



30.015-39999

COG Operating LLC

Eddy County(NAD83)

SRO State Unit

#18H

OH

Plan: Plan #1

Pathfinder X & Y Report

29 February, 2012

PATHFINDER®
A Schlumberger Company



Pathfinder
Pathfinder X & Y Report



Company: COG Operating LLC		Local Co-ordinate Reference: Well #18H	
Project: Eddy County(NAD83)		TVD Reference: KB = 30' @ 3091.1usft (Original Well Elev)	
Site: SRO State Unit		MD Reference: KB = 30' @ 3091.1usft (Original Well Elev)	
Well: #18H		North Reference: Grid	
Wellbore: OH		Survey Calculation Method: Minimum Curvature	
Design: Plan #1		Database: EDM 5000.1 Single User Db	

Project Eddy County(NAD83)			
Map System: US State Plane 1983		System Datum: Mean Sea Level	
Geo Datum: North American Datum 1983			
Map Zone: New Mexico Eastern Zone			

Site SRO State Unit			
Site Position:		Northing:	381,619.450 usft
From: Map		Easting:	612,967.080 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 2' 56.187 N
		Longitude:	104° 6' 7.699 W
		Grid Convergence:	0.12 °

Well #18H			
Well Position	+N/-S	0.0 usft	Northing: 381,619.450 usft
	+E/-W	0.0 usft	Easting: 612,967.080 usft
Position Uncertainty		0.0 usft	Wellhead Elevation: usft
			Latitude: 32° 2' 56.187 N
			Longitude: 104° 6' 7.699 W
			Ground Level: 3,061.1 usft

Wellbore OH					
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF200510	2/29/2012	7.72	59.94	48,424

Design Plan #1				
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.0	0.0	0.0	180.77

Survey Tool Program Date 2/29/2012				
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
0.0	17,766.4	Plan #1 (OH)		



Pathfinder
Pathfinder X & Y Report



Company: COG Operating LLC Project: Eddy County(NAD83) Site: SRO State Unit Well: #18H Wellbore: OH Design: Plan #1			Local Co-ordinate Reference: TVD Reference: MD Reference: North Reference: Survey Calculation Method: Database:			Well #18H KB = 30' @ 3091.1usft (Original Well Elev) KB = 30' @ 3091.1usft (Original Well Elev) Grid Minimum Curvature EDM 5000 1 Single User Db					
Planned 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	-3,091.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
100.0	0.00	0.00	100.0	-2,991.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
200.0	0.00	0.00	200.0	-2,891.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
300.0	0.00	0.00	300.0	-2,791.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
400.0	0.00	0.00	400.0	-2,691.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
500.0	0.00	0.00	500.0	-2,591.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
600.0	0.00	0.00	600.0	-2,491.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
700.0	0.00	0.00	700.0	-2,391.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
800.0	0.00	0.00	800.0	-2,291.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
900.0	0.00	0.00	900.0	-2,191.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
1,000.0	0.00	0.00	1,000.0	-2,091.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
1,100.0	0.00	0.00	1,100.0	-1,991.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
1,200.0	0.00	0.00	1,200.0	-1,891.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
1,300.0	0.00	0.00	1,300.0	-1,791.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
1,400.0	0.00	0.00	1,400.0	-1,691.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
1,500.0	0.00	0.00	1,500.0	-1,591.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
1,600.0	0.00	0.00	1,600.0	-1,491.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
1,700.0	0.00	0.00	1,700.0	-1,391.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
1,800.0	0.00	0.00	1,800.0	-1,291.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
1,900.0	0.00	0.00	1,900.0	-1,191.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
2,000.0	0.00	0.00	2,000.0	-1,091.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
2,100.0	0.00	0.00	2,100.0	-991.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
2,200.0	0.00	0.00	2,200.0	-891.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
2,300.0	0.00	0.00	2,300.0	-791.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
2,400.0	0.00	0.00	2,400.0	-691.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
2,500.0	0.00	0.00	2,500.0	-591.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
2,600.0	0.00	0.00	2,600.0	-491.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08	



Pathfinder
Pathfinder X & Y Report



Company: COG Operating LLC		Local Co-ordinate Reference:				Well #18H	
Project: Eddy County(NAD83)		TVD Reference:				KB = 30' @ 3091.1usft (Original Well Elev)	
Site: SRO State Unit		MD Reference:				KB = 30' @ 3091.1usft (Original Well Elev)	
Well: #18H		North Reference:				Grid	
Wellbore: OH		Survey Calculation Method:				Minimum Curvature	
Design: Plan #1		Database:				EDM 5000.1 Single User Db	

