



COG Operating LLC

Eddy County
Comet 22 Federal
#3
OH

Survey: MWD #1

Pathfinder X & Y Survey Report

05 August, 2009

PATHFINDER



Pathfinder Energy Services
Pathfinder X & Y Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3
Project:	Eddy County	TVD Reference:	RKBtoGL-27' @ 3638.00ft (Original Well Elev)
Site:	Comet 22 Federal	MD Reference:	RKBtoGL-27' @ 3638.00ft (Original Well Elev)
Well:	#3	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Midland Database

Project:	Eddy County	System Datum:	Mean Sea Level
Map System:	US State Plane 1983		
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site:	Comet 22 Federal		
Site Position:		Northing:	694,830.553 ft
From:	Lat/Long	Easting:	591,053.291 ft
Position Uncertainty:	0.00 ft	Slot Radius:	"
		Latitude:	32° 54' 36.000 N
		Longitude:	104° 10' 16.800 W
		Grid Convergence:	0.09 °

Well:	#3			
Well Position	+N/-S	0.00 ft	Northing:	694,830.553 ft
	+E/-W	0.00 ft	Easting:	591,053.291 ft
Position Uncertainty	0.00 ft		Wellhead Elevation:	ft
			Latitude:	32° 54' 36.000 N
			Longitude:	104° 10' 16.800 W
			Ground Level:	3,611.00ft

Wellbore	OH
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (mT)
	IGRF200510	06/30/2009	8.14	60.78	49,185

Design	OH
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Audit Notes:	
Version:	1.0
Phase:	ACTUAL
Tie On Depth:	0.00

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	86.62



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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland Database

Survey Program Date 08/05/2009

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
100.00	3,932.00	Intermediate Gyro (OH)	NS-GYRO-MS	North sensing gyrocompassing m/s
3,979.00	10,880.00	MWD #1 (OH)	MWD	MWD - Standard

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
3,932.00	0.08	322.97	3,931.80	293.80	-5.42	-16.39	-16.68	0.00	694,825.13	591,036.90
3,979.00	0.18	17.51	3,978.80	340.80	-5.32	-16.39	-16.67	0.32	694,825.23	591,036.90
4,027.00	1.32	58.07	4,026.79	388.79	-4.96	-15.90	-16.16	2.48	694,825.59	591,037.39
4,059.00	2.20	65.72	4,058.78	420.78	-4.51	-15.02	-15.26	2.84	694,826.04	591,038.27
4,091.00	2.90	70.83	4,090.75	452.75	-3.99	-13.70	-13.91	2.30	694,826.56	591,039.59
4,122.00	3.78	74.96	4,121.69	483.69	-3.47	-11.97	-12.16	2.94	694,827.08	591,041.32
4,186.00	4.04	85.03	4,185.55	547.55	-2.73	-7.69	-7.84	1.15	694,827.82	591,045.60
4,248.00	3.96	98.77	4,247.40	609.40	-2.87	-3.40	-3.56	1.55	694,827.69	591,049.89
4,311.00	4.13	100.50	4,310.24	672.24	-3.61	0.98	0.77	0.33	694,826.94	591,054.28
4,374.00	3.08	87.47	4,373.11	735.11	-3.95	4.91	4.66	2.10	694,826.60	591,058.20
4,437.00	2.20	78.98	4,436.05	798.05	-3.64	7.78	7.56	1.52	694,826.91	591,061.07
4,499.00	1.93	92.16	4,498.01	860.01	-3.46	10.00	9.77	0.88	694,827.10	591,063.29
4,562.00	2.11	95.73	4,560.97	922.97	-3.61	12.21	11.98	0.35	694,826.94	591,065.50
4,625.00	2.20	92.74	4,623.92	985.92	-3.79	14.57	14.32	0.23	694,826.77	591,067.86
4,689.00	2.29	96.20	4,687.87	1,049.87	-3.98	17.07	16.80	0.25	694,826.57	591,070.36
4,753.00	1.41	97.53	4,751.84	1,113.84	-4.22	19.12	18.84	1.38	694,826.33	591,072.41
4,846.00	1.06	93.55	4,844.82	1,206.82	-4.43	21.11	20.82	0.39	694,826.13	591,074.41
4,938.00	0.62	107.62	4,936.81	1,298.81	-4.63	22.44	22.13	0.52	694,825.92	591,075.73
5,032.00	0.62	95.41	5,030.80	1,392.80	-4.83	23.43	23.10	0.14	694,825.72	591,076.72
5,127.00	0.79	104.31	5,125.80	1,487.80	-5.04	24.58	24.24	0.21	694,825.51	591,077.87
5,222.00	0.70	93.83	5,220.79	1,582.79	-5.24	25.79	25.43	0.17	694,825.31	591,079.08



