

Results of Directional Survey

API number:	30-025-40477		
OGRID:		Operator:	CIMAREX ENERGY CO. OF COLORADO
		Property:	HALLERTA 4 FEDERAL # 8H

surface	ULSTR:	A	04	T 26S	R 32E
				330 FNL	510 FEL

BH Loc	ULSTR:	P	04	T 26S	R 32E
15202	MD	10719.6	TVD	273 FSL	485 FEL
				5007 FNL	

Top Perf/OH	ULSTR:	A	04	T 26S	R 32E
10304	MD	10302.3	TVD	361 FNL	540 FEL

Bot Perf/OH	ULSTR:	P	04	T 26S	R 32E
15045	MD	10713.8	TVD	430 FSL	489 FEL
				4850 FNL	

	MD	N/S	E/W	VD
	10299	-30.97	-29.72	10297.25
TOP PERFS/OH	10304	-30.98	-29.82	10302.25
	10394	-31.23	-31.60	10392.23
	15043	-4518.46	21.02	10713.73
BOT PERFS/OH	15045	-4520.46	21.07	10713.80
	15139	-4614.38	23.28	10716.99

NEXT TO LAST	15139	-4614.38	23.28	10716.99
LAST READING	15202	-4677.30	24.71	10719.63
TD	15202	-4677.30	24.71	10719.63

Surface Location	330	FN	510	FE
Projected BHL	5007	FN	485	FE
Location of				
Top Perfs/OH	361	FN	540	FE
Bottom Perfs/OH	4850	FN	489	FE

SUMMARY of Subsurface Locations

Surface Location	A-04-26S-32E	330	FN	510	FE	Vert. Depth
Top Perfs/OH	A-04-26S-32E	361	FN	540	FE	10302.25
Bottom Perfs/OH	P-04-26S-32E	4850	FN	489	FE	10713.80
Projected TD	P-04-26S-32E	5007	FN	485	FE	10719.63



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Cimarex Energy Company of Colorado

Lea County NM (NAD 83)

Hallertau 4 Federal 8H

Job # 1210148

Rig: Cactus 101

Design: Rig: Cactus 101

Cimarex Survey Report

17 May, 2012

SUR: A-4-26s-32e, 330/N & 510/E
BHL: P-4-26s-32e, 5007/N & 485/E
API # 30-025-40477



Cimarex Survey Report

Company:	Cimarex Energy Company of Colorado	Local Co-ordinate Reference:	Well Job # 1210148
Project:	Lea County NM (NAD 83)	TVD Reference:	WELL @ 3330.60usft (Cactus 101)
Site:	Hallertau 4 Federal 8H	MD Reference:	WELL @ 3330.60usft (Cactus 101)
Well:	Job # 1210148	North Reference:	Grid
Wellbore:	Rig: Cactus 101	Survey Calculation Method:	Minimum Curvature
Design:	Rig: Cactus 101	Database:	Compass5000

Project	Lea County NM (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site		Hallertau 4 Federal 8H					
Site Position:		Northing:	393,013.58	usft	Latitude:	32° 4' 43.5144 N	
From:	Map	Easting:	745,819.19	usft	Longitude:	103° 40' 23.2719 W	
Position Uncertainty:	0.00	usft	Slot Radius:	13-3/16	"	Grid Convergence:	0.35 °

Well		Job # 1210148				
Well Position	+N/-S	0.00 usft	Northing:	393,013.58 usft	Latitude:	32° 4' 43.5144 N
	+E/-W	0.00 usft	Easting:	745,819.19 usft	Longitude:	103° 40' 23.2719 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	18.60 usft	Ground Level:	3,312.00 usft

Wellbore	Rig: Cactus 101				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	02/14/12	7.54	60.02	48,451

Design		Rig: Cactus 101			
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	179.52



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Wellbore:	Rig Cactus 101	Survey Calculation Method:	Minimum Curvature
Design:	Rig Cactus 101	Database:	Compass5000

Survey Program		Date	05/17/12		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
1,121.00	10,422.70	Phoenix MWD Surveys (Rig: Cactus 101)	MWD	MWD - Standard	
10,433.00	15,202.00	Phx MWD Lateral Surveys (Rig: Cactus 1	MWD	MWD - Standard	

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
1,121.00	1.29	222.37	2,209.67	1,120.93	-7.54	-3.28	7.51	0.00	393,006.04	745,815.91
Tie In From Gyro Surveys @ 1121' MD										
1,265.00	1.40	237.40	2,065.71	1,264.89	-9.69	-5.85	9.64	0.26	393,003.90	745,813.33
First Phoenix MWD Surveys @ 1265' MD										
1,360.00	1.10	244.50	1,970.73	1,359.87	-10.70	-7.66	10.64	0.35	393,002.88	745,811.53
1,456.00	1.00	254.60	1,874.74	1,455.86	-11.32	-9.29	11.24	0.22	393,002.26	745,809.89
1,550.00	0.60	217.50	1,780.75	1,549.85	-11.93	-10.38	11.84	0.68	393,001.65	745,808.80
1,646.00	0.70	224.80	1,684.76	1,645.84	-12.75	-11.10	12.65	0.14	393,000.84	745,808.08
1,742.00	1.00	213.90	1,588.77	1,741.83	-13.86	-11.98	13.76	0.35	392,999.73	745,807.20
1,838.00	1.00	238.00	1,492.78	1,837.82	-15.00	-13.16	14.89	0.43	392,998.59	745,806.02
1,934.00	0.70	238.40	1,396.80	1,933.80	-15.75	-14.37	15.63	0.31	392,997.84	745,804.81
2,030.00	0.60	242.00	1,300.80	2,029.80	-16.29	-15.32	16.16	0.11	392,997.29	745,803.87
2,125.00	0.70	205.60	1,205.81	2,124.79	-17.05	-16.01	16.91	0.44	392,996.54	745,803.18
2,221.00	0.40	248.90	1,109.81	2,220.79	-17.70	-16.57	17.56	0.51	392,995.89	745,802.61
2,316.00	0.40	275.10	1,014.81	2,315.79	-17.79	-17.21	17.64	0.19	392,995.80	745,801.98
2,412.00	0.60	282.60	918.82	2,411.78	-17.65	-18.04	17.50	0.22	392,995.94	745,801.15
2,505.00	0.80	263.00	825.82	2,504.78	-17.62	-19.15	17.46	0.33	392,995.96	745,800.03
2,601.00	0.80	192.70	729.83	2,600.77	-18.36	-19.97	18.19	0.96	392,995.23	745,799.22
2,696.00	1.00	186.00	634.84	2,695.76	-19.83	-20.20	19.66	0.24	392,993.76	745,798.99
2,791.00	0.30	161.80	539.85	2,790.75	-20.89	-20.21	20.72	0.78	392,992.70	745,798.98
2,886.00	0.10	350.20	444.85	2,885.75	-21.04	-20.15	20.87	0.42	392,992.54	745,799.04
2,982.00	0.30	125.00	348.85	2,981.75	-21.10	-19.95	20.94	0.39	392,992.48	745,799.23



