



COG OPERATIONS, LLC

RECEIVED

OCT 11 2013

ARTESIA WEST

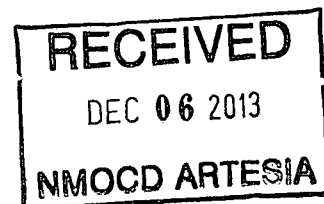
PO Box 1370
Artesia, NM 88211-1370
(575) 748-1288

September 16, 2013

COG, LLC
One Concho Center
600 W. Illinois Ave.
Midland, TX 79701

30-015-41529

RE: Canvasback 13 Federal #3H
190' FNL & 1470' FEL
Sec. 13, T24S, R31E
Eddy County, New Mexico



Dear Sir,

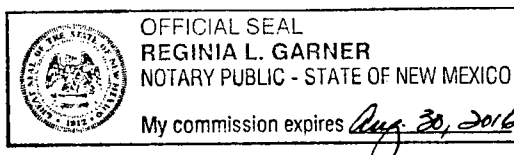
The attached is the Deviation Survey for the above captioned well.

Very truly yours,

Eddie LaRue
Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 16th day of September, 2013.

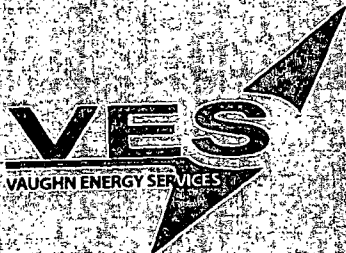
Notary Public

Canvasback 13 Federal 3H

Date	Depth	Deviation	Direction	TVD	Horiz
8/21/2013	206	0.30			
8/21/2013	441	0.40			
8/21/2013	683	0.50			
8/21/2013	818	0.60			
8/24/2013	929	1.50			
8/24/2013	1032	1.30			
8/24/2013	1143	1.00			
8/24/2013	1237	1.20			
8/24/2013	1421	1.00			
8/24/2013	1754	0.20			
8/24/2013	1938	0.70			
8/24/2013	2122	0.40			
8/24/2013	2313	0.00			
8/25/2013	2502	0.30			
8/25/2013	2693	0.20			
8/25/2013	3074	0.10			
8/26/2013	3298	0.90			
8/26/2013	3489	0.20			
8/26/2013	3682	0.10			
8/26/2013	3904	0.40			
8/27/2013	4059	0.30			
8/27/2013	4250	1.00			
8/27/2013	4432	0.60			
8/30/2013	4662	0.30			
8/30/2013	4880	0.60			
8/30/2013	5320	0.70			
8/30/2013	5746	0.40			
8/30/2013	6235	0.00			
8/31/2013	6677	0.10			
8/31/2013	7115	0.50			
9/1/2013	7498	0.80	2608.00	7497.00	34.00
9/2/2013	7625	0.70	211.20	7624.65	35.54
9/2/2013	7782	0.30	154.60	7781.65	36.78
9/2/2013	7846	2.00	163.20	7844.64	37.46
9/2/2013	7908	7.20	173.20	7907.00	42.00
9/2/2013	7972	10.80	182.50	7970.00	52.00
9/2/2013	8098	23.00	176.20	8091.00	88.00
9/2/2013	8130	26.40	177.90	8120.30	101.41
9/2/2013	8162	29.80	178.60	8148.53	116.47
9/2/2013	8193	32.20	178.30	8175.10	132.45
9/3/2013	8225	35.40	177.60	8201.00	150.00
9/3/2013	8289	46.10	177.60	8250.00	191.00
9/3/2013	8352	57.20	176.50	8289.00	241.00

Date	Depth	Deviation	Direction	TVD	Horiz
9/3/2013	8384	62.20	174.90	8305.18	268.76
9/3/2013	8416	67.70	174.90	8318.72	297.64
9/4/2013	8464	75.50	177.60	8333.00	343.00
9/4/2013	8558	79.70	180.00	8354.00	434.00
9/4/2013	8653	85.80	181.40	8365.00	528.00
9/4/2013	8684	86.70	181.30	8367.93	
9/4/2013	8779	89.40	182.70	8371.15	
9/4/2013	8875	88.60	182.70	8392.83	750.56
9/4/2013	8970	89.00	182.50	8374.80	845.42
9/4/2013	9064	92.80	182.00	8373.34	939.29
9/5/2013	9159	90.60	181.60	8370.52	134.18
9/5/2013	9254	89.50	181.10	8370.44	1129.13
9/5/2013	9349	89.80	181.10	8371.02	1224.10
9/5/2013	9444	89.40	180.20	8371.00	1319.00
9/5/2013	9538	8.80	179.50	8373.00	1413.00
9/5/2013	9633	86.30	178.80	8377.00	1507.00
9/5/2013	9728	89.30	179.20	8381.69	1602.85
9/5/2013	9822	89.20	179.00	8383.74	1696.83
9/5/2013	9916	91.50	179.30	8383.17	1790.82
9/5/2013	10011	89.40	179.20	838.42	1885.80
9/6/2013	10107	89.80	180.70	8383.09	1981.80
9/6/2013	10201	90.30	182.10	8383.01	2075.75
9/6/2013	10296	88.40	182.50	8384.09	2170.64
9/6/2013	10392	87.70	179.90	8387.36	2264.54
9/6/2013	10486	92.40	180.60	8387.27	2360.51
9/6/2013	10582	90.40	179.90	8384.93	2456.47
9/6/2013	10676	89.50	179.50	8385.01	2550.47
9/6/2013	10771	90.00	179.70	8385.42	2645.47
9/6/2013	10865	88.30	179.00	8386.82	2739.45
9/6/2013	10960	88.10	178.80	8389.80	2834.39
9/7/2013	11056	90.00	178.60	8391.40	2930.36
9/7/2013	11150	89.20	178.60	8392.05	3024.35
9/7/2013	11244	89.80	179.00	8392.87	3118.33
9/7/2013	11340	88.90	179.00	8393.96	3214.32
9/7/2013	11434	88.50	178.60	8396.09	3308.28
9/7/2013	11530	90.70	179.70	8396.76	3404.27
9/7/2013	11624	88.50	179.90	8397.42	3498.26
9/7/2013	11720	89.80	180.70	8398.84	3594.24
9/9/2013	11812	87.70	181.60	8400.85	3686.18
9/9/2013	11904	88.50	181.40	8403.90	3778.08
9/9/2013	11948	88.50	181.30	8405.05	3822.05
9/10/2013	12040	88.50	181.30	2407.46	3913.98
9/10/2013	12136	89.80	180.90	8408.88	4009.94
9/10/2013	12228	91.00	181.10	8408.00	4101.00
9/10/2013	12320	90.10	180.90	8407.00	4193.00

