

Farm name: Russell Hervey BRK 5H Operator Well No.: 835018

LOCATION: Elevation: 1,160' Quadrangle: Stuebenville East

District: Buffalo County: Brooke
Latitude: 4,260' Feet South of 40 Deg. 17 Min. 30 Sec.
Longitude 12,250' Feet West of 80 Deg. 32 Min. 30 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'	244 Cu. Ft.
Agent: Eric Gillespie	13 3/8"	358'	358'	505 Cu. Ft.
Inspector: Gayne J. Knitowski	9 5/8"	1,701'	1,701'	836 Cu. Ft.
Date Permit Issued: 8-25-2012	5 1/2"	11,638'	11,638'	1,077 Cu. Ft.
Date Well Work Commenced: 12-9-2012				
Date Well Work Completed: 5-7-2013				
Verbal Plugging:				
Date Permission granted on:				
Rotary <input checked="" type="checkbox"/> Cable <input type="checkbox"/> Rig <input type="checkbox"/>				
Total Vertical Depth (ft): 5,869'				
Total Measured Depth (ft): 11,638'				
Fresh Water Depth (ft.): 277'				
Salt Water Depth (ft.): 1100'				
Is coal being mined in area (N/Y)? N				
Coal Depths (ft.): 245'				
Void(s) encountered (N/Y) Depth(s) N				

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

Producing formation Marcellus Pay zone depth (ft) 6,200-11,401
 Gas: Initial open flow _____ MCF/d Oil: Initial open flow _____ Bbl/d
 Final open flow 2,464* MCF/d Final open flow 412 Bbl/d
 Time of open flow between initial and final tests 240 Hours
 Static rock Pressure 3,815* psig (surface pressure) after 240 Hours *Calculated

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

9-00144

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 GR, neutron, density, and resistivity
Open hole logs run from 0-1713' MD; LWD GR from 5232-11638' 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:

See attached

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: 5869 ft TVD @ 6377 ft MD**

Formation/Lithology	Top Depth, MD (ft)	Top Depth, TVD (ft)	Bottom Depth, MD (ft)	Bottom Depth, TVD (ft)
LS/SILT	0	0	272	272
PITTSBURG COAL	272	272	282	282
LS/SHALE/SILT	282	282	380	380
SS	380	380	440	440
SHALE	440	440	590	590
LS/SILT/SHALE	590	590	856	856
KITTANNING COAL	856	856	862	862
SS/SILT	862	862	1267	1267
BIG LIME	1267	1267	1315	1315
BIG INJUN (SS)	1315	1315	1612	1612
SHALE	1612	1612	5731	5667
GENESEO (SH)	5731	5667	5751	5680
TULLY (LS)	5751	5680	5763	5688
HAMILTON (SH)	5763	5688	6116	5837
MARCELLUS (SH)	6116	5837		
TD OF LATERAL			11638	5826

