

Results of Directional Survey

API number:	30-025-40346		
OGRID:		Operator:	CIMAREX ENERGY CO. OF COLORADO
		Property:	CASCADE 29 FEDERAL # 1H

surface	ULSTR:	D	29	T	25S	R	33E
				330	FNL	350	FWL

BH Loc	ULSTR:	M	29	T	25S	R	33E
14296	MD	9848.8	TVD	353	FSL	438	FWL
				4927	FNL		

Top Perf/OH	ULSTR:	D	29	T	25S	R	33E
9651	MD	9617.8	TVD	356	FNL	560	FWL

Bot Perf/OH	ULSTR:	M	29	T	25S	R	33E
14186	MD	9849.6	TVD	463	FSL	437	FWL
				4817	FNL		

	MD	N/S	E/W	VD
	9628	-10.00	213.70	9601.8
TOP PERFS/OH	9651	-26.01	209.72	9617.81
	9654	-28.10	209.20	9619.90
	14096	-4397.40	85.90	9850.20
BOT PERFS/OH	14186	-4487.36	86.85	9849.57
	14296	-4597.30	88.00	9848.80

NEXT TO LAST	14096	-4397.40	85.90	9850.20
LAST READING	14296	-4597.30	88.00	9848.80
TD	14296	-4597.30	88.00	9848.80

Surface Location	330	FN	350	FW
Projected BHL	4927	FN	438	FW
Location of				
Top Perfs/OH	356	FN	560	FW
Bottom Perfs/OH	4817	FN	437	FW

SUMMARY of Subsurface Locations

Surface Location	D-29-25S-33E	330	FN	350	FW	Vert. Depth
Top Perfs/OH	D-29-25S-33E	356	FN	560	FW	9617.81
Bottom Perfs/OH	M-29-25S-33E	4817	FN	437	FW	9849.57
Projected TD	M-29-25S-33E	4927	FN	438	FW	9848.80

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Cimarex Energy

Lea County, NM (NAD83 NME)

Cascade "29" Federal #1H

Cascade "29" Federal #1H (330' FNL & 350' FWL)

OH - Job #32D0212120

SUR: D-29-25s-33e, 330/N & 350/W
BHL: M-29-25s-33e/ 4927/N & 438/W
API # 30-025-40346

Design: Actual

SDI Standard Survey Report

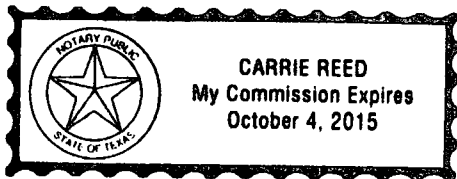
This survey is correct to the best of my knowledge and is supported by actual field data.

Richard

Notarized this date 15th of March, 2012.

Carrie Reed

Notary Signature
County of Midland
State of Texas



Scientific Drilling
Directional Drilling Operations



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	Cimarex Energy	Local Co-ordinate Reference:	Site Cascade "29" Federal #1H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	RF @ 3440.0usft (Key #880)
Site:	Cascade "29" Federal #1H	MD Reference:	RF @ 3440.0usft (Key #880)
Well:	Cascade "29" Federal #1H (330' FNL & 350' FWL)	North Reference:	Grid
Wellbore:	OH - Job #32D0212120	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Project	Lea County, NM (NAD83 NME)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Cascade "29" Federal #1H			
Site Position:		Northing:	403,768.80 usft	Latitude: 32° 6' 28.535 N
From:	Map	Easting:	767,866.70 usft	Longitude: 103° 36' 6.179 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"	Grid Convergence: 0.39 °

Well	Cascade "29" Federal #1H (330' FNL & 350' FWL)			
Well Position	+N/-S	0.0 usft	Northing:	403,768.80 usft
	+E/-W	0.0 usft	Easting:	767,866.70 usft
Position Uncertainty	0.0 usft		Wellhead Elevation:	usft
			Ground Level:	3,423.0 usft

Wellbore	OH - Job #32D0212120				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2/13/2012	7.51	60.06	48,476

Design	Actual			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	179.26

Survey Program	Date	3/15/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
118.8	10,252.1	Gyro (OH - Job #32D0212120)	Keeper	Standard Wireline Keeper ver 1.0.2
9,438.0	14,296.0	MWD ST (OH - Job #32D0212120)	MWD	MWD - Standard

Survey								
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.0	
118.8	0.79	60.93	118.8	0.4	0.7	60.93	0.8	
182.2	0.72	54.40	182.2	0.8	1.4	59.36	1.7	
245.6	0.94	47.31	245.5	1.4	2.1	56.16	2.6	
308.9	1.24	47.36	308.9	2.2	3.0	53.34	3.8	
372.3	1.69	55.22	372.2	3.2	4.3	52.91	5.4	
432.6	2.16	59.50	432.6	4.3	6.0	54.20	7.4	
493.0	2.47	59.23	492.9	5.6	8.1	55.48	9.8	
556.4	2.55	57.86	556.2	7.0	10.5	56.15	12.6	
619.7	2.67	56.27	619.5	8.6	12.9	56.32	15.5	
683.1	2.75	56.80	682.8	10.2	15.4	56.35	18.5	



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Well:	Cascade "29" Federal #1H (330' FNL & 350'	North Reference:	Grid
Wellbore:	EWL Job #32D0212120	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
744.4	2.71	58.77	744.0	11.8	17.9	56.55	21.4
805.8	2.74	58.98	805.3	13.3	20.3	56.83	24.3
867.2	2.64	59.38	866.6	14.8	22.8	57.08	27.2
930.5	2.49	58.55	929.9	16.2	25.3	57.25	30.0
990.9	2.49	60.56	990.2	17.6	27.5	57.44	32.6
1,051.2	2.49	63.21	1,050.5	18.8	29.8	57.77	35.3
1,115.6	2.36	63.51	1,114.8	20.0	32.3	58.17	38.0
1,177.0	2.33	61.63	1,176.1	21.2	34.5	58.44	40.5
1,238.3	2.35	59.52	1,237.4	22.4	36.7	58.57	43.0
1,299.7	2.39	59.23	1,298.8	23.7	38.9	58.61	45.5
1,361.0	2.55	58.28	1,360.1	25.1	41.1	58.62	48.2
1,422.4	2.75	54.42	1,421.4	26.7	43.5	58.49	51.0
1,483.8	2.83	55.42	1,482.6	28.4	45.9	58.29	54.0
1,545.1	2.87	53.51	1,543.9	30.1	48.4	58.09	57.0
1,608.5	2.97	55.63	1,607.2	32.0	51.0	57.90	60.2
1,671.8	2.97	56.12	1,670.5	33.9	53.7	57.79	63.5
1,735.2	3.09	53.72	1,733.7	35.8	56.5	57.65	66.9
1,798.6	2.97	56.85	1,797.0	37.7	59.2	57.54	70.2
1,861.9	3.01	58.78	1,860.3	39.4	62.0	57.55	73.5
1,925.3	2.96	60.15	1,923.6	41.1	64.9	57.63	76.8
1,988.6	3.13	61.89	1,986.8	42.8	67.8	57.77	80.2
2,050.0	3.11	58.65	2,048.1	44.4	70.7	57.87	83.5
2,114.4	3.13	60.60	2,112.4	46.2	73.7	57.94	87.0
2,178.7	3.24	60.16	2,176.6	47.9	76.8	58.04	90.6
2,243.1	3.10	59.25	2,240.9	49.7	79.9	58.10	94.1
2,305.4	3.15	56.38	2,303.2	51.6	82.8	58.09	97.5
2,432.2	3.62	57.16	2,429.7	55.6	89.1	58.00	105.0
2,496.5	3.89	44.22	2,493.9	58.3	92.3	57.71	109.2
2,558.9	3.95	62.22	2,556.1	60.8	95.7	57.55	113.4
2,621.2	4.14	56.42	2,618.3	63.1	99.4	57.61	117.8
2,685.6	4.02	64.10	2,682.5	65.3	103.4	57.71	122.3
2,748.0	3.47	62.00	2,744.7	67.2	107.0	57.88	126.4
2,812.3	2.89	57.48	2,809.0	69.0	110.1	57.94	129.9
2,876.7	2.63	54.35	2,873.3	70.7	112.7	57.89	133.0
2,939.0	2.29	52.63	2,935.6	72.3	114.8	57.81	135.7
3,003.4	2.27	54.33	2,999.9	73.8	116.9	57.73	138.3
3,067.8	2.29	49.88	3,064.2	75.4	118.9	57.63	140.8
3,129.1	2.19	47.92	3,125.5	77.0	120.7	57.48	143.2
3,193.5	2.18	46.56	3,189.8	78.6	122.5	57.31	145.6
3,257.8	2.10	39.86	3,254.1	80.4	124.2	57.08	147.9
3,320.2	2.15	36.57	3,316.5	82.2	125.6	56.80	150.1
3,384.6	2.03	42.64	3,380.8	84.0	127.1	56.54	152.3
3,448.9	1.77	42.24	3,445.1	85.6	128.5	56.34	154.4
3,511.3	1.26	35.77	3,507.4	86.9	129.6	56.17	156.0



