

Well Operator's Report of Well Work



Where energy meets innovation.

Well Number: 513759

API: 47 - 085 - 10135

Submission:  Initial  Amended

Notes: -Revised Plat  
-Revised "As Drilled" Coordinates

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AUG 25 2016  
WV Department of  
Environmental Protection

**APPROVED**

NAME: *Michael Doff*

DATE: *12-21-2016*

State of West Virginia  
Department of Environmental Protection - Office of Oil and Gas  
Well Operator's Report of Well Work

API 47-085-10135 County RITCHIE District UNION  
Quad OXFORD 7.5' Pad Name OXF163 Field/Pool Name \_\_\_\_\_  
Farm name HAROLD K. PIERCE Well Number 513759  
Operator (as registered with the OOG) EQT Production Company  
Address 625 Liberty Ave. EQT Plaza, Suite 1700 City Pittsburgh State PA Zip 15222

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey  
Top hole Northing 4,331,882.6 Easting 513,596.5  
Landing Point of Curve Northing 4,331,687.5 Easting 512,690.2  
Bottom Hole Northing 4,330,056.2 Easting 513,258.3

Elevation (ft) 1159 GL Type of Well  New  Existing Type of Report  Interim  Final  
Permit Type  Deviated  Horizontal  Horizontal 6A  Vertical Depth Type  Deep  Shallow  
Type of Operation  Convert  Deepen  Drill  Plug Back  Redrilling  Rework  Stimulate  
Well Type  Brine Disposal  CBM  Gas  Oil  Secondary Recovery  Solution Mining  Storage  Other \_\_\_\_\_  
Type of Completion  Single  Multiple Fluids Produced  Brine  Gas  NGL  Oil  Other \_\_\_\_\_  
Drilled with  Cable  Rotary

Drilling Media Surface hole  Air  Mud  Fresh Water Intermediate hole  Air  Mud  Fresh Water  Brine  
Production hole  Air  Mud  Fresh Water  Brine

Mud Type(s) and Additive(s)

Water base Mud 12.5 ppg barium sulfate, sodium chloride, xanthan gum, polyanionic cellulose, modified starch, sodium hydroxide, phosphonates and alkyl phosphates, glutaraldehyde solution, calcium hydroxide, partially hydrolyzed polyacrylamide/polyacrylate, potassium chloride, sodium carbonate, ground walnut shells, alcohol and modified fatty acid, ferrochrome lignosulfonate, calcium carbonate, fibrous cellulose

Date permit issued 9/22/2014 Date drilling commenced 01/9/2015 Date drilling ceased 6/2/2015  
Date completion activities began 10/5/2015 Date completion activities ceased 10/14/2015  
Verbal plugging (Y/N) N Date permission granted N/A Granted by Office of Oil and Gas

Please note: Operator is required to submit a plugging application within 5 days of verbal permission to plug

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Freshwater depth(s) ft 176',453',517' Open mine(s) (Y/N) depths N  
Salt water depth(s) ft 1156' Void(s) encountered (Y/N) depths N  
Coal depth(s) ft \_\_\_\_\_ Cavern(s) encountered (Y/N) depths N  
Is coal being mined in area (Y/N) N

Reviewed by: \_\_\_\_\_

API 47-085 10135

Farm name HAROLD K. PIERCE

Well number 513759

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/N) * Provide details below*
Conductor	24"	20"	40'	NEW	A-500 78.7LB/FT	NONE	Y
Surface	17.5"	13.375"	1057'	NEW	J-55 54.5LB/FT	469'	Y
Coal							
Intermediate 1	12.375"	9.625"	3037'	NEW	A-500 40LB/FT	1810'	Y
Intermediate 2							
Intermediate 3							
Production	8.5"	5.5"	14,684'	NEW	P-110 20LB/FT	NONE	N
Tubing							
Packer type and depth set							

Comment Details N/A

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft <sup>3</sup> /sks)	Volume (ft <sup>3</sup> )	Cement Top (MD)	WOC (hrs)
Conductor	CLASS A	38	15.6	1.18	44.84	0	8
Surface	CLASS A	803	15.6	1.18	948.9	0	8
Coal							
Intermediate 1	CLASS A	1031	15.6	1.18	1218.5	0	8
Intermediate 2							
Intermediate 3							
Production	Class H / Class H	995 / 785	14.2 / 15.2	1.26 / 1.97	2800.15	2,550' MD	72
Tubing							

Drillers TD (ft) 14,700' MD

Loggers TD (ft) N/A

Deepest formation penetrated Marcellus

Plug back to (ft) N/A

Plug back procedure N/A

Kick off depth (ft) 4,969' MD

Check all wireline logs run  
 caliper    density    deviated/directional    induction  
 neutron    resistivity    gamma ray    temperature    sonic

Well cored  Yes    No    Conventional    Sidewall   Were cuttings collected  Yes    No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING

CONDUCTOR- NONE

SURFACE- JOINTS: 1, 11, 23

INTERMEDIATE- RAN AT LEAST EVERY 500' FEET

PRODUCTION- 242 Composite Centralizers. One on every joint from TD to 4,300 MD

STATE OF OHIO  
Department of Oil and Gas

AUG 25 2016

WAS WELL COMPLETED AS SHOT HOLE  Yes    No   DETAILS

WAS WELL COMPLETED OPEN HOLE?  Yes    No   DETAILS

OHIO Department of  
Environmental Protection

WERE TRACERS USED  Yes    No   TYPE OF TRACER(S) USED





API 47- 085 - 10135 Farm name HAROLD K. PIERCE Well number 513759

Drilling Contractor Savanna Drilling  
Address 2204 Timberloch Place Suite 230 City Woodlands State TX Zip 77380

Logging Company GYRODATA  
Address 601 MAYER ST City BRIDGEVILLE State PA Zip 15017

Logging Company \_\_\_\_\_  
Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Cementing Company C&J Energy Services  
Address 1650 Hackers Creek Rd City Jane Lew State WV Zip 26378

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WV Department of  
Environmental Protection

API 47 - 085 - 10135

Formation Name	Final Top MD (ftGL) (ft)	Final Top TVD (ft)	Final Btm MD (ftGL) (ft)	Final Btm TVD (ft)
FRESH WATER ZONE	0	0	520	520
SAND/SHALE	520	520	1,774	1,774
MAXTON	1,774	1,774	1,955	1,955
BIG LIME	1,955	1,955	2,244	2,243
WEIR	2,244	2,243	2,472	2,471
GANTZ	2,472	2,471	2,567	2,566
50F	2,567	2,566	2,653	2,652
30F	2,653	2,652	2,715	2,714
GORDON	2,715	2,714	2,803	2,802
4TH	2,803	2,802	2,959	2,958
BAYARD	2,959	2,958	3,299	3,298
WARREN	3,299	3,298	3,352	3,351
SPEECHLEY	3,352	3,351	3,846	3,845
BALLTOWN A	3,846	3,845	4,430	4,429
RILEY	4,430	4,429	4,767	4,766
BENSON	4,767	4,766	5,100	5,096
ALEXANDER	5,100	5,096	7,765	6,222
SONYEA	7,765	6,222	8,134	6,351
MIDDLESEX	8,134	6,351	8,290	6,408
GENESSEE	8,290	6,408	8,475	6,468
GENESE0	8,475	6,468	8,631	6,509
TULLY	8,631	6,509	8,692	6,522
HAMILTON	8,692	6,522	8,737	6,532
MARCELLUS	8,737	6,532	14,700	6,567

**PHOENIX**  
TECHNOLOGY SERVICES



## **EQT Production - Marcellus**

**Ritchie County, WV**  
**Ritchie County 513759**  
**Well #513759**

**Main Wellbore**

**Design: 513759 As Drilled**

## **Standard Survey Report**

**01 June, 2015**

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PHX  
Survey Report



Database:	PHX - Single Well 11	Local Co-ordinate Reference:	PHX Survey Datum 1927
Company:	Q2 Petroleum, Missouri	TVD Reference:	PHX Survey Datum
Project:	Galena County, WV	MD Reference:	PHX Survey Datum
Site:	Galena County, WV	North Reference:	PHX
Well:	Well 841275	Survey Calculation Method:	Minimum Squares
Wellbore:	PHX Wellbore		
Design:	1275 - 11 - 2015		

<b>Project</b>			
<b>Map System:</b>	US State Plane 1927 (Exact solution)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD 1927 (NADCON CONUS)		
<b>Map Zone:</b>	West Virginia North 4701		Using geodetic scale factor

<b>Site</b>			
<b>Site Position:</b>		<b>Northing:</b>	234,466.60 usft
<b>From:</b>	Map	<b>Easting:</b>	1,619,096.50 usft
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	13-3/16 "
		<b>Latitude:</b>	39.14
		<b>Longitude:</b>	-80.84
		<b>Grid Convergence:</b>	-0.86 °

<b>Well</b>			
<b>Well Position</b>	<b>+N-S</b>	0.0 usft	<b>Northing:</b> 234,466.60 usft
	<b>+E-W</b>	0.0 usft	<b>Easting:</b> 1,619,096.50 usft
<b>Position Uncertainty</b>		0.0 usft	<b>Wellhead Elevation:</b> usft
			<b>Ground Level:</b> 1,159.0 usft

<b>Wellbore</b>					
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	HDGM	4/21/2015	-7.70	66.58	52,062

<b>Design</b>					
<b>Audit Notes:</b>					
<b>Version:</b>	1.0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0.0
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N-S (usft)</b>	<b>+E-W (usft)</b>	<b>Direction (°)</b>	
	0.0	0.0	0.0	191.57	

<b>Survey Program</b>		<b>Date</b>	6/1/2015
<b>From (')</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>
0.00	4,833.0	Gyrodata Gyro (Main Wellbore)	GYD_DP_MS
0.00	14,700.0	513759 PHX MWD (Main Wellbore)	PHX+MWD+HDGM
			<b>Description</b>
			Gyrodata gyro-compassing and drop
			PHX+OWSG MWD + HDGM

<b>Survey</b>										
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>Subsea Depth (usft)</b>	<b>+N-S (usft)</b>	<b>+E-W (usft)</b>	<b>Vertical Section (usft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>
0.0	0.00	0.00	0.0	-1,175.0	0.0	0.0	0.0	0.00	0.00	0.00
103.0	0.42	138.13	103.0	-1,072.0	-0.3	0.3	0.2	0.41	0.41	0.00
203.0	0.35	130.21	203.0	-972.0	-0.8	0.7	0.6	0.09	-0.07	-7.92
303.0	0.33	122.23	303.0	-872.0	-1.1	1.2	0.8	0.05	-0.02	-7.98
403.0	0.25	142.64	403.0	-772.0	-1.4	1.6	1.1	0.13	-0.08	20.41
503.0	0.25	155.87	503.0	-672.0	-1.8	1.8	1.4	0.06	0.00	13.23
603.0	0.16	163.87	603.0	-572.0	-2.1	1.9	1.7	0.09	-0.09	8.00
703.0	0.10	163.18	703.0	-472.0	-2.4	2.0	1.9	0.06	-0.06	-0.69

Database:	PHX Survey 2015	Local Co-ordinate Reference:	North American Datum 83
Company:	EQT Production Services	TVD Reference:	True Vertical Depth
Project:	Walter Quarry, PH	MD Reference:	MDG 100, 100usft
Site:	Madison County, AL	North Reference:	True
Well:	Walter Quarry	Survey Calculation Method:	Minimum Curvature
Wellbore:	Walter Quarry		
Design:	Walter Quarry		

**Survey**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/S (usft)	+E/W (usft)	Vertical Section (usft)	Dogleg Rate (%/100usft)	Build Rate (%/100usft)	Turn Rate (%/100usft)
803.0	0.13	171.80	803.0	-372.0	-2.5	2.0	2.1	0.03	0.03	8.62
903.0	0.20	106.58	903.0	-272.0	-2.7	2.2	2.2	0.19	0.07	-65.22
1,003.0	0.27	87.39	1,003.0	-172.0	-2.7	2.6	2.2	0.10	0.07	-19.19
1,103.0	0.38	96.13	1,103.0	-72.0	-2.8	3.2	2.1	0.12	0.11	8.74
1,203.0	0.50	101.66	1,203.0	28.0	-2.9	3.9	2.0	0.13	0.12	5.53
1,303.0	0.66	99.77	1,303.0	128.0	-3.1	4.9	2.0	0.16	0.16	-1.89
1,403.0	1.01	100.06	1,403.0	228.0	-3.3	6.4	2.0	0.35	0.35	0.29
1,503.0	1.21	98.07	1,503.0	328.0	-3.6	8.3	1.9	0.20	0.20	-1.99
1,603.0	1.79	100.63	1,602.9	427.9	-4.1	10.9	1.8	0.58	0.58	2.56
1,703.0	2.24	103.95	1,702.9	527.9	-4.8	14.3	1.9	0.46	0.45	3.32
1,803.0	2.27	104.27	1,802.8	627.8	-5.8	18.1	2.0	0.03	0.03	0.32
1,903.0	2.34	106.05	1,902.7	727.7	-6.8	22.0	2.3	0.10	0.07	1.78
2,003.0	2.36	108.61	2,002.6	827.6	-8.1	25.9	2.7	0.11	0.02	2.56
2,103.0	2.32	111.93	2,102.5	927.5	-9.5	29.7	3.3	0.14	-0.04	3.32
2,203.0	2.28	112.50	2,202.4	1,027.4	-11.0	33.5	4.1	0.05	-0.04	0.57
2,303.0	2.29	115.51	2,302.4	1,127.4	-12.6	37.1	4.9	0.12	0.01	3.01
2,403.0	2.20	117.36	2,402.3	1,227.3	-14.4	40.6	5.9	0.12	-0.09	1.85
2,503.0	2.17	118.40	2,502.2	1,327.2	-16.1	44.0	7.0	0.05	-0.03	1.04
2,603.0	2.10	119.20	2,602.1	1,427.1	-17.9	47.2	8.1	0.08	-0.07	0.80
2,703.0	2.01	119.26	2,702.1	1,527.1	-19.7	50.4	9.2	0.09	-0.09	0.06
2,803.0	1.72	121.05	2,802.0	1,627.0	-21.3	53.2	10.2	0.30	-0.29	1.79
2,903.0	1.70	121.89	2,902.0	1,727.0	-22.9	55.7	11.2	0.03	-0.02	0.84
3,003.0	1.42	117.26	3,002.0	1,827.0	-24.2	58.1	12.1	0.31	-0.28	-4.63
3,103.0	1.36	116.41	3,101.9	1,926.9	-25.3	60.3	12.7	0.06	-0.06	-0.85
3,203.0	1.09	121.19	3,201.9	2,026.9	-26.3	62.1	13.3	0.29	-0.27	4.78
3,303.0	0.85	124.13	3,301.9	2,126.9	-27.3	63.6	13.9	0.25	-0.24	2.94
3,403.0	0.48	137.75	3,401.9	2,226.9	-28.0	64.5	14.5	0.40	-0.37	13.62
3,503.0	0.35	139.96	3,501.9	2,326.9	-28.5	64.9	14.9	0.13	-0.13	2.21
3,603.0	0.27	141.89	3,601.9	2,426.9	-28.9	65.3	15.3	0.08	-0.08	1.93
3,703.0	0.14	154.26	3,701.9	2,526.9	-29.2	65.5	15.5	0.14	-0.13	12.37
3,803.0	0.07	184.43	3,801.9	2,626.9	-29.4	65.5	15.7	0.09	-0.07	30.17
3,903.0	0.20	310.96	3,901.9	2,726.9	-29.4	65.4	15.6	0.25	0.13	126.53
4,003.0	0.40	312.92	4,001.9	2,826.9	-29.0	65.0	15.4	0.20	0.20	1.96
4,103.0	0.63	315.98	4,101.9	2,926.9	-28.4	64.4	14.9	0.23	0.23	3.06
4,203.0	0.92	323.92	4,201.9	3,026.9	-27.3	63.5	14.0	0.31	0.29	7.94
4,303.0	1.01	329.40	4,301.8	3,126.8	-25.9	62.6	12.8	0.13	0.09	5.48
4,403.0	1.07	327.21	4,401.8	3,226.8	-24.4	61.6	11.5	0.07	0.06	-2.19
4,503.0	1.36	327.39	4,501.8	3,326.8	-22.6	60.5	10.0	0.29	0.29	0.18
4,603.0	1.55	324.49	4,601.8	3,426.8	-20.5	59.1	8.2	0.20	0.19	-2.90
4,703.0	1.92	330.62	4,701.7	3,526.7	-17.9	57.5	6.0	0.41	0.37	6.13
4,803.0	2.37	330.79	4,801.7	3,626.7	-14.7	55.6	3.2	0.45	0.45	0.17
4,833.0	2.57	330.29	4,831.6	3,656.6	-13.5	55.0	2.2	0.67	0.67	-1.67

Database:	PHX Survey 2015	Local Co-ordinate Reference:	PHX Survey 2015
Company:	Oil Production Services	TVD Reference:	PHX Survey 2015
Project:	PHX Survey 2015	MD Reference:	PHX Survey 2015
Site:	PHX Survey 2015	North Reference:	PHX Survey 2015
Well:	PHX Survey 2015	Survey Calculation Method:	PHX Survey 2015
Wellbore:	PHX Survey 2015		
Design:	PHX Survey 2015		

