

DRILLING INC. Oil Well Drilling Contractor

Post Office Box 160 Artesia, New Mexico 88211-0160 Office (575) 748-8704 Fax (575) 748-8719

August 29, 2011

30-015-38015

COG Operating, LLC
500 W. Texas, Suite 1300
Midland, Texas 79701

Re: Skelly Unit # 782
Sec. 23, T-17-S, R-31-E
Eddy County, New Mexico

Attn: John Coffman

The following is a Deviation Survey on the referenced well in Eddy County, New Mexico:

83' - 1°
169' - 0.25°
228' - 0.75°
345' - 0.5°
555' - 0.25°
1057' - 0.5°
1557' - 0.75°

Sincerely,

Gary W. Chappell
Contracts Manager

The foregoing was acknowledged before me this 29th day of August, 2011 by Gary W. Chappell.

Cheryl A Bartlett
NOTARY PUBLIC



OFFICIAL SEAL
CHERYL A. BARTLETT
NOTARY PUBLIC-STATE OF NEW MEXICO
My commission expires: 4-29-12



30-015-38015

COG Operating LLC

Eddy County, NM (NAN27 NME)

Skelly Unit #782

Skelly Unit #782

OH

Design: Actual

Standard Survey Report

23 August, 2011



Scientific Drilling
Directional Drilling Operations



Scientific Drilling

Survey Report



Company: COG Operating LLC
Project: Eddy County, NM (NAN27 NME)
Site: Skelly Unit #782
Well: Skelly Unit #782
Wellbore: OH
Design: Actual

Local Co-ordinate Reference: Site Skelly Unit #782
TVD Reference: KB Elev (13') @ 3901 00usft (JW #4)
MD Reference: KB Elev (13') @ 3901 00usft (JW #4)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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 #782				
Site Position:		Northing:	663,787 40 usft	Latitude:	32° 49' 25 835 N
From:	Map	Easting:	653,359 90 usft	Longitude:	103° 50' 2 771 W
Position Uncertainty:	0 00 usft	Slot Radius:	0 "	Grid Convergence:	0 27 °

Well	Skelly Unit #782					
Well Position	+N/-S	0 00 usft	Northing:	663,787.40 usft	Latitude:	32° 49' 25 835 N
	+E/-W	0 00 usft	Easting:	653,359 90 usft	Longitude:	103° 50' 2 771 W
Position Uncertainty	0 00 usft	Wellhead Elevation:	usft	Ground Level:	3,888 00 usft	

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2011/08/19	7 73	60 69	48,928

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	342 64	

Survey Program	Date 2011/08/23				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100 00	1,980 00	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1 0 2	
2,082 00	5,502 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 42	50 46	100 00	0 23	0 28	0 14	0 42	0 42	0 00
200 00	0 14	315 45	200 00	0 55	0 48	0 39	0 45	-0 28	-95 01
300 00	0 10	337 70	300 00	0 72	0 36	0 58	0 06	-0 04	22 25
400 00	0 10	341 43	400 00	0 88	0 30	0 76	0 01	0 00	3 73
500 00	0 19	322 24	500 00	1 10	0 17	1 00	0 10	0 09	-19 19
600 00	0 40	312 93	600 00	1 47	-0 19	1 46	0 21	0 21	-9 31
700 00	0 26	313 81	699 99	1 86	-0 61	1 96	0 14	-0 14	0 88
800 00	0 36	332 19	799 99	2 30	-0 92	2 47	0 14	0 10	18 38
900 00	0 46	355 44	899 99	2 98	-1 09	3 17	0 19	0 10	23 25



Scientific Drilling

Survey Report



Company: COG Operating LLC
Project: Eddy County, NM (NAN27 NME)
Site: Skelly Unit #782
Well: Skelly Unit #782
Wellbore: OH
Design: Actual

