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HOBBSOCD

COG Operating

Lea County, NM (NAD27 NME)

GC Federal #11

GC Federal #11

OH

SUR: I-19-17s-32e, 1550/S & 660/E
BHL: I-19-17s-32e, 1649/S & 339/E
API # 30-025-38994

Design: Actual

Standard Survey Report

13 January, 2009



Scientific Drilling Survey Report



Company:	COG Operating	Local Co-ordinate Reference:	Well GC Federal #11
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	Ground Elev @ 3937 80ft (Rig Basic #38)
Site:	GC Federal #11	MD Reference:	Ground Elev @ 3937 80ft (Rig Basic #38)
Well:	GC Federal #11	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 2003 16 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		GC Federal #11			
Site Position:		Northing:	661,366 400 ft	Latitude:	32° 49' 1 355 N
From:	Map	Easting:	664,205 000 ft	Longitude:	103° 47' 55 825 W
Position Uncertainty:	0 00 ft	Slot Radius:	"	Grid Convergence:	0 29 °

Well	GC Federal #11					
Well Position	+N/-S	0 00 ft	Northing:	661,366 400 ft	Latitude:	32° 49' 1 355 N
	+E/-W	0 00 ft	Easting:	664,205 000 ft	Longitude:	103° 47' 55 825 W
Position Uncertainty		0 00 ft	Wellhead Elevation:	ft	Ground Level:	3,937 80 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	1/13/2009	8 01	60 77	49,213

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	72 91

Survey Program	Date	1/13/2009			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100 00	2,125 00	GYRO (OH)	Keeper	Standard Wireline Keeper ver 1 0 2	
2,210 00	6,812 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 41	54 86	100 00	0 21	0 29	0 34	0 41	0 41	0 00
200 00	0 18	40 55	200 00	0 53	0 69	0 81	0 24	-0 23	-14 31
300 00	0 19	66 81	300 00	0 72	0 94	1 11	0 08	0 01	26 26
400 00	0 19	44 38	400 00	0 90	1 21	1 42	0 07	0 00	-22 43
500 00	0 42	59 85	500 00	1 20	1 64	1 92	0 24	0 23	15 47
600 00	0 20	104 32	599 99	1 34	2 13	2 43	0 31	-0 22	44 47
700 00	0 30	98 56	699 99	1 26	2 56	2 81	0 10	0 10	-5 76
800 00	0 17	72 95	799 99	1 27	2 96	3 20	0 16	-0 13	-25 61
900 00	0 23	94 08	899 99	1 29	3 30	3 53	0 09	0 06	21 13
1,000 00	0 37	78 56	999 99	1 34	3 82	4 04	0 16	0 14	-15 52
1,100 00	0 51	100 46	1,099 99	1 33	4 57	4 76	0 22	0 14	21 90