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,874.0	2.30	330.30	4,872.6	3,697.6	-12.0	54.1	0.9	0.66	-0.66	0.02
4,937.0	1.90	328.60	4,935.5	3,760.5	-10.0	53.0	-0.8	0.64	-0.63	-2.70
4,969.0	2.20	333.00	4,967.5	3,792.5	-9.0	52.4	-1.7	1.06	0.94	13.75
5,000.0	4.90	287.40	4,998.5	3,823.5	-8.1	50.9	-2.3	11.97	8.71	-147.10
5,032.0	9.90	286.10	5,030.2	3,855.2	-6.9	46.9	-2.6	15.63	15.63	-4.06
5,063.0	13.30	294.20	5,060.6	3,885.6	-4.7	41.1	-3.6	12.14	10.97	26.13
5,094.0	15.30	293.80	5,090.6	3,915.6	-1.6	34.1	-5.3	6.46	6.45	-1.29
5,125.0	18.90	285.60	5,120.2	3,945.2	1.4	25.5	-6.5	13.95	11.61	-26.45
5,156.0	21.70	278.40	5,149.3	3,974.3	3.6	15.0	-6.5	12.09	9.03	-23.23
5,188.0	24.80	274.30	5,178.7	4,003.7	4.9	2.5	-5.3	10.92	9.69	-12.81
5,219.0	27.40	274.50	5,206.5	4,031.5	6.0	-11.1	-3.6	8.39	8.39	0.65
5,251.0	30.00	274.90	5,234.6	4,059.6	7.2	-26.4	-1.8	8.15	8.13	1.25
5,283.0	32.10	272.80	5,262.0	4,087.0	8.3	-42.9	0.4	7.38	6.56	-6.56
5,314.0	34.50	270.90	5,287.9	4,112.9	8.9	-59.9	3.3	8.44	7.74	-6.13
5,346.0	36.90	270.90	5,313.9	4,138.9	9.2	-78.6	6.8	7.50	7.50	0.00
5,377.0	38.50	272.90	5,338.4	4,163.4	9.8	-97.5	10.0	6.50	5.16	6.45
5,409.0	40.10	273.20	5,363.2	4,188.2	10.9	-117.8	13.0	5.04	5.00	0.94
5,440.0	43.20	272.40	5,386.4	4,211.4	11.9	-138.3	16.1	10.15	10.00	-2.58
5,472.0	47.00	273.00	5,408.9	4,233.9	13.0	-161.0	19.6	11.95	11.88	1.88
5,503.0	50.50	273.80	5,429.4	4,254.4	14.3	-184.2	22.9	11.46	11.29	2.58
5,535.0	54.90	274.70	5,448.8	4,273.8	16.2	-209.6	26.1	13.93	13.75	2.81
5,566.0	59.30	274.90	5,465.6	4,290.6	18.4	-235.6	29.2	14.20	14.19	0.65
5,597.0	62.90	275.60	5,480.6	4,305.6	20.9	-262.6	32.2	11.78	11.61	2.26
5,629.0	65.80	274.60	5,494.4	4,319.4	23.5	-291.3	35.5	9.49	9.06	-3.13
5,692.0	69.90	273.40	5,518.2	4,343.2	27.5	-349.5	43.1	6.74	6.51	-1.90
5,755.0	70.30	273.30	5,539.6	4,364.6	31.0	-408.6	51.6	0.65	0.63	-0.16
5,818.0	70.60	273.10	5,560.7	4,385.7	34.3	-467.9	60.3	0.56	0.48	-0.32
5,881.0	70.90	273.20	5,581.5	4,406.5	37.6	-527.3	69.0	0.50	0.48	0.16
5,944.0	70.30	273.70	5,602.4	4,427.4	41.1	-586.6	77.4	1.21	-0.95	0.79
6,007.0	70.30	273.50	5,623.6	4,448.6	44.9	-645.8	85.6	0.30	0.00	-0.32
6,070.0	70.30	274.10	5,644.9	4,469.9	48.8	-705.0	93.6	0.90	0.00	0.95
6,132.0	70.20	274.30	5,665.8	4,490.8	53.1	-763.2	101.1	0.34	-0.16	0.32
6,196.0	69.50	273.30	5,687.9	4,512.9	57.1	-823.1	109.2	1.83	-1.09	-1.56
6,258.0	69.10	272.60	5,709.8	4,534.8	60.0	-881.1	117.9	1.24	-0.65	-1.13
6,321.0	69.40	272.70	5,732.1	4,557.1	62.8	-939.9	127.1	0.50	0.48	0.16
6,383.0	69.70	272.40	5,753.8	4,578.8	65.4	-997.9	136.2	0.66	0.48	-0.48
6,447.0	70.00	272.70	5,775.8	4,600.8	68.0	-1,058.0	145.6	0.64	0.47	0.47
6,510.0	70.40	272.40	5,797.2	4,622.2	70.7	-1,117.2	154.9	0.78	0.63	-0.48
6,573.0	70.80	272.50	5,818.1	4,643.1	73.2	-1,176.6	164.3	0.65	0.63	0.16
6,636.0	69.70	273.60	5,839.4	4,664.4	76.4	-1,235.8	173.1	2.40	-1.75	1.75
6,699.0	69.90	273.70	5,861.1	4,686.1	80.1	-1,294.8	181.3	0.35	0.32	0.16
6,762.0	70.20	273.20	5,882.6	4,707.6	83.7	-1,353.9	189.6	0.89	0.48	-0.79

Database:	PHX - PHX Survey Data	Local Co-ordinate Reference:	WGS 84 - UTM Zone 54 S
Company:	EQT Production - Williams	TVD Reference:	Height of 1115.00m
Project:	North Perry, TX	MD Reference:	PHX 10 1726 000
Site:	North Perry, TX	North Reference:	0m
Well:	Well 83 1726	Survey Calculation Method:	Minimum Curvature
Wellbore:	83 1726		
Design:	10122 000		

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,825.0	70.40	273.10	5,903.9	4,728.9	86.9	-1,413.1	198.3	0.35	0.32	-0.16
6,888.0	70.60	272.80	5,924.9	4,749.9	90.0	-1,472.4	207.2	0.55	0.32	-0.48
6,951.0	70.60	272.90	5,945.8	4,770.8	93.0	-1,531.8	216.2	0.15	0.00	0.16
7,014.0	69.80	272.30	5,967.2	4,792.2	95.6	-1,591.0	225.5	1.55	-1.27	-0.95
7,077.0	69.90	272.00	5,988.9	4,813.9	97.9	-1,650.1	235.2	0.47	0.16	-0.48
7,140.0	70.40	271.80	6,010.3	4,835.3	99.8	-1,709.3	245.1	0.85	0.79	-0.32
7,203.0	70.10	272.30	6,031.5	4,856.5	101.9	-1,768.6	254.9	0.89	-0.48	0.79
7,266.0	70.10	271.30	6,053.0	4,878.0	103.8	-1,827.8	265.0	1.49	0.00	-1.59
7,329.0	69.80	272.20	6,074.6	4,899.6	105.6	-1,886.9	275.1	1.42	-0.48	1.43
7,392.0	70.10	272.30	6,096.2	4,921.2	107.9	-1,946.1	284.7	0.50	0.48	0.16
7,455.0	70.80	273.00	6,117.3	4,942.3	110.7	-2,005.4	293.9	1.53	1.11	1.11
7,518.0	71.30	272.70	6,137.7	4,962.7	113.6	-2,064.9	302.9	0.91	0.79	-0.48
7,581.0	70.30	273.80	6,158.4	4,983.4	117.0	-2,124.3	311.5	2.29	-1.59	1.75
7,643.0	69.50	274.80	6,179.8	5,004.8	121.4	-2,182.3	318.9	1.99	-1.29	1.61
7,706.0	69.90	274.70	6,201.6	5,026.6	126.3	-2,241.2	325.9	0.65	0.63	-0.16
7,769.0	70.40	274.80	6,223.0	5,048.0	131.1	-2,300.3	333.0	0.81	0.79	-0.16
7,841.0	69.50	273.80	6,247.7	5,072.7	136.0	-2,367.7	341.7	1.63	-1.25	-1.11
7,904.0	70.10	274.10	6,269.4	5,094.4	140.1	-2,426.7	349.6	1.05	0.95	0.48
7,935.0	70.50	274.10	6,279.9	5,104.9	142.2	-2,455.8	353.4	1.29	1.29	0.00
7,967.0	70.20	269.10	6,290.7	5,115.7	143.0	-2,485.9	358.6	14.74	-0.94	-15.63
7,998.0	69.10	264.70	6,301.4	5,126.4	141.5	-2,514.9	365.9	13.77	-3.55	-14.19
8,030.0	69.30	261.00	6,313.1	5,138.1	137.8	-2,544.5	375.5	11.06	-2.50	-11.56
8,061.0	68.10	257.80	6,324.6	5,149.6	132.5	-2,572.8	386.4	9.61	-0.65	-10.32
8,093.0	68.90	254.50	6,336.3	5,161.3	125.3	-2,601.7	399.1	9.91	2.50	-10.31
8,124.0	69.30	250.50	6,347.4	5,172.4	116.6	-2,629.3	413.2	12.12	1.29	-12.90
8,156.0	69.10	248.60	6,358.7	5,183.7	106.2	-2,657.3	429.1	5.59	-0.63	-5.94
8,187.0	67.70	246.00	6,370.2	5,195.2	95.1	-2,683.9	445.3	9.01	-4.52	-8.39
8,219.0	67.80	242.50	6,382.3	5,207.3	82.2	-2,710.6	463.3	10.13	0.31	-10.94
8,250.0	68.70	240.70	6,393.8	5,218.8	68.5	-2,735.9	481.7	6.12	2.90	-5.81
8,282.0	69.80	238.10	6,405.1	5,230.1	53.3	-2,761.7	501.8	8.34	3.44	-8.13
8,313.0	70.70	235.70	6,415.6	5,240.6	37.3	-2,786.1	522.4	7.84	2.90	-7.74
8,345.0	72.20	231.00	6,425.8	5,250.8	19.2	-2,810.5	545.0	14.69	4.69	-14.69
8,376.0	71.70	226.50	6,435.4	5,260.4	-0.2	-2,832.6	568.4	13.90	-1.61	-14.52
8,407.0	70.90	222.90	6,445.3	5,270.3	-21.1	-2,853.3	593.0	11.30	-2.58	-11.61
8,439.0	70.60	219.00	6,455.9	5,280.9	-43.9	-2,873.1	619.3	11.54	-0.94	-12.19
8,470.0	71.30	214.60	6,466.0	5,291.0	-67.3	-2,890.6	645.9	13.60	2.26	-14.19
8,502.0	72.20	210.80	6,476.0	5,301.0	-92.9	-2,907.0	674.2	11.62	2.81	-11.88
8,533.0	74.60	209.00	6,484.9	5,309.9	-118.7	-2,921.8	702.4	9.53	7.74	-5.81
8,564.0	75.40	205.90	6,492.9	5,317.9	-145.2	-2,935.6	731.2	10.00	2.58	-10.00
8,596.0	76.20	202.90	6,500.8	5,325.8	-173.5	-2,948.4	761.4	9.43	2.50	-9.38
8,627.0	77.10	200.00	6,507.9	5,332.9	-201.5	-2,959.5	791.1	9.55	2.90	-9.35
8,659.0	77.50	196.70	6,514.9	5,339.9	-231.2	-2,969.3	822.1	10.14	1.25	-10.31
8,690.0	77.80	195.70	6,521.6	5,346.6	-260.2	-2,977.7	852.3	3.30	0.97	-3.23

Database:	Oil Field Services	Local Co-ordinate Reference:	North American Datum 1983
Company:	Oil Services International	TVD Reference:	Mean Sea Level
Project:	Alpha Omega, LLC	MD Reference:	Mean Sea Level
Site:	Alpha Omega, LLC	North Reference:	True
Well:	Alpha Omega	Survey Calculation Method:	Minimum Curvature
Wellbore:	Alpha Omega		
Design:	Alpha Omega		

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,722.0	77.80	193.60	6,528.3	5,353.3	-290.5	-2,985.6	883.6	6.41	0.00	-6.56
8,731.2	78.06	192.77	6,530.3	5,355.3	-299.3	-2,987.7	892.6	9.31	2.87	-9.05
8,753.0	78.70	190.80	6,534.7	5,359.7	-320.2	-2,992.1	913.9	9.31	2.92	-9.02
8,785.0	80.60	188.10	6,540.4	5,365.4	-351.2	-2,997.2	945.4	10.20	5.94	-8.44
8,816.0	83.40	185.60	6,544.7	5,369.7	-381.7	-3,000.9	975.9	12.06	9.03	-8.06
8,848.0	83.40	182.90	6,548.4	5,373.4	-413.4	-3,003.2	1,007.5	8.38	0.00	-8.44
8,879.0	81.50	180.70	6,552.5	5,377.5	-444.1	-3,004.2	1,037.7	9.33	-6.13	-7.10
8,911.0	81.50	177.70	6,557.2	5,382.2	-475.7	-3,003.8	1,068.7	9.27	0.00	-9.38
8,942.0	83.10	173.90	6,561.4	5,386.4	-506.4	-3,001.5	1,098.2	13.20	5.16	-12.26
8,974.0	84.90	170.30	6,564.7	5,389.7	-537.9	-2,997.1	1,128.2	12.52	5.63	-11.25
9,028.0	89.70	163.50	6,567.2	5,392.2	-590.4	-2,984.9	1,177.2	15.40	8.89	-12.59
9,033.2	89.92	163.42	6,567.3	5,392.3	-595.4	-2,983.4	1,181.8	4.42	4.13	-1.59
9,091.0	92.30	162.50	6,566.1	5,391.1	-650.6	-2,966.5	1,232.5	4.42	4.13	-1.59
9,154.0	92.50	162.00	6,563.5	5,388.5	-710.6	-2,947.3	1,287.4	0.85	0.32	-0.79
9,217.0	91.20	160.70	6,561.5	5,386.5	-770.2	-2,927.2	1,341.8	2.92	-2.06	-2.06
9,280.0	90.10	160.00	6,560.8	5,385.8	-829.5	-2,906.0	1,395.7	2.07	-1.75	-1.11
9,343.0	90.00	159.60	6,560.7	5,385.7	-888.7	-2,884.2	1,449.2	0.65	-0.16	-0.63
9,406.0	89.80	159.00	6,560.8	5,385.8	-947.6	-2,862.0	1,502.5	1.00	-0.32	-0.95
9,469.0	90.20	158.60	6,560.8	5,385.8	-1,006.3	-2,839.2	1,555.4	0.90	0.63	-0.63
9,532.0	90.60	159.70	6,560.3	5,385.3	-1,065.2	-2,816.8	1,608.6	1.99	0.95	1.75
9,595.0	91.20	161.60	6,559.2	5,384.2	-1,124.6	-2,795.9	1,662.7	3.08	0.63	3.02
9,658.0	90.60	159.80	6,558.2	5,383.2	-1,184.1	-2,775.1	1,716.7	3.01	-0.95	-2.86
9,721.0	89.10	157.90	6,558.3	5,383.3	-1,242.8	-2,752.3	1,769.7	3.84	-2.38	-3.02
9,784.0	88.80	160.20	6,559.5	5,384.5	-1,301.7	-2,729.8	1,822.8	3.68	-0.48	3.65
9,847.0	90.40	162.20	6,559.9	5,384.9	-1,361.3	-2,709.5	1,877.2	4.07	2.54	3.17
9,910.0	90.90	162.50	6,559.2	5,384.2	-1,421.3	-2,690.4	1,932.2	0.93	0.79	0.48
9,973.0	91.20	164.10	6,558.1	5,383.1	-1,481.7	-2,672.3	1,987.6	2.58	0.48	2.54
10,036.0	88.90	162.00	6,558.0	5,383.0	-1,541.9	-2,654.0	2,043.0	4.94	-3.65	-3.33
10,099.0	88.40	162.40	6,559.5	5,384.5	-1,601.9	-2,634.7	2,097.9	1.02	-0.79	0.63
10,162.0	88.50	163.60	6,561.2	5,386.2	-1,662.1	-2,616.3	2,153.2	1.91	0.16	1.90
10,225.0	88.50	163.80	6,562.9	5,387.9	-1,722.5	-2,598.6	2,208.8	0.32	0.00	0.32
10,288.0	88.40	164.20	6,564.6	5,389.6	-1,783.1	-2,581.3	2,264.7	0.65	-0.16	0.63
10,351.0	89.00	163.60	6,566.0	5,391.0	-1,843.6	-2,563.8	2,320.4	1.35	0.95	-0.95
10,414.0	90.10	163.90	6,566.5	5,391.5	-1,904.1	-2,546.2	2,376.2	1.81	1.75	0.48
10,477.0	91.20	163.10	6,565.8	5,390.8	-1,964.5	-2,528.3	2,431.7	2.16	1.75	-1.27
10,539.0	91.50	162.30	6,564.3	5,389.3	-2,023.7	-2,509.8	2,486.0	1.38	0.48	-1.29
10,603.0	91.70	162.00	6,562.5	5,387.5	-2,084.6	-2,490.2	2,541.7	0.56	0.31	-0.47
10,654.4	91.29	161.18	6,561.2	5,386.2	-2,133.3	-2,474.0	2,586.3	1.77	-0.79	-1.59
10,666.0	91.20	161.00	6,560.9	5,385.9	-2,144.3	-2,470.2	2,596.2	1.77	-0.79	-1.59

Database:	PHX Survey	Local Co-ordinate Reference:	North American Datum 1983
Company:	EQT Production Services	TVD Reference:	Mean Sea Level
Project:	Weller County, TX	MD Reference:	Weller County, TX
Site:	Weller County, TX	North Reference:	North
Well:	Weller 11333	Survey Calculation Method:	Minimum Curvature
Wellbore:	Weller 11333		
Design:	Weller 11333		

