

# Great Western

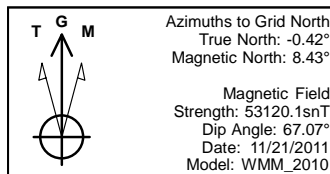
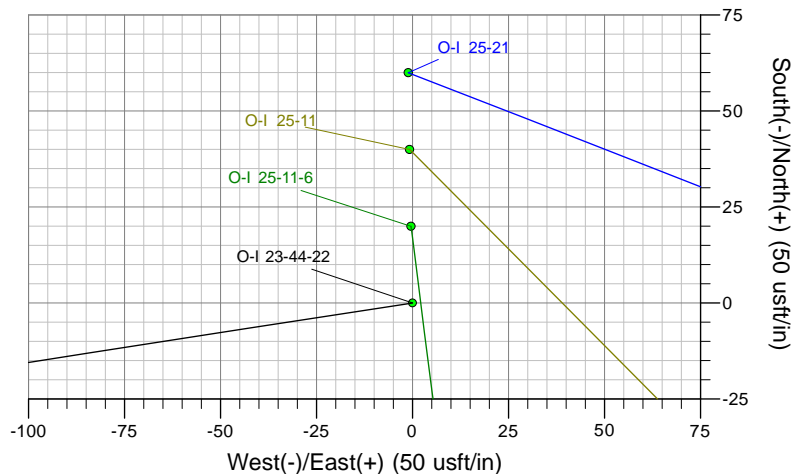
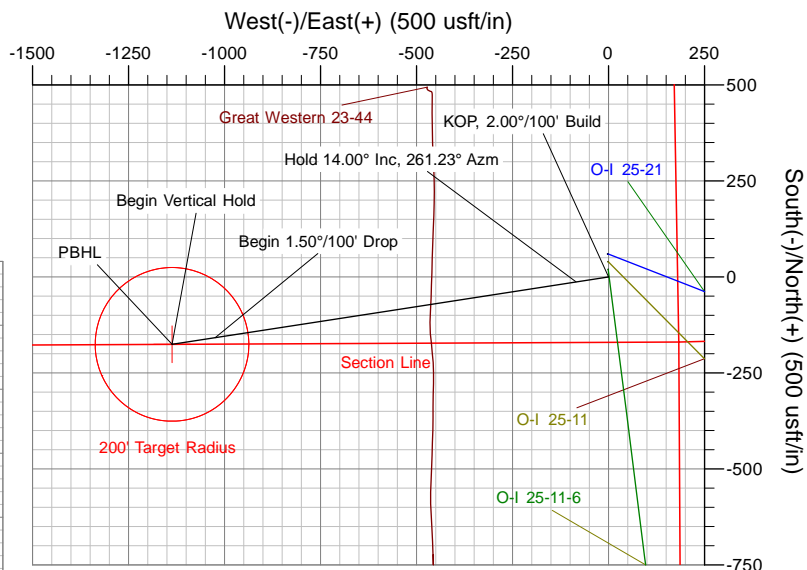
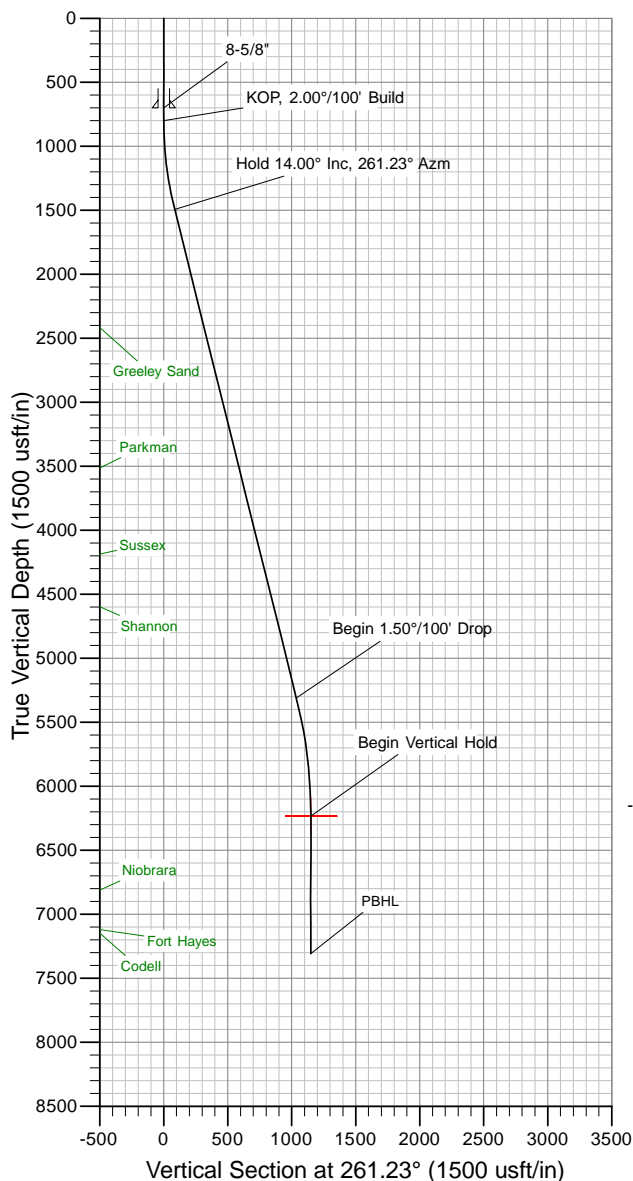
Company: Great Western  
Site: O-I  
Well: 23-44-22  
Project: Weld County, Colorado (NAD 83)  
Rig Name: Cade 22



