



COG Operating LLC

Lea County, NM (NAD27 NME)

GC Federal #14

GC Federal #14

OH

Design: Actual

Standard Survey Report

24 June, 2009

RECEIVED

JUL 31 2009

HOBBSOCD

SUR: O-19-17s-32e, 735/S & 2222/E
BHL: N-19-17s-32e, 975/S & 3014/E
API # 30-025-39110





Scientific Drilling Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site GC Federal #14
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	Ground Elev @ 3926 00ft (Rig ?)
Site:	GC Federal #14	MD Reference:	Ground Elev @ 3926 00ft (Rig ?)
Well:	GC Federal #14	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:	GC Federal #14		
Site Position:		Northing:	660,545 40 ft
From:	Map	Easting:	662,648 00 ft
Position Uncertainty:	0 00 ft	Slot Radius:	0 "
		Latitude:	32° 48' 53 308 N
		Longitude:	103° 48' 14 117 W
		Grid Convergence:	0 29 °

Well:	GC Federal #14		
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' 53 308 N
		Longitude:	103° 48' 14 117 W
		Ground Level:	3,926 00 ft

Wellbore:	OH		
Magnetics:	Model Name	Sample Date	Declination
	IGRF200510	2009/06/24	(°)
			7 96
			Dip Angle
			(°)
			60.76
			Field Strength
			(nT)
			49,170

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
			287 02

Survey/Program	Date:	2009/06/24
From (ft)	To (ft)	Survey (Wellbore)
100 00	2,080 00	Keeper gyro (OH)
2,171 00	7,025 00	MWD (OH)
		Tool Name
		Keeper
		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 16	211 10	100 00	-0 12	-0 07	0 03	0 16	0 16	0 00
200 00	0 15	213 89	200 00	-0 35	-0 22	0 11	0 01	-0 01	2 79
300 00	0 16	247 71	300 00	-0 51	-0 42	0 25	0 09	0 01	33 82
400 00	0 18	265 02	400 00	-0 58	-0 71	0 51	0 05	0 02	17 31
500 00	0 10	284 91	500 00	-0 57	-0 95	0 74	0 09	-0 08	19 89
600 00	0 14	350 77	600 00	-0 42	-1 05	0 88	0 13	0 04	65 86
700 00	0 20	22 80	700 00	-0 14	-1 00	0 92	0 11	0 06	32 03
800 00	0 36	77 05	800 00	0 09	-0 63	0 63	0 29	0 16	54 25
900 00	0 40	58 40	899 99	0 34	-0 02	0 12	0 13	0 04	-18 65



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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 49	40 63	999 99	0 85	0 55	-0 28	0 16	0 09	-17 77
1,100 00	0 31	66 77	1,099 99	1 28	1 08	-0 66	0 25	-0 18	26 14
1,200 00	0 71	65 20	1,199 99	1 65	1 89	-1 32	0 40	0 40	-1 57
1,300 00	0 98	59 38	1,299 97	2 34	3 19	-2 36	0 28	0 27	-5 82
1,400 00	1 00	39 53	1,399 96	3 45	4 48	-3 27	0 34	0 02	-19 85
1,500 00	1 02	35 89	1,499 94	4 85	5 56	-3 89	0 07	0 02	-3 64
1,600 00	1 46	36 95	1,599 92	6 58	6 84	-4 62	0 44	0 44	1 06
1,700 00	2 06	38 11	1,699 87	9 02	8 72	-5 70	0 60	0 60	1 16
1,800 00	2 27	37 37	1,799 80	12 00	11 03	-7 03	0 21	0 21	-0 74
1,900 00	2 13	38 40	1,899 73	15 04	13 39	-8 40	0 15	-0 14	1 03
2,000 00	1 65	42 77	1,999 67	17 55	15 52	-9 70	0 50	-0 48	4 37
2,080 00	1 32	42 69	2,079 65	19 07	16 93	-10 60	0 41	-0 41	-0 10
Gyro Tie-in									
2,171 00	1 40	53 57	2,170 62	20 50	18 53	-11 72	0 30	0 09	11 96
2,266 00	1 64	328 03	2,265 60	22 34	18 74	-11 38	2 18	0 25	-90 04
2,361 00	3 45	307 47	2,360 50	25 24	15 76	-7 68	2 10	1 91	-21 64
2,456 00	5 34	294 03	2,455 22	28 78	9 45	-0 61	2 25	1 99	-14 15
2,551 00	6 73	284 15	2,549 69	31 94	0 01	9 34	1 82	1 46	-10 40
2,647 00	6 47	286 26	2,645 06	34 83	-10 63	20 36	0 37	-0 27	2 20
2,742 00	7 19	285 54	2,739 38	37 92	-21 50	31 66	0 76	0 76	-0 76
2,837 00	8 47	284 80	2,833 50	41 30	-33 99	44 59	1 35	1 35	-0 78
2,932 00	9 84	284 05	2,927 28	45 06	-48 63	59 69	1 45	1 44	-0 79
3,027 00	13 10	285 10	3,020 37	49 83	-66 91	78 56	3 44	3 43	1 11
3,123 00	14 34	286 57	3,113 63	56 06	-88 81	101 32	1 34	1 29	1 53
3,218 00	15 94	287 35	3,205 33	63 30	-112 53	126 14	1 70	1 68	0 82
3,313 00	17 62	285 58	3,296 28	71 06	-138 84	153 56	1 85	1 77	-1 86
3,408 00	17 37	286 43	3,386 89	78 93	-166 29	182 11	0 38	-0 26	0 89
3,503 00	17 04	285 99	3,477 64	86 77	-193 27	210 21	0 37	-0 35	-0 46
3,598 00	16 73	287 06	3,568 54	94 62	-219 73	237 80	0 46	-0 33	1 13
3,693 00	16 47	286 39	3,659 58	102 43	-245 72	264 94	0 34	-0 27	-0 71
3,788 00	17 38	283 73	3,750 47	109 60	-272 42	292 57	1 26	0 96	-2 80
3,883 00	16 55	283 77	3,841 33	116 19	-299 35	320 24	0 87	-0 87	0 04
3,978 00	15 89	283 54	3,932 55	122 45	-325 13	346 73	0 70	-0 69	-0 24
4,073 00	17 40	282 13	4,023 57	128 48	-351 66	373 87	1 65	1 59	-1 48
4,168 00	17 51	281 73	4,114 20	134 37	-379 54	402 25	0 17	0 12	-0 42
4,263 00	17 65	282 24	4,204 76	140 33	-407 61	430 84	0 22	0 15	0 54
4,358 00	17 62	281 55	4,295 29	146 26	-435 77	459 50	0 22	-0 03	-0 73
4,453 00	17 47	279 41	4,385 88	151 47	-463 93	487 95	0 70	-0 16	-2 25
4,548 00	17 67	279 01	4,476 44	156 06	-492 24	516 36	0 25	0 21	-0 42
4,644 00	15 79	279 14	4,568 38	160 42	-519 53	543 73	1 96	-1 96	0 14
4,739 00	15 55	278 46	4,659 85	164 35	-544 88	569 12	0 32	-0 25	-0 72
4,841 00	13 93	280 33	4,758 49	168 56	-570 49	594 84	1 66	-1 59	1 83
4,936 00	12 09	283 22	4,851 04	172 89	-591 42	616 12	2 05	-1 94	3 04



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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 5000 1 Single User Db

