



Rockcliff Energy

Chaves County NM

Humboldt State 15

1H

ST #1

Design: ST #1

Standard Survey Report

14 December, 2016



Scientific Drilling

www.scientificdrilling.com

Company:	Rockcliff Energy	Local Co-ordinate Reference:	Well 1H
Project:	Chaves County NM	TVD Reference:	KB @ 4402.00usft
Site:	Humboldt State 15	MD Reference:	KB @ 4402.00usft
Well:	1H	North Reference:	Grid
Wellbore:	ST #1	Survey Calculation Method:	Minimum Curvature
Design:	ST #1	Database:	Midland District

Project	Chaves County NM		
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	Humboldt State 15		
Site Position:		Northing:	951,200.00 usft
From:	Map	Easting:	705,245.00 usft
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "
		Latitude:	33° 36' 46.693 N
		Longitude:	103° 39' 33.049 W
		Grid Convergence:	0.37 °

Well	1H		
Well Position	+N-S	0.00 usft	Northing:
	+E-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	0.00 usft
		Latitude:	33° 36' 46.693 N
		Longitude:	103° 39' 33.049 W
		Ground Level:	4,386.00 usft

Wellbore	ST #1		
Magnetics	Model Name	Sample Date	Declination
			(°)
	HDGM	12/5/2016	7.08
			Dip Angle
			(°)
			Field Strength
			(nT)
			61.42
			48,838

Design	ST #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	3,541.00
Vertical Section:	Depth From (TVD)	+N-S	+E-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
		Direction	
		(bearing)	
		0.00	

Survey Program	Date 12/14/2016		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
197.00	3,541.00	SDI MWD (Pilot Hole)	MWD+HDGM
3,669.00	8,870.00	SDI MWD #2 (ST #1)	MWD+HDGM
			Description
			OWSG MWD + HDGM
			OWSG MWD + HDGM

Survey									
Measured	Inclination	Azimuth	Vertical	+N-S	+E-W	Vertical	Dogleg	Build	Turn
Depth	(°)	(bearing)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
197.00	0.21	53.52	197.00	0.21	0.29	0.21	0.11	0.11	0.00
288.00	0.27	42.13	288.00	0.47	0.57	0.47	0.08	0.07	-12.52
474.00	0.62	32.38	473.99	1.65	1.40	1.65	0.19	0.19	-5.24
660.00	1.22	29.21	659.97	4.23	2.91	4.23	0.32	0.32	-1.70
845.00	1.59	24.11	844.91	8.29	4.92	8.29	0.21	0.20	-2.76
1,031.00	2.18	30.98	1,030.81	13.68	7.79	13.68	0.34	0.32	3.69
1,218.00	1.29	53.06	1,217.73	17.99	11.30	17.99	0.59	-0.48	11.81
1,404.00	0.77	94.06	1,403.70	19.16	14.22	19.16	0.47	-0.28	22.04
1,593.00	1.45	109.76	1,592.66	18.26	17.74	18.26	0.39	0.36	8.31

