

WR-35  
Rev (9-11)

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

DATE: 2-26-2015  
API #: 47-009-00147

Farm name: State of WV DNR A BRK 3H Operator Well No.: 835521

LOCATION: Elevation: 1,140' Quadrangle: Steubenville East, WV

District: Cross Creek County: Brooke  
Latitude: 9,860' Feet South of 40 Deg. 20 Min. 00 Sec.  
Longitude 4,500' Feet West of 80 Deg. 30 Min. 00 Sec.

Company: Chesapeake Appalachia, L.L.C.

Address:	Casing & Tubing	Used in drilling	Left in well	Cement fill up Cu. Ft.
P.O. Box 18496 Oklahoma City, OK 73154-0496	20"	138'	138'	443 Cu. Ft.
Agent: Eric Gillespie	13 3/8"	750'	750'	825 Cu. Ft.
Inspector: <b>Bill Hendershot</b>	9 5/8"	1,566'	1,566'	643 Cu. Ft.
Date Permit Issued: 8-28-2012	5 1/2"	13,476'	13,476'	1061 Cu. Ft.
Date Well Work Commenced: 10-17-2012				
Date Well Work Completed: 6-11-2013				
Verbal Plugging:				
Date Permission granted on:				
Rotary <input checked="" type="checkbox"/> Cable <input type="checkbox"/> Rig <input type="checkbox"/>				
Total Vertical Depth (ft): 5,705'				
Total Measured Depth (ft): 13,476'				
Fresh Water Depth (ft.): 330'				
Salt Water Depth (ft.): 1,210'				
Is coal being mined in area (N/Y)? N				
Coal Depths (ft.): N/A				
Void(s) encountered (N/Y) Depth(s) N				

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OPEN FLOW DATA (If more than two producing formations please include additional data on separate sheet)

Producing formation Marcellus Pay zone depth (ft) 5,870-13,345

Gas: Initial open flow \_\_\_\_\_ MCF/d Oil: Initial open flow \_\_\_\_\_ Bbl/d

Final open flow 1,154\* MCF/d Final open flow 582 Bbl/d

Time of open flow between initial and final tests 48 Hours \*Calculated

Static rock Pressure 3,708\* psig (surface pressure) after 48 Hours

Second producing formation \_\_\_\_\_ Pay zone depth (ft) \_\_\_\_\_

Gas: Initial open flow \_\_\_\_\_ MCF/d Oil: Initial open flow \_\_\_\_\_ Bbl/d

Final open flow \_\_\_\_\_ MCF/d Final open flow \_\_\_\_\_ Bbl/d

Time of open flow between initial and final tests \_\_\_\_\_ Hours

Static rock Pressure \_\_\_\_\_ psig (surface pressure) after \_\_\_\_\_ Hours

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I certify under penalty of law that I have personally examined and am familiar with the information submitted on this document and all the attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information I believe that the information is true, accurate, and complete.

Marlene Williams  
Signature

2-26-15  
Date

04/08/2016

9-00147

Were core samples taken? Yes \_\_\_\_\_ No N Were cuttings caught during drilling? Yes Y No \_\_\_\_\_

Were Electrical, Mechanical or Geophysical logs recorded on this well? If yes, please list LWD GR from 5091-13476' MD.

NOTE: IN THE AREA BELOW PUT THE FOLLOWING: 1). DETAILS OF PERFORATED INTERVALS, FRACTURING OR STIMULATING, PHYSICAL CHANGE, ETC. 2). THE WELL LOG WHICH IS A SYSTEMATIC DETAILED GEOLOGICAL RECORD OF THE TOPS AND BOTTOMS OF ALL FORMATIONS, INCLUDING COAL ENCOUNTERED BY THE WELLBORE FROM SURFACE TO TOTAL DEPTH.

Perforated Intervals, Fracturing, or Stimulating:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Plug Back Details Including Plug Type and Depth(s):

\_\_\_\_\_

Formations Encountered:	Top Depth	Bottom Depth
Surface:		

See attached

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
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**LATERAL WELLBORE (no vertical pilot hole associated with this well)**

**Maximum TVD of wellbore:** 5705 ft TVD @ 5943 ft MD

Formation/Lithology	Top Depth, MD (ft)	Top Depth, TVD (ft)	Bottom Depth, MD (ft)	Bottom Depth, TVD (ft)
SS/SH	0	0	656	656
KITTANING COAL	656	656	664	664
SS/SH	664	664	880	880
SHALE	880	880	1000	1000
SS	1000	1000	1120	1120
BIG LIME	1120	1120	1210	1210
BIG INJUN (SS)	1210	1210	1385	1385
SHALE	1385	1385	5520	5500
GENESE0 (SH)	5520	5500	5540	5517
TULLY (LS)	5540	5517	5617	5578
HAMILTON (SH)	5617	5578	5739	5656
MARCELLUS (SH)	5739	5656		
TD OF LATERAL			13476	5597

