

Results of Directional Survey

API number:	30-025-40154		
OGRID:		Operator:	COG OPERATING LLC
		Property:	SL EAST 30 FEDERAL COM # 1H

surface	ULSTR:	O	30	T	19S	R	32E
				330	FSL	1670	FEL

BH Loc	ULSTR:	B	30	T	19S	R	32E
13540	MD	9200.8	TVD	4910	FSL	1832	FEL
				370	FNL		

Top Perf/OH	ULSTR:	O	30	T	19S	R	32E
9380	MD	9183.9	TVD	781	FSL	1669	FEL

Bot Perf/OH	ULSTR:	B	30	T	19S	R	32E
13480	MD	9203.3	TVD	4850	FSL	1831	FEL
				430	FNL		

	MD	N/S	E/W	VD
	9348	422.50	12.12	9175.3
TOP PERFS/OH	9380	451.21	0.91	9183.89
	9380	451.21	0.91	9183.89
	13463	4502.72	-160.20	9204.00
BOT PERFS/OH	13480	4519.70	-160.51	9203.28
	13491	4530.69	-160.71	9202.82

NEXT TO LAST	13463	4502.72	-160.20	9204.00
LAST READING	13491	4530.69	-160.71	9202.82
TD	13540	4579.64	-161.60	9200.76

Surface Location	330	FS	1670	FE
Projected BHL	4910	FS	1832	FE
Location of				
Top Perfs/OH	781	FS	1669	FE
Bottom Perfs/OH	4850	FS	1831	FE

SUMMARY of Subsurface Locations

Surface Location	O-30-19S-32E	330	FS	1670	FE	Vert. Depth
Top Perfs/OH	O-30-19S-32E	781	FS	1669	FE	9183.89
Bottom Perfs/OH	B-30-19S-32E	4850	FS	1831	FE	9203.28
Projected TD	B-30-19S-32E	4910	FS	1832	FE	9200.76

OCT 25 2011

**McVAY DRILLING COMPANY**

P.O. Box 2450
 Hobbs, New Mexico 88241
 (575) 397-3311
 FAX 39-DRILL

HOBBS OCD**OCT 11 2011**

Well Name and Num: SL East 30 Fed Com #1H
 Location: Sec. 30, T19S, R32E
 Operator: COG
 Drilling Contractor: McVay Drilling Company

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The undersigned certifies that he is an authorized representative of the drilling contractor who drilled the above described well and that he has conducted deviation tests and obtained the following results:

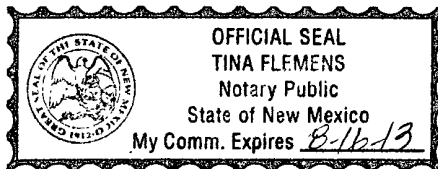
<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>
0.24	302	1.11	6858	3.20	8740	89.43	11605
0.89	597	2.24	7527	3.69	8773	90.31	12255
0.68	919	2.12	7452	9.76	8803	89.25	12440
0.55	1188	3.94	7597	33.94	8963	90.92	12810
0.89	1501	2.61	7681	38.08	8995	89.69	13184
2.47	2098	2.16	7786	56.81	9216	92.23	13463
2.71	2381	2.00	7882	62.61	9279	92.51	13540
2.31	2507	1.87	8022	72.72	9348		
1.88	2587	1.31	8278	83.89	9506		
1.46	2693	1.98	8529	85.47	9567		
0.56	3070	1.87	8677	91.98	10294		
0.75	3451	2.28	8804	92.86	10389		
0.46	4391	1.76	8931	91.45	10482		
1.05	4841	1.40	9090	93.74	10851		
1.02	5346	1.05	9292	88.72	11143		
0.84	5850	0.70	9798	88.99	11420		
1.32	6350	2.11	8708	87.32	11513		

SUR: O-30-19s-32e, 330/S & 1670/E
 BHL: P-30-19s-32e, 4910/S & 1832/E
 API # 30-025-40154

By: Hunter Crowl

Subscribed and sworn to before me this 24th day of August, 2011

Tina Flemens
 Notary Public, Lea County, New Mexico



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R **D**
 AUG 09 2011
 ARTESIA WEST



COG Operating LLC

Lea County(NAD27)

SL East 30 Fed

#1

OH

HOBBS OCD

OCT 11 2011

Design: OH

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Pathfinder X&Y Report

02 August, 2011

SUR: O-30-19s-32e, 330/S & 1670/E
BHL: P-30-19s-32e, 4910/S & 1832/E
API # 30-025-40154



Pathfinder
Pathfinder X&Y Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #1
Project:	Lea County(NAD27)	TVD Reference:	WELL @ 3563.00usft (Original Well Elev)
Site:	SL East 30 Fed	MD Reference:	WELL @ 3563.00usft.(Original Well Elev)
Well:	#1	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1' Single User Db

Project:	Lea 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		SL East 30 Fed			
Site Position:		Northing:		Latitude:	
From: Map		591,492.100 usft		32° 37' 29.966 N	
Position Uncertainty:		Easting:		Longitude:	
0.00 usft		663,621.200 usft		103° 48' 6.771 W	
		Slot Radius:		Grid Convergence:	
		13-3/16 "		0.29 °	

