

Farm name: Worthley BRK 8H Operator Well No.: 835860

LOCATION: Elevation: 1,160' Quadrangle: Bethany

District: Buffalo County: Brooke  
Latitude: 3,790' Feet South of 40 Deg. 15 Min. 00 Sec.  
Longitude 12,670' 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	26"	57'	57'	102 Cu. Ft.
Agent: Jessica Greathouse	18 5/8"	255'	255'	522 Cu. Ft.
Inspector: <b>Gayne J. Knitowski</b>	13 3/8"	375'	375'	359 Cu. Ft.
Date Permit Issued: 6-6-2012	9 5/8"	1,703'	1,703'	808 Cu. Ft.
Date Well Work Commenced: 12-2-2012	5 1/2"	12,558'	12,558'	1,207 Cu. Ft.
Date Well Work Completed: 7-5-2013				
Verbal Plugging:				
Date Permission granted on:				
Rotary <input checked="" type="checkbox"/> Cable <input type="checkbox"/> Rig <input type="checkbox"/>				
Total Vertical Depth (ft): 6,078'				
Total Measured Depth (ft): 12,561'				
Fresh Water Depth (ft.): 183'				
Salt Water Depth (ft.): 800'				
Is coal being mined in area (N/Y)? N				
Coal Depths (ft.): 316'				
Void(s) encountered (N/Y) Depth(s) Y 316'				

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

Producing formation Marcellus Pay zone depth (ft) 6,345-12,390

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

Final open flow 3,125\* MCF/d Final open flow 243 Bbl/d

Time of open flow between initial and final tests 72 Hours \*Calculated

Static rock Pressure 3,951\* psig (surface pressure) after 72 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.

Markas Williams  
Signature

2-26-15  
Date

WV Department of  
Environmental Protection

9-00133

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 5182-12561' 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: 6078 ft TVD @ 12361 ft MD**

Formation/Lithology	Top Depth, MD (ft)	Top Depth, TVD (ft)	Bottom Depth, MD (ft)	Bottom Depth, TVD (ft)
SILT/COAL	0	0	100	100
LS/SS	100	100	316	316
PITTSBURG COAL	316	316	340	340
LS/SS/SILT	340	340	400	400
SILT/SHALE/SS	400	400	910	910
SS	910	910	1336	1336
BIG LIME	1336	1336	1375	1375
BIG INJUN (SS)	1375	1375	1600	1600
SHALE	1600	1600	5853	5808
GENESEO (SH)	5853	5808	5876	5826
TULLY (LS)	5876	5826	5956	5880
HAMILTON (SH)	5956	5880	6183	5985
MARCELLUS (SH)	6183	5985		
TD OF LATERAL			12561	6074

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# Chesapeake Appalachia, LLC.

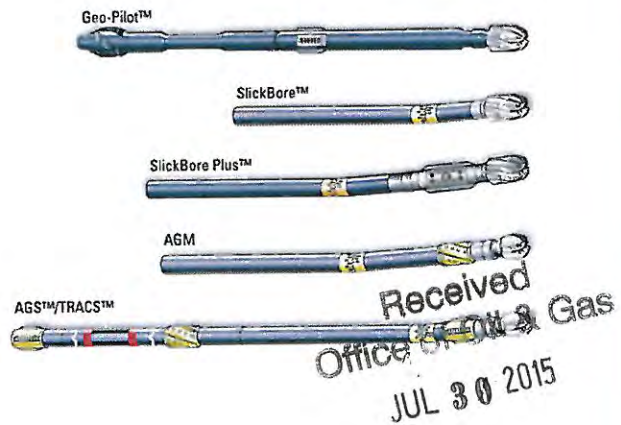
## Worthley BRK 8H

Brooke County, West Virginia  
Nomac 25

## Sperry Drilling Services

## End of Well Report

Prepared For: Chesapeake



December 19, 2012

Submitted by:  
David Lee - Well Planner  
Darin Brown - Directional Drilling Coordinator  
Hunter Williams - Sperry Account Rep.  
1-800-332-3992  
Houston, TX 77032

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# Chesapeake Appalachia

**Worthley BRK 8H  
Brooke County, West Virginia**

**End of Well Report**

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Well Summary and Graphs ..... Section 2

Drilling Parameters.....Section 3

BHA Performance Records..... Section 4

Daily Drilling Activity Reports..... Section 5

**HALLIBURTON**  

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Final Surveys and Plot

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# Chesapeake Appalachia, LLC

**HALLIBURTON**

**Sperry Drilling Services**

9-00133

Project: Brooke County, WV  
 Site: Bethany  
 Well: Worthley BRK 8H  
 Wellbore: Wellbore #1  
 Design: Plan #6  
 Rig: Nomac 25

### SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSet	Annotation
11485.00	90.17	155.57	6060.07	5377.00	2226.87	0.00	0.00	5819.89	Tie-In
11535.00	90.17	155.57	6059.93	5422.53	2247.55	0.00	0.00	5869.86	Start Drop/Turn
11738.87	87.00	158.13	6064.96	5609.89	2327.65	2.00	141.00	5973.64	End Drop/Turn
11882.92	87.00	158.13	6072.51	5703.99	2381.23	0.00	0.00	6217.46	Start Build/Turn
12007.24	89.40	157.49	6076.41	5852.44	2428.15	2.00	-15.00	6341.70	End Build/Turn
12561.74	89.40	157.49	6082.22	6370.66	2640.43	0.00	0.00	6896.13	TD

### Surface Location:

US State Plane 1927 (Exact solution)  
 West Virginia North 4701  
 Elevation: GL 1160 + KB 17' @ 1177.00ft (Nomac 25)