Local Co-ordinate Reference: Site Skelly Unit #782
TVD Reference: KB Elev (13') @ 3901 00usft (JW #4)
MD Reference: KB Elev (13') @ 3901 00usft (JW #4)
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 48	3 58	999 99	3 79	-1 10	3 95	0 07	0 02	8 14
1,100 00	0 35	13 75	1,099 98	4 51	-1 00	4 60	0 15	-0 13	10 17
1,200 00	0 44	352 05	1,199 98	5 19	-0 98	5 24	0 17	0 09	-21 70
1,300 00	0 48	7 81	1,299 98	5 98	-0 98	6 00	0 13	0 04	15 76
1,400 00	0 89	3 02	1,399 97	7 17	-0 88	7 11	0 41	0 41	-4 79
1,500 00	1.06	10 89	1,499 96	8 86	-0.66	8 65	0 22	0 17	7 87
1,600 00	1 51	28 94	1,599 93	10 92	0 15	10 38	0 60	0 45	18 05
1,700 00	1 55	40 00	1,699 90	13 11	1 65	12 01	0 30	0 04	11 06
1,800 00	1 16	34 27	1,799 87	14 98	3 09	13 37	0 41	-0 39	-5 73
1,900 00	1 01	29.17	1,899 85	16 58	4 09	14 61	0 18	-0 15	-5 10
1,980 00	0 45	52 26	1,979 84	17 39	4 69	15 20	0 78	-0 70	28 86
Gyro Tie-in									
2,082 00	0 65	74 39	2,081 84	17 79	5 56	15 32	0 28	0 20	21 70
2,146 00	0 76	46 01	2,145 83	18 19	6 21	15 50	0 57	0 17	-44 34
2,209 00	1 58	25 50	2,208 82	19 26	6 89	16.33	1 44	1 30	-32 56
2,271 00	1 85	16 71	2,270 79	20 99	7 54	17 78	0 61	0 44	-14 18
2,333 00	2 44	355 35	2,332 75	23 26	7 73	19 90	1 59	0 95	-34 45
2,396 00	2 83	345 18	2,395 68	26 10	7 22	22 76	0 96	0 62	-16 14
2,458 00	3 31	350 06	2,457 60	29 35	6 52	26.06	0 88	0 77	7 87
2,520 00	4 06	347 14	2,519 47	33 25	5 72	30 03	1 25	1 21	-4 71
2,582 00	4 62	339 90	2,581 29	37 73	4 37	34 71	1 26	0 90	-11 68
2,645 00	5 68	336 59	2,644 03	42 98	2 26	40 34	1 75	1 68	-5 25
2,706 00	5 41	334 46	2,704 75	48 34	-0 18	46 19	0 56	-0 44	-3 49
2,800 00	5 09	341 47	2,798 36	56 29	-3 41	54 75	0 76	-0 34	7 46
2,894 00	5 76	344 76	2,891 93	64 80	-5 98	63 63	0 79	0 71	3 50
2,988 00	5 52	343 24	2,985 48	73 68	-8 52	72 87	0 30	-0 26	-1 62
3,081 00	5.68	349.15	3,078 04	82 48	-10 68	81 91	0 64	0 17	6 35
3,175 00	5 73	342 33	3,171 57	91 52	-12 98	91 23	0 72	0 05	-7 26
3,268 00	5 21	341 96	3,264 15	99 96	-15 69	100 09	0 56	-0 56	-0 40
3,361 00	6 19	341 17	3,356 69	108 72	-18 62	109 32	1 06	1 05	-0 85
3,454 00	5 94	341 81	3,449 17	118 04	-21 74	119 15	0 28	-0 27	0 69
3,548 00	5 94	344 68	3,542 66	127 35	-24 54	128 87	0 32	0 00	3 05
3,642 00	5 73	344 25	3,636 17	136 56	-27 10	138 42	0 23	-0 22	-0 46
3,766 00	5 30	341 72	3,759 60	147 95	-30 58	150 34	0 40	-0 35	-2 04
3,860 00	6 46	335 04	3,853 11	156 87	-34 17	159 92	1 43	1 23	-7 11
3,953 00	6 47	336 21	3,945 51	166 41	-38 49	170 31	0 14	0 01	1 26
4,047 00	6 42	335 03	4,038 92	176 02	-42 85	180 79	0 15	-0 05	-1 26
4,140 00	6 24	334 57	4,131 35	185 30	-47 21	190 94	0 20	-0 19	-0 49
4,233 00	5 86	337 70	4,223 83	194 25	-51 19	200 68	0 54	-0 41	3 37
4,327 00	5 54	336 42	4,317 37	202 85	-54 82	209 97	0 37	-0 34	-1 36
4,420 00	5 72	334 68	4,409 92	211 16	-58 60	219 02	0 27	0 19	-1 87
4,514 00	5 74	331 58	4,503 45	219 52	-62 84	228 27	0 33	0 02	-3 30
4,608 00	5 61	332 30	4,596 99	227 73	-67 21	237 41	0 16	-0 14	0 77



