



Where energy meets innovation.

EQT PRODUCTION

Ritchie County, WV

OXF122

Well #514082 -Marcellus

Main Wellbore

API #: 47-085-10195

Design: 514082 As Drilled Surveys

Standard Survey Report

25 April, 2016



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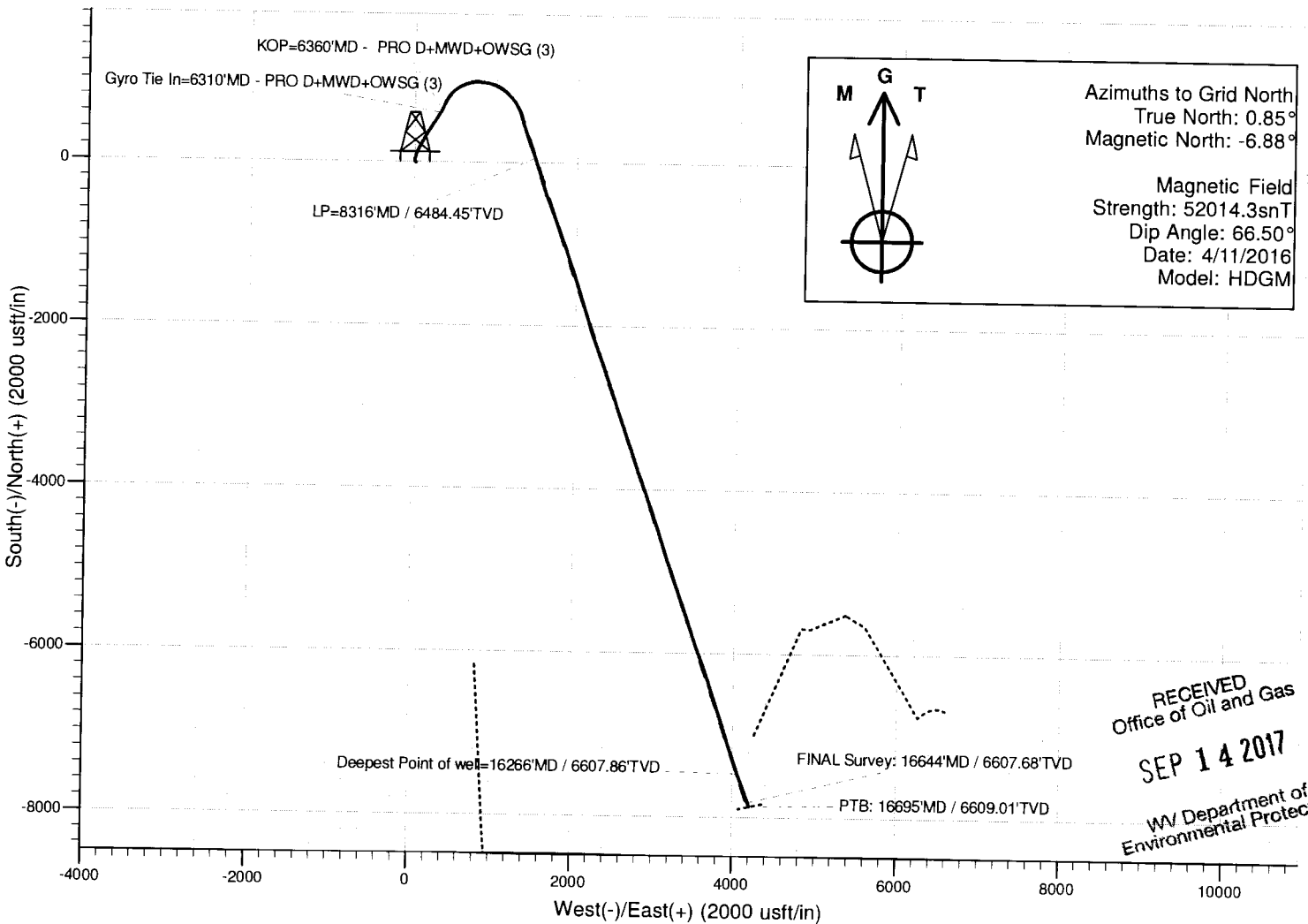
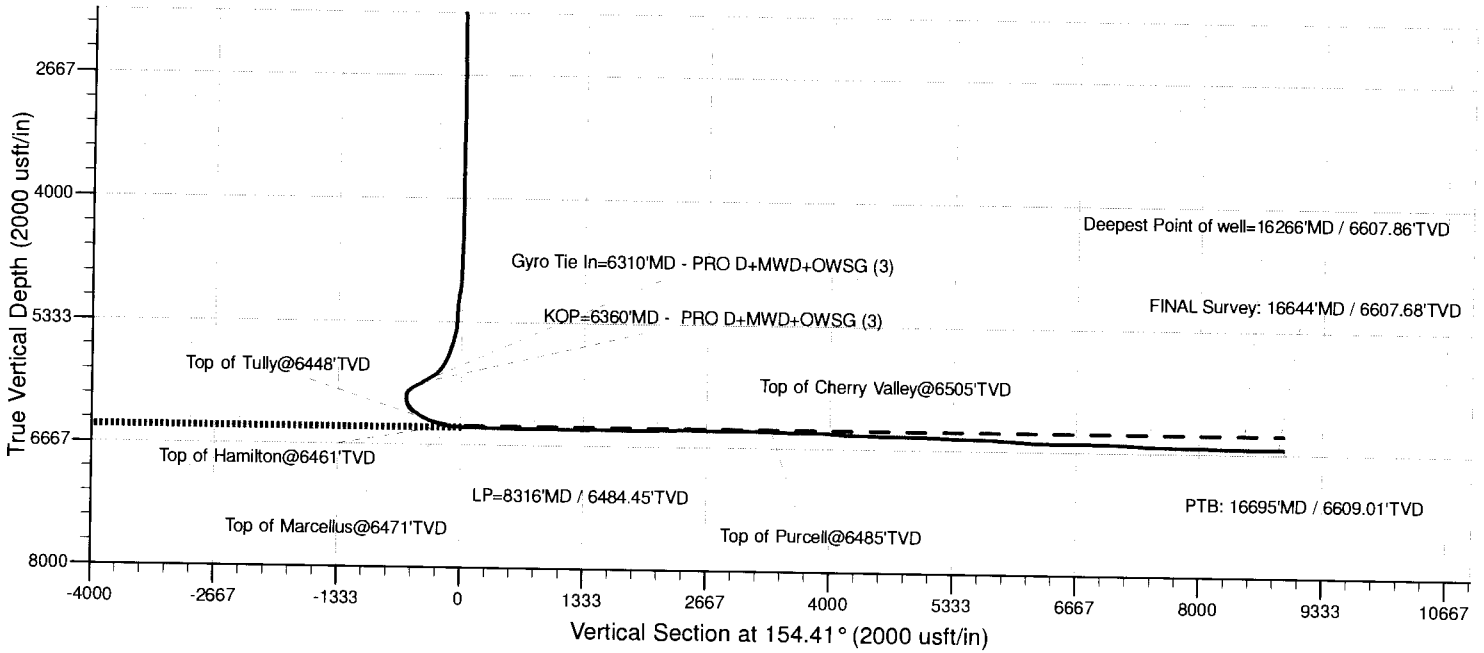
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Environmental Protection



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Project: Ritchie County, WV
Site: OXF122
Well: Well #514082 -Marcellus
Wellbore: Main Wellbore
Design: 514082 As Drilled Surveys
Elevation: GL 1111 + 23' KB @ 1134.00usft



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Professional Directional Survey Report



Company: EQT PRODUCTION
Project: Ritchie County, WV
Site: OXF122
Well: Well #514082 -Marcellus
Wellbore: Main Wellbore
Design: 514082 As Drilled Surveys

Local Co-ordinate Reference: Well Well #514082 -Marcellus
TVD Reference: GL 1111 + 23' KB @ 1134.00usft
MD Reference: GL 1111 + 23' KB @ 1134.00usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Well_Planner1

Project	Ritchie County, WV		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	West Virginia North 4701		

Site	OXF122				
Site Position:		Northing:	233,060.52 usft	Latitude:	39° 7' 55.94 N
From:	Map	Easting:	1,622,368.52 usft	Longitude:	80° 49' 52.49 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.85 °

Well	Well #514082 -Marcellus					
Well Position	+N/-S	0.00 usft	Northing:	233,055.86 usft	Latitude:	39° 7' 55.89 N
	+E/-W	0.00 usft	Easting:	1,622,354.25 usft	Longitude:	80° 49' 52.67 W
Position Uncertainty	0.00 usft		Wellhead Elevation:	usft	Ground Level:	1,111.00 usft

Wellbore	Main Wellbore				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	4/11/2016	-7.73	66.50	52,014

Design	514082 As Drilled Surveys				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	154.41	

Survey Program	Date	4/25/2016			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
110.00	4,720.00	514082 Gyrodata Gyros (Main Wellbore)	GYD_DP_MS	Gyrodata gyro-compassing and drop	
4,760.00	6,310.00	514082 Scientific MWD (Main Wellbore)	SDI MWD	SDI MWD - Standard ver 1.0.1	
6,360.00	16,695.00	514082 PRO D MWD (Main Wellbore)	MWD - OWSG	MWD - OWSG	

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Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
110.00	0.04	132.99	110.00	-0.03	0.03	0.04	0.04	0.04	0.00
210.00	0.04	77.28	210.00	-0.04	0.09	0.08	0.04	0.00	-55.71
310.00	0.04	135.85	310.00	-0.06	0.15	0.12	0.04	0.00	58.57
410.00	0.06	310.92	410.00	-0.05	0.13	0.10	0.10	0.02	175.07
510.00	0.07	35.03	510.00	0.03	0.13	0.02	0.09	0.01	84.11
610.00	0.06	75.87	610.00	0.10	0.21	0.00	0.05	-0.01	40.84
710.00	0.18	156.92	710.00	-0.04	0.32	0.17	0.18	0.12	81.05
810.00	0.11	152.44	810.00	-0.26	0.43	0.42	0.07	-0.07	-4.48



