

Vanguard Natural Resources

Garfield County, Co

MPD 25

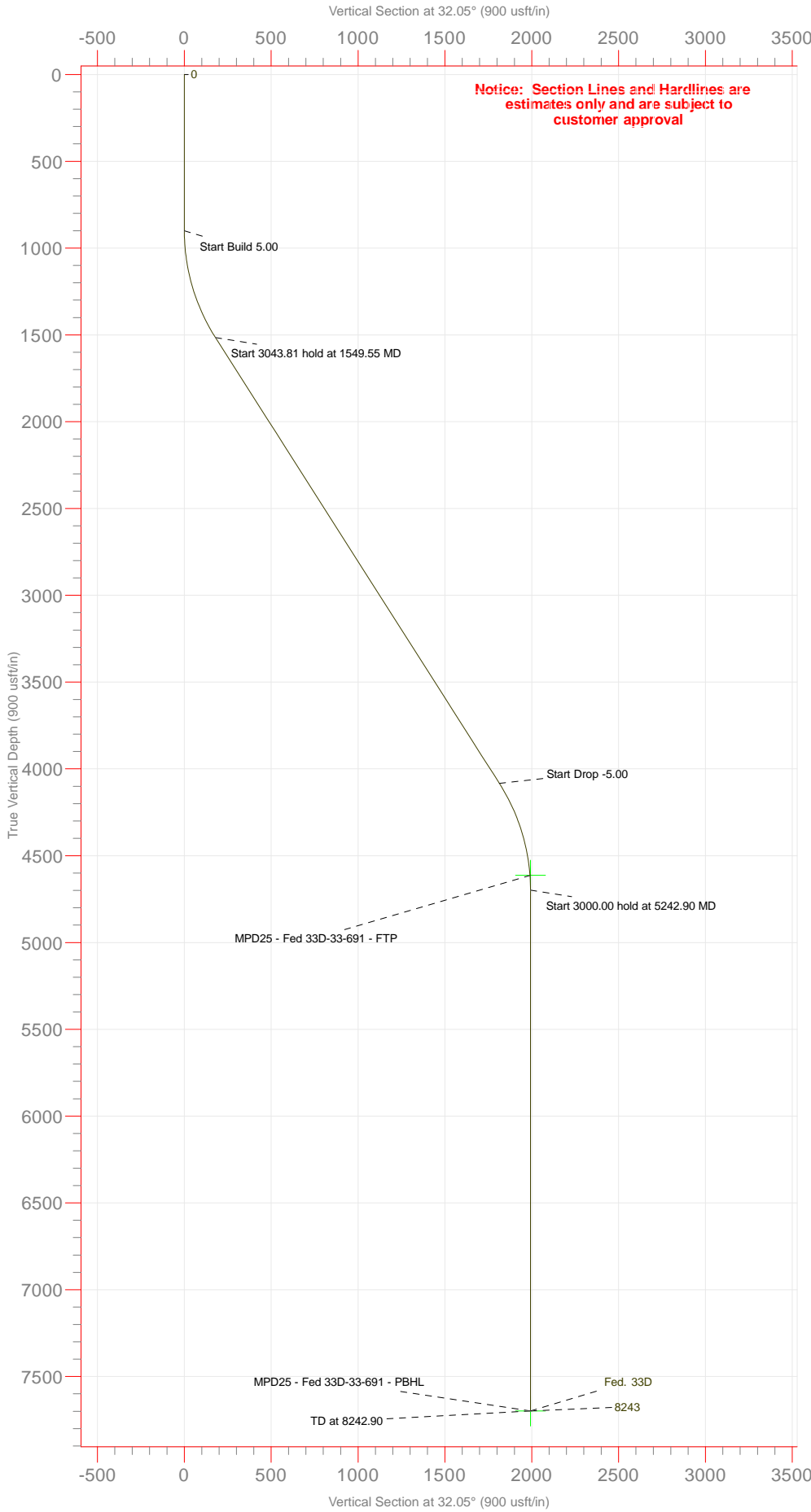
Fed. 33D-33-691

Fed. 33D

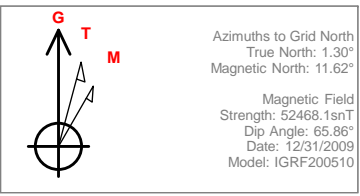
Plan: Design #1

Standard Planning Report

07 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°	

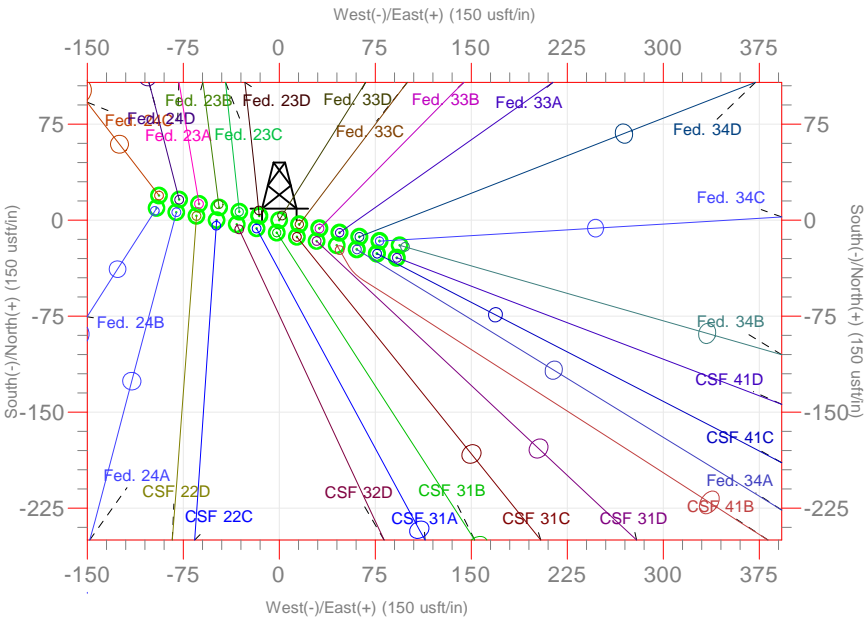


WELLBORE TARGET DETAILS						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape Point
Vanguard MPD25 - Federal 33D-33-691 - FTB	1612.40	1689.14	1057.49	1607751.53	2419563.71	Point
Vanguard MPD25 - Federal 33D-33-691 - PBHL	1698.40	1689.14	1057.49	1607751.53	2419563.71	Point

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	1549.55	32.48	32.05	1515.32	151.90	95.10	5.00	32.05	179.22	
4	4593.35	32.48	32.05	4083.08	1537.24	962.39	0.00	0.00	1813.64	
5	5242.90	0.00	360.00	4698.40	1689.14	1057.49	5.00	180.00	1992.86	
6	8242.90	0.00	360.00	7698.40	1689.14	1057.49	0.00	0.00	1992.86	MPD25 - Fed 33D-33-691 - PBHL

FORMATION TOPS ALONG WELLPATH	
No formation data is available	

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



Gyrodata Inc.
Planning Report

