



Vanguard Natural Resources

Garfield County, CO

MPD 25

Fed 23D-33-691

Wellbore #1

Plan: Design #1

Standard Planning Report

17 October, 2017





Payzone Directional Planning Report



Database:	EDM 5000.1 Single User Db	Local Co-ordinate Reference:	Well Fed 23D-33-691
Company:	Vanguard Natural Resources	TVD Reference:	Fed 23D-33-691 @ 6561.0usft (New KB)
Project:	Garfield County, CO	MD Reference:	Fed 23D-33-691 @ 6561.0usft (New KB)
Site:	MPD 25	North Reference:	Grid
Well:	Fed 23D-33-691	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Project	Garfield County, CO		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Central Zone		Using geodetic scale factor

Site	MPD 25			
Site Position:		Northing:	1,606,032.98 usft	Latitude: 39° 28' 45.253 N
From:	Lat/Long	Easting:	2,418,598.16 usft	Longitude: 107° 33' 35.748 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence: -1.30 °

Well	Fed 23D-33-691			
Well Position	+N/-S	14.2 usft	Northing:	1,606,047.20 usft
	+E/-W	-68.4 usft	Easting:	2,418,529.80 usft
Position Uncertainty	0.0 usft		Wellhead Elevation:	6,561.0 usft
			Ground Level:	6,540.4 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	10/17/2017	9.47	65.64	51,533

Design	Design #1			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	352.71

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.00	0.00	
200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.00	0.00	
285.7	3.00	180.00	285.7	-2.2	0.0	3.50	3.50	0.00	180.00	
435.7	3.00	180.00	435.5	-10.1	0.0	0.00	0.00	0.00	0.00	
1,291.8	26.99	352.84	1,263.4	164.2	-24.8	3.50	2.80	20.19	173.50	
4,444.4	26.99	352.84	4,072.7	1,583.6	-203.0	0.00	0.00	0.00	0.00	
5,215.4	0.00	0.00	4,815.5	1,760.5	-225.2	3.50	-3.50	0.00	180.00	23D-33-691 TGT
8,106.3	0.00	0.00	7,706.4	1,760.5	-225.2	0.00	0.00	0.00	0.00	



