



30-015-37476

COG Operating LLC

Eddy County, NM (NAN27 NME)

Skelly Unit #767

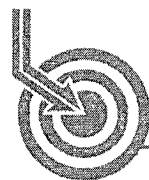
Skelly Unit #767

OH

Design: Actual

Standard Survey Report

12 November, 2010



Scientific Drilling
Directional Drilling Operations

WZ



Scientific Drilling

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Skelly Unit #767
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (12') @ 3910.00usft (Silver Oak #1)
Site:	Skelly Unit #767	MD Reference:	KB Elev (12') @ 3910.00usft (Silver Oak #1)
Well:	Skelly Unit #767	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Julio

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	Skelly Unit #767		
Site Position:		Northing:	665,175.60 usft
From:	Map	Easting:	653,135.10 usft
Position Uncertainty:	0.00 usft	Slot Radius:	0 "
		Latitude:	32° 49' 39.582 N
		Longitude:	103° 50' 5.328 W
		Grid Convergence:	0.27 °

Well	Skelly Unit #767		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0.00 usft	Easting:
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 49' 39.582 N
		Longitude:	103° 50' 5.328 W
		Ground Level:	3,898.00 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	2010/11/09	(°)
			Dip Angle
			(°)
			Field Strength
			(nT)
			7.83
			60.71
			49,008

Design	Actual		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			164.00

Survey Program	Date 2010/11/12		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.00	1,787.00	Gyro Survey (OH)	Keeper
1,888.00	6,863.00	MWD Survey (OH)	MWD
			Description
			Standard Wireline Keeper ver 1.0.2
			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)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	100.00	0.26	24.66	100.00	0.21	0.09	-0.17	0.26	0.26	0.00
	200.00	0.18	159.41	200.00	0.27	0.24	-0.19	0.41	-0.08	134.75
	300.00	0.17	137.36	300.00	0.01	0.40	0.10	0.07	-0.01	-22.05
	400.00	0.29	186.75	400.00	-0.35	0.47	0.47	0.22	0.12	49.39
	500.00	0.32	200.64	500.00	-0.86	0.34	0.92	0.08	0.03	13.89
	600.00	0.41	216.14	599.99	-1.41	0.03	1.37	0.13	0.09	15.50
	700.00	0.44	242.80	699.99	-1.88	-0.52	1.66	0.20	0.03	26.66
	800.00	0.53	235.91	799.99	-2.31	-1.24	1.88	0.11	0.09	-6.89
	900.00	0.45	230.48	899.98	-2.82	-1.93	2.18	0.09	-0.08	-5.43



Scientific Drilling Survey Report



Company: COG Operating, LLC
Project: Eddy County, NM (NAN27 NME)
Site: Skelly Unit #767
Well: Skelly Unit #767
Wellbore: OH
Design: Actual

Local Co-ordinate Reference: Site Skelly Unit #767
TVD Reference: KB Elev (12') @ 3910.00usft (Silver Oak #1)
MD Reference: KB Elev (12') @ 3910.00usft (Silver Oak #1)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM-Julio

