



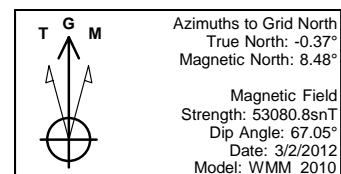
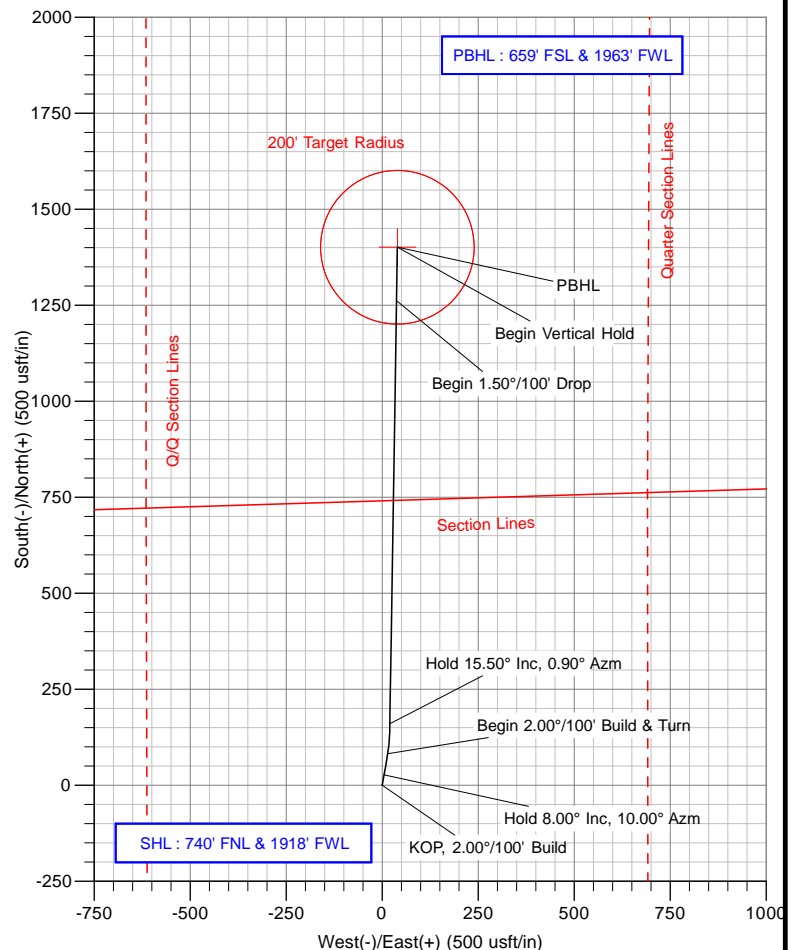
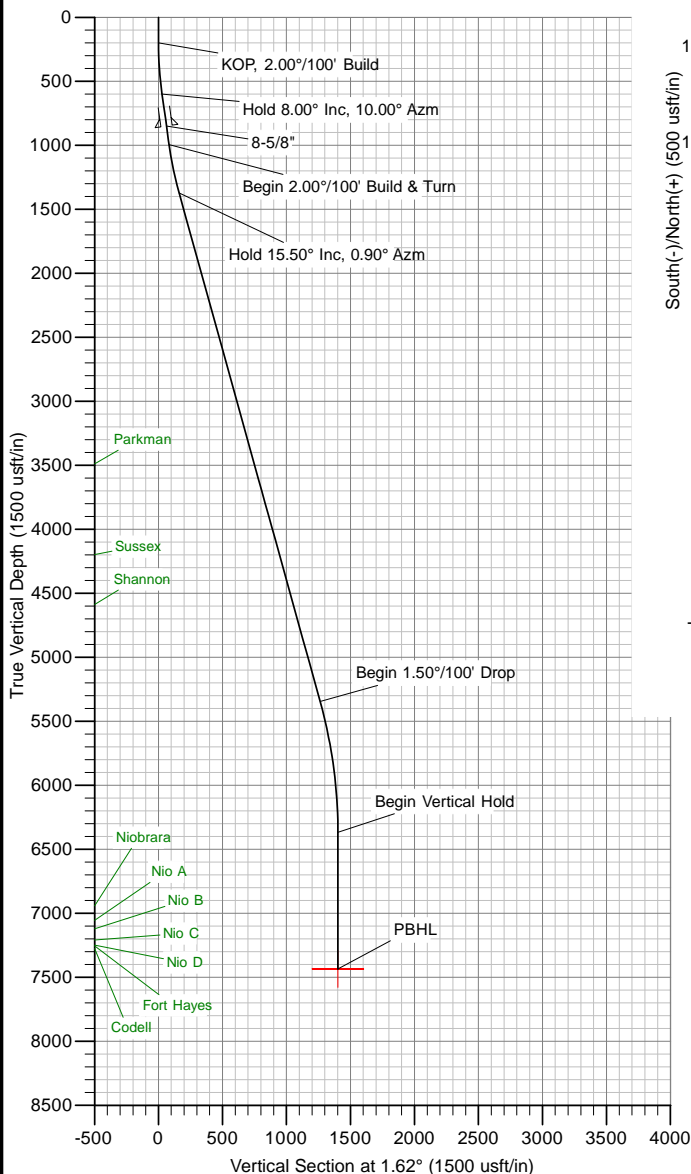
Company: Great Western
Site: H-Y
Well: 20-24
Project: Weld County, Colorado (NAD 83)
Rig Name: Cade 22



