

30-015-38014

COG OPERATING LLC

Eddy County, NM (NAN27 NME)

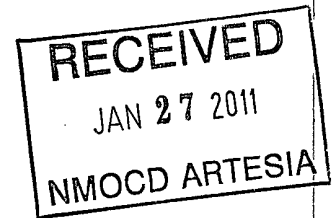
Skelly Unit #711

Skelly Unit #711

OH

Survey: MWD Survey

SDI Standard Survey Report



This survey is correct to the best of my knowledge and is supported by actual field data.

[Signature]

Notarized this date 17th of January, 2011.

[Signature]

Notary Signature
County of Midland
State of Texas



Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Skelly Unit #711
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (17') @ 3738.0usft (Silver Oak #8)
Site:	Skelly Unit #711	MD Reference:	KB Elev (17') @ 3738.0usft (Silver Oak #8)
Well:	Skelly Unit #711	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

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 #711		
Site Position:		Northing:	663,627.00 usft
From:	Map	Easting:	638,683.60 usft
Position Uncertainty:	0.0 usft	Slot Radius:	0"
		Latitude:	32° 49' 24.901 N
		Longitude:	103° 52' 54.766 W
		Grid Convergence:	0.24 °

Well	Skelly Unit #711		
Well Position	+N/-S	0.0 usft	Northing: 663,627.00 usft
	+E/-W	0.0 usft	Easting: 638,683.60 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	32° 49' 24.901 N
		Longitude:	103° 52' 54.766 W
		Ground Level:	3,721.0 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/7/2010	7.84	60.70	48,993

Design	Actual			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	161.75

Survey Program	Date 1/11/2011			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	1,765.5	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1.0.2
1,860.0	5,757.0	MWD Survey (OH)	MWD	MWD - Standard

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)		
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.0	0.0
100.0	0.25	116.80	100.0	-0.1	0.2	116.80	0.2		
200.0	0.37	125.45	200.0	-0.4	0.7	120.48	0.8		
300.0	0.41	161.74	300.0	-0.9	1.0	131.56	1.4		
400.0	0.60	212.26	400.0	-1.7	0.9	153.07	1.9		
500.0	0.60	228.32	500.0	-2.5	0.2	175.63	2.5		
600.0	0.63	238.74	600.0	-3.1	-0.7	192.15	3.2		
700.0	0.77	236.68	700.0	-3.8	-1.7	204.29	4.1		
800.0	0.62	236.04	800.0	-4.4	-2.7	211.40	5.2		
900.0	0.22	198.59	900.0	-4.9	-3.2	213.19	5.9		
1,000.0	0.41	99.89	1,000.0	-5.2	-2.9	209.55	5.9		

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Well:	Skelly Unit #711	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,100.0	1.07	65.65	1,100.0	-4.8	-1.7	199.62	5.1
1,200.0	1.70	59.52	1,199.9	-3.7	0.4	173.84	3.7
1,300.0	2.04	58.00	1,299.9	-2.0	3.2	122.29	3.8
1,400.0	1.97	54.78	1,399.8	-0.1	6.1	90.75	6.1
1,500.0	1.75	51.79	1,499.8	1.9	8.7	77.97	8.9
1,600.0	1.44	53.55	1,599.7	3.5	10.9	72.00	11.5
1,700.0	0.98	51.12	1,699.7	4.8	12.6	69.02	13.5
1,765.5	0.47	57.91	1,765.2	5.3	13.3	68.12	14.3

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Site:	Skelly Unit #711	MD Reference:	KB Elev (17') @ 3738.0usft (Silver Oak #8)
Well:	Skelly Unit #711	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

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 #711					
Site Position:		Northing:		663,627.00 usft		Latitude:		32° 49' 24.901 N			
From:		Map		Easting:		638,683.60 usft		Longitude:		103° 52' 54.766 W	
Position Uncertainty:		0.0 usft		Slot Radius:		0"		Grid Convergence:		0.24 °	

Well	Skelly Unit #711					
Well Position	+N/-S	0.0 usft	Northing:	663,627.00 usft	Latitude:	32° 49' 24.901 N
	+E/-W	0.0 usft	Easting:	638,683.60 usft	Longitude:	103° 52' 54.766 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	3,721.0 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/7/2010	7.84	60.70	48,993

Design	Actual			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	161.75

Survey Program	Date	1/11/2011			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	1,765.5	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1.0.2	
1,860.0	5,610.0	MWD Survey (OH)	MWD	MWD - Standard	

