

PATRIOT DRILLING, LLC

OPERATOR: COG Operating, LLC
WELL/LEASE: Way South State Com # 2 H
COUNTY: Eddy Co., New Mexico
Sec. 30, T26S, R28E

30-015-40336

**STATE OF NEW MEXICO
DEVIATION REPORT**

<u>Depth</u>	<u>Deviation</u>	<u>Depth</u>	<u>Deviation</u>
546	1/4	4,200	1
733	1/2	4,698	1 3/4
900	1/2	5,190	1 3/4
1,056	1/2	5,615	1 1/2
1,665	1/2	6,060	2
2,023	1 1/2	6,346	1 3/4
2,156	2	6,726	1 1/2
2,228	1 3/4	7,218	2 1/4
2,726	1	7,250	2
3,202	3/4	7,284	1 1/2
3,708	1/2	7,316	1 1/2

COG OPERATING, LLC
RECEIVED

JUN 29 2012

ARTESIA WEST

RECEIVED

AUG 21 2012

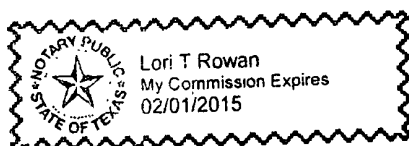
NMOCD ARTESIA

Patriot Drilling, LLC

M. Leroy Peterson, Executive Vice-
President

The foregoing instrument was acknowledged before me on this 26st day of June, 2012 by M. Leroy Peterson, Executive Vice-President of Patriot Drilling, LLC.

My Commission Expires: 02/01/2015



Lori T. Rowan
Notary Public for Ector Co., Texas



Company: COG OPERATING, LLC (CONCHO)
 Lease/Well: Way South State Com/No. 002H
 Location: S30 T26s R28e
 Rig Name: Patriot Drilling Rig #6
 State/County: New Mexico/Eddy
 Latitude: 32.02
 GRID North is 0.11 Degrees East of True North
 VS-Azi: 179.83 Degrees



RKB : 17'

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ... state com #2h_gyro survey.ut

Minimum Curvature Method

Report Date/Time: 6/14/2012 / 10:12

Vaughn Energy Services

Gardendale, TX 79758

432-563-5444

Surveyor: Dustin Wedel

Way South State Com No. 002H / API 30-015-40336

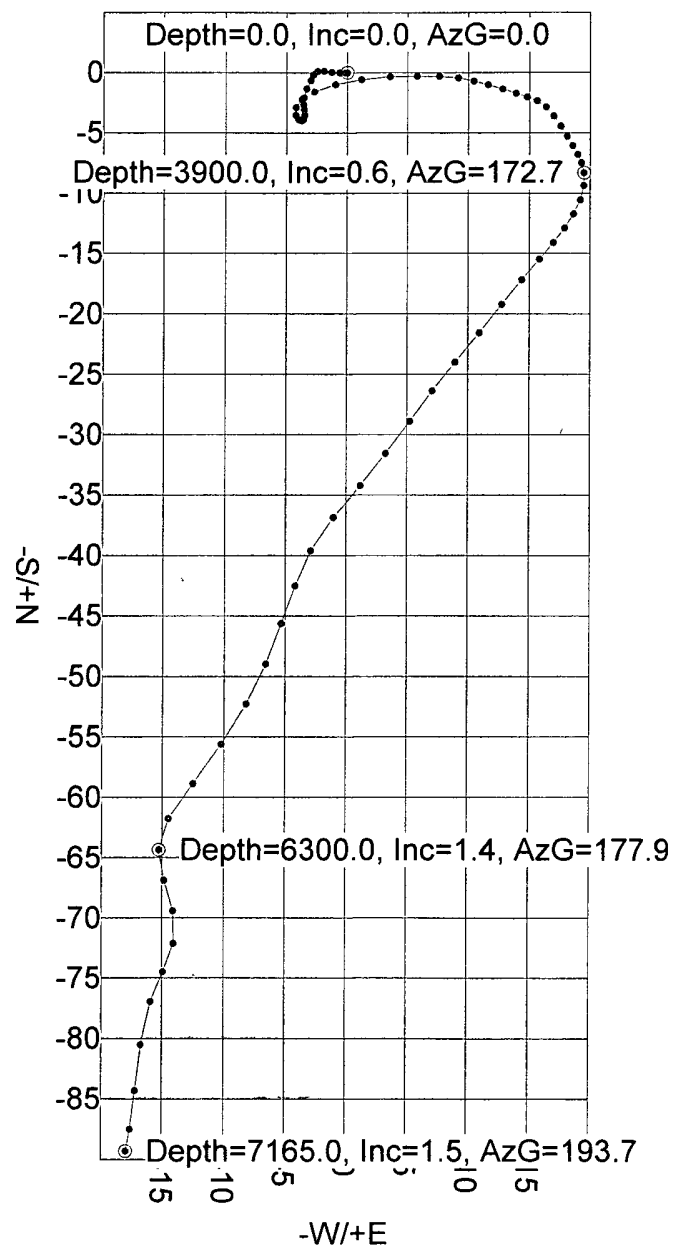
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.19	269.27	100.00	0.00	-0.16	0.00	0.16	269.27	0.19
200.00	0.37	270.53	200.00	0.00	-0.65	0.00	0.65	269.90	0.19
300.00	0.37	277.35	300.00	0.04	-1.30	-0.05	1.30	271.88	0.04
400.00	0.36	284.17	399.99	0.16	-1.92	-0.17	1.92	274.77	0.04
500.00	0.30	245.87	499.99	0.13	-2.46	-0.14	2.46	273.04	0.22
600.00	0.24	207.57	599.99	-0.16	-2.79	0.15	2.79	266.75	0.18
700.00	0.37	206.00	699.99	-0.63	-3.03	0.62	3.09	258.19	0.14
800.00	0.51	204.43	799.99	-1.33	-3.35	1.32	3.60	248.38	0.14
900.00	0.38	187.80	899.98	-2.06	-3.58	2.05	4.13	240.03	0.18
1000.00	0.26	175.16	999.98	-2.62	-3.61	2.61	4.46	233.96	0.14
1100.00	0.26	173.07	1099.98	-3.07	-3.56	3.06	4.70	229.19	0.01
1200.00	0.25	174.98	1199.98	-3.52	-3.51	3.51	4.97	224.95	0.01
1300.00	0.18	219.99	1299.98	-3.86	-3.59	3.85	5.27	222.95	0.18
1400.00	0.10	265.01	1399.98	-3.99	-3.78	3.97	5.49	223.47	0.13
1500.00	0.21	304.55	1499.98	-3.89	-4.02	3.88	5.59	225.92	0.15
1600.00	0.32	344.08	1599.98	-3.52	-4.24	3.50	5.51	230.35	0.21
1700.00	0.43	16.62	1699.98	-2.89	-4.21	2.88	5.11	235.56	0.23
1800.00	0.54	49.15	1799.97	-2.22	-3.75	2.21	4.36	239.33	0.29

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	Dogleğ Severity Deg/100
1900.00	0.88	62.95	1899.97	-1.57	-2.71	1.56	3.13	239.96	0.38
2000.00	1.23	76.75	1999.95	-0.97	-0.98	0.97	1.38	225.32	0.43
2100.00	1.31	82.09	2099.92	-0.57	1.19	0.57	1.32	115.57	0.14
2200.00	1.39	87.44	2199.90	-0.36	3.54	0.37	3.55	95.79	0.15
2300.00	1.17	89.59	2299.87	-0.30	5.77	0.31	5.78	92.94	0.22
2400.00	0.95	91.74	2399.85	-0.31	7.62	0.34	7.63	92.36	0.22
2500.00	0.82	98.20	2499.84	-0.44	9.16	0.47	9.17	92.76	0.17
2600.00	0.68	104.66	2599.83	-0.69	10.44	0.72	10.46	93.80	0.16
2700.00	0.70	106.09	2699.83	-1.01	11.60	1.05	11.64	94.99	0.03
2800.00	0.72	107.51	2799.82	-1.37	12.79	1.41	12.86	96.12	0.03
2900.00	0.61	108.12	2899.81	-1.73	13.89	1.77	14.00	97.08	0.12
3000.00	0.49	109.72	2999.81	-2.03	14.80	2.08	14.94	97.83	0.12
3100.00	0.51	111.87	3099.80	-2.34	15.61	2.39	15.79	98.54	0.03
3200.00	0.54	137.01	3199.80	-2.85	16.35	2.90	16.59	99.90	0.23
3300.00	0.57	144.16	3299.79	-3.60	16.96	3.65	17.33	101.98	0.08
3400.00	0.60	146.32	3399.79	-4.44	17.54	4.49	18.09	104.21	0.04
3500.00	0.55	147.91	3499.78	-5.29	18.09	5.34	18.84	106.29	0.06
3600.00	0.49	148.49	3599.78	-6.06	18.56	6.11	19.53	108.07	0.06
3700.00	0.46	153.31	3699.78	-6.78	18.97	6.83	20.14	109.66	0.05
3800.00	0.43	158.13	3799.77	-7.48	19.29	7.54	20.69	111.20	0.05
3900.00	0.55	172.65	3899.77	-8.30	19.49	8.36	21.18	113.08	0.17
4000.00	0.67	187.18	3999.76	-9.36	19.47	9.42	21.61	115.68	0.20
4100.00	0.72	199.03	4099.76	-10.54	19.20	10.60	21.90	118.78	0.15
4200.00	0.77	210.88	4199.75	-11.72	18.64	11.77	22.02	122.15	0.16
4300.00	0.84	215.17	4299.74	-12.89	17.88	12.94	22.04	125.79	0.09
4400.00	0.90	219.47	4399.73	-14.09	16.96	14.14	22.05	129.73	0.09
4500.00	1.15	220.38	4499.71	-15.46	15.81	15.51	22.12	134.36	0.25
4600.00	1.39	219.29	4599.69	-17.17	14.39	17.21	22.40	140.03	0.25
4700.00	1.60	218.44	4699.65	-19.20	12.75	19.24	23.05	146.42	0.21
4800.00	1.81	217.59	4799.61	-21.55	10.92	21.58	24.16	153.13	0.21
4900.00	1.78	220.59	4899.56	-23.98	8.94	24.01	25.60	159.55	0.10
5000.00	1.70	215.51	4999.51	-26.37	7.07	26.39	27.30	164.99	0.18
5100.00	1.89	216.46	5099.46	-28.90	5.23	28.92	29.37	169.74	0.20
5200.00	1.92	217.29	5199.41	-31.56	3.24	31.57	31.72	174.14	0.04
5300.00	1.94	218.52	5299.35	-34.21	1.17	34.22	34.23	178.04	0.05
5400.00	2.00	221.26	5399.29	-36.85	-1.03	36.85	36.86	181.61	0.11
5500.00	1.85	206.78	5499.24	-39.60	-2.91	39.59	39.71	184.21	0.51
5600.00	1.80	200.22	5599.19	-42.51	-4.18	42.50	42.72	185.62	0.21
5700.00	2.02	200.28	5699.13	-45.63	-5.33	45.61	45.94	186.66	0.22

