



Vanguard Natural Resources

Garfield County, CO

MPD 25

CSF 41B-4-791

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 CSF 41B-4-791
Company:	Vanguard Natural Resources	TVD Reference:	CSF 41B-4-791 @ 6561.0usft (New KB)
Project:	Garfield County, CO	MD Reference:	CSF 41B-4-791 @ 6561.0usft (New KB)
Site:	MPD 25	North Reference:	Grid
Well:	CSF 41B-4-791	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
From:	Lat/Long	Easting:	2,418,598.16 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	39° 28' 45.253 N
		Longitude:	107° 33' 35.748 W
		Grid Convergence:	-1.30 °

Well	CSF 41B-4-791		
Well Position	+N/-S	26.0 usft	Northing: 1,606,059.00 usft
	+E/-W	-14.9 usft	Easting: 2,418,583.30 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	6,561.0 usft
		Latitude:	39° 28' 45.507 N
		Longitude:	107° 33' 35.945 W
		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	123.59

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	
1,346.7	40.13	123.59	1,255.2	-213.3	321.1	3.50	3.50	0.00	123.59	
4,479.6	40.13	123.59	3,650.4	-1,330.7	2,003.2	0.00	0.00	0.00	0.00	
5,626.3	0.00	0.00	4,705.6	-1,544.0	2,324.3	3.50	-3.50	0.00	180.00	41B-4-791 TGT
8,583.2	0.00	0.00	7,662.5	-1,544.0	2,324.3	0.00	0.00	0.00	0.00	