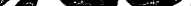
Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,765.5	0.47	57.91	1,765.2	5.3	13.3	68.12	14.3
1,860.0	0.28	98.51	1,859.7	5.5	13.8	68.30	14.9
1,986.0	0.14	130.14	1,985.7	5.4	14.2	69.40	15.2
2,049.0	1.29	128.92	2,048.7	4.9	14.8	71.89	15.6
2,112.0	2.48	158.50	2,111.6	3.1	15.9	78.82	16.2
2,176.0	3.69	177.04	2,175.6	-0.2	16.5	90.70	16.5
2,239.0	4.70	168.05	2,238.4	-4.8	17.2	105.49	17.8
2,302.0	5.56	165.34	2,301.1	-10.2	18.5	119.00	21.1
2,364.0	6.65	163.91	2,362.8	-16.6	20.2	129.37	26.1
2,427.0	7.01	160.14	2,425.3	-23.7	22.5	136.46	32.7
2,490.0	7.22	157.53	2,487.8	-31.0	25.3	140.71	40.0

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Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (17') @ 3738.0usft (Silver Oak #8)
Site:	Skelly Unit #711	MD Reference:	KB Elev (17') @ 3738.0usft (Silver Oak #8)
Well:	Skelly Unit #711	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
2,553.0	6.93	156.00	2,550.4	-38.1	28.4	143.30	47.5
2,616.0	7.69	157.24	2,612.9	-45.5	31.6	145.22	55.4
2,712.0	9.34	152.47	2,707.8	-58.3	37.7	147.13	69.4
2,807.0	8.26	152.53	2,801.7	-71.2	44.4	148.06	83.9
2,901.0	8.47	151.00	2,894.7	-83.2	50.9	148.58	97.5
2,996.0	8.59	151.69	2,988.6	-95.6	57.6	148.93	111.6
3,091.0	8.24	149.70	3,082.6	-107.7	64.4	149.13	125.5
3,184.0	8.83	152.66	3,174.6	-119.8	71.0	149.33	139.3
3,247.0	9.20	156.48	3,236.8	-128.7	75.3	149.68	149.1
3,310.0	9.12	156.81	3,299.0	-137.9	79.3	150.12	159.1
3,374.0	9.70	160.36	3,362.1	-147.7	83.1	150.64	169.4
3,468.0	11.33	165.83	3,454.6	-164.1	88.0	151.80	186.2
3,531.0	11.04	164.57	3,516.4	-175.9	91.1	152.62	198.1
3,626.0	12.04	167.25	3,609.4	-194.3	95.7	153.78	216.6
3,720.0	12.37	172.40	3,701.3	-213.9	99.2	155.12	235.8
3,813.0	12.70	171.90	3,792.1	-233.9	102.0	156.44	255.1
3,908.0	12.35	172.67	3,884.8	-254.3	104.7	157.62	275.0
4,003.0	11.30	176.09	3,977.8	-273.7	106.7	158.71	293.7
4,098.0	9.93	178.24	4,071.2	-291.1	107.6	159.72	310.4
4,192.0	8.70	175.99	4,164.0	-306.3	108.3	160.53	324.9
4,287.0	6.88	171.81	4,258.1	-319.1	109.6	161.04	337.4
4,382.0	6.90	174.96	4,352.4	-330.4	110.9	161.44	348.6
4,477.0	5.22	167.30	4,446.9	-340.3	112.4	161.73	358.4
4,569.0	4.52	163.13	4,538.5	-347.9	114.3	161.81	366.2
4,665.0	4.09	157.46	4,634.2	-354.7	116.8	161.78	373.4
4,760.0	2.80	162.04	4,729.1	-360.0	118.8	161.74	379.1
4,854.0	2.21	135.61	4,823.0	-363.5	120.7	161.62	383.0
4,949.0	1.43	153.75	4,917.9	-365.9	122.6	161.48	385.8
5,043.0	1.76	149.53	5,011.9	-368.2	123.8	161.41	388.4
5,138.0	0.87	129.86	5,106.9	-369.9	125.1	161.31	390.5
5,232.0	0.54	137.21	5,200.9	-370.7	125.9	161.23	391.5
5,326.0	0.95	151.27	5,294.9	-371.7	126.6	161.19	392.7
5,425.0	0.50	132.30	5,393.9	-372.7	127.3	161.14	393.8
5,515.0	0.78	129.39	5,483.8	-373.3	128.1	161.06	394.7
5,610.0	0.83	154.09	5,578.8	-374.4	128.9	161.00	395.9

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,765.5	1,765.2	5.3	13.3	Gyro Tie-in
5,610.0	5,578.8	-374.4	128.9	Last MWD Survey
5,757.0	5,725.8	-376.3	129.8	Projection to Bit



