



MS Directional Survey Report



Copper Ridge Resources, LLC

Project: Copper Ridge /Cobalt Operating
Lea County, New Mexico (NAD83)
Site: Warren
Well: Warren 1
Wellbore: Wellbore #3
Design: Surveys

Local Co-ordinate Reference: Well Warren 1
TVD Reference: WELL @ 3802.50usft (AD 1111)
MD Reference: WELL @ 3802.50usft (AD 1111)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Conroe DB

HOBBS OCD
APR 08 2019
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Project	Lea County, New Mexico (NAD83)		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site	Warren				
Site Position:		Northing:	674,957.80 usft	Latitude:	32° 51' 3.519 N
From:	Lat/Long	Easting:	867,399.42 usft	Longitude:	103° 16' 17.695 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "		

Well	Warren 1					
Well Position	+N/-S	0.00 usft	Northing:	674,957.80 usft	Latitude:	32° 51' 3.519 N
	+E/-W	0.00 usft	Easting:	867,399.42 usft	Longitude:	103° 16' 17.695 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,785.00 usft	
Grid Convergence:	0.576 °					

Wellbore	Wellbore #3				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2018	2/14/2019	6.702	60.643	48,210.27

Design	Surveys				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	11,603.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	285.89	

Survey Program	Date 3/28/2019			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
10.50	11,305.50	MS Gyro (Wellbore #1)	IS-GYRO-WLINE	MEMS RATE GYRO
11,420.00	11,603.00	MS MWD (Wellbore #2)	MWD	OWSG MWD - Standard
11,635.00	13,100.00	MS MWD (Wellbore #3)	MWD	OWSG MWD - Standard

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)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10.50	0.00	0.01	10.50	0.00	0.00	0.00	0.00	0.00	0.00
210.50	0.52	45.96	210.50	0.63	0.65	-0.45	0.26	0.26	0.00
410.50	0.54	52.42	410.49	1.84	2.05	-1.47	0.03	0.01	3.23
610.50	0.39	112.69	610.48	2.15	3.43	-2.71	0.24	-0.08	30.14
810.50	0.34	67.42	810.48	2.11	4.60	-3.85	0.14	-0.03	-22.64
1,010.50	0.33	80.24	1,010.48	2.44	5.72	-4.83	0.04	-0.01	6.41
1,210.50	0.38	28.19	1,210.47	3.12	6.60	-5.49	0.16	0.03	-26.03



