

30-015-38099

CIMAREX ENERGY

Hackberry, N.
Eddy County, NM
Irwin "13" Federal #2H
VH - Job #32K0411304

Survey: Actual

SDI Standard Survey Report

25 April, 2011

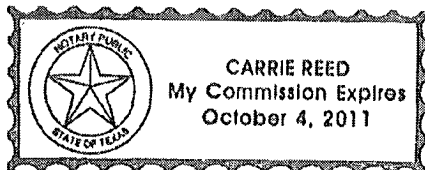
This survey is correct to the best of my knowledge and is supported by actual field data.

Steburn

Notarized this date 26th of April, 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
Project: Hackberry, N
Site: Eddy County, NM
Well: Irwin "13" Federal #2H
Wellbore: VH - Job #32K0411304
Design: VH - Job #32K0411304

Local Co-ordinate Reference: Well Irwin "13" Federal #2H
TVD Reference: WELL @ 0.0usft (Original Well Elev)
MD Reference: WELL @ 0.0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM-Regulatory

Project:	Hackberry, N.		
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:		Northing:	620,813.72 usft	Latitude:	32° 42' 21.600 N
From:	Lat/Long	Easting:	630,216.13 usft	Longitude:	103° 54' 36.000 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"	Grid Convergence:	0.23 °

Well	Irwin "13" Federal #2H, Directional (Great White)					
Well Position	+N/-S	0.0 usft	Northing:	602,214.60 usft	Latitude:	32° 39' 17.640 N
	+E/-W	0.0 usft	Easting:	628,029.00 usft	Longitude:	103° 55' 2.450 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft	Ground Level:	0.0 usft	

Wellbore:		VH - Job #32K0411304			
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF2010	4/2/2011	(°)	(°)	(nT)
			7.80	60.53	48,884

Design:	VH - Job #32K0411304				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(usft)	(usft)	(usft)	(°)	
	0.0	0.0	0.0	269.77	

Survey Program		Date	4/25/2011		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
54.9	8,375.5	Actual (VH - Job #32K0411304)	Keeper	Keeper Gyro	

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
54.9	0.44	244.55	54.9	-0.1	-0.2	244.55	0.2
115.1	0.31	262.85	115.1	-0.2	-0.6	249.45	0.6
175.4	0.14	220.88	175.4	-0.3	-0.8	249.63	0.8
235.6	0.15	127.54	235.6	-0.4	-0.8	242.73	0.9
295.8	0.08	251.10	295.8	-0.5	-0.7	238.39	0.9
356.1	0.57	237.41	356.1	-0.6	-1.0	238.59	1.2
416.3	0.93	216.24	416.3	-1.2	-1.6	232.98	2.0
475.8	0.84	226.26	475.8	-1.9	-2.2	229.17	2.9
536.9	0.94	233.25	536.9	-2.5	-2.9	229.37	3.8
598.0	1.03	223.91	598.0	-3.2	-3.7	229.15	4.9
659.1	1.00	217.00	659.1	-4.0	-4.4	227.58	5.9

