



## Chesapeake Appalachia, LLC.

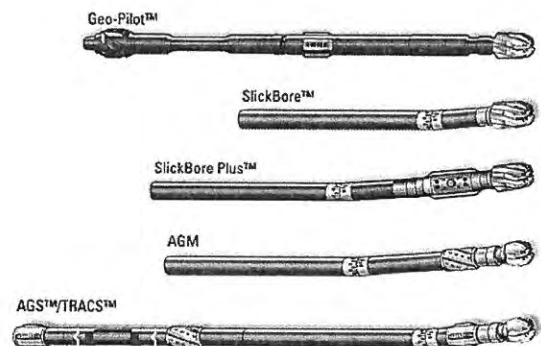
Worthley BRK 8H

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

**HALLIBURTON**

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WV GEOLOGICAL SURVEY  
MORGANTOWN, WV

# Chesapeake Appalachia

Worthley BRK 8H  
Brooke County, West Virginia

End of Well Report

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**Sperry Drilling Services**

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Final Surveys and Plot

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MORGANTOWN, WV



# Chesapeake Appalachia, LLC

**HALLIBURTON**  
Sperry Drilling Services

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

**Surface Location:**

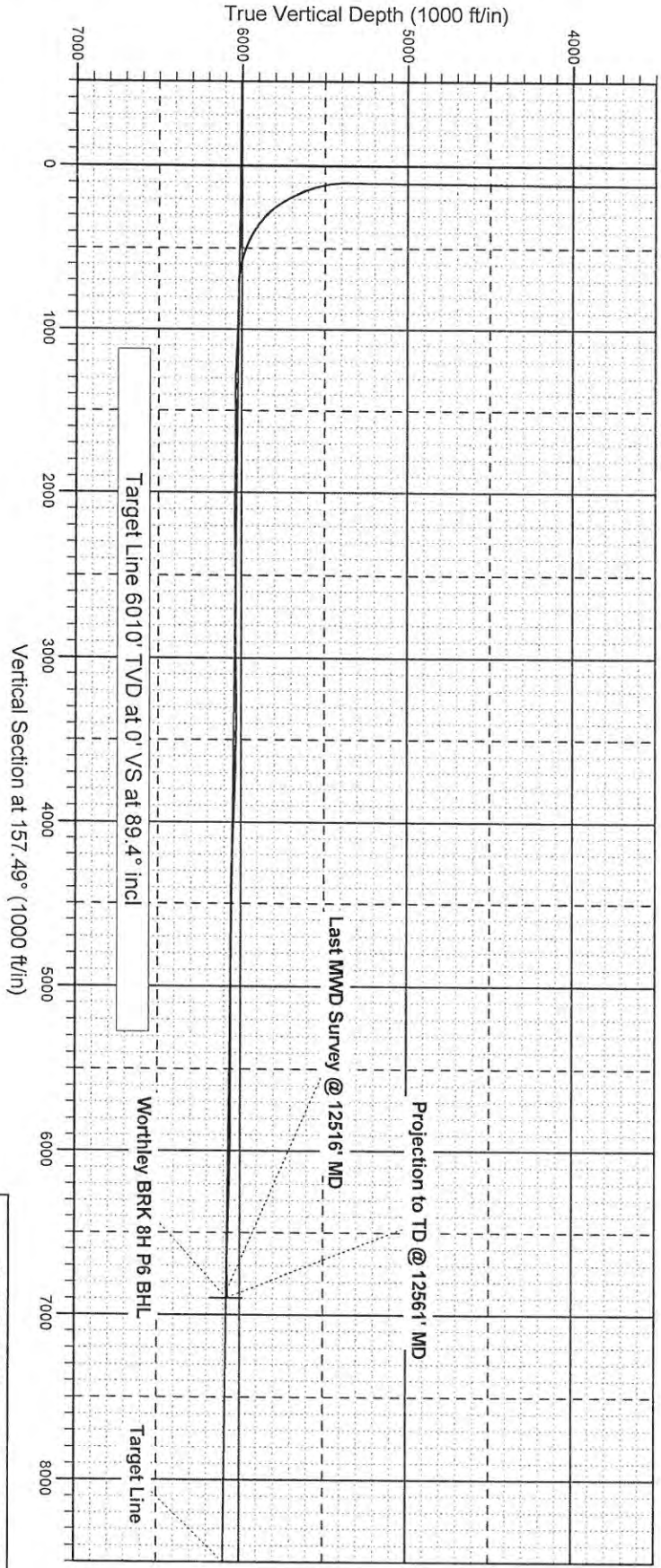
US State Plane 1927 (Exact solution)  
West Virginia North 4701  
Elevation: GL 1160 + KB 17' @ 1177.00ft (Nomac 25)  
Northing Easting Latitude Longitude  
626480.48 1705291.44 40° 12' 54.860 N 80° 33' 18.871 W

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	Te-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		

**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



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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°  
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 Azimuths to Grid North

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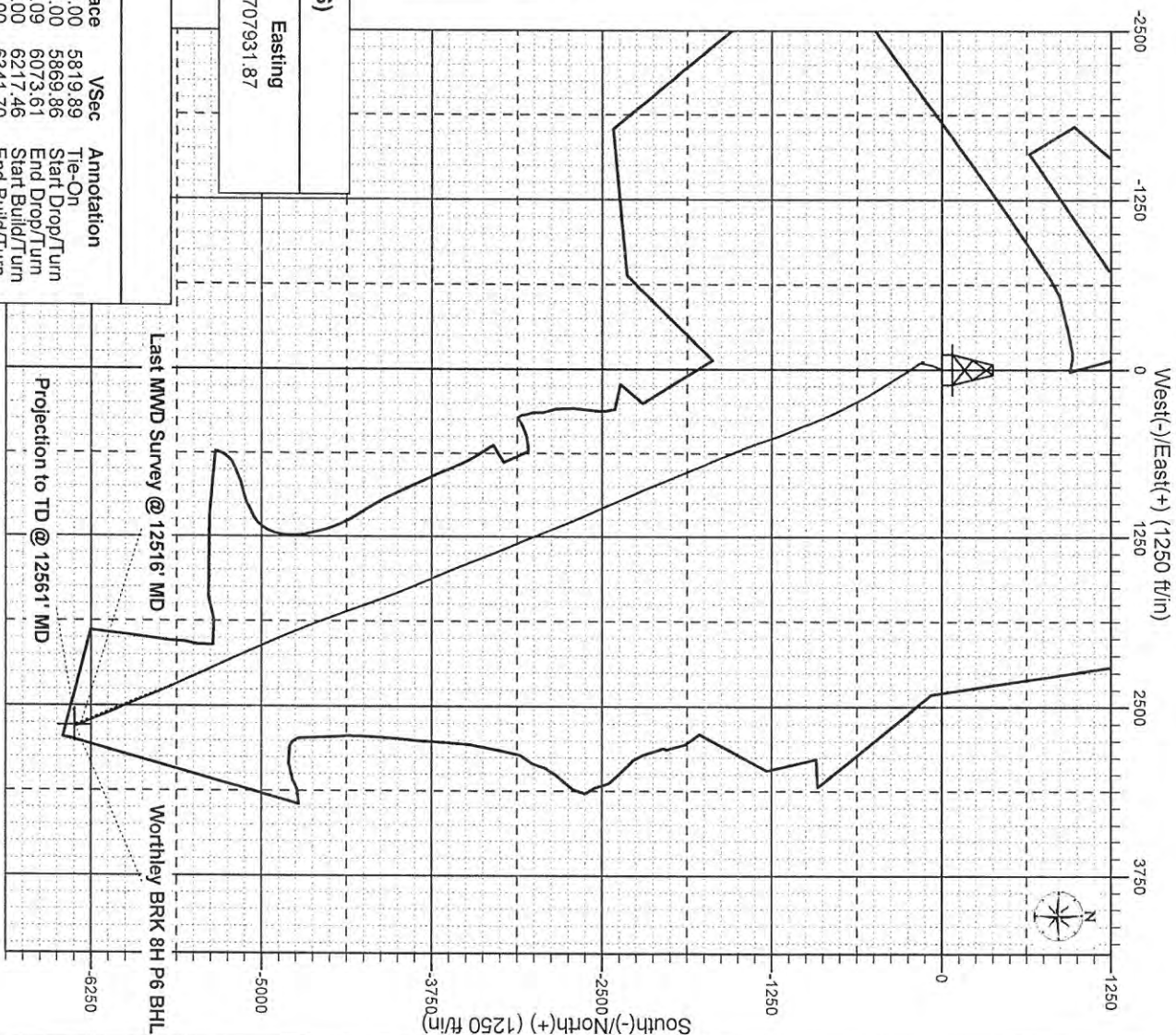
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 Northing Easting Latitude Longitude  
 626480.48 1705291.44 40° 12' 54.860 N 80° 33' 18.871 W

