

Great Western

Weld County, Colorado (NAD 83)

Diamond Valley

22-32-12

Wellbore #1

Plan: Design #1

Standard Planning Report

22 December, 2011

Database:	Local DB	Local Co-ordinate Reference:	Well 22-32-12
Company:	Great Western	TVD Reference:	WELL @ 4781.00usft (Cade 22)
Project:	Weld County, Colorado (NAD 83)	MD Reference:	WELL @ 4781.00usft (Cade 22)
Site:	Diamond Valley	North Reference:	Grid
Well:	22-32-12	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	22-32-12					
Well Position	+N/-S	1,412,687.69 usft	Northing:	1,412,687.69 usft	Latitude:	40° 27' 52.359 N
	+E/-W	3,174,053.27 usft	Easting:	3,174,053.27 usft	Longitude:	104° 52' 28.040 W
Position Uncertainty		0.00 usft	Wellhead Elevation:		Ground Level:	4,767.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM_2010	12/15/2011	8.86	67.07	53,110

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	356.47

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	356.47	598.70	27.83	-1.72	2.00	2.00	0.00	356.47	PBHL v1 Diamond - 2
1,000.00	8.00	356.47	994.81	83.39	-5.14	0.00	0.00	0.00	0.00	
2,500.24	38.00	356.47	2,360.04	661.87	-40.82	2.00	2.00	0.00	0.00	
5,115.90	38.00	356.47	4,421.07	2,269.35	-139.95	0.00	0.00	0.00	0.00	
7,016.14	0.00	0.00	6,185.00	2,875.65	-177.34	2.00	-2.00	0.00	180.00	
8,152.14	0.00	0.00	7,321.00	2,875.65	-177.34	0.00	0.00	0.00	0.00	PBHL v1 Diamond - 2

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Site:	Diamond Valley	North Reference:	Grid
Well:	22-32-12	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	0.00
100.00	0.00	0.00	100.00	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	0.00
KOP, 2.00°/100' Build										
300.00	2.00	356.47	299.98	1.74	-0.11	1.75	2.00	2.00	2.00	0.00
400.00	4.00	356.47	399.84	6.97	-0.43	6.98	2.00	2.00	2.00	0.00
9 5/8"										
500.00	6.00	356.47	499.45	15.66	-0.97	15.69	2.00	2.00	2.00	0.00
600.00	8.00	356.47	598.70	27.83	-1.72	27.88	2.00	2.00	2.00	0.00
Begin 8.00° Tangent										
700.00	8.00	356.47	697.73	41.72	-2.57	41.80	0.00	0.00	0.00	0.00
800.00	8.00	356.47	796.76	55.61	-3.43	55.71	0.00	0.00	0.00	0.00
900.00	8.00	356.47	895.78	69.50	-4.29	69.63	0.00	0.00	0.00	0.00
1,000.00	8.00	356.47	994.81	83.39	-5.14	83.55	0.00	0.00	0.00	0.00
Begin 2.00°/100' Build										
1,100.00	10.00	356.47	1,093.57	99.00	-6.11	99.19	2.00	2.00	2.00	0.00
1,200.00	12.00	356.47	1,191.73	118.05	-7.28	118.27	2.00	2.00	2.00	0.00
1,300.00	14.00	356.47	1,289.16	140.50	-8.66	140.77	2.00	2.00	2.00	0.00
1,400.00	16.00	356.47	1,385.75	166.33	-10.26	166.65	2.00	2.00	2.00	0.00
1,500.00	18.00	356.47	1,481.38	195.51	-12.06	195.88	2.00	2.00	2.00	0.00
1,600.00	20.00	356.47	1,575.92	228.00	-14.06	228.44	2.00	2.00	2.00	0.00
1,700.00	22.00	356.47	1,669.28	263.77	-16.27	264.27	2.00	2.00	2.00	0.00
1,800.00	24.00	356.47	1,761.32	302.77	-18.67	303.34	2.00	2.00	2.00	0.00
1,900.00	26.00	356.47	1,851.95	344.95	-21.27	345.60	2.00	2.00	2.00	0.00
2,000.00	28.00	356.47	1,941.04	390.26	-24.07	391.00	2.00	2.00	2.00	0.00
2,100.00	30.00	356.47	2,028.50	438.64	-27.05	439.48	2.00	2.00	2.00	0.00
2,200.00	32.00	356.47	2,114.21	490.05	-30.22	490.98	2.00	2.00	2.00	0.00
2,300.00	34.00	356.47	2,198.08	544.41	-33.57	545.44	2.00	2.00	2.00	0.00
2,400.00	36.00	356.47	2,279.99	601.65	-37.10	602.80	2.00	2.00	2.00	0.00
2,500.24	38.00	356.47	2,360.04	661.87	-40.82	663.12	2.00	2.00	2.00	0.00
Begin 38.00° Tangent										
2,571.26	38.00	356.47	2,416.00	705.51	-43.51	706.85	0.00	0.00	0.00	0.00
Greeley Sand										
2,600.00	38.00	356.47	2,438.64	723.17	-44.60	724.55	0.00	0.00	0.00	0.00
2,700.00	38.00	356.47	2,517.44	784.63	-48.39	786.12	0.00	0.00	0.00	0.00
2,800.00	38.00	356.47	2,596.23	846.08	-52.18	847.69	0.00	0.00	0.00	0.00
2,900.00	38.00	356.47	2,675.03	907.54	-55.97	909.27	0.00	0.00	0.00	0.00
3,000.00	38.00	356.47	2,753.83	969.00	-59.76	970.84	0.00	0.00	0.00	0.00
3,100.00	38.00	356.47	2,832.62	1,030.45	-63.55	1,032.41	0.00	0.00	0.00	0.00
3,200.00	38.00	356.47	2,911.42	1,091.91	-67.34	1,093.98	0.00	0.00	0.00	0.00
3,300.00	38.00	356.47	2,990.21	1,153.37	-71.13	1,155.56	0.00	0.00	0.00	0.00
3,400.00	38.00	356.47	3,069.01	1,214.82	-74.92	1,217.13	0.00	0.00	0.00	0.00
3,500.00	38.00	356.47	3,147.81	1,276.28	-78.71	1,278.70	0.00	0.00	0.00	0.00
3,600.00	38.00	356.47	3,226.60	1,337.73	-82.50	1,340.28	0.00	0.00	0.00	0.00
3,700.00	38.00	356.47	3,305.40	1,399.19	-86.29	1,401.85	0.00	0.00	0.00	0.00
3,800.00	38.00	356.47	3,384.19	1,460.65	-90.08	1,463.42	0.00	0.00	0.00	0.00
3,900.00	38.00	356.47	3,462.99	1,522.10	-93.87	1,524.99	0.00	0.00	0.00	0.00
3,948.24	38.00	356.47	3,501.00	1,551.75	-95.70	1,554.70	0.00	0.00	0.00	0.00
Parkman										
4,000.00	38.00	356.47	3,541.78	1,583.56	-97.66	1,586.57	0.00	0.00	0.00	0.00
4,100.00	38.00	356.47	3,620.58	1,645.01	-101.45	1,648.14	0.00	0.00	0.00	0.00
4,200.00	38.00	356.47	3,699.38	1,706.47	-105.24	1,709.71	0.00	0.00	0.00	0.00
4,300.00	38.00	356.47	3,778.17	1,767.93	-109.03	1,771.29	0.00	0.00	0.00	0.00

