

Great Western

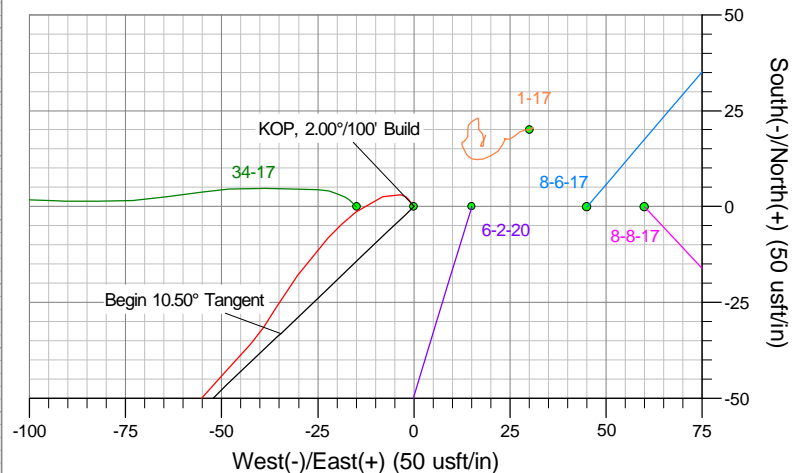
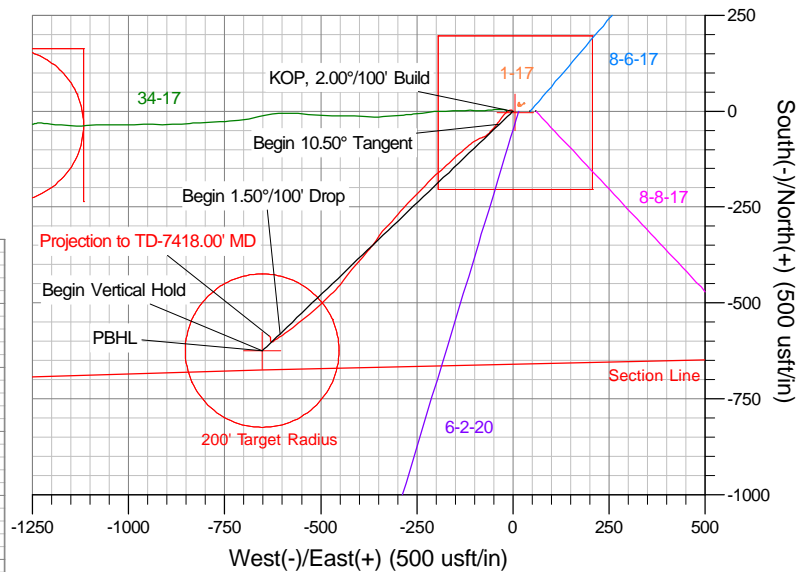
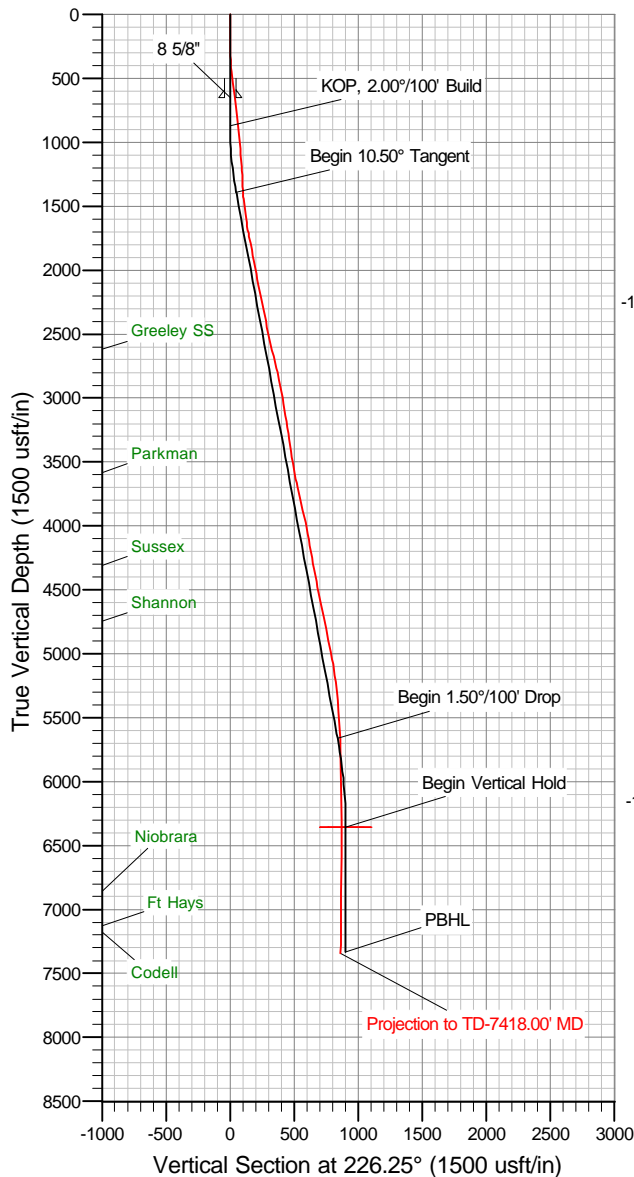
Company: Great Western
Site: Fritzler
Well: 6-8-17
Project: Weld County, Colorado (NAD 83)
Rig Name: Cade 22



