

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

API 47 - 017 - 6458 County DODDRIDGE District WEST UNION
Quad OXFORD 7.5' Pad Name OXFORD 157 Field/Pool Name _____
Farm name JUSTIN L. HENDERSON ET AL Well Number 513144
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 4,343,012 Easting 520,179
Landing Point of Curve Northing 4,343,048 Easting 520,023
Bottom Hole Northing 4,344,139 Easting 519,492

Elevation (ft) 968 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 04/18/2014 Date drilling commenced 08/18/2014 Date drilling ceased 12/10/2014
Date completion activities began 4/13/2015 Date completion activities ceased 4/18/2015
Verbal plugging (Y/N) N Date permission granted N/A Granted by N/A

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

Freshwater depth(s) ft 144 Open mine(s) (Y/N) depths N
Salt water depth(s) ft - Void(s) encountered (Y/N) depths N
Coal depth(s) ft 351 Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

Reviewed by: _____

10/09/2015

API 47-017 - 6458 Farm name JUSTIN L. HENDERSON ET AL Well number 513144

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"	63'	NEW	A-500 40LB/FT	None	Y
Surface	17.5"	13.375"	943'	NEW	J-55 54.5LB/FT	None	Y
Coal							
Intermediate 1	12.375"	9.625"	5,064'	NEW	P-110 40LB/FT	1418', 2937', 3689'	Y
Intermediate 2							
Intermediate 3							
Production	8.5"	5.5"	10,725'	NEW	P-110 20LB/FT	None.	N
Tubing							
Packer type and depth set							

Comment Details _____

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ³ /sks)	Volume (ft ³)	Cement Top (MD)	WOC (hrs)
Conductor	CLASS A	62	15.6	1.18	73.16	0	8
Surface	CLASS A	790	15.6	1.19	940.1	0	8
Coal							
Intermediate 1	CLASS A / CLASS A	375 / 340	14.2 / 15.6	1.28 / 1.18	881.2	0	8
Intermediate 2							
Intermediate 3							
Production	CLASS A / CLASS H	305 / 530	14.2 / 15.2	1.26 / 1.97	1392	4,486	72
Tubing							

Drillers TD (ft) 10,738' Loggers TD (ft) 6486'

Deepest formation penetrated Marcellus Plug back to (ft) 5019'

Plug back procedure Pumped isolation plug # 1 with 2 bbls H2O, 42.3 bbls of 14.2 ppg cmt, 2 bbls H2O. Trip out of hole to @ 5250'. Pump isolation plug # 2 with 2 bbls H2O, 40.5 bbls (sks 210 and 1.28 yield) of 14.2 ppg cmt, 2 bbls H2O. Trip out of hole to @ 4850', pump kickoff plug with 2 bbls H2O, 32.2 bbls cmt (sks 165 and 1.12 yield) @ 16.0 ppg, Plugcem, 2 bbls H2O, Trip out of hole @ 4500' pump 20 bbls H2O.

Kick off depth (ft) 5,147'

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- 111', 484', 899'

INTERMEDIATE- 85', 584', 1,085', 1,585', 2,085', 2,585', 3,104', 3,606', 4,104', 4,603', 5,062'

PRODUCTION- Composite body centralizers every JI from 4,545 to bottom'

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WAS WELL COMPLETED AS SHOT HOLE Yes No DETAILS _____

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WAS WELL COMPLETED OPEN HOLE? Yes No DETAILS _____

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

API 47- 017 - 6458 Farm name JUSTIN L. HENDERSON ET AL Well number 513144

Drilling Contractor Patterson UTI
Address 207 Carlton Drive City Eighty Four State PA Zip 15330

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

Logging Company WEATHERFORD
Address P.O. BOX 200698 City DALLAS State TX Zip 75320

Cementing Company NABORS CEMENTING SERVICES
Address 2504 SMITH CREEK ROAD City WAYNESBURG State PA Zip 15370

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10/09/2015

17-06458

Formation	Top (ft TVD)	Bottom (ft TVD)
FRESH WATER ZONE	1	154
SAND/SHALE	1	347
PITTSBURGH COAL SEAM	347	351
SAND/SHALE	351	1,599.00
BIG LIME	1,599.00	1,884.00
WEIR	1,884.00	2,089.00
BEREA	2,089.00	2,093.00
GANTZ	2,093.00	2,204.00
50F	2,204.00	2,294.00
30F	2,294.00	2,349.00
GORDON	2,349.00	2,438.00
4TH	2,438.00	2,660.00
BAYARD	2,660.00	2,933.00
WARREN	2,933.00	3,010.00
SPEECHLEY	3,010.00	3,499.00
BALLTOWN A	3,499.00	4,146.00
RILEY	4,146.00	4,596.00
BENSON	4,596.00	4,849.00
ALEXANDER	4,849.00	6,006.10
SONYEA	6,006.10	6,140.10
MIDDLESEX	6,140.10	6,196.60
GENESEE	6,196.60	6,268.70
GENESEO	6,268.70	6,309.90
TULLY	6,309.90	6,337.30
HAMILTON	6,337.30	6,360.50
MARCELLUS	6,360.50	

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EQT Production - Marcellus

Doddridge County, WV Grid

Doddridge County 513144

Well #513144

Main Wellbore

Design: 513144 As Drilled Surveys

Standard Survey Report

13 December, 2014

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10/09/2015

Phoenix Technologies
Survey Report

17-06458

Database: EDM 5000.1 Single User Db	Local Co-ordinate Reference: Site Doddridge County 513144
Company: EQT Production - Marcellus	TVD Reference: KB 23 ft @ 991.0usft
Project: Doddridge County, WV Grid	MD Reference: KB 23 ft @ 991.0usft
Site: Doddridge County 513144	North Reference: Grid
Well: Well #513144	Survey Calculation Method: Minimum Curvature
Wellbore: Main Wellbore	
Design: 513144 As Drilled Surveys	

Project	Doddridge County, WV Grid		
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		Using geodetic scale factor

Site	Doddridge County 513144				
Site Position:		Northing:	270,627.70 usft	Latitude:	39.24
From: Map		Easting:	1,641,308.60 usft	Longitude:	-80.77
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-0.81 °

Well	Well #513144					
Well Position	+N/-S	0.0 usft	Northing:	270,627.70 usft	Latitude:	39° 14' 9.931 N
	+E/-W	0.0 usft	Easting:	1,641,308.60 usft	Longitude:	80° 45' 58.871 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	968.0 usft

Wellbore	Main Wellbore				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	11/24/2014	-8.49	66.73	52,212

Design	513144 As Drilled Surveys				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	329.56	

Survey Program	Date	12/13/2014			
From ()	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	5,110.0	513144 Gyrodata Gyros (Main Wellbore)	GYD_DP_MS	Gyrodata gyro-compassing and drop	
0.00	10,737.0	513144 PHX MWD (Main Wellbore)	MWD+IGRF	MWD+IGRF v3:standard declination	

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)	
0.0	0.00	0.00	0.0	-991.0	0.0	0.0	0.0	0.00	0.00	0.00	
110.0	0.18	2.84	110.0	-881.0	0.2	0.0	0.1	0.16	0.16	0.00	
210.0	0.04	43.80	210.0	-781.0	0.4	0.0	0.3	0.15	-0.14	40.96	
310.0	0.05	38.03	310.0	-681.0	0.4	0.1	0.3	0.01	0.01	5.77	
410.0	0.05	305.53	410.0	-581.0	0.5	0.1	0.4	0.07	0.00	5.77	
510.0	0.08	253.41	510.0	-481.0	0.5	0.0	0.4	0.06	0.03	-52.06	
610.0	0.08	251.79	610.0	-381.0	0.4	-0.2	0.5	0.00	0.00	-1.62	
710.0	0.08	259.80	710.0	-281.0	0.4	-0.3	0.5	0.01	0.00	8.01	

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Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Site Doddridge County 513144
Company:	EQT Production - Marcellus	TVD Reference:	KB 23 ft @ 991.0usft
Project:	Doddridge County, WV Grid	MD Reference:	KB 23 ft @ 991.0usft
Site:	Doddridge County 513144	North Reference:	Grid
Well:	Well #513144	Survey Calculation Method:	Minimum Curvature
Wellbore:	Main Wellbore		
Design:	513144 As Drilled Surveys		

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)	
810.0	0.09	237.28	810.0	-181.0	0.3	-0.4	0.5	0.03	0.01	-22.52	
910.0	0.08	242.41	910.0	-81.0	0.3	-0.6	0.5	0.01	-0.01	5.13	
1,010.0	0.54	232.36	1,010.0	19.0	0.0	-1.0	0.5	0.46	0.46	-10.05	
1,110.0	0.96	237.11	1,110.0	119.0	-0.8	-2.1	0.4	0.42	0.42	4.75	
1,210.0	1.00	240.46	1,210.0	219.0	-1.7	-3.5	0.3	0.07	0.04	3.35	
1,310.0	1.06	239.71	1,310.0	319.0	-2.6	-5.1	0.4	0.06	0.06	-0.75	
1,410.0	1.02	248.23	1,409.9	418.9	-3.4	-6.7	0.5	0.16	-0.04	8.52	
1,510.0	0.95	256.80	1,509.9	518.9	-3.9	-8.3	0.9	0.16	-0.07	8.57	
1,610.0	0.90	257.50	1,609.9	618.9	-4.2	-9.9	1.4	0.05	-0.05	0.70	
1,710.0	0.84	258.72	1,709.9	718.9	-4.6	-11.4	1.8	0.06	-0.06	1.22	
1,810.0	0.66	256.90	1,809.9	818.9	-4.8	-12.7	2.3	0.18	-0.18	-1.82	
1,910.0	0.62	254.91	1,909.9	918.9	-5.1	-13.8	2.6	0.05	-0.04	-1.99	
2,010.0	0.57	251.71	2,009.9	1,018.9	-5.4	-14.8	2.8	0.06	-0.05	-3.20	
2,110.0	0.51	250.50	2,109.9	1,118.9	-5.7	-15.7	3.0	0.06	-0.06	-1.21	
2,210.0	0.48	251.73	2,209.9	1,218.9	-6.0	-16.5	3.2	0.03	-0.03	1.23	
2,310.0	0.39	248.60	2,309.9	1,318.9	-6.2	-17.2	3.3	0.09	-0.09	-3.13	
2,410.0	0.41	248.09	2,409.9	1,418.9	-6.5	-17.8	3.4	0.02	0.02	-0.51	
2,510.0	0.37	247.61	2,509.9	1,518.9	-6.8	-18.5	3.5	0.04	-0.04	-0.48	
2,610.0	0.25	232.82	2,609.9	1,618.9	-7.0	-18.9	3.5	0.14	-0.12	-14.79	
2,710.0	0.26	235.66	2,709.9	1,718.9	-7.3	-19.3	3.5	0.02	0.01	2.84	
2,810.0	0.22	223.08	2,809.9	1,818.9	-7.5	-19.6	3.4	0.07	-0.04	-12.58	
2,910.0	0.26	213.19	2,909.9	1,918.9	-7.9	-19.9	3.3	0.06	0.04	-9.89	
3,010.0	0.25	217.10	3,009.9	2,018.9	-8.2	-20.1	3.1	0.02	-0.01	3.91	
3,110.0	0.21	224.47	3,109.9	2,118.9	-8.5	-20.4	3.0	0.05	-0.04	7.37	
3,210.0	0.20	224.11	3,209.9	2,218.9	-8.8	-20.6	2.9	0.01	-0.01	-0.36	
3,310.0	0.19	210.22	3,309.9	2,318.9	-9.1	-20.8	2.7	0.05	-0.01	-13.89	
3,410.0	0.19	205.91	3,409.9	2,418.9	-9.4	-21.0	2.6	0.01	0.00	-4.31	
3,510.0	0.20	201.18	3,509.9	2,518.9	-9.7	-21.1	2.4	0.02	0.01	-4.73	
3,610.0	0.23	208.24	3,609.9	2,618.9	-10.0	-21.3	2.2	0.04	0.03	7.06	
3,710.0	0.32	238.82	3,709.9	2,718.9	-10.3	-21.6	2.0	0.17	0.09	30.58	
3,810.0	0.50	263.11	3,809.9	2,818.9	-10.5	-22.3	2.2	0.25	0.18	24.29	
3,910.0	0.68	274.91	3,909.8	2,918.8	-10.5	-23.3	2.7	0.22	0.18	11.80	
4,010.0	0.86	283.42	4,009.8	3,018.8	-10.3	-24.6	3.6	0.21	0.18	8.51	
4,110.0	1.00	289.02	4,109.8	3,118.8	-9.8	-26.2	4.8	0.17	0.14	5.60	
4,210.0	1.16	291.78	4,209.8	3,218.8	-9.2	-28.0	6.2	0.17	0.16	2.76	
4,310.0	1.39	300.10	4,309.8	3,318.8	-8.2	-30.0	8.1	0.29	0.23	8.33	
4,410.0	1.54	304.23	4,409.8	3,418.8	-6.8	-32.1	10.4	0.18	0.15	4.13	
4,510.0	1.74	309.52	4,509.7	3,518.7	-5.1	-34.4	13.0	0.25	0.20	5.29	
4,610.0	1.87	310.88	4,609.7	3,618.7	-3.1	-36.8	16.0	0.14	0.13	1.36	
4,710.0	2.01	315.59	4,709.6	3,718.6	-0.8	-39.3	19.2	0.21	0.14	4.71	
4,810.0	2.31	316.33	4,809.5	3,818.5	2.0	-41.9	22.9	0.30	0.30	0.74	
4,910.0	2.81	322.92	4,909.4	3,918.4	5.4	-44.7	27.3	0.58	0.50	6.59	

