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30-015-37948

COG Operating LLC

Eddy County(NAD83)

USP FEE

#3H

OH

Survey: MWD #1

Pathfinder X & Y Survey Report

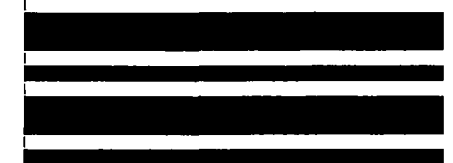
15 November, 2010



A Schlumberger Company



New F
Lands





Pathfinder
Pathfinder X & Y Survey Report



Company: COG Operating LLC	Local Co-ordinate Reference: Well #3H
Project: Eddy County(NAD83)	TVD Reference: WELL @ 2982.00ft (Original Well Elev)
Site: USP FEE	MD Reference: WELL @ 2982 00ft (Original Well Elev)
Well: #3H	North Reference: Grid
Wellbore: OH	Survey Calculation Method: Minimum Curvature
Design: OH	Database: Midland Database

Project Eddy County(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 USP FEE

Site Position:	Northing: 477,625.280 ft	Latitude: 32° 18' 45.426 N
From: Map	Easting: 645,048.480 ft	Longitude: 103° 59' 51.452 W
Position Uncertainty: 0 00 ft	Slot Radius: "	Grid Convergence: 0 18 °

Well #3H		
Well Position +N/-S 0.00 ft	Northing: 477,625.280 ft	Latitude: 32° 18' 45.426 N
+E/-W 0.00 ft	Easting: 645,048.480 ft	Longitude: 103° 59' 51.452 W
Position Uncertainty 0 00 ft	Wellhead Elevation: ft	Ground Level: 2,957 00 ft

Wellbore OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	06/16/10	7.90	60.24	48,780

Design OH

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	86.50

Survey Program Date 11/15/10				
From (ft) 7,690 00	To (ft) 14,561 00	Survey (Wellbore) MWD #1 (OH)	Tool Name MWD	Description MWD - Standard



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Site: USP FEE	MD Reference: WELL @ 2982 00ft (Original Well Elev)
Well: #3H	North Reference: Grid
Wellbore: OH	Survey Calculation Method: 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)
7,620.00	42.23	80.47	7,521.46	4,539.46	283.36	420.30	436.81	0.00	477,908.64	645,468.78
7,690.00	49.33	78.58	7,570.25	4,588.25	292.52	469.59	486.57	10.32	477,917.80	645,518.07
7,722.00	52.58	78.94	7,590.41	4,608.41	297.36	493.96	511.19	10.19	477,922.64	645,542.44
7,768.00	57.51	81.59	7,616.76	4,634.76	303.71	531.11	548.66	11.71	477,928.99	645,579.59
7,799.00	62.17	83.40	7,632.33	4,650.33	307.20	557.67	575.39	15.86	477,932.48	645,606.15
7,831.00	68.59	85.53	7,645.65	4,663.65	309.99	586.61	604.44	20.95	477,935.27	645,635.09
7,863.00	75.62	87.77	7,655.48	4,673.48	311.76	616.99	634.87	22.95	477,937.04	645,665.47
7,895.00	80.46	88.62	7,662.11	4,680.11	312.74	648.27	666.15	15.35	477,938.02	645,696.75
7,927.00	81.51	88.85	7,667.12	4,685.12	313.44	679.87	697.73	3.36	477,938.72	645,728.35
7,958.00	85.12	89.31	7,670.73	4,688.73	313.93	710.65	728.49	11.74	477,939.21	645,759.13
7,990.00	87.41	89.96	7,672.82	4,690.82	314.14	742.58	760.37	7.44	477,939.42	645,791.06
8,022.00	88.37	89.60	7,673.99	4,691.99	314.26	774.55	792.29	3.20	477,939.54	645,823.03
8,054.00	87.76	89.71	7,675.07	4,693.07	314.45	806.53	824.23	1.94	477,939.73	645,855.01
8,085.00	89.34	89.04	7,675.86	4,693.86	314.79	837.52	855.18	5.54	477,940.07	645,886.00
8,138.00	90.04	87.00	7,676.15	4,694.15	316.62	890.49	908.15	4.07	477,941.90	645,938.97
8,168.00	89.25	87.16	7,676.33	4,694.33	318.15	920.45	938.15	2.69	477,943.43	645,968.93
8,201.00	89.08	86.58	7,676.81	4,694.81	319.95	953.39	971.15	1.83	477,945.23	646,001.87
8,234.00	88.99	86.66	7,677.37	4,695.37	321.90	986.33	1,004.14	0.36	477,947.18	646,034.81
8,264.00	89.60	86.65	7,677.74	4,695.74	323.65	1,016.28	1,034.14	2.03	477,948.93	646,064.76
8,297.00	89.16	87.46	7,678.09	4,696.09	325.34	1,049.23	1,067.14	2.79	477,950.62	646,097.71
8,329.00	89.08	87.04	7,678.59	4,696.59	326.88	1,081.19	1,099.13	1.34	477,952.16	646,129.67
8,361.00	89.08	87.38	7,679.10	4,697.10	328.43	1,113.15	1,131.12	1.06	477,953.71	646,161.63
8,392.00	89.25	87.45	7,679.55	4,697.55	329.83	1,144.11	1,162.12	0.59	477,955.11	646,192.59
8,424.00	89.43	88.06	7,679.92	4,697.92	331.09	1,176.09	1,194.11	1.99	477,956.37	646,224.57
8,456.00	89.16	87.78	7,680.31	4,698.31	332.25	1,208.06	1,226.09	1.22	477,957.53	646,256.54
8,487.00	89.34	87.93	7,680.72	4,698.72	333.41	1,239.04	1,257.08	0.76	477,958.69	646,287.52
8,519.00	89.60	88.37	7,681.02	4,699.02	334.44	1,271.02	1,289.07	1.60	477,959.72	646,319.50



