

30-015-38059

CIMAREX ENERGY

Bone Spring Wildcat
Eddy County, NM
Empire "A" Federal Com #3H
VH - Job #32K0711645

Survey: Actual

SDI Standard Survey Report

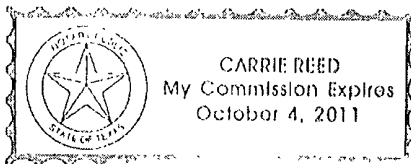
This survey is correct to the best of my knowledge and is supported by actual field data.

Carrie Reed

Notarized this date 1st of August, 2011.

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:	Well Empire "A" Federal Com #3H
Project:	Bone Spng Wildcat	TVD Reference	WELL @ 0.0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0.0usft (Original Well Elev)
Well:	Empire "A" Federal Com #3H	North Reference:	Grid
Wellbore:	VH - Job #32K0711645	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0711645	Database:	EDM-Regulatory

Project	Bone Spng Wildcat		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone	New Mexico East 3001		

Site	Eddy County, NM		
Site Position:	Northings:	622,880.73 usft	Latitude: 32° 42' 43.620 N
From:	Lat/Long	Easting: 581,443.41 usft	Longitude: 104° 4' 6.750 W
Position Uncertainty:	0.0 usft	Slot Radius: 0"	Grid Convergence 0.14 °

Well	Empire "A" Federal Com #3H, Directional (Great White)		
Well Position	+N/-S	0.0 usft	Northings: 622,880.73 usft
	+E/-W	0.0 usft	Easting: 581,443.41 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
			Ground Level 0.0usft

Wellbore	VH - Job #32K0711645		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2010	7/8/2011	7.85
			Dip Angle (°)
			60.55
			Field Strength (nT)
			48,875

Design	VH - Job #32K0711645		
Audit Notes			
Version:	1.0	Phase:	ACTUAL
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)
	0.0	0.0	0.0
			Direction (°)
			287.79

Survey Program	Date 8/25/2011		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
116.5	8,050.4	Actual (VH - Job #32K0711645)	Keeper
			Description
			Keeper Gyro

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
116.5	0.64	304.12	116.5	0.4	-0.5	304.12	0.7
179.6	0.35	228.69	179.6	0.4	-1.0	294.08	1.1
242.7	0.68	179.82	242.7	-0.1	-1.1	266.67	1.1
305.8	0.67	205.32	305.8	-0.8	-1.3	238.79	1.5
368.9	0.78	227.95	368.9	-1.4	-1.8	231.50	2.2
431.9	0.69	239.20	431.9	-1.9	-2.4	231.96	3.0
495.0	0.67	242.63	495.0	-2.2	-3.1	233.72	3.8
558.1	0.56	237.99	558.1	-2.6	-3.6	234.75	4.5
621.2	0.38	227.34	621.2	-2.9	-4.1	234.64	5.0
684.3	0.17	235.61	684.3	-3.1	-4.3	234.37	5.3
747.3	0.39	63.30	747.3	-3.0	-4.2	234.02	5.2

Scientific Drilling International, Inc.

SDI Standard Survey Report



Company: CIMAREX ENERGY
 Project: Bone Spring Wildcat
 Site: Eddy County, NM
 Well: Empire "A" Federal Com #311
 Wellbore: VH - Job #32K0711645
 Design: VH - Job #32K0711645

Local Co-ordinate Reference
 TVD Reference:
 MD Reference:
 North Reference:
 Survey Calculation Method:
 Database:

Well Empire "A" Federal Com #311
 WELL @ 0 0usft (Original Well Elev)
 WELL @ 0 0usft (Original Well Elev)
 Grid
 Minimum Curvature
 EDM-Regulatory

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
808.2	1.42	78.04	808.2	-2.8	-3.2	229.45	4.3
859.1	1.71	82.23	859.0	-2.5	-1.6	212.78	3.0
930.0	1.81	79.51	929.9	-2.2	0.2	173.90	2.2
990.9	1.67	71.55	990.8	-1.7	2.0	130.81	2.7
1,051.8	1.50	70.89	1,051.7	-1.2	3.6	108.42	3.8
1,112.8	1.21	68.77	1,112.6	-0.7	5.0	98.13	5.0
1,173.7	0.91	60.35	1,173.5	-0.2	6.0	92.28	6.0
1,232.8	0.78	62.70	1,232.6	0.2	6.8	88.49	6.8
1,295.8	0.66	50.04	1,295.6	0.6	7.4	85.31	7.4
1,358.9	0.50	32.17	1,358.7	1.1	7.8	82.20	7.9
1,422.0	0.37	13.08	1,421.8	1.5	8.0	79.38	8.2
1,485.0	0.66	338.91	1,484.8	2.0	8.0	75.59	8.2
1,548.1	0.66	338.72	1,547.9	2.7	7.7	70.51	8.2
1,611.1	0.77	335.83	1,610.9	3.4	7.4	64.99	8.1
1,674.1	0.82	332.62	1,673.9	4.2	7.0	58.85	8.2
1,737.2	0.89	322.59	1,737.0	5.0	6.5	52.30	8.2
1,800.3	0.92	268.03	1,800.1	5.4	5.7	46.55	7.8
1,863.3	1.05	311.07	1,863.1	5.8	4.8	39.54	7.5
1,926.3	1.01	307.00	1,926.1	6.5	3.9	30.91	7.5
1,989.4	1.06	290.62	1,989.2	7.0	2.9	22.36	7.6
2,052.4	0.90	283.16	2,052.1	7.3	1.9	14.21	7.6
2,115.5	0.64	285.01	2,115.2	7.5	1.0	7.81	7.6
2,178.6	0.44	285.52	2,178.3	7.7	0.5	3.42	7.7
2,241.6	0.34	284.52	2,241.3	7.8	0.0	0.33	7.8
2,304.7	0.38	269.66	2,304.4	7.8	-0.3	357.48	7.9
2,367.7	0.41	275.24	2,367.4	7.9	-0.8	354.34	7.9
2,430.8	0.47	264.03	2,430.5	7.9	-1.3	350.88	8.0
2,493.8	0.43	276.06	2,493.5	7.9	-1.8	347.42	8.0
2,556.8	0.44	260.69	2,556.5	7.8	-2.2	344.14	8.2
2,619.9	0.50	259.57	2,619.6	7.8	-2.7	340.55	8.2
2,682.9	0.53	278.26	2,682.6	7.7	-3.3	336.95	8.4
2,746.0	0.54	263.34	2,745.7	7.8	-3.9	333.41	8.7
2,809.1	0.57	263.02	2,808.8	7.7	-4.5	329.70	8.9
2,872.1	0.61	264.77	2,871.8	7.6	-5.1	326.01	9.2
2,935.1	0.69	269.55	2,934.8	7.6	-5.8	322.35	9.6
2,998.2	0.81	270.72	2,997.9	7.6	-6.7	318.65	10.1
3,061.6	0.81	270.81	3,061.3	7.6	-7.6	315.09	10.7
3,124.4	1.04	286.62	3,124.1	7.8	-8.6	312.21	11.6
3,187.2	0.98	281.16	3,186.9	8.0	-9.6	309.81	12.5
3,250.1	0.93	283.76	3,249.8	8.3	-10.7	307.76	13.5
3,312.9	0.97	267.46	3,312.6	8.4	-11.7	305.56	14.4
3,375.7	1.05	264.83	3,375.4	8.3	-12.8	302.92	15.2
3,438.6	1.16	267.34	3,435.2	8.2	-14.0	300.35	16.2
3,501.4	1.24	266.22	3,501.0	8.1	-15.3	297.94	17.3

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SDI Standard Survey Report



Company: CIMAREX ENERGY
Project: Bone Spring Wildcat
Site: Eddy County, NM
Well: Empire "A" Federal Com #3H
Wellbore: VH - Job #32K0/11645
Design: VH - Job #32K0711645

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:

Well Empire "A" Federal Com #3H
WELL @ 0 0usft (Original Well Elev)
WELL @ 0 0usft (Original Well Elev)
Grid
Minimum Curvature
EDM-Regulatory

