

## Results of Directional Survey

API number:	30-025-39420		
OGRID:		Operator:	COG OPERATING LLC
		Property:	GC FEDERAL # 34

surface	ULSTR:	L	19	T 17S	R 32E
				1985 FSL	585 FWL

BH Loc	ULSTR:	L	19	T 17S	R 32E
6900	MD		6876.0	TVD	1700 FSL 378 FWL

Top Perf/OH	ULSTR:	L	19	T 17S	R 32E
5290	MD		5266.4	TVD	1701 FSL 378 FWL

Bot Perf/OH	ULSTR:	L	19	T 17S	R 32E
6640	MD		6616.0	TVD	1700 FSL 378 FWL

	MD	N/S	E/W	VD
	5281	-283.89	-206.56	5257.41
TOP PERFS/OH	<b>5290</b>	-284.04	-206.64	5266.41
	5343	-284.93	-207.08	5319.40
	5416	-285.39	-206.53	
BOT PERFS/OH	<b>6640</b>	-285.39	-206.53	6616.00
	6640	-285.39	-206.53	

NEXT TO LAST	5416	-285.39	-206.53	
LAST READING	6900	-285.39	-206.53	
TD	<b>6900</b>	-285.39	-206.53	6876.00

Surface Location	1985	FS	585	FWL
Projected BHL	1700	FS	378	FWL
Location of				
Top Perfs/OH	1701	FS	378	FWL
Bottom Perfs/OH	1700	FS	378	FWL

### SUMMARY of Subsurface Locations

Surface Location	L-19-17S-32E	1985	FS	585	FWL	Vert. Depth
Top Perfs/OH	L-19-17S-32E	1701	FS	378	FWL	5266.41
Bottom Perfs/OH	L-19-17S-32E	1700	FS	378	FWL	6616.00
Projected TD	L-19-17S-32E	1700	FS	378	FWL	6876.00



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## COG Operating LLC

Lea County, NM (NAD27 NME)

GC Federal #34

GC Federal #34

OH

SUR: L-19-17s-32e, 1985/S & 585/W  
BHL: L-19-17s-32e, 1700/S & 378/W  
API # 30-025-39420

Design: Actual

## Plan vs. Survey Report

14 May, 2010





**Scientific Drilling**  
Plan vs. Survey Report



<b>Company:</b>	COG Operating LLC	<b>Local Co-ordinate Reference:</b>	Well GC Federal #34
<b>Project:</b>	Lea County, NM (NAD27 NME)	<b>TVD Reference:</b>	RKB Elev (13) @ 3935 00ft (JW #4)
<b>Site:</b>	GC Federal #34	<b>MD Reference:</b>	RKB Elev (13) @ 3935.00ft (JW #4)
<b>Well:</b>	GC Federal #34	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	OH	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Actual	<b>Database:</b>	EDM 5000 1 Single User Db

<b>Project:</b>	Lea County, NM (NAD27 NME)		
<b>Map System:</b>	US State Plane 1927 (Exact solution)	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	NAD 1927 (NADCON CONUS)		
<b>Map Zone:</b>	New Mexico East 3001		

<b>Site:</b>	GC Federal #34				
<b>Site Position:</b>	<b>Northing:</b>	661,785 80 ft	<b>Latitude:</b>	32° 49' 5 706 N	
<b>From:</b>	Map	<b>Easting:</b>	660,137 00 ft	<b>Longitude:</b>	103° 48' 43 468 W
<b>Position Uncertainty:</b>	0 00 ft	<b>Slot Radius:</b>	0 "	<b>Grid Convergence:</b>	0 28 °

<b>Well:</b>	GC Federal #34					
<b>Well Position</b>	<b>+N-S</b>	0 00 ft	<b>Northing:</b>	661,785 80 ft	<b>Latitude:</b>	32° 49' 5 706 N
	<b>+E-W</b>	0 00 ft	<b>Easting:</b>	660,137 00 ft	<b>Longitude:</b>	103° 48' 43 468 W
<b>Position Uncertainty</b>	0 00 ft	<b>Wellhead Elevation:</b>			<b>Ground Level:</b>	3,922 00 ft

<b>Wellbore:</b>	OH				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination</b>	<b>Dip Angle</b>	<b>Field Strength</b>
	IGRF200510	2009/05/09	(°) 7 98	(°) 60 76	(nT) 49,183

<b>Design:</b>	Actual				
<b>Audit Notes:</b>					
<b>Version:</b>	1 0	<b>Phase:</b>	ACTUAL	<b>Tie On Depth:</b>	0 00
<b>Vertical Section:</b>	<b>Depth From (TVD)</b>	<b>+N-S</b>	<b>+E-W</b>	<b>Direction</b>	
	(ft)	(ft)	(ft)	(°)	
	0 00	0 00	0 00	215 40	

<b>Survey Program:</b>	Date 2010/05/14				
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>	
100 00	1,836 00	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1 0 2	
2,003 00	5,416 00	MWD Survey (OH)	MWD	MWD - Standard	

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Measured Depth on Plan (ft)	Distance to Plan (ft)	Toolface to Plan (°)
0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
100 00	0 40	6 64	100 00	0 35	0 04	-0 31	100 00	0 00	0 00
200 00	0 34	6 30	200 00	0 99	0 11	-0 87	200 00	0 00	0 00
300 00	0 35	5 47	300 00	1 59	0 17	-1 40	300 00	0 00	0 00
400 00	0 07	313 18	399 99	1 93	0 16	-1 67	400 00	0 00	0 00
500 00	0 14	282 69	499 99	2 00	0 00	-1 63	500 00	0 00	0 00
600 00	0 09	278 47	599 99	2 04	-0 20	-1 55	600 00	0 00	0 00
700 00	0 13	293 00	699 99	2 10	-0 38	-1 49	700 00	0 00	0 00
800 00	0 17	273 18	799 99	2 15	-0 64	-1 38	800 00	0 00	0 00
900 00	0 27	289 37	899 99	2 24	-1 01	-1 24	900 00	0 00	0 00



Scientific Drilling  
Plan vs. Survey Report



Company: COG Operating LLC  
 Project: Lea County, NM (NAD27 NME)  
 Site: GC Federal #34  
 Well: GC Federal #34  
 Wellbore: OH  
 Design: Actual