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Company: Chesapeake  
 Lease/Well: State of WV DNR A BRK/3H



Rig Name: Nomac 37  
 State/County: West Virginia/Brooke  
 Latitude: 40.32, Longitude: -80.54  
 GRID North is 0.66 Degrees West of True North  
 VS-Azi: 0.00 Degrees

FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB = 18'

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: stateofwvdrnrbrk3h\_ed.ut  
 Minimum Curvature Method  
 Report Date/Time: 10/24/2012 / 08:29

Vaughn Energy Services  
 Morgantown, West Virginia  
 304-777-2189  
 Leon Laskowski

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.12	293.93	100.00	0.04	-0.10	0.04	0.10	293.93	0.12
200.00	0.19	294.60	200.00	0.15	-0.34	0.15	0.37	294.22	0.07
300.00	0.05	294.00	300.00	0.24	-0.52	0.24	0.57	294.31	0.14
400.00	0.14	292.66	400.00	0.30	-0.67	0.30	0.74	294.02	0.09
500.00	0.14	290.74	500.00	0.39	-0.90	0.39	0.98	293.45	0.01
600.00	0.11	293.63	600.00	0.47	-1.09	0.47	1.19	293.19	0.03
700.00	0.31	289.74	700.00	0.60	-1.43	0.60	1.55	292.61	0.21
800.00	0.41	206.60	800.00	0.37	-1.85	0.37	1.88	281.37	0.48
900.00	1.48	229.59	899.98	-0.78	-2.99	-0.78	3.09	255.34	1.11
1000.00	3.51	247.36	999.88	-2.80	-6.80	-2.80	7.35	247.63	2.15
1100.00	4.91	250.94	1099.61	-5.37	-13.67	-5.37	14.68	248.54	1.42
1200.00	6.75	241.42	1199.09	-9.58	-22.87	-9.58	24.79	247.27	2.07
1300.00	7.84	244.81	1298.28	-15.29	-34.20	-15.29	37.46	245.91	1.18
1400.00	7.72	242.87	1397.36	-21.26	-46.35	-21.26	50.99	245.36	0.29
1500.00	5.33	231.24	1496.71	-27.23	-55.95	-27.23	62.23	244.05	2.72
1600.00	4.20	237.47	1596.36	-32.11	-62.67	-32.11	70.41	242.87	1.25
1700.00	3.09	239.82	1696.16	-35.44	-68.08	-35.44	76.75	242.50	1.12
1800.00	2.06	246.89	1796.06	-37.49	-72.06	-37.49	81.23	242.51	1.08
1900.00	1.35	245.25	1896.01	-38.69	-74.78	-38.69	84.20	242.64	0.71
2000.00	0.89	244.82	1995.99	-39.51	-76.55	-39.51	86.45	242.70	0.46
2100.00	0.74	249.94	2095.98	-40.07	-77.86	-40.07	87.57	242.77	0.17
2200.00	0.68	263.68	2195.98	-40.36	-79.06	-40.36	88.77	242.96	0.18
2300.00	0.60	281.76	2295.97	-40.31	-80.17	-40.31	89.73	243.30	0.22
2400.00	0.54	289.08	2395.96	-40.05	-81.12	-40.05	90.47	243.72	0.10
2500.00	0.56	313.66	2495.96	-39.56	-81.92	-39.56	90.97	244.22	0.23
2600.00	0.44	322.24	2595.96	-38.93	-82.51	-38.93	91.23	244.7	0.14
2700.00	0.50	332.42	2695.95	-38.24	-82.94	-38.24	91.33	245.25	0.10
2800.00	0.52	344.36	2795.95	-37.42	-83.26	-37.42	91.29	245.80	0.11
2900.00	0.56	344.38	2895.94	-36.51	-83.52	-36.51	91.15	246.39	0.04