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)
1,000.00	0.43	240.22	999.98	-3.26	-2.56	2.43	0.08	-0.02	9.74
1,100.00	0.40	287.16	1,099.98	-3.34	-3.22	2.33	0.33	-0.03	46.94
1,200.00	0.38	330.38	1,199.98	-2.95	-3.71	1.81	0.29	-0.02	43.22
1,300.00	0.83	357.17	1,299.97	-1.94	-3.91	0.79	0.52	0.45	26.79
1,400.00	1.21	7.75	1,399.96	-0.17	-3.81	-0.89	0.42	0.38	10.58
1,500.00	1.52	9.81	1,499.93	2.18	-3.44	-3.05	0.31	0.31	2.06
1,600.00	1.98	13.94	1,599.88	5.17	-2.80	-5.74	0.48	0.46	4.13
1,700.00	1.99	21.49	1,699.82	8.46	-1.75	-8.61	0.26	0.01	7.55
1,787.00	1.72	24.36	1,786.78	11.05	-0.65	-10.81	0.33	-0.31	3.30
Gyro tie-in									
1,888.00	1.89	27.98	1,887.72	13.91	0.75	-13.16	0.20	0.17	3.58
1,951.00	1.17	38.79	1,950.70	15.32	1.64	-14.28	1.23	-1.14	17.16
2,013.00	0.47	145.53	2,012.70	15.61	2.18	-14.40	2.23	-1.13	172.16
2,076.00	1.17	170.20	2,075.69	14.76	2.44	-13.52	1.22	1.11	39.16
2,138.00	2.58	177.91	2,137.66	12.74	2.60	-11.53	2.31	2.27	12.44
2,201.00	3.76	172.78	2,200.56	9.28	2.91	-8.12	1.92	1.87	-8.14
2,263.00	3.34	178.13	2,262.44	5.45	3.22	-4.35	0.86	-0.68	8.63
2,326.00	4.12	176.66	2,325.31	1.36	3.42	-0.37	1.25	1.24	-2.33
2,388.00	4.97	178.48	2,387.11	-3.55	3.62	4.41	1.39	1.37	2.94
2,451.00	6.07	177.71	2,449.82	-9.60	3.82	10.29	1.75	1.75	-1.22
2,514.00	7.77	172.60	2,512.36	-17.16	4.50	17.73	2.87	2.70	-8.11
2,576.00	8.08	169.66	2,573.76	-25.60	5.83	26.21	0.82	0.50	-4.74
2,639.00	8.08	166.53	2,636.14	-34.26	7.65	35.04	0.70	0.00	-4.97
2,702.00	8.39	168.43	2,698.49	-43.07	9.61	44.05	0.65	0.49	3.02
2,764.00	8.29	166.40	2,759.83	-51.84	11.56	53.02	0.50	-0.16	-3.27
2,826.00	9.12	163.69	2,821.12	-60.90	13.99	62.40	1.49	1.34	-4.37
2,889.00	9.82	158.46	2,883.26	-70.69	17.37	72.74	1.76	1.11	-8.30
2,952.00	9.42	155.58	2,945.38	-80.39	21.47	83.19	0.99	-0.63	-4.57
3,014.00	9.17	157.08	3,006.56	-89.56	25.49	93.11	0.56	-0.40	2.42
3,076.00	9.37	154.72	3,067.75	-98.67	29.57	103.00	0.69	0.32	-3.81
3,172.00	8.77	153.82	3,162.55	-112.30	36.14	117.92	0.64	-0.63	-0.94
3,265.00	8.44	154.66	3,254.51	-124.83	42.19	131.63	0.38	-0.35	0.90
3,360.00	8.77	160.54	3,348.44	-137.96	47.59	145.74	0.99	0.35	6.19
3,454.00	8.87	161.99	3,441.33	-151.61	52.21	160.13	0.26	0.11	1.54
3,548.00	8.74	162.80	3,534.22	-165.33	56.57	174.51	0.19	-0.14	0.86
3,642.00	7.90	158.20	3,627.23	-178.15	61.08	188.08	1.14	-0.89	-4.89
3,735.00	7.73	157.47	3,719.37	-189.86	65.85	200.65	0.21	-0.18	-0.78
3,829.00	7.32	157.15	3,812.56	-201.22	70.60	212.88	0.44	-0.44	-0.34
3,923.00	7.10	163.16	3,905.81	-212.30	74.60	224.64	0.84	-0.23	6.39
4,017.00	6.81	161.76	3,999.12	-223.15	78.03	236.01	0.36	-0.31	-1.49
4,111.00	7.75	168.88	4,092.37	-234.66	81.00	247.90	1.38	1.00	7.57
4,206.00	7.79	167.59	4,186.49	-247.23	83.62	260.71	0.19	0.04	-1.36
4,300.00	7.78	167.30	4,279.63	-259.66	86.38	273.41	0.04	-0.01	-0.31



Scientific Drilling
Survey Report



Company: COG Operating LLC
Project: Eddy County, NM (NAN27 NME)
Site: Skelly Unit #767
Well: Skelly Unit #767
Wellbore: OH
Design: Actual

Local Co-ordinate Reference: Site Skelly Unit #767
TVD Reference: KB Elev (12') @ 3910.00usft (Silver Oak #1)
MD Reference: KB Elev (12') @ 3910.00usft (Silver Oak #1)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM-Julio

