

API # 30-015-36498

COG Operating

Eddy County, NM (NAN27 NME)

Skelly Unit #989

Skelly Unit #989

OH

Design: Actual

Standard Survey Report

12 November, 2008



Scientific Drilling
Directional Drilling Operations

Scientific Drilling Survey Report



Company:	COG Operating	Local Co-ordinate Reference:	Well Skelly Unit #989
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	Ground Elev. @ 3870 60ft (Rig ?)
Site:	Skelly Unit #989	MD Reference:	Ground Elev. @ 3870 60ft (Rig ?)
Well:	Skelly Unit #989	North Reference:	Gnd
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 2003 16 Single User Db

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 #989			
Site Position:		Northing:	663,038 100 ft	Latitude: 32° 49' 18 547 N
From: Map		Easting:	650,632 400 ft	Longitude: 103° 50' 34 774 W
Position Uncertainty:	0 00 ft	Slot Radius:	"	Grid Convergence: 0 27 °

Well	Skelly Unit #989			
Well Position	+N/-S	0 00 ft	Northing:	663,038 100 ft
	+E/-W	0 00 ft	Easting:	650,632 400 ft
Position Uncertainty		0 00 ft	Wellhead Elevation:	ft
			Ground Level:	3,870 60 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	11/12/2008	8 06	60 77	49,228

Design	Actual			
Audit Notes:				
Version:	1 0	Phase:	ACTUAL	Tie On Depth: 0 00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0 00	0 00	0 00	19 39

Survey Program	Date: 11/12/2008			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
100 00	1,745 00	GYRO (OH)	Keeper	Standard Wireline Keeper ver 1 0 2
1,851 00	5,054 00	MWD (OH)	MWD	MWD - Standard

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
0 00	0 00	0.00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
100 00	0 66	264.02	100 00	-0 06	-0 57	-0 25	0 66	0 66	0 00
200 00	0 21	5 78	200 00	0 06	-1 13	-0 32	0 73	-0 45	101 76
300 00	0 56	170.30	299 99	-0 24	-1 03	-0 56	0 76	0 35	164 52
400 00	0 57	202 88	399 99	-1 18	-1 14	-1 49	0 32	0 01	32 58
500 00	0 82	124 22	499 98	-2 04	-0 74	-2 17	0 90	0 25	-78 66
600 00	0 58	201 43	599 98	-2 91	-0 33	-2 86	0 89	-0 24	77 21
700 00	0 24	14 36	699 98	-3 18	-0 47	-3 15	0 82	-0 34	172 93
800 00	0 50	15 70	799 97	-2 56	-0 30	-2 51	0 26	0 26	1 34
900 00	0 51	44 69	899 97	-1 82	0 14	-1 67	0 25	0 01	28 99
1,000 00	0 67	19 28	999 97	-0 95	0 64	-0 68	0 30	0 16	-25 41
1,100 00	0 86	357 41	1,099 96	0 35	0 80	0 60	0 35	0 19	-21 87

Scientific Drilling
Survey Report



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Well:	Skelly Unit #989	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 2003 16 Single User Db

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
1,200 00	1 09	355 77	1,199 94	2 05	0 70	2 16	0 23	0 23	-1 64
1,300 00	1 11	15 61	1,299 92	3 93	0 89	4 00	0 38	0 02	19 84
1,400 00	1 78	37 60	1,399 89	6 09	2 10	6 44	0 86	0 67	21 99
1,500 00	2 26	37 16	1,499 83	8 89	4 23	9 80	0 48	0 48	-0 44
1,600 00	1 61	30 26	1,599 77	11 68	6 13	13 05	0 69	-0 65	-6 90
1,700 00	1 62	42 94	1,699 73	13 93	7 80	15 73	0 36	0 01	12 68
1,745 00	3 14	18 51	1,744 69	15 56	8 63	17 54	3 99	3 38	-54 29
Last gyro survey									
1,851 00	1 54	20 91	1,850 60	19 65	10 06	21 87	1 51	-1 51	2 26
1,944 00	3 80	3 63	1,943 50	23 89	10 70	26 09	2 55	2 43	-18 58
2,038 00	5 98	3 84	2,037 15	31 88	11 23	33 80	2 32	2 32	0 22
2,132 00	6 83	359 74	2,130 56	42 36	11 53	43 78	1 03	0 90	-4 36
2,225 00	6 53	3 99	2,222 93	53 17	11 87	54 09	0 62	-0 32	4 57
2,320 00	6 04	2 31	2,317 36	63 55	12 45	64 08	0 55	-0 52	-1 77
2,476 00	5 88	2 63	2,472 52	79 73	13 15	79 57	0 10	-0 10	0 21
2,633 00	6 41	352 69	2,628 62	96 46	12 40	95 10	0 76	0 34	-6 33
2,790 00	5 28	356 36	2,784 80	112 36	10 83	109 58	0 76	-0 72	2 34
2,914 00	6 76	353 98	2,908 11	125 31	9 70	121 42	1 21	1 19	-1 92
3,102 00	5 26	357 34	3,095 08	144 93	8 14	139 40	0 82	-0 80	1 79
3,226 00	7 43	357 37	3,218 31	158 61	7 51	152 11	1 75	1 75	0 02
3,383 00	7 21	357 43	3,374 03	178 60	6 60	170 65	0 14	-0 14	0 04
3,570 00	6 76	359 66	3,559 64	201 33	6 01	191 90	0 28	-0 24	1 19
3,759 00	5 91	1 53	3,747 49	222 18	6 20	211 63	0 46	-0 45	0 99
3,884 00	7 25	354 92	3,871 66	236 47	5 67	224 93	1 23	1 07	-5 29
4,172 00	7 04	354 59	4,157 42	272 14	2 40	257 49	0 07	-0 07	-0 11
4,259 00	6 94	357 12	4,243 78	282 70	1 63	267 20	0 37	-0 11	2 91
4,353 00	6 79	356 21	4,337 10	293 91	0 98	277 56	0 20	-0 16	-0 97
4,445 00	4 60	1 21	4,428 64	303 03	0 70	286 06	2 44	-2 38	5 43
4,540 00	4 71	357 28	4,523 33	310 73	0 59	293 30	0 36	0 12	-4 14
4,634 00	2 74	353 28	4,617 13	316 82	0 15	298 89	2 11	-2 10	-4 26
4,821 00	2 51	0 16	4,803 93	325 35	-0 36	306 77	0 21	-0 12	3 68
4,914 00	1 16	345 24	4,896 88	328 30	-0 60	309 47	1 53	-1 45	-16 04
5,011 00	0 44	16 28	4,993 87	329 61	-0 74	310 66	0 84	-0 74	32 00
5,054 00	0 44	16 28	5,036 87	329 92	-0 65	310 99	0 00	0 00	0 00
Last MWD Survey									

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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 2003 16 Single User Db

