

30-015-38250



COG Operating LLC

Eddy County(NAD83)
Blackhawk 11 Fed Com
#1
OH

Survey: MWD 2

Pathfinder X & Y Survey Report

26 January, 2011





Pathfinder
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Company: COG Operating LLC
Project: Eddy County(NAD83)
Site: Blackhawk 11 Fed Com
Well: #1
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #1
TVD Reference: JW#2 @ 3588 50usft (Original Well Elev)
MD Reference: JW#2 @ 3588 50usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000 1 Single User Db

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	Blackhawk 11 Fed Com		
Site Position		Northing	702,870 627 usft
From	Map	Easting	596,395 029 usft
Position Uncertainty	0 00 usft	Slot Radius	13-3/16 "
		Latitude	32° 55' 55 470 N
		Longitude	104° 9' 13 977 W
		Grid Convergence	0 10 "

Well	#1		
Well Position	+N/-S	0 00 usft	Northing
	+E/-W	0 00 usft	Easting
Position Uncertainty	0 00 usft	Wellhead Elevation	usft
		Latitude	32° 55' 55 470 N
		Longitude	104° 9' 13 977 W
		Ground Level	3,570 00 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
	IGRF200510	01/13/11	(°)
			7 95
			Dip Angle
			(°)
			60 77
			Field Strength
			(nT)
			49,053

Design	OH		
Audit Notes:			
Version:	1 0	Phase:	ACTUAL
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0 00	0 00	0 00
			Direction
			(°)
			90 62



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Survey Program Date 01/26/11

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100 00	6,000 00	GYRO (OH)	MWD	MWD - Standard
6 018 00	9,987 00	MWD #1 (OH)	MWD	MWD - Standard

Survey

MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
6.000 00	1 31	86 17	5,999 41	-2,410 91	59 92	13 82	13 17	0 00	702 930 55	596 408 85
6.018 00	2 81	91.36	6,017 40	-2,429 90	59 92	14 47	13 82	8 39	702 930 55	596 409 50
6.050 00	5 80	94 61	6 049 31	-2 460 81	59 78	16 87	16 22	9 37	702,930 40	596,411 90
6.082 00	8 35	94 61	6,081 06	-2,492 56	59 46	20 80	20 15	7 97	702,930 09	596,415 82
6.114 00	10 99	95 05	6,112 61	-2,524 11	59 00	26 15	25 51	8 25	702,929 63	596 421 18
6.146 00	14 68	93 29	6,143 80	-2,555 30	58 50	33 24	32 60	11 59	702,929 13	596,428 27
6.177 00	17 24	94 08	6,173 60	-2,585 10	57 95	41 74	41 12	8 29	702,928 58	596,436 77
6 209 00	20 58	95 22	6,203 87	-2,615 37	57 10	52 08	51 46	10 50	702,927 73	596,447 11
6.241 00	24 18	94 43	6,233 46	-2,644 96	56 08	64 22	63 61	11 29	702,926 71	596,459 25
6.273 00	27 96	93 73	6,262 20	-2,673 70	55 09	78 24	77 64	11 85	702,925 71	596,473 27
6.305 00	31 04	92 59	6 290 04	-2 701 54	54 23	93 97	93 38	9 78	702,924 85	596 489 00
6.337 00	34 29	90 13	6,316 98	-2,728 48	53 83	111 24	110 65	10 97	702,924 46	596,506 26
6,369 00	38 08	87 49	6,342 80	-2,754 30	54 24	130.12	129 52	12 80	702,924 87	596,525 14
6.401 00	42 65	85 73	6,367 18	-2 778 68	55 48	150 80	150 19	14 72	702,926 11	596,545 83
6.433 00	47 04	85 38	6,389 86	-2,801 36	57 24	173 29	172 66	13 74	702,927 86	596,568 32
6.465 00	51 00	85 12	6,410 85	-2,822 35	59 24	197 36	196 71	12 39	702,929 86	596 592 39
6.497 00	53 55	84 85	6 430 42	-2,841 92	61 45	222 57	221 89	8 00	702,932 08	596 617 60
6 529 00	57 60	85 29	6 448 51	-2,860 01	63 72	248 86	248 16	12 71	702 934 34	596,643 89
6.561 00	60 15	85 20	6 465 05	-2,876 55	65 99	276 16	275 43	7 97	702,936 61	596 671 19
6 593 00	64 10	86 17	6 480 01	-2,891 51	68 11	304 36	303 61	12 63	702 938 74	596 699 39
6 625 00	67 01	86 17	6,493 25	-2,904 75	70 06	333 42	332 65	9 09	702,940 68	596 728 45



