

PathFinder Energy Services, Inc.

Survey Report

COG OPERATING, INC.

MYOX 21 STATE #9H

EDDY COUNTY, NM

Rig: PATRIOT 2

PathFinder Office Supervisor: FRANCISCO SINISTERRA

PathFinder Field Engineers: JUAN ALCOCER

RYAN MILLER

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Tie-in Date: 04/26/2011

Date Completed: 05/03/2011

Survey Horiz. Reference: WELLHEAD

Ref Coordinates: LAT: 32.6353287 N LON: 104.5571751 W

GRID Reference: NAD27 new mexico east Transverse Mercator

Ref GRID Coord: X: 572488.8000 Y: 403751.8000

North Aligned To: GRID NORTH

Total Magnetic Correction: 7.71° EAST TO GRID

Vertical Section Plane: 3.96

Survey Vert. Reference: 17.00' Kelly Bushing To Ground

Altitude: 2998.00' Ground To MSL

Survey Calculations by RX5 V6.03E using Minimum Curvature

Measured Depth (ft)	Incl (deg)	Drift Dir. (deg)	TVD (ft)	Course Length (ft)	Vertical Section (ft)	TOTAL Rectangular Offsets (ft) (ft)		Closure Dist Dir (ft) (deg)		DLS (dg/100ft)
THE FOLLOWING ARE SCIENTIFIC DRILLING GYRO SURVEYS.										
0.00	0.00	0.00	0.00	0.00	0.00	0.00 N	0.00 E	0.00@	59.53	0.00
100.00	1.59	68.66	99.99	100.00	0.60	0.51 N	1.30 E	1.39@	68.63	1.59
200.00	1.77	72.31	199.95	100.00	1.76	1.48 N	4.06 E	4.32@	69.95	0.21
300.00	1.66	71.65	299.90	100.00	2.88	2.41 N	6.91 E	7.31@	70.79	0.11
400.00	1.41	84.08	399.87	100.00	3.64	2.99 N	9.50 E	9.96@	72.54	0.42
500.00	0.80	71.92	499.85	100.00	4.11	3.33 N	11.39 E	11.87@	73.69	0.65
600.00	0.68	55.80	599.84	100.00	4.74	3.88 N	12.55 E	13.13@	72.80	0.24
700.00	0.62	56.77	699.83	100.00	5.43	4.51 N	13.49 E	14.23@	71.50	0.06
800.00	0.96	357.33	799.82	100.00	6.59	5.65 N	13.90 E	15.01@	67.90	0.84
900.00	1.03	353.05	899.81	100.00	8.31	7.38 N	13.76 E	15.61@	61.80	0.10
1000.00	0.80	2.80	999.80	100.00	9.89	8.97 N	13.68 E	16.36@	56.76	0.28
1100.00	0.22	320.80	1099.79	100.00	10.73	9.81 N	13.59 E	16.76@	54.18	0.65
1200.00	0.32	243.53	1199.79	100.00	10.73	9.84 N	13.22 E	16.48@	53.36	0.35
1300.00	0.26	220.77	1299.79	100.00	10.40	9.54 N	12.82 E	15.98@	53.36	0.13
1400.00	0.29	213.01	1399.79	100.00	10.00	9.16 N	12.54 E	15.53@	53.86	0.05
1500.00	0.11	154.11	1499.79	100.00	9.69	8.86 N	12.44 E	15.27@	54.56	0.25
1600.00	0.20	125.92	1599.79	100.00	9.52	8.67 N	12.63 E	15.31@	55.53	0.12
1700.00	0.88	105.58	1699.78	100.00	9.27	8.36 N	13.51 E	15.88@	58.25	0.70
1800.00	1.76	98.13	1799.76	100.00	9.01	7.94 N	15.77 E	17.65@	63.28	0.89
1900.00	1.85	95.00	1899.71	100.00	8.86	7.58 N	18.90 E	20.36@	68.15	0.13
2000.00	1.79	91.63	1999.65	100.00	8.90	7.39 N	22.06 E	23.27@	71.48	0.12
2100.00	1.83	89.58	2099.61	100.00	9.08	7.36 N	25.22 E	26.27@	73.73	0.08
2200.00	2.29	85.21	2199.54	100.00	9.51	7.54 N	28.81 E	29.78@	75.34	0.49
2300.00	2.01	85.26	2299.47	100.00	10.08	7.85 N	32.55 E	33.48@	76.44	0.28
2400.00	1.86	92.30	2399.41	100.00	10.39	7.93 N	35.92 E	36.78@	77.55	0.28

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30-015-37416

PathFinder Energy Services, Inc.

Survey Report

COG OPERATING, INC.
MYOX 21 STATE #9H
EDDY COUNTY, NM
RIG:PATRIOT 2

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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)
2500.00	1.61	89.42	2499.37	100.00	10.55	7.88 N	38.94 E	39.73@	78.56	0.27
2600.00	1.44	91.07	2599.33	100.00	10.72	7.87 N	41.60 E	42.34@	79.29	0.18
2700.00	1.37	82.29	2699.30	100.00	11.03	8.01 N	44.05 E	44.77@	79.70	0.23
2800.00	1.33	91.82	2799.27	100.00	11.31	8.13 N	46.39 E	47.10@	80.06	0.23
2900.00	1.11	89.97	2899.25	100.00	11.43	8.09 N	48.52 E	49.19@	80.53	0.22
3000.00	0.72	95.04	2999.24	100.00	11.48	8.04 N	50.11 E	50.75@	80.89	0.40
3100.00	0.77	92.08	3099.23	100.00	11.49	7.96 N	51.41 E	52.02@	81.20	0.06
3200.00	0.63	97.12	3199.22	100.00	11.48	7.87 N	52.63 E	53.21@	81.50	0.15
3300.00	0.41	125.96	3299.22	100.00	11.26	7.59 N	53.46 E	54.00@	81.92	0.34
3400.00	0.48	169.22	3399.22	100.00	10.67	6.97 N	53.83 E	54.28@	82.62	0.34
3500.00	0.34	175.39	3499.21	100.00	9.97	6.26 N	53.93 E	54.30@	83.38	0.15
3600.00	0.45	203.31	3599.21	100.00	9.31	5.60 N	53.80 E	54.09@	84.05	0.22
3700.00	0.50	215.67	3699.21	100.00	8.56	4.89 N	53.39 E	53.62@	84.77	0.11
3800.00	0.51	223.31	3799.20	100.00	7.85	4.21 N	52.83 E	53.00@	85.44	0.07
3900.00	0.44	233.78	3899.20	100.00	7.26	3.66 N	52.22 E	52.34@	85.99	0.11
4000.00	0.54	229.62	3999.20	100.00	6.68	3.13 N	51.55 E	51.64@	86.53	0.11
4100.00	0.54	233.32	4099.19	100.00	6.04	2.54 N	50.81 E	50.87@	87.14	0.03
4200.00	0.54	237.20	4199.19	100.00	5.45	2.00 N	50.04 E	50.08@	87.71	0.04
4300.00	0.36	250.20	4299.18	100.00	5.05	1.64 N	49.35 E	49.37@	88.09	0.21
4400.00	0.44	250.32	4399.18	100.00	4.77	1.41 N	48.69 E	48.71@	88.35	0.08
4500.00	0.48	239.11	4499.18	100.00	4.37	1.06 N	47.97 E	47.98@	88.73	0.10
4600.00	0.43	230.24	4599.18	100.00	3.87	0.61 N	47.32 E	47.32@	89.26	0.09
4700.00	0.86	203.24	4699.17	100.00	2.91	0.32 S	46.73 E	46.74@	90.40	0.52
4800.00	0.75	209.96	4799.16	100.00	1.61	1.58 S	46.11 E	46.14@	91.96	0.14
4900.00	0.89	214.14	4899.15	100.00	0.35	2.79 S	45.35 E	45.43@	93.52	0.15
5000.00	0.94	212.96	4999.14	100.00	-1.04	4.12 S	44.47 E	44.66@	95.29	0.05
5100.00	0.70	221.13	5099.13	100.00	-2.24	5.27 S	43.62 E	43.94@	96.89	0.27
5200.00	0.85	215.10	5199.12	100.00	-3.36	6.34 S	42.79 E	43.26@	98.42	0.17

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MYOX 21 STATE #9H
EDDY COUNTY, NM
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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)
5300.00	1.00	204.31	5299.10	100.00	-4.82	7.74 S	42.01 E	42.71@	100.44	0.23
5400.00	0.99	201.27	5399.09	100.00	-6.46	9.34 S	41.33 E	42.37@	102.73	0.05
5500.00	0.93	192.89	5499.08	100.00	-8.09	10.93 S	40.84 E	42.28@	104.99	0.15
5600.00	0.99	189.19	5599.06	100.00	-9.75	12.58 S	40.52 E	42.43@	107.24	0.09
5700.00	1.43	189.98	5699.04	100.00	-11.85	14.66 S	40.16 E	42.76@	110.05	0.44
5800.00	1.44	190.59	5799.01	100.00	-14.34	17.12 S	39.72 E	43.25@	113.32	0.02
5900.00	1.64	192.06	5898.97	100.00	-17.00	19.76 S	39.19 E	43.89@	116.76	0.20
6000.00	1.69	194.03	5998.93	100.00	-19.87	22.59 S	38.53 E	44.66@	120.38	0.08
6100.00	1.57	195.37	6098.89	100.00	-22.67	25.34 S	37.81 E	45.52@	123.83	0.13
6200.00	2.21	155.83	6198.84	100.00	-25.71	28.42 S	38.24 E	47.64@	126.62	1.41
6300.00	2.52	144.70	6298.75	100.00	-29.11	31.97 S	40.30 E	51.44@	128.43	0.55
6400.00	2.21	139.75	6398.67	100.00	-32.20	35.24 S	42.81 E	55.45@	129.46	0.37
** TIE INTO SCIENTIFIC DRILLING GYRO SURVEYS @ 6500' MD.										
6500.00	1.66	145.94	6498.61	100.00	-34.72	37.91 S	44.87 E	58.74@	130.19	0.59
THE FOLLOWING ARE PATHFINDER MWD SURVEYS.										
6586.00	4.22	5.95	6584.54	86.00	-32.54	35.79 S	45.90 E	58.20@	127.95	6.51
6616.00	10.29	6.39	6614.29	30.00	-28.75	32.03 S	46.31 E	56.31@	124.67	20.23
6647.00	14.95	7.18	6644.53	31.00	-21.99	25.31 S	47.12 E	53.48@	118.24	15.04
6679.00	17.94	7.97	6675.22	32.00	-12.95	16.33 S	48.32 E	51.00@	108.67	9.37
6710.00	19.87	8.24	6704.55	31.00	-2.94	6.39 S	49.73 E	50.14@	97.32	6.23
6742.00	21.10	9.29	6734.52	32.00	8.22	4.68 N	51.44 E	51.66@	84.80	4.01
6772.00	21.90	9.29	6762.43	30.00	19.17	15.53 N	53.22 E	55.44@	73.73	2.67
6805.00	25.85	8.06	6792.61	33.00	32.48	28.73 N	55.22 E	62.25@	62.51	12.06
6837.00	30.25	6.30	6820.84	32.00	47.50	43.66 N	57.09 E	71.87@	52.59	13.99
6869.00	35.09	4.99	6847.77	32.00	64.76	60.85 N	58.77 E	84.59@	44.01	15.28
6900.00	40.10	4.81	6872.32	31.00	83.66	79.68 N	60.38 E	99.98@	37.15	16.16
6935.00	44.85	2.96	6898.13	35.00	107.29	103.26 N	61.97 E	120.42@	30.97	14.03
6967.00	48.98	2.09	6919.99	32.00	130.65	126.60 N	62.99 E	141.40@	26.45	13.06

