

MAR 16 2009

30-015-36472

COG Operating

Eddy County, NM (NAN27 NME)

Skelly Unit #993

Skelly Unit #993

OH

Design: Actual

Standard Survey Report

26 November, 2008



Scientific Drilling
Directional Drilling Operations

Scientific Drilling Survey Report



Company:	COG Operating	Local Co-ordinate Reference:	Well Skelly Unit #993
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	Ground Elev @ 3912 40ft (Rig Silver Oak #1)
Site:	Skelly Unit #993	MD Reference:	Ground Elev @ 3912 40ft (Rig Silver Oak #1)
Well:	Skelly Unit #993	North Reference:	Grid
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 #993			
Site Position:		Northing:	668,650 600 ft	Latitude:	32° 50' 14 074 N
From:	Map	Easting:	650,841 500 ft	Longitude:	103° 50' 32 018 W
Position Uncertainty:	0 00 ft	Slot Radius:	"	Grid Convergence:	0 27 °

Well	Skelly Unit #993					
Well Position	+N/-S	0 00 ft	Northing:	668,650 600 ft	Latitude:	32° 50' 14 074 N
	+E/-W	0 00 ft	Easting:	650,841 500 ft	Longitude:	103° 50' 32 018 W
Position Uncertainty		0 00 ft	Wellhead Elevation:	ft	Ground Level:	3,912 40 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF200510	11/26/2008	8 05	60 78	49,233

Design	Actual			
Audit Notes:				
Version:	1 0	Phase.	ACTUAL	Tie On Depth: 0 00
Vertical Section.	Depth From (TVD)	+N/-S	+E/-W	Direction
	(ft)	(ft)	(ft)	(°)
	0 00	0 00	0 00	269 57

Survey Program	Date	11/26/2008			
From	To	Survey (Wellbore)	Tool Name	Description	
(ft)	(ft)				
100 00	1,785 00	GYRO (OH)	Keeper	Standard Wireline Keeper ver 1 0 2	
1,849 00	5,154 00	MWD (OH)	MWD	MWD - Standard	

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn	
Depth	(°)	(°)	Depth	(ft)	(ft)	Section	Rate	Rate	Rate	
(ft)			(ft)			(ft)	(°/100ft)	(°/100ft)	(°/100ft)	
0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	
100 00	0 15	96 59	100 00	-0 02	0 13	-0 13	0 15	0 15	0 00	
200 00	0 17	33 12	200 00	0 09	0 34	-0 34	0 17	0 02	-63 47	
300 00	0 27	347 51	300 00	0 45	0 37	-0 37	0 19	0 10	-45 61	
400 00	0 19	46 58	400 00	0 79	0 44	-0 45	0 24	-0 08	59 07	
500 00	0 24	298 44	500 00	1 01	0 38	-0 38	0 35	0 05	-108 14	
600 00	0 35	347 02	600 00	1 40	0 12	-0 13	0 26	0 11	48 58	
700 00	0 17	64 68	700 00	1 76	0 19	-0 20	0 35	-0 18	77 66	
800 00	0 11	82 23	800 00	1 84	0 42	-0 43	0 07	-0 06	17 55	
900 00	0 33	111 63	899 99	1 75	0 78	-0 79	0 24	0 22	29 40	
1,000 00	0 33	102 11	999 99	1 58	1 33	-1 34	0 05	0 00	-9 52	
1,100 00	0 50	98 31	1,099 99	1 46	2 04	-2 06	0 17	0 17	-3 80	