Survey											
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
10,729.0	90.40	160.90	6,560.0	5,385.0	-2,203.8	-2,449.7	2,650.4	1.28	-1.27	-0.16	
10,792.0	90.50	160.40	6,559.5	5,384.5	-2,263.3	-2,428.8	2,704.5	0.81	0.16	-0.79	
10,854.0	90.50	160.10	6,559.0	5,384.0	-2,321.6	-2,407.9	2,757.5	0.48	0.00	-0.48	
10,918.0	90.10	162.30	6,558.7	5,383.7	-2,382.2	-2,387.2	2,812.7	3.49	-0.63	3.44	
10,980.0	90.10	162.30	6,558.6	5,383.6	-2,441.3	-2,368.4	2,866.7	0.00	0.00	0.00	
11,043.0	90.10	162.30	6,558.5	5,383.5	-2,501.3	-2,349.2	2,921.7	0.00	0.00	0.00	
11,106.0	90.10	162.10	6,558.3	5,383.3	-2,561.3	-2,330.0	2,976.6	0.32	0.00	-0.32	
11,169.0	90.00	161.80	6,558.3	5,383.3	-2,621.1	-2,310.3	3,031.3	0.81	-0.16	-0.79	
11,232.0	89.90	161.40	6,558.3	5,383.3	-2,680.9	-2,290.4	3,085.8	0.35	-0.16	-0.32	
11,295.0	90.20	161.90	6,558.3	5,383.3	-2,740.7	-2,270.5	3,140.4	0.93	0.48	0.79	
11,358.0	90.10	163.10	6,558.1	5,383.1	-2,800.7	-2,251.6	3,195.5	1.91	-0.16	1.90	
11,421.0	89.80	162.30	6,558.2	5,383.2	-2,860.9	-2,232.8	3,250.7	1.36	-0.48	-1.27	
11,484.0	89.50	162.00	6,558.6	5,383.6	-2,920.9	-2,213.5	3,305.5	0.67	-0.48	-0.48	
11,547.0	89.80	162.00	6,558.9	5,383.9	-2,980.8	-2,194.1	3,360.3	0.48	0.48	0.00	
11,610.0	90.00	161.80	6,559.1	5,384.1	-3,040.7	-2,174.5	3,415.1	0.45	0.32	-0.32	
11,673.0	90.50	161.80	6,558.8	5,383.8	-3,100.5	-2,154.8	3,469.8	0.79	0.79	0.00	
11,736.0	90.80	161.20	6,558.1	5,383.1	-3,160.2	-2,134.8	3,524.3	1.06	0.48	-0.95	
11,799.0	91.60	161.20	6,556.7	5,381.7	-3,219.9	-2,114.5	3,578.6	1.27	1.27	0.00	
11,862.0	91.80	161.30	6,554.9	5,379.9	-3,279.5	-2,094.3	3,633.0	0.35	0.32	0.16	
11,925.0	91.90	161.50	6,552.8	5,377.8	-3,339.2	-2,074.2	3,687.4	0.35	0.16	0.32	
11,988.0	91.00	162.50	6,551.3	5,376.3	-3,399.1	-2,054.7	3,742.2	2.14	-1.43	1.59	
12,051.0	91.30	162.30	6,550.0	5,375.0	-3,459.1	-2,035.7	3,797.2	0.57	0.48	-0.32	
12,114.0	91.20	161.70	6,548.6	5,373.6	-3,519.0	-2,016.2	3,852.0	0.97	-0.16	-0.95	
12,177.0	90.20	161.00	6,547.8	5,372.8	-3,578.7	-1,996.1	3,906.4	1.94	-1.59	-1.11	
12,240.0	90.40	161.40	6,547.5	5,372.5	-3,638.3	-1,975.8	3,960.7	0.71	0.32	0.63	
12,303.0	90.00	162.00	6,547.3	5,372.3	-3,698.2	-1,956.0	4,015.4	1.14	-0.63	0.95	
12,366.0	89.80	161.60	6,547.4	5,372.4	-3,758.0	-1,936.3	4,070.1	0.71	-0.32	-0.63	
12,429.0	90.00	161.40	6,547.5	5,372.5	-3,817.7	-1,916.3	4,124.6	0.45	0.32	-0.32	
12,492.0	89.80	160.90	6,547.6	5,372.6	-3,877.4	-1,896.0	4,178.9	0.85	-0.32	-0.79	
12,555.0	89.80	161.00	6,547.8	5,372.8	-3,936.9	-1,875.4	4,233.1	0.16	0.00	0.16	
12,618.0	90.60	161.60	6,547.6	5,372.6	-3,996.6	-1,855.2	4,287.5	1.59	1.27	0.95	
12,681.0	91.50	161.60	6,546.5	5,371.5	-4,056.4	-1,835.3	4,342.1	1.43	1.43	0.00	
12,744.0	91.30	161.10	6,544.9	5,369.9	-4,116.0	-1,815.2	4,396.5	0.85	-0.32	-0.79	
12,807.0	90.60	162.00	6,543.9	5,368.9	-4,175.8	-1,795.3	4,451.0	1.81	-1.11	1.43	
12,871.0	90.50	163.40	6,543.3	5,368.3	-4,236.9	-1,776.2	4,507.1	2.19	-0.16	2.19	
12,933.0	90.10	164.20	6,542.9	5,367.9	-4,296.4	-1,758.9	4,561.9	1.44	-0.65	1.29	
12,996.0	89.50	163.80	6,543.2	5,368.2	-4,357.0	-1,741.6	4,617.8	1.14	-0.95	-0.63	
13,060.0	89.30	163.80	6,543.8	5,368.8	-4,418.4	-1,723.7	4,674.4	0.31	-0.31	0.00	
13,123.0	88.80	163.70	6,544.9	5,369.9	-4,478.9	-1,706.1	4,730.1	0.81	-0.79	-0.16	
13,186.0	89.60	165.20	6,545.8	5,370.8	-4,539.6	-1,689.2	4,786.2	2.70	1.27	2.38	
13,249.0	89.90	164.70	6,546.0	5,371.0	-4,600.4	-1,672.8	4,842.5	0.93	0.48	-0.79	
13,312.0	90.90	165.40	6,545.6	5,370.6	-4,661.3	-1,656.6	4,898.9	1.94	1.59	1.11	



PHX  
Survey Report



Database:	2014 Survey 1 - 10/17/15	Local Co-ordinate Reference:	2014 Survey 1 - 10/17/15
Company:	OJ Production - Williams	TVD Reference:	2014 Survey 1 - 10/17/15
Project:	Phillips County, TX	MD Reference:	2014 Survey 1 - 10/17/15
Site:	Phillips County, TX	North Reference:	2014 Survey 1 - 10/17/15
Well:	Well #1-2275	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore		
Design:	11/28/14 10:50AM		

