



COG Operating LLC

Lea County, NM (NAD27 NME)

MC Federal #33

MC Federal #33

OH

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SEP 04 2009

HOBBSOCD

Design: Actual

Standard Survey Report

23 July, 2009

SUR: O-21-17s-32e, 1160/S & 1430/E

BHL: J - 21-17s-32e, 1664/S & 1662/E

API # 30-025-39001





Scientific Drilling
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site MC Federal #33
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	Ground Elev @ 4029 40ft (Basic #38)
Site:	MC Federal #33	MD Reference:	Ground Elev @ 4029 40ft (Basic #38)
Well:	MC Federal #33	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 5000 1 Single User Db

Project	Lea County, NM (NAD27 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:	MC Federal #33		
Site Position:		Northing:	661,015 20 ft
From:	Map	Easting:	673,994 00 ft
Position Uncertainty:	0 00 ft	Slot Radius:	0 "
		Latitude:	32° 48' 57 375 N
		Longitude:	103° 46' 1 143 W
		Grid Convergence:	0 31 °

Well:	MC Federal #33		
Well Position	+N/-S	0 00 ft	Northing:
	+E/-W	0 00 ft	Easting:
Position Uncertainty	0 00 ft	Wellhead Elevation:	ft
		Latitude:	32° 48' 57 375 N
		Longitude:	103° 46' 1 143 W
		Ground Level:	4,029 40 ft

Wellbore:	OH		
Magnetics	Model/Name	Sample Date	Declination
			(°)
	IGRF200510	2009/07/23	7 94
			Dip Angle
			(°)
			60 77
			Field Strength
			(nT)
			49,166

Design:	Actual		
Audit Notes:			
Version:	1 0	Phase:	ACTUAL
		Tie On Depth:	0 00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(ft)	(ft)	(ft)
	0 00	0 00	0 00
			Direction
			(°)
			334 97

Survey/Program	Date: 2009/07/23		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name
100 00	2,061 21	Gyro Survey (OH)	Keeper
2,136 00	7,138 00	MWD Survey (OH)	MWD
			Description
			Standard Wireline Keeper ver 1 0 2
			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 12	36 26	100 00	0 08	0 06	0 05	0 12	0 12	0 00
	200 00	0 09	141 12	200 00	0 11	0 17	0 02	0 17	-0 03	104 86
	300 00	0 12	235 99	300 00	-0 01	0 14	-0 07	0 16	0 03	94 87
	400 00	0 21	357 65	400 00	0 11	0 04	0 08	0 29	0 09	121 66
	500 00	0 08	168 09	500 00	0 23	0 05	0 19	0 29	-0 13	170 44
	600 00	0 17	349 22	600 00	0 30	0 03	0 26	0 25	0 09	-178 87
	700 00	0 24	2 08	700 00	0 66	0 01	0 59	0 08	0 07	12 86
	800 00	0 26	351 21	800 00	1 09	-0 01	1 00	0 05	0 02	-10 87
	900 00	0 34	332 71	900 00	1 58	-0 18	1 51	0 12	0 08	-18 50