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Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
717.1	0.89	209.29	717.1	-4.8	-4.9	225.62	6.9
779.5	0.73	202.51	779.4	-5.6	-5.3	223.45	7.7
839.7	0.51	210.89	839.6	-6.2	-5.6	222.10	8.3
899.9	0.37	242.56	899.8	-6.5	-5.9	222.20	8.8
961.9	0.32	240.08	961.8	-6.7	-6.2	222.98	9.1
1,021.8	0.09	230.91	1,021.7	-6.8	-6.4	223.32	9.3
1,081.7	0.09	16.78	1,081.6	-6.8	-6.4	223.49	9.3
1,142.6	0.52	36.00	1,142.5	-6.5	-6.2	223.85	9.0
1,203.5	0.86	45.23	1,203.4	-6.0	-5.8	224.04	8.3
1,264.4	1.34	51.53	1,264.3	-5.2	-4.9	223.21	7.1
1,324.2	1.58	53.79	1,324.1	-4.3	-3.7	220.64	5.6
1,387.6	1.78	54.89	1,387.5	-3.2	-2.1	214.04	3.8
1,451.0	1.85	57.18	1,450.8	-2.1	-0.5	193.21	2.1
1,513.2	1.96	53.89	1,513.0	-0.9	1.2	126.13	1.5
1,576.6	2.07	58.65	1,576.4	0.3	3.1	83.60	3.1
1,640.1	2.32	63.59	1,639.8	1.5	5.2	73.79	5.4
1,703.5	2.63	64.38	1,703.2	2.7	7.7	70.51	8.1
1,765.5	2.71	65.88	1,765.1	3.9	10.3	69.10	11.0
1,829.8	2.31	76.52	1,829.3	4.9	12.9	69.44	13.8
1,894.1	1.55	97.22	1,893.6	5.0	15.1	71.48	15.9
1,956.4	1.25	118.61	1,955.9	4.6	16.5	74.37	17.1
2,018.8	1.22	141.24	2,018.3	3.8	17.5	77.85	17.9
2,082.2	1.28	149.11	2,081.7	2.6	18.3	81.80	18.5
2,145.5	1.50	160.07	2,144.9	1.2	18.9	86.23	19.0
2,208.9	1.38	159.40	2,208.3	-0.2	19.5	90.73	19.5
2,272.3	1.30	158.01	2,271.7	-1.6	20.0	94.65	20.1
2,335.7	1.03	153.82	2,335.1	-2.8	20.5	97.78	20.7
2,399.2	0.60	164.16	2,398.6	-3.6	20.9	99.88	21.2
2,462.1	0.52	171.31	2,461.5	-4.2	21.0	101.40	21.4
2,526.4	0.63	182.67	2,525.8	-4.9	21.0	103.05	21.6
2,590.7	0.69	193.41	2,590.1	-5.6	20.9	105.00	21.7
2,654.1	0.70	198.29	2,653.5	-6.3	20.7	107.03	21.7
2,717.5	0.63	204.88	2,716.9	-7.0	20.5	108.97	21.6
2,780.9	0.50	196.00	2,780.3	-7.6	20.2	110.62	21.6
2,844.3	0.39	191.00	2,843.7	-8.1	20.1	111.91	21.7
2,907.7	0.35	201.00	2,907.0	-8.5	20.0	112.98	21.7
2,971.1	0.37	187.47	2,970.4	-8.9	19.9	114.00	21.8
3,034.5	0.41	174.54	3,033.8	-9.3	19.9	115.03	22.0
3,097.9	0.28	171.80	3,097.2	-9.7	20.0	115.87	22.2
3,161.3	0.21	185.54	3,160.6	-9.9	20.0	116.48	22.3
3,224.7	0.23	237.45	3,224.0	-10.1	19.8	117.04	22.3
3,288.1	0.52	249.96	3,287.4	-10.3	19.5	117.87	22.0
3,414.9	0.39	237.89	3,414.2	-10.7	18.6	120.01	21.4
3,478.3	0.29	225.31	3,477.6	-11.0	18.3	120.94	21.3

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North Reference: Grid
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Database: EDM-Regulatory

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
3,541.7	0.25	228.95	3,541.0	-11.2	18.0	121.72	21.2
3,605.1	0.31	202.10	3,604.4	-11.4	17.9	122.53	21.2
3,667.1	0.30	220.81	3,666.4	-11.7	17.7	123.41	21.2
3,731.6	0.23	242.25	3,730.9	-11.9	17.5	124.17	21.1
3,796.1	0.32	309.69	3,795.4	-11.8	17.2	124.44	20.9
3,859.0	0.75	333.04	3,858.3	-11.3	16.9	123.84	20.4
3,921.9	0.93	323.02	3,921.2	-10.6	16.4	122.76	19.5
3,984.7	0.68	331.54	3,984.0	-9.8	15.9	121.67	18.7
4,111.6	0.76	312.17	4,110.9	-8.6	14.9	119.91	17.2
4,173.4	0.76	313.16	4,172.7	-8.0	14.3	119.28	16.4
4,237.6	0.77	312.38	4,236.9	-7.5	13.7	118.55	15.6
4,301.9	0.63	291.56	4,301.2	-7.0	13.1	118.31	14.8
4,364.6	0.62	308.14	4,363.9	-6.7	12.5	118.24	14.2
4,427.3	0.74	315.23	4,426.6	-6.2	11.9	117.49	13.4
4,490.1	1.02	320.13	4,489.4	-5.5	11.3	115.95	12.5
4,553.5	1.34	304.36	4,552.8	-4.6	10.3	114.22	11.3
4,615.5	1.29	295.70	4,614.7	-3.9	9.1	113.38	9.9
4,679.2	1.47	293.96	4,678.4	-3.3	7.7	113.13	8.4
4,743.0	1.48	286.24	4,742.2	-2.7	6.2	113.87	6.7
4,806.8	1.34	281.09	4,806.0	-2.3	4.6	116.90	5.2
4,870.6	1.28	284.38	4,869.8	-2.0	3.2	122.30	3.8
4,932.4	1.14	280.54	4,931.6	-1.7	1.9	132.04	2.6
4,994.2	0.99	280.27	4,993.3	-1.5	0.8	152.37	1.7
5,058.9	0.99	264.29	5,058.0	-1.5	-0.3	191.44	1.5
5,123.5	1.11	246.78	5,122.6	-1.8	-1.4	218.60	2.3
5,185.3	0.89	247.44	5,184.4	-2.2	-2.4	227.61	3.3
5,247.1	0.81	242.77	5,246.2	-2.6	-3.3	231.42	4.2
5,311.9	1.11	197.57	5,311.0	-3.4	-3.9	228.53	5.1
5,439.3	1.26	199.83	5,438.4	-5.9	-4.7	218.55	7.5
5,564.1	1.09	205.56	5,563.1	-8.3	-5.7	214.50	10.0
5,627.8	1.05	207.32	5,626.8	-9.3	-6.2	213.65	11.2
5,691.4	0.90	205.52	5,690.4	-10.3	-6.7	213.02	12.3
5,815.6	1.31	180.94	5,814.6	-12.6	-7.1	209.53	14.5
5,944.5	1.01	180.52	5,943.5	-15.2	-7.2	205.24	16.8
6,006.5	0.91	187.53	6,005.5	-16.2	-7.2	204.03	17.8
6,068.5	0.94	206.96	6,067.5	-17.2	-7.5	203.68	18.8
6,132.2	0.97	219.89	6,131.2	-18.1	-8.1	204.20	19.8
6,196.0	1.06	226.61	6,194.9	-18.9	-8.9	205.22	20.9
6,259.7	1.08	235.78	6,258.6	-19.6	-9.8	206.58	21.9
6,323.5	1.09	237.09	6,322.4	-20.3	-10.8	208.08	23.0
6,385.2	0.90	250.29	6,384.1	-20.8	-11.8	209.54	23.9
6,447.0	0.71	242.24	6,445.9	-21.1	-12.6	210.76	24.6
6,510.4	0.74	258.69	6,509.3	-21.4	-13.3	211.92	25.2
6,573.9	0.27	224.00	6,572.8	-21.6	-13.8	212.66	25.6