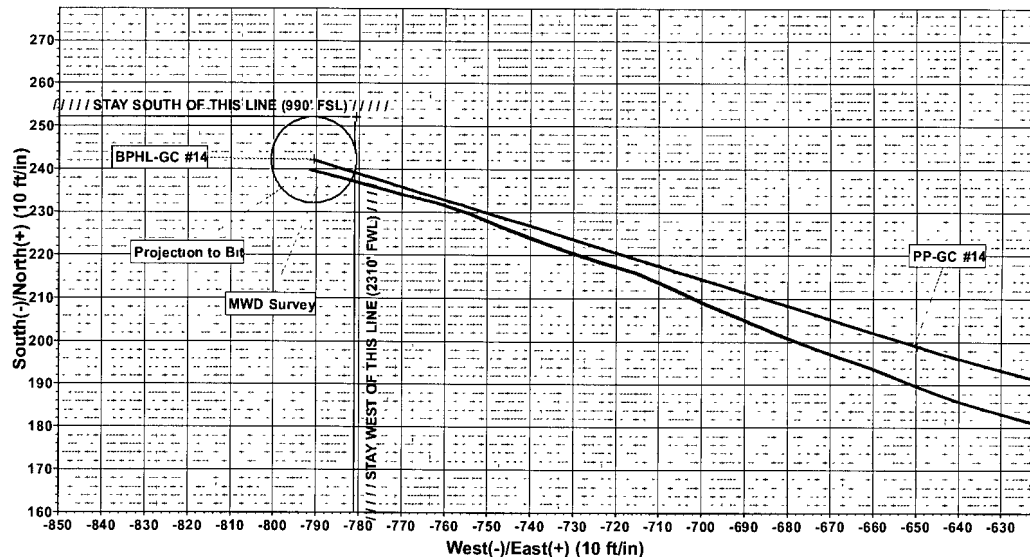
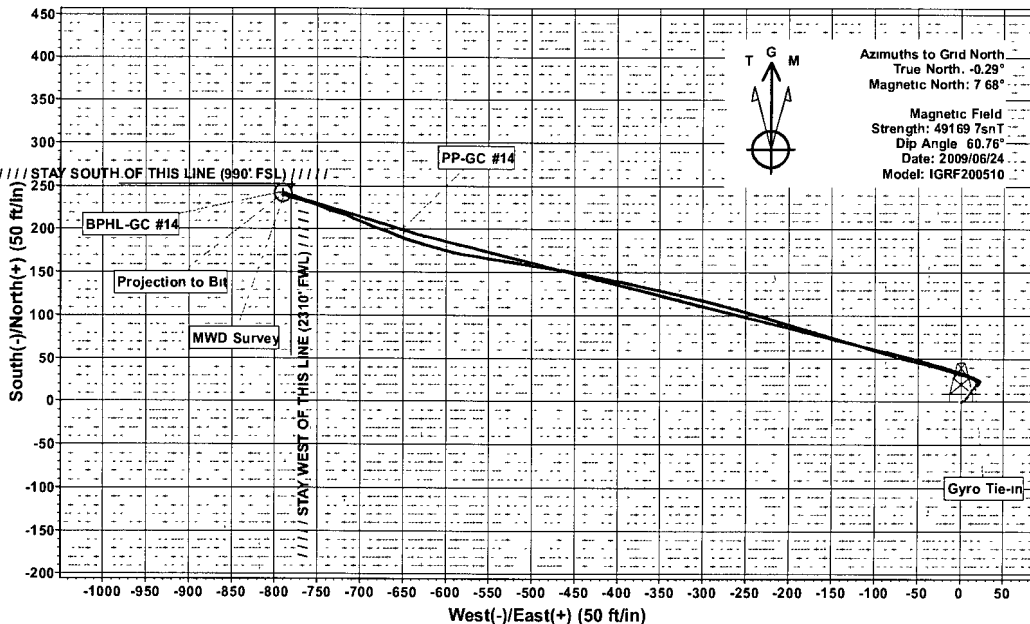
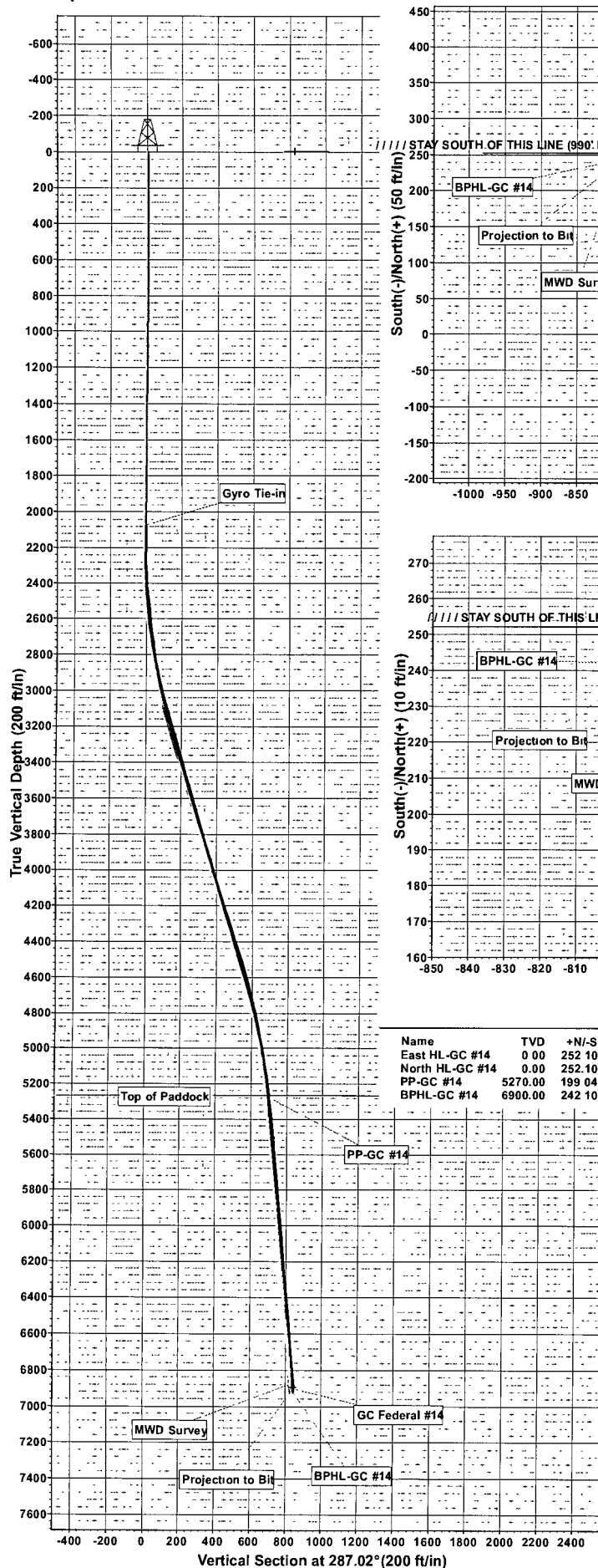
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
5,031 00	9 71	285 28	4,944 32	177 27	-608 84	634 06	2 54	-2 51	2 17
5,126 00	9 94	285 49	5,037 93	181 58	-624 47	650 27	0 25	0 24	0 22
5,190 00	10 05	285 65	5,100 96	184 56	-635 17	661 37	0 18	0 17	0 25
5,285 00	7 90	292 37	5,194 79	189 28	-649 19	676 16	2 51	-2 26	7 07
5,380 00	6 98	290 52	5,288 99	193 79	-660 63	688 42	1 00	-0 97	-1 95
5,475 00	5 39	287 79	5,383 44	197 17	-670 29	698 65	1 70	-1 67	-2 87
5,571 00	5 52	291 39	5,479 00	200 24	-678 88	707 76	0 38	0 14	3 75
5,665 00	4 17	293 35	5,572 66	203 24	-686 23	715 66	1 45	-1 44	2 09
5,762 00	4 75	291 14	5,669 37	206 09	-693 21	723 17	0 62	0 60	-2 28
5,856 00	4 88	293 37	5,763 04	209 07	-700 51	731 03	0 24	0 14	2 37
5,951 00	5 05	297 31	5,857 68	212 60	-707 94	739 16	0 40	0 18	4 15
6,046 00	5 16	287 91	5,952 31	215 83	-715 72	747 54	0 89	0 12	-9 89