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Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
3000.00	0.63	349.92	2995.94	-35.49	-83.75	-35.49	90.96	247.03	0.09
3100.00	0.58	359.11	3095.93	-34.44	-83.85	-34.44	90.65	247.67	0.11
3200.00	0.57	10.62	3195.93	-33.45	-83.77	-33.45	90.20	248.23	0.12
3300.00	0.52	20.26	3295.92	-32.53	-83.52	-32.53	89.63	248.72	0.10
3400.00	0.51	15.93	3395.92	-31.68	-83.24	-31.68	89.06	249.16	0.04
3500.00	0.50	10.84	3495.92	-30.83	-83.04	-30.83	88.57	249.63	0.05
3600.00	0.49	8.60	3595.91	-29.98	-82.89	-29.98	88.14	250.12	0.02
3700.00	0.35	6.86	3695.91	-29.25	-82.79	-29.25	87.81	250.54	0.14
3800.00	0.49	9.38	3795.91	-28.53	-82.68	-28.53	87.47	250.97	0.15
3900.00	0.53	9.68	3895.90	-27.64	-82.54	-27.64	87.04	251.48	0.04
4000.00	0.49	14.12	3995.90	-26.77	-82.35	-26.77	86.60	251.99	0.06
4100.00	0.42	21.86	4095.90	-26.02	-82.11	-26.02	86.14	252.42	0.09
4200.00	0.33	23.28	4195.89	-25.41	-81.86	-25.41	85.71	252.76	0.09
4300.00	0.39	16.18	4295.89	-24.81	-81.65	-24.81	85.34	253.10	0.07
4400.00	0.49	357.09	4395.89	-24.05	-81.58	-24.05	85.05	253.57	0.17
4500.00	0.45	353.95	4495.89	-23.24	-81.64	-23.24	84.88	254.11	0.05
4600.00	0.51	354.08	4595.88	-22.40	-81.73	-22.40	84.74	254.67	0.07
4700.00	0.51	355.39	4695.88	-21.51	-81.81	-21.51	84.59	255.27	0.01
4800.00	0.42	353.03	4795.87	-20.69	-81.89	-20.69	84.46	255.82	0.09
4900.00	0.23	350.04	4895.87	-20.12	-81.97	-20.12	84.41	256.21	0.19
4975.00	0.15	351.23	4970.87	-19.88	-82.01	-19.88	84.39	256.38	0.11

HORIZONTAL DISPLACEMENT IS  
84.39 FEET AT 256.38 DEGREES

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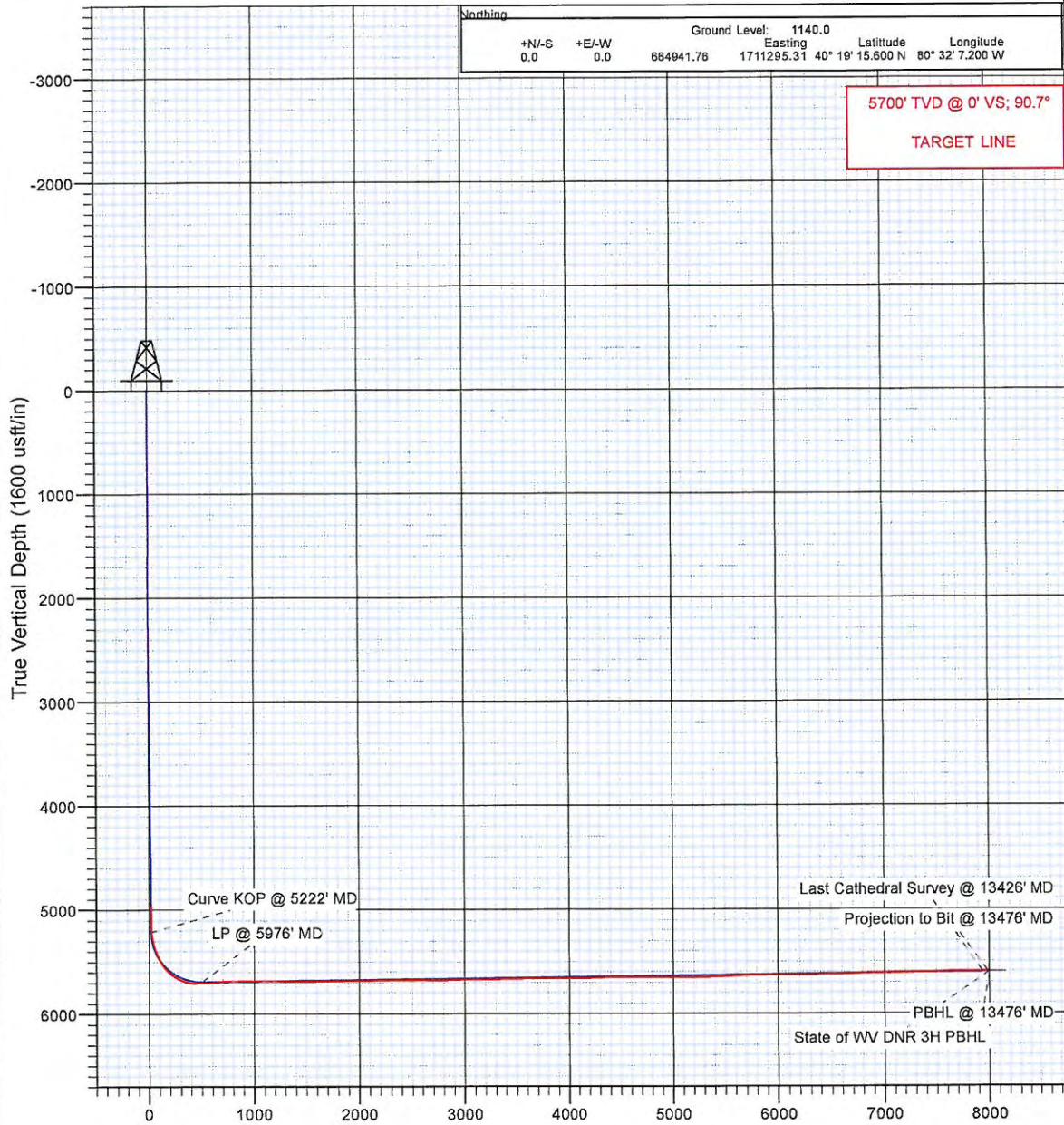


