

Great Western

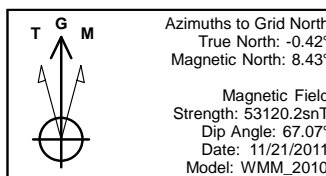
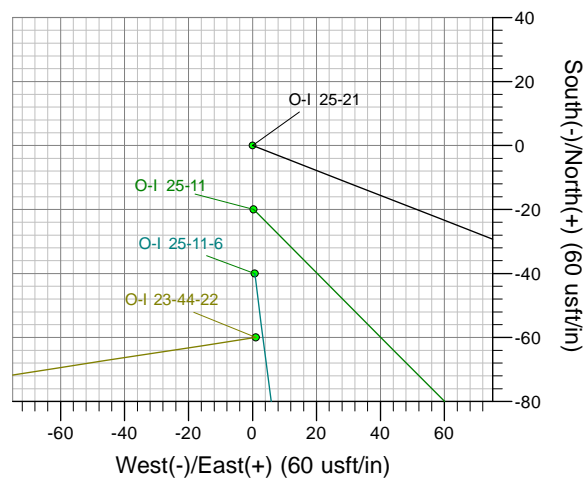
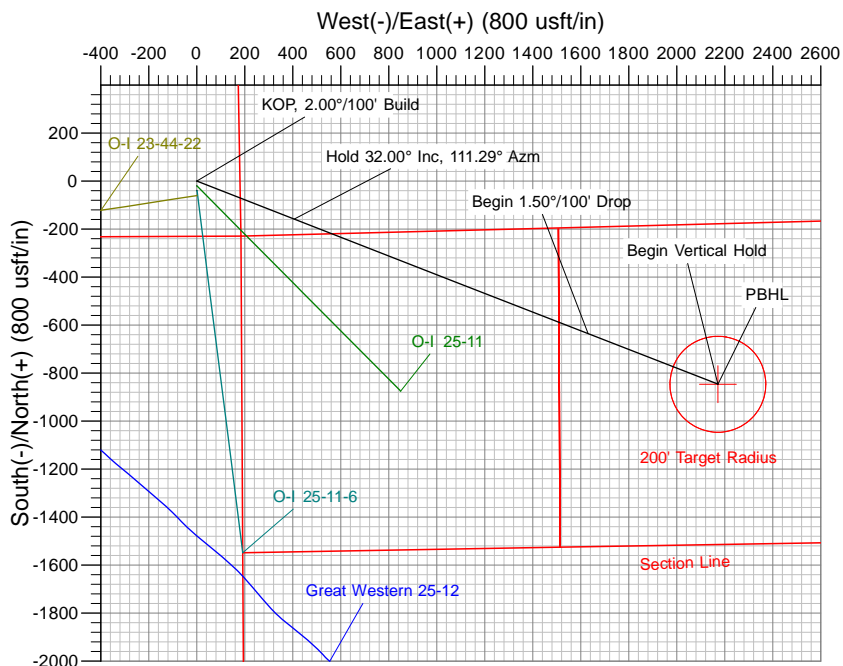
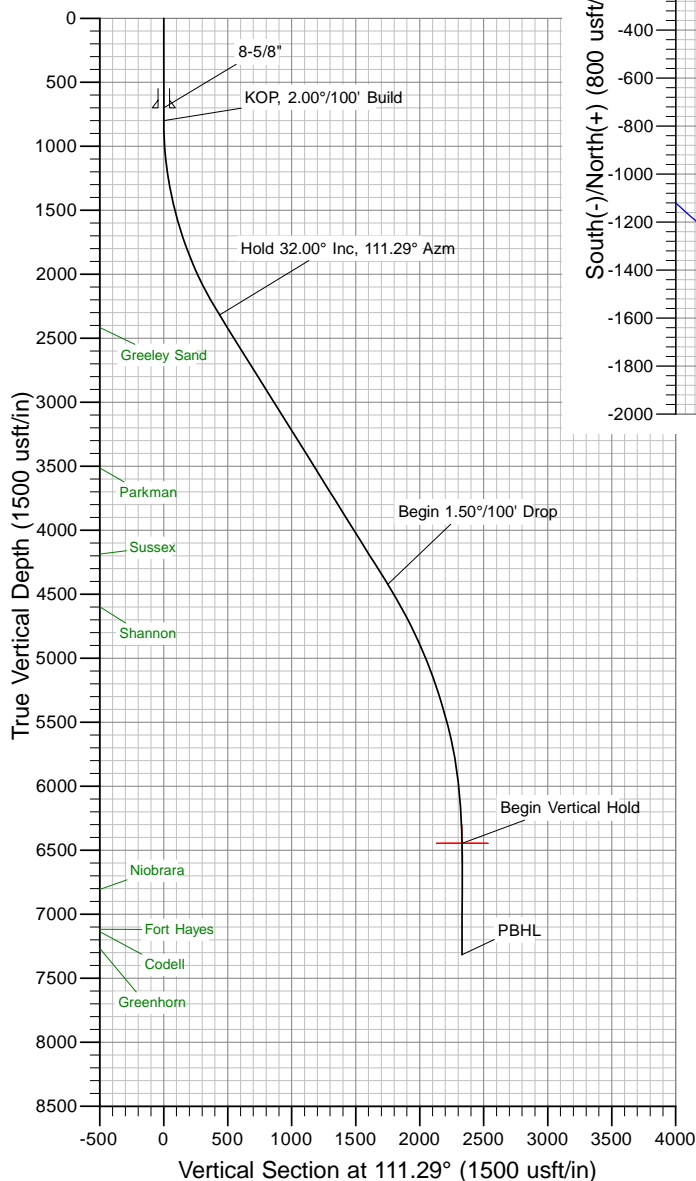
Company: Great Western
 Site: O-I
 Well: 25-21
 Project: Weld County, Colorado (NAD 83)
 Rig Name: Cade 22



