

Vanguard Natural Resources

Garfield County, Co

MPD 25

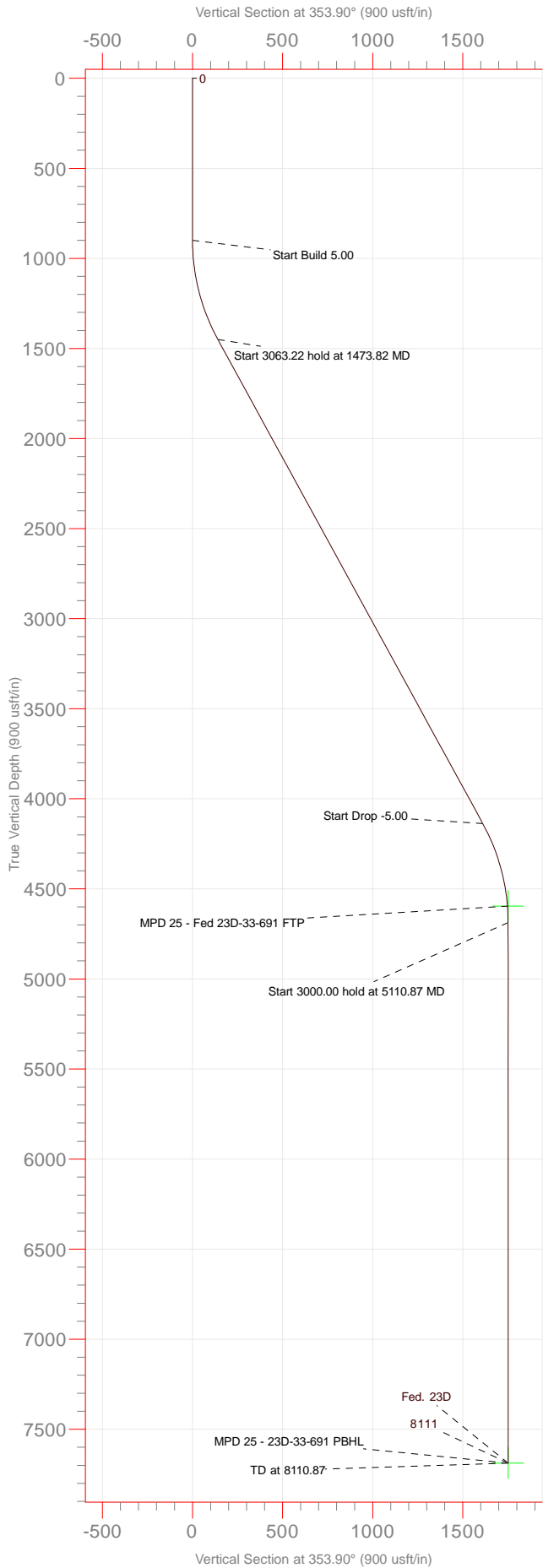
Fed. 23D-33-691

Fed. 23D

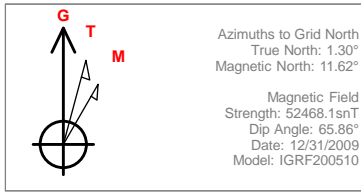
Plan: Design #1

Standard Planning Report

02 February, 2017



PROJECT DETAILS: Garfield County, Co	
Geodetic System:	US State Plane 1983
Datum:	North American Datum 1983
Ellipsoid:	GRS 1980
Zone:	Colorado Central Zone
North Reference:	Grid
System Datum:	Mean Sea Level
To convert a Magnetic Direction to a Grid Direction, Add 11.62°	
To convert a Magnetic Direction to a True Direction, Add 10.32° East	
To convert a True Direction to a Grid Direction, Add 1.30°	

