



COG Operating LLC

Eddy County, NM (NAN27 NME)

Skelly Unit #642

Skelly Unit #642

30-D15-37613

OH

Design: Actual

Standard Survey Report

28 August, 2010



Scientific Drilling
Directional Drilling Operations



Scientific Drilling
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Skelly Unit #642
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	RKB Elev (12') @ 3948.00usft (Basic #35)
Site:	Skelly Unit #642	MD Reference:	RKB Elev (12') @ 3948.00usft (Basic #35)
Well:	Skelly Unit #642	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 #642		
Site Position:		Northing:	669,625.10 usft
From:	Map	Easting:	653,694.90 usft
Position Uncertainty:	0.00 usft	Slot Radius:	0 "
		Latitude:	32° 50' 23.584 N
		Longitude:	103° 49' 58.521 W
		Grid Convergence:	0.27 °

Well	Skelly Unit #642					
Well Position	+N/-S	0.00 usft	Northing:	669,625.10 usft	Latitude:	32° 50' 23.584 N
	+E/-W	0.00 usft	Easting:	653,694.90 usft	Longitude:	103° 49' 58.521 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,936.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2010	2010/08/19	7.92	60.74	49,077

Design	Actual				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	240.81	

Survey Program	Date 2010/08/28				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	1,780.00	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1.0.2	
1,915.00	7,038.00	MWD Survey (OH)	MWD	MWD - Standard	

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
100.00	0.51	280.14	100.00	0.08	-0.44	0.34	0.51	0.51	0.00
200.00	0.68	271.38	199.99	0.17	-1.47	1.20	0.19	0.17	-8.76
300.00	0.96	245.26	299.98	-0.17	-2.82	2.55	0.46	0.28	-26.12
400.00	1.35	243.23	399.96	-1.05	-4.64	4.56	0.39	0.39	-2.03
500.00	1.58	240.50	499.93	-2.26	-6.89	7.11	0.24	0.23	-2.73
600.00	1.64	243.68	599.89	-3.57	-9.37	9.92	0.11	0.06	3.18
700.00	1.68	247.31	699.85	-4.77	-12.01	12.81	0.11	0.04	3.63
800.00	1.39	243.74	799.81	-5.87	-14.45	15.47	0.31	-0.29	-3.57
900.00	1.42	246.89	899.78	-6.89	-16.67	17.92	0.08	0.03	3.15



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Site:	Skelly Unit #642	MD Reference:	RKB Elev (12") @ 3948.00usft (Basic #35)
Well:	Skelly Unit #642	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	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	1.24	247.47	999.76	-7.80	-18.81	20.22	0.18	-0.18	0.58
1,100.00	0.92	244.04	1,099.74	-8.56	-20.53	22.10	0.33	-0.32	-3.43
1,200.00	0.74	227.92	1,199.73	-9.35	-21.73	23.53	0.29	-0.18	-16.12
1,300.00	0.71	228.56	1,299.72	-10.19	-22.68	24.77	0.03	-0.03	0.64
1,400.00	0.53	202.33	1,399.71	-11.03	-23.32	25.73	0.33	-0.18	-26.23
1,500.00	0.45	229.70	1,499.71	-11.71	-23.79	26.48	0.24	-0.08	27.37
1,600.00	0.44	169.39	1,599.71	-12.34	-24.02	26.99	0.45	-0.01	-60.31
1,700.00	0.18	99.63	1,699.71	-12.74	-23.80	26.99	0.41	-0.26	-69.76
1,780.00	0.78	108.57	1,779.70	-12.94	-23.16	26.53	0.75	0.75	11.18
Gyro Tie-in									
1,915.00	0.84	110.40	1,914.69	-13.57	-21.36	25.27	0.05	0.04	1.36
1,979.00	0.54	331.60	1,978.69	-13.47	-21.06	24.96	2.03	-0.47	-216.88
2,042.00	1.71	324.40	2,041.67	-12.45	-21.75	25.06	1.87	1.86	-11.43
2,105.00	2.96	321.70	2,104.62	-10.41	-23.31	25.42	1.99	1.98	-4.29
2,167.00	4.13	322.80	2,166.50	-7.37	-25.65	25.99	1.89	1.89	1.77
2,232.00	4.78	308.90	2,231.31	-3.81	-29.17	27.32	1.93	1.00	-21.38
2,295.00	5.91	305.10	2,294.03	-0.29	-33.87	29.71	1.88	1.79	-6.03
2,358.00	7.48	309.50	2,356.60	4.18	-39.69	32.61	2.62	2.49	6.98
2,421.00	9.19	311.50	2,418.93	10.12	-46.62	35.76	2.75	2.71	3.17
2,517.00	8.73	311.65	2,513.76	20.04	-57.80	40.69	0.48	-0.48	0.16
2,611.00	7.63	308.80	2,606.80	28.70	-68.00	45.37	1.25	-1.17	-3.03
2,707.00	7.77	309.00	2,701.94	36.77	-78.01	50.16	0.15	0.15	0.21
2,802.00	8.50	309.80	2,795.98	45.31	-88.39	55.07	0.78	0.77	0.84
2,898.00	8.65	316.00	2,890.91	55.04	-98.86	59.46	0.98	0.16	6.46
2,995.00	8.74	316.00	2,986.80	65.59	-109.04	63.20	0.09	0.09	0.00
3,059.00	9.40	314.40	3,050.00	72.75	-116.16	65.92	1.10	1.03	-2.50
3,122.00	10.35	307.70	3,112.06	79.81	-124.31	69.60	2.36	1.51	-10.63
3,185.00	10.59	299.70	3,174.02	86.14	-133.82	74.81	2.34	0.38	-12.70
3,249.00	10.43	296.60	3,236.94	91.64	-144.11	81.11	0.92	-0.25	-4.84
3,311.00	10.49	299.90	3,297.91	96.97	-154.02	87.16	0.97	0.10	5.32
3,375.00	10.50	307.50	3,360.85	103.42	-163.69	92.46	2.16	0.02	11.88
3,438.00	9.99	308.00	3,422.84	110.28	-172.55	96.85	0.82	-0.81	0.79
3,532.00	9.44	319.30	3,515.50	121.15	-184.01	101.55	2.11	-0.59	12.02
3,627.00	9.38	319.60	3,609.22	132.95	-194.11	104.61	0.08	-0.06	0.32
3,722.00	9.23	319.20	3,702.97	144.61	-204.10	107.65	0.17	-0.16	-0.42
3,817.00	8.78	309.40	3,796.81	154.98	-214.68	111.83	1.68	-0.47	-10.32
3,912.00	9.16	309.70	3,890.65	164.42	-226.10	117.19	0.40	0.40	0.32
4,007.00	8.96	310.06	3,984.46	174.01	-237.58	122.54	0.22	-0.21	0.38
4,101.00	8.54	310.50	4,077.37	183.25	-248.49	127.55	0.45	-0.45	0.47
4,197.00	8.45	308.70	4,172.31	192.29	-259.42	132.68	0.29	-0.09	-1.88
4,291.00	8.53	305.50	4,265.28	200.66	-270.48	138.26	0.51	0.09	-3.40
4,386.00	9.21	314.30	4,359.15	210.06	-281.66	143.43	1.60	0.72	9.26
4,483.00	9.16	313.80	4,454.91	220.82	-292.79	147.90	0.10	-0.05	-0.52



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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	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)
4,566.00	9.24	311.00	4,536.84	229.77	-302.59	152.09	0.55	0.10	-3.37
4,577.00	9.15	313.20	4,547.70	230.95	-303.89	152.65	3.30	-0.82	20.00
4,672.00	8.93	311.30	4,641.52	240.98	-314.94	157.40	0.39	-0.23	-2.00
4,768.00	8.78	310.10	4,736.38	250.62	-326.14	162.48	0.25	-0.16	-1.25
4,863.00	8.91	309.80	4,830.25	260.00	-337.34	167.68	0.15	0.14	-0.32
4,959.00	8.54	310.00	4,925.13	269.34	-348.51	172.88	0.39	-0.39	0.21
5,054.00	7.45	313.40	5,019.21	278.11	-358.39	177.23	1.25	-1.15	3.58
5,117.00	6.73	307.80	5,081.73	283.18	-364.27	179.89	1.58	-1.14	-8.89
5,180.00	5.63	318.50	5,144.36	287.75	-369.24	181.99	2.52	-1.75	16.98
5,243.00	4.95	315.80	5,207.10	292.02	-373.18	183.36	1.15	-1.08	-4.29
5,306.00	4.06	304.70	5,269.90	295.24	-376.91	185.04	1.97	-1.41	-17.62
5,366.00	3.56	304.70	5,329.77	297.50	-380.19	186.80	0.83	-0.83	0.00
5,464.00	3.64	306.80	5,427.58	301.10	-385.18	189.40	0.16	0.08	2.14
5,533.00	3.50	299.70	5,496.44	303.46	-388.76	191.38	0.67	-0.20	-10.29
5,633.00	3.59	290.20	5,596.25	306.05	-394.35	194.99	0.59	0.09	-9.50
5,749.00	3.19	303.00	5,712.05	309.06	-400.47	198.86	0.74	-0.34	11.03
5,844.00	3.26	299.80	5,806.90	311.84	-405.03	201.49	0.20	0.07	-3.37
5,938.00	3.21	325.10	5,900.75	315.33	-408.85	203.13	1.51	-0.05	26.91
6,035.00	3.38	323.70	5,997.59	319.86	-412.10	203.75	0.19	0.18	-1.44
6,130.00	1.89	326.92	6,092.49	323.43	-414.61	204.20	1.58	-1.57	3.39
6,225.00	2.17	335.20	6,187.43	326.38	-416.22	204.17	0.43	0.29	8.72
6,321.00	2.10	337.60	6,283.36	329.65	-417.66	203.83	0.12	-0.07	2.50
6,415.00	1.96	311.20	6,377.31	332.30	-419.52	204.16	1.00	-0.15	-28.09
6,511.00	2.04	310.10	6,473.25	334.49	-422.06	205.32	0.09	0.08	-1.15
6,574.00	2.49	313.40	6,536.20	336.15	-423.92	206.12	0.74	0.71	5.24
6,669.00	3.32	293.30	6,631.08	338.66	-427.94	208.42	1.37	0.87	-21.16
6,764.00	2.90	294.00	6,725.94	340.72	-432.66	211.53	0.44	-0.44	0.74
6,859.00	4.38	297.00	6,820.75	343.35	-438.09	214.99	1.57	1.56	3.16
6,994.00	4.12	297.30	6,955.37	347.91	-446.99	220.53	0.19	-0.19	0.22
Last MWD Survey									
7,038.00	4.12	297.30	6,999.26	349.36	-449.80	222.28	0.00	0.00	0.00
Projection to Bit									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
1,780.00	1,779.70	-12.94	-23.16	Gyro Tie-in
6,994.00	6,955.37	347.91	-446.99	Last MWD Survey
7,038.00	6,999.26	349.36	-449.80	Projection to Bit

Checked By:

Approved By:

Date: