

85-10052

PHOENIX  
TECHNOLOGY SERVICES



## **EQT Production - Marcellus**

Ritchie County, WV  
Ritchie County 513043  
Well #513043

Main Wellbore

Survey: 513043 MWD

## **Standard Survey Report**

27 August, 2013



Where energy meets innovation.

09/19/2014



85-10052

# Phoenix Technologies, Inc. Survey Report



<b>Database:</b> EQT DB	<b>Local Co-ordinate Reference:</b> State Plane County 513043
<b>Company:</b> EDT Production - Marcellus	<b>TVD Reference:</b> KB @ 610.04ft
<b>Project:</b> Ritchie County, WV	<b>MD Reference:</b> KB @ 116.04ft
<b>Site:</b> Ritchie County 513043	<b>North Reference:</b> GNT
<b>Well:</b> Well 513043	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Wellbore:</b> Main Wellbore	
<b>Design:</b> As Drilled Surveys	

<b>Project</b> Ritchie County, WV			
<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> Ritchie County 513043			
<b>Site Position:</b>	<b>Northing:</b> 277,010.20 usft	<b>Latitude:</b>	39.25
<b>From:</b> Map	<b>Easting:</b> 1,592,384.60 usft	<b>Longitude:</b>	-80.94
<b>Position Uncertainty:</b> 0.0 usft	<b>Slot Radius:</b> 13-3/16 "	<b>Grid Convergence:</b>	-0.92 "

<b>Well</b> Well 513043			
<b>Well Position</b>	<b>+N-S</b> 0.0 usft	<b>Northing:</b> 277,010.20 usft	<b>Latitude:</b> 39° 15' 5.727 N
	<b>+E-W</b> 0.0 usft	<b>Easting:</b> 1,592,384.60 usft	<b>Longitude:</b> 80° 56' 21.882 W
<b>Position Uncertainty</b>	0.0 usft	<b>Wellhead Elevation:</b> usft	<b>Ground Level:</b> 795.0 usft

<b>Wellbore</b> Main Wellbore					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	8/8/2013	-8.32	66.88	52,400

<b>Design</b> As Drilled Surveys					
<b>Audit Notes:</b>					
<b>Version:</b> 1.0	<b>Phase:</b> ACTUAL	<b>Tie On Depth:</b> 0.0			
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)	Direction (°)	
	0.0	0.0	0.0	359.23	

<b>Survey Program</b> Date 8/27/2013					
From (f)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	3,608.0	513043 Gyros (Main Wellbore)	GYD_DP_MS	Gyrodata gyro-compassing and drop	
0.00	9,944.0	513043 MWD (Main Wellbore)	MWD	MWD - Standard	

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)
Gyro Tie In MD=0690'										
3,608.0	0.20	186.69	3,608.0	2,790.0	-12.7	5.2	-12.8	0.00	0.00	0.00
3,684.0	2.90	85.10	3,683.9	2,865.9	-12.7	7.1	-12.8	3.88	3.55	-133.67
3,715.0	4.30	85.20	3,714.9	2,896.9	-12.5	9.0	-12.6	4.52	4.52	0.32
3,778.0	7.70	83.70	3,777.5	2,959.5	-11.9	15.6	-12.1	5.40	5.40	-2.38
3,841.0	10.40	84.90	3,839.7	3,021.7	-10.9	25.4	-11.2	4.30	4.29	1.90
3,873.0	11.30	92.40	3,871.2	3,053.2	-10.8	31.4	-11.2	5.23	2.81	23.44
3,936.0	11.70	103.70	3,932.9	3,114.9	-12.5	43.8	-13.1	3.63	0.63	17.94

Database:	EQT DB	Local Co-ordinate Reference:	City Reference: 415043
Company:	EQT Production (Houston)	TVD Reference:	KB 20 415043
Project:	REDAK Canyon WW	MD Reference:	KB 20 415043
Site:	Redak Canyon (WV)	North Reference:	City
Well:	Well 10101	Survey Calculation Method:	Minimum Curvature
Wellbore:	Well 10101		
Design:	NA DUKES 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)
4,031.0	11.50	107.00	4,026.0	3,208.0	-17.6	62.2	-18.4	0.73	-0.21	3.47
4,125.0	13.10	106.00	4,117.8	3,299.8	-23.3	81.4	-24.4	1.72	1.70	-1.06
4,220.0	14.90	106.90	4,210.0	3,392.0	-29.8	103.5	-31.2	1.91	1.89	0.95
4,314.0	17.10	110.90	4,300.3	3,482.3	-38.2	127.9	-39.9	2.62	2.34	4.26
4,409.0	19.60	109.80	4,390.5	3,572.5	-48.6	156.0	-50.7	2.66	2.63	-1.16
4,504.0	22.10	111.60	4,479.3	3,661.3	-60.6	187.6	-63.1	2.72	2.63	1.89
4,598.0	24.70	120.40	4,565.5	3,747.5	-77.0	221.0	-80.0	4.63	2.77	9.36
4,693.0	28.40	128.00	4,650.5	3,832.5	-101.0	255.9	-104.4	5.28	3.89	8.00
4,788.0	29.20	123.70	4,733.8	3,915.8	-127.8	293.0	-131.7	2.34	0.84	-4.53
4,882.0	31.60	117.80	4,814.9	3,996.9	-152.0	333.9	-156.5	4.07	2.55	-6.28
4,977.0	37.20	114.90	4,893.2	4,075.2	-175.7	382.0	-180.8	6.14	5.89	-3.05
5,072.0	41.60	116.60	4,966.6	4,148.6	-202.0	436.3	-207.8	4.77	4.63	1.79
5,165.0	40.80	121.40	5,036.6	4,218.6	-231.6	489.8	-238.1	3.51	-0.86	5.16
5,217.0	40.60	123.10	5,076.1	4,258.1	-249.7	518.5	-256.6	2.17	-0.38	3.27
5,280.0	41.60	124.90	5,123.5	4,305.5	-272.9	552.8	-280.2	2.46	1.59	2.86
5,375.0	42.00	119.70	5,194.4	4,376.4	-306.7	606.3	-314.8	3.67	0.42	-5.47
5,469.0	42.70	119.10	5,263.8	4,445.8	-337.8	661.5	-346.6	0.86	0.74	-0.64
5,532.0	40.80	114.20	5,310.9	4,492.9	-356.6	699.0	-365.9	5.99	-3.02	-7.78
5,564.0	37.50	107.70	5,335.7	4,517.7	-363.8	717.8	-373.4	16.45	-10.31	-20.31
5,595.0	33.20	98.90	5,361.0	4,543.0	-368.0	735.2	-377.8	21.47	-13.87	-28.39
5,627.0	31.10	93.60	5,388.1	4,570.1	-369.9	752.1	-379.9	10.98	-6.56	-16.56
5,658.0	30.30	92.80	5,414.7	4,596.7	-370.8	767.9	-381.0	2.90	-2.58	-2.58
5,690.0	29.40	91.70	5,442.5	4,624.5	-371.4	783.8	-381.9	3.29	-2.81	-3.44
5,721.0	27.90	88.80	5,469.7	4,651.7	-371.5	798.7	-382.1	6.60	-4.84	-9.35
5,753.0	26.70	80.90	5,498.1	4,680.1	-370.2	813.3	-381.0	11.92	-3.75	-24.69
5,785.0	26.60	71.80	5,526.7	4,708.7	-366.8	827.2	-377.8	12.75	-0.31	-28.44
5,816.0	27.50	64.80	5,554.4	4,736.4	-361.6	840.2	-372.8	10.67	2.90	-22.58
5,848.0	28.70	62.50	5,582.6	4,764.6	-354.9	853.7	-366.3	5.05	3.75	-7.19
5,879.0	30.60	58.00	5,609.5	4,791.5	-347.3	867.0	-358.8	9.44	6.13	-14.52
5,911.0	31.20	52.50	5,637.0	4,819.0	-337.9	880.5	-349.7	9.02	1.88	-17.19
5,942.0	31.50	48.40	5,663.5	4,845.5	-327.7	892.9	-339.6	6.95	0.97	-13.23
5,974.0	31.50	43.40	5,690.8	4,872.8	-316.0	904.9	-328.1	8.16	0.00	-15.63
6,005.0	32.40	38.30	5,717.1	4,899.1	-303.6	915.7	-315.8	9.17	2.90	-16.45
6,037.0	33.90	33.90	5,743.9	4,925.9	-289.5	926.0	-301.8	8.86	4.69	-13.75
6,069.0	36.30	27.90	5,770.1	4,952.1	-273.7	935.4	-286.2	13.13	7.50	-18.75
6,100.0	38.60	23.50	5,794.7	4,976.7	-256.7	943.5	-269.3	11.38	7.42	-14.19
6,132.0	42.20	19.30	5,819.0	5,001.0	-237.4	951.1	-250.1	14.10	11.25	-13.13
6,163.0	45.40	16.40	5,841.4	5,023.4	-217.0	957.6	-229.8	12.18	10.32	-9.35
6,195.0	48.30	14.00	5,863.3	5,045.3	-194.5	963.7	-207.3	10.59	9.06	-7.50
6,226.0	50.80	11.10	5,883.4	5,065.4	-171.4	968.8	-184.4	10.76	8.06	-9.35
6,258.0	52.40	9.40	5,903.3	5,085.3	-146.8	973.3	-159.8	6.51	5.00	-5.31
6,289.0	54.00	7.70	5,921.9	5,103.9	-122.2	977.0	-135.3	6.78	5.16	-5.48
6,321.0	55.60	6.40	5,940.3	5,122.3	-96.3	980.2	-109.4	6.00	5.00	-4.05

