

**Project:** Weld County, Colorado NAD27  
**Site:** Sec 16-T3N-R61W  
**Well:** State 16-3-61 1H  
**Wellbore:** Original Hole  
**Final Surveys**  
**Rig:** SST 53

## SECTION DETAILS Rev1

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5761.48	0.00	0.00	5761.48	0.00	0.00	0.00	0.00	0.00	
6467.36	60.00	178.40	6345.24	-336.90	9.41	8.50	178.40	337.03	
6768.36	90.10	178.40	6422.00	-624.27	17.44	10.00	0.00	624.51	
10500.71	90.10	178.40	6415.40	-4355.16	121.54	0.00	51.46	4356.86	<b>PBHL</b>

**Surface Location:**  
**SHL 250' FNL & 660' FEL Sec 16-T3N-R61W**

US State Plane 1927 (Exact solution)  
 Colorado North 501  
**Elevation: 4652.55 GL + 22' KB @ 4674.55ft (SST 53)**  
**Northing** 329813.68 **Easting** 2360594.55 **Latitude** 40° 13' 53.554 N **Longitude** 104° 12' 30.559 W

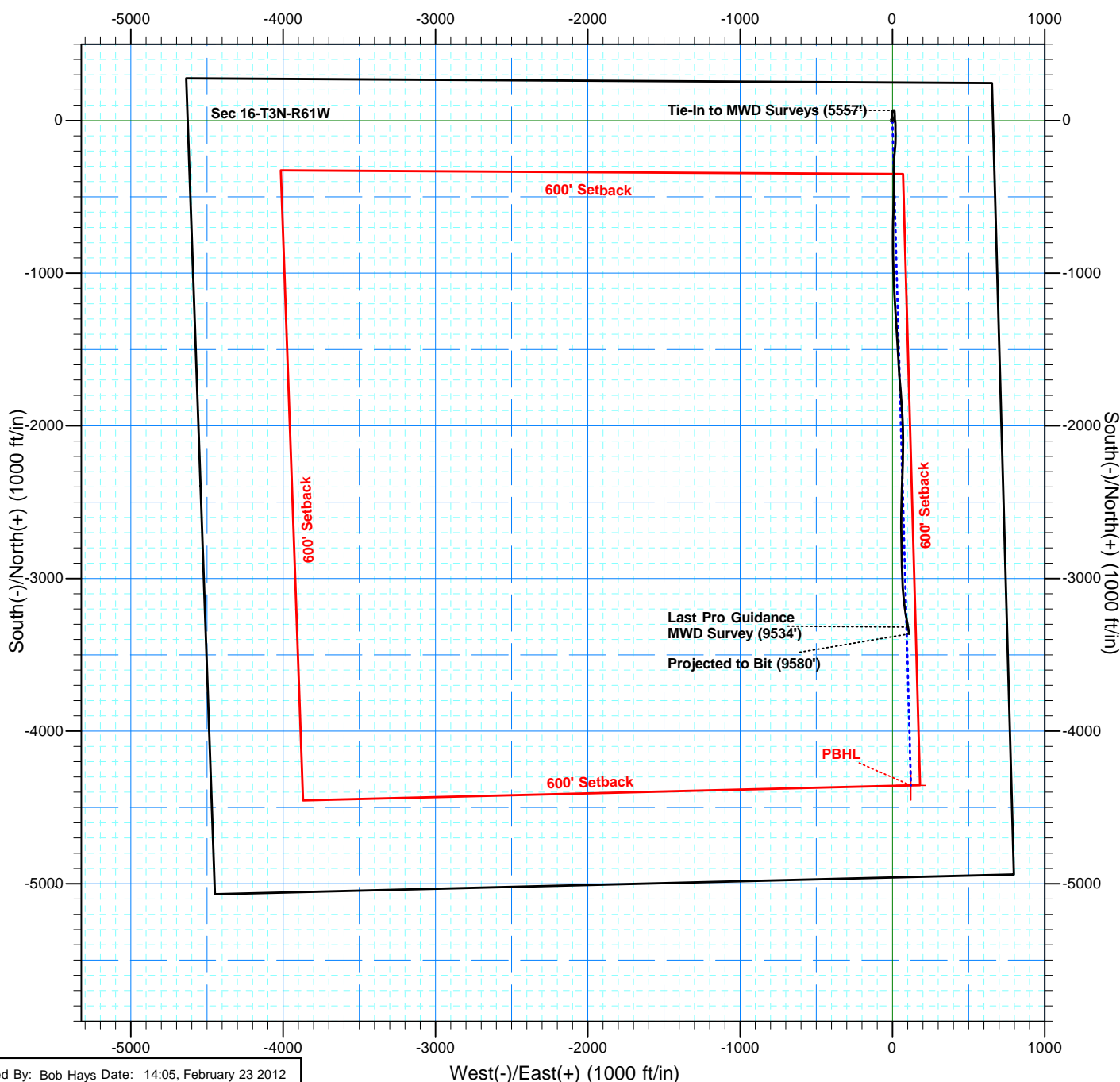
## WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude
<b>PBHL</b>	6415.40	-4355.16	121.54	40° 13' 10.501 N	104° 12' 29.811 W



**To convert a Magnetic Direction to a Grid Direction, Add 7.63°**

Magnetic Model: IGRF2010 Date: 19-Jan-12  
**Azimuths & Coordinates to NAD27 Grid**



# Chesapeake Operating Inc.



Project: Weld County, Colorado NAD27  
 Site: Sec 16-T3N-R61W  
 Well: State 16-3-61 1H  
 Wellbore: Original Hole  
 Final Surveys  
 Rig: SST 53



## SECTION DETAILS Rev1

MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	VSec	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
5761.48	0.00	0.00	5761.48	0.00	0.00	0.00	0.00	0.00	
6467.36	60.00	178.40	6345.24	-336.90	9.41	8.50	178.40	337.03	
6768.36	90.10	178.40	6422.00	-624.27	17.44	10.00	0.00	624.51	
10500.71	90.10	178.40	6415.40	-4355.16	121.54	0.00	51.46	4356.86	PBHL

Surface Location:  
 SHL 250' FNL & 660' FEL Sec 16-T3N-R61W

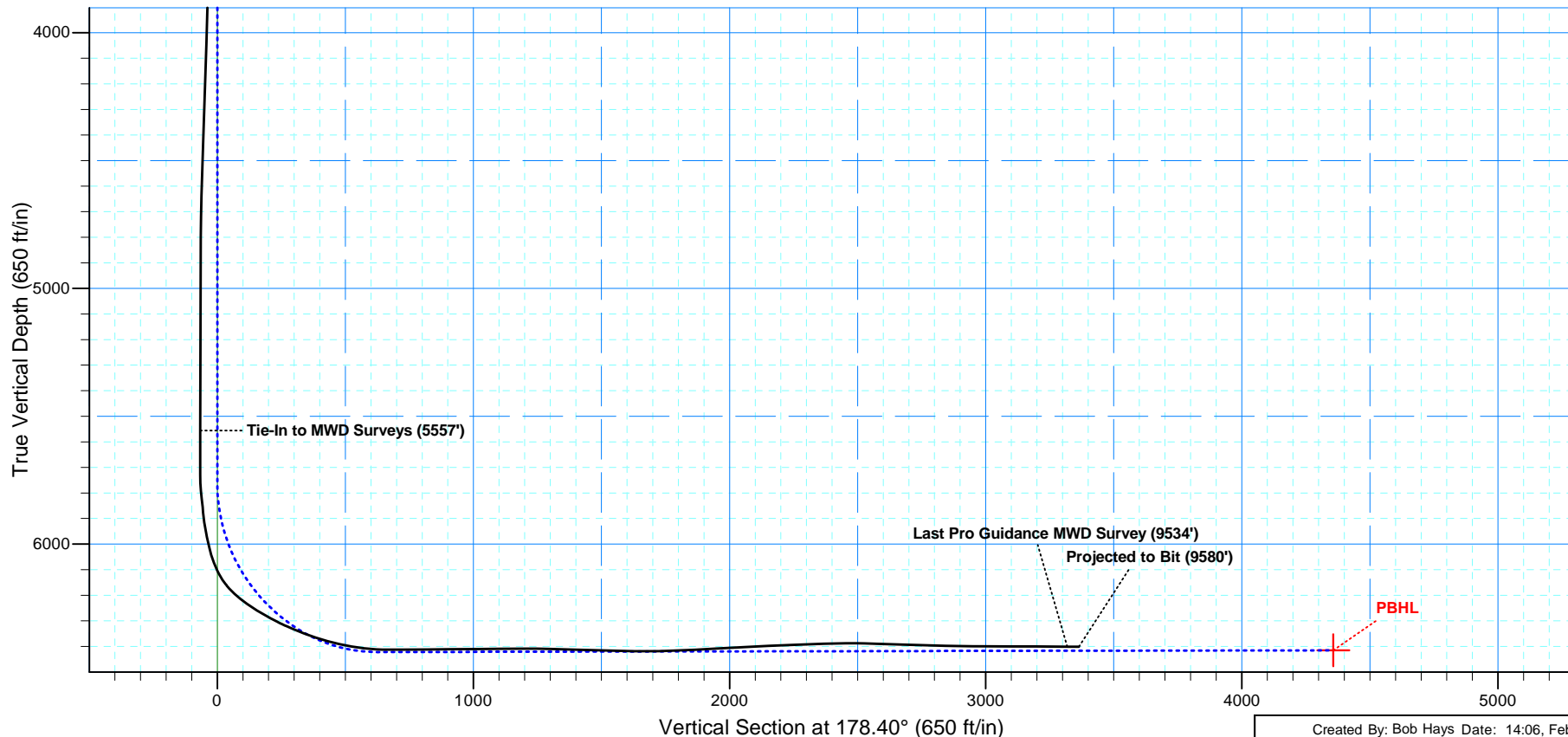
US State Plane 1927 (Exact solution)  
 Colorado North 501