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Design: OH

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TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:

Well #3
RKBtoGL-27' @ 3638.00ft (Original Well Elev)
RKBtoGL-27' @ 3638.00ft (Original Well Elev)
Grid:
Minimum Curvature
Midland Database

Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (ft/100ft)	Northing (ft)	Easting (ft)
5,317.00	0.97	90.72	5,315.78	1,677.78	-5.29	27.17	26.81	0.29	694,825.26	591,080.46
5,410.00	0.62	141.89	5,408.77	1,770.77	-5.70	28.27	27.88	0.81	694,824.86	591,081.56
5,505.00	0.62	144.65	5,503.76	1,865.76	-6.52	28.88	28.45	0.03	694,824.03	591,082.18
5,597.00	0.79	143.38	5,595.76	1,957.76	-7.44	29.55	29.06	0.19	694,823.12	591,082.84
5,692.00	0.70	128.28	5,690.75	2,052.75	-8.32	30.40	29.85	0.23	694,822.23	591,083.69
5,787.00	0.70	107.96	5,785.74	2,147.74	-8.86	31.40	30.83	0.26	694,821.69	591,084.70
5,866.00	0.79	121.76	5,864.74	2,226.74	-9.30	32.33	31.72	0.25	694,821.26	591,085.62
5,926.00	0.79	111.23	5,924.73	2,286.73	-9.66	33.06	32.44	0.24	694,820.89	591,086.35
5,957.00	0.79	102.76	5,955.73	2,317.73	-9.79	33.47	32.84	0.38	694,820.77	591,086.76
5,989.00	0.88	101.69	5,987.72	2,349.72	-9.89	33.93	33.29	0.29	694,820.67	591,087.22
6,022.00	1.06	100.85	6,020.72	2,382.72	-9.99	34.48	33.83	0.55	694,820.56	591,087.77
6,053.00	1.14	92.75	6,051.71	2,413.71	-10.06	35.06	34.41	0.56	694,820.49	591,088.36
6,085.00	1.23	93.35	6,083.71	2,445.71	-10.10	35.73	35.07	0.28	694,820.45	591,089.02
6,117.00	3.34	77.09	6,115.68	2,477.68	-9.91	36.98	36.33	6.83	694,820.64	591,090.27
6,149.00	7.47	74.96	6,147.53	2,509.53	-9.16	39.90	39.29	12.92	694,821.39	591,093.19
6,181.00	11.34	77.07	6,179.09	2,541.09	-7.92	44.97	44.43	12.14	694,822.64	591,098.26
6,214.00	15.39	78.16	6,211.19	2,573.19	-6.29	52.42	51.96	12.30	694,824.26	591,105.71
6,245.00	19.70	78.61	6,240.74	2,602.74	-4.42	61.58	61.21	13.91	694,826.14	591,114.87
6,277.00	23.92	78.56	6,270.45	2,632.45	-2.06	73.23	72.98	13.19	694,828.49	591,126.52
6,309.00	28.23	78.84	6,299.18	2,661.18	0.69	87.02	86.91	13.47	694,831.24	591,140.31
6,341.00	31.92	80.18	6,326.87	2,688.87	3.60	102.78	102.82	11.72	694,834.15	591,156.07
6,373.00	35.09	81.63	6,353.55	2,715.55	6.38	120.22	120.39	10.22	694,836.93	591,173.52
6,405.00	38.51	82.64	6,379.17	2,741.17	9.00	139.21	139.50	10.85	694,839.55	591,192.50
6,436.00	41.77	83.37	6,402.87	2,764.87	11.43	159.04	159.44	10.62	694,841.98	591,212.33
6,468.00	44.67	84.39	6,426.18	2,788.18	13.76	180.83	181.33	9.32	694,844.31	591,234.12
6,500.00	47.66	85.06	6,448.34	2,810.34	15.88	203.81	204.39	9.46	694,846.43	591,257.10
6,532.00	50.56	85.34	6,469.29	2,831.29	17.90	227.92	228.57	9.09	694,848.45	591,281.21

KOP →



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Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #3
TVD Reference: RKBtoGL-27 @ 3638.00ft (Original Well Elev)
MD Reference: RKBtoGL-27 @ 3638.00ft (Original Well Elev)
North Reference: Gnd
Survey Calculation Method: Minimum Curvature
Database: Midland Database