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
870.00	0.00	0.00	870.00	0.00	0.00	0.00	0.00	KOP, 2.00°/100' Build
1394.75	10.50	226.25	1391.83	-33.14	-34.62	47.93	47.93	Begin 10.50° Tangent
5736.80	10.50	226.25	5661.23	-580.04	-605.97	838.84	838.84	Begin 1.50°/100' Drop
6436.48	0.00	0.00	6357.00	-624.23	-652.13	902.74	902.74	Begin Vertical Hold
7409.48	0.00	0.00	7330.00	-624.23	-652.13	902.74	902.74	PBHL



T G M

Azimuths to Grid North
True North: -0.46°
Magnetic North: 8.37°

Magnetic Field
Strength: 53136.4snT
Dip Angle: 67.10°
Date: 11/17/2011
Model: WMM_2010

US State Plane 1983
Colorado Northern Zone

Created By: Megan Pope
Date: 11:46, November 21 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)

Fritzler

6-8-17

Wellbore #1

Survey: MS MWD

Standard Survey Report

21 November, 2011

Company:	Great Western	Local Co-ordinate Reference:	Well 6-8-17
Project:	Weld County, Colorado (NAD 83)	TVD Reference:	WELL @ 4785.00usft (Cade 22)
Site:	Fritzler	MD Reference:	WELL @ 4785.00usft (Cade 22)
Well:	6-8-17	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Southern Region

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	6-8-17				
Well Position	+N/-S	0.00 usft	Northing:	1,419,464.41 usft	Latitude: 40° 28' 57.6847 N
	+E/-W	0.00 usft	Easting:	3,196,155.17 usft	Longitude: 104° 47' 41.393 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level: 4,771.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	WMM_2010	11/17/11	8.83	67.10	53,136

