



COG Operating LLC

Lea County, NM (NAD27 NME)

GC Federal #32

GC Federal #32

OH

RECEIVED

DEC 22 2009

HOBBSOCD

Design: Actual

Standard Survey Report

30 September, 2009

SUR: O-20-17s-32e, 485/S & 2065/E

BHL: O-20-17s-32e, 386/S & 1667/E

API # 30-025-39270



Scientific Drilling



Scientific Drilling

Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: GC Federal #32
Well: GC Federal #32
Wellbore: OH
Design: Actual

Local Co-ordinate Reference: Well GC Federal #32
TVD Reference: Ground Elev @ 3978.00ft (Silver Oak #8)
MD Reference: Ground Elev @ 3978.00ft (Silver Oak #8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000 1 Single User Db

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

Site: GC Federal #32
Site Position: Northing: 660,320.40 ft Latitude: 32° 48' 50.808 N
From: Map Easting: 668,083.10 ft Longitude: 103° 47' 10.446 W
Position Uncertainty: 0.00 ft Slot Radius: 0" Grid Convergence: 0.30°

Well: GC Federal #32
Well Position: +N-S 0.00 ft Northing: 660,320.40 ft Latitude: 32° 48' 50.808 N
+E-W 0.00 ft Easting: 668,083.10 ft Longitude: 103° 47' 10.446 W
Position Uncertainty: 0.00 ft Wellhead Elevation: ft Ground Level: 3,978.00 ft

Wellbore: OH
Magnetics: Model Name Sample Date Declination (°) Dip Angle (°) Field Strength (nT)
IGRF200510 2009/09/30 7.92 60.76 49,145

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 0.00 105.72

Survey Program: Date: 2009/09/30
From (ft) To (ft) Survey (Wellbore) Tool Name Description
100.00 2,050.00 Gyro Survey (OH) Keeper Standard Wireline Keeper ver 1.0.2
2,050.00 5,419.00 MWD Survey (OH) MWD MWD - Standard

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	0.31	119.06	100.00	-0.13	0.24	0.26	0.31	0.31	0.00
200.00	0.21	113.95	200.00	-0.34	0.64	0.71	0.10	-0.10	-5.11
300.00	0.26	104.55	300.00	-0.47	1.03	1.12	0.06	0.05	-9.40
400.00	0.14	111.12	400.00	-0.57	1.36	1.46	0.12	-0.12	6.57
500.00	0.25	113.90	500.00	-0.70	1.67	1.80	0.11	0.11	2.78
600.00	0.31	115.92	600.00	-0.91	2.12	2.28	0.06	0.06	2.02
700.00	0.38	110.83	699.99	-1.14	2.67	2.88	0.08	-0.07	-5.09
800.00	0.38	128.60	799.99	-1.47	3.24	3.52	0.12	0.00	17.77
900.00	0.33	112.67	899.99	-1.79	3.76	4.11	0.11	-0.05	-15.93



Scientific Drilling

Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: GC Federal #32
Well: GC Federal #32
Wellbore: OH
Design: Actual