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Well:	GC Federal #11	North Reference:	Grnd
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 59	102 01	1,199 98	1 14	5 51	5 60	0 08	0 08	1 55
1,300 00	0 59	95 17	1,299 98	0 99	6 53	6 53	0 07	0 00	-6 84
1,400 00	0 51	103 77	1,399 97	0 83	7 47	7 39	0 11	-0 08	8 60
1,500 00	0 89	89 00	1,499 97	0 74	8 68	8 52	0 42	0 38	-14 77
1,600 00	1 26	82 63	1,599 95	0 90	10 55	10 35	0 39	0 37	-6 37
1,700 00	1 49	71 10	1,699 92	1 46	12 87	12 73	0 36	0 23	-11 53
1,800 00	1 59	66 40	1,799 88	2 43	15 37	15 41	0 16	0 10	-4 70
1,900 00	1 64	60 71	1,899 84	3 69	17 89	18 18	0 17	0 05	-5 69
2,000 00	1 43	58 86	1,999 81	5 04	20 21	20 79	0 22	-0 21	-1 85
2,100 00	1 09	64 38	2,099 78	6 09	22 13	22 94	0 36	-0 34	5 52
2,125 00	0 98	66 26	2,124 78	6 28	22 54	23 39	0 46	-0 44	7 52
Last GYRO Survey									
2,210 00	0 80	48 47	2,209 77	6 97	23 65	24 65	0 39	-0 21	-20 93
2,305 00	1 81	71 69	2,304 74	7 88	25 57	26 76	1 18	1 06	24 44
2,401 00	5 39	71 88	2,400 54	9 76	31 30	32 78	3 73	3 73	0 20
2,496 00	5 08	74 96	2,495 14	12 24	39 60	41 45	0 44	-0 33	3 24
2,591 00	4 58	72 18	2,589 80	14 49	47 27	49 44	0 58	-0 53	-2 93
2,687 00	3 66	70 17	2,685 56	16 70	53 81	56 34	0 97	-0 96	-2 09
2,782 00	4 38	72 45	2,780 32	18 82	60 12	62 99	0 78	0 76	2 40
2,877 00	3 77	61 65	2,875 08	21 40	66 32	69 69	1 03	-0 64	-11 37
2,972 00	4 36	74 22	2,969 84	23 87	72 55	76 36	1 12	0 62	13 23
3,067 00	4 06	75 32	3,064 59	25 70	79 28	83 33	0 33	-0 32	1 16
3,163 00	4 26	77 91	3,160 34	27 31	86 05	90 28	0 29	0 21	2 70
3,257 00	5 06	72 88	3,254 02	29 26	93 43	97 90	0 95	0 85	-5 35
3,352 00	4 28	70 88	3,348 71	31 65	100 78	105 63	0 84	-0 82	-2 11
3,446 00	4 32	75 55	3,442 44	33 69	107 52	112 67	0 37	0 04	4 97
3,542 00	4 45	82 91	3,538 16	35 05	114 72	119 95	0 60	0 14	7 67
3,636 00	4 21	74 97	3,631 90	36 39	121 67	126 99	0 69	-0 26	-8 45
3,700 00	3 65	69 62	3,695 75	37 71	125 85	131 37	1 04	-0 87	-8 36
3,763 00	3 53	71 28	3,758 62	39 03	129 57	135 32	0 25	-0 19	2 63
3,827 00	3 29	66 36	3,822 51	40 40	133 11	139 11	0 59	-0 37	-7 69
3,890 00	3 85	65 07	3,885 39	42 02	136 69	143 00	0 90	0 89	-2 05
3,954 00	4 11	83 27	3,949 23	43 19	140 91	147 39	2 01	0 41	28 44
4,017 00	3 65	84 45	4,012 09	43 65	145 15	151 57	0 74	-0 73	1 87
4,081 00	3 76	74 94	4,075 96	44 39	149 21	155 66	0 97	0 17	-14 86
4,144 00	3 87	69 17	4,138 82	45 69	153 19	159 85	0 63	0 17	-9 16
4,207 00	3 65	68 81	4,201 68	47 17	157 05	163 97	0 35	-0 35	-0 57
4,271 00	3 59	69 40	4,265 55	48 61	160 82	168 00	0 11	-0 09	0 92
4,335 00	3 36	70 05	4,329 44	49 95	164 46	171 88	0 36	-0 36	1 02
4,429 00	3 14	68 80	4,423 28	51 82	169 45	177 20	0 25	-0 23	-1 33
4,524 00	3 67	64 67	4,518 12	54 07	174 62	182 80	0 61	0 56	-4 35
4,619 00	3 72	68 63	4,612 92	56 49	180 24	188 88	0 27	0 05	4 17
4,683 00	4 10	75 20	4,676 77	57 83	184 39	193 24	0 92	0 59	10 27
4,746 00	3 95	76 51	4,739 62	58 91	188 67	197 66	0 28	-0 24	2 08
4,810 00	3 64	79 68	4,803 48	59 79	192 82	201 87	0 58	-0 48	4 95
4,904 00	3 93	69 73	4,897 27	61 44	198 77	208 05	0 76	0 31	-10 59
4,968 00	4 09	67 89	4,961 11	63 06	202 95	212 52	0 32	0 25	-2 87
5,063 00	3 72	74 09	5,055 89	65 18	209 05	218 97	0 59	-0 39	6 53
5,126 00	3 47	70 05	5,118 77	66 39	212 81	222 92	0 56	-0 40	-6 41
5,221 00	4 04	83 21	5,213 57	67 77	218 83	229 08	1 08	0 60	13 85
5,317 00	3 69	76 28	5,309 35	68 90	225 19	235 49	0 61	-0 36	-7 22
5,380 00	4 07	77 68	5,372 20	69 86	229 34	239 75	0 62	0 60	2 22
5,444 00	4 03	71 69	5,436 05	71 05	233 70	244 26	0 66	-0 06	-9 36
5,507 00	4 08	76 50	5,498 89	72 27	237 98	248 71	0 55	0 08	7 63