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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 5000 1 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)
1,000 00	0 35	359 62	999 99	2 15	-0 32	2 08	0 16	0 01	26 91
1,100 00	0 19	31 30	1,099 99	2 60	-0 24	2 45	0 21	-0 16	31 68
1,200 00	0 02	153 95	1,199 99	2 72	-0 14	2 53	0 20	-0 17	122 65
1,300 00	0 29	101 20	1,299 99	2 66	0 11	2 36	0 28	0 27	-52 75
1,400 00	0 23	182 75	1,399 99	2 41	0 35	2 03	0 34	-0 06	81 55
1,500 00	0 50	110 67	1,499 99	2 05	0 75	1 54	0 48	0 27	-72 08
1,600 00	0 90	114 53	1,599 98	1 57	1 87	0 63	0 40	0 40	3 86
1,700 00	1 07	86 37	1,699 97	1 31	3 52	-0 30	0 51	0 17	-28 16
1,800 00	1 53	78 45	1,799 94	1 63	5 76	-0 96	0 49	0 46	-7 92
1,900 00	1 83	65 83	1,899 90	2 55	8 52	-1 29	0 47	0 30	-12 62
2,000 00	1 97	64 54	1,999 84	3 95	11 53	-1 30	0 15	0 14	-1 29
2,061 21	1 95	62 40	2,061 02	4 88	13 41	-1 25	0 12	-0 03	-3 50
Gyro Tie-in									
2,136 00	1 72	53 95	2,135 77	6 13	15 44	-0 98	0 47	-0 31	-11 30
2,231 00	3 06	24 32	2,230 69	9 28	17 64	0 95	1 87	1 41	-31 19
2,327 00	4 54	13 82	2,326 48	15 31	19 60	5 58	1 70	1 54	-10 94
2,422 00	6 32	357 43	2,421 05	24 18	20 26	13 34	2 47	1 87	-17 25
2,517 00	8 22	341 02	2,515 29	35 83	17 82	24 93	2 94	2 00	-17 27
2,612 00	8 71	332 29	2,609 26	48 62	12 27	38 87	1 45	0 52	-9 19
2,707 00	8 60	333 45	2,703 18	61 34	5 75	53 15	0 22	-0 12	1 22
2,803 00	8 99	331 60	2,798 05	74 36	-1 03	67 81	0 50	0 41	-1 93
2,898 00	9 49	333 18	2,891 82	87 88	-8 09	83 05	0 59	0 53	1 66
2,993 00	9 13	328 18	2,985 57	101 27	-15 60	98 36	0 93	-0 38	-5 26
3,088 00	8 74	331 01	3,079 42	113 99	-23 07	113 05	0 62	-0 41	2 98
3,183 00	9 38	332 86	3,173 23	127 20	-30 10	127 99	0 74	0 67	1 95
3,278 00	9 89	330 30	3,266 89	141 17	-37 68	143 85	0 70	0 54	-2 69
3,374 00	9 44	330 24	3,361 53	155 17	-45 67	159 92	0 47	-0 47	-0 06
3,469 00	9 07	331 74	3,455 29	168 53	-53 08	175 16	0 46	-0 39	1 58
3,564 00	10 13	331 69	3,548 96	182 48	-60 59	190 97	1 12	1 12	-0 05
3,659 00	10 02	331 93	3,642 50	197 12	-68 44	207 57	0 12	-0 12	0 25
3,754 00	9 81	331 94	3,736 08	211 56	-76 14	223 90	0 22	-0 22	0 01
3,849 00	9 82	332 40	3,829 69	225 88	-83 70	240 08	0 08	0 01	0 48
3,945 00	9 80	332 70	3,924 28	240 39	-91 24	256 42	0 06	-0 02	0 31
4,040 00	9 25	327 62	4,017 97	254 03	-99 03	272 07	1 06	-0 58	-5 35
4,135 00	8 87	327 77	4,111 79	266 67	-107 03	286 91	0 40	-0 40	0 16
4,230 00	8 58	329 81	4,205 69	278 99	-114 50	301 23	0 45	-0 31	2 15
4,325 00	9 65	333 00	4,299 49	292 21	-121 68	316 25	1 25	1 13	3 36
4,420 00	9 47	333 55	4,393 17	306 30	-128 77	332 02	0 21	-0 19	0 58
4,516 00	8 64	327 14	4,487 97	319 43	-136 20	347 06	1 36	-0 86	-6 68
4,611 00	8 55	326 11	4,581 91	331 29	-144 01	361 11	0 19	-0 09	-1 08
4,706 00	9 02	330 68	4,675 79	343 64	-151 60	375 51	0 89	0 49	4 81
4,801 00	9 04	330 42	4,769 62	356 63	-158 93	390 38	0 05	0 02	-0 27
4,896 00	9 07	329 70	4,863 43	369 58	-166 39	405 27	0 12	0 03	-0 76