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Site:	Doddridge County 513144	North Reference:	Grid
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Wellbore:	Main Wellbore		
Design:	513144 As Drilled Surveys		

Survey											
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Top of Elks @4950' TVD											
4,950.6	2.87	323.15	4,950.0	3,959.0	7.0	-46.0	29.3	0.14	0.14	0.56	
Int. csg pt @5000' TVD											
5,000.7	2.94	323.41	5,000.0	4,009.0	9.0	-47.5	31.8	0.14	0.14	0.53	
5,010.0	2.95	323.46	5,009.3	4,018.3	9.4	-47.8	32.3	0.14	0.14	0.52	
Gyro Tie In=5110' MD											
5,110.0	2.95	328.70	5,109.2	4,118.2	13.7	-50.6	37.4	0.27	0.00	5.24	
5,157.0	1.90	0.10	5,156.1	4,165.1	15.5	-51.3	39.3	3.52	-2.23	66.81	
5,188.0	2.60	92.10	5,187.1	4,196.1	16.0	-50.5	39.4	10.56	2.26	296.77	
5,219.0	6.20	118.20	5,218.0	4,227.0	15.1	-48.4	37.6	13.00	11.61	84.19	
5,251.0	9.40	130.00	5,249.7	4,258.7	12.6	-44.8	33.6	11.13	10.00	36.88	
5,282.0	11.60	141.10	5,280.2	4,289.2	8.6	-40.9	28.1	9.61	7.10	35.81	
5,314.0	13.80	151.20	5,311.4	4,320.4	2.7	-37.1	21.1	9.74	6.88	31.56	
5,345.0	15.60	161.70	5,341.4	4,350.4	-4.5	-34.0	13.4	10.35	5.81	33.87	
5,377.0	17.20	170.60	5,372.1	4,381.1	-13.2	-31.9	4.8	9.30	5.00	27.81	
5,408.0	19.00	177.30	5,401.6	4,410.6	-22.8	-30.9	-4.0	8.87	5.81	21.61	
5,439.0	21.00	184.20	5,430.7	4,439.7	-33.4	-31.1	-13.0	9.97	6.45	22.26	
5,471.0	23.00	189.10	5,460.4	4,469.4	-45.3	-32.5	-22.6	8.48	6.25	15.31	
5,502.0	25.80	192.30	5,488.6	4,497.6	-57.8	-34.9	-32.2	9.99	9.03	10.32	
5,534.0	28.80	193.60	5,517.1	4,526.1	-72.1	-38.2	-42.9	9.56	9.38	4.06	
5,566.0	31.40	194.50	5,544.7	4,553.7	-87.7	-42.1	-54.3	8.25	8.13	2.81	
5,597.0	35.00	195.50	5,570.7	4,579.7	-104.1	-46.5	-66.2	11.75	11.61	3.23	
5,628.0	34.00	197.50	5,596.2	4,605.2	-120.9	-51.4	-78.2	4.87	-3.23	6.45	
5,660.0	31.50	198.80	5,623.1	4,632.1	-137.4	-56.8	-89.7	8.12	-7.81	4.06	
5,691.0	27.80	201.70	5,650.1	4,659.1	-151.8	-62.1	-99.4	12.80	-11.94	9.35	
5,722.0	25.00	205.50	5,677.8	4,686.8	-164.4	-67.6	-107.5	10.55	-9.03	12.26	
5,753.0	22.90	207.30	5,706.2	4,715.2	-175.7	-73.2	-114.4	7.17	-6.77	5.81	
5,785.0	21.90	210.60	5,735.7	4,744.7	-186.3	-79.1	-120.6	5.02	-3.13	10.31	
5,816.0	22.10	214.00	5,764.5	4,773.5	-196.1	-85.3	-125.9	4.16	0.65	10.97	
5,848.0	22.00	216.70	5,794.2	4,803.2	-205.9	-92.2	-130.8	3.18	-0.31	8.44	
5,879.0	22.70	221.50	5,822.8	4,831.8	-215.1	-99.7	-134.9	6.30	2.26	15.48	
5,911.0	23.50	228.70	5,852.3	4,861.3	-223.9	-108.6	-138.1	9.17	2.50	22.50	
5,942.0	24.00	236.40	5,880.6	4,889.6	-231.5	-118.5	-139.6	10.13	1.61	24.84	
5,974.0	24.00	247.90	5,909.9	4,918.9	-237.5	-129.9	-139.0	14.60	0.00	35.34	
6,005.0	24.00	257.80	5,938.2	4,947.2	-241.2	-141.9	-136.1	12.98	0.00	31.94	
6,037.0	24.70	265.50	5,967.4	4,976.4	-243.1	-154.9	-131.1	10.15	2.19	24.06	
6,068.0	26.50	273.10	5,995.4	5,004.4	-243.3	-168.3	-124.5	12.07	5.81	24.52	
6,100.0	28.40	278.70	6,023.8	5,032.8	-241.7	-183.0	-115.7	10.01	5.94	17.50	
6,131.0	30.10	283.50	6,050.8	5,059.8	-238.8	-197.8	-105.7	9.34	5.48	15.48	
513145 LP											
6,162.0	32.00	289.50	6,077.4	5,086.4	-234.3	-213.1	-94.0	11.71	6.13	19.35	
6,194.0	33.90	294.60	6,104.2	5,113.2	-227.7	-229.2	-80.2	10.50	5.94	15.94	
6,225.0	35.80	298.60	6,129.7	5,138.7	-219.8	-245.1	-65.3	9.59	6.13	12.90	
6,257.0	38.50	302.60	6,155.2	5,164.2	-209.9	-261.7	-48.4	11.32	8.44	12.50	

