

Great Western

Company: Great Western
Site: Rairdance
Well: 30-13



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
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	12.70	598.70	27.20	6.13	27.88	27.88	Begin 8.00° Tangent
1000.00	8.00	12.70	994.81	81.50	18.37	83.55	83.55	Begin 2.00°/100' Build
1500.08	18.00	12.70	1481.45	191.11	43.08	195.91	195.91	Begin 18.00° Tangent
5462.12	18.00	12.70	5249.55	1385.57	312.36	1420.34	1420.34	Begin 1.50°/100' Drop
6662.22	0.00	0.00	6430.00	1567.97	353.48	1607.33	1607.33	Begin Vertical Hold
7689.22	0.00	0.00	7457.00	1567.97	353.48	1607.33	1607.33	PBHL

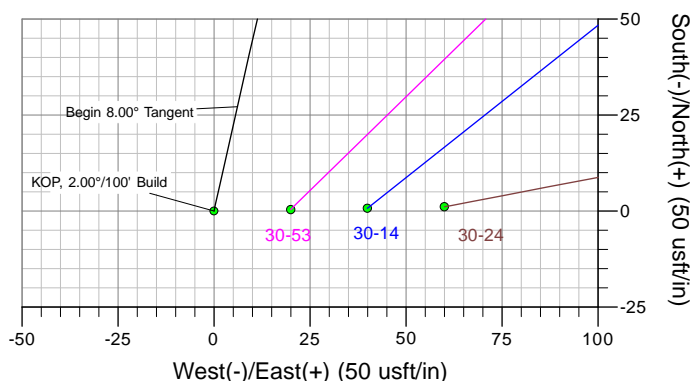
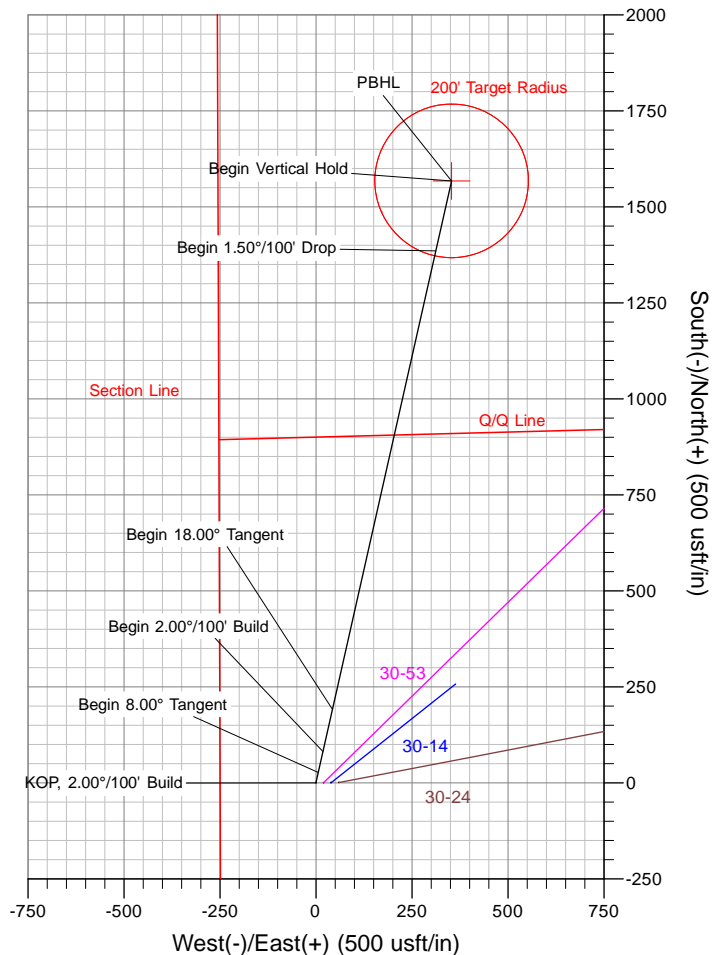
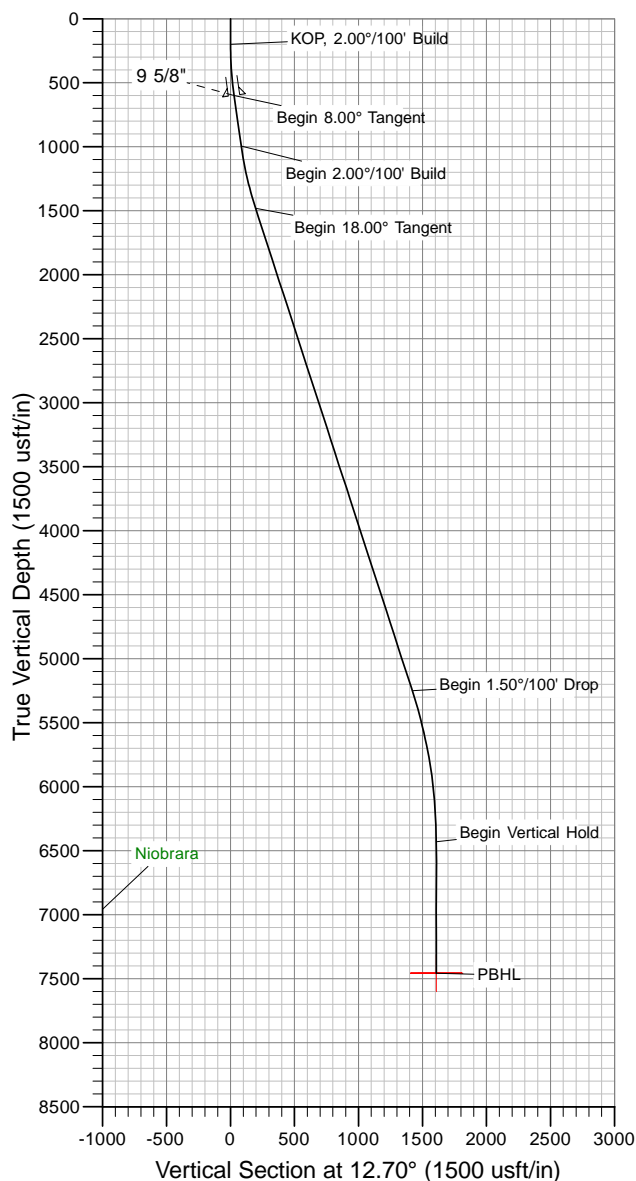


