

Great Western

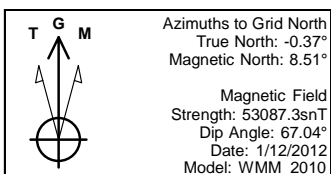
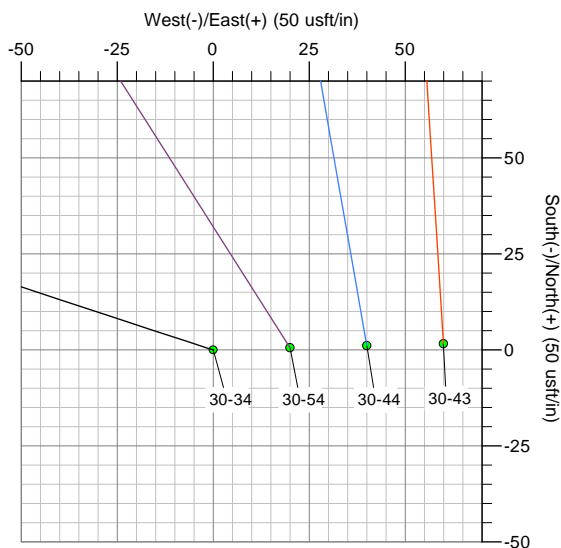
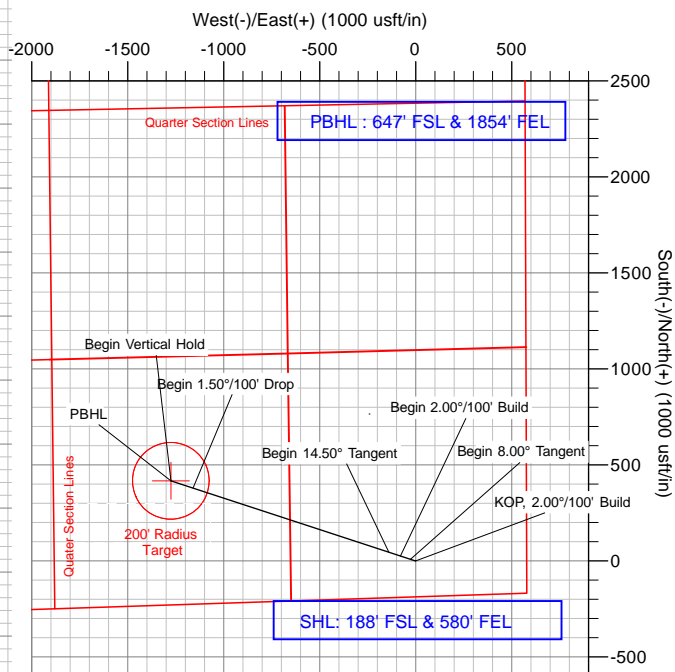
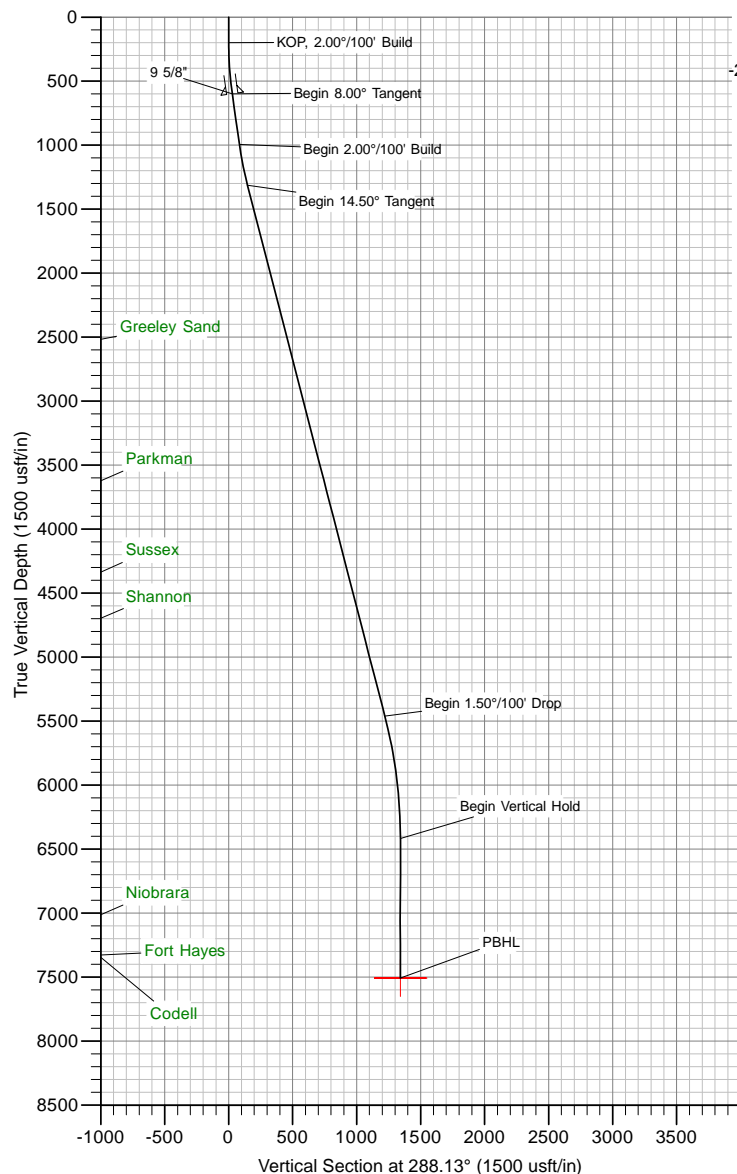
Company: Great Western
Site: Raindance
Well: 30-34
Project: Weld County, Colorado (NAD 83)
Rig Name: Cade 22

