

Great Western

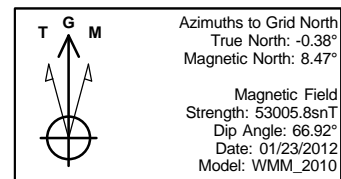
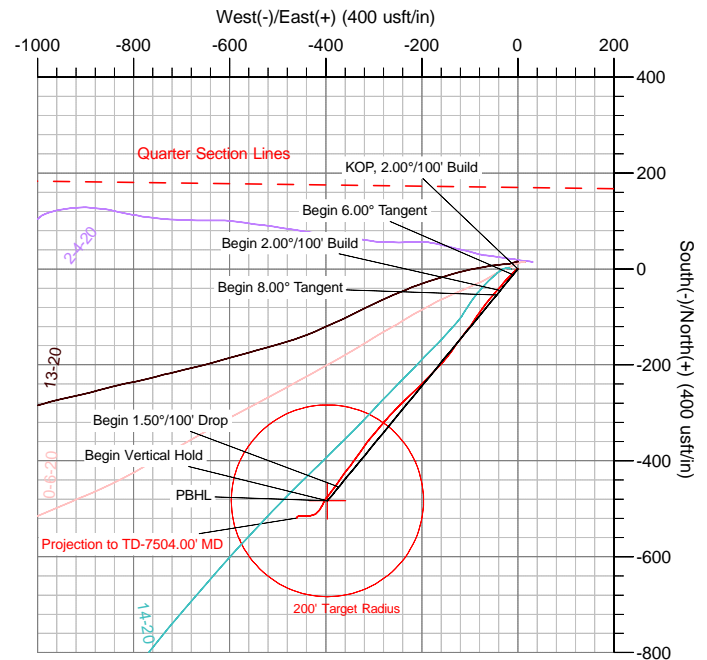
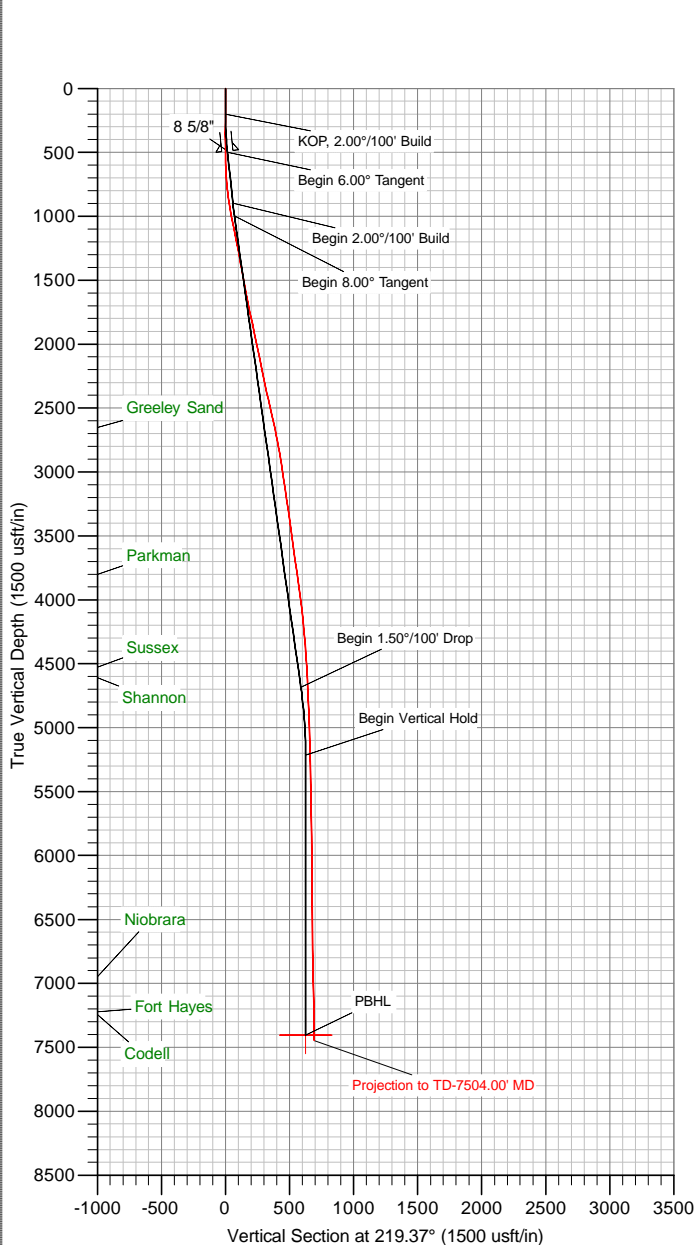
Company: Great Western
 Site: Binder
 Well: 23-20
 Project: Weld County, Colorado (NAD 83)
 Rig Name: Cade 22

