



30-015-36539

COG Operating LLC

Eddy County(NAD83)

Caribou 19 Federal

#2

OH

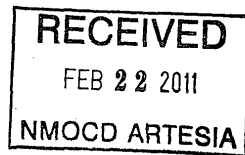
Survey: MWD #1

Pathfinder X & Y Survey Report

17 November, 2010

PATHFINDER

A Schlumberger Company



A handwritten signature in black ink, appearing to be "Cyr" or similar, written next to the stamp.



Pathfinder
Pathfinder X & Y Survey Report



Company: COG Operating LLC
Project: Eddy County(NAD83)
Site: Caribou 19 Federal
Well: #2
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #2
TVD Reference: WELL @ 3608.00ft (19' KB Correction)
MD Reference: WELL @ 3608.00ft (19' KB Correction)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland Database

Project: Eddy County(NAD83)

Map System: US State Plane 1983
Geo Datum: North American Datum 1983
Map Zone: New Mexico Eastern Zone

System Datum: Mean Sea Level

Site: Caribou 19 Federal

Site Position: Northing: 691,733.152 ft Latitude: 32° 54' 5.502 N
From: Map Easting: 579,846.595 ft Longitude: 104° 12' 28.305 W
Position Uncertainty: 0.00 ft Slot Radius: " Grid Convergence: 0.07 "

Well: #2

Well Position: +N/-S 0.00 ft Northing: 693,279.888 ft Latitude: 32° 54' 20.812 N
+E/-W 0.00 ft Easting: 579,493.231 ft Longitude: 104° 12' 32.428 W
Position Uncertainty: 0.00 ft Wellhead Elevation: ft Ground Level: 3,589.00 ft

Wellbore: OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	11/06/10	7.99	60.74	49,048

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	269.48



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Survey Program Date 11/17/10

From (ft)	To (ft)	Survey (Wellbore)
100.00	5,793.00	GYRO (OH)
5,901.00	10,425.00	MWD #1 (OH)

Tool Name	Description
NS-GYRO-MS	North sensing gyrocompassing m/s
MWD	MWD - Standard

Survey

MD (ft)	Inc (°)	Azi (°)	TVD (ft)	TVDSS (ft)	N/S (ft)	E/W (ft)	V. Sec (ft)	DLeg (%/100ft)	Northing (ft)	Easting (ft)
5,793.00	0.86	346.30	5,792.74	2,184.74	-12.11	-19.78	19.89	0.00	693,267.78	579,473.45
5,901.00	0.70	352.74	5,900.73	2,292.73	-10.67	-20.05	20.15	0.17	693,269.22	579,473.18
5,933.00	1.14	299.50	5,932.72	2,324.72	-10.32	-20.35	20.45	2.85	693,269.57	579,472.88
5,965.00	3.17	277.18	5,964.70	2,356.70	-10.05	-21.51	21.60	6.75	693,269.84	579,471.72
5,995.00	5.80	271.97	5,994.60	2,386.60	-9.90	-23.85	23.94	8.86	693,269.99	579,469.38
6,027.00	8.18	272.05	6,026.36	2,418.36	-9.76	-27.74	27.83	7.44	693,270.13	579,465.49
6,060.00	10.73	272.21	6,058.91	2,450.91	-9.56	-33.16	33.24	7.73	693,270.33	579,460.08
6,092.00	14.25	275.07	6,090.15	2,482.15	-9.09	-40.06	40.14	11.17	693,270.79	579,453.17
6,124.00	17.41	274.56	6,120.93	2,512.93	-8.36	-48.76	48.83	9.88	693,271.52	579,444.48
6,156.00	20.65	273.31	6,151.18	2,543.18	-7.66	-59.16	59.23	10.20	693,272.23	579,434.07
6,188.00	23.74	271.25	6,180.81	2,572.81	-7.19	-71.24	71.30	9.96	693,272.70	579,421.99
6,220.00	27.26	271.83	6,209.68	2,601.68	-6.82	-85.01	85.07	11.03	693,273.07	579,408.22
6,252.00	31.48	275.76	6,237.57	2,629.57	-5.74	-100.65	100.70	14.49	693,274.14	579,392.58
6,284.00	35.70	280.06	6,264.22	2,656.22	-3.27	-118.17	118.20	15.13	693,276.62	579,375.06
6,316.00	39.48	283.64	6,289.58	2,681.58	0.76	-137.28	137.25	13.64	693,280.65	579,355.97
6,347.00	43.35	283.66	6,312.82	2,704.82	5.60	-157.18	157.13	12.48	693,285.49	579,336.05
6,380.00	47.66	283.16	6,335.94	2,727.94	11.05	-180.08	179.97	13.11	693,290.94	579,313.15
6,412.00	50.21	283.29	6,356.96	2,748.96	16.57	-203.56	203.40	7.97	693,296.46	579,289.67
6,443.00	53.55	283.01	6,376.10	2,768.10	22.12	-227.31	227.10	10.80	693,302.01	579,265.92
6,475.00	57.60	282.30	6,394.18	2,786.18	27.90	-253.06	252.79	12.79	693,307.78	579,240.17
6,507.00	61.20	282.66	6,410.47	2,802.47	33.85	-279.94	279.63	11.29	693,313.74	579,213.29