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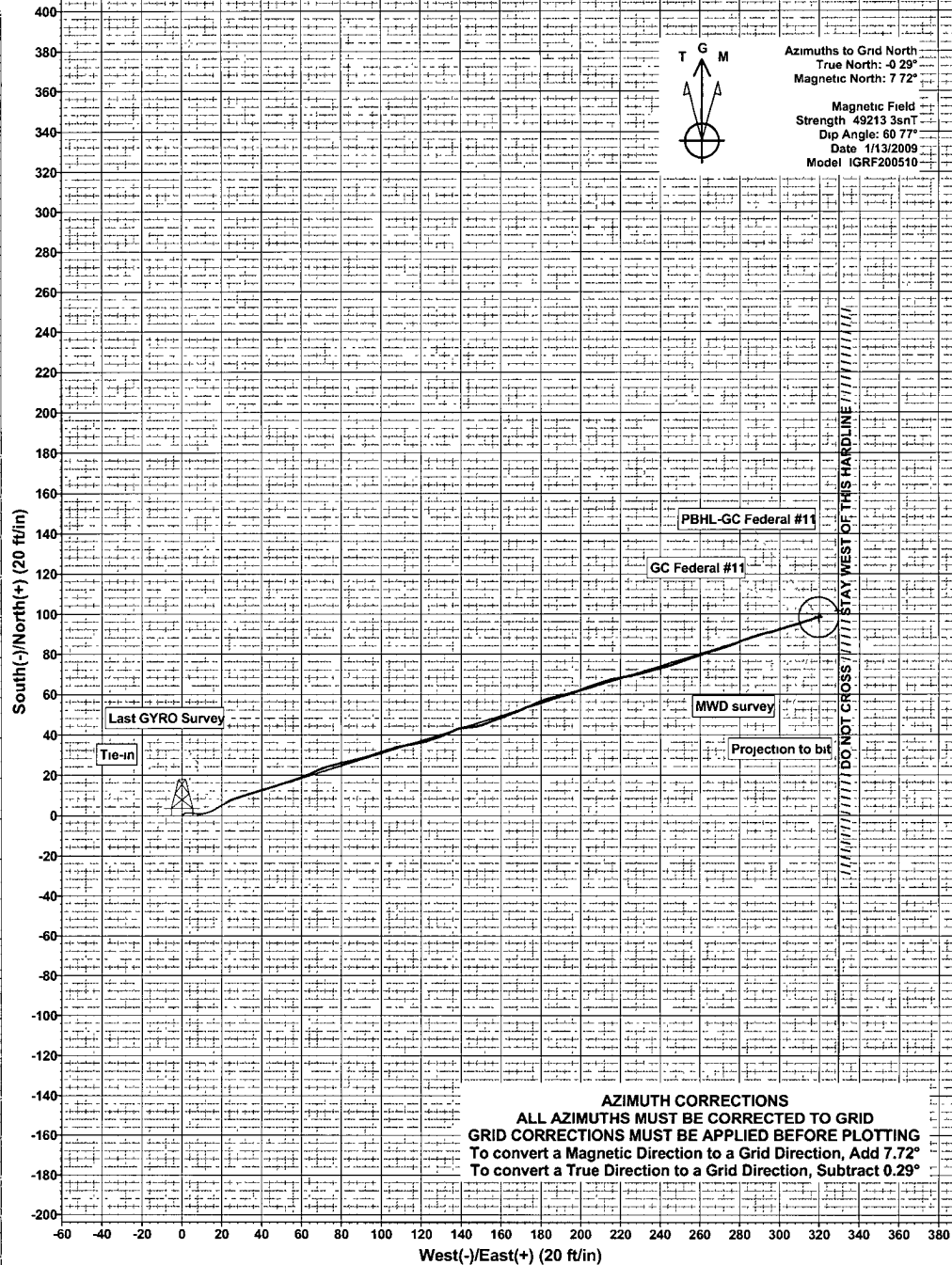
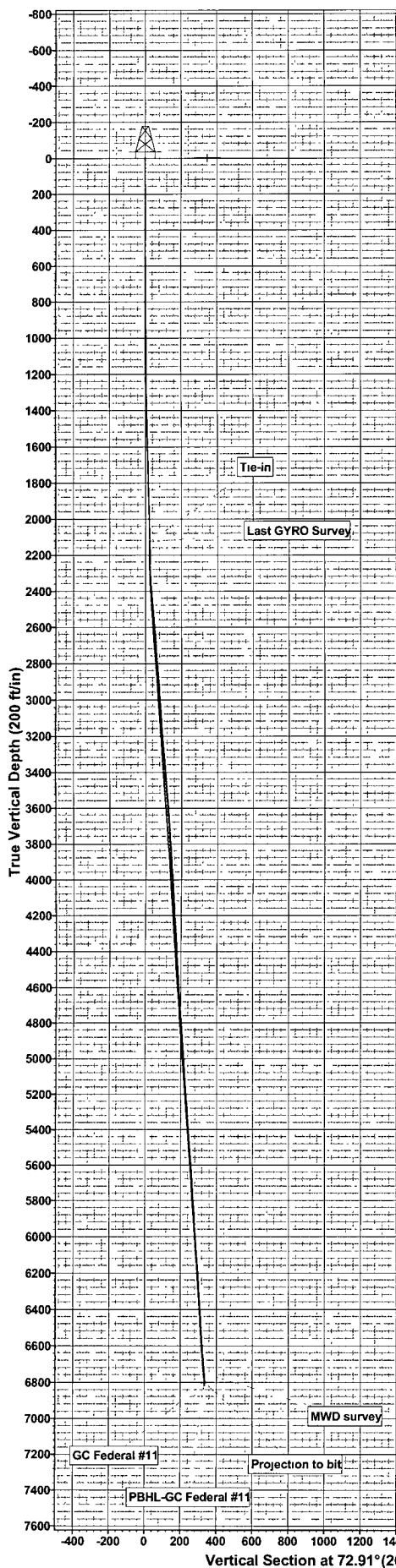
Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
5,602 00	4 42	74 82	5,593 63	74 01	244 80	255 74	0 38	0 36	-1 77
5,666 00	3 75	67 16	5,657 46	75 47	249 11	260 29	1 35	-1 05	-11 97
5,729 00	3 33	72 47	5,720 34	76 82	252 75	264 17	0 85	-0 67	8 43
5,825 00	3 75	69 81	5,816 16	78 75	258 36	270 09	0 47	0 44	-2 77
5,888 00	3 60	71 03	5,879 03	80 10	262 16	274 12	0 27	-0 24	1 94
5,951 00	3 39	74 55	5,941 91	81 24	265 83	277 96	0 48	-0 33	5 59
6,015 00	3 32	75 02	6,005 80	82 22	269 44	281 71	0 12	-0 11	0 73
6,078 00	4 01	70 42	6,068 68	83 43	273 28	285 73	1 19	1 10	-7 30
6,142 00	4 14	69 03	6,132 51	85 01	277 54	290 27	0 26	0 20	-2 17
6,205 00	3 78	68 05	6,195 36	86 60	281 59	294 61	0 58	-0 57	-1 56
6,269 00	3 58	68 60	6,259 23	88 12	285 41	298 70	0 32	-0 31	0 86
6,332 00	3 45	76 36	6,322 11	89 28	289 08	302 56	0 78	-0 21	12 32
6,396 00	3 55	77 30	6,385 99	90 17	292 89	306 45	0 18	0 16	1 47
6,459 00	3 01	75 98	6,448 89	91 00	296 39	310 05	0 87	-0 86	-2 10
6,522 00	3 54	71 13	6,511 79	92 03	299 84	313 65	0 95	0 84	-7 70
6,586 00	4 30	72 59	6,575 64	93 39	304 00	318 02	1 20	1 19	2 28
6,649 00	4 82	75 92	6,638 44	94 74	308 82	323 03	0 93	0 83	5 29
6,762 00	4 17	67 99	6,751 09	97 43	317 23	331 86	0 79	-0 58	-7 02
MWD survey									
6,812 00	4 17	67 99	6,800 96	98 80	320.61	335 48	0 00	0 00	0 00
Projection to bit									

Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
- hit/miss target									
- Shape									
HardL-GC Federal #11	0 00	0 00	0 00	101 30	329 50	661,467 700	664,534 500	32° 49' 2 341 N	103° 47' 51 958 W
- actual wellpath misses by 344 72ft at 1 17ft MD (1 17 TVD, 0 00 N, 0 00 E)									
- Rectangle (sides W500 00 H0 00 D0 00)									
PBHL-GC Federal #11	0 00	0 00	6,800 00	98 24	319 54	661,464 638	664,524 540	32° 49' 2 311 N	103° 47' 52 075 W
- actual wellpath misses by 1 13ft at 6810 96ft MD (6799 92 TVD, 98 77 N, 320 53 E)									
- Circle (radius 10 00)									

Checked By: _____ Approved By: _____ Date: _____

COG Operating

Scientific Drilling for COG Operating
Site: Lea County, NM (NAD27 NME)
Well: GC Federal #11
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 7.72°
To convert a True Direction to a Grid Direction, Subtract 0.29°

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
HardL-GC Federal #11	0.00	101.30	329.50	661467.700	664534.500	32°49' 2.341 N	103°47' 51.958 W	Rectangle (Sid es: L500.00 W0.00)
PBHL-GC Federal #11	6800.00	98.24	319.54	661464.638	664524.540	32°49' 2.311 N	103°47' 52.075 W	Circle (Radius s: 10.00)

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	2125.00	0.98	66.26	2124.78	6.28	22.54	0.00	0.00	23.39	
2	2300.00	0.98	66.26	2299.75	7.49	25.28	0.00	0.00	26.37	
3	2449.64	3.96	72.89	2449.23	9.52	31.40	2.00	8.79	32.81	
4	6810.84	3.96	72.89	6800.00	98.24	319.54	0.00	0.00	334.30	PBHL-GC Federal #11

WELL DETAILS: GC Federal #11

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	661366.400	664205.000	32°49' 1.355 N	103°47' 55.825 W	

PROJECT DETAILS: Lea County, NM (NAD27 NME) Plan: Plan #3 - 7-7/8" Hole (GC Federal #11/OH)

Geodetic System: US State Plane 1927 (Exact solution)	Created By: Julio Pina	Date: 13-Jan-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		