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	2.07	201.00	5799.07	-48.96	-6.59	48.94	49.41	187.66	0.06
5900.00	2.15	210.43	5899.00	-52.27	-8.18	52.24	52.90	188.90	0.36
6000.00	2.33	212.37	5998.92	-55.60	-10.22	55.57	56.53	190.42	0.20
6100.00	2.23	217.72	6098.84	-58.86	-12.50	58.82	60.17	191.99	0.24
6200.00	1.82	210.72	6198.78	-61.76	-14.50	61.71	63.44	193.21	0.48
6300.00	1.42	177.93	6298.74	-64.35	-15.27	64.31	66.14	193.34	0.99
6400.00	1.54	163.69	6398.71	-66.87	-14.84	66.83	68.50	192.52	0.38
6500.00	1.51	164.04	6498.68	-69.43	-14.11	69.39	70.85	191.48	0.03
6600.00	1.67	192.97	6598.64	-72.12	-14.07	72.07	73.48	191.04	0.81
6700.00	1.23	208.53	6698.61	-74.48	-14.91	74.44	75.96	191.32	0.59
6800.00	1.83	198.36	6798.57	-76.94	-15.93	76.90	78.58	191.70	0.66
6900.00	2.39	188.41	6898.50	-80.53	-16.74	80.48	82.25	191.74	0.66
7000.00	1.98	186.25	6998.43	-84.31	-17.23	84.26	86.05	191.55	0.41
7100.00	1.72	188.11	7098.38	-87.51	-17.63	87.46	89.27	191.39	0.28
7165.00	1.54	193.68	7163.35	-89.32	-17.97	89.27	91.11	191.38	0.36



Vaughn Energy Services
Gardendale, TX 79758
432-563-5444
Surveyor: Dustin Wedel
Way South State Com No. 002H / API 30-015-40336



VES Survey Date: 06/08/2012



COG Operating LLC

Eddy County(NAD27)
Way South State Com
#2H
OH

Design: OH

Pathfinder X&Y Report

18 June, 2012



A Schlumberger Company



Pathfinder
Pathfinder X&Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Eddy County(NAD27)	TVD Reference:	KB = 17.5 @ 3135.5usft (Original Well Elev)
Site:	Way South State Com	MD Reference:	KB = 17.5 @ 3135.5usft (Original Well Elev)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	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	Way South State Com		
Site Position:		Northing:	370,190.600 usft
From:	Map	Easting:	561,955.000 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 1' 3.398 N
		Longitude:	104° 8' 0.373 W
		Grid Convergence:	0.11 °

Well	#2H					
Well Position	+N/-S	0.0 usft	Northing:	370,190.600 usft	Latitude:	32° 1' 3.398 N
	+E/-W	0.0 usft	Easting:	561,955.000 usft	Longitude:	104° 8' 0.373 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	3,118.0 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	5/24/2012	7.71	59.87	48,337

Design	OH			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0 0	0.0	0.0	179.83



Pathfinder
Pathfinder X&Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Eddy County(NAD27)	TVD Reference:	KB = 17.5 @ 3135.5usft (Original Well Elev)
Site:	Way South State Com	MD Reference:	KB = 17.5 @ 3135.5usft (Original Well Elev)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey Program		Date 6/18/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	7,165.0	Gyro #1 (OH)	NS-GYRO-MS	North sensing gyrocompassing m/s
7,218.0	13,628.0	MWD #2 (OH)	MWD	MWD - Standard

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)		
0.0	0.00	0.00	0.0	-3,135.5	0.0	0.0	0.0	0.00	370,190.60	561,955.00		
100.0	0.19	269.27	100.0	-3,035.5	0.0	-0.2	0.0	0.19	370,190.60	561,954.83		
200.0	0.37	270.53	200.0	-2,935.5	0.0	-0.7	0.0	0.18	370,190.60	561,954.35		
300.0	0.37	277.35	300.0	-2,835.5	0.0	-1.3	0.0	0.04	370,190.64	561,953.70		
400.0	0.36	284.17	400.0	-2,735.5	0.2	-1.9	-0.2	0.04	370,190.76	561,953.08		
500.0	0.30	245.87	500.0	-2,635.5	0.1	-2.5	-0.1	0.22	370,190.73	561,952.53		
600.0	0.24	207.57	600.0	-2,535.5	-0.2	-2.8	0.2	0.19	370,190.44	561,952.20		
700.0	0.37	206.00	700.0	-2,435.5	-0.6	-3.0	0.6	0.13	370,189.96	561,951.96		
800.0	0.51	204.43	800.0	-2,335.5	-1.3	-3.4	1.3	0.14	370,189.27	561,951.63		
900.0	0.38	187.80	900.0	-2,235.5	-2.1	-3.6	2.1	0.18	370,188.53	561,951.41		
1,000.0	0.26	175.16	1,000.0	-2,135.5	-2.6	-3.6	2.6	0.14	370,187.98	561,951.38		
1,100.0	0.26	173.07	1,100.0	-2,035.5	-3.1	-3.6	3.1	0.01	370,187.53	561,951.43		
1,200.0	0.25	174.98	1,200.0	-1,935.5	-3.5	-3.5	3.5	0.01	370,187.08	561,951.47		
1,300.0	0.18	219.99	1,300.0	-1,835.5	-3.9	-3.6	3.8	0.18	370,186.75	561,951.39		
1,400.0	0.10	265.01	1,400.0	-1,735.5	-4.0	-3.8	4.0	0.13	370,186.62	561,951.20		
1,500.0	0.21	304.55	1,500.0	-1,635.5	-3.9	-4.0	3.9	0.15	370,186.72	561,950.96		
1,600.0	0.32	344.08	1,600.0	-1,535.5	-3.5	-4.3	3.5	0.21	370,187.09	561,950.74		
1,700.0	0.43	16.62	1,700.0	-1,435.5	-2.9	-4.2	2.9	0.24	370,187.72	561,950.77		
1,800.0	0.54	49.15	1,800.0	-1,335.5	-2.2	-3.8	2.2	0.29	370,188.38	561,951.23		
1,900.0	0.88	62.95	1,900.0	-1,235.5	-1.6	-2.7	1.6	0.38	370,189.04	561,952.27		
2,000.0	1.23	76.75	1,999.9	-1,135.6	-1.0	-1.0	1.0	0.43	370,189.64	561,954.00		