Elevation: 4652.55 GL + 22' KB @ 4674.55ft (SST 53)

Northing	Easting	Latitude	Longitude
329813.68	2360594.55	40° 13' 53.554 N	104° 12' 30.559 W

## WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N-S	+E-W	Latitude	Longitude
PBHL	6415.40	-4355.16	121.54	40° 13' 10.501 N	104° 12' 29.811 W



Created By: Bob Hays Date: 14:06, February 23 2012



## **Chesapeake Operating Inc.**

**Weld County, Colorado NAD27**

**Sec 16-T3N-R61W**

**State 16-3-61 1H**

**Original Hole**

**Design: Final Surveys**

## **Standard Survey Report**

**23 February, 2012**





# Professional Directional LTD

## Survey Report



<b>Company:</b>	Chesapeake Operating Inc.	<b>Local Co-ordinate Reference:</b>	Well State 16-3-61 1H
<b>Project:</b>	Weld County, Colorado NAD27	<b>TVD Reference:</b>	4652.55 GL + 22' KB @ 4674.55ft (SST 53)
<b>Site:</b>	Sec 16-T3N-R61W	<b>MD Reference:</b>	4652.55 GL + 22' KB @ 4674.55ft (SST 53)
<b>Well:</b>	State 16-3-61 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Final Surveys	<b>Database:</b>	EDM 5000.1 Single User Db

<b>Project</b>	Weld County, Colorado NAD27		
<b>Map System:</b>	US State Plane 1927 (Exact solution)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD 1927 (NADCON CONUS)		
<b>Map Zone:</b>	Colorado North 501		

<b>Site</b>	Sec 16-T3N-R61W		
<b>Site Position:</b>		<b>Northing:</b>	329,813.68 ft
<b>From:</b>	Map	<b>Easting:</b>	2,360,594.55 ft
<b>Position Uncertainty:</b>	0.00 ft	<b>Slot Radius:</b>	1.10000 ft
		<b>Latitude:</b>	40° 13' 53.554 N
		<b>Longitude:</b>	104° 12' 30.559 W
		<b>Grid Convergence:</b>	0.83 °