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Well:	MC Federal #33	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 5000 1 Single User Db

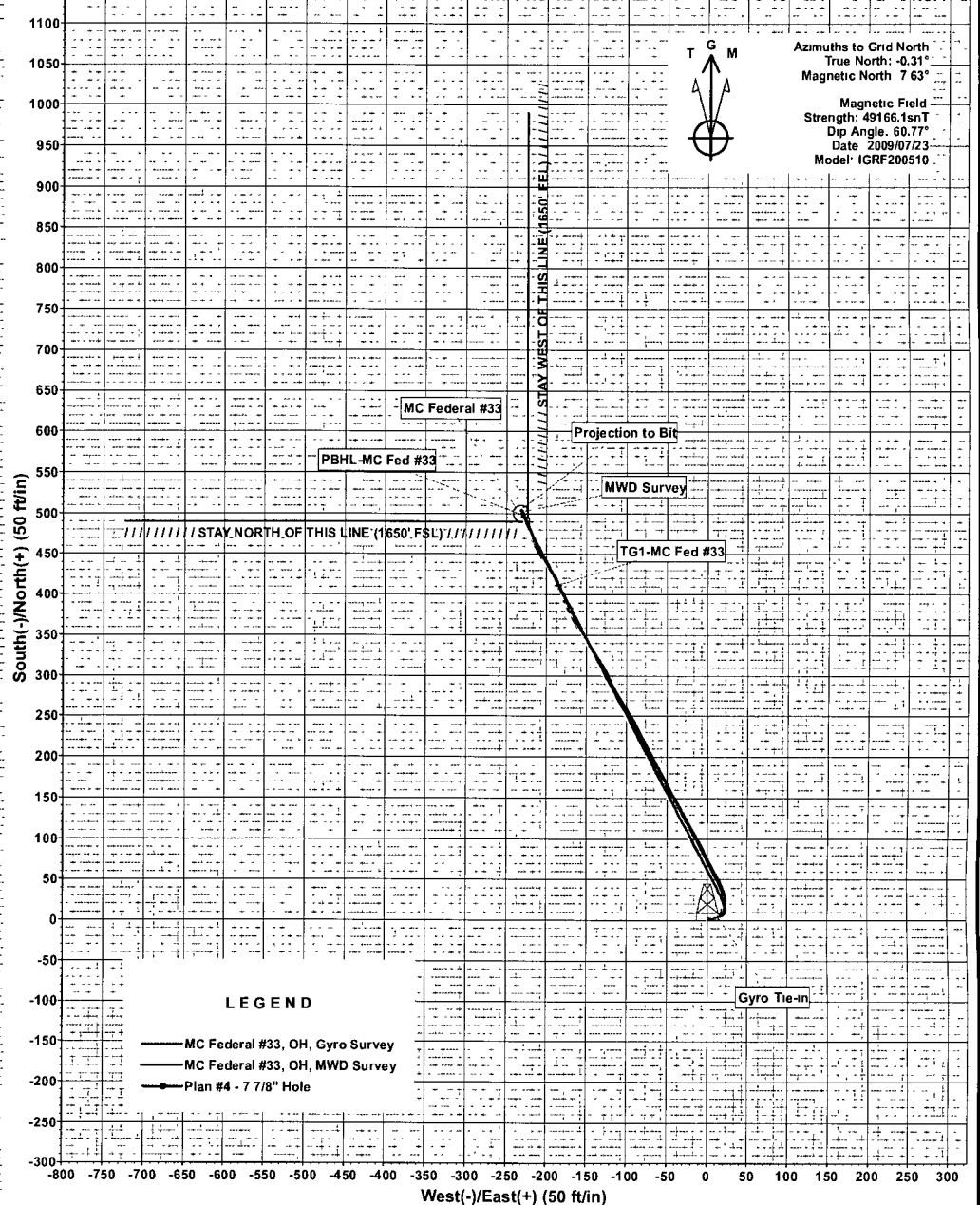
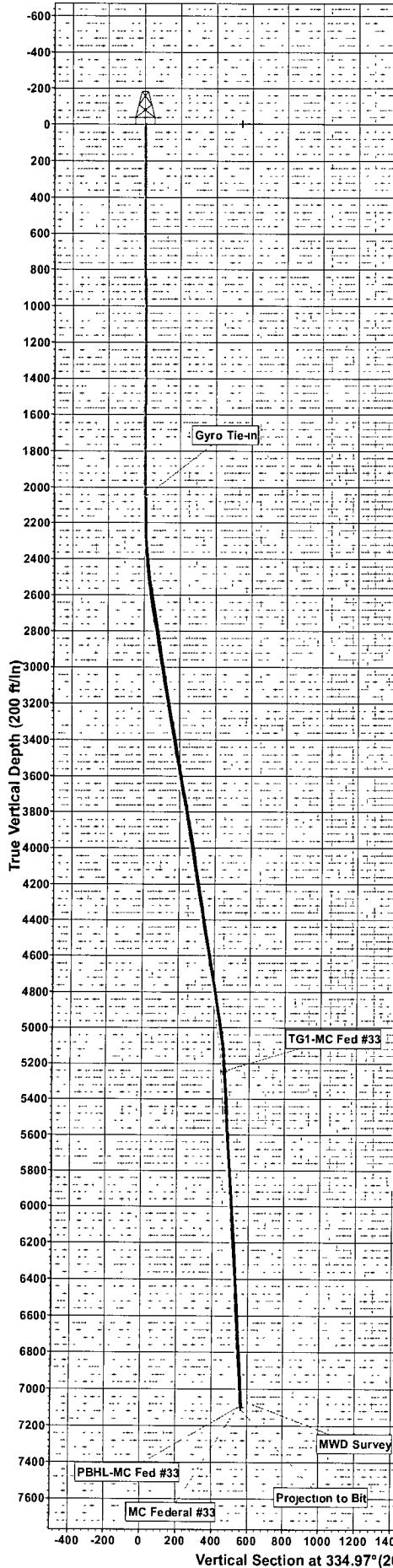
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,991 00	8 33	334 72	4,957 34	382 27	-173 11	419 61	1 12	-0 78	5 28
5,086 00	7 02	333 47	5,051 49	393 69	-178 64	432 30	1 39	-1 38	-1 32
5,182 00	4 70	330 70	5,146 98	402 37	-183 18	442 08	2 43	-2 42	-2 89
5,278 00	2 95	342 95	5,242 76	408 16	-185 83	448 45	2 00	-1 82	12 76
5,372 00	3 95	340 73	5,336 59	413 53	-187 61	454 07	1 07	1 06	-2 36
5,435 00	3 82	340 81	5,399 45	417 56	-189 02	458 32	0 21	-0 21	0 13
5,498 00	3 24	324 70	5,462 33	421 00	-190 74	462 16	1 81	-0 92	-25 57
5,595 00	3 67	326 78	5,559 15	425 83	-194 02	467 93	0 46	0 44	2 14
5,690 00	3 56	328 44	5,653 96	430 89	-197 23	473 87	0 16	-0 12	1 75
5,785 00	3 58	327 88	5,748 78	435 91	-200 35	479 74	0 04	0 02	-0 59
5,880 00	3 81	327 95	5,843 58	441 10	-203 60	485 82	0 24	0 24	0 07