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Phoenix Technologies

Survey Report

17-06458

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Site Doddridge County 513144
Company:	EQT Production - Marcellus	TVD Reference:	KB 23 ft @ 991.0usft
Project:	Doddridge County, WV Grid	MD Reference:	KB 23 ft @ 991.0usft
Site:	Doddridge County 513144	North Reference:	Grid
Well:	Well #513144	Survey Calculation Method:	Minimum Curvature
Wellbore:	Main Wellbore		
Design:	513144 As Drilled Surveys		

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)
6,289.0	41.60	305.60	6,179.7	5,188.7	-198.4	-278.7	-29.8	11.41	9.69	9.38
6,321.0	44.50	308.00	6,203.1	5,212.1	-185.3	-296.2	-9.7	10.41	9.06	7.50
6,352.0	48.30	310.70	6,224.4	5,233.4	-171.0	-313.5	11.4	13.78	12.26	8.71
6,384.0	51.80	313.40	6,245.0	5,254.0	-154.6	-331.7	34.8	12.71	10.94	8.44
6,415.0	54.60	316.30	6,263.5	5,272.5	-137.1	-349.3	58.8	11.73	9.03	9.35
6,447.0	57.90	320.10	6,281.3	5,290.3	-117.2	-367.0	84.8	14.27	10.31	11.88
6,478.0	61.20	323.50	6,297.0	5,306.0	-96.2	-383.5	111.3	14.24	10.65	10.97
6,510.0	64.50	325.40	6,311.6	5,320.6	-73.1	-400.1	139.7	11.59	10.31	5.94
6,541.0	67.00	326.70	6,324.4	5,333.4	-49.6	-415.9	167.9	8.92	8.06	4.19
6,573.0	69.30	328.10	6,336.3	5,345.3	-24.6	-431.9	197.6	8.26	7.19	4.38
6,605.0	70.60	329.70	6,347.3	5,356.3	1.1	-447.4	227.6	6.21	4.06	5.00
6,636.0	71.40	331.50	6,357.3	5,366.3	26.7	-461.8	256.9	6.07	2.58	5.81
6,668.0	72.80	333.20	6,367.2	5,376.2	53.6	-475.9	287.3	6.69	4.38	5.31
Top of Marcellus @6371' TVD										
6,681.2	73.61	333.54	6,371.0	5,380.0	64.9	-481.6	300.0	6.61	6.13	2.60
6,699.0	74.70	334.00	6,375.9	5,384.9	80.3	-489.1	317.0	6.61	6.13	2.57
513144 LP 341' VS										
6,727.2	76.64	334.35	6,382.8	5,391.8	104.9	-501.0	344.3	6.98	6.87	1.25
6,731.0	76.90	334.40	6,383.7	5,392.7	108.2	-502.6	347.9	6.98	6.88	1.24
513144 Plat LP										
6,755.0	78.84	334.56	6,388.7	5,397.7	129.4	-512.7	371.3	8.09	8.06	0.65
6,762.0	79.40	334.60	6,390.1	5,399.1	135.6	-515.7	378.2	8.09	8.06	0.64
6,794.0	84.00	335.50	6,394.7	5,403.7	164.3	-529.1	409.7	14.64	14.38	2.81
513144 LP 412' VS										
6,796.3	84.16	335.49	6,394.9	5,403.9	166.3	-530.0	411.9	6.90	6.87	-0.63
513144 LP 416' VS										
6,799.9	84.41	335.46	6,395.3	5,404.3	169.7	-531.5	415.5	6.90	6.87	-0.63
6,826.0	86.20	335.30	6,397.4	5,406.4	193.3	-542.3	441.4	6.90	6.88	-0.62
513144 LP 459' VS										
6,843.9	87.81	334.78	6,398.4	5,407.4	209.5	-549.8	459.1	9.49	9.03	-2.91
6,857.0	89.00	334.40	6,398.7	5,407.7	221.3	-555.5	472.2	9.49	9.03	-2.90
6,869.0	89.60	333.90	6,398.9	5,407.9	232.1	-560.7	484.2	6.51	5.00	-4.17
LP=6888' MD/6399' TVD										
6,888.0	89.80	333.40	6,399.0	5,408.0	249.1	-569.1	503.1	2.83	1.05	
6,983.0	91.10	334.40	6,398.2	5,407.2	334.5	-610.9	597.9	1.73	1.37	1.05
7,077.0	88.70	335.00	6,398.4	5,407.4	419.4	-651.1	691.5	2.63	-2.55	0.64
7,172.0	86.60	335.70	6,402.3	5,411.3	505.7	-690.7	785.9	2.33	-2.21	0.74
7,267.0	86.20	335.10	6,408.2	5,417.2	591.9	-730.2	880.2	0.76	-0.42	-0.63
7,361.0	86.10	336.40	6,414.6	5,423.6	677.4	-768.7	973.5	1.38	-0.11	1.38
7,456.0	88.90	335.00	6,418.7	5,427.7	763.9	-807.7	1,067.8	3.29	2.95	-1.47
7,550.0	90.90	332.40	6,418.9	5,427.9	848.2	-849.4	1,161.6	3.49	2.13	-2.77
7,645.0	91.10	332.10	6,417.2	5,426.2	932.2	-893.6	1,256.4	0.38	0.21	-0.32
7,739.0	91.20	334.30	6,415.3	5,424.3	1,016.1	-936.0	1,350.2	2.34	0.11	2.34

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Survey Report

17.06458

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Site Doddridge County 513144
Company:	EQT Production - Marcellus	TVD Reference:	KB 23 ft @ 991.0usft
Project:	Doddridge County, WV Grid	MD Reference:	KB 23 ft @ 991.0usft
Site:	Doddridge County 513144	North Reference:	Grid
Well:	Well #513144	Survey Calculation Method:	Minimum Curvature
Wellbore:	Main Wellbore		
Design:	513144 As Drilled Surveys		

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)
7,833.0	89.20	334.60	6,415.0	5,424.0	1,100.9	-976.5	1,443.9	2.15	-2.13	0.32
7,928.0	88.80	335.50	6,416.6	5,425.6	1,187.0	-1,016.6	1,538.4	1.04	-0.42	0.95
8,023.0	89.00	335.50	6,418.5	5,427.5	1,273.5	-1,056.0	1,632.9	0.21	0.21	0.00
8,117.0	89.20	334.90	6,419.9	5,428.9	1,358.8	-1,095.4	1,726.4	0.67	0.21	-0.64
8,211.0	88.90	335.50	6,421.5	5,430.5	1,444.1	-1,134.8	1,820.0	0.71	-0.32	0.64
8,305.0	88.80	336.50	6,423.4	5,432.4	1,530.0	-1,173.0	1,913.4	1.07	-0.11	1.06
8,400.0	89.00	341.60	6,425.2	5,434.2	1,618.6	-1,207.0	2,007.0	5.37	0.21	5.37
8,495.0	88.20	336.90	6,427.5	5,436.5	1,707.4	-1,240.6	2,100.6	5.02	-0.84	-4.95
Top of Onondaga @6428' TVD										
8,509.7	88.22	336.81	6,428.0	5,437.0	1,720.9	-1,246.4	2,115.2	0.65	0.11	-0.64
8,589.0	88.30	336.30	6,430.4	5,439.4	1,793.6	-1,277.9	2,193.8	0.65	0.11	-0.64
8,683.0	88.30	338.30	6,433.2	5,442.2	1,880.3	-1,314.2	2,286.9	2.13	0.00	2.13
8,778.0	88.50	336.50	6,435.9	5,444.9	1,968.0	-1,350.7	2,381.0	1.91	0.21	-1.89
8,872.0	90.20	334.20	6,436.9	5,445.9	2,053.4	-1,389.9	2,474.5	3.04	1.81	-2.45
8,966.0	90.90	334.00	6,436.0	5,445.0	2,138.0	-1,431.0	2,568.2	0.77	0.74	-0.21
9,060.0	89.40	332.70	6,435.8	5,444.8	2,222.0	-1,473.1	2,662.0	2.11	-1.60	-1.38
9,155.0	89.70	331.70	6,436.5	5,445.5	2,306.0	-1,517.4	2,756.9	1.10	0.32	-1.05
9,249.0	89.10	333.00	6,437.5	5,446.5	2,389.3	-1,561.0	2,850.8	1.52	-0.64	1.38
9,344.0	88.10	335.10	6,439.8	5,448.8	2,474.6	-1,602.6	2,945.5	2.45	-1.05	2.21
9,438.0	88.40	334.00	6,442.7	5,451.7	2,559.5	-1,643.0	3,039.1	1.21	0.32	-1.17
9,531.0	87.00	333.20	6,446.4	5,455.4	2,642.7	-1,684.3	3,131.8	1.73	-1.51	-0.86
9,626.0	87.00	332.90	6,451.4	5,460.4	2,727.3	-1,727.3	3,226.4	0.32	0.00	-0.32
513144 Plat TD										
9,685.9	87.19	333.03	6,454.4	5,463.4	2,780.6	-1,754.5	3,286.2	0.38	0.32	0.21
9,720.0	87.30	333.10	6,456.1	5,465.1	2,810.9	-1,769.9	3,320.2	0.38	0.32	0.21
9,815.0	88.80	334.70	6,459.3	5,468.3	2,896.2	-1,811.7	3,414.8	2.31	1.58	1.68
9,909.0	89.30	335.20	6,460.9	5,469.9	2,981.3	-1,851.5	3,508.4	0.75	0.53	0.53
10,003.0	90.80	335.80	6,460.8	5,469.8	3,066.9	-1,890.4	3,601.9	1.72	1.60	0.64
10,099.0	90.70	336.40	6,459.5	5,468.5	3,154.6	-1,929.3	3,697.3	0.63	-0.10	0.63
10,193.0	90.50	335.50	6,458.5	5,467.5	3,240.5	-1,967.6	3,790.7	0.98	-0.21	-0.96
10,288.0	90.40	335.20	6,457.8	5,466.8	3,326.8	-2,007.3	3,885.2	0.33	-0.11	-0.32
10,383.0	88.40	336.10	6,458.8	5,467.8	3,413.3	-2,046.4	3,979.6	2.31	-2.11	0.95
10,477.0	88.40	334.70	6,461.4	5,470.4	3,498.8	-2,085.5	4,073.1	1.49	0.00	-1.49
10,572.0	88.50	335.20	6,464.0	5,473.0	3,584.8	-2,125.7	4,167.7	0.54	0.11	0.53
10,666.0	88.30	334.50	6,466.6	5,475.6	3,669.9	-2,165.7	4,261.2	0.77	-0.21	-0.74
Final Survey=10682' MD/6467' TVD										
10,682.0	88.20	334.80	6,467.1	5,476.1	3,684.3	-2,172.5	4,277.2	1.98	-0.63	1.88
513144 Plat TD 2										
10,735.2	88.20	334.80	6,468.8	5,477.8	3,732.4	-2,195.2	4,330.1	0.00	0.00	0.00
Projection to TD/ Deapest Point of Well=10737' MD/6469' TVD										
10,737.0	88.20	334.80	6,468.8	5,477.8	3,734.1	-2,195.9	4,331.9	0.00	0.00	0.00