MS Energy Services
 WWW.MSENERGYSERVICES.COM

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
500.00	6.00	219.37	499.45	-12.13	-9.95	15.69	15.69	Begin 6.00° Tangent
900.00	6.00	219.37	897.26	-44.46	-36.47	57.50	57.50	Begin 2.00°/100' Build
1000.06	8.00	219.37	996.57	-53.88	-44.21	69.70	69.70	Begin 8.00° Tangent
4723.05	8.00	219.37	4683.32	-454.52	-372.91	587.92	587.92	Begin 1.50°/100' Drop
5256.47	0.00	0.00	5215.00	-483.27	-396.50	625.10	625.10	Begin Vertical Hold
7445.47	0.00	0.00	7404.00	-483.27	-396.50	625.10	625.10	PBHL



US State Plane 1983
 Colorado Northern Zone

Created By: Megan Pope
 Date: 9:30, January 27 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

23-20

Wellbore #1

Survey: MS MWD

Standard Survey Report

27 January, 2012



MS Energy Services

Survey Report



Company:	Great Western	Local Co-ordinate Reference:	Well 23-20
Project:	Weld County, Colorado (NAD 83)	TVD Reference:	WELL @ 4916.00usft (Cade 22)
Site:	Binder	MD Reference:	WELL @ 4916.00usft (Cade 22)
Well:	23-20	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Surveys	Database:	Southern Region

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

Well		23-20	
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	40° 17' 53.1700 N
		Longitude:	104° 54' 54.087 W
		Ground Level:	4,902.00 usft

Wellbore		Wellbore #1	
Magnetics	Model Name	Sample Date	Declination
			(°)
	WMM_2010	01/23/12	8.85
			Dip Angle (°)
			66.92
			Field Strength (nT)
			53,006

Design		Surveys	
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction (°)
			219.37

Survey Program		Date 01/27/12	
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
202.00	7,504.00	MS MWD (Wellbore #1)	MWD
			Description
			MWD - Standard

Survey									
Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Vertical Section	Dogleg Rate	Build Rate	Turn Rate
(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(°/100usft)	(°/100usft)	(°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
202.00	0.40	355.30	202.00	0.70	-0.06	-0.51	0.20	0.20	0.00
262.00	0.30	19.90	262.00	1.06	-0.02	-0.81	0.30	-0.17	41.00
353.00	0.30	132.40	353.00	1.12	0.24	-1.02	0.55	0.00	123.63
444.00	0.60	249.10	443.99	0.79	-0.03	-0.59	0.86	0.33	128.24
466.00	0.80	255.50	465.99	0.71	-0.29	-0.37	0.97	0.91	29.09
538.00	1.00	262.60	537.98	0.51	-1.40	0.50	0.32	0.28	9.86
629.00	2.20	221.40	628.95	-0.91	-3.34	2.82	1.75	1.32	-45.27
721.00	4.50	223.90	720.79	-4.83	-7.01	8.18	2.50	2.50	2.72
814.00	6.50	226.70	813.35	-11.07	-13.37	17.04	2.17	2.15	3.01
909.00	9.30	222.40	907.44	-20.43	-22.47	30.04	3.01	2.95	-4.53
1,003.00	11.30	220.70	999.92	-33.02	-33.59	46.84	2.15	2.13	-1.81
1,098.00	11.30	220.40	1,093.08	-47.17	-45.70	65.45	0.06	0.00	-0.32
1,193.00	11.00	220.00	1,186.29	-61.20	-57.55	83.82	0.33	-0.32	-0.42
1,288.00	10.10	217.60	1,279.68	-74.74	-68.46	101.21	1.05	-0.95	-2.53

Company:	Great Western	Local Co-ordinate Reference:	Well 23-20
Project:	Weld County, Colorado (NAD 83)	TVD Reference:	WELL @ 4916.00usft (Cade 22)
Site:	Binder	MD Reference:	WELL @ 4916.00usft (Cade 22)
Well:	23-20	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)	
1,382.00	11.00	215.20	1,372.09	-88.60	-78.66	118.39	1.07	0.96	-2.55	
1,476.00	9.90	212.00	1,464.53	-102.78	-88.11	135.35	1.32	-1.17	-3.40	
1,571.00	10.40	216.20	1,558.05	-116.63	-97.51	152.01	0.94	0.53	4.42	
1,666.00	11.50	216.10	1,651.32	-131.20	-108.15	170.03	1.16	1.16	-0.11	
1,759.00	12.30	219.00	1,742.32	-146.39	-119.85	189.19	1.07	0.86	3.12	
1,855.00	11.60	213.80	1,836.24	-162.36	-131.65	209.02	1.34	-0.73	-5.42	
1,949.00	12.30	217.30	1,928.20	-178.17	-142.98	228.43	1.07	0.74	3.72	
2,043.00	11.70	222.50	2,020.15	-193.17	-155.48	247.96	1.31	-0.64	5.53	
2,138.00	11.70	224.20	2,113.18	-207.17	-168.71	267.17	0.36	0.00	1.79	
2,231.00	12.00	223.00	2,204.20	-221.00	-181.87	286.22	0.42	0.32	-1.29	
2,416.00	11.80	226.00	2,385.22	-248.21	-208.60	324.20	0.35	-0.11	1.62	
2,511.00	12.90	228.30	2,478.02	-262.01	-223.50	344.33	1.27	1.16	2.42	
2,606.00	13.00	225.40	2,570.61	-276.57	-239.03	365.43	0.69	0.11	-3.05	
2,702.00	12.50	223.70	2,664.24	-291.66	-253.89	386.53	0.65	-0.52	-1.77	
2,797.00	10.90	222.40	2,757.26	-305.73	-267.05	405.75	1.71	-1.68	-1.37	
2,890.00	9.80	220.20	2,848.75	-318.27	-278.09	422.44	1.26	-1.18	-2.37	
2,985.00	8.60	219.00	2,942.53	-329.96	-287.78	437.63	1.28	-1.26	-1.26	
3,079.00	8.60	220.50	3,035.47	-340.77	-296.77	451.69	0.24	0.00	1.60	
3,172.00	8.30	222.10	3,127.46	-351.04	-305.79	465.34	0.41	-0.32	1.72	
3,265.00	8.10	215.70	3,219.51	-361.34	-314.11	478.59	1.00	-0.22	-6.88	
3,358.00	8.60	213.00	3,311.52	-372.49	-321.72	492.04	0.68	0.54	-2.90	
3,452.00	7.90	215.60	3,404.55	-383.64	-329.31	505.47	0.84	-0.74	2.77	
3,547.00	7.60	217.10	3,498.68	-393.96	-336.90	518.26	0.38	-0.32	1.58	
3,642.00	7.20	215.40	3,592.89	-403.82	-344.14	530.47	0.48	-0.42	-1.79	
3,738.00	8.10	219.20	3,688.04	-413.97	-351.90	543.24	1.07	0.94	3.96	
3,832.00	8.10	216.80	3,781.10	-424.40	-360.05	556.48	0.36	0.00	-2.55	
3,927.00	8.00	214.10	3,875.16	-435.23	-367.76	569.75	0.41	-0.11	-2.84	
4,021.00	7.70	214.60	3,968.28	-445.83	-375.01	582.54	0.33	-0.32	0.53	
4,114.00	6.80	217.80	4,060.54	-455.31	-381.92	594.25	1.06	-0.97	3.44	
4,209.00	5.90	217.20	4,154.96	-463.65	-388.32	604.75	0.95	-0.95	-0.63	
4,303.00	5.20	216.30	4,248.51	-470.93	-393.76	613.83	0.75	-0.74	-0.96	
4,395.00	4.70	218.00	4,340.17	-477.26	-398.55	621.76	0.57	-0.54	1.85	
4,490.00	3.50	208.40	4,434.93	-482.88	-402.33	628.50	1.45	-1.26	-10.11	
4,585.00	3.20	205.90	4,529.77	-487.81	-404.86	633.93	0.35	-0.32	-2.63	
4,680.00	3.00	206.30	4,624.63	-492.43	-407.12	638.93	0.21	-0.21	0.42	
4,774.00	2.90	207.50	4,718.50	-496.74	-409.31	643.65	0.13	-0.11	1.28	
4,870.00	2.40	215.80	4,814.40	-500.52	-411.61	648.03	0.66	-0.52	8.65	
4,964.00	2.10	218.50	4,908.33	-503.47	-413.83	651.72	0.34	-0.32	2.87	
5,058.00	1.90	226.50	5,002.27	-505.89	-416.03	654.99	0.36	-0.21	8.51	
5,341.00	1.20	233.80	5,285.16	-510.87	-421.83	662.51	0.26	-0.25	2.58	
5,907.00	1.10	273.30	5,851.06	-514.06	-432.03	671.45	0.14	-0.02	6.98	
6,190.00	1.00	263.00	6,134.01	-514.20	-437.20	674.84	0.08	-0.04	-3.64	
6,473.00	0.70	265.70	6,416.98	-514.63	-441.37	677.82	0.11	-0.11	0.95	
6,787.00	1.30	281.70	6,730.93	-514.05	-446.77	680.80	0.21	0.19	5.10	



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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)	
7,036.00	1.80	258.70	6,979.84	-514.25	-453.37	685.13	0.32	0.20	-9.24	
7,443.00	0.80	188.00	7,386.75	-518.31	-460.04	692.50	0.42	-0.25	-17.37	
7,504.00	0.80	188.00	7,447.75	-519.16	-460.16	693.23	0.00	0.00	0.00	
Projection to TD-7504.00' MD										

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		+N/-S (usft)	+E/-W (usft)	Comment	
7,504.00	7,447.75	-519.16	-460.16	Projection to TD-7504.00' MD	