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Well:	Skelly Unit #993	North Reference:	Gnd
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	0 42	95 72	1,199 99	1 36	2 84	-2 85	0 08	-0 08	-2 59
1,300 00	0 38	87 84	1,299 98	1 33	3 54	-3 55	0 07	-0 04	-7 88
1,400 00	0 46	75 94	1,399 98	1 44	4 26	-4 27	0 12	0 08	-11 90
1,500 00	0 46	60 99	1,499 98	1 74	5 00	-5 01	0 12	0 00	-14 95
1,600 00	0 56	56 06	1,599 97	2 20	5 75	-5 77	0 11	0 10	-4 93
1,700 00	0 81	63 30	1,699 97	2 79	6 79	-6 81	0 26	0 25	7 24
1,785 00	0 98	67 99	1,784 96	3 34	8 00	-8 03	0 22	0 20	5 52
Last gyro survey									
1,849 00	0 89	72 18	1,848 95	3 69	8 98	-9 01	0 18	-0 14	6 55
1,929 00	0 95	284 86	1,928 94	4 05	8 93	-8 96	2 21	0 07	-184 15
2,024 00	2 61	260 98	2,023 90	3 92	6 04	-6 06	1 88	1 75	-25 14
2,119 00	4 20	272 07	2,118 73	3 70	0 42	-0 45	1 80	1 67	11 67
2,214 00	4 17	274 21	2,213 47	4 08	-6 50	6 47	0 17	-0 03	2 25
2,308 00	3 76	276 61	2,307 25	4 69	-12 97	12 93	0 47	-0 44	2 55
2,403 00	4 98	277 78	2,401 97	5 61	-20 15	20 11	1 29	1 28	1 23
2,498 00	4 62	266 62	2,496 64	5 94	-28 05	28 01	1 05	-0 38	-11 75
2,593 00	4 28	266 33	2,591 35	5 49	-35 41	35 37	0 36	-0 36	-0 31
2,686 00	4 00	266 82	2,684 11	5 08	-42 11	42 07	0 30	-0 30	0 53
2,781 00	4 88	267 58	2,778 82	4 73	-49 46	49 42	0 93	0 93	0 80
2,876 00	4 35	267 34	2,873 52	4 39	-57 09	57 06	0 56	-0 56	-0 25
2,971 00	3 76	269 90	2,968 28	4 22	-63 81	63 78	0 65	-0 62	2 69
3,066 00	4 65	261 83	3,063 02	3 67	-70 74	70 71	1 12	0 94	-8 49
3,160 00	4 02	265 58	3,156 75	2 87	-77 79	77 77	0 73	-0 67	3 99
3,254 00	5 25	264 49	3,250 44	2 20	-85 36	85 34	1 31	1 31	-1 16
3,350 00	5 25	264 86	3,346 04	1 39	-94 10	94 09	0 04	0 00	0 39
3,444 00	4 98	262 70	3,439 67	0 48	-102 43	102 43	0 35	-0 29	-2 30
3,539 00	4 92	263 24	3,534 31	-0 52	-110 57	110 57	0 08	-0 06	0 57
3,634 00	4 42	263 92	3,629 00	-1 39	-118 26	118 26	0 53	-0 53	0 72
3,729 00	5 26	265 70	3,723 66	-2 10	-126 24	126 25	0 90	0 88	1 87
3,856 00	4 79	262 02	3,850 17	-3 27	-137 29	137 32	0 45	-0 37	-2 90
3,919 00	5 59	270 21	3,912 91	-3 63	-142 97	142 99	1 73	1 27	13 00
4,015 00	5 82	273 77	4,008 44	-3 29	-152 50	152 52	0 44	0 24	3 71
4,109 00	5 87	274 68	4,101 95	-2 58	-162 05	162 06	0 11	0 05	0 97
4,205 00	5 74	276 20	4,197 45	-1 67	-171 71	171 72	0 21	-0 14	1 58
4,300 00	5 68	276 17	4,291 98	-0 65	-181 11	181 11	0 06	-0 06	-0 03
4,396 00	5 50	277 15	4,387 53	0 44	-190 40	190 39	0 21	-0 19	1 02
4,489 00	5 43	278 40	4,480 10	1 63	-199 17	199 15	0 15	-0 08	1 34
4,583 00	5 17	266 81	4,573 70	2 05	-207 80	207 78	1 17	-0 28	-12 33
4,679 00	5 33	268 06	4,669 30	1 66	-216 58	216 56	0 20	0 17	1 30
4,773 00	4 48	266 65	4,762 96	1 29	-224 60	224 59	0 91	-0 90	-1 50
4,868 00	4 72	267 36	4,857 65	0 90	-232 21	232 20	0 26	0 25	0 75
4,962 00	3 20	266 12	4,951 42	0 54	-238 69	238 68	1 62	-1 62	-1 32
5,056 00	1 02	275 10	5,045 35	0 44	-242 15	242 14	2 34	-2 32	9 55
5,108 00	0 34	247 25	5,097 35	0 42	-242 75	242 74	1 42	-1 31	-53 56
MWD survey									
5,154 00	0 34	247 25	5,143 35	0 31	-243 00	242 99	0 00	0 00	0 00
Projection to Bit									

