



COG Operating LLC

Eddy County, NM (NAN27 NME)

Grave Digger State Com #3H

Grave Digger State Com #3H

OH

Plan: Plan #1 8-3/4" Hole

SHL = 240' FNL & 1850' FEL

PP = 330' FNL & 1850' FEL

BHL = 330' FSL & 1850' FEL

Standard Planning Report

18 November, 2011



Scientific Drilling
Directional Drilling Operations



Scientific Drilling
Planning Report



Database:	EDM-Julio	Local Co-ordinate Reference:	Site Grave Digger State Com #3H
Company:	COG Operating LLC	TVD Reference:	GL Elev @ 3453 00usft
Project:	Eddy County, NM (NAN27 NME)	MD Reference:	GL Elev @ 3453 00usft
Site:	Grave Digger State Com #3H	North Reference:	Grid
Well:	Grave Digger State Com #3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 8-3/4" Hole		

Project	Eddy County, NM (NAN27 NME)		
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		Grave Digger State Com #3H			
Site Position:		Northing:	585,274 50 usft	Latitude:	32° 36' 32.284 N
From:	Map	Easting:	463,340 80 usft	Longitude:	104° 27' 8.584 W
Position Uncertainty:	0 00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	-0 06 °

Well	Grave Digger State Com #3H					
Well Position	+N/-S	0 00 usft	Northing:	585,274 50 usft	Latitude:	32° 36' 32 284 N
	+E/-W	0 00 usft	Easting:	463,340 80 usft	Longitude:	104° 27' 8 584 W
Position Uncertainty		0 00 usft	Wellhead Elevation:		Ground Level:	3,453 00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2011/11/18	7 97	60 38	48,706

Design	Plan #1 8-3/4" Hole			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0 00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0 00	0 00	0.00	180 14

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	
2,237 00	0 00	0 00	2,237 00	0 00	0 00	0 00	0 00	0 00	0 00	
2,983 90	89 53	180 14	2,714 99	-474 05	-1 18	11 99	11 99	0 00	180 14	
7,208 77	89 53	180 14	2,750 00	-4,698 76	-11.71	0 00	0 00	0 00	0 00	PBHL-GDSC #3H



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Site:	Grave Digger State Com #3H	North Reference:	Grid
Well:	Grave Digger State Com #3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 8-3/4" Hole		