5,975 00	2 75	336 10	5,938 43	445 86	-206 20	491 23	1 22	-1 12	8 58
6,070 00	3 38	327 67	6,033 29	450 31	-208 62	496 28	0 81	0 66	-8 87
6,165 00	3 55	326 48	6,128 12	455 13	-211 74	501 97	0 19	0 18	-1 25
6,261 00	3 14	337 03	6,223 95	460 02	-214 41	507 54	0 77	-0 43	10 99
6,354 00	3 07	337 78	6,316 82	464 68	-216 35	512 57	0 09	-0 08	0 81
6,449 00	3 19	337 67	6,411 67	469 48	-218 31	517 75	0 13	0 13	-0 12
6,545 00	3 19	339 70	6,507 53	474 45	-220 26	523 08	0 12	0 00	2 11
6,670 00	3 37	339 57	6,632 32	481 16	-222 74	530 21	0 14	0 14	-0 10
6,733 00	3 23	340 19	6,695 22	484 56	-223 99	533 82	0 23	-0 22	0 98
6,828 00	2 90	333 93	6,790 08	489 24	-225 96	538 89	0 49	-0 35	-6 59
6,923 00	2 85	336 94	6,884 96	493 57	-227 94	543 65	0 17	-0 05	3 17
7,018 00	2 94	337 50	6,979 84	497 99	-229 79	548 45	0 10	0 09	0 59
7,091 00	2 95	335 25	7,052 74	501 43	-231 30	552 20	0 16	0 01	-3 08
MWD Survey									
7,138 00	2 95	335 25	7,099 68	503 63	-232 31	554 62	0 00	0 00	0 00
Projection to Bit									