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)
4,394.00	7.70	167.07	4,372.77	-272.01	89.19	286.05	0.09	-0.09	-0.24
4,488.00	8.62	169.58	4,465.82	-285.07	91.88	299.35	1.05	0.98	2.67
4,582.00	8.80	168.48	4,558.73	-299.05	94.59	313.53	0.26	0.19	-1.17
4,676.00	8.70	168.55	4,651.64	-313.06	97.43	327.79	0.11	-0.11	0.07
4,769.00	8.57	169.20	4,743.59	-326.76	100.13	341.70	0.17	-0.14	0.70
4,864.00	8.61	169.31	4,837.52	-340.70	102.77	355.83	0.05	0.04	0.12
4,927.00	8.44	169.76	4,899.82	-349.89	104.47	365.13	0.29	-0.27	0.71
4,989.00	7.82	167.62	4,961.20	-358.48	106.18	373.86	1.11	-1.00	-3.45
5,052.00	7.03	161.98	5,023.67	-366.34	108.29	381.99	1.70	-1.25	-8.95
5,114.00	5.79	167.75	5,085.28	-373.00	110.13	388.91	2.25	-2.00	9.31
5,177.00	5.06	167.29	5,148.00	-378.82	111.42	394.85	1.16	-1.16	-0.73
5,240.00	4.27	163.44	5,210.79	-383.77	112.70	399.97	1.35	-1.25	-6.11
5,302.00	3.86	159.27	5,272.64	-387.94	114.09	404.36	0.81	-0.66	-6.73
5,365.00	3.54	162.01	5,335.51	-391.77	115.45	408.42	0.58	-0.51	4.35
5,427.00	3.27	169.68	5,397.40	-395.33	116.35	412.09	0.85	-0.44	12.37
5,490.00	3.01	166.20	5,460.30	-398.71	117.07	415.53	0.51	-0.41	-5.52
5,552.00	2.98	165.77	5,522.22	-401.85	117.85	418.77	0.06	-0.05	-0.69
5,615.00	3.18	166.48	5,585.13	-405.13	118.67	422.15	0.32	0.32	1.13
5,709.00	3.27	164.79	5,678.98	-410.26	119.98	427.43	0.14	0.10	-1.80
5,803.00	3.17	157.54	5,772.83	-415.25	121.67	432.70	0.45	-0.11	-7.71
5,865.00	2.82	159.26	5,834.74	-418.26	122.87	435.92	0.58	-0.56	2.77
5,929.00	2.95	166.00	5,898.66	-421.33	123.83	439.14	0.57	0.20	10.53
5,992.00	3.57	172.29	5,961.56	-424.84	124.48	442.70	1.13	0.98	9.98
6,055.00	3.93	173.70	6,024.43	-428.93	124.98	446.77	0.59	0.57	2.24
6,118.00	4.23	173.33	6,087.27	-433.39	125.49	451.19	0.48	0.48	-0.59
6,213.00	4.03	173.37	6,182.02	-440.18	126.28	457.94	0.21	-0.21	0.04
6,306.00	4.18	172.59	6,274.78	-446.79	127.09	464.51	0.17	0.16	-0.84
6,400.00	4.34	170.99	6,368.52	-453.70	128.09	471.43	0.21	0.17	-1.70
6,495.00	4.20	163.54	6,463.26	-460.59	129.64	478.48	0.60	-0.15	-7.84
6,557.00	4.38	161.56	6,525.09	-465.01	131.03	483.11	0.38	0.29	-3.19
6,652.00	4.28	162.37	6,619.81	-471.83	133.25	490.28	0.12	-0.11	0.85
6,714.00	4.17	163.69	6,681.65	-476.20	134.59	494.85	0.24	-0.18	2.13
6,777.00	4.08	164.89	6,744.48	-480.56	135.82	499.38	0.20	-0.14	1.90
6,809.00	3.87	166.64	6,776.41	-482.71	136.36	501.60	0.76	-0.66	5.47
Last MWD Survey									
6,863.00	3.87	166.64	6,830.28	-486.26	137.20	505.24	0.00	0.00	0.00
Projection to Bit									



Scientific Drilling

Survey Report



Company: COG Operating LLC
Project: Eddy County, NM (NAN27 NME)
Site: Skelly Unit #767
Well: Skelly Unit #767
Wellbore: OH
Design: Actual

Local Co-ordinate Reference: Site Skelly Unit #767
TVD Reference: KB Elev (12') @ 3910.00usft (Silver Oak #1)
MD Reference: KB Elev (12') @ 3910.00usft (Silver Oak #1)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM-Julio

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,787.00	1,786.78	11.05	-0.65	Gyro tie-in
6,809.00	6,776.41	-482.71	136.36	Last MWD Survey
6,863.00	6,830.28	-486.26	137.20	Projection to Bit

Checked By: _____ Approved By: _____ Date: _____