Survey

MD (ft)	Inc. (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
6,564.00	54.43	85.87	6,488.77	2,850.77	19.84	253.22	253.95	12.16	694,850.39	591,306.51
6,596.00	57.95	86.44	6,506.57	2,868.57	21.62	279.75	280.53	11.10	694,852.17	591,333.04
6,628.00	61.82	86.73	6,522.62	2,884.62	23.27	307.37	308.21	12.12	694,853.82	591,360.66
6,660.00	64.54	86.88	6,537.06	2,899.06	24.86	335.88	336.76	8.51	694,855.41	591,389.17
6,692.00	67.80	86.50	6,549.99	2,911.99	26.55	365.10	368.03	10.25	694,857.10	591,418.39
6,724.00	70.70	86.25	6,561.32	2,923.32	28.44	394.96	395.95	9.09	694,858.99	591,448.25
6,730.00	71.49	86.08	6,563.27	2,925.27	28.82	400.63	401.63	13.44	694,859.37	591,453.92
6,762.00	74.92	85.62	6,572.51	2,934.51	31.04	431.18	432.26	10.81	694,861.59	591,484.47
6,794.00	79.23	85.18	6,579.67	2,941.67	33.54	462.26	463.43	13.54	694,864.09	591,515.55
6,826.00	83.98	86.76	6,584.34	2,946.34	35.76	493.83	495.08	15.63	694,866.32	591,547.12
6,858.00	88.72	88.53	6,586.38	2,948.38	37.07	525.73	527.00	15.81	694,867.63	591,579.02
6,890.00	91.28	89.89	6,586.38	2,948.38	37.51	557.72	558.96	9.06	694,868.07	591,611.01
6,921.00	91.54	89.81	6,585.61	2,947.61	37.60	588.71	589.90	0.88	694,868.15	591,642.00
6,954.00	91.28	89.51	6,584.80	2,946.80	37.79	621.70	622.85	1.20	694,868.34	591,674.99
7,017.00	90.84	88.92	6,583.64	2,945.64	38.65	684.68	685.77	1.17	694,869.21	591,737.97
7,081.00	90.57	88.72	6,582.85	2,944.85	39.97	748.66	749.72	0.52	694,870.52	591,801.95
7,139.00	91.01	89.12	6,582.05	2,944.05	41.06	806.65	807.67	1.03	694,871.62	591,859.94
7,203.00	91.36	89.58	6,580.73	2,942.73	41.79	870.63	871.58	0.90	694,872.34	591,923.92
7,267.00	90.75	88.77	6,579.55	2,941.55	42.71	934.61	935.50	1.58	694,873.26	591,987.90
7,330.00	90.04	87.03	6,579.11	2,941.11	45.02	997.56	998.48	2.98	694,875.57	592,050.85
7,394.00	89.08	86.75	6,579.80	2,941.60	48.49	1,061.47	1,062.48	1.56	694,879.05	592,114.76
7,458.00	88.29	85.81	6,581.07	2,943.07	52.64	1,125.31	1,126.46	1.92	694,883.20	592,178.61
7,522.00	89.34	85.98	6,582.40	2,944.40	57.22	1,189.14	1,190.44	1.66	694,887.78	592,242.43
7,585.00	90.84	86.47	6,582.30	2,944.30	61.37	1,252.00	1,253.44	2.50	694,891.92	592,305.29
7,647.00	89.60	86.01	6,582.06	2,944.06	65.44	1,313.86	1,315.43	2.13	694,895.99	592,367.15
7,711.00	88.46	85.81	6,583.14	2,945.14	70.00	1,377.69	1,379.42	1.81	694,900.55	592,430.98
7,775.00	89.34	86.02	6,584.37	2,946.37	74.56	1,441.51	1,443.40	1.41	694,905.11	592,494.80



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Design: OH

Local Co-ordinate Reference:
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RKBtoGL-27 @ 3638.00ft (Original Well Elev)
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Grid
Minimum Curvature
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Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
7,871.00	88.90	85.85	6,585.85	2,947.85	81.36	1,537.26	1,539.38	0.49	694,911.92	592,590.55
7,967.00	86.97	85.35	6,589.31	2,951.31	88.72	1,632.91	1,635.30	2.08	694,919.28	592,686.20
8,062.00	87.05	85.59	6,594.26	2,956.26	96.22	1,727.48	1,730.15	0.27	694,926.77	592,780.78
8,158.00	88.37	85.80	6,598.10	2,960.10	103.42	1,823.13	1,826.06	1.39	694,933.97	592,876.43
8,254.00	88.55	85.38	6,600.68	2,962.68	110.80	1,918.82	1,922.01	0.48	694,941.35	592,972.11
8,350.00	89.34	85.49	6,602.44	2,964.44	118.44	2,014.49	2,017.97	0.83	694,948.99	593,067.79
8,445.00	89.34	85.11	6,603.54	2,965.54	126.22	2,109.17	2,112.94	0.40	694,956.77	593,162.46
8,541.00	90.66	86.04	6,603.54	2,965.54	133.63	2,204.88	2,208.92	1.68	694,964.18	593,258.17
8,637.00	91.19	85.75	6,601.99	2,963.99	140.50	2,300.62	2,304.90	0.63	694,971.05	593,353.91
8,733.00	91.36	85.88	6,599.85	2,961.85	147.50	2,396.34	2,400.87	0.22	694,978.05	593,449.63
8,829.00	91.71	85.53	6,597.28	2,959.28	154.69	2,492.04	2,496.82	0.52	694,985.24	593,545.33
8,925.00	91.10	85.94	6,594.93	2,956.93	161.82	2,587.74	2,592.78	0.77	694,992.38	593,641.03
9,021.00	89.25	85.16	6,594.63	2,956.63	169.27	2,683.45	2,688.76	2.09	694,999.83	593,736.74
9,053.00	89.16	85.03	6,595.08	2,957.08	172.01	2,715.33	2,720.74	0.49	695,002.56	593,788.62
9,148.00	90.66	85.71	6,595.23	2,957.23	179.68	2,810.01	2,815.72	1.73	695,010.23	593,863.30
9,244.00	91.45	85.97	6,593.46	2,955.46	186.64	2,905.74	2,911.69	0.87	695,017.19	593,959.03
9,339.00	91.36	86.63	6,591.13	2,953.13	192.77	3,000.52	3,006.66	0.70	695,023.32	594,053.81
9,435.00	89.60	87.69	6,590.33	2,952.33	197.52	3,096.39	3,102.65	2.14	695,028.08	594,149.68
9,531.00	87.41	88.91	6,592.83	2,954.83	200.37	3,192.31	3,198.57	2.61	695,030.92	594,245.60
9,627.00	88.20	88.69	6,596.51	2,958.51	202.38	3,288.21	3,294.43	0.85	695,032.93	594,341.50
9,691.00	88.37	88.16	6,598.42	2,960.42	204.14	3,352.16	3,358.37	0.87	695,034.69	594,405.45
9,787.00	88.46	87.93	6,601.08	2,963.08	207.41	3,448.07	3,454.30	0.26	695,037.97	594,501.36
9,883.00	87.41	87.15	6,604.54	2,966.54	211.53	3,543.92	3,550.22	1.36	695,042.08	594,597.21
9,978.00	89.08	87.50	6,607.45	2,969.45	215.96	3,638.76	3,645.17	1.80	695,046.51	594,692.05
10,074.00	88.81	88.53	6,609.21	2,971.21	219.29	3,734.69	3,741.12	1.11	695,049.84	594,787.98
10,105.00	88.20	88.40	6,610.02	2,972.02	220.12	3,765.67	3,772.09	2.01	695,050.67	594,818.96
10,201.00	88.46	88.81	6,612.82	2,974.82	222.45	3,861.60	3,868.00	0.51	695,053.01	594,914.89



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10,296.00	88.37	87.69	6,615.45	2,977.45	225.35	3,956.52	3,962.92	1.18	695,055.91	595,009.81
10,392.00	88.29	88.05	6,618.25	2,980.25	228.92	4,052.41	4,058.86	0.38	695,059.47	595,105.70
10,488.00	88.81	88.22	6,620.68	2,982.68	232.04	4,148.33	4,154.79	0.57	695,062.60	595,201.62
10,584.00	90.40	88.91	6,621.34	2,983.34	234.45	4,244.29	4,250.73	1.81	695,065.00	595,297.58
10,679.00	91.71	88.47	6,619.59	2,981.59	236.62	4,339.25	4,345.65	1.45	695,067.17	595,392.54
10,775.00	92.24	88.41	6,616.28	2,978.28	239.23	4,435.15	4,441.54	0.56	695,069.78	595,488.44
10,807.00	92.77	88.09	6,614.88	2,976.88	240.21	4,467.11	4,473.50	1.93	695,070.76	595,520.40
10,880.00	92.77	88.09	6,611.35	2,973.35	242.64	4,539.98	4,546.39	0.00	695,073.19	595,593.27

Proj To Bit -10880.00'MD,92.77°INC,88.09°AZI, 6611.35'TVD, 4546.39'VS, 242.64°N, 4539.98'E