Azimuths to Grid North
True North: -0.36°
Magnetic North: 8.54°

Magnetic Field
Strength: 53098.2snT
Dip Angle: 67.04°
Date: 12/2/2011
Model: WMM_2010

US State Plane 1983
Colorado Northern Zone

Created By: Vanessa Thom
Date: 10:07, December 06 2011
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.

Great Western

Weld County, Colorado (NAD 83)

Raindance

30-13

Wellbore #1

Plan: Design #1

Standard Planning Report

06 December, 2011

Database:	Southern Region	Local Co-ordinate Reference:	Well 30-13
Company:	Great Western	TVD Reference:	WELL @ 4967.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4967.00usft (Cade 22)
Site:	Raindance	North Reference:	Grid
Well:	30-13	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	30-13			
Well Position	+N/-S	1,407,815.68 usft	Northing:	1,407,815.68 usft
	+E/-W	3,154,932.74 usft	Easting:	3,154,932.74 usft
Position Uncertainty		0.00 usft	Wellhead Elevation:	
			Latitude:	40° 27' 5.4744 N
			Longitude:	104° 56' 35.817 W
			Ground Level:	4,953.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM_2010	12/2/2011	8.90	67.04	53,098

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	12.70

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	12.70	598.70	27.20	6.13	2.00	2.00	0.00	12.70	PBHL v1 - Raindance
1,000.00	8.00	12.70	994.81	81.50	18.37	0.00	0.00	0.00	0.00	
1,500.08	18.00	12.70	1,481.45	191.11	43.08	2.00	2.00	0.00	0.00	
5,462.12	18.00	12.70	5,249.55	1,385.57	312.36	0.00	0.00	0.00	0.00	
6,662.22	0.00	0.00	6,430.00	1,567.98	353.48	1.50	-1.50	0.00	180.00	
7,689.22	0.00	0.00	7,457.00	1,567.98	353.48	0.00	0.00	0.00	0.00	PBHL v1 - Raindance

Database:	Southern Region	Local Co-ordinate Reference:	Well 30-13
Company:	Great Western	TVD Reference:	WELL @ 4967.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4967.00usft (Cade 22)
Site:	Raindance	North Reference:	Grid
Well:	30-13	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	12.70	299.98	1.70	0.38	1.75	2.00	2.00	0.00
400.00	4.00	12.70	399.84	6.81	1.53	6.98	2.00	2.00	0.00
500.00	6.00	12.70	499.45	15.31	3.45	15.69	2.00	2.00	0.00
600.00	8.00	12.70	598.70	27.20	6.13	27.88	2.00	2.00	0.00
Begin 8.00° Tangent									
601.31	8.00	12.70	600.00	27.38	6.17	28.06	0.00	0.00	0.00
9 5/8"									
700.00	8.00	12.70	697.73	40.77	9.19	41.80	0.00	0.00	0.00
800.00	8.00	12.70	796.76	54.35	12.25	55.71	0.00	0.00	0.00
900.00	8.00	12.70	895.78	67.93	15.31	69.63	0.00	0.00	0.00
1,000.00	8.00	12.70	994.81	81.50	18.37	83.55	0.00	0.00	0.00
Begin 2.00°/100' Build									