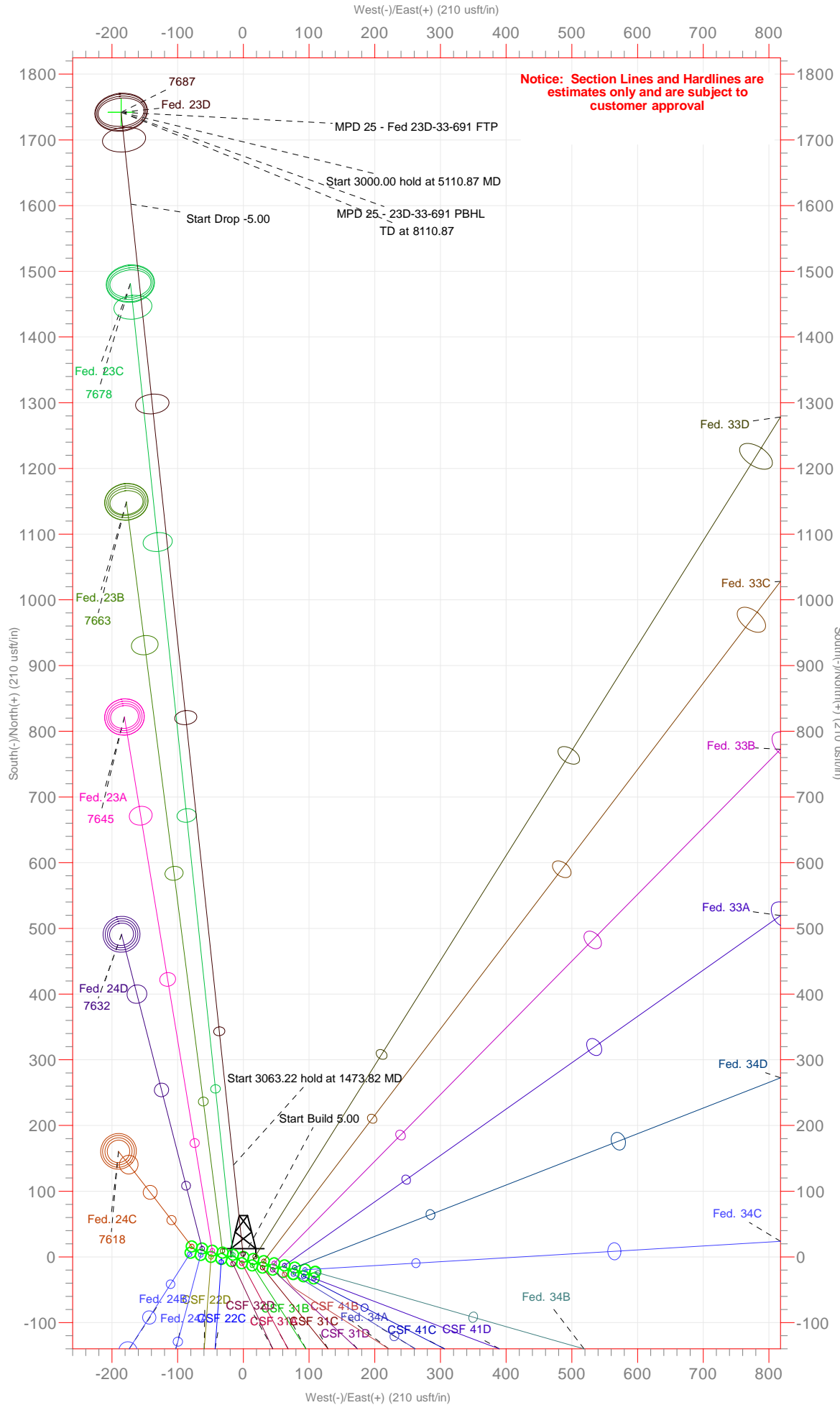
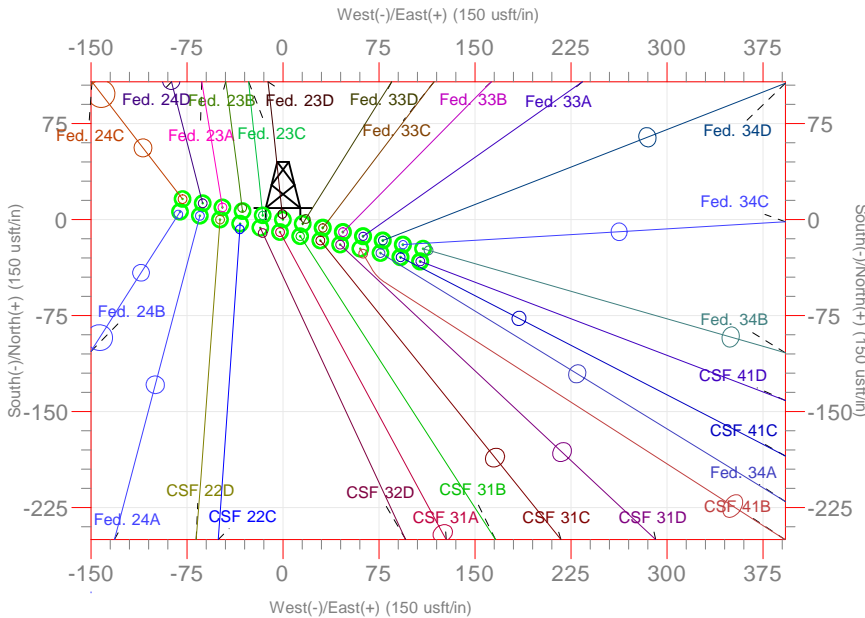


WELLBORE TARGET DETAILS						
Name	MPD 25 - Federal 23D-33-691 FTP	TVD	+N/-S	+E/-W	Northing	Easting
Vanguard - MPD 25 - Federal 23D-33-691 FTP	595.40	1742.10	-186.06	-186.06	1607807.76	2418304.71
Vanguard - MPD 25 - 23D-33-691 PBHL	7687.40	1742.10	-186.06	-186.06	1607807.76	2418304.71
					Shape Point	Point

SECTION DETAILS										
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	
3	1473.82	28.69	353.90	1450.14	139.90	-14.94	5.00	353.90	140.70	
4	4537.05	28.69	353.90	4137.26	1602.20	-171.12	0.00	0.00	1611.31	
5	5110.87	0.00	360.00	4687.40	1742.10	-186.06	5.00	180.00	1752.01	
6	8110.87	0.00	360.00	7687.40	1742.10	-186.06	0.00	0.00	1752.01	MPD 25 - 23D-33-691 PBHL

CASING DETAILS
No casing data is available
Notice: Casing Depths Are Estimates Only

FORMATION TOPS ALONG WELLPATH
No formation data is available



Gyrodata Inc.

Planning Report

Database:	Gyrodata NWDB	Local Co-ordinate Reference:	Well Fed. 23D-33-691
Company:	Vanguard Natural Resources	TVD Reference:	WELL @ 6540.40usft (Original Well Elev)
Project:	Garfield County, Co	MD Reference:	WELL @ 6540.40usft (Original Well Elev)
Site:	MPD 25	North Reference:	Grid
Well:	Fed. 23D-33-691	Survey Calculation Method:	Minimum Curvature
Wellbore:	Fed. 23D		
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		

Site	MPD 25				
Site Position:		Northing:	1,606,081.66 usft	Latitude:	39° 28' 45.692 N
From:	Lat/Long	Easting:	2,418,412.36 usft	Longitude:	107° 33' 38.131 W
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	-1.30 °

Well	Fed. 23D-33-691					
Well Position	+N-S	-16.01 usft	Northing:	1,606,065.65 usft	Latitude:	39° 28' 45.552 N
	+E-W	78.41 usft	Easting:	2,418,490.77 usft	Longitude:	107° 33' 37.127 W
Position Uncertainty		0.00 usft	Wellhead Elevation:		Ground Level:	6,504.40 usft

Wellbore	Fed. 23D				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	12/31/09	10.32	65.86	52,468.10857327

Design	Design #1			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	353.90

Plan Survey Tool Program	Date	02/02/17		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	8,110.87	Design #1 (Fed. 23D)	MWD - OSWG
				OWSG MWD - Standard

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,473.82	28.69	353.90	1,450.14	139.90	-14.94	5.00	5.00	0.00	353.90	
4,537.05	28.69	353.90	4,137.26	1,602.20	-171.12	0.00	0.00	0.00	0.00	
5,110.87	0.00	360.00	4,687.40	1,742.10	-186.06	5.00	-5.00	0.00	180.00	
8,110.87	0.00	360.00	7,687.40	1,742.10	-186.06	0.00	0.00	0.00	0.00	Vanguard - MPD 25

Gyrodatab Inc.

