

Great Western

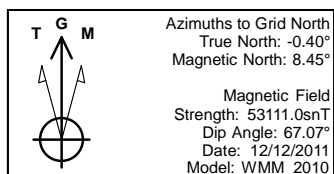
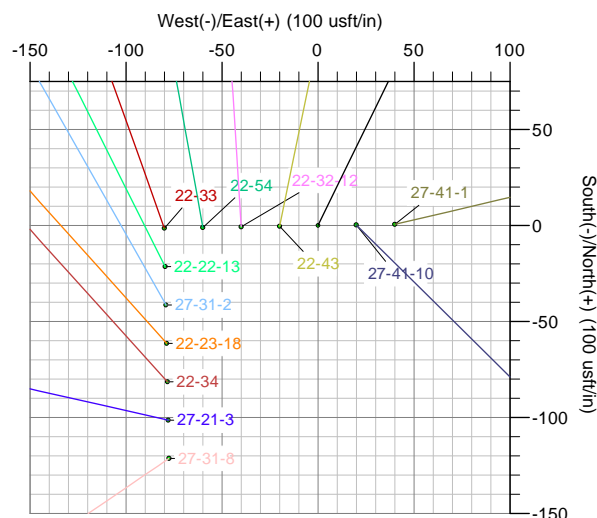
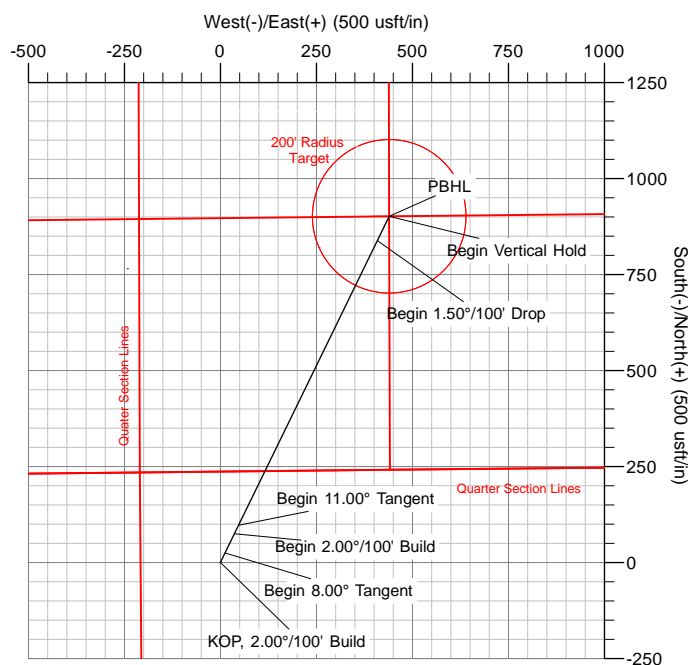
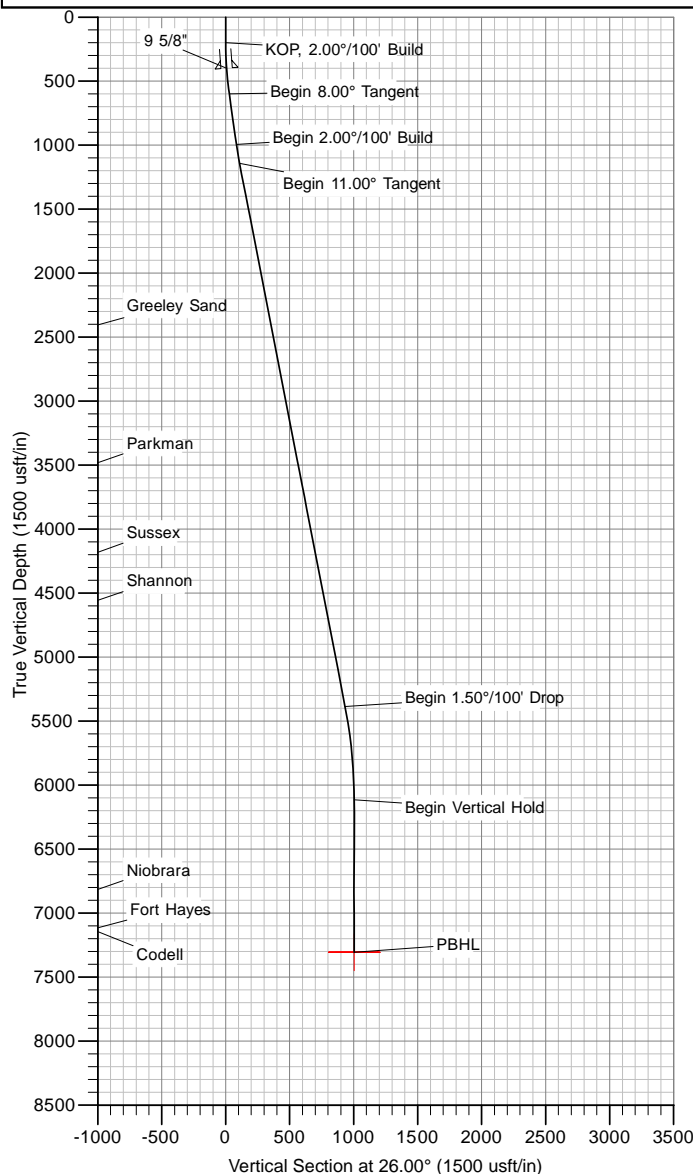
Company: Great Western
Site: Diamond Valley
Well: 22-44
Project: Weld County, Colorado (NAD 83)
Rig Name: Cade 22