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	226.25	

Survey Program	Date	11/21/11			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
82.00	7,418.00	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	
82.00	0.70	321.70	82.00	0.39	-0.31	-0.05	0.85	0.85	-4.00	
171.00	1.40	324.20	170.98	1.70	-1.28	-0.25	0.79	0.79	2.81	
263.00	2.00	287.00	262.94	3.08	-3.48	0.38	1.33	0.65	-40.43	
354.00	4.10	251.60	353.82	2.52	-8.08	4.10	3.00	2.31	-38.90	
445.00	6.10	233.40	444.46	-1.39	-15.05	11.83	2.80	2.20	-20.00	
536.00	6.40	221.30	534.92	-8.08	-22.28	21.69	1.48	0.33	-13.30	
643.00	7.10	216.50	641.18	-17.88	-30.15	34.14	0.84	0.65	-4.49	
724.00	7.40	211.20	721.53	-26.37	-35.83	44.12	0.90	0.37	-6.54	
819.00	6.80	219.60	815.81	-35.93	-42.59	55.61	1.26	-0.63	8.84	
912.00	6.00	224.00	908.23	-43.67	-49.47	65.94	1.01	-0.86	4.73	
1,007.00	5.60	219.50	1,002.74	-50.82	-55.87	75.50	0.64	-0.42	-4.74	
1,101.00	4.50	229.10	1,096.38	-56.77	-61.57	83.74	1.47	-1.17	10.21	
1,196.00	3.90	227.40	1,191.12	-61.40	-66.77	90.69	0.64	-0.63	-1.79	
1,289.00	1.80	217.30	1,284.00	-64.70	-69.98	95.30	2.31	-2.26	-10.86	

Company:	Great Western	Local Co-ordinate Reference:	Well 6-8-17
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Site:	Fritzler	MD Reference:	WELL @ 4785.00usft (Cade 22)
Well:	6-8-17	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)
1,383.00	3.50	253.80	1,377.90	-66.68	-73.63	99.30	2.46	1.81	38.83
1,445.00	7.20	252.20	1,439.62	-68.39	-79.15	104.47	5.97	5.97	-2.58
1,569.00	7.70	243.30	1,562.58	-74.50	-93.97	119.40	1.01	0.40	-7.18
1,665.00	9.60	231.80	1,657.49	-82.34	-106.01	133.52	2.67	1.98	-11.98
1,747.00	11.80	230.70	1,738.06	-91.88	-117.87	148.69	2.69	2.68	-1.34
1,852.00	10.20	229.10	1,841.13	-104.77	-133.21	168.68	1.55	-1.52	-1.52
1,944.00	11.50	226.80	1,931.48	-116.38	-146.05	185.98	1.49	1.41	-2.50
2,040.00	10.20	224.90	2,025.76	-128.96	-159.03	204.05	1.40	-1.35	-1.98
2,136.00	11.50	230.50	2,120.05	-141.07	-172.41	222.09	1.74	1.35	5.83
2,230.00	11.70	229.10	2,212.13	-153.27	-186.85	240.96	0.37	0.21	-1.49
2,324.00	11.20	226.50	2,304.26	-165.79	-200.67	259.61	0.76	-0.53	-2.77
2,419.00	11.40	225.20	2,397.42	-178.76	-214.03	278.22	0.34	0.21	-1.37
2,517.00	12.60	223.60	2,493.27	-193.32	-228.27	298.58	1.27	1.22	-1.63
2,607.00	12.70	224.20	2,581.09	-207.52	-241.94	318.27	0.18	0.11	0.67
2,701.00	14.20	223.90	2,672.51	-223.24	-257.14	340.12	1.60	1.60	-0.32
2,796.00	13.40	223.20	2,764.76	-239.66	-272.75	362.76	0.86	-0.84	-0.74
2,892.00	10.80	224.10	2,858.62	-254.23	-286.63	382.86	2.72	-2.71	0.94
2,986.00	11.10	218.80	2,950.91	-267.61	-298.43	400.63	1.12	0.32	-5.64