Payzone Directional Planning Report



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Site:	MPD 25	North Reference:	Grid
Well:	CSF 41B-4-791	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									
300.0	3.50	123.59	299.9	-1.7	2.5	3.1	3.50	3.50	0.00
400.0	7.00	123.59	399.5	-6.8	10.2	12.2	3.50	3.50	0.00
500.0	10.50	123.59	498.3	-15.2	22.8	27.4	3.50	3.50	0.00
600.0	14.00	123.59	596.0	-26.9	40.5	48.6	3.50	3.50	0.00
700.0	17.50	123.59	692.3	-41.9	63.1	75.8	3.50	3.50	0.00
800.0	21.00	123.59	786.7	-60.2	90.6	108.7	3.50	3.50	0.00
900.0	24.50	123.59	878.9	-81.6	122.8	147.4	3.50	3.50	0.00
1,000.0	28.00	123.59	968.5	-106.0	159.6	191.6	3.50	3.50	0.00
1,100.0	31.50	123.59	1,055.3	-133.5	200.9	241.2	3.50	3.50	0.00
1,200.0	35.00	123.59	1,139.0	-163.8	246.6	296.1	3.50	3.50	0.00
1,300.0	38.50	123.59	1,219.1	-196.9	296.4	355.9	3.50	3.50	0.00
1,346.7	40.13	123.59	1,255.2	-213.3	321.1	385.5	3.50	3.50	0.00
Start 3132.9 hold at 1346.7 MD									
1,400.0	40.13	123.59	1,295.9	-232.3	349.7	419.8	0.00	0.00	0.00
1,500.0	40.13	123.59	1,372.4	-268.0	403.4	484.3	0.00	0.00	0.00
1,600.0	40.13	123.59	1,448.9	-303.6	457.1	548.7	0.00	0.00	0.00
1,700.0	40.13	123.59	1,525.3	-339.3	510.8	613.2	0.00	0.00	0.00
1,800.0	40.13	123.59	1,601.8	-375.0	564.5	677.7	0.00	0.00	0.00
1,900.0	40.13	123.59	1,678.2	-410.6	618.2	742.1	0.00	0.00	0.00
2,000.0	40.13	123.59	1,754.7	-446.3	671.9	806.6	0.00	0.00	0.00
2,100.0	40.13	123.59	1,831.1	-482.0	725.5	871.0	0.00	0.00	0.00
2,200.0	40.13	123.59	1,907.6	-517.6	779.2	935.5	0.00	0.00	0.00
2,300.0	40.13	123.59	1,984.0	-553.3	832.9	1,000.0	0.00	0.00	0.00
2,400.0	40.13	123.59	2,060.5	-589.0	886.6	1,064.4	0.00	0.00	0.00
2,500.0	40.13	123.59	2,136.9	-624.6	940.3	1,128.9	0.00	0.00	0.00
2,600.0	40.13	123.59	2,213.4	-660.3	994.0	1,193.3	0.00	0.00	0.00
2,700.0	40.13	123.59	2,289.8	-696.0	1,047.7	1,257.8	0.00	0.00	0.00
2,800.0	40.13	123.59	2,366.3	-731.6	1,101.4	1,322.2	0.00	0.00	0.00
2,900.0	40.13	123.59	2,442.7	-767.3	1,155.1	1,386.7	0.00	0.00	0.00
3,000.0	40.13	123.59	2,519.2	-803.0	1,208.8	1,451.2	0.00	0.00	0.00
3,100.0	40.13	123.59	2,595.6	-838.6	1,262.5	1,515.6	0.00	0.00	0.00
3,200.0	40.13	123.59	2,672.1	-874.3	1,316.2	1,580.1	0.00	0.00	0.00
3,300.0	40.13	123.59	2,748.6	-910.0	1,369.9	1,644.5	0.00	0.00	0.00
3,400.0	40.13	123.59	2,825.0	-945.6	1,423.5	1,709.0	0.00	0.00	0.00
3,500.0	40.13	123.59	2,901.5	-981.3	1,477.2	1,773.5	0.00	0.00	0.00
3,600.0	40.13	123.59	2,977.9	-1,017.0	1,530.9	1,837.9	0.00	0.00	0.00
3,700.0	40.13	123.59	3,054.4	-1,052.6	1,584.6	1,902.4	0.00	0.00	0.00
3,800.0	40.13	123.59	3,130.8	-1,088.3	1,638.3	1,966.8	0.00	0.00	0.00
3,900.0	40.13	123.59	3,207.3	-1,124.0	1,692.0	2,031.3	0.00	0.00	0.00
4,000.0	40.13	123.59	3,283.7	-1,159.6	1,745.7	2,095.8	0.00	0.00	0.00
4,100.0	40.13	123.59	3,360.2	-1,195.3	1,799.4	2,160.2	0.00	0.00	0.00
4,200.0	40.13	123.59	3,436.6	-1,231.0	1,853.1	2,224.7	0.00	0.00	0.00
4,300.0	40.13	123.59	3,513.1	-1,266.6	1,906.8	2,289.1	0.00	0.00	0.00
4,400.0	40.13	123.59	3,589.5	-1,302.3	1,960.5	2,353.6	0.00	0.00	0.00
4,479.6	40.13	123.59	3,650.4	-1,330.7	2,003.2	2,404.9	0.00	0.00	0.00
Start Drop -3.50									
4,500.0	39.42	123.59	3,666.1	-1,337.9	2,014.1	2,418.0	3.50	-3.50	0.00
4,600.0	35.92	123.59	3,745.2	-1,371.7	2,065.0	2,479.1	3.50	-3.50	0.00
4,700.0	32.42	123.59	3,827.9	-1,402.8	2,111.8	2,535.2	3.50	-3.50	0.00