Pathfinder
Pathfinder X & Y Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3H
Project:	Eddy County(NAD83)	TVD Reference:	WELL @ 2982.00ft (Original Well Elev)
Site:	USP FEE	MD Reference:	WELL @ 2982.00ft (Original Well Elev)
Well:	#3H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	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)
8,551.00	89.08	88.78	7,681.38	4,699.38	335.24	1,303.01	1,321.04	2.07	477,960.52	646,351.49
8,583.00	89.08	88.66	7,681.90	4,699.90	335.95	1,335.00	1,353.02	0.37	477,961.23	646,383.48
8,615.00	89.43	88.85	7,682.31	4,700.31	336.65	1,366.99	1,384.99	1.24	477,961.93	646,415.47
8,647.00	88.99	89.08	7,682.76	4,700.76	337.22	1,398.98	1,416.96	1.55	477,962.50	646,447.46
8,678.00	88.90	89.25	7,683.33	4,701.33	337.68	1,429.97	1,447.92	0.62	477,962.96	646,478.45
8,711.00	89.34	89.70	7,683.83	4,701.83	337.98	1,462.96	1,480.87	1.91	477,963.26	646,511.44
8,742.00	88.55	90.06	7,684.40	4,702.40	338.04	1,493.96	1,511.81	2.80	477,963.32	646,542.44
8,774.00	88.29	90.20	7,685.29	4,703.29	337.97	1,525.95	1,543.73	0.92	477,963.25	646,574.43
8,806.00	88.81	90.03	7,686.10	4,704.10	337.91	1,557.94	1,575.66	1.71	477,963.19	646,606.42
8,837.00	88.55	89.68	7,686.81	4,704.81	337.98	1,588.93	1,606.60	1.41	477,963.26	646,637.41
8,869.00	88.37	89.95	7,687.67	4,705.67	338.09	1,620.92	1,638.53	1.01	477,963.37	646,669.40
8,900.00	88.64	90.20	7,688.48	4,706.48	338.05	1,651.90	1,669.46	1.19	477,963.33	646,700.38
8,932.00	88.55	90.15	7,689.26	4,707.26	337.95	1,683.90	1,701.39	0.32	477,963.23	646,732.38
8,964.00	88.02	90.72	7,690.22	4,708.22	337.71	1,715.88	1,733.30	2.43	477,962.99	646,764.36
8,996.00	88.46	90.60	7,691.20	4,709.20	337.34	1,747.86	1,765.20	1.43	477,962.62	646,796.34
9,028.00	89.08	90.83	7,691.89	4,709.89	336.94	1,779.85	1,797.10	2.07	477,962.22	646,828.33
9,059.00	88.90	90.88	7,692.44	4,710.44	336.48	1,810.84	1,828.01	0.60	477,961.76	646,859.32
9,091.00	88.46	90.62	7,693.17	4,711.17	336.06	1,842.83	1,859.91	1.60	477,961.34	646,891.31
9,123.00	88.55	90.41	7,694.01	4,712.01	335.77	1,874.82	1,891.82	0.71	477,961.05	646,923.30
9,155.00	89.34	90.21	7,694.60	4,712.60	335.60	1,906.81	1,923.75	2.55	477,960.88	646,955.29
9,186.00	88.99	89.82	7,695.05	4,713.05	335.59	1,937.81	1,954.68	1.69	477,960.87	646,986.29
9,218.00	88.72	89.79	7,695.69	4,713.69	335.70	1,969.80	1,986.62	0.85	477,960.98	647,018.28
9,250.00	89.08	89.55	7,696.30	4,714.30	335.88	2,001.80	2,018.57	1.35	477,961.16	647,050.28
9,282.00	89.08	89.52	7,696.82	4,714.82	336.14	2,033.79	2,050.52	0.09	477,961.42	647,082.27
9,314.00	88.72	89.28	7,697.43	4,715.43	336.48	2,065.78	2,082.47	1.35	477,961.76	647,114.26
9,345.00	89.25	89.65	7,697.98	4,715.98	336.77	2,096.78	2,113.43	2.08	477,962.05	647,145.26
9,377.00	88.99	89.71	7,698.47	4,716.47	336.94	2,128.77	2,145.37	0.83	477,962.22	647,177.25



Pathfinder
Pathfinder X & Y Survey Report



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Site: USP FEE	MD Reference: WELL @ 2982.00ft (Original Well Elev)
Well: #3H	North Reference: Gnd
Wellbore: OH	Survey Calculation Method: Minimum Curvature
Design: OH	Database: Midland Database

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (°/100ft)	Northing (ft)	Easting (ft)
9,408.00	88.72	88.93	7,699.09	4,717.09	337.31	2,159.77	2,176.33	2.66	477,962.59	647,208.25
9,440.00	89.08	88.80	7,699.71	4,717.71	337.95	2,191.75	2,208.30	1.20	477,963.23	647,240.23
9,471.00	89.16	88.73	7,700.18	4,718.18	338.61	2,222.74	2,239.27	0.34	477,963.89	647,271.22
9,503.00	89.08	88.91	7,700.67	4,718.67	339.27	2,254.73	2,271.24	0.62	477,964.55	647,303.21
9,535.00	88.90	88.96	7,701.24	4,719.24	339.87	2,286.72	2,303.20	0.58	477,965.15	647,335.20
9,567.00	89.60	89.29	7,701.66	4,719.66	340.36	2,318.71	2,335.17	2.42	477,965.64	647,367.19
9,598.00	89.69	89.38	7,701.85	4,719.85	340.72	2,349.71	2,366.13	0.41	477,966.00	647,398.19
9,629.00	88.90	89.55	7,702.23	4,720.23	341.01	2,380.71	2,397.09	2.61	477,966.29	647,429.19
9,661.00	88.72	90.03	7,702.90	4,720.90	341.12	2,412.70	2,429.03	1.60	477,966.40	647,461.18
9,692.00	89.08	89.95	7,703.49	4,721.49	341.13	2,443.69	2,459.96	1.19	477,966.41	647,492.17
9,724.00	88.99	89.80	7,704.03	4,722.03	341.20	2,475.69	2,491.90	0.55	477,966.48	647,524.17
9,756.00	88.99	89.99	7,704.59	4,722.59	341.26	2,507.69	2,523.84	0.59	477,966.54	647,556.17
9,788.00	89.60	89.80	7,704.99	4,722.99	341.32	2,539.68	2,555.78	2.00	477,966.60	647,588.16
9,819.00	89.87	89.62	7,705.13	4,723.13	341.47	2,570.68	2,586.73	1.05	477,966.75	647,619.16
9,850.00	89.25	90.01	7,705.37	4,723.37	341.57	2,601.68	2,617.68	2.36	477,966.85	647,650.16
9,882.00	89.25	90.23	7,705.79	4,723.79	341.51	2,633.68	2,649.61	0.69	477,966.79	647,682.16
9,913.00	89.60	90.68	7,706.10	4,724.10	341.26	2,664.68	2,680.54	1.84	477,966.54	647,713.16
9,944.00	89.52	90.47	7,706.34	4,724.34	340.95	2,695.67	2,711.46	0.72	477,966.23	647,744.15
9,976.00	89.43	90.65	7,706.63	4,724.63	340.64	2,727.67	2,743.38	0.63	477,965.92	647,776.15
10,008.00	89.34	90.74	7,706.97	4,724.97	340.25	2,759.67	2,775.29	0.40	477,965.53	647,808.15
10,040.00	89.25	90.73	7,707.37	4,725.37	339.84	2,791.66	2,807.20	0.28	477,965.12	647,840.14
10,071.00	89.60	90.82	7,707.68	4,725.68	339.42	2,822.66	2,838.11	1.17	477,964.70	647,871.14
10,103.00	89.08	90.80	7,708.05	4,726.05	338.97	2,854.65	2,870.02	1.63	477,964.25	647,903.13
10,134.00	89.25	90.85	7,708.50	4,726.50	338.52	2,885.64	2,900.93	0.57	477,963.80	647,934.12
10,166.00	89.60	90.98	7,708.82	4,726.82	338.01	2,917.64	2,932.83	1.17	477,963.29	647,966.12
10,198.00	89.60	91.04	7,709.04	4,727.04	337.44	2,949.63	2,964.73	0.19	477,962.72	647,998.11
10,229.00	88.46	90.44	7,709.57	4,727.57	337.04	2,980.62	2,995.64	4.16	477,962.32	648,029.10