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910.00	0.15	201.62	910.00	-0.47	0.43	0.61	0.11	0.04	49.18
1,010.00	0.22	210.97	1,010.00	-0.76	0.28	0.80	0.08	0.07	9.35
1,110.00	0.29	87.14	1,110.00	-0.91	0.43	1.01	0.45	0.07	-123.83
1,210.00	0.56	77.06	1,210.00	-0.79	1.16	1.21	0.28	0.27	-10.08
1,310.00	0.57	75.04	1,309.99	-0.55	2.12	1.41	0.02	0.01	-2.02
1,410.00	0.61	85.04	1,409.99	-0.38	3.13	1.69	0.11	0.04	10.00
1,510.00	0.63	81.87	1,509.98	-0.25	4.20	2.04	0.04	0.02	-3.17
1,610.00	0.70	85.68	1,609.97	-0.13	5.36	2.43	0.08	0.07	3.81
1,710.00	0.68	89.73	1,709.97	-0.08	6.56	2.91	0.05	-0.02	4.05
1,810.00	0.63	122.23	1,809.96	-0.37	7.62	3.62	0.37	-0.05	32.50
1,910.00	0.59	150.26	1,909.95	-1.11	8.34	4.60	0.30	-0.04	28.03
2,010.00	0.57	152.51	2,009.95	-2.00	8.82	5.61	0.03	-0.02	2.25
2,110.00	0.54	148.94	2,109.94	-2.84	9.30	6.58	0.05	-0.03	-3.57
2,210.00	0.46	150.16	2,209.94	-3.59	9.74	7.45	0.08	-0.08	1.22
2,310.00	0.46	158.54	2,309.94	-4.32	10.09	8.25	0.07	0.00	8.38
2,410.00	0.44	166.08	2,409.93	-5.06	10.33	9.03	0.06	-0.02	7.54
2,509.99	0.29	163.49	2,509.92	-5.68	10.49	9.65	0.15	-0.15	-2.59
2,609.99	0.18	182.60	2,609.92	-6.08	10.56	10.04	0.13	-0.11	19.11
2,709.99	0.16	176.96	2,709.92	-6.37	10.56	10.31	0.03	-0.02	-5.64
2,809.99	0.12	209.32	2,809.92	-6.60	10.51	10.50	0.09	-0.04	32.36
2,909.99	0.05	304.41	2,909.92	-6.67	10.42	10.52	0.13	-0.07	95.09
3,009.99	0.10	334.29	3,009.92	-6.57	10.35	10.39	0.06	0.05	29.88
3,109.99	0.05	32.47	3,109.92	-6.45	10.34	10.28	0.09	-0.05	58.19
3,209.99	0.07	16.44	3,209.92	-6.36	10.38	10.22	0.03	0.02	-16.03
3,309.99	0.11	27.42	3,309.92	-6.21	10.44	10.11	0.04	0.04	10.98
3,409.99	0.09	346.51	3,409.92	-6.05	10.46	9.98	0.07	-0.02	-40.91
3,509.99	0.14	20.59	3,509.92	-5.86	10.49	9.82	0.08	0.05	34.08
3,609.99	0.16	11.95	3,609.92	-5.61	10.56	9.62	0.03	0.02	-8.64
3,709.99	0.26	343.13	3,709.92	-5.26	10.52	9.29	0.14	0.10	-28.82
3,809.99	0.34	332.61	3,809.92	-4.78	10.32	8.77	0.10	0.08	-10.52
3,909.99	0.45	326.57	3,909.91	-4.18	9.97	8.08	0.12	0.11	-6.04
4,009.99	0.61	308.61	4,009.91	-3.52	9.34	7.21	0.23	0.16	-17.96
4,109.99	0.66	308.78	4,109.90	-2.83	8.47	6.21	0.05	0.05	0.17
4,209.99	0.68	312.87	4,209.90	-2.07	7.59	5.14	0.05	0.02	4.09
4,309.99	0.72	310.70	4,309.89	-1.25	6.68	4.01	0.05	0.04	-2.17
4,409.99	0.98	306.30	4,409.88	-0.34	5.51	2.69	0.27	0.26	-4.40
4,509.99	1.16	310.31	4,509.86	0.82	4.05	1.01	0.19	0.18	4.01
4,609.99	1.30	311.62	4,609.84	2.23	2.43	-0.96	0.14	0.14	1.31
4,709.99	1.47	310.42	4,709.81	3.82	0.61	-3.18	0.17	0.17	-1.20
4,720.00	1.48	310.55	4,719.82	3.98	0.41	-3.42	0.09	0.08	1.34
4,760.00	1.69	312.14	4,759.80	4.71	-0.42	-4.43	0.54	0.53	3.96
4,802.78	1.71	313.13	4,802.56	5.57	-1.35	-5.61	0.08	0.05	2.31
4,846.00	1.92	320.62	4,845.76	6.57	-2.28	-6.92	0.73	0.49	17.33