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Project: Hackberry, N
Site: Eddy County, NM
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Wellbore: VH - Job #32K0411304
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Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
6,699.5	0.42	70.37	6,698.4	-21.6	-13.6	212.16	25.5	
6,763.1	0.31	86.77	6,762.0	-21.5	-13.2	211.51	25.3	
6,826.7	0.33	154.82	6,825.6	-21.7	-13.0	210.84	25.3	
6,890.3	0.56	165.66	6,889.2	-22.2	-12.8	210.01	25.6	
6,952.1	1.00	173.82	6,951.0	-23.0	-12.7	208.85	26.2	
7,016.9	0.73	178.23	7,015.8	-24.0	-12.6	207.72	27.1	
7,081.7	0.50	133.63	7,080.6	-24.6	-12.4	206.73	27.5	
7,143.6	0.78	82.70	7,142.5	-24.7	-11.8	205.46	27.4	
7,205.5	0.92	89.47	7,204.4	-24.6	-10.8	203.76	26.9	
7,268.9	0.62	80.01	7,267.8	-24.6	-10.0	202.14	26.5	
7,332.4	0.40	46.49	7,331.3	-24.4	-9.5	201.30	26.2	
7,395.9	0.51	15.47	7,394.8	-23.9	-9.3	201.15	26.7	
7,459.4	0.56	350.87	7,458.3	-23.4	-9.2	201.57	25.1	
7,522.9	0.87	27.12	7,521.7	-22.6	-9.1	201.84	24.4	
7,648.7	1.49	49.26	7,647.5	-20.7	-7.4	199.64	22.0	
7,711.0	1.64	53.15	7,709.8	-19.6	-6.1	197.16	20.6	
7,773.3	1.93	56.12	7,772.1	-18.5	-4.5	193.60	19.1	
7,836.8	2.00	55.96	7,835.5	-17.3	-2.7	188.79	17.5	
7,900.3	1.98	58.18	7,899.0	-16.1	-0.8	182.93	16.1	
7,963.7	1.79	63.45	7,962.4	-15.1	1.0	176.24	15.1	
8,027.2	1.92	61.66	8,025.8	-14.1	2.8	168.75	14.4	
8,090.7	1.99	59.33	8,089.3	-13.1	4.7	160.24	13.9	
8,154.2	2.04	52.97	8,152.7	-11.8	6.5	151.04	13.5	
8,281.1	1.81	50.95	8,279.6	-9.2	9.9	132.91	13.5	
8,344.4	1.70	57.29	8,342.8	-8.1	11.5	125.13	14.0	
8,375.5	1.93	53.28	8,373.9	-7.5	12.3	121.45	14.4	