Cimarex Survey Report

Company:	Cimarex Energy Company of Colorado	Local Co-ordinate Reference:	Well Job # 1210148
Project:	Lea County NM (NAD 83)	TVD Reference:	WELL @ 3330.60usft (Cactus 101)
Site:	Hallertau 4 Federal 8H	MD Reference:	WELL @ 3330.60usft (Cactus 101)
Well:	Job # 1210148	North Reference:	Grid
Wellbore:	Rig: Cactus 101	Survey Calculation Method:	Minimum Curvature
Design:	Rig: Cactus 101	Database:	Compass5000

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
3,077.00	0.80	119.10	253.86	3,076.74	-21.57	-19.17	21.41	0.53	392,992.01	745,800.02
3,173.00	2.30	124.70	157.89	3,172.71	-22.99	-17.00	22.85	1.57	392,990.59	745,802.18
3,268.00	2.70	114.30	62.98	3,267.62	-25.00	-13.39	24.88	0.64	392,988.59	745,805.79
3,364.00	2.40	106.90	-32.92	3,363.52	-26.51	-9.41	26.43	0.46	392,987.07	745,809.78
3,460.00	2.80	104.50	-128.82	3,459.42	-27.68	-5.22	27.64	0.43	392,985.90	745,813.97
3,555.00	2.10	74.20	-223.74	3,554.34	-27.79	-1.30	27.78	1.52	392,985.79	745,817.89
3,651.00	1.70	64.60	-319.69	3,650.29	-26.70	1.68	26.71	0.53	392,986.88	745,820.87
3,746.00	2.00	64.60	-414.64	3,745.24	-25.39	4.45	25.42	0.32	392,988.20	745,823.64
3,842.00	1.70	77.70	-510.59	3,841.19	-24.36	7.36	24.42	0.54	392,989.22	745,826.54
3,938.00	1.80	91.70	-606.54	3,937.14	-24.11	10.26	24.19	0.46	392,989.48	745,829.44
4,033.00	1.20	121.80	-701.51	4,032.11	-24.67	12.59	24.78	1.02	392,988.91	745,831.78
4,128.00	1.70	145.50	-796.48	4,127.08	-26.36	14.24	26.48	0.81	392,987.22	745,833.42
4,221.00	1.60	155.00	-889.44	4,220.04	-28.67	15.57	28.80	0.31	392,984.91	745,834.75
4,315.00	1.50	146.60	-983.41	4,314.01	-30.89	16.80	31.03	0.26	392,982.69	745,835.98
4,410.00	1.00	167.30	-1,078.39	4,408.99	-32.74	17.67	32.88	0.70	392,980.85	745,836.85
4,472.00	0.60	213.20	-1,140.38	4,470.98	-33.54	17.61	33.68	1.17	392,980.05	745,836.79
4,588.00	1.00	223.50	-1,256.37	4,586.97	-34.78	16.58	34.92	0.37	392,978.80	745,835.76
4,683.00	1.00	233.30	-1,351.36	4,681.96	-35.88	15.34	36.00	0.18	392,977.71	745,834.53
4,779.00	1.00	233.50	-1,447.34	4,777.94	-36.87	14.00	36.99	0.00	392,976.71	745,833.18
4,875.00	0.90	32.80	-1,543.34	4,873.94	-36.74	13.73	36.85	1.95	392,976.84	745,832.92
4,970.00	1.10	34.90	-1,638.32	4,968.92	-35.36	14.66	35.49	0.21	392,978.22	745,833.84
5,065.00	1.20	34.40	-1,733.30	5,063.90	-33.79	15.74	33.93	0.11	392,979.79	745,834.93
5,160.00	1.00	306.50	-1,828.29	5,158.89	-32.48	15.64	32.61	1.61	392,981.10	745,834.82
5,256.00	1.40	303.90	-1,924.27	5,254.87	-31.33	13.99	31.44	0.42	392,982.25	745,833.18
5,351.00	0.40	174.00	-2,019.26	5,349.86	-31.01	13.06	31.12	1.77	392,982.57	745,832.25
5,446.00	0.80	175.40	-2,114.25	5,444.85	-32.00	13.15	32.11	0.42	392,981.58	745,832.34
5,541.00	0.90	182.40	-2,209.24	5,539.84	-33.41	13.17	33.52	0.15	392,980.17	745,832.36



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Site:	Hallertau 4 Federal 8H	MD Reference:	WELL @ 3330.60usft (Cactus 101)
Well:	Job # 1210148	North Reference:	Grid
Wellbore:	Rig: Cactus 101	Survey Calculation Method:	Minimum Curvature
Design:	Rig: Cactus 101	Database:	Compass5000

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
5,637.00	0.90	285.50	-2,305.24	5,635.84	-33.96	12.41	34.06	1.47	392,979.62	745,831.60
5,733.00	1.10	303.00	-2,401.22	5,731.82	-33.26	10.91	33.35	0.38	392,980.33	745,830.10
5,828.00	1.10	299.40	-2,496.21	5,826.81	-32.31	9.35	32.39	0.07	392,981.27	745,828.54
5,923.00	1.30	294.90	-2,591.18	5,921.78	-31.41	7.58	31.47	0.23	392,982.17	745,826.77
6,018.00	1.30	301.80	-2,686.16	6,016.76	-30.39	5.69	30.44	0.16	392,983.19	745,824.88
6,114.00	1.30	298.60	-2,782.14	6,112.74	-29.29	3.81	29.33	0.08	392,984.29	745,822.99
6,208.00	1.30	306.50	-2,876.11	6,206.71	-28.15	2.01	28.17	0.19	392,985.43	745,821.20
6,304.00	1.40	311.60	-2,972.08	6,302.68	-26.72	0.26	26.72	0.16	392,986.86	745,819.45
6,399.00	1.50	316.00	-3,067.05	6,397.65	-25.06	-1.47	25.05	0.16	392,988.52	745,817.72
6,495.00	1.50	315.30	-3,163.02	6,493.62	-23.26	-3.23	23.23	0.02	392,990.32	745,815.96
6,590.00	1.40	317.00	-3,257.99	6,588.59	-21.53	-4.89	21.49	0.11	392,992.05	745,814.29
6,686.00	1.50	316.60	-3,353.96	6,684.56	-19.76	-6.56	19.70	0.10	392,993.82	745,812.63
6,781.00	1.50	313.00	-3,448.93	6,779.53	-18.01	-8.32	17.94	0.10	392,995.58	745,810.87
6,875.00	0.50	299.30	-3,542.91	6,873.51	-16.97	-9.58	16.89	1.09	392,996.62	745,809.61
6,971.00	0.60	281.10	-3,638.91	6,969.51	-16.67	-10.43	16.58	0.21	392,996.92	745,808.75
7,066.00	0.70	280.20	-3,733.90	7,064.50	-16.47	-11.49	16.37	0.11	392,997.12	745,807.69
7,161.00	0.70	277.80	-3,828.89	7,159.49	-16.29	-12.64	16.18	0.03	392,997.30	745,806.55
7,257.00	0.60	288.40	-3,924.89	7,255.49	-16.05	-13.70	15.93	0.16	392,997.54	745,805.49
7,352.00	0.40	268.80	-4,019.89	7,350.49	-15.90	-14.50	15.77	0.27	392,997.69	745,804.68
7,446.00	0.70	266.80	-4,113.88	7,444.48	-15.94	-15.40	15.81	0.32	392,997.65	745,803.78
7,541.00	0.30	224.20	-4,208.88	7,539.48	-16.15	-16.16	16.01	0.55	392,997.44	745,803.03
7,636.00	0.40	208.20	-4,303.88	7,634.48	-16.62	-16.49	16.48	0.15	392,996.97	745,802.70
7,731.00	0.40	189.80	-4,398.87	7,729.47	-17.24	-16.70	17.10	0.13	392,996.35	745,802.49
7,827.00	0.30	198.70	-4,494.87	7,825.47	-17.80	-16.84	17.66	0.12	392,995.78	745,802.35
7,923.00	0.40	188.90	-4,590.87	7,921.47	-18.37	-16.97	18.23	0.12	392,995.21	745,802.22
8,018.00	0.60	194.80	-4,685.87	8,016.47	-19.18	-17.15	19.04	0.22	392,994.40	745,802.04
8,114.00	0.80	195.00	-4,781.86	8,112.46	-20.32	-17.45	20.17	0.21	392,993.27	745,801.74



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Design:	Rig: Cactus 101	Database:	Compass5000

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
8,209.00	0.50	294.10	-4,876.85	8,207.45	-20.79	-18.00	20.64	1.06	392,992.80	745,801.19	
8,304.00	0.50	274.90	-4,971.85	8,302.45	-20.58	-18.79	20.42	0.18	392,993.00	745,800.40	
8,399.00	0.50	263.60	-5,066.85	8,397.45	-20.59	-19.62	20.43	0.10	392,992.99	745,799.57	
8,495.00	0.30	341.10	-5,162.85	8,493.45	-20.40	-20.11	20.23	0.55	392,993.18	745,799.07	
8,590.00	0.50	327.60	-5,257.84	8,588.44	-19.82	-20.42	19.64	0.23	392,993.77	745,798.77	
8,686.00	0.40	300.90	-5,353.84	8,684.44	-19.29	-20.93	19.11	0.24	392,994.29	745,798.26	
8,782.00	1.00	266.50	-5,449.83	8,780.43	-19.17	-22.05	18.98	0.74	392,994.41	745,797.13	
8,877.00	1.00	254.40	-5,544.82	8,875.42	-19.44	-23.68	19.24	0.22	392,994.14	745,795.51	
8,971.00	0.80	264.20	-5,638.81	8,969.41	-19.73	-25.12	19.52	0.27	392,993.85	745,794.07	
9,067.00	0.90	220.30	-5,734.80	9,065.40	-20.37	-26.27	20.15	0.67	392,993.21	745,792.91	
9,162.00	0.80	273.00	-5,829.79	9,160.39	-20.91	-27.42	20.68	0.80	392,992.68	745,791.77	
9,251.00	0.30	45.70	-5,918.79	9,249.39	-20.71	-27.87	20.48	1.15	392,992.87	745,791.31	
9,346.00	0.30	37.50	-6,013.78	9,344.38	-20.34	-27.54	20.11	0.05	392,993.24	745,791.64	
9,441.00	0.30	122.60	-6,108.78	9,439.38	-20.28	-27.18	20.05	0.43	392,993.31	745,792.00	
9,536.00	1.00	151.10	-6,203.78	9,534.38	-21.14	-26.57	20.91	0.79	392,992.45	745,792.61	
9,631.00	1.00	159.10	-6,298.76	9,629.36	-22.64	-25.88	22.42	0.15	392,990.95	745,793.31	
9,726.00	0.80	153.80	-6,393.75	9,724.35	-24.01	-25.29	23.79	0.23	392,989.58	745,793.90	
9,822.00	1.10	159.40	-6,489.74	9,820.34	-25.47	-24.67	25.26	0.33	392,988.11	745,794.52	
9,917.00	0.80	178.90	-6,584.72	9,915.32	-26.99	-24.33	26.78	0.46	392,986.60	745,794.85	
10,013.00	0.70	227.70	-6,680.72	10,011.32	-28.05	-24.76	27.84	0.65	392,985.53	745,794.43	
10,108.00	0.80	237.00	-6,775.71	10,106.31	-28.80	-25.74	28.59	0.17	392,984.78	745,793.45	
10,203.00	1.70	236.30	-6,870.69	10,201.29	-29.95	-27.47	29.72	0.95	392,983.64	745,791.72	
10,299.00	1.30	257.80	-6,966.65	10,297.25	-30.97	-29.72	30.72	0.71	392,982.62	745,789.47	
10,394.00	1.00	267.40	-7,061.63	10,392.23	-31.23	-31.60	30.97	0.37	392,982.35	745,787.59	
10,422.70	6.49	181.44	-7,090.27	10,420.87	-32.87	-31.89	32.60	22.63	392,980.72	745,787.29	
Tie In From Surveys @ 10422.7 MD											



Cimarex Survey Report

Company:	Cimarex Energy Company of Colorado	Local Co-ordinate Reference:	Well Job # 1210148
Project:	Lea County NM (NAD 83)	TVD Reference:	WELL @ 3330.60usft (Cactus 101)
Site:	Hallertau 4 Federal 8H	MD Reference:	WELL @ 3330.60usft (Cactus 101)
Well:	Job # 1210148	North Reference:	Grid
Wellbore:	Rig: Cactus 101	Survey Calculation Method:	Minimum Curvature
Design:	Rig: Cactus 101	Database:	Compass5000