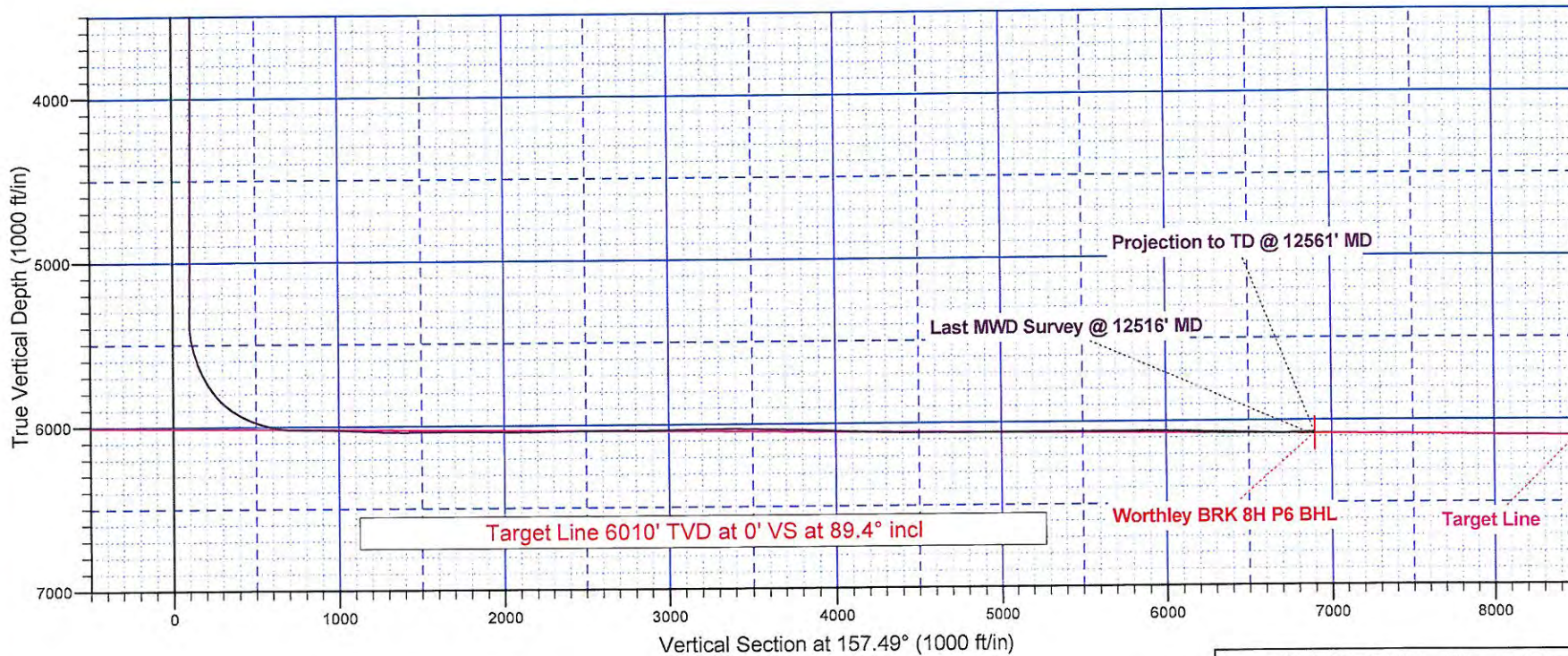
Northing	Easting	Latitude	Longitude
626480.48	1705291.44	40° 12' 54.860 N	80° 33' 18.871 W

### WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting
Worthley BRK 8H P6 BHL	6082.22	-6370.66	2640.43	620109.81	1707931.87

To convert a Magnetic Direction to a Grid Direction, Subtract 8.09°

Magnetic Model: BGGM2012 Date: 15-Dec-12  
 Azimuths to Grid North





# Chesapeake Appalachia, LLC

**HALLIBURTON**

**Sperry Drilling Services**

9-00133

**Project: Brooke County, WV**  
**Site: Bethany**  
**Well: Worthley BRK 8H**  
**Wellbore: Wellbore #1**  
**Design: Plan #6**  
**Rig: Nomac 25**



To convert a Magnetic Direction to a Grid Direction, Subtract 8.09°

Magnetic Model: BGGM2012 Date: 15-Dec-12  
 Azimuths to Grid North

### Surface Location:

US State Plane 1927 (Exact solution)  
 West Virginia North 4701  
 Elevation: GL 1160 + KB 17' @ 1177.00ft (Nomac 25)

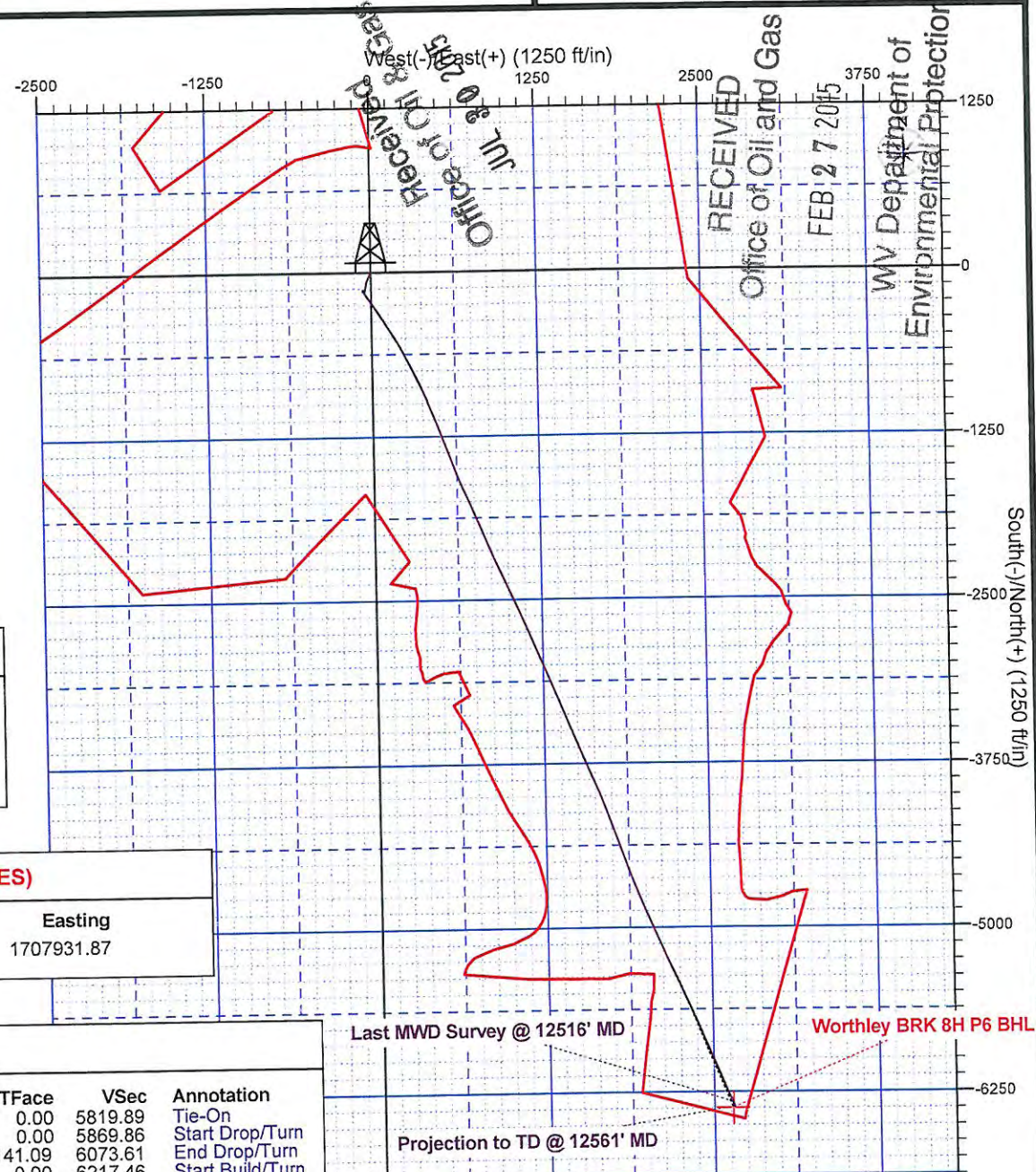
Northing	Easting	Latitude	Longitude
626480.48	1705291.44	40° 12' 54.860 N	80° 33' 18.871 W

### WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting
Worthley BRK 8H P6 BHL	6082.22	-6370.66	2640.43	620109.81	1707931.87

### SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Annotation
11485.00	90.17	155.57	6060.07	-5377.00	2226.87	0.00	0.00	5819.89	Tie-On
11535.00	90.17	155.57	6059.93	-5422.53	2247.55	0.00	0.00	5869.86	Start Drop/Turn
11738.87	87.00	158.13	6064.96	-5609.89	2327.65	2.00	141.09	6073.61	End Drop/Turn
11882.92	87.00	158.13	6072.51	-5743.39	2381.23	0.00	0.00	6217.46	Start Build/Turn
12007.24	89.40	157.49	6076.41	-5858.44	2428.15	2.00	-15.00	6341.70	End Build/Turn
12561.74	89.40	157.49	6082.22	-6370.66	2640.43	0.00	0.00	6896.17	TD





9-00133

# Chesapeake Appalachia, LLC

Brooke County, WV

Bethany

Worthley BRK 8H

Wellbore #1

Design: Surveys

## Sperry Drilling Services

### Combo Report

19 December, 2012

Well Coordinates: 626,480.48 N, 1,705,291.44 E (40° 12' 54.86" N, 080° 33' 18.87" W)  
Ground Level: 1,160.00 ft

Local Coordinate Origin:	Centered on Well Worthley BRK 8H
Viewing Datum:	GL 1160 + KB 17' @ 1177.00ft (Nomac 25)
TVDs to System:	N
North Reference:	Grid
Unit System:	API-US Survey Feet

Version: 2003.16 Build: 43I

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Design Report for Worthley BRK 8H - Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates		Map Coordinates		Dogleg Rate (°/100ft)	Vertical Section (ft)
					Northing (ft)	Easting (ft)	Northing (ft)	Easting (ft)		
0.00	0.00	0.00	-1,177.00	0.00	0.00 N	0.00 E	626,480.48	1,705,291.44	0.00	0.00
100.00	0.18	208.92	-1,077.00	100.00	0.14 S	0.08 W	626,480.34	1,705,291.37	0.18	0.10
200.00	0.13	206.99	-977.00	200.00	0.38 S	0.20 W	626,480.10	1,705,291.24	0.05	0.27
300.00	0.20	209.51	-877.00	300.00	0.63 S	0.34 W	626,479.85	1,705,291.10	0.07	0.45
400.00	0.08	205.97	-777.00	400.00	0.84 S	0.46 W	626,479.63	1,705,290.99	0.12	0.60
500.00	0.54	203.02	-677.00	500.00	1.34 S	0.67 W	626,479.14	1,705,290.77	0.46	0.98
600.00	2.96	201.13	-577.06	599.94	4.18 S	1.79 W	626,476.29	1,705,289.66	2.42	3.18
700.00	4.73	202.04	-477.29	699.71	10.41 S	4.27 W	626,470.06	1,705,287.18	1.77	7.99
800.00	5.75	204.76	-377.71	799.29	18.78 S	7.91 W	626,461.69	1,705,283.53	1.05	14.32
900.00	6.46	203.91	-278.27	898.73	28.48 S	12.29 W	626,452.00	1,705,279.16	0.72	21.60
1,000.00	7.75	203.98	-179.04	997.96	39.78 S	17.31 W	626,440.70	1,705,274.14	1.29	30.12
1,100.00	7.82	202.98	-79.96	1,097.04	52.20 S	22.71 W	626,428.27	1,705,268.74	0.15	39.53
1,200.00	7.61	200.48	19.13	1,196.13	64.67 S	27.68 W	626,415.81	1,705,263.77	0.40	49.15
1,300.00	6.67	197.31	118.35	1,295.35	76.42 S	31.72 W	626,404.06	1,705,259.72	1.02	58.45
1,400.00	6.10	192.45	217.73	1,394.73	87.15 S	34.60 W	626,393.33	1,705,256.85	0.79	67.27
1,500.00	6.60	193.15	317.12	1,494.12	97.93 S	37.05 W	626,382.54	1,705,254.39	0.51	76.29
1,600.00	6.75	192.40	416.44	1,593.44	109.27 S	39.62 W	626,371.21	1,705,251.83	0.17	85.78
1,700.00	6.73	192.43	515.75	1,692.75	120.73 S	42.14 W	626,359.74	1,705,249.30	0.02	95.40
1,800.00	4.94	191.77	615.23	1,792.23	130.67 S	44.28 W	626,349.81	1,705,247.16	1.79	103.76
1,900.00	3.47	192.47	714.96	1,891.96	137.84 S	45.81 W	626,342.64	1,705,245.63	1.47	109.80
2,000.00	2.47	192.21	814.82	1,991.82	142.90 S	46.92 W	626,337.57	1,705,244.52	1.00	114.05
2,100.00	1.57	197.17	914.76	2,091.76	146.32 S	47.78 W	626,334.16	1,705,243.66	0.92	116.88
2,200.00	1.04	206.18	1,014.73	2,191.73	148.44 S	48.59 W	626,332.04	1,705,242.86	0.57	118.53
2,300.00	0.53	216.12	1,114.72	2,291.72	149.63 S	49.26 W	626,330.85	1,705,242.18	0.53	119.37
2,400.00	0.36	244.96	1,214.72	2,391.72	150.14 S	49.82 W	626,330.34	1,705,241.63	0.28	119.62
2,500.00	0.32	282.10	1,314.72	2,491.72	150.21 S	50.38 W	626,330.27	1,705,241.07	0.22	119.48
2,600.00	0.27	289.12	1,414.72	2,591.72	150.07 S	50.87 W	626,330.40	1,705,240.57	0.06	119.16
2,700.00	0.30	290.32	1,514.72	2,691.72	149.91 S	51.34 W	626,330.57	1,705,240.10	0.03	118.83
2,800.00	0.20	285.91	1,614.71	2,791.71	149.77 S	51.75 W	626,330.71	1,705,239.69	0.10	118.54
2,900.00	0.26	283.12	1,714.71	2,891.71	149.67 S	52.14 W	626,330.81	1,705,239.30	0.06	118.30
3,000.00	0.25	285.34	1,814.71	2,991.71	149.56 S	52.57 W	626,330.92	1,705,238.87	0.01	118.04
3,100.00	0.37	290.86	1,914.71	3,091.71	149.39 S	53.09 W	626,331.09	1,705,238.36	0.12	117.68
3,200.00	0.47	294.74	2,014.71	3,191.71	149.10 S	53.76 W	626,331.38	1,705,237.88	0.10	117.16
3,300.00	0.40	297.25	2,114.71	3,291.71	148.77 S	54.44 W	626,331.71	1,705,237.00	0.07	116.59
3,400.00	0.37	296.65	2,214.70	3,391.70	148.46 S	55.04 W	626,332.04	1,705,236.40	0.03	116.08
3,500.00	0.18	296.73	2,314.70	3,491.70	148.25 S	55.47 W	626,332.23	1,705,235.97	0.19	115.72
3,600.00	0.10	298.22	2,414.70	3,591.70	148.14 S	55.69 W	626,332.34	1,705,235.76	0.08	115.53
3,700.00	0.22	297.52	2,514.70	3,691.70	148.01 S	55.93 W	626,332.47	1,705,235.51	0.12	115.32
3,800.00	0.44	298.98	2,614.70	3,791.70	147.73 S	56.44 W	626,332.75	1,705,235.00	0.22	114.87
3,900.00	0.54	297.01	2,714.70	3,891.70	147.33 S	57.20 W	626,333.15	1,705,234.25	0.10	114.21
4,000.00	0.41	296.31	2,814.69	3,991.69	146.96 S	57.94 W	626,333.52	1,705,233.51	0.13	113.58
4,100.00	0.52	298.99	2,914.69	4,091.69	146.58 S	58.65 W	626,333.90	1,705,232.79	0.11	112.96
4,200.00	0.35	300.11	3,014.69	4,191.69	146.21 S	59.32 W	626,334.27	1,705,232.19	0.17	112.36
4,300.00	0.32	303.12	3,114.69	4,291.69	145.90 S	59.81 W	626,334.58	1,705,231.63	0.03	111.89
4,400.00	0.35	321.96	3,214.68	4,391.68	145.51 S	60.24 W	626,334.97	1,705,231.21	0.11	111.36

