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HOBBS, NM

COG Operating LLC

Lea County, NM (NAD27 NME)

GC Federal #29

GC Federal #29

OH

SUR: O-20-17s-32e, 745/S & 1330/E
BHL: P-20-17s-32e, 987/S & 983/E
API # 30-025-39265

Design: Actual

Standard Survey Report

23 April, 2009



Scientific Drilling



Scientific Drilling
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site GC Federal #29
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	Ground Elev @ 3985 00ft (Basic #38)
Site:	GC Federal #29	MD Reference:	Ground Elev @ 3985 00ft (Basic #38)
Well:	GC Federal #29	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 #29		
Site Position:		Northing:	660,583 90 ft
From:	Map	Easting:	668,816 10 ft
Position Uncertainty:	0 00 ft	Slot Radius:	0 "
		Latitude:	32° 48' 53 378 N
		Longitude:	103° 47' 1 841 W
		Grid Convergence:	0 30 °

Well	GC Federal #29		
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' 53 378 N
		Longitude:	103° 47' 1 841 W
		Ground Level:	3,985 00 ft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF200510	2009/04/23	7 97
			Dip Angle
			(°)
			60 77
			Field Strength
			(nT)
			49,188

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
			(°)
			55 82

Survey Program	Date	2009/04/23		
From	To	Survey (Wellbore)	Tool Name	Description
(ft)	(ft)			
100 00	2,055 00	Keeper gyro (OH)	Keeper	Standard Wireline Keeper ver 1 0 2
2,240 00	5,464 00	MWD (OH)	MWD	MWD - Standard

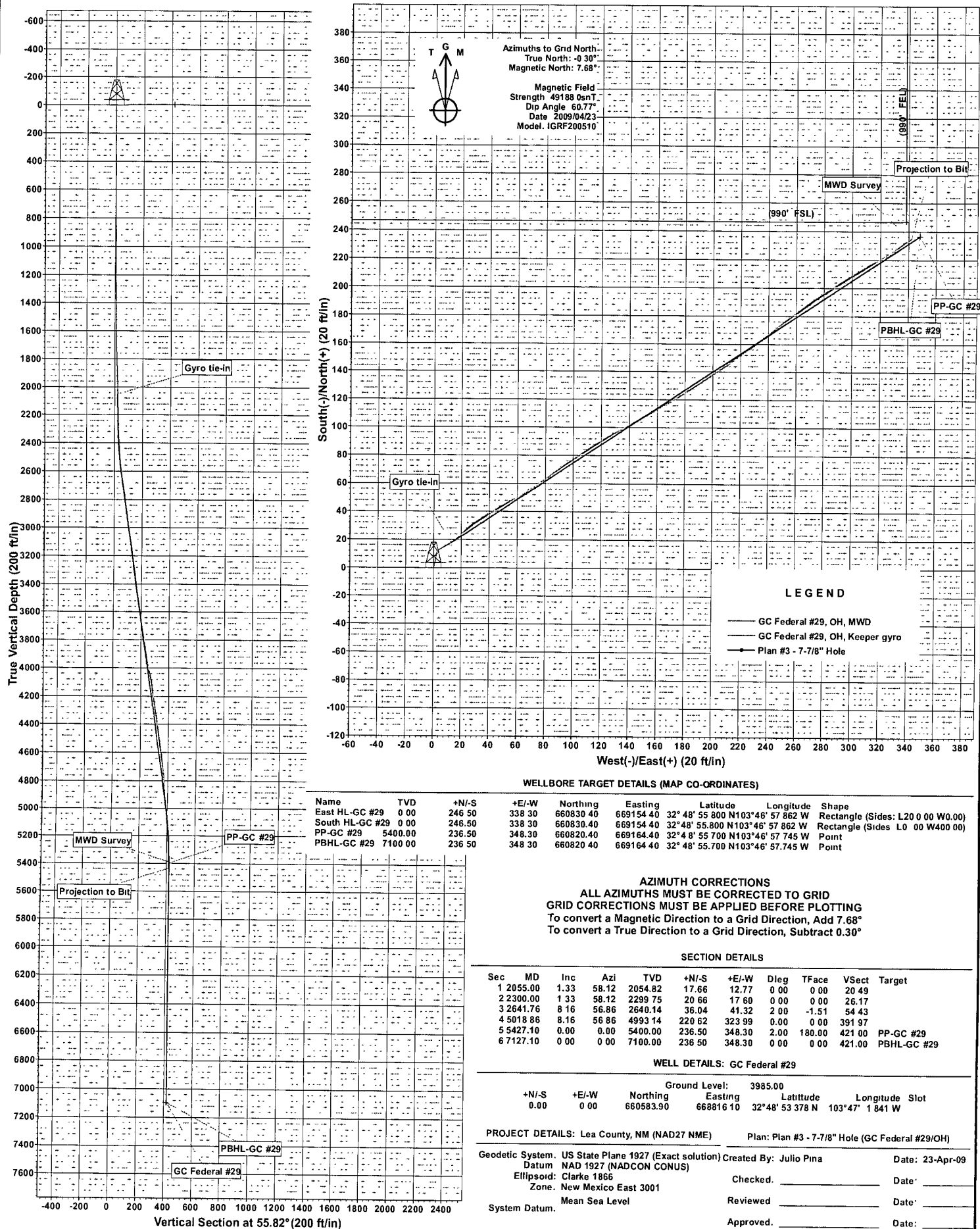
Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn
Depth	(°)	(°)	Depth	(ft)	(ft)	Section	Rate	Rate	Rate
(ft)			(ft)			(ft)	(°/100ft)	(°/100ft)	(°/100ft)
0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00
100.00	0 23	35 99	100.00	0 16	0 12	0 19	0 23	0.23	0 00
200 00	0 22	3 17	200 00	0 52	0 25	0 49	0 13	-0 01	-32 82
300 00	0 30	24 58	300.00	0 95	0 37	0 83	0 12	0 08	21 41
400 00	0 40	14.66	400 00	1 52	0 56	1 32	0 12	0 10	-9 92
500 00	0 41	11 00	499 99	2 21	0 72	1 84	0 03	0 01	-3 66
600 00	0 38	0 02	599.99	2 89	0 79	2 28	0 08	-0 03	-10 98
700 00	0 68	18 42	699 99	3 79	0 98	2 94	0 34	0 30	18 40
800 00	0 56	12 67	799 98	4 83	1 27	3 76	0 14	-0 12	-5 75
900 00	0 55	5 65	899 98	5 78	1 43	4 43	0 07	-0 01	-7 02