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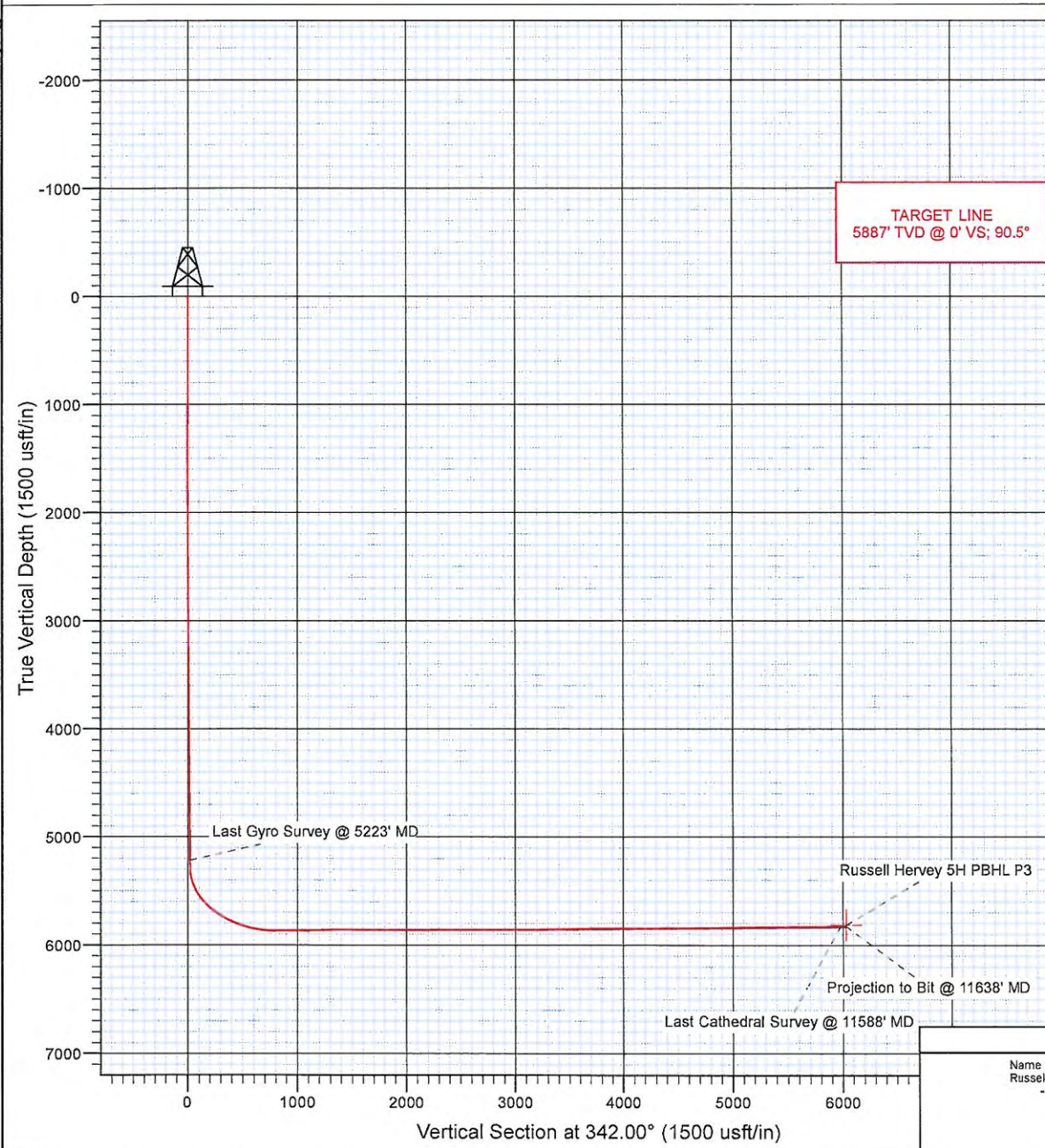
WV Department of
Environmental Protection