Database:	EDITION	Local Co-ordinate Reference:	Eq. Reference County: 1004
Company:	EQT Production Services	TVD Reference:	AB as 413 (usft)
Project:	Winn-Dixie 122/12W	MD Reference:	KR as 413 (usft)
Site:	Palma County 51304	North Reference:	GN
Well:	W-11-10040	Survey Calculation Method:	Minimum Variance
Wellbore:	W-11-10040		
Design:	AS-Direct Surveys		

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)
6,352.0	57.80	5.10	5,957.3	5,139.3	-70.5	982.8	-83.6	7.91	7.10	-4.19
6,384.0	59.40	3.10	5,974.0	5,156.0	-43.2	984.7	-56.4	7.31	5.00	-6.25
6,415.0	63.30	2.50	5,988.9	5,170.9	-16.1	986.1	-29.3	12.69	12.58	-1.94
6,447.0	67.40	359.10	6,002.2	5,184.2	13.0	986.4	-0.2	16.04	12.81	-10.63
6,478.0	70.70	356.20	6,013.3	5,195.3	41.9	985.3	28.7	13.77	10.65	-9.35
6,510.0	72.80	355.90	6,023.3	5,205.3	72.2	983.2	59.1	6.62	6.56	-0.94
6,541.0	73.20	355.90	6,032.4	5,214.4	101.8	981.0	88.7	1.29	1.29	0.00
6,573.0	75.60	354.40	6,041.0	5,223.0	132.5	978.4	119.4	8.75	7.50	-4.69
6,604.0	77.20	352.70	6,048.3	5,230.3	162.4	975.0	149.4	7.42	5.16	-5.48
6,636.0	78.60	352.00	6,055.0	5,237.0	193.4	970.9	180.4	4.87	4.38	-2.19
<b>51041.221</b>										
6,666.6	82.55	350.71	6,060.0	5,242.0	223.3	966.3	210.4	13.55	12.90	-4.19
6,667.0	82.60	350.70	6,060.0	5,242.0	223.7	966.3	210.7	13.55	12.91	-4.15
6,699.0	87.50	349.40	6,062.8	5,244.8	255.1	960.8	242.2	15.84	15.31	-4.06
6,793.0	90.90	343.60	6,064.1	5,246.1	346.4	938.8	333.8	7.15	3.62	-6.17
6,887.0	90.60	343.00	6,062.9	5,244.9	436.4	911.8	424.2	0.71	-0.32	-0.64
6,981.0	88.50	338.10	6,063.6	5,245.6	525.0	880.5	513.2	5.67	-2.23	-5.21
7,076.0	89.30	341.40	6,065.4	5,247.4	614.1	847.7	602.7	3.57	0.84	3.47
<b>5304.111</b>										
7,138.6	89.83	341.67	6,065.9	5,247.9	673.5	827.9	662.3	0.95	0.85	0.43
7,170.0	90.10	341.80	6,065.9	5,247.9	703.3	818.0	692.3	0.95	0.85	0.43
7,265.0	90.50	341.10	6,065.4	5,247.4	793.4	787.8	782.8	0.85	0.42	-0.74
7,360.0	90.50	341.20	6,064.6	5,246.6	883.3	757.1	873.1	0.11	0.00	0.11
7,453.0	90.70	339.90	6,063.6	5,245.6	971.0	726.1	961.2	1.41	0.22	-1.40
7,547.0	89.90	339.90	6,063.1	5,245.1	1,059.2	693.8	1,049.9	0.85	-0.35	0.00
7,642.0	88.30	343.30	6,064.6	5,246.6	1,149.4	663.8	1,140.4	3.95	-1.68	3.58
7,737.0	88.70	343.00	6,067.1	5,249.1	1,240.3	636.3	1,231.6	0.53	0.42	-0.32
7,831.0	88.70	342.30	6,069.2	5,251.2	1,330.0	608.3	1,321.7	0.74	0.00	-0.74
7,926.0	90.30	345.70	6,070.1	5,252.1	1,421.3	582.1	1,413.3	3.96	1.68	3.58
8,020.0	90.60	344.00	6,069.3	5,251.3	1,512.0	557.5	1,504.4	1.84	0.32	-1.81
8,115.0	91.10	343.30	6,067.9	5,249.9	1,603.1	530.8	1,595.9	0.91	0.53	-0.74
8,209.0	90.30	342.00	6,066.8	5,248.8	1,692.8	502.8	1,686.0	1.62	-0.85	-1.38
8,304.0	90.90	341.60	6,065.8	5,247.8	1,783.1	473.1	1,776.6	0.76	0.63	-0.42
8,399.0	89.60	339.40	6,065.4	5,247.4	1,872.6	441.4	1,866.6	2.69	-1.37	-2.32
8,493.0	88.80	339.90	6,066.7	5,248.7	1,960.8	408.7	1,955.1	1.00	-0.85	0.53
8,588.0	89.30	339.40	6,068.3	5,250.3	2,049.8	375.7	2,044.6	0.74	0.53	-0.53
8,682.0	88.50	340.30	6,070.1	5,252.1	2,138.0	343.3	2,133.3	1.28	-0.85	0.96
8,777.0	89.60	342.10	6,071.6	5,253.6	2,228.0	312.7	2,223.6	2.22	1.16	1.89
8,872.0	90.00	344.10	6,072.0	5,254.0	2,318.8	285.1	2,314.8	2.15	0.42	2.11
8,966.0	90.80	342.80	6,071.3	5,253.3	2,408.9	258.3	2,405.3	1.62	0.85	-1.38
9,061.0	89.90	343.50	6,070.7	5,252.7	2,499.9	230.8	2,496.6	1.20	-0.95	0.74
9,155.0	90.70	343.10	6,070.2	5,252.2	2,589.9	203.8	2,586.9	0.95	0.85	-0.43

