



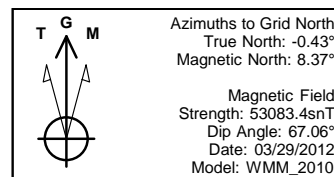
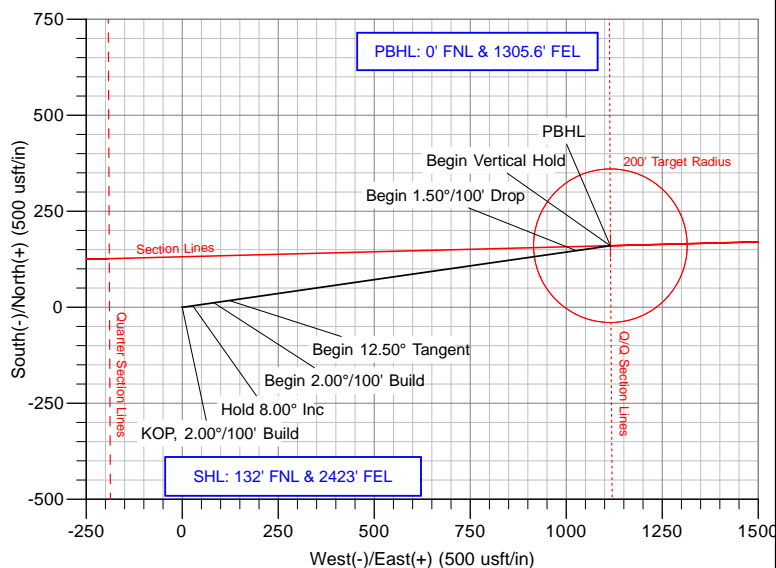
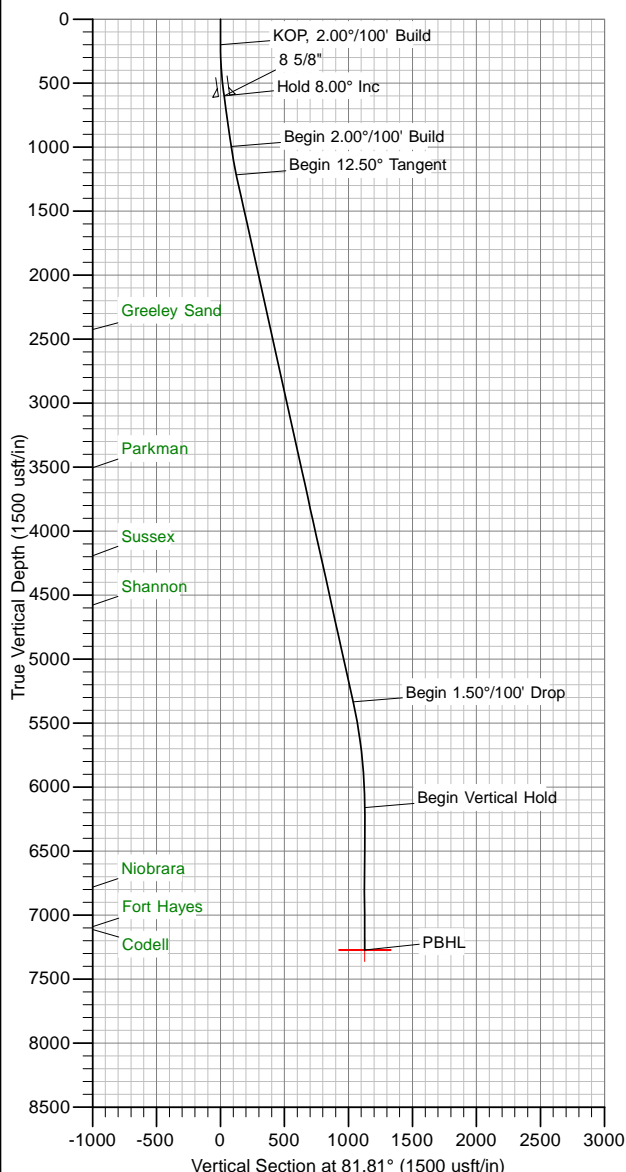
Company: Great Western  
Site: Dettler FD  
Well: #24-37D  
Project: Weld County, Colorado (NAD 83)  
Rig Name: Cade 22



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	VSec	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	81.81	598.70	3.97	27.60	27.88	27.88	Hold 8.00° Inc
1000.00	8.00	81.81	994.81	11.90	82.70	83.55	83.55	Begin 2.00°/100' Build
1224.86	12.50	81.81	1216.02	17.59	122.29	123.55	123.55	Begin 12.50° Tangent
5442.21	12.50	81.81	5333.45	147.56	1025.58	1036.14	1036.14	Begin 1.50°/100' Drop
6275.35	0.00	0.00	6160.00	160.45	1115.16	1126.64	1126.64	Begin Vertical Hold
7387.35	0.00	0.00	7272.00	160.45	1115.16	1126.64	1126.64	PBHL



US State Plane 1983  
Colorado Northern Zone

Created By: Allen Slack  
Date: 14:43, March 30 2012  
Plan: Design #1

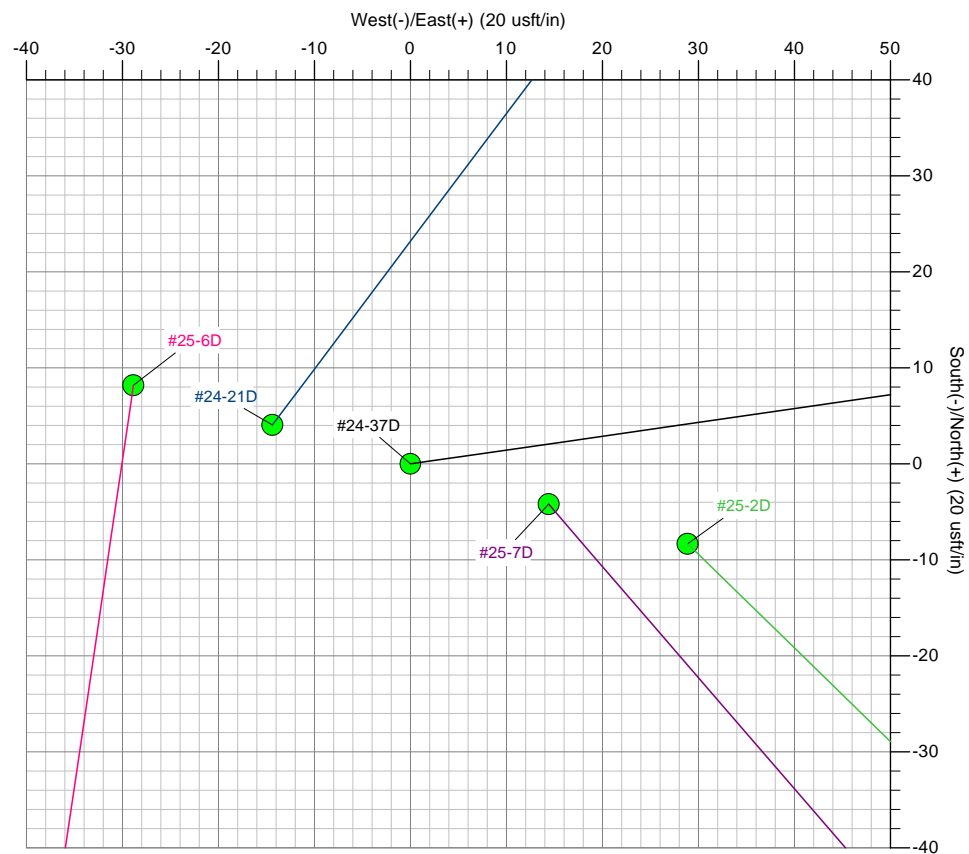
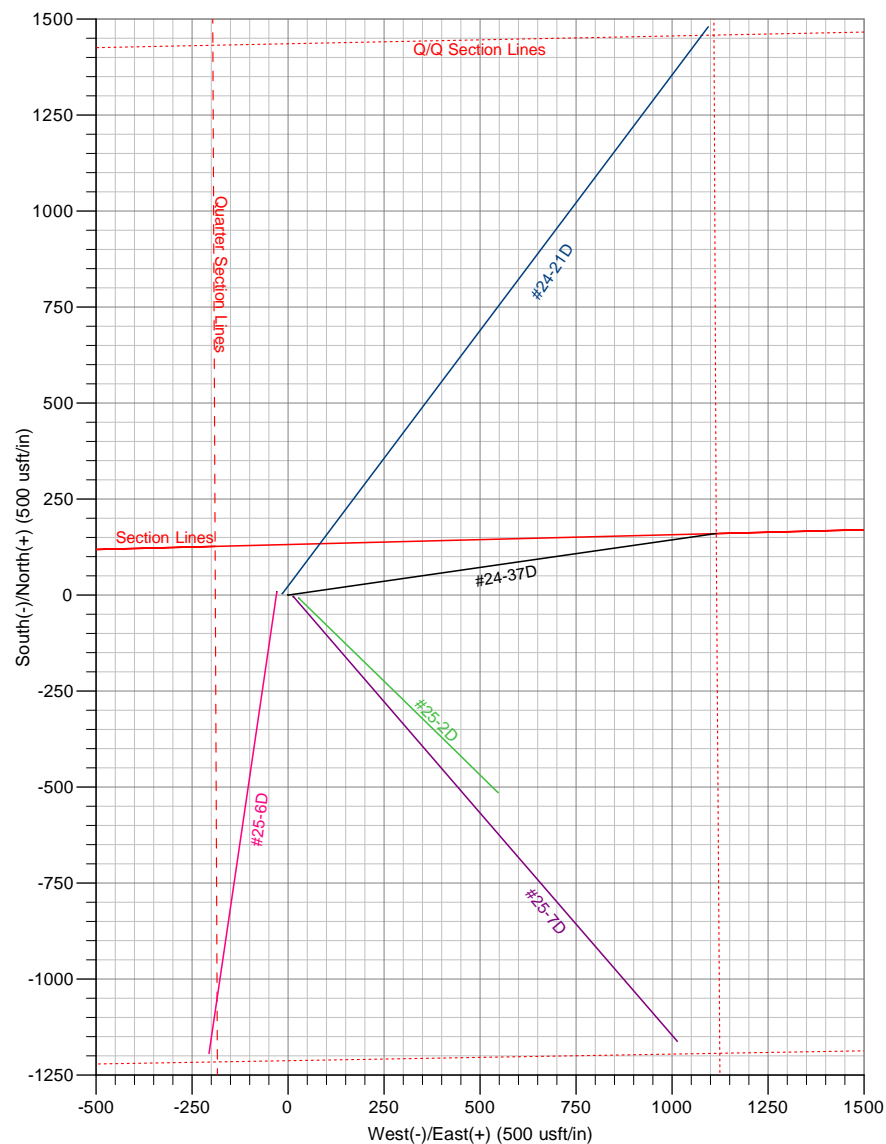
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Company: Great Western  
Site: Detterer FD  
Well: #24-37D  
Project: Weld County, Colorado (NAD 83)  
Rig Name: Cade 22