Date	Depth	Deviation	Direction	TVD	Horiz
9/10/2013	12142	91.20	181.10	8406.00	4288.00
9/10/2013	12507	90.10	181.30	8405.24	4380.80
9/10/2013	12601	90.70	180.90	8404.58	4474.77
9/11/2013	12694	89.00	181.10	8404.82	4567.74
9/11/2013	12785	88.20	181.30	8407.05	4658.68
9/11/2013	12826	88.60	181.10	8408.19	4699.65

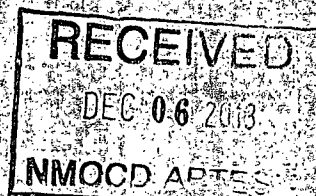


A GYRO TECHNOLOGIES INC. COMPANY

P.O. Box 261021
Corpus Christi, Texas 78426
(361) 767-0602 • (800) 606-GYRO • Fax: (361) 767-0612

September 9, 2013

Concho Resources, Inc.
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701



Attn: Kanicia Castillo

30-015-41529

RE: **Canvasback 13 Federal No. 003H**

Please find enclosed a copy of the survey from 0.00' to 7425.00' ran on the above referenced well.

Sincerely,

Keith Havelka
Operations

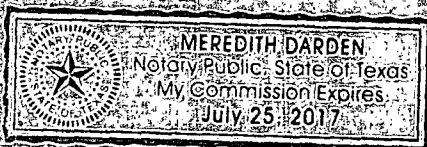
STATE OF TEXAS

COUNTY OF NUECES

§
§
§

This instrument was acknowledged before me on the 9th day of September
A.D. 2013, by Keith Havelka

Meredith Darden
Meredith Darden
Notary Public, State of Texas





Company: COG Operating, LLC (Concho)
Lease/Well: Canvasback 13 Federal /No. 003H
Location: Sec13 T24S R31E
Rig Name: Silver Oak #7
State/County: New Mexico/Eddy
Latitude: 32.22, Longitude: -103.73
GRID North is 0.32 Degrees East of True North
VS-Azi: 179.65 Degrees



Depth Reference : RKB 18 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ...back 13 fed #3h gyro-de_01.ut

Minimum Curvature Method

Report Date/Time: 9/9/2013 / 10:01

Vaughn Energy Services

West, Texas

432-563-5444

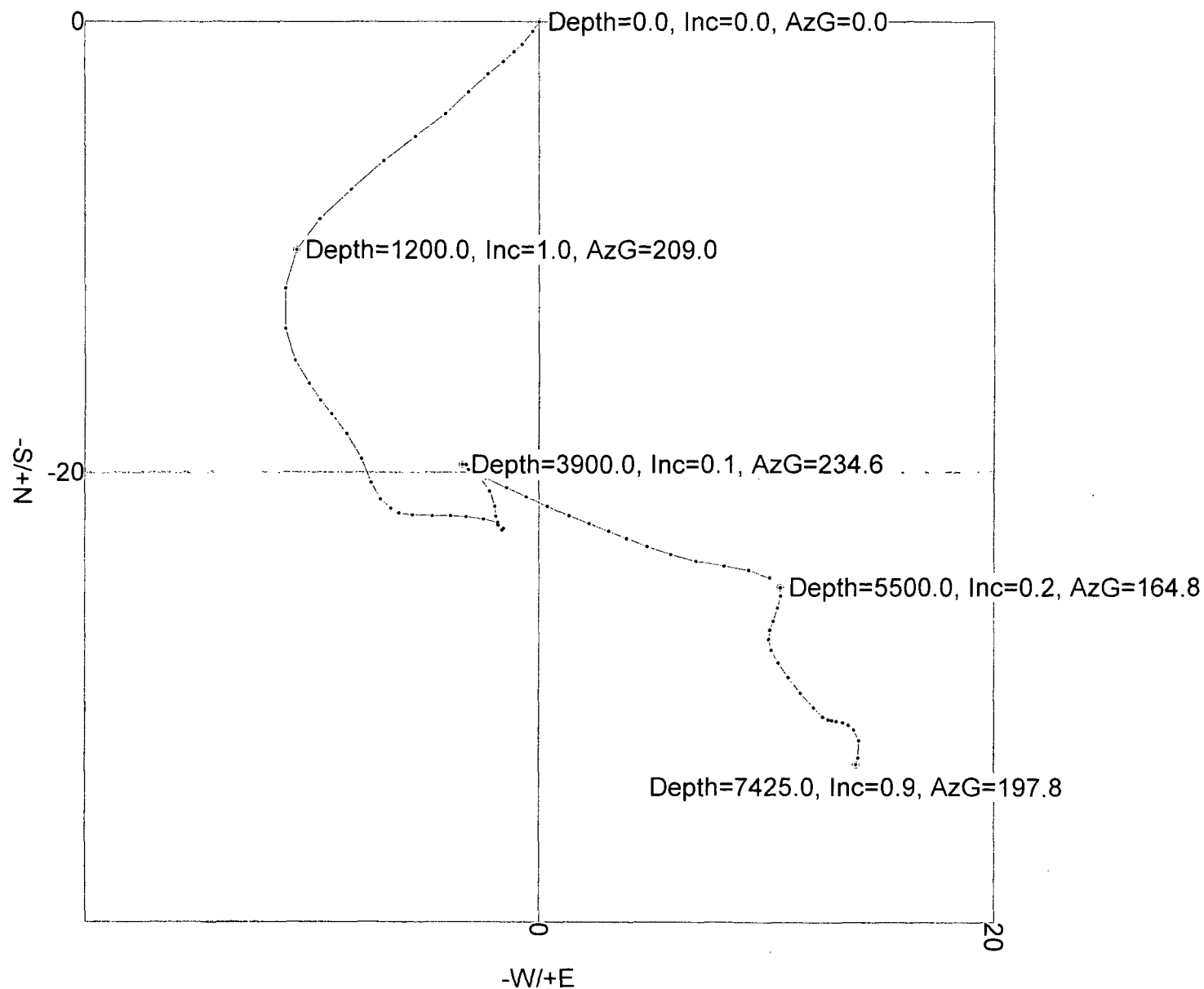
Surveyor: Chris Bankson

Canvasback 13 Federal No. 003H / API 30-015-41529

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.60	213.68	100.00	-0.43	-0.29	0.43	0.52	213.68	0.60
200.00	0.25	229.72	200.00	-1.01	-0.75	1.01	1.26	216.46	0.36
300.00	0.31	224.64	299.99	-1.34	-1.10	1.34	1.74	219.39	0.06
400.00	0.42	228.19	399.99	-1.78	-1.56	1.77	2.37	221.33	0.11
500.00	0.57	232.80	499.99	-2.32	-2.23	2.30	3.21	223.86	0.16
600.00	0.79	222.06	599.98	-3.13	-3.09	3.11	4.40	224.58	0.26
700.00	0.81	229.09	699.97	-4.11	-4.08	4.08	5.79	224.82	0.10
800.00	1.10	234.85	799.96	-5.12	-5.40	5.09	7.44	226.51	0.31
900.00	0.93	229.37	899.94	-6.20	-6.80	6.16	9.21	227.63	0.20
1000.00	1.24	228.12	999.92	-7.45	-8.22	7.40	11.10	227.81	0.31
1100.00	0.96	224.67	1099.91	-8.77	-9.62	8.71	13.01	227.63	0.29
1200.00	1.01	209.01	1199.89	-10.14	-10.63	10.07	14.69	226.36	0.27
1300.00	1.08	184.59	1299.87	-11.84	-11.13	11.78	16.26	223.23	0.45
1400.00	0.99	174.11	1399.86	-13.64	-11.12	13.57	17.60	219.19	0.21
1500.00	0.72	149.11	1499.85	-15.04	-10.71	14.98	18.46	215.45	0.46
1600.00	0.65	147.59	1599.84	-16.06	-10.08	16.00	18.96	212.11	0.07
1700.00	0.37	145.80	1699.84	-16.81	-9.59	16.75	19.36	209.71	0.28
1800.00	0.52	135.71	1799.83	-17.41	-9.09	17.35	19.64	207.58	0.17

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	0.76	147.82	1899.83	-18.30	-8.42	18.24	20.14	204.71	0.27
2000.00	0.72	151.42	1999.82	-19.41	-7.76	19.36	20.91	201.80	0.06
2100.00	0.58	167.04	2099.81	-20.46	-7.35	20.42	21.74	199.75	0.23
2200.00	0.42	132.29	2199.81	-21.21	-6.96	21.16	22.32	198.17	0.34
2300.00	0.30	129.33	2299.81	-21.62	-6.48	21.58	22.57	196.69	0.13
2400.00	0.17	107.23	2399.81	-21.83	-6.13	21.80	22.68	195.69	0.15
2500.00	0.52	95.09	2499.80	-21.92	-5.53	21.89	22.61	194.17	0.36
2600.00	0.48	90.87	2599.80	-21.97	-4.66	21.94	22.45	191.97	0.05
2700.00	0.42	88.50	2699.80	-21.96	-3.87	21.94	22.30	189.99	0.07
2800.00	0.37	98.65	2799.79	-22.00	-3.18	21.98	22.23	188.22	0.08
2900.00	0.49	96.57	2899.79	-22.10	-2.43	22.09	22.23	186.28	0.12
3000.00	0.27	117.21	2999.79	-22.26	-1.80	22.25	22.33	184.63	0.26
3100.00	0.19	164.96	3099.79	-22.52	-1.55	22.51	22.57	183.94	0.20
3200.00	0.16	308.51	3199.79	-22.59	-1.62	22.58	22.65	184.10	0.33
3300.00	0.17	334.93	3299.79	-22.36	-1.80	22.35	22.44	184.59	0.08
3400.00	0.30	354.95	3399.79	-21.97	-1.88	21.96	22.05	184.90	0.15
3500.00	0.21	349.25	3499.79	-21.53	-1.94	21.52	21.62	185.15	0.09
3600.00	0.62	340.64	3599.78	-20.84	-2.15	20.83	20.95	185.89	0.41
3700.00	0.54	309.45	3699.78	-20.04	-2.69	20.02	20.22	187.66	0.32
3800.00	0.14	300.79	3799.78	-19.67	-3.16	19.66	19.93	189.13	0.40
3900.00	0.10	234.61	3899.78	-19.67	-3.34	19.64	19.95	189.63	0.13
4000.00	0.44	117.52	3999.78	-19.90	-3.07	19.88	20.13	188.77	0.50
4100.00	0.51	114.62	4099.77	-20.26	-2.32	20.25	20.39	186.53	0.08
4200.00	0.64	116.63	4199.77	-20.70	-1.41	20.69	20.74	183.91	0.12
4300.00	0.44	114.06	4299.76	-21.10	-0.56	21.10	21.11	181.53	0.19
4400.00	0.72	115.07	4399.76	-21.53	0.36	21.53	21.53	179.04	0.28
4500.00	0.52	110.82	4499.75	-21.96	1.35	21.96	22.00	176.48	0.21
4600.00	0.56	112.22	4599.75	-22.30	2.22	22.31	22.41	174.30	0.04
4700.00	0.51	110.36	4699.74	-22.64	3.09	22.66	22.85	172.23	0.05
4800.00	0.46	113.90	4799.74	-22.96	3.88	22.98	23.28	170.42	0.05
4900.00	0.65	110.66	4899.73	-23.32	4.78	23.35	23.81	168.42	0.19
5000.00	0.61	105.97	4999.73	-23.67	5.82	23.70	24.37	166.18	0.07
5100.00	0.72	103.96	5099.72	-23.96	6.94	24.01	24.95	163.85	0.11
5200.00	0.70	97.08	5199.71	-24.19	8.15	24.24	25.53	161.39	0.09
5300.00	0.57	103.34	5299.71	-24.38	9.24	24.44	26.07	159.25	0.14
5400.00	0.55	118.41	5399.70	-24.72	10.14	24.78	26.72	157.69	0.15
5500.00	0.23	164.80	5499.70	-25.14	10.61	25.21	27.29	157.11	0.42
5600.00	0.21	191.06	5599.70	-25.51	10.63	25.58	27.64	157.38	0.10
5700.00	0.42	194.76	5699.70	-26.04	10.50	26.11	28.08	158.04	0.21

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
5800.00	0.29	202.70	5799.70	-26.63	10.31	26.69	28.56	158.83	0.14
5900.00	0.19	196.07	5899.70	-27.02	10.17	27.08	28.87	159.38	0.10
6000.00	0.28	185.21	5999.69	-27.42	10.10	27.48	29.22	159.78	0.10
6100.00	0.32	152.83	6099.69	-27.91	10.21	27.98	29.72	159.91	0.17
6200.00	0.41	148.93	6199.69	-28.47	10.52	28.54	30.36	159.72	0.09
6300.00	0.50	143.88	6299.69	-29.13	10.96	29.20	31.13	159.38	0.09
6400.00	0.51	140.60	6399.68	-29.83	11.50	29.90	31.97	158.91	0.03
6500.00	0.48	138.43	6499.68	-30.49	12.07	30.56	32.79	158.41	0.03
6600.00	0.19	126.05	6599.68	-30.90	12.48	30.98	33.33	158.00	0.30
6700.00	0.12	103.91	6699.68	-31.02	12.72	31.10	33.53	157.71	0.09
6800.00	0.05	91.92	6799.68	-31.05	12.87	31.13	33.61	157.49	0.07
6900.00	0.19	100.64	6899.68	-31.08	13.08	31.16	33.72	157.18	0.13
7000.00	0.15	111.49	6999.68	-31.16	13.36	31.24	33.91	156.79	0.05
7100.00	0.15	117.50	7099.68	-31.27	13.60	31.35	34.10	156.50	0.02
7200.00	0.22	140.56	7199.68	-31.48	13.84	31.56	34.39	156.27	0.10
7300.00	0.41	162.24	7299.68	-31.96	14.07	32.05	34.92	156.25	0.22
7400.00	0.53	196.89	7399.67	-32.74	14.04	32.82	35.62	156.79	0.30
7425.00	0.86	197.83	7424.67	-33.03	13.95	33.11	35.85	157.10	1.34



COG PRODUCTION, L.L.C.

EDDY COUNTY (NAD27)

SECTION 13

Canvasback 13 Federal #3H

Wellbore #1

Design: Wellbore #1

Standard Survey Report

11 September, 2013

Stryker Directional Survey Report

Company:	COG PRODUCTION, L.L.C.	Local Co-ordinate Reference:	Well Canvasback 13 Federal #3H
Project:	EDDY COUNTY (NAD27)	TVD Reference:	GL 3582.3 + 18 @ 3600.3usft (Silver Oak #7)
Site:	SECTION 13	MD Reference:	GL 3582.3 + 18 @ 3600.3usft (Silver Oak #7)
Well:	Canvasback 13 Federal #3H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Project:	EDDY COUNTY (NAD27), NM-East		
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:	SECTION 13				
Site Position:		Northing:	445,731.20 usft	Latitude:	32° 13' 26.325 N
From:	Map	Easting:	687,423.40 usft	Longitude:	103° 43' 38.130 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.32 °

Well	Canvasback 13 Federal #3H					
Well Position	+N/-S	0.0 usft	Northing:	445,731.20 usft	Latitude:	32° 13' 26.325 N
	+E/-W	0.0 usft	Easting:	687,423.40 usft	Longitude:	103° 43' 38.130 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft	Ground Level:	3,582.3 usft	

Wellbore:	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	9/1/2013	7.39	60.11	48,403

Design:	Wellbore #1				
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	179.65	

Survey Program:	Date 9/11/2013				
From	To	Survey (Wellbore)	Tool Name	Description	
(usft)	(usft)				
100.0	7,425.0	VES Gyro #1 (Wellbore #1)	SRG-GYRO-MS	surface readout gyro multishot	
7,498.0	12,875.0	Survey #2 (Wellbore #1)	MWD	MWD - Standard	

Survey:										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn	
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate	
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
100.0	0.60	213.68	100.0	-0.4	-0.3	0.4	0.60	0.60	0.00	
200.0	0.25	229.72	200.0	-1.0	-0.7	1.0	0.37	-0.35	16.04	
300.0	0.31	224.64	300.0	-1.3	-1.1	1.3	0.06	0.06	-5.08	
400.0	0.42	228.19	400.0	-1.8	-1.6	1.8	0.11	0.11	3.55	
500.0	0.57	232.80	500.0	-2.3	-2.2	2.3	0.16	0.15	4.61	
600.0	0.79	222.06	600.0	-3.1	-3.1	3.1	0.25	0.22	-10.74	
700.0	0.81	229.09	700.0	-4.1	-4.1	4.1	0.10	0.02	7.03	
800.0	1.10	234.85	800.0	-5.1	-5.4	5.1	0.31	0.29	5.76	
900.0	0.93	229.37	899.9	-6.2	-6.8	6.2	0.20	-0.17	-5.48	

Stryker Directional Survey Report

Company:	COG PRODUCTION, L.L.C.	Local Co-ordinate Reference:	Well Canvasback 13 Federal #3H
Project:	EDDY COUNTY (NAD27)	TVD Reference:	GL 3582.3 + 18 @ 3600.3usft (Silver Oak #7)
Site:	SECTION 13	MD Reference:	GL 3582.3 + 18 @ 3600.3usft (Silver Oak #7)
Well:	Canvasback 13 Federal #3H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	N-S (usft)	E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,000.0	1.24	228.12	999.9	-7.5	-8.2	7.4	0.31	0.31	-1.25
1,100.0	0.96	224.67	1,099.9	-8.8	-9.6	8.7	0.29	-0.28	-3.45
1,200.0	1.01	209.01	1,199.9	-10.1	-10.6	10.1	0.27	0.05	-15.66
1,300.0	1.08	184.59	1,299.9	-11.9	-11.1	11.8	0.45	0.07	-24.42
1,400.0	0.99	174.11	1,399.9	-13.7	-11.1	13.6	0.21	-0.09	-10.48
1,500.0	0.72	149.11	1,499.8	-15.1	-10.7	15.0	0.45	-0.27	-25.00
1,600.0	0.65	147.59	1,599.8	-16.1	-10.1	16.0	0.07	-0.07	-1.52
1,700.0	0.37	145.80	1,699.8	-16.8	-9.6	16.8	0.28	-0.28	-1.79
1,800.0	0.52	135.71	1,799.8	-17.4	-9.1	17.4	0.17	0.15	-10.09
1,900.0	0.76	147.82	1,899.8	-18.3	-8.4	18.2	0.27	0.24	12.11
2,000.0	0.72	151.42	1,999.8	-19.4	-7.8	19.4	0.06	-0.04	3.60
2,100.0	0.58	167.04	2,099.8	-20.5	-7.4	20.4	0.22	-0.14	15.62
2,200.0	0.42	132.29	2,199.8	-21.2	-7.0	21.2	0.34	-0.16	-34.75
2,300.0	0.30	129.33	2,299.8	-21.6	-6.5	21.6	0.12	-0.12	-2.96
2,400.0	0.17	107.23	2,399.8	-21.8	-6.2	21.8	0.16	-0.13	-22.10
2,500.0	0.52	95.09	2,499.8	-21.9	-5.6	21.9	0.36	0.35	-12.14
2,600.0	0.48	90.87	2,599.8	-21.9	-4.7	21.9	0.05	-0.04	-4.22
2,700.0	0.42	88.50	2,699.8	-21.9	-3.9	21.9	0.06	-0.06	-2.37
2,800.0	0.37	98.65	2,799.8	-22.0	-3.2	22.0	0.09	-0.05	10.15
2,900.0	0.49	96.57	2,899.8	-22.1	-2.5	22.1	0.12	0.12	-2.08
3,000.0	0.27	117.21	2,999.8	-22.2	-1.9	22.2	0.26	-0.22	20.64
3,100.0	0.19	164.96	3,099.8	-22.5	-1.6	22.5	0.20	-0.08	47.75
3,200.0	0.16	308.51	3,199.8	-22.6	-1.7	22.6	0.33	-0.03	143.55
3,300.0	0.17	334.93	3,299.8	-22.4	-1.8	22.3	0.08	0.01	26.42
3,400.0	0.30	354.95	3,399.8	-22.0	-1.9	22.0	0.15	0.13	20.02
3,500.0	0.21	349.25	3,499.8	-21.5	-2.0	21.5	0.09	-0.09	-5.70
3,600.0	0.62	340.64	3,599.8	-20.8	-2.2	20.8	0.41	0.41	-8.61
3,700.0	0.54	309.45	3,699.8	-20.0	-2.7	20.0	0.32	-0.08	-31.19
3,800.0	0.14	300.79	3,799.8	-19.7	-3.2	19.6	0.40	-0.40	-8.66
3,900.0	0.10	234.61	3,899.8	-19.6	-3.4	19.6	0.14	-0.04	-66.18
4,000.0	0.44	117.52	3,999.8	-19.9	-3.1	19.9	0.49	0.34	-117.09
4,100.0	0.51	114.62	4,099.8	-20.2	-2.4	20.2	0.07	0.07	-2.90
4,200.0	0.64	116.63	4,199.8	-20.7	-1.5	20.7	0.13	0.13	2.01
4,300.0	0.44	114.06	4,299.8	-21.1	-0.6	21.1	0.20	-0.20	-2.57
4,400.0	0.72	115.07	4,399.8	-21.5	0.3	21.5	0.28	0.28	1.01
4,500.0	0.52	110.82	4,499.8	-21.9	1.3	21.9	0.21	-0.20	-4.25
4,600.0	0.56	112.22	4,599.7	-22.3	2.2	22.3	0.04	0.04	1.40
4,700.0	0.51	110.36	4,699.7	-22.6	3.0	22.6	0.05	-0.05	-1.86
4,800.0	0.46	113.90	4,799.7	-22.9	3.8	23.0	0.06	-0.05	3.54
4,900.0	0.65	110.66	4,899.7	-23.3	4.7	23.3	0.19	0.19	-3.24
5,000.0	0.61	105.97	4,999.7	-23.6	5.8	23.7	0.07	-0.04	-4.69
5,100.0	0.72	103.96	5,099.7	-23.9	6.9	24.0	0.11	0.11	-2.01
5,200.0	0.70	97.08	5,199.7	-24.2	8.1	24.2	0.09	-0.02	-6.88

Stryker Directional Survey Report

Company:	COG PRODUCTION, L.L.C.	Local Co-ordinate Reference:	Well Canvasback 13 Federal #3H
Project:	EDDY COUNTY (NAD27)	TVD Reference:	GL 3582.3 + 18 @ 3600.3usft (Silver Oak #7)
Site:	SECTION 13	MD Reference:	GL 3582.3 + 18 @ 3600.3usft (Silver Oak #7)
Well:	Canvasback 13 Federal #3H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	N-S (usft)	E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,300.0	0.57	103.34	5,299.7	-24.4	9.2	24.4	0.15	-0.13	6.26
5,400.0	0.55	118.41	5,399.7	-24.7	10.1	24.8	0.15	-0.02	15.07
5,500.0	0.23	164.80	5,499.7	-25.1	10.6	25.2	0.43	-0.32	46.39
5,600.0	0.21	191.06	5,599.7	-25.5	10.6	25.6	0.10	-0.02	26.26
5,700.0	0.42	194.76	5,699.7	-26.0	10.5	26.1	0.21	0.21	3.70
5,800.0	0.29	202.70	5,799.7	-26.6	10.3	26.7	0.14	-0.13	7.94
5,900.0	0.19	196.07	5,899.7	-27.0	10.1	27.1	0.10	-0.10	-6.63
6,000.0	0.28	185.21	5,999.7	-27.4	10.1	27.5	0.10	0.09	-10.86
6,100.0	0.32	152.83	6,099.7	-27.9	10.2	28.0	0.17	0.04	-32.38
6,200.0	0.41	148.93	6,199.7	-28.5	10.5	28.5	0.09	0.09	-3.90
6,300.0	0.50	143.88	6,299.7	-29.1	10.9	29.2	0.10	0.09	-5.05
6,400.0	0.51	140.60	6,399.7	-29.8	11.5	29.9	0.03	0.01	-3.28
6,500.0	0.48	138.43	6,499.7	-30.5	12.0	30.5	0.04	-0.03	-2.17
6,600.0	0.19	126.05	6,599.7	-30.9	12.4	31.0	0.30	-0.29	-12.38
6,700.0	0.12	103.91	6,699.7	-31.0	12.7	31.1	0.09	-0.07	-22.14
6,800.0	0.05	91.92	6,799.7	-31.0	12.8	31.1	0.07	-0.07	-11.99
6,900.0	0.19	100.64	6,899.7	-31.1	13.0	31.1	0.14	0.14	8.72
7,000.0	0.15	111.49	6,999.7	-31.1	13.3	31.2	0.05	-0.04	10.85
7,100.0	0.15	117.50	7,099.7	-31.3	13.5	31.3	0.02	0.00	6.01
7,200.0	0.22	140.56	7,199.7	-31.5	13.8	31.5	0.10	0.07	23.06
7,300.0	0.41	162.24	7,299.7	-32.0	14.0	32.0	0.22	0.19	21.68
7,400.0	0.53	196.89	7,399.7	-32.7	14.0	32.8	0.30	0.12	34.65
7,425.0	0.86	197.83	7,424.7	-33.0	13.9	33.1	1.32	1.32	3.76
7,498.0	0.80	206.80	7,497.7	-34.0	13.5	34.1	0.20	-0.08	12.29
7,530.0	0.90	212.40	7,529.7	-34.4	13.3	34.5	0.41	0.31	17.50
7,561.0	0.70	215.70	7,560.7	-34.8	13.0	34.8	0.66	-0.65	10.65
7,593.0	0.70	203.90	7,592.7	-35.1	12.8	35.2	0.45	0.00	-36.88
7,625.0	0.70	211.20	7,624.7	-35.5	12.6	35.5	0.28	0.00	22.81
7,656.0	0.70	206.10	7,655.6	-35.8	12.5	35.9	0.20	0.00	-16.45
7,688.0	0.60	201.50	7,687.6	-36.1	12.3	36.2	0.35	-0.31	-14.38
7,719.0	0.40	188.80	7,718.6	-36.4	12.2	36.4	0.73	-0.65	-40.97
7,751.0	0.30	147.20	7,750.6	-36.6	12.3	36.6	0.83	-0.31	-130.00
7,782.0	0.30	154.60	7,781.6	-36.7	12.3	36.8	0.12	0.00	23.87
7,814.0	0.20	144.50	7,813.6	-36.8	12.4	36.9	0.34	-0.31	-31.56
7,845.0	2.00	163.20	7,844.6	-37.4	12.6	37.5	5.84	5.81	60.32
7,877.0	5.50	166.70	7,876.6	-39.4	13.1	39.5	10.96	10.94	10.94
7,908.0	7.20	173.20	7,907.4	-42.8	13.7	42.9	5.95	5.48	20.97
7,940.0	8.30	183.20	7,939.1	-47.1	13.8	47.2	5.43	3.44	31.25
7,972.0	10.80	182.50	7,970.6	-52.4	13.5	52.5	7.82	7.81	-2.19
8,003.0	13.30	179.50	8,001.0	-58.9	13.4	58.9	8.31	8.06	-9.68
8,035.0	16.10	175.80	8,031.9	-67.0	13.8	67.0	9.22	8.75	-11.56
8,066.0	19.50	175.10	8,061.4	-76.4	14.6	76.5	10.99	10.97	-2.26
8,098.0	23.00	176.20	8,091.2	-88.0	15.4	88.1	11.01	10.94	3.44

Stryker Directional Survey Report

Company:	COG PRODUCTION, L.L.C.	Local Co-ordinate Reference:	Well Canvasback 13 Federal #3H
Project:	EDDY COUNTY (NAD27)	TVD Reference:	GL 3582.3 + 18 @ 3600.3usft (Silver Oak #7)
Site:	SECTION 13	MD Reference:	GL 3582.3 + 18 @ 3600.3usft (Silver Oak #7)
Well:	Canvasback 13 Federal #3H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
8,130.0	26.40	177.90	8,120.3	-101.3	16.1	101.4	10.85	10.63	5.31	
8,162.0	29.80	178.60	8,148.5	-116.4	16.6	116.5	10.67	10.63	2.19	
8,193.0	32.20	178.30	8,175.1	-132.3	17.0	132.4	7.76	7.74	-0.97	
8,225.0	35.40	177.60	8,201.7	-150.1	17.6	150.2	10.07	10.00	-2.19	
8,257.0	40.20	177.80	8,227.0	-169.7	18.4	169.8	15.00	15.00	0.63	
8,289.0	46.10	177.60	8,250.3	-191.6	19.3	191.7	18.44	18.44	-0.63	
8,321.0	52.40	177.60	8,271.2	-215.8	20.3	215.9	19.69	19.69	0.00	
8,352.0	57.20	176.50	8,289.0	-241.1	21.6	241.2	15.75	15.48	-3.55	
8,384.0	62.20	174.90	8,305.2	-268.6	23.7	268.8	16.21	15.63	-5.00	
8,416.0	67.70	174.90	8,318.7	-297.5	26.3	297.6	17.19	17.19	0.00	
8,464.0	75.50	177.60	8,333.9	-342.9	29.2	343.1	17.10	16.25	5.63	
8,495.0	76.50	178.30	8,341.4	-372.9	30.3	373.1	3.90	3.23	2.26	
8,526.0	77.30	179.20	8,348.4	-403.1	31.0	403.3	3.83	2.58	2.90	
8,558.0	79.70	180.00	8,354.8	-434.5	31.2	434.7	7.89	7.50	2.50	
8,589.0	82.10	180.60	8,359.7	-465.1	31.0	465.3	7.97	7.74	1.94	
8,621.0	84.90	181.60	8,363.3	-496.9	30.4	497.1	9.28	8.75	3.13	
8,653.0	85.80	181.40	8,365.9	-528.8	29.6	528.9	2.88	2.81	-0.63	
8,684.0	86.70	181.30	8,367.9	-559.7	28.8	559.9	2.92	2.90	-0.32	
8,779.0	89.40	182.70	8,371.1	-654.6	25.5	654.7	3.20	2.84	1.47	
8,875.0	88.60	182.70	8,372.8	-750.4	21.0	750.6	0.83	-0.83	0.00	
8,970.0	89.00	182.50	8,374.8	-845.3	16.7	845.4	0.47	0.42	-0.21	
9,064.0	92.80	182.00	8,373.3	-939.2	13.0	939.3	4.08	4.04	-0.53	
9,159.0	90.60	181.60	8,370.5	-1,034.1	10.0	1,034.2	2.35	-2.32	-0.42	
9,254.0	89.50	181.10	8,370.4	-1,129.1	7.8	1,129.1	1.27	-1.16	-0.53	
9,349.0	89.80	181.10	8,371.0	-1,224.1	6.0	1,224.1	0.32	0.32	0.00	
9,444.0	89.40	180.20	8,371.7	-1,319.1	4.9	1,319.1	1.04	-0.42	-0.95	
9,538.0	88.80	179.50	8,373.2	-1,413.1	5.1	1,413.1	0.98	-0.64	-0.74	
9,633.0	86.30	178.80	8,377.2	-1,508.0	6.5	1,508.0	2.73	-2.63	-0.74	
9,728.0	88.30	179.20	8,381.7	-1,602.8	8.2	1,602.8	2.15	2.11	0.42	
9,822.0	89.20	179.00	8,383.7	-1,696.8	9.7	1,696.8	0.98	0.96	-0.21	
9,916.0	91.50	179.30	8,383.2	-1,790.8	11.1	1,790.8	2.47	2.45	0.32	
10,011.0	89.40	179.20	8,382.4	-1,885.8	12.3	1,885.8	2.21	-2.21	-0.11	
10,107.0	89.80	180.70	8,383.1	-1,981.8	12.4	1,981.8	1.62	0.42	1.56	
10,201.0	90.30	182.10	8,383.0	-2,075.7	10.1	2,075.7	1.58	0.53	1.49	
10,296.0	88.40	182.50	8,384.1	-2,170.6	6.3	2,170.6	2.04	-2.00	0.42	
10,392.0	87.70	179.90	8,387.4	-2,266.5	4.3	2,266.5	2.80	-0.73	-2.71	
10,486.0	92.40	180.60	8,387.3	-2,360.5	3.9	2,360.5	5.06	5.00	0.74	
10,582.0	90.40	179.90	8,384.9	-2,456.5	3.5	2,456.5	2.21	-2.08	-0.73	
10,676.0	89.50	179.50	8,385.0	-2,550.5	3.9	2,550.5	1.05	-0.96	-0.43	
10,771.0	90.00	179.70	8,385.4	-2,645.5	4.6	2,645.5	0.57	0.53	0.21	
10,865.0	88.30	179.00	8,386.8	-2,739.5	5.7	2,739.4	1.96	-1.81	-0.74	
10,960.0	88.10	178.80	8,389.8	-2,834.4	7.5	2,834.4	0.30	-0.21	-0.21	
11,056.0	90.00	178.60	8,391.4	-2,930.4	9.7	2,930.4	1.99	1.98	-0.21	
11,150.0	89.20	178.60	8,392.1	-3,024.3	12.0	3,024.3	0.85	-0.85	0.00	