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Wellbore:	Wellbore #1		
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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)	
4,400.00	38.00	356.47	3,856.97	1,829.38	-112.82	1,832.86	0.00	0.00	0.00	
4,500.00	38.00	356.47	3,935.76	1,890.84	-116.61	1,894.43	0.00	0.00	0.00	
4,600.00	38.00	356.47	4,014.56	1,952.30	-120.40	1,956.00	0.00	0.00	0.00	
4,700.00	38.00	356.47	4,093.36	2,013.75	-124.19	2,017.58	0.00	0.00	0.00	
4,760.47	38.00	356.47	4,141.00	2,050.91	-126.48	2,054.81	0.00	0.00	0.00	
Sussex										
4,800.00	38.00	356.47	4,172.15	2,075.21	-127.98	2,079.15	0.00	0.00	0.00	
4,900.00	38.00	356.47	4,250.95	2,136.66	-131.77	2,140.72	0.00	0.00	0.00	
5,000.00	38.00	356.47	4,329.74	2,198.12	-135.56	2,202.30	0.00	0.00	0.00	
5,100.00	38.00	356.47	4,408.54	2,259.58	-139.35	2,263.87	0.00	0.00	0.00	
5,115.90	38.00	356.47	4,421.07	2,269.35	-139.95	2,273.66	0.00	0.00	0.00	
Begin 2.00°/100' Drop										
5,200.00	36.32	356.47	4,488.09	2,320.05	-143.08	2,324.46	2.00	-2.00	0.00	
5,300.00	34.32	356.47	4,569.67	2,377.76	-146.64	2,382.28	2.00	-2.00	0.00	
5,313.69	34.05	356.47	4,581.00	2,385.44	-147.11	2,389.97	2.00	-2.00	0.00	
Shannon										
5,400.00	32.32	356.47	4,653.23	2,432.59	-150.02	2,437.21	2.00	-2.00	0.00	
5,500.00	30.32	356.47	4,738.65	2,484.47	-153.22	2,489.19	2.00	-2.00	0.00	
5,600.00	28.32	356.47	4,825.83	2,533.35	-156.23	2,538.16	2.00	-2.00	0.00	
5,700.00	26.32	356.47	4,914.67	2,579.16	-159.06	2,584.06	2.00	-2.00	0.00	
5,800.00	24.32	356.47	5,005.06	2,621.85	-161.69	2,626.83	2.00	-2.00	0.00	
5,900.00	22.32	356.47	5,096.88	2,661.36	-164.13	2,666.42	2.00	-2.00	0.00	
6,000.00	20.32	356.47	5,190.03	2,697.66	-166.36	2,702.78	2.00	-2.00	0.00	
6,100.00	18.32	356.47	5,284.39	2,730.68	-168.40	2,735.87	2.00	-2.00	0.00	
6,200.00	16.32	356.47	5,379.85	2,760.40	-170.23	2,765.64	2.00	-2.00	0.00	
6,300.00	14.32	356.47	5,476.29	2,786.77	-171.86	2,792.07	2.00	-2.00	0.00	
6,400.00	12.32	356.47	5,573.60	2,809.77	-173.28	2,815.11	2.00	-2.00	0.00	
6,500.00	10.32	356.47	5,671.64	2,829.37	-174.49	2,834.74	2.00	-2.00	0.00	
6,600.00	8.32	356.47	5,770.32	2,845.54	-175.48	2,850.94	2.00	-2.00	0.00	
6,700.00	6.32	356.47	5,869.50	2,858.26	-176.27	2,863.69	2.00	-2.00	0.00	
6,800.00	4.32	356.47	5,969.06	2,867.52	-176.84	2,872.96	2.00	-2.00	0.00	
6,900.00	2.32	356.47	6,068.89	2,873.30	-177.20	2,878.76	2.00	-2.00	0.00	
7,000.00	0.32	356.47	6,168.86	2,875.60	-177.34	2,881.07	2.00	-2.00	0.00	
7,016.14	0.00	0.00	6,185.00	2,875.65	-177.34	2,881.11	2.00	-2.00	21.86	
Begin Vertical Hold										
7,100.00	0.00	0.00	6,268.86	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	
7,200.00	0.00	0.00	6,368.86	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	
7,300.00	0.00	0.00	6,468.86	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	
7,400.00	0.00	0.00	6,568.86	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	
7,500.00	0.00	0.00	6,668.86	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	
7,600.00	0.00	0.00	6,768.86	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	
7,662.14	0.00	0.00	6,831.00	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	
Niobrara										
7,700.00	0.00	0.00	6,868.86	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	
7,800.00	0.00	0.00	6,968.86	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	
7,900.00	0.00	0.00	7,068.86	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	
7,962.14	0.00	0.00	7,131.00	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	
Fort Hayes										
7,992.14	0.00	0.00	7,161.00	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	
Codell										
8,000.00	0.00	0.00	7,168.86	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	
8,100.00	0.00	0.00	7,268.86	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	
8,152.14	0.00	0.00	7,321.00	2,875.65	-177.34	2,881.11	0.00	0.00	0.00	

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Site:	Diamond Valley	North Reference:	Grid
Well:	22-32-12	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)
PBHL									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
PBHL v1 Diamond - 22-32-12 - hit/miss target - Shape - Circle (radius 200.00)	0.00	0.00	7,321.00	2,875.65	-177.34	1,415,563.34	3,173,875.93	40° 28' 20.787 N	104° 52' 30.073 W

Casing Points					
Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")	
400.00	399.84	9 5/8"	9-5/8	12-1/4	

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
2,571.26	2,416.00	Greeley Sand		0.00		
3,948.24	3,501.00	Parkman		0.00		
4,760.47	4,141.00	Sussex		0.00		
5,313.69	4,581.00	Shannon		0.00		
7,662.14	6,831.00	Niobrara		0.00		
7,962.14	7,131.00	Fort Hayes		0.00		
7,992.14	7,161.00	Codell		0.00		

Plan Annotations					
Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment	
200.00	200.00	0.00	0.00	KOP, 2.00°/100' Build	
600.00	598.70	27.83	-1.72	Begin 8.00° Tangent	
1,000.00	994.81	83.39	-5.14	Begin 2.00°/100' Build	
2,500.24	2,360.04	661.87	-40.82	Begin 38.00° Tangent	
5,115.90	4,421.07	2,269.35	-139.95	Begin 2.00°/100' Drop	
7,016.14	6,185.00	2,875.65	-177.34	Begin Vertical Hold	
8,152.14	7,321.00	2,875.65	-177.34	PBHL	