Pathfinder
Pathfinder X&Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Eddy County(NAD27)	TVD Reference:	KB = 17.5 @ 3135.5usft (Original Well Elev)
Site:	Way South State Com	MD Reference:	KB = 17.5 @ 3135.5usft (Original Well Elev)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	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)
2,100.0	1.31	82.09	2,099.9	-1,035.6	-0.6	1.2	0.6	0.14	370,190.04	561,956.18
2,200.0	1.39	87.44	2,199.9	-935.6	-0.3	3.5	0.4	0.15	370,190.25	561,958.52
2,300.0	1.17	89.59	2,299.9	-835.6	-0.3	5.8	0.3	0.23	370,190.31	561,960.75
2,400.0	0.95	91.74	2,399.9	-735.6	-0.3	7.6	0.3	0.22	370,190.30	561,962.60
2,500.0	0.82	98.20	2,499.8	-635.7	-0.4	9.1	0.5	0.16	370,190.17	561,964.14
2,600.0	0.68	104.66	2,599.8	-535.7	-0.7	10.4	0.7	0.16	370,189.92	561,965.42
2,700.0	0.70	106.09	2,699.8	-435.7	-1.0	11.6	1.0	0.03	370,189.60	561,966.58
2,800.0	0.72	107.51	2,799.8	-335.7	-1.4	12.8	1.4	0.03	370,189.24	561,967.77
2,900.0	0.61	108.12	2,899.8	-235.7	-1.7	13.9	1.8	0.11	370,188.88	561,968.87
3,000.0	0.49	109.72	2,999.8	-135.7	-2.0	14.8	2.1	0.12	370,188.57	561,969.78
3,100.0	0.51	111.87	3,099.8	-35.7	-2.3	15.6	2.4	0.03	370,188.26	561,970.60
3,200.0	0.54	137.01	3,199.8	64.3	-2.8	16.3	2.9	0.23	370,187.75	561,971.33
3,300.0	0.57	144.16	3,299.8	164.3	-3.6	16.9	3.6	0.08	370,187.00	561,971.95
3,400.0	0.60	146.32	3,399.8	264.3	-4.4	17.5	4.5	0.04	370,186.17	561,972.53
3,500.0	0.55	147.91	3,499.8	364.3	-5.3	18.1	5.3	0.05	370,185.32	561,973.07
3,600.0	0.49	148.49	3,599.8	464.3	-6.0	18.6	6.1	0.06	370,184.55	561,973.55
3,700.0	0.46	153.31	3,699.8	564.3	-6.8	19.0	6.8	0.05	370,183.83	561,973.96
3,800.0	0.43	158.13	3,799.8	664.3	-7.5	19.3	7.5	0.05	370,183.12	561,974.28
3,900.0	0.55	172.65	3,899.8	764.3	-8.3	19.5	8.4	0.17	370,182.30	561,974.48
4,000.0	0.67	187.18	3,999.8	864.3	-9.4	19.5	9.4	0.19	370,181.24	561,974.46
4,100.0	0.72	199.03	4,099.8	964.3	-10.5	19.2	10.6	0.15	370,180.07	561,974.19
4,200.0	0.77	210.88	4,199.7	1,064.2	-11.7	18.6	11.8	0.16	370,178.90	561,973.64
4,300.0	0.84	215.17	4,299.7	1,164.2	-12.9	17.9	12.9	0.09	370,177.72	561,972.87
4,400.0	0.90	219.47	4,399.7	1,264.2	-14.1	16.9	14.1	0.09	370,176.52	561,971.95
4,500.0	1.15	220.38	4,499.7	1,364.2	-15.5	15.8	15.5	0.25	370,175.15	561,970.80
4,600.0	1.39	219.29	4,599.7	1,464.2	-17.2	14.4	17.2	0.24	370,173.44	561,969.38
4,700.0	1.60	218.44	4,699.7	1,564.2	-19.2	12.7	19.2	0.21	370,171.41	561,967.74



Pathfinder
Pathfinder X&Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Eddy County(NAD27)
Site: Way South State Corn
Well: #2H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #2H
TVD Reference: KB = 17.5 @ 3135.5usft (Original Well Elev)
MD Reference: KB = 17.5 @ 3135.5usft (Original Well Elev)
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)
4,800.0	1.81	217.59	4,799.6	1,664.1	-21.5	10.9	21.6	0.21	370,169.07	561,965.91
4,900.0	1.78	220.59	4,899.6	1,764.1	-24.0	8.9	24.0	0.10	370,166.63	561,963.94
5,000.0	1.70	215.51	4,999.5	1,864.0	-26.4	7.1	26.4	0.17	370,164.25	561,962.07
5,100.0	1.89	216.46	5,099.5	1,964.0	-28.9	5.2	28.9	0.19	370,161.71	561,960.23
5,200.0	1.92	217.29	5,199.4	2,063.9	-31.5	3.2	31.6	0.04	370,159.05	561,958.23
5,300.0	1.94	218.52	5,299.4	2,163.9	-34.2	1.2	34.2	0.05	370,156.40	561,956.16
5,400.0	2.00	221.26	5,399.3	2,263.8	-36.8	-1.0	36.8	0.11	370,153.76	561,953.96
5,500.0	1.85	206.78	5,499.2	2,363.7	-39.6	-2.9	39.6	0.51	370,151.01	561,952.08
5,600.0	1.80	200.22	5,599.2	2,463.7	-42.5	-4.2	42.5	0.21	370,148.09	561,950.81
5,700.0	2.02	200.28	5,699.1	2,563.6	-45.6	-5.3	45.6	0.22	370,144.97	561,949.66
5,800.0	2.07	201.00	5,799.1	2,663.6	-49.0	-6.6	49.0	0.06	370,141.63	561,948.40
5,900.0	2.15	210.43	5,899.0	2,763.5	-52.3	-8.2	52.3	0.36	370,138.32	561,946.80
6,000.0	2.33	212.37	5,998.9	2,863.4	-55.6	-10.2	55.6	0.20	370,134.99	561,944.76
6,100.0	2.23	217.72	6,098.8	2,963.3	-58.9	-12.5	58.8	0.24	370,131.73	561,942.48
6,200.0	1.82	210.72	6,198.8	3,063.3	-61.8	-14.5	61.7	0.48	370,128.83	561,940.48
6,300.0	1.42	177.93	6,298.7	3,163.2	-64.4	-15.3	64.3	0.99	370,126.23	561,939.72
6,400.0	1.54	163.69	6,398.7	3,263.2	-66.9	-14.9	66.9	0.39	370,123.70	561,940.14
6,500.0	1.51	164.04	6,498.7	3,363.2	-69.5	-14.1	69.4	0.03	370,121.14	561,940.88
6,600.0	1.67	192.97	6,598.6	3,463.1	-72.1	-14.1	72.1	0.81	370,118.46	561,940.91
6,700.0	1.23	208.53	6,698.6	3,563.1	-74.5	-14.9	74.5	0.59	370,116.09	561,940.07
6,800.0	1.83	198.36	6,798.6	3,663.1	-77.0	-15.9	76.9	0.66	370,113.63	561,939.06
6,900.0	2.39	188.41	6,898.5	3,763.0	-80.5	-16.8	80.5	0.67	370,110.06	561,938.25
7,000.0	1.98	186.25	6,998.4	3,862.9	-84.3	-17.2	84.3	0.42	370,106.28	561,937.76
7,100.0	1.72	188.11	7,098.4	3,962.9	-87.5	-17.6	87.5	0.27	370,103.07	561,937.36
7,165.0	1.54	193.68	7,163.4	4,027.9	-89.3	-18.0	89.3	0.37	370,101.26	561,937.01
7,218.0	2.02	190.59	7,216.3	4,080.8	-91.0	-18.3	90.9	0.92	370,099.65	561,936.67
7,250.0	1.85	201.93	7,248.3	4,112.8	-92.0	-18.6	91.9	1.31	370,098.62	561,936.38



Pathfinder
Pathfinder X&Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Eddy County(NAD27)	TVD Reference:	KB = 17.5 @ 3135.5usft (Original Well Elev)
Site:	Way South State Com	MD Reference:	KB = 17.5 @ 3135.5usft (Original Well Elev)
Well:	#2H	North Reference:	Grd
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	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)	
7,283.0	1.49	234.62	7,281.3	4,145.8	-92.7	-19.2	92.7	3.03	370,097.87	561,935.83	
7,316.0	1.41	167.65	7,314.3	4,178.8	-93.4	-19.4	93.3	4.85	370,097.23	561,935.56	
7,347.0	3.61	154.90	7,345.3	4,209.8	-94.6	-18.9	94.6	7.28	370,095.97	561,936.06	
KOP - 7347.0 'MD, 7345.3 'TVD, 154.90 'AZI, 3.61 'INC, -94.6 'N, -18.9 'E											
7,378.0	5.54	151.21	7,376.2	4,240.7	-96.8	-17.8	96.8	6.29	370,093.78	561,937.19	
7,411.0	5.89	165.72	7,409.0	4,273.5	-99.9	-16.6	99.8	4.49	370,090.74	561,938.38	
7,442.0	6.86	174.15	7,439.8	4,304.3	-103.2	-16.0	103.2	4.34	370,087.36	561,938.96	
7,474.0	12.40	182.59	7,471.3	4,335.8	-108.6	-16.0	108.5	17.82	370,082.02	561,939.00	
7,506.0	18.03	184.88	7,502.2	4,366.7	-117.0	-16.6	116.9	17.69	370,073.64	561,938.42	
7,538.0	23.13	183.65	7,532.2	4,396.7	-128.2	-17.4	128.1	15.99	370,062.43	561,937.60	
7,569.0	28.31	181.36	7,560.1	4,424.6	-141.6	-18.0	141.6	17.01	370,049.00	561,937.04	
7,601.0	33.24	178.81	7,587.6	4,452.1	-158.0	-18.0	157.9	15.93	370,032.63	561,937.04	
7,633.0	38.69	176.35	7,613.5	4,478.0	-176.7	-17.1	176.7	17.62	370,013.87	561,937.86	
7,665.0	44.58	175.03	7,637.4	4,501.9	-197.9	-15.5	197.9	18.61	369,992.68	561,939.47	
7,696.0	50.03	176.44	7,658.4	4,522.9	-220.6	-13.8	220.6	17.89	369,969.96	561,941.15	
7,728.0	56.37	178.81	7,677.5	4,542.0	-246.2	-12.8	246.2	20.68	369,944.38	561,942.19	
7,763.0	60.41	179.43	7,695.9	4,560.4	-276.0	-12.4	276.0	11.64	369,914.58	561,942.65	
7,794.0	63.49	179.60	7,710.4	4,574.9	-303.4	-12.1	303.3	9.95	369,887.23	561,942.88	
7,826.0	66.30	179.51	7,724.0	4,588.5	-332.3	-11.9	332.3	8.78	369,858.25	561,943.10	
7,858.0	69.47	179.51	7,736.1	4,600.6	-362.0	-11.6	362.0	9.91	369,828.61	561,943.36	
7,890.0	71.31	179.34	7,746.8	4,611.3	-392.1	-11.3	392.1	5.77	369,798.47	561,943.66	
7,922.0	73.42	178.72	7,756.5	4,621.0	-422.6	-10.8	422.6	6.85	369,767.98	561,944.18	
7,954.0	75.62	178.11	7,765.0	4,629.5	-453.4	-10.0	453.4	7.12	369,737.16	561,945.03	
7,985.0	77.91	177.40	7,772.1	4,636.6	-483.6	-8.8	483.6	7.72	369,707.00	561,946.21	
8,017.0	79.76	176.79	7,778.3	4,642.8	-514.9	-7.2	514.9	6.08	369,675.65	561,947.80	
8,049.0	81.78	176.61	7,783.5	4,648.0	-546.5	-5.4	546.5	6.34	369,644.12	561,949.62	
8,081.0	83.27	176.53	7,787.6	4,652.1	-578.1	-3.5	578.1	4.66	369,612.45	561,951.52	