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)**

**Detterer FD**

**#24-37D**

**Wellbore #1**

**Plan: Design #1**

## **Standard Planning Report**

**30 March, 2012**

<b>Database:</b>	Southern Region	<b>Local Co-ordinate Reference:</b>	Well #24-37D
<b>Company:</b>	Great Western	<b>TVD Reference:</b>	WELL @ 4760.00usft (Cade 22)
<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>MD Reference:</b>	WELL @ 4760.00usft (Cade 22)
<b>Site:</b>	Detterer FD	<b>North Reference:</b>	Grid
<b>Well:</b>	#24-37D	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Design #1		

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

<b>Well</b>	#24-37D			
<b>Well Position</b>	<b>+N/-S</b>	1,412,902.36 usft	<b>Northing:</b>	1,412,902.36 usft
	<b>+E/-W</b>	3,183,299.63 usft	<b>Easting:</b>	3,183,299.63 usft
<b>Position Uncertainty</b>		0.00 usft	<b>Wellhead Elevation:</b>	
			<b>Latitude:</b>	40° 27' 53.8183 N
			<b>Longitude:</b>	104° 50' 28.391 W
			<b>Ground Level:</b>	4,744.00 usft

<b>Wellbore</b>	Wellbore #1				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	WMM_2010	03/29/2012	8.80	67.06	53,083

<b>Design</b>	Design #1			
<b>Audit Notes:</b>				
<b>Version:</b>	<b>Phase:</b>	PROTOTYPE	<b>Tie On Depth:</b>	0.00
<b>Vertical Section:</b>	<b>Depth From (TVD) (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Direction (°)</b>
	0.00	0.00	0.00	81.81

<b>Plan Sections</b>										
<b>Measured Depth (usft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (usft)</b>	<b>+N/-S (usft)</b>	<b>+E/-W (usft)</b>	<b>Dogleg Rate (°/100usft)</b>	<b>Build Rate (°/100usft)</b>	<b>Turn Rate (°/100usft)</b>	<b>TFO (°)</b>	<b>Target</b>
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	81.81	598.70	3.97	27.60	2.00	2.00	0.00	81.81	
1,000.00	8.00	81.81	994.81	11.90	82.70	0.00	0.00	0.00	0.00	
1,224.86	12.50	81.81	1,216.02	17.59	122.29	2.00	2.00	0.00	0.00	
5,442.21	12.50	81.81	5,333.45	147.56	1,025.58	0.00	0.00	0.00	0.00	
6,275.35	0.00	0.00	6,160.00	160.45	1,115.16	1.50	-1.50	0.00	180.00	
7,387.35	0.00	0.00	7,272.00	160.45	1,115.16	0.00	0.00	0.00	0.00	0.00 PBHL - Detterer FD

<b>Database:</b>	Southern Region	<b>Local Co-ordinate Reference:</b>	Well #24-37D
<b>Company:</b>	Great Western	<b>TVD Reference:</b>	WELL @ 4760.00usft (Cade 22)
<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>MD Reference:</b>	WELL @ 4760.00usft (Cade 22)
<b>Site:</b>	Detterer FD	<b>North Reference:</b>	Grid
<b>Well:</b>	#24-37D	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	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
<b>KOP, 2.00°/100' Build</b>									
300.00	2.00	81.81	299.98	0.25	1.73	1.75	2.00	2.00	0.00
400.00	4.00	81.81	399.84	0.99	6.91	6.98	2.00	2.00	0.00
500.00	6.00	81.81	499.45	2.23	15.53	15.69	2.00	2.00	0.00
600.00	8.00	81.81	598.70	3.97	27.60	27.88	2.00	2.00	0.00
<b>Hold 8.00° Inc</b>									
601.31	8.00	81.81	600.00	4.00	27.78	28.06	0.00	0.00	0.00
<b>8 5/8"</b>									
700.00	8.00	81.81	697.73	5.95	41.37	41.80	0.00	0.00	0.00
800.00	8.00	81.81	796.76	7.93	55.15	55.71	0.00	0.00	0.00
900.00	8.00	81.81	895.78	9.92	68.92	69.63	0.00	0.00	0.00
1,000.00	8.00	81.81	994.81	11.90	82.70	83.55	0.00	0.00	0.00
<b>Begin 2.00°/100' Build</b>									
1,100.00	10.00	81.81	1,093.57	14.13	98.18	99.19	2.00	2.00	0.00
1,200.00	12.00	81.81	1,191.73	16.84	117.07	118.27	2.00	2.00	0.00
1,224.86	12.50	81.81	1,216.02	17.59	122.29	123.55	2.00	2.00	0.00
<b>Begin 12.50° Tangent</b>									
1,300.00	12.50	81.81	1,289.38	19.91	138.38	139.81	0.00	0.00	0.00
1,400.00	12.50	81.81	1,387.01	22.99	159.80	161.44	0.00	0.00	0.00
1,500.00	12.50	81.81	1,484.65	26.07	181.22	183.08	0.00	0.00	0.00
1,600.00	12.50	81.81	1,582.28	29.15	202.64	204.72	0.00	0.00	0.00
1,700.00	12.50	81.81	1,679.91	32.24	224.05	226.36	0.00	0.00	0.00
1,800.00	12.50	81.81	1,777.54	35.32	245.47	248.00	0.00	0.00	0.00
1,900.00	12.50	81.81	1,875.17	38.40	266.89	269.64	0.00	0.00	0.00
2,000.00	12.50	81.81	1,972.80	41.48	288.31	291.28	0.00	0.00	0.00
2,100.00	12.50	81.81	2,070.43	44.56	309.73	312.92	0.00	0.00	0.00
2,200.00	12.50	81.81	2,168.06	47.64	331.15	334.56	0.00	0.00	0.00
2,300.00	12.50	81.81	2,265.69	50.73	352.57	356.20	0.00	0.00	0.00
2,400.00	12.50	81.81	2,363.32	53.81	373.98	377.84	0.00	0.00	0.00
2,463.18	12.50	81.81	2,425.00	55.75	387.52	391.51	0.00	0.00	0.00
<b>Greeley Sand</b>									
2,500.00	12.50	81.81	2,460.95	56.89	395.40	399.47	0.00	0.00	0.00
2,600.00	12.50	81.81	2,558.58	59.97	416.82	421.11	0.00	0.00	0.00
2,700.00	12.50	81.81	2,656.21	63.05	438.24	442.75	0.00	0.00	0.00
2,800.00	12.50	81.81	2,753.84	66.13	459.66	464.39	0.00	0.00	0.00
2,900.00	12.50	81.81	2,851.48	69.22	481.08	486.03	0.00	0.00	0.00
3,000.00	12.50	81.81	2,949.11	72.30	502.50	507.67	0.00	0.00	0.00
3,100.00	12.50	81.81	3,046.74	75.38	523.91	529.31	0.00	0.00	0.00
3,200.00	12.50	81.81	3,144.37	78.46	545.33	550.95	0.00	0.00	0.00
3,300.00	12.50	81.81	3,242.00	81.54	566.75	572.59	0.00	0.00	0.00
3,400.00	12.50	81.81	3,339.63	84.62	588.17	594.23	0.00	0.00	0.00
3,500.00	12.50	81.81	3,437.26	87.71	609.59	615.87	0.00	0.00	0.00
3,569.38	12.50	81.81	3,505.00	89.84	624.45	630.88	0.00	0.00	0.00
<b>Parkman</b>									
3,600.00	12.50	81.81	3,534.89	90.79	631.01	637.50	0.00	0.00	0.00
3,700.00	12.50	81.81	3,632.52	93.87	652.42	659.14	0.00	0.00	0.00
3,800.00	12.50	81.81	3,730.15	96.95	673.84	680.78	0.00	0.00	0.00
3,900.00	12.50	81.81	3,827.78	100.03	695.26	702.42	0.00	0.00	0.00
4,000.00	12.50	81.81	3,925.41	103.11	716.68	724.06	0.00	0.00	0.00
4,100.00	12.50	81.81	4,023.04	106.20	738.10	745.70	0.00	0.00	0.00

