



Cimarex Energy Co., Inc.

Eddy Co., New Mexico

McGruder 13 #1 ST

McGruder 13 #1 ST

Slant #1

Survey: MWD Survey #1

Standard Survey Report

11 May, 2005

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Black Viper Energy Services

Survey Report



Database:	EDM 2003.5 Single User Db	Local Co-ordinate Reference:	Well McGruder 13 #1 ST
Company:	Cimarex Energy Co., Inc.	TVD Reference:	WELL @ 0.00ft (Original Well Elev)
Project:	Eddy Co., New Mexico	MD Reference:	WELL @ 0.00ft (Original Well Elev)
Site:	McGruder 13 #1 ST	North Reference:	Grid
Well:	McGruder 13 #1 ST	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slant #1		
Design:	Slant #1		

Project	Eddy Co., New Mexico		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Ground Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	McGruder 13 #1 ST		
Site Position:		Northing:	503794.10 ft
From:	Map	Easting:	494502.30 ft
Position Uncertainty:	0.00 ft	Slot Radius:	in
		Latitude:	32° 23' 06.146" N
		Longitude:	104° 21' 04.126" W
		Grid Convergence:	-0.01 °

Well	McGruder 13 #1 ST		
Well Position	+N/-S	0.00 ft	Northing: 503794.10 ft
	+E/-W	0.00 ft	Easting: 494502.30 ft
Position Uncertainty	0.00 ft	Wellhead Elevation:	ft
		Latitude:	32° 23' 06.146" N
		Longitude:	104° 21' 04.126" W
		Ground Level:	0.00 ft

Wellbore	Slant #1		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2005-10	2/17/2005	8.69
			Dip Angle (°)
			60.35
			Field Strength (nT)
			49291

Design	Slant #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	5817.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(ft)	(ft)	(ft)
	0.00	0.00	0.00
		Direction	(°)
			351.64

Survey Program	Date 5/11/2005		
From	To	Survey (Wellbore)	Tool Name
(ft)	(ft)		
5160.00	5817.00	MWD Survey #1 (OH)	MWD
5854.00	11025.00	MWD Survey #1 (Slant #1)	MWD
			Description
			Standard MWD
			Standard MWD

Survey										
Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Vertical Section	Dogleg Rate	Build Rate	Turn Rate	
(ft)	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(°/100ft)	(°/100ft)	(°/100ft)	
5817.00	13.30	64.31	5810.81	69.32	67.15	58.82	0.00	0.00	0.00	
5854.00	11.60	52.30	5846.95	73.44	73.93	61.91	8.35	-4.59	-32.46	
First MWD Survey										
5876.00	11.00	45.50	5868.52	76.26	77.17	64.23	6.64	-2.73	-30.91	
5939.00	10.20	32.20	5930.46	85.20	84.43	72.02	4.08	-1.27	-21.11	
6004.00	9.80	16.00	5994.48	95.39	89.03	81.43	4.36	-0.62	-24.92	
6066.00	9.10	3.60	6055.65	105.35	90.79	91.03	3.46	-1.13	-20.00	
6132.00	8.90	353.90	6120.84	115.64	90.57	101.24	2.32	-0.30	-14.70	
6196.00	9.90	348.10	6183.98	125.95	88.91	111.68	2.15	1.56	-9.06	
6260.00	9.50	347.80	6247.06	136.49	86.66	122.44	0.63	-0.62	-0.47	
6324.00	8.80	347.00	6310.25	146.42	84.44	132.59	1.11	-1.09	-1.25	



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Site:	McGruder 13 #1 ST	North Reference:	Grid
Well:	McGruder 13 #1 ST	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slant #1		
Design:	Slant #1		

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)	
6388.00	8.00	347.70	6373.56	155.55	82.39	141.91	1.26	-1.25	1.09	
6451.00	8.00	344.00	6435.95	164.04	80.25	150.63	0.82	0.00	-5.87	
6515.00	8.20	340.50	6499.31	172.63	77.50	159.53	0.83	0.31	-5.47	
6579.00	7.60	337.70	6562.70	180.85	74.37	168.11	1.11	-0.94	-4.37	
6643.00	7.70	340.70	6626.13	188.81	71.35	176.43	0.64	0.16	4.69	
6674.00	7.70	340.30	6656.85	192.72	69.96	180.50	0.17	0.00	-1.29	
6705.00	8.30	343.20	6687.55	196.82	68.62	184.75	2.33	1.94	9.35	
6737.00	9.50	345.00	6719.17	201.58	67.26	189.66	3.85	3.75	5.62	
6801.00	8.40	342.40	6782.39	211.14	64.48	199.52	1.83	-1.72	-4.06	
6864.00	9.10	348.80	6844.65	220.41	62.12	209.04	1.90	1.11	10.16	
6928.00	10.60	345.20	6907.71	231.07	59.64	219.94	2.53	2.34	-5.62	
6992.00	9.80	343.70	6970.70	241.99	56.61	231.19	1.32	-1.25	-2.34	
7056.00	9.20	348.10	7033.82	252.22	54.02	241.69	1.47	-0.94	6.87	
7088.00	9.90	348.50	7065.38	257.42	52.95	246.99	2.20	2.19	1.25	
7152.00	9.70	349.30	7128.44	268.11	50.85	257.87	0.38	-0.31	1.25	
7216.00	10.00	345.10	7191.50	278.78	48.42	268.78	1.22	0.47	-6.56	
7285.00	8.70	345.60	7259.58	289.62	45.58	279.92	1.89	-1.88	0.72	
7349.00	10.00	348.20	7322.73	299.75	43.24	290.28	2.14	2.03	4.06	
7412.00	10.60	348.70	7384.72	310.79	40.99	301.53	0.96	0.95	0.79	
7476.00	10.10	350.20	7447.67	322.09	38.88	313.02	0.89	-0.78	2.34	
7540.00	10.70	348.80	7510.62	333.45	36.77	324.56	1.02	0.94	-2.19	
7604.00	11.70	347.40	7573.40	345.61	34.20	336.97	1.62	1.56	-2.19	
7668.00	11.20	345.90	7636.13	357.97	31.27	349.62	0.91	-0.78	-2.34	
7732.00	10.40	345.30	7698.99	369.59	28.29	361.55	1.26	-1.25	-0.94	
7795.00	10.90	346.90	7760.91	380.89	25.49	373.14	0.92	0.79	2.54	
7857.00	10.90	348.00	7821.79	392.33	22.95	384.83	0.34	0.00	1.77	
7919.00	10.20	347.90	7882.74	403.43	20.58	396.16	1.13	-1.13	-0.16	
7980.00	11.30	344.90	7942.67	414.49	17.89	407.48	2.02	1.80	-4.92	
8041.00	11.30	343.90	8002.49	426.00	14.67	419.34	0.32	0.00	-1.64	
8102.00	10.60	343.90	8062.38	437.13	11.46	430.82	1.15	-1.15	0.00	
8164.00	10.30	343.60	8123.35	447.93	8.32	441.96	0.49	-0.48	-0.48	
8227.00	10.30	344.90	8185.33	458.77	5.26	453.13	0.37	0.00	2.06	
8289.00	9.90	343.10	8246.37	469.22	2.26	463.90	0.82	-0.65	-2.90	
8321.00	9.10	342.30	8277.93	474.26	0.70	469.12	2.53	-2.50	-2.50	
8381.00	8.90	343.20	8337.20	483.23	-2.09	478.39	0.41	-0.33	1.50	
8473.00	9.80	345.10	8427.97	497.61	-6.16	493.21	1.03	0.98	2.07	
8535.00	9.70	343.70	8489.08	507.72	-8.98	503.63	0.42	-0.16	-2.26	
8661.00	9.40	339.90	8613.33	527.57	-15.50	524.22	0.55	-0.24	-3.02	
8753.00	9.60	344.00	8704.07	542.00	-20.19	539.18	0.77	0.22	4.46	
8817.00	10.90	342.50	8767.05	552.90	-23.48	550.44	2.07	2.03	-2.34	
8880.00	10.30	341.10	8828.97	563.91	-27.10	561.86	1.04	-0.95	-2.22	
8943.00	10.70	344.40	8890.92	574.87	-30.50	573.20	1.15	0.63	5.24	
9005.00	10.30	348.00	8951.88	585.84	-33.20	584.44	1.24	-0.65	5.81	
9067.00	9.50	347.00	9012.96	596.24	-35.50	595.07	1.32	-1.29	-1.61	
9129.00	9.10	346.60	9074.14	606.00	-37.79	605.05	0.65	-0.65	-0.65	
9190.00	9.70	346.30	9134.32	615.68	-40.12	614.98	0.99	0.98	-0.49	
9251.00	10.30	349.20	9194.40	626.03	-42.36	625.54	1.28	0.98	4.75	
9314.00	9.80	342.40	9256.43	636.68	-45.04	636.46	2.04	-0.79	-10.79	
9376.00	10.30	344.60	9317.48	647.05	-48.11	647.17	1.02	0.81	3.55	
9438.00	11.00	342.20	9378.41	658.03	-51.39	658.51	1.34	1.13	-3.87	
9499.00	10.50	341.90	9438.34	668.85	-54.89	669.72	0.82	-0.82	-0.49	
9559.00	10.10	343.70	9497.38	679.10	-58.07	680.32	0.86	-0.67	3.00	
9623.00	10.80	343.00	9560.31	690.22	-61.40	691.81	1.11	1.09	-1.09	



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Well:	McGruder 13 #1 ST	Survey Calculation Method:	Minimum Curvature
Wellbore:	Slant #1		
Design:	Slant #1		

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)	
9685.00	10.10	342.30	9621.28	700.95	-64.75	702.92	1.15	-1.13	-1.13	
9748.00	10.50	340.10	9683.27	711.61	-68.38	713.99	0.89	0.63	-3.49	
9811.00	11.30	342.50	9745.13	722.90	-72.19	725.71	1.46	1.27	3.81	
9872.00	11.40	342.20	9804.94	734.34	-75.83	737.56	0.19	0.16	-0.49	
9933.00	10.40	342.90	9864.84	745.34	-79.29	748.95	1.65	-1.64	1.15	
9995.00	10.30	338.80	9925.83	755.86	-82.94	759.88	1.20	-0.16	-6.61	
10057.00	9.60	338.60	9986.90	765.84	-86.83	770.32	1.13	-1.13	-0.32	
10181.00	9.90	340.90	10109.11	785.54	-94.09	790.87	0.40	0.24	1.85	
10244.00	10.40	337.20	10171.12	795.90	-98.07	801.70	1.30	0.79	-5.87	
10306.00	9.50	334.50	10232.19	805.67	-102.44	812.01	1.63	-1.45	-4.35	
10368.00	9.80	338.60	10293.31	815.20	-106.57	822.04	1.21	0.48	6.61	
10430.00	10.00	340.80	10354.39	825.20	-110.26	832.46	0.69	0.32	3.55	
10493.00	10.60	344.10	10416.37	835.94	-113.65	843.58	1.34	0.95	5.24	
10555.00	10.40	345.20	10477.34	846.83	-116.64	854.80	0.46	-0.32	1.77	
10617.00	10.20	344.80	10538.34	857.54	-119.51	865.81	0.34	-0.32	-0.65	
10679.00	9.20	344.70	10599.45	867.62	-122.26	876.18	1.61	-1.61	-0.16	
10742.00	10.40	347.10	10661.53	878.02	-124.86	886.85	2.01	1.90	3.81	
10804.00	10.40	346.60	10722.51	888.92	-127.40	898.00	0.15	0.00	-0.81	
10865.00	9.70	344.40	10782.57	899.23	-130.06	908.58	1.31	-1.15	-3.61	
10928.00	9.30	345.70	10844.71	909.27	-132.75	918.91	0.72	-0.63	2.06	
Last MWD Survey										
11025.00	9.30	345.70	10940.44	924.46	-136.62	934.50	0.00	0.00	0.00	
Proj to Bit - TD										

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S ft	+E/-W ft	Northing (ft)	Easting (ft)	Latitude	Longitude
PBHL [McG13#1ST] -Rectangle (sides W400.00 H400.00 D0.00)	0.00	0.13	11600.00	1020.00	-150.00	504814.10	494352.30	32° 23' 16.240" N	104° 21' 05.878" W

Survey Annotations				
Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Comment
5854.00	5846.95	73.44	73.93	First MWD Survey
10928.00	10844.71	909.27	-132.75	Last MWD Survey
11025.00	10940.44	924.46	-136.62	Proj to Bit - TD