Planned 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)
0 00	0.00	0 00	0.00	0 00	0 00	0 00	0.00	0 00	0 00
2,237 00	0 00	0 00	2,237 00	0 00	0 00	0 00	0 00	0 00	0 00
KOP Start Build 11.99°/100'									
2,300 00	7 55	180 14	2,299 82	-4 15	-0 01	4 15	11 99	11 99	0 00
2,400 00	19 54	180 14	2,396 86	-27 52	-0 07	27 52	11 99	11 99	0 00
2,500 00	31 52	180 14	2,486 93	-70 54	-0 18	70 54	11.99	11 99	0 00
2,535.12	35 73	180 14	2,516 16	-89 99	-0.22	89.99	11 99	11 99	0 00
PP=330' FNL GDSC #3H									
2,600 00	43 51	180 14	2,566 10	-131 33	-0.33	131 33	11 99	11 99	0 00
2,700 00	55 50	180 14	2,630 93	-207 24	-0 52	207 24	11 99	11.99	0 00
2,800 00	67 48	180 14	2,678 57	-294 95	-0 74	294 95	11 99	11 99	0 00
2,900 00	79 47	180 14	2,706 96	-390 65	-0.97	390 65	11 99	11 99	0 00
2,983 90	89 53	180 14	2,714 99	-474 05	-1 18	474 05	11 99	11 99	0 00
2,983 90	89 53	180 14	2,714 99	-474 05	-1 18	474.06	0 02	0 00	0 00
EOC hold 89.53°									
3,000 00	89 53	180 14	2,715 13	-490 15	-1 22	490 15	0 00	0 00	0 00
3,100 00	89 53	180 14	2,715 96	-590 15	-1 47	590.15	0 00	0 00	0 00
3,200 00	89 53	180 14	2,716 79	-690 14	-1.72	690 15	0 00	0 00	0 00
3,300 00	89 53	180 14	2,717 61	-790 14	-1 97	790 14	0 00	0 00	0 00
3,400 00	89 53	180.14	2,718 44	-890 14	-2 22	890 14	0 00	0 00	0 00
3,500 00	89 53	180 14	2,719 27	-990 13	-2 47	990 14	0 00	0 00	0 00
3,600 00	89 53	180 14	2,720 10	-1,090 13	-2.72	1,090 13	0 00	0 00	0 00
3,700 00	89 53	180 14	2,720 93	-1,190 12	-2.97	1,190 13	0 00	0 00	0 00
3,800 00	89 53	180 14	2,721 76	-1,290 12	-3 22	1,290 12	0 00	0 00	0 00
3,900 00	89 53	180 14	2,722.59	-1,390 12	-3 46	1,390 12	0 00	0 00	0 00
4,000 00	89 53	180 14	2,723 41	-1,490 11	-3.71	1,490 12	0 00	0 00	0 00
4,100 00	89 53	180 14	2,724.24	-1,590 11	-3 96	1,590 11	0 00	0 00	0.00
4,200 00	89 53	180 14	2,725 07	-1,690 11	-4.21	1,690 11	0 00	0 00	0 00
4,300 00	89 53	180.14	2,725 90	-1,790 10	-4 46	1,790 11	0 00	0 00	0 00
4,400 00	89 53	180 14	2,726.73	-1,890 10	-4 71	1,890 10	0 00	0 00	0 00
4,500 00	89 53	180 14	2,727 56	-1,990 09	-4 96	1,990 10	0 00	0 00	0 00
4,600 00	89 53	180 14	2,728 39	-2,090.09	-5.21	2,090 10	0 00	0 00	0 00
4,700 00	89 53	180 14	2,729 21	-2,190 09	-5.46	2,190 09	0 00	0 00	0 00
4,800 00	89 53	180 14	2,730 04	-2,290 08	-5 71	2,290 09	0 00	0 00	0 00
4,900 00	89 53	180.14	2,730 87	-2,390 08	-5 96	2,390 09	0 00	0 00	0 00
5,000.00	89 53	180 14	2,731 70	-2,490 08	-6 21	2,490 08	0 00	0 00	0 00
5,100 00	89 53	180 14	2,732 53	-2,590 07	-6 46	2,590 08	0 00	0 00	0 00
5,200 00	89 53	180 14	2,733 36	-2,690 07	-6 70	2,690 08	0 00	0 00	0 00
5,300 00	89 53	180.14	2,734 18	-2,790 06	-6.95	2,790 07	0 00	0 00	0 00
5,400 00	89 53	180 14	2,735 01	-2,890 06	-7 20	2,890 07	0 00	0 00	0 00
5,500 00	89 53	180.14	2,735 84	-2,990 06	-7 45	2,990 07	0 00	0 00	0 00
5,600 00	89 53	180 14	2,736.67	-3,090 05	-7 70	3,090.06	0 00	0 00	0 00
5,700 00	89 53	180 14	2,737 50	-3,190 05	-7 95	3,190.06	0 00	0 00	0 00
5,800 00	89 53	180 14	2,738 33	-3,290 05	-8.20	3,290.06	0 00	0 00	0 00
5,900 00	89 53	180 14	2,739 16	-3,390 04	-8 45	3,390 05	0 00	0 00	0 00
6,000 00	89 53	180 14	2,739 98	-3,490 04	-8 70	3,490 05	0 00	0 00	0 00
6,100 00	89 53	180 14	2,740 81	-3,590 03	-8 95	3,590.05	0 00	0 00	0 00
6,200 00	89 53	180 14	2,741 64	-3,690 03	-9 20	3,690 04	0 00	0 00	0 00
6,300 00	89 53	180.14	2,742 47	-3,790 03	-9 45	3,790 04	0 00	0 00	0 00
6,400 00	89 53	180 14	2,743 30	-3,890 02	-9.70	3,890 04	0 00	0 00	0 00
6,500 00	89 53	180 14	2,744 13	-3,990 02	-9 94	3,990.03	0 00	0 00	0 00
6,600 00	89 53	180 14	2,744 96	-4,090 02	-10 19	4,090 03	0 00	0 00	0 00
6,700.00	89.53	180.14	2,745 78	-4,190 01	-10 44	4,190 03	0 00	0 00	0 00