<b>Well</b>	State 16-3-61 1H		
<b>Well Position</b>	<b>+N/-S</b>	0.00 ft	<b>Northing:</b>
	<b>+E/-W</b>	0.00 ft	<b>Easting:</b>
<b>Position Uncertainty</b>	0.00 ft	<b>Wellhead Elevation:</b>	ft
		<b>Latitude:</b>	40° 13' 53.554 N
		<b>Longitude:</b>	104° 12' 30.559 W
		<b>Ground Level:</b>	4,652.55 ft

<b>Wellbore</b>	Original Hole				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2010	01/19/12	8.47	66.98	53,040

<b>Survey Program</b>	<b>Date</b>	02/23/12			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
800.00	5,557.00	MWD Surveys (Original Hole)	MWD	MWD	
5,730.00	9,534.00	Pro Guidance MWD Surveys (Original Hol	MWD	MWD	
9,580.00	9,580.00	Projected to Bit (Original Hole)	Projection	Projection	

<b>Survey</b>										
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Turn Rate (°/100ft)</b>	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
800.00	0.00	359.20	800.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,031.00	0.10	73.60	1,031.00	0.06	0.19	-0.05	0.04	0.04	0.00	
1,252.00	0.10	264.60	1,252.00	0.09	0.19	-0.09	0.09	0.00	-76.47	
1,442.00	0.10	251.60	1,442.00	0.03	-0.14	-0.03	0.01	0.00	-6.84	
1,727.00	0.10	256.60	1,727.00	-0.11	-0.61	0.09	0.00	0.00	1.75	
1,981.00	0.20	38.60	1,981.00	0.18	-0.55	-0.20	0.11	0.04	55.91	
2,647.00	1.40	3.60	2,646.92	9.21	0.68	-9.19	0.19	0.18	-5.26	
2,930.00	1.30	349.60	2,929.85	15.82	0.32	-15.81	0.12	-0.04	-4.95	
3,217.00	1.30	350.60	3,216.77	22.23	-0.80	-22.25	0.01	0.00	0.35	
3,501.00	1.20	0.60	3,500.70	28.39	-1.29	-28.41	0.08	-0.04	3.52	
3,787.00	1.60	346.60	3,786.62	35.27	-2.19	-35.31	0.18	0.14	-4.90	
4,040.00	1.70	1.60	4,039.52	42.45	-2.90	-42.52	0.17	0.04	5.93	
4,418.00	2.20	10.60	4,417.30	55.19	-1.41	-55.21	0.15	0.13	2.38	
4,640.00	1.40	7.60	4,639.18	62.07	-0.27	-62.05	0.36	-0.36	-1.35	



# Professional Directional LTD

## Survey Report



<b>Company:</b>	Chesapeake Operating Inc.	<b>Local Co-ordinate Reference:</b>	Well State 16-3-61 1H
<b>Project:</b>	Weld County, Colorado NAD27	<b>TVD Reference:</b>	4652.55 GL + 22' KB @ 4674.55ft (SST 53)
<b>Site:</b>	Sec 16-T3N-R61W	<b>MD Reference:</b>	4652.55 GL + 22' KB @ 4674.55ft (SST 53)
<b>Well:</b>	State 16-3-61 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Final Surveys	<b>Database:</b>	EDM 5000.1 Single User Db