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
10,433.00	8.80	179.10	-7,100.48	10,431.08	-34.24	-31.89	33.97	22.63	392,979.35	745,787.29	
First Phoenix MWD Surveys @ 10433' MD											
10,465.00	18.30	176.10	-7,131.55	10,462.15	-41.71	-31.51	41.45	29.76	392,971.87	745,787.67	
10,497.00	26.50	175.20	-7,161.11	10,491.71	-53.86	-30.57	53.60	25.65	392,959.72	745,788.61	
10,528.00	33.70	176.20	-7,187.92	10,518.52	-69.35	-29.42	69.11	23.28	392,944.23	745,789.76	
10,560.00	39.20	173.10	-7,213.65	10,544.25	-88.27	-27.62	88.03	18.12	392,925.32	745,791.57	
10,592.00	44.90	174.90	-7,237.40	10,568.00	-109.57	-25.40	109.36	18.21	392,904.01	745,793.79	
10,623.00	49.40	174.90	-7,258.48	10,589.08	-132.21	-23.38	132.01	14.52	392,881.38	745,795.81	
10,655.00	53.90	174.40	-7,278.33	10,608.93	-157.19	-21.03	157.00	14.12	392,856.40	745,798.15	
10,686.00	56.30	174.10	-7,296.06	10,626.66	-182.48	-18.49	182.32	7.78	392,831.10	745,800.70	
10,718.00	57.50	177.00	-7,313.54	10,644.14	-209.20	-16.41	209.06	8.47	392,804.38	745,802.78	
10,750.00	59.80	180.70	-7,330.19	10,660.79	-236.52	-15.87	236.37	12.21	392,777.07	745,803.31	
10,782.00	63.80	182.00	-7,345.31	10,675.91	-264.70	-16.54	264.55	13.00	392,748.88	745,802.64	
10,813.00	68.50	181.80	-7,357.84	10,688.44	-293.03	-17.48	292.88	15.17	392,720.55	745,801.70	
10,845.00	74.50	181.40	-7,367.99	10,698.59	-323.35	-18.33	323.19	18.79	392,690.23	745,800.86	
10,877.00	78.40	180.80	-7,375.49	10,706.09	-354.45	-18.92	354.28	12.32	392,659.13	745,800.26	
10,888.00	80.40	180.80	-7,377.51	10,708.11	-365.26	-19.07	365.09	18.18	392,648.32	745,800.11	
10,901.00	82.00	180.80	-7,379.50	10,710.10	-378.11	-19.25	377.93	12.31	392,635.48	745,799.93	
10,933.00	85.50	181.20	-7,382.98	10,713.58	-409.91	-19.81	409.73	11.01	392,603.68	745,799.38	
11,028.00	86.60	180.60	-7,389.53	10,720.13	-504.67	-21.30	504.47	1.32	392,508.92	745,797.89	
11,123.00	88.10	179.60	-7,393.92	10,724.52	-599.56	-21.46	599.36	1.90	392,414.02	745,797.72	
11,218.00	90.50	180.40	-7,395.08	10,725.68	-694.55	-21.46	694.34	2.66	392,319.04	745,797.72	
11,313.00	90.70	180.00	-7,394.08	10,724.68	-789.54	-21.79	789.33	0.47	392,224.04	745,797.39	
11,409.00	90.40	179.20	-7,393.16	10,723.76	-885.53	-21.12	885.32	0.89	392,128.05	745,798.06	
11,504.00	89.70	179.30	-7,393.08	10,723.68	-980.52	-19.88	980.32	0.74	392,033.06	745,799.31	
11,599.00	90.20	180.30	-7,393.16	10,723.76	-1,075.52	-19.55	1,075.32	1.18	391,938.06	745,799.64	
11,694.00	90.00	179.50	-7,393.00	10,723.60	-1,170.52	-19.38	1,170.32	0.87	391,843.06	745,799.80	



Cimarex Survey Report

Company:	Cimarex Energy Company of Colorado	Local Co-ordinate Reference:	Well Job # 1210148
Project:	Lea County NM (NAD 83)	TVD Reference:	WELL @ 3330.60usft (Cactus 101)
Site:	Hallertau 4 Federal 8H	MD Reference:	WELL @ 3330.60usft (Cactus 101)
Well:	Job # 1210148	North Reference:	Grid
Wellbore:	Rig: Cactus 101	Survey Calculation Method:	Minimum Curvature
Design:	Rig: Cactus 101	Database:	Compass5000

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
11,790.00	89.60	178.80	-7,393.33	10,723.93	-1,266.51	-17.96	1,266.31	0.84	391,747.07	745,801.23
11,885.00	90.70	178.70	-7,393.08	10,723.68	-1,361.48	-15.89	1,361.30	1.16	391,652.10	745,803.30
11,981.00	91.10	178.10	-7,391.58	10,722.18	-1,457.43	-13.21	1,457.27	0.75	391,556.15	745,805.98
12,076.00	90.60	177.10	-7,390.17	10,720.77	-1,552.34	-9.23	1,552.21	1.18	391,461.24	745,809.96
12,171.00	90.70	178.00	-7,389.09	10,719.89	-1,647.25	-5.17	1,647.14	0.95	391,366.34	745,814.02
12,267.00	90.40	180.30	-7,388.17	10,718.77	-1,743.22	-3.74	1,743.13	2.42	391,270.36	745,815.44
12,362.00	89.70	180.40	-7,388.08	10,718.68	-1,838.22	-4.32	1,838.12	0.74	391,175.36	745,814.86
12,456.00	90.90	180.00	-7,387.59	10,718.19	-1,932.22	-4.65	1,932.11	1.35	391,081.37	745,814.53
12,549.00	90.90	180.20	-7,386.13	10,716.73	-2,025.21	-4.81	2,025.09	0.22	390,988.38	745,814.37
12,645.00	90.20	179.00	-7,385.21	10,715.81	-2,121.20	-4.14	2,121.09	1.45	390,892.39	745,815.04
12,740.00	90.20	178.80	-7,384.88	10,715.48	-2,216.18	-2.32	2,216.08	0.21	390,797.40	745,816.87
12,835.00	90.50	179.10	-7,384.30	10,714.90	-2,311.16	-0.58	2,311.07	0.45	390,702.42	745,818.61
12,930.00	90.40	178.80	-7,383.55	10,714.15	-2,406.14	1.16	2,406.07	0.33	390,607.44	745,820.35
13,026.00	90.60	178.40	-7,382.71	10,713.31	-2,502.11	3.51	2,502.05	0.47	390,511.47	745,822.69
13,122.00	91.00	177.30	-7,381.37	10,711.97	-2,598.03	7.11	2,598.00	1.22	390,415.55	745,826.29
13,216.00	90.60	178.50	-7,380.06	10,710.66	-2,691.96	10.55	2,691.95	1.35	390,321.63	745,829.74
13,323.00	90.20	178.40	-7,379.31	10,709.91	-2,798.91	13.45	2,798.93	0.39	390,214.67	745,832.63
13,418.00	89.90	177.80	-7,379.23	10,709.83	-2,893.86	16.60	2,893.90	0.71	390,119.72	745,835.78
13,514.00	89.70	178.80	-7,379.57	10,710.17	-2,989.82	19.44	2,989.88	1.06	390,023.77	745,838.63
13,610.00	90.60	178.80	-7,379.32	10,709.92	-3,085.79	21.45	3,085.87	0.94	389,927.79	745,840.64
13,705.00	90.50	179.10	-7,378.40	10,709.00	-3,180.77	23.19	3,180.86	0.33	389,832.81	745,842.38
13,800.00	89.60	180.00	-7,378.32	10,708.92	-3,275.77	23.94	3,275.86	1.34	389,737.81	745,843.13
13,895.00	89.30	179.80	-7,379.23	10,709.83	-3,370.76	24.11	3,370.85	0.38	389,642.82	745,843.29
13,994.00	89.00	178.80	-7,380.70	10,711.30	-3,469.75	25.32	3,469.84	1.05	389,543.84	745,844.50
14,089.00	88.80	180.00	-7,382.52	10,713.12	-3,564.72	26.31	3,564.82	1.28	389,448.86	745,845.50
14,184.00	89.10	180.90	-7,384.27	10,714.87	-3,659.70	25.56	3,659.79	1.00	389,353.88	745,844.75
14,279.00	90.10	180.30	-7,384.93	10,715.53	-3,754.69	24.57	3,754.77	1.23	389,258.89	745,843.76



