

Great Western

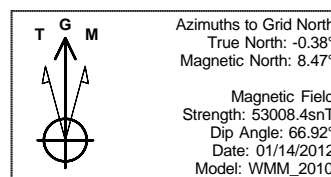
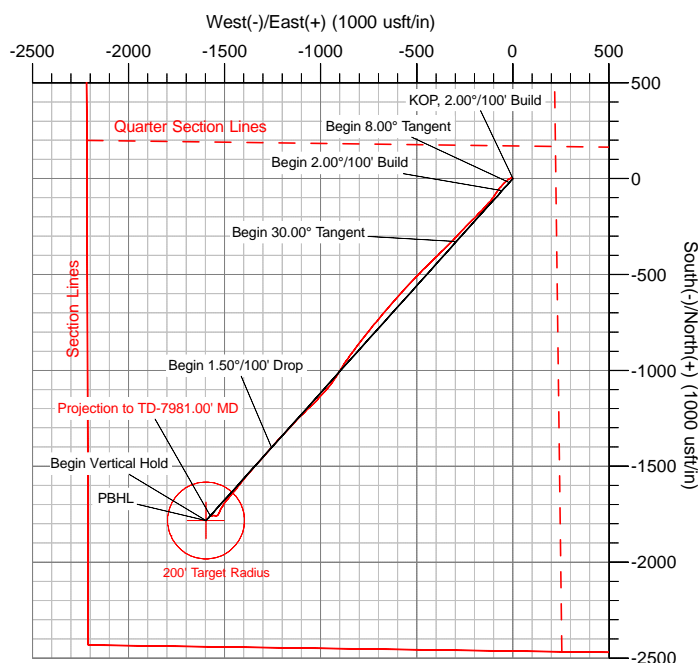
Company: Great Western
 Site: Binder
 Well: 14-20
 Project: Weld County, Colorado (NAD 83)
 Rig Name: Cade 22



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	221.84	598.70	-20.77	-18.60	27.88	27.88	Begin 8.00° Tangent
1000.00	8.00	221.84	994.81	-62.24	-55.74	83.55	83.55	Begin 2.00°/100' Build
2099.95	30.00	221.84	2028.46	-327.37	-293.17	439.45	439.45	Begin 30.00° Tangent
4982.91	30.00	221.84	4525.20	-1401.17	-1254.77	1880.89	1880.89	Begin 1.50°/100' Drop
6982.84	0.00	0.00	6435.00	-1782.38	-1596.15	2392.60	2392.60	Begin Vertical Hold
7965.84	0.00	0.00	7418.00	-1782.38	-1596.15	2392.60	2392.60	PBHL



US State Plane 1983
 Colorado Northern Zone

Created By: Megan Pope
 Date: 10:18, January 23 2012
 Plan: Design #2

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)

Binder

14-20

Wellbore #1

Survey: MS MWD

Standard Survey Report

23 January, 2012

Company:	Great Western	Local Co-ordinate Reference:	Well 14-20
Project:	Weld County, Colorado (NAD 83)	TVD Reference:	WELL @ 4916.00usft (Cade 22)
Site:	Binder	MD Reference:	WELL @ 4916.00usft (Cade 22)
Well:	14-20	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Southern Region

Site	Binder					
Site Position:			Northing:	0.00 usft	Latitude:	36° 7' 5.9694 N
From:	Map		Easting:	0.00 usft	Longitude:	115° 39' 12.952 W
Position Uncertainty:		0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-6.56 °

Well	14-20					
Well Position	+N/-S	0.00 usft	Northing:	1,351,978.30 usft	Latitude:	40° 17' 53.1726 N
	+E/-W	0.00 usft	Easting:	3,163,150.44 usft	Longitude:	104° 54' 54.282 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	4,902.00 usft

Wellbore						Wellbore #1									
Magnetics						Model Name		Sample Date		Declination (°)		Dip Angle (°)		Field Strength (nT)	
						WMM_2010		01/14/12		8.85		66.92		53,008	

Design	Surveys				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	221.84	

Survey Program		Date	01/23/12		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
172.00	7,981.00	MS MWD (Wellbore #1)	MWD	MWD - Standard	