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
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	KOP, 2.00°/100' Build
2399.84	32.00	111.29	2317.97	-158.05	405.51	435.23	435.23	Hold 32.00° Inc, 111.29° Azm
4881.41	32.00	111.29	4422.54	-635.56	1630.66	1750.14	1750.14	Begin 1.50°/100' Drop
7014.53	0.00	0.00	6446.50	-846.29	2171.35	2330.44	2330.44	Begin Vertical Hold
7884.03	0.00	0.00	7316.00	-846.29	2171.35	2330.44	2330.44	PBHL



US State Plane 1983
 Colorado Northern Zone

Created By: Allen Slack
 Date: 17:45, November 21 2011
 Plan: Design #1

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Great Western

Weld County, Colorado (NAD 83)

O-I

25-21

Wellbore #1

Plan: Design #1

Standard Planning Report

21 November, 2011

Database:	Southern Region	Local Co-ordinate Reference:	Well 25-21
Company:	Great Western	TVD Reference:	WELL @ 4786.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4786.00usft (Cade 22)
Site:	O-I	North Reference:	Grid
Well:	25-21	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	25-21			
Well Position	+N-S	1,413,196.06 usft	Northing:	1,413,196.06 usft
	+E-W	3,180,275.18 usft	Easting:	3,180,275.18 usft
Position Uncertainty		0.00 usft	Wellhead Elevation:	
			Latitude:	40° 27' 56.9406 N
			Longitude:	104° 51' 7.494 W
			Ground Level:	4,772.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM_2010	11/21/2011	8.85	67.07	53,120

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	111.29

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	
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	
2,399.84	32.00	111.29	2,317.97	-158.05	405.51	2.00	2.00	0.00	111.29	
4,881.41	32.00	111.29	4,422.54	-635.56	1,630.66	0.00	0.00	0.00	0.00	
7,014.53	0.00	0.00	6,446.50	-846.29	2,171.35	1.50	-1.50	0.00	180.00	Vert. v1 - O-I 25-21
7,884.03	0.00	0.00	7,316.00	-846.29	2,171.35	0.00	0.00	0.00	0.00	

