

COG Operating

Lea County, NM (NAD27 NME)

GC Federal #13

GC Federal #13

OH

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HOBBSOCD

Design: Actual

Standard Survey Report

12 February, 2009

SUR: N-19-17s-32e, 575/S & 1915/W
BHL: N-19-17s-32e, 983/S & 1649/W
API # 30-025-39109

SDI Survey Report

Company:	COG Operating	Local Co-ordinate Reference:	Well GC Federal #13
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	Ground Elev @ 3925.00ft (Rig ?)
Site:	GC Federal #13	MD Reference:	Ground Elev @ 3925 00ft (Rig ?)
Well:	GC Federal #13	North Reference:	Gnd
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	DB 16

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 #13				
Site Position:		Northing:	660,381 200 ft	Latitude:	32° 48' 51 742 N
From:	Map	Easting:	661,474 400 ft	Longitude:	103° 48' 27 878 W
Position Uncertainty:	0 00 ft	Slot Radius:	"	Grid Convergence:	0 28 °

Well		GC Federal #13				
Well Position	+N/-S	0 00 ft	Northing:	660,381 200 ft	Latitude:	32° 48' 51 742 N
	+E/-W	0 00 ft	Easting:	661,474 400 ft	Longitude:	103° 48' 27 878 W
Position Uncertainty		0 00 ft	Wellhead Elevation:	ft	Ground Level:	3,925 00 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	2/12/2009	8 01	60 76	49,203

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	327 15	

Survey Program	Date	2/12/2009			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100 00	2,197 00	GYRO (OH)	Keeper	Standard Wireline Keeper ver 1 0 2	
2,336 00	6,954 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 21	218 51	100 00	-0 14	-0 11	-0 06	0 21	0 21	0 00
200 00	0 33	203 00	200 00	-0 55	-0 34	-0 28	0 14	0 12	-15 51
300 00	0 32	202 21	300 00	-1 08	-0 56	-0 60	0 01	-0 01	-0 79
400 00	0 28	181 78	400 00	-1 58	-0 67	-0 96	0 11	-0 04	-20 43
500 00	0 23	171 60	499 99	-2 02	-0 65	-1 35	0 07	-0 05	-10 18
600 00	0 31	158 29	599 99	-2 47	-0 52	-1 79	0 10	0 08	-13 31
700 00	0 30	160 36	699 99	-2 97	-0 33	-2 31	0 01	-0 01	2 07
800 00	0 22	152 62	799 99	-3 39	-0 16	-2 76	0 09	-0 08	-7 74
900 00	0 22	164 45	899 99	-3 74	-0 02	-3 13	0 05	0 00	11 83
1,000 00	0 15	188 81	999 99	-4 06	0 01	-3 42	0 10	-0 07	24 36
1,100 00	0 12	216 51	1,099 99	-4 27	-0 07	-3 55	0 07	-0 03	27 70

SDI

Survey Report

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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	DB 16