Planning: 936.442.2510 Fax: 936.442.2515
Operations: 936.442.2500 Fax: 936.442.2599

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	V Sect	Departure	Annotation
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	KOP, 2.00°/100' Build
600.00	8.00	10.00	598.70	27.46	4.84	27.58	27.88	Hold 8.00° Inc, 10.00° Azm
1000.00	8.00	10.00	994.81	82.28	14.51	82.66	83.55	Begin 2.00°/100' Build & Turn
1385.27	15.50	0.90	1371.76	160.28	19.98	160.78	161.82	Hold 15.50° Inc, 0.90° Azm
5508.57	15.50	0.90	5345.05	1262.24	37.33	1262.79	1263.92	Begin 1.50°/100' Drop
6542.09	0.00	0.00	6366.00	1401.19	39.52	1401.75	1402.89	Begin Vertical Hold
7611.09	0.00	0.00	7435.00	1401.19	39.52	1401.75	1402.89	PBHL



US State Plane 1983
Colorado Northern Zone

Created By: Allen Slack
Date: 11:09, March 08 2012
Plan: Design #1

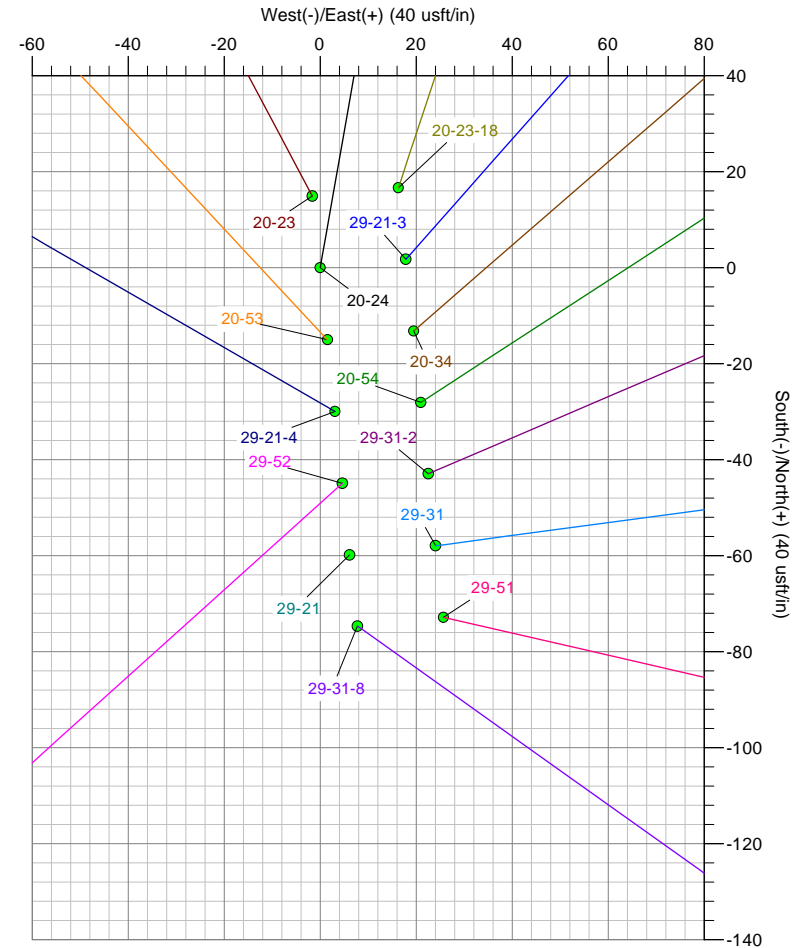
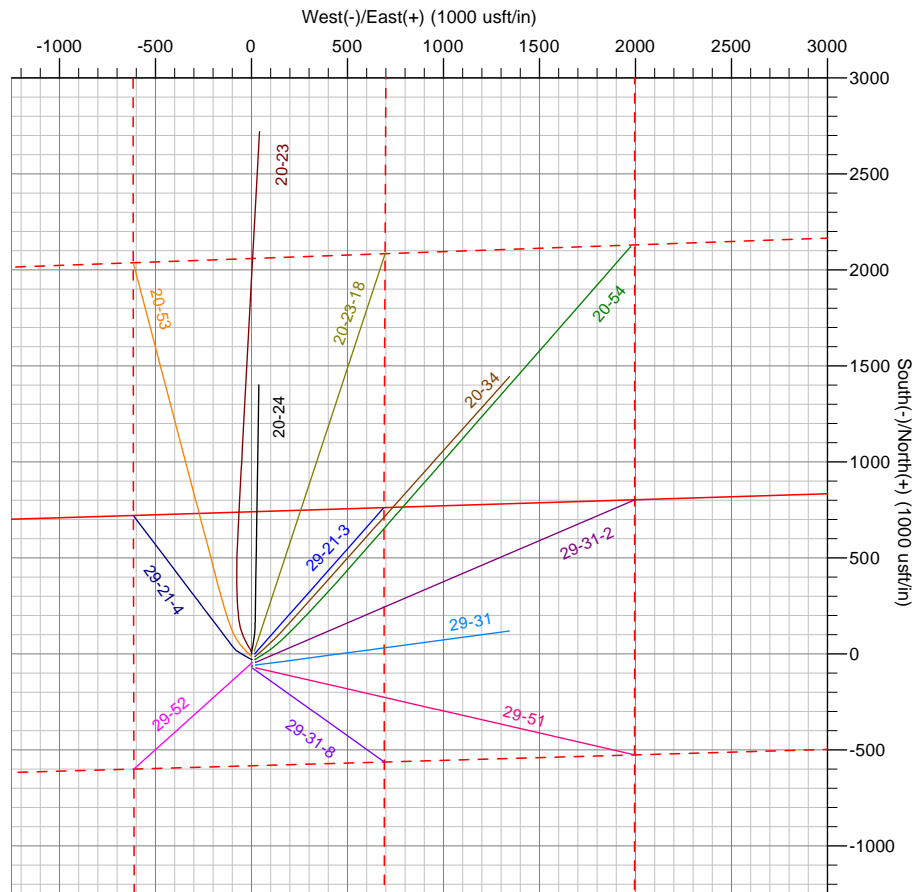
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Company: Great Western
Site: H-Y
Project: Weld County, Colorado (NAD 83)
Rig Name: Cade 22



Planning: 936.442.2510 Fax: 936.442.2515
Operations: 936.442.2500 Fax: 936.442.2599



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Great Western

Weld County, Colorado (NAD 83)

H-Y

20-24

Wellbore #1

Plan: Design #1

Standard Planning Report

08 March, 2012