Cimarex Survey Report

Company:	Cimarex Energy Company of Colorado	Local Co-ordinate Reference:	Well Job # 1210148
Project:	Lea County NM (NAD 83)	TVD Reference:	WELL @ 3330.60usft (Cactus 101)
Site:	Hallertau 4 Federal 8H	MD Reference:	WELL @ 3330.60usft (Cactus 101)
Well:	Job # 1210148	North Reference:	Grid
Wellbore:	Rig: Cactus 101	Survey Calculation Method:	Minimum Curvature
Design:	Rig: Cactus 101	Database:	Compass5000

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
14,375.00	90.90	180.40	-7,384.09	10,714.69	-3,850.69	23.98	3,850.75	0.84	389,162.90	745,843.17
14,470.00	92.10	180.90	-7,381.60	10,712.20	-3,945.64	22.91	3,945.70	1.37	389,067.94	745,842.09
14,565.00	91.40	180.90	-7,378.70	10,709.30	-4,040.59	21.41	4,040.63	0.74	388,972.99	745,840.60
14,661.00	90.70	180.90	-7,376.94	10,707.54	-4,136.56	19.91	4,136.58	0.73	388,877.02	745,839.09
14,756.00	88.80	180.80	-7,377.36	10,707.96	-4,231.54	18.50	4,231.55	2.00	388,782.04	745,837.68
14,851.00	89.10	179.60	-7,379.10	10,709.70	-4,326.53	18.17	4,326.53	1.30	388,687.06	745,837.35
14,946.00	88.80	179.20	-7,380.84	10,711.44	-4,421.50	19.16	4,421.51	0.53	388,592.08	745,838.35
15,043.00	88.50	178.60	-7,383.13	10,713.73	-4,518.46	21.02	4,518.48	0.69	388,495.12	745,840.21
15,139.00	87.60	178.70	-7,386.39	10,716.99	-4,614.38	23.28	4,614.41	0.94	388,399.21	745,842.47
Last Phoenix MWD Surveys @ 15139' MD										
15,202.00	87.60	178.70	-7,389.03	10,719.63	-4,677.30	24.71	4,677.35	0.00	388,336.28	745,843.90
Projection to TD @ 15202' MD										

Formations					
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
10,239.73	10,238.00	2nd Bone Spring Ss		0.00	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N/-S (usft)	+E/-W (usft)		
1,121.00	1,120.93	-7.54	-3.28	Tie In From Gyro Surveys @ 1121' MD	
1,265.00	1,264.89	-9.69	-5.85	First Phoenix MWD Surveys @ 1265' MD	
10,422.70	10,420.87	-32.87	-31.89	Tie In From Surveys @ 10422.7' MD	
10,433.00	10,431.08	-34.24	-31.89	First Phoenix MWD Surveys @ 10433' MD	
15,139.00	10,716.99	-4,614.38	23.28	Last Phoenix MWD Surveys @ 15139' MD	
15,202.00	10,719.63	-4,677.30	24.71	Projection to TD @ 15202' MD	



Cimarex Survey Report

Company:	Cimarex Energy Company of Colorado	Local Co-ordinate Reference:	Well Job # 1210148
Project:	Lea County NM (NAD 83)	TVD Reference:	WELL @ 3330.60usft (Cactus 101)
Site:	Hallertau 4 Federal 8H	MD Reference:	WELL @ 3330.60usft (Cactus 101)
Well:	Job # 1210148	North Reference:	Grid
Wellbore:	Rig : Cactus 101	Survey Calculation Method:	Minimum Curvature
Design:	Rig : Cactus 101	Database:	Compass5000

Checked By: _____	Approved By: _____	Date: _____
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Cimarex Energy Company of Colorado

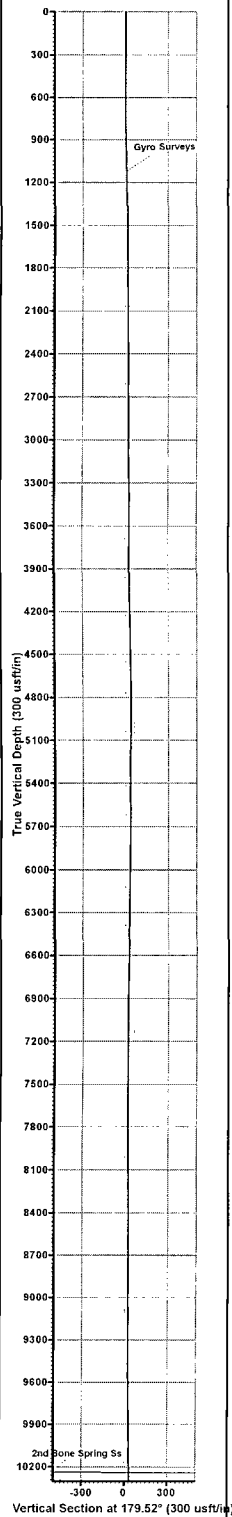
Project: Lea County NM (NAD 83)

Site: Hallertau 4 Federal 8H

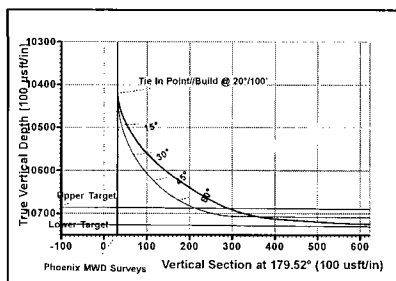
Well: Job # 1210148

Wellbore: Rig: Cactus 101

Plan: Plan 5 4-22-2012



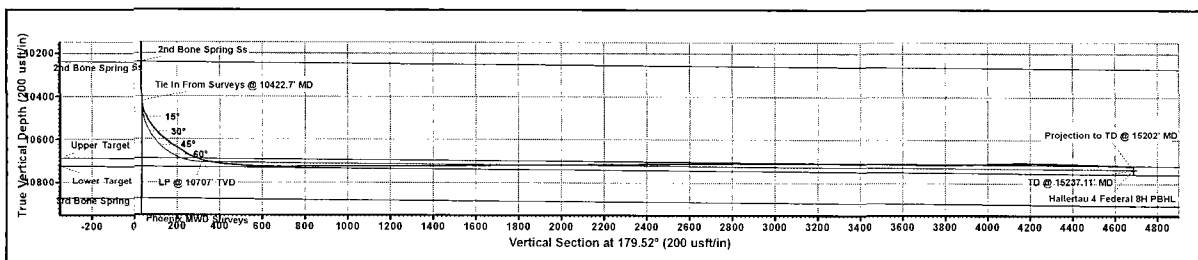
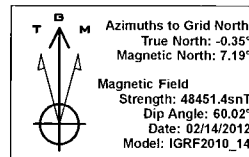
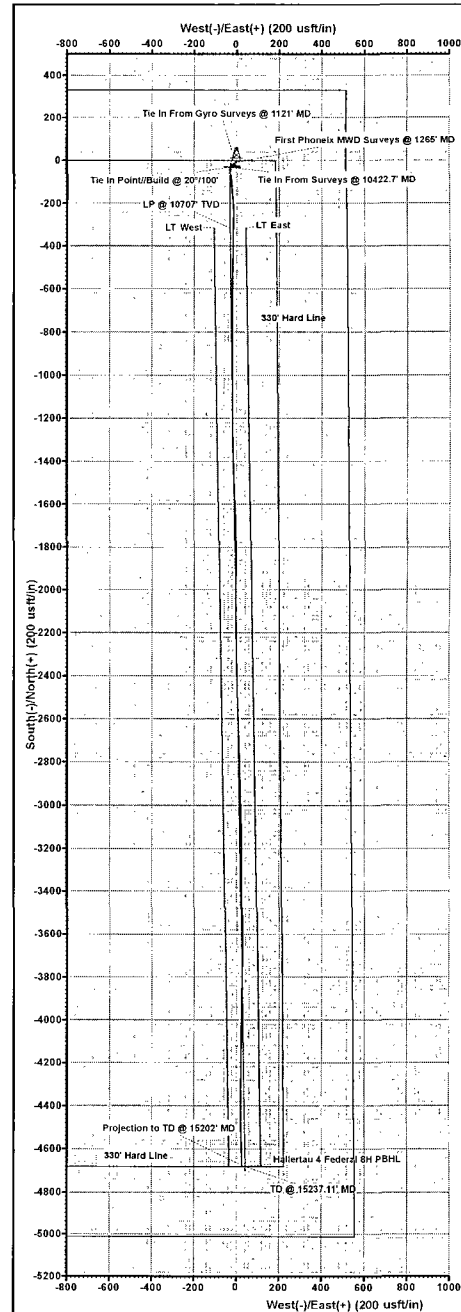
ANNOTATIONS		
TVD	MD	Annotation
10420.93	10422.70	Tie In Point/Build @ 20°/100'
10707.00	10870.41	LP @ 10707' TVD
10737.00	15237.00	TD @ 15237.11' MD



WELL DETAILS: Job # 1210148				
Ground Level: 3312.00				
Northing	Easting	Latitude	Longitude	
393013.58	745819.19	32° 4' 43.5144 N	103° 40' 23.2719 W	

FORMATION TOP DETAILS				
TVDPath	MDPath	Formation	DipAngle	DipDir
10686.44	10763.12	Upper Target	6.39	179.52

SECTION DETAILS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSecl	
10422.70	1.15	265.53	10420.93	-31.27	-32.14	0.00	0.00	30.99	
10870.41	89.61	179.05	10707.00	-315.86	-33.10	20.00	-86.49	315.57	
10871.06	89.61	179.05	10707.00	-316.51	-33.09	0.70	-143.30	316.21	
15237.11	89.61	179.05	10737.00	-4681.85	39.50	0.00	0.00	4682.02	Hallertau 4 Federal 8H PBHL





PHOENIX
TECHNOLOGY SERVICES

May 31, 2012

Cimarex Energy Co.
Attention: Regulatory Department
15 E. 5th Street, Suite 1000
Tulsa, OK 74103

HOBBS OCD

DEC 20 2012

RECEIVED

Re: Cimarex Energy Co.
Hallertau 4 Federal 8H
Lea Co., NM
API #30-025-40477
Job No. 1210148

Dear Regulatory Department;

Phoenix Technology Services, Inc. has filed the survey certification, surveys, and lease plat for the above referenced well with the State of New Mexico Oil Conservation Division – District 1 via certified mail. A copy of the filing is attached for your records.

Name of Surveyor	Drainhole Number	Surveyed Depths		Dates Performed		Type of Survey
		From	To	Start	End	
Daniel Scott	8H	1,265	15,139	04/03/12	05/16/12	MWD

Thank you for the opportunity to be of service. Please contact me if you have any questions or require additional information.

Best Regards,

Amy Pope
Operations Administrator

Phoenix Technology Services
SURVEY DATA CERTIFICATION



PHOENIX JOB NUMBER 1210148

OPERATOR Cimarex

WELL NAME Hallertau 4 Federal 8H

COUNTY & STATE Lea, New Mexico

API WELL NUMBER 30-025-40477

PROPOSED DIRECTION 179.52

TIE-IN DATA						
MEASURED	VERTICAL			N-S	E-W	DATA
DEPTH	DEPTH	INCLIN	AZIMUTH	COORD	COORD	SOURCE
1,121 ft	1,120.93 ft	1.3	222.4	-7.54 ft	-3.28 ft	Gyro

FIRST	FIRST		
SURVEY	SURVEY		
DATE	DEPTH	INCLIN	AZIMUTH
3-Apr-12	1,265 ft	1.4	237.4

SURVEY INSTRUMENT
TYPE
Phoenix MWD

LAST	LAST		
SURVEY	SURVEY		
DATE	DEPTH	INCLIN	AZIMUTH
16-May-12	15,139 ft	87.6	178.7

TO THE BEST OF MY KNOWLEDGE I
CERTIFY THIS SURVEY DATA TO BE
TRUE AND CORRECT.

PROJECTED	PROJECTED		
TD SURVEY	TD SURVEY		
DATE	DEPTH	INCLIN	AZIMUTH
16-May-12	15,202 ft	87.6	178.7

Daniel Scott

PRINT YOUR NAME ABOVE

SIGN YOUR NAME ABOVE

5/17/12

TODAY'S DATE

MAGNETIC DECLINATION OR TOTAL GRID

TOTAL CORRECTION USED	7.19
DECLINATION OR GRID	GRID

MWD SUPERVISOR 1

Daniel Scott

DIRECTIONAL DRILLER 1

Brinton Donaldson

MWD SUPERVISOR 2

Antonio Thompkins

DIRECTIONAL DRILLER 2

Chris Jabsen

1805 Brittmore Road

Houston, Texas 77043

(713)3370609 (Voice), (713)337-0599 (Fax)



Cimarex Energy Company of Colorado

Lea County NM (NAD 83)

Hallertau 4 Federal 8H

Job # 1210148

Rig: Cactus 101

Survey: Phx MWD Lateral Surveys

Cimarex Survey Report

17 May, 2012

**SUR: A-04-26s-32e, 330/N & 510/E
BHL: P-04-26s-32e, 5007/N & 485/E
API # 30-025-40477**



Cimarex Survey Report

Company:	Cimarex Energy Company of Colorado	Local Co-ordinate Reference:	Well Job # 1210148
Project:	Lea County NM (NAD 83)	TVD Reference:	WELL @ 3330.60usft (Cactus 101)
Site:	Hallertau 4 Federal 8H	MD Reference:	WELL @ 3330.60usft (Cactus 101)
Well:	Job # 1210148	North Reference:	Grid
Wellbore:	Rig: Cactus 101	Survey Calculation Method:	Minimum Curvature
Design:	Rig: Cactus 101	Database:	Compass5000

Project	Lea County NM (NAD 83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Hallertau 4 Federal 8H		
Site Position:		Northing:	393,013.58 usft
From:	Map	Easting:	745,819.19 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 4' 43.5144 N
		Longitude:	103° 40' 23.2719 W
		Grid Convergence:	0.35 °

Well	Job # 1210148		
Well Position	+N/-S 0.00 usft	Northing:	393,013.58 usft
	+E/-W 0.00 usft	Easting:	745,819.19 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	18.60 usft
		Latitude:	32° 4' 43.5144 N
		Longitude:	103° 40' 23.2719 W
		Ground Level:	3,312.00 usft

Wellbore	Rig: Cactus 101				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010_14	02/14/12	7.54	60.02	48,451

Design		Rig: Cactus 101		
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.00	0.00	0.00	179.52



Cimarex Survey Report

Company:	Cimarex Energy Company of Colorado	Local Co-ordinate Reference:	Well Job # 1210148
Project:	Lea County NM (NAD 83)	TVD Reference:	WELL @ 3330.60usft (Cactus 101)
Site:	Hallertau 4 Federal 8H	MD Reference:	WELL @ 3330.60usft (Cactus 101)
Well:	Job # 1210148	North Reference:	Grid
Wellbore:	Rig: Cactus 101	Survey Calculation Method:	Minimum Curvature
Design:	Rig: Cactus 101	Database:	Compass5000

Survey Program		Date	05/17/12		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
1,121.00	10,422.70	Phoenix MWD Surveys (Rig: Cactus 101)	MWD	MWD - Standard	
10,433.00	15,202.00	Phx MWD Lateral Surveys (Rig: Cactus 1	MWD	MWD - Standard	

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
10,422.70	1.15	265.53	-7,089.40	10,420.00	-31.27	-32.14	31.00	0.00	392,982.32	745,787.05	
Tie In From Surveys @ 10422.7' MD											
10,433.00	8.80	179.10	-7,099.66	10,430.26	-32.06	-32.23	31.79	85.46	392,981.52	745,786.96	
First Phoenix MWD Surveys @ 10433' MD											
10,465.00	18.30	176.10	-7,130.73	10,461.33	-39.54	-31.85	39.27	29.76	392,974.04	745,787.34	
10,497.00	26.50	175.20	-7,160.29	10,490.89	-51.69	-30.91	51.43	25.65	392,961.89	745,788.28	
10,528.00	33.70	176.20	-7,187.10	10,517.70	-67.18	-29.76	66.93	23.28	392,946.40	745,789.43	
10,560.00	39.20	173.10	-7,212.83	10,543.43	-86.09	-27.95	85.86	18.12	392,927.49	745,791.24	
10,592.00	44.90	174.90	-7,236.58	10,567.18	-107.40	-25.73	107.18	18.21	392,906.18	745,793.46	
10,623.00	49.40	174.90	-7,257.66	10,588.26	-130.03	-23.71	129.83	14.52	392,883.55	745,795.48	
10,655.00	53.90	174.40	-7,277.51	10,608.11	-155.01	-21.37	154.83	14.12	392,858.57	745,797.82	
10,686.00	56.30	174.10	-7,295.24	10,625.84	-180.31	-18.82	180.14	7.78	392,833.28	745,800.37	
10,718.00	57.50	177.00	-7,312.72	10,643.32	-207.03	-16.74	206.88	8.47	392,806.55	745,802.44	
10,750.00	59.80	180.70	-7,329.37	10,659.97	-234.34	-16.21	234.20	12.21	392,779.24	745,802.98	
10,782.00	63.80	182.00	-7,344.49	10,675.09	-262.53	-16.88	262.38	13.00	392,751.05	745,802.31	
10,813.00	68.50	181.80	-7,357.02	10,687.62	-290.86	-17.82	290.70	15.17	392,722.72	745,801.37	
10,845.00	74.50	181.40	-7,367.17	10,697.77	-321.18	-18.66	321.01	18.79	392,692.40	745,800.52	
10,877.00	78.40	180.80	-7,374.67	10,705.27	-352.28	-19.26	352.10	12.32	392,661.31	745,799.93	
10,888.00	80.40	180.80	-7,376.69	10,707.29	-363.09	-19.41	362.91	18.18	392,650.50	745,799.78	
10,901.00	82.00	180.80	-7,378.68	10,709.28	-375.93	-19.59	375.76	12.31	392,637.65	745,799.60	
10,933.00	85.50	181.20	-7,382.16	10,712.76	-407.73	-20.14	407.55	11.01	392,605.85	745,799.04	
11,028.00	86.60	180.60	-7,388.71	10,719.31	-502.49	-21.63	502.29	1.32	392,511.09	745,797.55	



Cimarex Survey Report

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Site:	Hallertau 4 Federal 8H	MD Reference:	WELL @ 3330.60usft (Cactus 101)
Well:	Job # 1210148	North Reference:	Grid
Wellbore:	Rig - Cactus 101	Survey Calculation Method:	Minimum Curvature
Design:	Rig - Cactus 101	Database:	Compass5000

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V- Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
11,123.00	88.10	179.60	-7,393.10	10,723.70	-597.39	-21.80	597.18	1.90	392,416.19	745,797.39	
11,218.00	90.50	180.40	-7,394.26	10,724.86	-692.37	-21.80	692.17	2.66	392,321.21	745,797.39	
11,313.00	90.70	180.00	-7,393.26	10,723.86	-787.37	-22.13	787.15	0.47	392,226.22	745,797.06	
11,409.00	90.40	179.20	-7,392.34	10,722.94	-883.36	-21.46	883.15	0.89	392,130.22	745,797.73	
11,504.00	89.70	179.30	-7,392.26	10,722.86	-978.35	-20.21	978.15	0.74	392,035.23	745,798.97	
11,599.00	90.20	180.30	-7,392.34	10,722.94	-1,073.35	-19.88	1,073.14	1.18	391,940.23	745,799.30	
11,694.00	90.00	179.50	-7,392.18	10,722.78	-1,168.35	-19.72	1,168.14	0.87	391,845.24	745,799.47	
11,790.00	89.60	178.80	-7,392.51	10,723.11	-1,264.34	-18.29	1,264.14	0.84	391,749.25	745,800.89	
11,885.00	90.70	178.70	-7,392.26	10,722.86	-1,359.31	-16.22	1,359.13	1.16	391,654.27	745,802.97	
11,981.00	91.10	178.10	-7,390.76	10,721.36	-1,455.26	-13.54	1,455.10	0.75	391,558.32	745,805.65	
12,076.00	90.60	177.10	-7,389.35	10,719.95	-1,550.17	-9.56	1,550.03	1.18	391,463.42	745,809.62	
12,171.00	90.70	178.00	-7,388.27	10,718.87	-1,645.07	-5.50	1,644.97	0.95	391,368.51	745,813.68	
12,267.00	90.40	180.30	-7,387.35	10,717.95	-1,741.05	-4.08	1,740.96	2.42	391,272.53	745,815.11	
12,362.00	89.70	180.40	-7,387.26	10,717.86	-1,836.05	-4.66	1,835.94	0.74	391,177.53	745,814.53	
12,456.00	90.90	180.00	-7,386.77	10,717.37	-1,930.04	-4.99	1,929.93	1.35	391,083.54	745,814.20	
12,549.00	90.90	180.20	-7,385.31	10,715.91	-2,023.03	-5.15	2,022.92	0.22	390,990.55	745,814.04	
12,645.00	90.20	179.00	-7,384.39	10,714.99	-2,119.02	-4.48	2,118.91	1.45	390,894.56	745,814.71	
12,740.00	90.20	178.80	-7,384.06	10,714.66	-2,214.01	-2.65	2,213.91	0.21	390,799.58	745,816.53	
12,835.00	90.50	179.10	-7,383.48	10,714.08	-2,308.99	-0.91	2,308.90	0.45	390,704.60	745,818.27	
12,930.00	90.40	178.80	-7,382.73	10,713.33	-2,403.97	0.83	2,403.89	0.33	390,609.61	745,820.01	
13,026.00	90.60	178.40	-7,381.89	10,712.49	-2,499.94	3.17	2,499.87	0.47	390,513.65	745,822.36	
13,122.00	91.00	177.30	-7,380.55	10,711.15	-2,595.86	6.77	2,595.82	1.22	390,417.73	745,825.96	
13,216.00	90.60	178.50	-7,379.24	10,709.84	-2,689.78	10.22	2,689.77	1.35	390,323.80	745,829.40	
13,323.00	90.20	178.40	-7,378.49	10,709.09	-2,796.74	13.11	2,796.75	0.39	390,216.84	745,832.30	
13,418.00	89.90	177.80	-7,378.41	10,709.01	-2,891.69	16.26	2,891.72	0.71	390,121.89	745,835.45	
13,514.00	89.70	178.80	-7,378.75	10,709.35	-2,987.64	19.11	2,987.70	1.06	390,025.94	745,838.30	
13,610.00	90.60	178.80	-7,378.49	10,709.09	-3,083.62	21.12	3,083.69	0.94	389,929.96	745,840.31	



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Well:	Job # 1210148	North Reference:	Grid
Wellbore:	Rig: Cactus 101	Survey Calculation Method:	Minimum Curvature
Design:	Rig: Cactus 101	Database:	Compass5000

Survey											
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVDSS (usft)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)	
13,705.00	90.50	179.10	-7,377.58	10,708.18	-3,178.60	22.86	3,178.68	0.33	389,834.98	745,842.05	
13,800.00	89.60	180.00	-7,377.50	10,708.10	-3,273.60	23.61	3,273.68	1.34	389,739.99	745,842.79	
13,895.00	89.30	179.80	-7,378.41	10,709.01	-3,368.59	23.77	3,368.67	0.38	389,644.99	745,842.96	
13,994.00	89.00	178.80	-7,379.88	10,710.48	-3,467.57	24.98	3,467.66	1.05	389,546.01	745,844.17	
14,089.00	88.80	180.00	-7,381.70	10,712.30	-3,562.55	25.98	3,562.64	1.28	389,451.04	745,845.16	
14,184.00	89.10	180.90	-7,383.45	10,714.05	-3,657.53	25.23	3,657.61	1.00	389,356.06	745,844.42	
14,279.00	90.10	180.30	-7,384.11	10,714.71	-3,752.52	24.24	3,752.59	1.23	389,261.06	745,843.42	
14,375.00	90.90	180.40	-7,383.27	10,713.87	-3,848.51	23.65	3,848.58	0.84	389,165.07	745,842.84	
14,470.00	92.10	180.90	-7,380.78	10,711.38	-3,943.47	22.57	3,943.52	1.37	389,070.11	745,841.76	
14,565.00	91.40	180.90	-7,377.88	10,708.48	-4,038.42	21.08	4,038.45	0.74	388,975.17	745,840.27	
14,661.00	90.70	180.90	-7,376.12	10,706.72	-4,134.39	19.57	4,134.41	0.73	388,879.20	745,838.76	
14,756.00	88.80	180.80	-7,376.54	10,707.14	-4,229.37	18.16	4,229.37	2.00	388,784.21	745,837.35	
14,851.00	89.10	179.60	-7,378.28	10,708.88	-4,324.35	17.83	4,324.35	1.30	388,689.23	745,837.02	
14,946.00	88.80	179.20	-7,380.02	10,710.62	-4,419.33	18.83	4,419.33	0.53	388,594.25	745,838.01	
15,043.00	88.50	178.60	-7,382.31	10,712.91	-4,516.29	20.69	4,516.30	0.69	388,497.30	745,839.87	
15,139.00	87.60	178.70	-7,385.57	10,716.17	-4,612.20	22.95	4,612.23	0.94	388,401.38	745,842.13	
Last Phoenix MWD Surveys @ 15139' MD											
15,202.00	87.60	178.70	-7,388.21	10,718.81	-4,675.13	24.38	4,675.17	0.00	388,338.45	745,843.56	
Projection to TD @ 15202' MD											

Formations						
Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)	
10,239.73	10,238.00	2nd Bone Spring Ss		0.00		



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Site:	Hallertau 4 Federal 8H	MD Reference:	WELL @ 3330.60usft (Cactus 101)
Well:	Job # 1210148	North Reference:	Grid
Wellbore:	Rig: Cactus 101	Survey Calculation Method:	Minimum Curvature
Design:	Rig: Cactus 101	Database:	Compass5000

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
10,422.70	10,420.00	-31.27	-32.14	Tie In From Surveys @ 10422.7' MD
10,433.00	10,430.26	-32.06	-32.23	First Phoenix MWD Surveys @ 10433' MD
15,139.00	10,716.17	-4,612.20	22.95	Last Phoenix MWD Surveys @ 15139' MD
15,202.00	10,718.81	-4,675.13	24.38	Projection to TD @ 15202' MD

Checked By: _____	Approved By: _____	Date: _____
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