Payzone Directional Planning Report



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Project:	Garfield County, CO	MD Reference:	Fed 23D-33-691 @ 6561.0usft (New KB)
Site:	MPD 25	North Reference:	Grid
Well:	Fed 23D-33-691	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.00	0.00	100.0	0.0	0.0	0.0	0.00	0.00	0.00
200.0	0.00	0.00	200.0	0.0	0.0	0.0	0.00	0.00	0.00
Start Build 3.50									
285.7	3.00	180.00	285.7	-2.2	0.0	-2.2	3.50	3.50	0.00
Start 150.0 hold at 285.7 MD									
300.0	3.00	180.00	299.9	-3.0	0.0	-3.0	0.00	0.00	0.00
400.0	3.00	180.00	399.8	-8.2	0.0	-8.2	0.00	0.00	0.00
435.7	3.00	180.00	435.5	-10.1	0.0	-10.0	0.00	0.00	0.00
Start DLS 3.50 TFO 173.50									
500.0	0.81	198.42	499.7	-12.2	-0.1	-12.1	3.50	-3.41	28.66
600.0	2.79	346.53	599.7	-10.5	-0.9	-10.3	3.50	1.98	148.10
700.0	6.28	350.42	699.4	-2.7	-2.4	-2.4	3.50	3.49	3.90
800.0	9.78	351.54	798.4	11.0	-4.6	11.5	3.50	3.50	1.12
900.0	13.27	352.07	896.3	30.8	-7.4	31.5	3.50	3.50	0.53
1,000.0	16.77	352.38	992.9	56.5	-10.9	57.4	3.50	3.50	0.31
1,100.0	20.27	352.59	1,087.7	88.0	-15.0	89.2	3.50	3.50	0.21
1,200.0	23.77	352.74	1,180.4	125.2	-19.8	126.7	3.50	3.50	0.15
1,291.8	26.99	352.84	1,263.4	164.2	-24.8	166.0	3.50	3.50	0.11
Start 3152.6 hold at 1291.8 MD									
1,300.0	26.99	352.84	1,270.6	167.9	-25.2	169.7	0.00	0.00	0.00
1,400.0	26.99	352.84	1,359.7	212.9	-30.9	215.1	0.00	0.00	0.00
1,500.0	26.99	352.84	1,448.9	257.9	-36.5	260.5	0.00	0.00	0.00
1,600.0	26.99	352.84	1,538.0	303.0	-42.2	305.9	0.00	0.00	0.00
1,700.0	26.99	352.84	1,627.1	348.0	-47.8	351.2	0.00	0.00	0.00
1,800.0	26.99	352.84	1,716.2	393.0	-53.5	396.6	0.00	0.00	0.00
1,900.0	26.99	352.84	1,805.3	438.0	-59.2	442.0	0.00	0.00	0.00
2,000.0	26.99	352.84	1,894.4	483.1	-64.8	487.4	0.00	0.00	0.00
2,100.0	26.99	352.84	1,983.5	528.1	-70.5	532.8	0.00	0.00	0.00
2,200.0	26.99	352.84	2,072.6	573.1	-76.1	578.1	0.00	0.00	0.00
2,300.0	26.99	352.84	2,161.7	618.1	-81.8	623.5	0.00	0.00	0.00
2,400.0	26.99	352.84	2,250.9	663.2	-87.4	668.9	0.00	0.00	0.00
2,500.0	26.99	352.84	2,340.0	708.2	-93.1	714.3	0.00	0.00	0.00
2,600.0	26.99	352.84	2,429.1	753.2	-98.7	759.6	0.00	0.00	0.00
2,700.0	26.99	352.84	2,518.2	798.2	-104.4	805.0	0.00	0.00	0.00
2,800.0	26.99	352.84	2,607.3	843.2	-110.0	850.4	0.00	0.00	0.00
2,900.0	26.99	352.84	2,696.4	888.3	-115.7	895.8	0.00	0.00	0.00
3,000.0	26.99	352.84	2,785.5	933.3	-121.3	941.1	0.00	0.00	0.00
3,100.0	26.99	352.84	2,874.6	978.3	-127.0	986.5	0.00	0.00	0.00
3,200.0	26.99	352.84	2,963.8	1,023.3	-132.6	1,031.9	0.00	0.00	0.00
3,300.0	26.99	352.84	3,052.9	1,068.4	-138.3	1,077.3	0.00	0.00	0.00
3,400.0	26.99	352.84	3,142.0	1,113.4	-144.0	1,122.7	0.00	0.00	0.00
3,500.0	26.99	352.84	3,231.1	1,158.4	-149.6	1,168.0	0.00	0.00	0.00
3,600.0	26.99	352.84	3,320.2	1,203.4	-155.3	1,213.4	0.00	0.00	0.00
3,700.0	26.99	352.84	3,409.3	1,248.5	-160.9	1,258.8	0.00	0.00	0.00
3,800.0	26.99	352.84	3,498.4	1,293.5	-166.6	1,304.2	0.00	0.00	0.00
3,900.0	26.99	352.84	3,587.5	1,338.5	-172.2	1,349.5	0.00	0.00	0.00
4,000.0	26.99	352.84	3,676.6	1,383.5	-177.9	1,394.9	0.00	0.00	0.00
4,100.0	26.99	352.84	3,765.8	1,428.6	-183.5	1,440.3	0.00	0.00	0.00
4,200.0	26.99	352.84	3,854.9	1,473.6	-189.2	1,485.7	0.00	0.00	0.00
4,300.0	26.99	352.84	3,944.0	1,518.6	-194.8	1,531.1	0.00	0.00	0.00
4,400.0	26.99	352.84	4,033.1	1,563.6	-200.5	1,576.4	0.00	0.00	0.00
4,444.4	26.99	352.84	4,072.7	1,583.6	-203.0	1,596.6	0.00	0.00	0.00
Start Drop -3.50									

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Wellbore:	Wellbore #1		
Design:	Design #1		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,500.0	25.04	352.84	4,122.6	1,607.8	-206.0	1,621.0	3.50	-3.50	0.00
4,600.0	21.54	352.84	4,214.5	1,647.0	-211.0	1,660.5	3.50	-3.50	0.00
4,700.0	18.04	352.84	4,308.5	1,680.6	-215.2	1,694.3	3.50	-3.50	0.00
4,800.0	14.54	352.84	4,404.5	1,708.5	-218.7	1,722.4	3.50	-3.50	0.00
4,900.0	11.04	352.84	4,502.0	1,730.4	-221.4	1,744.5	3.50	-3.50	0.00
5,000.0	7.54	352.84	4,600.7	1,746.4	-223.4	1,760.7	3.50	-3.50	0.00
5,014.9	7.02	352.84	4,615.5	1,748.3	-223.7	1,762.6	3.50	-3.50	0.00
Price Coal									
5,100.0	4.04	352.84	4,700.2	1,756.4	-224.7	1,770.8	3.50	-3.50	0.00
5,200.0	0.54	352.84	4,800.1	1,760.4	-225.2	1,774.7	3.50	-3.50	0.00
5,215.4	0.00	0.00	4,815.5	1,760.5	-225.2	1,774.8	3.50	-3.50	0.00
Start 2890.9 hold at 5215.4 MD									
5,300.0	0.00	0.00	4,900.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
5,400.0	0.00	0.00	5,000.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
5,500.0	0.00	0.00	5,100.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
5,600.0	0.00	0.00	5,200.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
5,700.0	0.00	0.00	5,300.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
5,776.3	0.00	0.00	5,376.4	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
Top of Gas									
5,800.0	0.00	0.00	5,400.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
5,900.0	0.00	0.00	5,500.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
6,000.0	0.00	0.00	5,600.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
6,100.0	0.00	0.00	5,700.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
6,200.0	0.00	0.00	5,800.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
6,300.0	0.00	0.00	5,900.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
6,400.0	0.00	0.00	6,000.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
6,500.0	0.00	0.00	6,100.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
6,600.0	0.00	0.00	6,200.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
6,700.0	0.00	0.00	6,300.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
6,800.0	0.00	0.00	6,400.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
6,900.0	0.00	0.00	6,500.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
7,000.0	0.00	0.00	6,600.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
7,100.0	0.00	0.00	6,700.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
7,200.0	0.00	0.00	6,800.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
7,300.0	0.00	0.00	6,900.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
7,400.0	0.00	0.00	7,000.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
7,500.0	0.00	0.00	7,100.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
7,600.0	0.00	0.00	7,200.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
7,700.0	0.00	0.00	7,300.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
7,800.0	0.00	0.00	7,400.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
7,856.3	0.00	0.00	7,456.4	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
Rollins									
7,900.0	0.00	0.00	7,500.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
8,000.0	0.00	0.00	7,600.1	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
8,106.3	0.00	0.00	7,706.4	1,760.5	-225.2	1,774.8	0.00	0.00	0.00
TD at 8106.3									

