

Results of Directional Survey

API number:	30-025-39613		
OGRID:		Operator:	COG OPERATING LLC
		Property:	GC FEDERAL # 50

surface	ULSTR:	M	19	T 17S	R 32E
				770 FSL	330 FWL

BH Loc	ULSTR:	M	19	T 17S	R 32E
7128	MD	7096.9	TVD	395 FSL	392 FWL

Top Perf/OH	ULSTR:	M	19	T 17S	R 32E
5310	MD	5279.3	TVD	381 FSL	387 FWL

Bot Perf/OH	ULSTR:	M	19	T 17S	R 32E
6850	MD	6818.9	TVD	390 FSL	391 FWL

	MD	N/S	E/W	VD
	5310	-389.50	56.90	5279.3
TOP PERFS/OH	5310	-389.50	56.90	5279.30
	5403	-395.80	56.80	5372.00
	6120	-393.30	57.00	6088.90
BOT PERFS/OH	6850	-380.35	60.53	6818.90
	6182	-392.20	57.30	6150.90

NEXT TO LAST	6120	-393.30	57.00	6088.90
LAST READING	6182	-392.20	57.30	6150.90
TD	7128	-375.42	61.88	7096.90

Surface Location	770	FS	330	FW
Projected BHL	395	FS	392	FW
Location of				
Top Perfs/OH	381	FS	387	FW
Bottom Perfs/OH	390	FS	391	FW

SUMMARY of Subsurface Locations

Surface Location	M-19-17S-32E	770	FS	330	FW	Vert. Depth
Top Perfs/OH	M-19-17S-32E	381	FS	387	FW	5279.30
Bottom Perfs/OH	M-19-17S-32E	390	FS	391	FW	6818.90
Projected TD	M-19-17S-32E	395	FS	392	FW	7096.90

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HOBBSOCD

COG OPERATING LLC

Lea County, NM (NAD27 NME)

GC Federal #50

GC Federal #50

DH - Job #32D12101017

SUR @ M-19-17s-32e, 770/S & 330/W
BHL @ M-19-17s-32e, 395/S & 392/W
API #30-025-39613

Survey: MWD Survey

SDI Standard Survey Report

03 February, 2011

This survey is correct to the best of my knowledge and is supported by actual field data.

Elwharton

Notarized this date 3rd of February, 2011.

Carrie Reed

Notary Signature
County of Midland
State of Texas



Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well GC Federal #50
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB Elev (13') @ 3922.0usft (JW #4)
Site:	GC Federal #50	MD Reference:	KB Elev (13') @ 3922.0usft (JW #4)
Well:	GC Federal #50	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

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 #50			
Site Position:		Northing:	660,570.30 usft	Latitude:	32° 48' 53.690 N
From:	Map	Easting:	659,888.70 usft	Longitude:	103° 48' 46.448 W
Position Uncertainty:	0.0 usft	Slot Radius:	0"	Grid Convergence:	0.28 °

Well	GC Federal #50					
Well Position	+N/-S	0.0 usft	Northing:	660,570.30 usft	Latitude:	32° 48' 53.690 N
	+E/-W	0.0 usft	Easting:	659,888.70 usft	Longitude:	103° 48' 46.448 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	3,909.0 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/28/2010	7.80	60.70	48,989

Design	Actual			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	172.35

Survey Program	Date 2/3/2011			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	2,106.0	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1.0.2
2,217.0	6,182.0	MWD Survey (OH)	MWD	MWD - Standard

Survey								
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.0	
100.0	0.23	31.50	100.0	0.2	0.1	31.50	0.2	
200.0	0.29	55.48	200.0	0.5	0.4	40.73	0.6	
300.0	0.34	56.87	300.0	0.8	0.9	47.88	1.2	
400.0	0.52	56.72	400.0	1.2	1.5	51.34	1.9	
500.0	0.51	35.57	500.0	1.8	2.1	49.74	2.8	
600.0	0.54	23.86	600.0	2.6	2.6	44.83	3.7	
700.0	0.50	31.98	700.0	3.4	3.0	41.48	4.5	
800.0	0.29	12.31	800.0	4.0	3.3	39.33	5.2	
900.0	0.39	31.22	900.0	4.6	3.5	37.71	5.8	
1,000.0	0.60	35.24	1,000.0	5.3	4.0	37.18	6.6	

Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well GC Federal #50
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB Elev (13') @ 3922.0usft (JW #4)
Site:	GC Federal #50	MD Reference:	KB Elev (13') @ 3922.0usft (JW #4)
Well:	GC Federal #50	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,100.0	0.67	20.76	1,100.0	6.3	4.5	35.82	7.7
1,200.0	0.54	31.25	1,200.0	7.2	5.0	34.58	8.8
1,300.0	0.59	59.31	1,300.0	7.9	5.7	35.69	9.7
1,400.0	0.59	55.25	1,400.0	8.4	6.5	37.73	10.7
1,500.0	0.64	55.44	1,499.9	9.0	7.4	39.32	11.7
1,600.0	0.98	46.12	1,599.9	9.9	8.5	40.45	13.1
1,700.0	1.63	47.59	1,699.9	11.5	10.1	41.42	15.3
1,800.0	2.01	49.14	1,799.9	13.6	12.5	42.63	18.5
1,900.0	2.06	50.41	1,899.8	15.9	15.2	43.78	22.0
2,000.0	1.74	54.47	1,999.7	17.9	17.9	44.89	25.3
2,100.0	1.54	59.34	2,099.7	19.5	20.2	46.08	28.1
2,106.0	1.61	61.99	2,105.7	19.6	20.4	46.17	28.3

Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well GC Federal #50
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB Elev (13') @ 3922.0usft (JW #4)
Site:	GC Federal #50	MD Reference:	KB Elev (13') @ 3922.0usft (JW #4)
Well:	GC Federal #50	North Reference:	Grid
Wellbore:	DH - Job #32D12101017	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

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 #50				
Site Position:		Northing:	660,570.30 usft	Latitude:	32° 48' 53.690 N
From:	Map	Easting:	659,888.70 usft	Longitude:	103° 48' 46.448 W
Position Uncertainty:	0.0 usft	Slot Radius:	0"	Grid Convergence:	0.28 °

Well	GC Federal #50					
Well Position	+N/-S	0.0 usft	Northing:	660,570.30 usft	Latitude:	32° 48' 53.690 N
	+E/-W	0.0 usft	Easting:	659,888.70 usft	Longitude:	103° 48' 46.448 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	3,909.0 usft

Wellbore	DH - Job #32D12101017				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	12/28/2010	7.80	60.70	48,989

Design	Actual			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	172.35

Survey Program	Date	2/3/2011			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	2,106.0	Gyro Survey (DH - Job #32D12101017)	Keeper	Standard Wireline Keeper ver 1.0.2	
2,217.0	6,182.0	MWD Survey (DH - Job #32D12101017)	MWD	MWD - Standard	

Survey								
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
2,106.0	1.61	61.99	2,105.7	19.6	20.4	46.17	28.3	
2,217.0	1.37	60.32	2,216.7	21.0	22.9	47.55	31.1	
2,279.0	1.14	81.96	2,278.6	21.4	24.2	48.46	32.3	
2,341.0	1.14	133.38	2,340.6	21.1	25.2	50.12	32.9	
2,403.0	2.40	167.31	2,402.6	19.4	26.0	53.25	32.4	
2,464.0	3.52	174.07	2,463.5	16.3	26.4	58.38	31.1	
2,527.0	4.01	179.38	2,526.4	12.2	26.7	65.49	29.3	
2,589.0	4.90	173.74	2,588.2	7.4	27.0	74.75	28.0	
2,652.0	6.25	169.37	2,650.9	1.3	27.9	87.31	27.9	
2,714.0	7.63	171.03	2,712.4	-6.1	29.2	101.76	29.8	
2,777.0	7.65	172.14	2,774.9	-14.4	30.4	115.29	33.6	

Scientific Drilling International, Inc.
SDI Standard Survey Report

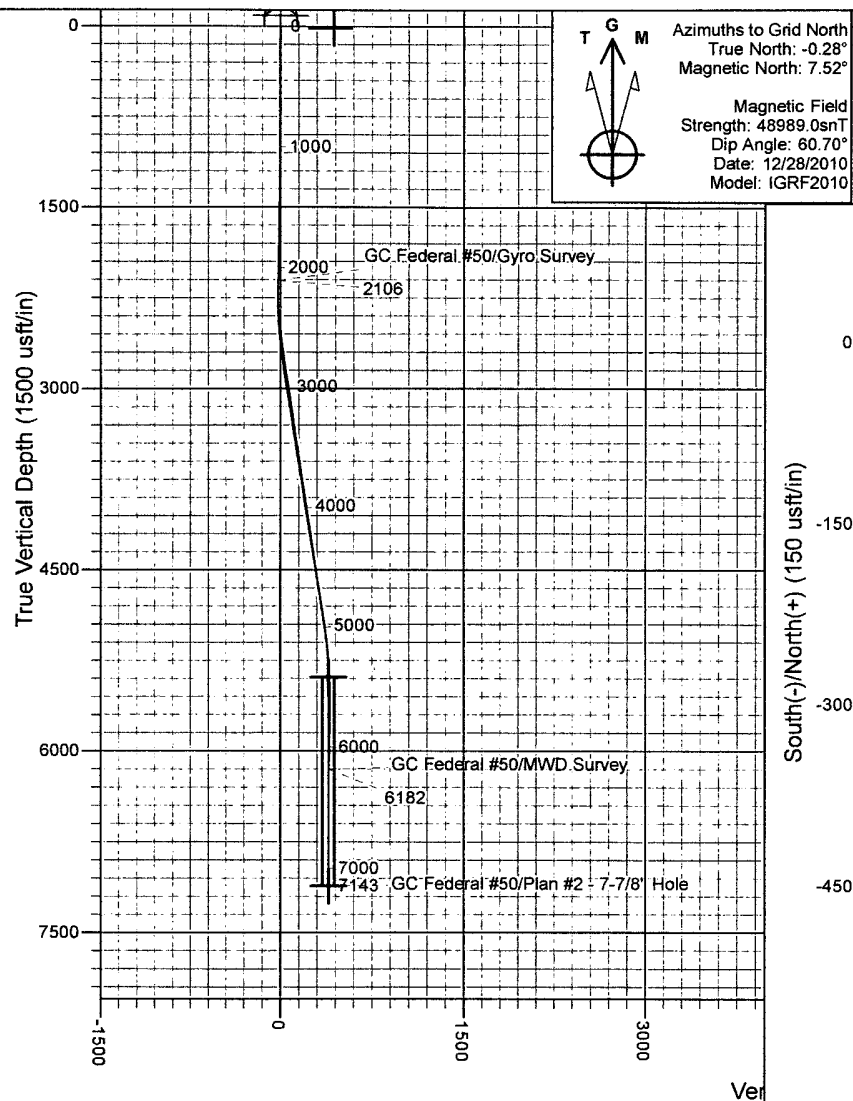
Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well GC Federal #50
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB Elev (13') @ 3922.0usft (JW #4)
Site:	GC Federal #50	MD Reference:	KB Elev (13') @ 3922.0usft (JW #4)
Well:	GC Federal #50	North Reference:	Grid
Wellbore:	DH - Job #32D12101017	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
2,839.0	8.23	173.70	2,836.3	-22.9	31.4	126.01	38.9
2,902.0	9.04	173.71	2,898.6	-32.3	32.5	134.80	45.8
2,964.0	9.76	177.85	2,959.7	-42.4	33.2	141.90	53.8
3,026.0	9.51	178.05	3,020.9	-52.7	33.6	147.50	62.5
3,119.0	8.56	178.19	3,112.7	-67.3	34.1	153.16	75.4
3,214.0	8.56	176.89	3,206.7	-81.4	34.7	156.94	88.5
3,306.0	8.15	175.95	3,297.7	-94.8	35.5	159.47	101.2
3,399.0	9.73	178.65	3,389.5	-109.2	36.2	161.69	115.0
3,524.0	9.08	178.51	3,512.9	-129.6	36.7	164.21	134.7
3,617.0	8.73	178.76	3,604.7	-144.0	37.0	165.59	148.7
3,710.0	8.88	179.87	3,696.7	-158.3	37.2	166.78	162.6
3,803.0	8.31	181.71	3,788.6	-172.2	37.0	167.88	176.1
3,898.0	9.27	174.74	3,882.5	-186.6	37.5	168.64	190.4
3,992.0	9.07	174.54	3,975.3	-201.6	38.9	169.08	205.3
