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30-025-39874

COG Operating LLC

Lea County, NM (NAD27 NME)

MC Federal #51

MC Federal #51

OH

Design: Actual

Standard Survey Report

17 February, 2011





Scientific Drilling

Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well MC Federal #51
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB Elev (20') @ 4031.00usft (United #42)
Site:	MC Federal #51	MD Reference:	KB Elev (20') @ 4031.00usft (United #42)
Well:	MC Federal #51	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	MC Federal #51		
Site Position:		Northing:	663,365.50 usft
From:	Map	Easting:	675,309.10 usft
Position Uncertainty:	0.00 usft	Slot Radius:	0 "
		Latitude:	32° 49' 20.561 N
		Longitude:	103° 45' 45.584 W
		Grid Convergence:	0.31 °

Well	MC Federal #51		
Well Position	+N/-S	0.00 usft	Northing: 663,365.50 usft
	+E/-W	0.00 usft	Easting: 675,309.10 usft
Position Uncertainty	0.00 usft	Wellhead Elevation:	usft
		Latitude:	32° 49' 20.561 N
		Longitude:	103° 45' 45.584 W
		Ground Level:	4,011.00 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF200510	2011/02/12	7.75
			Dip Angle
			(°)
			60.74
			Field Strength
			(nT)
			49,020

Design	Actual		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.00	0.00	0.00
			Direction
			(°)
			294.46

Survey Program	Date 2011/02/17		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.00	2,095.00	Gyro Survey (OH)	Keeper
2,225.00	5,670.00	MWD Survey (OH)	MWD
			Description
			Standard Wireline Keeper ver 1.0.2
			MWD - Standard

Survey	Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Vertical Section	Dogleg Rate	Build Rate	Turn Rate
	(usft)	(°)	(°)	(usft)	(usft)	(usft)	(usft)	(°/100usft)	(°/100usft)	(°/100usft)
	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	100.00	0.45	289.40	100.00	0.13	-0.37	0.39	0.45	0.45	0.00
	200.00	0.50	282.87	200.00	0.36	-1.17	1.21	0.07	0.05	-6.53
	300.00	0.78	266.61	299.99	0.42	-2.27	2.24	0.33	0.28	-16.26
	400.00	1.35	267.10	399.97	0.32	-4.13	3.89	0.57	0.57	0.49
	500.00	1.96	270.01	499.93	0.26	-7.01	6.49	0.62	0.61	2.91
	600.00	3.06	263.46	599.83	-0.05	-11.38	10.33	1.14	1.10	-6.55
	700.00	4.66	258.21	699.60	-1.18	-18.00	15.90	1.64	1.60	-5.25
	800.00	6.07	259.92	799.16	-2.94	-27.19	23.53	1.42	1.41	1.71
	900.00	5.91	260.92	898.62	-4.68	-37.48	32.18	0.19	-0.16	1.00



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Well:	MC Federal #51	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	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	5.17	266.18	998.15	-5.79	-47.06	40.44	0.90	-0.74	5.26
1,100.00	4.74	269.16	1,097.77	-6.15	-55.68	48.14	0.50	-0.43	2.98
1,200.00	4.01	271.64	1,197.48	-6.11	-63.31	55.10	0.75	-0.73	2.48
1,300.00	3.51	272.43	1,297.27	-5.88	-69.86	61.16	0.50	-0.50	0.79
1,400.00	2.96	272.15	1,397.11	-5.65	-75.50	66.38	0.55	-0.55	-0.28
1,500.00	2.42	277.62	1,497.00	-5.28	-80.17	70.79	0.60	-0.54	5.47
1,600.00	1.98	289.07	1,596.92	-4.43	-83.90	74.53	0.62	-0.44	11.45
1,700.00	1.89	301.86	1,696.87	-3.00	-86.93	77.89	0.44	-0.09	12.79
1,800.00	1.50	319.50	1,796.82	-1.13	-89.18	80.71	0.65	-0.39	17.64
1,900.00	1.30	337.16	1,896.79	0.91	-90.47	82.73	0.47	-0.20	17.66
2,000.00	1.14	355.48	1,996.77	2.95	-90.99	84.05	0.42	-0.16	18.32
2,095.00	0.85	353.23	2,091.76	4.59	-91.15	84.87	0.31	-0.31	-2.37
Gyro tie-in									
2,225.00	0.74	354.44	2,221.75	6.38	-91.34	85.79	0.09	-0.08	0.93
2,319.00	2.00	333.06	2,315.72	8.45	-92.15	87.37	1.42	1.34	-22.74
2,414.00	2.93	322.84	2,410.63	11.86	-94.36	90.81	1.08	0.98	-10.76
2,509.00	2.75	324.31	2,505.51	15.65	-97.16	94.92	0.20	-0.19	1.55
2,604.00	2.62	322.81	2,600.41	19.23	-99.80	98.81	0.16	-0.14	-1.58
2,699.00	2.45	322.18	2,695.31	22.56	-102.36	102.52	0.18	-0.18	-0.66
2,794.00	3.28	321.31	2,790.19	26.29	-105.30	106.74	0.87	0.87	-0.92
2,889.00	2.98	320.50	2,885.05	30.31	-108.57	111.38	0.32	-0.32	-0.85
2,985.00	2.96	299.44	2,980.93	33.46	-112.32	116.09	1.13	-0.02	-21.94
3,080.00	2.64	294.67	3,075.81	35.58	-116.44	120.72	0.42	-0.34	-5.02
3,175.00	2.98	302.26	3,170.70	37.81	-120.52	125.36	0.53	0.36	7.99
3,270.00	4.01	303.55	3,265.52	40.96	-125.38	131.08	1.09	1.08	1.36
3,364.00	3.77	300.19	3,359.31	44.33	-130.79	137.41	0.35	-0.26	-3.57
3,459.00	3.56	297.73	3,454.11	47.28	-136.10	143.46	0.28	-0.22	-2.59
3,554.00	3.39	297.00	3,548.94	49.92	-141.21	149.21	0.18	-0.18	-0.77
3,649.00	3.43	296.35	3,643.77	52.46	-146.26	154.85	0.06	0.04	-0.68
3,744.00	3.44	296.60	3,738.60	55.00	-151.36	160.54	0.02	0.01	0.26
3,839.00	3.31	294.71	3,833.43	57.42	-156.40	166.13	0.18	-0.14	-1.99
3,934.00	3.31	293.44	3,928.27	59.66	-161.40	171.62	0.08	0.00	-1.34
4,029.00	3.44	291.97	4,023.11	61.81	-166.56	177.21	0.16	0.14	-1.55
4,131.00	3.45	293.38	4,124.93	64.18	-172.22	183.33	0.08	0.01	1.38
4,226.00	3.64	296.04	4,219.74	66.64	-177.55	189.21	0.26	0.20	2.80
4,321.00	3.58	298.16	4,314.55	69.36	-182.88	195.18	0.15	-0.06	2.23
4,416.00	3.94	297.56	4,409.35	72.27	-188.38	201.40	0.38	0.38	-0.63
4,511.00	4.11	297.99	4,504.12	75.38	-194.28	208.06	0.18	0.18	0.45
4,606.00	4.25	299.91	4,598.86	78.73	-200.34	214.96	0.21	0.15	2.02
4,701.00	4.60	299.85	4,693.58	82.38	-206.70	222.26	0.37	0.37	-0.06
4,796.00	4.80	302.26	4,788.26	86.40	-213.36	229.99	0.30	0.21	2.54
4,891.00	3.79	294.61	4,882.99	89.83	-219.58	237.06	1.22	-1.06	-8.05
4,987.00	3.93	294.14	4,978.78	92.49	-225.46	243.53	0.15	0.15	-0.49



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Survey Report



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Site:	MC Federal #51	MD Reference:	KB Elev (20') @ 4031.00usft (United #42)
Well:	MC Federal #51	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Julio

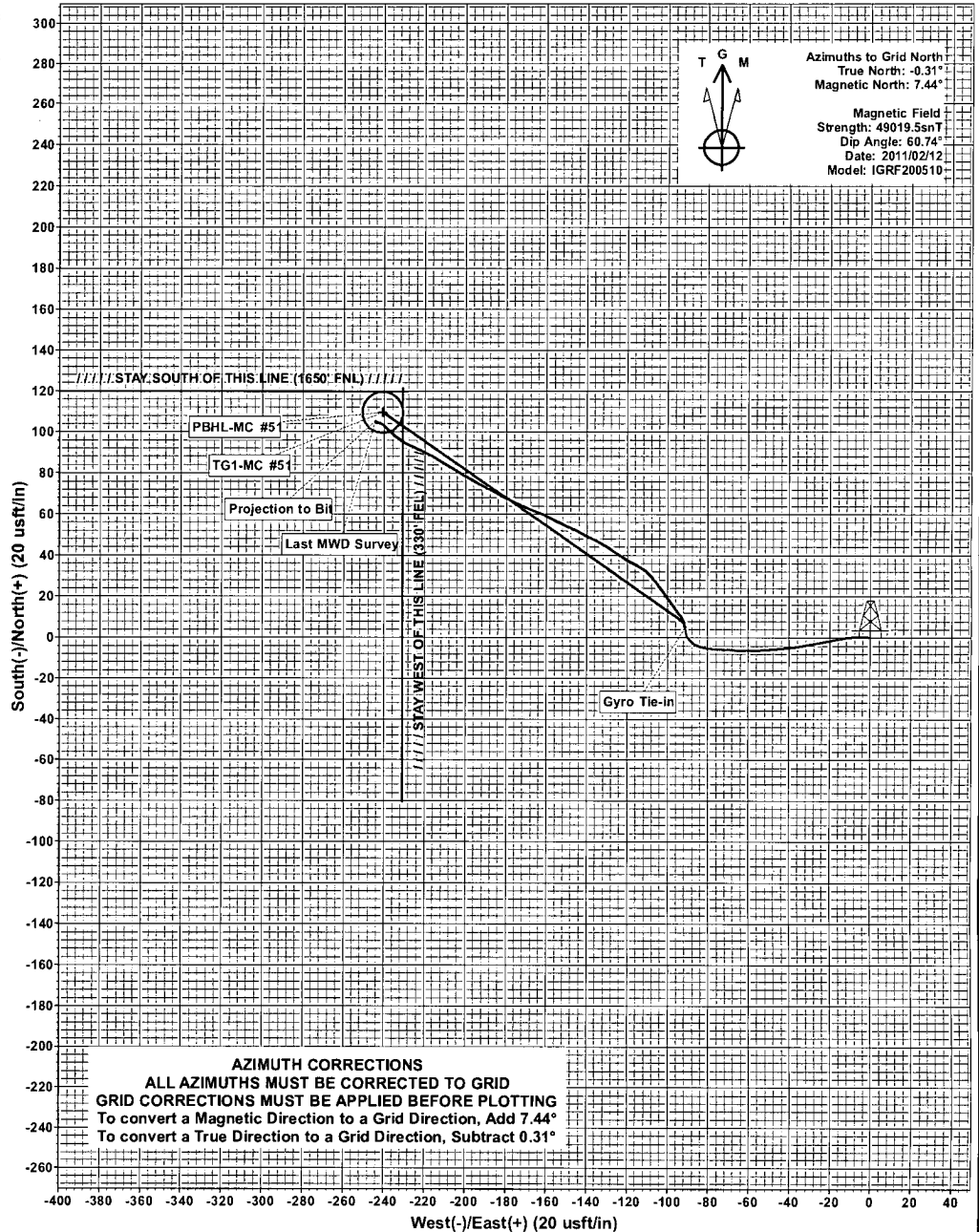
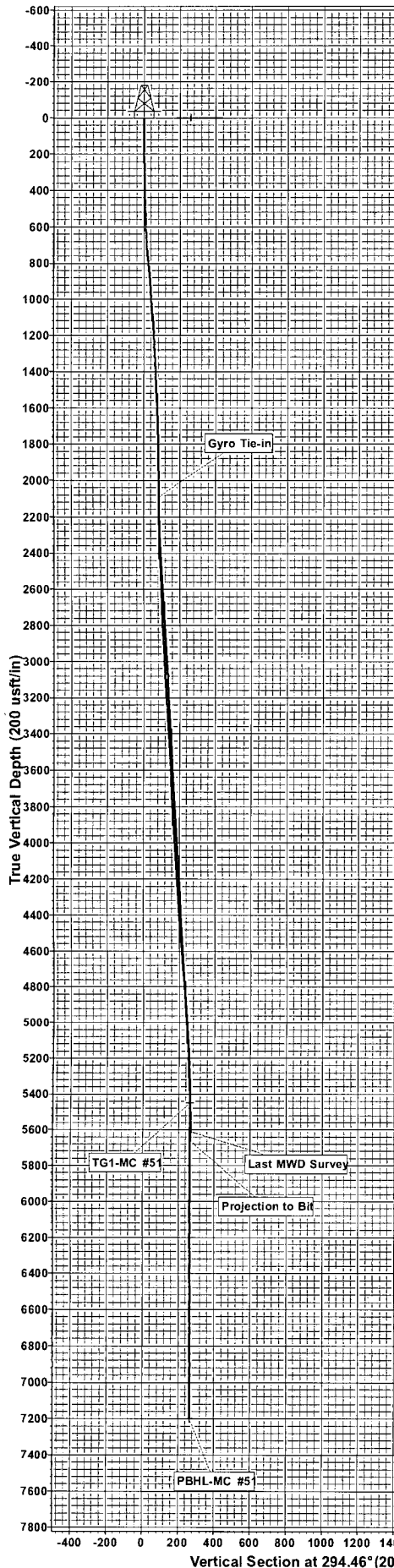
Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,083.00	2.79	302.04	5,074.61	95.08	-230.45	249.13	1.28	-1.19	8.23
5,178.00	2.51	307.52	5,169.51	97.57	-234.06	253.45	0.40	-0.29	5.77
5,273.00	2.85	313.15	5,264.40	100.46	-237.43	257.71	0.45	0.36	5.93
5,367.00	2.51	309.31	5,358.30	103.36	-240.73	261.92	0.41	-0.36	-4.09
5,461.00	1.12	272.55	5,452.25	104.70	-243.24	264.76	1.86	-1.48	-39.11
5,556.00	0.18	2.41	5,547.25	104.89	-244.16	265.68	1.19	-0.99	94.59
5,619.00	0.12	3.34	5,610.25	105.06	-244.15	265.74	0.10	-0.10	1.48
Last MWD Survey									
5,670.00	0.12	3.34	5,661.25	105.16	-244.14	265.78	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)	
2,095.00	2,091.76	4.59	-91.15	Gyro tie-in
5,619.00	5,610.25	105.06	-244.15	Last MWD Survey
5,670.00	5,661.25	105.16	-244.14	Projection to Bit

Checked By: _____	Approved By: _____	Date: _____
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Scientific Drilling for COG Operating LLC
Site: Lea County, NM (NAD27 NME)
Well: MC Federal #51
Wellbore: OH
Design: Plan #2 vs Actual - 7-7/8" Hole



Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
East HL-MC #51	0.00	119.50	-230.70	663485.00	675078.40	32°49' 21.756 N	103°45' 48.280 W	Rectangle (Sides: L2 00.00 W0.00)
North HL-MC #51	0.00	119.50	-230.70	663485.00	675078.40	32°49' 21.756 N	103°45' 48.280 W	Rectangle (Sides: L 0.00 W200.00)
TG1-MC #51	5450.00	109.50	-240.70	663475.00	675068.40	32°49' 21.658 N	103°45' 48.398 W	Point
PBHL-MC #51	7200.00	109.50	-240.70	663475.00	675068.40	32°49' 21.658 N	103°45' 48.398 W	Circle (Radius: 10.0 0)

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
1	2095.00	0.85	353.23	2091.76	4.59	-91.15	0.00	0.00	84.87	
2	2200.00	0.85	353.23	2196.75	6.14	-91.33	0.00	0.00	85.68	
3	2342.75	3.34	304.43	2339.39	9.54	-94.89	2.00	-61.73	90.32	
4	5291.35	3.34	304.43	5282.98	106.74	-236.68	0.00	0.00	259.64	
5	5458.46	0.00	0.00	5450.00	109.50	-240.70	2.00	180.00	264.44	TG1-MC #51
6	7208.46	0.00	0.00	7200.00	109.50	-240.70	0.00	0.00	264.44	PBHL-MC #51

WELL DETAILS: MC Federal #51

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	663365.50	675309.10	32°49' 20.561 N	103°45' 45.584 W	

PROJECT DETAILS: Lea County, NM (NAD27 NME) Plan: Plan #2 - 7-7/8" Hole (MC Federal #51/OH)

Geodetic System: US State Plane 1927 (Exact solution) Created By: Julio Pina Date: 12-Feb-11
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866 Checked: Date:
Zone: New Mexico East 3001
System Datum: Mean Sea Level Reviewed: Date:
Approved: Date: