

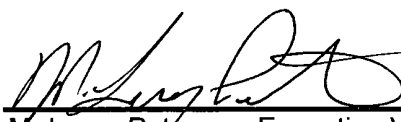
OPERATOR: COG Operating, LLC
WELL/LEASE: Cavansback 13 Fed # 1H
COUNTY: Eddy Co., New Mexico
Sec. 13, T24S, R31E

30-015-39191

STATE OF NEW MEXICO
DEVIATION REPORT

Depth	Deviation	Depth	Deviation
336	1/2	4,317	3
544	1 1/2	4,441	3
826	2	4,555	2 1/2
1,179	1	4,650	1 1/4
1,272	1/2	4,744	3/4
1,431	1/2	4,839	1
1,593	1/2	5,029	2
1,747	3/4	5,315	2
1,939	1	5,504	1 3/4
2,034	1/4	5,697	1 3/4
2,196	1 1/4	5,889	1 1/2
2,321	1	6,079	1 1/2
2,447	1	6,270	2
2,575	1	6,461	1 1/2
2,800	1 1/2	6,651	2 1/4
2,958	1 1/2	6,842	1 3/4
3,083	1 1/2	7,128	3/4
3,222	1 1/2	7,508	3/4
3,300	1 1/4	7,698	1
3,497	1/2	7,762	1
3,606	1	7,794	1 1/2
3,891	2		
4,032	2		
4,190	2 1/2		

Patriot Drilling, LLC



M. Leroy Peterson, Executive Vice-President

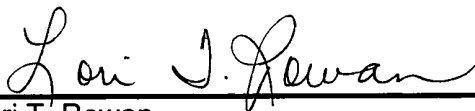
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APR 30 2012

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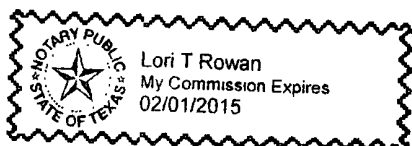
The foregoing instrument was acknowledged before me on this 13th day of February, 2012 by M. Leroy Peterson, Executive Vice-President of Patriot Drilling,

My Commission Expires: 02/01/2015



Lori T. Rowan

Notary Public for Ector Co., Texas



COG OPERATING

Cotton Draw
Eddy County, NM
Canvasback "13" Federal #1H
VH - Job #32K0112072

Survey: Gyro

SDI Standard Survey Report

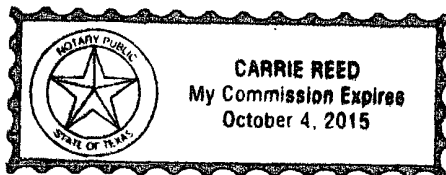
This survey is correct to the best of my knowledge and is supported by actual field data.

[Signature]

Notarized this date 17th of February, 2012.

[Signature]

Notary Signature
County of Midland
State of Texas



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING	Local Co-ordinate Reference:	Well Canvasback "13" Federal #1H
Project:	Cotton Draw	TVD Reference:	WELL @ 0 0usft (Original Well Elev)
Site:	Eddy County, NM	MD Reference:	WELL @ 0 0usft (Original Well Elev)
Well:	Canvasback "13" Federal #1H	North Reference:	Grid
Wellbore:	VH - Job #32K0112072	Survey Calculation Method:	Minimum Curvature
Design:	VH - Job #32K0112072	Database:	EDM-Regulatory

Project	Cotton Draw		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Eddy County, NM				
Site Position:		Northing:	446,243 03 usft	Latitude:	32° 13' 31 476 N
From:	Lat/Long	Easting:	685,868 49 usft	Longitude:	103° 43' 56 197 W
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"	Grid Convergence:	0 32 °

Well	Canvasback "13" Federal #1H, Directional (Pathfinder)					
Well Position	+N/-S	0 0 usft	Northing:	445,576 87 usft	Latitude:	32° 13' 24 982 N
	+E/-W	0 0 usft	Easting:	684,092 75 usft	Longitude:	103° 44' 16 912 W
Position Uncertainty		0 0 usft	Wellhead Elevation:	usft	Ground Level:	0 0 usft

Wellbore:	VH - Job #32K0112072				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF2010	1/21/2012	(°)	(°)	(nT)
			7 59	60 14	48,563

Design:	VH - Job #32K0112072			
Audit Notes:				
Version:	1 0	Phase:	ACTUAL	Tie On Depth: 0 0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0 0	0 0	0 0	179 67

Survey Program		Date 2/17/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100 0	4,419 0	Gyro (VH - Job #32K0112072)	Keeper	Keeper Gyro

Survey								
Measured Depth	Inclination	Azimuth	True Vertical	North/South	East/West	Closure Azimuth	Closure Distance	
(usft)	(°)	(°)	Depth	(usft)	(usft)	(°)	(usft)	
0 0	0 00	0 00	0 0	0 0	0 0	0 00	0 0	0 0
100 0	1 32	23 35	100 0	1 1	0 5	23 35	1 2	
200 0	1 10	39 01	200 0	2 9	1 5	27 94	3 2	
300 0	0 27	27 17	300 0	3 8	2 2	30 29	4 4	
400 0	0 61	215 90	400 0	3 6	2 0	29 39	4 1	
500 0	1 16	223 46	499 9	2 4	1 0	22 70	2 6	
600 0	2 35	202 97	599 9	-0 2	-0 5	248 04	0 5	
700 0	2 63	202 17	699 8	-4 2	-2 1	207 03	4 7	
800 0	2 41	198 38	799 7	-8 3	-3 7	203 82	9 1	
900 0	1 34	201 01	899 7	-11 4	-4 8	202 63	12 4	
1,000 0	1 16	226 43	999 6	-13 2	-5 9	204 12	14 5	
1,100 0	1 26	227 29	1,099 6	-14 6	-7 5	206 97	16 4	

Scientific Drilling International, Inc.

SDI Standard Survey Report



Company: COG OPERATING
Project: Cotton Draw
Site: Eddy County, NM
Well: Canvasback "13" Federal #1H
Wellbore: VH - Job #32K0112072
Design: VH - Job #32K0112072

Local Co-ordinate Reference: Well Canvasback "13" Federal #1H
TVD Reference: WELL @ 0 0usft (Original Well Elev)
MD Reference: WELL @ 0 0usft (Original Well Elev)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM-Regulatory

Survey								
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
1,200 0	0 90	181 33	1,199 6	-16 2	-8 3	207 10	18 2	
1,300 0	0 37	145 01	1,299 6	-17 2	-8 1	205 21	19 0	
1,400 0	0 07	280 66	1,399 6	-17 5	-8 0	204 55	19 2	
1,500 0	0 10	304 48	1,499 6	-17 4	-8 1	204 99	19 2	
1,600 0	0 27	130 16	1,599 6	-17 5	-8 0	204 57	19 3	
1,700 0	0 59	85 16	1,699 6	-17 6	-7 3	202 54	19 1	
1,800 0	1 10	61 11	1,799 6	-17 1	-6 0	199 20	18 1	
1,900 0	0 85	82 95	1,899 6	-16 6	-4 4	194 83	17 1	
2,000 0	0 66	88 94	1,999 5	-16 5	-3 1	190 57	16 8	
2,100 0	0 88	76 00	2,099 5	-16 3	-1 8	186 15	16 4	
2,200 0	1 29	48 32	2,199 5	-15 3	-0 2	180 62	15 3	
2,300 0	1 13	30 50	2,299 5	-13 7	1 2	175 11	13 8	
2,400 0	1 14	37 52	2,399 5	-12 1	2 3	169 33	12 3	
2,500 0	1 07	41 36	2,499 5	-10 6	3 5	161 73	11 2	
2,600 0	0 99	22 58	2,599 4	-9 1	4 5	153 96	10 1	
2,700 0	1 28	42 39	2,699 4	-7 5	5 5	143 52	9 3	
2,800 0	1 49	38 57	2,799 4	-5 6	7 1	128 49	9 1	
2,900 0	1 65	35 32	2,899 4	-3 5	8 7	111 56	9 4	
3,000 0	1 61	34 11	2,999 3	-1 1	10 4	96 15	10 4	
3,100 0	1 67	28 98	3,099 3	1 3	11 9	83 64	11 9	
3,200 0	0 95	23 51	3,199 3	3 4	12 9	75 41	13 3	
3,300 0	1 65	23 55	3,299 2	5 4	13 8	68 50	14 8	
3,400 0	1 71	38 02	3,399 2	7 9	15 3	62 59	17 2	
3,500 0	1 46	44 67	3,499 1	10 0	17 1	59 66	19 8	
3,600 0	1 18	39 41	3,599 1	11 7	18 7	57 88	22 0	
3,700 0	0 62	21 99	3,699 1	13 0	19 5	56 31	23 5	
3,800 0	1 15	64 44	3,799 1	13 9	20 6	55 93	24 9	
3,900 0	3 02	89 13	3,899 0	14 4	24 2	59 17	28 1	
4,000 0	4 47	102 09	3,998 8	13 6	30 6	65 98	33 5	
4,100 0	3 92	113 61	4,098 5	11 5	37 5	73 03	39 3	
4,200 0	3 50	128 59	4,198 3	8 2	43 1	79 24	43 8	
4,300 0	3 45	136 64	4,298 2	4 1	47 5	85 08	47 7	
4,400 0	2 87	130 02	4,398 0	0 3	51 5	89 67	51 5	
4,419 0	2 61	130 71	4,417 0	-0 3	52 2	90 32	52 2	

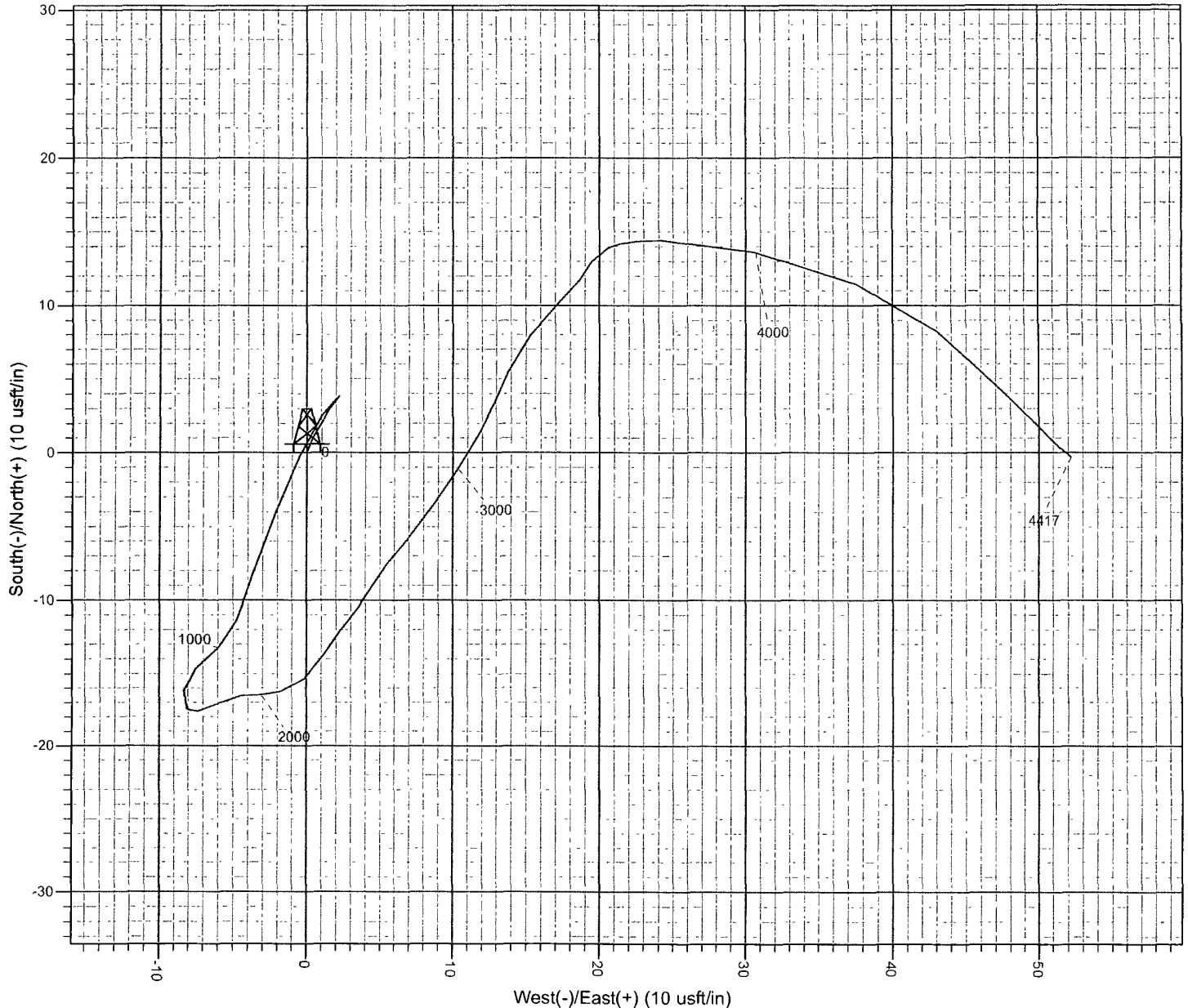


Project Cotton Draw
Eddy County, NM
Well: Canvasback "13" Federal #1H
Wellbore: VH - Job #32K0112072
Design: VH - Job #32K0112072

G
T M
Azimuths to Grid North
True North -0.32'
Magnetic North 7.27'
Magnetic Field
Strength 48563 2snT
Dip Angle 60.14'
Date 1/21/2012
Model IGRF2010

WELL DETAILS: Canvasback "13" Federal #1H
WELL @ 0.0usft (Original Well Elev)

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	445576.87	684092.75	32° 13' 24.982 N	103° 44' 16.912 W	



PROJECT DETAILS: Cotton Draw
Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level

SITE DETAILS: Eddy County, NM
Site Centre Latitude: 32° 13' 31.476 N
Longitude: 103° 43' 56.197 W
Positional Uncertainty: 0.0
Convergence: 0.32
Local North: Grid



COG Operating LLC

Eddy County(NAD27)

Canvasback 13 Federal

#1H

OH

Design: OH

Pathfinder X & Y Report

03 February, 2012





Pathfinder
Pathfinder X & Y Report



Company: COG Operating LLC
Project: Eddy County(NAD27)
Site: Canvasback 13 Federal
Well: #1H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #1H
TVD Reference: KB = 17' @ 3586 0usft
MD Reference: KB = 17' @ 3586 0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000 1 Single User Db

Project Eddy County(NAD27)

Map System: US State Plane 1927 (Exact solution)
Geo Datum: NAD 1927 (NADCON CONUS)
Map Zone: New Mexico East 3001

System Datum: Mean Sea Level

Site Canvasback 13 Federal

Site Position:	Northing:	445,577 000 usft	Latitude:	32° 13' 24 983 N
From: Map	Easting:	684,092.600 usft	Longitude:	103° 44' 16 913 W
Position Uncertainty: 0 0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0 32 °

Well #1H

Well Position	+N/-S	0 0 usft	Northing:	445,577 000 usft	Latitude:	32° 13' 24 983 N
	+E/-W	0 0 usft	Easting:	684,092 600 usft	Longitude:	103° 44' 16 913 W
Position Uncertainty		0 0 usft	Wellhead Elevation:	usft	Ground Level:	3,569 0 usft

Wellbore OH

Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	12/2/2011	7 61	60 15	48,550

Design OH

Audit Notes:

Version: 1.0 **Phase:** ACTUAL **Tie On Depth:** 0.0

Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.0	0.0	0 0	179 67



Pathfinder
Pathfinder X & Y Report



Company: COG Operating LLC
Project: Eddy County(NAD27)
Site: Canvasback 13 Federal
Well: #1H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #1H
TVD Reference: KB = 17' @ 3586.0usft
MD Reference: KB = 17' @ 3586.0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000 1 Single User Db

Survey Program	Date	2/3/2012			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100 0	4,419.0	Gyro #1 (OH)	NS-GYRO-MS	North sensing gyrocompassing m/s	
4,555.0	12,712 0	MWD #2 (OH)	MWD	MWD - Standard	

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
0 0	0.00	0 00	0 0	-3,586.0	0 0	0.0	0 0	0 00	445,577 00	684,092 60
100 0	1 32	23 35	100 0	-3,486 0	1 1	0 5	-1 1	1 32	445,578 06	684,093 06
200 0	1 10	39 01	200 0	-3,386 0	2 9	1 5	-2 9	0 40	445,579 86	684,094 12
300 0	0 27	27 17	300 0	-3,286 0	3 8	2 2	-3 8	0 84	445,580 82	684,094 83
400 0	0 61	215 90	400 0	-3,186 0	3 6	2 0	-3 6	0 88	445,580 59	684,094 62
500 0	1 16	223 46	499 9	-3,086.1	2 4	1 0	-2 4	0 56	445,579.43	684,093.62
600 0	2 35	202 97	599.9	-2,986 1	-0 2	-0 5	0 2	1 33	445,576 81	684,092 12
700 0	2 63	202 17	699.8	-2,886 2	-4 2	-2 1	4 2	0 28	445,572 79	684,090 45
800 0	2 41	198.38	799 7	-2,786 3	-8 3	-3 7	8 3	0 28	445,568 67	684,088 93
900 0	1 34	201 01	899 7	-2,686 3	-11 4	-4 8	11 4	1 07	445,565 59	684,087 84
1,000 0	1 16	226 43	999 6	-2,586 4	-13 2	-5 9	13 2	0 58	445,563 80	684,086.69
1,100 0	1 26	227 29	1,099 6	-2,486 4	-14.6	-7 5	14.6	0 10	445,562.35	684,085 15
1,200 0	0 90	181 33	1,199 6	-2,386 4	-16 2	-8 3	16.1	0 91	445,560 82	684,084 32
1,300 0	0 37	145 01	1,299 6	-2,286.4	-17 2	-8 1	17 2	0 64	445,559 77	684,084 49
1,400 0	0 07	280 66	1,399.6	-2,186 4	-17 5	-8 0	17 4	0 42	445,559 52	684,084 61
1,500 0	0 10	304 48	1,499 6	-2,086 4	-17 4	-8 1	17 4	0 05	445,559 58	684,084 48
1,600 0	0 27	130 16	1,599 6	-1,986 4	-17.5	-8 0	17 5	0 37	445,559 48	684,084 59
1,700 0	0 59	85 16	1,699 6	-1,886.4	-17 6	-7 3	17.6	0 44	445,559 37	684,085.28
1,800 0	1 10	61 11	1,799 6	-1,786 4	-17 1	-6 0	17 1	0 61	445,559 88	684,086 64
1,900 0	0 85	82.95	1,899.6	-1,686 4	-16.6	-4 4	16 5	0 44	445,560 43	684,088 21
2,000 0	0 66	88 94	1,999 5	-1,586 5	-16 5	-3 1	16 4	0 21	445,560 53	684,089 53



Pathfinder Pathfinder X & Y Report



Company: COG Operating LLC
Project: Eddy County(NAD27)
Site: Canvasback 13 Federal
Well: #1H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #1H
TVD Reference: KB = 17' @ 3586.0usft
MD Reference: KB = 17' @ 3586.0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000 1 Single User Db

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
2,100.0	0.88	76.00	2,099.5	-1,486.5	-16.3	-1.8	16.3	0.28	445,560.73	684,090.85
2,200.0	1.29	48.32	2,199.5	-1,386.5	-15.3	-0.2	15.3	0.65	445,561.66	684,092.43
2,300.0	1.13	30.50	2,299.5	-1,286.5	-13.7	1.2	13.7	0.41	445,563.26	684,093.77
2,400.0	1.14	37.52	2,399.5	-1,186.5	-12.1	2.3	12.1	0.14	445,564.90	684,094.88
2,500.0	1.07	41.36	2,499.5	-1,086.5	-10.6	3.5	10.6	0.10	445,566.39	684,096.10
2,600.0	0.99	22.58	2,599.4	-986.6	-9.1	4.5	9.1	0.35	445,567.89	684,097.05
2,700.0	1.28	42.39	2,699.4	-886.6	-7.5	5.5	7.5	0.48	445,569.51	684,098.14
2,800.0	1.49	38.57	2,799.4	-786.6	-5.6	7.1	5.7	0.23	445,571.35	684,099.70
2,900.0	1.65	35.32	2,899.4	-686.6	-3.5	8.7	3.5	0.18	445,573.55	684,101.34
3,000.0	1.61	34.11	2,999.3	-586.7	-1.1	10.4	1.2	0.05	445,575.88	684,102.96
3,100.0	1.67	28.98	3,099.3	-486.7	1.3	11.9	-1.3	0.16	445,578.32	684,104.46
3,200.0	0.95	23.51	3,199.3	-386.7	3.4	12.9	-3.3	0.73	445,580.36	684,105.49
3,300.0	1.65	23.55	3,299.2	-286.8	5.4	13.8	-5.4	0.70	445,582.44	684,106.40
3,400.0	1.71	38.02	3,399.2	-186.8	7.9	15.3	-7.8	0.43	445,584.93	684,107.89
3,500.0	1.46	44.67	3,499.1	-86.9	10.0	17.1	-9.9	0.31	445,587.01	684,109.71
3,600.0	1.18	39.41	3,599.1	13.1	11.7	18.7	-11.6	0.30	445,588.71	684,111.26
3,700.0	0.62	21.99	3,699.1	113.1	13.0	19.5	-12.9	0.62	445,590.01	684,112.11
3,800.0	1.15	64.44	3,799.1	213.1	13.9	20.6	-13.8	0.81	445,590.95	684,113.22
3,900.0	3.02	89.13	3,899.0	313.0	14.4	24.2	-14.3	2.03	445,591.42	684,116.76
4,000.0	4.47	102.09	3,998.8	412.8	13.6	30.6	-13.5	1.67	445,590.64	684,123.21
4,100.0	3.92	113.61	4,098.5	512.5	11.5	37.5	-11.2	1.00	445,588.46	684,130.15
4,200.0	3.50	128.59	4,198.3	612.3	8.2	43.1	-7.9	1.05	445,585.18	684,135.67
4,300.0	3.45	136.64	4,298.2	712.2	4.1	47.5	-3.8	0.49	445,581.09	684,140.12
4,400.0	2.87	130.02	4,398.0	812.0	0.3	51.5	0.0	0.68	445,577.30	684,144.10
4,419.0	2.61	130.71	4,417.0	831.0	-0.3	52.2	0.6	1.38	445,576.71	684,144.79
4,555.0	2.46	134.33	4,552.8	966.8	-4.4	56.6	4.7	0.16	445,572.65	684,149.23
4,650.0	1.14	122.43	4,647.8	1,061.8	-6.3	58.9	6.6	1.44	445,570.72	684,151.49