Scientific Drilling

Survey Report



Company: COG Operating LLC
Project: Eddy County, NM (NAN27 NME)
Site: Skelly Unit #782
Well: Skelly Unit #782
Wellbore: OH
Design: Actual

Local Co-ordinate Reference: Site Skelly Unit #782
TVD Reference: KB Elev (13') @ 3901 00usft (JW #4)
MD Reference: KB Elev (13') @ 3901 00usft (JW #4)
North Reference: Grd
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)
4,703 00	5 36	331 67	4,691.56	235.74	-71 48	246 33	0 27	-0 26	-0 66
4,794.00	5 15	339 62	4,782 17	243 31	-74 92	254 58	0 83	-0 23	8 74
4,857 00	4 35	346 09	4,844 96	248 28	-76 47	259.79	1 53	-1 27	10 27
4,920 00	4 39	349 65	4,907 78	252 97	-77 48	264 57	0 44	0 06	5 65
5,014 00	3 48	340 68	5,001 55	259 21	-79 07	270 99	1 17	-0 97	-9 54
5,109 00	2 78	343 38	5,096 41	264 13	-80 69	276 18	0 75	-0 74	2 84
5,202 00	1 74	338 96	5,189 34	267 61	-81 84	279 84	1 13	-1 12	-4 75
5,296 00	1 35	344 92	5,283 30	270 01	-82 64	282 37	0 45	-0 41	6 34
5,390 00	0 42	226 08	5,377 30	270 84	-83 17	283 32	1 70	-0 99	-126 43
5,452 00	0 28	209 45	5,439 29	270 56	-83 41	283 12	0 28	-0 23	-26 82
Last MWD Survey									
5,502 00	0 28	209 45	5,489 29	270 34	-83 53	282 95	0 00	0 00	0 00
Projection to Bit									