Stryker Directional Survey Report

Company:	COG PRODUCTION, L.L.C.	Local Co-ordinate Reference:	Well Canvasback 13 Federal #3H
Project:	EDDY COUNTY (NAD27)	TVD Reference:	GL 3582.3 + 18 @ 3600.3usft (Silver Oak #7)
Site:	SECTION 13	MD Reference:	GL 3582.3 + 18 @ 3600.3usft (Silver Oak #7)
Well:	Canvasback 13 Federal #3H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,244.0	89.80	179.00	8,392.9	-3,118.3	13.9	3,118.3	0.77	0.64	0.43
11,340.0	88.90	179.00	8,394.0	-3,214.3	15.6	3,214.3	0.94	-0.94	0.00
11,434.0	88.50	178.60	8,396.1	-3,308.2	17.6	3,308.3	0.60	-0.43	-0.43
11,530.0	90.70	179.70	8,396.8	-3,404.2	19.0	3,404.3	2.56	2.29	1.15
11,624.0	88.50	179.90	8,397.4	-3,498.2	19.3	3,498.3	2.35	-2.34	0.21
11,720.0	89.80	180.70	8,398.8	-3,594.2	18.8	3,594.2	1.59	1.35	0.83
11,812.0	87.70	181.60	8,400.9	-3,686.1	17.0	3,686.2	2.48	-2.28	0.98
11,904.0	88.50	181.40	8,403.9	-3,778.1	14.6	3,778.1	0.90	0.87	-0.22
11,948.0	88.50	181.30	8,405.1	-3,822.0	13.5	3,822.0	0.23	0.00	-0.23
12,040.0	88.50	181.30	8,407.5	-3,914.0	11.5	3,914.0	0.00	0.00	0.00
12,136.0	89.80	180.90	8,408.9	-4,009.9	9.6	4,009.9	1.42	1.35	-0.42
12,228.0	91.00	181.10	8,408.2	-4,101.9	8.0	4,101.9	1.32	1.30	0.22
12,320.0	90.10	180.90	8,407.4	-4,193.9	6.4	4,193.9	1.00	-0.98	-0.22
12,415.0	91.20	181.10	8,406.3	-4,288.9	4.7	4,288.8	1.18	1.16	0.21
12,507.0	90.10	181.30	8,405.2	-4,380.9	2.8	4,380.8	1.22	-1.20	0.22
12,601.0	90.70	180.90	8,404.6	-4,474.8	1.0	4,474.8	0.77	0.64	-0.43
12,694.0	89.00	181.10	8,404.8	-4,567.8	-0.6	4,567.7	1.84	-1.83	0.22
12,785.0	88.20	181.30	8,407.0	-4,658.8	-2.5	4,658.7	0.91	-0.88	0.22
12,826.0	88.60	181.10	8,408.2	-4,699.7	-3.4	4,699.6	1.09	0.98	-0.49
12,875.0	88.60	181.10	8,409.4	-4,748.7	-4.3	4,748.6	0.00	0.00	0.00

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,425.0	7,424.7	-33.0	13.9	7425' MD VES Gyro
12,875.0	8,409.4	-4,748.7	-4.3	12875' MD Projected to Bit



COMPANY: COG PRODUCTION, L.L.C.
WELL: Canvasback 13 Federal #3H
COUNTY: EDDY COUNTY (NAD27)
DATUM: NAD 1927 (NADCON CONUS)



RIG: Silver Oak 7
GRID CORRECTION: To convert a Magnetic Direction to a Grid Direction, Add 7.06°

OFFICE: 936.582.7296

GEODETTIC ZONE: New Mexico East 3001
GL 3582.3 + 18 @ 3600.3usft (Silver Oak #7)
GROUND ELEVATION: 3582.3

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	445731.20	687423.40	32° 13' 26.325 N	103° 43' 38.130 W

PLAN SECTIONS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
1	7425.0	0.86	197.83	7424.7	-33.0	13.9	0.00	0.00	33.1	
2	7899.8	0.86	197.83	7899.4	-39.8	11.7	0.00	0.00	39.9	
3	8638.5	89.46	179.76	8370.0	-512.7	11.5	12.00	-18.08	512.8	
4	12684.2	89.46	179.76	8410.0	-4758.2	29.4	0.00	0.00	4758.3	PBHL Canvasback 13 Federal #3H