6,141 00	5 05	286 40	6,046 93	218 32	-723 79	756 00	0 18	-0 12	-1 59
6,236 00	4 98	288 30	6,141 57	220 80	-731 72	764 30	0 19	-0 07	2 00
6,332 00	5 05	290 29	6,237 20	223 57	-739 64	772 68	0 20	0 07	2 07
6,427 00	4 81	292 67	6,331 85	226 56	-747 24	780 82	0 33	-0 25	2 51
6,523 00	4 90	292 29	6,427 50	229 66	-754 74	788 91	0 10	0 09	-0 40
6,617 00	5 00	283 50	6,521 15	232 14	-762 44	797 00	0 81	0 11	-9 35
6,712 00	4 38	283 31	6,615 84	233 94	-770 00	804 75	0 65	-0 65	-0 20
6,807 00	4 01	287 02	6,710 58	235 75	-776 70	811 69	0 48	-0 39	3 91
6,903 00	4 04	285 27	6,806 34	237 62	-783 18	818 43	0 13	0 03	-1 82
6,978 00	4 05	282 91	6,881 16	238 91	-788 31	823 71	0 22	0 01	-3 15
MWD Survey 7,025 00	4 05	282 91	6,928 04	239 65	-791 54	827 02	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)	
2,080 00	2,079 65	19 07	16 93	Gyro Tie-in
6,978 00	6,881 16	238 91	-788 31	MWD Survey
7,025 00	6,928 04	239 65	-791 54	Projection to Bit

Checked By _____ Approved By: _____ Date: _____



Scientific Drilling for COG Operating LLC
Site: Lea County, NM (NAD27 NME)
Well: GC Federal #14
Wellbore: OH
Design: Plan #6 vs Actual - 7-7/8" Hole



WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
East HL-GC #14	0.00	252.10	-781.00	660797.50	661867.00	32°48'55.842 N	103°48'23.254 W	Rectangle (Sides: L2 00.00 W0.00)
North HL-GC #14	0.00	252.10	-781.00	660797.50	661867.00	32°48'55.842 N	103°48'23.254 W	Rectangle (Sides: L 0.00 W200.00)
PP-GC #14	5270.00	199.04	-650.22	660744.44	661997.78	32°48'55.310 N	103°48'21.725 W	Point
BPHL-GC #14	6900.00	242.10	-791.00	660787.50	661857.00	32°48'55.743 N	103°48'23.372 W	Circle (Radius: 10.0 0)

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 7.68°
To convert a True Direction to a Grid Direction, Subtract 0.29°

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
1	2080.00	1.32	42.69	2079.65	19.07	16.93	0.00	0.00	-10.60	
2	2250.00	1.32	42.69	2249.60	21.95	19.58	0.00	0.00	-12.30	
3	3091.44	16.16	283.99	3080.29	57.64	-88.22	2.00	-122.53	101.22	
4	4809.02	16.16	283.99	4730.04	173.21	-551.96	0.00	0.00	578.48	
5	5359.30	5.16	287.01	5270.00	199.04	-650.22	2.00	178.58	680.00	PP-GC #14
6	6995.93	5.16	287.01	6900.00	242.10	-791.00	0.00	0.00	827.22	BPHL-GC #14

WELL DETAILS: GC Federal #14

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	660545.40	662648.00	32°48'53.308 N	103°48'14.117 W	

PROJECT DETAILS: Lea County, NM (NAD27 NME) Plan: Plan #6 - 7-7/8" Hole (GC Federal #14/OH)

Geodetic System: US State Plane 1927 (Exact solution)	Created By: Julio Pina	Date: 24-Jun-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		