Database:	Southern Region	Local Co-ordinate Reference:	Well 20-24
Company:	Great Western	TVD Reference:	WELL @ 4888.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4888.00usft (Cade 22)
Site:	H-Y	North Reference:	Grid
Well:	20-24	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Project	Weld County, Colorado (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	Colorado Northern Zone		

Well	20-24			
Well Position	+N/-S	1,412,074.26 usft	Northing:	1,412,074.26 usft
	+E/-W	3,161,504.64 usft	Easting:	3,161,504.64 usft
Position Uncertainty		0.00 usft	Wellhead Elevation:	
			Latitude:	40° 27' 47.1401 N
			Longitude:	104° 55' 10.446 W
			Ground Level:	4,874.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM_2010	3/2/2012	8.85	67.05	53,081

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	1.62

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
0.00	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	
600.00	8.00	10.00	598.70	27.46	4.84	2.00	2.00	0.00	10.00	
1,000.00	8.00	10.00	994.81	82.28	14.51	0.00	0.00	0.00	0.00	
1,385.27	15.50	0.90	1,371.76	160.28	19.98	2.00	1.95	-2.36	-18.37	
5,508.57	15.50	0.90	5,345.05	1,262.24	37.33	0.00	0.00	0.00	0.00	
6,542.09	0.00	0.00	6,366.00	1,401.19	39.52	1.50	-1.50	0.00	180.00	
7,611.09	0.00	0.00	7,435.00	1,401.19	39.52	0.00	0.00	0.00	0.00	PBHL v1 - H-Y 20-2

