



COG Operating LLC

Lea County, NM (NAD27 NME)

GC Federal #40

GC Federal #40

OH

Design: Actual

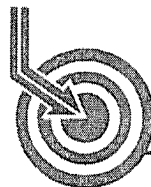
Standard Survey Report

30 August, 2010

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Scientific Drilling
Directional Drilling Operations



Scientific Drilling
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well GC Federal #40
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	RKB Elev (17') @ 3967.00usft (Silver Oak #8)
Site:	GC Federal #40	MD Reference:	RKB Elev (17') @ 3967.00usft (Silver Oak #8)
Well:	GC Federal #40	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Julio

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 #40				
Site Position:		Northing:	660,298.40 usft	Latitude:	32° 48' 50.708 N
From:	Map	Easting:	665,765.70 usft	Longitude:	103° 47' 37.601 W
Position Uncertainty:	0.00 usft	Slot Radius:	0 "	Grid Convergence:	0.29 °

Well	GC Federal #40					
Well Position	+N/-S	0.00 usft	Northing:	660,298.40 usft	Latitude:	32° 48' 50.708 N
	+E/-W	0.00 usft	Easting:	665,765.70 usft	Longitude:	103° 47' 37.601 W
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,950.00 usft	

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	2010/08/22	7.82	60.74	49,058

Design	Actual				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	259.98	

Survey Program	Date	2010/08/30			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	2,075.00	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1.0.2	
2,141.00	7,168.00	MWD Survey (OH)	MWD	MWD - Standard	

Survey	Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	100.00	0.26	66.37	100.00	0.09	0.21	-0.22	0.26	0.26	0.00
	200.00	0.35	47.79	200.00	0.39	0.64	-0.70	0.13	0.09	-18.58
	300.00	0.21	44.43	300.00	0.72	1.00	-1.11	0.14	-0.14	-3.36
	400.00	0.37	53.23	400.00	1.05	1.38	-1.54	0.17	0.16	8.80
	500.00	0.06	84.80	499.99	1.25	1.69	-1.89	0.32	-0.31	31.57
	600.00	0.25	155.31	599.99	1.05	1.84	-1.99	0.24	0.19	70.51
	700.00	0.36	150.65	699.99	0.58	2.08	-2.15	0.11	0.11	-4.66
	800.00	0.23	133.13	799.99	0.17	2.38	-2.38	0.16	-0.13	-17.52
	900.00	0.08	199.75	899.99	-0.03	2.51	-2.46	0.21	-0.15	66.62



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Project: Lea County, NM (NAD27 NME)
Site: GC Federal #40
Well: GC Federal #40
Wellbore: OH
Design: Actual

Local Co-ordinate Reference: Well GC Federal #40
TVD Reference: RKB Elev (17') @ 3967.00usft (Silver Oak #8)
MD Reference: RKB Elev (17') @ 3967.00usft (Silver Oak #8)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM-Julio

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,000.00	0.12	17.42	999.99	0.00	2.51	-2.48	0.20	0.04	177.67
1,100.00	0.18	43.36	1,099.99	0.21	2.65	-2.65	0.09	0.06	25.94
1,200.00	0.22	71.23	1,199.99	0.39	2.94	-2.97	0.10	0.04	27.87
1,300.00	0.29	90.43	1,299.99	0.45	3.38	-3.40	0.11	0.07	19.20
1,400.00	0.42	70.38	1,399.99	0.57	3.98	-4.01	0.18	0.13	-20.05
1,500.00	0.68	63.25	1,499.98	0.96	4.85	-4.94	0.27	0.26	-7.13
1,600.00	0.94	75.32	1,599.97	1.44	6.17	-6.33	0.31	0.26	12.07
1,700.00	1.36	78.80	1,699.95	1.87	8.13	-8.33	0.43	0.42	3.48
1,800.00	1.71	79.02	1,799.92	2.39	10.76	-11.01	0.35	0.35	0.22
1,900.00	1.89	78.71	1,899.87	3.00	13.84	-14.15	0.18	0.18	-0.31
2,000.00	1.68	88.49	1,999.82	3.36	16.92	-17.25	0.37	-0.21	9.78
2,075.00	1.29	87.82	2,074.79	3.42	18.87	-19.17	0.52	-0.52	-0.89
Gyro tie-in									
2,141.00	1.15	94.39	2,140.78	3.40	20.27	-20.55	0.30	-0.21	9.95
2,204.00	0.43	104.01	2,203.77	3.29	21.13	-21.38	1.16	-1.14	15.27
2,267.00	0.54	232.00	2,266.77	3.05	21.13	-21.33	1.39	0.17	203.16
2,331.00	1.63	260.49	2,330.76	2.71	19.99	-20.16	1.85	1.70	44.52
2,393.00	2.30	269.68	2,392.72	2.56	17.88	-18.05	1.19	1.08	14.82
2,456.00	2.79	272.47	2,455.66	2.62	15.08	-15.31	0.80	0.78	4.43
2,519.00	3.57	270.04	2,518.56	2.69	11.59	-11.88	1.26	1.24	-3.86
2,583.00	3.86	264.86	2,582.43	2.50	7.45	-7.77	0.69	0.45	-8.09
2,646.00	4.32	265.53	2,645.27	2.12	2.97	-3.30	0.73	0.73	1.06
2,709.00	5.15	263.65	2,708.05	1.62	-2.20	1.89	1.34	1.32	-2.98
2,772.00	6.08	267.16	2,770.75	1.15	-8.35	8.02	1.57	1.48	5.57
2,835.00	6.81	264.85	2,833.35	0.65	-15.40	15.05	1.23	1.16	-3.67
2,867.00	6.67	265.20	2,865.13	0.32	-19.14	18.79	0.46	-0.44	1.09
2,898.00	6.92	268.27	2,895.91	0.11	-22.80	22.43	1.42	0.81	9.90
2,930.00	7.66	263.87	2,927.65	-0.17	-26.85	26.47	2.90	2.31	-13.75
2,962.00	8.59	260.90	2,959.33	-0.78	-31.33	30.99	3.19	2.91	-9.28
2,994.00	9.20	259.51	2,990.95	-1.62	-36.20	35.93	2.02	1.91	-4.34
3,057.00	10.12	260.93	3,053.05	-3.41	-46.62	46.51	1.51	1.46	2.25
3,088.00	10.21	259.63	3,083.57	-4.34	-52.01	51.98	0.79	0.29	-4.19
3,151.00	9.55	260.63	3,145.63	-6.19	-62.66	62.79	1.08	-1.05	1.59
3,244.00	9.95	257.14	3,237.29	-9.24	-78.11	78.52	0.77	0.43	-3.75
3,339.00	10.41	263.82	3,330.80	-11.99	-94.64	95.29	1.33	0.48	7.03
3,434.00	9.73	262.82	3,424.33	-13.91	-111.14	111.87	0.74	-0.72	-1.05
3,529.00	10.75	264.38	3,517.82	-15.79	-127.92	128.72	1.11	1.07	1.64
3,623.00	10.50	262.47	3,610.21	-17.77	-145.14	146.02	0.46	-0.27	-2.03
3,718.00	11.23	257.18	3,703.51	-20.95	-162.74	163.91	1.30	0.77	-5.57
3,812.00	10.79	255.72	3,795.78	-25.15	-180.19	181.82	0.55	-0.47	-1.55
3,906.00	10.33	254.08	3,888.18	-29.64	-196.83	198.98	0.58	-0.49	-1.74
4,001.00	10.71	251.97	3,981.59	-34.71	-213.41	216.19	0.57	0.40	-2.22
4,096.00	10.92	248.89	4,074.90	-40.68	-230.20	233.77	0.65	0.22	-3.24



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Wellbore: OH
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Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,191.00	10.68	246.92	4,168.22	-47.37	-246.69	251.17	0.46	-0.25	-2.07
4,285.00	10.65	245.41	4,260.59	-54.40	-262.60	268.06	0.30	-0.03	-1.61
4,379.00	10.62	249.97	4,352.98	-60.98	-278.64	285.00	0.90	-0.03	4.85
4,411.00	10.75	249.28	4,384.43	-63.05	-284.20	290.84	0.57	0.41	-2.16
4,504.00	11.19	260.34	4,475.74	-67.63	-301.21	308.39	2.31	0.47	11.89
4,599.00	11.10	259.15	4,568.95	-70.90	-319.28	326.75	0.26	-0.09	-1.25
4,694.00	11.13	264.78	4,662.17	-73.45	-337.39	345.03	1.14	0.03	5.93
4,787.00	10.84	264.71	4,753.46	-75.08	-355.04	362.69	0.31	-0.31	-0.08
4,882.00	10.71	262.70	4,846.79	-77.02	-372.69	380.41	0.42	-0.14	-2.12
4,977.00	10.61	263.00	4,940.15	-79.21	-390.13	397.96	0.12	-0.11	0.32
5,072.00	10.68	265.65	5,033.51	-80.94	-407.59	415.45	0.52	0.07	2.79
5,135.00	9.42	261.65	5,095.55	-82.13	-418.51	426.42	2.29	-2.00	-6.35
5,197.00	8.17	263.28	5,156.82	-83.39	-427.90	435.89	2.06	-2.02	2.63
5,260.00	7.09	271.63	5,219.26	-83.80	-436.24	444.16	2.45	-1.71	13.25
5,323.00	5.76	268.31	5,281.86	-83.78	-443.28	451.10	2.19	-2.11	-5.27
5,418.00	4.11	260.42	5,376.51	-84.49	-451.41	459.22	1.87	-1.74	-8.31
5,576.00	4.28	259.38	5,534.09	-86.52	-462.78	470.78	0.12	0.11	-0.66
5,671.00	4.07	257.41	5,628.83	-87.91	-469.56	477.69	0.27	-0.22	-2.07
5,829.00	3.94	257.80	5,786.45	-90.28	-480.34	488.72	0.08	-0.08	0.25
5,981.00	3.63	256.02	5,938.12	-92.54	-490.11	498.74	0.22	-0.20	-1.17
6,075.00	3.00	257.88	6,031.96	-93.78	-495.40	504.16	0.68	-0.67	1.98
6,233.00	2.88	254.09	6,189.75	-95.73	-503.26	512.24	0.14	-0.08	-2.40
6,390.00	3.09	255.31	6,346.54	-97.89	-511.15	520.38	0.14	0.13	0.78
6,546.00	2.91	257.88	6,502.32	-99.79	-519.09	528.53	0.14	-0.12	1.65
6,705.00	2.32	252.43	6,661.16	-101.60	-526.10	535.76	0.40	-0.37	-3.43
6,894.00	1.90	246.59	6,850.03	-104.00	-532.62	542.60	0.25	-0.22	-3.09
7,116.00	1.66	261.09	7,071.92	-105.96	-539.18	549.39	0.23	-0.11	6.53
Last MWD Survey									
7,168.00	1.66	261.09	7,123.90	-106.20	-540.67	550.90	0.00	0.00	0.00
Projection to Bit									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
2,075.00	2,074.79	3.42	18.87	Gyro tie-in
7,116.00	7,071.92	-105.96	-539.18	Last MWD Survey
7,168.00	7,123.90	-106.20	-540.67	Projection to Bit

Checked By: _____

Approved By: _____

Date: _____