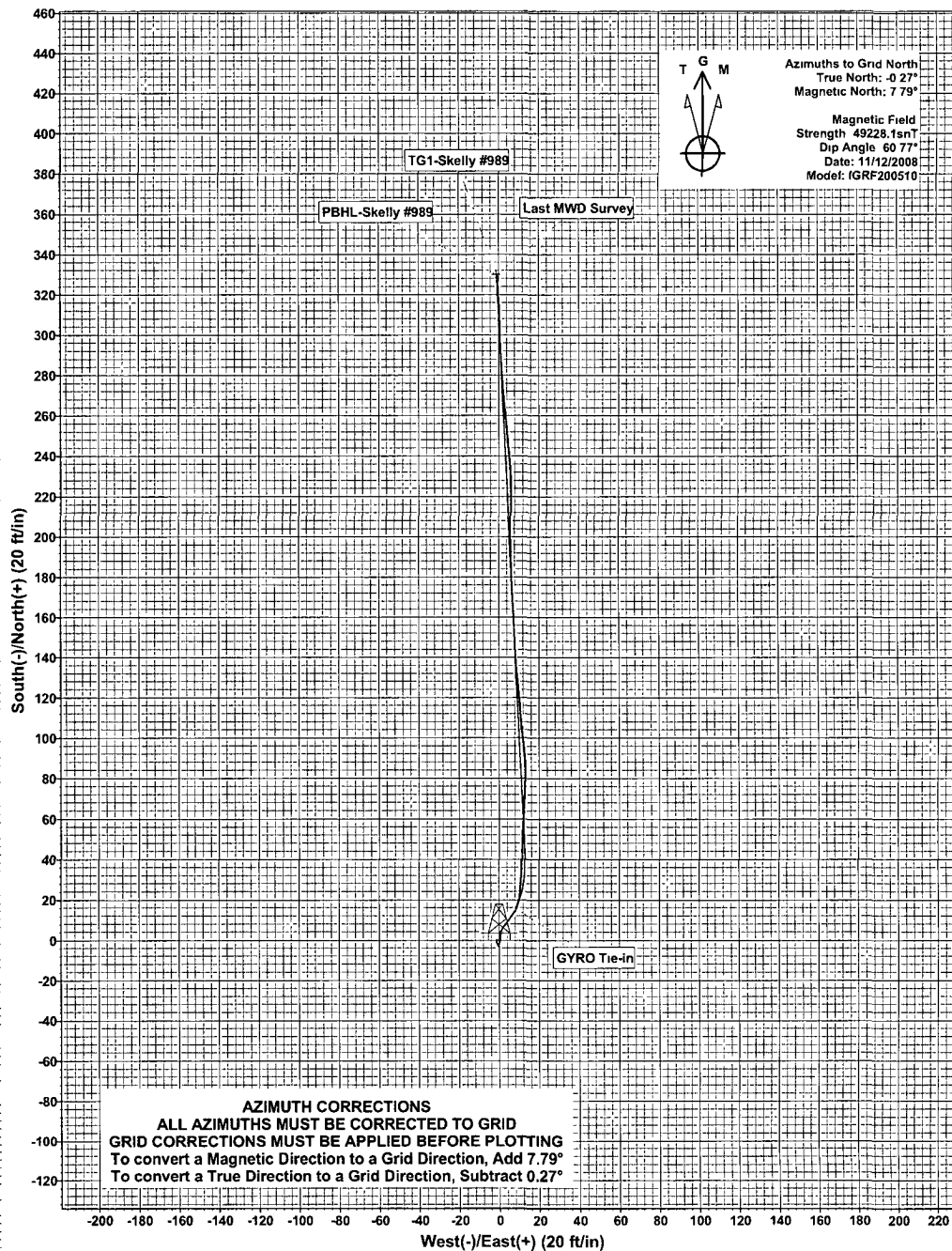
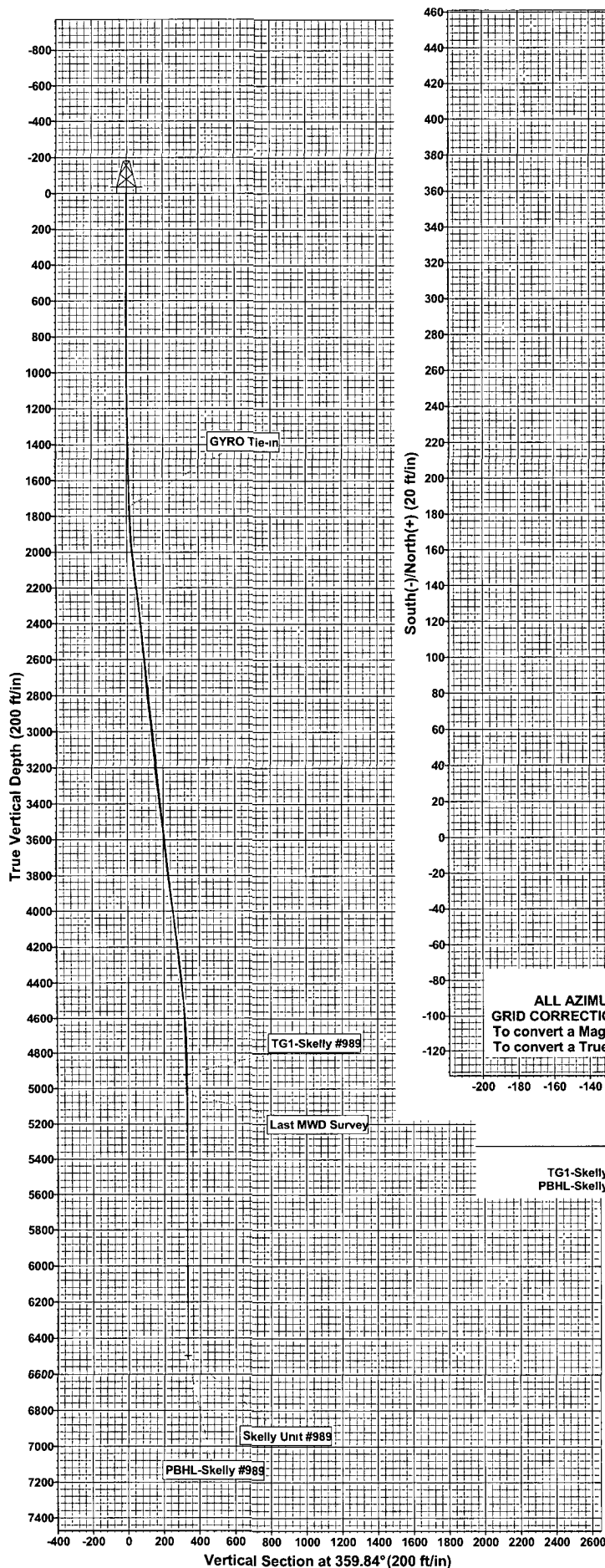
Targets									
Target Name	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- hit/miss target	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
- Shape									
PBHL-Skelly #989	0 00	0 00	6,500 00	330 00	-0 90	663,368.100	650,631 500	32° 49' 21 813 N	103° 50' 34 767 W
- actual wellpath misses by 1463 13ft at 5054 00ft MD (5036 87 TVD, 329 92 N, -0 65 E)									
- Point									
TG1-Skelly #989	0 00	0 00	4,920 00	330 00	-0 90	663,368 100	650,631 500	32° 49' 21 813 N	103° 50' 34 767 W
- actual wellpath misses by 1 30ft at 4937 14ft MD (4920 02 TVD, 328 72 N, -0 70 E)									
- Point									

Design Annotations				
Measured Depth	Vertical Depth	Local Coordinates		Comment
(ft)	(ft)	+N/-S (ft)	+E/-W (ft)	
1,745 00	1,744 69	15 56	8 63	Last gyro survey
5,054 00	5,036 87	329 92	-0 65	Last MWD Survey

Checked By: _____	Approved By: _____	Date: _____
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COG Operating

Scientific Drilling for COG Operating
Site: Eddy County, NM (NAN27 NME)
Well: Skelly Unit #989
Wellbore: OH
Design: Plan #2 vs Actual - 7 7/8" Hole



Azimuths to Grid North
True North: -0.27°
Magnetic North: 7.79°
Magnetic Field
Strength 49228.1nT
Dip Angle 60.77°
Date: 11/12/2008
Model: IGRF200510

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 7.79°
To convert a True Direction to a Grid Direction, Subtract 0.27°

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
TG1-Skelly #989	4920.00	330.00	-0.90	663368 100	650631.500	32°49' 21.813 N	103°50' 34.767 W	Point
PBHL-Skelly #989	6500.00	330.00	-0.90	663368 100	650631.500	32°49' 21.813 N	103°50' 34.767 W	Point

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	1745.00	3.14	18.51	1744.69	15.56	8.63	0.00	0.00	15.54	
2	1900.00	3.14	18.51	1899.46	23.61	11.32	0.00	0.00	23.58	
3	2142.39	6.38	357.27	2141.01	43.37	12.79	1.50	-39.42	43.33	
4	4511.56	6.38	357.27	4495.50	306.37	0.23	0.00	0.00	306.36	
5	4936.94	0.00	0.00	4920.00	330.00	-0.90	1.50	180.00	330.00	TG1-Skelly #989
6	6516.94	0.00	0.00	6500.00	330.00	-0.90	0.00	0.00	330.00	PBHL-Skelly #989

WELL DETAILS: Skelly Unit #989

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	663038.100	650632.400	32°49' 18.547 N	103°50' 34.774 W	

PROJECT DETAILS: Eddy County, NM (NAN27 NME) Plan: Plan #2 - 7 7/8" Hole (Skelly Unit #989/OH)

Geodetic System: US State Plane 1927 (Exact solution)	Created By: Julio Pina	Date: 12-Nov-08
Datum: NAD 1927 (NADCON CONUS)	Checked: _____	Date: _____
Ellipsoid: Clarke 1866	Reviewed: _____	Date: _____
Zone: New Mexico East 3001	Approved: _____	Date: _____
System Datum: Mean Sea Level		