Pathfinder
Pathfinder X & Y Survey Report



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 Wellbore: OH
 Design: OH

Local Co-ordinate Reference: Well #3H
 TVD Reference: WELL @ 2982.00ft (Original Well Elev)
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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)
10,261.00	87.23	89.24	7,710.77	4,728.77	337.13	3,012.60	3,027.56	5.37	477,962.41	648,061.08
10,293.00	87.93	88.71	7,712.12	4,730.12	337.70	3,044.57	3,059.50	2.74	477,962.98	648,093.05
10,324.00	88.72	88.83	7,713.03	4,731.03	338.37	3,075.55	3,090.47	2.58	477,963.65	648,124.03
10,356.00	89.25	88.84	7,713.60	4,731.60	339.02	3,107.53	3,122.44	1.66	477,964.30	648,156.01
10,387.00	89.87	88.77	7,713.83	4,731.83	339.67	3,138.53	3,153.41	2.01	477,964.95	648,187.01
10,419.00	89.43	88.58	7,714.03	4,732.03	340.41	3,170.52	3,185.39	1.50	477,965.69	648,219.00
10,450.00	89.69	88.01	7,714.27	4,732.27	341.33	3,201.50	3,216.37	2.02	477,966.61	648,249.98
10,482.00	90.66	88.13	7,714.17	4,732.17	342.41	3,233.48	3,248.36	3.05	477,967.69	648,281.96
10,514.00	90.48	88.50	7,713.85	4,731.85	343.35	3,265.47	3,280.34	1.29	477,968.63	648,313.95
10,579.00	90.22	87.01	7,713.45	4,731.45	345.89	3,330.42	3,345.32	2.33	477,971.17	648,378.90
10,610.00	89.68	86.97	7,713.48	4,731.48	347.52	3,361.37	3,376.32	1.75	477,972.80	648,409.85
10,642.00	90.04	86.86	7,713.56	4,731.56	349.24	3,393.33	3,408.32	1.18	477,974.52	648,441.81
10,705.00	89.83	86.26	7,713.63	4,731.63	353.02	3,456.21	3,471.32	1.01	477,978.30	648,504.69
10,737.00	90.04	85.97	7,713.67	4,731.67	355.19	3,488.14	3,503.32	1.12	477,980.47	648,536.62
10,769.00	90.13	86.02	7,713.62	4,731.62	357.43	3,520.06	3,535.32	0.32	477,982.71	648,568.54
10,801.00	89.69	86.00	7,713.67	4,731.67	359.65	3,551.98	3,567.31	1.38	477,984.93	648,600.46
10,833.00	90.13	85.94	7,713.72	4,731.72	361.90	3,583.90	3,599.31	1.39	477,987.18	648,632.38
10,865.00	90.13	85.32	7,713.65	4,731.65	364.34	3,615.81	3,631.31	1.94	477,989.62	648,664.29
10,896.00	90.00	85.92	7,713.61	4,731.61	366.71	3,646.72	3,662.30	1.98	477,991.99	648,695.20
10,927.00	89.69	86.00	7,713.70	4,731.70	368.89	3,677.64	3,693.30	1.03	477,994.17	648,726.12
10,959.00	90.22	85.46	7,713.72	4,731.72	371.28	3,709.55	3,725.30	2.36	477,996.56	648,758.03
10,991.00	89.96	85.72	7,713.67	4,731.67	373.74	3,741.46	3,757.30	1.15	477,999.02	648,789.94
11,023.00	90.04	85.29	7,713.67	4,731.67	376.24	3,773.36	3,789.29	1.37	478,001.52	648,821.84
11,054.00	90.31	85.27	7,713.58	4,731.58	378.79	3,804.25	3,820.28	0.87	478,004.07	648,852.73
11,086.00	89.96	85.60	7,713.50	4,731.50	381.34	3,836.15	3,852.28	1.50	478,006.62	648,884.63
11,117.00	89.96	85.06	7,713.52	4,731.52	383.87	3,867.05	3,883.27	1.74	478,009.15	648,915.53
11,149.00	90.57	85.19	7,713.37	4,731.37	386.58	3,898.93	3,915.26	1.95	478,011.86	648,947.41



