

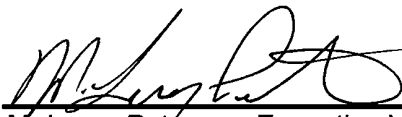
30-015-39191

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

**STATE OF NEW MEXICO
DEVIATION REPORT**

<u>Depth</u>	<u>Deviation</u>	<u>Depth</u>	<u>Deviation</u>
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		

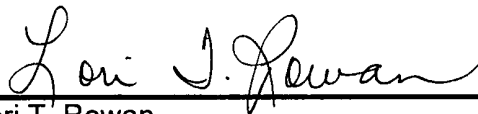
Patriot Drilling, LLC



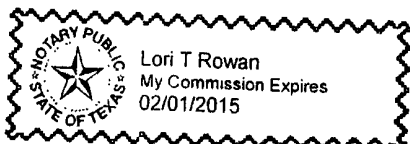
M. Leroy Peterson, Executive Vice-
President

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

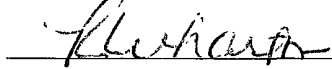
Canvasback "13" Federal #1H

VH - Job #32K0112072

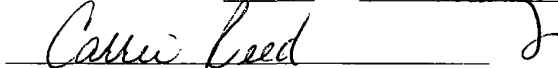
Survey: Gyro

SDI Standard Survey Report

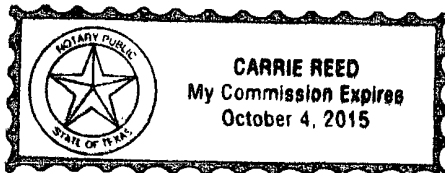
This survey is correct to the best of my knowledge and is supported by actual field data.



Notarized this date 17th of February, 2012.



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

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

Wellbore	VH - Job #32K0112072		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	1/21/2012	(°)
			7 59
		Dip Angle	(°)
		60 14	
		Field Strength	(nT)
			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
	(usft)	(usft)	(usft)
	0 0	0 0	0 0
		Direction	(°)
		179 67	

Survey Program	Date: 2/17/2012		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
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	
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

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

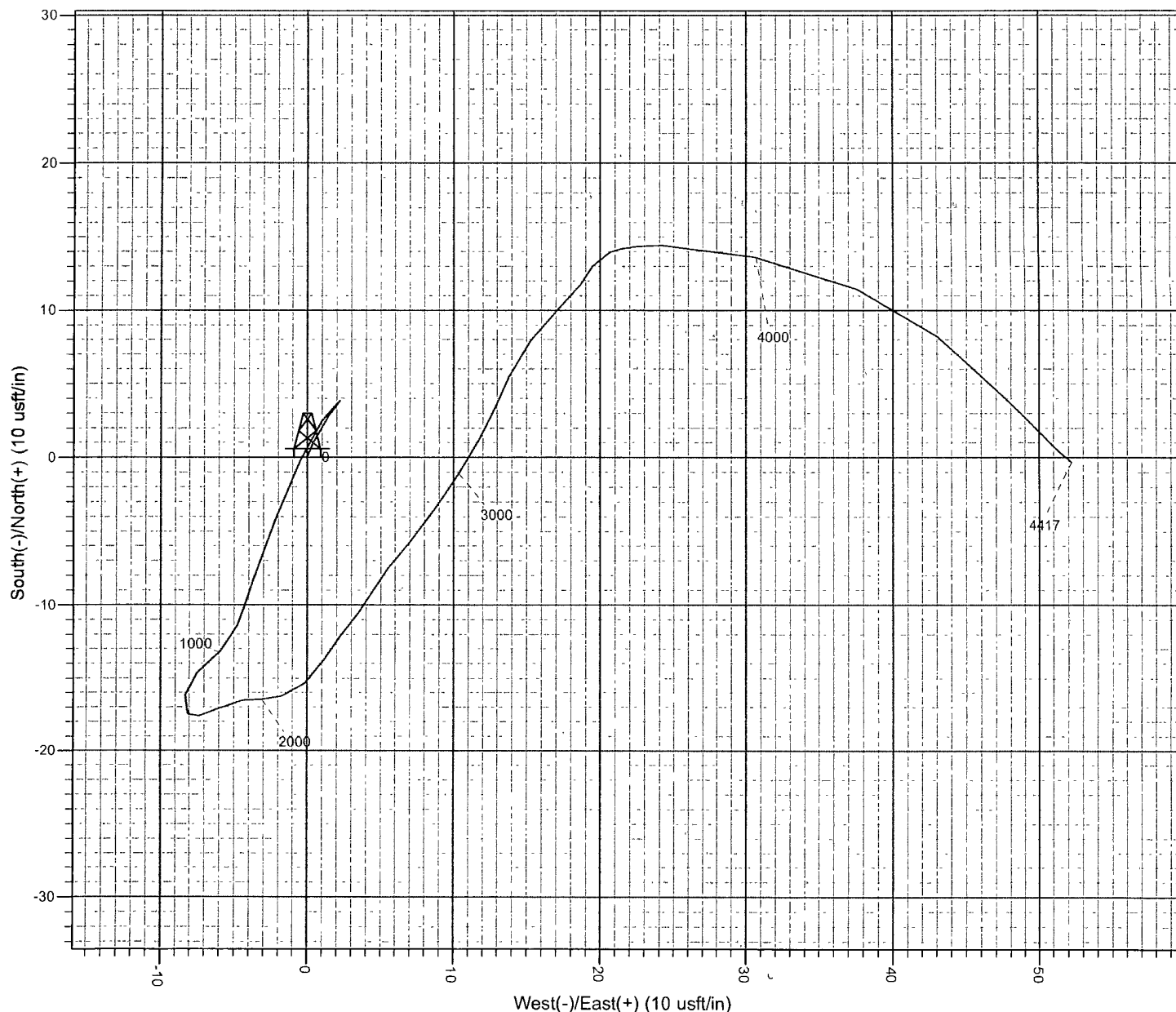


Azimuths to Grid North
True North -0 32°
Magnetic North 7 27°

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



A Schlumberger Company



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

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

Project	Eddy County(NAD27)		
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	Canvasback 13 Federal		
Site Position:		Northing:	445,577 000 usft
From:	Map	Easting:	684,092 600 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 13' 24 983 N
		Longitude:	103° 44' 16 913 W
		Grid Convergence:	0 32 °

Well:	#1H		
Well Position	+N/-S	0 0 usft	Northing:
	+E/-W	0 0 usft	Easting:
Position Uncertainty	0 0 usft	Wellhead Elevation:	usft
		Latitude:	32° 13' 24 983 N
		Longitude:	103° 44' 16 913 W
		Ground Level:	3,569 0 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	12/2/2011	(°)
			7 61
			Dip Angle
			(°)
			60 15
			Field Strength
			(nT)
			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
	(usft)	(usft)	(usft)
	0 0	0 0	0 0
			Direction
			(°)
			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

Survey											
MD (usft)	Incl (°)	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

PATHFINDER
A Schlumberger Company

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)	
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

PATHFINDER
A Schlumberger Company

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)	
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

PATHFINDER
A Schlumberger Company

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

PATHFINDER
A Schlumberger Company

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

Local Co-ordinate Reference:
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)
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

