



30-015-37443

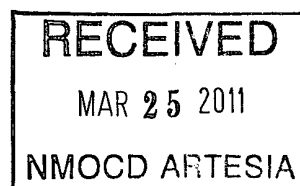
COG OPERATING LLC

Eddy County, NM (NAN27 NME)

Electra Federal #57

Electra Federal #57

OH



Survey: MWD Survey

SDI Standard Survey Report

21 February, 2011

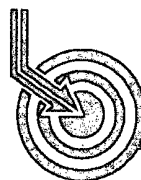
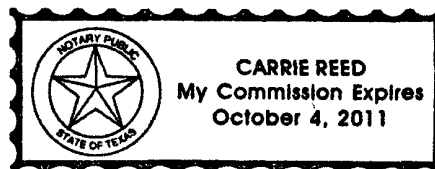
This survey is correct to the best of my knowledge and is supported by actual field data.

Robert

Notarized this date 21st of February, 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:	Site Electra Federal #57
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (12') @ 3720.0usft (Silver Oak #5)
Site:	Electra Federal #57	MD Reference:	KB Elev (12') @ 3720.0usft (Silver Oak #5)
Well:	Electra Federal #57	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Project	Eddy County, NM (NAN27 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	Electra Federal #57			
Site Position:		Northing:	674,896.50 usft	Latitude: 32° 51' 17.392 N
From:	Map	Easting:	613,223.30 usft	Longitude: 103° 57' 52.668 W
Position Uncertainty:	0.0 usft	Slot Radius:	0"	Grid Convergence: 0.20 °

Well	Electra Federal #57			
Well Position	+N/-S	0.0 usft	Northing:	674,896.50 usft
	+E/-W	0.0 usft	Easting:	613,223.30 usft
Position Uncertainty	0.0 usft		Wellhead Elevation:	usft
			Ground Level:	3,708.0 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	1/22/2011	7.86	60.71	48,990

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	180.96

Survey Program	Date 2/21/2011			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	1,140.0	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1.0.2
1,240.0	6,070.0	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	0.0
100.0	0.48	301.08	100.0	0.2	-0.4	301.08	0.4	
200.0	0.24	273.77	200.0	0.4	-0.9	295.72	1.0	
300.0	0.73	309.77	300.0	0.9	-1.6	298.09	1.8	
400.0	1.38	344.83	400.0	2.4	-2.4	315.09	3.4	
500.0	1.13	350.24	500.0	4.6	-2.9	327.50	5.4	
600.0	0.91	2.59	599.9	6.3	-3.0	334.34	7.0	
700.0	0.67	1.33	699.9	7.7	-3.0	338.79	8.3	
800.0	0.46	26.90	799.9	8.7	-2.8	342.08	9.1	
900.0	0.57	33.25	899.9	9.4	-2.3	346.04	9.7	
1,000.0	0.89	57.80	999.9	10.3	-1.4	352.15	10.4	



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SDI Standard Survey Report



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Site:	Electra Federal #57	MD Reference:	KB Elev (12') @ 3720.0usft (Silver Oak #5)
Well:	Electra Federal #57	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	1.10	58.08	1,099.9	11.2	0.1	0.29	11.2
1,140.0	1.08	56.25	1,139.9	11.6	0.7	3.44	11.6



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Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (12') @ 3720.0usft (Silver Oak #5)
Site:	Electra Federal #57	MD Reference:	KB Elev (12') @ 3720.0usft (Silver Oak #5)
Well:	Electra Federal #57	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Project	Eddy County, NM (NAN27 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		Electra Federal #57			
Site Position:		Northing:	674,896.50 usft	Latitude:	32° 51' 17.392 N
From:	Map	Easting:	613,223.30 usft	Longitude:	103° 57' 52.668 W
Position Uncertainty:	0.0 usft	Slot Radius:	0"	Grid Convergence:	0.20 °