MS Energy Services
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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	288.13	598.70	8.68	-26.50	27.88	27.88	Begin 8.00° Tangent
1000.00	8.00	288.13	994.81	26.00	-79.40	83.55	83.55	Begin 2.00°/100' Build
1325.23	14.50	288.13	1313.62	45.74	-139.68	146.98	146.98	Begin 14.50° Tangent
5608.45	14.50	288.13	5460.32	379.55	-1159.19	1219.74	1219.74	Begin 1.50°/100' Drop
6575.43	0.00	0.00	6417.00	417.43	-1274.89	1341.49	1341.49	Begin Vertical Hold
7664.43	0.00	0.00	7506.00	417.43	-1274.89	1341.49	1341.49	PBHL



Created By: Marcus Mitcham
Date: 15:07, January 12 2012
Plan: Design #1

US State Plane 1983
Colorado Northern Zone

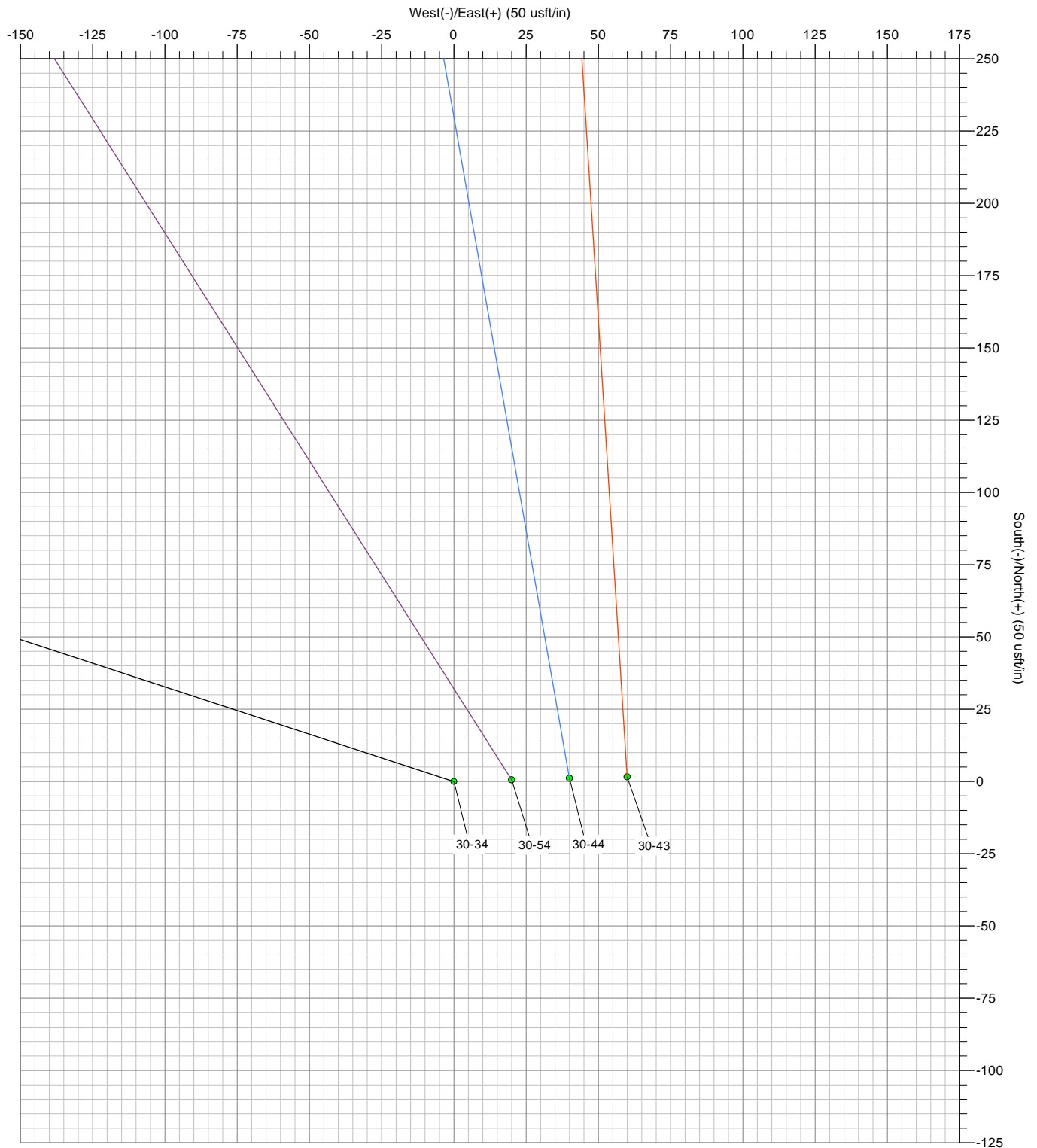
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Great Western

Weld County, Colorado (NAD 83)

Raindance

30-34

Wellbore #1

Plan: Design #1

Standard Planning Report

12 January, 2012

Database:	Local DB	Local Co-ordinate Reference:	Well 30-34
Company:	Great Western	TVD Reference:	WELL @ 4999.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4999.00usft (Cade 22)
Site:	Raindance	North Reference:	Grid
Well:	30-34	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	30-34			
Well Position	+N/-S	1,407,725.36 usft	Northing:	1,407,725.36 usft
	+E/-W	3,159,024.24 usft	Easting:	3,159,024.24 usft
Position Uncertainty		0.00 usft	Wellhead Elevation:	
			Latitude:	40° 27' 4.325 N
			Longitude:	104° 55' 42.899 W
			Ground Level:	4,985.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM_2010	1/12/2012	8.87	67.04	53,087