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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)
6,539.00	64.46	282.24	6,425.08	2,817.08	39.98	-307.74	307.37	10.25	693,319.87	579,185.49
6,571.00	67.36	280.74	6,438.14	2,830.14	45.80	-336.36	335.94	10.02	693,325.69	579,156.87
6,603.00	71.84	280.06	6,449.29	2,841.29	51.21	-365.86	365.38	14.14	693,331.10	579,127.37
6,635.00	76.68	280.40	6,457.97	2,849.97	56.68	-396.16	395.63	15.16	693,336.57	579,097.07
6,667.00	81.87	279.95	6,463.92	2,855.92	62.23	-427.10	426.51	16.28	693,342.12	579,066.14
6,699.00	84.24	279.68	6,467.79	2,859.79	67.64	-458.39	457.76	7.45	693,347.53	579,034.84
6,731.00	86.00	278.59	6,470.52	2,862.52	72.70	-489.87	489.19	6.46	693,352.59	579,003.36
6,763.00	88.02	275.50	6,472.18	2,864.18	76.62	-521.58	520.86	11.53	693,356.51	578,971.65
6,795.00	87.93	272.94	6,473.32	2,865.32	78.98	-553.47	552.73	8.00	693,358.86	578,939.76
6,827.00	89.25	271.86	6,474.10	2,866.10	80.31	-585.43	584.68	5.33	693,360.20	578,907.80
6,859.00	89.34	271.81	6,474.50	2,866.50	81.34	-617.41	616.65	0.32	693,361.23	578,875.82
6,901.00	90.48	271.81	6,474.56	2,866.56	82.67	-659.39	658.61	2.71	693,362.55	578,833.84
6,933.00	89.87	270.93	6,474.46	2,866.46	83.43	-691.38	690.60	3.35	693,363.32	578,801.85
6,964.00	89.69	270.17	6,474.58	2,866.58	83.73	-722.38	721.59	2.52	693,363.62	578,770.85
6,996.00	90.40	270.17	6,474.56	2,866.56	83.82	-754.38	753.59	2.22	693,363.71	578,738.85
7,027.00	91.10	269.61	6,474.15	2,866.15	83.76	-785.38	784.58	2.89	693,363.65	578,707.85
7,060.00	91.54	267.80	6,473.39	2,865.39	83.02	-818.36	817.57	5.64	693,362.91	578,674.87
7,090.00	91.45	267.02	6,472.61	2,864.61	81.66	-848.32	847.54	2.62	693,361.55	578,644.91
7,122.00	91.71	267.03	6,471.73	2,863.73	80.00	-880.26	879.50	0.81	693,359.89	578,612.97
7,154.00	90.66	267.48	6,471.07	2,863.07	78.47	-912.22	911.47	3.57	693,358.36	578,581.01
7,186.00	91.36	268.21	6,470.50	2,862.50	77.27	-944.19	943.45	3.16	693,357.16	578,549.04
7,217.00	91.01	268.08	6,469.86	2,861.86	76.26	-975.17	974.43	1.20	693,356.15	578,518.06
7,249.00	90.57	267.53	6,469.42	2,861.42	75.04	-1,007.14	1,006.42	2.20	693,354.93	578,486.09
7,280.00	91.63	267.40	6,468.82	2,860.82	73.67	-1,038.10	1,037.39	3.44	693,353.56	578,455.13
7,312.00	91.01	267.74	6,468.09	2,860.09	72.31	-1,070.07	1,069.37	2.21	693,352.20	578,423.16
7,343.00	91.28	268.03	6,467.47	2,859.47	71.17	-1,101.04	1,100.35	1.28	693,351.06	578,392.19
7,375.00	90.22	267.68	6,467.05	2,859.05	69.97	-1,133.01	1,132.33	3.49	693,349.86	578,360.22



