



SUR: K-20-17s-32e, 2005/S & 1900/W
BHL: K-20-17s-32e, 1639/S & 1647/W
API# 30-025-39476

COG OPERATING LLC

Lea County, NM (NAD27 NME)

GC Federal #63

GC Federal #63

OH - Job #32D0211175

HOBBS OCD

MAY 19 2011

RECEIVED

Survey: MWD Survey

SDI Standard Survey Report

07 April, 2011

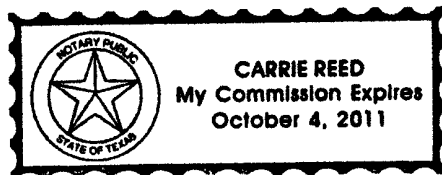
This survey is correct to the best of my knowledge and is supported by actual field data.

Robert

Notarized this date 14 of April, 2011.

Carrie Reed

Notary Signature
County of Midland
State of Texas



Scientific Drilling
Directional Drilling Operations



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well GC Federal #63
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB Elev (13') @ 3988.0usft (Cavaloz #1)
Site:	GC Federal #63	MD Reference:	KB Elev (13') @ 3988.0usft (Cavaloz #1)
Well:	GC Federal #63	North Reference:	Grid
Wellbore:	OH - Job #32D0211175	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 #63		
Site Position:		Northing:	661,833.30 usft
From:	Map	Easting:	666,762.10 usft
Position Uncertainty:	0.0 usft	Slot Radius:	0"
		Latitude:	32° 49' 5.846 N
		Longitude:	103° 47' 25.833 W
		Grid Convergence:	0.29 °

Well	GC Federal #63		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	32° 49' 5.846 N
		Longitude:	103° 47' 25.833 W
		Ground Level:	3,975.0 usft

Wellbore	OH - Job #32D0211175		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	2/27/2011	7.77
			Dip Angle
			(°)
			60.71
			Field Strength
			(nT)
			48,976

Design	Actual		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			214.52

Survey Program	Date 4/7/2011		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.0	2,082.0	Gyro Survey (OH - Job #32D0211175)	Keeper
2,204.0	5,412.0	MWD Survey (OH - Job #32D0211175)	MWD
			Description
			Standard Wireline Keeper ver 1.0.2
			MWD - Standard

Survey							
Measured Depth	Inclination	Azimuth	True Vertical	North/South	East/West	Closure Azimuth	Closure Distance
(usft)	(°)	(°)	Depth	(usft)	(usft)	(°)	(usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.0
100.0	0.48	36.86	100.0	0.3	0.3	36.86	0.4
200.0	0.77	37.80	200.0	1.2	0.9	37.28	1.5
300.0	0.88	9.27	300.0	2.5	1.4	30.21	2.9
400.0	0.80	339.43	400.0	3.9	1.3	18.80	4.1
500.0	0.78	334.26	500.0	5.2	0.8	8.66	5.2
600.0	1.11	2.68	599.9	6.7	0.5	4.55	6.8
700.0	1.15	1.97	699.9	8.7	0.6	4.05	8.7
800.0	1.08	2.98	799.9	10.7	0.7	3.76	10.7
900.0	0.55	0.10	899.9	12.1	0.8	3.55	12.1
1,000.0	0.69	341.21	999.9	13.1	0.6	2.43	13.1



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Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB Elev (13') @ 3988.0usft (Cavaloz #1)
Site:	GC Federal #63	MD Reference:	KB Elev (13') @ 3988.0usft (Cavaloz #1)
Well:	GC Federal #63	North Reference:	Grid
Wellbore:	OH - Job #32D0211175	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	0.86	9.45	1,099.9	14.4	0.5	1.93	14.5		
1,200.0	0.89	16.38	1,199.9	15.9	0.8	2.98	16.0		
1,300.0	0.78	22.86	1,299.9	17.3	1.3	4.34	17.4		
1,400.0	0.82	21.94	1,399.9	18.6	1.8	5.66	18.7		
1,500.0	0.85	28.11	1,499.8	19.9	2.5	7.04	20.1		
1,600.0	1.08	31.65	1,599.8	21.4	3.3	8.79	21.6		
1,700.0	1.18	48.42	1,699.8	22.9	4.6	11.31	23.3		
1,800.0	2.06	57.13	1,799.8	24.5	6.8	15.61	25.5		
1,900.0	1.71	53.37	1,899.7	26.4	9.6	19.91	28.1		
2,000.0	1.57	52.34	1,999.7	28.1	11.8	22.84	30.5		
2,082.0	1.50	52.60	2,081.6	29.4	13.6	24.76	32.4		