Local Co-ordinate Reference: Well GC Federal #34  
 TVD Reference: RKB Elev (13') @ 3935 00ft (JW #4)  
 MD Reference: RKB Elev (13') @ 3935 00ft (JW #4)  
 North Reference: Grd  
 Survey Calculation Method: Minimum Curvature  
 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)	Measured Depth on Plan (ft)	Distance to Plan (ft)	Toolface to Plan (°)
1,000 00	0 28	260 38	999 99	2 27	-1 47	-1.00	1,000 00	0 00	0 00
1,100 00	0 36	223 21	1,099 99	2 00	-1 93	-0 52	1,100 00	0 00	0 00
1,200 00	0 49	227 73	1,199 99	1 49	-2 46	0 21	1,200 00	0 00	0 00
1,300 00	0 33	226 45	1,299 99	1 00	-2 98	0 91	1,300 00	0 00	0 00
1,400 00	0 27	267 84	1,399 98	0 79	-3 43	1 34	1,400 00	0 00	0 00
1,500 00	0 23	7 19	1,499 98	0 98	-3 64	1 31	1,500 00	0 00	0 00
1,600 00	0 72	66 11	1,599 98	1 44	-3 04	0 59	1,600 00	0 00	0 00
1,700 00	0 99	86 99	1,699 97	1 74	-1 60	-0 49	1,700 00	0 00	0 00
1,800 00	1 07	85 24	1,799 95	1 86	0 19	-1 63	1,800 00	0 00	0 00
1,836 00	1 02	81 96	1,835 95	1 93	0 85	-2 06	1,836 00	0 00	0 00
Gyro tie-in									
2,003 00	0 87	79 52	2,002 92	2 37	3 56	-4 00	2,003 00	0 23	16 24
2,097 00	0 94	74 53	2,096 91	2 71	5 01	-5 11	2,097 00	0 45	31 32
2,191 00	1 01	78 37	2,190 90	3 08	6 56	-6 31	2,191 00	0 60	37 60
2,254 00	1 11	132 91	2,253 89	2 77	7 55	-6 64	2,254 00	0 69	-59 59
2,317 00	1 49	155 67	2,316 87	1 61	8 34	-6 15	2,316 99	1 76	-122 89
2,380 00	2 03	182 03	2,379 84	-0 25	8 64	-4 80	2,380 03	2 90	-160 66
2,442 00	2 64	193 99	2,441 79	-2 73	8 25	-2 55	2,442 09	3 66	-179 16
2,505 00	3 04	207 31	2,504 72	-5 62	7 14	0 45	2,505 16	3 79	162 28
2,567 00	3 48	212 12	2,566 62	-8 68	5 38	3 96	2,567 22	3 12	149 44
2,629 00	3 90	215 82	2,628 49	-11 98	3 15	7 94	2,629 23	1 96	117 80
2,691 00	4 89	219 52	2,690 30	-15 73	0 23	12 69	2,691 18	2 04	45 96
2,754 00	5 68	217 51	2,753 04	-20 27	-3 38	18 48	2,754 11	4 07	18 53
2,817 00	6 44	215 70	2,815 68	-25 62	-7 34	25 13	2,817 08	5 83	14 57
2,879 00	7 27	213 91	2,877 24	-31 70	-11 55	32 53	2,879 07	6 80	16 57
2,942 00	8 80	214 27	2,939 62	-38 99	-16 49	41 33	2,942 07	6 58	20 32
3,035 00	8 73	212 67	3,031 53	-50 81	-24 31	55 49	3,035 05	5 38	35 66
3,128 00	7 89	215 35	3,123 56	-61 95	-31 81	68 93	3,128 04	5 03	45 06
3,221 00	7 06	214 47	3,215 77	-71 87	-38 74	81 03	3,221 04	5 57	45 92
3,283 00	7 89	212 08	3,277 24	-78 62	-43 15	89 08	3,283 04	6 12	49 84
3,377 00	9 02	219 02	3,370 22	-89 81	-51 22	102 88	3,377 03	5 53	53 40
3,470 00	8 73	218 93	3,462 10	-100 97	-60 25	117 20	3,470 01	4 19	70 48
3,564 00	8 49	218 24	3,555 04	-111 97	-69 02	131 25	3,563 99	3 55	91 89
3,657 00	8 56	219 07	3,647 02	-122 73	-77 63	145 01	3,656 98	3 43	113 90
3,751 00	8 33	218 82	3,740 00	-133 47	-86 31	158 79	3,750 97	3 71	134 68
3,845 00	7 94	219 23	3,833 05	-143 80	-94 69	172 07	3,844 97	3 93	146 82
3,939 00	7 80	219 07	3,926 17	-153 78	-102 81	184 91	3,938 97	3 91	155 72
4,032 00	7 40	216 85	4,018 35	-163 48	-110 38	197 20	4,031 97	3 63	160 78
4,125 00	7 33	214 21	4,110 58	-173 17	-117 31	209 11	4,124 96	3 19	155 84
4,218 00	7 30	214 39	4,202 83	-182 96	-123 98	220 95	4,217 96	2 92	140 95
4,311 00	7 80	220 17	4,295 02	-192 65	-131 39	233 15	4,310 96	2 62	133 41
4,404 00	8 03	221 01	4,387 13	-202 38	-139 72	245 90	4,403 95	2 39	152 97
4,498 00	7 63	222 44	4,480 26	-211 94	-148 24	258 63	4,497 95	2 35	178 90
4,592 00	8 15	218 41	4,573 37	-221 76	-156 59	271 48	4,591 94	2 78	-160 49



Scientific Drilling  
Plan vs. Survey Report



Company: COG Operating LLC  
 Project: Lea County, NM (NAD27 NME)  
 Site: GC Federal #34  
 Well: GC Federal #34  
 Wellbore: OH  
 Design: Actual

Local Co-ordinate Reference: Well GC Federal #34  
 TVD Reference: RKB Elev (13') @ 3935 00ft (JW #4)  
 MD Reference: RKB Elev (13') @ 3935 00ft (JW #4)  
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 Survey Calculation Method: Minimum Curvature  
 Database: EDM 5000 1 Single User Db