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7,407.00	89.25	267.14	6,467.20	2,859.20	68.52	-1,164.98	1,164.31	3.47	693,348.41	578,328.25
7,438.00	89.43	265.74	6,467.55	2,859.55	66.60	-1,195.92	1,195.26	4.55	693,346.49	578,297.31
7,470.00	89.34	264.97	6,467.90	2,859.90	64.01	-1,227.81	1,227.18	2.42	693,343.90	578,265.42
7,502.00	89.43	264.75	6,468.24	2,860.24	61.14	-1,259.68	1,259.07	0.74	693,341.03	578,233.55
7,534.00	89.25	264.38	6,468.61	2,860.61	58.11	-1,291.53	1,290.95	1.29	693,338.00	578,201.70
7,566.00	89.43	264.48	6,468.98	2,860.98	55.01	-1,323.38	1,322.83	0.64	693,334.89	578,169.85
7,598.00	89.52	264.75	6,469.27	2,861.27	52.00	-1,355.24	1,354.71	0.89	693,331.89	578,137.99
7,629.00	89.34	265.56	6,469.58	2,861.58	49.38	-1,386.12	1,385.62	2.68	693,329.27	578,107.11
7,724.00	90.04	266.32	6,470.09	2,862.09	42.66	-1,480.88	1,480.44	1.09	693,322.55	578,012.35
7,819.00	89.87	266.35	6,470.17	2,862.17	36.59	-1,575.69	1,575.29	0.18	693,316.47	577,917.54
7,882.00	89.69	266.63	6,470.41	2,862.41	32.73	-1,638.57	1,638.21	0.53	693,312.62	577,854.66
7,978.00	89.52	266.54	6,471.07	2,863.07	27.01	-1,734.40	1,734.08	0.20	693,306.90	577,758.83
8,074.00	88.55	265.98	6,472.69	2,864.69	20.75	-1,830.18	1,829.91	1.17	693,300.64	577,663.05
8,169.00	88.72	265.29	6,474.95	2,866.95	13.52	-1,924.88	1,924.67	0.75	693,293.41	577,568.36
8,265.00	88.46	264.89	6,477.31	2,869.31	5.31	-2,020.49	2,020.36	0.50	693,285.19	577,472.74
8,361.00	88.64	266.02	6,479.74	2,871.74	-2.30	-2,116.16	2,116.09	1.19	693,277.59	577,377.07
8,457.00	88.99	266.37	6,481.73	2,873.73	-8.67	-2,211.93	2,211.91	0.52	693,271.22	577,281.30
8,553.00	91.01	267.98	6,481.73	2,873.73	-13.40	-2,307.80	2,307.83	2.69	693,266.49	577,185.43
8,648.00	92.15	268.92	6,479.11	2,871.11	-15.97	-2,402.73	2,402.78	1.56	693,263.92	577,090.50
8,744.00	91.36	268.93	6,476.17	2,868.17	-17.77	-2,498.67	2,498.72	0.82	693,262.12	576,994.56
8,840.00	92.42	268.26	6,473.00	2,865.00	-20.12	-2,594.58	2,594.66	1.31	693,259.77	576,898.65
8,936.00	92.77	268.22	6,468.66	2,860.66	-23.07	-2,690.44	2,690.54	0.37	693,256.82	576,802.79
9,032.00	92.95	267.51	6,463.87	2,855.87	-26.64	-2,786.25	2,786.38	0.76	693,253.25	576,706.98
9,128.00	92.86	267.64	6,459.00	2,851.00	-30.69	-2,882.04	2,882.20	0.16	693,249.19	576,611.19
9,224.00	92.33	267.43	6,454.66	2,846.66	-34.82	-2,977.86	2,978.05	0.59	693,245.07	576,515.38
9,320.00	91.01	268.58	6,451.86	2,843.86	-38.16	-3,073.75	3,073.97	1.82	693,241.73	576,419.48
9,416.00	90.57	269.54	6,450.53	2,842.53	-39.73	-3,169.73	3,169.96	1.10	693,240.15	576,323.50