Local Co-ordinate Reference: Well GC Federal #32
TVD Reference: Ground Elev @ 3978.00ft (Silver Oak #8)
MD Reference: Ground Elev @ 3978.00ft (Silver Oak #8)
North Reference: Grid
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)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
1,000.00	0.25	127.58	999.99	-2.03	4.20	4.60	0.11	-0.08	14.91
1,100.00	0.22	120.49	1,099.99	-2.26	4.54	4.98	0.04	-0.03	-7.09
1,200.00	0.27	104.48	1,199.99	-2.42	4.94	5.41	0.08	0.05	-16.01
1,300.00	0.28	121.17	1,299.99	-2.60	5.37	5.88	0.08	0.01	16.69
1,400.00	0.18	108.57	1,399.98	-2.78	5.73	6.27	0.11	-0.10	-12.60
1,500.00	0.22	70.29	1,499.98	-2.77	6.06	6.58	0.14	0.04	-38.28
1,600.00	0.46	71.57	1,599.98	-2.57	6.62	7.07	0.24	0.24	1.28
1,700.00	0.72	65.54	1,699.98	-2.19	7.57	7.88	0.27	0.26	-6.03
1,800.00	1.48	74.49	1,799.96	-1.58	9.39	9.47	0.78	0.76	8.95
1,900.00	1.90	72.97	1,899.91	-0.75	12.22	11.97	0.42	0.42	-1.52
2,000.00	1.62	69.17	1,999.87	0.24	15.13	14.50	0.30	-0.28	-3.80
2,050.00	1.69	60.16	2,049.85	0.86	16.43	15.58	0.54	0.14	-18.02
Gyro Tie-in									
2,133.00	1.40	63.21	2,132.82	1.92	18.39	17.18	0.36	-0.35	3.67
2,227.00	2.75	98.09	2,226.76	2.12	21.65	20.27	1.90	1.44	37.11
2,321.00	4.79	100.71	2,320.55	1.08	27.74	26.41	2.18	2.17	2.79
2,416.00	5.21	108.54	2,415.19	-1.03	35.73	34.67	0.84	0.44	8.24
2,511.00	6.26	112.12	2,509.71	-4.36	44.62	44.13	1.17	1.11	3.77
2,606.00	7.96	112.32	2,603.98	-8.80	55.50	55.81	1.79	1.79	0.21
2,700.00	7.85	110.23	2,697.08	-13.50	67.54	68.67	0.33	-0.12	-2.22
2,795.00	6.86	116.63	2,791.30	-18.28	78.70	80.71	1.35	-1.04	6.74
2,890.00	7.22	107.79	2,885.59	-22.65	89.46	92.25	1.20	0.38	-9.31
2,983.00	6.94	104.72	2,977.88	-25.86	100.46	103.71	0.51	-0.30	-3.30
3,078.00	6.24	106.87	3,072.25	-28.82	110.95	114.61	0.78	-0.74	2.26
3,174.00	7.38	101.83	3,167.57	-31.60	121.98	125.98	1.34	1.19	-5.25
3,268.00	6.77	99.86	3,260.86	-33.78	133.35	137.51	0.70	-0.65	-2.10
3,364.00	6.77	99.56	3,356.19	-35.69	144.50	148.77	0.04	0.00	-0.31
3,459.00	7.00	104.62	3,450.50	-38.08	155.62	160.12	0.68	0.24	5.33
3,554.00	7.80	108.13	3,544.71	-41.55	167.35	172.35	0.97	-0.84	3.69
3,649.00	7.43	106.77	3,638.87	-45.33	179.36	184.93	0.43	-0.39	-1.43
3,744.00	7.11	107.28	3,733.11	-48.85	190.85	196.95	0.34	-0.34	0.54
3,838.00	7.18	106.32	3,826.38	-52.23	202.05	208.64	0.15	0.07	-1.02
3,932.00	6.92	106.37	3,919.67	-55.47	213.12	220.18	0.28	-0.28	0.05
4,026.00	6.62	106.12	4,013.01	-58.57	223.76	231.26	0.32	-0.32	-0.27
4,122.00	6.41	107.72	4,108.39	-61.74	234.18	242.15	0.29	-0.22	-1.67
4,216.00	6.30	112.26	4,201.82	-65.29	243.95	252.51	0.55	-0.12	4.83
4,311.00	7.91	106.59	4,296.09	-69.13	255.04	264.23	1.85	1.69	-5.97
4,405.00	7.40	102.86	4,389.25	-72.33	267.14	276.74	0.76	-0.54	-3.97
4,500.00	7.15	102.12	4,483.48	-74.93	278.88	288.75	0.28	-0.26	-0.78
4,594.00	7.38	101.84	4,576.73	-77.40	290.51	300.62	0.25	0.24	-0.30
4,688.00	7.13	98.25	4,669.98	-79.47	302.19	312.42	0.55	-0.27	-3.82
4,782.00	8.96	102.28	4,763.05	-81.87	315.12	325.52	2.04	1.95	4.29
4,884.00	7.57	109.31	4,863.99	-85.78	329.22	340.15	1.68	-1.36	6.89



Scientific Drilling
Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: GC Federal #32
Well: GC Federal #32
Wellbore: OH
Design: Actual

Local Co-ordinate Reference: Well GC Federal #32
TVD Reference: Ground Elev @ 3978.00ft (Silver Oak #8)
MD Reference: Ground Elev @ 3978.00ft (Silver Oak #8)
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)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
4,978.00	6.20	107.55	4,957.31	-89.36	-339.91	351.40	1.47	-1.46	-1.87	
5,073.00	5.98	107.70	5,051.77	-92.41	-349.51	361.48	0.23	-0.23	0.16	
5,168.00	4.76	105.80	5,146.35	-94.99	-358.02	370.36	1.30	-1.28	-2.00	
5,263.00	3.02	115.58	5,241.13	-97.14	-364.07	376.77	1.95	-1.83	10.29	
5,358.00	0.99	92.48	5,336.07	-98.26	-367.15	380.04	2.26	-2.14	-24.32	
MWD Survey										
5,419.00	0.99	92.48	5,397.06	-98.30	-368.20	381.06	0.00	0.00	0.00	
Projection to Bit										

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
2,050.00	2,049.85	0.86	16.43	Gyro Tie-in
5,358.00	5,336.07	-98.26	367.15	MWD Survey
5,419.00	5,397.06	-98.30	368.20	Projection to Bit

Checked By: _____ Approved By: _____ Date: _____