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AUG 19 2015

Phoenix Technologies

Survey Report

17-06458

Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Site Doddridge County 513144
Company:	EOT Production - Marcellus	TVD Reference:	KB 23 ft @ 991.0usft
Project:	Doddridge County, WV Grid	MD Reference:	KB 23 ft @ 991.0usft
Site:	Doddridge County 513144	North Reference:	Grid
Well:	Well #513144	Survey Calculation Method:	Minimum Curvature
Wellbore:	Main Wellbore		
Design:	513144 As Drilled Surveys		

Formations					
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
4,950.6	4,950.0	Top of Elks @4950' TVD			
5,000.7	5,000.0	Int. csg pt @5000' TVD			
6,681.2	6,371.0	Top of Marcellus @6371' TVD			
8,509.7	6,428.0	Top of Onondaga @6428' TVD			

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,110.0	5,109.2	13.7	-50.6	Gyro Tie In=5110' MD
6,888.0	6,399.0	249.1	-569.1	LP=6888' MD/6399' TVD
10,682.0	6,467.1	3,684.3	-2,172.5	Final Survey=10682' MD/6467' TVD
10,737.0	6,468.8	3,734.1	-2,195.9	Projection to TD/ Deepest Point of Well=10737' MD/6469' TVD

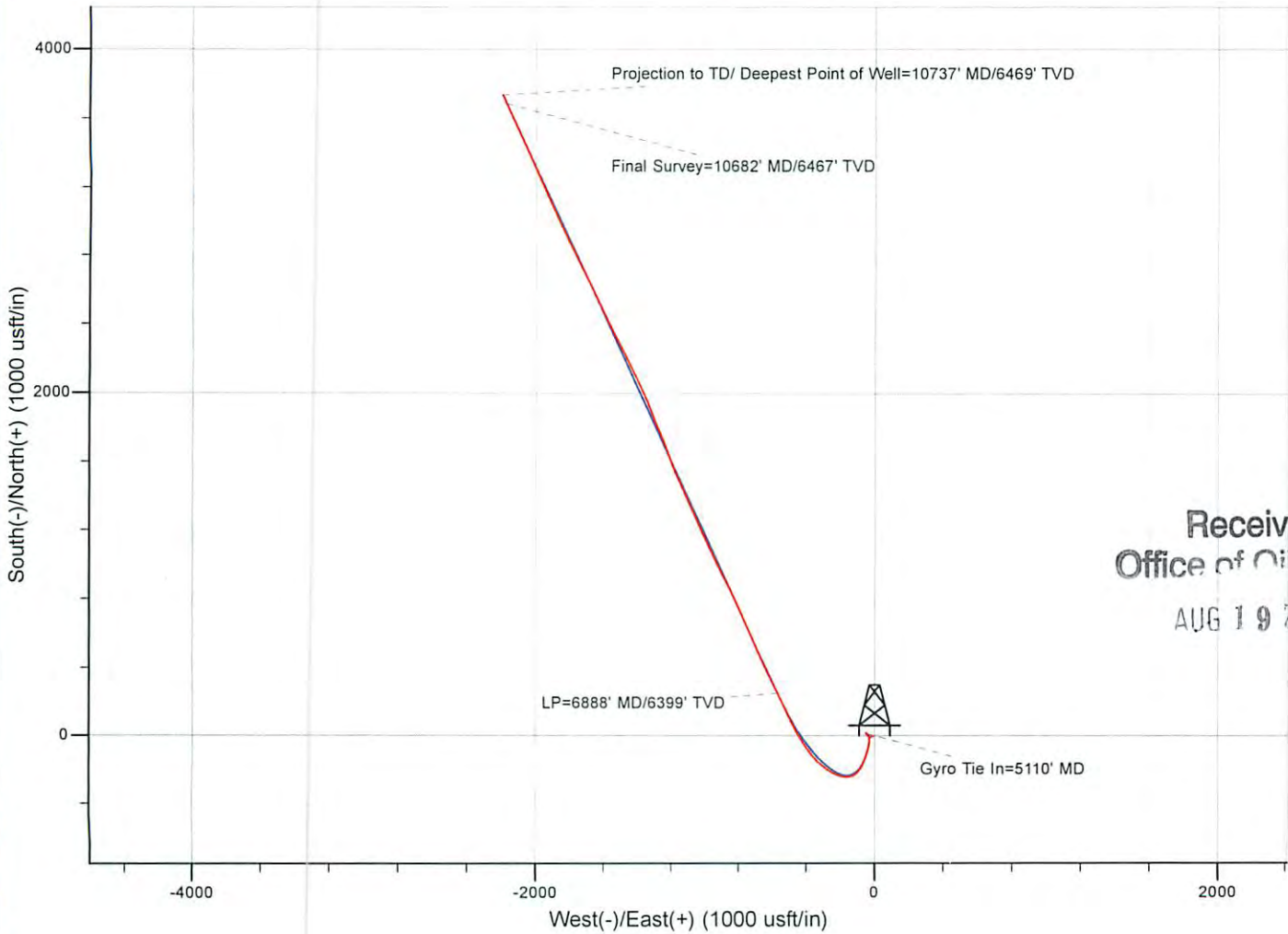
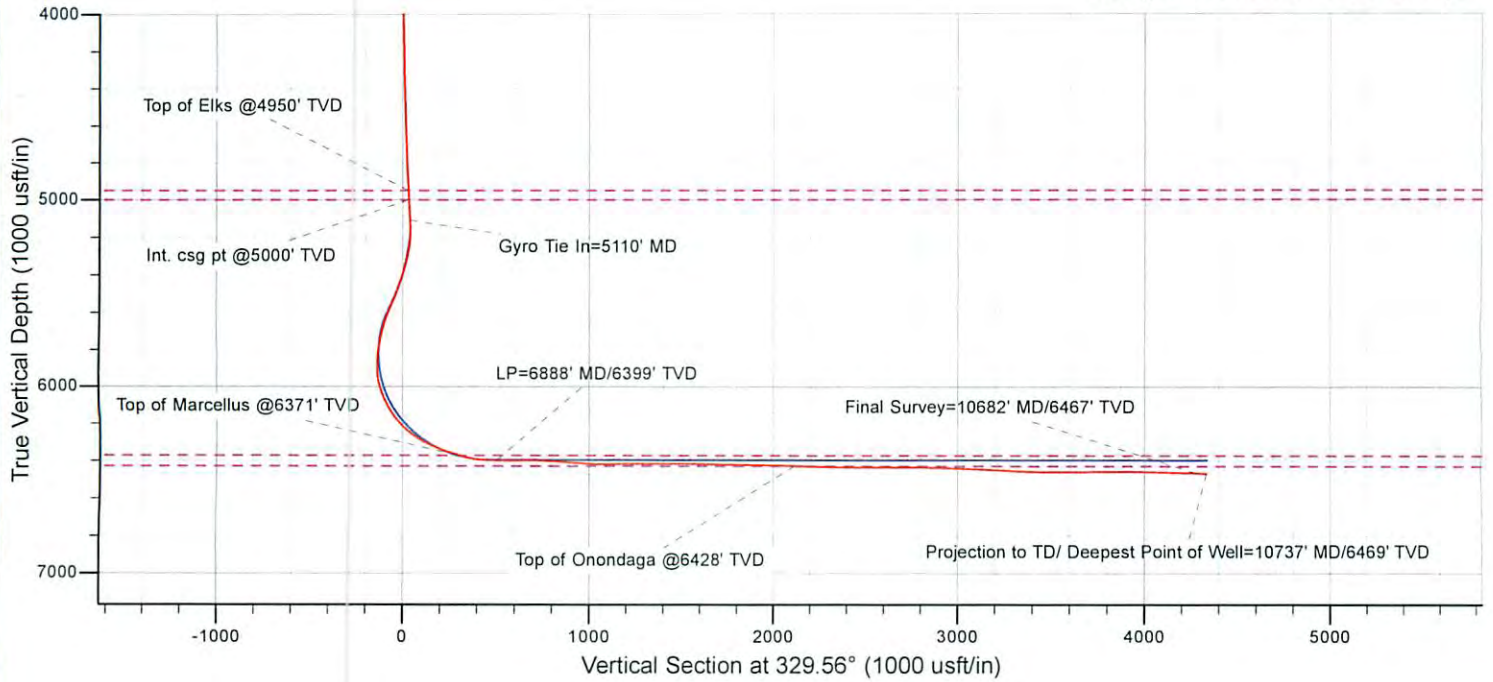
Checked By: _____ Approved By: _____ Date: _____

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17-06458

EQT Production - Marcellus

Project: Doddridge County, WV Grid
Site: Doddridge County 513144
Well: Well #513144
Wellbore: Main Wellbore
Design: 513144 As Drilled Surveys



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AUG 19 2015

10/09/2015

513144 - 47-017-06358-0000 - Perforations

Stage Number	Perforation Date	Top Perf Depth (ftKB)	Bottom Perf Depth (ftKB)	Number of Shots	Formation
Initiation Sleeve	3/27/2015	10,723.00	10,725.00	10	MARCELLUS
1	4/13/2015	10,458.00	10,640.00	32	MARCELLUS
2	4/14/2015	10,234.00	10,416.00	40	MARCELLUS
3	4/14/2015	10,009.00	10,191.00	40	MARCELLUS
4	4/15/2015	9,784.00	9,966.00	40	MARCELLUS
5	4/15/2015	9,561.00	9,741.00	40	MARCELLUS
6	4/16/2015	9,336.00	9,516.00	40	MARCELLUS
7	4/16/2015	9,109.00	9,291.00	40	MARCELLUS
8	4/16/2015	8,884.00	9,066.00	40	MARCELLUS
9	4/16/2015	8,661.00	8,841.00	40	MARCELLUS
10	4/16/2015	8,436.00	8,616.00	40	MARCELLUS
11	4/17/2015	8,209.00	8,387.00	40	MARCELLUS
12	4/17/2015	7,984.00	8,166.00	40	MARCELLUS
13	4/17/2015	7,759.00	7,941.00	40	MARCELLUS
14	4/17/2015	7,532.00	7,718.00	40	MARCELLUS
15	4/17/2015	7,309.00	7,491.00	40	MARCELLUS
16	4/18/2015	7,084.00	7,266.00	40	MARCELLUS
17	4/18/2015	6,859.00	7,041.00	40	MARCELLUS

17-06-458

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513144 - 47-017-06358-0000 - 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	4/13/2015	14.7	7,813.00	9,310.00	5,135.00	0	1814	0
1	4/13/2015	92.9	8,307.00	8,570.00	5,060.00	483,360	14429	0
2	4/14/2015	101.3	7,449.00	7,710.00	5,201.00	361,980	9311	0
3	4/14/2015	94.1	8,311.00	9,224.00	4,908.00	361,760	13960	0
4	4/15/2015	98.6	7,172.00	7,489.00	5,174.00	375,740	13935	0
5	4/16/2015	99.6	7,414.00	9,403.00	5,349.00	369,240	9911	0
6	4/16/2015	101.2	7,482.00	7,809.00	5,071.00	363,400	8962	0
7	4/16/2015	100.6	7,439.00	7,649.00	4,854.00	361,360	8824	0
8	4/16/2015	100.1	7,407.00	7,592.00	5,066.00	362,840	8954	0
9	4/16/2015	100.2	7,313.00	7,605.00	5,092.00	364,220	8547	0
10	4/17/2015	98.1	7,189.00	7,823.00	4,981.00	372,020	11121	0
11	4/17/2015	100.2	7,319.00	7,606.00	4,801.00	370,240	8714	0
12	4/17/2015	100.8	7,374.00	7,839.00	5,007.00	367,940	8630	0
13	4/17/2015	99.7	7,384.00	7,659.00	4,934.00	365,880	8607	0
14	4/17/2015	98.5	7,501.00	8,537.00	5,197.00	370,240	8550	0
15	4/18/2015	99.4	7,193.00	8,013.00	5,146.00	371,200	8557	0
16	4/18/2015	99.4	7,242.00	8,545.00	4,394.00	366,860	9317	0
17	4/18/2015	100.90	6,726.00	7,336.00	4,442	360,280	8,434	0