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Well:	GC Federal #29	North Reference:	Grid
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 58	7 94	999 97	6.76	1 54	5 07	0 04	0 03	2 29
1,100 00	0 56	3 18	1,099 97	7 75	1 64	5 71	0 05	-0 02	-4 76
1,200 00	0 58	16 70	1,199 96	8 72	1.81	6 40	0 14	0 02	13 52
1,300 00	0 62	4 08	1,299.96	9 75	2.00	7 13	0 14	0 04	-12 62
1,400 00	0 61	27 13	1,399 95	10 76	2 28	7 93	0 25	-0 01	23 05
1,500 00	0 71	50 59	1,499 94	11 63	3 00	9 01	0 29	0 10	23 46
1,600 00	0 91	51 17	1,599 93	12 52	4 10	10 42	0 20	0 20	0 58
1,700 00	1 04	56 61	1,699 92	13.52	5 47	12 12	0 16	0 13	5 44
1,800 00	1 29	59 93	1,799 90	14 58	7 20	14 15	0 26	0 25	3 32
1,900 00	1 52	60 96	1,899 87	15 79	9 34	16 59	0 23	0 23	1 03
2,000 00	1 44	62 80	1,999 84	17 01	11 61	19 16	0 09	-0 08	1 84
2,055 00	1 33	58 12	2,054 82	17 66	12 77	20 49	0 29	-0 20	-8 51
Gyro tie-in									
2,240 00	1 44	54 56	2,239 77	20 14	16 49	24 96	0 08	0 06	-1 92
2,335 00	2 73	45 28	2,334 70	22 43	19 07	28 37	1 40	1 36	-9 77
2,461 00	4 42	49 72	2,460 45	27 68	24 91	36 15	1 36	1 34	3 52
2,747 00	8 50	61 02	2,744 59	45 05	51 82	68 17	1 49	1 43	3 95
2,842 00	8 01	59 53	2,838 60	51 81	63 66	81 77	0 56	-0 52	-1 57
3,000 00	8 64	54 31	2,994 94	64 31	82 79	104 62	0 62	0 40	-3 30
3,190 00	7 46	55 46	3,183 06	79.63	104 54	131 22	0 63	-0 62	0 61
3,381 00	8 82	59 76	3,372 14	94 04	127.41	158 23	0 78	0 71	2 25
3,571 00	7 90	60 67	3,560 11	107 77	151 37	185 77	0 49	-0 48	0 48
3,761 00	9 55	58 46	3,747 91	122 41	176 19	214 53	0 89	0 87	-1 16
3,951 00	9 57	56 30	3,935 27	139 42	202 77	246 07	0 19	0 01	-1 14
4,142 00	9 10	53 10	4,123 74	157 30	228 05	277 03	0 37	-0 25	-1 68
4,332 00	8 71	52 05	4,311 45	175 17	251 41	306 40	0 22	-0 21	-0 55
4,522 00	7 87	55 61	4,499 47	191 36	273 49	333 76	0 52	-0 44	1 87
4,712 00	7 34	59.04	4,687 80	204 95	294 63	358 89	0 37	-0 28	1 81
4,902 00	5 74	60 20	4,876 55	215 92	313 29	380 48	0 84	-0 84	0 61
5,092 00	5 75	57 86	5,065 60	225 71	329 59	399 46	0 12	0 01	-1.23
5,194 00	3 73	49 84	5,167 25	230 56	336 46	407 87	2 08	-1 98	-7 86
5,289 00	1 95	66 20	5,262 13	233 21	340 30	412 54	2 04	-1 87	17 22
5,384 00	0 44	30 63	5,357 10	234 18	341 96	414 46	1 70	-1 59	-37 44
5,416 00	0 31	31 17	5,389 10	234 36	342 07	414 65	0 41	-0 41	1.69
MWD Survey									
5,464 00	0 31	31 17	5,437 10	234 58	342 20	414 88	0 00	0 00	0 00
Projection to Bit									