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1,410.50	0.48	40.11	1,410.47	4.35	7.45	-5.98	0.07	0.05	5.96
1,610.50	0.35	27.68	1,610.46	5.53	8.28	-6.45	0.08	-0.07	-6.22
1,810.50	0.08	28.11	1,810.46	6.19	8.63	-6.60	0.14	-0.14	0.22
2,010.50	0.10	121.01	2,010.46	6.23	8.84	-6.80	0.07	0.01	46.45
2,210.50	0.21	358.91	2,210.46	6.50	8.98	-6.86	0.14	0.06	-61.05
2,410.50	0.66	357.25	2,410.45	8.02	8.92	-6.38	0.23	0.23	-0.83
2,610.50	0.77	356.01	2,610.44	10.51	8.77	-5.56	0.06	0.06	-0.62
2,810.50	0.71	359.39	2,810.42	13.09	8.67	-4.75	0.04	-0.03	1.69
3,010.50	1.06	334.98	3,010.40	16.01	7.87	-3.19	0.25	0.18	-12.21
3,210.50	0.92	336.44	3,210.37	19.15	6.45	-0.96	0.07	-0.07	0.73
3,410.50	0.66	337.89	3,410.35	21.69	5.37	0.77	0.13	-0.13	0.73
3,610.50	1.11	342.67	3,610.32	24.61	4.36	2.54	0.23	0.23	2.39
3,810.50	0.77	359.62	3,810.30	27.80	3.77	3.98	0.22	-0.17	8.48
4,010.50	1.06	4.59	4,010.27	30.99	3.91	4.72	0.15	0.15	2.49
4,210.50	0.91	333.43	4,210.24	34.25	3.35	6.16	0.27	-0.08	-15.58
4,410.50	1.30	296.95	4,410.21	36.70	0.62	9.46	0.39	0.20	-18.24
4,610.50	1.52	305.09	4,610.15	39.26	-3.58	14.19	0.15	0.11	4.07
4,810.50	1.24	285.48	4,810.09	41.36	-7.83	18.86	0.27	-0.14	-9.81
5,010.50	1.04	310.37	5,010.05	43.11	-11.30	22.67	0.26	-0.10	12.45
5,210.50	0.72	281.04	5,210.03	44.53	-13.92	25.58	0.27	-0.16	-14.67
5,410.50	0.14	325.36	5,410.02	44.97	-15.29	27.02	0.31	-0.29	22.16
5,610.50	0.73	329.28	5,610.02	46.27	-16.08	28.13	0.30	0.30	1.96
5,810.50	0.82	326.51	5,810.00	48.56	-17.52	30.14	0.05	0.05	-1.39
6,010.50	0.60	319.51	6,009.98	50.55	-18.99	32.10	0.12	-0.11	-3.50
6,210.50	1.01	316.90	6,209.96	52.63	-20.87	34.48	0.21	0.21	-1.31
6,410.50	1.78	315.72	6,409.90	56.14	-24.25	38.69	0.39	0.39	-0.59
6,610.50	1.49	316.10	6,609.82	60.24	-28.22	43.63	0.15	-0.15	0.19
6,810.50	1.89	297.67	6,809.73	63.64	-32.94	49.11	0.33	0.20	-9.22
7,010.50	1.95	305.02	7,009.62	67.13	-38.65	55.55	0.13	0.03	3.68
7,210.50	2.35	299.97	7,209.48	71.13	-44.99	62.74	0.22	0.20	-2.53
7,410.50	2.12	292.34	7,409.33	74.58	-51.96	70.40	0.19	-0.12	-3.82
7,610.50	1.92	290.67	7,609.21	77.17	-58.52	77.41	0.10	-0.10	-0.84
7,810.50	2.13	309.73	7,809.08	80.73	-64.51	84.15	0.35	0.11	9.53
8,010.50	1.73	297.94	8,008.97	84.52	-70.04	90.50	0.28	-0.20	-5.90
8,210.50	1.47	320.14	8,208.89	87.90	-74.35	95.57	0.33	-0.13	11.10
8,410.50	1.47	348.36	8,408.83	92.39	-76.51	98.88	0.36	0.00	14.11
8,610.50	2.13	338.91	8,608.73	98.37	-78.36	102.30	0.36	0.33	-4.73
8,810.50	2.19	358.58	8,808.59	105.65	-79.80	105.67	0.37	0.03	9.84
9,010.50	3.20	28.57	9,008.38	114.38	-77.22	105.59	0.85	0.51	15.00
9,210.50	4.59	24.82	9,207.91	126.54	-71.19	103.12	0.71	0.70	-1.88
9,410.50	5.02	19.94	9,407.21	142.03	-64.85	101.26	0.30	0.22	-2.44
9,610.50	4.30	17.51	9,606.55	157.41	-59.61	100.43	0.37	-0.36	-1.22
9,810.50	3.80	11.94	9,806.05	171.04	-55.98	100.67	0.32	-0.25	-2.79