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4,889.00	3.90	347.43	4,888.70	8.56	-3.06	-9.04	5.47	4.60	62.35
4,932.00	7.99	358.51	4,931.47	12.98	-3.46	-13.20	9.84	9.51	25.77
4,975.00	12.63	5.20	4,973.76	20.65	-3.11	-19.97	11.13	10.79	15.56
5,018.00	12.61	8.12	5,015.72	29.98	-2.02	-27.91	1.48	-0.05	6.79
5,061.00	9.67	12.88	5,057.91	38.15	-0.55	-34.64	7.16	-6.84	11.07
5,104.00	8.39	15.43	5,100.37	44.69	1.09	-39.84	3.12	-2.98	5.93
5,147.00	7.58	18.45	5,142.96	50.41	2.82	-44.24	2.12	-1.88	7.02
5,190.00	6.45	23.36	5,185.64	55.31	4.68	-47.87	2.97	-2.63	11.42
5,233.00	5.14	29.05	5,228.42	59.22	6.57	-50.57	3.32	-3.05	13.23
5,276.00	3.52	31.95	5,271.29	62.02	8.21	-52.39	3.80	-3.77	6.74
5,319.00	1.17	24.44	5,314.25	63.54	9.09	-53.38	5.50	-5.47	-17.47
5,362.00	3.65	7.13	5,357.21	65.30	9.44	-54.82	5.95	5.77	-40.26
5,405.00	9.59	9.48	5,399.91	70.19	10.20	-58.90	13.83	13.81	5.47
5,448.00	15.03	11.83	5,441.90	79.19	11.93	-66.27	12.70	12.65	5.47
5,491.00	19.38	14.32	5,482.97	91.57	14.84	-76.17	10.26	10.12	5.79
5,534.00	22.79	18.89	5,523.09	106.36	19.30	-87.59	8.80	7.93	10.63
5,579.00	23.69	21.81	5,564.44	123.00	25.48	-99.93	3.25	2.00	6.49
5,622.00	25.15	23.36	5,603.59	139.41	32.32	-111.78	3.71	3.40	3.60
5,665.00	28.21	25.77	5,642.01	156.96	40.36	-124.13	7.55	7.12	5.60
5,708.00	31.72	27.74	5,679.25	176.12	50.04	-137.23	8.48	8.16	4.58
5,751.00	35.28	28.52	5,715.10	197.04	61.24	-151.27	8.34	8.28	1.81
5,794.00	38.74	27.66	5,749.44	219.88	73.42	-166.60	8.14	8.05	-2.00
5,837.00	42.65	27.85	5,782.03	244.69	86.47	-183.33	9.10	9.09	0.44
5,880.00	46.94	28.20	5,812.54	271.42	100.71	-201.30	9.99	9.98	0.81
5,923.00	51.85	29.46	5,840.52	300.01	116.46	-220.28	11.63	11.42	2.93
5,966.00	57.04	30.86	5,865.51	330.23	134.04	-239.95	12.36	12.07	3.26
6,010.00	62.72	31.85	5,887.59	362.72	153.84	-260.69	13.05	12.91	2.25
6,053.00	68.44	32.48	5,905.36	395.84	174.68	-281.57	13.37	13.30	1.47
6,096.00	71.77	33.20	5,919.99	429.81	196.61	-302.73	7.90	7.74	1.67
6,139.00	72.17	32.76	5,933.30	464.11	218.86	-324.05	1.35	0.93	-1.02
6,182.00	72.38	32.40	5,946.39	498.62	240.92	-345.65	0.94	0.49	-0.84
6,225.00	71.45	32.48	5,959.73	533.12	262.84	-367.29	2.17	-2.16	0.19
6,236.00	71.12	32.18	5,963.26	541.92	268.42	-372.83	3.96	-3.00	-2.73
6,310.00	71.12	32.18	5,987.21	601.18	305.71	-410.17	0.00	0.00	0.00
Gyro Tie In=6310'MD - PRO D+MWD+OWSG (3)									
6,360.00	72.00	25.10	6,003.04	642.79	328.42	-437.88	13.55	1.76	-14.16
KOP=6360'MD - PRO D+MWD+OWSG (3)									
6,392.00	73.00	24.00	6,012.67	670.54	341.10	-457.44	4.53	3.13	-3.44
6,423.00	73.00	25.50	6,021.73	697.47	353.51	-476.36	4.63	0.00	4.84
6,455.00	71.70	27.80	6,031.43	724.72	367.18	-495.03	7.96	-4.06	7.19
6,486.00	71.80	30.10	6,041.14	750.48	381.43	-512.11	7.05	0.32	7.42
6,518.00	70.40	31.70	6,051.51	776.45	396.98	-528.83	6.44	-4.38	5.00
6,549.00	69.00	34.40	6,062.26	800.82	412.83	-543.96	9.33	-4.52	8.71
6,581.00	67.70	38.10	6,074.07	824.81	430.41	-557.99	11.49	-4.06	11.56