Well	Electra Federal #57					
Well Position	+N/-S	0.0 usft	Northing:	674,896.50 usft	Latitude:	32° 51' 17.392 N
	+E/-W	0.0 usft	Easting:	613,223.30 usft	Longitude:	103° 57' 52.668 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	3,708.0 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	1/22/2011	7.86	60.71	48,990

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	180.96

Survey Program	Date 2/21/2011				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	1,140.0	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1.0.2	
1,240.0	6,020.0	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)	
1,140.0	1.08	56.25	1,139.9	11.6	0.7	3.44	11.6	
1,240.0	0.97	72.11	1,239.9	12.4	2.3	10.46	12.6	
1,304.0	1.12	84.77	1,303.9	12.6	3.4	15.20	13.1	
1,368.0	0.86	87.99	1,367.9	12.7	4.5	19.66	13.5	
1,432.0	0.92	87.25	1,431.8	12.7	5.5	23.47	13.9	
1,496.0	1.21	135.24	1,495.8	12.3	6.5	27.96	13.9	
1,559.0	1.75	160.03	1,558.8	10.9	7.3	33.87	13.1	
1,623.0	2.39	171.13	1,622.8	8.6	7.8	42.22	11.7	
1,687.0	3.61	177.48	1,686.7	5.3	8.1	56.85	9.7	
1,751.0	4.87	183.46	1,750.5	0.6	8.1	85.80	8.1	
1,814.0	6.51	180.66	1,813.2	-5.6	7.9	125.70	9.7	



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Site:	Electra Federal #57	MD Reference:	KB Elev (12') @ 3720.0usft (Silver Oak #5)
Well:	Electra Federal #57	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,878.0	7.92	180.98	1,876.7	-13.7	7.7	150.49	15.7
1,942.0	8.64	184.22	1,940.0	-22.9	7.3	162.27	24.0
2,005.0	8.55	183.64	2,002.3	-32.3	6.7	168.33	33.0
2,069.0	8.33	183.03	2,065.6	-41.7	6.1	171.64	42.1
2,133.0	7.94	183.31	2,129.0	-50.7	5.6	173.67	51.0
2,197.0	8.18	183.84	2,192.3	-59.7	5.1	175.15	59.9
2,260.0	7.72	182.24	2,254.7	-68.4	4.6	176.15	68.5
2,324.0	8.15	184.95	2,318.1	-77.2	4.0	177.00	77.3
2,388.0	9.08	184.53	2,381.4	-86.7	3.2	177.86	86.8
2,451.0	8.97	179.84	2,443.6	-96.6	2.9	178.30	96.6
2,515.0	8.59	177.96	2,506.9	-106.4	3.1	178.36	106.4
2,579.0	8.27	178.46	2,570.2	-115.7	3.3	178.34	115.8
2,642.0	7.83	179.94	2,632.6	-124.6	3.5	178.40	124.6
2,706.0	8.46	182.46	2,695.9	-133.6	3.3	178.60	133.7
2,770.0	8.51	183.18	2,759.2	-143.1	2.8	178.87	143.1
2,833.0	8.30	182.60	2,821.5	-152.3	2.3	179.12	152.3
2,897.0	8.69	185.10	2,884.8	-161.7	1.7	179.40	161.7
2,961.0	9.05	185.91	2,948.1	-171.5	0.8	179.75	171.5
3,024.0	9.12	186.10	3,010.3	-181.4	-0.3	180.09	181.4
3,088.0	8.82	185.10	3,073.5	-191.3	-1.3	180.38	191.3
3,152.0	8.76	183.80	3,136.7	-201.1	-2.0	180.57	201.1
3,216.0	9.00	186.11	3,200.0	-210.9	-2.9	180.78	210.9
3,279.0	9.41	183.03	3,262.2	-221.0	-3.7	180.95	221.0
3,343.0	8.51	176.87	3,325.4	-230.9	-3.7	180.91	230.9
3,407.0	8.52	176.80	3,388.7	-240.4	-3.2	180.75	240.4
3,471.0	8.29	177.08	3,452.0	-249.7	-2.7	180.61	249.7
3,534.0	8.15	182.78	3,514.3	-258.7	-2.6	180.59	258.7
3,598.0	8.88	184.22	3,577.6	-268.2	-3.2	180.69	268.2
3,662.0	9.09	184.95	3,640.9	-278.1	-4.0	180.83	278.2
3,726.0	8.96	184.22	3,704.1	-288.1	-4.8	180.96	288.2
3,789.0	8.77	184.26	3,766.3	-297.8	-5.6	181.07	297.9
3,853.0	8.78	182.42	3,829.6	-307.6	-6.1	181.14	307.6
3,917.0	8.52	179.46	3,892.8	-317.2	-6.3	181.13	317.3
3,981.0	8.44	177.43	3,956.1	-326.6	-6.0	181.06	326.7
4,044.0	8.31	177.35	4,018.5	-335.8	-5.6	180.96	335.8
4,108.0	7.90	177.52	4,081.8	-344.8	-5.2	180.87	344.8
4,172.0	7.87	183.94	4,145.2	-353.6	-5.3	180.86	353.6
4,235.0	7.78	184.71	4,207.6	-362.1	-6.0	180.94	362.2
4,299.0	7.67	186.16	4,271.1	-370.7	-6.8	181.05	370.7
4,363.0	7.01	183.04	4,334.5	-378.8	-7.4	181.13	378.9
4,427.0	5.84	182.21	4,398.1	-386.0	-7.8	181.15	386.1
4,490.0	4.53	177.86	4,460.9	-391.7	-7.8	181.14	391.8
4,554.0	3.34	172.88	4,524.7	-396.0	-7.5	181.08	396.1
4,618.0	3.40	172.29	4,588.6	-399.8	-7.0	181.00	399.8



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SDI Standard Survey Report



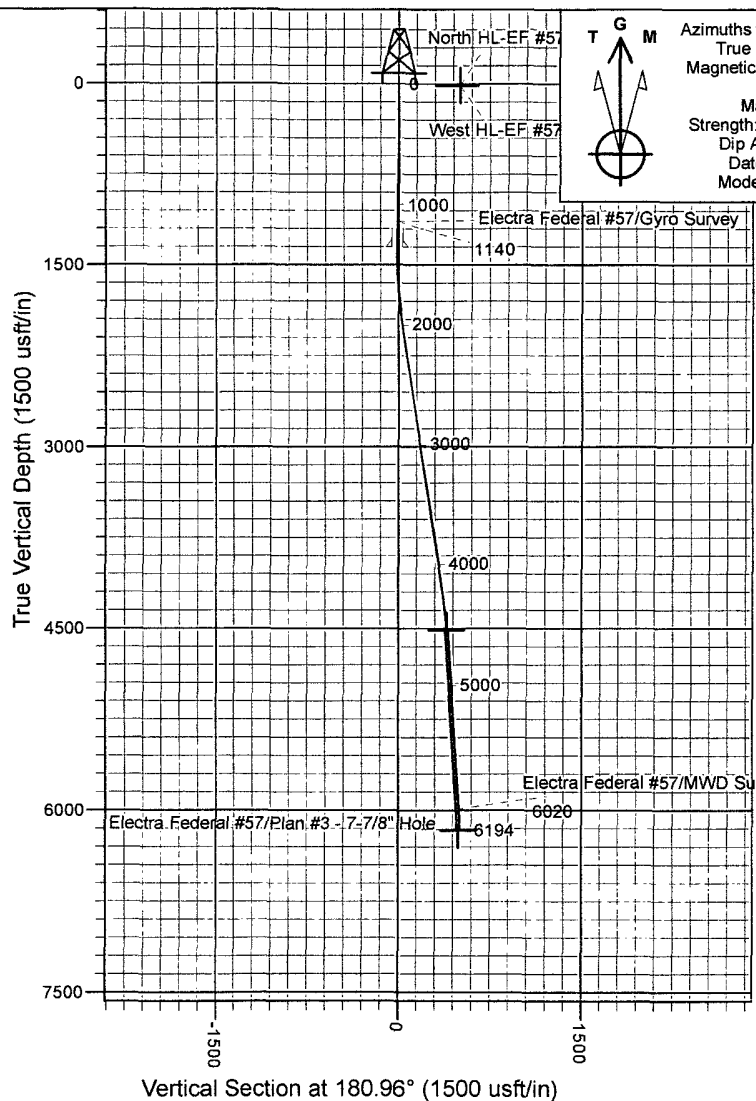
Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Electra Federal #57
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (12') @ 3720.0usft (Silver Oak #5)
Site:	Electra Federal #57	MD Reference:	KB Elev (12') @ 3720.0usft (Silver Oak #5)
Well:	Electra Federal #57	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
4,681.0	3.27	170.16	4,651.5	-403.4	-6.4	180.91	403.5
4,745.0	3.48	174.71	4,715.4	-407.1	-5.9	180.84	407.2
4,809.0	3.69	180.90	4,779.3	-411.1	-5.8	180.81	411.2
4,873.0	3.51	180.81	4,843.1	-415.1	-5.9	180.81	415.2
4,937.0	3.65	179.61	4,907.0	-419.1	-5.9	180.80	419.2
5,000.0	3.40	178.90	4,969.9	-423.0	-5.8	180.79	423.1
5,064.0	3.41	180.62	5,033.8	-426.8	-5.8	180.78	426.9
5,128.0	3.32	182.05	5,097.7	-430.6	-5.9	180.78	430.6
5,192.0	3.40	181.02	5,161.6	-434.3	-6.0	180.79	434.4
5,256.0	3.27	182.76	5,225.4	-438.0	-6.1	180.80	438.1
5,319.0	3.34	180.96	5,288.3	-441.7	-6.2	180.81	441.7
5,383.0	3.13	177.93	5,352.2	-445.3	-6.2	180.80	445.3
5,447.0	3.14	178.38	5,416.1	-448.8	-6.1	180.78	448.8
5,510.0	2.96	178.36	5,479.1	-452.1	-6.0	180.76	452.2
5,574.0	3.59	183.76	5,543.0	-455.8	-6.1	180.76	455.8
5,638.0	3.65	187.53	5,606.8	-459.8	-6.5	180.81	459.8
5,702.0	3.63	186.28	5,670.7	-463.8	-7.0	180.86	463.9
5,765.0	3.54	189.23	5,733.6	-467.7	-7.5	180.92	467.8
5,829.0	3.61	181.48	5,797.4	-471.7	-7.9	180.96	471.8
5,893.0	3.68	182.43	5,861.3	-475.8	-8.0	180.96	475.8
5,956.0	3.47	182.72	5,924.2	-479.7	-8.2	180.98	479.8
6,020.0	3.21	181.40	5,988.1	-483.4	-8.3	180.99	483.5

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,140.0	1,139.9	11.6	0.7	Gyro Tie-in
6,020.0	5,988.1	-483.4	-8.3	Last MWD Survey
6,070.0	6,038.0	-486.2	-8.4	Projection to Bit



Project: Eddy County, NM (NAN27 NME)
 Site: Electra Federal #57
 Well: Electra Federal #57
 Wellbore: OH
 Design: Plan #3 - 7-7/8" Hole



Azimuths to Grid North
 True North: -0.20°
 Magnetic North: 7.66°
 Magnetic Field
 Strength: 48990.3snT
 Dip Angle: 60.71°
 Date: 1/22/2011
 Model: IGRF2010

+N/-S +E/-W
 0.0 0.0

Northing
 674896.50

WELL DETAILS: Electra Federal #57
 KB Elev (12') @ 3720.0usft (Silver Oak #5)
 Ground Level: 3708.0
 Easting 32° 51' 17.392 N
 Latitude 103° 57' 52.668 W

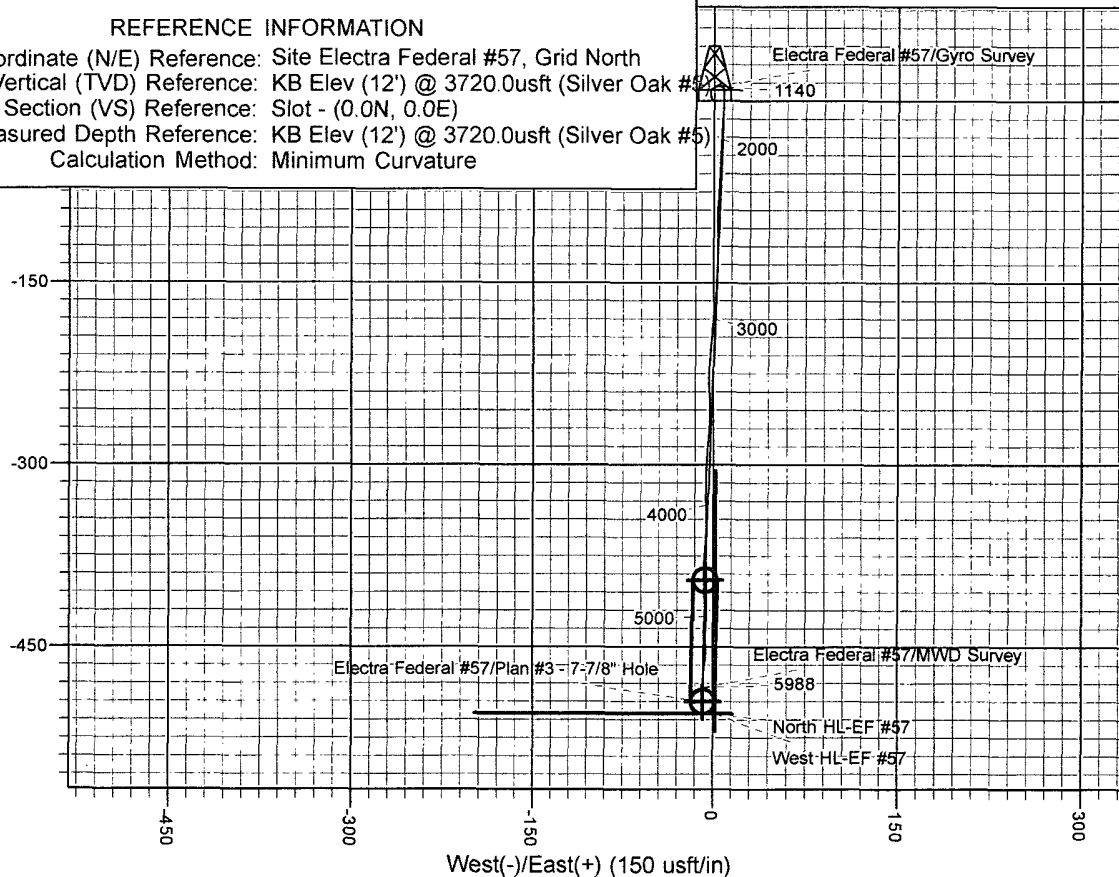
Longitude
 103° 57' 52.668 W

Slot

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Site Electra Federal #57, Grid North
 Vertical (TVD) Reference: KB Elev (12') @ 3720.0usft (Silver Oak #5)
 Section (VS) Reference: Slot - (0.0N, 0.0E)
 Measured Depth Reference: KB Elev (12') @ 3720.0usft (Silver Oak #5)
 Calculation Method: Minimum Curvature

South(-)/North(+) (150 usft/in)



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: Eddy County, NM (NAN27 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: Electra Federal #57
 Site Centre Latitude: 32° 51' 17.392 N
 Longitude: 103° 57' 52.668 W
 Positional Uncertainty: 0.0
 Convergence: 0.20
 Local North: Grid