1,100.00	10.00	12.70	1,093.57	96.76	21.81	99.19	2.00	2.00	0.00
1,200.00	12.00	12.70	1,191.73	115.38	26.01	118.27	2.00	2.00	0.00
1,300.00	14.00	12.70	1,289.16	137.32	30.96	140.77	2.00	2.00	0.00
1,400.00	16.00	12.70	1,385.75	162.57	36.65	166.65	2.00	2.00	0.00
1,500.08	18.00	12.70	1,481.45	191.11	43.08	195.91	2.00	2.00	0.00
Begin 18.00° Tangent									
1,600.00	18.00	12.70	1,576.48	221.23	49.87	226.79	0.00	0.00	0.00
1,700.00	18.00	12.70	1,671.59	251.38	56.67	257.69	0.00	0.00	0.00
1,800.00	18.00	12.70	1,766.69	281.53	63.47	288.59	0.00	0.00	0.00
1,900.00	18.00	12.70	1,861.80	311.68	70.26	319.50	0.00	0.00	0.00
2,000.00	18.00	12.70	1,956.90	341.82	77.06	350.40	0.00	0.00	0.00
2,100.00	18.00	12.70	2,052.00	371.97	83.86	381.31	0.00	0.00	0.00
2,200.00	18.00	12.70	2,147.11	402.12	90.65	412.21	0.00	0.00	0.00
2,300.00	18.00	12.70	2,242.21	432.27	97.45	443.12	0.00	0.00	0.00
2,400.00	18.00	12.70	2,337.32	462.41	104.25	474.02	0.00	0.00	0.00
2,500.00	18.00	12.70	2,432.42	492.56	111.04	504.92	0.00	0.00	0.00
2,600.00	18.00	12.70	2,527.53	522.71	117.84	535.83	0.00	0.00	0.00
2,700.00	18.00	12.70	2,622.63	552.86	124.64	566.73	0.00	0.00	0.00
2,800.00	18.00	12.70	2,717.74	583.01	131.43	597.64	0.00	0.00	0.00
2,900.00	18.00	12.70	2,812.84	613.15	138.23	628.54	0.00	0.00	0.00
3,000.00	18.00	12.70	2,907.95	643.30	145.03	659.44	0.00	0.00	0.00
3,100.00	18.00	12.70	3,003.05	673.45	151.82	690.35	0.00	0.00	0.00
3,200.00	18.00	12.70	3,098.16	703.60	158.62	721.25	0.00	0.00	0.00
3,300.00	18.00	12.70	3,193.26	733.74	165.41	752.16	0.00	0.00	0.00
3,400.00	18.00	12.70	3,288.37	763.89	172.21	783.06	0.00	0.00	0.00
3,500.00	18.00	12.70	3,383.47	794.04	179.01	813.97	0.00	0.00	0.00
3,600.00	18.00	12.70	3,478.58	824.19	185.80	844.87	0.00	0.00	0.00
3,700.00	18.00	12.70	3,573.68	854.33	192.60	875.77	0.00	0.00	0.00
3,800.00	18.00	12.70	3,668.79	884.48	199.40	906.68	0.00	0.00	0.00
3,900.00	18.00	12.70	3,763.89	914.63	206.19	937.58	0.00	0.00	0.00
4,000.00	18.00	12.70	3,859.00	944.78	212.99	968.49	0.00	0.00	0.00
4,100.00	18.00	12.70	3,954.10	974.92	219.79	999.39	0.00	0.00	0.00
4,200.00	18.00	12.70	4,049.21	1,005.07	226.58	1,030.30	0.00	0.00	0.00
4,300.00	18.00	12.70	4,144.31	1,035.22	233.38	1,061.20	0.00	0.00	0.00
4,400.00	18.00	12.70	4,239.42	1,065.37	240.18	1,092.10	0.00	0.00	0.00
4,500.00	18.00	12.70	4,334.52	1,095.51	246.97	1,123.01	0.00	0.00	0.00
4,600.00	18.00	12.70	4,429.63	1,125.66	253.77	1,153.91	0.00	0.00	0.00
4,700.00	18.00	12.70	4,524.73	1,155.81	260.56	1,184.82	0.00	0.00	0.00