Pathfinder
Pathfinder X & Y Report



Company: COG Operating LLC
Project: Eddy County(NAD27)
Site: Canvasback 13 Federal
Well: #1H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #1H
TVD Reference: KB = 17' @ 3586 0usft
MD Reference: KB = 17' @ 3586 0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000 1 Single User Db

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
4,744 0	0 53	223.16	4,741 8	1,155 8	-7.1	59 4	7 4	1.43	445,569.90	684,151 98
4,839 0	0 79	253 68	4,836 8	1,250 8	-7 6	58 4	7 9	0 45	445,569 39	684,151 05
4,934.0	0 53	238 05	4,931.8	1,345 8	-8 0	57 4	8 4	0 33	445,568 98	684,150 05
5,029 0	1 93	268.95	5,026 8	1,440 8	-8.3	55 5	8.6	1 58	445,568 71	684,148 07
5,124 0	1 76	266.33	5,121 7	1,535 7	-8.4	52.4	8 7	0.20	445,568 59	684,145 02
5,315.0	1.85	272 58	5,312 6	1,726.6	-8.5	46 4	8 7	0 11	445,568 54	684,139 01
5,507 0	1.58	286 91	5,504.5	1,918 5	-7 5	40.8	7 8	0 26	445,569.45	684,133.38
5,697 0	1 67	282 27	5,694 4	2,108 4	-6.2	35 6	6 4	0 08	445,570 80	684,128 17
5,889 0	1.41	276 24	5,886 4	2,300 4	-5 3	30.5	5 5	0 16	445,571 65	684,123.09
6,079 0	1 41	291 42	6,076 3	2,490 3	-4 2	26 0	4 4	0 20	445,572 76	684,118 59
6,270 0	1 76	280 93	6,267 2	2,681 2	-2 8	20 9	2 9	0 24	445,574 18	684,113 52
6,461 0	1 49	282 61	6,458 2	2,872 2	-1 7	15.6	1 8	0 14	445,575 27	684,108 22
6,651.0	1 23	281 78	6,648.1	3,062 1	-0 8	11 2	0 8	0 14	445,576 23	684,103.81
6,842 0	1 58	260 29	6,839 1	3,253 1	-0 8	6 6	0 8	0.33	445,576 20	684,099.21
6,938 0	1 93	267 81	6,935.0	3,349 0	-1 1	3 7	1 1	0 44	445,575 92	684,096 29
7,033 0	0 62	217 06	7,030 0	3,444 0	-1 6	1 8	1 6	1 70	445,575.45	684,094.38
7,128 0	0 62	190 33	7,125.0	3,539.0	-2 5	1 4	2 5	0 30	445,574 53	684,093.98
7,319.0	0 53	156 15	7,316 0	3,730 0	-4 3	1 6	4 3	0 18	445,572 71	684,094.15
7,508 0	0 62	182 09	7,505.0	3,919 0	-6 1	1 9	6 1	0 14	445,570 89	684,094 47
7,698.0	0 79	185 75	7,695 0	4,109 0	-8 4	1 7	8 5	0 09	445,568 56	684,094.30
7,730 0	0 88	176 78	7,727 0	4,141 0	-8 9	1 7	8 9	0 50	445,568 09	684,094.29
7,762.0	0 88	197 46	7,758 9	4,172 9	-9 4	1 6	9 4	0 99	445,567 61	684,094 23
7,794.0	1 41	213 91	7,790.9	4,204 9	-9 9	1 3	10 0	1 93	445,567 05	684,093 94
7,825 0	3 69	193 58	7,821.9	4,235 9	-11 2	0 9	11 2	7 80	445,565 76	684,093.49
7,857 0	6 68	187 72	7,853 8	4,267.8	-14 1	0 4	14 1	9 48	445,562.92	684,093 00
7,889 0	9 58	185 28	7,885 5	4,299 5	-18 6	-0 1	18 6	9 12	445,558 42	684,092 50
7,921 0	12 57	183 51	7,916 9	4,330 9	-24 7	-0 6	24.7	9 40	445,552 29	684,092 05



Pathfinder
Pathfinder X & Y Report



Company: COG Operating LLC
Project: Eddy County(NAD27)
Site: Canvasback 13 Federal
Well: #1H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #1H
TVD Reference: KB = 17' @ 3586.0usft
MD Reference: KB = 17' @ 3586.0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000 1 Single User Db