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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)
6998.00	52.06	2.26	6939.70	31.00	154.56	150.51 N	63.90 E	163.51@	23.00	9.94
7030.00	54.17	2.35	6958.90	32.00	180.14	176.08 N	64.93 E	187.67@	20.24	6.60
7061.00	56.01	4.02	6976.64	31.00	205.56	201.46 N	66.35 E	212.10@	18.23	7.40
7093.00	57.60	4.72	6994.16	32.00	232.34	228.16 N	68.39 E	238.19@	16.69	5.30
7125.00	60.15	5.95	7010.70	32.00	259.72	255.43 N	70.94 E	265.10@	15.52	8.62
7156.00	63.14	6.57	7025.42	31.00	286.97	282.54 N	73.91 E	292.05@	14.66	9.80
7188.00	66.65	6.92	7039.00	32.00	315.91	311.31 N	77.32 E	320.77@	13.95	11.01
7220.00	70.35	7.09	7050.72	32.00	345.64	340.86 N	80.95 E	350.34@	13.36	11.57
7252.00	74.22	6.83	7060.46	32.00	376.07	371.11 N	84.64 E	380.64@	12.85	12.12
7283.00	77.12	6.39	7068.13	31.00	406.07	400.95 N	88.10 E	410.51@	12.39	9.45
7315.00	78.96	6.12	7074.76	32.00	437.35	432.06 N	91.51 E	441.65@	11.96	5.81
7347.00	81.25	5.66	7080.26	32.00	468.85	463.42 N	94.74 E	473.00@	11.55	7.29
7379.00	83.89	5.03	7084.40	32.00	500.57	495.01 N	97.70 E	504.56@	11.16	8.48
7411.00	86.00	4.59	7087.22	32.00	532.44	526.77 N	100.37 E	536.25@	10.79	6.73
7442.00	86.97	4.11	7089.12	31.00	563.38	557.62 N	102.72 E	567.00@	10.44	3.49
7474.00	87.32	3.89	7090.71	32.00	595.35	589.51 N	104.95 E	598.77@	10.09	1.29
7506.00	88.46	3.31	7091.89	32.00	627.32	621.42 N	106.95 E	630.56@	9.77	4.00
7538.00	88.64	3.08	7092.70	32.00	659.31	653.36 N	108.74 E	662.35@	9.45	0.91
7569.00	88.64	3.16	7093.43	31.00	690.30	684.31 N	110.42 E	693.16@	9.17	0.26
7600.00	89.43	3.89	7093.96	31.00	721.29	715.24 N	112.33 E	724.01@	8.93	3.47
7664.00	89.96	3.91	7094.30	64.00	785.29	779.09 N	116.68 E	787.78@	8.52	0.83
7728.00	89.78	4.13	7094.44	64.00	849.29	842.93 N	121.17 E	851.60@	8.18	0.44
7791.00	90.84	5.28	7094.10	63.00	912.28	905.72 N	126.34 E	914.49@	7.94	2.48
7853.00	91.19	5.47	7093.00	62.00	974.25	967.44 N	132.14 E	976.42@	7.78	0.64
7916.00	91.10	5.73	7091.74	63.00	1037.21	1030.12 N	138.29 E	1039.36@	7.65	0.44
7979.00	90.48	3.97	7090.88	63.00	1100.20	1092.89 N	143.62 E	1102.29@	7.49	2.96
8043.00	90.92	2.84	7090.09	64.00	1164.19	1156.77 N	147.42 E	1166.13@	7.26	1.89
8105.00	89.16	1.86	7090.05	62.00	1226.16	1218.72 N	149.96 E	1227.91@	7.01	3.25