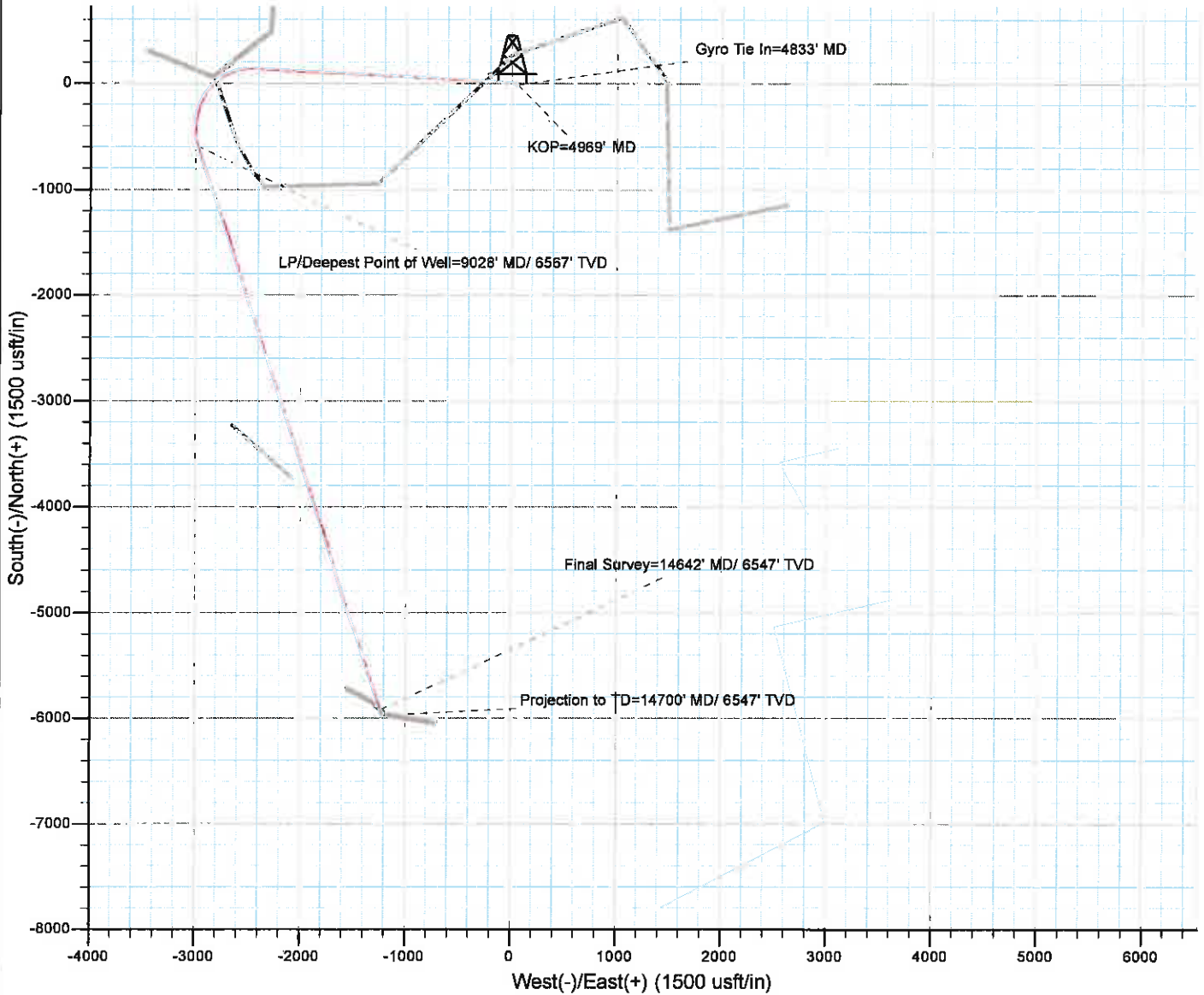
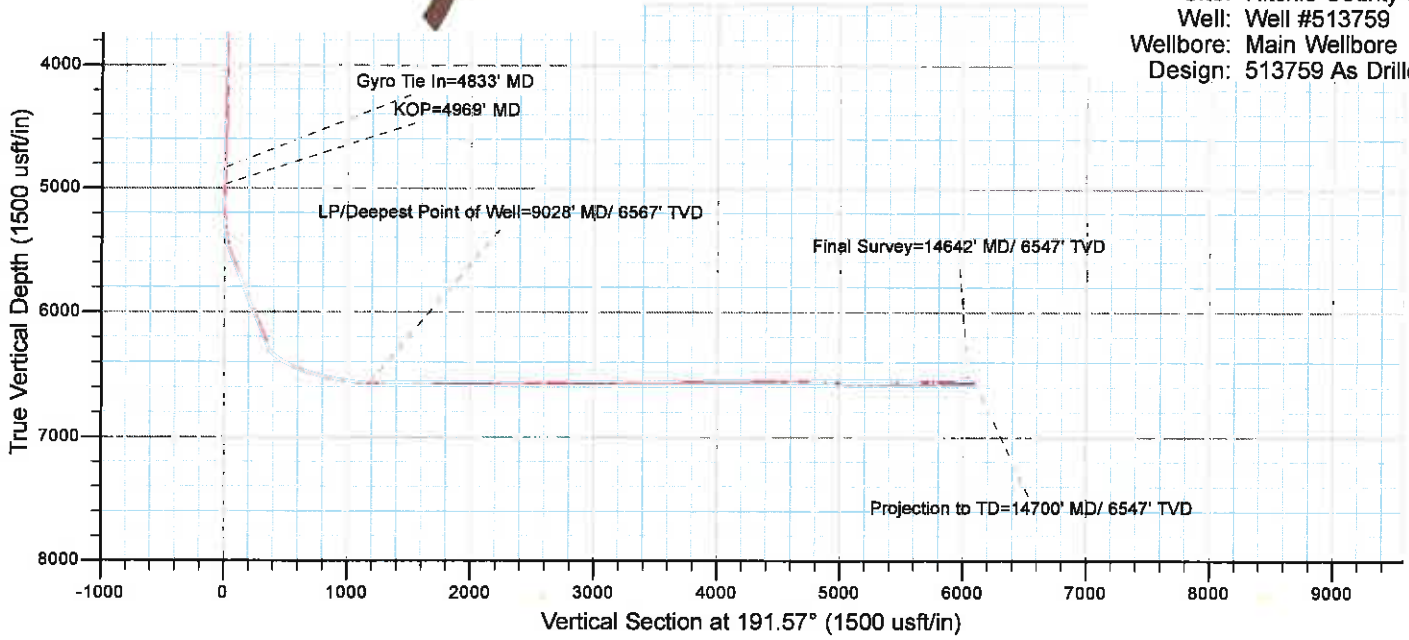
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Subsea Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,375.0	90.50	163.80	6,544.8	5,369.8	-4,722.0	-1,639.9	4,955.0	2.62	-0.63	-2.54
13,438.0	89.80	161.80	6,544.7	5,369.7	-4,782.2	-1,621.2	5,010.2	3.36	-1.11	-3.17
13,501.0	90.00	161.80	6,544.8	5,369.8	-4,842.0	-1,601.5	5,064.9	0.45	0.32	-0.32
13,564.0	90.20	161.20	6,544.7	5,369.7	-4,901.7	-1,581.4	5,119.3	0.71	0.32	-0.63
13,627.0	90.20	160.60	6,544.4	5,369.4	-4,961.3	-1,560.7	5,173.5	0.95	0.00	-0.95
13,690.0	90.30	159.70	6,544.2	5,369.2	-5,020.5	-1,539.4	5,227.3	1.44	0.16	-1.43
13,753.0	90.20	159.70	6,543.9	5,368.9	-5,079.6	-1,517.5	5,280.8	0.16	-0.16	0.00
13,815.0	90.10	160.10	6,543.7	5,368.7	-5,137.8	-1,496.2	5,333.5	0.67	-0.16	0.65
13,878.0	90.20	159.70	6,543.6	5,368.6	-5,197.0	-1,474.5	5,387.2	0.65	0.16	-0.63
13,941.0	89.80	159.90	6,543.6	5,368.6	-5,256.1	-1,452.8	5,440.7	0.71	-0.63	0.32
14,004.0	88.80	162.30	6,544.3	5,369.3	-5,315.7	-1,432.4	5,495.0	4.13	-1.59	3.81
14,067.0	89.00	161.80	6,545.5	5,370.5	-5,375.6	-1,413.0	5,549.8	0.85	0.32	-0.79
14,130.0	90.50	164.20	6,545.8	5,370.8	-5,435.9	-1,394.6	5,605.1	4.49	2.38	3.81
14,192.0	90.30	163.10	6,545.4	5,370.4	-5,495.4	-1,377.1	5,659.9	1.80	-0.32	-1.77
14,254.0	90.20	161.90	6,545.1	5,370.1	-5,554.5	-1,358.5	5,714.1	1.94	-0.16	-1.94
14,317.0	90.00	161.00	6,545.0	5,370.0	-5,614.2	-1,338.4	5,768.6	1.46	-0.32	-1.43
14,380.0	89.70	159.40	6,545.2	5,370.2	-5,673.5	-1,317.1	5,822.4	2.58	-0.48	-2.54
14,443.0	89.60	160.00	6,545.6	5,370.6	-5,732.6	-1,295.2	5,875.9	0.97	-0.16	0.95
14,506.0	89.30	160.10	6,546.2	5,371.2	-5,791.8	-1,273.7	5,929.6	0.50	-0.48	0.16
14,569.0	89.70	160.80	6,546.7	5,371.7	-5,851.2	-1,252.6	5,983.5	1.28	0.63	1.11
14,632.0	89.90	160.90	6,546.9	5,371.9	-5,910.7	-1,232.0	6,037.7	0.35	0.32	0.16
14,642.0	90.00	160.90	6,546.9	5,371.9	-5,920.1	-1,228.7	6,046.3	1.00	1.00	0.00
14,695.6	90.00	160.90	6,546.9	5,371.9	-5,970.8	-1,211.2	6,092.4	0.00	0.00	0.00
14,700.0	90.00	160.90	6,546.9	5,371.9	-5,974.9	-1,209.7	6,096.1	0.00	0.00	0.00

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
4,969.0	4,967.5	-9.0	52.4	KOP=4969' MD
9,028.0	6,567.2	-590.4	-2,984.9	LP/Deepest Point of Well=9028' MD/ 6567' TVD
14,642.0	6,546.9	-5,920.1	-1,228.7	Final Survey=14642' MD/ 6547' TVD
14,700.0	6,546.9	-5,974.9	-1,209.7	Projection to TD=14700' MD/ 6547' TVD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_



Project: Ritchie County, WV  
 Site: Ritchie County 513759  
 Well: Well #513759  
 Wellbore: Main Wellbore  
 Design: 513759 As Drilled