Project: Brooke County, WV  
Site: State of WV DNR  
Well: State of WV DNR A BRK 3H  
Wellbore: HZ  
Design: HZ

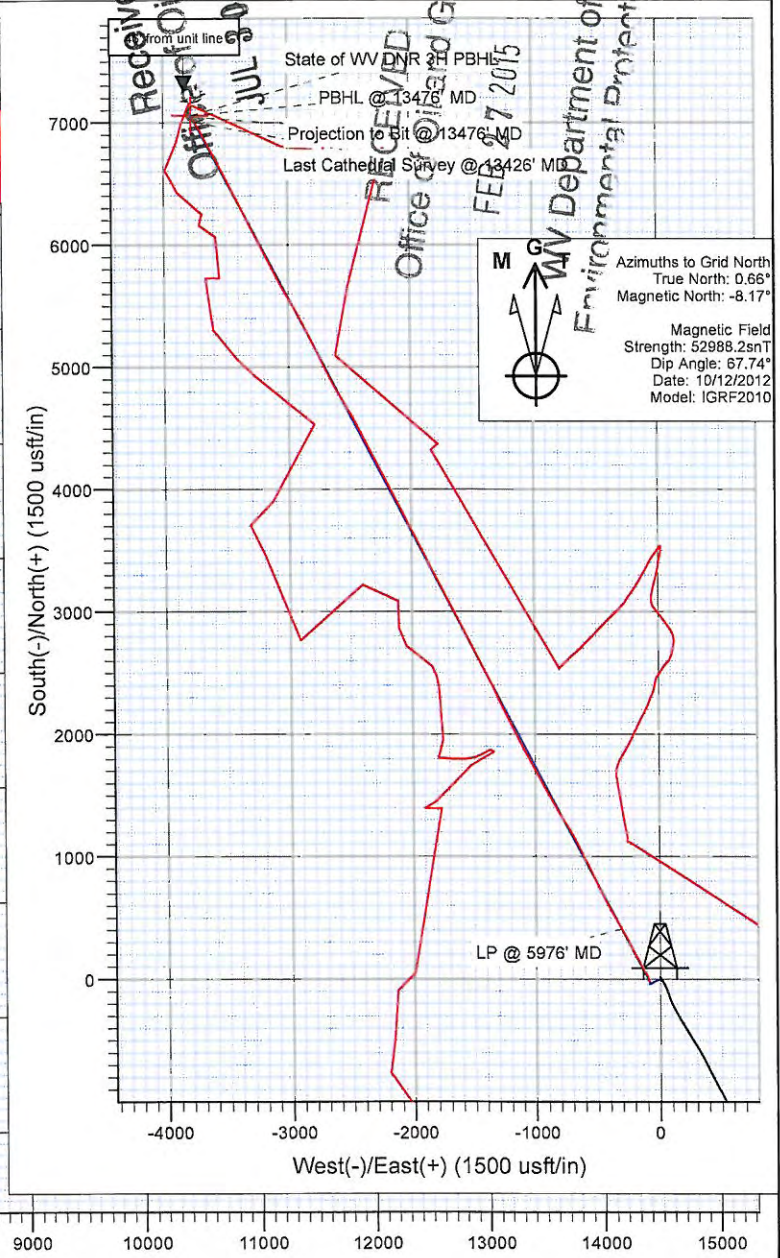


Northing			
+N/-S	+E/-W	Ground Level: 1140.0	
0.0	0.0	Easting	Latitude Longitude
		664941.76 1711295.31	40° 19' 15.600 N 80° 32' 7.200 W

5700' TVD @ 0° VS; 90.7°  
TARGET LINE



Vertical Section at 332.33° (1600 usft/in)



M  
 Azimuths to Grid North  
 True North: 0.66°  
 Magnetic North: -8.17°  
 Magnetic Field  
 Strength: 52988.2snT  
 Dip Angle: 67.74°  
 Date: 10/12/2012  
 Model: IGRF2010



**Cathedral Energy Services**  
Survey Report

9.00147

<b>Company:</b>	Chesapeake Energy Corp	<b>Local Co-ordinate Reference:</b>	Well State of WV DNR A BRK 3H
<b>Project:</b>	Brooke County, WV	<b>TVD Reference:</b>	WELL @ 1158.0usft (Original Well Elev)
<b>Site:</b>	State of WV DNR	<b>MD Reference:</b>	WELL @ 1158.0usft (Original Well Elev)
<b>Well:</b>	State of WV DNR A BRK 3H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	HZ	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	HZ	<b>Database:</b>	USA EDM 5000 Multi Users DB

<b>Project</b>	Brooke 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>	State of WV DNR				
<b>Site Position:</b>		<b>Northing:</b>	664,929.27 usft	<b>Latitude:</b>	40° 19' 15.478 N
<b>From:</b>	Lat/Long	<b>Easting:</b>	1,711,305.58 usft	<b>Longitude:</b>	80° 32' 7.066 W
<b>Position Uncertainty:</b>	0.0 usft	<b>Slot Radius:</b>	13-3/16"	<b>Grid Convergence:</b>	-0.66 °

<b>Well</b>	State of WV DNR A BRK 3H					
<b>Well Position</b>	<b>+N/-S</b>	0.0 usft	<b>Northing:</b>	664,941.76 usft	<b>Latitude:</b>	40° 19' 15.600 N
	<b>+E/-W</b>	0.0 usft	<b>Easting:</b>	1,711,295.31 usft	<b>Longitude:</b>	80° 32' 7.200 W
<b>Position Uncertainty</b>		0.0 usft	<b>Wellhead Elevation:</b>	usft	<b>Ground Level:</b>	1,140.0 usft

<b>Wellbore</b>	HZ				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	10/12/2012	-8.83	67.74	52,988

<b>Design</b>	HZ				
<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	332.33

<b>Survey Program</b>	<b>Date</b>	10/31/2012			
<b>From (usft)</b>	<b>To (usft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
100.0	4,975.0	Gyro 2 (HZ)	MWD	Geolink MWD	
4,975.0	13,476.0	Survey #1 (HZ)	MWD	Geolink MWD	

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100u)	Formations / Comments
4,975.0	0.15	351.23	4,970.9	-19.9	-82.1	20.5	0.00	0.00	Office of Oil and Gas
5,091.0	0.20	238.30	5,086.9	-19.9	-82.2	20.6	0.25	0.04	
5,122.0	0.20	47.70	5,117.9	-19.9	-82.3	20.6	1.28	0.00	
5,154.0	1.40	347.80	5,149.9	-19.4	-82.3	21.0	4.10	3.75	
5,186.0	3.30	333.50	5,181.8	-18.2	-82.8	22.3	6.17	5.94	
5,217.0	4.70	338.90	5,212.8	-16.3	-83.6	24.5	4.67	4.52	
5,248.0	6.60	340.40	5,243.6	-13.4	-84.7	27.5	6.15	6.13	
5,279.0	9.70	342.50	5,274.3	-9.2	-86.1	31.8	10.04	10.00	
5,311.0	12.60	342.50	5,305.7	-3.3	-87.9	37.9	9.06	9.06	
5,342.0	15.40	341.00	5,335.8	3.8	-90.3	45.3	9.11	9.03	
5,374.0	16.50	339.40	5,366.5	12.1	-93.3	54.0	3.70	3.70	
5,406.0	20.00	333.10	5,396.9	21.2	-97.4	64.0	12.54	10.94	

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<b>Site:</b> State of WV DNR	<b>MD Reference:</b> WELL @ 1156.0usft (Original Well Elev)
<b>Well:</b> State of WV DNR A BRK 3H	<b>North Reference:</b> Grid
<b>Wellbore:</b> HZ	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> HZ	<b>Database:</b> USA EDM 5000 Multi Users DB

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100u)	Formations / Comments
5,438.0	22.50	332.90	5,426.7	31.5	-102.6	75.6	7.82	7.82	
5,469.0	24.70	331.20	5,455.1	42.5	-108.4	88.0	7.43	7.10	
5,501.0	28.50	330.20	5,483.7	55.0	-115.5	102.3	11.96	11.88	
5,533.0	32.40	330.90	5,511.3	69.1	-123.4	118.5	12.24	12.19	
5,564.0	34.80	331.40	5,537.1	84.1	-131.7	135.7	7.79	7.74	
5,596.0	39.80	332.10	5,562.6	101.2	-140.9	155.1	15.68	15.63	
5,628.0	44.60	332.20	5,586.3	120.2	-150.9	176.5	15.00	15.00	
5,659.0	47.60	332.50	5,607.8	140.0	-161.3	198.9	9.70	9.68	
5,691.0	51.10	330.50	5,628.6	161.3	-172.9	223.2	11.92	10.94	
5,722.0	56.30	331.90	5,647.0	183.2	-184.9	248.1	17.16	16.77	
5,754.0	62.00	332.30	5,663.4	207.5	-197.7	275.6	17.84	17.81	
5,785.0	66.50	333.60	5,676.8	232.4	-210.4	303.5	15.00	14.52	
5,817.0	72.20	333.70	5,688.1	259.2	-223.7	333.4	17.81	17.81	
5,848.0	75.50	334.20	5,696.8	285.9	-236.8	363.2	10.76	10.65	
5,880.0	82.20	333.10	5,702.9	314.0	-250.7	394.6	21.21	20.94	
5,911.0	88.60	332.10	5,705.4	341.5	-264.9	425.4	20.89	20.65	
5,943.0	90.70	331.40	5,705.6	369.6	-280.1	457.4	6.92	6.56	
6,067.0	94.30	330.50	5,700.2	477.9	-340.2	581.3	2.99	2.90	
6,193.0	93.40	331.90	5,691.7	588.1	-400.8	706.9	1.32	-0.71	
6,319.0	90.00	332.50	5,688.0	699.5	-459.5	832.9	2.74	-2.70	
6,443.0	90.70	334.30	5,687.3	810.3	-515.0	956.8	1.56	0.56	
6,569.0	90.00	334.20	5,686.5	923.8	-569.8	1,082.8	0.56	-0.56	
6,696.0	89.20	334.30	5,687.4	1,038.2	-624.9	1,209.7	0.63	-0.63	
6,822.0	88.50	332.90	5,689.9	1,151.0	-681.0	1,335.6	1.24	-0.56	
6,948.0	91.70	327.50	5,689.7	1,260.3	-743.5	1,461.5	4.98	2.54	
7,073.0	90.50	329.70	5,687.3	1,367.0	-808.6	1,586.2	2.00	-0.96	
7,196.0	89.70	330.40	5,687.1	1,473.6	-870.1	1,709.1	0.86	-0.65	
7,322.0	90.70	331.40	5,686.6	1,583.7	-931.3	1,835.0	1.12	0.79	
7,448.0	90.20	332.40	5,685.6	1,694.8	-990.7	1,961.0	0.89	-0.40	
7,573.0	90.90	331.50	5,684.4	1,805.1	-1,049.5	2,086.0	0.91	0.56	
7,697.0	91.90	333.00	5,681.4	1,914.8	-1,107.2	2,210.0	1.45	0.81	
7,822.0	91.70	332.20	5,677.5	2,025.7	-1,164.7	2,334.9	0.66	-0.16	
7,945.0	89.60	333.90	5,676.1	2,135.4	-1,220.4	2,457.9	2.20	-1.71	
8,070.0	88.70	334.40	5,677.9	2,247.8	-1,274.9	2,582.8	0.82	-0.72	
8,196.0	90.20	335.30	5,679.1	2,361.9	-1,328.4	2,708.7	1.39	1.19	
8,322.0	91.20	332.30	5,677.6	2,474.9	-1,384.1	2,834.6	2.51	0.79	
8,448.0	92.20	333.10	5,673.9	2,586.8	-1,441.8	2,960.5	1.02	0.79	
8,575.0	90.70	332.70	5,670.7	2,699.9	-1,499.7	3,087.5	1.22	-1.18	
8,703.0	89.20	332.80	5,670.8	2,813.6	-1,558.3	3,215.5	1.17	-1.17	
8,828.0	90.50	332.10	5,671.1	2,924.4	-1,616.1	3,340.5	1.18	1.04	
8,952.0	91.90	332.50	5,668.5	3,034.2	-1,673.7	3,464.4	1.17	1.13	
9,078.0	92.00	332.80	5,664.2	3,146.1	-1,731.5	3,590.4	0.25	0.08	
9,204.0	92.20	332.90	5,659.6	3,258.1	-1,789.0	3,716.3	0.18	0.16	
9,328.0	88.50	333.60	5,658.8	3,368.8	-1,844.8	3,840.2	3.04	-2.98	
9,453.0	89.70	332.90	5,660.8	3,480.4	-1,901.1	3,965.2	1.11	0.96	
9,580.0	90.80	333.00	5,660.2	3,593.5	-1,958.8	4,092.2	0.87	0.87	
9,706.0	90.70	332.50	5,658.6	3,705.5	-2,016.5	4,218.2	0.40	-0.08	
9,831.0	91.50	332.90	5,656.2	3,816.6	-2,073.8	4,343.1	0.72	0.64	
9,955.0	90.00	332.00	5,654.6	3,926.5	-2,131.2	4,467.1	1.41	-1.21	
10,082.0	91.00	331.80	5,653.5	4,038.5	-2,191.0	4,594.1	0.80	0.79	
10,209.0	90.20	332.50	5,652.1	4,150.8	-2,250.3	4,721.1	0.84	-0.63	
10,335.0	90.50	334.40	5,651.4	4,263.5	-2,306.6	4,847.1	1.53	0.24	
10,462.0	88.80	332.80	5,652.1	4,377.3	-2,363.1	4,974.0	1.84	-1.34	