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9,511.00	91.63	269.80	6,448.71	2,840.71	-40.28	-3,264.71	3,264.94	1.15	693,239.61	576,228.52
9,607.00	92.15	269.89	6,445.54	2,837.54	-40.54	-3,360.66	3,360.89	0.55	693,239.35	576,132.57
9,703.00	91.89	269.95	6,442.16	2,834.16	-40.67	-3,456.60	3,456.82	0.28	693,239.21	576,036.63
9,799.00	91.54	270.28	6,439.29	2,831.29	-40.48	-3,552.55	3,552.77	0.50	693,239.41	575,940.68
9,894.00	91.71	270.74	6,436.59	2,828.59	-39.64	-3,647.51	3,647.72	0.52	693,240.25	575,845.72
9,989.00	91.71	270.96	6,433.76	2,825.76	-38.23	-3,742.46	3,742.65	0.23	693,241.66	575,750.77
10,085.00	91.71	270.69	6,430.89	2,822.89	-36.85	-3,838.41	3,838.58	0.28	693,243.04	575,654.83
10,180.00	91.28	271.31	6,428.41	2,820.41	-35.19	-3,933.36	3,933.52	0.79	693,244.70	575,559.87
10,275.00	91.36	271.89	6,426.23	2,818.23	-32.54	-4,028.30	4,028.42	0.62	693,247.35	575,464.94
10,380.00	91.98	272.27	6,423.17	2,815.17	-28.73	-4,133.18	4,133.27	0.69	693,251.16	575,360.05
10,425.00	91.98	272.27	6,421.61	2,813.61	-26.95	-4,178.12	4,178.19	0.00	693,252.94	575,315.11

BHL-10425.00°MD,91.98°INC,272.27°AZI, 6421.61°TVD, 4178.19°VS, -26.95°N, -4178.12°E

Targets

Target Name

- hit/miss target	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- Shape									
PBHL(C19Fed#2)	0.00	0.00	6,420.00	-37.70	-4,189.01	693,242.185	575,304.224	32° 54' 20.485 N	104° 13' 21.566 W
- survey misses target center by 15.39ft at 10425.00ft MD (6421.61 TVD, -26.95 N, -4178.12 E)									
- Point									

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
10,425.00	6,421.61	-26.95	-4,178.12	BHL-10425.00°MD,91.98°INC,272.27°AZI, 6421.61°TVD, 4178.19°VS, -

Checked By: _____ Approved By: _____ Date: _____