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,801.00	0.40	19.60	4,800.16	64.54	0.18	-64.51	0.63	-0.62	7.45
5,557.00	1.10	89.60	5,556.10	67.08	8.32	-66.82	0.14	0.09	9.26
Tie-In to MWD Surveys (5557')									
5,730.00	1.20	87.20	5,729.07	67.18	11.79	-66.83	0.06	0.06	-1.39
5,762.00	2.10	151.60	5,761.06	66.68	12.41	-66.31	5.99	2.81	201.25
5,793.00	4.90	168.60	5,792.00	64.88	12.94	-64.50	9.54	9.03	54.84
5,825.00	7.60	177.00	5,823.81	61.43	13.32	-61.04	8.89	8.44	26.25
5,857.00	5.70	175.60	5,855.59	57.73	13.55	-57.33	5.96	-5.94	-4.38
5,889.00	5.80	174.60	5,887.43	54.54	13.83	-54.13	0.44	0.31	-3.13
5,920.00	8.30	175.40	5,918.19	50.75	14.15	-50.33	8.07	8.06	2.58
5,952.00	10.40	176.80	5,949.76	45.56	14.50	-45.14	6.60	6.56	4.38
5,983.00	12.20	177.90	5,980.16	39.49	14.78	-39.07	5.85	5.81	3.55
6,015.00	13.90	178.30	6,011.33	32.27	15.01	-31.84	5.32	5.31	1.25
6,047.00	16.00	177.90	6,042.25	24.02	15.29	-23.59	6.57	6.56	-1.25
6,079.00	20.50	177.20	6,072.63	14.01	15.72	-13.57	14.08	14.06	-2.19
6,111.00	25.50	172.90	6,102.08	1.57	16.85	-1.10	16.47	15.63	-13.44
6,143.00	31.50	174.60	6,130.19	-13.60	18.49	14.11	18.92	18.75	5.31
6,174.00	37.20	178.80	6,155.78	-31.05	19.45	31.58	19.90	18.39	13.55
6,206.00	43.60	179.30	6,180.13	-51.77	19.79	52.31	20.03	20.00	1.56
6,237.00	49.00	177.90	6,201.54	-74.17	20.35	74.71	17.72	17.42	-4.52
6,269.00	53.00	179.40	6,221.68	-99.03	20.92	99.57	13.02	12.50	4.69
6,301.00	56.30	181.40	6,240.19	-125.12	20.73	125.65	11.50	10.31	6.25
6,332.00	57.90	184.00	6,257.03	-151.11	19.50	151.60	8.73	5.16	8.39
6,364.00	59.40	185.10	6,273.68	-178.35	17.33	178.77	5.53	4.69	3.44
6,396.00	61.60	184.80	6,289.44	-206.10	14.93	206.44	6.92	6.88	-0.94
6,427.00	63.70	184.00	6,303.68	-233.55	12.82	233.82	7.15	6.77	-2.58
6,459.00	65.70	182.60	6,317.35	-262.43	11.16	262.64	7.40	6.25	-4.38
6,491.00	67.30	181.00	6,330.11	-291.76	10.24	291.93	6.78	5.00	-5.00
6,523.00	68.70	180.90	6,342.10	-321.43	9.74	321.57	4.38	4.38	-0.31
6,554.00	69.10	180.60	6,353.26	-350.35	9.37	350.47	1.57	1.29	-0.97
6,586.00	70.90	180.20	6,364.21	-380.41	9.16	380.52	5.75	5.63	-1.25
6,618.00	73.10	179.60	6,374.09	-410.85	9.21	410.94	7.10	6.88	-1.88
6,649.00	75.70	179.90	6,382.43	-440.70	9.34	440.79	8.44	8.39	0.97
6,681.00	77.40	180.00	6,389.87	-471.82	9.37	471.90	5.32	5.31	0.31
6,713.00	78.80	180.50	6,396.47	-503.13	9.23	503.20	4.63	4.38	1.56
6,744.00	80.90	181.00	6,401.93	-533.64	8.83	533.68	6.96	6.77	1.61
6,776.00	82.90	182.30	6,406.44	-565.31	7.92	565.31	7.43	6.25	4.06
6,808.00	85.10	182.20	6,409.79	-597.11	6.67	597.06	6.88	6.88	-0.31
6,840.00	87.70	181.60	6,411.80	-629.02	5.61	628.94	8.34	8.13	-1.88
6,871.00	89.50	181.10	6,412.55	-660.00	4.88	659.88	6.03	5.81	-1.61
6,935.00	90.20	180.50	6,412.72	-724.00	3.99	723.83	1.44	1.09	-0.94
7,030.00	90.80	180.20	6,411.89	-818.99	3.41	818.77	0.71	0.63	-0.32
7,125.00	90.10	178.70	6,411.15	-913.98	4.32	913.75	1.74	-0.74	-1.58
7,221.00	90.40	178.00	6,410.73	-1,009.94	7.08	1,009.74	0.79	0.31	-0.73