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Project:	Garfield County, CO	MD Reference:	Fed 23D-33-691 @ 6561.0usft (New KB)
Site:	MPD 25	North Reference:	Grid
Well:	Fed 23D-33-691	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

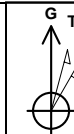
Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
23D-33-691 TGT	0.00	360.00	4,815.5	1,760.5	-225.2	1,607,807.60	2,418,304.60	39° 29' 2.722 N	107° 33' 40.005 W
- plan hits target center									
- Rectangle (sides W100.0 H40.0 D2,890.9)									

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
5,014.9	4,615.5	Price Coal		0.00		
5,776.3	5,376.4	Top of Gas		0.00		
7,856.3	7,456.4	Rollins		0.00		

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
200.0	200.0	0.0	0.0	Start Build 3.50	
285.7	285.7	-2.2	0.0	Start 150.0 hold at 285.7 MD	
435.7	435.5	-10.1	0.0	Start DLS 3.50 TFO 173.50	
1,291.8	1,263.4	164.2	-24.8	Start 3152.6 hold at 1291.8 MD	
4,444.4	4,072.7	1,583.6	-203.0	Start Drop -3.50	
5,215.4	4,815.5	1,760.5	-225.2	Start 2890.9 hold at 5215.4 MD	
8,106.3	7,706.4	1,760.5	-225.2	TD at 8106.3	



Well Name: Fed 23D-33-691
Surface Location: MPD 25
North American Datum 1983, US State Plane 1983, Colorado Central Zone
Ground Elevation: 6540.4
+N/-S +E/-W Northing Easting Latitude Longitude
0.0 0.0 1606047.20 2418529.80 39° 28' 45.378 N 107° 33' 36.624 W
New KB Fed 23D-33-691 @ 6561.0usft (New KB)



Azimuths to Grid North
True North: 1.30°
Magnetic North: 10.76°
Magnetic Field
Strength: 51533.1snT
Dip Angle: 65.64°
Date: 10/17/2017
Model: IGRF2015

MPD 25
Fed 23D-33-691
Design #1
11:28, October 17 2017

WELLBORE TARGET DETAILS (MAP CO-ORDINATES AND LAT/LONG)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
23D-33-691 TGT	4815.5	1760.5	-225.2	1607807.60	2418304.60	39° 29' 2.722 N	107° 33' 40.005 W	Rectangle (Sides: L40.0 W100.0)

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
1	0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
2	200.0	0.00	0.00	200.0	0.0	0.0	0.00	0.00	0.0	
3	285.7	3.00	180.00	285.7	-2.2	0.0	3.50	180.00	-2.2	
4	435.7	3.00	180.00	435.5	-10.1	0.0	0.00	0.00	-10.0	
5	1291.8	26.99	352.84	1263.4	164.2	-24.8	3.50	173.50	166.0	
6	4444.4	26.99	352.84	4072.7	1583.6	-203.0	0.00	0.00	1596.6	
7	5215.4	0.00	0.00	4815.5	1760.5	-225.2	3.50	180.00	1774.8	23D-33-691 TGT
8	8106.3	0.00	0.00	7706.4	1760.5	-225.2	0.00	0.00	1774.8	

ANNOTATIONS

TVD	MD	Annotation
200.0	200.0	Start Build 3.50
285.7	285.7	Start 150.0 hold at 285.7 MD
435.5	435.7	Start DLS 3.50 TFO 173.50
1263.4	1291.8	Start 3152.6 hold at 1291.8 MD
4072.7	4444.4	Start Drop -3.50
4815.5	5215.4	Start 2890.9 hold at 5215.4 MD
7706.4	8106.3	TD at 8106.3

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
4615.5	5014.9	Price Coal
5376.4	5776.3	Top of Gas
7456.4	7856.3	Rollins