Database:	Southern Region	Local Co-ordinate Reference:	Well 30-13
Company:	Great Western	TVD Reference:	WELL @ 4967.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4967.00usft (Cade 22)
Site:	Raindance	North Reference:	Grid
Well:	30-13	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)
4,800.00	18.00	12.70	4,619.84	1,185.96	267.36	1,215.72	0.00	0.00	0.00
4,900.00	18.00	12.70	4,714.94	1,216.10	274.16	1,246.62	0.00	0.00	0.00
5,000.00	18.00	12.70	4,810.05	1,246.25	280.95	1,277.53	0.00	0.00	0.00
5,100.00	18.00	12.70	4,905.15	1,276.40	287.75	1,308.43	0.00	0.00	0.00
5,200.00	18.00	12.70	5,000.25	1,306.55	294.55	1,339.34	0.00	0.00	0.00
5,300.00	18.00	12.70	5,095.36	1,336.70	301.34	1,370.24	0.00	0.00	0.00
5,400.00	18.00	12.70	5,190.46	1,366.84	308.14	1,401.15	0.00	0.00	0.00
5,462.12	18.00	12.70	5,249.55	1,385.57	312.36	1,420.34	0.00	0.00	0.00
Begin 1.50°/100' Drop									
5,500.00	17.43	12.70	5,285.63	1,396.82	314.90	1,431.87	1.50	-1.50	0.00
5,600.00	15.93	12.70	5,381.41	1,424.82	321.21	1,460.58	1.50	-1.50	0.00
5,700.00	14.43	12.70	5,477.92	1,450.37	326.97	1,486.77	1.50	-1.50	0.00
5,800.00	12.93	12.70	5,575.08	1,473.45	332.17	1,510.42	1.50	-1.50	0.00
5,900.00	11.43	12.70	5,672.83	1,494.03	336.81	1,531.53	1.50	-1.50	0.00
6,000.00	9.93	12.70	5,771.09	1,512.12	340.89	1,550.06	1.50	-1.50	0.00
6,100.00	8.43	12.70	5,869.80	1,527.68	344.40	1,566.02	1.50	-1.50	0.00
6,200.00	6.93	12.70	5,968.90	1,540.73	347.34	1,579.39	1.50	-1.50	0.00
6,300.00	5.43	12.70	6,068.32	1,551.23	349.71	1,590.16	1.50	-1.50	0.00
6,400.00	3.93	12.70	6,167.98	1,559.20	351.50	1,598.33	1.50	-1.50	0.00
6,500.00	2.43	12.70	6,267.83	1,564.62	352.73	1,603.88	1.50	-1.50	0.00
6,600.00	0.93	12.70	6,367.78	1,567.48	353.37	1,606.82	1.50	-1.50	0.00
6,662.22	0.00	0.00	6,430.00	1,567.98	353.48	1,607.33	1.50	-1.50	-20.42
Begin Vertical Hold									
6,700.00	0.00	0.00	6,467.78	1,567.98	353.48	1,607.33	0.00	0.00	0.00
6,800.00	0.00	0.00	6,567.78	1,567.98	353.48	1,607.33	0.00	0.00	0.00
6,900.00	0.00	0.00	6,667.78	1,567.98	353.48	1,607.33	0.00	0.00	0.00
7,000.00	0.00	0.00	6,767.78	1,567.98	353.48	1,607.33	0.00	0.00	0.00
7,100.00	0.00	0.00	6,867.78	1,567.98	353.48	1,607.33	0.00	0.00	0.00
7,189.22	0.00	0.00	6,957.00	1,567.98	353.48	1,607.33	0.00	0.00	0.00
Niobrara									
7,200.00	0.00	0.00	6,967.78	1,567.98	353.48	1,607.33	0.00	0.00	0.00
7,300.00	0.00	0.00	7,067.78	1,567.98	353.48	1,607.33	0.00	0.00	0.00
7,400.00	0.00	0.00	7,167.78	1,567.98	353.48	1,607.33	0.00	0.00	0.00
7,500.00	0.00	0.00	7,267.78	1,567.98	353.48	1,607.33	0.00	0.00	0.00
7,600.00	0.00	0.00	7,367.78	1,567.98	353.48	1,607.33	0.00	0.00	0.00
7,689.22	0.00	0.00	7,457.00	1,567.98	353.48	1,607.33	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 - Raindance 3C	0.00	0.00	7,457.00	1,567.98	353.48	1,409,383.65	3,155,286.23	40° 27' 20.9468 N	104° 56' 31.117 W
- plan hits target center									
- Circle (radius 200.00)									

Database:	Southern Region	Local Co-ordinate Reference:	Well 30-13
Company:	Great Western	TVD Reference:	WELL @ 4967.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4967.00usft (Cade 22)
Site:	Raindance	North Reference:	Grid
Well:	30-13	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
601.31	600.00	9 5/8"	9-5/8	12-1/4	

Formations					
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
7,189.22	6,957.00	Niobrara		0.00	

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
200.00	200.00	0.00	0.00	KOP, 2.00°/100' Build	
600.00	598.70	27.20	6.13	Begin 8.00° Tangent	
1,000.00	994.81	81.50	18.37	Begin 2.00°/100' Build	
1,500.08	1,481.45	191.11	43.08	Begin 18.00° Tangent	
5,462.12	5,249.55	1,385.57	312.36	Begin 1.50°/100' Drop	
6,662.22	6,430.00	1,567.98	353.48	Begin Vertical Hold	
7,689.22	7,457.00	1,567.98	353.48	PBHL	