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Design Report for Worthley BRK 8H - Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates		Map Coordinates		Dogleg Rate (°/100ft)	Vertical Section (ft)
					Northing (ft)	Easting (ft)	Northing (ft)	Easting (ft)		
4,500.00	0.65	350.95	3,314.68	4,491.68	144.71 S	60.51 W	626,335.77	1,705,230.93	0.38	110.51
4,600.00	0.68	357.20	3,414.67	4,591.67	143.55 S	60.63 W	626,336.92	1,705,230.81	0.08	109.40
4,700.00	0.65	356.21	3,514.67	4,691.67	142.40 S	60.70 W	626,338.08	1,705,230.75	0.03	108.31
4,800.00	0.37	358.27	3,614.66	4,791.66	141.51 S	60.75 W	626,338.97	1,705,230.70	0.28	107.47
4,900.00	0.32	16.87	3,714.66	4,891.66	140.92 S	60.67 W	626,339.56	1,705,230.77	0.12	106.95
5,000.00	0.59	7.13	3,814.66	4,991.66	140.14 S	60.53 W	626,340.34	1,705,230.92	0.28	106.29
5,080.00	0.55	6.84	3,894.65	5,071.65	139.35 S	60.43 W	626,341.13	1,705,231.01	0.05	105.60
5,214.00	0.58	353.92	4,028.65	5,205.65	138.04 S	60.43 W	626,342.44	1,705,231.02	0.10	104.38
5,277.00	0.81	344.04	4,091.64	5,268.64	137.29 S	60.58 W	626,343.19	1,705,230.86	0.41	103.64
5,341.00	0.64	348.78	4,155.64	5,332.64	136.50 S	60.78 W	626,343.97	1,705,230.67	0.28	102.84
5,404.00	0.94	135.32	4,218.63	5,395.63	136.53 S	60.48 W	626,343.95	1,705,230.96	2.41	102.97
5,435.00	5.14	148.68	4,249.58	5,426.58	137.89 S	59.58 W	626,342.58	1,705,231.86	13.65	104.58
5,466.00	8.85	156.68	4,280.35	5,457.35	141.27 S	57.92 W	626,339.20	1,705,233.53	12.34	108.34
5,498.00	12.20	154.54	4,311.81	5,488.81	146.59 S	55.49 W	626,333.89	1,705,235.96	10.54	114.18
5,530.00	13.17	157.11	4,343.02	5,520.02	153.00 S	52.62 W	626,327.48	1,705,238.83	3.51	121.20
5,560.00	15.29	152.11	4,372.10	5,549.10	159.64 S	49.43 W	626,320.83	1,705,242.01	8.16	128.56
5,592.00	17.79	149.33	4,402.78	5,579.78	167.58 S	44.97 W	626,312.90	1,705,246.48	8.19	137.60
5,622.00	19.82	146.42	4,431.18	5,608.18	175.76 S	39.82 W	626,304.72	1,705,251.63	7.45	147.13
5,653.00	22.35	144.83	4,460.10	5,637.10	184.96 S	33.51 W	626,295.52	1,705,257.93	8.37	158.04
5,685.00	25.09	146.20	4,489.39	5,666.39	195.57 S	26.23 W	626,284.91	1,705,265.21	8.73	170.63
5,716.00	27.45	145.60	4,517.19	5,694.19	206.93 S	18.54 W	626,273.55	1,705,272.91	7.66	184.07
5,747.00	29.88	146.10	4,544.39	5,721.39	219.24 S	10.19 W	626,261.24	1,705,281.25	7.88	198.63
5,779.00	31.98	146.27	4,571.83	5,748.83	232.90 S	1.04 W	626,247.58	1,705,290.40	6.57	214.76
5,810.00	35.98	146.62	4,597.54	5,774.54	247.34 S	8.53 E	626,233.14	1,705,299.98	12.92	231.76
5,841.00	37.65	144.23	4,622.35	5,799.35	262.63 S	19.08 E	626,217.85	1,705,310.52	7.10	249.92
5,873.00	41.42	146.69	4,647.03	5,824.03	279.41 S	30.61 E	626,201.07	1,705,322.05	12.76	269.84
5,903.00	45.44	146.34	4,668.81	5,845.81	296.61 S	41.99 E	626,183.87	1,705,333.43	13.42	290.08
5,935.00	50.77	147.23	4,690.17	5,867.17	316.53 S	55.02 E	626,163.95	1,705,346.47	16.78	313.48
5,967.00	52.05	146.48	4,710.13	5,887.13	337.47 S	68.70 E	626,143.00	1,705,360.14	24.40	338.06
5,999.00	55.02	147.41	4,729.15	5,906.15	359.04 S	82.73 E	626,121.44	1,705,374.55	35.73	363.36
6,031.00	57.83	147.40	4,746.85	5,923.85	381.50 S	97.09 E	626,098.98	1,705,388.54	50.88	389.61
6,061.00	61.38	147.41	4,762.02	5,939.02	403.30 S	111.03 E	626,077.18	1,705,402.47	81.83	415.08
6,093.00	64.59	148.39	4,776.55	5,953.55	427.45 S	126.17 E	626,053.03	1,705,417.22	104.40	443.19
6,124.00	67.50	148.04	4,789.14	5,966.14	451.53 S	141.10 E	626,028.95	1,705,432.54	139.44	471.14
6,156.00	70.75	147.93	4,800.54	5,977.54	476.87 S	156.94 E	626,003.60	1,705,448.39	194.16	500.63
6,187.00	73.49	148.89	4,810.06	5,987.06	502.00 S	172.40 E	625,978.47	1,705,463.84	259.93	529.76
6,216.00	74.41	149.02	4,818.08	5,995.08	525.88 S	186.77 E	625,954.60	1,705,478.21	320.32	557.32
6,247.00	76.78	150.35	4,825.79	6,002.79	551.80 S	201.92 E	625,928.68	1,705,493.36	381.70	587.06
6,278.00	79.61	150.77	4,832.13	6,009.13	578.22 S	216.83 E	625,902.25	1,705,508.29	443.12	617.18
6,310.00	82.80	151.73	4,837.02	6,014.02	605.94 S	232.04 E	625,874.99	1,705,523.49	504.40	648.61
6,341.00	85.33	152.78	4,840.23	6,017.23	633.23 S	246.39 E	625,847.25	1,705,537.84	565.83	679.32
6,372.00	86.91	154.02	4,842.32	6,019.32	660.88 S	260.24 E	625,819.59	1,705,551.69	627.21	710.17
6,404.00	88.72	154.49	4,843.54	6,020.54	689.69 S	274.13 E	625,790.79	1,705,565.57	688.58	742.09
6,466.00	89.16	152.98	4,844.69	6,021.69	745.27 S	301.56 E	625,735.80	1,705,593.00	749.94	803.94
6,527.00	89.97	153.18	4,845.15	6,022.15	799.66 S	329.18 E	625,680.82	1,705,620.62	811.37	864.76