Database:	EQT US	Local Co-ordinate Reference:	Rich Middle County 513043
Company:	EQT Production - Marcellus	TVD Reference:	KB-07 014-020
Project:	Palmer County WZ	MD Reference:	08 07 11E-9005
Site:	Richie County 513043	North Reference:	000
Well:	Waco 010040	Survey Calculation Method:	Average Curvature
Wellbore:	Major Wellbore		
Design:	AA Donald Stearns		

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)
9,250.0	90.00	342.00	6,069.7	5,251.7	2,680.5	175.3	2,677.9	1.37	-0.74	-1.16
9,343.0	90.20	340.60	6,069.5	5,251.5	2,768.6	145.5	2,766.4	1.52	0.22	-1.51
9,438.0	87.30	337.00	6,071.6	5,253.6	2,857.1	111.1	2,855.4	4.87	-3.05	-3.79
9,532.0	88.60	339.40	6,074.9	5,256.9	2,944.3	76.2	2,943.1	2.90	1.38	2.55
9,627.0	89.00	341.40	6,076.9	5,258.9	3,033.8	44.4	3,033.0	2.15	0.42	2.11
9,722.0	89.90	342.10	6,077.8	5,259.8	3,124.0	14.6	3,123.6	1.20	0.95	0.74
9,816.0	90.60	341.10	6,077.4	5,259.4	3,213.2	-15.0	3,213.1	1.30	0.74	-1.06
Last Survey MD=3608'										
9,890.0	91.30	340.70	6,076.2	5,258.2	3,283.1	-39.2	3,283.4	1.09	0.95	-0.54
TD=9944'										
9,940.5	91.30	340.70	6,075.1	5,257.1	3,330.7	-55.9	3,331.2	0.00	0.00	0.00
Projected to TD MD=9944'										
9,944.0	91.30	340.70	6,075.0	5,257.0	3,334.1	-57.1	3,334.6	0.00	0.00	0.00

