



Cimarex Energy Co., Inc.

Ward Co., Texas

Cimarex-University 18-38 #2H

Cimarex-University 18-38 #2H

Lateral

Survey: MWD Survey #1

Standard Survey Report

12 December, 2007





Black Viper Energy

Survey Report



Company:	Cimarex Energy Co., Inc.	Local Co-ordinate Reference:	Well Cimarex-University 18-38 #2H
Project:	Ward Co., Texas	TVD Reference:	Rig KB @ 2812.00ft (Key Rig #92 KB Elev)
Site:	Cimarex-University 18-38 #2H	MD Reference:	Rig KB @ 2812.00ft (Key Rig #92 KB Elev)
Well:	Cimarex-University 18-38 #2H	North Reference:	Grid
Wellbore:	Lateral	Survey Calculation Method:	Minimum Curvature
Design:	Lateral	Database:	EDM 2003.14.1.0 Server DB

Project	Ward Co., Texas		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	Texas Central 4203		

Site	Cimarex-University 18-38 #2H			
Site Position:		Northing:	715,197.40 ft	Latitude: 31° 35' 55.942 N
From:	Map	Easting:	1,070,805.16 ft	Longitude: 103° 19' 5.350 W
Position Uncertainty:	0.00 ft	Slot Radius:	"	Grid Convergence: -1.54 °

Well	Cimarex-University 18-38 #2H			
Well Position	+N/-S	0.00 ft	Northing:	715,197.40 ft
	+E/-W	0.00 ft	Easting:	1,070,805.16 ft
Position Uncertainty	0.00 ft		Wellhead Elevation:	ft
			Ground Level:	2,796.00 ft

Wellbore	Lateral				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	11/20/2007	7.84	59.74	48,648

Design	Lateral			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 11,200.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	218.33

Survey Program	Date	12/12/2007		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
100.00	11,200.00	Gyro Survey (OH)	NS-GYRO-MS	North sensing gyrocompassing m/s
11,200.00	12,255.00	MWD Survey #1 (Lateral)	MWD	MWD - Standard

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
11,200.00	0.64	207.55	11,195.39	-13.99	-31.51	30.51	0.00	0.00	0.00	
11,313.00	19.70	218.50	11,306.10	-29.60	-43.77	50.36	16.88	16.87	9.69	
First MWD Survey										
11,356.00	30.80	226.50	11,344.94	-42.89	-56.31	68.57	26.95	25.81	18.60	
11,366.00	32.30	223.00	11,353.47	-46.61	-59.99	73.77	23.67	15.00	-35.00	
11,376.00	34.80	220.10	11,361.80	-50.75	-63.65	79.28	29.69	25.00	-29.00	
11,388.00	37.60	218.70	11,371.48	-56.23	-68.14	86.37	24.33	23.33	-11.67	
11,398.00	40.30	219.40	11,379.26	-61.11	-72.10	92.65	27.36	27.00	7.00	
11,408.00	43.10	220.30	11,386.72	-66.21	-76.37	99.30	28.63	28.00	9.00	
11,418.00	45.50	221.60	11,393.88	-71.49	-80.95	106.28	25.66	24.00	13.00	
11,428.00	47.80	223.00	11,400.74	-76.86	-85.84	113.53	25.15	23.00	14.00	
11,438.00	50.40	223.40	11,407.29	-82.37	-91.01	121.06	26.18	26.00	4.00	



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Site:	Cimarex-University 18-38 #2H	MD Reference:	Rig KB @ 2812.00ft (Key Rig #92 KB Elev)
Well:	Cimarex-University 18-38 #2H	North Reference:	Grid
Wellbore:	Lateral	Survey Calculation Method:	Minimum Curvature
Design:	Lateral	Database:	EDM 2003.14.1.0 Server DB

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
11,450.00	52.60	223.50	11,414.76	-89.19	-97.47	130.41	18.34	18.33	0.83
11,460.00	54.70	224.00	11,420.69	-95.01	-103.04	138.43	21.38	21.00	5.00
11,470.00	56.80	224.10	11,426.32	-100.95	-108.79	146.66	21.02	21.00	1.00
11,481.00	58.90	224.10	11,432.17	-107.63	-115.27	155.92	19.09	19.09	0.00
11,491.00	60.80	223.90	11,437.19	-113.85	-121.28	164.53	19.08	19.00	-2.00
11,501.00	63.30	223.60	11,441.88	-120.23	-127.38	173.32	25.14	25.00	-3.00
11,513.00	65.40	224.20	11,447.07	-128.03	-134.89	184.08	18.07	17.50	5.00
11,523.00	67.50	224.40	11,451.07	-134.59	-141.29	193.20	21.08	21.00	2.00
11,533.00	69.60	224.30	11,454.72	-141.24	-147.79	202.46	21.02	21.00	-1.00
11,545.00	72.00	224.00	11,458.67	-149.37	-155.69	213.73	20.14	20.00	-2.50
11,555.00	74.10	224.00	11,461.59	-156.26	-162.33	223.25	21.00	21.00	0.00
11,565.00	76.20	224.00	11,464.15	-163.21	-169.04	232.87	21.00	21.00	0.00
11,577.00	78.40	223.80	11,466.79	-171.64	-177.16	244.52	18.41	18.33	-1.67
11,587.00	80.80	223.50	11,468.59	-178.76	-183.95	254.31	24.18	24.00	-3.00
11,597.00	82.90	223.80	11,470.01	-185.92	-190.78	264.17	21.21	21.00	3.00
11,608.00	85.10	224.30	11,471.16	-193.78	-198.39	275.05	20.50	20.00	4.55
11,640.00	90.40	219.70	11,472.42	-217.53	-219.77	306.94	21.92	16.56	-14.38
11,671.00	91.40	218.50	11,471.93	-241.59	-239.32	337.93	5.04	3.23	-3.87
11,703.00	92.20	218.30	11,470.92	-266.65	-259.18	369.92	2.58	2.50	-0.63
11,735.00	92.20	218.10	11,469.69	-291.78	-278.96	401.89	0.62	0.00	-0.63
11,767.00	92.90	218.00	11,468.27	-316.95	-298.66	433.86	2.21	2.19	-0.31
11,798.00	92.10	218.20	11,466.92	-341.33	-317.77	464.83	2.66	-2.58	0.65
11,830.00	91.30	218.70	11,465.97	-366.38	-337.66	496.82	2.95	-2.50	1.56
11,862.00	90.20	218.30	11,465.55	-391.42	-357.58	528.81	3.66	-3.44	-1.25
11,894.00	88.80	218.20	11,465.83	-416.55	-377.39	560.81	4.39	-4.38	-0.31
11,926.00	88.80	218.20	11,466.50	-441.69	-397.17	592.80	0.00	0.00	0.00
11,958.00	89.50	218.40	11,466.97	-466.80	-417.00	624.80	2.28	2.19	0.63
11,990.00	89.70	218.70	11,467.20	-491.82	-436.95	656.80	1.13	0.63	0.94
12,021.00	89.50	218.50	11,467.41	-516.05	-456.29	687.80	0.91	-0.65	-0.65
12,053.00	90.80	218.70	11,467.33	-541.06	-476.25	719.80	4.11	4.06	0.63
12,085.00	90.80	218.70	11,466.88	-566.03	-496.26	751.79	0.00	0.00	0.00
12,116.00	91.00	219.00	11,466.40	-590.17	-515.70	782.79	1.16	0.65	0.97
12,147.00	90.70	218.10	11,465.94	-614.41	-535.02	813.78	3.06	-0.97	-2.90
12,179.00	91.30	218.00	11,465.38	-639.60	-554.74	845.78	1.90	1.88	-0.31
12,211.00	92.50	217.90	11,464.32	-664.82	-574.40	877.76	3.76	3.75	-0.31
Last MWD Survey									
12,255.00	93.00	217.50	11,462.21	-699.60	-601.28	921.70	1.45	1.14	-0.91
Proj. To Bit									
15,523.19	90.70	217.66	11,424.81	-3,286.64	-2,598.03	4,189.48	0.07	-0.07	0.00
PBHL#3[CU18-38#2H]									



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Site:	Cimarex-University 18-38 #2H	MD Reference:	Rig KB @ 2812.00ft (Key Rig #92 KB Elev)
Well:	Cimarex-University 18-38 #2H	North Reference:	Grid
Wellbore:	Lateral	Survey Calculation Method:	Minimum Curvature
Design:	Lateral	Database:	EDM 2003.14.1.0 Server DB

Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
- Shape									
z1	0.00	0.00	0.00	0.00	0.00	715,197.40	1,070,805.16	31° 35' 55.942 N	103° 19' 5.350 W
- survey misses by 11195.44ft at 11200.00ft MD (11195.39 TVD, -13.99 N, -31.51 E)									
- Point									
PBHL#2[CU18-38#2H]	0.00	0.00	11,434.13	-3,286.64	-2,598.03	711,910.76	1,068,207.13	31° 35' 22.735 N	103° 19' 34.357 W
- survey misses by 77.69ft at 15523.08ft MD (11356.60 TVD, -3288.01 N, -2593.23 E)									
- Point									
PBHL#3[CU18-38#2H]	0.00	0.00	11,424.81	-3,286.64	-2,598.03	711,910.76	1,068,207.13	31° 35' 22.735 N	103° 19' 34.357 W
- survey hits target									
- Point									
PBHL#1[CU18-38#2H]	0.00	0.00	11,403.87	-3,286.64	-2,598.03	711,910.76	1,068,207.13	31° 35' 22.735 N	103° 19' 34.357 W
- survey misses by 20.94ft at 15523.19ft MD (11424.81 TVD, -3286.64 N, -2598.03 E)									
- Point									

Survey Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(ft)	(ft)	+N/-S (ft)	+E/-W (ft)	
11,313.00	11,306.10	-29.60	-43.77	First MWD Survey
12,211.00	11,464.32	-664.82	-574.40	Last MWD Survey
12,255.00	11,462.21	-699.60	-601.28	Proj. To Bit

Checked By: _____ Approved By: _____ Date: _____

Cimarex-University 18-38 #2H - MWD Survey #1

Company:
Survey / Plan:
Wellbore Type:

Cimarex Energy Co., Inc.
Cimarex-University 18-38 #2H - MWD Survey #1
Horizontal

Ward Co., Texas
Cimarex-University 18-38 #2H



	Measured Depth (ft)	Incl.	Azim.	Vertical Depth (ft)	Northings (ft)	Eastings (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	
Reference	0	0	0	0	0	0	0	0	
Tie In	11200	0.638	207.549	11195.39	-13.99	-31.51	30.51	0	Gyro
First MWD Survey	11313	19.7	218.5	11306.1	-29.6	-43.77	50.36	16.88	
	11356	30.8	226.5	11344.94	-42.89	-56.31	68.57	26.95	
	11366	32.3	223	11353.47	-46.61	-59.99	73.77	23.67	
	11376	34.8	220.1	11361.8	-50.75	-63.65	79.28	29.69	
	11388	37.6	218.7	11371.48	-56.23	-68.14	86.37	24.33	
	11398	40.3	219.4	11379.26	-61.11	-72.1	92.65	27.36	
	11408	43.1	220.3	11386.72	-66.21	-76.37	99.3	28.63	
	11418	45.5	221.6	11393.88	-71.49	-80.95	106.28	25.66	
	11428	47.8	223	11400.74	-76.86	-85.84	113.53	25.15	
	11438	50.4	223.4	11407.29	-82.37	-91.01	121.06	26.18	
	11450	52.6	223.5	11414.76	-89.19	-97.47	130.41	18.34	
	11460	54.7	224	11420.69	-95.01	-103.04	138.43	21.38	
	11470	56.8	224.1	11426.32	-100.95	-108.79	146.66	21.02	
	11481	58.9	224.1	11432.17	-107.63	-115.27	155.92	19.09	
	11491	60.8	223.9	11437.19	-113.85	-121.28	164.53	19.08	
	11501	63.3	223.6	11441.88	-120.23	-127.38	173.32	25.14	
	11513	65.4	224.2	11447.07	-128.03	-134.89	184.08	18.07	
	11523	67.5	224.4	11451.07	-134.59	-141.29	193.2	21.08	
	11533	69.6	224.3	11454.72	-141.24	-147.79	202.46	21.02	
	11545	72	224	11458.67	-149.37	-155.69	213.73	20.14	
	11555	74.1	224	11461.59	-156.26	-162.33	223.25	21	
	11565	76.2	224	11464.15	-163.21	-169.04	232.87	21	
	11577	78.4	223.8	11466.79	-171.64	-177.16	244.52	18.41	
	11587	80.8	223.5	11468.59	-178.76	-183.95	254.31	24.18	
	11597	82.9	223.8	11470.01	-185.92	-190.78	264.17	21.21	
	11608	85.1	224.3	11471.16	-193.78	-198.39	275.05	20.5	
	11640	90.4	219.7	11472.42	-217.53	-219.77	306.94	21.92	
	11671	91.4	218.5	11471.93	-241.59	-239.32	337.93	5.04	
	11703	92.2	218.3	11470.92	-266.65	-259.18	369.92	2.58	
	11735	92.2	218.1	11469.69	-291.78	-278.96	401.89	0.62	
	11767	92.9	218	11468.27	-316.95	-298.66	433.86	2.21	
	11798	92.1	218.2	11466.92	-341.33	-317.77	464.83	2.66	
	11830	91.3	218.7	11465.97	-366.38	-337.66	496.82	2.95	
	11862	90.2	218.3	11465.55	-391.42	-357.58	528.81	3.66	
	11894	88.8	218.2	11465.83	-416.55	-377.39	560.81	4.39	
	11926	88.8	218.2	11466.5	-441.69	-397.17	592.8	0	
	11958	89.5	218.4	11466.97	-466.8	-417	624.8	2.28	
	11990	89.7	218.7	11467.2	-491.82	-436.95	656.8	1.13	
	12021	89.5	218.5	11467.41	-516.05	-456.29	687.8	0.91	
	12053	90.8	218.7	11467.33	-541.06	-476.25	719.8	4.11	
	12085	90.8	218.7	11466.88	-566.03	-496.26	751.79	0	
	12116	91	219	11466.4	-590.17	-515.7	782.79	1.16	
	12147	90.7	218.1	11465.94	-614.41	-535.02	813.78	3.06	
	12179	91.3	218	11465.38	-639.6	-554.74	845.78	1.9	
Last MWD Survey	12211	92.5	217.9	11464.32	-664.82	-574.4	877.76	3.76	