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Site:	O-I	North Reference:	Grid
Well:	25-21	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
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
8-5/8"									
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
KOP, 2.00°/100' Build									
900.00	2.00	111.29	899.98	-0.63	1.63	1.75	2.00	2.00	0.00
1,000.00	4.00	111.29	999.84	-2.53	6.50	6.98	2.00	2.00	0.00
1,100.00	6.00	111.29	1,099.45	-5.70	14.62	15.69	2.00	2.00	0.00
1,200.00	8.00	111.29	1,198.70	-10.12	25.98	27.88	2.00	2.00	0.00
1,300.00	10.00	111.29	1,297.47	-15.81	40.55	43.52	2.00	2.00	0.00
1,400.00	12.00	111.29	1,395.62	-22.73	58.33	62.60	2.00	2.00	0.00
1,500.00	14.00	111.29	1,493.06	-30.90	79.29	85.10	2.00	2.00	0.00
1,600.00	16.00	111.29	1,589.64	-40.30	103.40	110.98	2.00	2.00	0.00
1,700.00	18.00	111.29	1,685.27	-50.92	130.64	140.21	2.00	2.00	0.00
1,800.00	20.00	111.29	1,779.82	-62.74	160.97	172.77	2.00	2.00	0.00
1,900.00	22.00	111.29	1,873.17	-75.75	194.36	208.60	2.00	2.00	0.00
2,000.00	24.00	111.29	1,965.21	-89.94	230.77	247.67	2.00	2.00	0.00
2,100.00	26.00	111.29	2,055.84	-105.29	270.14	289.93	2.00	2.00	0.00
2,200.00	28.00	111.29	2,144.94	-121.77	312.44	335.33	2.00	2.00	0.00
2,300.00	30.00	111.29	2,232.39	-139.38	357.61	383.81	2.00	2.00	0.00
2,399.84	32.00	111.29	2,317.97	-158.05	405.51	435.23	2.00	2.00	0.00
Hold 32.00° Inc, 111.29° Azm									
2,400.00	32.00	111.29	2,318.11	-158.08	405.59	435.31	0.00	0.00	0.00
2,500.00	32.00	111.29	2,402.91	-177.32	454.96	488.30	0.00	0.00	0.00
2,515.43	32.00	111.29	2,416.00	-180.29	462.58	496.47	0.00	0.00	0.00
Greeley Sand									
2,600.00	32.00	111.29	2,487.72	-196.57	504.33	541.28	0.00	0.00	0.00
2,700.00	32.00	111.29	2,572.53	-215.81	553.70	594.27	0.00	0.00	0.00
2,800.00	32.00	111.29	2,657.34	-235.05	603.07	647.26	0.00	0.00	0.00
2,900.00	32.00	111.29	2,742.15	-254.29	652.44	700.25	0.00	0.00	0.00
3,000.00	32.00	111.29	2,826.95	-273.53	701.81	753.23	0.00	0.00	0.00
3,100.00	32.00	111.29	2,911.76	-292.78	751.18	806.22	0.00	0.00	0.00
3,200.00	32.00	111.29	2,996.57	-312.02	800.55	859.21	0.00	0.00	0.00
3,300.00	32.00	111.29	3,081.38	-331.26	849.92	912.19	0.00	0.00	0.00
3,400.00	32.00	111.29	3,166.18	-350.50	899.29	965.18	0.00	0.00	0.00
3,500.00	32.00	111.29	3,250.99	-369.75	948.66	1,018.17	0.00	0.00	0.00
3,600.00	32.00	111.29	3,335.80	-388.99	998.03	1,071.16	0.00	0.00	0.00
3,700.00	32.00	111.29	3,420.61	-408.23	1,047.40	1,124.14	0.00	0.00	0.00
3,800.00	32.00	111.29	3,505.42	-427.47	1,096.77	1,177.13	0.00	0.00	0.00
3,810.12	32.00	111.29	3,514.00	-429.42	1,101.77	1,182.49	0.00	0.00	0.00
Parkman									
3,900.00	32.00	111.29	3,590.22	-446.71	1,146.14	1,230.12	0.00	0.00	0.00
4,000.00	32.00	111.29	3,675.03	-465.96	1,195.51	1,283.11	0.00	0.00	0.00
4,100.00	32.00	111.29	3,759.84	-485.20	1,244.88	1,336.09	0.00	0.00	0.00
4,200.00	32.00	111.29	3,844.65	-504.44	1,294.25	1,389.08	0.00	0.00	0.00
4,300.00	32.00	111.29	3,929.45	-523.68	1,343.62	1,442.07	0.00	0.00	0.00
4,400.00	32.00	111.29	4,014.26	-542.92	1,392.99	1,495.05	0.00	0.00	0.00
4,500.00	32.00	111.29	4,099.07	-562.17	1,442.36	1,548.04	0.00	0.00	0.00