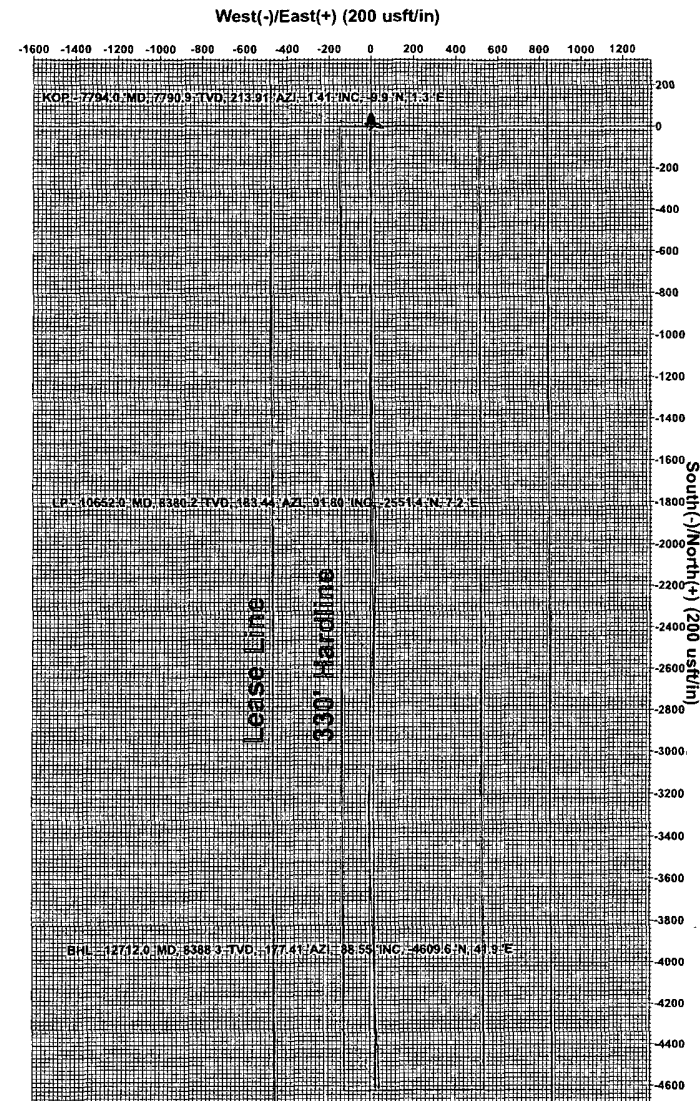
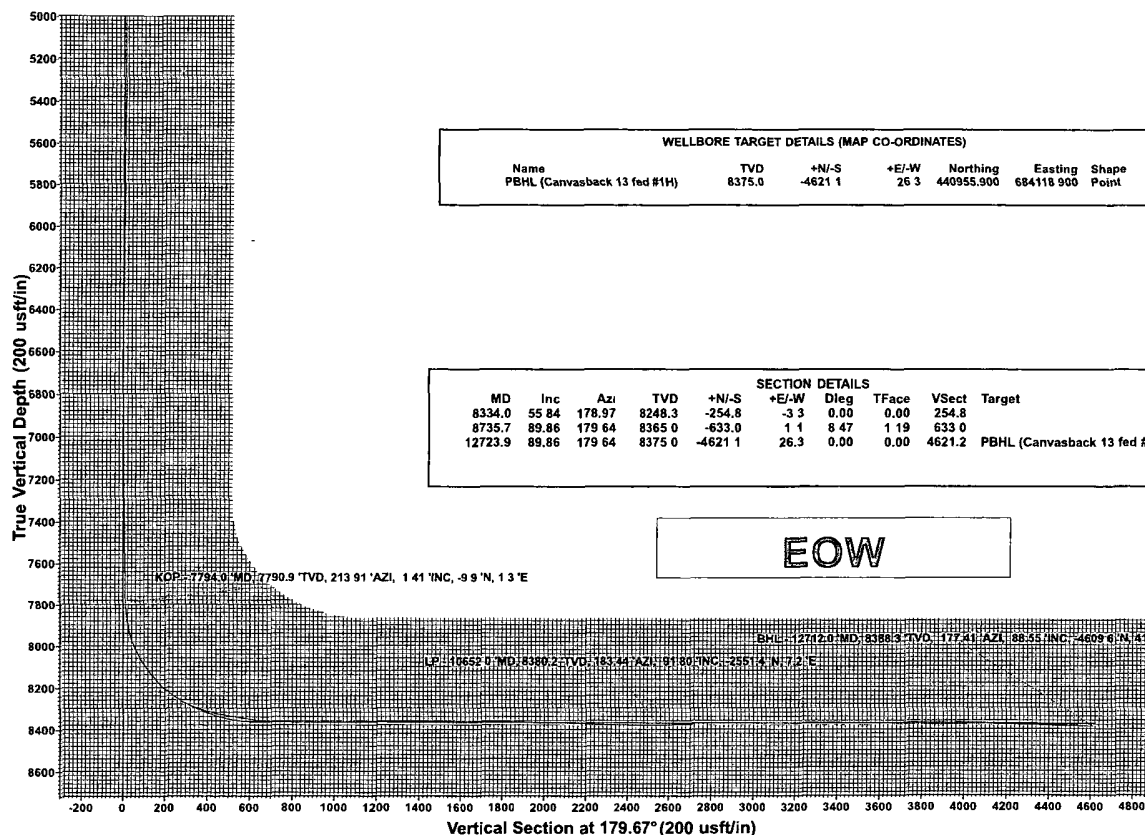
PATHFINDER
 A Schlumberger Company

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°13'24.93"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
Checked		Date	

COO Operating LLC
 Safety Compliance/OSHA
 Canvasback 13 Federal
 #1H
 OH
 Plan #5