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9-00147

**Cathedral Energy Services**  
Survey Report

<b>Company:</b> Chesapeake Energy Corp	<b>Local Co-ordinate Reference:</b> Well State of WV DNR A BRK 3H
<b>Project:</b> Brooke County, WV	<b>TVD Reference:</b> WELL @ 1158 0usft (Original Well Elev)
<b>Site:</b> State of WV DNR	<b>MD Reference:</b> WELL @ 1158 0usft (Original Well Elev)
<b>Well:</b> State of WV DNR A BRK 3H	<b>North Reference:</b> Grid
<b>Wellbore:</b> HZ	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> HZ	<b>Database:</b> USA EDM 5000 Multi Users DB

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100u)	Formations / Comments
10,589.0	89.30	332.20	5,654.2	4,489.9	-2,421.7	5,101.0	0.61	0.39	
10,716.0	90.10	330.30	5,654.9	4,601.2	-2,482.8	5,228.0	1.62	0.63	
10,844.0	92.30	329.00	5,652.2	4,711.7	-2,547.5	5,355.8	2.00	1.72	
10,971.0	93.00	329.00	5,646.4	4,820.4	-2,612.8	5,482.5	0.55	0.55	
11,096.0	92.20	333.50	5,640.7	4,929.9	-2,672.8	5,607.3	3.65	-0.64	
11,223.0	92.60	332.90	5,635.4	5,043.1	-2,730.1	5,734.1	0.57	0.31	
11,350.0	90.00	334.30	5,632.5	5,156.8	-2,786.5	5,861.1	2.32	-2.05	
11,478.0	89.50	333.50	5,633.0	5,271.8	-2,842.8	5,989.0	0.74	-0.39	
11,604.0	91.90	332.10	5,631.5	5,383.8	-2,900.4	6,115.0	2.21	1.90	
11,730.0	90.10	330.00	5,629.3	5,494.0	-2,961.4	6,240.9	2.19	-1.43	
11,857.0	91.00	330.10	5,628.1	5,604.1	-3,024.8	6,367.8	0.71	0.71	
11,983.0	90.00	332.70	5,627.0	5,714.7	-3,085.1	6,493.8	2.21	-0.79	
12,107.0	90.80	333.10	5,626.1	5,825.1	-3,141.6	6,617.8	0.72	0.65	
12,233.0	93.70	332.80	5,621.2	5,937.2	-3,198.8	6,743.7	2.31	2.30	
12,358.0	92.00	332.90	5,615.0	6,048.3	-3,255.8	6,868.5	1.36	-1.36	
12,483.0	90.20	334.80	5,612.6	6,160.4	-3,310.9	6,993.4	2.09	-1.44	
12,609.0	90.60	333.70	5,611.7	6,273.9	-3,365.6	7,119.3	0.93	0.32	
12,734.0	90.80	332.80	5,610.2	6,385.5	-3,421.8	7,244.3	0.74	0.16	
12,859.0	90.40	332.40	5,608.8	6,496.5	-3,479.4	7,369.3	0.45	-0.32	
12,984.0	92.50	333.20	5,605.7	6,607.6	-3,536.5	7,494.2	1.80	1.68	
13,109.0	90.90	332.20	5,602.0	6,718.7	-3,593.8	7,619.2	1.51	-1.28	
13,237.0	90.80	333.30	5,600.1	6,832.4	-3,652.4	7,747.2	0.86	-0.08	
13,364.0	90.20	331.90	5,599.0	6,945.2	-3,710.8	7,874.1	1.20	-0.47	
13,426.0	90.90	330.80	5,598.4	6,999.6	-3,740.6	7,936.1	2.10	1.13	
13,476.0	90.90	330.80	5,597.6	7,043.2	-3,764.9	7,986.1	0.00	0.00	

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
State of WV DNR 3H PE	0.00	360.00	5,602.2	7,057.1	-3,775.3	671,998.95	1,707,519.93	40° 20' 24.00" N	80° 32' 57.00" W
- survey misses target center by 17.9usft at 13476.0usft MD (5597.6 TVD, 7043.2 N, -3764.9 E)									
- Point									

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
13,426.0	5,598.4	6,999.6	-3,740.6	Last Cathedral Survey @ 13426' MD
13,476.0	5,597.6	7,043.2	-3,764.9	Projection to Bit @ 13476' MD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ FEB 27 2015

WV Department of  
Environmental Protection

04/08/2016



# Hydraulic Fracturing Fluid Product Component Information Disclosure

9-00147

<b>Fracture Date:</b>	5/2/2013
<b>State:</b>	WEST VIRGINIA
<b>County:</b>	BROOKE
<b>API Number:</b>	4700900147
<b>Operator Name:</b>	CHESAPEAKE APPALACHIA LLC
<b>Well Name and Number:</b>	STATE OF WV DNR A BRK 3H
<b>Longitude:</b>	-80.535331
<b>Latitude:</b>	40.320994
<b>Long/Lat Projection:</b>	NAD27
<b>Production Type:</b>	GAS
<b>True Vertical Depth (TVD):</b>	5,706
<b>Total Water Volume (gal)*:</b>	6,923,532

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## 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
Fresh Water	CHESAPEAKE ENERGY	Carrier/Base Fluid	Water	007732-18-5	100.00000%	74.36702%	
Recycled Produced Water	CHESAPEAKE ENERGY	Carrier/Base Fluid	Water	007732-18-5	100.00000%	11.00719%	
EC6486A	NALCO	Scale Inhibitor	Ethylene Glycol	000107-21-1	30.00000%	0.00189%	
EC6110A	NALCO	Anti-Bacterial Agent	Ethanol	000064-17-5	5.00000%	0.00137%	
			Glutaraldehyde (Pentanediol)	000111-30-8	60.00000%	0.01639%	
			Quaternary Ammonium Compounds	NA	10.00000%	0.00273%	
Acid, Hydrochloric 15pct, A264, B315, D047, J218, J475, J580, J610, L058, 100 Mesh Sand, Northern White Sand	SCHLUMBERGER	Acid, Breaker, Corrosion Inhibitor, Cross Linker, Defoaming Agent, Friction Reducer, Gelling Agent, Iron Control Agent, Proppant - Natural	Crystalline silica	14808-60-7	98.73571%	14.22614%	
			Hydrogen chloride	7647-01-0	0.85826%	0.12366%	
			Water	007732-18-5	1.48638%	0.21749%	
			Distillates (petroleum), hydrotreated light	64742-47-8	0.12498%	0.01801%	
			Acrylamide/ammonium acrylate copolymer	26100-47-0	0.10415%	0.01501%	
			Guar gum	9000-30-0	0.09296%	0.01339%	



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Ammonium chloride	12125-02-9	0.05989%	0.00863%
Ethoxylated oleic acid	9004-96-0	0.01042%	0.00150%
Sorbitan monooleate	1308-43-8	0.00911%	0.00131%
Diammonium peroxodisulphate	1727-54-0	0.00668%	0.00096%
Sorbitol Tetraoleate	6173-83-9	0.00651%	0.00094%
Alcohols, C12-C16, ethoxylated	6855-112-2	0.00542%	0.00078%
Alcohols, C12-C14, ethoxylated	68439-50-9	0.00536%	0.00077%
Alcohols, C10-C16, ethoxylated	68002-97-1	0.00536%	0.00077%
Sodium erythorbate	6384-77-7	0.00332%	0.00048%
Methanol	6756-1	0.00317%	0.00046%
C14 alpha olefin ethoxylate	84133-50-6	0.00286%	0.00041%
2-Propenoic acid, ammonium salt	10604-69-0	0.00260%	0.00038%
Fatty acids, tall-oil	61790-12-3	0.00233%	0.00034%
Thiourea, polymer with formaldehyde and 1-phenylethanone	68527-49-1	0.00192%	0.00028%
Alcohols, C14-15, ethoxylated (7EO)	68951-67-7	0.00089%	0.00013%
Polypropylene glycol	25322-69-4	0.00087%	0.00013%
Prop-2-yn-1-ol	107-19-7	0.00059%	0.00009%
Alkenes, C>10 a-	64743-02-8	0.00040%	0.00006%
Potassium borate	1332-77-0	0.00029%	0.00004%
Non-crystalline silica	7631-86-9	0.00025%	0.00004%
Glycerol	56-81-5	0.00009%	0.00001%
Potassium hydroxide	1310-58-3	0.00009%	0.00001%
Vinylidene chloride/methylacrylate copolymer	25038-72-6	0.00006%	0.00001%
Magnesium silicate hydrate (talc)	14807-96-6	0.00001%	0.00001%

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Additional Ingredients Not Listed on MSDS							
EC6110A, EC6486A	NALCO	Anti-Bacterial Agent, Scale Inhibitor	Diethylene Glycol	000111-46-6		0.00007%	
			Proprietary Inorganic Phosphate	TRADE SECRET		0.00073%	
			Proprietary Organic Acid Derivatives	TRADE SECRET		0.00219%	
			Water	007732-18-5		0.02466%	

\* 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%

"Additional Ingredients Not Listed on MSDS" component information were obtained directly from the supplier. As such, the Operator is not responsible for inaccurate and/or incomplete information. Any questions regarding the content of this information should be directed to the supplier who provided it.