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	26.00	598.70	25.06	12.22	27.88	27.88	Begin 8.00° Tangent
1000.00	8.00	26.00	994.81	75.09	36.63	83.55	83.55	Begin 2.00°/100' Build
1150.10	11.00	26.00	1142.83	97.36	47.49	108.32	108.32	Begin 11.00° Tangent
5472.75	11.00	26.00	5386.03	838.82	409.13	933.27	933.27	Begin 1.50°/100' Drop
6206.21	0.00	0.00	6115.00	901.92	439.90	1003.48	1003.48	Begin Vertical Hold
7397.21	0.00	0.00	7306.00	901.92	439.90	1003.48	1003.48	PBHL



Created By: Marcus Mitcham
Date: 12:29, December 22 2011
Plan: Design #1

US State Plane 1983
Colorado Northern Zone

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)

Diamond Valley

22-44

Wellbore #1

Plan: Design #1

Standard Planning Report

22 December, 2011

Database:	Local DB	Local Co-ordinate Reference:	Well 22-44
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:	22-44	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	22-44			
Well Position	+N/-S	1,412,688.36 usft	Northing:	1,412,688.36 usft
	+E/-W	3,174,093.22 usft	Easting:	3,174,093.22 usft
Position Uncertainty		0.00 usft	Wellhead Elevation:	
			Latitude:	40° 27' 52.362 N
			Longitude:	104° 52' 27.523 W
			Ground Level:	4,767.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM_2010	12/12/2011	8.86	67.07	53,111

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	26.00

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	26.00	598.70	25.06	12.22	2.00	2.00	0.00	26.00	PBHL v1 - Diamond \
1,000.00	8.00	26.00	994.81	75.09	36.63	0.00	0.00	0.00	0.00	
1,150.10	11.00	26.00	1,142.83	97.36	47.49	2.00	2.00	0.00	0.00	
5,472.75	11.00	26.00	5,386.03	838.82	409.13	0.00	0.00	0.00	0.00	
6,206.21	0.00	0.00	6,115.00	901.92	439.90	1.50	-1.50	0.00	180.00	
7,397.21	0.00	0.00	7,306.00	901.92	439.90	0.00	0.00	0.00	0.00	PBHL v1 - Diamond \