Well:	#1					
Well Position	+N/-S	0.00 usft	Northing:	591,492.100 usft	Latitude:	32° 37' 29.966 N
	+E/-W	0.00 usft	Easting:	663,621.200 usft	Longitude:	103° 48' 6.771 W
Position Uncertainty	0.00 usft		Wellhead Elevation:	usft	Ground Level:	3,545.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	7/16/2011	7.70	60.54	48,860

Design:	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/S	+E/W	Direction	
	(usft)	(usft)	(usft)	(°)	
	0 00	0.00	0.00	359.73	



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Well:	#1	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey Program		Date	8/2/2011		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	8,700.00	Survey #1 - Gyro (OH)	NS-GYRO-MS	North sensing gyrocompassing m/s	
8,708.00	13,540.00	Survey #2 - MWD (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)
0.00	0.00	0.00	0.00	-3,563.00	0.00	0.00	0.00	0.00	591,492.10	663,621.20
100.00	0.24	37.73	100.00	-3,463.00	0.17	0.13	0.17	0.24	591,492.27	663,621.33
200.00	0.49	9.75	200.00	-3,363.00	0.75	0.33	0.75	0.30	591,492.85	663,621.53
300.00	0.55	356.91	299.99	-3,263.01	1.65	0.38	1.65	0.13	591,493.75	663,621.58
400.00	0.75	340.68	399.99	-3,163.01	2.75	0.13	2.75	0.27	591,494.85	663,621.33
500.00	0.65	337.82	499.98	-3,063.02	3.89	-0.30	3.89	0.11	591,495.99	663,620.90
600.00	0.73	320.03	599.97	-2,963.03	4.91	-0.92	4.91	0.23	591,497.01	663,620.28
700.00	0.71	325.75	699.96	-2,863.04	5.91	-1.68	5.91	0.07	591,498.01	663,619.52
800.00	0.66	315.18	799.96	-2,763.04	6.83	-2.43	6.84	0.14	591,498.93	663,618.77
900.00	0.27	23.53	899.95	-2,663.05	7.45	-2.75	7.47	0.61	591,499.55	663,618.45
1,000.00	0.31	354.50	999.95	-2,563.05	7.94	-2.68	7.95	0.15	591,500.04	663,618.52
1,100.00	0.26	5.35	1,099.95	-2,463.05	8.43	-2.68	8.45	0.07	591,500.53	663,618.52
1,200.00	0.24	342.46	1,199.95	-2,363.05	8.86	-2.72	8.87	0.10	591,500.96	663,618.48
1,300.00	0.34	6.61	1,299.95	-2,263.05	9.35	-2.75	9.37	0.16	591,501.45	663,618.45
1,400.00	0.29	10.53	1,399.95	-2,163.05	9.90	-2.67	9.91	0.05	591,502.00	663,618.53
1,500.00	0.66	21.04	1,499.94	-2,063.06	10.68	-2.42	10.69	0.38	591,502.78	663,618.78
1,600.00	0.58	36.30	1,599.94	-1,963.06	11.63	-1.91	11.64	0.18	591,503.73	663,619.29
1,700.00	1.15	32.43	1,699.93	-1,863.07	12.88	-1.08	12.89	0.57	591,504.98	663,620.12
1,800.00	1.19	40.40	1,799.91	-1,763.09	14.52	0.14	14.52	0.17	591,506.62	663,621.34
1,900.00	1.96	45.86	1,899.87	-1,663.13	16.50	2.04	16.49	0.78	591,508.60	663,623.24
2,000.00	2.56	61.35	1,999.79	-1,563.21	18.76	5.22	18.74	0.85	591,510.86	663,626.42