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	288.13

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	288.13	598.70	8.68	-26.50	2.00	2.00	0.00	288.13	
1,000.00	8.00	288.13	994.81	26.00	-79.40	0.00	0.00	0.00	0.00	
1,325.23	14.50	288.13	1,313.62	45.74	-139.68	2.00	2.00	0.00	0.00	
5,608.45	14.50	288.13	5,460.32	379.55	-1,159.19	0.00	0.00	0.00	0.00	
6,575.43	0.00	0.01	6,417.00	417.43	-1,274.89	1.50	-1.50	0.00	180.00	
7,664.43	0.00	0.01	7,506.00	417.43	-1,274.89	0.00	0.00	0.00	0.01	PBHL v1 - Raindance



Database:	Local DB	Local Co-ordinate Reference:	Well 30-34
Company:	Great Western	TVD Reference:	WELL @ 4999.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4999.00usft (Cade 22)
Site:	Raindance	North Reference:	Grid
Well:	30-34	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	288.13	299.98	0.54	-1.66	1.75	2.00	2.00	0.00
400.00	4.00	288.13	399.84	2.17	-6.63	6.98	2.00	2.00	0.00
500.00	6.00	288.13	499.45	4.88	-14.91	15.69	2.00	2.00	0.00
600.00	8.00	288.13	598.70	8.68	-26.50	27.88	2.00	2.00	0.00
Begin 8.00° Tangent									
601.31	8.00	288.13	600.00	8.73	-26.67	28.06	0.00	0.00	0.00
9 5/8"									
700.00	8.00	288.13	697.73	13.01	-39.72	41.80	0.00	0.00	0.00
800.00	8.00	288.13	796.76	17.34	-52.95	55.71	0.00	0.00	0.00
900.00	8.00	288.13	895.78	21.67	-66.17	69.63	0.00	0.00	0.00
1,000.00	8.00	288.13	994.81	26.00	-79.40	83.55	0.00	0.00	0.00
Begin 2.00°/100' Build									
1,100.00	10.00	288.13	1,093.57	30.87	-94.27	99.19	2.00	2.00	0.00
1,200.00	12.00	288.13	1,191.73	36.80	-112.40	118.27	2.00	2.00	0.00
1,300.00	14.00	288.13	1,289.16	43.80	-133.78	140.77	2.00	2.00	0.00
1,325.23	14.50	288.13	1,313.62	45.74	-139.68	146.98	2.00	2.00	0.00
Begin 14.50° Tangent									
1,400.00	14.50	288.13	1,386.00	51.56	-157.48	165.70	0.00	0.00	0.00
1,500.00	14.50	288.13	1,482.82	59.36	-181.28	190.75	0.00	0.00	0.00
1,600.00	14.50	288.13	1,579.63	67.15	-205.08	215.80	0.00	0.00	0.00