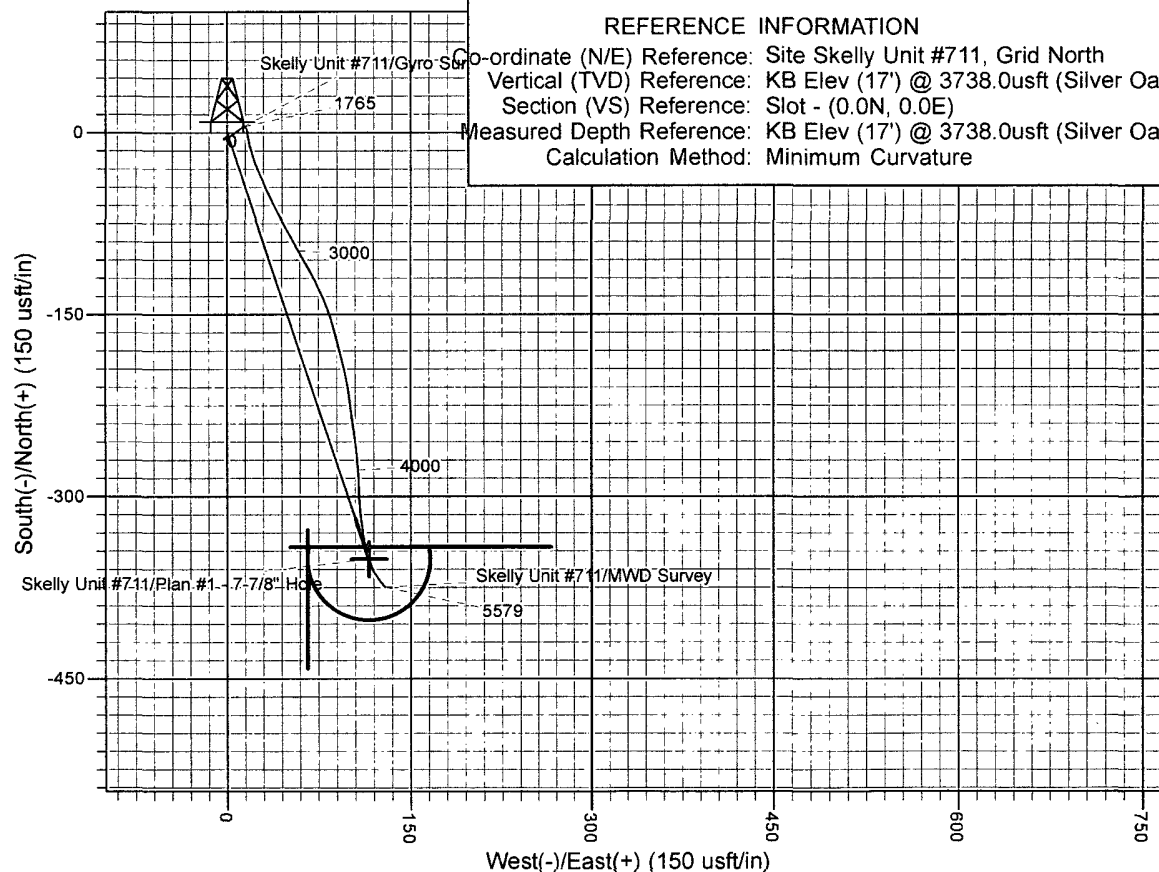
Azimuths to Grid North
True North: -0.24°
Magnetic North: 7.59°

Magnetic Field
Strength: 48993.5snT
Dip Angle: 60.70°
Date: 12/7/2010
Model: IGRF2010

WELL DETAILS: Skelly Unit #711
KB Elev (17") @ 3738.0usft (Silver Oak #8)
Ground Level: 3721.0

Easting	Latitude	Longitude	Station
638683.60	32° 49' 24.901 N	103° 52' 54.766 W	

Co-ordinate (N/E) Reference: Site Skelly Unit #711, Grid North
Vertical (TVD) Reference: KB Elev (17') @ 3738.0usft (Silver Oak 8),
Section (VS) Reference: Slot - (0.0N, 0.0E)
Measured Depth Reference: KB Elev (17') @ 3738.0usft (Silver Oak 8),
Calculation Method: Minimum Curvature



Calculation Method: Minimum Curvature
Error System: ISCWSA
Scan Method: Closest Approach 3D
Error Surface: Elliptical Conic
Warning Method: Error Ratio

Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)

SITE DETAILS: Skelly Unit #711
Site Centre Latitude: 32° 49' 24.901 N
Longitude: 103° 52' 54.766 W
Positional Uncertainty: 0.0
Convergence: 0.24
Local North: Grid

Positional Uncertainty: 0.0
Convergence: 0.24
Local North: Grid