

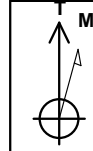


REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Federal GGU 24D-28-691, True North
Vertical (TVD) Reference: WELL @ 6130.60ft (Original Well Elev)
Section (VS) Reference: Slot - (0.00N, 0.00E)
Measured Depth Reference: WELL @ 6130.60ft (Original Well Elev)
Calculation Method: Minimum Curvature



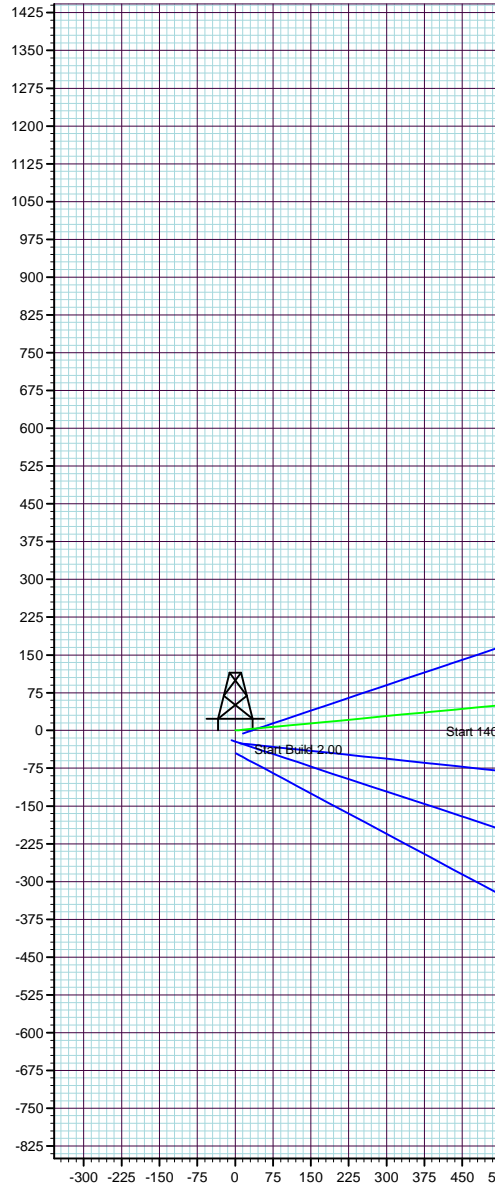
Project: GGU 13-28
Site: GGU 13-28
Well: Federal GGU 24D-28-691
Wellbore: Federal GGU 24D-28-691
Design: Design #1



Azimuths to True North
Magnetic North: 9.43°
Magnetic Field
Strength: 51793.8nT
Dip Angle: 65.60°
Date: 12/31/2016
Model: HDGM

WELL DETAILS: Federal GGU 24D-28-691

+N/-S	+E/-W	Northing	Easting	Ground Level:	6130.60	Latitude	Longitude
0.00	0.00	1611641.909	2416881.236	2416881.236	39.494525	-107.566463	



ANNOTATIONS

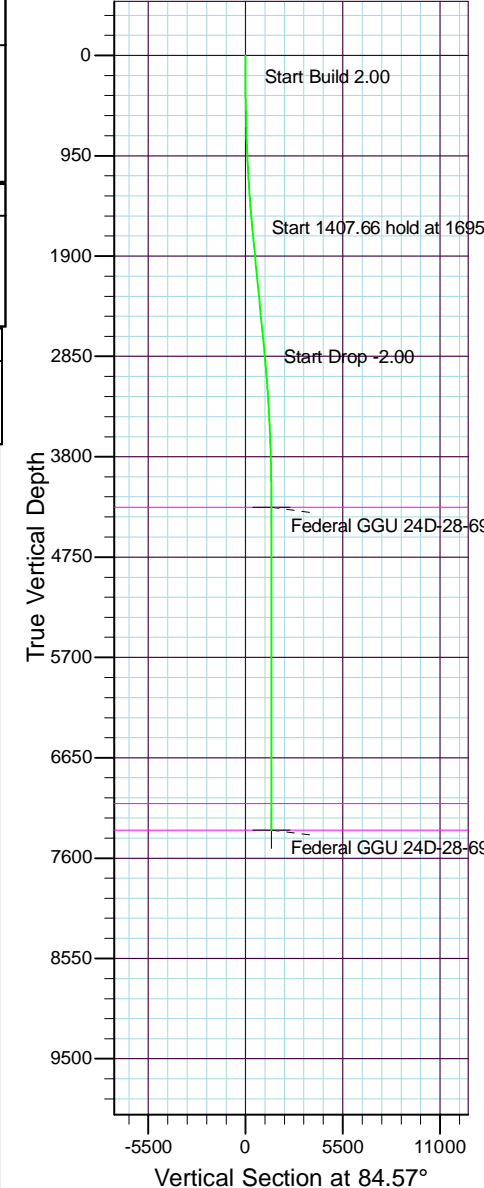
MD	TVD	Inc	Azi	+N/-S	+E/-W	V/Sect	Departure	Annotation
200.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	Start Build 2.00
1695.12	1628.16	29.90	84.57	36.06	379.66	381.37	381.37	Start 1407.66 hold at 1695.12 MD
3102.78	2848.44	29.90	84.57	102.41	1078.27	1083.12	1083.12	Start Drop -2.00
4597.90	4276.60	0.00	0.00	138.47	1457.93	1464.49	1464.49	Start 3057.00 hold at 4597.90 MD
7654.90	7333.60	0.00	0.00	138.47	1457.93	1464.49	1464.49	TD at 7654.90