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	Vsect	Departure	Annotation
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	KOP, 2.00°/100' Build
1499.89	14.00	261.23	1492.95	-12.98	-84.07	85.07	85.07	Hold 14.00° Inc, 261.23° Azm
5432.80	14.00	261.23	5309.07	-158.10	-1024.25	1036.38	1036.38	Begin 1.50°/100' Drop
6365.98	0.00	0.00	6233.00	-175.40	-1136.35	1149.81	1149.81	Begin Vertical Hold
7439.98	0.00	0.00	7307.00	-175.40	-1136.35	1149.81	1149.81	PBHL



US State Plane 1983  
Colorado Northern Zone  
Created By: Allen Slack  
Date: 16:12, November 21 2011  
Plan: Design #1

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# **Great Western**

**Weld County, Colorado (NAD 83)**

**O-I**

**23-44-22**

**Wellbore #1**

**Plan: Design #1**

## **Standard Planning Report**

**21 November, 2011**

<b>Database:</b>	Southern Region	<b>Local Co-ordinate Reference:</b>	Well 23-44-22
<b>Company:</b>	Great Western	<b>TVD Reference:</b>	WELL @ 4786.00usft (Cade 22)
<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>MD Reference:</b>	WELL @ 4786.00usft (Cade 22)
<b>Site:</b>	O-I	<b>North Reference:</b>	Grid
<b>Well:</b>	23-44-22	<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>	23-44-22			
<b>Well Position</b>	<b>+N-S</b>	1,413,136.08 usft	<b>Northing:</b>	1,413,136.08 usft
	<b>+E-W</b>	3,180,276.25 usft	<b>Easting:</b>	3,180,276.25 usft
<b>Position Uncertainty</b>		0.00 usft	<b>Wellhead Elevation:</b>	
			<b>Latitude:</b>	40° 27' 56.3479 N
			<b>Longitude:</b>	104° 51' 7.486 W
			<b>Ground Level:</b>	4,772.00 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	11/21/2011	8.85	67.07	53,120

<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	261.23

<b>Plan Sections</b>										
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	
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,499.89	14.00	261.23	1,492.95	-12.98	-84.07	2.00	2.00	0.00	261.23	
5,432.80	14.00	261.23	5,309.07	-158.10	-1,024.25	0.00	0.00	0.00	0.00	
6,365.98	0.00	0.00	6,233.00	-175.40	-1,136.35	1.50	-1.50	0.00	180.00	Vert. v1 - O-I 23-44
7,439.98	0.00	0.00	7,307.00	-175.40	-1,136.35	0.00	0.00	0.00	0.00	

