

Revised

Farm name: Deborah Craig OHI 3H Operator Well No.: 833806

LOCATION: Elevation: 1331' Quadrangle: Valley Grove

District: Tridelphia County: Ohio
Latitude: 400' Feet South of 40 Deg. 05 Min. 00 Sec.
Longitude 12940' Feet West of 80 Deg. 35 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"	126'	126'	Driven
Agent: Eric Gillespie	13 3/8"	739'	739'	729 Cu. Ft.
Inspector: Bill Hendershot	9 5/8"	2295'	2295'	1021 Cu. Ft.
Date Permit Issued: 11-16-2011	5 1/2"	13947'	13947'	2851 Cu. Ft.
Date Well Work Commenced: 3-23-2012				
Date Well Work Completed: 7-5-2012				
Verbal Plugging:				
Date Permission granted on:				
Rotary <input checked="" type="checkbox"/> Cable <input type="checkbox"/> Rig <input type="checkbox"/>				
Total Vertical Depth (ft): 6537'(cement plug@ 5663' - 6512')				
Total Measured Depth (ft): 13950'				
Fresh Water Depth (ft.): 82', 350'				
Salt Water Depth (ft.): 1520'				
Is coal being mined in area (N/Y)? <u>N</u>				
Coal Depths (ft.): 683'				
Void(s) encountered (N/Y) Depth(s) <u>N</u>				

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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) 6,950'-13,814'
Gas: Initial open flow _____ MCF/d Oil: Initial open flow _____ Bbl/d
Final open flow 2,169* MCF/d Final open flow 124 Bbl/d
Time of open flow between initial and final tests 96 Hours
Static rock Pressure 4,249* psig (surface pressure) after 96 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 L. Williams
Signature

2-26-2015
Date

REJECTED
4.6.5/19/15

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 0-2318' MD; LWD GR from 5662-13950' 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): Cement plug @ 5663' - 6512'

Formations Encountered: _____ Top Depth _____ / _____ Bottom Depth _____
Surface: _____

(See Attached)

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PERFORATION RECORD ATTACHMENT

Well Number and Name: 833806 Deborah Craig OHI 3H

PERFORATION RECORD			STIMULATION RECORD							
Date	Interval Perforated		Date	Interval Treated		Fluid		Propping Agent		Average Injection
	From	To		Type	Amount	Type	Amount			
5/20/2012	13,271	13,814	6/1/2012	13,271	13,814	Slk wtr	11,450	Sand	629,800	83
6/1/2012	12,646	13,182	6/1/2012	12,646	13,182	Slk wtr	12,275	Sand	630,780	85
6/1/2012	12,012	12,550	6/2/2012	12,012	12,550	Slk wtr	11,468	Sand	630,640	84
6/2/2012	11,375	11,918	6/2/2012	11,375	11,918	Slk wtr	11,695	Sand	621,800	82
6/2/2012	10,743	11,286	6/2/2012	10,743	11,286	Slk wtr	11,631	Sand	631,300	84
6/2/2012	10,110	10,654	6/3/2012	10,110	10,654	Slk wtr	11,642	Sand	631,380	85
6/3/2012	9,478	10,021	6/3/2012	9,478	10,021	Slk wtr	11,189	Sand	630,580	86
6/3/2012	8,851	9,389	6/4/2012	8,851	9,389	Slk wtr	12,703	Sand	629,080	85
6/4/2012	8,219	8,757	6/4/2012	8,219	8,757	Slk wtr	10,963	Sand	630,980	86
6/4/2012	7,587	8,125	6/4/2012	7,587	8,125	Slk wtr	11,341	Sand	630,920	85
6/5/2012	6,950	7,493	6/5/2012	6,950	7,493	Slk wtr	11,004	Sand	646,780	85

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04/08/2016

LATERAL SIDETRACK WELLBORE (no vertical pilot hole associated with this well)**Maximum TVD of wellbore: 6537 ft TVD @ 6990 ft MD**

Formation/Lithology	Top Depth, MD (ft)	Top Depth, TVD (ft)	Bottom Depth, MD (ft)	Bottom Depth, TVD (ft)
LS/SS	0	0	683	683
PITTSBURG COAL	683	683	690	690
LS	690	690	840	840
SS	840	840	990	990
SS/SH	990	990	1770	1770
BIG LIME (LS)	1770	1770	1820	1820
BIG INJUN (SS)	1820	1820	2057	2057
SHALE	2057	2057	6446	6344
GENESEO (SH)	6446	6344	6474	6362
TULLY (LS)	6474	6362	6528	6396
HAMILTON (SH)	6528	6396	6759	6502
MARCELLUS (SH)	6759	6502		
TD OF LATERAL			13950	6443

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Company: CHESAPEAKE
 Lease/Well: DEBORAH CRAIG/3H
 Location:
 Rig Name: NOMAC #237
 State/County: WEST VIRGINIA/OHIO
 Latitude: 40.05, Longitude: -80.58
 GRID North is 0.69 Degrees West of True North
 VS-Azi: 0.00 Degrees

69-00100



FIELD COPY ONLY (NOT DEFINITIVE)

Depth Reference : RKB=15'

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: deborahcraigohi#3h_ed.ut

Minimum Curvature Method

Report Date/Time: 4/2/2012 / 21:32

Vaughn Energy Services
 Morgantown, West Virginia
 304-777-2189
 Michael Komarek

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	0.96	53.87	100.00	0.49	0.68	0.49	0.84	53.87	0.96
200.00	0.74	57.59	199.98	1.34	1.90	1.34	2.32	54.90	0.23
300.00	0.53	59.56	299.98	1.92	2.85	1.92	3.43	56.04	0.21
400.00	0.27	51.01	399.98	2.30	3.43	2.30	4.13	56.15	0.27
500.00	0.42	49.96	499.97	2.68	3.89	2.68	4.73	55.41	0.16
600.00	0.20	350.61	599.97	3.09	4.14	3.09	5.17	53.31	0.36
700.00	0.24	94.89	699.97	3.24	4.33	3.24	5.40	53.16	0.35
800.00	0.31	3.69	799.97	3.49	4.55	3.49	5.74	52.51	0.39
900.00	0.06	140.82	899.97	3.72	4.60	3.72	5.92	51.08	0.36
1000.00	0.15	4.74	999.97	3.80	4.65	3.80	6.00	50.73	0.20
1100.00	0.25	36.11	1099.97	4.10	4.79	4.10	6.30	49.40	0.14
1200.00	0.38	78.08	1199.97	4.34	5.24	4.34	6.81	50.33	0.26
1300.00	0.43	72.50	1299.97	4.53	5.93	4.53	7.46	52.62	0.07
1400.00	0.51	71.14	1399.96	4.79	6.71	4.79	8.24	54.50	0.08
1500.00	0.55	70.95	1499.96	5.09	7.58	5.09	9.13	56.15	0.03
1600.00	0.61	71.12	1599.95	5.41	8.54	5.41	10.11	57.08	0.07
1700.00	0.56	73.14	1699.95	5.73	9.51	5.73	11.10	58.94	0.06
1800.00	0.46	68.98	1799.94	6.01	10.35	6.01	11.97	59.64	0.10
1900.00	0.40	68.43	1899.94	6.29	11.05	6.29	12.71	60.37	0.06
2000.00	0.31	71.36	1999.94	6.50	11.63	6.50	13.33	60.80	0.09
2100.00	0.19	28.38	2099.94	6.74	11.97	6.74	13.73	60.63	0.21
2200.00	0.26	17.96	2199.94	7.10	12.12	7.10	14.05	59.63	0.08
2300.00	0.30	31.18	2299.94	7.54	12.32	7.54	14.45	58.54	0.07
2400.00	0.27	16.87	2399.94	7.99	12.53	7.99	14.85	57.68	0.08
2500.00	0.31	337.97	2499.93	8.46	12.49	8.46	15.08	55.90	0.20
2600.00	0.28	337.66	2599.93	8.93	12.30	8.93	15.20	54.00	0.03
2700.00	0.39	331.35	2699.93	9.46	12.04	9.46	15.31	51.85	0.11
2800.00	0.42	324.85	2799.93	10.06	11.67	10.06	15.40	49.25	0.05
2900.00	0.58	299.82	2899.92	10.60	11.02	10.60	15.79	46.10	0.27
3000.00	0.50	314.56	2999.92	11.16	10.27	11.16	15.17	42.61	0.16
3100.00	0.63	314.16	3099.92	11.85	9.56	11.85	15.23	38.90	0.13
3200.00	0.63	310.37	3199.91	12.59	8.76	12.59	15.33	34.82	0.04
3300.00	0.61	313.30	3299.90	13.31	7.95	13.31	15.50	30.86	0.03
3400.00	0.53	316.55	3399.90	14.01	7.25	14.01	15.77	27.35	0.09

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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
3500.00	0.66	312.82	3499.89	14.73	6.51	14.73	16.11	23.82	0.14
3600.00	0.72	310.96	3599.89	15.54	5.61	15.54	16.52	19.84	0.06
3700.00	0.65	303.88	3699.88	16.27	4.66	16.27	16.92	15.98	0.11
3800.00	0.61	299.15	3799.87	16.84	3.72	16.84	17.25	12.46	0.06
3900.00	0.66	296.64	3899.87	17.36	2.74	17.36	17.58	8.98	0.05
4000.00	0.69	295.81	3999.86	17.88	1.68	17.88	17.96	5.38	0.04
4100.00	0.59	292.01	4099.85	18.34	0.66	18.34	18.35	2.06	0.11
4200.00	0.66	294.37	4199.85	18.77	-0.34	18.77	18.77	358.97	0.07
4300.00	0.62	290.61	4299.84	19.20	-1.37	19.20	19.25	355.92	0.05
4400.00	0.50	295.90	4399.84	19.58	-2.27	19.58	19.71	353.38	0.13
4500.00	0.57	294.05	4499.83	19.98	-3.12	19.98	20.22	351.12	0.07
4600.00	0.56	298.25	4599.83	20.41	-4.01	20.41	20.80	348.90	0.04
4700.00	0.53	304.63	4699.82	20.90	-4.82	20.90	21.45	347.02	0.07
4800.00	0.43	301.06	4799.82	21.36	-5.52	21.36	22.06	345.52	0.11
4900.00	0.29	283.47	4899.82	21.61	-6.09	21.61	22.45	344.27	0.17
5000.00	0.15	255.93	4999.82	21.64	-6.47	21.64	22.58	343.36	0.17
5100.00	0.24	290.66	5099.82	21.68	-6.79	21.68	22.72	342.61	0.14
5200.00	0.18	294.59	5199.82	21.82	-7.12	21.82	22.95	341.92	0.06
5300.00	0.17	245.27	5299.81	21.82	-7.40	21.82	23.04	341.26	0.15
5400.00	0.17	227.55	5399.81	21.66	-7.64	21.66	22.97	340.56	0.05
5500.00	0.28	265.45	5499.81	21.54	-8.00	21.54	22.98	339.63	0.18
5600.00	0.27	262.07	5599.81	21.49	-8.48	21.49	23.10	338.45	0.02
5700.00	0.20	265.40	5699.81	21.44	-8.89	21.44	23.21	337.47	0.07
5800.00	0.21	287.53	5799.81	21.48	-9.24	21.48	23.39	336.72	0.08
5900.00	0.26	271.06	5899.81	21.54	-9.65	21.54	23.60	335.87	0.08

HORIZONTAL DISPLACEMENT IS
23.60 FEET AT 335.87 DEGREES

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Weatherford®
SURVEY REPORT

Report Date: 5/4/2012

Customer: Chesapeake

Job Name: 4026127

Well Name: Deborah Craig OHI 3H ST

Field: Ohio County

Rig: Nomac 37

Rig Loc: Ohio County

Survey Calculation Method: Minimum Curvature						
Magnetic Reference	Target Direction	Total Magnetic Field	Magnetic Dip Angle	Magnetic Declination	Grid Convergence	Total Correction
Grid North	331.02 deg	53578 nT	67.87 deg	-8.71 deg	-0.69 deg	-8.02 deg
Survey Tie-On	Depth	INC	AZ	TVD	NS	EW
	5601.00 ft	0.27 deg	262.07 deg	5600.81 ft	21.52 ft	-8.47 ft

Depth (ft)	Inc (deg)	Azm (deg)	TVD (ft)	Well Head		VSect (ft)	Dogleg (deg/100ft)
				NS (ft)	EW (ft)		
5692.00	0.22	282.12	5691.81	21.53	-8.85	23.12	0.11
5724.00	0.29	314.32	5723.81	21.60	-8.97	23.24	0.49
5756.00	2.32	17.48	5755.80	22.27	-8.83	23.76	6.89
5788.00	6.27	22.37	5787.70	24.51	-7.97	25.30	12.39
5819.00	10.48	21.89	5818.37	28.69	-6.28	28.14	13.58
5851.00	14.89	22.80	5849.58	35.18	-3.60	32.52	13.79
5883.00	16.55	19.12	5880.38	43.28	-0.51	38.11	6.05
5914.00	18.34	9.60	5909.96	52.26	1.75	44.87	10.85
5944.00	20.58	1.76	5938.25	62.19	2.70	53.10	11.45
5976.00	23.41	356.35	5967.92	74.16	2.47	63.68	10.87
6007.00	25.45	354.09	5996.14	86.93	1.39	75.38	7.24
6039.00	27.61	351.39	6024.77	101.10	-0.43	88.65	7.73
6071.00	29.95	349.50	6052.82	116.29	-3.00	103.18	7.85
6102.00	31.31	349.04	6079.49	131.81	-5.94	118.18	4.45
6134.00	32.42	348.72	6106.67	148.39	-9.20	134.26	3.51
6166.00	34.80	348.10	6133.32	165.74	-12.76	151.17	7.51
6198.00	37.48	347.93	6159.16	184.20	-16.68	169.21	8.38
6229.00	38.48	348.12	6183.59	202.86	-20.64	187.46	3.25
6261.00	39.22	347.40	6208.51	222.47	-24.89	206.68	2.71
6293.00	39.64	347.40	6233.23	242.31	-29.33	226.18	1.31
6325.00	41.49	346.00	6257.54	262.56	-34.12	246.21	6.44
6356.00	42.98	345.07	6280.49	282.73	-39.33	266.38	5.25
6387.00	44.45	344.06	6302.90	303.38	-45.03	287.21	4.70
6419.00	45.84	343.25	6325.47	325.15	-51.41	309.35	4.89
6450.00	47.30	342.69	6346.78	346.67	-58.01	331.37	7.58
6482.00	49.55	341.48	6368.01	369.45	-65.38	354.86	9.58
6514.00	52.46	340.24	6388.15	392.94	-73.53	379.36	7.70
6546.00	54.92	340.06	6407.09	417.19	-82.29	404.82	6.65
6577.00	56.94	339.57	6424.46	441.29	-91.15	430.20	7.47
6609.00	59.32	339.29	6441.35	466.73	-100.70	457.08	8.85
6641.00	62.14	338.98	6457.00	492.81	-110.64	484.71	8.90
6673.00	64.96	338.53	6471.25	519.51	-121.02	513.10	10.23
6705.00	68.22	338.20	6483.96	546.80	-131.85	542.22	9.88
6735.00	70.93	336.92	6494.43	572.78	-142.58	570.15	9.10
6767.00	73.57	335.63	6504.19	600.68	-154.85	600.49	

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				NS (ft)	EW (ft)		
6799.00	75.73	335.52	6512.66	628.78	-167.61	631.25	6.76
6831.00	78.04	335.02	6519.92	657.08	-180.64	662.33	7.38
6863.00	79.31	336.11	6526.20	685.65	-193.62	693.61	5.19
6895.00	81.79	334.81	6531.46	714.36	-206.73	725.07	8.72
6926.00	84.54	333.29	6535.14	742.03	-220.20	755.81	10.12
6958.00	88.32	332.97	6537.14	770.51	-234.63	787.72	11.85
6990.00	91.33	333.86	6537.23	799.13	-248.95	819.69	9.81
7023.00	91.96	333.50	6536.29	828.69	-263.58	852.64	2.20
7085.00	92.80	333.34	6533.71	884.09	-291.29	914.53	1.38
7147.00	91.68	333.31	6531.29	939.45	-319.11	976.43	1.81
7211.00	90.84	332.85	6529.88	996.50	-348.07	1040.37	1.50
7275.00	90.35	333.63	6529.22	1053.64	-376.89	1104.32	1.44
7337.00	90.91	335.26	6528.54	1109.57	-403.63	1166.20	2.78
7401.00	91.19	336.24	6527.36	1167.91	-429.91	1229.97	1.59
7463.00	90.00	335.03	6526.72	1224.39	-455.49	1291.77	2.74
7527.00	89.86	334.85	6526.80	1282.36	-482.60	1355.62	0.36
7654.00	89.30	332.64	6527.73	1396.25	-538.77	1482.46	1.80
7781.00	92.45	332.43	6525.79	1508.91	-597.33	1609.39	2.49
7908.00	91.61	333.41	6521.29	1621.91	-655.11	1736.23	1.02
8034.00	89.72	333.20	6519.83	1734.47	-711.71	1862.12	1.51
8161.00	89.09	331.61	6521.15	1847.01	-770.53	1989.07	1.35
8289.00	88.95	331.16	6523.34	1959.36	-831.82	2117.05	0.37
8415.00	92.59	335.13	6521.64	2071.72	-888.72	2242.91	4.27
8541.00	92.31	334.38	6516.26	2185.58	-942.40	2368.52	0.63
8668.00	90.63	332.93	6513.00	2299.35	-998.74	2495.34	1.75
8795.00	90.42	331.73	6511.83	2411.82	-1057.72	2622.30	0.96
8921.00	90.35	330.98	6510.99	2522.39	-1118.12	2748.29	0.60
9047.00	90.98	330.19	6509.53	2632.14	-1179.99	2874.28	0.80
9174.00	90.91	329.78	6507.43	2742.09	-1243.51	3001.24	0.33
9301.00	91.12	330.23	6505.18	2852.06	-1306.99	3128.20	0.39
9427.00	91.75	331.17	6502.03	2961.91	-1368.64	3254.16	0.90
9554.00	91.75	330.96	6498.15	3073.00	-1430.05	3381.10	0.17
9678.00	89.44	329.14	6496.86	3180.43	-1491.95	3505.06	2.37
9803.00	88.95	327.72	6498.62	3286.91	-1557.38	3629.91	1.20
9929.00	90.07	327.03	6499.69	3393.03	-1625.31	3755.65	1.04
10053.00	90.98	326.64	6498.56	3496.82	-1693.14	3879.31	0.80
10178.00	91.05	326.87	6496.34	3601.35	-1761.66	4003.95	0.19
10302.00	90.28	325.85	6494.90	3704.57	-1830.34	4127.53	1.03
10427.00	91.12	327.15	6493.38	3808.80	-1899.33	4252.13	0.22
10551.00	90.63	326.08	6491.48	3912.32	-1967.55	4375.74	0.95
10676.00	93.15	327.26	6487.36	4016.69	-2036.19	4500.30	2.23
10801.00	93.29	329.74	6480.34	4123.10	-2101.40	4624.97	1.98
10925.00	92.86	331.86	6473.69	4231.18	-2161.80	4748.79	1.74
11050.00	89.93	329.50	6470.64	4340.11	-2222.98	4873.73	3.01
11174.00	90.35	329.39	6470.34	4446.89	-2286.02	4997.68	0.35
11298.00	88.53	327.59	6471.55	4552.60	-2350.82	5121.54	2.06
11424.00	89.23	327.17	6474.01	4658.70	-2418.73	5247.26	0.65
11550.00	89.16	326.58	6475.78	4764.21	-2487.57	5372.92	0.47
11675.00	91.40	329.25	6475.17	4870.10	-2553.96	5497.72	2.79
11800.00	91.19	329.15	6472.35	4977.44	-2617.95	5622.62	0.19

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Depth (ft)	Inc (deg)	Azm (deg)	TVD (ft)	Well Head		VSect (ft)	Dogleg (deg/100ft)
				NS (ft)	EW (ft)		
11924.00	90.98	328.04	6470.00	5083.26	-2682.55	5746.49	0.91
12049.00	91.19	328.02	6467.63	5189.28	-2748.72	5871.29	0.17
12176.00	91.47	327.49	6464.69	5296.66	-2816.47	5998.05	0.47
12301.00	90.07	328.60	6463.01	5402.71	-2882.61	6122.87	1.43
12427.00	89.58	328.63	6463.39	5510.27	-2948.23	6248.75	0.39
12551.00	90.63	327.64	6463.16	5615.58	-3013.69	6372.59	1.16
12677.00	91.05	328.76	6461.32	5722.65	-3080.08	6498.43	0.95
12801.00	90.63	328.16	6459.50	5828.32	-3144.94	6622.29	0.59
12927.00	89.79	327.36	6459.04	5934.89	-3212.15	6748.08	0.92
13052.00	89.51	327.27	6459.80	6040.10	-3279.65	6872.82	0.24
13177.00	90.84	326.42	6459.42	6144.74	-3348.01	6997.48	1.26
13303.00	90.70	326.52	6457.73	6249.77	-3417.61	7123.07	0.14
13427.00	90.21	326.26	6456.74	6353.03	-3486.24	7246.66	0.45
13552.00	91.82	327.68	6454.53	6457.81	-3554.36	7371.32	1.72
13677.00	91.82	327.45	6450.56	6563.26	-3621.37	7496.03	0.18
13803.00	91.68	327.40	6446.71	6669.39	-3689.18	7621.73	0.12
13887.00	91.26	327.31	6444.55	6740.09	-3734.48	7705.53	0.51

Vertical Section is 7768.38 ft along the target direction of 331.02 deg at a measured depth of 13950.00 ft.
 Horizontal Displacement is 7768.38 ft along the well bore azimuth of 330.98 deg.
 The total correction is -8.02 deg relative to Grid North.

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Hydraulic Fracturing Fluid Product Component Information Disclosure

69-00100	Fracture Date:	6/1/2012
	State:	WEST VIRGINIA
	County:	OHIO
	API Number:	4706900100
	Operator Name:	CHESAPEAKE APPALACHIA LLC
	Well Name and Number:	DEBORAH CRAIG OHI 3H
	Longitude:	-80.584946
	Latitude:	40.047766
	Long/Lat Projection:	NAD27
	Production Type:	GAS
	True Vertical Depth (TVD):	6,583
	Total Water Volume (gal)*:	5,349,162

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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		Carrier/Base Fluid				77.85747%	
Recycled Produced Water		Carrier/Base Fluid				8.28314%	
Ottawa Sand		Proppant	Crystalline Silica (Quartz Sand, Silicon Dioxide)	014808-60-7	100.00%	9.28701%	
100 Mesh Sand		Proppant	Crystalline Silica (Quartz Sand, Silicon Dioxide)	014808-60-7	100.00%	3.98864%	
ACID, HYDROCHLORIC, WIC-641L	WEATHERFORD	Acid	Water	007732-18-5	85.00%	0.37855%	
			Hydrochloric Acid	007647-01-0	15.00%	0.06680%	
WAI-251LC	WEATHERFORD	Iron Control Agent	Citric Acid	000077-92-9	70.00%	0.00332%	
WAI-251LC	WEATHERFORD	Corrosion Inhibitor	Ethylene Glycol	000107-21-1	60.00%	0.00048%	
			Dimethyl Formamide	000068-12-2	40.00%	0.00032%	
			Tar bases, quinoline derivs, benzyl chloride-gauternized	072480-70-7	13.00%	0.00010%	
			Branched-Ethoxylated Nonyl Phenol (Branched-Nonyl Phenol Ethoxylate)	068412-54-4	10.00%	0.00008%	

64-00100			Cinnamaldehyde	000104-55-2	10.00%	0.00008%	
			2-Butoxyethanol (Ethylene Glycol Monobutyl Ether)	000111-76-2	7.00%	0.00006%	
			Isopropanol (Isopropyl Alcohol, Propan-2-ol)	000067-63-0	7.00%	0.00006%	
			Triethyl Phosphate	000078-40-0	7.00%	0.00006%	
EC6110A	NALCO	Anti-Bacterial Agent	Glutaraldehyde	000111-30-8	50.00%	0.01671%	RECEIVED Office of Oil and Gas FEB 27 2015 WV Department of Environmental Protection
			Quaternary Ammonium Compounds	N/A	10.00%	0.00279%	
			Ethanol	000064-17-5	5.00%	0.00139%	
EC6629A	NALCO	Scale Inhibitor	No Hazardous Components	NONE		0.00000%	
WFR-61LA	WEATHERFORD	Friction Reducer	Petroleum Distillate Hydrotreated Light	064742-47-8	40.00%	0.03672%	
			Sodium Chloride	007647-14-5	10.00%	0.00918%	
			Alcohols ethoxylated C12-16	068551-12-2	7.00%	0.00643%	
			Quaternary Ammonium Chloride (Ammonium Chloride)	012125-02-9	7.00%	0.00643%	
WGA-15L	WEATHERFORD	Gelling Agent	Petroleum Distillate Hydrotreated Light	064742-47-8	70.00%	0.00534%	
WBK-133 OXIDIZER	WEATHERFORD	Breaker	Ammonium Persulfate	007727-54-0	100.00%	0.00021%	
Additional Ingredients Not Listed on MSDS							
EC6110A, EC6629A	NALCO	Anti-Bacterial Agent, Scale Inhibitor	Methanol (Methyl Alcohol)	000067-56-1			
			Proprietary Acrylate Polymer	TRADE SECRET			
			Proprietary Quaternary Ammonium Salt	TRADE SECRET			
			Water	007732-18-5			
WAI-251LC, WFR-61LA, WGA-15L, WIC-641L	WEATHERFORD	Corrosion Inhibitor, Friction Reducer, Gelling Agent, Iron Control Agent	Alcohols ethoxylated C12-16	068551-12-2			
			Guar Gum	009000-30-0			
			Proprietary Alcohol	TRADE SECRET			
			Proprietary Ethoxylated Nonylphenol	TRADE SECRET			
			Proprietary Friction Reducer Additive (WFR-61LA)	TRADE SECRET			
			Sorbitan	008007-43-0			
			Water	007732-18-5			

* 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.