Pathfinder
Pathfinder X&Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Eddy County(NAD27)	TVD Reference:	KB = 17.5 @ 3135.5usft (Original Well Elev)
Site:	Way South State Com	MD Reference:	KB = 17.5 @ 3135.5usft (Original Well Elev)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	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)
8,112.0	84.15	176.44	7,791.0	4,655.5	-608.9	-1.6	608.9	2.85	369,581.70	561,953.41
8,144.0	84.33	176.35	7,794.2	4,658.7	-640.7	0.4	640.7	0.63	369,549.92	561,955.41
8,176.0	85.12	176.35	7,797.2	4,661.7	-672.5	2.4	672.5	2.47	369,518.12	561,957.44
8,207.0	86.26	176.70	7,799.5	4,664.0	-703.3	4.3	703.3	3.85	369,487.27	561,959.31
8,239.0	87.58	177.23	7,801.2	4,665.7	-735.2	6.0	735.3	4.44	369,455.36	561,961.00
8,271.0	89.08	177.14	7,802.2	4,666.7	-767.2	7.6	767.2	4.70	369,423.41	561,962.58
LP - 8271.0 'MD, 7802.2 'TVD, 177.14 'AZI, 89.08 'INC, -767.2 'N, 7.6 'E										
8,303.0	90.92	177.49	7,802.2	4,666.7	-799.2	9.1	799.2	5.85	369,391.45	561,964.07
8,334.0	91.36	177.23	7,801.5	4,666.0	-830.1	10.5	830.1	1.65	369,360.49	561,965.50
8,429.0	91.71	177.14	7,799.0	4,663.5	-925.0	15.2	925.0	0.38	369,265.63	561,970.17
8,524.0	91.89	176.88	7,796.0	4,660.5	-1,019.8	20.1	1,019.8	0.33	369,170.81	561,975.12
8,619.0	91.10	176.70	7,793.5	4,658.0	-1,114.6	25.4	1,114.7	0.85	369,075.99	561,980.44
8,715.0	89.78	176.96	7,792.8	4,657.3	-1,210.5	30.7	1,210.5	1.40	368,980.14	561,985.75
8,810.0	90.13	176.53	7,792.9	4,657.4	-1,305.3	36.1	1,305.4	0.58	368,885.30	561,991.14
8,906.0	90.57	176.35	7,792.3	4,656.8	-1,401.1	42.1	1,401.2	0.50	368,789.49	561,997.10
9,001.0	89.87	177.23	7,791.9	4,656.4	-1,496.0	47.4	1,496.1	1.18	368,694.64	562,002.42
9,097.0	90.04	177.93	7,792.0	4,656.5	-1,591.9	51.5	1,592.0	0.75	368,598.72	562,006.47
9,192.0	90.31	178.99	7,791.7	4,656.2	-1,686.8	54.0	1,687.0	1.15	368,503.76	562,009.03
9,287.0	88.64	178.72	7,792.6	4,657.1	-1,781.8	55.9	1,782.0	1.78	368,408.79	562,010.92
9,382.0	88.72	179.08	7,794.8	4,659.3	-1,876.8	57.7	1,876.9	0.39	368,313.83	562,012.75
9,476.0	88.90	178.72	7,796.7	4,661.2	-1,970.7	59.6	1,970.9	0.43	368,219.87	562,014.55
9,571.0	89.25	178.46	7,798.3	4,662.8	-2,065.7	61.9	2,065.9	0.46	368,124.91	562,016.89
9,666.0	89.87	178.72	7,799.0	4,663.5	-2,160.7	64.2	2,160.8	0.71	368,029.94	562,019.23
9,761.0	90.40	178.99	7,798.8	4,663.3	-2,255.6	66.1	2,255.8	0.63	367,934.96	562,021.12
9,856.0	90.57	177.93	7,798.0	4,662.5	-2,350.6	68.7	2,350.8	1.13	367,840.00	562,023.68
9,951.0	91.36	179.16	7,796.4	4,660.9	-2,445.6	71.1	2,445.8	1.54	367,745.05	562,026.09
10,046.0	91.80	178.37	7,793.7	4,658.2	-2,540.5	73.1	2,540.7	0.95	367,650.10	562,028.14



Pathfinder
Pathfinder X&Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Eddy County(NAD27)
Site: Way South State Com
Well: #2H
Wellbore: OH
Design: OH