Pathfinder
Pathfinder X & Y Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3H
Project:	Eddy County(NAD83)	TVD Reference:	WELL @ 2982.00ft (Original Well Elev)
Site:	USP FEE	MD Reference:	WELL @ 2982.00ft (Original Well Elev)
Well:	#3H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	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)	
11,181.00	89.78	85.34	7,713.28	4,731.28	389.23	3,930.82	3,947.25	2.51	478,014.51	648,979.30	
11,212.00	89.69	84.94	7,713.42	4,731.42	391.85	3,961.71	3,978.24	1.32	478,017.13	649,010.19	
11,244.00	90.40	85.25	7,713.39	4,731.39	394.59	3,993.59	4,010.23	2.42	478,019.87	649,042.07	
11,276.00	90.22	85.88	7,713.22	4,731.22	397.06	4,025.50	4,042.23	2.05	478,022.34	649,073.98	
11,308.00	89.87	86.02	7,713.20	4,731.20	399.32	4,057.42	4,074.23	1.18	478,024.60	649,105.90	
11,340.00	89.52	85.69	7,713.37	4,731.37	401.64	4,089.33	4,106.23	1.50	478,026.92	649,137.81	
11,371.00	89.69	85.78	7,713.58	4,731.58	403.94	4,120.25	4,137.22	0.62	478,029.22	649,168.73	
11,403.00	89.96	86.55	7,713.68	4,731.68	406.08	4,152.18	4,169.22	2.55	478,031.36	649,200.66	
11,435.00	89.52	86.34	7,713.82	4,731.82	408.07	4,184.11	4,201.22	1.52	478,033.35	649,232.59	
11,467.00	88.99	86.57	7,714.24	4,732.24	410.04	4,216.05	4,233.22	1.81	478,035.32	649,264.53	
11,499.00	89.34	87.03	7,714.71	4,732.71	411.83	4,248.00	4,265.21	1.81	478,037.11	649,296.48	
11,531.00	88.99	87.34	7,715.17	4,733.17	413.40	4,279.95	4,297.21	1.46	478,038.68	649,328.43	
11,562.00	89.08	87.60	7,715.69	4,733.69	414.77	4,310.92	4,328.20	0.89	478,040.05	649,359.40	
11,594.00	89.69	88.30	7,716.04	4,734.04	415.91	4,342.90	4,360.19	2.90	478,041.19	649,391.38	
11,626.00	90.31	88.72	7,716.04	4,734.04	416.75	4,374.89	4,392.17	2.34	478,042.03	649,423.37	
11,657.00	90.40	88.74	7,715.85	4,733.85	417.43	4,405.88	4,423.14	0.30	478,042.71	649,454.36	
11,689.00	91.10	88.61	7,715.43	4,733.43	418.17	4,437.87	4,455.12	2.22	478,043.45	649,486.35	
11,721.00	91.89	89.36	7,714.59	4,732.59	418.74	4,469.85	4,487.08	3.40	478,044.02	649,518.33	
11,752.00	91.98	90.47	7,713.55	4,731.55	418.79	4,500.83	4,518.00	3.59	478,044.07	649,549.31	
11,784.00	90.84	90.88	7,712.76	4,730.76	418.41	4,532.82	4,549.91	3.79	478,043.69	649,581.30	
11,816.00	90.57	90.89	7,712.36	4,730.36	417.92	4,564.81	4,581.81	0.84	478,043.20	649,613.29	
11,847.00	90.84	90.96	7,711.98	4,729.98	417.41	4,595.81	4,612.72	0.90	478,042.69	649,644.29	
11,879.00	90.75	91.32	7,711.54	4,729.54	416.78	4,627.80	4,644.61	1.16	478,042.06	649,676.28	
11,911.00	90.31	91.39	7,711.24	4,729.24	416.02	4,659.79	4,676.49	1.39	478,041.30	649,708.27	
11,943.00	90.31	91.38	7,711.07	4,729.07	415.25	4,691.78	4,708.38	0.03	478,040.53	649,740.26	
11,974.00	90.84	91.32	7,710.76	4,728.76	414.52	4,722.77	4,739.26	1.72	478,039.80	649,771.25	
12,006.00	91.01	91.03	7,710.24	4,728.24	413.86	4,754.76	4,771.15	1.05	478,039.14	649,803.24	



Pathfinder
Pathfinder X & Y Survey Report



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 Project: Eddy County(NAD83)
 Site: USP FEE
 Well: #3H
 Wellbore: OH
 Design: OH