17-06458

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AUG 19 2015

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	4/13/2015
Job End Date:	4/18/2015
State:	West Virginia
County:	Doddridge
API Number:	47-017-06458-00-00
Operator Name:	EQT Production
Well Name and Number:	513144
Longitude:	-80.76635300
Latitude:	39.23609200
Datum:	NAD83
Federal/Tribal Well:	NO
True Vertical Depth:	6,361
Total Base Water Volume (gal):	7,164,234
Total Base Non Water Volume:	0



17-06458

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	90.08098	None
Sand (Proppant)	Keane Group	Proppant	Silica Substrate	14808-60-7	100.00000	9.56560	None
MC MX 437-5	Multi-Chem	Calcium nitrate solution	Calcium nitrate	10124-37-5	60.00000	0.06122	None
FFR 760	Keane Group	Friction reducer	Hydrotreated Light Distillate	64742-47-8	30.00000	0.01610	None
			Alkyl Alcohol	Proprietary	10.00000	0.00537	None
			Oxyalkylated alcohol A	Proprietary	5.00000	0.00268	None
Hydrochloric Acid (15%)	Keane Group	Acidizing	Hydrochloric Acid	7647-01-0	15.00000	0.02246	None
EC6380A	Keane Group	Scale Inhibitor	Sodium Phosphate, Tribasic	7601-54-9	5.00000	0.00121	None
FFR 730	Keane Group	Friction reducer	Oxyalkylated alcohol A	Proprietary	5.00000	0.00117	None
AI 600	Keane Group	Corrosion Inhibitor	Ethylene Glycol	107-21-1	40.00000	0.00015	None

Received
 Office of Oil & Gas
 April 15, 2015

			N, N-Dimethylformamide	68-12-2	20.00000	0.00007	None
			Cinnamialdehyde	104-55-2	15.00000	0.00006	None
			Tar bases, quinoline derivs, benzyl chloride-quaternized	72480-70-7	15.00000	0.00006	None
			2-Butoxyethanol	111-76-2	15.00000	0.00006	None
			Poly (oxy-1,2-ethanediyl), alpha-(4-nonylphenyl)-omega- hydroxy-, branched	127087-87-0	5.00000	0.00002	None
			1-Decanol	112-30-1	5.00000	0.00002	None
			Isopropyl alcohol	67-63-0	2.50000	0.00001	None
			1-Octanol	111-87-5	2.50000	0.00001	None
			Triethyl Phosphate	78-40-0	2.50000	0.00001	None
LEB-10X	Keane Group	Gel Breaker					
			Ethylene Glycol	107-21-1	30.00000	0.00001	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)

17-06458

Received
Office of M & E
AUG 19 2015

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.



**EQT PRODUCTION COMPANY
LEEMAN MAXWELL LEASE
2,164 ACRES±
WELL NO. WV 513144**

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)
 NAD'27 S.P.C.(FT) N. 270,627.7 E. 1,641,308.6
 NAD'27 GEO. LAT-(N) 39.236092 LONG-(W) 80.766353
 NAD'83 UTM (M) N. 4,343,011.9 E. 520,179.4

LANDING POINT
 NAD'27 S.P.C.(FT) N. 270,755.7 E. 1,640,796.0
 NAD'27 GEO. LAT-(N) 39.236424 LONG-(W) 80.768169
 NAD'83 UTM (M) N. 4,343,048.3 E. 520,022.6

BOTTOM HOLE
 NAD'27 S.P.C.(FT) N. 274,362.8 E. 1,639,114.0
 NAD'27 GEO. LAT-(N) 39.246261 LONG-(W) 80.774287
 NAD'83 UTM (M) N. 4,344,138.6 E. 519,491.9

LEGEND
 AS DRILLED ——— (Red line)
 PROPOSED - - - - - (Green dashed line)

**AS DRILLED COORDINATES
FOR WELL NO. WV 513144
(47-017-06458)**

(S.P.C. NORTHZONE) (UTM(M) ZONE 17 NORTH)
 NAD'27 S.P.C.(FT) N. 270,627.7 E. 1,641,308.6
 NAD'27 GEO. LAT-(N) 39.236092 LONG-(W) 80.766353
 NAD'83 UTM (M) N. 4,343,011.9 E. 520,179.4

BOTTOM HOLE
 NAD'27 S.P.C.(FT) N. 274,361.6 E. 1,639,112.3
 NAD'27 GEO. LAT-(N) 39.246257 LONG-(W) 80.774291
 NAD'83 UTM (M) N. 4,344,138.3 E. 519,491.5

Professional Energy Consultants
 A DIVISION OF SMITH LAND SURVEYING, INC.

 SURVEYORS
 ENGINEERS
 ENVIRONMENTAL
 PROJECT MGMT.
 (304) 462-5634
 WWW.SLSURVEY.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. 677
Gregory A. Smith



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
 DATE APRIL 16, 20 13
 REVISED 03/06/14 & 12/18/14
 OPERATORS WELL NO. WV 513144
 API WELL NO. 47-017-06458
 STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 200 FILE NO. 7889ASDRILLED513144
 HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 1000'

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:
 ELEVATION: 970'(GROUND) 968'(PROPOSED) WATERSHED BLUESTONE CREEK
 DISTRICT WEST UNION COUNTY DODDRIDGE QUADRANGLE OXFORD 7.5'
 SURFACE OWNER JUSTIN L. HENDERSON (LIFE) ACREAGE 1,602.90±
 ROYALTY OWNER LEEMAN MAXWELL HRS ACREAGE (2,164±) (1,000±)
 PROPOSED WORK:
 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 6399'

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

COUNTY NAME PERMIT

10/09/2015