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6.657 00	69 03	86 43	6,505 23	-2 916 73	71 97	363 04	362 24	6 36	702,942 60	596,758 06
6.689 00	71 84	87 23	6,515 94	-2 927 44	73 64	393 14	392 32	9 09	702,944 26	596,788 17
6.720 00	74 13	87 66	6,525 01	-2 936 51	74 96	422 75	421 91	7 51	702,945 58	596,817 78
6.752 00	77 65	88 46	6,532 81	-2 944 31	76 01	453 76	452 91	11 26	702,946 63	596,848 79
6.784 00	79 40	89 16	6,539 18	-2 950 68	76 66	485 11	484 26	5 87	702,947 28	596,880 14
6.816 00	81 43	90 21	6,544 51	-2,956 01	76 83	516 66	515 80	7 12	702,947 46	596,911 69
6.848 00	85 82	91 18	6,548 06	-2 959 56	76 44	548 46	547 60	14 05	702,947 07	596,943 48
6.880 00	89 96	91 18	6,549 24	-2,960 74	75 78	580 42	579 57	12 94	702,946 41	596,975 45
6.912 00	89 96	90 83	6,549 26	-2,960 76	75 22	612 42	611 57	1 09	702,945 85	597,007 44
6.944 00	90 13	90 83	6,549 23	-2 960 73	74 76	644 41	643 57	0 53	702,945 39	597,039 44
7.020 00	88 64	91 10	6,550 05	-2,961 55	73 48	720 39	719 56	1 99	702,944 11	597,115 42
7.115 00	88 90	91 10	6,552 09	-2,963 59	71 66	815 36	814 53	0 27	702,942 28	597,210 38
7.211 00	88 90	91 38	6,553 93	-2 965 43	69 58	911 32	910 51	0 29	702,940 21	597,306 34
7.307 00	88 55	90 17	6,556 07	-2,967 57	68 28	1,007 28	1,006 48	1 31	702,938 91	597,402 31
7.403 00	88 64	90 38	6,558 42	-2,969 92	67 82	1,103 25	1,102 45	0 24	702,938 45	597,498 28
7.499 00	89 08	92 40	6,560 33	-2 971 83	65 49	1,199 20	1,198 42	2 15	702,936 12	597,594 23
7.595 00	88 99	95 65	6,561 95	-2,973 45	58 76	1,294 93	1,294 22	3 39	702,929 38	597,689 96
7.691 00	88.72	95 82	6,563 87	-2,975 37	49 16	1,390 44	1,389 82	0 33	702,919 79	597,785 46
7.786 00	87 76	93 99	6,566 79	-2,978 29	41 05	1,485 04	1,484 51	2 17	702,911 67	597,880 07
7.882 00	89 16	90 77	6,569 37	-2,980 87	37 06	1,580 90	1,580 41	3 66	702,907 69	597,975 93
7.978 00	88 99	88 85	6,570 92	-2,982 42	37 38	1,676 89	1,676 38	2 01	702,908 01	598,071 92
8.074 00	90 40	88 83	6,571 43	-2,982.93	39 32	1,772 86	1,772 33	1 47	702,909 95	598,167 89
8.170 00	89 16	90 56	6,571 80	-2,983 30	39 83	1,868 86	1,868 32	2 22	702,910 46	598,263 89
8.265 00	89 96	90 67	6,572 52	-2,984 02	38 81	1,963 85	1,963 31	0 85	702,909 44	598,358 88
8.323 00	90 04	90 48	6,572 52	-2,984 02	38 23	2,021 84	2,021 31	0 36	702,908 86	598,416 87
8.361 00	89 52	89 83	6,572 67	-2,984 17	38 13	2,059 84	2,059 31	2 19	702,908 76	598,454 87
8.456 00	90 22	89 85	6,572 89	-2 984 39	38 40	2,154 84	2,154 30	0 74	702,909 02	598,549 87