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SDI Standard Survey Report



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Project:	Lea County, NM (NAD83 NME)	TVD Reference:	RF @ 3440.0usft (Key #880)
Site:	Cascade "29" Federal #1H	MD Reference:	RF @ 3440.0usft (Key #880)
Well:	Cascade "29" Federal #1H (330' FNL & 350'	North Reference:	Grid
Wellbore:	BNL Job #32D0212120	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
3,575.6	1.14	40.19	3,571.8	87.9	130.4	56.01	157.3
3,637.0	1.05	39.18	3,633.1	88.8	131.2	55.90	158.4
3,701.4	1.20	35.60	3,697.5	89.8	131.9	55.75	159.6
3,765.7	2.15	36.51	3,761.8	91.3	133.0	55.53	161.4
3,828.1	2.54	36.83	3,824.1	93.4	134.6	55.24	163.8
3,893.4	2.27	26.39	3,889.4	95.7	136.0	54.87	166.3
3,956.8	2.25	33.21	3,952.7	97.9	137.2	54.51	168.6
4,020.2	2.18	32.70	4,016.0	99.9	138.6	54.21	170.8
4,083.5	1.95	24.95	4,079.4	101.9	139.7	53.88	172.9
4,146.9	2.14	47.95	4,142.7	103.7	141.0	53.67	175.0
4,210.2	2.44	64.70	4,206.0	105.1	143.1	53.72	177.5
4,273.6	2.75	74.63	4,269.3	106.0	145.8	53.97	180.3
4,337.0	2.53	84.55	4,332.6	106.6	148.7	54.36	182.9
4,400.3	2.60	91.55	4,395.9	106.7	151.5	54.85	185.3
4,463.7	3.46	104.00	4,459.1	106.2	154.8	55.55	187.7
4,527.0	3.80	101.37	4,522.4	105.3	158.7	56.44	190.4
4,590.4	4.07	105.68	4,585.6	104.3	162.9	57.38	193.4
4,653.8	4.03	108.78	4,648.8	102.9	167.2	58.38	196.3
4,717.1	3.46	114.38	4,712.0	101.4	171.0	59.33	198.8
4,780.5	2.79	109.24	4,775.3	100.1	174.2	60.11	201.0
4,843.8	2.62	111.08	4,838.6	99.1	177.0	60.76	202.9
4,907.2	2.18	112.14	4,901.9	98.1	179.5	61.34	204.6
4,970.6	1.84	128.54	4,965.2	97.0	181.4	61.86	205.7
5,033.9	1.79	115.61	5,028.5	96.0	183.1	62.34	206.7
5,097.3	1.67	121.02	5,091.9	95.1	184.8	62.77	207.8
5,160.6	1.55	110.42	5,155.2	94.3	186.4	63.16	208.9
5,224.0	1.45	114.80	5,218.5	93.7	187.9	63.51	210.0
5,287.4	1.38	112.96	5,281.9	93.0	189.3	63.83	211.0
5,351.7	1.36	111.77	5,346.2	92.4	190.8	64.14	212.0
5,413.1	1.34	107.85	5,407.6	92.0	192.1	64.42	213.0
5,477.4	1.27	100.63	5,471.9	91.6	193.5	64.67	214.1
5,541.8	1.09	100.30	5,536.2	91.4	194.8	64.88	215.2
5,605.2	0.93	106.78	5,599.6	91.1	195.9	65.06	216.1
5,668.5	1.02	103.28	5,662.9	90.8	197.0	65.25	216.9
5,731.9	0.88	115.12	5,726.3	90.5	198.0	65.44	217.7
5,793.2	0.91	105.67	5,787.6	90.2	198.9	65.61	218.3
5,857.6	0.79	105.76	5,852.0	89.9	199.8	65.77	219.1
5,922.0	0.68	104.40	5,916.4	89.7	200.6	65.91	219.7
5,984.3	0.63	107.55	5,978.7	89.5	201.3	66.03	220.3
6,048.7	0.56	165.14	6,043.1	89.1	201.7	66.17	220.5
6,111.0	0.58	101.97	6,105.4	88.7	202.1	66.30	220.7
6,173.4	0.52	95.83	6,167.8	88.6	202.7	66.38	221.2
6,237.8	0.48	93.99	6,232.1	88.6	203.2	66.45	221.7
6,302.1	0.48	108.13	6,296.5	88.5	203.7	66.53	222.1
6,364.5	0.43	102.33	6,358.9	88.3	204.2	66.61	222.5