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
3,564.2	1.30	266.62	3,563.8	8.0	-16.7	295.69	18.5
3,622.3	1.41	269.50	3,621.9	8.0	-18.1	293.85	19.8
3,685.6	1.03	272.67	3,685.2	8.0	-19.7	292.11	21.3
3,748.9	1.94	273.88	3,748.4	8.1	-21.7	290.54	23.2
3,812.1	2.33	273.35	3,811.6	8.3	-24.1	289.00	25.5
3,875.4	2.67	274.87	3,874.8	8.5	-26.8	287.56	28.1
3,938.7	3.13	276.27	3,938.1	8.8	-30.0	286.34	31.3
4,001.9	3.66	277.34	4,001.1	9.2	-33.7	285.33	35.0
4,065.2	4.17	277.61	4,064.3	9.8	-38.0	284.47	39.3
4,128.5	4.65	278.21	4,127.4	10.5	-42.8	283.75	44.1
4,191.8	5.16	278.03	4,190.5	11.2	-48.2	283.13	49.5
4,255.0	5.68	279.26	4,253.4	12.1	-54.1	282.65	55.4
4,318.3	6.38	280.01	4,316.3	13.3	-60.6	282.33	62.1
4,381.6	6.77	281.42	4,379.2	14.6	-67.8	282.17	69.3
4,444.8	6.56	282.03	4,442.0	16.1	-74.9	282.12	76.7
4,508.1	5.84	281.32	4,504.9	17.5	-81.6	282.09	83.5
4,571.4	5.34	279.44	4,567.9	18.6	-87.7	281.97	89.7
4,634.6	4.78	278.71	4,630.9	19.5	-93.2	281.81	95.2
4,697.9	4.28	277.89	4,694.0	20.2	-98.2	281.63	100.2
4,761.2	3.94	277.22	4,757.1	20.8	-102.6	281.46	104.7
4,824.4	3.59	274.47	4,820.2	21.2	-106.8	281.25	108.9
4,887.7	3.62	273.78	4,883.4	21.5	-110.7	280.99	112.8
4,951.0	3.08	273.32	4,946.5	21.7	-114.4	280.76	116.5
5,014.3	2.68	272.44	5,009.8	21.9	-117.6	280.55	119.6
5,077.5	2.24	267.87	5,072.9	21.9	-120.3	280.33	122.3
5,140.8	2.17	278.67	5,136.2	22.1	-122.7	280.19	124.7
5,204.1	2.35	289.04	5,199.4	22.7	-125.1	280.27	127.2
5,267.3	2.43	292.13	5,262.6	23.6	-127.6	280.47	129.8
5,330.6	2.38	293.03	5,325.8	24.6	-130.1	280.72	132.4
5,393.9	2.25	294.52	5,389.1	25.6	-132.4	280.96	134.9
5,457.1	2.04	288.81	5,452.2	26.5	-134.6	281.15	137.2
5,520.4	1.93	281.84	5,515.5	27.1	-136.7	281.21	139.4
5,583.7	1.59	278.22	5,578.7	27.4	-138.6	281.20	141.3
5,647.0	1.88	281.47	5,642.0	27.8	-140.5	281.18	143.2
5,710.2	2.28	288.43	5,705.2	28.4	-142.7	281.25	145.5
5,773.5	2.59	285.57	5,768.4	29.2	-145.3	281.35	148.2
5,836.8	2.64	284.37	5,831.6	29.9	-148.1	281.42	151.1
5,900.0	2.31	289.73	5,894.8	30.7	-150.7	281.52	153.8
5,963.3	2.13	285.40	5,958.0	31.4	-153.0	281.61	156.2
6,026.6	2.33	284.00	6,021.3	32.1	-155.4	281.66	158.7
6,089.8	2.54	285.70	6,084.4	32.8	-158.0	281.71	161.3
6,153.1	2.87	286.92	6,147.7	33.6	-160.9	281.80	164.3
6,216.4	2.82	288.59	6,210.9	34.6	-163.8	281.91	167.5
6,279.7	2.36	292.03	6,274.1	35.6	-166.5	282.05	170.3