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Planning Report



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Company:	COG Operating LLC	TVD Reference:	GL Elev @ 3453.00usft
Project:	Eddy County, NM (NAN27 NME)	MD Reference:	GL Elev @ 3453 00usft
Site:	Grave Digger State Com #3H	North Reference:	Grid
Well:	Grave Digger State Com #3H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #1 8-3/4" Hole		

Planned 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)
6,800 00	89 53	180 14	2,746 61	-4,290 01	-10 69	4,290 02	0 00	0 00	0 00
6,900 00	89 53	180 14	2,747 44	-4,390 00	-10 94	4,390.02	0 00	0 00	0 00
7,000 00	89.53	180 14	2,748 27	-4,490.00	-11 19	4,490.02	0 00	0.00	0 00
7,100 00	89 53	180 14	2,749 10	-4,590 00	-11 44	4,590.01	0 00	0 00	0 00
7,200 00	89 53	180 14	2,749 93	-4,689 99	-11 69	4,690.01	0 00	0 00	0 00
7,208 77	89 53	180 14	2,750 00	-4,698 76	-11.71	4,698 78	0 00	0 00	0 00
PBHL-GDSC #3H									

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
PP=330' FNL GDSC #3H	0 00	360 00	2,516 18	-90 00	-0 22	585,184 50	463,340 58	32° 36' 31 393 N	104° 27' 8 585 W
- plan hits target center									
- Point									
PBHL-GDSC #3H	0 00	0 00	2,750 00	-4,698 76	-11 71	580,575 74	463,329 09	32° 35' 45.786 N	104° 27' 8 659 W
- plan hits target center									
- Point									

Plan Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,237 00	2,237 00	0 00	0 00	KOP Start Build 11 99°/100'
2,983 90	2,715 00	-474 05	-1 18	EOC hold 89 53°



Scientific Drilling for COG Operating LLC
Site: Eddy County, NM (NAN27 NME)
Well: Grave Digger State Com #3H
Wellbore: OH
Design: Design #1



SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	2237.00	0.00	0.00	2237.00	0.00	0.00	0.00	0.00	0.00	
3	2983.90	89.53	180.14	2715.00	-474.05	-1.18	11.99	180.14	474.05	
4	7208.77	89.53	180.14	2750.00	-4698.76	-11.71	0.00	0.00	4698.78	PBHL-GDSC #3H

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
PP=330° FNL GDSC #3H	2516.18	-90.00	-0.22	585184.50	463340.58	32°36' 31.393 N	104°27' 8.585 W	Point
PBHL-GDSC #3H	2750.00	-4698.76	-11.71	580575.74	463329.09	32°35' 45.786 N	104°27' 8.659 W	Point

WELL DETAILS: Grave Digger State Com #3H

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	585274.50	463340.80	32°36' 32.284 N	104°27' 8.584 W	

Grave Digger State Com #3H

Created By: Julio Pina Date: 18-Nov-11

Checked: _____ Date: _____

Reviewed: _____ Date: _____

PROJECT DETAILS Eddy County, NM (NAN27 NME)

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

AZIMUTH CORRECTIONS

ALL AZIMUTHS MUST BE CORRECTED TO GRID
GRID CORRECTIONS MUST BE APPLIED BEFORE PLOTTING
To convert a Magnetic Direction to a Grid Direction, Add 8.03°
To convert a True Direction to a Grid Direction, Add 0.06°