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
172.00	1.50	308.00	171.98	1.39	-1.77	0.15	0.87	0.87	0.00
262.00	2.40	280.20	261.93	2.45	-4.56	1.22	1.42	1.00	-30.89
354.00	3.80	258.10	353.80	2.16	-9.44	4.69	1.97	1.52	-24.02
445.00	5.80	245.80	444.47	-0.35	-16.58	11.32	2.46	2.20	-13.52
540.00	6.70	230.00	538.92	-5.88	-25.21	21.19	2.03	0.95	-16.63
631.00	8.80	226.60	629.08	-14.08	-34.33	33.39	2.36	2.31	-3.74
721.00	10.50	226.00	717.80	-24.50	-45.23	48.43	1.89	1.89	-0.67
816.00	10.70	223.30	811.18	-36.93	-57.51	65.88	0.56	0.21	-2.84
908.00	12.90	219.20	901.23	-51.11	-69.86	84.68	2.56	2.39	-4.46
1,003.00	14.80	213.70	993.47	-69.43	-83.29	107.28	2.43	2.00	-5.79
1,098.00	13.90	212.40	1,085.51	-89.16	-96.14	130.55	1.01	-0.95	-1.37
1,192.00	14.40	217.50	1,176.66	-107.96	-109.31	153.35	1.43	0.53	5.43
1,287.00	15.20	223.30	1,268.51	-126.40	-125.04	177.58	1.77	0.84	6.11
1,382.00	15.10	222.40	1,360.21	-144.60	-141.93	202.40	0.27	-0.11	-0.95

Company:	Great Western	Local Co-ordinate Reference:	Well 14-20
Project:	Weld County, Colorado (NAD 83)	TVD Reference:	WELL @ 4916.00usft (Cade 22)
Site:	Binder	MD Reference:	WELL @ 4916.00usft (Cade 22)
Well:	14-20	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Southern Region

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)	
1,476.00	16.60	225.30	1,450.63	-163.09	-159.73	228.05	1.80	1.60	3.09	
1,571.00	17.20	223.60	1,541.53	-182.81	-179.06	255.63	0.82	0.63	-1.79	
1,665.00	18.20	223.70	1,631.08	-203.48	-198.79	284.20	1.06	1.06	0.11	
1,759.00	19.90	224.80	1,719.93	-225.45	-220.20	314.85	1.85	1.81	1.17	
1,853.00	20.70	224.20	1,808.09	-248.71	-243.06	347.43	0.88	0.85	-0.64	
1,948.00	22.30	223.00	1,896.48	-273.93	-267.06	382.22	1.75	1.68	-1.26	
2,042.00	24.40	223.20	1,982.77	-301.13	-292.51	419.47	2.24	2.23	0.21	
2,137.00	26.40	223.80	2,068.59	-330.68	-320.57	460.20	2.12	2.11	0.63	
2,231.00	27.70	226.30	2,152.31	-360.86	-350.83	502.87	1.84	1.38	2.66	
2,326.00	29.70	224.60	2,235.63	-392.88	-383.32	548.39	2.27	2.11	-1.79	
2,421.00	33.20	226.30	2,316.66	-427.62	-418.66	597.85	3.80	3.68	1.79	
2,515.00	34.20	225.00	2,394.87	-464.08	-455.95	649.89	1.31	1.06	-1.38	
2,609.00	37.00	223.60	2,471.29	-503.25	-494.14	704.55	3.10	2.98	-1.49	
2,703.00	37.40	222.90	2,546.17	-544.65	-533.08	761.36	0.62	0.43	-0.74	
2,797.00	37.00	222.10	2,621.04	-586.55	-571.48	818.19	0.67	-0.43	-0.85	
2,891.00	34.30	221.60	2,697.42	-627.35	-608.03	872.97	2.89	-2.87	-0.53	
2,984.00	33.60	220.20	2,774.57	-666.60	-642.04	924.90	1.13	-0.75	-1.51	
3,078.00	34.20	220.70	2,852.59	-706.49	-676.06	977.31	0.70	0.64	0.53	
3,172.00	35.00	220.30	2,929.96	-747.08	-710.72	1,030.67	0.88	0.85	-0.43	
3,267.00	33.40	218.10	3,008.53	-788.44	-744.48	1,084.00	2.13	-1.68	-2.32	
3,362.00	32.60	217.50	3,088.21	-829.32	-776.19	1,135.62	0.91	-0.84	-0.63	
3,455.00	30.80	218.00	3,167.33	-867.96	-806.11	1,184.36	1.96	-1.94	0.54	
3,550.00	27.80	217.50	3,250.17	-904.71	-834.57	1,230.72	3.17	-3.16	-0.53	
3,643.00	26.70	214.90	3,332.85	-939.06	-859.73	1,273.09	1.74	-1.18	-2.80	
3,738.00	24.70	211.00	3,418.45	-973.58	-882.17	1,313.78	2.76	-2.11	-4.11	
3,831.00	23.20	212.70	3,503.44	-1,005.65	-902.07	1,350.95	1.78	-1.61	1.83	
3,925.00	20.20	212.50	3,590.77	-1,034.93	-920.80	1,385.25	3.19	-3.19	-0.21	
4,020.00	19.50	215.20	3,680.13	-1,061.72	-938.75	1,417.19	1.21	-0.74	2.84	
4,115.00	20.50	219.80	3,769.40	-1,087.46	-958.54	1,449.57	1.96	1.05	4.84	
4,208.00	23.70	222.70	3,855.56	-1,113.71	-981.65	1,484.54	3.63	3.44	3.12	
4,301.00	26.20	222.10	3,939.88	-1,142.68	-1,008.09	1,523.76	2.70	2.69	-0.65	
4,397.00	27.90	225.60	4,025.38	-1,174.13	-1,038.35	1,567.37	2.43	1.77	3.65	
4,492.00	29.80	226.30	4,108.58	-1,205.99	-1,071.30	1,613.09	2.03	2.00	0.74	
4,585.00	32.50	224.60	4,188.17	-1,239.75	-1,105.56	1,661.10	3.05	2.90	-1.83	
4,678.00	33.00	222.90	4,266.39	-1,276.10	-1,140.34	1,711.37	1.13	0.54	-1.83	
4,773.00	31.60	223.60	4,346.68	-1,313.07	-1,175.12	1,762.12	1.53	-1.47	0.74	
4,869.00	32.70	222.10	4,427.96	-1,350.53	-1,209.85	1,813.19	1.42	1.15	-1.56	
4,963.00	30.00	220.90	4,508.23	-1,387.14	-1,242.27	1,862.09	2.95	-2.87	-1.28	
5,056.00	30.10	222.10	4,588.73	-1,422.02	-1,273.12	1,908.66	0.66	0.11	1.29	
5,150.00	28.50	221.60	4,670.71	-1,456.28	-1,303.82	1,954.66	1.72	-1.70	-0.53	
5,244.00	26.80	220.80	4,753.97	-1,489.09	-1,332.56	1,998.28	1.85	-1.81	-0.85	
5,338.00	23.90	220.70	4,838.91	-1,519.58	-1,358.83	2,038.51	3.09	-3.09	-0.11	
5,433.00	22.50	220.70	4,926.22	-1,547.95	-1,383.23	2,075.93	1.47	-1.47	0.00	
5,528.00	21.90	218.90	5,014.18	-1,575.52	-1,406.21	2,111.79	0.95	-0.63	-1.89	

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Southern Region

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)	
5,622.00	19.80	217.70	5,102.02	-1,601.76	-1,426.96	2,145.19	2.28	-2.23	-1.28	
5,716.00	17.90	218.50	5,190.98	-1,625.67	-1,445.69	2,175.49	2.04	-2.02	0.85	
5,811.00	17.40	222.10	5,281.51	-1,647.63	-1,464.30	2,204.27	1.26	-0.53	3.79	
5,904.00	14.40	217.30	5,370.94	-1,667.15	-1,480.63	2,229.71	3.52	-3.23	-5.16	
5,999.00	12.60	219.20	5,463.31	-1,684.58	-1,494.34	2,251.84	1.95	-1.89	2.00	
6,094.00	10.10	212.80	5,556.45	-1,699.62	-1,505.41	2,270.42	2.94	-2.63	-6.74	
6,189.00	7.90	211.10	5,650.28	-1,712.21	-1,513.29	2,285.06	2.33	-2.32	-1.79	
6,283.00	6.50	206.60	5,743.53	-1,722.50	-1,519.01	2,296.54	1.60	-1.49	-4.79	
6,377.00	5.40	205.40	5,837.03	-1,731.25	-1,523.29	2,305.92	1.18	-1.17	-1.28	
6,471.00	4.30	203.30	5,930.69	-1,738.49	-1,526.58	2,313.50	1.19	-1.17	-2.23	
6,565.00	3.20	204.00	6,024.49	-1,744.12	-1,529.04	2,319.34	1.17	-1.17	0.74	
6,660.00	2.50	212.10	6,119.37	-1,748.30	-1,531.22	2,323.91	0.85	-0.74	8.53	
6,753.00	2.20	215.60	6,212.29	-1,751.47	-1,533.34	2,327.68	0.36	-0.32	3.76	
6,847.00	2.10	232.30	6,306.22	-1,753.99	-1,535.75	2,331.17	0.67	-0.11	17.77	
7,035.00	1.60	245.00	6,494.13	-1,757.20	-1,540.86	2,336.97	0.34	-0.27	6.76	
7,319.00	1.70	291.60	6,778.02	-1,757.33	-1,548.37	2,342.07	0.46	0.04	16.41	
7,603.00	2.20	262.20	7,061.86	-1,756.52	-1,557.69	2,347.68	0.39	0.18	-10.35	
7,920.00	2.30	260.10	7,378.62	-1,758.44	-1,569.98	2,357.31	0.04	0.03	-0.66	
7,981.00	2.30	260.10	7,439.57	-1,758.86	-1,572.39	2,359.23	0.00	0.00	0.00	
Projection to TD-7981.00' MD										

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
7,981.00	7,439.57	-1,758.86	-1,572.39	Projection to TD-7981.00' MD	