Database:	Southern Region	Local Co-ordinate Reference:	Well 25-21
Company:	Great Western	TVD Reference:	WELL @ 4786.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4786.00usft (Cade 22)
Site:	O-I	North Reference:	Grid
Well:	25-21	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)
4,600.00	32.00	111.29	4,183.88	-581.41	1,491.73	1,601.03	0.00	0.00	0.00
4,602.50	32.00	111.29	4,186.00	-581.89	1,492.96	1,602.35	0.00	0.00	0.00
Sussex									
4,700.00	32.00	111.29	4,268.69	-600.65	1,541.10	1,654.02	0.00	0.00	0.00
4,800.00	32.00	111.29	4,353.49	-619.89	1,590.47	1,707.00	0.00	0.00	0.00
4,881.41	32.00	111.29	4,422.54	-635.56	1,630.66	1,750.14	0.00	0.00	0.00
Begin 1.50°/100' Drop									
4,900.00	31.72	111.29	4,438.32	-639.12	1,639.80	1,759.95	1.50	-1.50	0.00
5,000.00	30.22	111.29	4,524.07	-657.81	1,687.74	1,811.41	1.50	-1.50	0.00
5,082.73	28.98	111.29	4,596.00	-672.64	1,725.81	1,852.27	1.50	-1.50	0.00
Shannon									
5,100.00	28.72	111.29	4,611.13	-675.67	1,733.58	1,860.60	1.50	-1.50	0.00
5,200.00	27.22	111.29	4,699.45	-692.70	1,777.27	1,907.50	1.50	-1.50	0.00
5,300.00	25.72	111.29	4,788.96	-708.89	1,818.80	1,952.06	1.50	-1.50	0.00
5,400.00	24.22	111.29	4,879.61	-724.21	1,858.13	1,994.27	1.50	-1.50	0.00
5,500.00	22.72	111.29	4,971.34	-738.68	1,895.23	2,034.10	1.50	-1.50	0.00
5,600.00	21.22	111.29	5,064.08	-752.26	1,930.09	2,071.50	1.50	-1.50	0.00
5,700.00	19.72	111.29	5,157.76	-764.96	1,962.67	2,106.47	1.50	-1.50	0.00
5,800.00	18.22	111.29	5,252.33	-776.76	1,992.95	2,138.97	1.50	-1.50	0.00
5,900.00	16.72	111.29	5,347.71	-787.66	2,020.92	2,168.99	1.50	-1.50	0.00
6,000.00	15.22	111.29	5,443.85	-797.65	2,046.55	2,196.50	1.50	-1.50	0.00
6,100.00	13.72	111.29	5,540.68	-806.73	2,069.83	2,221.48	1.50	-1.50	0.00
6,200.00	12.22	111.29	5,638.13	-814.87	2,090.74	2,243.92	1.50	-1.50	0.00
6,300.00	10.72	111.29	5,736.13	-822.09	2,109.26	2,263.81	1.50	-1.50	0.00
6,400.00	9.22	111.29	5,834.61	-828.38	2,125.39	2,281.11	1.50	-1.50	0.00
6,500.00	7.72	111.29	5,933.52	-833.73	2,139.11	2,295.84	1.50	-1.50	0.00
6,600.00	6.22	111.29	6,032.78	-838.13	2,150.41	2,307.97	1.50	-1.50	0.00
6,700.00	4.72	111.29	6,132.32	-841.59	2,159.29	2,317.50	1.50	-1.50	0.00
6,800.00	3.22	111.29	6,232.08	-844.11	2,165.74	2,324.42	1.50	-1.50	0.00
6,900.00	1.72	111.29	6,331.98	-845.67	2,169.75	2,328.73	1.50	-1.50	0.00
7,000.00	0.22	111.29	6,431.97	-846.28	2,171.32	2,330.41	1.50	-1.50	0.00
7,014.53	0.00	0.00	6,446.50	-846.29	2,171.35	2,330.44	1.50	-1.50	0.00
Begin Vertical Hold									
7,100.00	0.00	0.00	6,531.97	-846.29	2,171.35	2,330.44	0.00	0.00	0.00
7,200.00	0.00	0.00	6,631.97	-846.29	2,171.35	2,330.44	0.00	0.00	0.00
7,300.00	0.00	0.00	6,731.97	-846.29	2,171.35	2,330.44	0.00	0.00	0.00
7,374.03	0.00	0.00	6,806.00	-846.29	2,171.35	2,330.44	0.00	0.00	0.00
Niobrara									
7,400.00	0.00	0.00	6,831.97	-846.29	2,171.35	2,330.44	0.00	0.00	0.00
7,500.00	0.00	0.00	6,931.97	-846.29	2,171.35	2,330.44	0.00	0.00	0.00
7,600.00	0.00	0.00	7,031.97	-846.29	2,171.35	2,330.44	0.00	0.00	0.00
7,684.03	0.00	0.00	7,116.00	-846.29	2,171.35	2,330.44	0.00	0.00	0.00
Fort Hayes									
7,700.00	0.00	0.00	7,131.97	-846.29	2,171.35	2,330.44	0.00	0.00	0.00
7,704.03	0.00	0.00	7,136.00	-846.29	2,171.35	2,330.44	0.00	0.00	0.00
Codell									
7,800.00	0.00	0.00	7,231.97	-846.29	2,171.35	2,330.44	0.00	0.00	0.00
7,834.03	0.00	0.00	7,266.00	-846.29	2,171.35	2,330.44	0.00	0.00	0.00
Greenhorn									
7,884.03	0.00	0.00	7,316.00	-846.29	2,171.35	2,330.44	0.00	0.00	0.00
PBHL									