Pathfinder Pathfinder X&Y Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #1
Project:	Lea County(NAD27)	TVD Reference:	WELL @ 3563.00usft (Original Well Elev)
Site:	SL East 30 Fed	MD Reference:	WELL @ 3563.00usft (Original Well Elev)
Well:	#1	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)	
2,100.00	2.62	56.73	2,099.69	-1,463.31	21.09	9.09	21.05	0.22	591,513.19	663,630.29	
2,200.00	2.52	62.10	2,199.59	-1,363.41	23.37	12.95	23.31	0.26	591,515.47	663,634.15	
2,300.00	2.48	66.49	2,299.49	-1,263.51	25.26	16.87	25.18	0.20	591,517.36	663,638.07	
2,400.00	2.43	68.95	2,399.40	-1,163.60	26.89	20.84	26.79	0.12	591,518.99	663,642.04	
2,500.00	2.15	70.67	2,499.32	-1,063.68	28.27	24.59	28.15	0.29	591,520.37	663,645.79	
2,600.00	1.49	65.92	2,599.27	-963.73	29.42	27.54	29.29	0.68	591,521.52	663,648.74	
2,700.00	1.19	58.22	2,699.24	-863.76	30.50	29.61	30.36	0.35	591,522.60	663,650.81	
2,800.00	1.01	55.63	2,799.22	-763.78	31.54	31.22	31.40	0.19	591,523.64	663,652.42	
2,900.00	0.80	51.33	2,899.21	-663.79	32.48	32.49	32.32	0.22	591,524.58	663,653.69	
3,000.00	0.45	64.96	2,999.21	-563.79	33.08	33.40	32.92	0.38	591,525.18	663,654.60	
3,100.00	0.45	69.39	3,099.20	-463.80	33.38	34.12	33.22	0.03	591,525.48	663,655.32	
3,200.00	0.58	48.33	3,199.20	-363.80	33.86	34.86	33.69	0.23	591,525.96	663,656.06	
3,300.00	0.76	77.13	3,299.19	-263.81	34.34	35.89	34.17	0.38	591,526.44	663,657.09	
3,400.00	0.70	74.79	3,399.18	-163.82	34.65	37.13	34.48	0.07	591,526.75	663,658.33	
3,500.00	0.67	77.35	3,499.18	-63.82	34.94	38.29	34.76	0.04	591,527.04	663,659.49	
3,600.00	0.90	100.05	3,599.17	36.17	34.93	39.63	34.74	0.38	591,527.03	663,660.83	
3,700.00	1.11	118.06	3,699.15	136.15	34.34	41.26	34.14	0.38	591,526.44	663,662.46	
3,800.00	1.23	131.58	3,799.13	236.13	33.17	42.91	32.97	0.30	591,525.27	663,664.11	
3,900.00	0.89	142.33	3,899.11	336.11	31.84	44.19	31.63	0.39	591,523.94	663,665.39	
4,000.00	0.88	143.92	3,999.10	436.10	30.61	45.12	30.39	0.03	591,522.71	663,666.32	
4,100.00	0.92	168.26	4,099.09	536.09	29.20	45.73	28.98	0.38	591,521.30	663,666.93	
4,200.00	0.99	165.04	4,199.08	636.08	27.58	46.12	27.36	0.09	591,519.68	663,667.32	
4,300.00	0.84	173.66	4,299.06	736.06	26.02	46.42	25.80	0.20	591,518.12	663,667.62	
4,400.00	0.77	150.03	4,399.05	836.05	24.71	46.84	24.48	0.34	591,516.81	663,668.04	
4,500.00	0.89	143.27	4,499.04	936.04	23.50	47.64	23.28	0.15	591,515.60	663,668.84	
4,600.00	0.91	157.09	4,599.03	1,036.03	22.15	48.42	21.92	0.22	591,514.25	663,669.62	
4,700.00	0.63	151.13	4,699.02	1,136.02	20.93	48.99	20.70	0.29	591,513.03	663,670.19	



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Site:	SL East 30 Fed	MD Reference:	WELL @ 3563.00usft (Original Well Elev)
Well:	#1	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)	
4,800.00	0.63	130.35	4,799.02	1,236.02	20.10	49.67	19.86	0.23	591,512.20	663,670.87	
4,900.00	0.58	119.97	4,899.01	1,336.01	19.49	50.53	19.25	0.12	591,511.59	663,671.73	
5,000.00	0.57	100.51	4,999.01	1,436.01	19.14	51.46	18.90	0.19	591,511.24	663,672.66	
5,100.00	0.66	100.35	5,099.00	1,536.00	18.95	52.51	18.70	0.09	591,511.05	663,673.71	
5,200.00	0.65	114.82	5,198.99	1,635.99	18.61	53.60	18.36	0.17	591,510.71	663,674.80	
5,300.00	0.61	117.17	5,298.99	1,735.99	18.13	54.58	17.87	0.05	591,510.23	663,675.78	
5,400.00	0.92	97.59	5,398.98	1,835.98	17.78	55.85	17.52	0.40	591,509.88	663,677.05	
5,500.00	0.92	82.59	5,498.97	1,935.97	17.78	57.45	17.51	0.24	591,509.88	663,678.65	
5,600.00	0.94	73.46	5,598.95	2,035.95	18.11	59.03	17.83	0.15	591,510.21	663,680.23	
5,700.00	1.03	80.38	5,698.94	2,135.94	18.50	60.70	18.21	0.15	591,510.60	663,681.90	
5,800.00	0.91	79.82	5,798.92	2,235.92	18.79	62.37	18.49	0.12	591,510.89	663,683.57	
5,900.00	1.17	70.70	5,898.91	2,335.91	19.27	64.11	18.96	0.31	591,511.37	663,685.31	
6,000.00	0.88	74.41	5,998.89	2,435.89	19.81	65.82	19.50	0.30	591,511.91	663,687.02	
6,100.00	1.18	68.34	6,098.88	2,535.88	20.40	67.51	20.08	0.32	591,512.50	663,688.71	
6,200.00	1.12	60.94	6,198.86	2,635.86	21.25	69.32	20.92	0.16	591,513.35	663,690.52	
6,300.00	1.16	56.37	6,298.84	2,735.84	22.29	71.02	21.95	0.10	591,514.39	663,692.22	
6,400.00	1.28	55.44	6,398.81	2,835.81	23.48	72.78	23.14	0.12	591,515.58	663,693.98	
6,500.00	1.16	45.35	6,498.79	2,935.79	24.82	74.42	24.47	0.25	591,516.92	663,695.62	
6,600.00	1.20	46.52	6,598.77	3,035.77	26.26	75.90	25.90	0.05	591,518.36	663,697.10	
6,700.00	1.19	41.76	6,698.75	3,135.75	27.75	77.36	27.39	0.10	591,519.85	663,698.56	
6,800.00	1.20	48.51	6,798.73	3,235.73	29.22	78.83	28.85	0.14	591,521.32	663,700.03	
6,900.00	1.67	48.79	6,898.69	3,335.69	30.87	80.71	30.49	0.47	591,522.97	663,701.91	
7,000.00	2.01	39.97	6,998.64	3,435.64	33.18	82.94	32.79	0.44	591,525.28	663,704.14	
7,100.00	2.27	32.25	7,098.57	3,535.57	36.20	85.12	35.80	0.39	591,528.30	663,706.32	
7,200.00	2.21	33.92	7,198.50	3,635.50	39.47	87.25	39.06	0.09	591,531.57	663,708.45	
7,300.00	2.39	30.22	7,298.42	3,735.42	42.87	89.38	42.45	0.23	591,534.97	663,710.58	
7,400.00	2.24	29.66	7,398.33	3,835.33	46.37	91.39	45.94	0.15	591,538.47	663,712.59	