Scientific Drilling for COG Operating LLC
Site: Lea County, NM (NAD27 NME)
Well: GC Federal #29
Wellbore: OH
Design: Plan #3 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 #29	0 00	246 50	338 30	660830 40	669154 40	32° 48' 55.800 N 103° 46' 57.862 W	Rectangle (Sides: L20 0 00 W0.00)	
South HL-GC #29	0 00	246.50	338 30	660830.40	669154.40	32° 48' 55.800 N 103° 46' 57.862 W	Rectangle (Sides: L0 00 W400 00)	
PP-GC #29	5400.00	236.50	348.30	660820.40	669164.40	32° 48' 55.700 N 103° 46' 57.745 W	Point	
PBHL-GC #29	7100 00	236 50	348 30	660820 40	669164 40	32° 48' 55.700 N 103° 46' 57.745 W	Point	

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 0.30°

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
1	2055.00	1.33	58.12	2054.82	17.66	12.77	0 00	0 00	20 49	
2	2300.00	1.33	58.12	2299.75	20 66	17 60	0 00	0 00	26.17	
3	2641.76	8 16	56.86	2640.14	36.04	41.32	2 00	-1.51	54 43	
4	5018.86	8.16	56.86	4993.14	220 62	323 99	0 00	0 00	391 97	
5	5427.10	0.00	0.00	5400.00	236.50	348.30	2.00	180.00	421 00	PP-GC #29
6	7127.10	0 00	0 00	7100.00	236 50	348.30	0 00	0 00	421.00	PBHL-GC #29

WELL DETAILS: GC Federal #29

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0 00	660583.90	668816 10	32° 48' 53.378 N	103° 47' 1.841 W	

PROJECT DETAILS: Lea County, NM (NAD27 NME) Plan: Plan #3 - 7-7/8" Hole (GC Federal #29/OH)

Geodetic System: US State Plane 1927 (Exact solution) Created By: Julio Pina Date: 23-Apr-09
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level
Checked: _____ Date: _____
Reviewed: _____ Date: _____
Approved: _____ Date: _____



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Survey Report



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Well:	GC Federal #29	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
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Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
2,055 00	2,054 82	17 66	12 77	Gyro tie-in
5,416 00	5,389 10	234 36	342.07	MWD Survey
5,464 00	5,437 10	234 58	342 20	Projection to Bit

Checked By: _____ Approved By: _____ Date: _____