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Wellbore:	EWL) Job #32D0212120	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
6,426.8	0.43	85.11	6,421.2	88.3	204.7	66.66	222.9
6,491.2	0.53	78.50	6,485.6	88.4	205.2	66.70	223.4
6,555.6	0.59	87.05	6,549.9	88.5	205.8	66.74	224.0
6,617.9	0.58	68.63	6,612.3	88.6	206.4	66.77	224.7
6,680.3	0.60	69.02	6,674.6	88.8	207.0	66.78	225.3
6,745.6	0.50	65.43	6,740.0	89.1	207.6	66.78	225.9
6,811.0	0.42	58.34	6,805.4	89.3	208.1	66.77	226.4
6,873.4	0.33	25.41	6,867.7	89.6	208.4	66.73	226.8
6,935.7	0.31	93.94	6,930.1	89.7	208.6	66.72	227.1
6,998.1	0.38	45.50	6,992.4	89.9	208.9	66.72	227.4
7,063.4	0.43	78.63	7,057.8	90.1	209.3	66.72	227.9
7,125.8	0.42	94.25	7,120.2	90.1	209.8	66.75	228.3
7,188.2	0.43	95.23	7,182.5	90.1	210.2	66.81	228.7
7,253.5	0.38	91.40	7,247.9	90.0	210.7	66.86	229.1
7,316.9	0.33	104.87	7,311.2	90.0	211.1	66.91	229.5
7,380.2	0.39	129.44	7,374.6	89.8	211.4	66.99	229.7
7,443.6	0.39	118.44	7,437.9	89.6	211.8	67.08	229.9
7,507.0	0.32	143.38	7,501.3	89.3	212.1	67.16	230.1
7,570.3	0.41	144.68	7,564.7	89.0	212.3	67.26	230.2
7,633.7	0.43	138.46	7,628.0	88.6	212.6	67.37	230.3
7,697.0	0.45	148.18	7,691.4	88.2	212.9	67.49	230.5
7,760.4	0.88	103.23	7,754.7	87.9	213.5	67.62	230.9
7,823.8	0.81	118.93	7,818.1	87.6	214.4	67.77	231.6
7,887.1	1.10	103.69	7,881.4	87.2	215.3	67.95	232.3
7,950.5	1.27	95.90	7,944.8	87.0	216.6	68.12	233.5
8,013.8	1.01	121.48	8,008.1	86.7	217.8	68.31	234.4
8,077.2	0.90	115.66	8,071.5	86.1	218.7	68.50	235.1
8,140.6	0.85	114.86	8,134.8	85.7	219.6	68.68	235.7
8,203.9	0.86	118.02	8,198.2	85.3	220.5	68.84	236.4
8,267.3	1.02	122.26	8,261.5	84.8	221.3	69.04	237.0
8,330.6	1.20	125.90	8,324.9	84.1	222.4	69.28	237.7
8,394.0	1.28	121.32	8,388.2	83.3	223.5	69.55	238.5
8,457.4	1.42	130.62	8,451.6	82.5	224.7	69.85	239.4
8,520.7	1.50	128.94	8,514.9	81.4	225.9	70.18	240.2
8,584.1	1.57	132.10	8,578.3	80.3	227.2	70.53	241.0
8,647.4	1.51	143.21	8,641.6	79.1	228.4	70.90	241.7
8,710.8	1.39	146.33	8,704.9	77.8	229.3	71.27	242.1
8,774.2	1.41	151.43	8,768.3	76.4	230.1	71.62	242.5
8,837.5	1.27	150.67	8,831.6	75.1	230.8	71.97	242.7
8,900.9	1.26	154.19	8,895.0	73.9	231.5	72.29	243.0
8,964.2	1.22	150.48	8,958.3	72.7	232.1	72.61	243.2
9,027.6	1.26	151.16	9,021.7	71.5	232.8	72.93	243.5
9,091.0	1.25	154.36	9,085.0	70.3	233.4	73.25	243.8
9,154.3	1.15	161.87	9,148.3	69.0	233.9	73.56	243.9