Database:	Gyrodata NWDB	Local Co-ordinate Reference:	Well Fed. 33D-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. 33D-33-691	Survey Calculation Method:	Minimum Curvature
Wellbore:	Fed. 33D		
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. 33D-33-691				
Well Position	+N-S	-19.27 usft	Northing:	1,606,062.39 usft	Latitude:	39° 28' 45.523 N
	+E-W	93.86 usft	Easting:	2,418,506.22 usft	Longitude:	107° 33' 36.929 W
Position Uncertainty		0.00 usft	Wellhead Elevation:		Ground Level:	6,540.40 usft

Wellbore	Fed. 33D				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	12/31/09	10.32	65.86	52,468.11128690

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	32.05

Plan Survey Tool Program	Date	02/07/17		
Depth From (usft)	Depth To (usft)	Survey (Wellbore)	Tool Name	Remarks
1	0.00	8,242.90	Design #1 (Fed. 33D)	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	
1,549.55	32.48	32.05	1,515.32	151.90	95.10	5.00	5.00	0.00	32.05	
4,593.35	32.48	32.05	4,083.08	1,537.24	962.39	0.00	0.00	0.00	0.00	
5,242.90	0.00	360.00	4,698.40	1,689.14	1,057.49	5.00	-5.00	0.00	180.00	
8,242.90	0.00	360.00	7,698.40	1,689.14	1,057.49	0.00	0.00	0.00	0.00	Vanguard MPD25 -

Gyrodatab Inc.