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6,613.00	67.50	42.50	6,086.27	847.36	449.54	-570.08	12.73	-0.63	13.75
6,644.00	66.60	46.80	6,098.37	867.67	469.59	-579.73	13.10	-2.90	13.87
6,676.00	65.40	51.40	6,111.39	886.80	491.67	-587.45	13.66	-3.75	14.38
6,707.00	64.00	55.50	6,124.64	903.49	514.18	-592.78	12.78	-4.52	13.23
6,739.00	63.00	59.90	6,138.92	918.80	538.37	-596.13	12.70	-3.13	13.75
6,770.00	64.10	64.70	6,152.74	931.69	562.94	-597.15	14.31	3.55	15.48
6,802.00	65.00	68.50	6,166.49	943.16	589.45	-596.04	11.08	2.81	11.88
6,833.00	64.00	70.70	6,179.84	952.91	615.67	-593.51	7.17	-3.23	7.10
6,865.00	61.90	73.10	6,194.39	961.77	642.76	-589.80	9.36	-6.56	7.50
6,896.00	60.20	75.80	6,209.40	969.04	668.88	-585.08	9.39	-5.48	8.71
6,928.00	59.30	80.30	6,225.53	974.77	695.92	-578.57	12.47	-2.81	14.06
6,959.00	59.60	84.60	6,241.29	978.28	722.37	-570.30	11.98	0.97	13.87
6,991.00	61.70	87.70	6,256.98	980.14	750.20	-559.97	10.69	6.56	9.69
7,022.00	63.50	90.50	6,271.24	980.57	777.71	-548.47	9.90	5.81	9.03
7,054.00	64.10	93.80	6,285.37	979.49	806.40	-535.10	9.44	1.88	10.31
7,085.00	65.00	97.10	6,298.70	976.83	834.25	-520.67	10.04	2.90	10.65
7,117.00	65.70	100.30	6,312.05	972.43	863.00	-504.29	9.35	2.19	10.00
7,149.00	65.80	102.10	6,325.19	966.76	891.62	-486.81	5.14	0.31	5.63
7,180.00	66.70	105.40	6,337.68	960.01	919.17	-468.83	10.17	2.90	10.65
7,212.00	67.10	108.30	6,350.24	951.48	947.34	-448.97	8.43	1.25	9.06
7,243.00	67.40	112.00	6,362.23	941.63	974.17	-428.50	11.05	0.97	11.94
7,275.00	68.60	116.00	6,374.22	929.57	1,001.27	-405.91	12.18	3.75	12.50
7,306.00	69.20	118.80	6,385.38	916.26	1,026.94	-382.82	8.65	1.94	9.03
7,338.00	69.70	121.90	6,396.62	901.12	1,052.79	-357.99	9.20	1.56	9.69
7,369.00	71.30	124.70	6,406.97	885.07	1,077.21	-332.98	9.96	5.16	9.03
7,401.00	73.00	128.10	6,416.78	867.00	1,101.72	-306.09	11.42	5.31	10.63
7,432.00	72.60	131.20	6,425.95	848.11	1,124.52	-279.20	9.64	-1.29	10.00
7,464.00	73.10	134.30	6,435.38	827.35	1,146.97	-250.79	9.39	1.56	9.69
7,496.00	75.30	137.00	6,444.10	805.34	1,168.49	-221.64	10.64	6.88	8.44
7,512.03	76.54	138.56	6,448.00	793.82	1,178.94	-206.73	12.18	7.71	9.72
Top of Tully@6448'TVD									
7,527.00	77.70	140.00	6,451.34	782.76	1,188.45	-192.65	12.18	7.77	9.63
7,559.00	79.70	141.80	6,457.61	758.41	1,208.24	-162.14	8.34	6.25	5.63
7,579.03	80.79	144.19	6,461.00	742.65	1,220.12	-142.80	12.99	5.46	11.96
Top of Hamilton@6461'TVD									
7,590.00	81.40	145.50	6,462.70	733.79	1,226.36	-132.11	12.99	5.52	11.90
7,622.00	83.10	148.90	6,467.01	707.14	1,243.53	-100.66	11.79	5.31	10.63
7,653.00	84.60	152.40	6,470.34	680.28	1,258.63	-69.91	12.22	4.84	11.29
7,660.17	84.78	153.14	6,471.00	673.93	1,261.90	-62.77	10.57	2.48	10.32
Top of Marcellus@6471'TVD									
7,685.00	85.40	155.70	6,473.13	651.62	1,272.58	-38.03	10.57	2.51	10.31
7,716.00	86.80	159.30	6,475.24	623.05	1,284.41	-7.16	12.43	4.52	11.61
7,748.00	88.30	162.00	6,476.60	592.89	1,295.00	24.62	9.65	4.69	8.44
7,843.00	89.10	162.80	6,478.76	502.36	1,323.72	118.67	1.19	0.84	0.84

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Professional Directional Survey Report



Company: EQT PRODUCTION
Project: Ritchie County, WV
Site: OXF122
Well: Well #514082 -Marcellus
Wellbore: Main Wellbore
Design: 514082 As Drilled Surveys

Local Co-ordinate Reference: Well Well #514082 -Marcellus
TVD Reference: GL 1111 + 23' KB @ 1134.00usft
MD Reference: GL 1111 + 23' KB @ 1134.00usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Well_Planner1