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Project:	Garfield County, Co	MD Reference:	WELL @ 6540.40usft (Original Well Elev)
Site:	MPD 25	North Reference:	Grid
Well:	Fed. 23D-33-691	Survey Calculation Method:	Minimum Curvature
Wellbore:	Fed. 23D		
Design:	Design #1		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	5.00	353.90	999.87	4.34	-0.46	4.36	5.00	5.00	0.00
1,100.00	10.00	353.90	1,098.99	17.31	-1.85	17.41	5.00	5.00	0.00
1,200.00	15.00	353.90	1,196.58	38.83	-4.15	39.05	5.00	5.00	0.00
1,300.00	20.00	353.90	1,291.93	68.72	-7.34	69.11	5.00	5.00	0.00
1,400.00	25.00	353.90	1,384.28	106.76	-11.40	107.36	5.00	5.00	0.00
1,473.82	28.69	353.90	1,450.14	139.90	-14.94	140.70	5.00	5.00	0.00
1,500.00	28.69	353.90	1,473.10	152.40	-16.28	153.26	0.00	0.00	0.00
1,600.00	28.69	353.90	1,560.83	200.13	-21.37	201.27	0.00	0.00	0.00
1,700.00	28.69	353.90	1,648.55	247.87	-26.47	249.28	0.00	0.00	0.00
1,800.00	28.69	353.90	1,736.27	295.61	-31.57	297.29	0.00	0.00	0.00
1,900.00	28.69	353.90	1,823.99	343.35	-36.67	345.30	0.00	0.00	0.00
2,000.00	28.69	353.90	1,911.71	391.08	-41.77	393.31	0.00	0.00	0.00
2,100.00	28.69	353.90	1,999.44	438.82	-46.87	441.32	0.00	0.00	0.00
2,200.00	28.69	353.90	2,087.16	486.56	-51.96	489.32	0.00	0.00	0.00
2,300.00	28.69	353.90	2,174.88	534.30	-57.06	537.33	0.00	0.00	0.00
2,400.00	28.69	353.90	2,262.60	582.03	-62.16	585.34	0.00	0.00	0.00
2,500.00	28.69	353.90	2,350.32	629.77	-67.26	633.35	0.00	0.00	0.00
2,600.00	28.69	353.90	2,438.05	677.51	-72.36	681.36	0.00	0.00	0.00
2,700.00	28.69	353.90	2,525.77	725.24	-77.46	729.37	0.00	0.00	0.00
2,800.00	28.69	353.90	2,613.49	772.98	-82.56	777.38	0.00	0.00	0.00
2,900.00	28.69	353.90	2,701.21	820.72	-87.65	825.39	0.00	0.00	0.00
3,000.00	28.69	353.90	2,788.93	868.46	-92.75	873.40	0.00	0.00	0.00
3,100.00	28.69	353.90	2,876.66	916.19	-97.85	921.40	0.00	0.00	0.00
3,200.00	28.69	353.90	2,964.38	963.93	-102.95	969.41	0.00	0.00	0.00
3,300.00	28.69	353.90	3,052.10	1,011.67	-108.05	1,017.42	0.00	0.00	0.00
3,400.00	28.69	353.90	3,139.82	1,059.41	-113.15	1,065.43	0.00	0.00	0.00
3,500.00	28.69	353.90	3,227.54	1,107.14	-118.24	1,113.44	0.00	0.00	0.00
3,600.00	28.69	353.90	3,315.27	1,154.88	-123.34	1,161.45	0.00	0.00	0.00
3,700.00	28.69	353.90	3,402.99	1,202.62	-128.44	1,209.46	0.00	0.00	0.00
3,800.00	28.69	353.90	3,490.71	1,250.36	-133.54	1,257.47	0.00	0.00	0.00
3,900.00	28.69	353.90	3,578.43	1,298.09	-138.64	1,305.48	0.00	0.00	0.00
4,000.00	28.69	353.90	3,666.15	1,345.83	-143.74	1,353.48	0.00	0.00	0.00
4,100.00	28.69	353.90	3,753.88	1,393.57	-148.83	1,401.49	0.00	0.00	0.00
4,200.00	28.69	353.90	3,841.60	1,441.31	-153.93	1,449.50	0.00	0.00	0.00
4,300.00	28.69	353.90	3,929.32	1,489.04	-159.03	1,497.51	0.00	0.00	0.00
4,400.00	28.69	353.90	4,017.04	1,536.78	-164.13	1,545.52	0.00	0.00	0.00
4,500.00	28.69	353.90	4,104.76	1,584.52	-169.23	1,593.53	0.00	0.00	0.00
4,537.05	28.69	353.90	4,137.26	1,602.20	-171.12	1,611.31	0.00	0.00	0.00
4,600.00	25.54	353.90	4,193.29	1,630.73	-174.16	1,640.01	5.00	-5.00	0.00
4,700.00	20.54	353.90	4,285.28	1,669.64	-178.32	1,679.14	5.00	-5.00	0.00
4,800.00	15.54	353.90	4,380.33	1,700.43	-181.61	1,710.10	5.00	-5.00	0.00
4,900.00	10.54	353.90	4,477.72	1,722.86	-184.00	1,732.66	5.00	-5.00	0.00
5,000.00	5.54	353.90	4,576.70	1,736.77	-185.49	1,746.65	5.00	-5.00	0.00
5,018.96	4.60	353.90	4,595.59	1,738.44	-185.67	1,748.33	5.00	-5.00	0.00