Database:	Southern Region	Local Co-ordinate Reference:	Well 20-24
Company:	Great Western	TVD Reference:	WELL @ 4888.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4888.00usft (Cade 22)
Site:	H-Y	North Reference:	Grid
Well:	20-24	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)
0.00	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
KOP, 2.00°/100' Build									
300.00	2.00	10.00	299.98	1.72	0.30	1.73	2.00	2.00	0.00
400.00	4.00	10.00	399.84	6.87	1.21	6.90	2.00	2.00	0.00
500.00	6.00	10.00	499.45	15.46	2.73	15.53	2.00	2.00	0.00
600.00	8.00	10.00	598.70	27.46	4.84	27.58	2.00	2.00	0.00
Hold 8.00° Inc, 10.00° Azm									
700.00	8.00	10.00	697.73	41.16	7.26	41.35	0.00	0.00	0.00
800.00	8.00	10.00	796.76	54.87	9.67	55.12	0.00	0.00	0.00
853.77	8.00	10.00	850.00	62.24	10.97	62.52	0.00	0.00	0.00
8-5/8"									
900.00	8.00	10.00	895.78	68.57	12.09	68.89	0.00	0.00	0.00
1,000.00	8.00	10.00	994.81	82.28	14.51	82.66	0.00	0.00	0.00
Begin 2.00°/100' Build & Turn									
1,100.00	9.92	6.34	1,093.59	97.69	16.67	98.12	2.00	1.92	-3.66
1,200.00	11.86	3.86	1,191.78	116.51	18.31	116.98	2.00	1.94	-2.48
1,300.00	13.82	2.07	1,289.27	138.71	19.43	139.20	2.00	1.96	-1.79
1,385.27	15.50	0.90	1,371.76	160.28	19.98	160.78	2.00	1.97	-1.37
Hold 15.50° Inc, 0.90° Azm									
1,400.00	15.50	0.90	1,385.96	164.22	20.04	164.72	0.00	0.00	0.00
1,500.00	15.50	0.90	1,482.32	190.94	20.46	191.44	0.00	0.00	0.00
1,600.00	15.50	0.90	1,578.68	217.67	20.89	218.17	0.00	0.00	0.00
1,700.00	15.50	0.90	1,675.04	244.39	21.31	244.90	0.00	0.00	0.00
1,800.00	15.50	0.90	1,771.41	271.12	21.73	271.62	0.00	0.00	0.00
1,900.00	15.50	0.90	1,867.77	297.84	22.15	298.35	0.00	0.00	0.00
2,000.00	15.50	0.90	1,964.13	324.57	22.57	325.08	0.00	0.00	0.00
2,100.00	15.50	0.90	2,060.49	351.29	22.99	351.80	0.00	0.00	0.00
2,200.00	15.50	0.90	2,156.85	378.02	23.41	378.53	0.00	0.00	0.00
2,300.00	15.50	0.90	2,253.21	404.74	23.83	405.26	0.00	0.00	0.00
2,400.00	15.50	0.90	2,349.58	431.47	24.25	431.98	0.00	0.00	0.00
2,500.00	15.50	0.90	2,445.94	458.19	24.67	458.71	0.00	0.00	0.00
2,600.00	15.50	0.90	2,542.30	484.92	25.09	485.43	0.00	0.00	0.00
2,700.00	15.50	0.90	2,638.66	511.64	25.51	512.16	0.00	0.00	0.00
2,800.00	15.50	0.90	2,735.02	538.37	25.93	538.89	0.00	0.00	0.00
2,900.00	15.50	0.90	2,831.38	565.10	26.35	565.61	0.00	0.00	0.00
3,000.00	15.50	0.90	2,927.75	591.82	26.78	592.34	0.00	0.00	0.00
3,100.00	15.50	0.90	3,024.11	618.55	27.20	619.07	0.00	0.00	0.00
3,200.00	15.50	0.90	3,120.47	645.27	27.62	645.79	0.00	0.00	0.00
3,300.00	15.50	0.90	3,216.83	672.00	28.04	672.52	0.00	0.00	0.00
3,400.00	15.50	0.90	3,313.19	698.72	28.46	699.25	0.00	0.00	0.00
3,500.00	15.50	0.90	3,409.56	725.45	28.88	725.97	0.00	0.00	0.00
3,581.41	15.50	0.90	3,488.00	747.20	29.22	747.73	0.00	0.00	0.00
Parkman									
3,600.00	15.50	0.90	3,505.92	752.17	29.30	752.70	0.00	0.00	0.00
3,700.00	15.50	0.90	3,602.28	778.90	29.72	779.42	0.00	0.00	0.00
3,800.00	15.50	0.90	3,698.64	805.62	30.14	806.15	0.00	0.00	0.00
3,900.00	15.50	0.90	3,795.00	832.35	30.56	832.88	0.00	0.00	0.00
4,000.00	15.50	0.90	3,891.36	859.07	30.98	859.60	0.00	0.00	0.00
4,100.00	15.50	0.90	3,987.73	885.80	31.40	886.33	0.00	0.00	0.00
4,200.00	15.50	0.90	4,084.09	912.52	31.82	913.06	0.00	0.00	0.00
4,300.00	15.50	0.90	4,180.45	939.25	32.24	939.78	0.00	0.00	0.00