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,937.00	89.70	163.00	6,479.74	412.52	1,351.36	211.64	0.67	0.64	0.21
8,032.00	88.70	160.50	6,481.07	322.31	1,381.10	305.84	2.83	-1.05	-2.63
8,127.00	88.90	160.10	6,483.06	232.89	1,413.12	400.32	0.47	0.21	-0.42
8,221.00	89.40	159.70	6,484.45	144.63	1,445.42	493.88	0.68	0.53	-0.43
8,316.00	90.60	161.30	6,484.45	55.08	1,477.13	588.33	2.11	1.26	1.68
LP=8316'MD / 6484.45'TVD									
8,411.00	89.40	161.30	6,484.45	-34.90	1,507.59	682.65	1.26	-1.26	0.00
8,505.00	90.60	163.30	6,484.45	-124.44	1,536.17	775.75	2.48	1.28	2.13
8,600.00	90.10	163.80	6,483.87	-215.55	1,563.07	869.54	0.74	-0.53	0.53
8,695.00	89.30	161.30	6,484.37	-306.17	1,591.55	963.58	2.76	-0.84	-2.63
8,741.55	89.15	160.16	6,485.00	-350.11	1,606.91	1,009.83	2.47	-0.32	-2.45
Top of Purcell@6485'TVD									
8,789.00	89.00	159.00	6,485.77	-394.57	1,623.46	1,057.09	2.47	-0.32	-2.45
8,884.00	88.70	158.90	6,487.67	-483.21	1,657.58	1,151.77	0.33	-0.32	-0.11
8,978.00	90.70	159.00	6,488.16	-570.94	1,691.34	1,245.47	2.13	2.13	0.11
9,073.00	90.70	159.40	6,487.00	-659.74	1,725.07	1,340.13	0.42	0.00	0.42
9,168.00	91.10	159.60	6,485.51	-748.71	1,758.34	1,434.74	0.47	0.42	0.21
9,262.00	89.20	159.60	6,485.27	-836.81	1,791.10	1,528.35	2.02	-2.02	0.00
9,357.00	89.30	159.60	6,486.51	-925.84	1,824.21	1,622.96	0.11	0.11	0.00
9,452.00	89.90	160.70	6,487.17	-1,015.20	1,856.47	1,717.48	1.32	0.63	1.16
9,546.00	89.70	160.50	6,487.50	-1,103.86	1,887.69	1,810.93	0.30	-0.21	-0.21
9,641.00	90.60	160.60	6,487.25	-1,193.44	1,919.33	1,905.38	0.95	0.95	0.11
9,736.00	90.40	159.90	6,486.42	-1,282.84	1,951.43	1,999.88	0.77	-0.21	-0.74
9,830.00	90.90	162.60	6,485.36	-1,371.84	1,981.64	2,093.20	2.92	0.53	2.87
9,925.00	91.60	162.30	6,483.28	-1,462.40	2,010.28	2,187.24	0.80	0.74	-0.32
10,019.00	91.70	162.20	6,480.58	-1,551.88	2,038.92	2,280.33	0.15	0.11	-0.11
10,114.00	90.40	162.10	6,478.84	-1,642.29	2,068.04	2,374.44	1.37	-1.37	-0.11
10,208.00	88.90	162.10	6,479.41	-1,731.74	2,096.93	2,467.59	1.60	-1.60	0.00
10,303.00	88.90	162.10	6,481.23	-1,822.12	2,126.12	2,561.72	0.00	0.00	0.00
10,398.00	89.80	163.00	6,482.31	-1,912.74	2,154.61	2,655.76	1.34	0.95	0.95
10,493.00	90.20	164.60	6,482.31	-2,003.97	2,181.11	2,749.48	1.74	0.42	1.68
10,587.00	90.30	160.10	6,481.90	-2,093.52	2,209.60	2,842.55	4.79	0.11	-4.79
10,682.00	90.20	159.90	6,481.49	-2,182.79	2,242.10	2,937.10	0.24	-0.11	-0.21
10,777.00	90.10	159.90	6,481.24	-2,272.00	2,274.74	3,031.66	0.11	-0.11	0.00
10,872.00	90.00	160.20	6,481.16	-2,361.30	2,307.16	3,126.20	0.33	-0.11	0.32
10,966.00	89.40	160.30	6,481.65	-2,449.77	2,338.92	3,219.71	0.65	-0.64	0.11
11,061.00	88.40	160.30	6,483.47	-2,539.19	2,370.94	3,314.19	1.05	-1.05	0.00
11,156.00	88.20	160.20	6,486.29	-2,628.57	2,403.03	3,408.66	0.24	-0.21	-0.11
11,250.00	88.20	159.90	6,489.24	-2,716.88	2,435.08	3,502.16	0.32	0.00	-0.32
11,345.00	90.60	163.00	6,490.24	-2,806.92	2,465.30	3,596.42	4.13	2.53	3.26
11,440.00	90.50	161.60	6,489.33	-2,897.42	2,494.18	3,690.51	1.48	-0.11	-1.47
11,534.00	88.40	161.60	6,490.23	-2,986.61	2,523.85	3,783.76	2.23	-2.23	0.00
11,629.00	88.80	161.50	6,492.55	-3,076.70	2,553.90	3,878.00	0.43	0.42	-0.11

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Wellbore: Main Wellbore
Design: 514082 As Drilled Surveys

Local Co-ordinate Reference: Well Well #514082 -Marcellus
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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Well_Planner1