Planned 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)
2,700.0	0.00	0.00	2,700.0	-391.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08
2,800.0	0.00	0.00	2,800.0	-291.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08
2,900.0	0.00	0.00	2,900.0	-191.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08
3,000.0	0.00	0.00	3,000.0	-91.1	0.0	0.0	0.0	0.00	381,619.45	612,967.08
3,100.0	0.00	0.00	3,100.0	8.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
3,200.0	0.00	0.00	3,200.0	108.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
3,300.0	0.00	0.00	3,300.0	208.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
3,400.0	0.00	0.00	3,400.0	308.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
3,500.0	0.00	0.00	3,500.0	408.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
3,600.0	0.00	0.00	3,600.0	508.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
3,700.0	0.00	0.00	3,700.0	608.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
3,800.0	0.00	0.00	3,800.0	708.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
3,900.0	0.00	0.00	3,900.0	808.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
4,000.0	0.00	0.00	4,000.0	908.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
4,100.0	0.00	0.00	4,100.0	1,008.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
4,200.0	0.00	0.00	4,200.0	1,108.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
4,300.0	0.00	0.00	4,300.0	1,208.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
4,400.0	0.00	0.00	4,400.0	1,308.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
4,500.0	0.00	0.00	4,500.0	1,408.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
4,600.0	0.00	0.00	4,600.0	1,508.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
4,700.0	0.00	0.00	4,700.0	1,608.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
4,800.0	0.00	0.00	4,800.0	1,708.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
4,900.0	0.00	0.00	4,900.0	1,808.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
5,000.0	0.00	0.00	5,000.0	1,908.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
5,100.0	0.00	0.00	5,100.0	2,008.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
5,200.0	0.00	0.00	5,200.0	2,108.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08
5,300.0	0.00	0.00	5,300.0	2,208.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08



Pathfinder
Pathfinder X & Y Report



Company: COG Operating LLC		Local Co-ordinate Reference: Well #18H	
Project: Eddy County(NAD83)		TVD Reference: KB = 30' @ 3091.1usft (Original Well Elev)	
Site: SRO State Unit		MD Reference: KB = 30' @ 3091.1usft (Original Well Elev)	
Well: #18H		North Reference: Grid	
Wellbore: .OH		Survey Calculation Method: Minimum Curvature	
Design: Plan #1		Database: EDM 5000.1 Single User Db	

Planned 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)	
5,400.0	0.00	0.00	5,400.0	2,308.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
5,500.0	0.00	0.00	5,500.0	2,408.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
5,600.0	0.00	0.00	5,600.0	2,508.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
5,700.0	0.00	0.00	5,700.0	2,608.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
5,800.0	0.00	0.00	5,800.0	2,708.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
5,900.0	0.00	0.00	5,900.0	2,808.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
6,000.0	0.00	0.00	6,000.0	2,908.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
6,100.0	0.00	0.00	6,100.0	3,008.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
6,200.0	0.00	0.00	6,200.0	3,108.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
6,300.0	0.00	0.00	6,300.0	3,208.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
6,400.0	0.00	0.00	6,400.0	3,308.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
6,500.0	0.00	0.00	6,500.0	3,408.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
6,600.0	0.00	0.00	6,600.0	3,508.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
6,700.0	0.00	0.00	6,700.0	3,608.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
6,800.0	0.00	0.00	6,800.0	3,708.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
6,900.0	0.00	0.00	6,900.0	3,808.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
7,000.0	0.00	0.00	7,000.0	3,908.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
7,100.0	0.00	0.00	7,100.0	4,008.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
7,200.0	0.00	0.00	7,200.0	4,108.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
7,300.0	0.00	0.00	7,300.0	4,208.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
7,400.0	0.00	0.00	7,400.0	4,308.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
7,500.0	0.00	0.00	7,500.0	4,408.9	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
7,547.6	0.00	0.00	7,547.6	4,456.5	0.0	0.0	0.0	0.00	381,619.45	612,967.08	
7,550.0	0.29	180.77	7,550.0	4,458.9	0.0	0.0	0.0	12.00	381,619.44	612,967.08	
7,575.0	3.29	180.77	7,575.0	4,483.9	-0.8	0.0	0.8	12.00	381,618.66	612,967.07	
7,600.0	6.29	180.77	7,599.9	4,508.8	-2.9	0.0	2.9	12.00	381,616.58	612,967.04	
7,625.0	9.29	180.77	7,624.7	4,533.6	-6.3	-0.1	6.3	12.00	381,613.19	612,967.00	