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 05	242 50	1,199 99	-4 37	-0 17	-3 58	0 08	-0 07	25 99	
1,300 00	0 08	153 70	1,299 99	-4 46	-0 18	-3 65	0 09	0 03	-88 80	
1,400 00	0 20	170 44	1,399 99	-4 69	-0 12	-3 88	0 13	0 12	16 74	
1,500 00	0 15	55 50	1,499 99	-4 79	0 02	-4 03	0 30	-0 05	-114 94	
1,600 00	0 94	49 90	1,599 98	-4 19	0 76	-3 93	0 79	0 79	-5 60	
1,700 00	1 33	52 91	1,699 96	-2 96	2 31	-3 74	0 39	0 39	3 01	
1,800 00	1 49	48 26	1,799 93	-1 39	4 20	-3 45	0 20	0 16	-4 65	
1,900 00	1 55	44 00	1,899 90	0 45	6 11	-2 94	0 13	0 06	-4 26	
2,000 00	1 57	44 15	1,999 86	2 40	8 01	-2 33	0 02	0 02	0 15	
2,100 00	1 47	42 69	2,099 83	4 33	9 83	-1 70	0 11	-0 10	-1 46	
2,197 00	1 17	39 32	2,196 80	6 01	11 30	-1 08	0 32	-0 31	-3 47	
Last gyro survey										
2,336 00	0 75	55 93	2,335 78	7 62	12 96	-0 63	0 36	-0 30	11 95	
2,431 00	2 41	340 17	2,430 75	9 84	12 79	1 33	2 46	1 75	-79 75	
2,526 00	4 82	347 19	2,525 55	15 61	11 23	7 03	2 57	2 54	7 39	
2,621 00	7 09	326 42	2,620 04	24 39	7 10	16 64	3 26	2 39	-21 86	
2,811 00	7 11	329 95	2,808 59	44 34	-5 27	40 11	0 23	0 01	1 86	
2,970 00	8 32	336 71	2,966 15	63 43	-14 75	61 28	0 95	0 76	4 25	
3,160 00	7 72	339 96	3,154 29	88 04	-24 56	87 28	0 40	-0 32	1 71	
3,350 00	8 44	332 08	3,342 41	112 35	-35 46	113 62	0 69	0 38	-4 15	
3,540 00	8 63	317 18	3,530 33	135 13	-51 68	141 56	1 16	0 10	-7 84	
3,731 00	8 20	319 64	3,719 27	156 02	-70 24	169 17	0 29	-0 23	1 29	
3,921 00	7 87	305 98	3,907 42	173 99	-89 54	194 74	1 02	-0 17	-7 19	
4,111 00	9 37	318 69	4,095 29	193 25	-110 28	222 17	1 27	0 79	6 69	
4,302 00	9 35	316 77	4,283 75	216 24	-131 17	252 81	0 16	-0 01	-1 01	
4,491 00	9 27	332 72	4,470 29	240 96	-148 67	283 07	1 36	-0 04	8 44	
4,682 00	7 49	320 54	4,659 26	264 24	-163 63	310 75	1 31	-0 93	-6 38	
4,881 00	8 87	321 95	4,856 23	286 34	-181 33	338 92	0 70	0 69	0 71	
5,071 00	8 29	320 88	5,044 10	308 50	-199 01	367 12	0 32	-0 31	-0 56	
5,166 00	8 12	330 91	5,138 13	319 68	-206 59	380 62	1 52	-0 18	10 56	
5,261 00	6 21	335 56	5,232 39	330 22	-211 98	392 40	2 10	-2 01	4 89	
5,356 00	4 55	327 68	5,326 97	338 08	-216 12	401 25	1 91	-1 75	-8 29	
5,546 00	4 68	330 51	5,516 35	351 20	-223 96	416 53	0 14	0 07	1 49	
5,641 00	2 97	320 13	5,611 14	356 46	-227 45	422 84	1 93	-1 80	-10 93	
5,832 00	3 69	333 85	5,801 82	365 78	-233 33	433 86	0 56	0 38	7 18	
6,020 00	3 23	316 99	5,989 48	375 08	-239 61	445 08	0 59	-0 24	-8 97	
6,212 00	3 69	317 78	6,181 13	383 61	-247 45	456 50	0 24	0 24	0 41	
6,403 00	3 12	322 12	6,371 79	392 27	-254 77	467 74	0 33	-0 30	2 27	
6,593 00	1 96	327 53	6,561 60	399 09	-259 69	476 14	0 62	-0 61	2 85	
6,688 00	1 97	325 33	6,656 54	401 80	-261 49	479 40	0 08	0 01	-2 32	
6,756 00	1 83	320 33	6,724 51	403 60	-262 85	481 64	0 32	-0 21	-7 35	
6,815 00	1 82	325 81	6,783 48	405 10	-263 98	483 51	0 30	-0 02	9 29	
6,908 00	1 82	328 43	6,876 43	407 58	-265 58	486 47	0 09	0 00	2 82	
MWD Survey										
6,954 00	1 82	328 43	6,922 41	408 82	-266 35	487 93	0 00	0 00	0 00	
Projection to Bit										