Scientific Drilling
Directional Drilling Operations

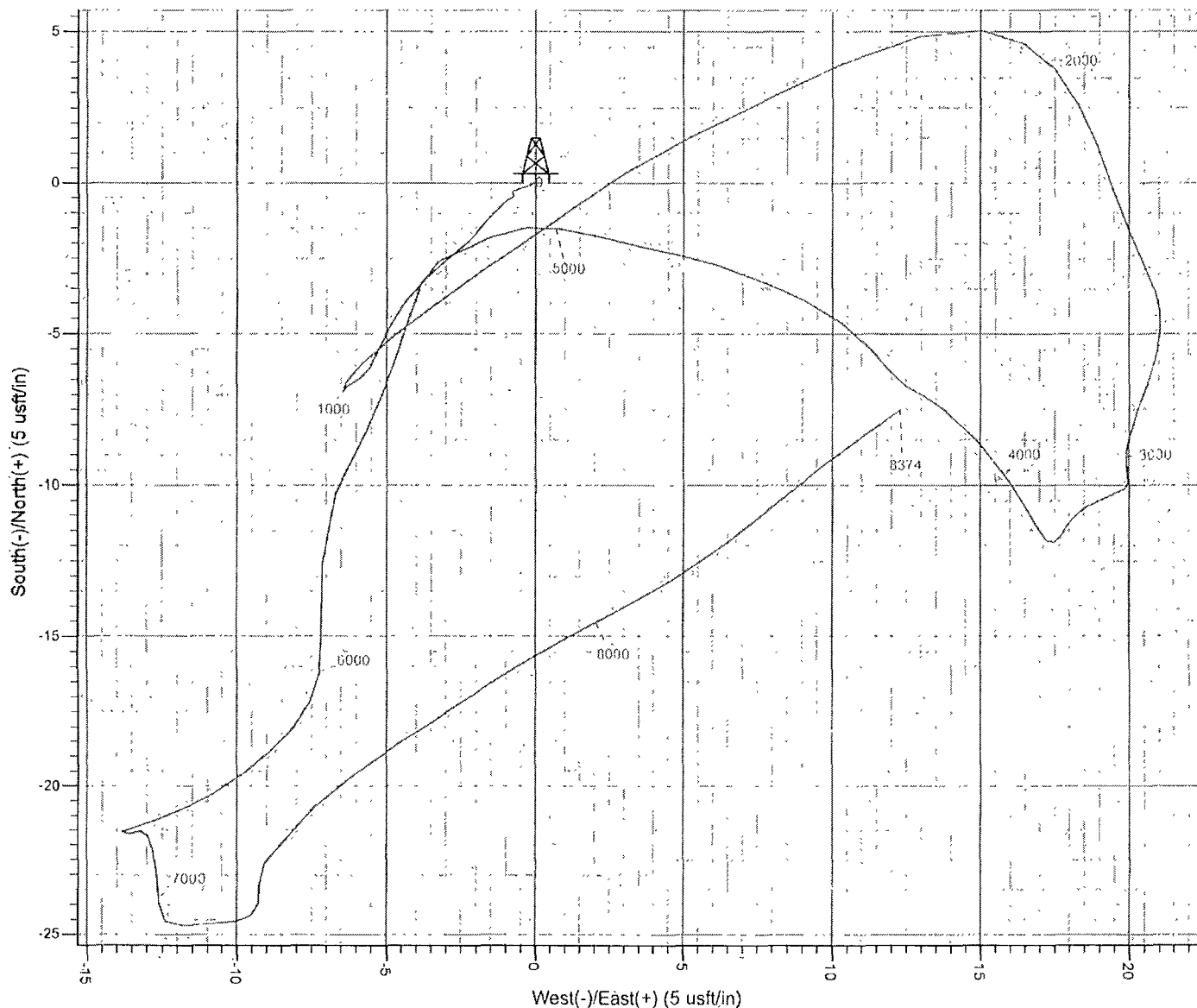
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Azimuth to Grid North
True North: -0.22°
Magnetic North: 7.58°
Magnetic Field
Strength: 4884.0501
Dip Angle: 60.53°
Date: 4/21/2011
Model: IGRF2010

WELL DETAILS: Irwin "13" Federal #2H
WELL @ 0.0usft (Original Well Elev)
Ground Level: 0.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	602214.60	628029.00	32° 39' 17.640 N	103° 55' 2.450 W	



PROJECT DETAILS: Hackberry, N.
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' 21.600 N
Longitude: 103° 54' 36.000 W
Positional Uncertainty: 0.0
Convergence: 0.23
Local North: Grid