Gyrodatab Inc.
Planning Report

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Project:	Garfield County, Co	MD Reference:	WELL @ 6540.40usft (Original Well Elev)
Site:	MPD 25	North Reference:	Grid
Well:	Fed. 23D-33-691	Survey Calculation Method:	Minimum Curvature
Wellbore:	Fed. 23D		
Design:	Design #1		

Planned Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
Vanguard - MPD 25 - Federal 23D-33-691 FTP									
5,100.00	0.54	353.90	4,676.53	1,742.05	-186.05	1,751.96	5.00	-5.00	0.00
5,110.87	0.00	360.00	4,687.40	1,742.10	-186.06	1,752.01	5.00	-5.00	0.00
5,200.00	0.00	0.00	4,776.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
5,300.00	0.00	0.00	4,876.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
5,400.00	0.00	0.00	4,976.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
5,500.00	0.00	0.00	5,076.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
5,600.00	0.00	0.00	5,176.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
5,700.00	0.00	0.00	5,276.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
5,800.00	0.00	0.00	5,376.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
5,900.00	0.00	0.00	5,476.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
6,000.00	0.00	0.00	5,576.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
6,100.00	0.00	0.00	5,676.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
6,200.00	0.00	0.00	5,776.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
6,300.00	0.00	0.00	5,876.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
6,400.00	0.00	0.00	5,976.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
6,500.00	0.00	0.00	6,076.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
6,600.00	0.00	0.00	6,176.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
6,700.00	0.00	0.00	6,276.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
6,800.00	0.00	0.00	6,376.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
6,900.00	0.00	0.00	6,476.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
7,000.00	0.00	0.00	6,576.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
7,100.00	0.00	0.00	6,676.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
7,200.00	0.00	0.00	6,776.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
7,300.00	0.00	0.00	6,876.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
7,400.00	0.00	0.00	6,976.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
7,500.00	0.00	0.00	7,076.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
7,600.00	0.00	0.00	7,176.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
7,700.00	0.00	0.00	7,276.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
7,800.00	0.00	0.00	7,376.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
7,900.00	0.00	0.00	7,476.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
8,000.00	0.00	0.00	7,576.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
8,100.00	0.00	0.00	7,676.53	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
8,110.87	0.00	360.00	7,687.40	1,742.10	-186.06	1,752.01	0.00	0.00	0.00
Vanguard - MPD 25 - 23D-33-691 PBHL									

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									
Vanguard - MPD 25 - - plan misses target center by 3.69usft at 5018.96usft MD (4595.59 TVD, 1738.44 N, -185.67 E) - Point	0.00	360.00	4,595.40	1,742.10	-186.06	1,607,807.76	2,418,304.71	39° 29' 2.724 N	107° 33' 40.003 W
Vanguard - MPD 25 - - plan hits target center - Point	0.00	0.00	7,687.40	1,742.10	-186.06	1,607,807.76	2,418,304.71	39° 29' 2.724 N	107° 33' 40.003 W