Local Co-ordinate Reference: Well #3H
 TVD Reference: WELL @ 2982 00ft (Original Well Elev)
 MD Reference: WELL @ 2982 00ft (Original Well Elev)
 North Reference: Grid
 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)
12,037.00	91.01	90.81	7,709.70	4,727.70	413.36	4,785.75	4,802.06	0.71	478,038.64	649,834.23
12,069.00	91.10	91.06	7,709.11	4,727.11	412.84	4,817.74	4,833.95	0.83	478,038.12	649,866.22
12,101.00	90.75	90.61	7,708.59	4,726.59	412.38	4,849.73	4,865.86	1.78	478,037.66	649,898.21
12,132.00	90.66	91.06	7,708.21	4,726.21	411.92	4,880.72	4,896.77	1.48	478,037.20	649,929.20
12,164.00	90.22	90.96	7,707.96	4,725.96	411.36	4,912.72	4,928.67	1.41	478,036.64	649,961.20
12,195.00	90.40	90.84	7,707.79	4,725.79	410.87	4,943.71	4,959.57	0.70	478,036.15	649,992.19
12,227.00	91.19	91.21	7,707.35	4,725.35	410.30	4,975.70	4,991.47	2.73	478,035.58	650,024.18
12,258.00	89.78	91.35	7,707.09	4,725.09	409.61	5,006.69	5,022.36	4.57	478,034.89	650,055.17
12,282.00	89.52	93.51	7,707.23	4,725.23	408.59	5,030.67	5,046.23	9.06	478,033.87	650,079.15
12,314.00	89.69	93.66	7,707.46	4,725.46	406.59	5,062.61	5,077.99	0.71	478,031.87	650,111.09
12,346.00	89.60	93.53	7,707.65	4,725.65	404.58	5,094.54	5,109.74	0.49	478,029.86	650,143.02
12,378.00	90.48	93.32	7,707.63	4,725.63	402.67	5,126.49	5,141.51	2.83	478,027.95	650,174.97
12,410.00	90.04	93.27	7,707.49	4,725.49	400.83	5,158.43	5,173.28	1.38	478,026.11	650,206.91
12,441.00	90.48	92.98	7,707.35	4,725.35	399.14	5,189.39	5,204.07	1.70	478,024.42	650,237.87
12,473.00	89.96	93.39	7,707.22	4,725.22	397.36	5,221.34	5,235.86	2.07	478,022.64	650,269.82
12,505.00	89.78	93.23	7,707.30	4,725.30	395.52	5,253.28	5,267.63	0.75	478,020.80	650,301.76
12,536.00	90.66	93.49	7,707.18	4,725.18	393.70	5,284.23	5,298.41	2.96	478,018.98	650,332.71
12,568.00	90.40	94.00	7,706.88	4,724.88	391.61	5,316.16	5,330.15	1.79	478,016.89	650,364.64
12,576.00	89.87	93.82	7,706.86	4,724.86	391.06	5,324.14	5,338.08	7.00	478,016.34	650,372.62
12,608.00	89.78	93.55	7,706.96	4,724.96	389.01	5,356.07	5,369.83	0.89	478,014.29	650,404.55
12,640.00	87.14	92.11	7,707.82	4,725.82	387.43	5,388.02	5,401.62	9.40	478,012.71	650,436.50
12,671.00	87.49	91.65	7,709.27	4,727.27	386.41	5,418.97	5,432.45	1.86	478,011.69	650,467.45
12,703.00	86.53	91.08	7,710.94	4,728.94	385.65	5,450.92	5,464.29	3.49	478,010.93	650,499.40
12,735.00	85.12	89.54	7,713.27	4,731.27	385.48	5,482.83	5,496.14	6.52	478,010.76	650,531.31
12,766.00	86.97	89.18	7,715.41	4,733.41	385.82	5,513.75	5,527.02	6.08	478,011.10	650,562.23
12,798.00	88.20	88.53	7,716.76	4,734.76	386.46	5,545.72	5,558.97	4.35	478,011.74	650,594.20
12,835.00	90.84	88.20	7,717.07	4,735.07	387.52	5,582.70	5,595.94	7.19	478,012.80	650,631.18