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Well:	CSF 41B-4-791	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)
4,800.0	28.92	123.59	3,913.9	-1,431.0	2,154.2	2,586.2	3.50	-3.50	0.00
4,900.0	25.42	123.59	4,002.9	-1,456.3	2,192.3	2,631.9	3.50	-3.50	0.00
5,000.0	21.92	123.59	4,094.5	-1,478.5	2,225.7	2,672.0	3.50	-3.50	0.00
5,100.0	18.42	123.59	4,188.3	-1,497.6	2,254.4	2,706.5	3.50	-3.50	0.00
5,200.0	14.92	123.59	4,284.1	-1,513.4	2,278.3	2,735.2	3.50	-3.50	0.00
5,300.0	11.42	123.59	4,381.4	-1,526.0	2,297.3	2,758.0	3.50	-3.50	0.00
5,400.0	7.92	123.59	4,480.0	-1,535.3	2,311.3	2,774.8	3.50	-3.50	0.00
5,425.8	7.02	123.59	4,505.6	-1,537.2	2,314.1	2,778.1	3.50	-3.50	0.00
Price Coal									
5,500.0	4.42	123.59	4,579.4	-1,541.3	2,320.2	2,785.5	3.50	-3.50	0.00
5,600.0	0.92	123.59	4,679.3	-1,543.8	2,324.1	2,790.2	3.50	-3.50	0.00
5,626.3	0.00	0.00	4,705.6	-1,544.0	2,324.3	2,790.4	3.50	-3.50	0.00
Start 2956.9 hold at 5626.3 MD									
5,700.0	0.00	0.00	4,779.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
5,800.0	0.00	0.00	4,879.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
5,900.0	0.00	0.00	4,979.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
6,000.0	0.00	0.00	5,079.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
6,100.0	0.00	0.00	5,179.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
6,183.2	0.00	0.00	5,262.5	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
Top of Gas									
6,200.0	0.00	0.00	5,279.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
6,300.0	0.00	0.00	5,379.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
6,400.0	0.00	0.00	5,479.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
6,500.0	0.00	0.00	5,579.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
6,600.0	0.00	0.00	5,679.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
6,700.0	0.00	0.00	5,779.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
6,800.0	0.00	0.00	5,879.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
6,900.0	0.00	0.00	5,979.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
7,000.0	0.00	0.00	6,079.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
7,100.0	0.00	0.00	6,179.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
7,200.0	0.00	0.00	6,279.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
7,300.0	0.00	0.00	6,379.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
7,400.0	0.00	0.00	6,479.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
7,500.0	0.00	0.00	6,579.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
7,600.0	0.00	0.00	6,679.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
7,700.0	0.00	0.00	6,779.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
7,800.0	0.00	0.00	6,879.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
7,900.0	0.00	0.00	6,979.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
8,000.0	0.00	0.00	7,079.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
8,100.0	0.00	0.00	7,179.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
8,200.0	0.00	0.00	7,279.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
8,300.0	0.00	0.00	7,379.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
8,333.2	0.00	0.00	7,412.5	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
Rollins									
8,400.0	0.00	0.00	7,479.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
8,500.0	0.00	0.00	7,579.3	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
8,583.2	0.00	0.00	7,662.5	-1,544.0	2,324.3	2,790.4	0.00	0.00	0.00
TD at 8583.2									

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Site:	MPD 25	North Reference:	Grid
Well:	CSF 41B-4-791	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
41B-4-791 TGT	0.00	0.00	4,705.6	-1,544.0	2,324.3	1,604,515.10	2,420,907.50	39° 28' 30.771 N	107° 33' 5.865 W
- hit/miss target									
- Shape									
- plan hits target center									
- Rectangle (sides W100.0 H40.0 D2,956.9)									

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
5,425.8	4,505.6	Price Coal		0.00		
6,183.2	5,262.5	Top of Gas		0.00		
8,333.2	7,412.5	Rollins		0.00		

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment	
200.0	200.0	0.0	0.0	Start Build 3.50	
1,346.7	1,255.2	-213.3	321.1	Start 3132.9 hold at 1346.7 MD	
4,479.6	3,650.4	-1,330.7	2,003.2	Start Drop -3.50	
5,626.3	4,705.6	-1,544.0	2,324.3	Start 2956.9 hold at 5626.3 MD	
8,583.2	7,662.5	-1,544.0	2,324.3	TD at 8583.2	



Well Name: CSF 41B-4-791
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 1606059.00 2418583.30 39° 28' 30.771 N 107° 33' 5.865 W
New KB CSF 41B-4-791 @ 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
CSF 41B-4-791
Design #1
11:00, October 17 2017

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

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
41B-4-791 TGT	4705.6	-1544.0	2324.3	1604515.10	2420907.50	39° 28' 30.771 N	107° 33' 5.865 W	Rectangle (Sides: L40.0 W100.0)

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	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	1346.7	40.13	123.59	1255.2	-213.3	321.1	3.50	123.59	385.5	
4	4479.6	40.13	123.59	3650.4	-1330.7	2003.2	0.00	0.00	2404.9	
5	5626.3	0.00	0.00	4705.6	-1544.0	2324.3	3.50	180.00	2790.4	41B-4-791 TGT
6	8583.2	0.00	0.00	7662.5	-1544.0	2324.3	0.00	0.00	2790.4	

ANNOTATIONS

TVD	MD	Annotation
200.0	200.0	Start Build 3.50
1255.2	1346.7	Start 3132.9 hold at 1346.7 MD
3650.4	4479.6	Start Drop -3.50
4705.6	5626.3	Start 2956.9 hold at 5626.3 MD
7662.5	8583.2	TD at 8583.2

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
4505.6	5425.8	Price Coal
5262.5	6183.2	Top of Gas
7412.5	8333.2	Rollins

