



COG OPERATING LLC

Eddy County, NM (NAN27 NME)

Foster Eddy #24

Foster Eddy #24

OH - Job #32D0811785

30-015-39124

Survey: MWD Survey

SDI Standard Survey Report

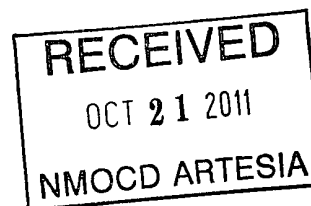
This survey is correct to the best of my knowledge and is supported by actual field data.

K. H. H. H.

Notarized this date 27th of September, 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 Foster Eddy #24
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (12') @ 3791 0usft (Basic #35)
Site:	Foster Eddy #24	MD Reference:	KB Elev (12') @ 3791 0usft (Basic #35)
Well:	Foster Eddy #24	North Reference:	Grid
Wellbore:	OH - Job #32D0811785	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	Foster Eddy #24		
Site Position:		Northing:	669,998 60 usft
From:	Map	Easting:	637,821 70 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 50' 27 985 N
		Longitude:	103° 53' 4 549 W
		Grid Convergence:	0 24 °

Well	Foster Eddy #24		
Well Position	+N/-S	0 0 usft	Northing:
	+E/-W	0 0 usft	Easting:
Position Uncertainty	0 0 usft	Wellhead Elevation:	usft
		Latitude:	32° 50' 27 985 N
		Longitude:	103° 53' 4 549 W
		Ground Level:	3,779 0 usft

Wellbore	OH - Job #32D0811785		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	8/19/2011	7 76
			Dip Angle
			(°)
			60 70
			Field Strength
			(nT)
			48,933

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
			(°)
			133 03

Survey Program	Date 10/9/2011		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100 0	1,710 0	Gyro Survey (OH - Job #32D0811785)	Keeper
1,848 0	4,999 0	MWD Survey (OH - Job #32D0811785)	MWD
			Description
			Standard Wireline Keeper ver 1 0 2
			MWD - Standard

Survey			
Measured Depth	Inclination	Azimuth	True Vertical
(usft)	(°)	(°)	Depth
0 0	0 00	0 00	0 0
100.0	0 41	293 40	100 0
200 0	0 36	312 07	200 0
300 0	0 45	319 99	300 0
400 0	0 46	314 56	400 0
500 0	0 43	337 40	500 0
600 0	0 36	30 02	600 0
700 0	0 33	30 28	700 0
800 0	0 41	32 52	800 0
900 0	0 44	31 51	900 0
1,000 0	0 40	38 47	1,000.0
			North/South
			(usft)
			0 0
			0 1
			0 5
			1 0
			1 6
			2 2
			2 8
			3 4
			3 9
			4 5
			5 1
			East/West
			(usft)
			0 0
			-0 3
			-0 9
			-1 4
			-1 9
			-2 3
			-2 3
			-2 0
			-1 7
			-1 3
			-0 9
			Closure Azimuth
			(°)
			0 00
			293 40
			299 07
			306 18
			309 69
			313 39
			320 57
			328 84
			336 59
			344 02
			350 27
			Closure Distance
			(usft)
			0 0
			0 4
			1 0
			1 7
			2 5
			3 2
			3 7
			3 9
			4 3
			4 7
			5 2



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Site:	Foster Eddy #24	MD Reference:	KB Elev (12') @ 3791 0usft (Basic #35)
Well:	Foster Eddy #24	North Reference:	Grid
Wellbore:	OH - Job #32D0811785	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 59	27 33	1,100 0	5 9	-0 4	355 84	5 9
1,200 0	0 65	35 90	1,200 0	6 8	0 1	1 20	6 8
1,300 0	0 77	47 57	1,300 0	7 7	1 0	7 19	7 8
1,400 0	1 03	55 19	1,399 9	8 7	2 2	14 28	8 9
1,500 0	0 88	49 06	1,499 9	9 7	3 5	20 00	10 3
1,600 0	0 79	46 24	1,599 9	10 7	4 6	23 35	11 6
1,700 0	0 76	39 81	1,699 9	11 6	5 5	25 37	12 9
1,710 0	0 54	34 14	1,709 9	11 7	5 6	25 48	13 0



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Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (12') @ 3791 0usft (Basic #35)
Site:	Foster Eddy #24	MD Reference:	KB Elev (12') @ 3791 0usft (Basic #35)
Well:	Foster Eddy #24	North Reference:	Grid
Wellbore:	OH - Job #32D0811785	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	Foster Eddy #24			
Site Position:		Northing:	669,998 60 usft	Latitude: 32° 50' 27 985 N
From:	Map	Easting:	637,821 70 usft	Longitude: 103° 53' 4 549 W
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"	Grid Convergence: 0 24 °

Well	Foster Eddy #24			
Well Position	+N/-S	0 0 usft	Northing:	669,998 60 usft
	+E/-W	0 0 usft	Easting:	637,821 70 usft
Position Uncertainty	0 0 usft	Wellhead Elevation:	usft	Ground Level: 3,779 0 usft

Wellbore	OH - Job #32D0811785				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	8/19/2011	7 76	60 70	48,933

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	133 03

Survey Program	Date	10/9/2011			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100 0	1,710 0	Gyro Survey (OH - Job #32D0811785)	Keeper	Standard Wireline Keeper ver 1 0 2	
1,848 0	4,999 0	MWD Survey (OH - Job #32D0811785)	MWD	MWD - Standard	

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,710 0	0 54	34 14	1,709 9	11 7	5 6	25 48	13 0
Gyro Tie-in							
1,848 0	0 38	342 20	1,847 9	12 7	5 8	24 59	14 0
1,943 0	0 24	339 60	1,942 9	13 2	5 7	23 18	14 4
2,006 0	0 64	108 92	2,005 9	13 2	5 9	24 21	14 5
2,069 0	1 59	131 78	2,068 9	12 5	6 9	28 96	14 3
2,132 0	2 48	126 31	2,131 9	11 1	8 7	37 95	14 1
2,195 0	3 29	124 56	2,194 8	9 3	11 3	50 49	14 6
2,259 0	2 62	138 70	2,258 7	7 1	13 7	62 52	15 5
2,322 0	2 92	138 56	2,321 6	4 9	15 8	72 85	16 5
2,386 0	3 78	138 31	2,385 5	2 1	18 2	83 54	18 3



