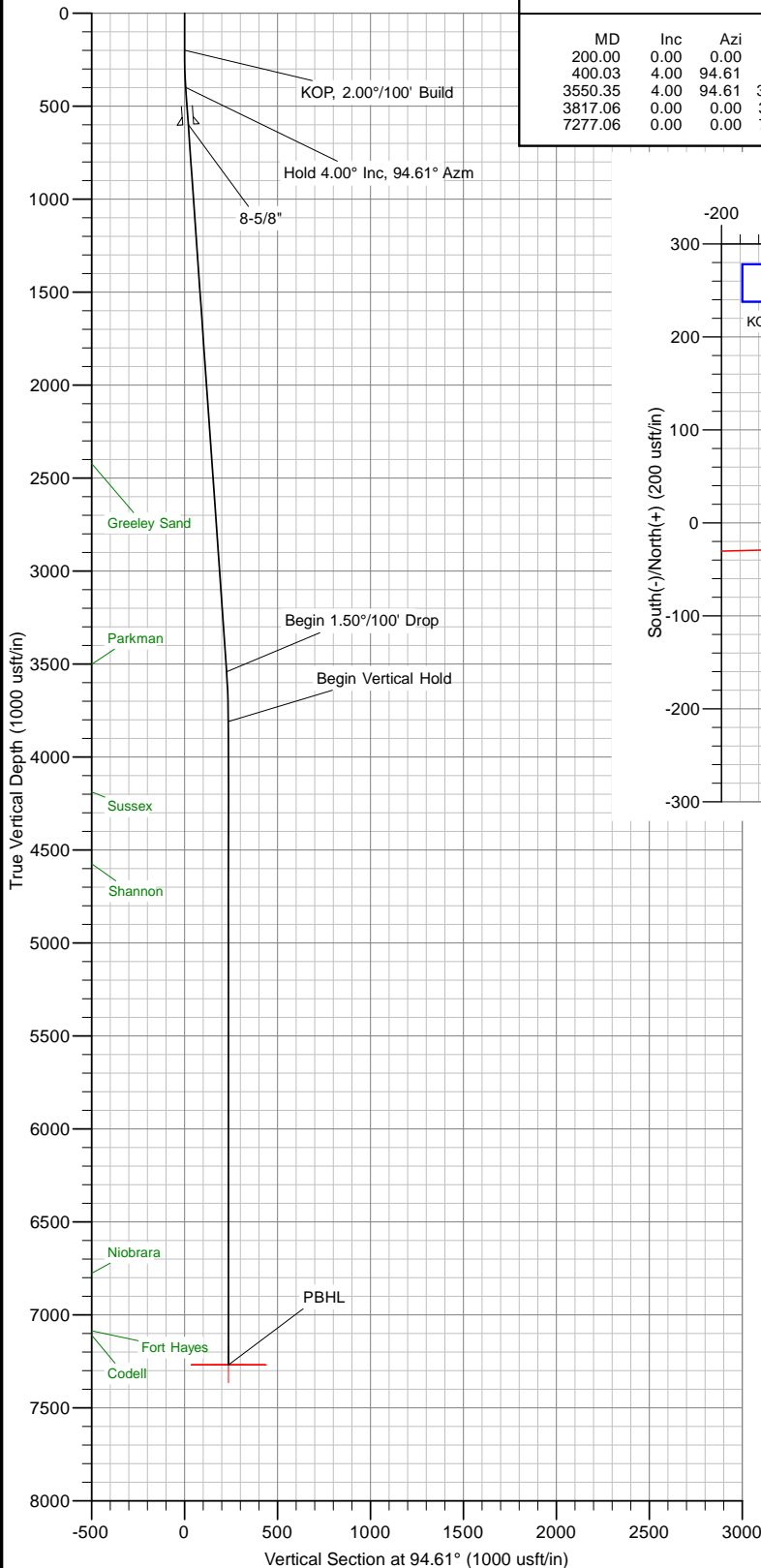




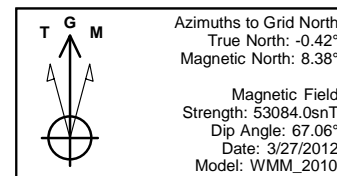
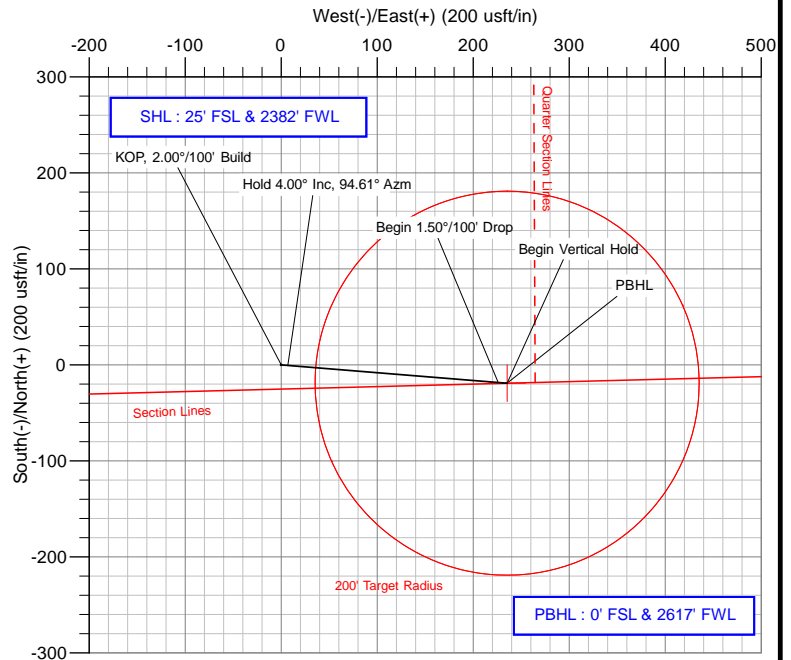
Company: Great Western
Site: HCW FD
Well: 24-36D
Project: Weld County, Colorado (NAD 83)
Rig Name: Cade 22



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	
400.03	4.00	94.61	399.87	-0.56	6.96	6.98	6.98	Hold 4.00° Inc, 94.61° Azm	
3550.35	4.00	94.61	3542.51	-18.24	226.03	226.77	226.77	Begin 1.50°/100' Drop	
3817.06	0.00	0.00	3809.00	-18.99	235.31	236.07	236.07	Begin Vertical Hold	
7277.06	0.00	0.00	7269.00	-18.99	235.31	236.07	236.07	PBHL	