<b>Company:</b>	Chesapeake Operating Inc.	<b>Local Co-ordinate Reference:</b>	Well State 16-3-61 1H
<b>Project:</b>	Weld County, Colorado NAD27	<b>TVD Reference:</b>	4652.55 GL + 22' KB @ 4674.55ft (SST 53)
<b>Site:</b>	Sec 16-T3N-R61W	<b>MD Reference:</b>	4652.55 GL + 22' KB @ 4674.55ft (SST 53)
<b>Well:</b>	State 16-3-61 1H	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Original Hole	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Final Surveys	<b>Database:</b>	EDM 5000.1 Single User Db

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
7,316.00	91.20	176.50	6,409.40	-1,104.82	11.64	1,104.71	1.79	0.84	-1.58
7,411.00	89.90	176.80	6,408.49	-1,199.65	17.19	1,199.66	1.40	-1.37	0.32
7,507.00	88.10	176.90	6,410.16	-1,295.48	22.46	1,295.61	1.88	-1.88	0.10
7,602.00	88.90	175.90	6,412.65	-1,390.26	28.43	1,390.51	1.35	0.84	-1.05
7,697.00	88.30	176.80	6,414.97	-1,485.04	34.47	1,485.42	1.14	-0.63	0.95
7,792.00	88.30	176.90	6,417.79	-1,579.86	39.69	1,580.35	0.11	0.00	0.11
7,887.00	90.40	175.90	6,418.87	-1,674.66	45.66	1,675.28	2.45	2.21	-1.05
7,982.00	91.60	175.10	6,417.21	-1,769.35	53.11	1,770.14	1.52	1.26	-0.84
8,078.00	93.20	175.80	6,413.19	-1,864.96	60.72	1,865.92	1.82	1.67	0.73
8,172.00	93.20	177.00	6,407.94	-1,958.62	66.61	1,959.72	1.27	0.00	1.28
8,267.00	92.80	179.50	6,402.97	-2,053.44	69.51	2,054.58	2.66	-0.42	2.63
8,362.00	92.50	180.80	6,398.58	-2,148.34	69.26	2,149.43	1.40	-0.32	1.37
8,458.00	92.30	181.70	6,394.56	-2,244.23	67.17	2,245.23	0.96	-0.21	0.94
8,553.00	92.30	181.60	6,390.74	-2,339.11	64.43	2,340.00	0.11	0.00	-0.11
8,648.00	90.70	181.90	6,388.26	-2,434.03	61.53	2,434.80	1.71	-1.68	0.32
8,741.00	88.80	181.10	6,388.66	-2,526.99	59.10	2,527.66	2.22	-2.04	-0.86
8,837.00	87.80	180.10	6,391.51	-2,622.94	58.09	2,623.54	1.47	-1.04	-1.04
8,932.00	88.70	179.50	6,394.41	-2,717.90	58.42	2,718.47	1.14	0.95	-0.63
9,027.00	88.60	178.30	6,396.65	-2,812.85	60.25	2,813.44	1.27	-0.11	-1.26
9,122.00	89.00	179.20	6,398.64	-2,907.81	62.32	2,908.41	1.04	0.42	0.95
9,217.00	89.60	177.80	6,399.80	-3,002.76	64.81	3,003.40	1.60	0.63	-1.47
9,312.00	89.90	175.20	6,400.22	-3,097.58	70.61	3,098.34	2.75	0.32	-2.74
9,407.00	89.80	171.90	6,400.46	-3,191.96	81.28	3,192.99	3.48	-0.11	-3.47
9,471.00	89.70	169.80	6,400.74	-3,255.15	91.45	3,256.43	3.28	-0.16	-3.28
9,534.00	89.40	169.80	6,401.24	-3,317.15	102.61	3,318.72	0.48	-0.48	0.00
<b>Last Pro Guidance MWD Survey (9534')</b>									
9,580.00	89.40	169.80	6,401.72	-3,362.42	110.75	3,364.20	0.00	0.00	0.00
<b>Projected to Bit (9580')</b>									

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
5,557.00	5,556.10	67.08	8.32	Tie-In to MWD Surveys (5557')
9,534.00	6,401.24	-3,317.15	102.61	Last Pro Guidance MWD Survey (9534')
9,580.00	6,401.72	-3,362.42	110.75	Projected to Bit (9580')