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SDI Standard Survey Report



Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well GC Federal #63
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB Elev (13') @ 3988.0usft (Cavaloz #1)
Site:	GC Federal #63	MD Reference:	KB Elev (13') @ 3988.0usft (Cavaloz #1)
Well:	GC Federal #63	North Reference:	Grid
Wellbore:	OH - Job #32D0211175	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 #63		
Site Position:	Map	Northing:	661,833.30 usft
From:		Easting:	666,762.10 usft
Position Uncertainty:	0.0 usft	Slot Radius:	0"
		Latitude:	32° 49' 5.846 N
		Longitude:	103° 47' 25.833 W
		Grid Convergence:	0.29 °

Well	GC Federal #63		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	32° 49' 5.846 N
		Longitude:	103° 47' 25.833 W
		Ground Level:	3,975.0 usft

Wellbore	OH - Job #32D0211175				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2/27/2011	7.77	60.71	48,976

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	214.52

Survey Program	Date	4/7/2011		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	2,082.0	Gyro Survey (OH - Job #32D0211175)	Keeper	Standard Wireline Keeper ver 1.0.2
2,204.0	5,412.0	MWD Survey (OH - Job #32D0211175)	MWD	MWD - Standard

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
2,082.0	1.50	52.60	2,081.6	29.4	13.6	24.76	32.4
Gyro Tie-in							
2,204.0	1.53	63.74	2,203.6	31.1	16.3	27.65	35.1
2,267.0	1.56	65.00	2,266.6	31.9	17.8	29.24	36.5
2,361.0	2.89	163.79	2,360.5	30.1	19.7	33.12	36.0
2,454.0	4.16	179.76	2,453.4	24.5	20.3	39.68	31.8
2,550.0	5.98	191.76	2,549.0	16.1	19.3	50.15	25.2
2,645.0	7.31	205.58	2,643.3	5.8	15.7	69.63	16.8
2,740.0	8.69	215.52	2,737.4	-5.5	8.9	121.45	10.5
2,834.0	9.96	218.85	2,830.2	-17.6	-0.3	180.97	17.6
2,927.0	8.87	221.23	2,921.9	-29.2	-10.1	199.01	30.9



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SDI Standard Survey Report



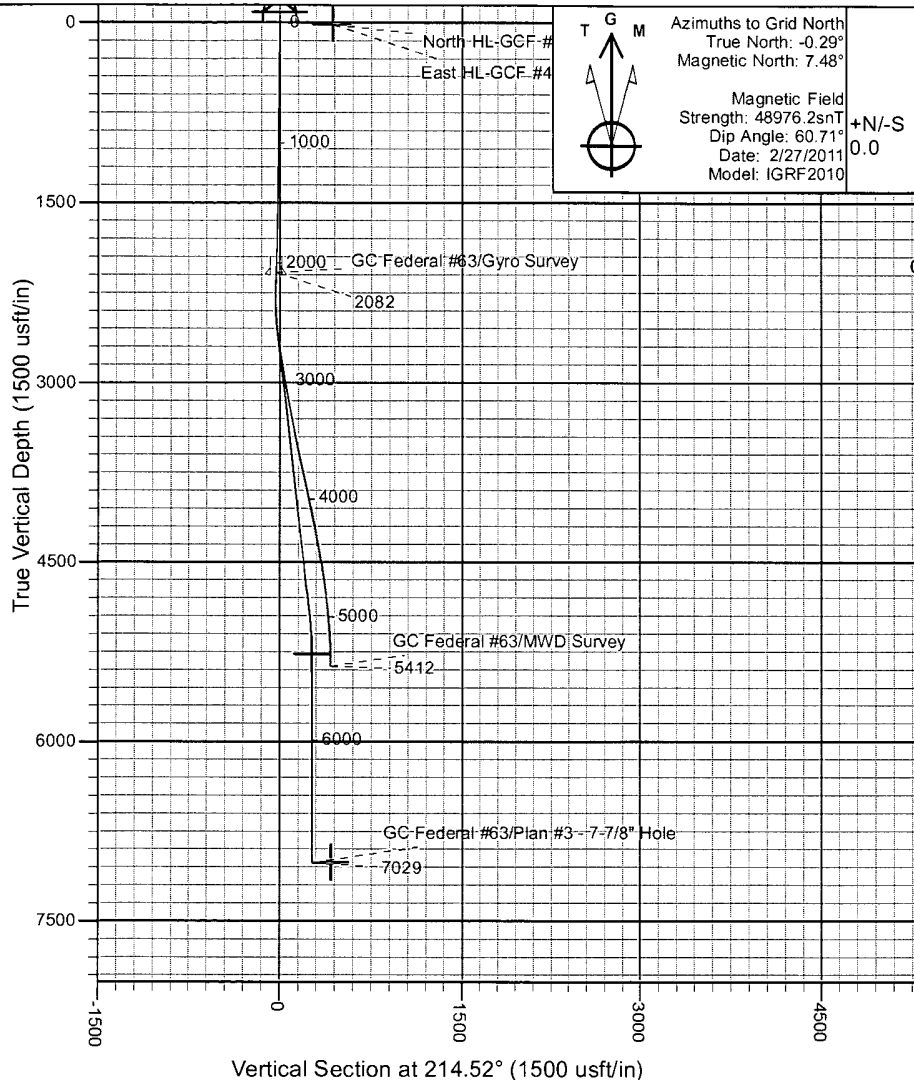
Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well GC Federal #63
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB Elev (13') @ 3988.0usft (Cavaloz #1)
Site:	GC Federal #63	MD Reference:	KB Elev (13') @ 3988.0usft (Cavaloz #1)
Well:	GC Federal #63	North Reference:	Grid
Wellbore:	OH - Job #32D0211175	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)
3,021.0	9.92	219.49	3,014.7	-40.9	-20.0	206.04	45.6
3,114.0	11.55	215.68	3,106.0	-54.7	-30.5	209.17	62.6
3,208.0	11.07	215.32	3,198.2	-69.7	-41.2	210.61	81.0
3,302.0	10.58	215.04	3,290.5	-84.1	-51.4	211.43	98.6
3,397.0	9.88	215.28	3,384.0	-97.9	-61.1	211.97	115.4
3,491.0	11.65	216.13	3,476.4	-112.2	-71.4	212.47	132.9
3,584.0	11.84	215.59	3,567.4	-127.5	-82.5	212.89	151.8
3,684.0	11.96	216.02	3,665.3	-144.2	-94.5	213.24	172.4
3,778.0	11.98	216.55	3,757.2	-159.9	-106.1	213.55	191.9
3,874.0	11.84	216.51	3,851.2	-175.9	-117.9	213.83	211.7
3,969.0	11.76	215.43	3,944.2	-191.6	-129.3	214.01	231.1
4,062.0	11.93	214.82	4,035.2	-207.2	-140.2	214.09	250.2
4,157.0	12.03	214.64	4,128.1	-223.4	-151.5	214.14	269.9
4,252.0	11.41	214.14	4,221.1	-239.3	-162.4	214.16	289.2
4,346.0	10.39	213.70	4,313.4	-254.1	-172.3	214.14	307.0
4,442.0	9.90	216.20	4,407.9	-267.9	-182.0	214.18	323.9
4,568.0	8.87	216.90	4,532.2	-284.4	-194.2	214.32	344.4
4,695.0	8.96	218.01	4,657.7	-300.1	-206.2	214.49	364.1
4,789.0	7.05	218.94	4,750.8	-310.3	-214.3	214.63	377.1
4,882.0	6.15	218.78	4,843.2	-318.6	-221.0	214.75	387.8
4,975.0	4.67	214.53	4,935.7	-325.6	-226.3	214.80	396.5
5,069.0	3.42	213.73	5,029.5	-331.1	-230.0	214.79	403.2
5,163.0	2.21	211.80	5,123.4	-335.0	-232.5	214.76	407.8
5,257.0	2.10	212.13	5,217.3	-338.0	-234.4	214.74	411.3
5,351.0	1.01	215.11	5,311.3	-340.1	-235.8	214.73	413.9
Last MWD Survey							
5,412.0	1.01	215.11	5,372.3	-341.0	-236.4	214.73	414.9
Projection to Bit							

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,082.0	2,081.6	29.4	13.6	Gyro Tie-in
5,351.0	5,311.3	-340.1	-235.8	Last MWD Survey
5,412.0	5,372.3	-341.0	-236.4	Projection to Bit