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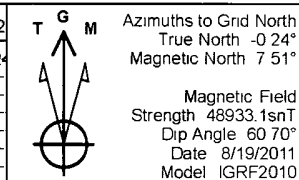
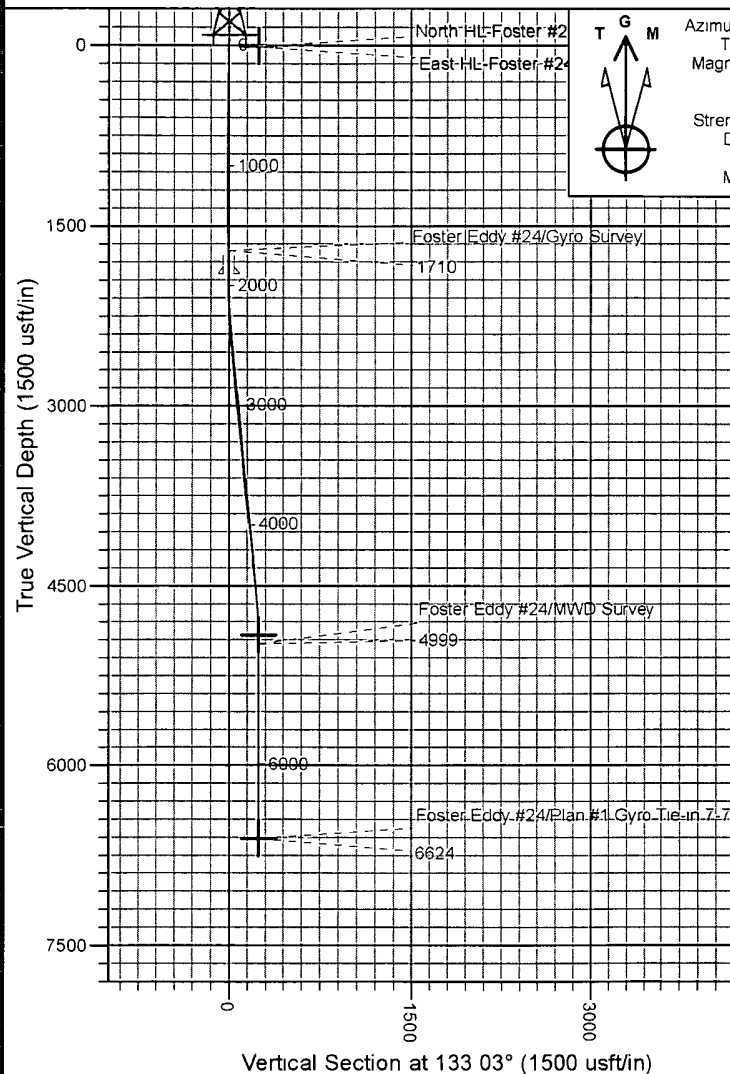
Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Well Foster Eddy #24
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (12') @ 3791 0usft (Basic #35)
Site:	Foster Eddy #24	MD Reference:	KB Elev (12') @ 3791 0usft (Basic #35)
Well:	Foster Eddy #24	North Reference:	Grid
Wellbore:	OH - Job #32D0811785	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)
2,449 0	4 63	129 66	2,448 3	-1 1	21 6	92 95	21 6
2,512 0	5 71	129 33	2,511 1	-4 7	26 0	100 31	26 4
2,608 0	5 52	126 29	2,606 6	-10 5	33 4	107 43	35 0
2,702 0	5 27	135 61	2,700 2	-16 2	40 0	112 08	43 2
2,797 0	5 55	136 86	2,794 8	-22 7	46 2	116 16	51 5
2,892 0	5 07	136 75	2,889 4	-29 1	52 2	119 13	59 8
2,987 0	5 51	139 26	2,984 0	-35 6	58 1	121 52	68 2
3,082 0	5 21	138 11	3,078 6	-42 3	64 0	123 48	76 7
3,177 0	6 09	135 92	3,173 1	-49 1	70 3	124 93	85 8
3,272 0	5 90	135 70	3,267 6	-56 2	77 3	126 06	95 6
3,367 0	5 89	135 13	3,362 1	-63 2	84 1	126 92	105 2
3,460 0	5 51	133 00	3,454 6	-69 6	90 7	127 50	114 4
3,555 0	5 38	132 00	3,549 2	-75 7	97 4	127 86	123 4
3,651 0	5 39	140 10	3,644 8	-82 2	103 6	128 42	132 3
3,747 0	5 29	139 90	3,740 3	-89 0	109 4	129 15	141 0
3,842 0	6 44	139 92	3,834 8	-96 5	115 6	129 84	150 6
3,936 0	6 34	141 69	3,928 3	-104 6	122 2	130 55	160 8
4,031 0	6 11	137 86	4,022 7	-112 4	128 9	131 10	171 0
4,126 0	5 93	135 03	4,117 2	-119 6	135 7	131 40	180 9
4,271 0	5 73	133 00	4,261 4	-129 9	146 3	131 59	195 6
4,314 0	5 85	137 84	4,304 2	-133 0	149 4	131 68	200 0
4,410 0	5 64	138 12	4,399 7	-140 1	155 8	131 97	209 5
4,505 0	5 59	137 85	4,494 3	-147 0	162 0	132 22	218 8
4,601 0	5 45	139 20	4,589 8	-153 9	168 1	132 48	228 0
4,664 0	4 76	139 91	4,652 6	-158 2	171 8	132 65	233 5
4,728 0	3 81	145 98	4,716 4	-162 0	174 7	132 84	238 2
4,791 0	2 55	152 18	4,779 3	-165 0	176 5	133 07	241 6
4,854 0	1 26	165 45	4,842 3	-166 9	177 3	133 26	243 5
4,918 0	0 56	82 68	4,906 3	-167 5	177 8	133 29	244 3
Last MWD Survey							
4,999 0	0 57	78 99	4,987 2	-167 4	178 6	133 15	244 8
Projection to bit							