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,724.00	87.10	161.30	6,495.95	-3,166.67	2,584.18	3,972.23	1.80	-1.79	-0.21
11,818.00	86.90	161.90	6,500.87	-3,255.74	2,613.81	4,065.36	0.67	-0.21	0.64
11,894.44	86.90	161.82	6,505.00	-3,328.28	2,637.58	4,141.04	0.11	0.00	-0.11
Top of Cherry Valley@6505'TVD									
11,913.00	86.90	161.80	6,506.00	-3,345.89	2,643.36	4,159.42	0.11	0.00	-0.11
12,008.00	88.00	161.30	6,510.23	-3,435.91	2,673.40	4,253.59	1.27	1.16	-0.53
12,103.00	89.10	161.10	6,512.63	-3,525.81	2,704.00	4,347.89	1.18	1.16	-0.21
12,197.00	88.90	161.20	6,514.28	-3,614.76	2,734.37	4,441.23	0.24	-0.21	0.11
12,292.00	88.90	160.60	6,516.10	-3,704.51	2,765.45	4,535.60	0.63	0.00	-0.63
12,387.00	89.50	159.50	6,517.43	-3,793.80	2,797.86	4,630.13	1.32	0.63	-1.16
12,481.00	89.20	159.90	6,518.49	-3,881.96	2,830.47	4,723.73	0.53	-0.32	0.43
12,576.00	89.10	159.30	6,519.90	-3,970.99	2,863.58	4,818.33	0.64	-0.11	-0.63
12,671.00	91.00	160.80	6,519.82	-4,060.28	2,895.99	4,912.86	2.55	2.00	1.58
12,765.00	89.40	160.40	6,519.49	-4,148.94	2,927.21	5,006.31	1.75	-1.70	-0.43
12,860.00	87.80	161.10	6,521.81	-4,238.60	2,958.52	5,100.69	1.84	-1.68	0.74
12,955.00	86.90	161.30	6,526.20	-4,328.43	2,989.11	5,194.93	0.97	-0.95	0.21
13,049.00	87.00	161.30	6,531.20	-4,417.34	3,019.20	5,288.11	0.11	0.11	0.00
13,144.00	87.90	162.10	6,535.43	-4,507.45	3,049.00	5,382.25	1.27	0.95	0.84
13,238.00	88.90	162.60	6,538.06	-4,596.99	3,077.49	5,475.31	1.19	1.06	0.53
13,333.00	89.40	162.60	6,539.47	-4,687.63	3,105.89	5,569.33	0.53	0.53	0.00
13,428.00	89.50	162.30	6,540.38	-4,778.20	3,134.54	5,663.40	0.33	0.11	-0.32
13,522.00	87.50	161.60	6,542.84	-4,867.54	3,163.65	5,756.54	2.25	-2.13	-0.74
13,617.00	86.20	160.80	6,548.06	-4,957.33	3,194.22	5,850.73	1.61	-1.37	-0.84
13,711.00	86.60	160.60	6,553.96	-5,045.88	3,225.23	5,943.98	0.48	0.43	-0.21
13,806.00	86.50	160.50	6,559.68	-5,135.29	3,256.80	6,038.27	0.15	-0.11	-0.11
13,900.00	87.70	160.30	6,564.43	-5,223.73	3,288.30	6,131.63	1.29	1.28	-0.21
13,995.00	87.70	160.70	6,568.25	-5,313.21	3,319.98	6,226.02	0.42	0.00	0.42
14,089.00	89.20	161.30	6,570.79	-5,402.05	3,350.57	6,319.36	1.72	1.60	0.64
14,184.00	90.00	161.60	6,571.45	-5,492.11	3,380.79	6,413.64	0.90	0.84	0.32
14,279.00	90.10	161.10	6,571.37	-5,582.13	3,411.17	6,507.95	0.54	0.11	-0.53
14,373.00	90.50	161.00	6,570.88	-5,671.03	3,441.70	6,601.31	0.44	0.43	-0.11
14,468.00	90.90	160.50	6,569.72	-5,760.71	3,473.02	6,695.72	0.67	0.42	-0.53
14,563.00	89.40	160.00	6,569.47	-5,850.12	3,505.12	6,790.23	1.66	-1.58	-0.53
14,657.00	89.60	160.00	6,570.29	-5,938.45	3,537.27	6,883.78	0.21	0.21	0.00
14,752.00	88.80	159.80	6,571.61	-6,027.65	3,569.91	6,978.33	0.87	-0.84	-0.21
14,846.00	87.90	159.90	6,574.32	-6,115.86	3,602.28	7,071.87	0.96	-0.96	0.11
14,941.00	88.30	159.90	6,577.47	-6,205.03	3,634.91	7,166.38	0.42	0.42	0.00
15,035.00	85.90	160.40	6,582.23	-6,293.32	3,666.78	7,259.78	2.61	-2.55	0.53
15,130.00	87.10	161.60	6,588.02	-6,382.97	3,697.65	7,353.98	1.78	1.26	1.26
15,225.00	88.70	162.00	6,591.51	-6,473.16	3,727.30	7,448.12	1.74	1.68	0.42
15,320.00	88.50	161.30	6,593.83	-6,563.30	3,757.20	7,542.33	0.77	-0.21	-0.74
15,414.00	89.00	161.40	6,595.88	-6,652.34	3,787.26	7,635.62	0.54	0.53	0.11
15,509.00	89.70	161.70	6,596.96	-6,742.45	3,817.32	7,729.88	0.80	0.74	0.32
15,604.00	89.90	161.70	6,597.29	-6,832.65	3,847.15	7,824.11	0.21	0.21	0.00

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Wellbore: Main Wellbore
Design: 514082 As Drilled Surveys

Local Co-ordinate Reference: Well Well #514082 -Marcellus
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MD Reference: GL 1111 + 23' KB @ 1134.00usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Well_Planner1

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
15,698.00	89.40	162.20	6,597.86	-6,922.02	3,876.27	7,917.30	0.75	-0.53	0.53
15,793.00	89.80	162.80	6,598.52	-7,012.62	3,904.84	8,011.35	0.76	0.42	0.63
15,887.00	88.20	161.70	6,600.16	-7,102.13	3,933.49	8,104.45	2.07	-1.70	-1.17
15,982.00	88.20	161.40	6,603.15	-7,192.20	3,963.54	8,198.67	0.32	0.00	-0.32
16,077.00	88.50	161.00	6,605.88	-7,282.09	3,994.14	8,292.96	0.53	0.32	-0.42
16,171.00	89.60	160.80	6,607.44	-7,370.90	4,024.90	8,386.34	1.19	1.17	-0.21
16,266.00	89.90	160.20	6,607.86	-7,460.45	4,056.61	8,480.81	0.71	0.32	-0.63
Deepest Point of well=16266'MD / 6607.86'TVD									
16,360.00	90.60	159.50	6,607.45	-7,548.70	4,088.99	8,574.38	1.05	0.74	-0.74
16,455.00	90.70	159.10	6,606.37	-7,637.56	4,122.57	8,669.03	0.43	0.11	-0.42
16,550.00	89.60	159.70	6,606.12	-7,726.48	4,155.99	8,763.67	1.32	-1.16	0.63
16,644.00	88.50	160.40	6,607.68	-7,814.83	4,188.06	8,857.20	1.39	-1.17	0.74
FINAL Survey: 16644'MD / 6607.68'TVD									
16,695.00	88.50	160.40	6,609.01	-7,862.86	4,205.16	8,907.90	0.00	0.00	0.00
PTB: 16695'MD / 6609.01'TVD									

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Design Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
514082 Plat LP2p4 - actual wellpath misses target center by 7.74usft at 7752.72usft MD (6476.74 TVD, 588.40 N, 1296.46 E) - Point	0.00	0.00	6,470.00	589.40	1,300.13	233,645.26	1,623,654.39	39° 8' 1.91 N	80° 49' 36.28 W
514082 LP 30' VSp5 - actual wellpath misses target center by 7.75usft at 7752.72usft MD (6476.74 TVD, 588.40 N, 1296.46 E) - Point	0.00	360.00	6,470.00	589.41	1,300.14	233,645.26	1,623,654.39	39° 8' 1.91 N	80° 49' 36.28 W
514082 Plat TD - actual wellpath misses target center by 102.46usft at 15540.08usft MD (6597.10 TVD, -6771.96 N, 3827.08 E) - Point	0.00	360.00	6,495.00	-6,774.99	3,819.06	226,280.87	1,626,173.32	39° 6' 49.49 N	80° 49' 2.94 W
514082 Plat TD2 p4 - actual wellpath misses target center by 10.12usft at 11113.58usft MD (6484.99 TVD, -2588.67 N, 2388.68 E) - Point	0.00	360.00	6,495.00	-2,588.87	2,387.24	230,466.98	1,624,741.49	39° 7' 30.65 N	80° 49' 21.89 W
514082 Plat TD2 - actual wellpath misses target center by 116.70usft at 16644.00usft MD (6607.68 TVD, -7814.83 N, 4188.06 E) - Point	0.00	360.00	6,495.00	-7,845.06	4,185.07	225,210.80	1,626,539.33	39° 6' 38.97 N	80° 48' 58.10 W
514082 Plat TD2 p3 - actual wellpath misses target center by 3290.96usft at 16695.00usft MD (6609.01 TVD, -7862.86 N, 4205.16 E) - Point	0.00	360.00	6,495.00	-10,979.10	5,257.04	222,076.76	1,627,611.30	39° 6' 8.15 N	80° 48' 43.92 W
514082 LP 125' VS - actual wellpath misses target center by 27.51usft at 7753.49usft MD (6476.76 TVD, 587.66 N, 1296.70 E) - Point	0.00	360.00	6,504.00	589.41	1,300.14	233,645.26	1,623,654.39	39° 8' 1.91 N	80° 49' 36.28 W
514082 Plat LP - actual wellpath misses target center by 20.08usft at 8277.13usft MD (6484.69 TVD, 91.83 N, 1464.46 E) - Point	0.00	0.00	6,504.00	93.68	1,469.67	233,149.54	1,623,823.93	39° 7' 57.03 N	80° 49' 34.03 W
514082 Plat LP2 - actual wellpath misses target center by 27.51usft at 7753.49usft MD (6476.76 TVD, 587.66 N, 1296.70 E) - Point	0.00	0.00	6,504.00	589.40	1,300.13	233,645.26	1,623,654.39	39° 8' 1.91 N	80° 49' 36.28 W

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
7,512.03	6,448.00	Top of Tully@6448'TVD		0.00	
7,579.03	6,461.00	Top of Hamilton@6461'TVD		0.00	
7,660.17	6,471.00	Top of Marcellus@6471'TVD		0.00	
8,741.55	6,485.00	Top of Purcell@6485'TVD		0.00	
11,894.44	6,505.00	Top of Cherry Valley@6505'TVD		0.00	

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
6,310.00	5,987.21	601.18	305.71	Gyro Tie In=6310'MD - PRO D+MWD+OWSG (3)
6,360.00	6,003.04	642.79	328.42	KOP=6360'MD - PRO D+MWD+OWSG (3)
8,316.00	6,484.45	55.08	1,477.13	LP=8316'MD / 6484.45'TVD
16,266.00	6,607.86	-7,460.45	4,056.61	Deepest Point of well=16266'MD / 6607.86'TVD
16,644.00	6,607.68	-7,814.83	4,188.06	FINAL Survey: 16644'MD / 6607.68'TVD
16,695.00	6,609.01	-7,862.86	4,205.16	PTB: 16695'MD / 6609.01'TVD

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