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10,010.50	3.71	355.48	10,005.62	183.98	-55.12	103.39	0.54	-0.05	-8.23
10,210.50	3.42	358.41	10,205.24	196.39	-55.80	107.43	0.17	-0.15	1.47
10,410.50	2.94	351.39	10,404.93	207.43	-56.73	111.35	0.31	-0.24	-3.51
10,610.50	0.65	58.83	10,604.83	213.09	-56.53	112.71	1.38	-1.15	33.72
10,810.50	0.71	116.38	10,804.82	213.12	-54.45	110.72	0.33	0.03	28.78
11,010.50	0.52	90.56	11,004.81	212.56	-52.43	108.62	0.17	-0.10	-12.91
11,210.50	0.28	221.46	11,204.80	212.19	-51.84	107.96	0.37	-0.12	65.45
11,305.50	0.90	123.03	11,299.80	211.61	-51.37	107.35	1.03	0.65	-103.61
11,420.00	0.90	162.50	11,414.29	210.26	-50.35	105.99	0.53	0.00	34.47
11,452.00	2.80	318.10	11,446.28	210.60	-50.79	106.51	11.37	5.94	486.25
11,482.00	6.10	322.70	11,476.18	212.42	-52.25	108.41	11.06	11.00	15.33
11,511.00	9.70	337.80	11,504.90	215.90	-54.11	111.15	14.23	12.41	52.07
11,541.00	11.70	338.70	11,534.38	221.08	-56.17	114.55	6.69	6.67	3.00
11,573.00	15.40	335.80	11,565.49	227.98	-59.09	119.25	11.75	11.56	-9.06
11,603.00	18.20	333.90	11,594.20	235.82	-62.78	124.95	9.51	9.33	-6.33
Tie-In to MS MWD - 11603.00' MD									
11,635.00	17.70	326.80	11,624.65	244.38	-67.65	131.97	7.01	-1.56	-22.19
11,666.00	22.70	322.70	11,653.73	253.09	-73.86	140.33	16.75	16.13	-13.23
11,698.00	30.70	313.70	11,682.31	263.67	-83.52	152.52	27.95	25.00	-28.13
11,729.00	37.30	315.30	11,708.00	275.82	-95.86	167.72	21.48	21.29	5.16
11,760.00	45.50	311.80	11,731.23	289.89	-110.74	185.88	27.48	26.45	-11.29
11,789.00	53.70	310.60	11,750.01	304.42	-127.35	205.83	28.45	28.28	-4.14
11,820.00	60.50	303.40	11,766.86	320.01	-148.14	230.10	29.33	21.94	-23.23
11,852.00	67.80	297.70	11,780.81	334.59	-172.94	257.93	27.87	22.81	-17.81
11,882.00	74.90	291.30	11,790.41	346.33	-198.78	286.01	31.11	23.67	-21.33
11,910.00	82.10	285.40	11,795.99	354.94	-224.80	313.39	32.97	25.71	-21.07
11,972.00	87.20	282.00	11,801.77	369.55	-284.75	375.05	9.87	8.23	-5.48
12,035.00	89.40	278.00	11,803.64	380.48	-346.75	437.67	7.24	3.49	-6.35
12,097.00	89.10	274.90	11,804.45	387.44	-408.34	498.82	5.02	-0.48	-5.00
12,158.00	89.00	271.60	11,805.46	390.90	-469.23	558.32	5.41	-0.16	-5.41
12,219.00	88.40	270.30	11,806.85	391.91	-530.20	617.24	2.35	-0.98	-2.13
12,283.00	88.10	269.80	11,808.80	391.97	-594.17	678.78	0.91	-0.47	-0.78
12,348.00	86.80	269.80	11,811.69	391.74	-659.10	741.17	2.00	-2.00	0.00
12,407.00	85.60	269.50	11,815.60	391.38	-717.97	797.69	2.10	-2.03	-0.51
12,470.00	85.20	269.80	11,820.66	391.00	-780.77	857.99	0.79	-0.63	0.48
12,533.00	84.40	268.90	11,826.37	390.28	-843.50	918.13	1.91	-1.27	-1.43
12,597.00	84.90	270.70	11,832.33	390.06	-907.22	979.35	2.91	0.78	2.81
12,660.00	85.20	271.50	11,837.77	391.27	-969.97	1,040.04	1.35	0.48	1.27
12,724.00	87.40	273.40	11,841.90	394.00	-1,033.78	1,102.15	4.54	3.44	2.97
12,787.00	87.70	273.70	11,844.59	397.90	-1,096.60	1,163.64	0.67	0.48	0.48
12,851.00	87.70	273.80	11,847.16	402.08	-1,160.41	1,226.15	0.16	0.00	0.16
12,914.00	88.30	274.60	11,849.36	406.69	-1,223.20	1,287.81	1.59	0.95	1.27
12,977.00	88.70	275.20	11,851.01	412.07	-1,285.95	1,349.63	1.14	0.63	0.95
13,041.00	89.70	276.10	11,851.90	418.37	-1,349.63	1,412.60	2.10	1.56	1.41



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13,047.00	89.70	275.80	11,851.93	418.99	-1,355.60	1,418.51	5.00	0.00	-5.00
13,100.00	89.70	275.80	11,852.21	424.35	-1,408.33	1,470.69	0.00	0.00	0.00

Projection to Bit-13100.00' MD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
11,603.00	11,594.20	235.82	-62.78	Tie-In to MS MWD - 11603.00' MD
13,100.00	11,852.21	424.35	-1,408.33	Projection to Bit-13100.00' MD

Warren 1
Midway Devonian Field
API 30-025-26323
Lea County, NM
4/5/2019

Completed 07-20-1979
 Plugged 1-12-1990
 IP 182 bopd (11,818 to 11,882)
 Re-Entered 11/4/2014