1,700.00	14.50	288.13	1,676.44	74.94	-228.88	240.84	0.00	0.00	0.00
1,800.00	14.50	288.13	1,773.25	82.74	-252.69	265.89	0.00	0.00	0.00
1,900.00	14.50	288.13	1,870.07	90.53	-276.49	290.93	0.00	0.00	0.00
2,000.00	14.50	288.13	1,966.88	98.32	-300.29	315.98	0.00	0.00	0.00
2,100.00	14.50	288.13	2,063.69	106.12	-324.09	341.02	0.00	0.00	0.00
2,200.00	14.50	288.13	2,160.50	113.91	-347.90	366.07	0.00	0.00	0.00
2,300.00	14.50	288.13	2,257.32	121.70	-371.70	391.12	0.00	0.00	0.00
2,400.00	14.50	288.13	2,354.13	129.50	-395.50	416.16	0.00	0.00	0.00
2,500.00	14.50	288.13	2,450.94	137.29	-419.30	441.21	0.00	0.00	0.00
2,568.23	14.50	288.13	2,517.00	142.61	-435.54	458.30	0.00	0.00	0.00
Greeley Sand									
2,600.00	14.50	288.13	2,547.76	145.08	-443.11	466.25	0.00	0.00	0.00
2,700.00	14.50	288.13	2,644.57	152.88	-466.91	491.30	0.00	0.00	0.00
2,800.00	14.50	288.13	2,741.38	160.67	-490.71	516.35	0.00	0.00	0.00
2,900.00	14.50	288.13	2,838.19	168.46	-514.51	541.39	0.00	0.00	0.00
3,000.00	14.50	288.13	2,935.01	176.26	-538.32	566.44	0.00	0.00	0.00
3,100.00	14.50	288.13	3,031.82	184.05	-562.12	591.48	0.00	0.00	0.00
3,200.00	14.50	288.13	3,128.63	191.84	-585.92	616.53	0.00	0.00	0.00
3,300.00	14.50	288.13	3,225.44	199.64	-609.72	641.57	0.00	0.00	0.00
3,400.00	14.50	288.13	3,322.26	207.43	-633.53	666.62	0.00	0.00	0.00
3,500.00	14.50	288.13	3,419.07	215.23	-657.33	691.67	0.00	0.00	0.00
3,600.00	14.50	288.13	3,515.88	223.02	-681.13	716.71	0.00	0.00	0.00
3,700.00	14.50	288.13	3,612.70	230.81	-704.93	741.76	0.00	0.00	0.00
3,708.58	14.50	288.13	3,621.00	231.48	-706.97	743.91	0.00	0.00	0.00
Parkman									
3,800.00	14.50	288.13	3,709.51	238.61	-728.73	766.80	0.00	0.00	0.00
3,900.00	14.50	288.13	3,806.32	246.40	-752.54	791.85	0.00	0.00	0.00
4,000.00	14.50	288.13	3,903.13	254.19	-776.34	816.89	0.00	0.00	0.00
4,100.00	14.50	288.13	3,999.95	261.99	-800.14	841.94	0.00	0.00	0.00