Pathfinder
Pathfinder X & Y Survey Report



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 Wellbore: OH
 Design: OH

Local Co-ordinate Reference: Well #3H
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 North Reference: Grid
 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)
12,867.00	90.48	88.05	7,716.70	4,734.70	388.57	5,614.68	5,627.93	1.22	478,013.85	650,663.16
12,899.00	88.99	87.14	7,716.85	4,734.85	389.91	5,646.65	5,659.92	5.46	478,015.19	650,695.13
12,930.00	89.60	86.88	7,717.23	4,735.23	391.52	5,677.60	5,690.92	2.14	478,016.80	650,726.08
12,962.00	88.11	87.44	7,717.87	4,735.87	393.11	5,709.56	5,722.91	4.97	478,018.39	650,758.04
12,994.00	89.43	87.87	7,718.55	4,736.55	394.42	5,741.52	5,754.89	4.34	478,019.70	650,790.00
13,026.00	89.69	87.74	7,718.80	4,736.80	395.64	5,773.50	5,786.88	0.91	478,020.92	650,821.98
13,057.00	89.69	88.11	7,718.97	4,736.97	396.77	5,804.48	5,817.87	1.19	478,022.05	650,852.96
13,089.00	89.60	88.18	7,719.17	4,737.17	397.80	5,836.46	5,849.86	0.36	478,023.08	650,884.94
13,121.00	89.52	87.87	7,719.41	4,737.41	398.91	5,868.44	5,881.85	1.00	478,024.19	650,916.92
13,153.00	89.16	87.42	7,719.78	4,737.78	400.22	5,900.41	5,913.84	1.80	478,025.50	650,948.89
13,185.00	89.16	87.25	7,720.25	4,738.25	401.71	5,932.37	5,945.83	0.53	478,026.99	650,980.85
13,216.00	89.16	87.23	7,720.70	4,738.70	403.20	5,963.33	5,976.82	0.06	478,028.48	651,011.81
13,248.00	88.81	86.99	7,721.27	4,739.27	404.81	5,995.29	6,008.82	1.33	478,030.09	651,043.77
13,280.00	88.81	87.20	7,721.93	4,739.93	406.44	6,027.24	6,040.81	0.66	478,031.72	651,075.72
13,312.00	87.41	87.12	7,722.99	4,740.99	408.02	6,059.18	6,072.79	4.38	478,033.30	651,107.66
13,343.00	87.93	86.69	7,724.25	4,742.25	409.69	6,090.11	6,103.76	2.18	478,034.97	651,138.59
13,374.00	88.46	86.73	7,725.23	4,743.23	411.47	6,121.04	6,134.75	1.71	478,036.75	651,169.52
13,406.00	88.64	86.67	7,726.04	4,744.04	413.31	6,152.98	6,166.74	0.59	478,038.59	651,201.46
13,437.00	88.55	86.43	7,726.80	4,744.80	415.18	6,183.91	6,197.73	0.83	478,040.46	651,232.39
13,469.00	88.46	86.76	7,727.63	4,745.63	417.08	6,215.85	6,229.72	1.07	478,042.36	651,264.33
13,501.00	88.29	86.54	7,728.54	4,746.54	418.95	6,247.78	6,261.70	0.87	478,044.23	651,296.26
13,533.00	88.55	85.96	7,729.42	4,747.42	421.04	6,279.70	6,293.69	1.99	478,046.32	651,328.18
13,565.00	88.64	85.79	7,730.21	4,748.21	423.34	6,311.61	6,325.68	0.60	478,048.62	651,360.09
13,596.00	88.55	85.58	7,730.97	4,748.97	425.67	6,342.51	6,356.67	0.74	478,050.95	651,390.99
13,628.00	88.46	85.31	7,731.80	4,749.80	428.21	6,374.40	6,388.65	0.89	478,053.49	651,422.88
13,661.00	89.43	86.09	7,732.96	4,750.96	432.93	6,437.21	6,451.63	1.98	478,058.21	651,485.69
13,723.00	89.52	86.26	7,733.25	4,751.25	435.07	6,469.14	6,483.63	0.60	478,060.35	651,517.62