Scientific Drilling International, Inc.
SDI Standard Survey Report



Company: CIMAREX ENERGY
Project: Bone Spring Wildcat
Site: Eddy County, NM
Well: Empire "A" Federal Com #3H
Wellbore: VH - Job #32K0711645
Design: VH - Job #32K0711645

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:

Well Empire "A" Federal Com #3H
WELL @ 0.0usft (Original Well Elev)
WELL @ 0.0usft (Original Well Elev)
Grid
Minimum Curvature
EDM-Regulatory

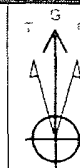
Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
6,342.9	1.99	297.11	6,337.3	36.6	-168.7	282.23	172.6
6,406.2	1.65	303.03	6,400.5	37.5	-170.5	282.41	174.5
6,469.5	1.21	311.06	6,463.8	38.4	-171.8	282.61	176.0
6,532.7	1.00	339.24	6,527.0	39.4	-172.5	282.86	176.9
6,596.0	0.47	35.44	6,590.3	40.1	-172.5	283.09	177.1
6,659.3	0.61	8.03	6,653.6	40.6	-172.3	283.27	177.0
6,722.6	0.57	335.99	6,716.9	41.3	-172.4	283.46	177.3
6,785.8	0.51	349.72	6,780.1	41.8	-172.6	283.63	177.6
6,849.1	0.69	347.84	6,843.4	42.5	-172.7	283.82	177.8
6,912.4	0.68	344.45	6,906.7	43.2	-172.9	284.04	178.2
6,975.6	0.61	338.90	6,969.9	43.9	-173.1	284.23	178.6
7,038.9	0.67	358.15	7,033.2	44.6	-173.2	284.43	178.9
7,102.2	0.86	354.84	7,096.5	45.4	-173.3	284.69	179.1
7,165.4	0.73	359.93	7,159.7	46.3	-173.3	284.95	179.4
7,228.7	0.73	341.36	7,223.0	47.1	-173.4	285.19	179.7
7,292.0	0.90	4.10	7,286.3	48.0	-173.5	285.45	180.0
7,355.2	0.92	1.98	7,349.5	49.0	-173.5	285.76	180.3
7,418.5	0.95	8.07	7,412.7	50.0	-173.4	286.08	180.5
7,481.8	0.98	5.03	7,476.0	51.0	-173.3	286.41	180.6
7,549.3	1.08	1.58	7,543.5	52.3	-173.2	286.79	180.9
7,611.9	1.16	354.71	7,606.1	53.5	-173.2	287.15	181.3
7,674.6	1.19	338.80	7,668.8	54.7	-173.5	287.50	182.0
7,737.2	0.88	349.86	7,731.4	55.8	-173.9	287.79	182.6
7,799.8	0.40	6.13	7,794.0	56.5	-173.9	287.99	182.9
7,862.5	0.41	22.65	7,856.7	56.9	-173.8	288.13	182.9
7,925.1	0.11	309.85	7,919.3	57.2	-173.8	288.21	182.9
7,987.7	0.77	216.62	7,981.9	56.9	-174.1	288.09	183.1
8,050.4	1.02	210.93	8,044.6	56.0	-174.6	287.79	183.4



Scientific Drilling
Directional Drilling Operations

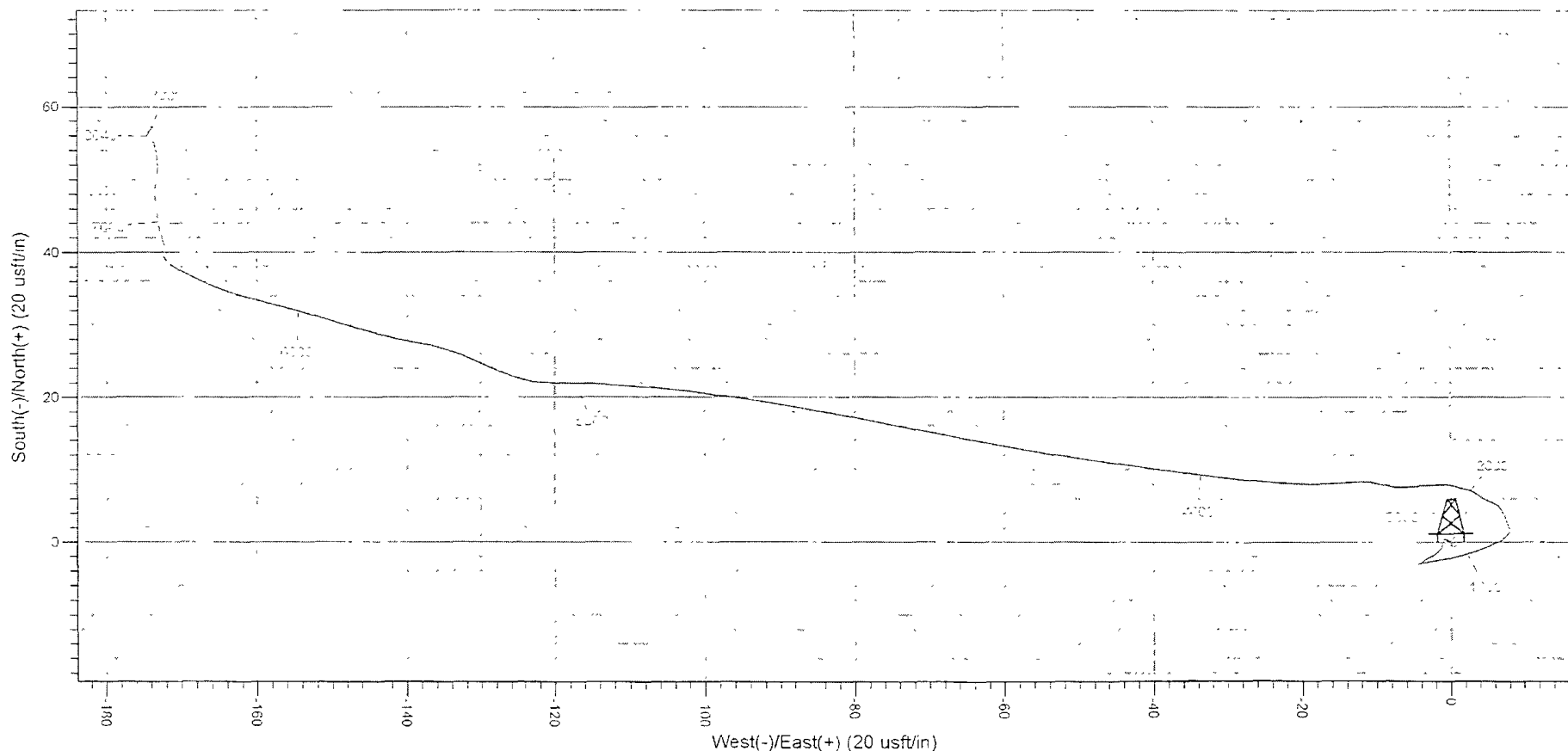
Project Bone Spring Wildcat
Eddy County, NM
Well Empire "A" Federal Com #3H
Wellbore VH - Job #32K0711645
Design VH - Job #32K0711645



ADDITIONAL DATA
Incl. Angle 0°
Magnetic Decl. 11°30'
Magnetic Field
Strength 0.194 Gauss
Alt. Angle 6.0°
Date 1/27/2010
Version 13-02-2010

WELL DETAILS Empire "A" Federal Com #3H
WELL @ 0.0usft (Original Well Elev)

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	622860.73	581443.41	32° 42' 43.620 N	104° 4' 6.750 W	



PROJECT DETAILS Bone Spring Wildcat
Geodetic System US State Plane 1927 (Exact solution)
Datum NAD 1927 (NADCON CONUS)
Ellipsoid Clarke 1866
Zone New Mexico East 3001
System Datum Mean Sea Level

SITE DETAILS Eddy County, NM
Site Centre Latitude 32° 42' 43.620 N
Longitude 104° 4' 6.750 W
Positional Uncertainty 0.0
Convergence 0.14
Local North Grid