Database:	Local DB	Local Co-ordinate Reference:	Well 30-34
Company:	Great Western	TVD Reference:	WELL @ 4999.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4999.00usft (Cade 22)
Site:	Raindance	North Reference:	Grid
Well:	30-34	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)	
4,200.00	14.50	288.13	4,096.76	269.78	-823.94	866.99	0.00	0.00	0.00	
4,300.00	14.50	288.13	4,193.57	277.57	-847.75	892.03	0.00	0.00	0.00	
4,400.00	14.50	288.13	4,290.39	285.37	-871.55	917.08	0.00	0.00	0.00	
4,446.08	14.50	288.13	4,335.00	288.96	-882.52	928.62	0.00	0.00	0.00	
Sussex										
4,500.00	14.50	288.13	4,387.20	293.16	-895.35	942.12	0.00	0.00	0.00	
4,600.00	14.50	288.13	4,484.01	300.95	-919.15	967.17	0.00	0.00	0.00	
4,700.00	14.50	288.13	4,580.82	308.75	-942.96	992.22	0.00	0.00	0.00	
4,800.00	14.50	288.13	4,677.64	316.54	-966.76	1,017.26	0.00	0.00	0.00	
4,818.97	14.50	288.13	4,696.00	318.02	-971.27	1,022.01	0.00	0.00	0.00	
Shannon										
4,900.00	14.50	288.13	4,774.45	324.33	-990.56	1,042.31	0.00	0.00	0.00	
5,000.00	14.50	288.13	4,871.26	332.13	-1,014.36	1,067.35	0.00	0.00	0.00	
5,100.00	14.50	288.13	4,968.07	339.92	-1,038.17	1,092.40	0.00	0.00	0.00	
5,200.00	14.50	288.13	5,064.89	347.71	-1,061.97	1,117.44	0.00	0.00	0.00	
5,300.00	14.50	288.13	5,161.70	355.51	-1,085.77	1,142.49	0.00	0.00	0.00	
5,400.00	14.50	288.13	5,258.51	363.30	-1,109.57	1,167.54	0.00	0.00	0.00	
5,500.00	14.50	288.13	5,355.33	371.09	-1,133.38	1,192.58	0.00	0.00	0.00	
5,608.45	14.50	288.13	5,460.32	379.55	-1,159.19	1,219.74	0.00	0.00	0.00	
Begin 1.50°/100' Drop										
5,700.00	13.13	288.13	5,549.22	386.35	-1,179.97	1,241.61	1.50	-1.50	0.00	
5,800.00	11.63	288.13	5,646.89	393.02	-1,200.35	1,263.05	1.50	-1.50	0.00	
5,900.00	10.13	288.13	5,745.09	398.90	-1,218.29	1,281.93	1.50	-1.50	0.00	
6,000.00	8.63	288.13	5,843.75	403.97	-1,233.78	1,298.23	1.50	-1.50	0.00	
6,100.00	7.13	288.13	5,942.80	408.24	-1,246.81	1,311.94	1.50	-1.50	0.00	
6,200.00	5.63	288.13	6,042.18	411.69	-1,257.37	1,323.05	1.50	-1.50	0.00	
6,300.00	4.13	288.13	6,141.81	414.34	-1,265.46	1,331.56	1.50	-1.50	0.00	
6,400.00	2.63	288.13	6,241.63	416.18	-1,271.06	1,337.46	1.50	-1.50	0.00	
6,500.00	1.13	288.13	6,341.58	417.20	-1,274.18	1,340.74	1.50	-1.50	0.00	
6,575.43	0.00	0.01	6,417.00	417.43	-1,274.89	1,341.49	1.50	-1.50	0.00	
Begin Vertical Hold										
6,600.00	0.00	0.01	6,441.57	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
6,700.00	0.00	0.01	6,541.57	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
6,800.00	0.00	0.01	6,641.57	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
6,900.00	0.00	0.01	6,741.57	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
7,000.00	0.00	0.01	6,841.57	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
7,100.00	0.00	0.01	6,941.57	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
7,170.43	0.00	0.01	7,012.00	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
Niobrara										
7,200.00	0.00	0.01	7,041.57	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
7,300.00	0.00	0.01	7,141.57	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
7,400.00	0.00	0.01	7,241.57	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
7,484.43	0.00	0.01	7,326.00	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
Fort Hayes										
7,500.00	0.00	0.01	7,341.57	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
7,504.43	0.00	0.01	7,346.00	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
Codell										
7,600.00	0.00	0.01	7,441.57	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
7,664.43	0.00	0.01	7,506.00	417.43	-1,274.89	1,341.49	0.00	0.00	0.00	
PBHL										

Database:	Local DB	Local Co-ordinate Reference:	Well 30-34
Company:	Great Western	TVD Reference:	WELL @ 4999.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4999.00usft (Cade 22)
Site:	Raindance	North Reference:	Grid
Well:	30-34	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

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	7,506.00	417.43	-1,274.89	1,408,142.79	3,157,749.35	40° 27' 8.531 N	104° 55' 59.356 W
- plan hits target center									
- Point									

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 (°)
2,568.23	2,517.00	Greeley Sand		0.00	
3,708.58	3,621.00	Parkman		0.00	
4,446.08	4,335.00	Sussex		0.00	
4,818.97	4,696.00	Shannon		0.00	
7,170.43	7,012.00	Niobrara		0.00	
7,484.43	7,326.00	Fort Hayes		0.00	
7,504.43	7,346.00	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	8.68	-26.50	Begin 8.00° Tangent
1,000.00	994.81	26.00	-79.40	Begin 2.00°/100' Build
1,325.23	1,313.62	45.74	-139.68	Begin 14.50° Tangent
5,608.45	5,460.32	379.55	-1,159.19	Begin 1.50°/100' Drop
6,575.43	6,417.00	417.43	-1,274.89	Begin Vertical Hold
7,664.43	7,506.00	417.43	-1,274.89	PBHL