04/08/2016

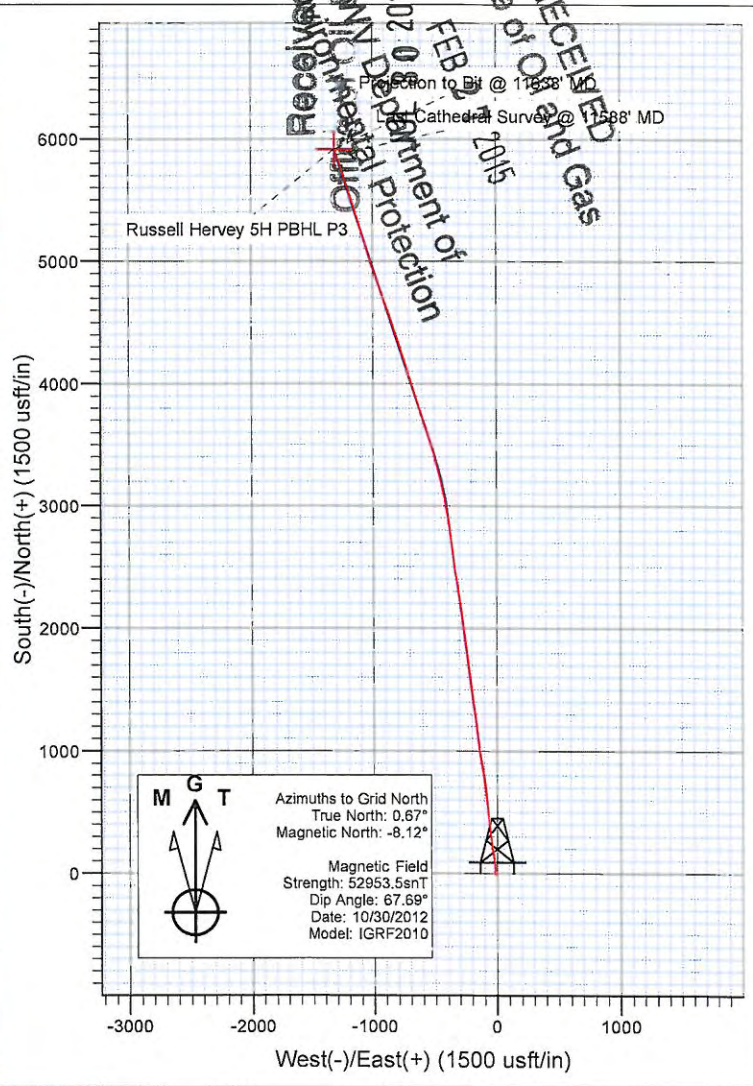
9.00144



Project: Brooke County, WV
 Site: Russell Hervey
 Well: Russell Hervey BRK 5H
 Wellbore: HZ
 Design: HZ



TARGET LINE
 5887' TVD @ 0° VS; 90.5°



M G T
 Azimuths to Grid North
 True North: 0.67°
 Magnetic North: -8.12°
 Magnetic Field
 Strength: 52953.5snT
 Dip Angle: 67.69°
 Date: 10/30/2012
 Model: IGRF2010

Ground Level: 1160.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	642082.72	1705007.27	40° 15' 28.000 N	80° 33' 42.700 W

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Russell Hervey BRK 5H PBHL P3	5887	0.0	-1310.2	647998.18	1703697.03	40° 16' 27.300 N	80° 33' 42.700 W	Point
- survey misses target center by 10.5usft at 11638.0usft MD (5826.4 TVD, 5915.4 N, -1305.9 E)								

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 Cathedral Survey
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 Projection to Bit @ 11638' MD
 Cathedral Survey @ 11588' MD

Cathedral Energy Services

Survey Report

9-00144

Company:	Chesapeake Energy Corp	Local Co-ordinate Reference:	Well Russell Hervey BRK 5H
Project:	Brooke County, WV	TVD Reference:	WELL @ 1178.0usft (Original Well Elev)
Site:	Russell Hervey	MD Reference:	WELL @ 1178.0usft (Original Well Elev)
Well:	Russell Hervey BRK 5H	North Reference:	Grid
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	HZ	Database:	USA EDM 5000 Multi Users DB

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

Site	Russell Hervey				
Site Position:		Northing:	642,082.72 usft	Latitude:	40° 15' 29.000 N
From:	Lat/Long	Easting:	1,705,007.27 usft	Longitude:	80° 33' 24.900 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"	Grid Convergence:	-0.67 °

Well	Russell Hervey BRK 5H					
Well Position	+N/-S	0.0 usft	Northing:	642,082.72 usft	Latitude:	40° 15' 29.000 N
	+E/-W	0.0 usft	Easting:	1,705,007.27 usft	Longitude:	80° 33' 24.900 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	1,160.0 usft

Wellbore	HZ				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	10/30/2012	-8.80	67.69	52,954

Design	HZ				
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	342.00

Survey Program	Date	12/20/2012			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	5,223.0	Gyro (HZ)	Gyro	Gyro	
5,242.0	11,638.0	Survey #2 (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
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	
100.0	0.47	17.81	100.0	0.4	0.1	0.3	0.47	0.47	
200.0	0.26	349.07	200.0	1.0	0.2	0.9	0.27	-0.21	
300.0	0.26	234.77	300.0	1.1	0.0	1.0	0.44	0.00	
400.0	0.27	237.13	400.0	0.8	-0.4	0.9	0.01	0.01	
500.0	0.29	225.70	500.0	0.5	-0.8	0.7	0.06	0.02	
600.0	0.16	222.70	600.0	0.3	-1.1	0.6	0.13	-0.13	
700.0	0.38	223.88	700.0	-0.1	-1.4	0.3	0.22	0.22	
800.0	0.29	220.89	800.0	-0.5	-1.8	0.1	0.09	-0.09	
900.0	0.48	222.67	900.0	-1.0	-2.2	-0.3	0.19	0.19	
1,000.0	0.56	223.91	1,000.0	-1.7	-2.9	-0.7	0.08	0.08	
1,100.0	0.56	226.64	1,100.0	-2.4	-3.5	-1.2	0.03	0.00	