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Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
9,217.7	0.99	161.07	9,211.7	67.9	234.3	73.83	243.9
9,281.0	0.91	160.99	9,275.0	66.9	234.6	74.08	244.0
9,344.4	0.95	170.42	9,338.4	65.9	234.9	74.32	243.9
9,407.8	0.86	181.47	9,401.7	64.9	234.9	74.55	243.8
9,438.0	4.62	194.69	9,431.9	63.5	234.6	74.85	243.1
9,470.0	11.02	195.12	9,463.6	59.3	233.5	75.75	240.9
9,502.0	17.53	196.63	9,494.6	51.7	231.3	77.39	237.0
9,532.0	24.29	196.77	9,522.6	41.5	228.3	79.70	232.0
9,564.0	31.11	197.00	9,551.0	27.3	223.9	83.06	225.6
9,596.0	37.16	195.39	9,577.4	10.0	218.9	87.38	219.2
9,628.0	43.37	194.30	9,601.8	-10.0	213.7	92.67	213.9
9,654.0	48.62	193.29	9,619.9	-28.1	209.2	97.65	211.1
9,690.0	52.86	193.55	9,642.7	-55.2	202.7	105.24	210.1
9,717.0	54.84	194.06	9,658.6	-76.4	197.5	111.14	211.8
9,753.0	56.48	194.74	9,678.9	-105.2	190.1	118.95	217.3
9,780.0	58.13	195.27	9,693.5	-127.1	184.3	124.60	223.9
9,816.0	59.14	194.47	9,712.2	-156.8	176.4	131.64	236.0
9,843.0	59.22	194.21	9,726.1	-179.3	170.6	136.42	247.5
9,880.0	61.83	195.02	9,744.3	-210.5	162.5	142.33	265.9
9,906.0	63.62	194.59	9,756.2	-232.8	156.6	146.07	280.6
9,943.0	67.33	194.35	9,771.5	-265.4	148.2	150.82	304.0
9,970.0	70.00	194.37	9,781.4	-289.8	141.9	153.90	322.7
10,007.0	71.57	194.41	9,793.5	-323.6	133.3	157.62	350.0
10,033.0	71.79	194.45	9,801.7	-347.5	127.1	159.91	370.0
10,070.0	74.00	194.52	9,812.6	-381.7	118.3	162.79	399.6
10,097.0	76.36	194.28	9,819.5	-407.0	111.8	164.64	422.1
10,134.0	79.59	193.91	9,827.2	-442.1	103.0	166.89	453.9
10,160.0	81.40	193.95	9,831.5	-467.0	96.8	168.29	476.9
10,197.0	83.26	193.43	9,836.4	-502.6	88.1	170.06	510.3
10,224.0	85.19	193.10	9,839.1	-528.8	82.0	171.19	535.1
10,261.0	86.91	190.62	9,841.7	-564.9	74.4	172.50	569.8
10,288.0	87.82	188.47	9,842.9	-591.5	69.9	173.26	595.6
10,351.0	88.12	184.83	9,845.2	-654.0	62.6	174.53	657.0
10,414.0	89.26	183.33	9,846.6	-716.8	58.1	175.36	719.2
10,478.0	90.81	182.73	9,846.6	-780.7	54.7	175.99	782.7
10,542.0	89.93	182.56	9,846.2	-844.7	51.8	176.49	846.3
10,605.0	89.87	182.66	9,846.3	-907.6	48.9	176.91	908.9
10,669.0	90.87	182.76	9,845.9	-971.5	45.9	177.30	972.6
10,732.0	90.07	181.14	9,845.3	-1,034.5	43.8	177.58	1,035.4
10,795.0	89.90	180.19	9,845.4	-1,097.5	43.0	177.76	1,098.3
10,859.0	90.34	179.89	9,845.2	-1,161.5	43.0	177.88	1,162.3
10,922.0	90.91	179.35	9,844.5	-1,224.5	43.4	177.97	1,225.2
10,985.0	90.44	179.09	9,843.8	-1,287.5	44.3	178.03	1,288.2
11,049.0	90.81	178.59	9,843.1	-1,351.5	45.5	178.07	1,352.2