Measured Depth (')	Vertical Depth (')	Local Coordinates		Comment
		+N/-S (')	+E/-W (')	
3,608.0	3,608.0	-12.7	5.2	Gyro Tie In MD=3608'
9,890.0	6,076.2	3,283.1	-39.2	Last Survey MD=9890'
9,944.0	6,075.0	3,334.1	-57.1	Projection to TD MD=9944'

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

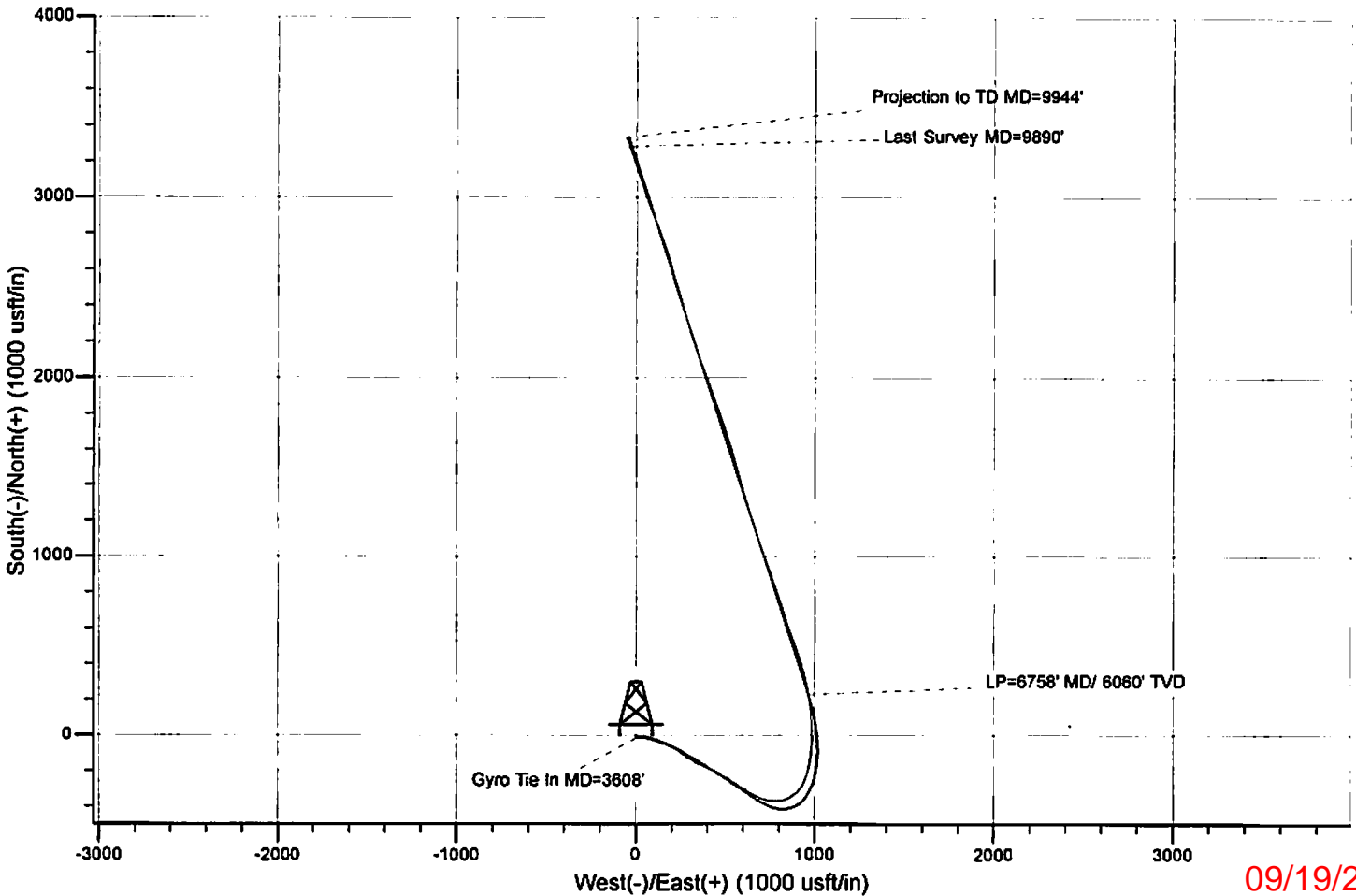
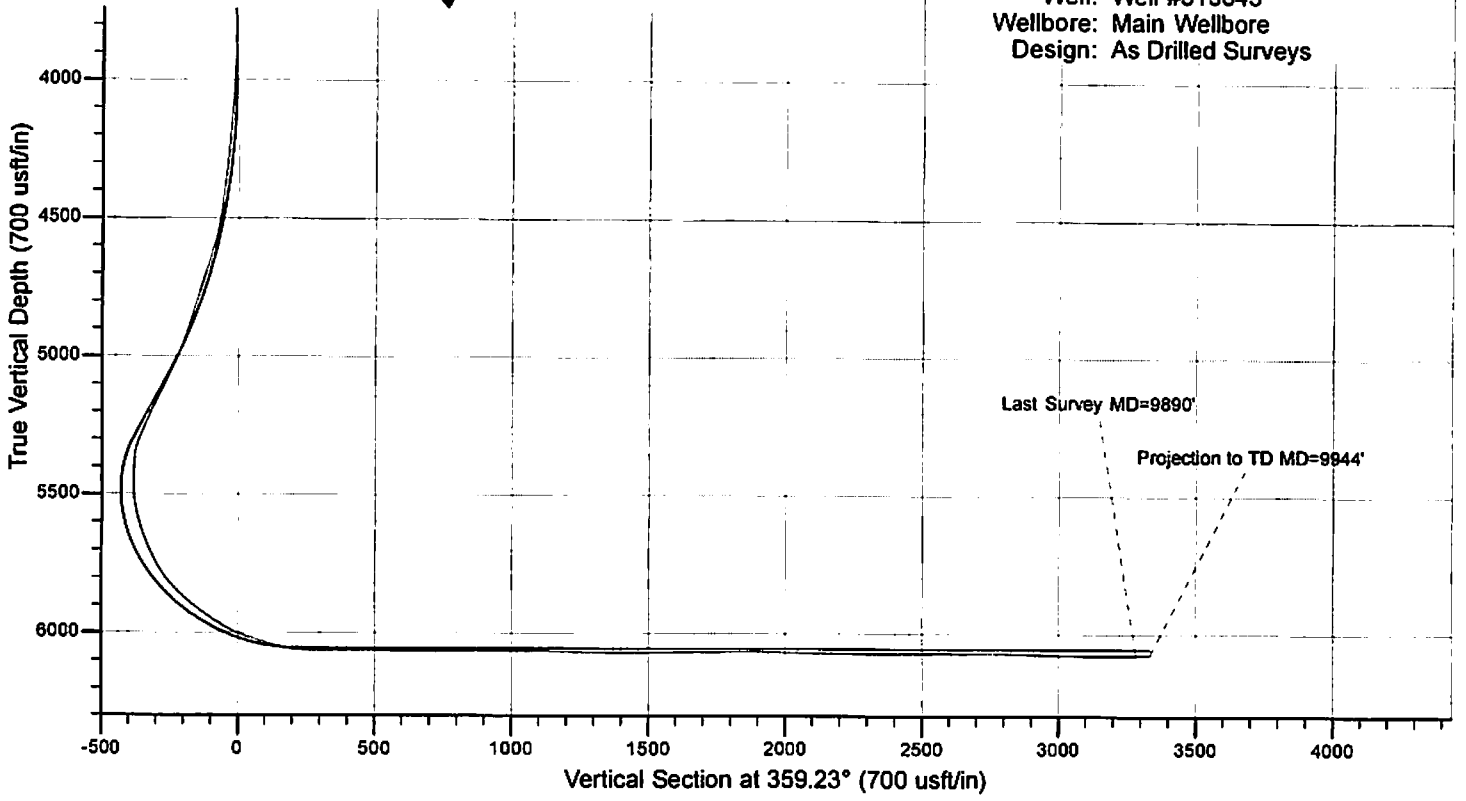
85-10052

**PHOENIX**  
TECHNOLOGY SERVICES



# EQT Production - Marcellus

Project: Ritchie County, WV  
Site: Ritchie County 513043  
Well: Well #513043  
Wellbore: Main Wellbore  
Design: As Drilled Surveys



09/19/2014