Database:	Southern Region	Local Co-ordinate Reference:	Well 25-21
Company:	Great Western	TVD Reference:	WELL @ 4786.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4786.00usft (Cade 22)
Site:	O-I	North Reference:	Grid
Well:	25-21	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	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 25-21	0.00	0.01	6,446.50	-846.29	2,171.35	1,412,349.76	3,182,446.53	40° 27' 48.4202 N	104° 50' 39.482 W
- plan hits target center									
- Point									

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 (°)
2,515.43	2,416.00	Greeley Sand		0.00	
3,810.12	3,514.00	Parkman		0.00	
4,602.50	4,186.00	Sussex		0.00	
5,082.73	4,596.00	Shannon		0.00	
7,374.03	6,806.00	Niobrara		0.00	
7,684.03	7,116.00	Fort Hayes		0.00	
7,704.03	7,136.00	Codell		0.00	
7,834.03	7,266.00	Greenhorn		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
2,399.84	2,317.97	-158.05	405.51	Hold 32.00° Inc, 111.29° Azm
4,881.41	4,422.54	-635.56	1,630.66	Begin 1.50°/100' Drop
7,014.53	6,446.50	-846.29	2,171.35	Begin Vertical Hold
7,884.03	7,316.00	-846.29	2,171.35	PBHL