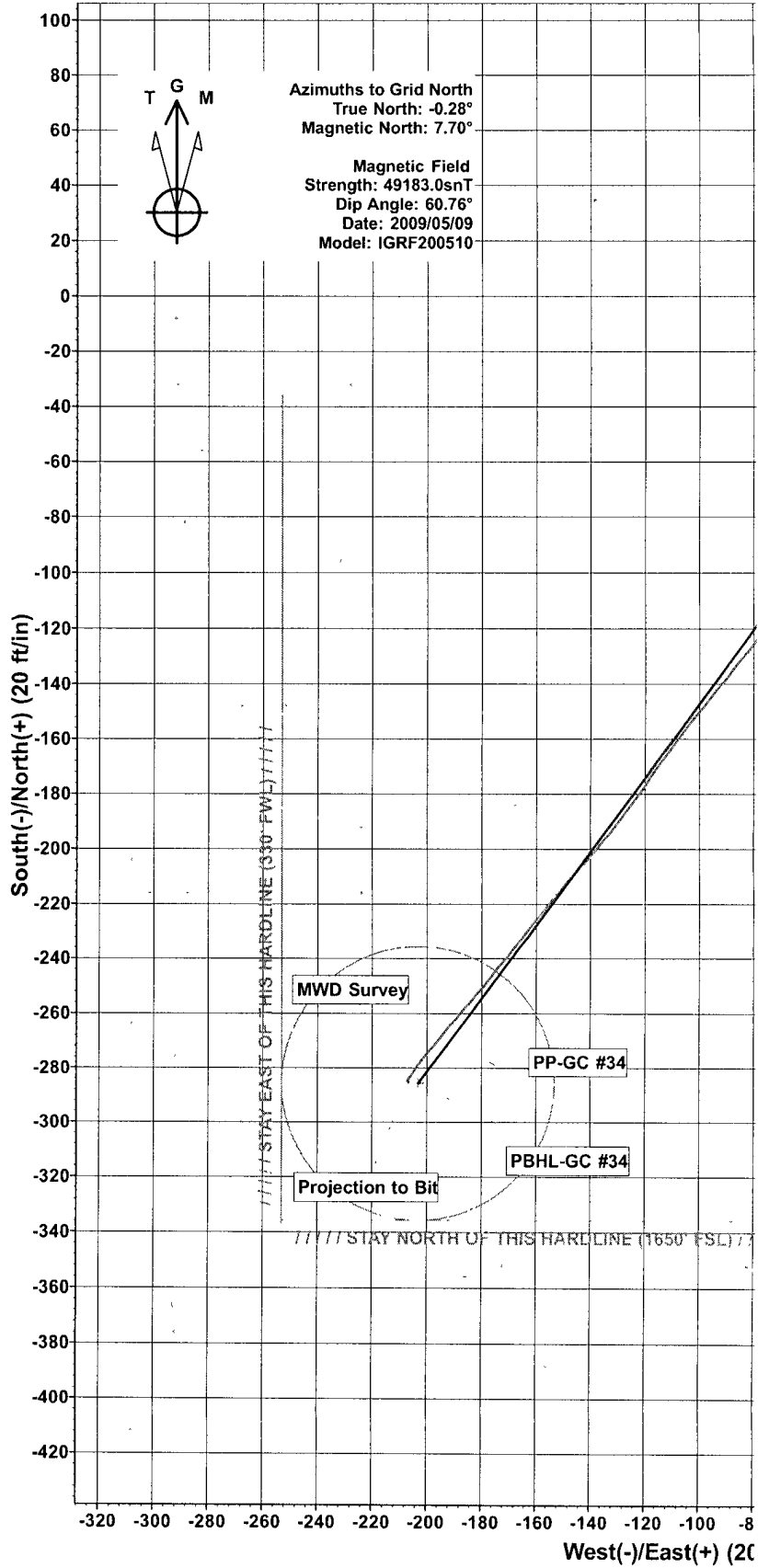
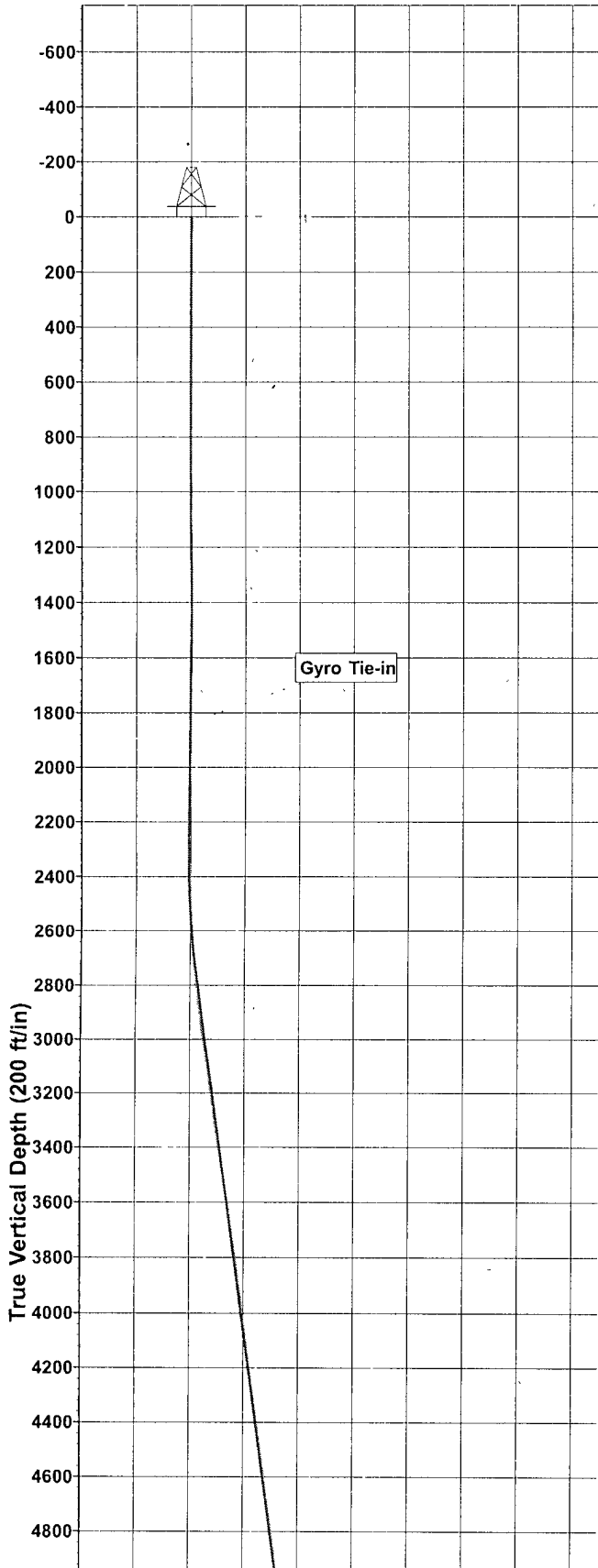
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E-W (ft)	Vertical Section (ft)	Measured Depth on Plan (ft)	Distance to Plan (ft)	Toolface to Plan (°)
4,690 00	7 62	217 89	4,670 44	-232 34	-164 90	284 91	4,689 94	3 18	-156 15
4,783 00	7 75	219 02	4,762 61	-242 07	-172 64	297 32	4,782 94	3 31	-150 92
4,877 00	7 77	219.95	4,855 75	-251 87	-180 71	309 98	4,876 94	3 71	-144 21
4,970 00	7 80	220 98	4,947.89	-261 45	-188 88	322.53	4,969 93	4 34	-137 46
5,032 00	7 28	219 65	5,009 35	-267 65	-194 15	330 64	5,031 91	4 66	-130 91
5,094 00	6 37	217 82	5,070.91	-273 39	-198 76	337 99	5,093 84	5 01	-129 30
5,156 00	4 50	217 23	5,132 63	-278 05	-202 34	343 86	5,155 77	5 13	-128 75
5,219 00	3 38	214 03	5,195 48	-281 56	-204 88	348 19	5,218 71	4 96	-124 22
5,281 00	1 94	218 61	5,257 41	-283 89	-206 56	351 06	5,280.64	4 78	-126 96
5,343 00	0 48	149.32	5,319.40	-284 93	-207 08	352 21	5,342 59	4 28	-52 49
5,374 00	0 59	125 78	5,350 40	-285 14	-206 88	352 27	5,373.56	3 87	-26 75
<b>MWD Survey</b>									
5,416 00	0 59	125 78	5,392.40	-285.39	-206 53	352 27	5,415 55	3 46	-29 00
<b>Projection to Bit</b>									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N-S (ft)	+E-W (ft)	
1,836 00	1,835 95	1 93	0 85	Gyro tie-in
5,374 00	5,350.40	-285 14	-206 88	MWD Survey
5,416 00	5,392 40	-285 39	-206 53	Projection to Bit

Checked By \_\_\_\_\_ Approved By: \_\_\_\_\_ Date \_\_\_\_\_



Scientific Drilling for COG Operating LLC  
 Site: Lea County, NM (NAD27 NME)  
 Well: GC Federal #34  
 Wellbore: OH  
 Design: Plan #2 - 7-7/8" Hole





Scientific Drilling for COG Operating LLC  
Site: Lea County, NM (NAD27 NME)  
Well: GC Federal #34  
Wellbore: OH  
Design: Plan #2 - 7-7/8" Hole