Pathfinder
Pathfinder X & Y Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #18H
Project:	Eddy County(NAD83)	TVD Reference:	KB = 30' @ 3091.1usft (Original Well Elev)
Site:	SRO State Unit	MD Reference:	KB = 30' @ 3091.1usft (Original Well Elev)
Well:	#18H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000 1 Single User Db

Planned 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)	
7,650.0	12.29	180.77	7,649.2	4,558.1	-10.9	-0.1	10.9	12.00	381,608.51	612,966.93	
7,675.0	15.29	180.77	7,673.5	4,582.4	-16.9	-0.2	16.9	12.00	381,602.56	612,966.85	
7,700.0	18.29	180.77	7,697.4	4,606.3	-24.1	-0.3	24.1	12.00	381,595.34	612,966.76	
7,725.0	21.29	180.77	7,720.9	4,629.8	-32.6	-0.4	32.6	12.00	381,586.87	612,966.64	
7,750.0	24.29	180.77	7,744.0	4,652.9	-42.3	-0.6	42.3	12.00	381,577.19	612,966.51	
7,775.0	27.29	180.77	7,766.5	4,675.4	-53.1	-0.7	53.1	12.00	381,566.32	612,966.37	
7,800.0	30.29	180.77	7,788.4	4,697.3	-65.2	-0.9	65.2	12.00	381,554.28	612,966.21	
7,825.0	33.29	180.77	7,809.7	4,718.6	-78.3	-1.1	78.3	12.00	381,541.12	612,966.03	
7,850.0	36.29	180.77	7,830.2	4,739.1	-92.6	-1.2	92.6	12.00	381,526.86	612,965.84	
7,875.0	39.29	180.77	7,849.9	4,758.8	-107.9	-1.4	107.9	12.00	381,511.54	612,965.63	
7,900.0	42.29	180.77	7,868.9	4,777.8	-124.2	-1.7	124.2	12.00	381,495.21	612,965.41	
7,925.0	45.29	180.77	7,886.9	4,795.8	-141.5	-1.9	141.5	12.00	381,477.92	612,965.18	
7,950.0	48.29	180.77	7,904.0	4,812.9	-159.8	-2.1	159.8	12.00	381,459.70	612,964.94	
7,975.0	51.29	180.77	7,920.2	4,829.1	-178.8	-2.4	178.9	12.00	381,440.61	612,964.68	
8,000.0	54.29	180.77	7,935.3	4,844.2	-198.7	-2.7	198.8	12.00	381,420.70	612,964.41	
8,025.0	57.29	180.77	7,949.3	4,858.2	-219.4	-2.9	219.4	12.00	381,400.03	612,964.13	
8,050.0	60.29	180.77	7,962.3	4,871.2	-240.8	-3.2	240.8	12.00	381,378.66	612,963.85	
8,075.0	63.29	180.77	7,974.1	4,883.0	-262.8	-3.5	262.8	12.00	381,356.63	612,963.55	
8,100.0	66.29	180.77	7,984.8	4,893.7	-285.4	-3.8	285.5	12.00	381,334.02	612,963.25	
8,125.0	69.29	180.77	7,994.2	4,903.1	-308.6	-4.1	308.6	12.00	381,310.88	612,962.94	
8,150.0	72.29	180.77	8,002.4	4,911.3	-332.2	-4.5	332.2	12.00	381,287.28	612,962.62	
8,175.0	75.29	180.77	8,009.4	4,918.3	-356.2	-4.8	356.2	12.00	381,263.27	612,962.30	
8,200.0	78.29	180.77	8,015.1	4,924.0	-380.5	-5.1	380.5	12.00	381,238.94	612,961.97	
8,225.0	81.29	180.77	8,019.6	4,928.5	-405.1	-5.4	405.1	12.00	381,214.34	612,961.64	
8,250.0	84.29	180.77	8,022.7	4,931.6	-429.9	-5.8	429.9	12.00	381,189.55	612,961.31	
8,275.0	87.29	180.77	8,024.5	4,933.4	-454.8	-6.1	454.9	12.00	381,164.62	612,960.98	
8,291.6	89.27	180.77	8,025.0	4,933.9	-471.4	-6.3	471.4	12.00	381,148.07	612,960.75	