3,079.00	9.80	219.80	3,042.37	-280.67	-309.11	417.37	1.41	-1.40	1.08
3,173.00	9.30	225.70	3,135.07	-292.12	-319.66	432.92	1.17	-0.53	6.28
3,268.00	7.90	223.70	3,229.00	-302.20	-329.67	447.12	1.51	-1.47	-2.11
3,362.00	9.30	217.90	3,321.94	-312.86	-338.80	461.08	1.75	1.49	-6.17
3,457.00	8.70	212.80	3,415.77	-324.96	-347.41	475.67	1.05	-0.63	-5.37
3,550.00	9.80	213.50	3,507.56	-337.47	-355.58	490.23	1.19	1.18	0.75
3,644.00	10.20	220.00	3,600.14	-350.52	-365.35	506.30	1.27	0.43	6.91
3,739.00	12.20	222.00	3,693.32	-364.43	-377.47	524.68	2.14	2.11	2.11
3,834.00	13.30	221.70	3,785.98	-380.04	-391.46	545.58	1.16	1.16	-0.32
3,930.00	13.30	219.80	3,879.41	-396.77	-405.87	567.56	0.46	0.00	-1.98
4,025.00	12.70	217.80	3,971.97	-413.42	-419.27	588.75	0.79	-0.63	-2.11
4,118.00	10.40	218.20	4,063.08	-428.10	-430.73	607.18	2.47	-2.47	0.43
4,211.00	9.30	216.30	4,154.71	-440.75	-440.37	622.89	1.23	-1.18	-2.04
4,305.00	9.80	219.60	4,247.41	-453.03	-449.96	638.32	0.79	0.53	3.51
4,399.00	10.90	222.40	4,339.88	-465.76	-461.06	655.13	1.29	1.17	2.98
4,495.00	10.80	228.30	4,434.16	-478.45	-473.89	673.18	1.16	-0.10	6.15
4,588.00	11.80	226.40	4,525.36	-490.80	-487.29	691.39	1.15	1.08	-2.04
4,682.00	11.80	225.90	4,617.37	-504.12	-501.15	710.62	0.11	0.00	-0.53
4,775.00	11.80	228.50	4,708.41	-517.04	-515.10	729.63	0.57	0.00	2.80
4,870.00	11.20	229.50	4,801.50	-529.47	-529.39	748.54	0.67	-0.63	1.05
4,964.00	11.20	231.80	4,893.71	-541.04	-543.51	766.75	0.48	0.00	2.45
5,057.00	12.10	232.80	4,984.79	-552.52	-558.37	785.42	0.99	0.97	1.08
5,152.00	9.90	232.50	5,078.04	-563.51	-572.78	803.43	2.32	-2.32	-0.32
5,246.00	8.00	232.30	5,170.89	-572.43	-584.37	817.97	2.02	-2.02	-0.21
5,340.00	6.40	233.90	5,264.15	-579.52	-593.78	829.67	1.72	-1.70	1.70
5,435.00	5.30	236.00	5,358.65	-585.09	-601.69	839.24	1.18	-1.16	2.21

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5,530.00	4.50	238.30	5,453.31	-589.50	-608.50	847.21	0.87	-0.84	2.42	
5,814.00	1.40	225.80	5,736.90	-597.78	-620.47	861.58	1.11	-1.09	-4.40	
6,095.00	0.50	251.00	6,017.86	-600.57	-624.09	866.12	0.35	-0.32	8.97	
6,379.00	0.60	275.80	6,301.84	-600.83	-626.74	868.21	0.09	0.04	8.73	
6,661.00	0.80	309.50	6,583.82	-599.42	-629.73	869.40	0.16	0.07	11.95	
6,946.00	1.30	7.00	6,868.78	-594.95	-630.87	867.13	0.39	0.18	20.18	
7,229.00	0.80	335.00	7,151.74	-589.97	-631.31	864.01	0.27	-0.18	-11.31	
7,356.00	1.70	328.90	7,278.70	-587.56	-632.66	863.31	0.72	0.71	-4.80	
7,418.00	1.70	328.90	7,340.68	-585.98	-633.61	862.91	0.00	0.00	0.00	
Projection to TD-7418.00' MD										

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
7,418.00	7,340.68	-585.98	-633.61	Projection to TD-7418.00' MD	