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
Federal GGU 24D-28-691 DT	4276.60	138.47	1457.93	1611747.175	2418341.879	39.494905	-107.561297	Point
- plan hits target center								
Federal GGU 24D-28-691 BHL	7333.60	138.47	1457.93	1611747.175	2418341.879	39.494905	-107.561297	Point
- plan hits target center								

FORMATION TOP DETAILS

TVDPath	MDPath	Formation
4276.60	4597.90	Price Coal
7083.60	7404.90	Rollins
7333.60	7654.90	TD





Vanguard Natural Resources, LLC

GGU 13-28

GGU 13-28

Federal GGU 24D-28-691

Federal GGU 24D-28-691

Plan: Design #1

Standard Planning Report

07 February, 2017

Database:	Compass DB Connection	Local Co-ordinate Reference:	Well Federal GGU 24D-28-691
Company:	Vanguard Natural Resources, LLC	TVD Reference:	WELL @ 6130.60ft (Original Well Elev)
Project:	GGU 13-28	MD Reference:	WELL @ 6130.60ft (Original Well Elev)
Site:	GGU 13-28	North Reference:	True
Well:	Federal GGU 24D-28-691	Survey Calculation Method:	Minimum Curvature
Wellbore:	Federal GGU 24D-28-691		
Design:	Design #1		

Project	GGU 13-28		
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	GGU 13-28				
Site Position:		Northing:	1,611,635.732 usft	Latitude:	39.494509
From:	Lat/Long	Easting:	2,416,896.904 usft	Longitude:	-107.566407
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	-1.30

Well	Federal GGU 24D-28-691					
Well Position	+N/-S	5.82 ft	Northing:	1,611,641.909 usft	Latitude:	39.494525
	+E/-W	-15.80 ft	Easting:	2,416,881.236 usft	Longitude:	-107.566463
Position Uncertainty		0.00 ft	Wellhead Elevation:	6,130.60 ft	Ground Level:	6,130.60 ft

Wellbore	Federal GGU 24D-28-691				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	12/31/2016	9.43	65.60	51,794

Design	Design #1			
Audit Notes:				
Version:	Phase:	PROTOTYPE	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(ft)	(ft)	(ft)	(°)
	0.00	0.00	0.00	84.57

Plan Sections										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	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	
1,695.12	29.90	84.57	1,628.16	36.06	379.66	2.00	2.00	0.00	84.57	
3,102.78	29.90	84.57	2,848.44	102.41	1,078.27	0.00	0.00	0.00	0.00	
4,597.90	0.00	0.00	4,276.60	138.47	1,457.93	2.00	-2.00	0.00	180.00	Federal GGU 24D-28
7,654.90	0.00	0.00	7,333.60	138.47	1,457.93	0.00	0.00	0.00	0.00	Federal GGU 24D-28

Database:	Compass DB Connection	Local Co-ordinate Reference:	Well Federal GGU 24D-28-691
Company:	Vanguard Natural Resources, LLC	TVD Reference:	WELL @ 6130.60ft (Original Well Elev)
Project:	GGU 13-28	MD Reference:	WELL @ 6130.60ft (Original Well Elev)
Site:	GGU 13-28	North Reference:	True
Well:	Federal GGU 24D-28-691	Survey Calculation Method:	Minimum Curvature
Wellbore:	Federal GGU 24D-28-691		
Design:	Design #1		

Planned Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
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	2.00	84.57	299.98	0.17	1.74	1.75	2.00	2.00	0.00
400.00	4.00	84.57	399.84	0.66	6.95	6.98	2.00	2.00	0.00
500.00	6.00	84.57	499.45	1.48	15.62	15.69	2.00	2.00	0.00
600.00	8.00	84.57	598.70	2.64	27.75	27.88	2.00	2.00	0.00
700.00	10.00	84.57	697.47	4.12	43.33	43.52	2.00	2.00	0.00
800.00	12.00	84.57	795.62	5.92	62.32	62.60	2.00	2.00	0.00
900.00	14.00	84.57	893.06	8.05	84.72	85.10	2.00	2.00	0.00
1,000.00	16.00	84.57	989.64	10.49	110.48	110.98	2.00	2.00	0.00
1,100.00	18.00	84.57	1,085.27	13.26	139.58	140.21	2.00	2.00	0.00
1,200.00	20.00	84.57	1,179.82	16.34	171.99	172.77	2.00	2.00	0.00
1,300.00	22.00	84.57	1,273.17	19.72	207.67	208.60	2.00	2.00	0.00
1,400.00	24.00	84.57	1,365.21	23.42	246.56	247.67	2.00	2.00	0.00
1,500.00	26.00	84.57	1,455.84	27.41	288.63	289.93	2.00	2.00	0.00
1,600.00	28.00	84.57	1,544.94	31.71	333.83	335.33	2.00	2.00	0.00
1,695.12	29.90	84.57	1,628.16	36.06	379.66	381.37	2.00	2.00	0.00
1,700.00	29.90	84.57	1,632.40	36.29	382.09	383.80	0.00	0.00	0.00
1,800.00	29.90	84.57	1,719.08	41.00	431.71	433.66	0.00	0.00	0.00
1,900.00	29.90	84.57	1,805.77	45.72	481.34	483.51	0.00	0.00	0.00
2,000.00	29.90	84.57	1,892.46	50.43	530.97	533.36	0.00	0.00	0.00
2,100.00	29.90	84.57	1,979.15	55.14	580.60	583.21	0.00	0.00	0.00
2,200.00	29.90	84.57	2,065.84	59.86	630.23	633.07	0.00	0.00	0.00
2,300.00	29.90	84.57	2,152.52	64.57	679.86	682.92	0.00	0.00	0.00
2,400.00	29.90	84.57	2,239.21	69.28	729.49	732.77	0.00	0.00	0.00
2,500.00	29.90	84.57	2,325.90	74.00	779.12	782.62	0.00	0.00	0.00
2,600.00	29.90	84.57	2,412.59	78.71	828.75	832.47	0.00	0.00	0.00
2,700.00	29.90	84.57	2,499.27	83.42	878.37	882.33	0.00	0.00	0.00
2,800.00	29.90	84.57	2,585.96	88.14	928.00	932.18	0.00	0.00	0.00
2,900.00	29.90	84.57	2,672.65	92.85	977.63	982.03	0.00	0.00	0.00
3,000.00	29.90	84.57	2,759.34	97.56	1,027.26	1,031.88	0.00	0.00	0.00
3,100.00	29.90	84.57	2,846.02	102.28	1,076.89	1,081.74	0.00	0.00	0.00
3,102.78	29.90	84.57	2,848.44	102.41	1,078.27	1,083.12	0.00	0.00	0.00
3,200.00	27.96	84.57	2,933.52	106.86	1,125.09	1,130.15	2.00	-2.00	0.00
3,300.00	25.96	84.57	3,022.65	111.14	1,170.21	1,175.48	2.00	-2.00	0.00
3,400.00	23.96	84.57	3,113.30	115.13	1,212.22	1,217.67	2.00	-2.00	0.00
3,500.00	21.96	84.57	3,205.38	118.82	1,251.05	1,256.68	2.00	-2.00	0.00
3,600.00	19.96	84.57	3,298.76	122.20	1,286.65	1,292.44	2.00	-2.00	0.00
3,700.00	17.96	84.57	3,393.33	125.27	1,318.99	1,324.93	2.00	-2.00	0.00
3,800.00	15.96	84.57	3,488.98	128.03	1,348.03	1,354.09	2.00	-2.00	0.00
3,900.00	13.96	84.57	3,585.58	130.47	1,373.72	1,379.90	2.00	-2.00	0.00
4,000.00	11.96	84.57	3,683.03	132.59	1,396.04	1,402.33	2.00	-2.00	0.00
4,100.00	9.96	84.57	3,781.20	134.39	1,414.97	1,421.33	2.00	-2.00	0.00
4,200.00	7.96	84.57	3,879.98	135.86	1,430.47	1,436.90	2.00	-2.00	0.00
4,300.00	5.96	84.57	3,979.24	137.00	1,442.53	1,449.02	2.00	-2.00	0.00
4,400.00	3.96	84.57	4,078.86	137.82	1,451.13	1,457.66	2.00	-2.00	0.00
4,500.00	1.96	84.57	4,178.72	138.31	1,456.27	1,462.82	2.00	-2.00	0.00
4,597.90	0.00	0.00	4,276.60	138.47	1,457.93	1,464.49	2.00	-2.00	0.00
4,600.00	0.00	0.00	4,278.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00
4,700.00	0.00	0.00	4,378.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00
4,800.00	0.00	0.00	4,478.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00
4,900.00	0.00	0.00	4,578.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00
5,000.00	0.00	0.00	4,678.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00

Database:	Compass DB Connection	Local Co-ordinate Reference:	Well Federal GGU 24D-28-691
Company:	Vanguard Natural Resources, LLC	TVD Reference:	WELL @ 6130.60ft (Original Well Elev)
Project:	GGU 13-28	MD Reference:	WELL @ 6130.60ft (Original Well Elev)
Site:	GGU 13-28	North Reference:	True
Well:	Federal GGU 24D-28-691	Survey Calculation Method:	Minimum Curvature
Wellbore:	Federal GGU 24D-28-691		
Design:	Design #1		

Planned Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
5,100.00	0.00	0.00	4,778.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
5,200.00	0.00	0.00	4,878.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
5,300.00	0.00	0.00	4,978.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
5,400.00	0.00	0.00	5,078.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
5,500.00	0.00	0.00	5,178.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
5,600.00	0.00	0.00	5,278.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
5,700.00	0.00	0.00	5,378.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
5,800.00	0.00	0.00	5,478.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
5,900.00	0.00	0.00	5,578.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
6,000.00	0.00	0.00	5,678.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
6,100.00	0.00	0.00	5,778.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
6,200.00	0.00	0.00	5,878.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
6,300.00	0.00	0.00	5,978.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
6,400.00	0.00	0.00	6,078.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
6,500.00	0.00	0.00	6,178.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
6,600.00	0.00	0.00	6,278.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
6,700.00	0.00	0.00	6,378.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
6,800.00	0.00	0.00	6,478.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
6,900.00	0.00	0.00	6,578.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
7,000.00	0.00	0.00	6,678.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
7,100.00	0.00	0.00	6,778.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
7,200.00	0.00	0.00	6,878.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
7,300.00	0.00	0.00	6,978.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
7,400.00	0.00	0.00	7,078.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
7,500.00	0.00	0.00	7,178.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
7,600.00	0.00	0.00	7,278.70	138.47	1,457.93	1,464.49	0.00	0.00	0.00	
7,654.90	0.00	0.00	7,333.60	138.47	1,457.93	1,464.49	0.00	0.00	0.00	

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
Federal GGU 24D-28-691	0.00	0.00	4,276.60	138.47	1,457.93	1,611,747.175	2,418,341.879	39.494905	-107.561297
- plan hits target center									
- Point									
Federal GGU 24D-28-691	0.00	0.00	7,333.60	138.47	1,457.93	1,611,747.175	2,418,341.879	39.494905	-107.561297
- plan hits target center									
- Point									

Formations						
Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)	
4,597.90	4,276.60	Price Coal		0.00		
7,404.90	7,083.60	Rollins		0.00		
7,654.90	7,333.60	TD		0.00		

Database:	Compass DB Connection	Local Co-ordinate Reference:	Well Federal GGU 24D-28-691
Company:	Vanguard Natural Resources, LLC	TVD Reference:	WELL @ 6130.60ft (Original Well Elev)
Project:	GGU 13-28	MD Reference:	WELL @ 6130.60ft (Original Well Elev)
Site:	GGU 13-28	North Reference:	True
Well:	Federal GGU 24D-28-691	Survey Calculation Method:	Minimum Curvature
Wellbore:	Federal GGU 24D-28-691		
Design:	Design #1		

Plan Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
200.00	200.00	0.00	0.00	Start Build 2.00
1,695.12	1,628.16	36.06	379.66	Start 1407.66 hold at 1695.12 MD
3,102.78	2,848.44	102.41	1,078.27	Start Drop -2.00
4,597.90	4,276.60	138.47	1,457.93	Start 3057.00 hold at 4597.90 MD
7,654.90	7,333.60	138.47	1,457.93	TD at 7654.90