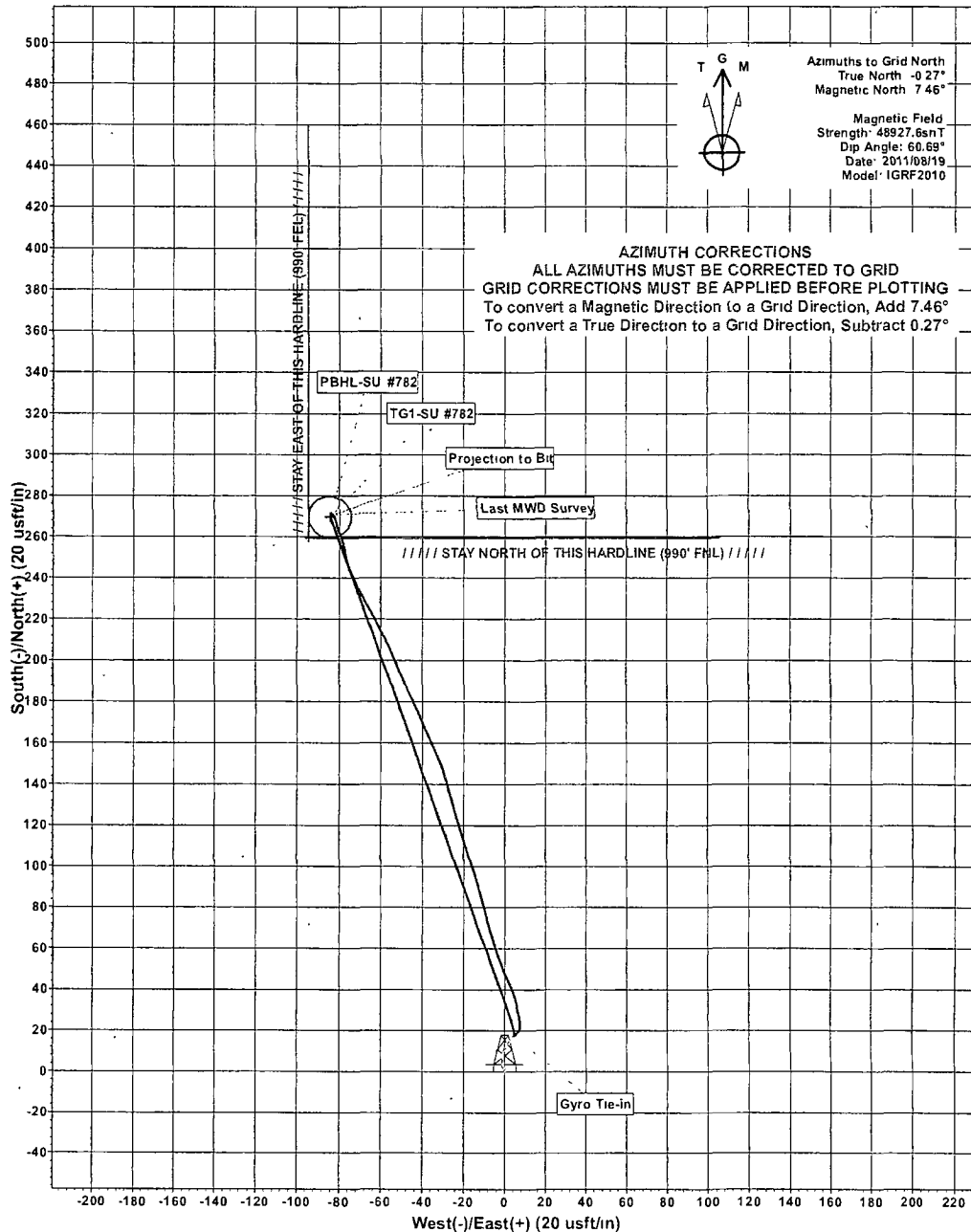
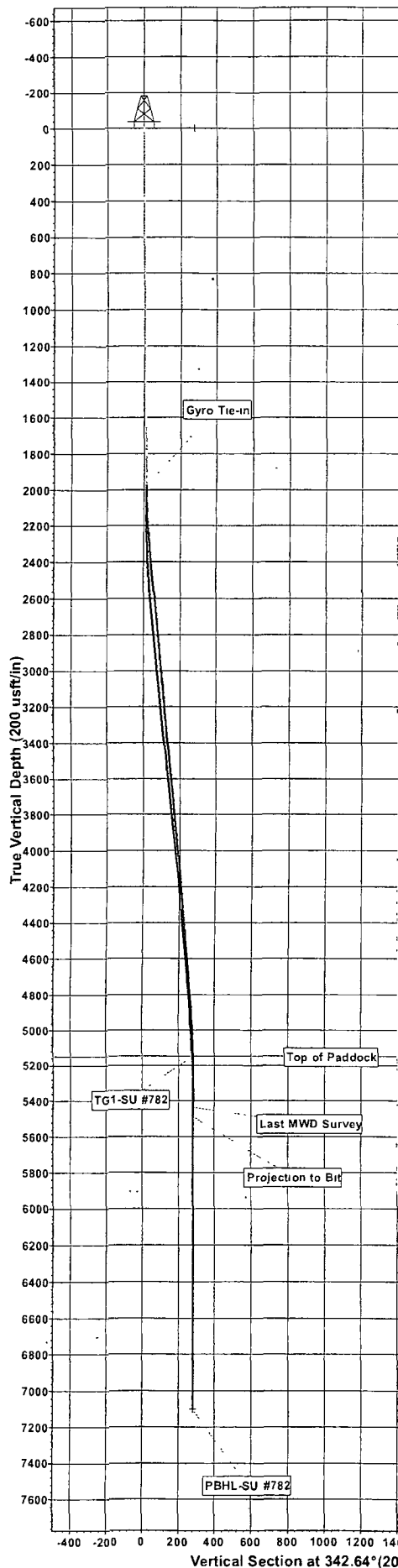
Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,980 00	1,979 84	17 39	4 69	Gyro Tie-in
5,452 00	5,439 29	270 56	-83 41	Last MWD Survey
5,502 00	5,489 29	270 34	-83 53	Projection to Bit

Checked By _____ Approved By _____ Date. _____



Scientific Drilling for COG Operating LLC
Site: Eddy County, NM (NAN27 NME)
Well: Skelly Unit #782
Wellbore: OH
Design: Plan #1 Gyro Tie-in - 7-7/8" Hole



Azimuths to Grid North
True North -0.27°
Magnetic North 7.46°
Magnetic Field
Strength: 48927.85nT
Dip Angle: 60.68°
Date: 2011/08/19
Model: IGRF2010

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 7.46°
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
East HL-SU #782	0 00	259 30	-94.20	664046.70	653265.70	32°49'28.405 N	103°50'3.860 W	Rectangle (Sides: L20 0 00 W0 00)
North HL-SU #782	0 00	259 30	-94.20	664046.70	653265.70	32°49'28.405 N	103°50'3.860 W	Rectangle (Sides: L0 00 W200 00)
TG1-SU #782	5150 00	269 30	-84 20	664056.70	653275.70	32°49'28.504 N	103°50'3.742 W	Point
PBHL-SU #782	7100 00	269 30	-84 20	664056.70	653275.70	32°49'28.504 N	103°50'3.742 W	Circle (Radius 10 00)

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
1	1980.00	0.45	52.26	1979.84	17.39	4.69	0.00	0.00	15.20	
2	2000.00	0.45	52.26	1999.84	17.49	4.81	0.00	0.00	15.26	
3	2257.67	5.28	340.33	2257.13	29.27	1.62	2.00	-76.68	27.45	
4	4898.33	5.28	340.33	4886.62	257.88	-80.12	0.00	0.00	270.03	
5	5162.09	0.00	0.00	5150.00	269.30	-84.20	2.00	180.00	282.16	TG1-SU #782
6	7112.09	0.00	0.00	7100.00	269.30	-84.20	0.00	0.00	282.16	PBHL-SU #782

WELL DETAILS: Skelly Unit #782

+N/-S	+E/-W	Ground Level	3888 00	Longitude	Slot
0.00	0.00	663787.40	653359.90	32°49'25.835 N	103°50'2.771 W

PROJECT DETAILS Eddy County, NM (NAN27 NME) Plan Plan #1 Gyro Tie-in - 7-7/8" Hole (Skelly Unit #782/OH)

Geodetic System	US State Plane 1927 (Exact solution)	Created By	Julio Pina	Date	19-Aug-11
Datum	NAD 1927 (NADCON CONUS)	Checked		Date	
Ellipsoid	Clarke 1866	Reviewed		Date	
Zone	New Mexico East 3001	Approved		Date	
System Datum	Mean Sea Level				