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #18H
Project:	Eddy County(NAD83)	TVD Reference:	KB = 30' @ 3091.1usft (Original Well Elev)
Site:	SRO State Unit	MD Reference:	KB = 30' @ 3091.1usft (Original Well Elev)
Well:	#18H	North Reference:	Gnd
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000 1 Single User Db

Planned 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)	
8,300.0	89.27	180.77	8,025.1	4,934.0	-479.8	-6.4	479.9	0.00	381,139.63	612,960.64	
8,400.0	89.27	180.77	8,026.4	4,935.3	-579.8	-7.8	579.9	0.00	381,039.65	612,959.30	
8,500.0	89.27	180.77	8,027.7	4,936.6	-679.8	-9.1	679.8	0.00	380,939.66	612,957.96	
8,600.0	89.27	180.77	8,028.9	4,937.8	-779.8	-10.5	779.8	0.00	380,839.68	612,956.61	
8,700.0	89.27	180.77	8,030.2	4,939.1	-879.8	-11.8	879.8	0.00	380,739.70	612,955.27	
8,800.0	89.27	180.77	8,031.5	4,940.4	-979.7	-13.2	979.8	0.00	380,639.71	612,953.93	
8,900.0	89.27	180.77	8,032.7	4,941.6	-1,079.7	-14.5	1,079.8	0.00	380,539.73	612,952.59	
9,000.0	89.27	180.77	8,034.0	4,942.9	-1,179.7	-15.8	1,179.8	0.00	380,439.75	612,951.25	
9,100.0	89.27	180.77	8,035.3	4,944.2	-1,279.7	-17.2	1,279.8	0.00	380,339.77	612,949.90	
9,200.0	89.27	180.77	8,036.5	4,945.4	-1,379.7	-18.5	1,379.8	0.00	380,239.78	612,948.56	
9,300.0	89.27	180.77	8,037.8	4,946.7	-1,479.7	-19.9	1,479.8	0.00	380,139.80	612,947.22	
9,400.0	89.27	180.77	8,039.1	4,948.0	-1,579.6	-21.2	1,579.8	0.00	380,039.82	612,945.88	
9,500.0	89.27	180.77	8,040.3	4,949.2	-1,679.6	-22.5	1,679.8	0.00	379,939.83	612,944.54	
9,600.0	89.27	180.77	8,041.6	4,950.5	-1,779.6	-23.9	1,779.8	0.00	379,839.85	612,943.19	
9,700.0	89.27	180.77	8,042.9	4,951.8	-1,879.6	-25.2	1,879.8	0.00	379,739.87	612,941.85	
9,800.0	89.27	180.77	8,044.1	4,953.0	-1,979.6	-26.6	1,979.7	0.00	379,639.88	612,940.51	
9,900.0	89.27	180.77	8,045.4	4,954.3	-2,079.5	-27.9	2,079.7	0.00	379,539.90	612,939.17	
10,000.0	89.27	180.77	8,046.7	4,955.6	-2,179.5	-29.3	2,179.7	0.00	379,439.92	612,937.83	
10,100.0	89.27	180.77	8,047.9	4,956.8	-2,279.5	-30.6	2,279.7	0.00	379,339.94	612,936.48	
10,200.0	89.27	180.77	8,049.2	4,958.1	-2,379.5	-31.9	2,379.7	0.00	379,239.95	612,935.14	
10,300.0	89.27	180.77	8,050.5	4,959.4	-2,479.5	-33.3	2,479.7	0.00	379,139.97	612,933.80	
10,400.0	89.27	180.77	8,051.7	4,960.6	-2,579.5	-34.6	2,579.7	0.00	379,039.99	612,932.46	
10,500.0	89.27	180.77	8,053.0	4,961.9	-2,679.4	-36.0	2,679.7	0.00	378,940.00	612,931.12	
10,600.0	89.27	180.77	8,054.3	4,963.2	-2,779.4	-37.3	2,779.7	0.00	378,840.02	612,929.77	
10,700.0	89.27	180.77	8,055.5	4,964.4	-2,879.4	-38.6	2,879.7	0.00	378,740.04	612,928.43	
10,800.0	89.27	180.77	8,056.8	4,965.7	-2,979.4	-40.0	2,979.7	0.00	378,640.05	612,927.09	
10,900.0	89.27	180.77	8,058.1	4,967.0	-3,079.4	-41.3	3,079.7	0.00	378,540.07	612,925.75	