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MD (usft)	Inc (°)	Azi (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V Sec (usft)	DLeg (*/100usft)	Northing (usft)	Easting (usft)
8,551 00	91 80	90 32	6,571 21	-2,982 71	38 25	2,249 82	2 249 28	1 74	702,908 88	598,844 85
8,647 00	92 07	90 85	6,567 97	-2,979 47	37 27	2,345 76	2 345 22	0 62	702,907 90	598 740 79
8,743 00	92 51	90 31	6,564 13	-2,975 63	36 30	2,441 68	2,441 15	0 73	702,906 93	598,836 71
8,839 00	92 42	90 41	6,560 01	-2,971 51	35 70	2,537 59	2,537 06	0 14	702,906 33	598,932 62
8,935 00	92 07	91 02	6,556 25	-2,967 75	34 50	2,633 51	2,632 98	0 73	702,905 13	599,028 54
9,031 00	90 48	92 63	6,554 11	-2,965 61	31 45	2,729 43	2,728 93	2 36	702 902 07	599,124 46
9,126 00	90 92	93 11	6,552 95	-2,964 45	26 69	2,824 30	2 823 85	0 69	702,897 32	599,219 33
9,222 00	89 78	94 02	6,552 36	-2,963 86	20 72	2,920 11	2,919 72	1 52	702 891 35	599,315 14
9,318 00	89 96	92 94	6,552 58	-2,964 08	14 89	3,015 94	3,015 60	1 14	702,885 52	599,410 96
9,414 00	90 57	91 11	6,552 14	-2,963 64	11 50	3,111 87	3,111 56	2 01	702,882 13	599,506 90
9,510 00	90 66	91 61	6,551 11	-2,962 61	9 22	3,207 84	3,207 55	0 53	702,879 85	599,602 87
9,606 00	89 87	91 82	6,550 66	-2,962 16	6 35	3,303 79	3,303 53	0 85	702,876 98	599,698 82
9,702 00	89 34	91 67	6,551 32	-2,962 82	3 43	3,399 74	3,399 51	0 57	702,874 05	599,794 77
9,797 00	89 87	91 24	6,551 98	-2,963 48	1 02	3,494 71	3,494 50	0 72	702 871 64	599,889 74
9,892 00	89 69	89 78	6,552 34	-2,963 84	0 17	3,589 70	3,589 49	1 55	702,870 80	599,984 73
9,987 00	90 22	90 62	6,552 42	-2,963 92	-0 16	3,684 70	3,684 49	1 05	702,870 47	600,079 73
10,083 00	89 25	90 15	6,552 86	-2,964 36	-0 81	3,780 70	3 780 49	1 12	702,869 82	600,175 73
10,179 00	89 16	90 29	6,554 19	-2,965 69	-1 18	3,876 69	3,876 47	0 17	702,869 45	600,271 72
10,275 00	88 29	88 94	6,556 33	-2,967 83	-0 53	3,972 66	3,972 43	1 67	702,870 10	600,367 69
10,371 00	88 29	89 90	6,559 19	-2,970 69	0 44	4,068 61	4,068 37	1 00	702,871 07	600,463 64
10,467 00	88 46	89 25	6,561 92	-2,973 42	1 15	4,164 57	4,164 31	0 70	702,871 78	600,559 60
10,496 00	88 55	88 95	6,562 67	-2,974 17	1 61	4,193 55	4,193 29	1 08	702,872 24	600,588 58

BHL-10496.00°MD,88.55°INC,88 95°AZI, 6562 67°TVD, 4193 29°VS, 1 61°N, 4193.55°E - PBHL (BH11)



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Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
10.496 00	6 562 67	1 61	4.193 55	BHL-10496 00'MD.86 55"INC.88 95"AZI. 6562 67'TVD -4193 29'VS. 1 61'N -41'

Checked By: _____	Approved By: _____	Date: _____
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