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:
Well #2H
KB = 17.5 @ 3135.5usft (Original Well Elev)
KB = 17.5 @ 3135.5usft (Original Well Elev)
Grid
Minimum Curvature
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)
10,141.0	90.48	178.02	7,791.8	4,656.3	-2,635.4	76.1	2,635.6	1.44	367,555.17	562,031.13
10,236.0	90.13	177.40	7,791.3	4,655.8	-2,730.3	79.9	2,730.6	0.75	367,460.25	562,034.92
10,331.0	90.22	177.23	7,791.1	4,655.6	-2,825.2	84.4	2,825.5	0.20	367,365.36	562,039.37
10,426.0	90.31	177.14	7,790.6	4,655.1	-2,920.1	89.0	2,920.4	0.13	367,270.47	562,044.04
10,521.0	90.48	175.38	7,790.0	4,654.5	-3,014.9	95.2	3,015.2	1.86	367,175.68	562,050.24
10,616.0	88.90	175.74	7,790.5	4,655.0	-3,109.6	102.6	3,109.9	1.71	367,080.97	562,057.59
10,711.0	89.34	176.26	7,791.9	4,656.4	-3,204.4	109.2	3,204.7	0.72	366,986.21	562,064.22
10,806.0	89.52	178.28	7,792.9	4,657.4	-3,299.3	113.7	3,299.6	2.13	366,891.33	562,068.74
10,901.0	89.34	180.39	7,793.8	4,658.3	-3,394.3	114.8	3,394.6	2.23	366,796.35	562,069.84
10,996.0	89.52	179.69	7,794.8	4,659.3	-3,489.2	114.8	3,489.6	0.76	366,701.35	562,069.78
11,091.0	90.66	182.15	7,794.6	4,659.1	-3,584.2	113.3	3,584.6	2.85	366,606.37	562,068.25
11,186.0	91.36	181.89	7,792.9	4,657.4	-3,679.2	109.9	3,679.5	0.79	366,511.45	562,064.90
11,281.0	91.71	181.80	7,790.4	4,654.9	-3,774.1	106.8	3,774.4	0.38	366,416.53	562,061.85
11,376.0	92.42	181.36	7,787.0	4,651.5	-3,869.0	104.2	3,869.3	0.88	366,321.63	562,059.23
11,471.0	90.92	182.77	7,784.2	4,648.7	-3,963.9	100.8	3,964.1	2.17	366,226.74	562,055.81
11,566.0	91.10	182.24	7,782.7	4,647.2	-4,048.8	97.1	4,049.0	0.66	366,141.83	562,052.09
11,650.0	91.45	181.54	7,780.6	4,645.1	-4,142.7	94.0	4,143.0	0.83	366,047.91	562,048.99
11,745.0	89.87	181.01	7,779.5	4,644.0	-4,237.7	91.9	4,237.9	1.75	365,952.94	562,046.88
11,840.0	90.30	181.71	7,779.4	4,643.9	-4,332.6	89.6	4,332.9	0.86	365,857.97	562,044.62
11,935.0	89.16	180.66	7,779.8	4,644.3	-4,427.6	87.7	4,427.9	1.63	365,762.99	562,042.66
12,030.0	89.69	180.22	7,780.8	4,645.3	-4,522.6	86.9	4,522.8	0.73	365,668.00	562,041.93
12,125.0	90.92	179.87	7,780.3	4,644.8	-4,617.6	86.9	4,617.8	1.35	365,573.00	562,041.86
12,220.0	88.99	179.34	7,780.3	4,644.8	-4,712.6	87.5	4,712.8	2.11	365,478.01	562,042.51
12,315.0	87.32	179.69	7,783.4	4,647.9	-4,807.5	88.3	4,807.8	1.80	365,383.07	562,043.31
12,410.0	88.11	178.99	7,787.2	4,651.7	-4,902.5	89.4	4,902.7	1.11	365,288.15	562,044.41
12,505.0	88.72	178.90	7,789.8	4,654.3	-4,997.4	91.2	4,997.6	0.65	365,193.20	562,046.16
12,600.0	89.43	178.20	7,791.4	4,655.9	-5,092.4	93.6	5,092.6	1.05	365,098.25	562,048.56



Pathfinder
Pathfinder X&Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #2H
Project:	Eddy County(NAD27)	TVD Reference:	KB = 17.5 @ 3135.5usft (Original Well Elev)
Site:	Way South State Com	MD Reference:	KB = 17.5 @ 3135.5usft (Original Well Elev)
Well:	#2H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	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)	
12,695.0	91.28	179.43	7,790.8	4,655.3	-5,187.3	95.5	5,187.6	2.34	365,003.27	562,050.52	
12,789.0	92.33	179.34	7,787.8	4,652.3	-5,281.3	96.5	5,281.5	1.12	364,909.33	562,051.53	
12,884.0	91.19	179.25	7,784.9	4,649.4	-5,376.2	97.7	5,376.5	1.20	364,814.38	562,052.70	
12,979.0	92.07	179.34	7,782.2	4,646.7	-5,471.2	98.9	5,471.4	0.93	364,719.43	562,053.87	
13,074.0	92.95	178.90	7,778.0	4,642.5	-5,566.1	100.3	5,566.3	1.04	364,624.53	562,055.33	
13,169.0	92.86	179.95	7,773.2	4,637.7	-5,660.9	101.3	5,661.2	1.11	364,529.66	562,056.28	
13,264.0	91.10	176.96	7,769.9	4,634.4	-5,755.8	103.8	5,756.1	3.65	364,434.77	562,058.84	
13,359.0	91.80	176.53	7,767.5	4,632.0	-5,850.6	109.2	5,851.0	0.86	364,339.95	562,064.23	
13,454.0	92.68	176.35	7,763.8	4,628.3	-5,945.4	115.1	5,945.7	0.95	364,245.21	562,070.13	
13,549.0	93.83	176.44	7,758.4	4,622.9	-6,040.1	121.1	6,040.4	1.21	364,150.55	562,076.09	
13,628.0	93.83	176.44	7,753.1	4,617.6	-6,118.7	126.0	6,119.1	0.00	364,071.88	562,080.98	
BHL - 13628.0 'MD, 7753.1 'TVD, 176.44 'AZI, 93.83 'INC, -6118.7 'N, 126.0 'E											

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,347.0	7,345.3	-94.6	-18.9	KOP - 7347.0 'MD, 7345.3 'TVD, 154.90 'AZI, 3.61 'INC, -94.6 'N, -18.9 'E
8,271.0	7,802.2	-767.2	7.6	LP - 8271.0 'MD, 7802.2 'TVD, 177.14 'AZI, 89.08 'INC, -767.2 'N, 7.6 'E
13,628.0	7,753.1	-6,118.7	126.0	BHL - 13628.0 'MD, 7753.1 'TVD, 176.44 'AZI, 93.83 'INC, -6118.7 'N, 126.0 'E

Checked By: _____ Approved By: _____ Date: _____



Project: Eddy County(NAD27)
Site: Way South State Con
Well: #2H
Wellbore: OH
Plan: Post Gyro Plan #2 (#2H/OH)



Azimuths to Grid North
True North: -0.11°
Magnetic North: 7.61°

Magnetic Field
Strength: 48337.0snT
Dip Angle: 59.87°
Date: 5/24/2012
Model: IGRF2010

EOW

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 #2H

Ground Elevation: 3118.0
RKB Elevation KB = 17.5 @ 3135.5usft (Original Well Elev)
Rig Name Original Well Elev

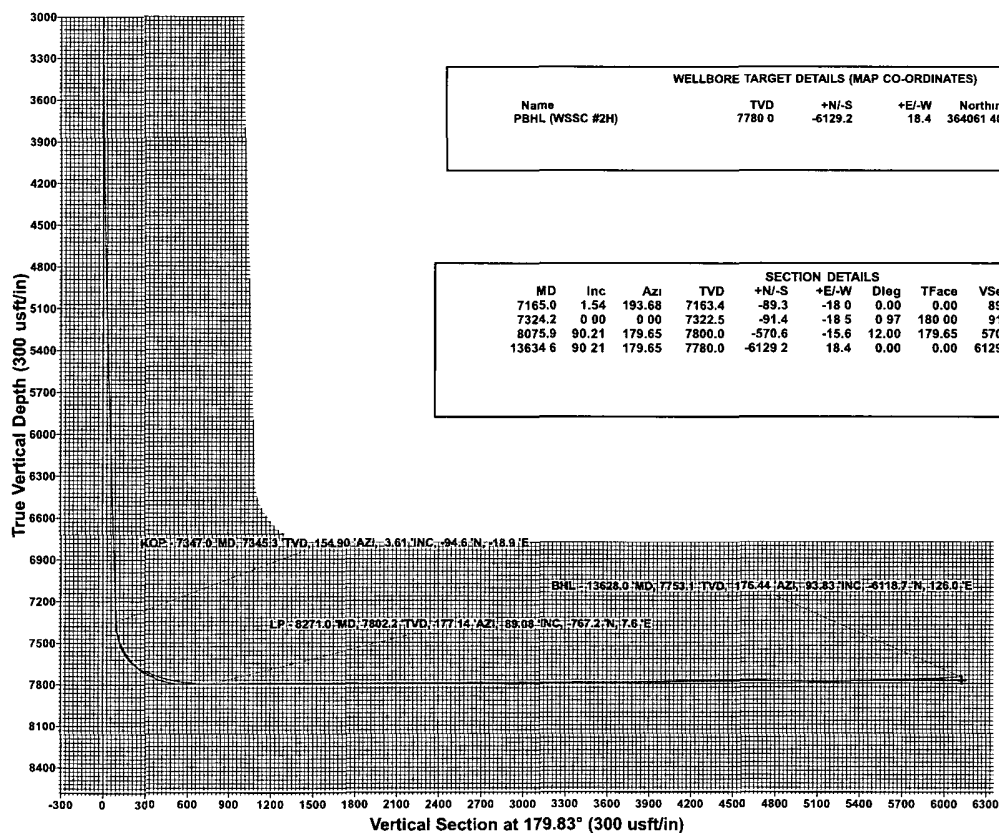
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0 0	0.0	370190 600	561955 000	32° 1' 3.398 N	104° 8' 0 373 W	

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
PBHL (WSSC #2H)	7780 0	-6129.2	18.4	364061 400	561973 400	Point

SECTION DETAILS

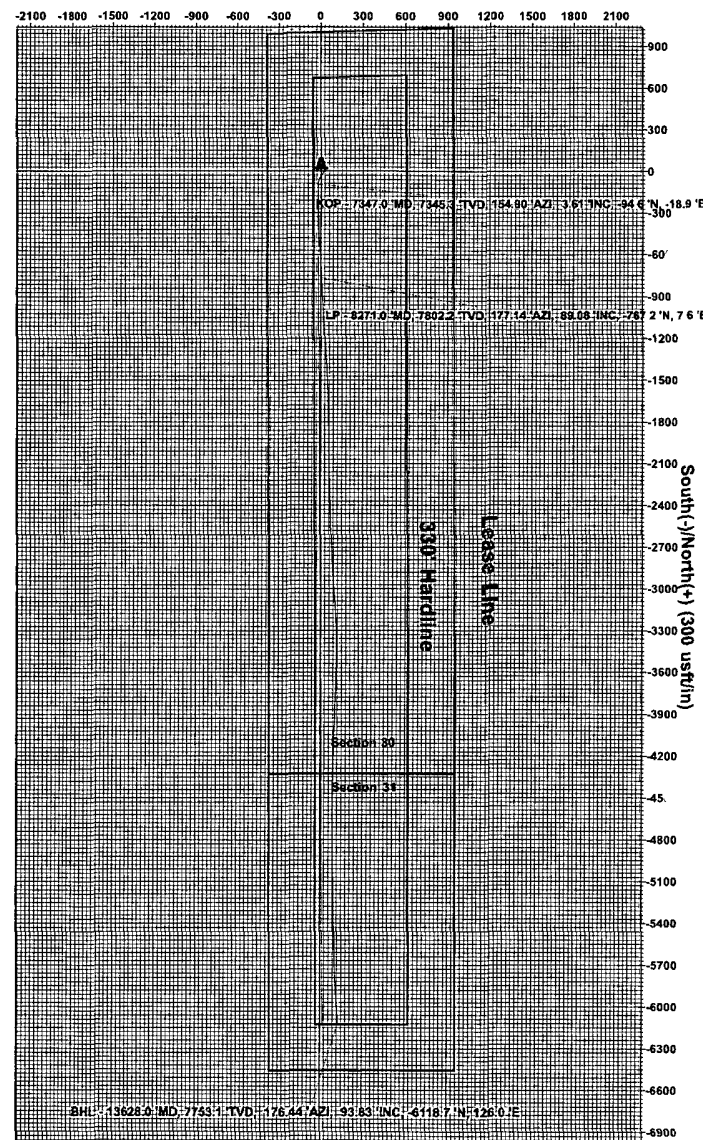
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSeal	Target
7165.0	1.54	193.68	7163.4	-89.3	-18 0	0.00	0.00	89.3	
7324.2	0 00	0 00	7322.5	-91.4	-18 5	0 97	180 00	91.4	
8075.9	90.21	179.65	7800.0	-570.6	-15.6	12.00	179.65	570.5	
13634 6	90 21	179.65	7780.0	-6129 2	18.4	0.00	0.00	6129 2	PBHL (WSSC #2H)



PATHFINDER

A Schlumberger Company

West(-)/East(+) (300 usft/in)



Plan Post Gyro Plan #2 (#2H/OH)

Created By Michael Trout Date 14.38, June 18 2012

Checked _____ Date _____

COG Operating LLC
Eddy County(NAD27)
Way South State Con
#2H
Original Well Elev
OH
Post Gyro Plan #2