**513759- 47-085-10135-0000 - Perforations**

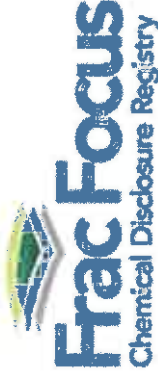
Stage Number	Perforation Date	Top Perf Depth (ftKB)	Bottom Perf Depth (ftKB)	Number of Shots	Formation
Initiation Sleeve	10/5/2015	14,683	14,684	10	MARCELLUS
1	10/5/2015	14,538	14,630	32	MARCELLUS
2	10/5/2015	14,388	14,510	40	MARCELLUS
3	10/5/2015	14,238	14,360	40	MARCELLUS
4	10/6/2015	14,088	14,210	40	MARCELLUS
5	10/6/2015	13,938	14,060	40	MARCELLUS
6	10/8/2015	13,788	13,910	40	MARCELLUS
7	10/8/2015	13,638	13,756	40	MARCELLUS
8	10/8/2015	13,488	13,610	40	MARCELLUS
9	10/8/2015	13,339	13,460	40	MARCELLUS
10	10/8/2015	13,188	13,310	40	MARCELLUS
11	10/9/2015	13,038	13,160	40	MARCELLUS
12	10/9/2015	12,888	13,010	40	MARCELLUS
13	10/10/2015	12,738	12,860	40	MARCELLUS
14	10/10/2015	12,588	12,710	40	MARCELLUS
15	10/10/2015	12,438	12,560	40	MARCELLUS
16	10/10/2015	12,291	12,410	40	MARCELLUS
17	10/10/2015	12,138	12,260	40	MARCELLUS
18	10/10/2015	11,988	12,110	40	MARCELLUS
19	10/10/2015	11,838	11,956	40	MARCELLUS
20	10/11/2015	11,688	11,810	40	MARCELLUS
21	10/11/2015	11,538	11,660	40	MARCELLUS
22	10/11/2015	11,387	11,510	40	MARCELLUS
23	10/11/2015	11,238	11,360	40	MARCELLUS
24	10/11/2015	11,088	11,210	40	MARCELLUS
25	10/12/2015	10,938	11,058	40	MARCELLUS
26	10/12/2015	10,788	10,910	40	MARCELLUS
27	10/12/2015	10,638	10,760	40	MARCELLUS
28	10/12/2015	10,487	10,610	40	MARCELLUS
29	10/12/2015	10,338	10,460	40	MARCELLUS
30	10/12/2015	10,192	10,310	40	MARCELLUS
31	10/13/2015	10,038	10,160	40	MARCELLUS
32	10/13/2015	9,891	10,010	40	MARCELLUS
33	10/13/2015	9,738	9,860	40	MARCELLUS
34	10/13/2015	9,588	9,710	40	MARCELLUS
35	10/14/2015	9,438	9,560	40	MARCELLUS
36	10/14/2015	9,288	9,410	40	MARCELLUS
38	10/14/2015	8,988	9,110	40	MARCELLUS
37	10/14/2015	9,138	9,260	40	MARCELLUS
39	10/14/2015	8,844	8,958	32	MARCELLUS

**513759 47-085-10135-0000 - Stimulated Stages**

Stage Number	Stimulation Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
Initiation Sleeve	10/5/2015	18.6	6,363	7,226	3,910	0	1030	0
1	10/5/2015	90.9	8,336	8,951	3,819	250,400.00	6,906.00	0
2	10/5/2015	93.1	8,571	8,717	3,991	248,340.00	6,641.00	0
3	10/6/2015	96.2	8,710	8,908	4,095	248,980.00	6,561.00	0
4	10/6/2015	96.6	8,620	8,901	4,054	244,300.00	7,162.00	0
5	10/7/2015	84.2	8,275	8,636	5,120	249,700.00	9,344.00	0
6	10/8/2015	99.5	8,752	9,023	4,716	249,180.00	6,689.00	0
7	10/8/2015	100.1	8,599	8,728	4,703	252,520.00	6,192.00	0
8	10/8/2015	101.4	8,358	8,610	3,742	251,440.00	6,564.00	0
9	10/8/2015	101	8,462	8,637	3,910	249,200.00	6,199.00	0
10	10/9/2015	101	8,431	8,568	3,665	251,540.00	6,197.00	0
11	10/9/2015	100.2	8,476	8,622	4,787	253,220.00	6,215.00	0
12	10/9/2015	100.4	8,326	8,419	3,765	253,000.00	6,237.00	0
13	10/10/2015	100.3	8,413	8,501	4,381	249,080.00	6,255.00	0
14	10/10/2015	100.4	8,378	9,061	4,523	249,740.00	6,136.00	0
15	10/10/2015	100.7	8,248	8,417	3,787	252,570.00	6,090.00	0
16	10/10/2015	100	8,515	8,758	3,769	254,830.00	6,091.00	0
17	10/10/2015	100.2	8,699	8,939	4,312	250,870.00	6,344.00	0
18	10/10/2015	100.5	8,277	8,666	3,592	250,174.00	6,281.00	0
19	10/11/2015	100.3	8,285	8,500	3,831	249,000.00	6,298.00	0
20	10/11/2015	101.2	8,397	8,897	3,650	250,400.00	6,206.00	0
21	10/11/2015	99.8	8,507	8,853	3,640	252,060.00	5,954.00	0
22	10/11/2015	100.1	8,570	8,980	3,708	251,140.00	6,060.00	0
23	10/11/2015	100.2	8,089	8,224	3,254	248,720.00	6,170.00	0
24	10/12/2015	99.1	8,592	9,036	3,100	254,600.00	6,528.00	0
25	10/12/2015	100.1	8,223	8,600	3,265	249,300.00	6,174.00	0
26	10/12/2015	100.6	8,136	8,377	3,416	250,780.00	5,733.00	0
27	10/12/2015	100.6	8,026	8,320	3,364	252,040.00	5,647.00	0
28	10/12/2015	100.5	8,072	8,419	3,696	249,710.00	5,589.00	0
29	10/12/2015	100.1	7,897	8,146	3,481	254,860.00	6,106.00	0
30	10/12/2015	100.1	8,023	8,440	3,366	253,850.00	6,029.00	0
31	10/13/2015	97.9	8,205	8,998	3,408	249,100.00	6,532.00	0
32	10/13/2015	98	7,930	8,317	3,825	248,720.00	5,924.00	0
33	10/13/2015	93.1	8,220	9,534	5,712	253,160.00	6,216.00	0
33.1	10/13/2015	8.6	4,829	6,672	4,583	0.00	3,113.00	0
34	10/13/2015	100	7,783	8,070	3,794	252,860.00	6,043.00	0
35	10/14/2015	99.5	7,504	7,821	3,270	248,880.00	6,017.00	0
36	10/14/2015	98.8	7,850	8,453	3,842	253,000.00	6,322.00	0
37	10/14/2015	99.8	7,264	7,441	3,692	250,960.00	5,651.00	0
38	10/14/2015	54.8	6,433	8,704	4,068	67,040.00	5,179.00	0
39	10/14/2015	100.8	7,312	7,650	2,912	473,446.00	10,272.00	0

# Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date	10/5/2015
Job End Date	10/14/2015
State	West Virginia
County	Ritchie
API Number	47-085-10135-00-00
Operator Name	EQT Production
Well Name and Number	513759
Longitude	-80.84285300
Latitude	39 13593200
Datum	NAD83
Federal/Tribal Well	NO
True Vertical Depth	6,532
Total Base Water Volume (gal)	10,621,674
Total Base Non Water Volume	0



## Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Keane Group	Carrier/Base Fluid	Water	7732-18-5	100.00000	89.65604	None
Sand (Proppant)	Keane Group	Proppant	Silica Substrate	14808-60-7	100.00000	9.93554	None
MC MX 437-5	Multi-Chem	Calcium nitrate solution	Calcium nitrate	10124-37-5	60.00000	0.05747	None
Hydrochloric Acid (15%)	Keane Group	Acidizing	Hydrochloric Acid	7647-01-0	15.00000	0.03997	None
FFR760	Keane Group	Friction Reducer	Hydrotreated Light Distillate	84742-47-8	30.00000	0.01801	None
			Alkyl Alcohol	Proprietary	10.00000	0.00600	None
			Oxyalkylated alcohol A	Proprietary	5.00000	0.00300	None
EC6330A	Keane Group	Scale Inhibitor	Ethylene Glycol	107-21-1	5.00000	0.00127	None
			Sodium Phosphate, Tribasic	7601-54-9	5.00000	0.00127	None
AI 600	Keane Group	Corrosion Inhibitor	Ethylene Glycol	107-21-1	40.00000	0.00022	None
			Dimethylformamide	68-12-2	20.00000	0.00011	None

				Pyridine, alkyl derives, quaternized with benzyl chloride	68909-18-2	15.00000	0.00003	None
				Cinnamaldehyde	104-55-2	15.00000	0.00008	None
				2-Butoxyethanol	111-76-2	5.00000	0.00003	None
				1-Octanol	111-87-5	5.00000	0.00003	None
				1-Decanol	112-30-1	5.00000	0.00003	None
				Nonyl Phenol Ethoxylate, Branched	127087-87-0	5.00000	0.00003	None
				Triethyl Phosphate	78-40-0	2.50000	0.00001	None
				Methanol	67-56-1	2.50000	0.00001	None
				Alkyl Pyridine	68391-11-7	1.00000	0.00001	None
Breaker- LEB 10 X	Keane Group		Gel Breaker	Ethylene Glycol	107-21-1	30.00000	0.00003	None

Ingredients shown above are subject to 29 CFR 1910.1200(i) and appear on Material Safety Data Sheets (MSDS). Ingredients shown below are Non-MSDS.

- \* Total Water Volume sources may include fresh water, produced water, and/or recycled water
- \*\* Information is based on the maximum potential for concentration and thus the total may be over 100%

Note: For Field Development Products (products that begin with FDP), MSDS level only information has been provided. Ingredient information for chemicals subject to 29 CFR 1910.1200(i) and Appendix D are obtained from suppliers Material Safety Data Sheets (MSDS)



June 8, 2016

Mr. Gene Smith  
West Virginia Department of Environmental Protection  
Office of Oil and Gas  
601 57th Street SE  
Charleston, WV 25304

Re: Modification of 47-085-10135

Dear Mr. Smith,

Please accept the attached updates for the above referenced permit. Upon inspection of our as-drilled plat, we noted the curve geometry crossed into an additional tract, for which EQT had acquired a subsurface agreement. Enclosed is an updated WW-6A1, WW-6B, mylar plat and rec plan reflecting corrections to update the permit file to be consistent with the as-drilled well bore.

If you have any questions, please do not hesitate to contact me at (304) 848-0076.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Vicki Roark', is written over a light blue horizontal line.

Vicki Roark  
Permitting Supervisor-WV

Enc.

RECEIVED  
Office of Oil and Gas

AUG 25 2016

WV Department of  
Environmental Protection

ROYALTY OWNERS		
CRAIG H. WILLIAMS	243.83 AC.±	LEASE NO. 987447
RUBBELL L. LOCKE	40.00 AC.±	LEASE NO. 987480
J.P. SMITH ET UX	130.00 AC.±	LEASE NO. 107867

**NOTES ON SURVEY**

1. NO WATER WELLS WERE FOUND WITHIN 250' OF PROPOSED GAS WELL. NO AGRICULTURAL BUILDINGS ≥ 2500 SQ. FT. OR DWELLINGS WERE FOUND WITHIN 625' OF THE CENTER OF PROPOSED WELL PAD.
2. AS DRILLED INFORMATION PROVIDED BY EQT.
3. NONPRODUCTIVE SUBSURFACE RIGHT OF WAY.

**EQT PRODUCTION COMPANY**  
**J.E. PIERCE ET AL LEASE**  
**108 (98.73±) ACRES±**  
**WELL NO. WV 513759**  
**(OXF163 H4)**

**AS DRILLED COORDINATES**  
 (S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)

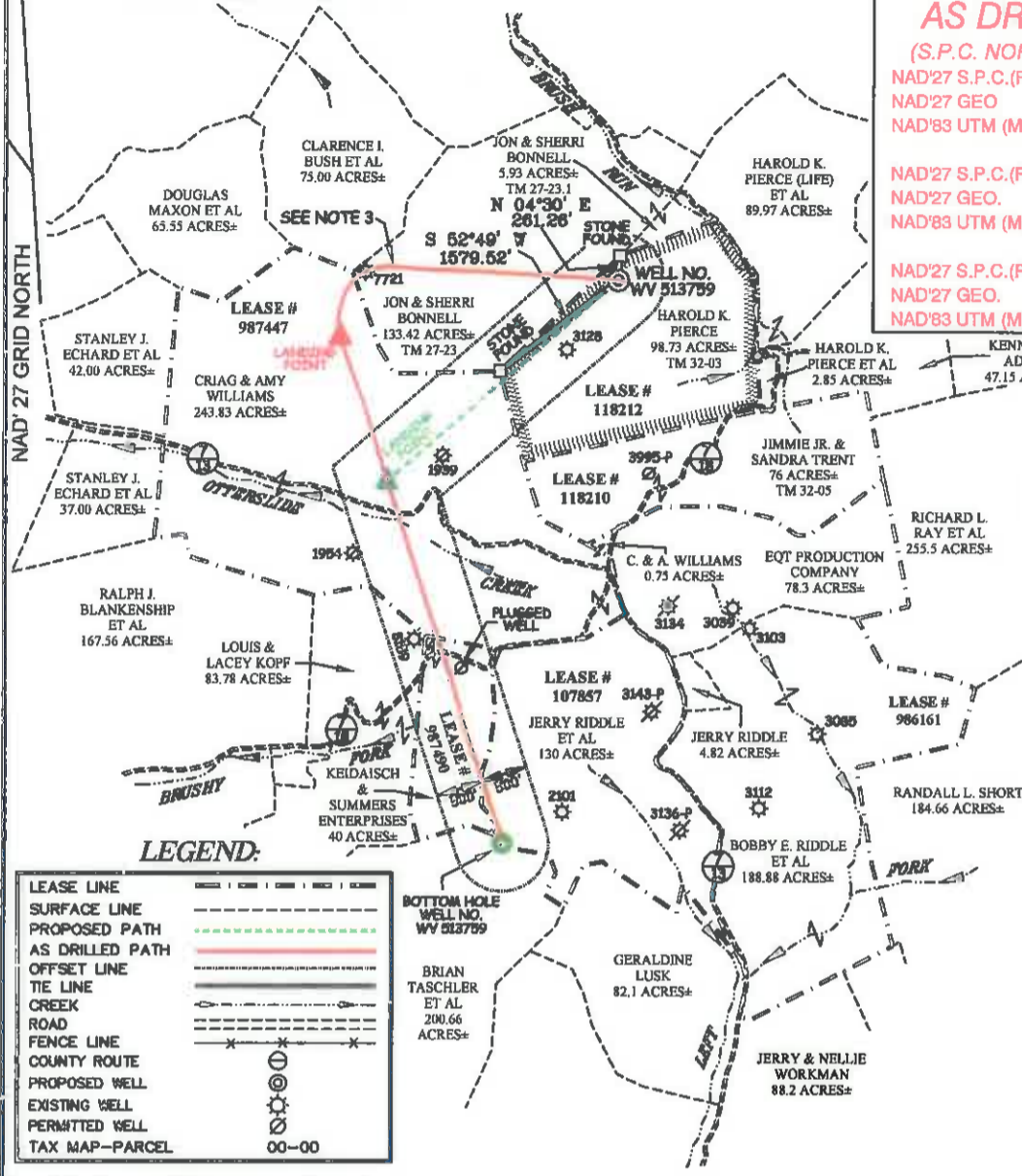
NAD'27 S.P.C.(FT)	N. 234,466.6	E. 1,619,096.5
NAD'27 GEO.	LAT-(N) 39.135932	LONG-(W) 80.842853
NAD'83 UTM (M)	N. 4,331,882.6	E. 513,596.5

**LANDING POINT**

NAD'27 S.P.C.(FT)	N. 233,876.2	E. 1,616,111.7
NAD'27 GEO.	LAT-(N) 39.134189	LONG-(W) 80.853343
NAD'83 UTM (M)	N. 4,331,887.5	E. 512,690.2

**BOTTOM HOLE**

NAD'27 S.P.C.(FT)	N. 228,491.8	E. 1,617,886.8
NAD'27 GEO.	LAT-(N) 39.119480	LONG-(W) 80.846801
NAD'83 UTM (M)	N. 4,330,056.2	E. 513,258.3



**SUBSURFACE AGREEMENT**  
 JOHN M. & SHERRI L. BONNELL 133.42 AC.± TM 27-23

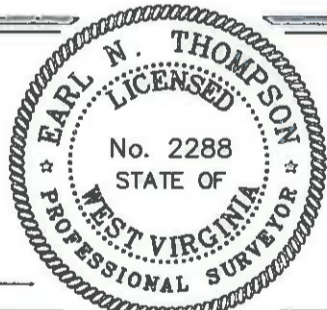
**LEGEND:**

LEASE LINE	---
SURFACE LINE	---
PROPOSED PATH	---
AS DRILLED PATH	---
OFFSET LINE	---
TIE LINE	---
CREEK	---
ROAD	---
FENCE LINE	---
COUNTY ROUTE	---
PROPOSED WELL	⊙
EXISTING WELL	⊙
PERMITTED WELL	⊙
TAX MAP-PARCEL	00-00

**Professional Energy Consultants**  
 A DIVISION OF SMITH AND CURRIE, INC.

**SLS**  
 SURVEYORS  
 ENGINEERS  
 ENVIRONMENTAL  
 PROJECT MGMT.

(304) 482-9854 WWW.SLSURVEYS.COM




I THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DIVISION OF ENVIRONMENTAL PROTECTION.

P.S. 2288 *Earl N. Thompson*

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.  
 DATE MAY 27, 20 14  
 REVISED 06/22/14, 10/27/14, 12/03/15, 05/16/16 & 06/03/16  
 OPERATORS WELL NO. WV 513759  
 API WELL NO. 47 - 085 - 10135H  
 STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 7698AD513759R2  
 HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 2000'

STATE OF WEST VIRGINIA  
 DIVISION OF ENVIRONMENTAL PROTECTION  
 OFFICE OF OIL AND GAS



WELL TYPE: OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  IF "GAS" PRODUCTION  STORAGE  DEEP  SHALLOW

LOCATION: PAD ELEVATION 1,158.4' WATERSHED BRUSH RUN OF MIDDLE FORK  
 DISTRICT UNION COUNTY RITCHIE QUADRANGLE OXFORD 7.5'

SURFACE OWNER HAROLD K. PIERCE ACREAGE 98.73±  
 ROYALTY OWNER J.E. PIERCE ET AL ACREAGE 108± (98.73±)

PROPOSED WORK: LEASE NO. 118212  
 DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE  PLUG OFF OLD FORMATION  PERFORATE NEW FORMATION  PLUG AND ABANDON  CLEAN OUT AND REPLUG  OTHER

PHYSICAL CHANGE IN WELL (SPECIFY) \_\_\_\_\_ TARGET FORMATION MARCELLUS  
 ESTIMATED DEPTH 6495'

WELL OPERATOR EQT PRODUCTION COMPANY DESIGNATED AGENT REX C. RAY  
 ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280 BRIDGEPORT, WV 26330 ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280 BRIDGEPORT, WV 26330