Scientific Drilling
Survey Report



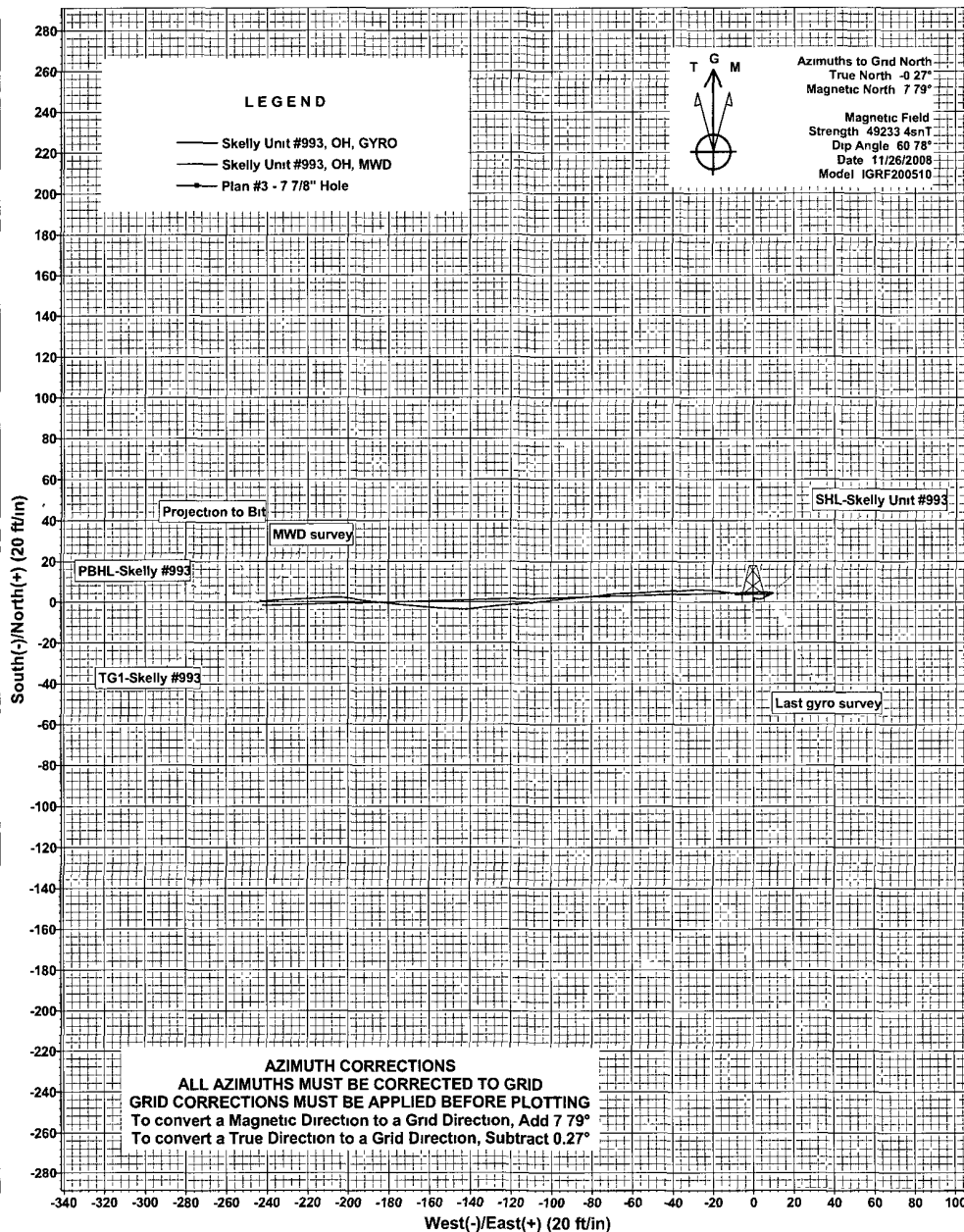
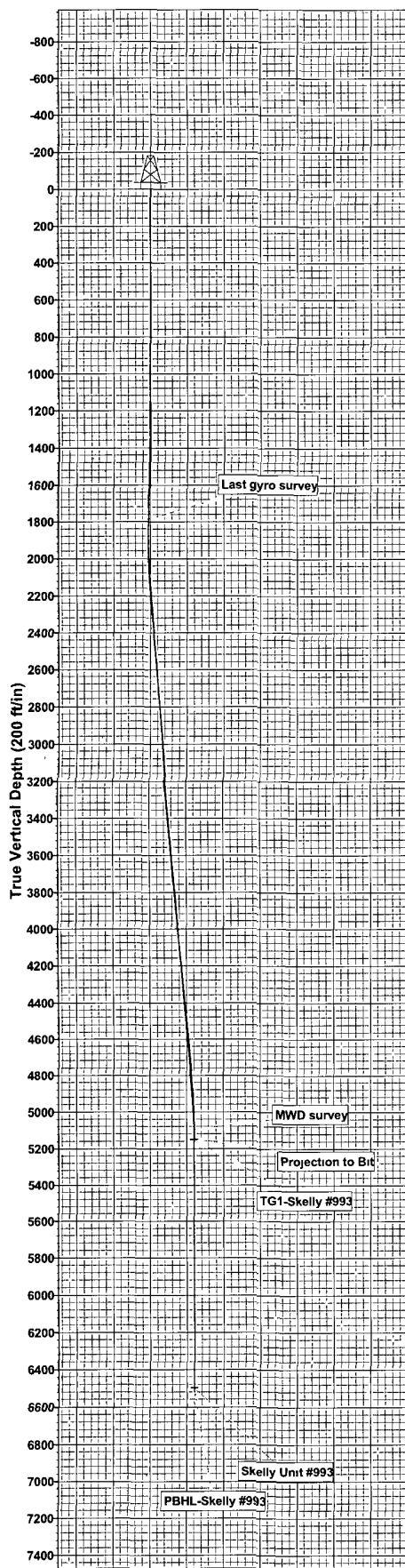
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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 2003 16 Single User Db