SDI Survey Report

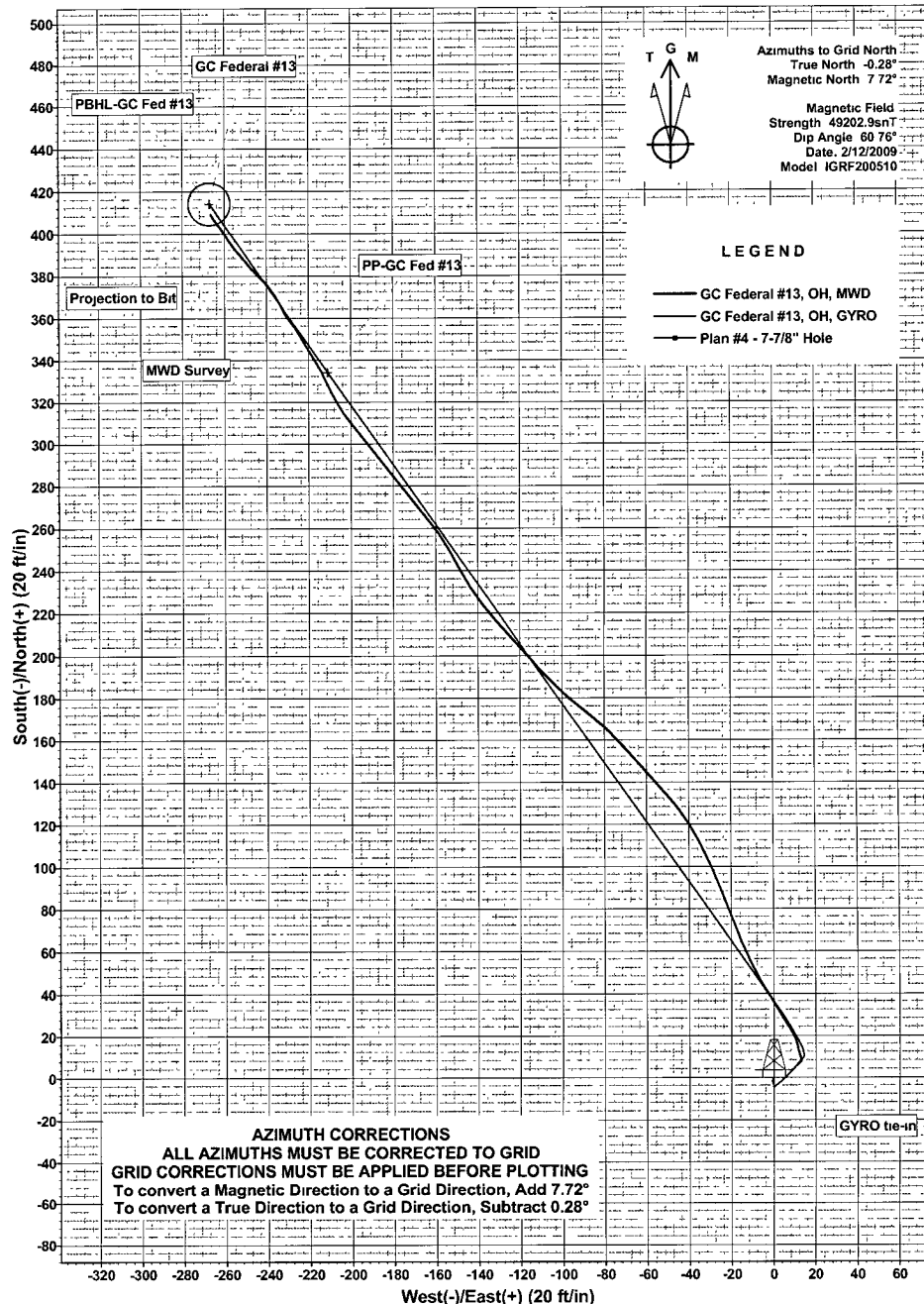
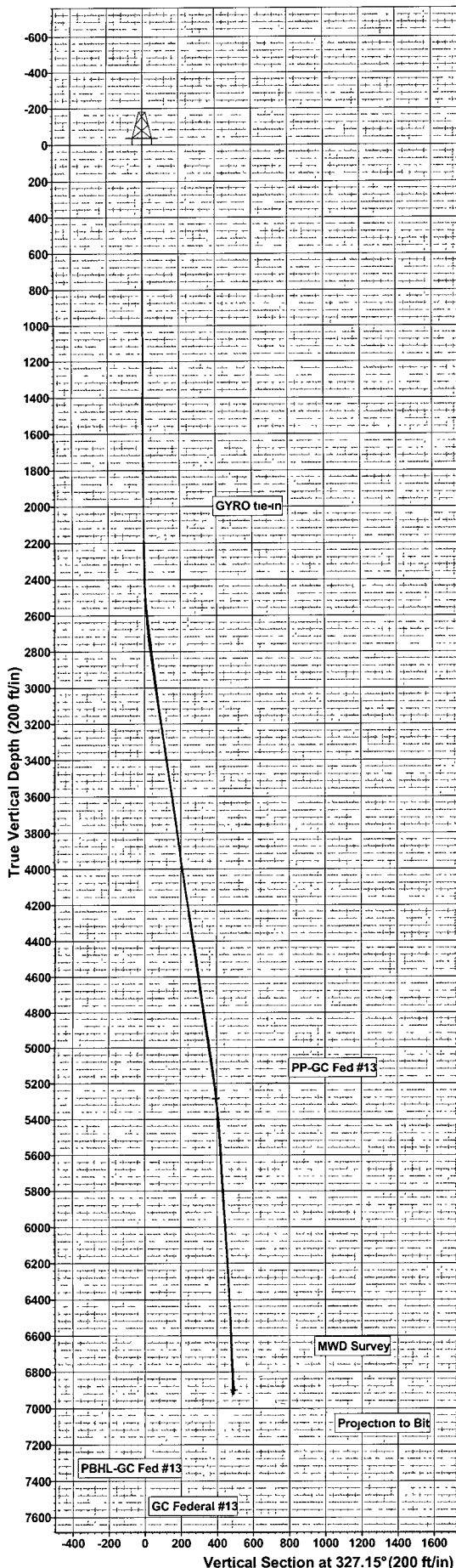
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Site:	GC Federal #13	MD Reference:	Ground Elev @ 3925 00ft (Rig ?)
Well:	GC Federal #13	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	DB 16

Targets									
Target Name									
- hit/miss target	Dip Angle	Dip Dir.	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
- Shape	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(ft)		
PBHL-GC Fed #13	0 00	0 00	6,900 00	413 80	-267 20	660,795 000	661,207 200	32° 48' 55 849 N	103° 48' 30 985 W
- actual wellpath misses by 5 71ft at 6931 75ft MD (6900 17 TVD, 408 22 N, -265 98 E)									
- Circle (radius 10 00)									
PP-GC Fed #13	0 00	0 00	5,285 00	333 88	-211 07	660,715 078	661,263 331	32° 48' 55 056 N	103° 48' 30 332 W
- actual wellpath misses by 3 41ft at 5313 65ft MD (5284 77 TVD, 334 95 N, -214 30 E)									
- Point									

Checked By: _____	Approved By: _____	Date: _____
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COG Operating

Scientific Drilling for COG Operating
Site: Lea County, NM (NAD27 NME)
Well: GC Federal #13
Wellbore: OH
Design: Plan #4 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 0.28°

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
PP-GC Fed #13	5285.00	333.88	-211.07	660715.078	661263.331	32°48' 55.056 N	103°48' 30.332 W	Point
PBHL-GC Fed #13	6900.00	413.80	-267.20	660795.000	661207.200	32°48' 55.849 N	103°48' 30.985 W	Circle (Radius = 10.00)

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec	Target
1	2197.00	1.17	39.32	2196.80	6.01	11.30	0.00	0.00	-1.08	
2	2400.00	1.17	39.32	2399.76	9.21	13.93	0.00	0.00	0.18	
3	2806.16	8.36	324.70	2804.40	36.55	-0.52	2.00	-82.55	30.99	
4	5313.37	8.36	324.70	5285.00	333.88	-211.07	0.00	0.00	394.98	PP-GC Fed #13
5	5580.08	3.02	324.97	5550.29	355.46	-226.31	2.00	179.84	421.38	
6	6931.66	3.02	324.97	6900.00	413.80	-267.20	0.00	0.00	492.57	PBHL-GC Fed #13

WELL DETAILS: GC Federal #13

+N/-S	+E/-W	Northing	Easting	Ground Level:	Latitude	Longitude	Slot
0.00	0.00	660381.200	661474.400	3925.00	32°48' 51.742 N	103°48' 27.878 W	

PROJECT DETAILS: Lea County, NM (NAD27 NME)

Plan: Plan #4 - 7-7/8" Hole (GC Federal #13/OH)

Geodetic System: US State Plane 1927 (Exact solution)	Created By: Julio Pina	Date: 12-Feb-09
Datum: NAD 1927 (NADCON CONUS)		
Ellipsoid: Clarke 1866	Checked:	Date:
Zone: New Mexico East 3001		
System Datum: Mean Sea Level	Reviewed:	Date:
	Approved:	Date: