

30-015-38225

PathFinder Energy Services, Inc.

Survey Report

COG OPERATING, LLC
DIRTY DOZEN STATE COM #3H
EDDY COUNTY, NEW MEXICO
Rig:MCVAY #7PathFinder Office Supervisor: FRANCISCO SINISTERRA
PathFinder Field Engineers: DAVID BAKER
JEFF CORBETTSurvey Horiz. Reference:WELLHEAD
Ref Coordinates: LAT:32.36.52.4305 N LON:103.48.57.5327 W
GRID Reference:NAD27 new mexico east Transverse Mercator
Ref GRID Coord: X: 659298.4000 Y: 587677.5000
North Aligned To:GRID NORTH
Total Magnetic Correction: 7.53°EAST TO GRID
Vertical Section Plane: 88.40
Survey Vert. Reference: 17.00' Kelly Bushing To Ground
Altitude:3502.00' Ground To MSL

Survey Calculations by RX5 V6.03B using Minimum Curvature

Measured Depth (ft)	Incl (deg)	Drift Dir. (deg)	TVD (ft)	Course Length (ft)	Vertical Section (ft)	TOTAL Rectangular Offsets (ft)	Closure Dist Dir (ft) (deg)	DLS (dg/100ft)
TIED INTO SCIENTIFIC DRILLING GYRO SURVEY @ 8800'MD.								
8800.00	1.40	182.79	8796.52	0.00	90.09	5.52 N 89.97 E	90.14@ 86.49	0.00
THE FOLLOWING ARE PATHFINDER MWD SURVEYS.								
8857.00	1.41	200.46	8853.50	57.00	89.77	4.17 N 89.69 E	89.79@ 87.34	0.76
8888.00	1.32	202.49	8884.49	31.00	89.48	3.48 N 89.42 E	89.49@ 87.77	0.33
8920.00	2.81	128.75	8916.48	32.00	89.93	2.65 N 89.89 E	89.93@ 88.31	8.59
8952.00	6.24	116.73	8948.37	32.00	92.06	1.37 N 92.06 E	92.07@ 89.14	11.06
8984.00	8.71	111.52	8980.10	32.00	95.82	0.30 S 95.87 E	95.87@ 90.18	8.00
9016.00	11.61	104.88	9011.59	32.00	101.14	2.01 S 101.23 E	101.25@ 91.14	9.76
9048.00	14.51	100.75	9042.76	32.00	108.14	3.59 S 108.28 E	108.34@ 91.90	9.51
9079.00	18.29	101.06	9072.50	31.00	116.69	5.25 S 116.88 E	117.00@ 92.57	12.20
9111.00	22.07	99.84	9102.53	32.00	127.48	7.24 S 127.73 E	127.94@ 93.24	11.89
9143.00	25.50	98.44	9131.81	32.00	140.16	9.28 S 140.47 E	140.78@ 93.78	10.86
9174.00	28.31	95.55	9159.45	31.00	154.03	10.97 S 154.39 E	154.78@ 94.06	10.00
9206.00	31.48	94.37	9187.19	32.00	169.87	12.34 S 170.28 E	170.73@ 94.14	10.07
9238.00	35.00	93.11	9213.95	32.00	187.33	13.47 S 187.78 E	188.26@ 94.10	11.21
9270.00	38.78	91.60	9239.54	32.00	206.49	14.25 S 206.97 E	207.46@ 93.94	12.15
9302.00	42.56	90.50	9263.80	32.00	227.32	14.62 S 227.82 E	228.29@ 93.67	12.02
9334.00	46.96	89.18	9286.52	32.00	249.84	14.55 S 250.34 E	250.77@ 93.33	14.05
9366.00	51.97	88.13	9307.31	32.00	274.15	13.97 S 274.65 E	275.00@ 92.91	15.85
9397.00	56.37	89.97	9325.46	31.00	299.27	13.57 S 299.77 E	300.08@ 92.59	14.99
9429.00	61.29	89.71	9342.01	32.00	326.64	13.49 S 327.14 E	327.42@ 92.36	15.39
9461.00	66.48	92.17	9356.10	32.00	355.33	13.97 S 355.86 E	356.13@ 92.25	17.62
9491.00	71.40	94.47	9366.87	30.00	383.21	15.60 S 383.80 E	384.11@ 92.33	17.89
9522.00	76.24	96.58	9375.51	31.00	412.74	18.48 S 413.42 E	413.83@ 92.56	16.92
9554.00	79.67	96.62	9382.19	32.00	443.71	22.07 S 444.50 E	445.05@ 92.84	10.72
9586.00	80.20	96.17	9387.78	32.00	474.91	25.58 S 475.81 E	476.50@ 93.08	2.16

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Page 02/04

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9617.00	81.25	95.43	9392.78	31.00	505.25	28.67 S	506.25 E	507.06@	93.24	4.13
9647.00	83.71	94.16	9396.70	30.00	534.81	31.16 S	535.88 E	536.79@	93.33	9.21
9679.00	86.79	93.36	9399.35	32.00	566.55	33.25 S	567.70 E	568.68@	93.35	9.94
9711.00	89.43	92.63	9400.41	32.00	598.43	34.92 S	599.64 E	600.65@	93.33	8.56
9743.00	89.96	92.51	9400.58	32.00	630.34	36.35 S	631.61 E	632.65@	93.29	1.70
9775.00	89.60	92.56	9400.70	32.00	662.26	37.77 S	663.57 E	664.65@	93.26	1.14
9807.00	89.16	91.27	9401.05	32.00	694.20	38.84 S	695.55 E	696.64@	93.20	4.26
9902.00	89.69	90.17	9402.00	95.00	789.11	40.03 S	790.54 E	791.55@	92.90	1.29
9997.00	90.22	88.96	9402.07	95.00	884.09	39.31 S	885.53 E	886.41@	92.54	1.39
10091.00	91.01	87.89	9401.07	94.00	978.08	36.73 S	979.49 E	980.18@	92.15	1.41
10186.00	90.66	88.25	9399.68	95.00	1073.07	33.53 S	1074.43 E	1074.95@	91.79	0.53
10282.00	88.90	87.50	9400.05	96.00	1169.06	29.97 S	1170.36 E	1170.74@	91.47	1.99
10377.00	87.76	88.18	9402.82	95.00	1264.02	26.39 S	1265.25 E	1265.52@	91.19	1.40
10470.00	86.53	86.88	9407.45	93.00	1356.89	22.39 S	1358.04 E	1358.22@	90.94	1.92
10563.00	87.76	87.01	9412.08	93.00	1449.74	17.44 S	1450.79 E	1450.90@	90.69	1.33
10625.00	89.52	87.69	9413.55	62.00	1511.71	14.57 S	1512.70 E	1512.78@	90.55	3.04
10687.00	89.69	88.50	9413.98	62.00	1573.70	12.51 S	1574.67 E	1574.72@	90.46	1.33
10749.00	91.28	88.42	9413.46	62.00	1635.70	10.85 S	1636.64 E	1636.68@	90.38	2.57
10810.00	91.36	88.45	9412.05	61.00	1696.68	9.18 S	1697.60 E	1697.63@	90.31	0.14
10872.00	90.84	88.65	9410.86	62.00	1758.67	7.61 S	1759.57 E	1759.59@	90.25	0.90
10935.00	91.54	87.76	9409.55	63.00	1821.66	5.64 S	1822.53 E	1822.53@	90.18	1.80
10996.00	90.75	87.93	9408.33	61.00	1882.64	3.35 S	1883.47 E	1883.47@	90.10	1.33
11058.00	92.95	87.53	9406.33	62.00	1944.60	0.89 S	1945.38 E	1945.39@	90.03	3.61
11120.00	93.65	87.65	9402.76	62.00	2006.49	1.71 N	2007.23 E	2007.23@	89.95	1.15
11181.00	94.35	87.85	9398.51	61.00	2067.34	4.10 N	2068.03 E	2068.04@	89.89	1.19
11243.00	93.83	87.09	9394.09	62.00	2129.17	6.83 N	2129.81 E	2129.82@	89.82	1.48
11305.00	92.42	85.96	9390.71	62.00	2191.04	10.58 N	2191.60 E	2191.63@	89.72	2.91
11366.00	88.90	85.88	9390.00	61.00	2251.97	14.92 N	2252.44 E	2252.48@	89.62	5.77
11428.00	89.43	85.90	9390.91	62.00	2313.91	19.37 N	2314.27 E	2314.35@	89.52	0.86

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Page 03/04

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11489.00	90.04	86.19	9391.19	61.00	2374.86	23.57 N	2375.12 E	2375.24@	89.43	1.11
11551.00	88.55	85.76	9391.95	62.00	2436.79	27.92 N	2436.96 E	2437.12@	89.34	2.50
11613.00	88.11	86.35	9393.76	62.00	2498.71	32.19 N	2498.79 E	2499.00@	89.26	1.19
11674.00	88.99	87.75	9395.30	61.00	2559.68	35.33 N	2559.69 E	2559.93@	89.21	2.71
11736.00	88.64	88.05	9396.59	62.00	2621.66	37.60 N	2621.63 E	2621.90@	89.18	0.74
11798.00	90.66	88.37	9396.96	62.00	2683.66	39.53 N	2683.60 E	2683.89@	89.16	3.30
11859.00	91.10	89.20	9396.03	61.00	2744.65	40.83 N	2744.58 E	2744.88@	89.15	1.54
11921.00	90.84	89.81	9394.98	62.00	2806.63	41.36 N	2806.56 E	2806.87@	89.16	1.07
11983.00	89.60	88.37	9394.74	62.00	2868.62	42.35 N	2868.55 E	2868.87@	89.15	3.06
12045.00	88.72	87.67	9395.65	62.00	2930.61	44.49 N	2930.51 E	2930.85@	89.13	1.81
12106.00	88.46	87.71	9397.15	61.00	2991.59	46.95 N	2991.44 E	2991.81@	89.10	0.43
12169.00	89.60	87.93	9398.22	63.00	3054.57	49.34 N	3054.38 E	3054.78@	89.07	1.84
12231.00	89.43	87.96	9398.74	62.00	3116.57	51.57 N	3116.34 E	3116.77@	89.05	0.28
12293.00	89.25	88.66	9399.46	62.00	3178.56	53.39 N	3178.31 E	3178.76@	89.04	1.16
12354.00	89.08	89.53	9400.34	61.00	3239.55	54.36 N	3239.30 E	3239.75@	89.04	1.45
12416.00	88.90	89.96	9401.44	62.00	3301.52	54.63 N	3301.29 E	3301.74@	89.05	0.75
12478.00	89.43	89.42	9402.34	62.00	3363.50	54.97 N	3363.28 E	3363.73@	89.06	1.22
12539.00	90.40	88.70	9402.43	61.00	3424.50	55.97 N	3424.27 E	3424.73@	89.06	1.98
12602.00	90.66	88.71	9401.85	63.00	3487.49	57.39 N	3487.25 E	3487.72@	89.06	0.41
12664.00	89.25	87.96	9401.90	62.00	3549.49	59.20 N	3549.22 E	3549.72@	89.04	2.58
12725.00	89.16	88.79	9402.74	61.00	3610.49	60.92 N	3610.19 E	3610.71@	89.03	1.37
12787.00	89.60	88.25	9403.41	62.00	3672.48	62.53 N	3672.17 E	3672.70@	89.02	1.12
12848.00	90.48	87.83	9403.37	61.00	3733.48	64.61 N	3733.13 E	3733.69@	89.01	1.60
12910.00	90.84	88.22	9402.66	62.00	3795.47	66.75 N	3795.09 E	3795.68@	88.99	0.86
12972.00	90.75	88.66	9401.80	62.00	3857.47	68.44 N	3857.06 E	3857.67@	88.98	0.72
13035.00	89.25	87.28	9401.80	63.00	3920.46	70.67 N	3920.02 E	3920.65@	88.97	3.24
13096.00	88.99	87.54	9402.73	61.00	3981.45	73.42 N	3980.95 E	3981.62@	88.94	0.60
13158.00	89.08	87.99	9403.78	62.00	4043.43	75.84 N	4042.89 E	4043.60@	88.93	0.74
13220.00	88.11	88.54	9405.30	62.00	4105.41	77.72 N	4104.84 E	4105.58@	88.92	1.80

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Page 04/04

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13281.00	89.78	88.10	9406.42	61.00	4166.40	79.51 N	4165.80 E	4166.56@	88.91	2.83
13343.00	90.84	88.43	9406.09	62.00	4228.40	81.38 N	4227.77 E	4228.56@	88.90	1.79
13405.00	91.36	88.60	9404.90	62.00	4290.39	82.99 N	4289.74 E	4290.54@	88.89	0.88
13466.00	91.45	87.42	9403.40	61.00	4351.37	85.11 N	4350.69 E	4351.52@	88.88	1.94
13528.00	91.45	87.22	9401.83	62.00	4413.33	88.01 N	4412.60 E	4413.48@	88.86	0.32
13592.00	91.45	87.54	9400.21	64.00	4477.30	90.93 N	4476.51 E	4477.43@	88.84	0.50
13656.00	91.28	86.82	9398.69	64.00	4541.27	94.08 N	4540.41 E	4541.39@	88.81	1.16
13719.00	91.36	86.90	9397.24	63.00	4604.23	97.53 N	4603.30 E	4604.34@	88.79	0.18
13784.00	92.51	86.78	9395.04	65.00	4669.17	101.11 N	4668.17 E	4669.26@	88.76	1.78
13849.00	90.75	86.03	9393.19	65.00	4734.10	105.18 N	4733.01 E	4734.18@	88.73	2.94
13913.00	88.90	85.49	9393.39	64.00	4798.03	109.91 N	4796.83 E	4798.09@	88.69	3.01
13977.00	88.46	85.25	9394.86	64.00	4861.92	115.08 N	4860.60 E	4861.97@	88.64	0.78
14041.00	88.81	85.13	9396.39	64.00	4925.80	120.44 N	4924.36 E	4925.83@	88.60	0.58
14105.00	89.08	85.17	9397.56	64.00	4989.69	125.85 N	4988.12 E	4989.71@	88.55	0.43
14169.00	87.76	86.33	9399.33	64.00	5053.59	130.60 N	5051.92 E	5053.61@	88.52	2.75
14233.00	88.29	86.50	9401.54	64.00	5117.52	134.60 N	5115.75 E	5117.52@	88.49	0.87
14298.00	89.16	87.75	9402.98	65.00	5182.48	137.85 N	5180.65 E	5182.49@	88.48	2.34
14362.00	89.69	87.38	9403.62	64.00	5246.47	140.57 N	5244.59 E	5246.48@	88.46	1.01
14425.00	89.69	87.37	9403.96	63.00	5309.46	143.46 N	5307.53 E	5309.46@	88.45	0.02
14488.00	89.52	87.89	9404.40	63.00	5372.46	146.06 N	5370.47 E	5372.46@	88.44	0.87
14551.00	88.99	87.79	9405.22	63.00	5435.45	148.44 N	5433.42 E	5435.45@	88.44	0.86
14615.00	88.29	87.44	9406.74	64.00	5499.42	151.10 N	5497.35 E	5499.42@	88.43	1.22
14678.00	89.52	88.14	9407.94	63.00	5562.41	153.53 N	5560.29 E	5562.41@	88.42	2.25
14702.00	89.52	87.93	9408.14	24.00	5586.40	154.35 N	5584.27 E	5586.40@	88.42	0.87
STRAIGHT LINE PROJECTION TO BIT LOCATION @ 14781' MD.										
14781.00	89.52	87.93	9408.80	79.00	5665.40	157.21 N	5663.22 E	5665.40@	88.41	0.00