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 #993	0 00	0 00	6,500 00	-1 80	-240 00	668,648 800	650,601 500	32° 50' 14 067 N	103° 50' 34 831 W
- actual wellpath misses by 1356 66ft at 5154 00ft MD (5143 35 TVD, 0 31 N, -243 00 E)									
- Point									
TG1-Skelly #993	0 00	0 00	5,150 00	-1 80	-240 00	668,648 800	650,601 500	32° 50' 14 067 N	103° 50' 34 831 W
- actual wellpath misses by 7 60ft at 5154 00ft MD (5143 35 TVD, 0 31 N, -243 00 E)									
- Point									

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 #993
Wellbore: OH
Design: Plan #3 vs Actual - 7 7/8" Hole



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 #993	5150 00	-1.80	-240 00	668648 800	650601 500	32°50' 14.067 N	103°50' 34.831 W	Point
PBHL-Skelly #993	6500 00	-1.80	-240 00	668648 800	650601 500	32°50' 14.067 N	103°50' 34.831 W	Point

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	1785 00	0.98	67.99	1784.96	3.34	8.00	0.00	0.00	-8.03	
2	1900 00	0.98	67.99	1899.94	4.07	9.63	0.00	0.00	-9.66	
3	2187.87	4.83	288.46	2187.52	4.67	-0.01	2.00	-162.94	-0.02	
4	4918.88	4.83	288.46	4908.83	-1.53	-229.83	0.00	0.00	229.84	
5	5160.33	0.00	0.00	5150.00	-1.80	-240.00	2.00	180.00	240.01	TG1-Skelly #993
6	6510.33	0.00	0.00	6500.00	-1.80	-240.00	0.00	0.00	240.01	PBHL-Skelly #993

WELL DETAILS Skelly Unit #993

+N/-S	+E/-W	Northing	Easting	Ground Level	Latitude	Longitude	Slot
0.00	0.00	668650.600	650841.500	3912.40	32°50' 14.074 N	103°50' 32.018 W	

PROJECT DETAILS Eddy County, NM (NAN27 NME)

Plan Plan #3 - 7 7/8" Hole (Skelly Unit #993/OH)

Geodetic System	US State Plane 1927 (Exact solution)	Created By	Julio Pina	Date	26-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				

Vertical Section at 269.57° (200 ft/in)