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	Cimarex Energy	Local Co-ordinate Reference:	Site Cascade "29" Federal #1H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	RF @ 3440.0usft (Key #880)
Site:	Cascade "29" Federal #1H	MD Reference:	RF @ 3440.0usft (Key #880)
Well:	Cascade "29" Federal #1H (330' FNL & 350'	North Reference:	Grid
Wellbore:	SWL Job #32D0212120	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
11,112.0	89.09	179.53	9,843.1	-1,414.4	46.6	178.11	1,415.2
11,176.0	88.86	180.15	9,844.3	-1,478.4	46.8	178.19	1,479.2
11,239.0	89.29	180.25	9,845.3	-1,541.4	46.5	178.27	1,542.1
11,303.0	89.43	180.56	9,846.0	-1,605.4	46.1	178.36	1,606.1
11,367.0	87.75	180.44	9,847.6	-1,669.4	45.5	178.44	1,670.0
11,430.0	88.52	179.82	9,849.6	-1,732.4	45.4	178.50	1,733.0
11,494.0	90.50	179.91	9,850.2	-1,796.4	45.5	178.55	1,796.9
11,558.0	91.08	179.57	9,849.3	-1,860.3	45.8	178.59	1,860.9
11,621.0	91.82	178.85	9,847.7	-1,923.3	46.7	178.61	1,923.9
11,684.0	92.93	179.10	9,845.1	-1,986.3	47.8	178.62	1,986.8
11,747.0	92.25	178.89	9,842.3	-2,049.2	48.9	178.63	2,049.8
11,811.0	91.58	180.07	9,840.1	-2,113.1	49.5	178.66	2,113.7
11,874.0	91.95	180.53	9,838.2	-2,176.1	49.2	178.71	2,176.7
11,938.0	91.28	180.76	9,836.4	-2,240.1	48.5	178.76	2,240.6
12,001.0	90.88	180.61	9,835.2	-2,303.1	47.7	178.81	2,303.6
12,065.0	88.62	180.56	9,835.5	-2,367.1	47.1	178.86	2,367.5
12,128.0	90.00	180.46	9,836.2	-2,430.0	46.5	178.90	2,430.5
12,192.0	88.42	180.02	9,837.1	-2,494.0	46.2	178.94	2,494.5
12,255.0	88.62	179.89	9,838.7	-2,557.0	46.3	178.96	2,557.4
12,319.0	89.50	180.00	9,839.8	-2,621.0	46.3	178.99	2,621.4
12,383.0	89.83	178.91	9,840.2	-2,685.0	46.9	179.00	2,685.4
12,446.0	87.58	178.55	9,841.6	-2,748.0	48.3	178.99	2,748.4
12,509.0	89.66	179.21	9,843.1	-2,810.9	49.6	178.99	2,811.4
12,573.0	90.81	179.60	9,842.8	-2,874.9	50.2	179.00	2,875.4
12,636.0	90.03	178.77	9,842.4	-2,937.9	51.1	179.00	2,938.4
12,700.0	89.83	178.56	9,842.5	-3,001.9	52.6	179.00	3,002.4
12,764.0	88.66	178.08	9,843.3	-3,065.9	54.5	178.98	3,066.3
12,827.0	89.50	178.32	9,844.3	-3,128.8	56.5	178.97	3,129.3
12,890.0	88.79	178.50	9,845.3	-3,191.8	58.2	178.95	3,192.3
12,954.0	89.23	178.79	9,846.4	-3,255.8	59.7	178.95	3,256.3
13,017.0	90.07	178.72	9,846.7	-3,318.7	61.1	178.95	3,319.3
13,081.0	88.69	178.54	9,847.4	-3,382.7	62.6	178.94	3,383.3
13,144.0	89.09	178.66	9,848.7	-3,445.7	64.2	178.93	3,446.3
13,208.0	89.02	177.88	9,849.7	-3,509.7	66.1	178.92	3,510.3
13,271.0	89.77	177.33	9,850.4	-3,572.6	68.7	178.90	3,573.3
13,334.0	89.13	178.15	9,851.0	-3,635.5	71.2	178.88	3,636.2
13,398.0	90.20	178.66	9,851.4	-3,699.5	73.0	178.87	3,700.2
13,461.0	90.67	178.98	9,850.9	-3,762.5	74.3	178.87	3,763.2
13,525.0	91.08	178.79	9,849.9	-3,826.5	75.5	178.87	3,827.2
13,588.0	90.03	179.81	9,849.3	-3,889.5	76.3	178.88	3,890.2
13,652.0	90.03	178.79	9,849.3	-3,953.5	77.1	178.88	3,954.2
13,716.0	89.70	179.05	9,849.4	-4,017.5	78.3	178.88	4,018.2
13,779.0	89.53	178.28	9,849.8	-4,080.4	79.8	178.88	4,081.2
13,842.0	90.70	178.74	9,849.7	-4,143.4	81.4	178.87	4,144.2