Design Annotations:				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
2,061 21	2,061 02	4 88	13 41	Gyro Tie-in
7,091 00	7,052 74	501 43	-231 30	MWD Survey
7,138 00	7,099 68	503 63	-232 31	Projection to Bit

Checked By _____ Approved By: _____ Date: _____



Scientific Drilling for COG Operating LLC
Site: Lea County, NM (NAD27 NME)
Well: MC Federal #33
Wellbore: OH
Design: Plan #4 vs Actual - 7 7/8" Hole



Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
East HL-MC Fed #33	0.00	489.40	-223.20	661504.60	673770.80	32°49' 2 230 N	103°46' 3 727 W	Rectangle (Sides: L500.00 W0 00)
South HL-MC Fed #33	0.00	489.40	-223.20	661504.60	673770.80	32°49' 2 230 N	103°46' 3 727 W	Rectangle (Sides: L0.00 W500 00)
TG1-MC Fed #33	5250.00	410.67	-186.81	661425.87	673807.19	32°49' 1.449 N	103°46' 3 306 W	Point
PBHL-MC Fed #33	7100.00	499.40	-233.20	661514.60	673760.80	32°49' 2 329 N	103°46' 3.844 W	Circle (Radius 10 00)

SECTION DETAILS										
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
1	2061.21	1.95	62.40	2061.02	4.88	13.41	0.00	0.00	-1.25	
2	2200.00	1.95	62.40	2199.73	7.07	17.59	0.00	0.00	-1.04	
3	2686.22	9.52	332.08	2683.62	46.52	6.07	2.00	-101.77	39.58	
4	4965.08	9.52	332.08	4931.11	379.50	-170.34	0.00	0.00	415.93	
5	5286.08	3.10	332.40	5250.00	410.67	-186.81	2.00	179.85	451.14	TG1-MC Fed #33
6	7138.79	3.10	332.40	7100.00	499.40	-233.20	0.00	0.00	551.16	PBHL-MC Fed #33

WELL DETAILS: MC Federal #33

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	661015.20	673994.00	32°48' 57.375 N	103°46' 1.143 W	

PROJECT DETAILS: Lea County, NM (NAD27 NME)			Plan Plan #4 - 7 7/8" Hole (MC Federal #33/OH)		
Geodetic System:	US State Plane 1927 (Exact solution)	Created By:	Julio Pina	Date:	23-Jul-09
Datum:	NAD 1927 (NADCON CONUS)	Checked:		Date:	
Ellipsoid:	Clarke 1866	Reviewed:		Date:	
Zone:	New Mexico East 3001	Approved:		Date:	
System Datum:	Mean Sea Level				