

30-015-37981

COG OPERATING LLC

Eddy County, NM (NAN27 NME)

Skelly Unit #700

Skelly Unit #700

OH

SDI Standard Survey Report



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

Robert

Notarized this date 10th of January, 2011.

Carris Reed

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 #700
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (17') @ 3781.0usft (Silver Oak #8)
Site:	Skelly Unit #700	MD Reference:	KB Elev (17') @ 3781.0usft (Silver Oak #8)
Well:	Skelly Unit #700	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 #700			
Site Position:		Northing:	663,591.90 usft	Latitude:	32° 49' 24.463 N
From:	Map	Easting:	640,814.40 usft	Longitude:	103° 52' 29.797 W
Position Uncertainty:	0.0 usft	Slot Radius:	0"	Grid Convergence:	0.25 °

Well	Skelly Unit #700					
Well Position	+N/-S	0.0 usft	Northing:	663,591.90 usft	Latitude:	32° 49' 24.463 N
	+E/-W	0.0 usft	Easting:	640,814.40 usft	Longitude:	103° 52' 29.797 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	3,764.0 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/26/2010	7.84	60.70	48,997

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	345.25

Survey Program	Date	1/8/2011			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	1,760.0	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1.0.2	
1,851.0	6,550.0	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	0.18	159.01	100.0	-0.1	0.1	159.01	0.2		
200.0	0.20	182.36	200.0	-0.5	0.1	167.31	0.5		
300.0	0.15	203.60	300.0	-0.8	0.0	176.56	0.8		
400.0	0.29	216.61	400.0	-1.1	-0.2	188.26	1.1		
500.0	0.56	182.74	500.0	-1.8	-0.3	190.58	1.8		
600.0	0.66	168.63	600.0	-2.8	-0.2	184.88	2.8		
700.0	0.58	168.02	700.0	-3.9	0.0	180.34	3.9		
800.0	0.66	173.60	800.0	-5.0	0.1	178.31	5.0		
900.0	0.41	142.56	900.0	-5.8	0.4	175.79	5.8		
1,000.0	0.52	137.75	1,000.0	-6.4	1.0	171.59	6.5		

Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Skelly Unit #700
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (17') @ 3781.0usft (Silver Oak #8)
Site:	Skelly Unit #700	MD Reference:	KB Elev (17') @ 3781.0usft (Silver Oak #8)
Well:	Skelly Unit #700	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	1.04	103.91	1,100.0	-7.0	2.1	163.00	7.3
1,200.0	1.33	85.76	1,199.9	-7.1	4.2	149.61	8.3
1,300.0	1.72	74.45	1,299.9	-6.6	6.8	134.37	9.5
1,400.0	2.04	73.36	1,399.9	-5.7	9.9	119.94	11.5
1,500.0	1.75	69.38	1,499.8	-4.7	13.1	109.68	13.9
1,600.0	1.19	70.83	1,599.8	-3.8	15.5	103.77	15.9
1,700.0	0.87	65.80	1,699.7	-3.1	17.1	100.38	17.4
1,760.0	0.49	66.24	1,759.7	-2.9	17.8	99.10	18.0

Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Skelly Unit #700
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (17') @ 3781.0usft (Silver Oak #8)
Site:	Skelly Unit #700	MD Reference:	KB Elev (17') @ 3781.0usft (Silver Oak #8)
Well:	Skelly Unit #700	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 #700			
Site Position:		Northing:	663,591.90 usft	Latitude: 32° 49' 24.463 N
From:	Map	Easting:	640,814.40 usft	Longitude: 103° 52' 29.797 W
Position Uncertainty:	0.0 usft	Slot Radius:	0"	Grid Convergence: 0.25 °

Well	Skelly Unit #700			
Well Position	+N/-S	0.0 usft	Northing:	663,591.90 usft
	+E/-W	0.0 usft	Easting:	640,814.40 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft	Ground Level: 3,764.0 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/26/2010	7.84	60.70	48,997

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	345.25

Survey Program	Date	1/8/2011			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	1,760.0	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1.0.2	
1,851.0	6,550.0	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)	
1,760.0	0.49	66.24	1,759.7	-2.9	17.8	99.10	18.0	
1,851.0	0.45	68.16	1,850.7	-2.6	18.5	97.89	18.7	
1,946.0	0.22	123.49	1,945.7	-2.5	19.0	97.57	19.2	
2,009.0	0.85	339.64	2,008.7	-2.2	18.9	96.49	19.0	
2,072.0	2.37	343.03	2,071.7	-0.5	18.4	91.46	18.4	
2,135.0	4.11	342.07	2,134.6	2.9	17.3	80.40	17.5	
2,199.0	5.15	343.43	2,198.4	7.9	15.8	63.51	17.6	
2,262.0	6.18	345.30	2,261.1	13.9	14.1	45.53	19.8	
2,325.0	7.29	346.89	2,323.7	21.0	12.3	30.42	24.4	
2,389.0	8.39	344.82	2,387.1	29.5	10.2	19.08	31.2	
2,452.0	9.35	341.91	2,449.3	38.8	7.4	10.81	39.5	

Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Skelly Unit #700
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (17') @ 3781.0usft (Silver Oak #8)
Site:	Skelly Unit #700	MD Reference:	KB Elev (17') @ 3781.0usft (Silver Oak #8)
Well:	Skelly Unit #700	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)
2,515.0	9.27	339.40	2,511.5	48.4	4.0	4.76	48.6
2,575.0	9.04	339.14	2,570.7	57.3	0.7	0.65	57.3
2,640.0	8.98	340.81	2,634.9	66.9	-2.8	357.58	67.0
2,703.0	9.33	347.76	2,697.1	76.5	-5.5	355.87	76.7
2,765.0	9.60	345.45	2,758.3	86.4	-7.9	354.78	86.8
2,828.0	9.25	343.65	2,820.4	96.4	-10.6	353.70	97.0
2,891.0	8.88	342.10	2,882.6	105.9	-13.6	352.70	106.7
2,954.0	9.82	344.20	2,944.8	115.7	-16.5	351.87	116.8
3,049.0	10.22	345.03	3,038.3	131.6	-20.9	350.98	133.3
3,143.0	9.99	341.18	3,130.9	147.4	-25.7	350.11	149.6
3,239.0	9.30	340.43	3,225.5	162.6	-31.0	349.21	165.5
3,302.0	9.55	340.22	3,287.7	172.3	-34.4	348.69	175.7
3,365.0	9.64	340.45	3,349.8	182.2	-38.0	348.22	186.1
3,429.0	9.35	337.12	3,412.9	192.0	-41.8	347.72	196.5
3,491.0	9.65	340.05	3,474.1	201.5	-45.5	347.27	206.6
3,554.0	9.98	341.09	3,536.1	211.7	-49.1	346.94	217.3
3,616.0	9.92	339.84	3,597.2	221.8	-52.7	346.64	227.9
3,680.0	9.88	342.61	3,660.3	232.2	-56.2	346.39	238.9
3,743.0	10.24	345.90	3,722.3	242.8	-59.2	346.30	249.9
3,838.0	9.90	343.34	3,815.8	258.8	-63.6	346.19	266.5
3,931.0	9.47	343.64	3,907.5	273.8	-68.0	346.04	282.1
4,026.0	9.57	344.79	4,001.2	288.9	-72.3	345.95	297.8
4,120.0	10.21	344.60	4,093.8	304.5	-76.6	345.88	314.0
4,183.0	9.44	345.85	4,155.9	314.9	-79.3	345.86	324.7
4,246.0	8.83	342.39	4,218.1	324.5	-82.0	345.81	334.7
4,309.0	8.58	341.63	4,280.3	333.6	-85.0	345.70	344.2
4,372.0	7.91	341.81	4,342.7	342.1	-87.8	345.60	353.2
4,403.0	7.44	341.16	4,373.4	346.1	-89.1	345.56	357.4
4,435.0	6.87	341.78	4,405.2	349.8	-90.4	345.51	361.3
4,467.0	6.11	342.90	4,437.0	353.3	-91.5	345.48	364.9
4,499.0	5.16	343.88	4,468.8	356.3	-92.4	345.46	368.1
4,531.0	4.49	343.66	4,500.7	358.9	-93.2	345.45	370.8
4,562.0	4.27	339.14	4,531.6	361.1	-93.9	345.42	373.1
4,625.0	3.80	337.39	4,594.4	365.2	-95.5	345.34	377.5
4,656.0	3.51	335.86	4,625.4	367.1	-96.3	345.29	379.5
4,688.0	2.68	343.90	4,657.3	368.7	-96.9	345.27	381.2
4,751.0	1.65	348.10	4,720.3	371.0	-97.5	345.27	383.6
4,814.0	1.68	341.44	4,783.3	372.7	-98.0	345.27	385.4
4,877.0	1.49	333.93	4,846.2	374.3	-98.7	345.23	387.1
4,940.0	0.39	41.56	4,909.2	375.2	-98.9	345.24	388.0
5,004.0	0.44	50.69	4,973.2	375.6	-98.6	345.30	388.3
5,099.0	0.63	22.34	5,068.2	376.3	-98.1	345.39	388.8
5,193.0	0.60	42.72	5,162.2	377.1	-97.5	345.50	389.5
5,381.0	0.77	22.09	5,350.2	379.0	-96.4	345.73	391.1

Scientific Drilling International, Inc.
SDI Standard Survey Report

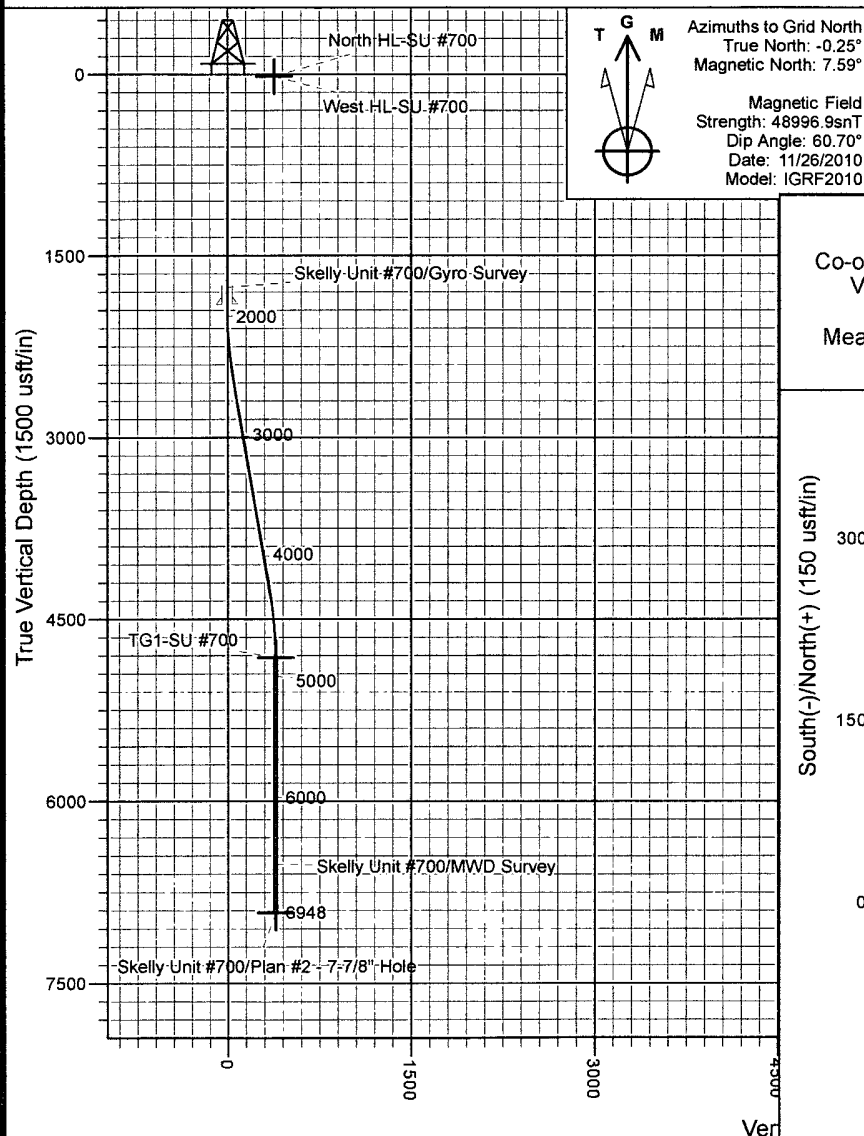
Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Skelly Unit #700
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (17') @ 3781.0usft (Silver Oak #8)
Site:	Skelly Unit #700	MD Reference:	KB Elev (17') @ 3781.0usft (Silver Oak #8)
Well:	Skelly Unit #700	North Reference:	Grid
Wellbore:	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)
5,476.0	0.42	38.59	5,445.2	379.9	-95.9	345.83	391.8
5,571.0	0.95	215.74	5,540.2	379.5	-96.2	345.78	391.5
5,665.0	1.14	207.80	5,634.2	378.0	-97.1	345.60	390.3
5,760.0	1.16	202.75	5,729.2	376.3	-97.9	345.42	388.8
5,854.0	1.02	198.50	5,823.1	374.6	-98.5	345.27	387.4
5,949.0	0.51	308.30	5,918.1	374.1	-99.1	345.16	387.0
6,099.0	0.32	297.40	6,068.1	374.7	-100.0	345.06	387.8
6,133.0	0.69	268.43	6,102.1	374.8	-100.3	345.02	387.9
6,233.0	0.51	255.74	6,202.1	374.6	-101.3	344.86	388.1
6,328.0	0.98	229.64	6,297.1	374.0	-102.4	344.69	387.8
6,422.0	0.47	319.92	6,391.1	373.8	-103.2	344.56	387.8
6,508.0	0.77	357.65	6,477.1	374.6	-103.5	344.56	388.6

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,760.0	1,759.7	-2.9	17.8	Gyro Tie-in
6,508.0	6,477.1	374.6	-103.5	Last MWD Survey
6,550.0	6,519.1	375.2	-103.4	Projection to Bit

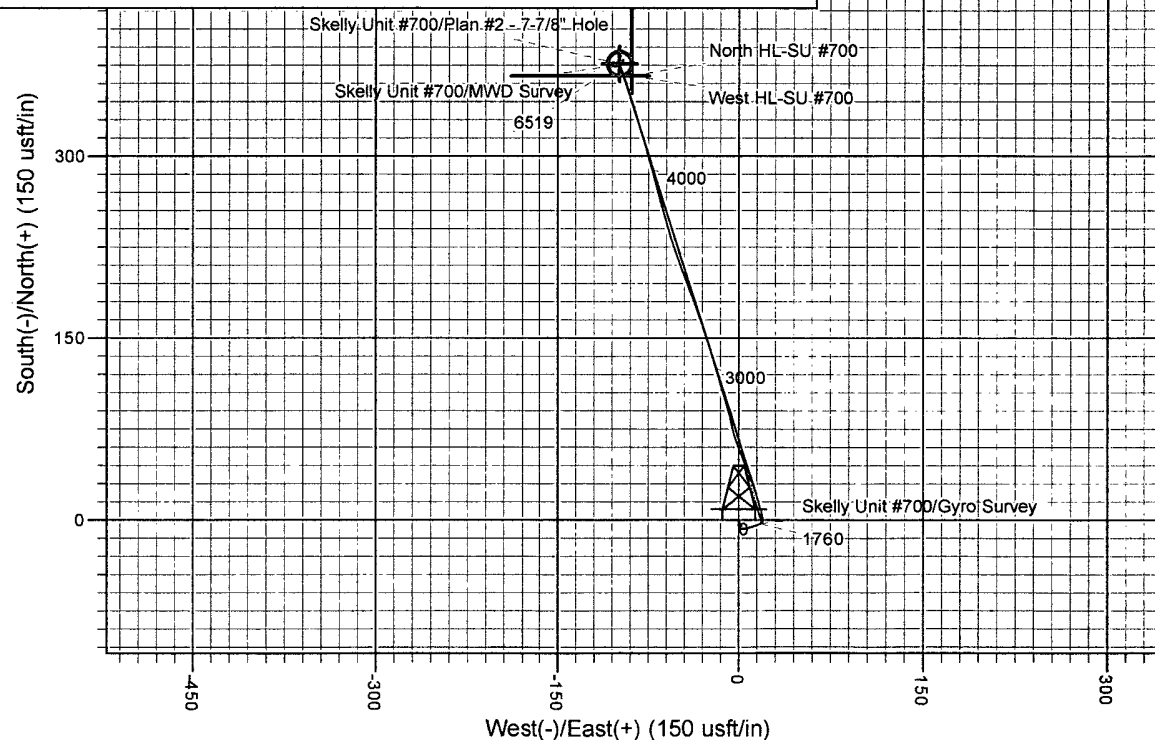


Project: Eddy County, NM (NAN27 NME)
 Site: Skelly Unit #700
 Well: Skelly Unit #700
 Wellbore: OH
 Design: Plan #2 - 7-7/8" Hole



WELL DETAILS: Skelly Unit #700
 KB Elev (17') @ 3781.0usft (Silver Oak #8)
 Ground Level: 3764.0
 Easting: 640814.40
 Latitude: 32° 49' 24.463 N
 Longitude: 103° 52' 29.797 W
 Slot

REFERENCE INFORMATION
 Co-ordinate (N/E) Reference: Site Skelly Unit #700, Grid North
 Vertical (TVD) Reference: KB Elev (17') @ 3781.0usft (Silver Oak #8)
 Section (VS) Reference: Slot - (0.0N, 0.0E)
 Measured Depth Reference: KB Elev (17') @ 3781.0usft (Silver Oak #8)
 Calculation Method: Minimum Curvature



COMPANY DETAILS: COG OPERATING LLC
 223032
 Calculation Method: Minimum Curvature
 Error System: ISCWSA
 Scan Method: Closest Approach 3D
 Error Surface: Elliptical Conic
 Warning Method: Error Ratio

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

SITE DETAILS: Skelly Unit #700
 Site Centre Latitude: 32° 49' 24.463 N
 Longitude: 103° 52' 29.797 W
 Positional Uncertainty: 0.0
 Convergence: 0.25
 Local North: Grid