ROCKCLIFF ENERGY LLC

Rockcliff Energy

Lea County, NM (NAD 27 NME)
K2 State 18
1H

ST #1

Design: ST #1

Standard Survey Report

30 January, 2017

Scientific Drilling

www.scientificdrilling.com

Company:	Rockcliff Energy	**Local Co-ordinate Reference:**	Well 1H
Project:	Lea County, NM (NAD 27 NME)	**TVD Reference:**	KB @ 4407.0usft (Norton #6)
Site:	K2 State 18	**MD Reference:**	KB @ 4407.0usft (Norton #6)
Well:	1H	**North Reference:**	Grid
Wellbore:	ST #1	**Survey Calculation Method:**	Minimum Curvature
Design:	ST #1	**Database:**	Midland District

Project Lea County, NM (NAD 27 NME)

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 K2 State 18

Site Position:		**Northing:**	919,699.00 usft	**Latitude:**	33° 31' 33.805 N
From:	Map	**Easting:**	723,603.00 usft	**Longitude:**	103° 35' 58.624 W
Position Uncertainty:	0.0 usft	**Slot Radius:**	13-3/16 "	**Grid Convergence:**	0.41 °

Well 1H

Well Position	**+N/-S**	0.0 usft	**Northing:**	919,699.00 usft	**Latitude:**	33° 31' 33.805 N
	+E/-W	0.0 usft	**Easting:**	723,603.00 usft	**Longitude:**	103° 35' 58.624 W
Position Uncertainty		0.0 usft	**Wellhead Elevation:**	0.0 usft	**Ground Level:**	4,391.0 usft

Wellbore ST #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	1/17/2017	7.08	61.37	48,795

Design ST #1

Audit Notes:

Version:	1.0	**Phase:**	ACTUAL	**Tie On Depth:**	3,896.0

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	0.26

Survey Program Date 1/30/2017

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
199.0	3,896.0	SDI MWD (Pilot Hole)	MWD+HDGM	OWSG MWD + HDGM
3,906.0	9,201.0	SDI MWD (ST #1)	MWD+HDGM	OWSG MWD + HDGM

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
199.0	0.89	240.05	199.0	-0.8	-1.3	-0.8	0.45	0.45	0.00
385.0	1.53	225.54	384.9	-3.2	-4.4	-3.3	0.38	0.34	-7.80
567.0	1.76	224.61	566.9	-6.9	-8.1	-7.0	0.13	0.13	-0.51
752.0	1.84	236.42	751.8	-10.6	-12.5	-10.6	0.20	0.04	6.38
940.0	2.75	234.93	939.6	-14.8	-18.7	-14.9	0.49	0.48	-0.79
1,128.0	0.83	186.27	1,127.5	-18.8	-22.6	-18.9	1.22	-1.02	-25.88
1,317.0	1.09	181.21	1,316.5	-22.0	-22.8	-22.1	0.14	0.14	-2.68
1,505.0	1.23	171.25	1,504.5	-25.7	-22.5	-25.8	0.13	0.07	-5.30
1,694.0	1.41	171.28	1,693.4	-30.0	-21.8	-30.1	0.10	0.10	0.02

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Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,836.0	2.00	166.53	1,835.4	-34.2	-21.0	-34.3	0.43	0.42	-3.35
2,013.0	1.89	160.47	2,012.3	-39.9	-19.3	-40.0	0.13	-0.06	-3.42
2,202.0	1.00	122.89	2,201.2	-43.8	-16.9	-43.8	0.66	-0.47	-19.88
2,390.0	0.48	135.02	2,389.2	-45.2	-14.9	-45.3	0.29	-0.28	6.45
2,578.0	0.50	92.61	2,577.2	-45.8	-13.6	-45.9	0.19	0.01	-22.56
2,766.0	0.62	98.37	2,765.2	-46.0	-11.7	-46.0	0.07	0.06	3.06
2,954.0	0.86	63.17	2,953.2	-45.5	-9.5	-45.5	0.27	0.13	-18.72
3,142.0	1.29	64.97	3,141.1	-44.0	-6.3	-44.0	0.23	0.23	0.96
3,331.0	1.38	75.35	3,330.1	-42.5	-2.2	-42.5	0.14	0.05	5.49
3,518.0	1.15	81.30	3,517.0	-41.6	1.9	-41.6	0.14	-0.12	3.18
3,707.0	1.19	74.77	3,706.0	-40.8	5.6	-40.8	0.07	0.02	-3.46
3,896.0	0.86	66.89	3,895.0	-39.8	8.8	-39.7	0.19	-0.17	-4.17
3,906.0	2.21	345.75	3,905.0	-39.5	8.9	-39.5	22.45	13.50	-811.40
3,937.0	6.58	334.36	3,935.9	-37.4	7.9	-37.3	14.31	14.10	-36.74
3,969.0	10.46	341.36	3,967.5	-33.0	6.2	-32.9	12.53	12.13	21.88
4,000.0	13.09	351.34	3,997.8	-26.8	4.8	-26.8	10.70	8.48	32.19
4,032.0	14.10	1.95	4,028.9	-19.3	4.4	-19.3	8.39	3.16	33.16
4,063.0	17.44	5.30	4,058.8	-10.9	4.9	-10.9	11.16	10.77	10.81
4,094.0	21.55	5.58	4,088.0	-0.6	5.9	-0.6	13.26	13.26	0.90
4,126.0	25.86	4.39	4,117.3	12.2	7.0	12.2	13.55	13.47	-3.72
4,157.0	28.31	2.97	4,144.9	26.3	7.9	26.3	8.17	7.90	-4.58
4,188.0	31.29	1.34	4,171.8	41.6	8.5	41.7	9.96	9.61	-5.26
4,219.0	34.86	0.02	4,197.8	58.6	8.7	58.6	11.75	11.52	-4.26
4,251.0	37.09	2.38	4,223.7	77.3	9.1	77.4	8.20	6.97	7.38
4,282.0	39.32	2.48	4,248.0	96.5	9.9	96.5	7.20	7.19	0.32
4,314.0	42.88	1.59	4,272.1	117.5	10.6	117.6	11.27	11.13	-2.78
4,345.0	46.59	359.76	4,294.1	139.3	10.9	139.4	12.67	11.97	-5.90
4,377.0	50.13	358.45	4,315.4	163.2	10.5	163.3	11.48	11.06	-4.09
4,408.0	52.87	358.96	4,334.7	187.5	10.0	187.5	8.93	8.84	1.65
4,435.9	55.62	359.42	4,351.0	210.1	9.6	210.2	9.96	9.87	1.65
Production Entrance (4435.9' MD)									
4,439.0	55.93	359.47	4,352.7	212.7	9.6	212.7	9.96	9.87	1.59
4,471.0	60.68	359.31	4,369.5	239.9	9.3	240.0	14.85	14.84	-0.50
4,502.0	65.68	359.25	4,383.5	267.6	9.0	267.6	16.13	16.13	-0.19
4,533.0	70.04	358.56	4,395.2	296.3	8.4	296.3	14.21	14.06	-2.23
4,565.0	73.49	358.20	4,405.2	326.6	7.6	326.7	10.83	10.78	-1.13
4,596.0	77.45	358.30	4,413.0	356.6	6.7	356.7	12.78	12.77	0.32
4,628.0	80.39	358.26	4,419.1	388.0	5.7	388.0	9.19	9.19	-0.13
4,658.0	80.80	358.79	4,424.1	417.6	4.9	417.6	2.21	1.37	1.77
4,689.0	81.08	358.53	4,428.9	448.2	4.2	448.2	1.23	0.90	-0.84
4,722.0	82.41	359.04	4,433.7	480.9	3.5	480.9	4.31	4.03	1.55
4,754.0	83.60	359.30	4,437.6	512.6	3.1	512.6	3.81	3.72	0.81
4,785.0	85.02	359.69	4,440.6	543.5	2.8	543.5	4.75	4.58	1.26

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Well:	1H	**North Reference:**	Grid
Wellbore:	ST #1	**Survey Calculation Method:**	Minimum Curvature
Design:	ST #1	**Database:**	Midland District

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,848.0	88.45	359.04	4,444.2	606.3	2.1	606.4	5.54	5.44	-1.03
4,942.0	90.81	358.74	4,444.8	700.3	0.3	700.3	2.53	2.51	-0.32
5,037.0	90.44	359.46	4,443.8	795.3	-1.2	795.3	0.85	-0.39	0.76
5,131.0	90.60	0.03	4,442.9	889.3	-1.6	889.3	0.63	0.17	0.61
5,225.0	88.82	358.68	4,443.4	983.3	-2.7	983.3	2.38	-1.89	-1.44
5,320.0	89.87	359.12	4,444.5	1,078.3	-4.5	1,078.2	1.20	1.11	0.46
5,414.0	90.20	1.11	4,444.5	1,172.3	-4.3	1,172.2	2.15	0.35	2.12
5,508.0	90.71	2.79	4,443.7	1,266.2	-1.1	1,266.2	1.87	0.54	1.79
5,603.0	88.99	2.14	4,444.0	1,361.1	3.0	1,361.1	1.94	-1.81	-0.68
5,697.0	91.08	3.44	4,443.9	1,455.0	7.5	1,455.0	2.62	2.22	1.38
5,792.0	90.20	1.88	4,442.8	1,549.9	12.0	1,549.9	1.89	-0.93	-1.64
5,885.0	88.99	359.72	4,443.5	1,642.9	13.3	1,642.9	2.66	-1.30	-2.32
5,980.0	90.81	359.40	4,443.7	1,737.8	12.5	1,737.9	1.95	1.92	-0.34
6,074.0	91.28	359.82	4,441.9	1,831.8	11.9	1,831.9	0.67	0.50	0.45
6,168.0	89.73	359.83	4,441.1	1,925.8	11.6	1,925.9	1.65	-1.65	0.01
6,262.0	88.96	0.36	4,442.2	2,019.8	11.8	2,019.8	0.99	-0.82	0.56
6,356.0	88.19	0.10	4,444.5	2,113.8	12.1	2,113.8	0.86	-0.82	-0.28
6,450.0	89.03	0.79	4,446.8	2,207.7	12.9	2,207.8	1.16	0.89	0.73
6,544.0	89.76	1.35	4,447.8	2,301.7	14.6	2,301.8	0.98	0.78	0.60
6,638.0	88.29	0.87	4,449.4	2,395.7	16.4	2,395.7	1.65	-1.56	-0.51
6,733.0	89.13	1.19	4,451.5	2,490.7	18.1	2,490.7	0.95	0.88	0.34
6,827.0	90.94	2.11	4,451.5	2,584.6	20.9	2,584.7	2.16	1.93	0.98
6,921.0	90.03	1.14	4,450.7	2,678.6	23.5	2,678.6	1.41	-0.97	-1.03
7,014.0	88.56	359.61	4,451.8	2,771.5	24.1	2,771.6	2.28	-1.58	-1.65
7,108.0	88.96	358.56	4,453.9	2,865.5	22.6	2,865.6	1.20	0.43	-1.12
7,202.0	89.97	358.22	4,454.7	2,959.5	20.0	2,959.5	1.13	1.07	-0.36
7,296.0	91.38	358.09	4,453.6	3,053.4	17.0	3,053.5	1.51	1.50	-0.14
7,390.0	91.04	359.30	4,451.6	3,147.4	14.8	3,147.4	1.34	-0.36	1.29
7,484.0	90.74	359.02	4,450.2	3,241.3	13.4	3,241.4	0.44	-0.32	-0.30
7,578.0	90.00	359.54	4,449.6	3,335.3	12.3	3,335.4	0.96	-0.79	0.55
7,672.0	88.96	0.50	4,450.4	3,429.3	12.3	3,429.3	1.51	-1.11	1.02
7,767.0	88.56	0.54	4,452.5	3,524.3	13.2	3,524.3	0.42	-0.42	0.04
7,862.0	89.33	0.79	4,454.2	3,619.3	14.3	3,619.3	0.85	0.81	0.26
7,956.0	89.73	2.32	4,455.0	3,713.2	16.8	3,713.3	1.68	0.43	1.63
8,049.0	89.19	3.29	4,455.9	3,806.1	21.4	3,806.2	1.19	-0.58	1.04
8,144.0	88.76	2.62	4,457.6	3,901.0	26.3	3,901.1	0.84	-0.45	-0.71
8,238.0	89.83	2.29	4,458.7	3,994.9	30.3	3,995.0	1.19	1.14	-0.35
8,332.0	90.81	1.97	4,458.2	4,088.8	33.8	4,088.9	1.10	1.04	-0.34
8,426.0	90.64	1.76	4,457.0	4,182.8	36.8	4,182.9	0.29	-0.18	-0.22
8,520.0	90.40	359.63	4,456.2	4,276.7	38.0	4,276.9	2.28	-0.26	-2.27
8,614.0	92.22	359.90	4,454.0	4,370.7	37.6	4,370.8	1.96	1.94	0.29
8,708.0	92.32	358.63	4,450.3	4,464.6	36.4	4,464.7	1.35	0.11	-1.35
8,802.0	92.39	358.25	4,446.4	4,558.5	33.8	4,558.6	0.41	0.07	-0.40

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Wellbore:	ST #1	**Survey Calculation Method:**	Minimum Curvature
Design:	ST #1	**Database:**	Midland District

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,896.0	93.06	357.81	4,442.0	4,652.4	30.6	4,652.4	0.85	0.71	-0.47
8,990.0	94.47	357.85	4,435.8	4,746.1	27.0	4,746.2	1.50	1.50	0.04
9,059.1	95.64	358.00	4,429.7	4,814.9	24.6	4,814.9	1.71	1.69	0.22
Production Exit (9059.1' MD)									
9,084.0	96.06	358.06	4,427.2	4,839.6	23.7	4,839.7	1.71	1.69	0.22
9,147.0	97.30	357.95	4,419.8	4,902.2	21.5	4,902.2	1.98	1.97	-0.17
Final MWD Survey (9147.0' MD)									
9,201.0	97.30	357.95	4,413.0	4,955.7	19.6	4,955.7	0.00	0.00	0.00
Final Projection to Bit (9201.0' MD)									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
4,435.9	4,351.0	210.1	9.6	Production Entrance (4435.9' MD)
9,059.1	4,429.7	4,814.9	24.6	Production Exit (9059.1' MD)
9,147.0	4,419.8	4,902.2	21.5	Final MWD Survey (9147.0' MD)
9,201.0	4,413.0	4,955.7	19.6	Final Projection to Bit (9201.0' MD)

Checked By: _____ Approved By: _____ Date: _____