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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. 33D-33-691	Survey Calculation Method:	Minimum Curvature
Wellbore:	Fed. 33D		
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	32.05	999.87	3.70	2.31	4.36	5.00	5.00	0.00
1,100.00	10.00	32.05	1,098.99	14.76	9.24	17.41	5.00	5.00	0.00
1,200.00	15.00	32.05	1,196.58	33.10	20.72	39.05	5.00	5.00	0.00
1,300.00	20.00	32.05	1,291.93	58.58	36.67	69.11	5.00	5.00	0.00
1,400.00	25.00	32.05	1,384.28	91.00	56.97	107.36	5.00	5.00	0.00
1,500.00	30.00	32.05	1,472.96	130.13	81.47	153.52	5.00	5.00	0.00
1,549.55	32.48	32.05	1,515.32	151.90	95.10	179.22	5.00	5.00	0.00
1,600.00	32.48	32.05	1,557.88	174.87	109.48	206.31	0.00	0.00	0.00
1,700.00	32.48	32.05	1,642.24	220.38	137.97	260.01	0.00	0.00	0.00
1,800.00	32.48	32.05	1,726.60	265.89	166.46	313.70	0.00	0.00	0.00
1,900.00	32.48	32.05	1,810.96	311.41	194.96	367.40	0.00	0.00	0.00
2,000.00	32.48	32.05	1,895.32	356.92	223.45	421.10	0.00	0.00	0.00
2,100.00	32.48	32.05	1,979.68	402.43	251.94	474.79	0.00	0.00	0.00
2,200.00	32.48	32.05	2,064.04	447.95	280.44	528.49	0.00	0.00	0.00
2,300.00	32.48	32.05	2,148.40	493.46	308.93	582.19	0.00	0.00	0.00
2,400.00	32.48	32.05	2,232.76	538.97	337.43	635.88	0.00	0.00	0.00
2,500.00	32.48	32.05	2,317.12	584.48	365.92	689.58	0.00	0.00	0.00
2,600.00	32.48	32.05	2,401.48	630.00	394.41	743.28	0.00	0.00	0.00
2,700.00	32.48	32.05	2,485.84	675.51	422.91	796.97	0.00	0.00	0.00
2,800.00	32.48	32.05	2,570.20	721.02	451.40	850.67	0.00	0.00	0.00
2,900.00	32.48	32.05	2,654.56	766.54	479.89	904.37	0.00	0.00	0.00
3,000.00	32.48	32.05	2,738.92	812.05	508.39	958.06	0.00	0.00	0.00
3,100.00	32.48	32.05	2,823.28	857.56	536.88	1,011.76	0.00	0.00	0.00
3,200.00	32.48	32.05	2,907.65	903.08	565.38	1,065.46	0.00	0.00	0.00
3,300.00	32.48	32.05	2,992.01	948.59	593.87	1,119.15	0.00	0.00	0.00
3,400.00	32.48	32.05	3,076.37	994.10	622.36	1,172.85	0.00	0.00	0.00
3,500.00	32.48	32.05	3,160.73	1,039.62	650.86	1,226.55	0.00	0.00	0.00
3,600.00	32.48	32.05	3,245.09	1,085.13	679.35	1,280.24	0.00	0.00	0.00
3,700.00	32.48	32.05	3,329.45	1,130.64	707.84	1,333.94	0.00	0.00	0.00
3,800.00	32.48	32.05	3,413.81	1,176.16	736.34	1,387.64	0.00	0.00	0.00
3,900.00	32.48	32.05	3,498.17	1,221.67	764.83	1,441.33	0.00	0.00	0.00
4,000.00	32.48	32.05	3,582.53	1,267.18	793.32	1,495.03	0.00	0.00	0.00
4,100.00	32.48	32.05	3,666.89	1,312.70	821.82	1,548.73	0.00	0.00	0.00
4,200.00	32.48	32.05	3,751.25	1,358.21	850.31	1,602.42	0.00	0.00	0.00
4,300.00	32.48	32.05	3,835.61	1,403.72	878.81	1,656.12	0.00	0.00	0.00
4,400.00	32.48	32.05	3,919.97	1,449.23	907.30	1,709.82	0.00	0.00	0.00
4,500.00	32.48	32.05	4,004.33	1,494.75	935.79	1,763.51	0.00	0.00	0.00
4,593.35	32.48	32.05	4,083.08	1,537.24	962.39	1,813.64	0.00	0.00	0.00
4,600.00	32.15	32.05	4,088.70	1,540.25	964.28	1,817.19	5.00	-5.00	0.00
4,700.00	27.15	32.05	4,175.58	1,582.16	990.52	1,866.64	5.00	-5.00	0.00
4,800.00	22.15	32.05	4,266.44	1,617.49	1,012.64	1,908.33	5.00	-5.00	0.00
4,900.00	17.15	32.05	4,360.59	1,645.98	1,030.47	1,941.94	5.00	-5.00	0.00
5,000.00	12.15	32.05	4,457.31	1,667.40	1,043.88	1,967.21	5.00	-5.00	0.00
5,100.00	7.15	32.05	4,555.87	1,681.60	1,052.77	1,983.96	5.00	-5.00	0.00

Gyrodata Inc.

Planning Report

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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. 33D-33-691	Survey Calculation Method:	Minimum Curvature
Wellbore:	Fed. 33D		
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)
5,157.08	4.29	32.05	4,612.66	1,686.42	1,055.79	1,989.65	5.00	-5.00	0.00
Vanguard MPD25 - Federal 33D-33-691 - FTP									
5,200.00	2.15	32.05	4,655.51	1,688.46	1,057.07	1,992.06	5.00	-5.00	0.00
5,242.90	0.00	360.00	4,698.40	1,689.14	1,057.49	1,992.86	5.00	-5.00	0.00
5,300.00	0.00	0.00	4,755.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
5,400.00	0.00	0.00	4,855.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
5,500.00	0.00	0.00	4,955.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
5,600.00	0.00	0.00	5,055.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
5,700.00	0.00	0.00	5,155.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
5,800.00	0.00	0.00	5,255.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
5,900.00	0.00	0.00	5,355.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
6,000.00	0.00	0.00	5,455.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
6,100.00	0.00	0.00	5,555.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
6,200.00	0.00	0.00	5,655.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
6,300.00	0.00	0.00	5,755.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
6,400.00	0.00	0.00	5,855.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
6,500.00	0.00	0.00	5,955.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
6,600.00	0.00	0.00	6,055.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
6,700.00	0.00	0.00	6,155.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
6,800.00	0.00	0.00	6,255.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
6,900.00	0.00	0.00	6,355.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
7,000.00	0.00	0.00	6,455.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
7,100.00	0.00	0.00	6,555.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
7,200.00	0.00	0.00	6,655.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
7,300.00	0.00	0.00	6,755.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
7,400.00	0.00	0.00	6,855.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
7,500.00	0.00	0.00	6,955.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
7,600.00	0.00	0.00	7,055.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
7,700.00	0.00	0.00	7,155.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
7,800.00	0.00	0.00	7,255.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
7,900.00	0.00	0.00	7,355.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
8,000.00	0.00	0.00	7,455.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
8,100.00	0.00	0.00	7,555.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
8,200.00	0.00	0.00	7,655.50	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
8,242.90	0.00	360.00	7,698.40	1,689.14	1,057.49	1,992.86	0.00	0.00	0.00
Vanguard MPD25 - Federal 33D-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
Vanguard MPD25 - Fc - hit/miss target - Shape - Point	0.00	360.00	4,612.40	1,689.14	1,057.49	1,607,751.53	2,419,563.71	39° 29' 2.450 N	107° 33' 23.933 W
- plan misses target center by 3.22usft at 5157.08usft MD (4612.66 TVD, 1686.42 N, 1055.79 E)									
Vanguard MPD25 - Fc - plan hits target center - Point	0.00	360.00	7,698.40	1,689.14	1,057.49	1,607,751.53	2,419,563.72	39° 29' 2.450 N	107° 33' 23.933 W