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Project:	Brooke County, WV	TVD Reference:	WELL @ 1178.0usft (Original Well Elev)
Site:	Russell Hervey	MD Reference:	WELL @ 1178.0usft (Original Well Elev)
Well:	Russell Hervey BRK 5H	North Reference:	Grid
Wellbore:	HZ	Survey Calculation Method:	Minimum Curvature
Design:	HZ	Database:	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
1,200.0	0.56	229.09	1,200.0	-3.0	-4.3	-1.6	0.02	0.00	
1,300.0	0.46	231.63	1,300.0	-3.6	-5.0	-1.9	0.10	-0.10	
1,400.0	0.36	238.56	1,400.0	-4.0	-5.5	-2.1	0.11	-0.10	
1,500.0	0.37	242.37	1,500.0	-4.3	-6.1	-2.2	0.03	0.01	
1,600.0	0.30	244.54	1,600.0	-4.6	-6.6	-2.3	0.07	-0.07	
1,700.0	0.31	252.80	1,700.0	-4.8	-7.1	-2.3	0.05	0.01	
1,800.0	0.36	278.92	1,800.0	-4.8	-7.7	-2.2	0.16	0.05	
1,900.0	0.60	275.46	1,900.0	-4.7	-8.5	-1.8	0.24	0.24	
2,000.0	0.53	276.37	1,999.9	-4.6	-9.5	-1.4	0.07	-0.07	
2,100.0	0.55	281.04	2,099.9	-4.5	-10.4	-1.0	0.05	0.02	
2,200.0	0.58	280.40	2,199.9	-4.3	-11.4	-0.5	0.03	0.03	
2,300.0	0.52	285.66	2,299.9	-4.1	-12.3	-0.1	0.08	-0.06	
2,400.0	0.50	301.06	2,399.9	-3.7	-13.1	0.5	0.14	-0.02	
2,500.0	0.67	301.97	2,499.9	-3.2	-14.0	1.3	0.17	0.17	
2,600.0	0.69	306.30	2,599.9	-2.5	-15.0	2.2	0.06	0.02	
2,700.0	0.71	307.64	2,699.9	-1.8	-16.0	3.2	0.03	0.02	
2,800.0	0.69	302.04	2,799.9	-1.1	-17.0	4.2	0.07	-0.02	
2,900.0	0.57	307.16	2,899.9	-0.5	-17.9	5.1	0.13	-0.12	
3,000.0	0.49	304.34	2,999.9	0.1	-18.6	5.8	0.08	-0.08	
3,100.0	0.48	306.16	3,099.9	0.6	-19.3	6.5	0.02	-0.01	
3,200.0	0.60	308.71	3,199.9	1.1	-20.1	7.3	0.12	0.12	
3,300.0	0.65	307.09	3,299.9	1.8	-20.9	8.2	0.05	0.05	
3,400.0	0.46	304.91	3,399.9	2.4	-21.7	9.0	0.19	-0.19	
3,500.0	0.50	315.24	3,499.9	2.9	-22.3	9.7	0.10	0.04	
3,600.0	0.34	348.13	3,599.9	3.5	-22.7	10.4	0.28	-0.16	
3,700.0	0.65	355.79	3,699.9	4.4	-22.8	11.2	0.32	0.31	
3,800.0	0.60	346.98	3,799.9	5.5	-23.0	12.3	0.11	-0.05	
3,900.0	0.34	11.95	3,899.9	6.3	-23.0	13.1	0.33	-0.26	
4,000.0	0.59	13.55	3,999.8	7.0	-22.8	13.8	0.25	0.25	
4,100.0	0.71	4.38	4,099.8	8.2	-22.7	14.8	0.16	0.12	
4,200.0	0.47	7.89	4,199.8	9.2	-22.6	15.7	0.24	-0.24	
4,300.0	0.79	19.02	4,299.8	10.2	-22.3	16.6	0.34	0.32	
4,400.0	0.50	22.47	4,399.8	11.3	-21.9	17.5	0.29	-0.29	
4,500.0	0.78	37.27	4,499.8	12.2	-21.3	18.2	0.32	0.28	
4,600.0	0.33	32.76	4,599.8	13.0	-20.7	18.8	0.45	-0.45	
4,700.0	0.62	34.65	4,699.8	13.7	-20.3	19.3	0.29	0.29	
4,800.0	0.33	39.01	4,799.8	14.4	-19.8	19.8	0.29	-0.29	
4,900.0	0.62	43.27	4,899.8	15.0	-19.2	20.2	0.29	0.29	
5,000.0	0.54	43.44	4,999.8	15.7	-18.6	20.7	0.08	-0.08	
5,100.0	0.52	36.26	5,099.8	16.4	-18.0	21.2	0.07	-0.02	
5,200.0	0.61	34.56	5,199.8	17.3	-17.4	21.8	0.09	0.09	
5,223.0	0.71	36.41	5,222.8	17.5	-17.2	21.9	0.44	0.43	
5,242.0	0.40	56.70	5,241.8	17.6	-17.1	22.0	1.91	-1.63	
5,305.0	3.70	15.50	5,304.7	19.7	-16.4	23.8	5.41	5.24	
5,336.0	7.70	8.50	5,335.6	22.7	-15.8	26.5	13.07	12.90	
5,367.0	11.90	6.70	5,366.1	27.9	-15.1	31.2	13.58	13.55	
5,399.0	16.10	4.90	5,397.2	35.6	-14.4	38.3	13.19	13.13	
5,430.0	19.50	1.80	5,426.7	45.1	-13.8	47.2	11.38	10.97	
5,462.0	22.50	357.10	5,456.5	56.5	-14.0	58.1	10.74	9.38	
5,494.0	26.60	352.60	5,485.6	69.8	-15.2	71.1	14.07	12.81	
5,525.0	30.40	351.20	5,512.9	84.4	-17.3	85.6	12.45	12.26	
5,557.0	34.00	352.20	5,540.0	101.3	-19.8	102.4	11.37	11.25	
5,588.0	37.50	351.40	5,565.1	119.2	-22.3	120.3	11.39	11.29	