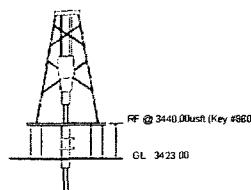
Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	Cimarex Energy	Local Co-ordinate Reference:	Site Cascade "29" Federal #1H
Project:	Lea County, NM (NAD83 NME)	TVD Reference:	RF @ 3440.0usft (Key #880)
Site:	Cascade "29" Federal #1H	MD Reference:	RF @ 3440.0usft (Key #880)
Well:	Cascade "29" Federal #1H (330' FNL & 350'	North Reference:	Grid
Wellbore:	FNL) Job #32D0212120	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
13,905.0	89.43	179.04	9,849.6	-4,206.4	82.6	178.87	4,207.2
13,969.0	89.29	178.21	9,850.3	-4,270.4	84.2	178.87	4,271.2
14,033.0	90.27	179.59	9,850.6	-4,334.4	85.4	178.87	4,335.2
14,096.0	90.40	179.42	9,850.2	-4,397.4	85.9	178.88	4,398.2
Last MWD Survey							
14,296.0	90.40	179.42	9,848.8	-4,597.3	88.0	178.90	4,598.2
Projection to Bit							

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
14,096.0	9,850.2	-4,397.4	85.9	Last MWD Survey
14,296.0	9,848.8	-4,597.3	88.0	Projection to Bit



Scientific Drilling
Directional Drilling Operations



Azimuths to Grid North
 True North -0.29°
 Magnetic North 7.12°
 Magnetic Field
 Strength: 48478.4 nT
 Dip Angle 60.36°
 Date 02/13/2012
 Model IGD2011

+N/S 0.00	+E/W 0.00	Northing 402769.80	Ground Level Easting 767099.70	3423.00 Latitude 22° 51' 20.525 N	Longitude 103° 28' 8.170 W	Spot
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Sec	MD	Inc	AD	TVD	+N/S	+E/W	Dleg	TFace	VSec	Target
1	8407.78	0.66	181.47	8401.75	64.93	234.95	0.00	0.00	-81.90	
2	8430.00	0.66	181.47	8422.56	64.50	234.94	0.00	0.00	-81.90	
3	10094.88	90.00	198.00	9945.00	-348.47	18.72	13.41	14.53	347.97	
4	10635.70	90.00	178.78	9945.00	-830.38	64.75	3.00	-90.00	680.88	
5	14374.45	90.00	178.78	9845.00	-4619.11	49.40	0.00	0.00	4912.49	PRHL (330° FSL & 380° FVLM)