Project: Lea County, NM (NAD27 NME)
 Site: GC Federal #63
 Well: GC Federal #63
 Wellbore: OH - Job #32D0211175
 Design: Plan #3 - 7-7/8" Hole



Azimuths to Grid North
 True North: -0.29°
 Magnetic North: 7.48°
 Magnetic Field
 Strength: 48976.2snT
 Dip Angle: 60.71°
 Date: 2/27/2011
 Model: IGRF2010

+N/-S
 0.0

+E/-W
 0.0

Northing
 661833.30

Easting
 666762.10

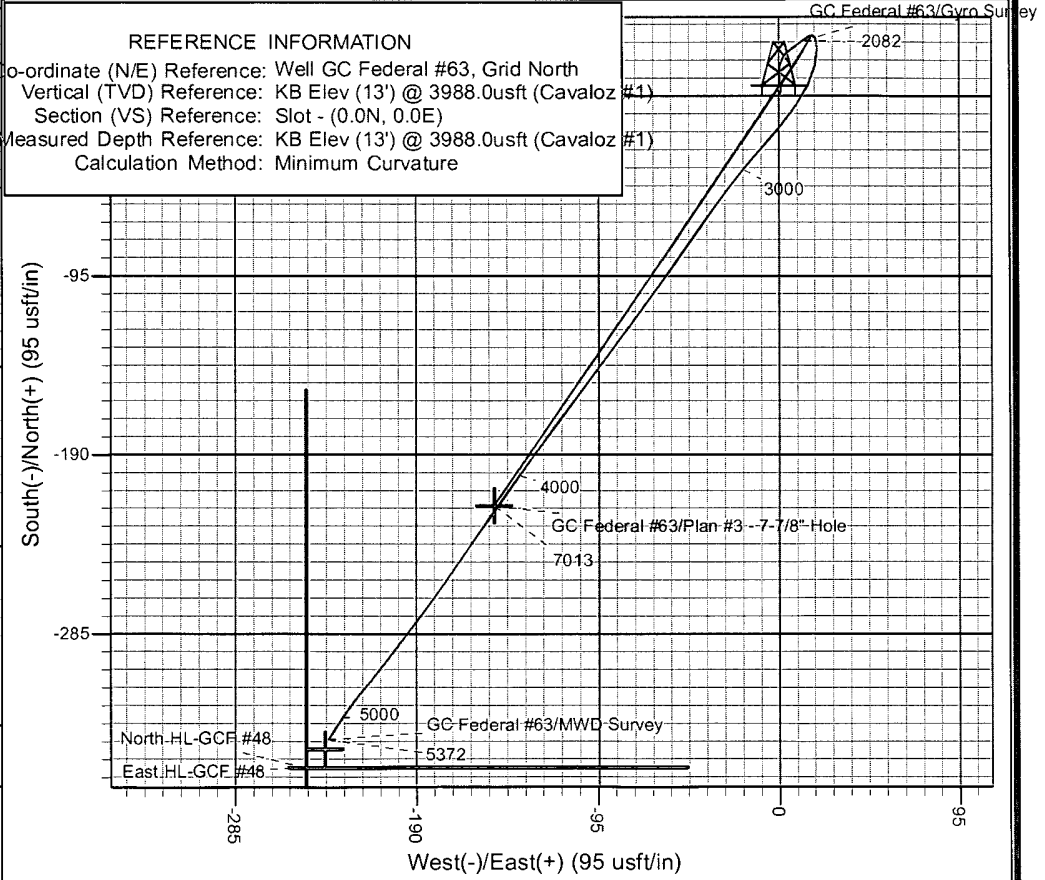
Latitude
 32° 49' 5.846 N

Longitude
 103° 47' 25.833 W

Slot

WELL DETAILS: GC Federal #63
 KB Elev (13') @ 3988.0usft (Cavaloz #1)
 Ground Level: 3975.0

REFERENCE INFORMATION
 Co-ordinate (N/E) Reference: Well GC Federal #63, Grid North
 Vertical (TVD) Reference: KB Elev (13') @ 3988.0usft (Cavaloz #1)
 Section (VS) Reference: Slot - (0.0N, 0.0E)
 Measured Depth Reference: KB Elev (13') @ 3988.0usft (Cavaloz #1)
 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: US 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 #63
 Site Centre Latitude: 32° 49' 5.846 N
 Longitude: 103° 47' 25.833 W
 Positional Uncertainty: 0.0
 Convergence: 0.29
 Local North: Grid