Proj. To Bit	12255	93	217.5	11462.21	-699.6	-601.28	921.7	1.45

All data are in feet unless otherwise stated. Directions and coordinates are relative to Grid North.
Vertical depths are relative to Rig KB. Northings and Eastings are relative to Well.

The Dogleg Severity is in Degrees per 100 feet.
Vertical Section is from Site and calculated along an Azimuth of 218.326° (Grid).

Coordinate System is NAD 1927 (NADCON CONUS) US State Plane 1927 (Exact solution), Texas Central 4203.
Central meridian is -100.333°.
Grid Convergence at Surface is -1.537°.

Based upon Minimum Curvature type calculations, at a Measured Depth of 12255.00ft.,
the Bottom Hole Displacement is 922.48ft., in the Direction of 218.326° (Grid).

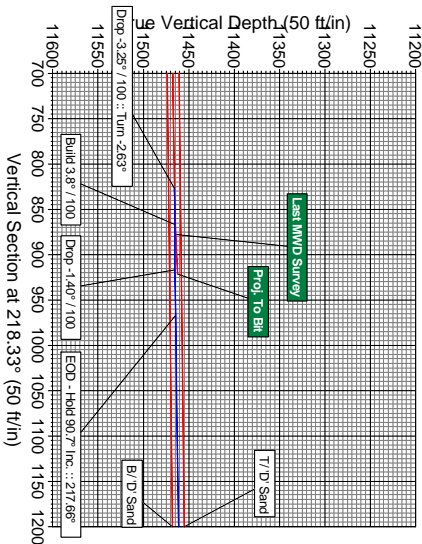
Cimarex-University 18-38 #2H - MWD Survey #1



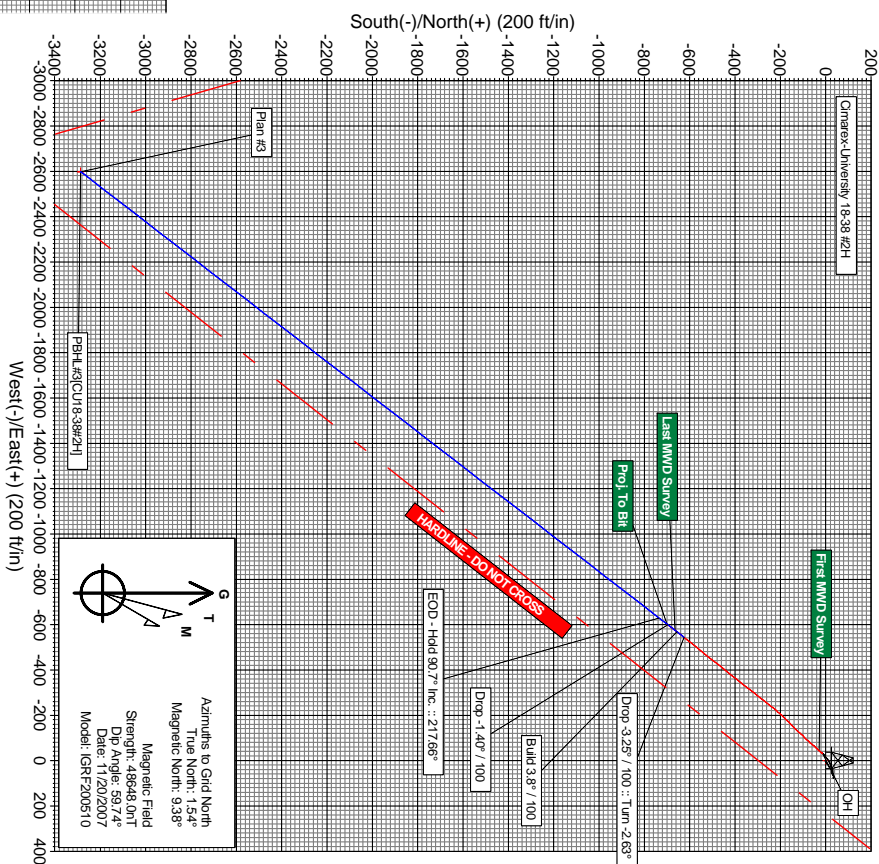
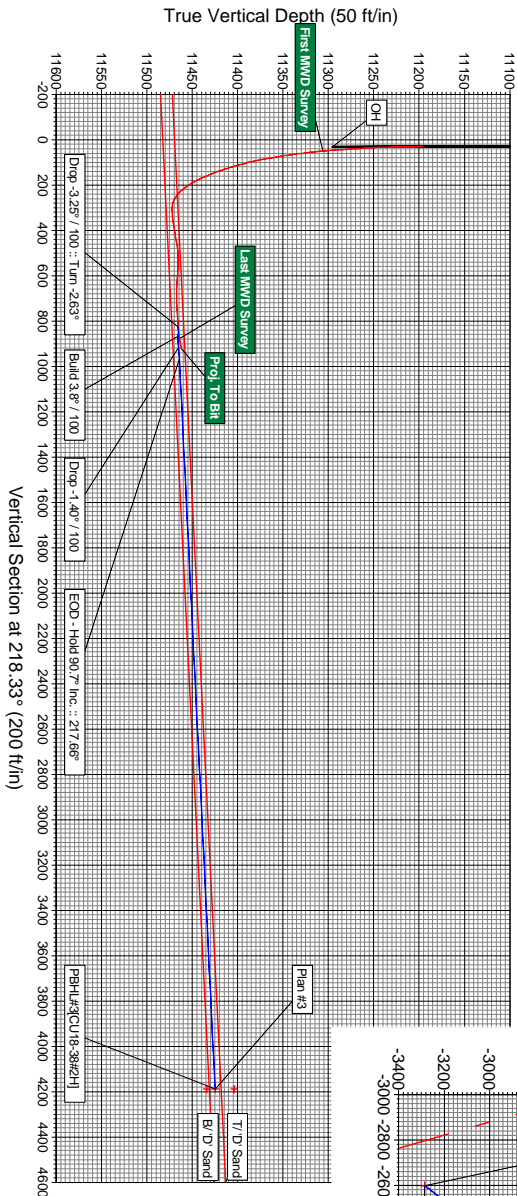
Project: Ward Co., Texas
Site: Cimarex-University 18-38 #2H
Well: Cimarex-University 18-38 #2H
Wellbore: Latera
Plan: Plan #3 (Cimarex-University 18-38 #2H Lateral)



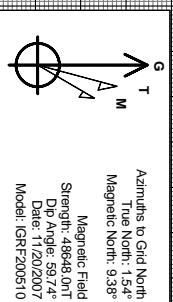
SECTION DETAILS											
Sec	MD	Inc	Azi	TVD	-N/S	-E/W	DLg	Trace	VSec	Target	
1	12160.00	90.80	218.70	11463.71	-624.43	-543.30	0.00	0.00	826.76		
2	12200.00	89.50	217.65	11463.50	-653.67	-568.52	4.18	-14.107	866.75		
3	12300.00	90.70	217.65	11463.29	-735.64	-629.09	3.80	180.00	916.76		
4	12300.00	90.70	217.66	11424.61	-326.64	-2598.03	0.00	71.23	4169.48		
5	15323.19	90.70									



PROJECT DETAILS: Ward Co., Texas
Geodetic System: US State Plane 1827 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: Texas Central 4203
System Datum: Mean Sea Level



ANNOTATIONS	
TVD	MD
11465.71	12160.00
11465.60	12200.00
11465.21	12300.00
11464.29	15300.00
EOO - HDD 90.7° Inc.: 217.66°	



CIMAREX-UNIVERSITY 18-38 #2H