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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)
8167.00	89.08	1.52	7091.00	62.00	1288.11	1280.68 N	151.79 E	1289.64@	6.76	0.56
8231.00	89.52	1.91	7091.79	64.00	1352.05	1344.65 N	153.70 E	1353.40@	6.52	0.92
8325.00	89.60	1.36	7092.51	94.00	1445.97	1438.61 N	156.38 E	1447.08@	6.20	0.59
8420.00	90.13	1.24	7092.73	95.00	1540.87	1533.58 N	158.54 E	1541.75@	5.90	0.57
8515.00	90.13	359.75	7092.52	95.00	1635.69	1628.57 N	159.36 E	1636.35@	5.59	1.57
8610.00	89.60	0.81	7092.74	95.00	1730.49	1723.57 N	159.82 E	1730.96@	5.30	1.25
8673.00	89.16	0.66	7093.42	63.00	1793.39	1786.56 N	160.63 E	1793.77@	5.14	0.74
8768.00	89.52	0.49	7094.52	95.00	1888.22	1881.55 N	161.59 E	1888.48@	4.91	0.42
8863.00	88.46	0.62	7096.19	95.00	1983.03	1976.53 N	162.51 E	1983.20@	4.70	1.12
8926.00	87.14	1.84	7098.61	63.00	2045.91	2039.47 N	163.86 E	2046.04@	4.59	2.85
8990.00	87.05	3.16	7101.85	64.00	2109.81	2103.32 N	166.65 E	2109.91@	4.53	2.06
9053.00	87.32	2.66	7104.95	63.00	2172.72	2166.16 N	169.84 E	2172.81@	4.48	0.90
9117.00	87.49	1.82	7107.84	64.00	2236.63	2230.05 N	172.34 E	2236.70@	4.42	1.34
9180.00	87.49	2.45	7110.60	63.00	2299.53	2292.94 N	174.68 E	2299.59@	4.36	1.00
9244.00	88.20	3.05	7113.01	64.00	2363.47	2356.83 N	177.75 E	2363.52@	4.31	1.45
9306.00	88.90	3.98	7114.58	62.00	2425.45	2418.69 N	181.55 E	2425.49@	4.29	1.88
9370.00	90.22	4.82	7115.07	64.00	2489.45	2482.50 N	186.46 E	2489.49@	4.30	2.44
9433.00	90.57	4.41	7114.64	63.00	2552.44	2545.29 N	191.53 E	2552.49@	4.30	0.86
9497.00	91.19	3.95	7113.65	64.00	2616.43	2609.11 N	196.19 E	2616.48@	4.30	1.21
9561.00	90.66	2.38	7112.62	64.00	2680.41	2673.00 N	199.73 E	2680.45@	4.27	2.59
9623.00	89.34	1.57	7112.62	62.00	2742.37	2734.96 N	201.86 E	2742.40@	4.22	2.50
9686.00	89.60	2.59	7113.20	63.00	2805.34	2797.92 N	204.15 E	2805.36@	4.17	1.67
9750.00	89.96	3.01	7113.45	64.00	2869.32	2861.84 N	207.28 E	2869.34@	4.14	0.86
9813.00	89.52	3.53	7113.73	63.00	2932.32	2924.74 N	210.87 E	2932.33@	4.12	1.08
9908.00	90.13	6.03	7114.02	95.00	3027.30	3019.40 N	218.79 E	3027.32@	4.14	2.71
9972.00	91.10	6.29	7113.34	64.00	3091.25	3083.03 N	225.65 E	3091.27@	4.19	1.57
10067.00	91.89	4.94	7110.86	95.00	3186.17	3177.53 N	234.95 E	3186.21@	4.23	1.65
10161.00	90.57	3.03	7108.84	94.00	3280.15	3271.28 N	241.48 E	3280.18@	4.22	2.47

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10224.00	89.52	3.28	7108.79	63.00	3343.14	3334.18 N 244.94 E	3343.17@ 4.20	1.71
10287.00	90.13	3.84	7108.98	63.00	3406.14	3397.06 N 248.85 E	3406.16@ 4.19	1.32
10350.00	90.40	3.67	7108.69	63.00	3469.13	3459.92 N 252.98 E	3469.16@ 4.18	0.51
10414.00	88.64	2.35	7109.23	64.00	3533.12	3523.83 N 256.34 E	3533.14@ 4.16	3.44
10477.00	88.29	2.96	7110.92	63.00	3596.08	3586.74 N 259.26 E	3596.10@ 4.13	1.12
10540.00	89.16	4.63	7112.32	63.00	3659.06	3649.58 N 263.43 E	3659.08@ 4.13	2.99
10604.00	90.40	5.51	7112.56	64.00	3723.05	3713.33 N 269.08 E	3723.07@ 4.14	2.38
10667.00	89.96	4.02	7112.37	63.00	3786.04	3776.11 N 274.32 E	3786.06@ 4.15	2.47
10761.00	90.40	3.23	7112.07	94.00	3880.04	3869.92 N 280.26 E	3880.06@ 4.14	0.96
10855.00	90.40	3.84	7111.41	94.00	3974.03	3963.74 N 286.05 E	3974.05@ 4.13	0.65
10949.00	91.28	3.58	7110.04	94.00	4068.02	4057.53 N 292.14 E	4068.03@ 4.12	0.98
11045.00	91.19	2.88	7107.97	96.00	4163.99	4153.36 N 297.54 E	4164.00@ 4.10	0.74
11097.00	91.80	2.88	7106.61	52.00	4215.96	4205.27 N 300.16 E	4215.97@ 4.08	1.17
STRAIGHT LINE PROJECTION TO BIT @ 11150' MD.								
11150.00	91.80	2.88	7104.94	53.00	4268.93	4258.18 N 302.82 E	4268.93@ 4.07	0.00

** The survey data at tie-in point was furnished by a recognized survey company and entered as submitted. Survey stations above the tie-in point represent recalculated data by PathFinder Energy Services, Inc. and may reflect minor changes due to rounding differences between survey programs. Only survey stations taken by qualified PathFinder personnel are subject to certification.