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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)	
7,500.00	2.36	26.53	7,498.25	3,935.25	49.91	93.28	49.47	0.17	591,542.01	663,714.48	
7,600.00	2.32	27.96	7,598.17	4,035.17	53.54	95.15	53.09	0.07	591,545.64	663,716.35	
7,700.00	1.90	27.60	7,698.10	4,135.10	56.80	96.87	56.34	0.42	591,548.90	663,718.07	
7,800.00	1.66	32.64	7,798.05	4,235.05	59.49	98.41	59.02	0.29	591,551.59	663,719.61	
7,900.00	1.70	38.51	7,898.01	4,335.01	61.87	100.12	61.40	0.18	591,553.97	663,721.32	
8,000.00	1.79	48.26	7,997.97	4,434.97	64.07	102.21	63.59	0.31	591,556.17	663,723.41	
8,100.00	1.83	49.19	8,097.92	4,534.92	66.15	104.58	65.66	0.05	591,558.25	663,725.78	
8,200.00	1.70	55.11	8,197.87	4,634.87	68.05	107.01	67.54	0.22	591,560.15	663,728.21	
8,300.00	1.80	65.25	8,297.82	4,734.82	69.55	109.65	69.03	0.32	591,561.65	663,730.85	
8,400.00	1.78	66.66	8,397.77	4,834.77	70.82	112.50	70.29	0.05	591,562.92	663,733.70	
8,500.00	1.70	66.51	8,497.73	4,934.73	72.03	115.29	71.49	0.08	591,564.13	663,736.49	
8,600.00	1.92	59.44	8,597.68	5,034.68	73.47	118.09	72.92	0.31	591,565.57	663,739.29	
8,700.00	1.94	56.24	8,697.62	5,134.62	75.27	120.94	74.70	0.11	591,567.37	663,742.14	
8,708.00	2.11	59.24	8,705.62	5,142.62	75.42	121.18	74.84	2.50	591,567.52	663,742.38	
8,740.00	2.20	55.93	8,737.59	5,174.59	76.06	122.20	75.49	0.48	591,568.16	663,743.40	
8,772.00	3.69	8.99	8,769.55	5,206.55	77.42	122.87	76.84	8.48	591,569.52	663,744.07	
KOP - 8772.00'MD, 8769.55'TVD', 77.42'N, 122.87'E											
8,803.00	9.76	356.02	8,800.33	5,237.33	81.03	122.84	80.45	20.06	591,573.13	663,744.04	
8,835.00	16.27	2.69	8,831.49	5,268.49	88.23	122.86	87.65	20.85	591,580.33	663,744.06	
8,867.00	20.84	4.63	8,861.82	5,298.82	98.38	123.53	97.80	14.41	591,590.48	663,744.73	
8,899.00	24.97	1.85	8,891.29	5,328.29	110.81	124.21	110.23	13.34	591,602.91	663,745.41	
8,931.00	29.28	357.88	8,919.77	5,356.77	125.39	124.14	124.80	14.60	591,617.49	663,745.34	
8,963.00	33.94	353.97	8,947.01	5,384.01	142.11	122.91	141.52	15.90	591,634.21	663,744.11	
8,995.00	38.08	349.79	8,972.90	5,409.90	160.71	120.22	160.14	15.04	591,652.81	663,741.42	
9,026.00	41.77	344.40	8,996.67	5,433.67	180.08	115.75	179.53	16.31	591,672.18	663,736.95	
9,058.00	44.76	339.79	9,019.98	5,456.98	200.93	108.98	200.41	13.59	591,693.03	663,730.18	
9,090.00	48.10	334.66	9,042.04	5,479.04	222.28	99.99	221.80	15.61	591,714.38	663,721.19	