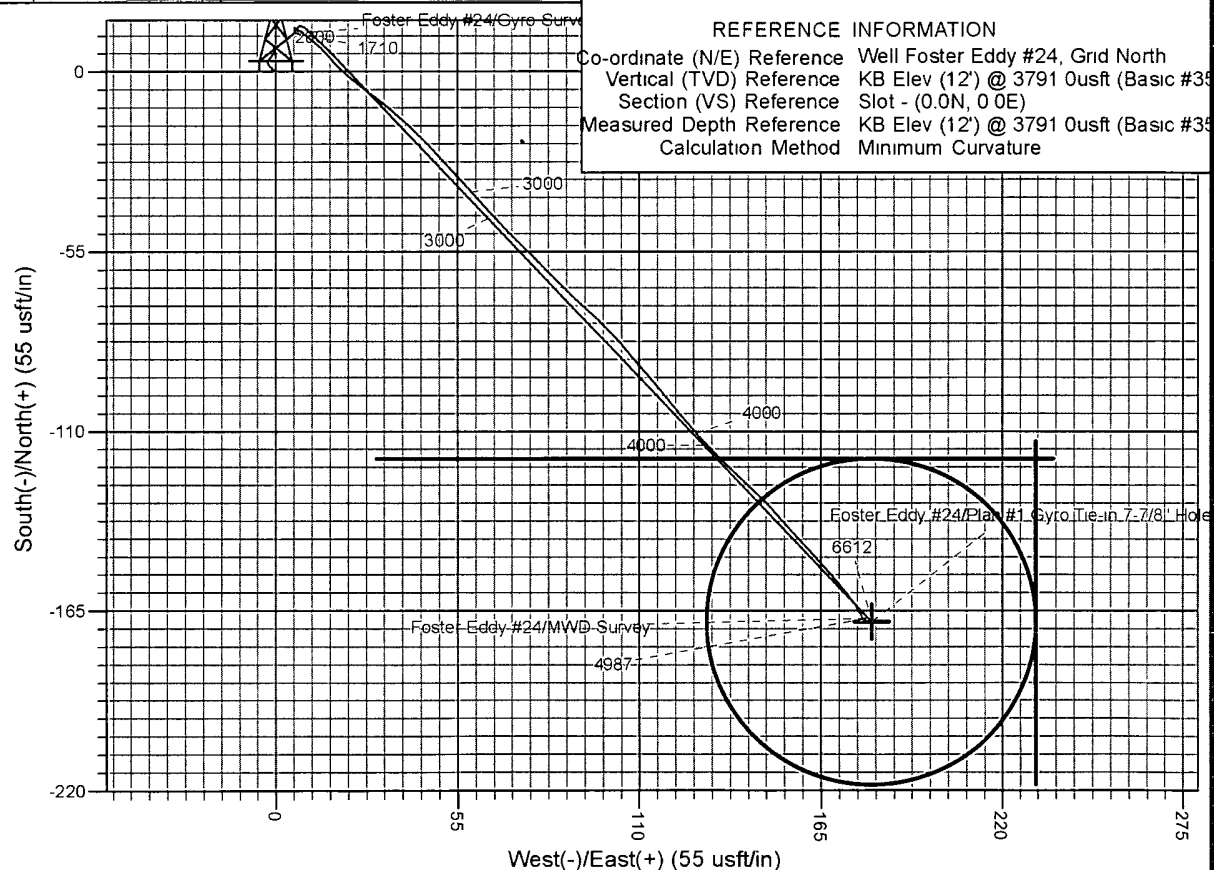
Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,710 0	1,709 9	11 7	5 6	Gyro Tie-in
4,918 0	4,906 3	-167 5	177 8	Last MWD Survey
4,999 0	4,987 2	-167 4	178 6	Projection to bit



Project: Eddy County, NM (NAN27 NME)
 Site: Foster Eddy #24
 Well: Foster Eddy #24
 Wellbore: OH - Job #32D0811785
 Design: Plan #1 Gyro Tie-in 7-7/8" Hole



WELL DETAILS Foster Eddy #24					Slot
KB Elev (12') @ 3791 0usft (Basic #35)					
Ground Level: 3779.0					
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	669998.60	637821.70	32° 50' 27.985 N	103° 53' 4.549 W



REFERENCE INFORMATION	
Co-ordinate (N/E) Reference	Well Foster Eddy #24, Grid North
Vertical (TVD) Reference	KB Elev (12') @ 3791 0usft (Basic #35)
Section (VS) Reference	Slot - (0.0N, 0.0E)
Measured Depth Reference	KB Elev (12') @ 3791 0usft (Basic #35)
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: Eddy County, NM (NAN27 NME)
 Geodetic System: 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: Foster Eddy #24
 Site Centre Latitude: 32° 50' 27.985 N
 Longitude: 103° 53' 4.549 W
 Positional Uncertainty: 0.0
 Convergence: 0.24
 Local North: Grid