Pathfinder
Pathfinder X & Y Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #18H
Project:	Eddy County(NAD83)	TVD Reference:	KB = 30' @ 3091.1usft (Original Well Elev)
Site:	SRO State Unit	MD Reference:	KB = 30' @ 3091.1usft (Original Well Elev)
Well:	#18H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000.1 Single User Db

Planned Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLog (°/100usft)	Northing (usft)	Easting (usft)
11,000.0	89.27	180.77	8,059.3	4,968.2	-3,179.4	-42.7	3,179.6	0.00	378,440.09	612,924.41
11,100.0	89.27	180.77	8,060.6	4,969.5	-3,279.3	-44.0	3,279.6	0.00	378,340.11	612,923.06
11,200.0	89.27	180.77	8,061.9	4,970.8	-3,379.3	-45.4	3,379.6	0.00	378,240.12	612,921.72
11,300.0	89.27	180.77	8,063.1	4,972.0	-3,479.3	-46.7	3,479.6	0.00	378,140.14	612,920.38
11,400.0	89.27	180.77	8,064.4	4,973.3	-3,579.3	-48.0	3,579.6	0.00	378,040.16	612,919.04
11,500.0	89.27	180.77	8,065.7	4,974.6	-3,679.3	-49.4	3,679.6	0.00	377,940.17	612,917.70
11,600.0	89.27	180.77	8,066.9	4,975.8	-3,779.3	-50.7	3,779.6	0.00	377,840.19	612,916.35
11,700.0	89.27	180.77	8,068.2	4,977.1	-3,879.2	-52.1	3,879.6	0.00	377,740.21	612,915.01
11,800.0	89.27	180.77	8,069.5	4,978.4	-3,979.2	-53.4	3,979.6	0.00	377,640.22	612,913.67
11,900.0	89.27	180.77	8,070.7	4,979.6	-4,079.2	-54.8	4,079.6	0.00	377,540.24	612,912.33
12,000.0	89.27	180.77	8,072.0	4,980.9	-4,179.2	-56.1	4,179.6	0.00	377,440.26	612,910.99
12,100.0	89.27	180.77	8,073.2	4,982.1	-4,279.2	-57.4	4,279.6	0.00	377,340.28	612,909.64
12,200.0	89.27	180.77	8,074.5	4,983.4	-4,379.2	-58.8	4,379.6	0.00	377,240.29	612,908.30
12,300.0	89.27	180.77	8,075.8	4,984.7	-4,479.1	-60.1	4,479.5	0.00	377,140.31	612,906.96
12,400.0	89.27	180.77	8,077.0	4,985.9	-4,579.1	-61.5	4,579.5	0.00	377,040.33	612,905.62
12,500.0	89.27	180.77	8,078.3	4,987.2	-4,679.1	-62.8	4,679.5	0.00	376,940.34	612,904.28
12,600.0	89.27	180.77	8,079.6	4,988.5	-4,779.1	-64.1	4,779.5	0.00	376,840.36	612,902.93
12,700.0	89.27	180.77	8,080.8	4,989.7	-4,879.1	-65.5	4,879.5	0.00	376,740.38	612,901.59
12,800.0	89.27	180.77	8,082.1	4,991.0	-4,979.1	-66.8	4,979.5	0.00	376,640.39	612,900.25
12,900.0	89.27	180.77	8,083.4	4,992.3	-5,079.0	-68.2	5,079.5	0.00	376,540.41	612,898.91
13,000.0	89.27	180.77	8,084.6	4,993.5	-5,179.0	-69.5	5,179.5	0.00	376,440.43	612,897.57
13,100.0	89.27	180.77	8,085.9	4,994.8	-5,279.0	-70.9	5,279.5	0.00	376,340.45	612,896.22
13,200.0	89.27	180.77	8,087.2	4,996.1	-5,379.0	-72.2	5,379.5	0.00	376,240.46	612,894.88
13,300.0	89.27	180.77	8,088.4	4,997.3	-5,479.0	-73.5	5,479.5	0.00	376,140.48	612,893.54
13,400.0	89.27	180.77	8,089.7	4,998.6	-5,579.0	-74.9	5,579.5	0.00	376,040.50	612,892.20
13,500.0	89.27	180.77	8,091.0	4,999.9	-5,678.9	-76.2	5,679.4	0.00	375,940.51	612,890.86
13,600.0	89.27	180.77	8,092.2	5,001.1	-5,778.9	-77.6	5,779.4	0.00	375,840.53	612,889.51



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company: COG Operating LLC
Project: Eddy County(NAD83)
Site: SRO State Unit
Well: #18H
Wellbore: OH
Design: Plan #1

Local Co-ordinate Reference:
TVD Reference:
MD Reference:
North Reference:
Survey Calculation Method:
Database:

Well #18H
KB = 30' @ 3091.1usft (Original Well Elev)
KB = 30' @ 3091.1usft (Original Well Elev)
Grid
Minimum Curvature
EDM 5000.1 Single User Db

Planned Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	TVDSS (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLog (°/100usft)	Northing (usft)	Easting (usft)
13,700.0	89.27	180.77	8,093.5	5,002.4	-5,878.9	-78.9	5,879.4	0.00	375,740.55	612,888.17
13,800.0	89.27	180.77	8,094.8	5,003.7	-5,978.9	-80.3	5,979.4	0.00	375,640.57	612,886.83
13,900.0	89.27	180.77	8,096.0	5,004.9	-6,078.9	-81.6	6,079.4	0.00	375,540.58	612,885.49
14,000.0	89.27	180.77	8,097.3	5,006.2	-6,178.9	-82.9	6,179.4	0.00	375,440.60	612,884.15
14,100.0	89.27	180.77	8,098.6	5,007.5	-6,278.8	-84.3	6,279.4	0.00	375,340.62	612,882.80
14,200.0	89.27	180.77	8,099.8	5,008.7	-6,378.8	-85.6	6,379.4	0.00	375,240.63	612,881.46
14,300.0	89.27	180.77	8,101.1	5,010.0	-6,478.8	-87.0	6,479.4	0.00	375,140.65	612,880.12
14,400.0	89.27	180.77	8,102.4	5,011.3	-6,578.8	-88.3	6,579.4	0.00	375,040.67	612,878.78
14,500.0	89.27	180.77	8,103.6	5,012.5	-6,678.8	-89.6	6,679.4	0.00	374,940.68	612,877.44
14,600.0	89.27	180.77	8,104.9	5,013.8	-6,778.7	-91.0	6,779.4	0.00	374,840.70	612,876.09
14,700.0	89.27	180.77	8,106.2	5,015.1	-6,878.7	-92.3	6,879.4	0.00	374,740.72	612,874.75
14,800.0	89.27	180.77	8,107.4	5,016.3	-6,978.7	-93.7	6,979.3	0.00	374,640.74	612,873.41
14,900.0	89.27	180.77	8,108.7	5,017.6	-7,078.7	-95.0	7,079.3	0.00	374,540.75	612,872.07
15,000.0	89.27	180.77	8,110.0	5,018.9	-7,178.7	-96.4	7,179.3	0.00	374,440.77	612,870.73
15,100.0	89.27	180.77	8,111.2	5,020.1	-7,278.7	-97.7	7,279.3	0.00	374,340.79	612,869.38
15,200.0	89.27	180.77	8,112.5	5,021.4	-7,378.6	-99.0	7,379.3	0.00	374,240.80	612,868.04
15,300.0	89.27	180.77	8,113.8	5,022.7	-7,478.6	-100.4	7,479.3	0.00	374,140.82	612,866.70
15,400.0	89.27	180.77	8,115.0	5,023.9	-7,578.6	-101.7	7,579.3	0.00	374,040.84	612,865.36
15,500.0	89.27	180.77	8,116.3	5,025.2	-7,678.6	-103.1	7,679.3	0.00	373,940.85	612,864.02
15,600.0	89.27	180.77	8,117.6	5,026.5	-7,778.6	-104.4	7,779.3	0.00	373,840.87	612,862.67
15,700.0	89.27	180.77	8,118.8	5,027.7	-7,878.6	-105.7	7,879.3	0.00	373,740.89	612,861.33
15,800.0	89.27	180.77	8,120.1	5,029.0	-7,978.5	-107.1	7,979.3	0.00	373,640.91	612,859.99
15,900.0	89.27	180.77	8,121.4	5,030.3	-8,078.5	-108.4	8,079.3	0.00	373,540.92	612,858.65
16,000.0	89.27	180.77	8,122.6	5,031.5	-8,178.5	-109.8	8,179.2	0.00	373,440.94	612,857.31
16,100.0	89.27	180.77	8,123.9	5,032.8	-8,278.5	-111.1	8,279.2	0.00	373,340.96	612,855.96
16,200.0	89.27	180.77	8,125.2	5,034.1	-8,378.5	-112.5	8,379.2	0.00	373,240.97	612,854.62
16,300.0	89.27	180.77	8,126.4	5,035.3	-8,478.5	-113.8	8,479.2	0.00	373,140.99	612,853.28



Pathfinder
Pathfinder X & Y Report

PATHFINDER
A Schlumberger Company

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #18H
Project:	Eddy County(NAD83)	TVD Reference:	KB = 30' @ 3091.1usft (Original Well Elev)
Site:	SRO State Unit	MD Reference:	KB = 30' @ 3091.1usft (Original Well Elev)
Well:	#18H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Plan #1	Database:	EDM 5000 1 Single User Db

Planned 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)	
16,400.0	89.27	180.77	8,127.7	5,036.6	-8,578.4	-115.1	8,579.2	0.00	373,041.01	612,851.94	
16,500.0	89.27	180.77	8,129.0	5,037.9	-8,678.4	-116.5	8,679.2	0.00	372,941.02	612,850.60	
16,600.0	89.27	180.77	8,130.2	5,039.1	-8,778.4	-117.8	8,779.2	0.00	372,841.04	612,849.25	
16,700.0	89.27	180.77	8,131.5	5,040.4	-8,878.4	-119.2	8,879.2	0.00	372,741.06	612,847.91	
16,800.0	89.27	180.77	8,132.8	5,041.7	-8,978.4	-120.5	8,979.2	0.00	372,641.08	612,846.57	
16,900.0	89.27	180.77	8,134.0	5,042.9	-9,078.4	-121.9	9,079.2	0.00	372,541.09	612,845.23	
17,000.0	89.27	180.77	8,135.3	5,044.2	-9,178.3	-123.2	9,179.2	0.00	372,441.11	612,843.89	
17,100.0	89.27	180.77	8,136.6	5,045.5	-9,278.3	-124.5	9,279.2	0.00	372,341.13	612,842.54	
17,200.0	89.27	180.77	8,137.8	5,046.7	-9,378.3	-125.9	9,379.2	0.00	372,241.14	612,841.20	
17,300.0	89.27	180.77	8,139.1	5,048.0	-9,478.3	-127.2	9,479.1	0.00	372,141.16	612,839.86	
17,400.0	89.27	180.77	8,140.4	5,049.3	-9,578.3	-128.6	9,579.1	0.00	372,041.18	612,838.52	
17,500.0	89.27	180.77	8,141.6	5,050.5	-9,678.3	-129.9	9,679.1	0.00	371,941.19	612,837.18	
17,600.0	89.27	180.77	8,142.9	5,051.8	-9,778.2	-131.2	9,779.1	0.00	371,841.21	612,835.83	
17,700.0	89.27	180.77	8,144.2	5,053.1	-9,878.2	-132.6	9,879.1	0.00	371,741.23	612,834.49	
17,766.5	89.27	180.77	8,145.0	5,053.9	-9,944.7	-133.5	9,945.6	0.00	371,674.76	612,833.60	

Checked By: _____	Approved By: _____	Date: _____
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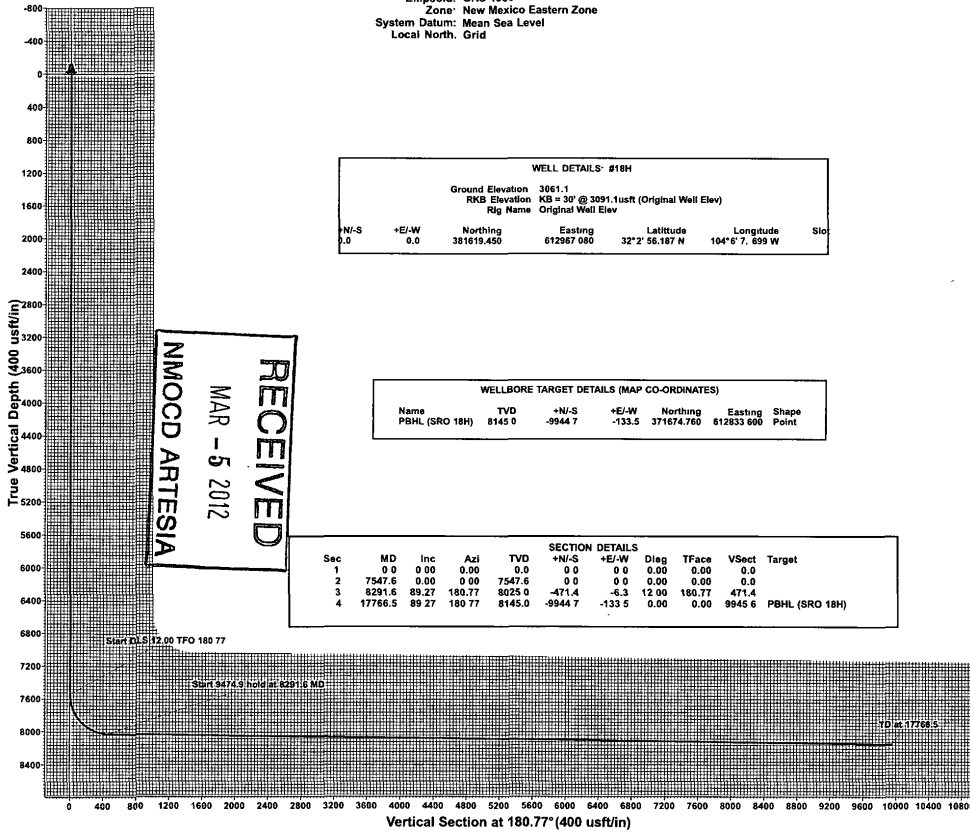


Project: Eddy County(NAD83)
Site: SRO State Unit
Well: #18H
Wellbore: OH
Plan: Plan #1 (#18H/OH)



Azimuths to Grid North
True North: -0.12°
Magnetic North: 7.60°
Magnetic Field
Strength: 48424.0snT
Dip Angle: 59.94°
Date: 2/29/2012
Model: IGRF200510

PROJECT DETAILS: Eddy County(NAD83)
Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Eastern Zone
System Datum: Mean Sea Level
Local North: Grid



WELL DETAILS- #18H						
Ground Elevation		3061.1				
RKB Elevation		KB + 30' @ 3091.1usft (Original Well Elev)				
Rig Name		Original Well Elev				
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slo
0.0	0.0	381619.450	612967.080	32° 2' 56.187 N	104° 6' 7.699 W	

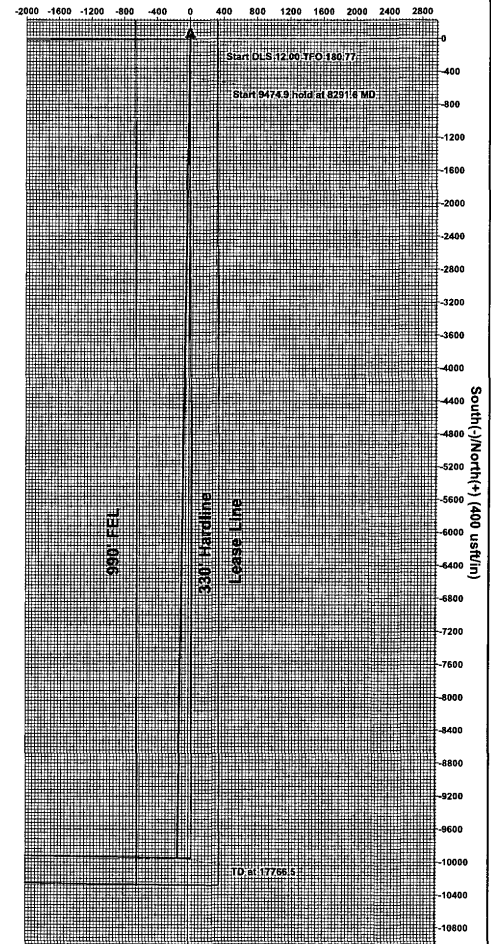
WELLBORE TARGET DETAILS (MAP CO-ORDINATES)						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape Point
PBHL (SRO 18H)	8145.0	-9944.7	-133.5	371674.760	612833.600	

SECTION DETAILS									
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Diag	TFace	Vsect Target
1	0.0	0.00	0.00	0.0	0.0	0.00	0.00	0.0	
2	7547.6	0.00	0.00	7547.6	0.0	0.00	0.00	0.0	
3	8291.6	89.27	180.77	8025.0	-471.4	-6.3	12.00	180.77	471.4
4	17766.5	89.27	180.77	8145.0	-9944.7	-133.5	0.00	0.00	9945.6 PBHL (SRO 18H)

PATHFINDER®

A Schlumberger Company

West(-)/East(+) (400 usft/in)



Created By: Michael Trout Date: 15-08, February 29 2012
Checked: _____ Date: _____

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Eddy County(NAD83)
SRO State Unit
OH
Plan #1