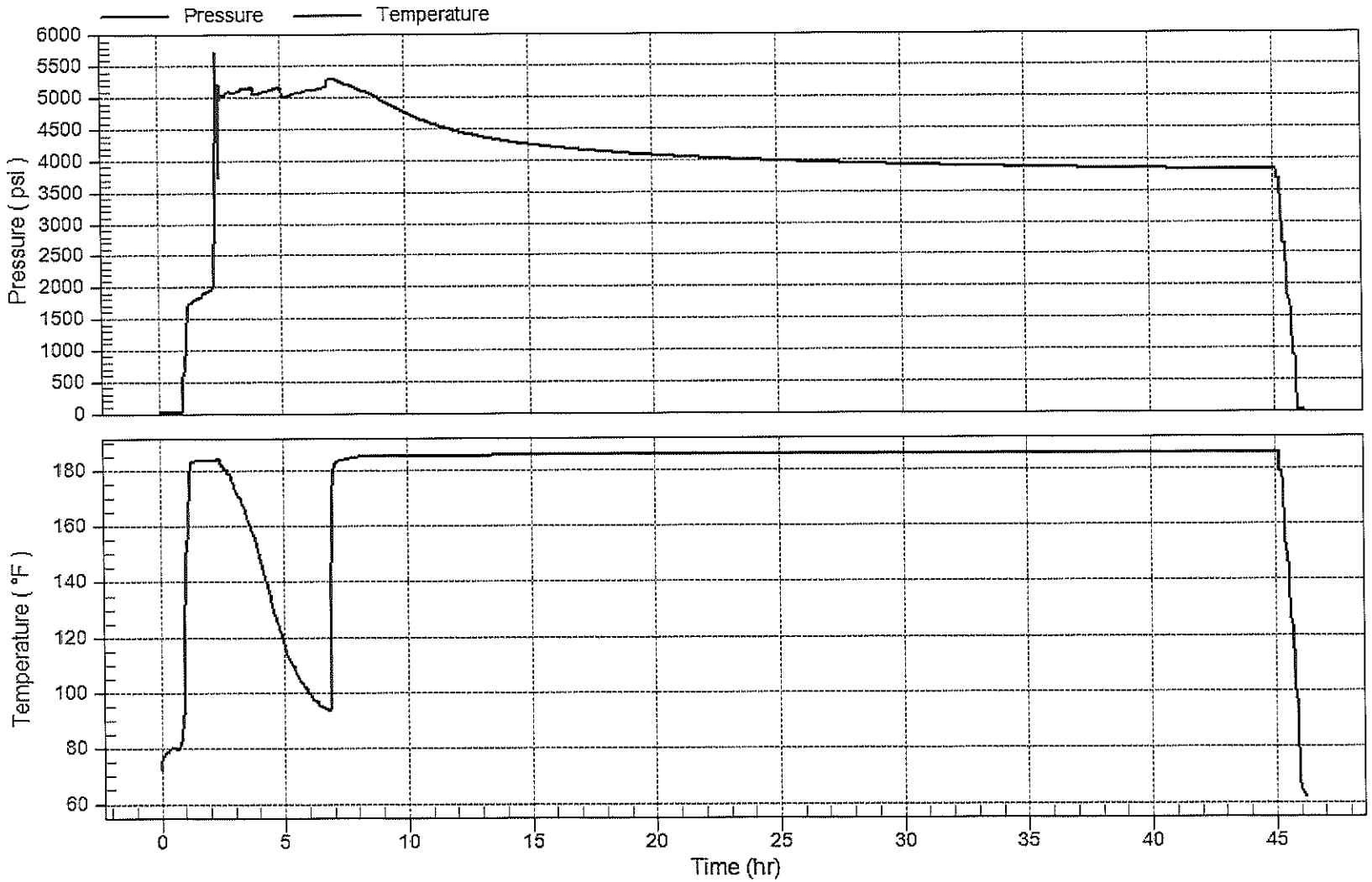
Analysis Summary

Depth ft	Gradient psi/ft
0.00	
	0.0000
166.58	←Fluid Level
	0.4345
8712.00	

Wood Wireline Service, Inc. (307) 682-0143

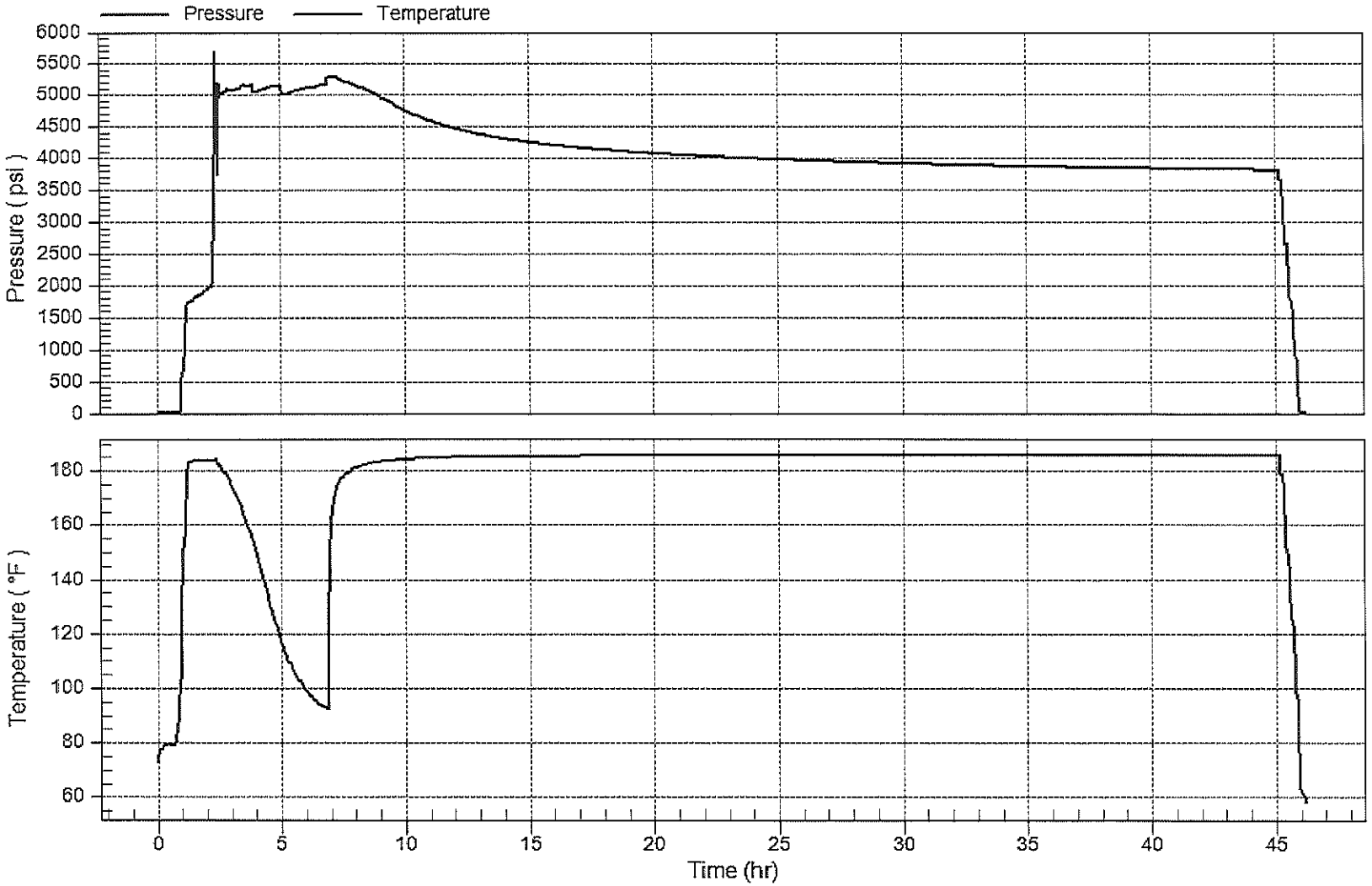
Petrotek

Nichdw1 Top Gauge



Petrotek

Nichdw1 Bottom Gauge



SPARTEK SYSTEMS
GEOPHYSICAL INSTRUMENTATION

Pressure Survey Report

Petrotek
NICH DW 1

Set August 14, 2013
Pulled August 15, 2013

JOB INFORMATION SHEET

Company Information	
Company Name:	Petrotek
Address:	5935 South Zang Street, Suite 200 Littleton, Colorado USA 80127

Well Information	
Well Name:	NICH DW 1
Location:	NA
Field – Pool:	NA
Status:	Shut In

Test Information	
Type of Test:	Injectivity Test
Gauge Depth:	8000 ft
Production Interval:	NA
Production Through:	NA
Tubing Pressure:	412 psi
Casing Pressure:	NA
Shut In Time	NA
Status:	Shut In
Temperature @ Run Depth	178.73 degF
Surface Temperature:	56.7 degF

Gauge Information		
	Top Recorder	Bottom Recorder
Serial Number:	76357	78192
Calibration Date:	6/27/13	6/27/13
Pressure Range:	6010 psi	6000 psi

Comments

Set gauges @ 8000' WLM @ 08:04:10 AM on 08/14/2013
Pulled Gauges @ 06:03:05 AM on 08/15/2013
We made gradient stops @ 6,000', 4,000',and 2,000' WLM going in and out of the hole.
Fluid Level was @ surface.
There was 412 PSI on the tubing when we pulled the gauges.

Petrotek
5935 South Zang Street, Suite 200
Littleton, Colorado USA 80127

WELL INFORMATION SHEET

Well:	Nich-dw-1
Well License:	NA
Company:	Petrotek
Partner:	NA
Field	NA

Type Production (EUB Code):	2	
Producing Status (EUB Code):	0	
Type of Well (EUB Code):	0	
Well Type	V	(H) orizontal, (V)ertical, or (D)eviated

Open Hole Completion?	N/A	(Y)es or (N)o
Casing Liner Present?	N/A	(Y)es or (N)o
Flow Regime	N/A	(T)ubing, (A)nnular, or (C)asing

Total Depth:	8,000' WLM	ID Borehole:	N/A
Packer Depth:	N/A	ID Production Casing:	N/A
Depth of whipstock:	N/A	OD Production Tubing:	N/A
Depth at which casing is landed:	N/A	ID Production Tubing:	N/A
Depth at which tubing is landed:	N/A	ID Drill Pipe:	N/A

Wood Wireline Service, Inc. (307) 682-0143

Gradient Data Report

Petrotek
NICH DW 1

Gradient Data Table

Depth Ft (WLM)	Pressure psi	Temperature degF	Gradient psi/ft
0.00	412.27	60.14	0.0000
2000.00	1307.17	93.22	0.4474
4000.00	2189.89	120.46	0.4414
6000.00	3069.30	144.69	0.4397
8000.00	3947.01	165.05	0.4389

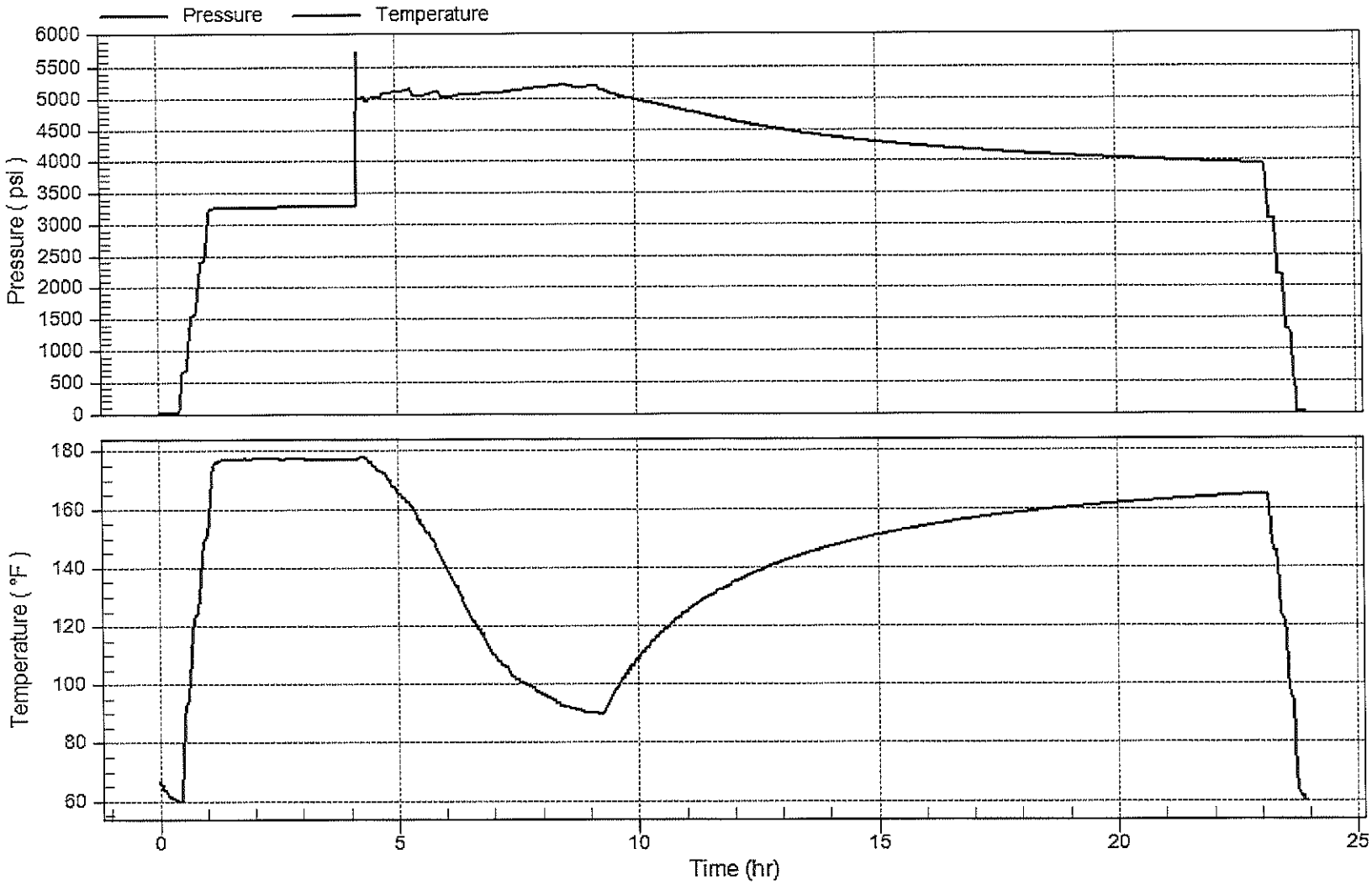
Analysis Summary

Depth ft	Gradient psi/ft
0.00	
	0.4418
8000.00	

Wood Wireline Service, Inc. (307) 682-0143

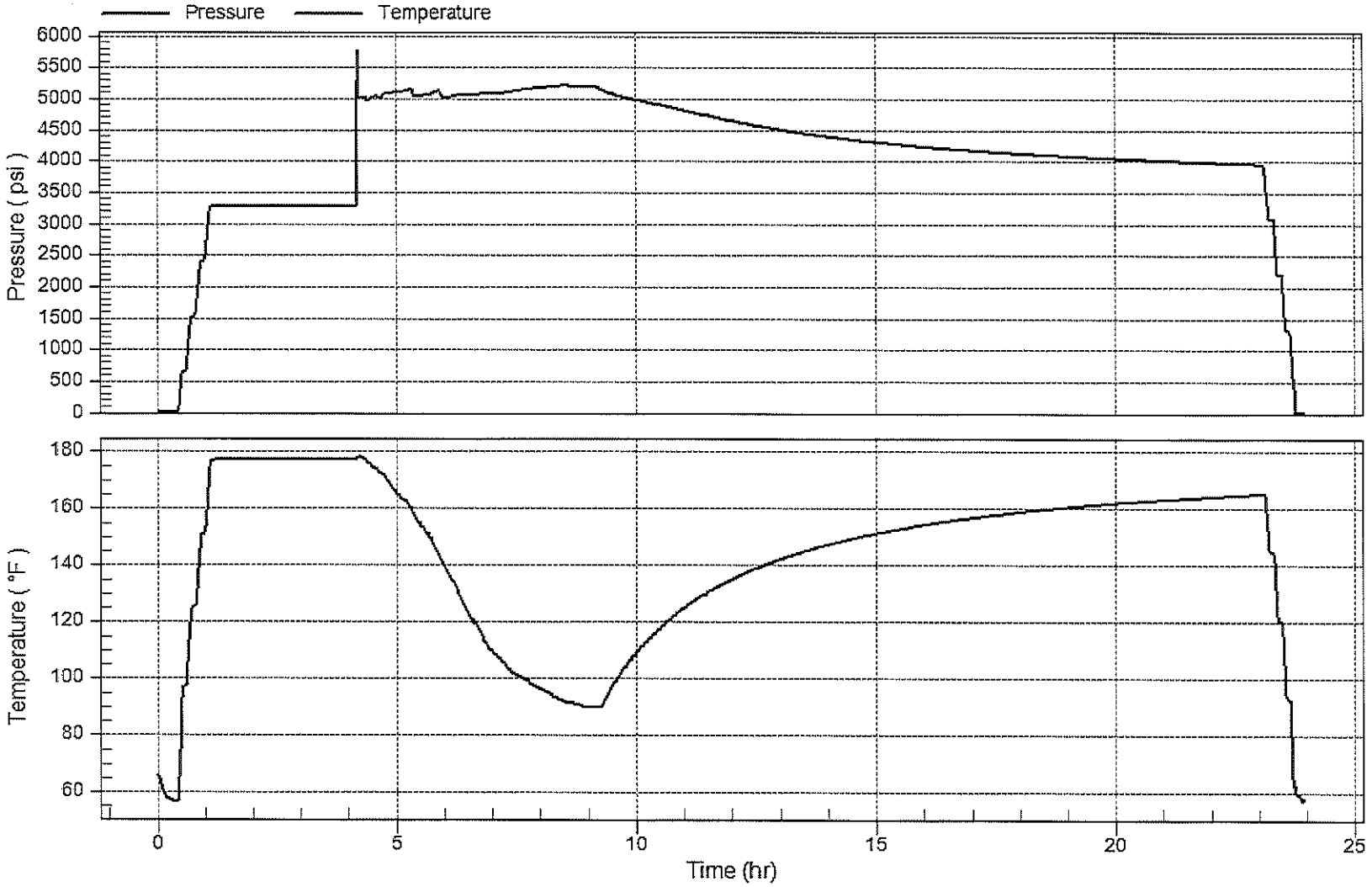
Petrotek

NICH DW1 Top Gauge 8/14/2013



Petrotek

NICH DW1 Bottom Gauge 8/14/2013



SPARTEK SYSTEMS
GEOPHYSICAL INSTRUMENTATION

Pressure Survey Report

Petrotek
NICH DW1

Set August 17, 2013
Pulled August 19, 2013

JOB INFORMATION SHEET

Company Information	
Company Name:	Petrotek
Address:	5935 South Zang Street, Suite 200 Littleton, Colorado USA 80127

Well Information	
Well Name:	NICH DW1
Location:	NA
Field – Pool:	NA
Status:	Shut In

Test Information	
Type of Test:	Injectivity Test
Gauge Depth:	7264 ft
Production Interval:	NA
Production Through:	NA
Tubing Pressure:	Vacuum
Casing Pressure:	NA
Shut In Time	NA
Status:	Shut In
Temperature @ Run Depth	165.71 degF
Surface Temperature:	61.19 degF

Gauge Information	Top Recorder	Bottom Recorder
Serial Number:	78934	78935
Calibration Date:	8/20/12	1/8/13
Pressure Range:	10005 psi	10006 psi

Comments

Set gauges @ 7264' WLM @ 08:25:33 AM on 08/17/2013 **(tagged high)**
Pulled Gauges @ 06:11:57 AM on 08/19/2013
We made gradient stops @ 6,000', 4,000',and 2,000' WLM going in and out of the hole.
Fluid Level was 401 ft from @ surface.
The well was on a vacuum when we pulled the gauges.

Petrotek
5935 South Zang Street, Suite 200
Littleton, Colorado USA 80127

WELL INFORMATION SHEET

Well:	NICH DW1
Well License:	NA
Company:	Petrotek
Partner:	NA
Field	NA

Type Production (EUB Code):	2	
Producing Status (EUB Code):	0	
Type of Well (EUB Code):	0	
Well Type	V	(H) orizontal, (V)ertical, or (D)eviated

Open Hole Completion?	N/A	(Y)es or (N)o
Casing Liner Present?	N/A	(Y)es or (N)o
Flow Regime	N/A	(T)ubing, (A)nnular, or (C)asing

Total Depth:	7264 ft WLM	ID Borehole:	N/A
Packer Depth:	N/A	ID Production Casing:	N/A
Depth of whipstock:	N/A	OD Production Tubing:	N/A
Depth at which casing is landed:	N/A	ID Production Tubing:	N/A
Depth at which tubing is landed:	N/A	ID Drill Pipe:	N/A

Wood Wireline Service, Inc.(307) 682-0143

Gradient Data Report

Petrotek
NICH DW1

Gradient Data Table

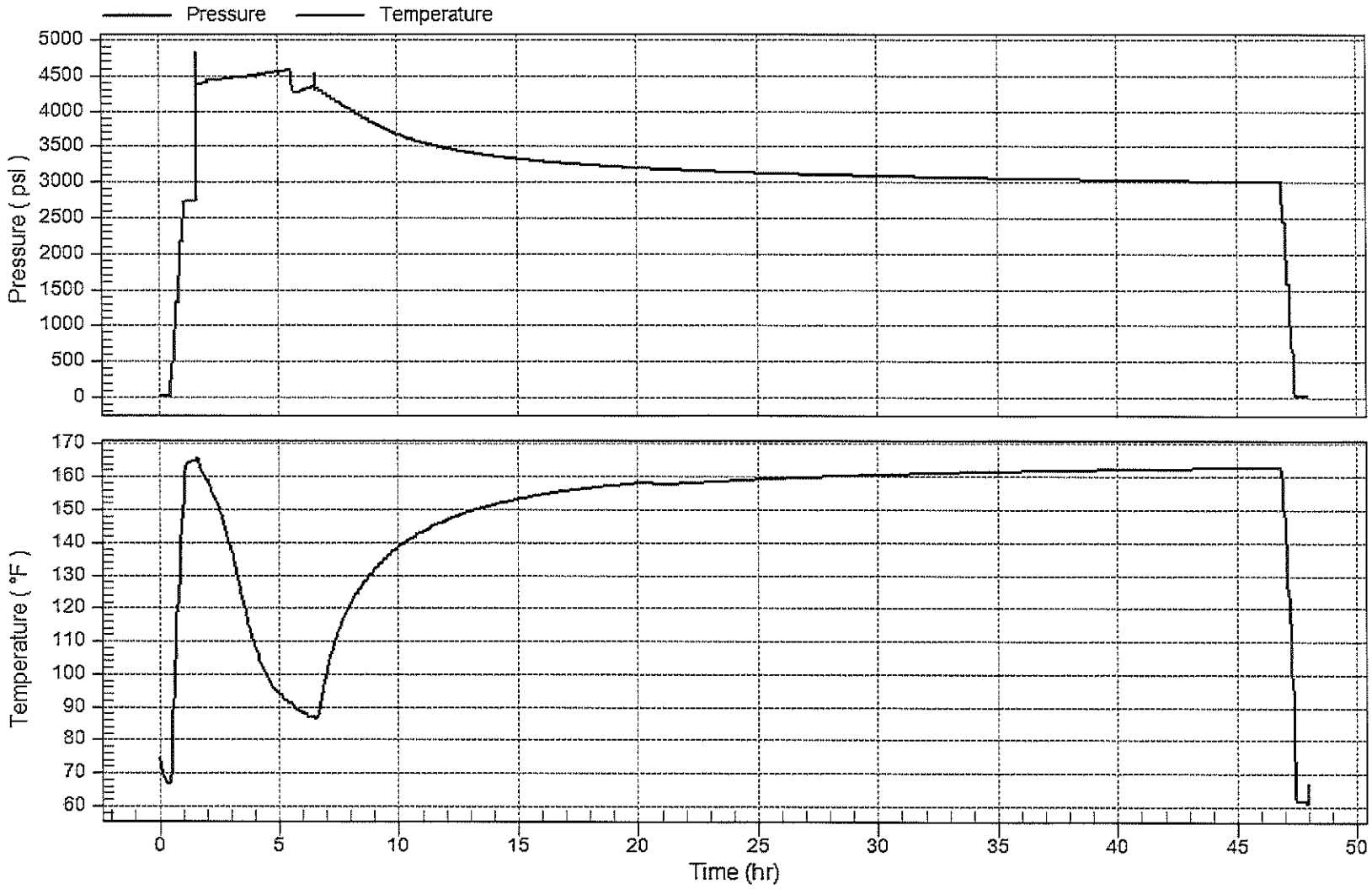
Depth Ft (WLM)	Pressure psi	Temperature degF	Gradient psi/ft
0.00	2.43	63.06	0.0000
2000.00	699.85	98.15	0.3487
4000.00	1575.90	124.86	0.4380
6000.00	2448.78	149.77	0.4364
7264.00	2995.96	162.73	0.4329

Analysis Summary

Depth ft	Gradient psi/ft
0.00	
	0.0000
401.56	←Fluid Level
	0.4363
7264.00	

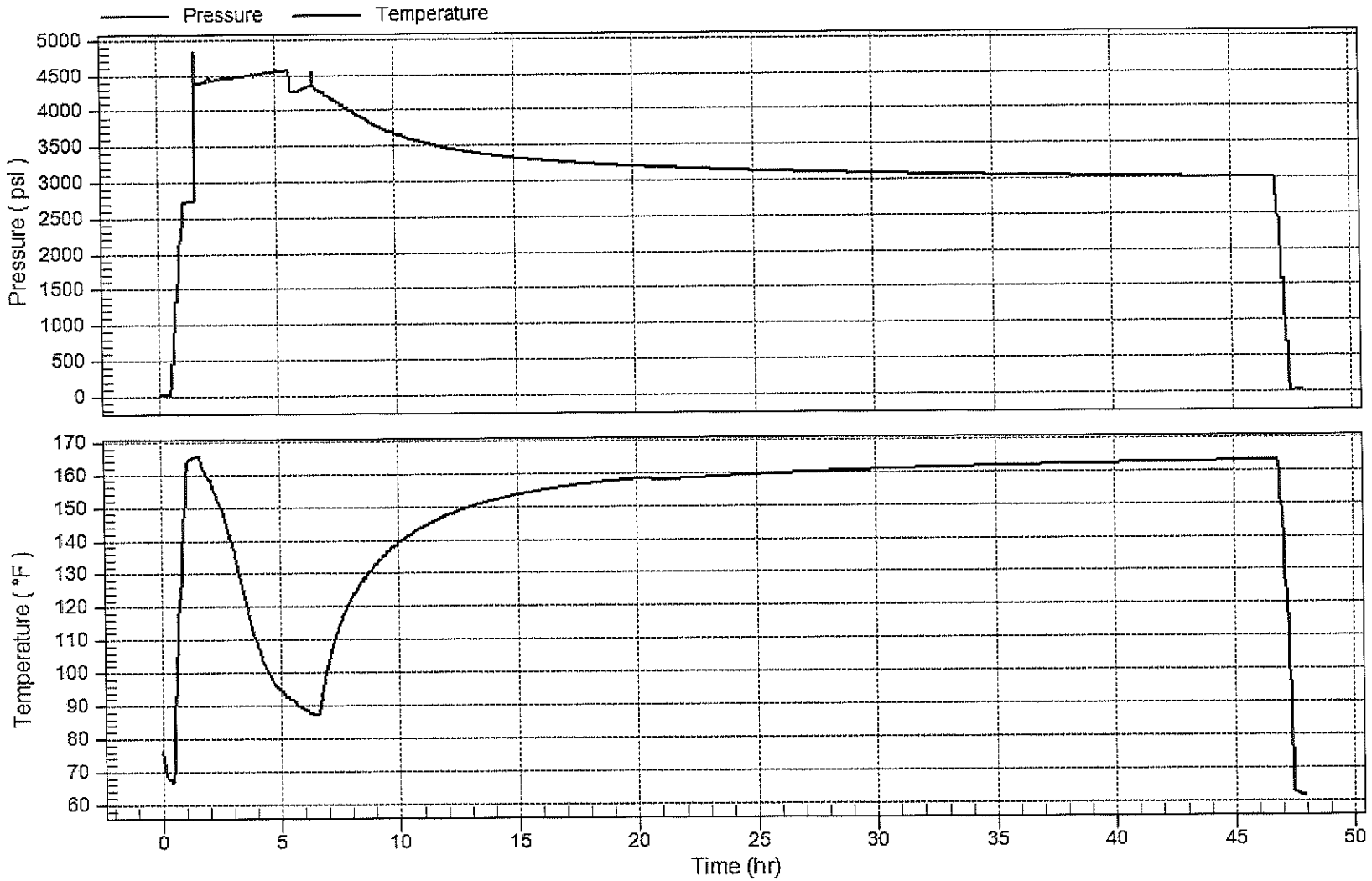
Petrotek

NICH DW1 8/17/2013 thru 8/19/2013



Petrotek

NICH DW1 bottom gauge 8/17/2013 thru 8/19/2013



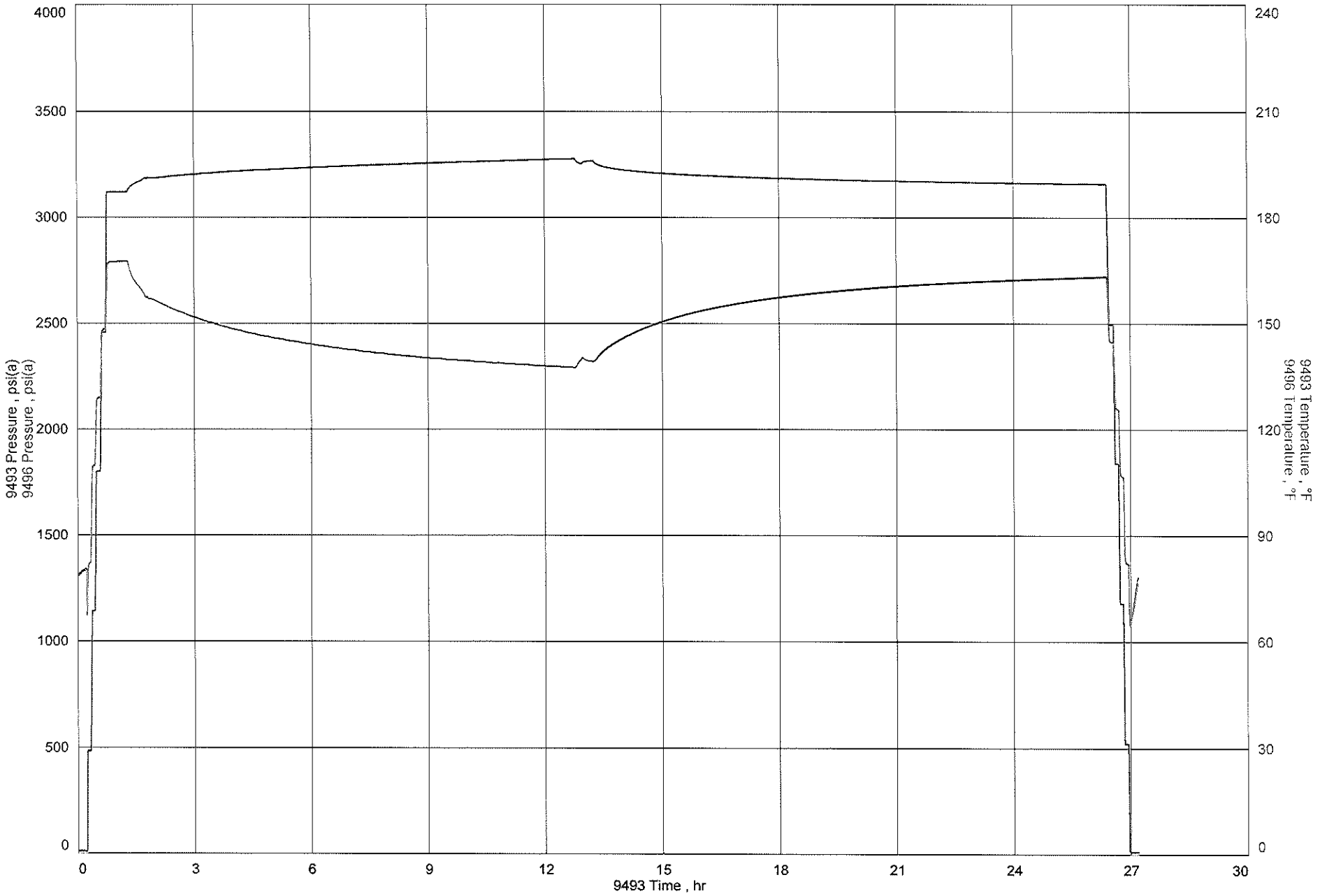
Appendix 2
September 2013 Injection Fall-off Test
(Field Data Reports)

Petrotek

Uranerz Energy

Cartesian

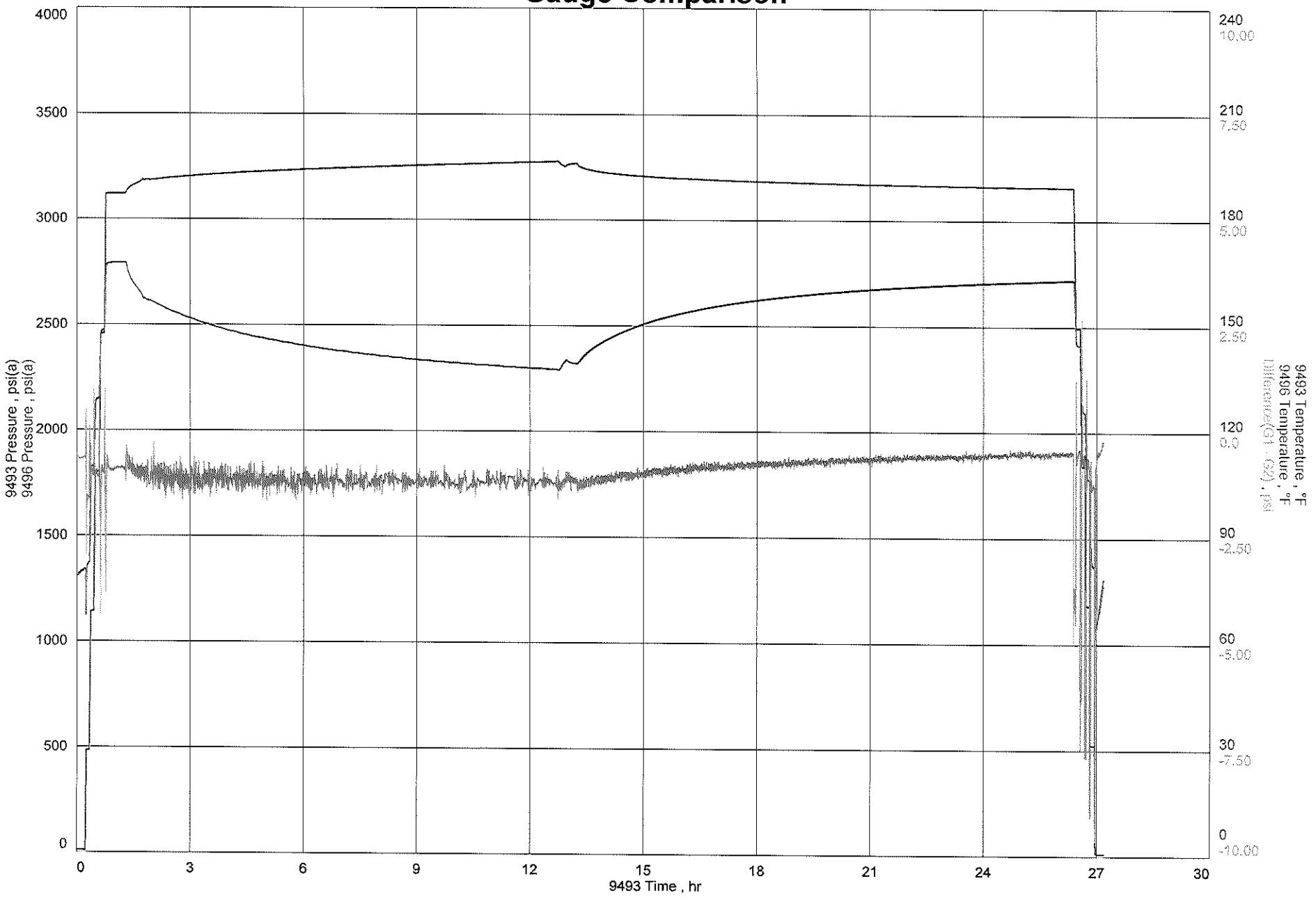
NICH-DW #1



Uranerz Energy

Gauge Comparison

NICH-DW #1



Fast

RIH Shut-in Gradient

Uranerz Energy — NICH-DW #1

Gauge Serial Number	9493	Gauge Type	Silicon Crystal
Gauge Manufacturer	Calscan	Maximum Recorder Range	10000.00 psi
Run Depth (Log KB)	7522.00 ft	Date of Last Calibration	
Gauge Start Date	2013/09/06 08:21:00	Gauge Stop Date	2013/09/07 11:33:00
Date Gauge On Bottom	2013/09/06 09:07:00	Date Gauge Off Bottom	2013/09/07 10:45:00

Test Data

Top(TVD KB)	ft	Bottom(TVD KB)	ft
Pool Datum Depth (SS)	ft	Well Datum Depth	7522.000 ft
Tubing Pressure: Initial	0.00 psi(a)	Tubing Pressure: Final	7.00 psi(a)
Casing Pressure: Initial	362.00 psi(a)	Casing Pressure: Final	470.00 psi(a)
Start Test Date	2013/09/06	Date Well Shut-In	2013/09/06 21:36:00

Depth ft	Time hh:mm:ss	Duration min	Pressure psi(a)	Gradient psi/ft	Temp. °F	Gradient °F/ft
0.00	08:34:20		8.20		80.44	
				0.317		0.001
1500.00	08:40:20	6.00	483.87		82.35	
				0.439		0.018
3000.00	08:47:20	7.00	1143.04		109.85	
				0.438		0.013
4500.00	08:55:40	8.33	1800.45		129.00	
				0.437		0.013
6000.00	09:04:10	8.50	2455.92		148.40	
				0.435		0.012
7522.00	09:10:20	6.17	3118.62		167.34	

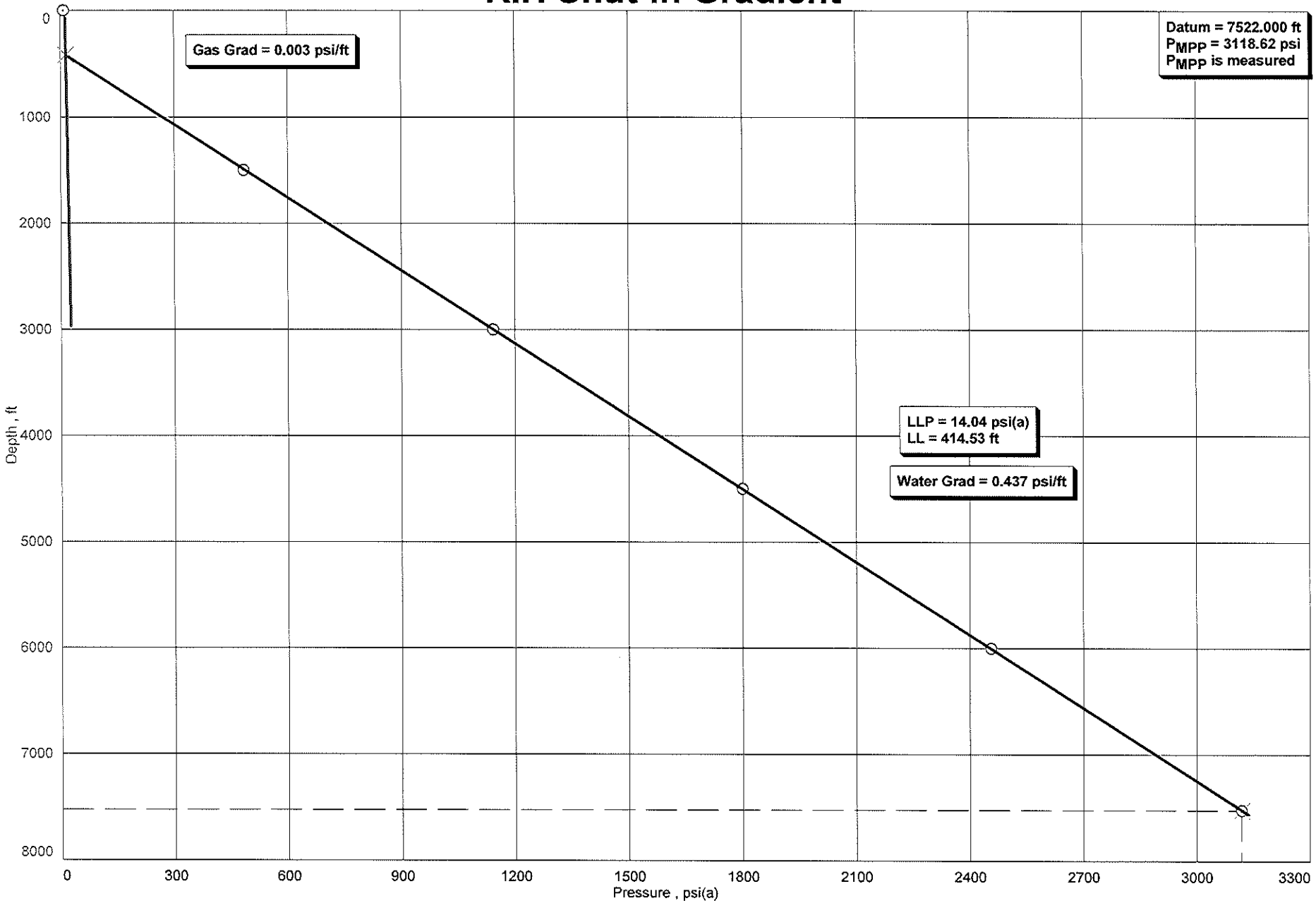
Results

Gas	0.003 psi/ft	Gas - Water Interface	414.53 ft	14.04 psi(a)
Water	0.437 psi/ft			
		Well Datum Depth	**7522.00 ft**	**3118.62 psi(a)**

Uranerz Energy

RIH Shut-in Gradient

NICH-DW #1



Fast

POOH Shut-in Gradient

Uranerz Energy — NICH-DW #1

Gauge Serial Number	9493	Gauge Type	Silicon Crystal
Gauge Manufacturer	Calscan	Maximum Recorder Range	10000.00 psi
Run Depth (Log KB)	7522.00 ft	Date of Last Calibration	
Gauge Start Date	2013/09/06 08:21:00	Gauge Stop Date	2013/09/07 11:33:00
Date Gauge On Bottom	2013/09/06 09:07:00	Date Gauge Off Bottom	2013/09/07 10:45:00

Test Data

Top(TVD KB)	ft	Bottom(TVD KB)	ft
Pool Datum Depth (SS)	ft	Well Datum Depth	7522.000 ft
Tubing Pressure: Initial	0.00 psi(a)	Tubing Pressure: Final	7.00 psi(a)
Casing Pressure: Initial	362.00 psi(a)	Casing Pressure: Final	470.00 psi(a)
Start Test Date	2013/09/06	Date Well Shut-In	2013/09/06 21:36:00

Depth ft	Time hh:mm:ss	Duration min	Pressure psi(a)	Gradient psi/ft	Temp. °F	Gradient °F/ft
7522.00	10:44:10		3156.47		163.22	
				0.435		0.012
6000.00	10:54:40	10.50	2493.74		144.74	
				0.437		0.013
4500.00	11:02:10	7.50	1838.45		125.73	
				0.438		0.013
3000.00	11:09:30	7.33	1181.59		106.59	
				0.440		0.016
1500.00	11:17:20	7.83	522.32		81.94	
				0.340		0.007
0.00	11:25:50	8.50	11.59		70.88	

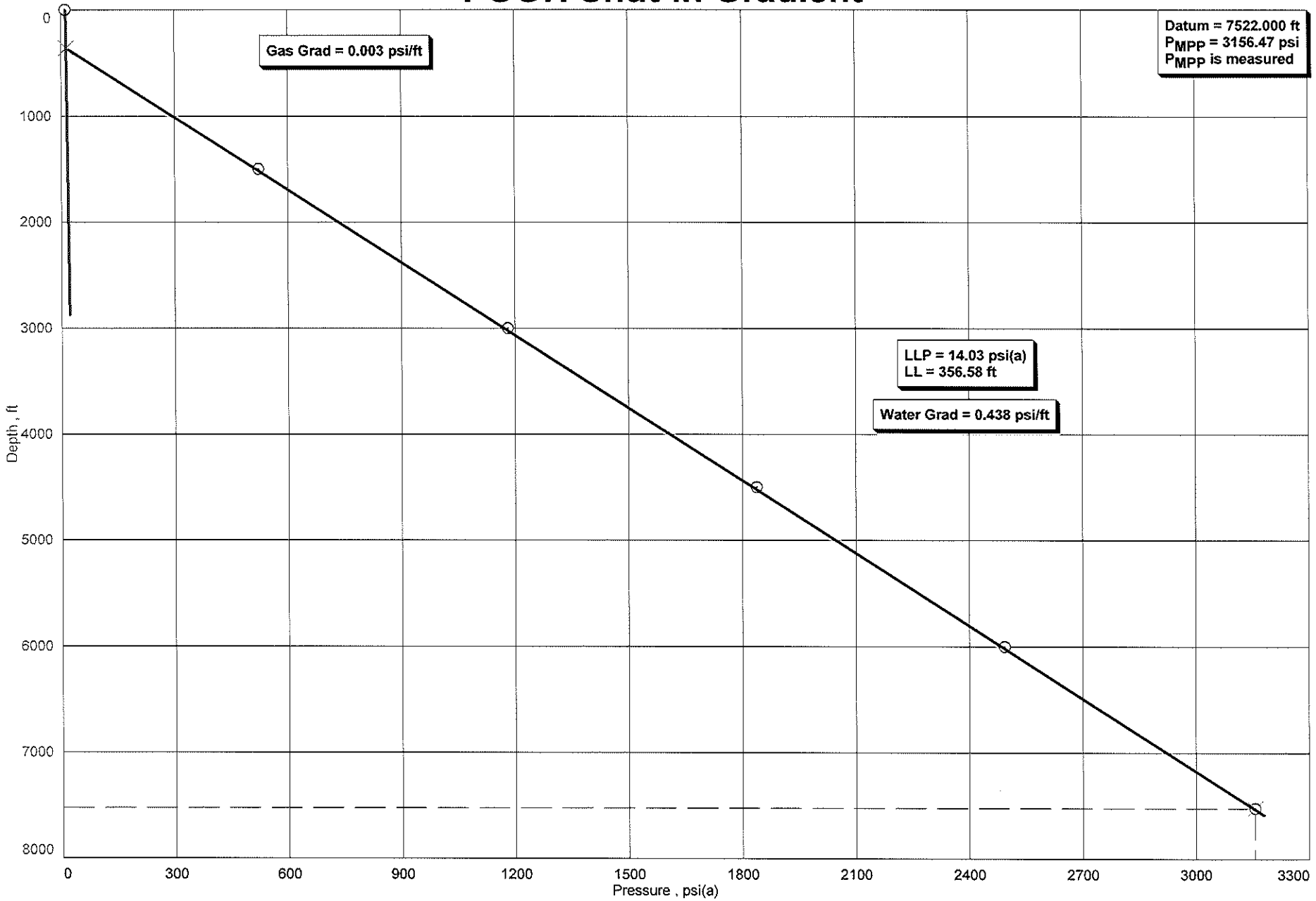
Results

Gas	0.003 psi/ft	Gas - Water Interface	356.58 ft	14.03 psi(a)
Water	0.438 psi/ft			
		Well Datum Depth	**7522.00 ft**	**3156.47 psi(a)**

Uranerz Energy

POOH Shut-in Gradient

NICH-DW #1



Fast