Pathfinder
Pathfinder X & Y Survey Report



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 Site: USP FEE
 Well: #3H
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Local Co-ordinate Reference: Well #3H
 TVD Reference: WELL @ 2982.00ft (Original Well Elev)
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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)
13,755.00	89.52	86.25	7,733.52	4,751.52	437.16	6,501.07	6,515.63	0.03	478,062.44	651,549.55
13,787.00	89.78	86.48	7,733.72	4,751.72	439.19	6,533.00	6,547.63	1.08	478,064.47	651,581.48
13,818.00	89.60	86.75	7,733.89	4,751.89	441.02	6,563.95	6,578.63	1.05	478,066.30	651,612.43
13,850.00	89.60	86.99	7,734.11	4,752.11	442.76	6,595.90	6,610.63	0.75	478,068.04	651,644.38
13,881.00	89.52	87.06	7,734.35	4,752.35	444.37	6,626.86	6,641.62	0.34	478,069.65	651,675.34
13,913.00	89.69	87.73	7,734.57	4,752.57	445.83	6,658.82	6,673.62	2.16	478,071.11	651,707.30
13,944.00	89.34	87.24	7,734.83	4,752.83	447.19	6,689.79	6,704.61	1.94	478,072.47	651,738.27
13,976.00	89.87	87.19	7,735.05	4,753.05	448.74	6,721.75	6,736.61	1.66	478,074.02	651,770.23
14,008.00	89.52	87.88	7,735.22	4,753.22	450.12	6,753.72	6,768.60	2.42	478,075.40	651,802.20
14,040.00	89.78	88.32	7,735.42	4,753.42	451.18	6,785.70	6,800.59	1.60	478,076.46	651,834.18
14,071.00	89.43	88.32	7,735.63	4,753.63	452.09	6,816.69	6,831.57	1.13	478,077.37	651,865.17
14,103.00	89.43	87.60	7,735.95	4,753.95	453.23	6,848.67	6,863.56	2.25	478,078.51	651,897.15
14,134.00	89.25	87.95	7,736.31	4,754.31	454.43	6,879.64	6,894.55	1.27	478,079.71	651,928.12
14,166.00	89.25	87.79	7,736.72	4,754.72	455.62	6,911.62	6,926.54	0.50	478,080.90	651,960.10
14,198.00	89.43	87.41	7,737.09	4,755.09	456.96	6,943.59	6,958.53	1.31	478,082.24	651,992.07
14,230.00	89.16	87.55	7,737.49	4,755.49	458.37	6,975.55	6,990.52	0.95	478,083.65	652,024.03
14,261.00	89.43	87.56	7,737.87	4,755.87	459.69	7,006.52	7,021.52	0.87	478,084.97	652,055.00
14,293.00	89.25	87.89	7,738.24	4,756.24	460.96	7,038.49	7,053.51	1.17	478,086.24	652,086.97
14,325.00	89.25	87.92	7,738.66	4,756.66	462.13	7,070.47	7,085.49	0.09	478,087.41	652,118.95
14,357.00	89.25	88.26	7,739.07	4,757.07	463.20	7,102.45	7,117.48	1.06	478,088.48	652,150.93
14,388.00	89.34	88.18	7,739.46	4,757.46	464.16	7,133.43	7,148.46	0.39	478,089.44	652,181.91
14,420.00	89.25	87.91	7,739.85	4,757.85	465.25	7,165.41	7,180.45	0.89	478,090.53	652,213.89
14,451.00	88.81	87.80	7,740.37	4,758.37	466.41	7,196.39	7,211.44	1.46	478,091.69	652,244.87
14,483.00	89.52	87.18	7,740.84	4,758.84	467.81	7,228.35	7,243.43	2.95	478,093.09	652,276.83
14,517.00	89.52	87.77	7,741.13	4,759.13	469.31	7,262.32	7,277.42	1.74	478,094.59	652,310.80
14,561.00	89.52	87.77	7,741.49	4,759.49	471.02	7,306.28	7,321.41	0.00	478,096.30	652,354.76

BHL-14561.00°MD,89.52°INC,87.77°AZI, 7741.49°TVD, 7321.41°VS, 471.02°N, 7306.28°E



Pathfinder
Pathfinder X & Y Survey Report



Company: COG Operating LLC	Local Co-ordinate Reference: Well #3H
Project: Eddy County(NAD83)	TVD Reference: WELL @ 2982 00ft (Original Well Elev)
Site: USP FEE	MD Reference: WELL @ 2982 00ft (Original Well Elev)
Well: #3H	North Reference: Gnd
Wellbore: .OH	Survey Calculation Method: Minimum Curvature
Design: OH	Database: Midland Database

Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
- Shape									
PBHL(USP#3)	0.00	0.00	7,728.14	486.03	7,331.56	478,111.314	652,380.037	32° 18' 50.000 N	103° 58' 26.000 W
- survey misses target center by 32.29ft at 14561.00ft MD (7741.49 TVD, 471.02 N, 7306.28 E)									
- Point									
Slat Pt(USP#3)	0.00	0.00	7,100.00	317.87	192.97	477,943.154	645,241.446	32° 18' 48.565 N	103° 59' 49.192 W
- survey misses target center by 480.10ft at 7620.00ft MD (7521.46 TVD, 283.36 N, 420.30 E)									
- Point									

Survey Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(ft)	(ft)	+N/-S (ft)	+E/-W (ft)	
14,561.00	7,741.49	471.02	7,306.28	BHL-14561.00MD,89.52°INC,87.77°AZI, 7741.49TVD, 7321.41VS, 47

Checked By: _____ Approved By: _____ Date: _____