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
7,953.0	15.48	183.84	7,947.9	4,361.9	-32.4	-1.1	32.4	9.10	445,544.55	684,091.55
7,985.0	19.17	183.74	7,978.4	4,392.4	-42.0	-1.7	41.9	11.53	445,535.05	684,090.92
8,016.0	23.65	184.24	8,007.3	4,421.3	-53.2	-2.5	53.2	14.46	445,523.76	684,090.12
8,048.0	27.96	184.08	8,036.1	4,450.1	-67.1	-3.5	67.1	13.47	445,509.87	684,089.12
8,080.0	31.57	183.56	8,063.9	4,477.9	-83.0	-4.5	82.9	11.31	445,494.02	684,088.06
8,112.0	34.12	182.36	8,090.7	4,504.7	-100.3	-5.4	100.3	8.22	445,476.69	684,087.17
8,143.0	37.11	180.67	8,115.9	4,529.9	-118.3	-5.9	118.3	10.15	445,458.65	684,086.70
8,175.0	40.01	178.92	8,141.0	4,555.0	-138.3	-5.8	138.3	9.68	445,438.71	684,086.79
8,207.0	42.38	178.01	8,165.0	4,579.0	-159.4	-5.2	159.3	7.64	445,417.64	684,087.35
8,239.0	45.11	178.79	8,188.2	4,602.2	-181.5	-4.6	181.4	8.70	445,395.53	684,087.97
8,271.0	48.80	178.22	8,210.0	4,624.0	-204.8	-4.0	204.8	11.60	445,372.15	684,088.58
8,302.0	52.67	179.70	8,229.6	4,643.6	-228.8	-3.6	228.8	13.02	445,348.16	684,089.01
8,334.0	55.84	178.97	8,248.3	4,662.3	-254.8	-3.3	254.8	10.08	445,322.19	684,089.31
8,366.0	59.53	179.18	8,265.4	4,679.4	-281.8	-2.9	281.8	11.54	445,295.16	684,089.75
8,398.0	63.66	179.42	8,280.6	4,694.6	-310.0	-2.5	310.0	12.92	445,267.02	684,090.09
8,430.0	66.65	179.26	8,294.1	4,708.1	-339.0	-2.2	339.0	9.35	445,237.99	684,090.43
8,461.0	69.64	180.20	8,305.6	4,719.6	-367.8	-2.0	367.8	10.05	445,209.22	684,090.56
8,493.0	74.04	180.34	8,315.6	4,729.6	-398.2	-2.2	398.2	13.76	445,178.82	684,090.42
8,557.0	79.93	181.02	8,330.0	4,744.0	-460.5	-2.9	460.5	9.26	445,116.50	684,089.67
8,620.0	80.64	179.98	8,340.6	4,754.6	-522.6	-3.5	522.6	1.98	445,054.40	684,089.13
8,684.0	81.25	179.30	8,350.7	4,764.7	-585.8	-3.1	585.8	1.42	444,991.20	684,089.53
8,716.0	81.34	179.50	8,355.5	4,769.5	-617.4	-2.7	617.4	0.68	444,959.57	684,089.86
8,747.0	83.71	179.46	8,359.6	4,773.6	-648.2	-2.5	648.1	7.65	444,928.84	684,090.14
8,779.0	86.88	179.29	8,362.2	4,776.2	-680.0	-2.1	680.0	9.92	444,896.95	684,090.49
8,843.0	88.99	179.40	8,364.5	4,778.5	-744.0	-1.4	744.0	3.30	444,833.00	684,091.22
8,938.0	88.81	179.44	8,366.3	4,780.3	-839.0	-0.4	839.0	0.19	444,738.03	684,092.18
9,033.0	90.48	180.23	8,366.9	4,780.9	-934.0	-0.1	934.0	1.94	444,643.03	684,092.45



Pathfinder
Pathfinder X & Y Report



Company: COG Operating LLC
Project: Eddy County(NAD27)
Site: Canvasback 13 Federal
Well: #1H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #1H
TVD Reference: KB = 17' @ 3586 0usft
MD Reference: KB = 17' @ 3586 0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000 1 Single User Db

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
9,161 0	89.78	179.60	8,366 6	4,780 6	-1,062.0	0 0	1,061 9	0.74	444,515 03	684,092 64
9,256 0	90.92	182 16	8,366 0	4,780 0	-1,156 9	-1 4	1,156.9	2 95	444,420 06	684,091.18
9,351 0	90 75	181 49	8,364.7	4,778 7	-1,251.9	-4.4	1,251 8	0 73	444,325.11	684,088 16
9,447 0	89.87	179 25	8,364 1	4,778 1	-1,347 9	-5 1	1,347 8	2.51	444,229.13	684,087 54
9,542 0	89.34	177 15	8,364 8	4,778.8	-1,442.8	-2 1	1,442 8	2 28	444,134.18	684,090 52
9,637.0	89 34	176 05	8,365 9	4,779 9	-1,537 6	3 6	1,537 6	1 16	444,039 36	684,096.16
9,732.0	90 66	176 62	8,365 9	4,779 9	-1,632 4	9.6	1,632 5	1 51	443,944 55	684,102.23
9,828 0	91.01	175 87	8,364 5	4,778 5	-1,728 2	15.9	1,728.3	0 86	443,848 77	684,108 51
9,891 0	89 25	176.97	8,364 3	4,778.3	-1,791.1	19 8	1,791 2	3 29	443,785 90	684,112 45
9,986.0	88 46	179.16	8,366.2	4,780.2	-1,886 0	23 1	1,886 1	2.45	443,690.98	684,115 65
10,082 0	88 37	179 48	8,368 9	4,782.9	-1,982 0	24 2	1,982 1	0 35	443,595.02	684,116.79
10,177.0	89 34	180 60	8,370 8	4,784 8	-2,077.0	24.1	2,077 1	1 56	443,500 04	684,116 73
10,272 0	88 46	180 14	8,372.6	4,786 6	-2,171 9	23 5	2,172 0	1 05	443,405.06	684,116 11
10,367.0	87 76	181 71	8,375 8	4,789.8	-2,266 9	22 0	2,267 0	1 81	443,310.13	684,114 58
10,462 0	88 72	182 82	8,378 7	4,792 7	-2,361.7	18 2	2,361.8	1 54	443,215 25	684,110 83
10,557 0	88.81	183 54	8,380 7	4,794.7	-2,456 6	13.0	2,456 6	0 76	443,120 42	684,105 56
10,652 0	91.80	183 44	8,380 2	4,794 2	-2,551 4	7 2	2,551 4	3 15	443,025 61	684,099 78
10,747 0	92 07	183 04	8,377 0	4,791.0	-2,646 2	1.8	2,646.2	0.51	442,930 81	684,094 41
10,842.0	91.63	181 18	8,373 9	4,787 9	-2,741.1	-1 7	2,741 0	2 01	442,835 93	684,090 92
10,938 0	90.31	178 59	8,372.3	4,786 3	-2,837 0	-1.5	2,837 0	3 03	442,739 96	684,091 11
11,033 0	90 04	180 33	8,372 0	4,786 0	-2,932 0	-0 6	2,932 0	1 85	442,644 96	684,092.00
11,128 0	90.40	179.31	8,371 7	4,785.7	-3,027 0	-0 3	3,027 0	1.14	442,549 97	684,092 30
11,223 0	90 66	182 10	8,370 8	4,784.8	-3,122 0	-1 5	3,122 0	2 95	442,454 99	684,091 13
11,318 0	90 57	182.06	8,369 8	4,783 8	-3,216 9	-4 9	3,216 9	0.10	442,360 06	684,087 69
11,381.0	90 40	180 37	8,369.2	4,783 2	-3,279 9	-6 2	3,279 8	2 70	442,297.07	684,086.35
11,476 0	89.52	178.60	8,369 3	4,783 3	-3,374 9	-5.4	3,374 8	2 08	442,202 08	684,087 20
11,571.0	89.34	177 95	8,370 2	4,784.2	-3,469 9	-2 5	3,469 8	0 71	442,107 13	684,090.06



Pathfinder
Pathfinder X & Y Report



Company: COG Operating LLC
Project: Eddy County(NAD27)
Site: Canvasback 13 Federal
Well: #1H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #1H
TVD Reference: KB = 17' @ 3586 0usft
MD Reference: KB = 17' @ 3586 0usft
North Reference: Grd
Survey Calculation Method: Minimum Curvature
Database: EDM 5000 1 Single User Db

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	Northing (usft)	Easting (usft)
11,667.0	90.04	177.49	8,370.8	4,784.8	-3,565.8	1.3	3,565.7	0.87	442,011.21	684,093.88
11,762.0	91.19	177.70	8,369.7	4,783.7	-3,660.7	5.3	3,660.7	1.23	441,916.30	684,097.87
11,857.0	90.57	177.90	8,368.3	4,782.3	-3,755.6	8.9	3,755.6	0.69	441,821.38	684,101.52
11,953.0	89.78	178.42	8,368.0	4,782.0	-3,851.6	12.0	3,851.6	0.99	441,725.43	684,104.60
12,048.0	90.13	177.76	8,368.1	4,782.1	-3,946.5	15.2	3,946.5	0.79	441,630.49	684,107.76
12,143.0	87.85	177.67	8,369.7	4,783.7	-4,041.4	19.0	4,041.5	2.40	441,535.58	684,111.55
12,239.0	87.93	178.08	8,373.3	4,787.3	-4,137.3	22.5	4,137.3	0.43	441,439.71	684,115.11
12,334.0	86.97	177.85	8,377.5	4,791.5	-4,232.1	25.9	4,232.2	1.04	441,344.87	684,118.48
12,430.0	88.99	178.13	8,380.9	4,794.9	-4,328.0	29.2	4,328.1	2.12	441,248.99	684,121.84
12,525.0	88.11	176.91	8,383.3	4,797.3	-4,422.9	33.4	4,423.0	1.58	441,154.12	684,125.95
12,620.0	88.64	177.66	8,386.0	4,800.0	-4,517.7	37.8	4,517.9	0.97	441,059.26	684,130.45
12,666.0	88.55	177.41	8,387.1	4,801.1	-4,563.7	39.8	4,563.8	0.58	441,013.32	684,132.43
12,712.0	88.55	177.41	8,388.3	4,802.3	-4,609.6	41.9	4,609.8	0.00	440,967.38	684,134.51

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
7,794.0	7,790.9	-9.9	1.3	KOP - 7794.0 'MD, 7790.9 'TVD, 213.91 'AZI, 1.41 'INC, -9.9 'N, 1.3 'E
10,652.0	8,380.2	-2,551.4	7.2	LP - 10652.0 'MD, 8380.2 'TVD, 183.44 'AZI, 91.80 'INC, -2551.4 'N, 7.2 'E
12,712.0	8,388.3	-4,609.6	41.9	BHL - 12712.0 'MD, 8388.3 'TVD, 177.41 'AZI, 88.55 'INC, -4609.6 'N, 41.9 'E

Checked By: _____ Approved By: _____ Date: _____



Project: Eddy County(NAD27)
Site: Canvasback 13 Federal
Well: #1H
Wellbore: OH
Plan: Plan #5 (#1H/OH)



Azimuths to Grid North
True North: -0.32°
Magnetic North: 7.29°

Magnetic Field
Strength: 48550.2snT
Dip Angle: 60.15°
Date: 12/2/2011
Model: IGRF2010

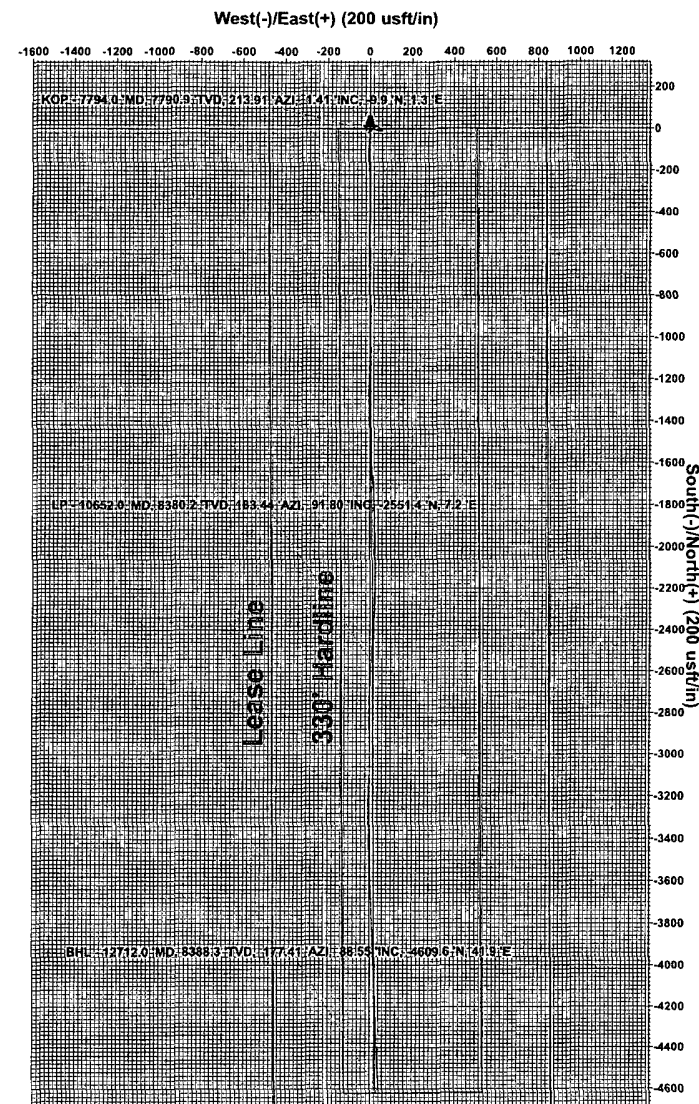
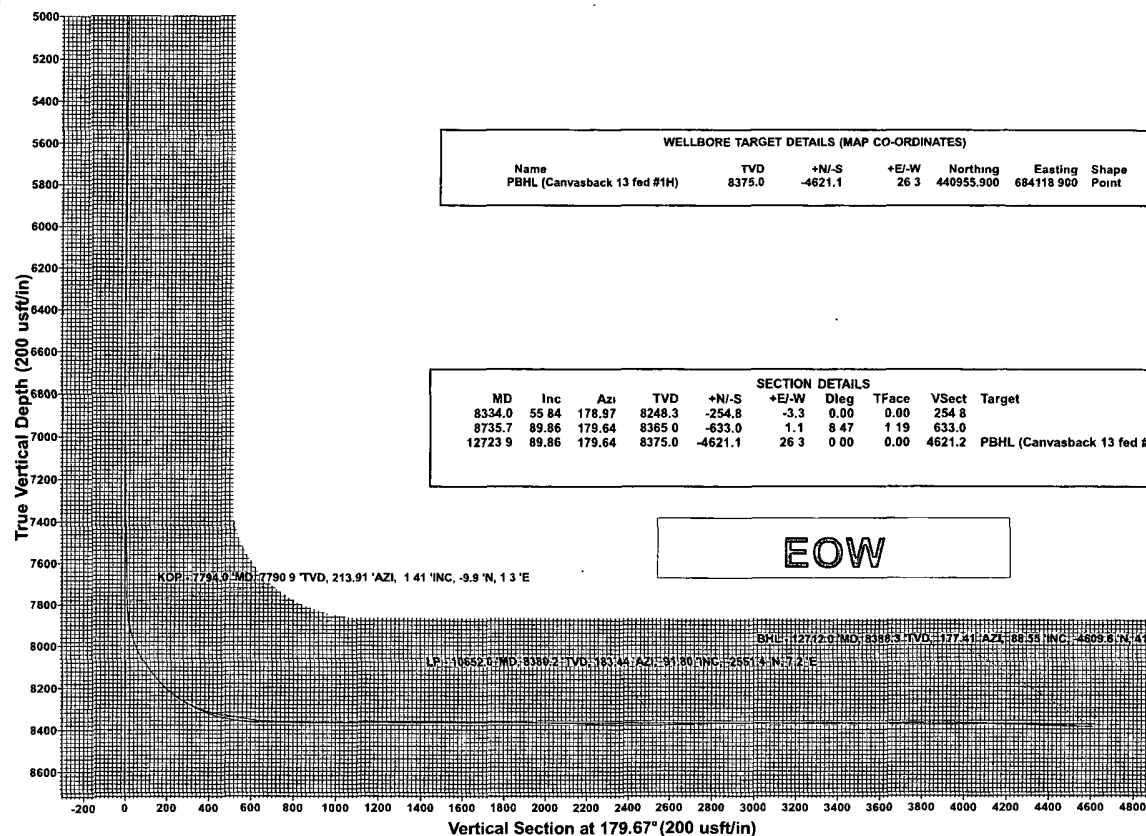
PATHFINDER
A Schlumberger Company

PROJECT DETAILS: Eddy County(NAD27)
Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level
Local North: Grid

WELL DETAILS: #1H						
Ground Elevation: 3569.0						
RKB Elevation: KB = 17' @ 3586.0usft						
Rig Name:						
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	445577.000	684092.600	32°13' 24.983 N	103°44' 16.913 W	

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
PBHL (Canvasback 13 fed #1H)	8375.0	-4621.1	26.3	440955.900	684118.900	Point

SECTION DETAILS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
8334.0	55.84	178.97	8248.3	-254.8	-3.3	0.00	0.00	254.8	
8735.7	89.86	179.64	8365.0	-633.0	1.1	8.47	1.19	633.0	
12723.9	89.86	179.64	8375.0	-4621.1	26.3	0.00	0.00	4621.2	PBHL (Canvasback 13 fed #1H)



Plan Plan #5 (#1H/OH)			
Created By: Michael Trout	Date: 9/26, February 03 2012	COO Operating LLC Eddy County(NAD27) Canvasback 13 Federal #1H Plan #5	
Checked: _____	Date: _____		