US State Plane 1983
Colorado Northern Zone

Created By: Allen Slack
Date: 13:11, March 28 2012
Plan: Design #1

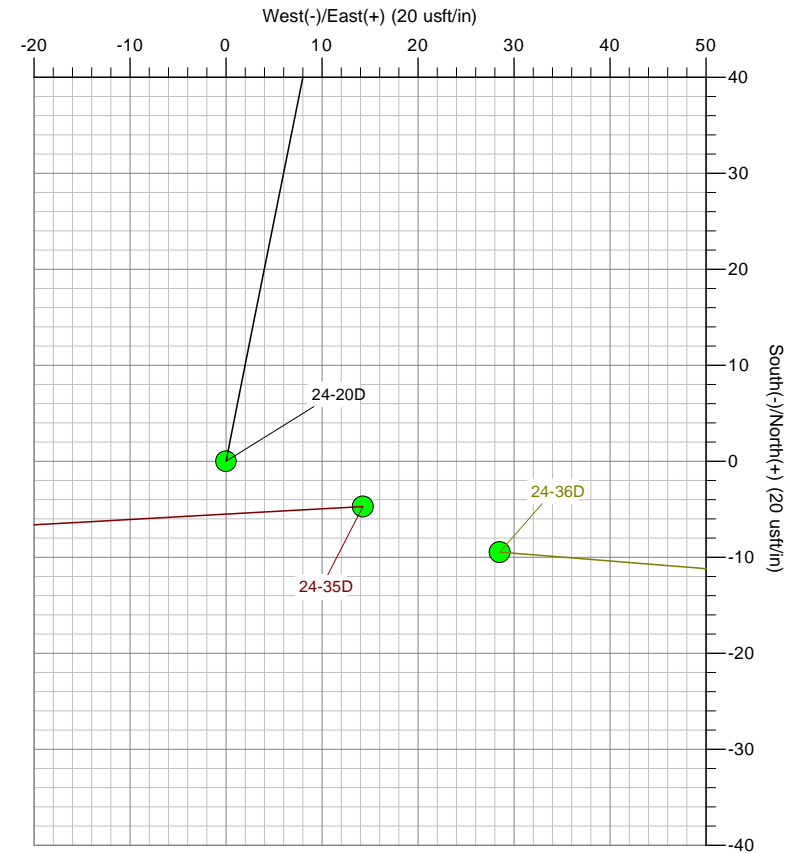
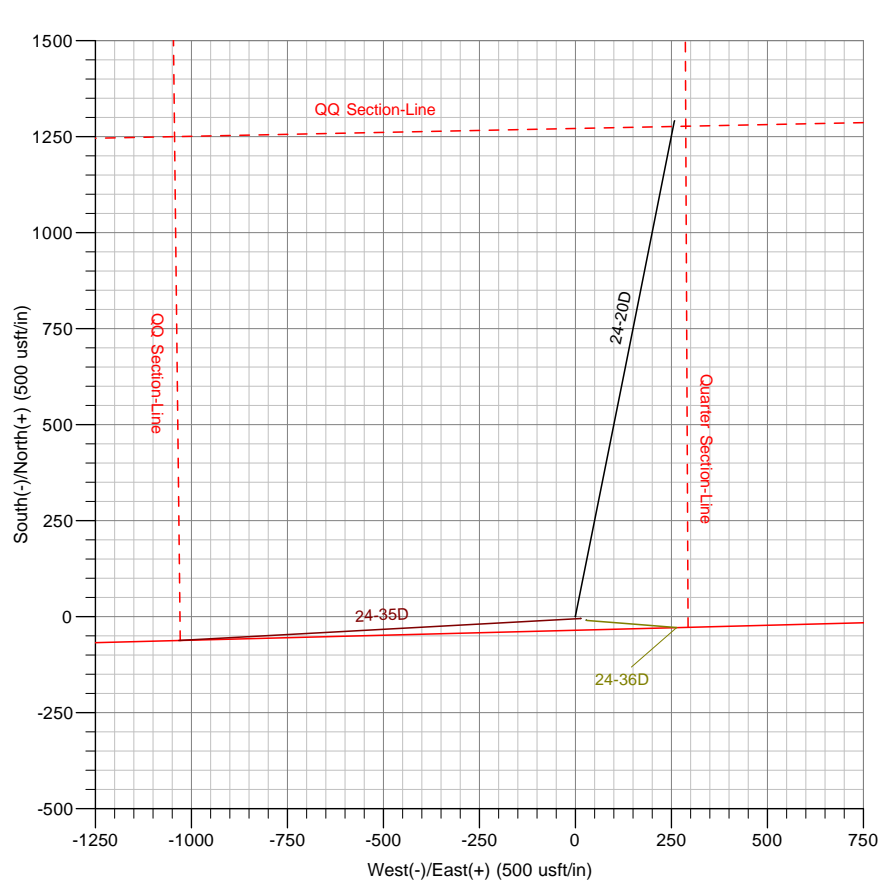
The customer should only rely on this document after independently verifying all paths, targets, coordinates, lease and hard lines represented. Any decisions made or wells drilled utilizing this or any other information supplied by MS Energy are at the sole risk and responsibility of the customer. MS Energy is not responsible for the accuracy of this schematic or the information contained herein.



Company: Great Western
Site: HCW FD
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



The customer should only rely on this document after independently verifying all paths, targets, coordinates, lease and hard lines represented.
Any decisions made or wells drilled utilizing this or any other information supplied by MS Energy are at the sole risk and responsibility of the customer.
MS Energy is not responsible for the accuracy of this schematic or the information contained herein.



Great Western

Weld County, Colorado (NAD 83)

HCW FD

24-36D

Wellbore #1

Plan: Design #1

Standard Planning Report

28 March, 2012

Database:	Southern Region	Local Co-ordinate Reference:	Well 24-36D
Company:	Great Western	TVD Reference:	WELL @ 4760.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4760.00usft (Cade 22)
Site:	HCW FD	North Reference:	Grid
Well:	24-36D	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	24-36D			
Well Position	+N/-S	1,413,047.26 usft	Northing:	1,413,047.26 usft
	+E/-W	3,182,845.35 usft	Easting:	3,182,845.35 usft
Position Uncertainty		0.00 usft	Wellhead Elevation:	
			Latitude:	40° 27' 55.2834 N
			Longitude:	104° 50' 34.255 W
			Ground Level:	4,744.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM_2010	3/27/2012	8.80	67.06	53,084

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	94.61

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	
400.03	4.00	94.61	399.87	-0.56	6.96	2.00	2.00	0.00	94.61	
3,550.35	4.00	94.61	3,542.51	-18.24	226.03	0.00	0.00	0.00	0.00	
3,817.06	0.00	0.00	3,809.00	-18.99	235.31	1.50	-1.50	0.00	180.00	
7,277.06	0.00	0.00	7,269.00	-18.99	235.31	0.00	0.00	0.00	0.00	PBHL v1 - HCW FD

Database:	Southern Region	Local Co-ordinate Reference:	Well 24-36D
Company:	Great Western	TVD Reference:	WELL @ 4760.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4760.00usft (Cade 22)
Site:	HCW FD	North Reference:	Grid
Well:	24-36D	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	94.61	299.98	-0.14	1.74	1.75	2.00	2.00	0.00
400.00	4.00	94.61	399.84	-0.56	6.96	6.98	2.00	2.00	0.00
400.03	4.00	94.61	399.87	-0.56	6.96	6.98	2.00	2.00	0.00
Hold 4.00° Inc, 94.61° Azm									
500.00	4.00	94.61	499.59	-1.12	13.91	13.96	0.00	0.00	0.00
600.00	4.00	94.61	599.35	-1.68	20.86	20.93	0.00	0.00	0.00
600.65	4.00	94.61	600.00	-1.69	20.91	20.98	0.00	0.00	0.00
8-5/8"									
700.00	4.00	94.61	699.11	-2.25	27.82	27.91	0.00	0.00	0.00
800.00	4.00	94.61	798.86	-2.81	34.77	34.88	0.00	0.00	0.00
900.00	4.00	94.61	898.62	-3.37	41.73	41.86	0.00	0.00	0.00
1,000.00	4.00	94.61	998.38	-3.93	48.68	48.84	0.00	0.00	0.00
1,100.00	4.00	94.61	1,098.13	-4.49	55.63	55.81	0.00	0.00	0.00
1,200.00	4.00	94.61	1,197.89	-5.05	62.59	62.79	0.00	0.00	0.00
1,300.00	4.00	94.61	1,297.64	-5.61	69.54	69.77	0.00	0.00	0.00
1,400.00	4.00	94.61	1,397.40	-6.17	76.50	76.74	0.00	0.00	0.00
1,500.00	4.00	94.61	1,497.16	-6.74	83.45	83.72	0.00	0.00	0.00
1,600.00	4.00	94.61	1,596.91	-7.30	90.40	90.70	0.00	0.00	0.00
1,700.00	4.00	94.61	1,696.67	-7.86	97.36	97.67	0.00	0.00	0.00
1,800.00	4.00	94.61	1,796.43	-8.42	104.31	104.65	0.00	0.00	0.00
1,900.00	4.00	94.61	1,896.18	-8.98	111.27	111.63	0.00	0.00	0.00
2,000.00	4.00	94.61	1,995.94	-9.54	118.22	118.60	0.00	0.00	0.00
2,100.00	4.00	94.61	2,095.70	-10.10	125.17	125.58	0.00	0.00	0.00
2,200.00	4.00	94.61	2,195.45	-10.66	132.13	132.56	0.00	0.00	0.00
2,300.00	4.00	94.61	2,295.21	-11.22	139.08	139.53	0.00	0.00	0.00
2,400.00	4.00	94.61	2,394.96	-11.79	146.04	146.51	0.00	0.00	0.00
2,427.10	4.00	94.61	2,422.00	-11.94	147.92	148.40	0.00	0.00	0.00
Greeley Sand									
2,500.00	4.00	94.61	2,494.72	-12.35	152.99	153.49	0.00	0.00	0.00
2,600.00	4.00	94.61	2,594.48	-12.91	159.94	160.46	0.00	0.00	0.00
2,700.00	4.00	94.61	2,694.23	-13.47	166.90	167.44	0.00	0.00	0.00
2,800.00	4.00	94.61	2,793.99	-14.03	173.85	174.42	0.00	0.00	0.00
2,900.00	4.00	94.61	2,893.75	-14.59	180.81	181.39	0.00	0.00	0.00
3,000.00	4.00	94.61	2,993.50	-15.15	187.76	188.37	0.00	0.00	0.00
3,100.00	4.00	94.61	3,093.26	-15.71	194.71	195.35	0.00	0.00	0.00
3,200.00	4.00	94.61	3,193.02	-16.28	201.67	202.32	0.00	0.00	0.00
3,300.00	4.00	94.61	3,292.77	-16.84	208.62	209.30	0.00	0.00	0.00
3,400.00	4.00	94.61	3,392.53	-17.40	215.58	216.28	0.00	0.00	0.00
3,500.00	4.00	94.61	3,492.28	-17.96	222.53	223.25	0.00	0.00	0.00
3,509.74	4.00	94.61	3,502.00	-18.01	223.21	223.93	0.00	0.00	0.00
Parkman									
3,550.35	4.00	94.61	3,542.51	-18.24	226.03	226.77	0.00	0.00	0.00
Begin 1.50°/100' Drop									
3,600.00	3.26	94.61	3,592.06	-18.50	229.16	229.91	1.50	-1.50	0.00
3,700.00	1.76	94.61	3,691.96	-18.85	233.52	234.28	1.50	-1.50	0.00
3,800.00	0.26	94.61	3,791.94	-18.99	235.27	236.04	1.50	-1.50	0.00
3,817.06	0.00	0.00	3,809.00	-18.99	235.31	236.07	1.50	-1.50	0.00
Begin Vertical Hold									
3,900.00	0.00	0.00	3,891.94	-18.99	235.31	236.07	0.00	0.00	0.00

Database:	Southern Region	Local Co-ordinate Reference:	Well 24-36D
Company:	Great Western	TVD Reference:	WELL @ 4760.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4760.00usft (Cade 22)
Site:	HCW FD	North Reference:	Grid
Well:	24-36D	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)
4,000.00	0.00	0.00	3,991.94	-18.99	235.31	236.07	0.00	0.00	0.00
4,100.00	0.00	0.00	4,091.94	-18.99	235.31	236.07	0.00	0.00	0.00
4,196.06	0.00	0.00	4,188.00	-18.99	235.31	236.07	0.00	0.00	0.00
Sussex									
4,200.00	0.00	0.00	4,191.94	-18.99	235.31	236.07	0.00	0.00	0.00
4,300.00	0.00	0.00	4,291.94	-18.99	235.31	236.07	0.00	0.00	0.00
4,400.00	0.00	0.00	4,391.94	-18.99	235.31	236.07	0.00	0.00	0.00
4,500.00	0.00	0.00	4,491.94	-18.99	235.31	236.07	0.00	0.00	0.00
4,582.06	0.00	0.00	4,574.00	-18.99	235.31	236.07	0.00	0.00	0.00
Shannon									
4,600.00	0.00	0.00	4,591.94	-18.99	235.31	236.07	0.00	0.00	0.00
4,700.00	0.00	0.00	4,691.94	-18.99	235.31	236.07	0.00	0.00	0.00
4,800.00	0.00	0.00	4,791.94	-18.99	235.31	236.07	0.00	0.00	0.00
4,900.00	0.00	0.00	4,891.94	-18.99	235.31	236.07	0.00	0.00	0.00
5,000.00	0.00	0.00	4,991.94	-18.99	235.31	236.07	0.00	0.00	0.00
5,100.00	0.00	0.00	5,091.94	-18.99	235.31	236.07	0.00	0.00	0.00
5,200.00	0.00	0.00	5,191.94	-18.99	235.31	236.07	0.00	0.00	0.00
5,300.00	0.00	0.00	5,291.94	-18.99	235.31	236.07	0.00	0.00	0.00
5,400.00	0.00	0.00	5,391.94	-18.99	235.31	236.07	0.00	0.00	0.00
5,500.00	0.00	0.00	5,491.94	-18.99	235.31	236.07	0.00	0.00	0.00
5,600.00	0.00	0.00	5,591.94	-18.99	235.31	236.07	0.00	0.00	0.00
5,700.00	0.00	0.00	5,691.94	-18.99	235.31	236.07	0.00	0.00	0.00
5,800.00	0.00	0.00	5,791.94	-18.99	235.31	236.07	0.00	0.00	0.00
5,900.00	0.00	0.00	5,891.94	-18.99	235.31	236.07	0.00	0.00	0.00
6,000.00	0.00	0.00	5,991.94	-18.99	235.31	236.07	0.00	0.00	0.00
6,100.00	0.00	0.00	6,091.94	-18.99	235.31	236.07	0.00	0.00	0.00
6,200.00	0.00	0.00	6,191.94	-18.99	235.31	236.07	0.00	0.00	0.00
6,300.00	0.00	0.00	6,291.94	-18.99	235.31	236.07	0.00	0.00	0.00
6,400.00	0.00	0.00	6,391.94	-18.99	235.31	236.07	0.00	0.00	0.00
6,500.00	0.00	0.00	6,491.94	-18.99	235.31	236.07	0.00	0.00	0.00
6,600.00	0.00	0.00	6,591.94	-18.99	235.31	236.07	0.00	0.00	0.00
6,700.00	0.00	0.00	6,691.94	-18.99	235.31	236.07	0.00	0.00	0.00
6,785.06	0.00	0.00	6,777.00	-18.99	235.31	236.07	0.00	0.00	0.00
Niobrara									
6,800.00	0.00	0.00	6,791.94	-18.99	235.31	236.07	0.00	0.00	0.00
6,900.00	0.00	0.00	6,891.94	-18.99	235.31	236.07	0.00	0.00	0.00
7,000.00	0.00	0.00	6,991.94	-18.99	235.31	236.07	0.00	0.00	0.00
7,094.06	0.00	0.00	7,086.00	-18.99	235.31	236.07	0.00	0.00	0.00
Fort Hayes									
7,100.00	0.00	0.00	7,091.94	-18.99	235.31	236.07	0.00	0.00	0.00
7,117.06	0.00	0.00	7,109.00	-18.99	235.31	236.07	0.00	0.00	0.00
Codell									
7,200.00	0.00	0.00	7,191.94	-18.99	235.31	236.07	0.00	0.00	0.00
7,277.06	0.00	0.00	7,269.00	-18.99	235.31	236.07	0.00	0.00	0.00
PBHL									

Database:	Southern Region	Local Co-ordinate Reference:	Well 24-36D
Company:	Great Western	TVD Reference:	WELL @ 4760.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4760.00usft (Cade 22)
Site:	HCW FD	North Reference:	Grid
Well:	24-36D	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Design Targets

Target Name

- hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PBHL v1 - HCW FD 2 - plan hits target center - Circle (radius 200.00)	0.00	0.00	7,269.00	-18.99	235.31	1,413,028.27	3,183,080.66	40° 27' 55.0785 N	104° 50' 31.212 W

Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
600.65	600.00	8-5/8"	8-5/8	12-1/4

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,427.10	2,422.00	Greeley Sand		0.00	
3,509.74	3,502.00	Parkman		0.00	
4,196.06	4,188.00	Sussex		0.00	
4,582.06	4,574.00	Shannon		0.00	
6,785.06	6,777.00	Niobrara		0.00	
7,094.06	7,086.00	Fort Hayes		0.00	
7,117.06	7,109.00	Codell		0.00	

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
200.00	200.00	0.00	0.00	KOP, 2.00°/100' Build
400.03	399.87	-0.56	6.96	Hold 4.00° Inc, 94.61° Azm
3,550.35	3,542.51	-18.24	226.03	Begin 1.50°/100' Drop
3,817.06	3,809.00	-18.99	235.31	Begin Vertical Hold
7,277.06	7,269.00	-18.99	235.31	PBHL