Database:	Local DB	Local Co-ordinate Reference:	Well 22-44
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:	22-44	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	26.00	299.98	1.57	0.77	1.75	2.00	2.00	0.00
400.00	4.00	26.00	399.84	6.27	3.06	6.98	2.00	2.00	0.00
400.16	4.00	26.00	400.00	6.28	3.06	6.99	0.00	0.00	0.00
9 5/8"									
500.00	6.00	26.00	499.45	14.11	6.88	15.69	2.00	2.00	0.00
600.00	8.00	26.00	598.70	25.06	12.22	27.88	2.00	2.00	0.00
Begin 8.00° Tangent									
700.00	8.00	26.00	697.73	37.57	18.32	41.80	0.00	0.00	0.00
800.00	8.00	26.00	796.76	50.08	24.42	55.71	0.00	0.00	0.00
900.00	8.00	26.00	895.78	62.58	30.53	69.63	0.00	0.00	0.00
1,000.00	8.00	26.00	994.81	75.09	36.63	83.55	0.00	0.00	0.00
Begin 2.00°/100' Build									
1,100.00	10.00	26.00	1,093.57	89.15	43.48	99.19	2.00	2.00	0.00
1,150.10	11.00	26.00	1,142.83	97.36	47.49	108.32	2.00	2.00	0.00
Begin 11.00° Tangent									
1,200.00	11.00	26.00	1,191.82	105.92	51.66	117.85	0.00	0.00	0.00
1,300.00	11.00	26.00	1,289.98	123.07	60.03	136.93	0.00	0.00	0.00
1,400.00	11.00	26.00	1,388.14	140.22	68.39	156.01	0.00	0.00	0.00
1,500.00	11.00	26.00	1,486.30	157.38	76.76	175.10	0.00	0.00	0.00
1,600.00	11.00	26.00	1,584.46	174.53	85.13	194.18	0.00	0.00	0.00
1,700.00	11.00	26.00	1,682.63	191.68	93.49	213.27	0.00	0.00	0.00
1,800.00	11.00	26.00	1,780.79	208.84	101.86	232.35	0.00	0.00	0.00
1,900.00	11.00	26.00	1,878.95	225.99	110.22	251.44	0.00	0.00	0.00
2,000.00	11.00	26.00	1,977.11	243.14	118.59	270.52	0.00	0.00	0.00
2,100.00	11.00	26.00	2,075.27	260.29	126.96	289.61	0.00	0.00	0.00
2,200.00	11.00	26.00	2,173.44	277.45	135.32	308.69	0.00	0.00	0.00
2,300.00	11.00	26.00	2,271.60	294.60	143.69	327.77	0.00	0.00	0.00
2,400.00	11.00	26.00	2,369.76	311.75	152.06	346.86	0.00	0.00	0.00
2,436.91	11.00	26.00	2,406.00	318.08	155.14	353.90	0.00	0.00	0.00
Greeley Sand									
2,500.00	11.00	26.00	2,467.92	328.91	160.42	365.94	0.00	0.00	0.00
2,600.00	11.00	26.00	2,566.08	346.06	168.79	385.03	0.00	0.00	0.00
2,700.00	11.00	26.00	2,664.25	363.21	177.15	404.11	0.00	0.00	0.00
2,800.00	11.00	26.00	2,762.41	380.36	185.52	423.20	0.00	0.00	0.00
2,900.00	11.00	26.00	2,860.57	397.52	193.89	442.28	0.00	0.00	0.00
3,000.00	11.00	26.00	2,958.73	414.67	202.25	461.36	0.00	0.00	0.00
3,100.00	11.00	26.00	3,056.89	431.82	210.62	480.45	0.00	0.00	0.00
3,200.00	11.00	26.00	3,155.06	448.98	218.98	499.53	0.00	0.00	0.00
3,300.00	11.00	26.00	3,253.22	466.13	227.35	518.62	0.00	0.00	0.00
3,400.00	11.00	26.00	3,351.38	483.28	235.72	537.70	0.00	0.00	0.00
3,500.00	11.00	26.00	3,449.54	500.43	244.08	556.79	0.00	0.00	0.00
3,532.04	11.00	26.00	3,480.99	505.93	246.76	562.90	0.00	0.00	0.00
Parkman									
3,600.00	11.00	26.00	3,547.70	517.59	252.45	575.87	0.00	0.00	0.00
3,700.00	11.00	26.00	3,645.87	534.74	260.82	594.96	0.00	0.00	0.00
3,800.00	11.00	26.00	3,744.03	551.89	269.18	614.04	0.00	0.00	0.00
3,900.00	11.00	26.00	3,842.19	569.05	277.55	633.12	0.00	0.00	0.00
4,000.00	11.00	26.00	3,940.35	586.20	285.91	652.21	0.00	0.00	0.00
4,100.00	11.00	26.00	4,038.52	603.35	294.28	671.29	0.00	0.00	0.00

Database:	Local DB	Local Co-ordinate Reference:	Well 22-44
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:	22-44	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	11.00	26.00	4,136.68	620.50	302.65	690.38	0.00	0.00	0.00
4,245.14	11.00	26.00	4,180.99	628.25	306.42	698.99	0.00	0.00	0.00
Sussex									
4,300.00	11.00	26.00	4,234.84	637.66	311.01	709.46	0.00	0.00	0.00
4,400.00	11.00	26.00	4,333.00	654.81	319.38	728.55	0.00	0.00	0.00
4,500.00	11.00	26.00	4,431.16	671.96	327.75	747.63	0.00	0.00	0.00
4,600.00	11.00	26.00	4,529.33	689.12	336.11	766.71	0.00	0.00	0.00
4,627.17	11.00	26.00	4,555.99	693.77	338.38	771.90	0.00	0.00	0.00
Shannon									
4,700.00	11.00	26.00	4,627.49	706.27	344.48	785.80	0.00	0.00	0.00
4,800.00	11.00	26.00	4,725.65	723.42	352.84	804.88	0.00	0.00	0.00
4,900.00	11.00	26.00	4,823.81	740.57	361.21	823.97	0.00	0.00	0.00
5,000.00	11.00	26.00	4,921.97	757.73	369.58	843.05	0.00	0.00	0.00
5,100.00	11.00	26.00	5,020.14	774.88	377.94	862.14	0.00	0.00	0.00
5,200.00	11.00	26.00	5,118.30	792.03	386.31	881.22	0.00	0.00	0.00
5,300.00	11.00	26.00	5,216.46	809.19	394.68	900.31	0.00	0.00	0.00
5,400.00	11.00	26.00	5,314.62	826.34	403.04	919.39	0.00	0.00	0.00
5,472.75	11.00	26.00	5,386.03	838.82	409.13	933.27	0.00	0.00	0.00
Begin 1.50°/100' Drop									
5,500.00	10.59	26.00	5,412.80	843.41	411.37	938.38	1.50	-1.50	0.00
5,600.00	9.09	26.00	5,511.33	858.77	418.86	955.47	1.50	-1.50	0.00
5,700.00	7.59	26.00	5,610.27	871.81	425.22	969.98	1.50	-1.50	0.00
5,800.00	6.09	26.00	5,709.55	882.52	430.44	981.90	1.50	-1.50	0.00
5,900.00	4.59	26.00	5,809.11	890.89	434.53	991.21	1.50	-1.50	0.00
6,000.00	3.09	26.00	5,908.89	896.91	437.46	997.91	1.50	-1.50	0.00
6,100.00	1.59	26.00	6,008.80	900.59	439.26	1,002.00	1.50	-1.50	0.00
6,206.21	0.00	0.00	6,115.00	901.92	439.90	1,003.48	1.50	-1.50	0.00
Begin Vertical Hold									
6,300.00	0.00	0.00	6,208.79	901.92	439.90	1,003.48	0.00	0.00	0.00
6,400.00	0.00	0.00	6,308.79	901.92	439.90	1,003.48	0.00	0.00	0.00
6,500.00	0.00	0.00	6,408.79	901.92	439.90	1,003.48	0.00	0.00	0.00
6,600.00	0.00	0.00	6,508.79	901.92	439.90	1,003.48	0.00	0.00	0.00
6,700.00	0.00	0.00	6,608.79	901.92	439.90	1,003.48	0.00	0.00	0.00
6,800.00	0.00	0.00	6,708.79	901.92	439.90	1,003.48	0.00	0.00	0.00
6,900.00	0.00	0.00	6,808.79	901.92	439.90	1,003.48	0.00	0.00	0.00
6,907.20	0.00	0.00	6,815.99	901.92	439.90	1,003.48	0.00	0.00	0.00
Niobrara									
7,000.00	0.00	0.00	6,908.79	901.92	439.90	1,003.48	0.00	0.00	0.00
7,100.00	0.00	0.00	7,008.79	901.92	439.90	1,003.48	0.00	0.00	0.00
7,200.00	0.00	0.00	7,108.79	901.92	439.90	1,003.48	0.00	0.00	0.00
7,207.20	0.00	0.00	7,115.99	901.92	439.90	1,003.48	0.00	0.00	0.00
Fort Hayes									
7,237.20	0.00	0.00	7,145.99	901.92	439.90	1,003.48	0.00	0.00	0.00
Codell									
7,300.00	0.00	0.00	7,208.79	901.92	439.90	1,003.48	0.00	0.00	0.00
7,397.21	0.00	0.00	7,306.00	901.92	439.90	1,003.48	0.00	0.00	0.00
PBHL									

Database:	Local DB	Local Co-ordinate Reference:	Well 22-44
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:	22-44	Survey Calculation Method:	Minimum Curvature
Wellbore:	Wellbore #1		
Design:	Design #1		

Design Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(usft)		
- Shape									
PBHL v1 - Diamond Val	0.00	0.00	7,306.00	901.92	439.90	1,413,590.28	3,174,533.13	40° 28' 1.244 N	104° 52' 21.749 W
- plan hits target center									
- Circle (radius 200.00)									

Casing Points				
Measured Depth	Vertical Depth	Name	Casing Diameter	Hole Diameter
(usft)	(usft)		(")	(")
400.16	400.00	9 5/8"	9-5/8	12-1/4

Formations						
Measured Depth	Vertical Depth	Name	Lithology	Dip	Dip Direction	
(usft)	(usft)			(°)	(°)	
2,436.91	2,406.00	Greeley Sand		0.00		
3,532.04	3,480.99	Parkman		0.00		
4,245.14	4,180.99	Sussex		0.00		
4,627.17	4,555.99	Shannon		0.00		
6,907.20	6,815.99	Niobrara		0.00		
7,207.20	7,115.99	Fort Hayes		0.00		
7,237.20	7,145.99	Codell		0.00		

Plan Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(usft)	(usft)	+N/-S (usft)	+E/-W (usft)	
200.00	200.00	0.00	0.00	KOP, 2.00°/100' Build
600.00	598.70	25.06	12.22	Begin 8.00° Tangent
1,000.00	994.81	75.09	36.63	Begin 2.00°/100' Build
1,150.10	1,142.83	97.36	47.49	Begin 11.00° Tangent
5,472.75	5,386.03	838.82	409.13	Begin 1.50°/100' Drop
6,206.21	6,115.00	901.92	439.90	Begin Vertical Hold
7,397.21	7,306.00	901.92	439.90	PBHL