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Last Gyro Survey @ 5223' MD
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Cathedral Energy Services

Survey Report

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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 (°/100u)	Formations / Comments
5,619.0	40.90	350.00	5,589.1	138.5	-25.5	139.6	11.33	10.97	
5,651.0	43.30	349.80	5,612.9	159.7	-29.3	160.9	7.51	7.50	
5,682.0	46.20	350.90	5,634.9	181.2	-32.9	182.5	9.68	9.35	
5,714.0	48.70	352.90	5,656.5	204.5	-36.2	205.7	9.07	7.81	
5,745.0	50.80	353.60	5,676.6	228.0	-39.0	228.9	6.99	6.77	
5,777.0	52.60	354.30	5,696.4	253.0	-41.7	253.5	5.88	5.63	
5,808.0	56.30	354.50	5,714.4	278.1	-44.1	278.1	11.95	11.94	
5,840.0	59.00	354.60	5,731.5	305.0	-46.7	304.5	8.44	8.44	
5,871.0	61.50	354.00	5,746.9	331.8	-49.4	330.8	8.24	8.06	
5,903.0	64.20	353.10	5,761.5	360.0	-52.6	358.7	8.80	8.44	
5,934.0	66.00	352.30	5,774.6	387.9	-56.1	386.3	6.26	5.81	
5,966.0	66.50	352.00	5,787.5	416.9	-60.1	415.1	1.78	1.56	
5,997.0	66.90	352.50	5,799.7	445.2	-64.0	443.1	1.96	1.29	
6,029.0	69.40	353.50	5,811.6	474.6	-67.6	472.3	8.33	7.81	
6,061.0	71.80	354.40	5,822.3	504.6	-70.8	501.8	7.96	7.50	
6,093.0	73.90	354.50	5,831.7	535.1	-73.7	531.7	6.57	6.56	
6,124.0	75.90	355.00	5,839.8	564.9	-76.5	560.9	6.64	6.45	
6,156.0	77.30	355.10	5,847.2	595.9	-79.2	591.2	4.39	4.38	
6,188.0	79.20	354.20	5,853.7	627.1	-82.1	621.8	6.54	5.94	
6,219.0	80.80	354.20	5,859.1	657.5	-85.2	651.6	5.16	5.16	
6,251.0	83.10	354.10	5,863.6	689.0	-88.4	682.6	7.19	7.19	
6,283.0	85.10	353.40	5,866.8	720.6	-91.9	713.7	6.62	6.25	
6,313.0	87.90	352.30	5,868.7	750.3	-95.6	743.1	10.03	9.33	
6,377.0	91.10	351.30	5,869.2	813.7	-104.7	806.2	5.24	5.00	
6,439.0	91.40	350.50	5,867.9	874.9	-114.5	867.4	1.38	0.48	
6,503.0	89.60	349.60	5,867.3	937.9	-125.6	930.8	3.14	-2.81	
6,566.0	89.60	351.20	5,867.8	1,000.0	-136.1	993.1	2.54	0.00	
6,629.0	91.00	353.00	5,867.4	1,062.4	-144.7	1,055.1	3.62	2.22	
6,692.0	91.40	353.00	5,866.1	1,124.9	-152.4	1,117.0	0.63	0.63	
6,756.0	91.30	352.50	5,864.6	1,188.4	-160.5	1,179.8	0.80	-0.16	
6,818.0	91.90	352.30	5,862.9	1,249.8	-168.7	1,240.8	1.02	0.97	
6,943.0	91.00	352.00	5,859.7	1,373.6	-185.8	1,363.8	0.76	-0.72	
7,069.0	90.20	352.10	5,858.4	1,498.4	-203.2	1,487.8	0.64	-0.63	
7,195.0	89.10	353.00	5,859.2	1,623.3	-219.5	1,611.7	1.13	-0.87	
7,321.0	89.20	352.90	5,861.0	1,748.4	-235.0	1,735.4	0.11	0.08	
7,446.0	89.30	352.50	5,862.7	1,872.3	-250.9	1,858.2	0.33	0.08	
7,571.0	90.30	353.50	5,863.1	1,996.4	-266.1	1,980.9	1.13	0.80	
7,696.0	90.60	353.10	5,862.1	2,120.5	-280.7	2,103.5	0.40	0.24	
7,820.0	90.50	351.90	5,860.9	2,243.5	-296.9	2,225.4	0.97	-0.08	
7,947.0	90.20	349.70	5,860.2	2,368.8	-317.2	2,350.9	1.75	-0.24	
8,072.0	91.20	351.80	5,858.6	2,492.2	-337.3	2,474.4	1.86	0.80	
8,198.0	90.60	353.90	5,856.7	2,617.2	-352.9	2,598.1	1.73	-0.48	
8,325.0	89.40	353.00	5,856.7	2,743.3	-367.4	2,722.6	1.18	-0.94	
8,450.0	89.40	351.60	5,858.0	2,867.2	-384.2	2,845.6	1.12	0.00	
8,574.0	89.40	349.80	5,859.3	2,989.6	-404.2	2,968.2	1.45	0.00	
8,699.0	89.30	347.90	5,860.7	3,112.2	-428.4	3,092.2	1.52	-0.08	
8,823.0	91.40	347.40	5,859.9	3,233.3	-454.9	3,215.6	1.74	1.69	
8,948.0	91.40	344.80	5,856.9	3,354.6	-484.9	3,340.3	2.08	0.00	
9,075.0	91.10	343.40	5,854.1	3,476.7	-519.7	3,467.1	1.13	-0.24	
9,199.0	90.80	342.30	5,852.0	3,595.2	-556.3	3,591.1	0.92	-0.24	
9,325.0	91.20	342.40	5,849.8	3,715.2	-594.5	3,717.1	0.33	-0.48	
9,450.0	90.60	341.70	5,847.9	3,834.1	-633.0	3,842.1	0.74	-0.48	
9,575.0	88.60	342.40	5,848.8	3,953.0	-671.5	3,967.1	1.70	-1.60	

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Cathedral Energy Services
Survey Report

9-00144

Company: Chesapeake Energy Corp	Local Co-ordinate Reference: Well Russell Hervey BRK 5H
Project: Brooke County, WV	TVD Reference: WELL @ 1178.0usft (Original Well Elev)
Site: Russell Hervey	MD Reference: WELL @ 1178.0usft (Original Well Elev)
Well: Russell Hervey BRK 5H	North Reference: Grid
Wellbore: HZ	Survey Calculation Method: Minimum Curvature
Design: HZ	Database: 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
9,700.0	89.00	341.70	5,851.4	4,071.9	-710.0	4,092.0	0.64	0.32	
9,827.0	91.40	343.80	5,850.9	4,193.2	-747.7	4,219.0	2.51	1.89	
9,952.0	91.50	342.60	5,847.8	4,312.8	-783.8	4,343.9	0.96	0.08	
10,080.0	89.60	341.40	5,846.5	4,434.5	-823.3	4,471.9	1.76	-1.48	
10,205.0	90.30	341.20	5,846.6	4,552.9	-863.4	4,596.9	0.58	0.56	
10,330.0	90.30	340.80	5,846.0	4,671.1	-904.1	4,721.9	0.32	0.00	
10,454.0	91.10	340.30	5,844.5	4,788.0	-945.4	4,845.8	0.76	0.65	
10,578.0	90.30	340.40	5,843.0	4,904.8	-987.1	4,969.8	0.65	-0.65	
10,706.0	91.90	343.40	5,840.5	5,026.4	-1,026.8	5,097.7	2.66	1.25	
10,830.0	91.40	343.10	5,836.9	5,145.1	-1,062.6	5,221.7	0.47	-0.40	
10,956.0	90.70	343.30	5,834.6	5,265.7	-1,099.0	5,347.6	0.58	-0.56	
11,080.0	89.60	342.80	5,834.3	5,384.3	-1,135.1	5,471.6	0.97	-0.89	
11,206.0	90.30	342.70	5,834.4	5,504.7	-1,172.5	5,597.6	0.56	0.56	
11,332.0	90.60	342.30	5,833.4	5,624.8	-1,210.4	5,723.6	0.40	0.24	
11,457.0	91.10	341.90	5,831.6	5,743.8	-1,248.8	5,848.5	0.51	0.40	
11,584.0	91.90	341.40	5,828.2	5,864.3	-1,288.8	5,975.5	0.74	0.63	
11,588.0	92.00	341.50	5,828.1	5,868.1	-1,290.0	5,979.5	3.51	2.49	Last Cathedral Survey @ 11588' MD
11,638.0	92.00	341.50	5,826.4	5,915.4	-1,305.9	6,029.5	0.00	0.00	Projection to Bit @ 11638' MD

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Russell Hervey 5H PBHI - hit/miss target - Shape	0.00	0.00	5,816.8	5,915.5	-1,310.2	647,998.18	1,703,697.03	40° 16' 27.300 N	80° 33' 42.700 W
- actual wellpath misses target center by 10.5usft at 11638.0usft MD (5826.4 TVD, 5915.4 N, -1305.9 E)									
- Point									
Russell Hervey 5H PBHI - actual wellpath misses target center by 9.1usft at 11638.0usft MD (5826.4 TVD, 5915.4 N, -1305.9 E)	0.00	0.00	5,834.4	5,915.5	-1,310.2	647,998.18	1,703,697.03	40° 16' 27.300 N	80° 33' 42.700 W
- Point									
Russell Hervey 5H PBHI - actual wellpath misses target center by 29.9usft at 11638.0usft MD (5826.4 TVD, 5915.4 N, -1305.9 E)	0.00	0.00	5,796.8	5,915.5	-1,310.2	647,998.18	1,703,697.03	40° 16' 27.300 N	80° 33' 42.700 W
- Point									

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,223.0	5,222.8	17.5	-17.2	Last Gyro Survey @ 5223' MD
11,588.0	5,828.1	5,868.1	-1,290.0	Last Cathedral Survey @ 11588' MD
11,638.0	5,826.4	5,915.4	-1,305.9	Projection to Bit @ 11638' MD

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Hydraulic Fracturing Fluid Product Component Information Disclosure

9-00144	Fracture Date:	4/4/2013
	State:	WEST VIRGINIA
	County:	BROOKE
	API Number:	4700900144
	Operator Name:	CHESAPEAKE APPALACHIA LLC
	Well Name and Number:	RUSSELL HERVEY BRK 5H
	Longitude:	-80.556929
	Latitude:	40.258056
	Long/Lat Projection:	NAD27
	Production Type:	GAS
	True Vertical Depth (TVD):	5,869
	Total Water Volume (gal)*:	4,922,022

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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	100.00%	81.83964%	
Recycled Produced Water	CHESAPEAKE ENERGY	Carrier/Base Fluid	Water	007732-18-5	100.00%	2.98005%	
Northern White Sand	FTS INTERNATIONAL	Proppant - Natural	Crystalline Silica (Quartz Sand, Silicon Dioxide)	014808-60-7	100.00%	10.02584%	
100 Mesh Sand	FTS INTERNATIONAL	Proppant - Natural	Crystalline Silica (Quartz Sand, Silicon Dioxide)	014808-60-7	100.00%	4.27413%	
10.1 - 15 HCL	FTS INTERNATIONAL	Acid	Hydrochloric Acid	007647-01-0	15.00%	0.11132%	
			Water	007732-18-5	85.00%	0.63081%	
FRW-200	FTS INTERNATIONAL	Friction Reducer	Petroleum Distillate Hydrotreated Light	064742-47-8	26.00%	0.01827%	
FE-100L	FTS INTERNATIONAL	Iron Control Agent	Citric Acid	000077-92-9	55.00%	0.00669%	
HVG01 (TURQUOISE-1 BULK)	FTS INTERNATIONAL	Gelling Agent	Crystalline Silica (Quartz Sand, Silicon Dioxide)	014808-60-7	2.00%	0.00015%	
			Guar Gum	009000-30-0	50.00%	0.00387%	

			Petroleum Distillate Hydrotreated Light	064742-47-8	55.00%	0.00425%	
			Surfactant	068439-51-0	2.00%	0.00015%	
9-001443 CI-150	FTS INTERNATIONAL	Corrosion Inhibitor	Dimethyl Formamide	000068-12-2	10.00%	0.00013%	
			Isopropanol (Isopropyl Alcohol, Propan-2-ol)	000067-63-0	60.00%	0.00075%	
			Proprietary Aromatic Aldehyde	TRADE SECRET	10.00%	0.00013%	
			Proprietary Organic Amine Resin Salt	TRADE SECRET	10.00%	0.00038%	
			Proprietary Quaternary Ammonium Compound	TRADE SECRET	10.00%	0.00013%	
			Ammonium Persulfate	007727-54-0	100.00%	0.00011%	
APB01 (AMMONIUM PERSUFATE BREAKER)	FTS INTERNATIONAL	Breaker					
SC30W	X CHEM	Scale Inhibitor	Methanol (Methyl Alcohol)	000067-56-1	100.00%	0.00934%	
			Sodium Hydroxide	001310-73-2	100.00%	0.00934%	
			Sodium Polyacrylate	009003-04-7	100.00%	0.00934%	
B84	X CHEM	Anti-Bacterial Agent	Didecyl Dimethyl Ammonium Chloride	007173-51-5	8.00%	0.00299%	
			Ethanol	000064-17-5	4.00%	0.00149%	
			Glutaraldehyde (Pentanediol)	000111-30-8	27.00%	0.01009%	
			Quaternary Ammonium Compound	068424-85-1	6.00%	0.00205%	

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Additional Ingredients Not Listed on MSDS							
APB01 (AMMONIUM PERSUFATE BREAKER), CI-150, FE-100L, FRW-200	FTS INTERNATIONAL	Breaker, Corrosion Inhibitor, Friction Reducer, Iron Control Agent	Proprietary Breaker (APB01) Additive	TRADE SECRET		0.00001%	
			Proprietary Corrosion Inhibitor Additive (CI-150)	TRADE SECRET		0.00066%	
			Proprietary Friction Reducer Additive (FRW-200 and FRW-200W)	TRADE SECRET		0.06755%	
			Water	007732-18-5		0.01419%	
B84, SC30W	X CHEM	Anti-Bacterial Agent, Scale Inhibitor	Water	007732-18-5		0.05450%	

* 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.