<b>Database:</b>	Southern Region	<b>Local Co-ordinate Reference:</b>	Well #24-37D
<b>Company:</b>	Great Western	<b>TVD Reference:</b>	WELL @ 4760.00usft (Cade 22)
<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>MD Reference:</b>	WELL @ 4760.00usft (Cade 22)
<b>Site:</b>	Detterer FD	<b>North Reference:</b>	Grid
<b>Well:</b>	#24-37D	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	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)
4,200.00	12.50	81.81	4,120.67	109.28	759.52	767.34	0.00	0.00	0.00
4,272.03	12.50	81.81	4,191.00	111.50	774.95	782.93	0.00	0.00	0.00
<b>Sussex</b>									
4,300.00	12.50	81.81	4,218.30	112.36	780.94	788.98	0.00	0.00	0.00
4,400.00	12.50	81.81	4,315.94	115.44	802.35	810.62	0.00	0.00	0.00
4,500.00	12.50	81.81	4,413.57	118.52	823.77	832.26	0.00	0.00	0.00
4,600.00	12.50	81.81	4,511.20	121.60	845.19	853.89	0.00	0.00	0.00
4,667.40	12.50	81.81	4,577.00	123.68	859.63	868.48	0.00	0.00	0.00
<b>Shannon</b>									
4,700.00	12.50	81.81	4,608.83	124.69	866.61	875.53	0.00	0.00	0.00
4,800.00	12.50	81.81	4,706.46	127.77	888.03	897.17	0.00	0.00	0.00
4,900.00	12.50	81.81	4,804.09	130.85	909.45	918.81	0.00	0.00	0.00
5,000.00	12.50	81.81	4,901.72	133.93	930.87	940.45	0.00	0.00	0.00
5,100.00	12.50	81.81	4,999.35	137.01	952.28	962.09	0.00	0.00	0.00
5,200.00	12.50	81.81	5,096.98	140.09	973.70	983.73	0.00	0.00	0.00
5,300.00	12.50	81.81	5,194.61	143.18	995.12	1,005.37	0.00	0.00	0.00
5,400.00	12.50	81.81	5,292.24	146.26	1,016.54	1,027.01	0.00	0.00	0.00
5,442.21	12.50	81.81	5,333.45	147.56	1,025.58	1,036.14	0.00	0.00	0.00
<b>Begin 1.50°/100' Drop</b>									
5,500.00	11.63	81.81	5,389.97	149.28	1,037.54	1,048.22	1.50	-1.50	0.00
5,600.00	10.13	81.81	5,488.17	151.97	1,056.22	1,067.09	1.50	-1.50	0.00
5,700.00	8.63	81.81	5,586.83	154.29	1,072.35	1,083.39	1.50	-1.50	0.00
5,800.00	7.13	81.81	5,685.88	156.24	1,085.92	1,097.10	1.50	-1.50	0.00
5,900.00	5.63	81.81	5,785.26	157.82	1,096.92	1,108.21	1.50	-1.50	0.00
6,000.00	4.13	81.81	5,884.89	159.03	1,105.34	1,116.72	1.50	-1.50	0.00
6,100.00	2.63	81.81	5,984.71	159.87	1,111.18	1,122.62	1.50	-1.50	0.00
6,200.00	1.13	81.81	6,084.66	160.34	1,114.42	1,125.90	1.50	-1.50	0.00
6,275.35	0.00	0.00	6,160.00	160.45	1,115.16	1,126.64	1.50	-1.50	0.00
<b>Begin Vertical Hold</b>									
6,300.00	0.00	0.00	6,184.65	160.45	1,115.16	1,126.64	0.00	0.00	0.00
6,400.00	0.00	0.00	6,284.65	160.45	1,115.16	1,126.64	0.00	0.00	0.00
6,500.00	0.00	0.00	6,384.65	160.45	1,115.16	1,126.64	0.00	0.00	0.00
6,600.00	0.00	0.00	6,484.65	160.45	1,115.16	1,126.64	0.00	0.00	0.00
6,700.00	0.00	0.00	6,584.65	160.45	1,115.16	1,126.64	0.00	0.00	0.00
6,800.00	0.00	0.00	6,684.65	160.45	1,115.16	1,126.64	0.00	0.00	0.00
6,895.35	0.00	0.00	6,780.00	160.45	1,115.16	1,126.64	0.00	0.00	0.00
<b>Niobrara</b>									
6,900.00	0.00	0.00	6,784.65	160.45	1,115.16	1,126.64	0.00	0.00	0.00
7,000.00	0.00	0.00	6,884.65	160.45	1,115.16	1,126.64	0.00	0.00	0.00
7,100.00	0.00	0.00	6,984.65	160.45	1,115.16	1,126.64	0.00	0.00	0.00
7,200.00	0.00	0.00	7,084.65	160.45	1,115.16	1,126.64	0.00	0.00	0.00
7,204.35	0.00	0.00	7,089.00	160.45	1,115.16	1,126.64	0.00	0.00	0.00
<b>Fort Hayes</b>									
7,227.35	0.00	0.00	7,112.00	160.45	1,115.16	1,126.64	0.00	0.00	0.00
<b>Codell</b>									
7,300.00	0.00	0.00	7,184.65	160.45	1,115.16	1,126.64	0.00	0.00	0.00
7,387.35	0.00	0.00	7,272.00	160.45	1,115.16	1,126.64	0.00	0.00	0.00
<b>PBHL</b>									

<b>Database:</b>	Southern Region	<b>Local Co-ordinate Reference:</b>	Well #24-37D
<b>Company:</b>	Great Western	<b>TVD Reference:</b>	WELL @ 4760.00usft (Cade 22)
<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>MD Reference:</b>	WELL @ 4760.00usft (Cade 22)
<b>Site:</b>	Detterer FD	<b>North Reference:</b>	Grid
<b>Well:</b>	#24-37D	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Wellbore:</b>	Wellbore #1		
<b>Design:</b>	Design #1		

#### Design Targets

##### Target Name

- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- Shape									
PBHL - Detterer FD #:	0.00	0.00	7,272.00	160.45	1,115.16	1,413,062.81	3,184,414.79	40° 27' 55.3216 N	104° 50' 13.948 W
- plan hits target center									
- Circle (radius 200.00)									

#### Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
601.31	600.00	8 5/8"	8-5/8	12-1/4

#### Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,463.18	2,425.00	Greeley Sand		0.00	
3,569.38	3,505.00	Parkman		0.00	
4,272.03	4,191.00	Sussex		0.00	
4,667.40	4,577.00	Shannon		0.00	
6,895.35	6,780.00	Niobrara		0.00	
7,204.35	7,089.00	Fort Hayes		0.00	
7,227.35	7,112.00	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
600.00	598.70	3.97	27.60	Hold 8.00° Inc
1,000.00	994.81	11.90	82.70	Begin 2.00°/100' Build
1,224.86	1,216.02	17.59	122.29	Begin 12.50° Tangent
5,442.21	5,333.45	147.56	1,025.58	Begin 1.50°/100' Drop
6,275.35	6,160.00	160.45	1,115.16	Begin Vertical Hold
7,387.35	7,272.00	160.45	1,115.16	PBHL