Database:	Southern Region	Local Co-ordinate Reference:	Well 20-24
Company:	Great Western	TVD Reference:	WELL @ 4888.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4888.00usft (Cade 22)
Site:	H-Y	North Reference:	Grid
Well:	20-24	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)
4,318.21	15.50	0.90	4,198.00	944.11	32.32	944.65	0.00	0.00	0.00
Sussex									
4,400.00	15.50	0.90	4,276.81	965.97	32.67	966.51	0.00	0.00	0.00
4,500.00	15.50	0.90	4,373.17	992.70	33.09	993.23	0.00	0.00	0.00
4,600.00	15.50	0.90	4,469.53	1,019.42	33.51	1,019.96	0.00	0.00	0.00
4,700.00	15.50	0.90	4,565.90	1,046.15	33.93	1,046.69	0.00	0.00	0.00
4,722.94	15.50	0.90	4,588.00	1,052.28	34.02	1,052.82	0.00	0.00	0.00
Shannon									
4,800.00	15.50	0.90	4,662.26	1,072.87	34.35	1,073.41	0.00	0.00	0.00
4,900.00	15.50	0.90	4,758.62	1,099.60	34.77	1,100.14	0.00	0.00	0.00
5,000.00	15.50	0.90	4,854.98	1,126.32	35.19	1,126.87	0.00	0.00	0.00
5,100.00	15.50	0.90	4,951.34	1,153.05	35.61	1,153.59	0.00	0.00	0.00
5,200.00	15.50	0.90	5,047.71	1,179.77	36.03	1,180.32	0.00	0.00	0.00
5,300.00	15.50	0.90	5,144.07	1,206.50	36.45	1,207.05	0.00	0.00	0.00
5,400.00	15.50	0.90	5,240.43	1,233.22	36.87	1,233.77	0.00	0.00	0.00
5,500.00	15.50	0.90	5,336.79	1,259.95	37.29	1,260.50	0.00	0.00	0.00
5,508.57	15.50	0.90	5,345.05	1,262.24	37.33	1,262.79	0.00	0.00	0.00
Begin 1.50°/100' Drop									
5,600.00	14.13	0.90	5,433.44	1,285.62	37.70	1,286.17	1.50	-1.50	0.00
5,700.00	12.63	0.90	5,530.72	1,308.76	38.06	1,309.31	1.50	-1.50	0.00
5,800.00	11.13	0.90	5,628.57	1,329.34	38.39	1,329.89	1.50	-1.50	0.00
5,900.00	9.63	0.90	5,726.93	1,347.36	38.67	1,347.91	1.50	-1.50	0.00
6,000.00	8.13	0.90	5,825.73	1,362.79	38.91	1,363.35	1.50	-1.50	0.00
6,100.00	6.63	0.90	5,924.90	1,375.64	39.11	1,376.20	1.50	-1.50	0.00
6,200.00	5.13	0.90	6,024.37	1,385.88	39.28	1,386.44	1.50	-1.50	0.00
6,300.00	3.63	0.90	6,124.08	1,393.52	39.40	1,394.08	1.50	-1.50	0.00
6,400.00	2.13	0.90	6,223.95	1,398.55	39.48	1,399.11	1.50	-1.50	0.00
6,500.00	0.63	0.90	6,323.92	1,400.96	39.51	1,401.52	1.50	-1.50	0.00
6,542.09	0.00	0.00	6,366.00	1,401.19	39.52	1,401.75	1.50	-1.50	0.00
Begin Vertical Hold									
6,600.00	0.00	0.00	6,423.91	1,401.19	39.52	1,401.75	0.00	0.00	0.00
6,700.00	0.00	0.00	6,523.91	1,401.19	39.52	1,401.75	0.00	0.00	0.00
6,800.00	0.00	0.00	6,623.91	1,401.19	39.52	1,401.75	0.00	0.00	0.00
6,900.00	0.00	0.00	6,723.91	1,401.19	39.52	1,401.75	0.00	0.00	0.00
7,000.00	0.00	0.00	6,823.91	1,401.19	39.52	1,401.75	0.00	0.00	0.00
7,100.00	0.00	0.00	6,923.91	1,401.19	39.52	1,401.75	0.00	0.00	0.00
7,117.09	0.00	0.00	6,941.00	1,401.19	39.52	1,401.75	0.00	0.00	0.00
Niobrara									
7,200.00	0.00	0.00	7,023.91	1,401.19	39.52	1,401.75	0.00	0.00	0.00
7,231.09	0.00	0.00	7,055.00	1,401.19	39.52	1,401.75	0.00	0.00	0.00
Nio A									
7,297.09	0.00	0.00	7,121.00	1,401.19	39.52	1,401.75	0.00	0.00	0.00
Nio B									
7,300.00	0.00	0.00	7,123.91	1,401.19	39.52	1,401.75	0.00	0.00	0.00
7,384.09	0.00	0.00	7,208.00	1,401.19	39.52	1,401.75	0.00	0.00	0.00
Nio C									
7,400.00	0.00	0.00	7,223.91	1,401.19	39.52	1,401.75	0.00	0.00	0.00
7,424.09	0.00	0.00	7,248.00	1,401.19	39.52	1,401.75	0.00	0.00	0.00
Nio D									
7,431.09	0.00	0.00	7,255.00	1,401.19	39.52	1,401.75	0.00	0.00	0.00
Fort Hayes									
7,451.09	0.00	0.00	7,275.00	1,401.19	39.52	1,401.75	0.00	0.00	0.00
Codell									

Database:	Southern Region	Local Co-ordinate Reference:	Well 20-24
Company:	Great Western	TVD Reference:	WELL @ 4888.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4888.00usft (Cade 22)
Site:	H-Y	North Reference:	Grid
Well:	20-24	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)
7,500.00	0.00	0.00	7,323.91	1,401.19	39.52	1,401.75	0.00	0.00	0.00
7,600.00	0.00	0.00	7,423.91	1,401.19	39.52	1,401.75	0.00	0.00	0.00
7,611.09	0.00	0.00	7,435.00	1,401.19	39.52	1,401.75	0.00	0.00	0.00
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									
PBHL v1 - H-Y 20-24	0.00	0.01	7,435.00	1,401.19	39.52	1,413,475.45	3,161,544.15	40° 28' 0.9837 N	104° 55' 9.816 W
- plan hits target center									
- Circle (radius 200.00)									

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
853.77	850.00	8-5/8"	8-5/8	12-1/4	

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
3,581.41	3,488.00	Parkman		0.00		
4,318.21	4,198.00	Sussex		0.00		
4,722.94	4,588.00	Shannon		0.00		
7,117.09	6,941.00	Niobrara		0.00		
7,231.09	7,055.00	Nio A		0.00		
7,297.09	7,121.00	Nio B		0.00		
7,384.09	7,208.00	Nio C		0.00		
7,424.09	7,248.00	Nio D		0.00		
7,431.09	7,255.00	Fort Hayes		0.00		
7,451.09	7,275.00	Codell		0.00		

Plan Annotations				
Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
200.00	200.00	0.00	0.00	KOP, 2.00°/100' Build
600.00	598.70	27.46	4.84	Hold 8.00° Inc, 10.00° Azm
1,000.00	994.81	82.28	14.51	Begin 2.00°/100' Build & Turn
1,385.27	1,371.76	160.28	19.98	Hold 15.50° Inc, 0.90° Azm
5,508.57	5,345.05	1,262.24	37.33	Begin 1.50°/100' Drop
6,542.09	6,366.00	1,401.19	39.52	Begin Vertical Hold
7,611.09	7,435.00	1,401.19	39.52	PBHL