Name	TVD	+N-5	+E-W	Northing	Easting	Latitude	Longitude	Shape
PERIL (330° FSL & 380° FWL)	9845.00	-4610.11	59.40	399148.69	767928.10	32° 5' 42.823 N	103° 36' 5.852 W	Rectangle (Sides: L40.00 W100.00)
plan hits barrel center								

TVDPath	MDPath	Formation	DipAngle	DipDir
9468.00	9474.13	Bone Spring "B"	0.00	179.64
9667.00	9715.06	Bone Spring "C"	0.00	179.64

TYD	MD	Name	So
1100.00		13 3/8"	13-3
4800.00		9 5/8"	9-5

Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Eastern Zone
System Datum: Mean Sea Level

Site Centre Northing 403788.60
Easting 767885.70

Positional Uncertainty 0.00
Convergence 0.39
Local North Grid

Map System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone Name: New Mexico Eastern Zone

Local Origin: See Cascade #29 Federal #1H, Gnd North

Latitude: 32° 6' 28.535 N
Longitude: 103° 36' 6.179 W

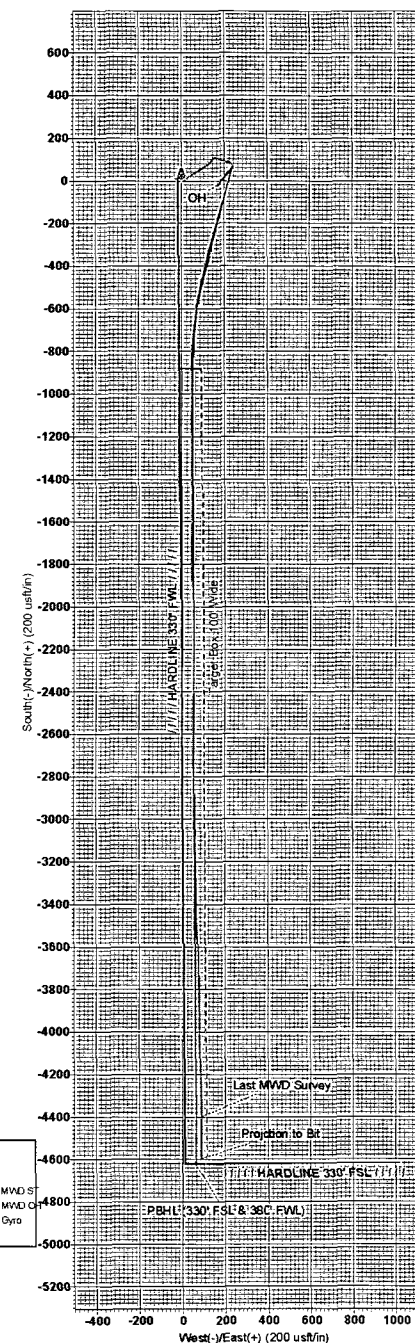
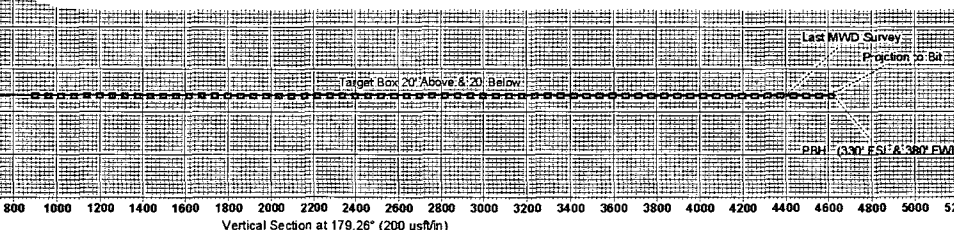
Grid East 787866 70
Grid North 403768 80
Scale Factor 1.000

Geomagnetic Model: IGRF2010

Sample Date, 13-Feb-12
Magnetic Declination, 7.51°

Wing Area, Deciduous 7.51
Wing Angle from Horizontal 60.06°
Maximum Field Capacity 10475

To convert a Magnetic Direction to a Grid Direction, Add 7.12°
To convert a Magnetic Direction to a True Direction, Add 7.51° East
To convert a True Direction to a Grid Direction, Subtract 0.39°



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