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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



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MORGANTOWN, WV

# 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: 431

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**HALLIBURTON****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	1,705,237.68	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	626,332.01	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	1,705,232.13	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

19 December, 2012 - 14:08

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Design Report for Worthley BRK 8H - Surveys

Measured Depth (ft)	Inclination (°)	Azimuth (°)	TVD 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	4.40	338.06
5,999.00	55.02	147.41	4,729.15	5,906.15	359.04 S	82.73 E	626,121.44	1,705,374.18	9.57	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	8.78	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	11.83	415.08
6,093.00	64.59	148.39	4,776.55	5,953.55	427.45 S	126.17 E	626,053.03	1,705,417.62	10.40	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	9.44	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	10.16	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	9.32	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	3.20	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	8.70	587.06
6,278.00	79.61	150.77	4,832.13	6,009.13	578.22 S	216.83 E	625,902.25	1,705,508.28	9.22	617.18
6,310.00	82.80	151.73	4,837.02	6,014.02	605.94 S	232.04 E	625,874.53	1,705,523.49	10.40	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	8.83	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	6.47	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	5.84	742.09
6,466.00	89.16	152.98	4,844.69	6,021.69	745.27 S	301.56 E	625,735.20	1,705,593.00	2.54	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	1.37	864.76

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HALLIBURTON

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	2.36	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	1,706,322.42	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	2.48	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	1,706,663.66	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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**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)		
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	1,707,414.14	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	1,707,466.21	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	620,704.56	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	1,707,771.79	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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**HALLIBURTON****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)		
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
5,214.00	12,561.00	Sperry MWD 2	MWD

**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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# HALLIBURTON

## 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

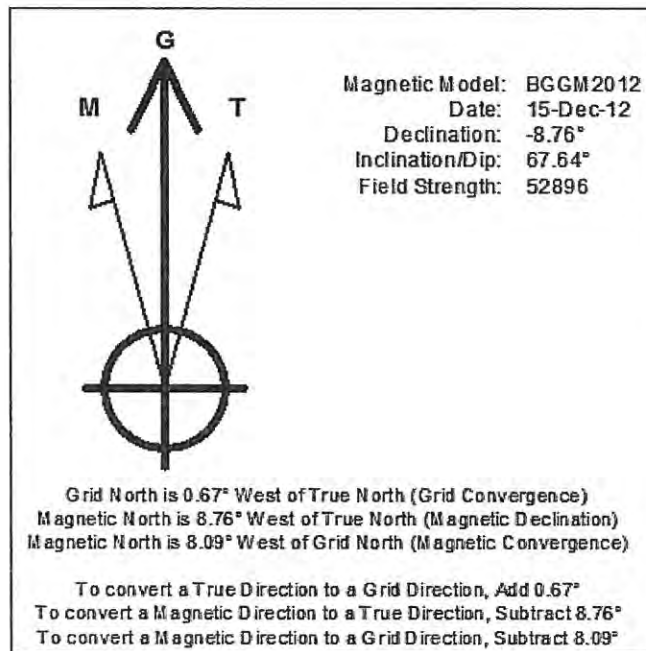
Grid Coordinates of Well: 626,480.48 ft N, 1,705,291.44 ft E

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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