<b>Database:</b>	Southern Region	<b>Local Co-ordinate Reference:</b>	Well 23-44-22
<b>Company:</b>	Great Western	<b>TVD Reference:</b>	WELL @ 4786.00usft (Cade 22)
<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>MD Reference:</b>	WELL @ 4786.00usft (Cade 22)
<b>Site:</b>	O-I	<b>North Reference:</b>	Grid
<b>Well:</b>	23-44-22	<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
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
<b>8-5/8"</b>									
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>KOP, 2.00°/100' Build</b>									
900.00	2.00	261.23	899.98	-0.27	-1.72	1.75	2.00	2.00	0.00
1,000.00	4.00	261.23	999.84	-1.06	-6.90	6.98	2.00	2.00	0.00
1,100.00	6.00	261.23	1,099.45	-2.39	-15.51	15.69	2.00	2.00	0.00
1,200.00	8.00	261.23	1,198.70	-4.25	-27.55	27.88	2.00	2.00	0.00
1,300.00	10.00	261.23	1,297.47	-6.64	-43.01	43.52	2.00	2.00	0.00
1,400.00	12.00	261.23	1,395.62	-9.55	-61.87	62.60	2.00	2.00	0.00
1,499.89	14.00	261.23	1,492.95	-12.98	-84.07	85.07	2.00	2.00	0.00
<b>Hold 14.00° Inc, 261.23° Azm</b>									
1,500.00	14.00	261.23	1,493.06	-12.98	-84.10	85.10	0.00	0.00	0.00
1,600.00	14.00	261.23	1,590.09	-16.67	-108.01	109.28	0.00	0.00	0.00
1,700.00	14.00	261.23	1,687.12	-20.36	-131.91	133.47	0.00	0.00	0.00
1,800.00	14.00	261.23	1,784.15	-24.05	-155.82	157.66	0.00	0.00	0.00
1,900.00	14.00	261.23	1,881.18	-27.74	-179.72	181.85	0.00	0.00	0.00
2,000.00	14.00	261.23	1,978.21	-31.43	-203.63	206.04	0.00	0.00	0.00
2,100.00	14.00	261.23	2,075.24	-35.12	-227.53	230.23	0.00	0.00	0.00
2,200.00	14.00	261.23	2,172.27	-38.81	-251.44	254.42	0.00	0.00	0.00
2,300.00	14.00	261.23	2,269.30	-42.50	-275.34	278.60	0.00	0.00	0.00
2,400.00	14.00	261.23	2,366.33	-46.19	-299.25	302.79	0.00	0.00	0.00
2,451.19	14.00	261.23	2,416.00	-48.08	-311.49	315.17	0.00	0.00	0.00
<b>Greeley Sand</b>									
2,500.00	14.00	261.23	2,463.36	-49.88	-323.15	326.98	0.00	0.00	0.00
2,600.00	14.00	261.23	2,560.39	-53.57	-347.06	351.17	0.00	0.00	0.00
2,700.00	14.00	261.23	2,657.42	-57.26	-370.96	375.36	0.00	0.00	0.00
2,800.00	14.00	261.23	2,754.45	-60.95	-394.87	399.55	0.00	0.00	0.00
2,900.00	14.00	261.23	2,851.48	-64.64	-418.78	423.73	0.00	0.00	0.00
3,000.00	14.00	261.23	2,948.51	-68.33	-442.68	447.92	0.00	0.00	0.00
3,100.00	14.00	261.23	3,045.54	-72.02	-466.59	472.11	0.00	0.00	0.00
3,200.00	14.00	261.23	3,142.57	-75.71	-490.49	496.30	0.00	0.00	0.00
3,300.00	14.00	261.23	3,239.60	-79.40	-514.40	520.49	0.00	0.00	0.00
3,400.00	14.00	261.23	3,336.63	-83.09	-538.30	544.68	0.00	0.00	0.00
3,500.00	14.00	261.23	3,433.67	-86.78	-562.21	568.87	0.00	0.00	0.00
3,582.79	14.00	261.23	3,514.00	-89.83	-582.00	588.89	0.00	0.00	0.00
<b>Parkman</b>									
3,600.00	14.00	261.23	3,530.70	-90.47	-586.11	593.05	0.00	0.00	0.00
3,700.00	14.00	261.23	3,627.73	-94.16	-610.02	617.24	0.00	0.00	0.00
3,800.00	14.00	261.23	3,724.76	-97.85	-633.92	641.43	0.00	0.00	0.00
3,900.00	14.00	261.23	3,821.79	-101.54	-657.83	665.62	0.00	0.00	0.00
4,000.00	14.00	261.23	3,918.82	-105.23	-681.73	689.81	0.00	0.00	0.00
4,100.00	14.00	261.23	4,015.85	-108.92	-705.64	714.00	0.00	0.00	0.00
4,200.00	14.00	261.23	4,112.88	-112.61	-729.55	738.18	0.00	0.00	0.00
4,275.36	14.00	261.23	4,186.00	-115.39	-747.56	756.41	0.00	0.00	0.00
<b>Sussex</b>									

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<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>MD Reference:</b>	WELL @ 4786.00usft (Cade 22)
<b>Site:</b>	O-I	<b>North Reference:</b>	Grid
<b>Well:</b>	23-44-22	<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)
4,300.00	14.00	261.23	4,209.91	-116.30	-753.45	762.37	0.00	0.00	0.00
4,400.00	14.00	261.23	4,306.94	-119.99	-777.36	786.56	0.00	0.00	0.00
4,500.00	14.00	261.23	4,403.97	-123.68	-801.26	810.75	0.00	0.00	0.00
4,600.00	14.00	261.23	4,501.00	-127.37	-825.17	834.94	0.00	0.00	0.00
4,697.91	14.00	261.23	4,596.00	-130.98	-848.57	858.62	0.00	0.00	0.00
<b>Shannon</b>									
4,700.00	14.00	261.23	4,598.03	-131.06	-849.07	859.13	0.00	0.00	0.00
4,800.00	14.00	261.23	4,695.06	-134.75	-872.98	883.32	0.00	0.00	0.00
4,900.00	14.00	261.23	4,792.09	-138.44	-896.88	907.50	0.00	0.00	0.00
5,000.00	14.00	261.23	4,889.12	-142.13	-920.79	931.69	0.00	0.00	0.00
5,100.00	14.00	261.23	4,986.15	-145.82	-944.69	955.88	0.00	0.00	0.00
5,200.00	14.00	261.23	5,083.18	-149.51	-968.60	980.07	0.00	0.00	0.00
5,300.00	14.00	261.23	5,180.21	-153.20	-992.50	1,004.26	0.00	0.00	0.00
5,400.00	14.00	261.23	5,277.24	-156.89	-1,016.41	1,028.45	0.00	0.00	0.00
5,432.80	14.00	261.23	5,309.07	-158.10	-1,024.25	1,036.38	0.00	0.00	0.00
<b>Begin 1.50°/100' Drop</b>									
5,500.00	12.99	261.23	5,374.41	-160.49	-1,039.75	1,052.06	1.50	-1.50	0.00
5,600.00	11.49	261.23	5,472.14	-163.72	-1,060.70	1,073.26	1.50	-1.50	0.00
5,700.00	9.99	261.23	5,570.38	-166.57	-1,079.11	1,091.89	1.50	-1.50	0.00
5,800.00	8.49	261.23	5,669.08	-169.02	-1,094.98	1,107.95	1.50	-1.50	0.00
5,900.00	6.99	261.23	5,768.17	-171.07	-1,108.29	1,121.42	1.50	-1.50	0.00
6,000.00	5.49	261.23	5,867.58	-172.73	-1,119.03	1,132.29	1.50	-1.50	0.00
6,100.00	3.99	261.23	5,967.23	-173.99	-1,127.20	1,140.55	1.50	-1.50	0.00
6,200.00	2.49	261.23	6,067.07	-174.85	-1,132.79	1,146.20	1.50	-1.50	0.00
6,300.00	0.99	261.23	6,167.02	-175.31	-1,135.79	1,149.24	1.50	-1.50	0.00
6,365.98	0.00	0.00	6,233.00	-175.40	-1,136.35	1,149.81	1.50	-1.50	0.00
<b>Begin Vertical Hold</b>									
6,400.00	0.00	0.00	6,267.02	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
6,500.00	0.00	0.00	6,367.02	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
6,600.00	0.00	0.00	6,467.02	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
6,700.00	0.00	0.00	6,567.02	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
6,800.00	0.00	0.00	6,667.02	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
6,900.00	0.00	0.00	6,767.02	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
6,943.98	0.00	0.00	6,811.00	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
<b>Niobrara</b>									
7,000.00	0.00	0.00	6,867.02	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
7,100.00	0.00	0.00	6,967.02	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
7,200.00	0.00	0.00	7,067.02	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
7,252.98	0.00	0.00	7,120.00	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
<b>Fort Hayes</b>									
7,279.98	0.00	0.00	7,147.00	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
<b>Codell</b>									
7,300.00	0.00	0.00	7,167.02	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
7,400.00	0.00	0.00	7,267.02	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
7,439.98	0.00	0.00	7,307.00	-175.40	-1,136.35	1,149.81	0.00	0.00	0.00
<b>PBHL</b>									

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<b>Company:</b>	Great Western	<b>TVD Reference:</b>	WELL @ 4786.00usft (Cade 22)
<b>Project:</b>	Weld County, Colorado (NAD 83)	<b>MD Reference:</b>	WELL @ 4786.00usft (Cade 22)
<b>Site:</b>	O-I	<b>North Reference:</b>	Grid
<b>Well:</b>	23-44-22	<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									
Vert. v1 - O-I 23-44-22	0.00	0.00	6,233.00	-175.40	-1,136.35	1,412,960.67	3,179,139.90	40° 27' 54.6964 N	104° 51' 22.204 W
- plan hits target center									
- Circle (radius 200.00)									

#### Casing Points

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
700.00	700.00	8-5/8"	8-5/8	12-1/4

#### Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,451.19	2,416.00	Greeley Sand		0.00	
3,582.79	3,514.00	Parkman		0.00	
4,275.36	4,186.00	Sussex		0.00	
4,697.91	4,596.00	Shannon		0.00	
6,943.98	6,811.00	Niobrara		0.00	
7,252.98	7,120.00	Fort Hayes		0.00	
7,279.98	7,147.00	Codell		0.00	

#### Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
800.00	800.00	0.00	0.00	KOP, 2.00°/100' Build
1,499.89	1,492.95	-12.98	-84.07	Hold 14.00° Inc, 261.23° Azm
5,432.80	5,309.07	-158.10	-1,024.25	Begin 1.50°/100' Drop
6,365.98	6,233.00	-175.40	-1,136.35	Begin Vertical Hold
7,439.98	7,307.00	-175.40	-1,136.35	PBHL