Pathfinder Pathfinder X&Y Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #1
Project:	Lea County(NAD27)	TVD Reference:	WELL @ 3563.00usft (Original Well Elev)
Site:	SL East 30 Fed	MD Reference:	WELL @ 3563.00usft (Original Well Elev)
Well:	#1	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)	
9,122.00	52.32	330.82	9,062.52	5,499.52	244.11	88.71	243.69	16.09	591,736.21	663,709.91	
9,154.00	54.26	331.07	9,081.65	5,518.65	266.53	76.25	266.17	6.09	591,758.63	663,697.45	
9,184.00	54.96	333.50	9,099.02	5,536.02	288.18	64.88	287.87	7.00	591,780.28	663,686.08	
9,216.00	56.81	336.91	9,116.97	5,553.97	312.23	53.78	311.97	10.55	591,804.33	663,674.98	
9,248.00	59.00	340.73	9,133.98	5,570.98	337.50	44.00	337.29	12.21	591,829.60	663,665.20	
9,279.00	62.61	340.06	9,149.10	5,586.10	362.99	34.92	362.82	11.80	591,855.09	663,656.12	
9,311.00	67.27	338.86	9,162.65	5,599.65	390.13	24.75	390.00	14.95	591,882.23	663,645.95	
9,348.00	72.72	338.53	9,175.30	5,612.30	422.50	12.12	422.44	14.75	591,914.60	663,633.32	
9,380.00	76.15	338.80	9,183.89	5,620.89	451.21	0.91	451.20	10.75	591,943.31	663,622.11	
9,411.00	79.49	339.51	9,190.43	5,627.43	479.53	-9.87	479.57	11.00	591,971.63	663,611.33	
9,443.00	81.25	339.91	9,195.78	5,632.78	509.12	-20.81	509.21	5.64	592,001.22	663,600.39	
9,474.00	82.83	339.73	9,200.07	5,637.07	537.94	-31.40	538.08	5.13	592,030.04	663,589.80	
9,506.00	83.89	340.57	9,203.77	5,640.77	567.83	-42.20	568.02	4.22	592,059.93	663,579.00	
9,537.00	84.59	341.05	9,206.88	5,643.88	596.96	-52.33	597.20	2.73	592,089.06	663,568.87	
9,567.00	85.47	341.16	9,209.48	5,646.48	625.24	-62.01	625.52	2.96	592,117.34	663,559.19	
9,599.00	85.47	341.58	9,212.01	5,649.01	655.47	-72.20	655.80	1.31	592,147.57	663,549.00	
9,631.00	85.21	341.21	9,214.61	5,651.61	685.69	-82.38	686.07	1.41	592,177.79	663,538.82	
9,663.00	85.74	341.51	9,217.13	5,654.13	715.92	-92.58	716.35	1.90	592,208.02	663,528.62	
9,694.00	86.61	341.42	9,219.20	5,656.20	745.25	-102.41	745.72	2.82	592,237.35	663,518.79	
9,726.00	86.97	340.93	9,220.99	5,657.99	775.49	-112.72	776.01	1.90	592,267.59	663,508.48	
9,758.00	87.67	341.90	9,222.49	5,659.49	805.78	-122.90	806.35	3.74	592,297.88	663,498.30	
9,790.00	88.29	343.32	9,223.62	5,660.62	836.30	-132.46	836.92	4.84	592,328.40	663,488.74	
9,821.00	88.81	345.20	9,224.40	5,661.40	866.13	-140.87	866.78	6.29	592,358.23	663,480.33	
9,853.00	89.34	347.47	9,224.92	5,661.92	897.22	-148.43	897.91	7.28	592,389.32	663,472.77	
LP - 9853.00'MD, 9224.92'TVD, 897.22'N, -148.43'E											
9,885.00	89.96	349.67	9,225.11	5,662.11	928.58	-154.77	929.30	7.14	592,420.68	663,466.43	
9,917.00	89.78	351.31	9,225.19	5,662.19	960.14	-160.05	960.88	5.16	592,452.24	663,461.15	



Pathfinder Pathfinder X&Y Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #1
Project:	Lea County(NAD27)	TVD Reference:	WELL @ 3563.00usft (Original Well Elev)
Site:	SL East 30 Fed	MD Reference:	WELL @ 3563.00usft (Original Well Elev)
Well:	#1	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)
9,949.00	90.57	353.10	9,225.09	5,662.09	991.84	-164.39	992.60	6.11	592,483.94	663,456.81
9,981.00	90.13	354.95	9,224.89	5,661.89	1,023.66	-167.72	1,024.44	5.94	592,515.76	663,453.48
10,013.00	89.08	357.09	9,225.11	5,662.11	1,055.58	-169.95	1,056.37	7.45	592,547.68	663,451.25
10,045.00	88.55	359.05	9,225.78	5,662.78	1,087.56	-171.02	1,088.35	6.34	592,579.66	663,450.18
10,075.00	88.64	359.33	9,226.51	5,663.51	1,117.55	-171.45	1,118.34	0.98	592,609.65	663,449.75
10,106.00	89.96	358.66	9,226.89	5,663.89	1,148.54	-171.99	1,149.34	4.78	592,640.64	663,449.21
10,138.00	90.48	358.70	9,226.77	5,663.77	1,180.53	-172.73	1,181.33	1.63	592,672.63	663,448.47
10,170.00	90.04	359.31	9,226.62	5,663.62	1,212.52	-173.28	1,213.33	2.35	592,704.62	663,447.92
10,202.00	90.31	359.29	9,226.53	5,663.53	1,244.52	-173.67	1,245.33	0.85	592,736.62	663,447.53
10,294.00	91.98	0.33	9,224.69	5,661.69	1,336.50	-173.98	1,337.30	2.14	592,828.60	663,447.22
10,389.00	92.86	357.40	9,220.67	5,657.67	1,431.38	-175.86	1,432.20	3.22	592,923.48	663,445.34
10,482.00	91.54	357.52	9,217.10	5,654.10	1,524.22	-179.98	1,525.05	1.43	593,016.32	663,441.22
10,578.00	90.92	359.49	9,215.04	5,652.04	1,620.16	-182.48	1,621.00	2.15	593,112.26	663,438.72
10,673.00	91.63	1.47	9,212.93	5,649.93	1,715.13	-181.69	1,715.97	2.21	593,207.23	663,439.51
10,765.00	93.83	1.06	9,208.55	5,645.55	1,807.00	-179.66	1,807.82	2.43	593,299.10	663,441.54
10,861.00	93.74	1.18	9,202.21	5,639.21	1,902.77	-177.78	1,903.59	0.16	593,394.87	663,443.42
10,957.00	91.19	359.87	9,198.08	5,635.08	1,998.67	-176.91	1,999.48	2.99	593,490.77	663,444.29
11,050.00	88.81	359.15	9,198.08	5,635.08	2,091.66	-177.70	2,092.47	2.67	593,583.76	663,443.50
11,143.00	88.72	358.86	9,200.09	5,637.09	2,184.62	-179.32	2,185.44	0.33	593,676.72	663,441.88
11,235.00	86.79	2.96	9,203.69	5,640.69	2,276.51	-177.86	2,277.33	4.92	593,768.61	663,443.34
11,328.00	88.64	4.31	9,207.40	5,644.40	2,369.25	-171.97	2,370.03	2.46	593,861.35	663,449.23
11,420.00	88.99	4.17	9,209.30	5,646.30	2,460.97	-165.17	2,461.73	0.41	593,953.07	663,456.03
11,513.00	87.32	4.16	9,212.30	5,649.30	2,553.68	-158.42	2,554.40	1.80	594,045.78	663,462.78
11,605.00	89.43	3.47	9,214.91	5,651.91	2,645.43	-152.30	2,646.12	2.41	594,137.53	663,468.90
11,698.00	88.29	1.24	9,216.76	5,653.76	2,738.33	-148.48	2,739.00	2.69	594,230.43	663,472.72
11,791.00	89.52	2.07	9,218.53	5,655.53	2,831.27	-145.79	2,831.92	1.60	594,323.37	663,475.41
11,884.00	91.45	0.58	9,217.75	5,654.75	2,924.23	-143.64	2,924.88	2.62	594,416.33	663,477.56



Pathfinder Pathfinder X&Y Report

Company: COG Operating LLC
Project: Lea County(NAD27)
Site: SL East 30 Fed
Well: #1
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #1
TVD Reference: WELL @ 3563.00usft (Original Well Elev)
MD Reference: WELL @ 3563.00usft (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)	
11,977.00	90.48	0.57	9,216.18	5,653.18	3,017.21	-142.71	3,017.85	1.04	594,509.31	663,478.49	
12,069.00	90.92	359.08	9,215.06	5,652.06	3,109.20	-142.99	3,109.84	1.69	594,601.30	663,478.21	
12,161.00	91.10	357.56	9,213.43	5,650.43	3,201.15	-145.69	3,201.80	1.66	594,693.25	663,475.51	
12,255.00	90.31	357.78	9,212.28	5,649.28	3,295.06	-149.51	3,295.73	0.87	594,787.16	663,471.69	
12,348.00	89.52	357.38	9,212.42	5,649.42	3,387.98	-153.43	3,388.66	0.95	594,880.08	663,467.77	
12,440.00	89.25	358.39	9,213.40	5,650.40	3,479.91	-156.83	3,480.61	1.14	594,972.01	663,464.37	
12,533.00	90.31	359.28	9,213.76	5,650.76	3,572.89	-158.72	3,573.59	1.49	595,064.99	663,462.48	
12,625.00	90.04	0.22	9,213.48	5,650.48	3,664.88	-159.12	3,665.59	1.06	595,156.98	663,462.08	
12,718.00	90.66	0.89	9,212.91	5,649.91	3,757.88	-158.22	3,758.58	0.98	595,249.98	663,462.98	
12,810.00	90.92	0.09	9,211.64	5,648.64	3,849.86	-157.43	3,850.56	0.91	595,341.96	663,463.77	
12,903.00	91.19	0.01	9,209.93	5,646.93	3,942.85	-157.35	3,943.55	0.30	595,434.95	663,463.85	
12,996.00	90.48	359.94	9,208.57	5,645.57	4,035.84	-157.39	4,036.53	0.77	595,527.94	663,463.81	
13,090.00	89.34	0.92	9,208.72	5,645.72	4,129.83	-156.69	4,130.52	1.60	595,621.93	663,464.51	
13,184.00	89.69	359.22	9,209.52	5,646.52	4,223.83	-156.57	4,224.52	1.85	595,715.93	663,464.63	
13,276.00	90.75	359.10	9,209.16	5,646.16	4,315.81	-157.92	4,316.51	1.16	595,807.91	663,463.28	
13,370.00	91.63	359.55	9,207.21	5,644.21	4,409.79	-159.03	4,410.49	1.05	595,901.89	663,462.17	
13,463.00	92.33	359.01	9,204.00	5,641.00	4,502.72	-160.20	4,503.43	0.95	595,994.82	663,461.00	
13,491.00	92.51	358.89	9,202.82	5,639.82	4,530.69	-160.71	4,531.40	0.77	596,022.79	663,460.49	
13,540.00	92.51	358.89	9,200.67	5,637.67	4,579.64	-161.66	4,580.35	0.00	596,071.74	663,459.54	

BHL - 13540.00'MD, 9200.67'TVD', 4579.64'N, -161.66'E - PBHL (SLE30)



Pathfinder
Pathfinder X&Y Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #1
Project:	Lea County(NAD27)	TVD Reference:	WELL @ 3563.00usft (Original Well Elev)
Site:	SL East 30 Fed	MD Reference:	WELL @ 3563.00usft (Original Well Elev)
Well:	#1	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
8,772.00	8,769.55	77.42	122.87	KOP - 8772.00'MD, 8769.55'TVD', 77.42'N, 122.87'E
9,853.00	9,224.92	897.22	-148.43	LP - 9853.00'MD, 9224.92'TVD', 897.22'N, -148.43'E
13,540.00	9,200.67	4,579.64	-161.66	BHL - 13540.00'MD, 9200.67'TVD', 4579.64'N, -161.66'E

Checked By: _____	Approved By: _____	Date: _____
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Project: Lea County(NAD27)
Site: SL East 30 Fed
Well: #1
Wellbore: OH
Plan: Plan #3 (#1/OH)



Azimuths to Grid North
True North: -0.29°
Magnetic North: 7.41°

Magnetic Field
Strength: 48859.6snT
Dip Angle: 60.54°
Date: 7/16/2011
Model: IGRF200510

PROJECT DETAILS: Lea 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

SECTION DETAILS

MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	Vsect	Target
9279.00	62.61	340.06	3149.10	362.99	34.92	0.00	0.00	361.28	
9602.69	90.35	340.06	3224.03	655.96	-71.36	8.57	0.00	658.32	
10267.35	90.35	0.00	9219.97	1307.28	-185.86	3.00	90.00	1313.74	
4 13537.07	90.35	0.00	9200.00	4576.94	-185.86	0.00	0.00	4580.71	

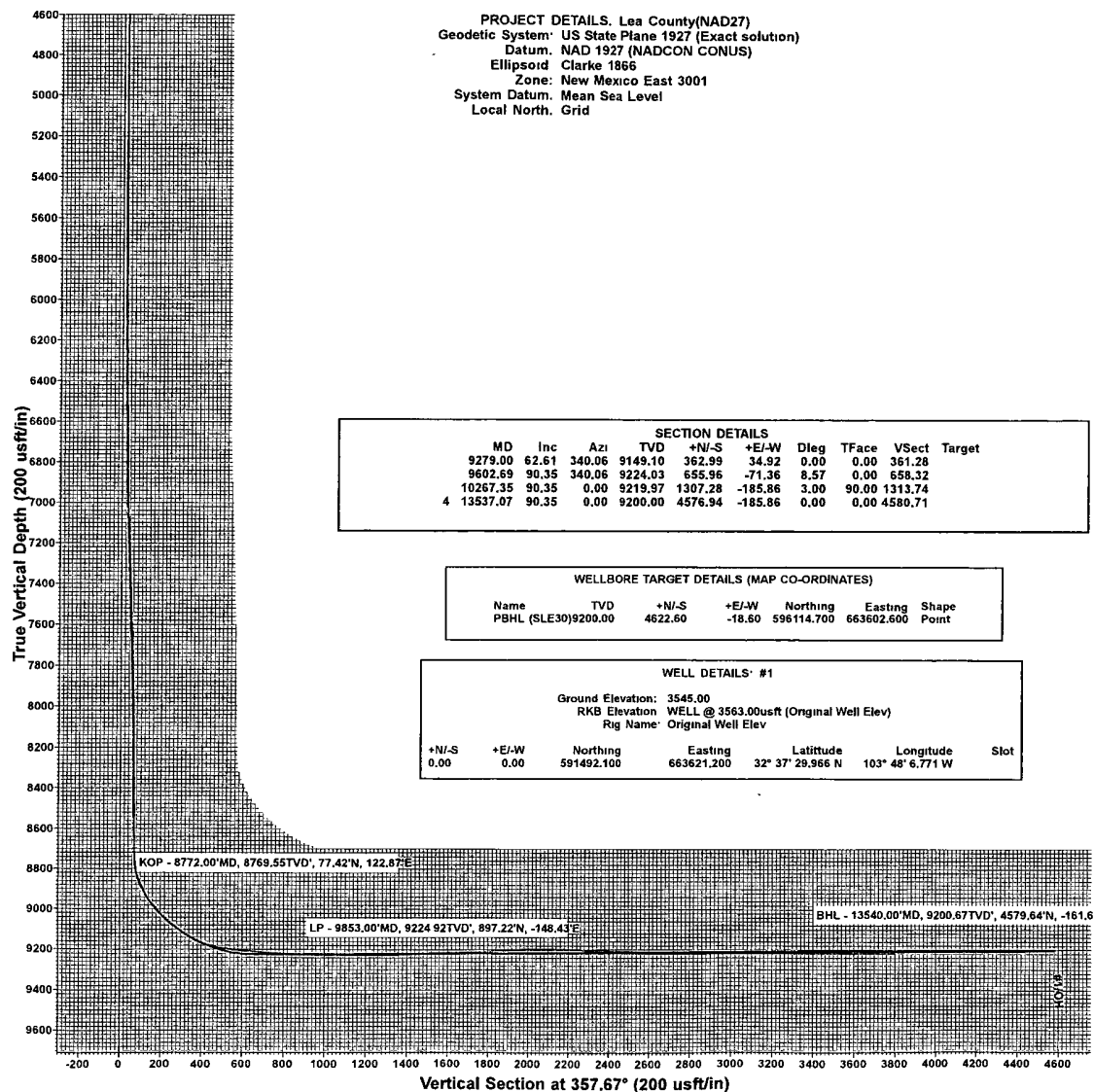
WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N-S	+E-W	Northing	Easting	Shape
PBHL (SLE30)9200.00	4622.60	-18.60	596114.700	663602.600		Point

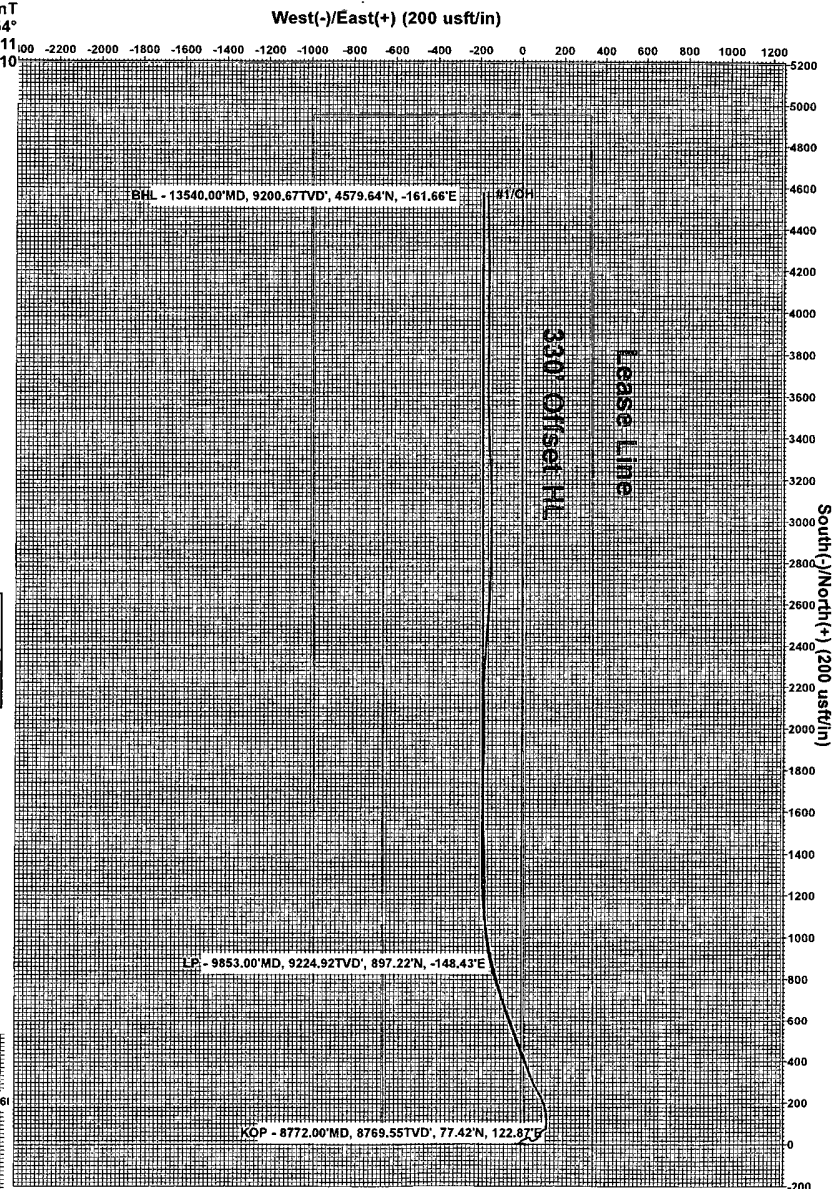
WELL DETAILS: #1

Ground Elevation: 3545.00
RKB Elevation WELL @ 3563.00usft (Original Well Elev)
Rig Name: Original Well Elev

+N-S	+E-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	591492.100	663621.200	32° 37' 29.966 N	103° 48' 6.771 W	



Vertical Section at 357.67° (200 usf/in)



Plan Plan #3 (#1/OH)

Created By: Nate Bingham Date: 9/53, August 02 2011

Checked: _____ Date: _____