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Site:	Humboldt State 15	MD Reference:	KB @ 4402.00usft
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 (bearing)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,677.00	1.80	113.89	1,676.63	17.37	19.95	17.37	0.44	0.42	4.92
1,825.00	2.92	129.08	1,824.50	14.05	25.00	14.05	0.86	0.76	10.26
2,016.00	0.97	152.42	2,015.38	9.55	29.53	9.55	1.08	-1.02	12.22
2,206.00	0.46	155.23	2,205.37	7.43	30.59	7.43	0.27	-0.27	1.48
2,397.00	0.64	147.58	2,396.36	5.84	31.48	5.84	0.10	0.09	-4.01
2,588.00	0.78	117.71	2,587.35	4.33	33.21	4.33	0.20	0.07	-15.64
2,779.00	0.28	259.38	2,778.34	3.64	33.90	3.64	0.53	-0.26	74.17
2,969.00	0.47	298.24	2,968.34	3.92	32.75	3.92	0.16	0.10	20.45
3,160.00	0.34	306.46	3,159.33	4.63	31.61	4.63	0.07	-0.07	4.30
3,350.00	0.50	271.88	3,349.33	4.99	30.33	4.99	0.15	0.08	-18.20
3,541.00	0.67	280.47	3,540.32	5.22	28.40	5.22	0.10	0.09	4.50
3,669.00	1.98	6.82	3,668.29	7.55	27.92	7.55	1.60	1.02	67.46
3,701.00	4.92	15.85	3,700.23	9.42	28.36	9.42	9.31	9.19	28.22
3,733.00	8.49	8.81	3,732.00	13.08	29.10	13.08	11.43	11.16	-22.00
3,765.00	11.27	4.37	3,763.53	18.53	29.70	18.53	9.00	8.69	-13.88
3,797.00	13.73	2.59	3,794.76	25.45	30.11	25.45	7.78	7.69	-5.56
3,828.00	17.92	359.93	3,824.58	33.89	30.27	33.89	13.71	13.52	-8.58
3,860.00	21.89	357.36	3,854.67	44.78	29.99	44.78	12.70	12.41	-8.03
3,892.00	25.85	355.54	3,883.92	57.70	29.17	57.70	12.59	12.38	-5.69
3,924.00	30.07	354.93	3,912.18	72.65	27.92	72.65	13.22	13.19	-1.91
3,956.00	33.95	354.28	3,939.31	89.53	26.32	89.53	12.17	12.13	-2.03
3,987.00	37.17	353.94	3,964.53	107.46	24.47	107.46	10.41	10.39	-1.10
4,019.00	40.49	354.32	3,989.45	127.42	22.42	127.42	10.40	10.38	1.19
4,051.00	44.29	354.92	4,013.08	148.89	20.40	148.89	11.94	11.88	1.88
4,082.00	47.02	356.36	4,034.75	170.99	18.72	170.99	9.41	8.81	4.65
4,114.00	49.19	357.57	4,056.12	194.78	17.47	194.78	7.34	6.78	3.78
4,132.00	50.46	358.38	4,067.73	208.52	16.98	208.52	7.84	7.05	4.50
417' FEL, 330' FSL - 330' HL Crossing (MD= 4132')									
4,146.00	51.45	358.99	4,076.55	219.39	16.73	219.39	7.84	7.08	4.36
4,178.00	54.58	359.68	4,095.80	244.95	16.44	244.95	9.93	9.78	2.16
4,209.00	58.31	359.65	4,112.93	270.78	16.29	270.78	12.03	12.03	-0.10
4,241.00	62.36	359.59	4,128.76	298.58	16.10	298.58	12.66	12.66	-0.19
4,273.00	65.48	359.24	4,142.83	327.31	15.81	327.31	9.80	9.75	-1.09
4,305.00	68.90	358.54	4,155.23	356.80	15.23	356.80	10.88	10.69	-2.19
4,336.00	72.09	358.11	4,165.58	386.01	14.38	386.01	10.37	10.29	-1.39
4,369.00	75.97	358.82	4,174.66	417.72	13.53	417.72	11.94	11.76	2.15
4,400.00	79.82	358.47	4,181.16	448.01	12.81	448.01	12.47	12.42	-1.13
4,432.00	82.95	358.81	4,185.95	479.64	12.06	479.64	9.84	9.78	1.06
4,495.00	88.59	359.91	4,190.60	542.44	11.36	542.44	9.12	8.95	1.75
4,589.00	91.17	0.41	4,190.80	636.43	11.63	636.43	2.80	2.74	0.53
4,684.00	90.87	0.29	4,189.10	731.41	12.21	731.41	0.34	-0.32	-0.13
4,780.00	90.94	359.35	4,187.59	827.40	11.91	827.40	0.98	0.07	-0.98
4,875.00	90.17	359.48	4,186.67	922.39	10.94	922.39	0.82	-0.81	0.14

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

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (bearing)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,969.00	89.83	359.31	4,186.67	1,016.38	9.94	1,016.38	0.40	-0.36	-0.18
5,065.00	91.38	359.34	4,185.65	1,112.37	8.81	1,112.37	1.61	1.61	0.03
5,160.00	89.66	0.28	4,184.79	1,207.36	8.50	1,207.36	2.06	-1.81	0.99
5,255.00	88.86	0.56	4,186.02	1,302.35	9.19	1,302.35	0.89	-0.84	0.29
5,351.00	90.07	1.06	4,186.92	1,398.33	10.55	1,398.33	1.36	1.26	0.52
5,446.00	91.18	0.80	4,185.88	1,493.31	12.09	1,493.31	1.20	1.17	-0.27
5,541.00	90.47	0.29	4,184.51	1,588.30	13.00	1,588.30	0.92	-0.75	-0.54
5,637.00	90.90	359.90	4,183.36	1,684.29	13.16	1,684.29	0.60	0.45	-0.41
5,712.00	90.60	359.39	4,182.38	1,759.28	12.69	1,759.28	0.79	-0.40	-0.68
5,826.00	88.80	359.80	4,182.98	1,873.27	11.88	1,873.27	1.62	-1.58	0.36
5,922.00	88.82	359.25	4,184.97	1,969.25	11.09	1,969.25	0.57	0.02	-0.57
6,017.00	89.73	358.48	4,186.17	2,064.22	9.21	2,064.22	1.25	0.96	-0.81
6,112.00	89.87	358.12	4,186.51	2,159.18	6.39	2,159.18	0.41	0.15	-0.38
6,208.00	89.50	0.13	4,187.03	2,255.16	4.92	2,255.16	2.13	-0.39	2.09
6,303.00	90.30	1.03	4,187.20	2,350.15	5.88	2,350.15	1.27	0.84	0.95
6,399.00	88.96	2.12	4,187.82	2,446.11	8.52	2,446.11	1.80	-1.40	1.14
6,494.00	88.19	2.72	4,190.18	2,540.99	12.53	2,540.99	1.03	-0.81	0.63
6,590.00	86.54	0.28	4,194.60	2,636.85	15.04	2,636.85	3.07	-1.72	-2.54
6,685.00	86.78	358.23	4,200.13	2,731.67	13.81	2,731.67	2.17	0.25	-2.16
6,780.00	88.59	357.49	4,203.97	2,826.53	10.27	2,826.53	2.06	1.91	-0.78
6,875.00	90.98	358.49	4,204.32	2,921.46	6.93	2,921.46	2.73	2.52	1.05
6,971.00	89.87	357.75	4,203.61	3,017.40	3.79	3,017.40	1.39	-1.16	-0.77
7,066.00	90.50	355.76	4,203.31	3,112.24	-1.59	3,112.24	2.20	0.66	-2.09
7,161.00	92.86	356.24	4,200.52	3,206.96	-8.22	3,206.96	2.54	2.48	0.51
7,256.00	92.45	359.05	4,196.12	3,301.77	-12.11	3,301.77	2.99	-0.43	2.96
7,352.00	90.71	359.88	4,193.47	3,397.73	-13.01	3,397.73	2.01	-1.81	0.86
7,447.00	90.17	1.21	4,192.74	3,492.72	-12.11	3,492.72	1.51	-0.57	1.40
7,542.00	89.36	0.44	4,193.13	3,587.71	-10.74	3,587.71	1.18	-0.85	-0.81
7,637.00	89.33	1.09	4,194.22	3,682.69	-9.47	3,682.69	0.68	-0.03	0.68
7,733.00	89.16	1.39	4,195.48	3,778.66	-7.39	3,778.66	0.36	-0.18	0.31
7,828.00	90.20	0.86	4,196.01	3,873.64	-5.53	3,873.64	1.23	1.09	-0.56
7,923.00	89.33	0.81	4,196.40	3,968.63	-4.14	3,968.63	0.92	-0.92	-0.05
8,018.00	88.35	0.82	4,198.33	4,063.60	-2.79	4,063.60	1.03	-1.03	0.01
8,113.00	90.54	1.17	4,199.25	4,158.57	-1.14	4,158.57	2.33	2.31	0.37
8,208.00	89.77	0.21	4,198.99	4,253.56	0.00	4,253.56	1.30	-0.81	-1.01
8,303.00	89.97	1.09	4,199.21	4,348.56	1.08	4,348.56	0.95	0.21	0.93
8,398.00	91.31	2.55	4,198.14	4,443.50	4.10	4,443.50	2.09	1.41	1.54
8,493.00	90.57	2.13	4,196.59	4,538.40	7.97	4,538.40	0.90	-0.78	-0.44
8,589.00	89.60	1.99	4,196.44	4,634.34	11.42	4,634.34	1.02	-1.01	-0.15
8,684.00	89.66	1.40	4,197.06	4,729.30	14.23	4,729.30	0.62	0.06	-0.62
8,761.00	90.34	0.50	4,197.06	4,806.28	15.51	4,806.28	1.47	0.88	-1.17
Toe Sleeve (MD= 8761')									
8,779.00	90.50	0.29	4,196.92	4,824.28	15.64	4,824.28	1.47	0.88	-1.17
8,785.00	90.59	0.17	4,196.87	4,830.28	15.66	4,830.28	2.58	1.56	-2.05

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Site:	Humboldt State 15	MD Reference:	KB @ 4402.00usft
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 (bearing)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
330' HL Crossing (MD= 8785') - 420' FEL, 330' FNL									
8,818.00	91.11	359.49	4,196.38	4,863.28	15.56	4,863.28	2.58	1.56	-2.05
Final MWD Survey (8818.00' MD)									
8,870.00	91.11	359.49	4,195.37	4,915.27	15.10	4,915.27	0.00	0.00	0.00
420' FEL, 244' FNL - Final Projection to Bit (8870.00' MD)									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
4,132.00	4,067.73	208.52	16.98	417' FEL, 330' FSL
4,132.00	4,067.73	208.52	16.98	330' HL Crossing (MD= 4132')
8,761.00	4,197.06	4,806.28	15.51	Toe Sleeve (MD= 8761')
8,785.00	4,196.87	4,830.28	15.66	330' HL Crossing (MD= 8785')
8,785.00	4,196.87	4,830.28	15.66	420' FEL, 330' FNL
8,818.00	4,196.38	4,863.28	15.56	Final MWD Survey (8818.00' MD)
8,870.00	4,195.37	4,915.27	15.10	420' FEL, 244' FNL
8,870.00	4,195.37	4,915.27	15.10	Final Projection to Bit (8870.00' MD)

Checked By: _____ Approved By: _____ Date: _____