4,085.0	9.03	177.26	4,067.1	-216.1	39.9	169.53	219.8
4,179.0	9.50	179.87	4,159.9	-231.3	40.3	170.12	234.8
4,272.0	9.23	180.93	4,251.7	-246.4	40.2	170.74	249.7
4,366.0	9.32	181.19	4,344.4	-261.6	39.9	171.32	264.6
4,459.0	9.32	177.24	4,436.2	-276.6	40.1	171.75	279.5
4,553.0	8.97	172.23	4,529.0	-291.5	41.5	171.90	294.4
4,647.0	8.88	169.33	4,621.9	-305.9	43.8	171.85	309.0
4,740.0	8.71	169.77	4,713.8	-319.8	46.4	171.75	323.2
4,833.0	8.54	170.60	4,805.7	-333.6	48.8	171.68	337.1
4,928.0	8.24	170.65	4,899.7	-347.3	51.0	171.64	351.0
5,022.0	7.39	173.28	4,992.8	-359.9	52.8	171.65	363.8
5,122.0	6.22	171.76	5,092.1	-371.7	54.4	171.68	375.6
5,216.0	5.54	167.57	5,185.6	-381.1	56.1	171.63	385.2
5,310.0	4.84	182.16	5,279.3	-389.5	56.9	171.69	393.7
5,403.0	2.86	179.87	5,372.0	-395.8	56.8	171.84	399.8
5,496.0	0.95	146.74	5,465.0	-398.7	57.2	171.84	402.8
5,621.0	0.35	299.57	5,590.0	-399.4	57.4	171.82	403.5
5,745.0	0.62	349.15	5,714.0	-398.6	57.0	171.87	402.6
5,870.0	0.79	351.52	5,839.0	-397.0	56.7	171.87	401.1
5,995.0	0.82	358.03	5,964.0	-395.3	56.5	171.86	399.3
6,120.0	1.14	22.87	6,088.9	-393.3	57.0	171.75	397.4
6,182.0	0.99	3.13	6,150.9	-392.2	57.3	171.69	396.3

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,106.0	2,105.7	19.6	20.4	Gyro Tie-in
6,182.0	6,150.9	-392.2	57.3	Last MWD Survey



Project: Lea County, NM (NAD27 NME)
 Site: GC Federal #50
 Well: GC Federal #50
 Wellbore: DH - Job #32D12101017
 Design: Plan #2 - 7-7/8" Hole



Azimuths to Grid North
 True North: -0.28°
 Magnetic North: 7.52°

Magnetic Field
 Strength: 48989.0snT
 Dip Angle: 60.70°
 Date: 12/28/2010
 Model: IGRF2010

+N/-S
 0.0

+E/-W
 0.0

Northing
 660570.30

WELL DETAILS: GC Federal #50
 KB Elev (13') @ 3922.0usft (JW #4)
 Ground Level: 3909.0
 Easting
 659888.70

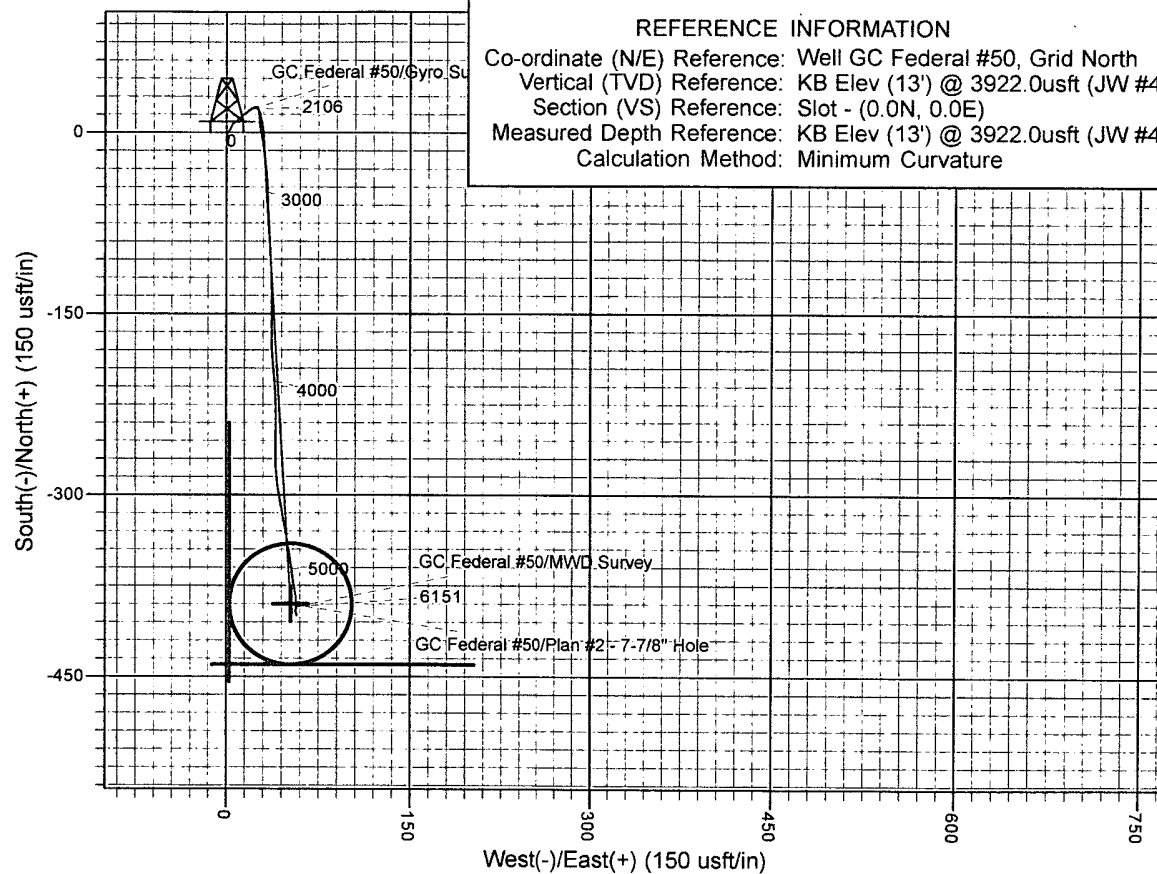
Latitude
 32° 48' 53.690 N

Longitude
 103° 48' 46.448 W

Slot

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well GC Federal #50, Grid North
 Vertical (TVD) Reference: KB Elev (13') @ 3922.0usft (JW #4)
 Section (VS) Reference: Slot - (0.0N, 0.0E)
 Measured Depth Reference: KB Elev (13') @ 3922.0usft (JW #4)
 Calculation Method: Minimum Curvature



COMPANY DETAILS: COG OPERATING LLC
 223032

Calculation Method: Minimum Curvature
 Error System: ISCWSA
 Scan Method: Closest Approach 3D
 Error Surface: Elliptical Conic
 Warning Method: Error Ratio

PROJECT DETAILS: Lea County, NM (NAD27 NME)
 Geodetic System: State Plane 1927 (Exact solution)
 Datum: NAD 1927 (NADCON CONUS)
 Ellipsoid: Clarke 1866
 Zone: New Mexico East 3001
 System Datum: Mean Sea Level

SITE DETAILS: GC Federal #50
 Site Centre Latitude: 32° 48' 53.690 N
 Longitude: 103° 48' 46.448 W
 Positional Uncertainty: 0.0
 Convergence: 0.28
 Local North: Grid