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Design Report for Worthley BRK 8H - Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates		Map Coordinates		Dogleg Rate (°/100ft)	Vertical Section (ft)
					Northing (ft)	Easting (ft)	Northing (ft)	Easting (ft)		
6,591.00	89.13	154.19	4,845.66	6,022.66	857.03 S	357.55 E	625,623.45	1,705,648.99	2.05	928.62
6,654.00	88.08	156.87	4,847.19	6,024.19	914.34 S	383.63 E	625,566.13	1,705,675.08	4.57	991.55
6,716.00	87.72	158.82	4,849.46	6,026.46	971.73 S	407.00 E	625,508.75	1,705,698.44	3.20	1,053.51
6,779.00	87.21	157.74	4,852.25	6,029.25	1,030.19 S	430.29 E	625,450.28	1,705,721.73	1.89	1,116.44
6,842.00	87.11	158.20	4,855.37	6,032.37	1,088.52 S	453.89 E	625,391.95	1,705,745.33	0.75	1,179.36
6,904.00	86.94	157.58	4,858.59	6,035.59	1,145.89 S	477.19 E	625,334.59	1,705,768.64	1.04	1,241.27
6,967.00	89.19	159.44	4,860.72	6,037.72	1,204.47 S	500.26 E	625,276.01	1,705,791.70	4.63	1,304.22
7,029.00	89.87	159.97	4,861.23	6,038.23	1,262.61 S	521.76 E	625,217.86	1,705,813.21	1.39	1,366.17
7,092.00	90.54	160.94	4,861.00	6,038.00	1,321.98 S	542.84 E	625,158.49	1,705,834.28	1.87	1,429.09
7,155.00	90.67	159.91	4,860.33	6,037.33	1,381.34 S	563.94 E	625,099.14	1,705,855.39	1.65	1,492.00
7,218.00	90.87	160.16	4,859.49	6,036.49	1,440.55 S	585.45 E	625,039.93	1,705,876.90	0.51	1,554.93
7,280.00	89.80	157.53	4,859.13	6,036.13	1,498.36 S	607.82 E	624,982.12	1,705,899.27	4.58	1,616.91
7,343.00	90.07	158.12	4,859.20	6,036.20	1,556.70 S	631.60 E	624,923.78	1,705,923.05	1.03	1,679.91
7,406.00	88.92	157.17	4,859.75	6,036.75	1,614.96 S	655.56 E	624,865.51	1,705,947.01	2.37	1,742.90
7,469.00	89.43	156.62	4,860.66	6,037.66	1,672.90 S	680.28 E	624,807.57	1,705,971.73	1.19	1,805.89
7,532.00	89.36	155.83	4,861.32	6,038.32	1,730.55 S	705.68 E	624,749.92	1,705,997.12	1.26	1,868.87
7,595.00	88.89	156.32	4,862.29	6,039.29	1,788.13 S	731.23 E	624,692.35	1,706,022.67	1.08	1,931.84
7,657.00	89.26	156.50	4,863.29	6,040.29	1,844.94 S	756.03 E	624,635.53	1,706,047.48	0.66	1,993.83
7,720.00	89.63	157.59	4,863.90	6,040.90	1,902.95 S	780.60 E	624,577.53	1,706,072.05	1.83	2,056.82
7,783.00	90.24	158.75	4,863.97	6,040.97	1,961.43 S	804.03 E	624,519.05	1,706,095.47	2.08	2,119.81
7,846.00	90.54	159.25	4,863.54	6,040.54	2,020.25 S	826.61 E	624,460.23	1,706,118.05	0.93	2,182.79
7,909.00	90.81	156.90	4,862.80	6,039.80	2,078.68 S	850.13 E	624,401.80	1,706,141.57	3.75	2,245.78
7,972.00	90.97	156.06	4,861.82	6,038.82	2,136.44 S	875.26 E	624,344.04	1,706,166.71	1.36	2,308.76
8,034.00	91.68	156.31	4,860.39	6,037.39	2,193.14 S	900.29 E	624,287.33	1,706,191.74	1.21	2,370.73
8,097.00	92.31	155.55	4,858.19	6,035.19	2,250.63 S	925.97 E	624,229.85	1,706,217.42	1.57	2,433.66
8,160.00	89.80	155.60	4,857.03	6,034.03	2,307.98 S	952.01 E	624,172.50	1,706,243.46	3.98	2,496.61
8,223.00	90.40	154.84	4,856.92	6,033.92	2,365.18 S	978.42 E	624,115.30	1,706,269.86	1.54	2,559.56
8,286.00	88.96	155.21	4,857.27	6,034.27	2,422.28 S	1,005.02 E	624,058.19	1,706,296.46	2.26	2,622.50
8,349.00	89.06	156.12	4,858.36	6,035.36	2,479.68 S	1,030.98 E	624,000.80	1,706,323.42	1.45	2,685.46
8,412.00	89.50	156.12	4,859.15	6,036.15	2,537.28 S	1,056.48 E	623,943.20	1,706,347.92	0.70	2,748.44
8,474.00	90.07	156.80	4,859.39	6,036.39	2,594.12 S	1,081.24 E	623,886.36	1,706,372.68	1.43	2,810.43
8,537.00	90.17	157.24	4,859.26	6,036.26	2,652.12 S	1,105.83 E	623,828.36	1,706,397.28	0.72	2,873.42
8,599.00	90.20	157.18	4,859.06	6,036.06	2,709.28 S	1,129.85 E	623,771.20	1,706,421.29	0.11	2,935.42
8,662.00	90.37	156.27	4,858.74	6,035.74	2,767.15 S	1,154.74 E	623,713.33	1,706,446.19	1.47	2,998.42
8,725.00	91.01	157.59	4,857.98	6,034.98	2,825.11 S	1,179.43 E	623,655.37	1,706,470.87	2.33	3,061.41
8,788.00	91.38	157.16	4,856.67	6,033.67	2,883.24 S	1,203.66 E	623,597.23	1,706,495.10	0.90	3,124.39
8,850.00	91.95	156.80	4,854.87	6,031.87	2,940.28 S	1,227.89 E	623,540.19	1,706,519.34	1.09	3,186.36
8,913.00	90.37	156.78	4,853.59	6,030.59	2,998.17 S	1,252.72 E	623,482.31	1,706,544.16	2.51	3,249.34
8,976.00	90.84	156.70	4,852.93	6,029.93	3,056.05 S	1,277.59 E	623,424.43	1,706,569.04	0.76	3,312.33
9,038.00	89.93	157.63	4,852.51	6,029.51	3,113.18 S	1,301.65 E	623,367.29	1,706,593.10	2.10	3,374.33
9,101.00	88.62	158.48	4,853.31	6,030.31	3,171.61 S	1,325.19 E	623,308.86	1,706,616.64	2.46	3,437.32
9,163.00	88.52	158.00	4,854.85	6,031.85	3,229.18 S	1,348.17 E	623,251.30	1,706,639.62	0.79	3,499.30
9,227.00	88.86	157.85	4,856.32	6,033.32	3,288.47 S	1,372.22 E	623,192.01	1,706,662.60	0.58	3,563.28
9,290.00	89.63	157.52	4,857.15	6,034.15	3,346.75 S	1,396.14 E	623,133.73	1,706,687.58	1.33	3,626.27
9,352.00	88.42	157.72	4,858.20	6,035.20	3,404.07 S	1,419.74 E	623,076.41	1,706,711.18	1.98	3,688.26

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Measured Depth (ft)	Inclination (°)	Azimuth (°)	TVD below System (ft)	Vertical Depth (ft)	Local Coordinates		Map Coordinates		Dogleg Rate (°/100ft)	Vertical Section (ft)
					Northing (ft)	Easting (ft)	Northing (ft)	Easting (ft)		
9,415.00	87.74	158.20	4,860.31	6,037.31	3,462.43 S	1,443.37 E	623,018.05	1,706,734.81	1.32	3,751.22
9,478.00	88.49	157.23	4,862.39	6,039.39	3,520.69 S	1,467.24 E	622,959.78	1,706,758.69	1.95	3,814.19
9,541.00	87.89	156.98	4,864.38	6,041.38	3,578.70 S	1,491.74 E	622,901.78	1,706,783.19	1.03	3,877.15
9,604.00	87.03	157.35	4,867.17	6,044.17	3,636.70 S	1,516.17 E	622,843.77	1,706,807.61	1.49	3,940.09
9,667.00	87.45	157.29	4,870.20	6,047.20	3,694.77 S	1,540.43 E	622,785.71	1,706,831.87	0.67	4,003.02
9,729.00	87.72	157.09	4,872.81	6,049.81	3,751.87 S	1,564.44 E	622,728.61	1,706,855.89	0.54	4,064.96
9,792.00	88.19	157.51	4,875.06	6,052.06	3,809.95 S	1,588.74 E	622,670.53	1,706,880.19	1.00	4,127.92
9,855.00	88.22	156.52	4,877.04	6,054.04	3,867.92 S	1,613.33 E	622,612.56	1,706,904.77	1.57	4,190.89
9,918.00	88.09	156.08	4,879.06	6,056.06	3,925.57 S	1,638.64 E	622,554.90	1,706,930.08	0.73	4,253.84
9,981.00	88.62	158.49	4,880.87	6,057.87	3,983.66 S	1,662.95 E	622,496.82	1,706,954.40	3.92	4,316.81
10,044.00	89.19	159.33	4,882.08	6,059.08	4,042.43 S	1,685.62 E	622,438.05	1,706,977.06	1.61	4,379.78
10,107.00	89.33	159.55	4,882.89	6,059.89	4,101.41 S	1,707.74 E	622,379.07	1,706,999.19	0.41	4,442.73
10,169.00	89.46	160.07	4,883.55	6,060.55	4,159.60 S	1,729.14 E	622,320.88	1,707,020.58	0.86	4,504.68
10,232.00	89.50	160.14	4,884.12	6,061.12	4,218.83 S	1,750.58 E	622,261.64	1,707,042.02	0.13	4,567.61
10,293.00	89.73	160.40	4,884.53	6,061.53	4,276.25 S	1,771.17 E	622,204.23	1,707,062.61	0.57	4,628.54
10,356.00	89.93	160.18	4,884.71	6,061.71	4,335.56 S	1,792.42 E	622,144.92	1,707,083.86	0.47	4,691.46
10,418.00	90.07	160.04	4,884.71	6,061.71	4,393.86 S	1,813.51 E	622,086.61	1,707,104.95	0.32	4,753.40
10,480.00	90.30	159.82	4,884.51	6,061.51	4,452.10 S	1,834.79 E	622,028.38	1,707,126.23	0.51	4,815.34
10,543.00	90.60	160.39	4,884.02	6,061.02	4,511.33 S	1,856.22 E	621,969.14	1,707,147.67	1.02	4,878.27
10,606.00	90.10	159.45	4,883.63	6,060.63	4,570.50 S	1,877.85 E	621,909.97	1,707,169.30	1.69	4,941.22
10,668.00	89.50	159.06	4,883.85	6,060.85	4,628.48 S	1,899.81 E	621,851.99	1,707,191.26	1.15	5,003.19
10,731.00	89.66	158.22	4,884.31	6,061.31	4,687.15 S	1,922.76 E	621,793.32	1,707,214.20	1.36	5,066.17
10,794.00	89.43	157.59	4,884.81	6,061.81	4,745.52 S	1,946.46 E	621,734.95	1,707,237.90	1.06	5,129.17
10,856.00	90.10	156.41	4,885.07	6,062.07	4,802.59 S	1,970.68 E	621,677.88	1,707,262.13	2.19	5,191.16
10,920.00	90.60	156.44	4,884.68	6,061.68	4,861.25 S	1,996.28 E	621,619.23	1,707,287.72	0.78	5,255.15
10,982.00	91.34	156.50	4,883.63	6,060.63	4,918.09 S	2,021.03 E	621,562.39	1,707,312.47	1.20	5,317.13
11,045.00	89.90	156.12	4,882.94	6,059.94	4,975.77 S	2,046.34 E	621,504.70	1,707,337.78	2.36	5,380.11
11,108.00	90.24	156.73	4,882.87	6,059.87	5,033.51 S	2,071.53 E	621,446.96	1,707,362.98	1.11	5,443.10
11,171.00	90.98	156.12	4,882.20	6,059.20	5,091.25 S	2,096.73 E	621,389.22	1,707,388.17	1.52	5,506.08
11,234.00	89.63	155.19	4,881.86	6,058.86	5,148.65 S	2,122.70 E	621,331.83	1,707,414.44	2.60	5,569.05
11,296.00	90.30	155.86	4,881.90	6,058.90	5,205.08 S	2,148.38 E	621,275.40	1,707,439.83	1.53	5,631.01
11,360.00	89.29	155.44	4,882.13	6,059.13	5,263.38 S	2,174.77 E	621,217.10	1,707,466.22	1.71	5,694.98
11,422.00	89.40	155.23	4,882.84	6,059.84	5,319.72 S	2,200.64 E	621,160.76	1,707,492.09	0.38	5,756.93
11,485.00	90.17	155.57	4,883.07	6,060.07	5,377.00 S	2,226.87 E	621,103.47	1,707,518.31	1.34	5,819.89
11,547.00	88.79	155.24	4,883.64	6,060.64	5,433.37 S	2,252.67 E	621,047.10	1,707,544.11	2.29	5,881.84
11,610.00	88.86	156.20	4,884.93	6,061.93	5,490.79 S	2,278.57 E	620,989.69	1,707,570.01	1.53	5,944.80
11,674.00	89.30	155.54	4,885.96	6,062.96	5,549.19 S	2,304.73 E	620,931.29	1,707,596.17	1.24	6,008.76
11,736.00	89.06	156.74	4,886.84	6,063.84	5,605.88 S	2,329.81 E	620,874.60	1,707,621.25	1.97	6,070.74
11,798.00	88.32	156.27	4,888.26	6,065.26	5,662.73 S	2,354.52 E	620,817.75	1,707,645.96	1.41	6,132.71
11,860.00	88.72	155.89	4,889.86	6,066.86	5,719.38 S	2,379.65 E	620,761.09	1,707,671.09	0.89	6,194.67
11,922.00	88.22	155.72	4,891.52	6,068.52	5,775.92 S	2,405.05 E	620,704.66	1,707,696.49	0.85	6,256.62
11,984.00	89.16	156.37	4,892.93	6,069.93	5,832.56 S	2,430.21 E	620,647.92	1,707,721.66	1.84	6,318.59
12,048.00	87.25	156.35	4,894.94	6,071.94	5,891.16 S	2,455.86 E	620,589.32	1,707,747.31	2.98	6,382.54
12,110.00	87.85	157.09	4,897.59	6,074.59	5,948.06 S	2,480.34 E	620,532.42	1,707,772.59	1.54	6,444.48
12,173.00	88.32	157.46	4,899.69	6,076.69	6,006.13 S	2,504.67 E	620,474.34	1,707,796.11	0.95	6,507.44

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					Northing (ft)	Easting (ft)	Northing (ft)	Easting (ft)		
12,235.00	89.03	157.71	4,901.13	6,078.13	6,063.43 S	2,528.30 E	620,417.04	1,707,819.75	1.21	6,569.42
12,298.00	89.66	157.13	4,901.85	6,078.85	6,121.60 S	2,552.49 E	620,358.88	1,707,843.94	1.36	6,632.42
12,361.00	90.34	157.07	4,901.85	6,078.85	6,179.63 S	2,577.01 E	620,300.84	1,707,868.45	1.08	6,695.42
12,423.00	90.77	157.20	4,901.25	6,078.25	6,236.76 S	2,601.10 E	620,243.72	1,707,892.54	0.72	6,757.41
12,486.00	91.65	157.87	4,899.92	6,076.92	6,294.96 S	2,625.16 E	620,185.51	1,707,916.61	1.76	6,820.40
12,516.00	91.81	156.90	4,899.01	6,076.01	6,322.65 S	2,636.69 E	620,157.83	1,707,928.14	3.28	6,850.38
<b>Last MWD Survey @ 12516' MD</b>										
12,561.00	91.81	156.90	4,897.59	6,074.59	6,364.02 S	2,654.34 E	620,116.46	1,707,945.79	0.00	6,895.36
<b>Projection to TD @ 12561' MD</b>										

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
12,516.00	6,076.01	-6,322.65	2,636.69	Last MWD Survey @ 12516' MD
12,561.00	6,074.59	-6,364.02	2,654.34	Projection to TD @ 12561' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
User	No Target (Freehand)	157.49	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
100.00	5,080.00	VES Gyro	NS-Gyro-MS MWD
5,214.00	12,561.00	Sperry MWD 2	

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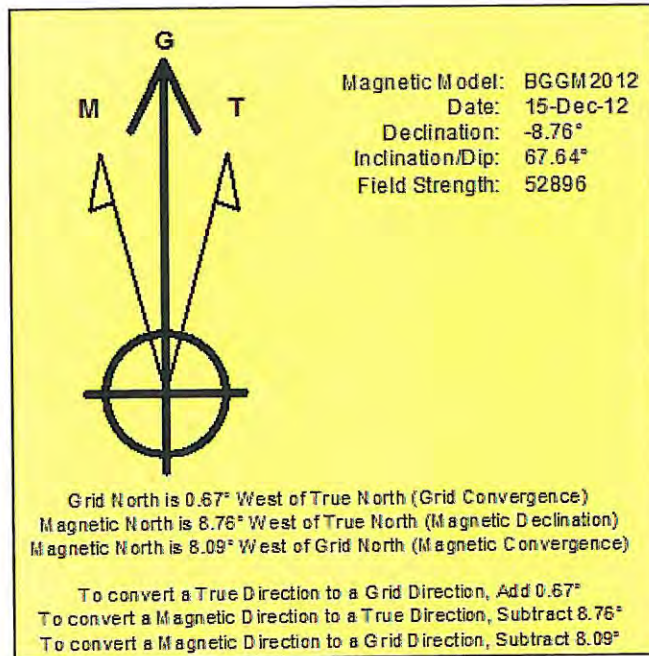
Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
Worthley BRK 8H P	0.00	360.00	6,082.22	-6,370.66	2,640.43	620,109.81	1,707,931.87	40° 11' 52.213 N	80° 32' 43.883 W
- hit/miss target									
- Shape									
- actual wellpath misses target center by 17.20ft at 12561.00ft MD (6074.59 TVD, -6364.02 N, 2654.34 E)									
- Point									

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**North Reference Sheet for Bethany - Worthley BRK 8H - Wellbore #1**

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.  
Vertical Depths are relative to GL 1160 + KB 17' @ 1177.00ft (Nomac 25). Northing and Easting are relative to Worthley BRK 8H  
Coordinate System is US State Plane 1927 (Exact solution), West Virginia North 4701 using datum NAD 1927 (NADCON CONUS), ellipsoid Clarke 1866  
Projection method is Lambert Conformal Conic (2 parallel)  
Central Meridian is 79° 30' 0.000 W°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:40° 15' 0.000 N°  
False Easting: 2,000,000.00ft, False Northing: 0.00ft, Scale Reduction: 0.99999357  
Grid Coordinates of Well: 626,480.48 ft N, 1,705,291.44 ft E  
Geographical Coordinates of Well: 40° 12' 54.86" N, 080° 33' 18.87" W  
Grid Convergence at Surface is: -0.67°  
  
Based upon Minimum Curvature type calculations, at a Measured Depth of 12,561.00ft  
the Bottom Hole Displacement is 6,895.38ft in the Direction of 157.36° (Grid).  
Magnetic Convergence at surface is: 8.09° (15 December 2012, , BGGM2012)



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# Hydraulic Fracturing Fluid Product Component Information Disclosure

9-00133

<b>Fracture Date:</b>	6/1/2013
<b>State:</b>	WEST VIRGINIA
<b>County:</b>	BROOKE
<b>API Number:</b>	4700900133
<b>Operator Name:</b>	CHESAPEAKE APPALACHIA LLC
<b>Well Name and Number:</b>	WORTHLEY BRK 8H
<b>Longitude:</b>	-80.555242
<b>Latitude:</b>	40.215239
<b>Long/Lat Projection:</b>	NAD27
<b>Production Type:</b>	GAS
<b>True Vertical Depth (TVD):</b>	6,079
<b>Total Water Volume (gal)*:</b>	6,276,018

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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%	73.34418%	
Recycled Produced Water	CHESAPEAKE ENERGY	Carrier/Base Fluid	Water	007732-18-5	100.00000%	13.46337%	
EC6486A	NALCO	Scale Inhibitor	Ethylene Glycol	000107-21-1	30.00000%	0.00155%	
EC6110A	NALCO	Anti-Bacterial Agent	Ethanol	000064-17-5	5.00000%	0.00136%	
			Glutaraldehyde (Pentanediol)	000111-30-8	60.00000%	0.01629%	
			Quaternary Ammonium Compounds	NA	10.00000%	0.00271%	
Acid, Hydrochloric 15pct, A264, B315, J218, J580, L058, 100 Mesh Sand, Northern White Sand	SCHLUMBERGER	Acid, Breaker, Corrosion Inhibitor, Friction Reducer, Gelling Agent, Iron Control Agent, Proppant - Natural	Crystalline silica	14808-60-7	98.08773%	12.61613%	
			Hydrogen chloride	7647-01-0	1.47181%	0.18931%	
			Water	007732-18-5	2.50419%	0.33036%	
			Acrylamide sodium acrylate copolymer	25085-02-3	0.17907%	0.02303%	
			Distillates (petroleum), hydrotreated light	64742-47-8	0.15558%	0.02001%	
			Guar gum	9000-30-0	0.05238%	0.00674%	



9-00133

Alkylalcohol, ethoxylate >C10	68002-97-1	0.00953%	0.00123%
Sorbitan monooleate	1338-43-8	0.00762%	0.00098%
Sodium erythorbate	6381-77-7	0.00559%	0.00072%
Methanol	67-56-1	0.00539%	0.00069%
Thiocyanic acid, ammonium salt	1762-95-4	0.00470%	0.00060%
Poly(oxyethylene) sorbitol monostearate	9005-67-8	0.00445%	0.00057%
Diammonium peroxodisulphate	7727-54-0	0.00418%	0.00054%
Fatty acids, tall-oil	61790-12-3	0.00396%	0.00051%
Thiourea, polymer with formaldehyde and 1-phenylethanone	68527-49-1	0.00326%	0.00042%
Alcohols, C14-15, ethoxylated (7EO)	68951-67-7	0.00152%	0.00020%
Prop-2-yn-1-ol	107-19-7	0.00101%	0.00013%
Alkenes, C>10 a-	64743-02-8	0.00067%	0.00009%
Non-crystalline silica	7631-86-9	0.00014%	0.00002%
Tetrasodium ethylenediaminetetraacetate	64-02-8	0.00006%	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	0.00006%
			Proprietary Inorganic Phosphate	TRADE SECRET	0.00059%
			Proprietary Organic Acid Derivatives	TRADE SECRET	0.00176%
			Water	007732-18-5	0.02323%

\* 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.