



COG OPERATING LLC

Eddy County, NM (NAN27 NME)

Foster Eddy #23

Foster Eddy #23

OH - Job #32D0811740

3D-015-39123

Survey: MWD Survey

SDI Standard Survey Report

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

[Signature]

Notarized this date 27th of September, 2011.

[Signature]

Notary Signature
County of Midland
State of Texas





Scientific Drilling International, Inc.
SDI Standard Survey Report



Company: COG OPERATING LLC
Project: Eddy County, NM (NAN27 NME)
Site: Foster Eddy #23
Well: Foster Eddy #23
Wellbore: OH - Job #32D0811740
Design: Actual

Local Co-ordinate Reference: Well Foster Eddy #23
TVD Reference: KB Elev (13') @ 3771.0usft (JW #4)
MD Reference: KB Elev (13') @ 3771.0usft (JW #4)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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 #23		
Site Position:		Northing:	669,104.30 usft
From:	Map	Easting:	637,180.30 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 50' 19.163 N
		Longitude:	103° 53' 12.111 W
		Grid Convergence:	0.24'

Well	Foster Eddy #23		
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' 19.163 N
		Longitude:	103° 53' 12.111 W
		Ground Level:	3,758.0 usft

Wellbore	OH - Job #32D0811740		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	8/7/2011	(°)
			Dip Angle
			(°)
			Field Strength
			(nT)
			48,935

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
			(°)
			61.59

Survey Program	Date 10/9/2011		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.0	1,762.0	Gyro Survey (OH - Job #32D0811740)	Keeper
1,896.0	5,205.0	MWD Survey (OH - Job #32D0811740)	MWD
			Description
			Standard Wireline Keeper ver 1.0.2
			MWD - Standard

Survey								
Measured Depth	Inclination	Azimuth	True Vertical	North/South	East/West	Closure Azimuth	Closure Distance	
(usft)	(°)	(°)	Depth	(usft)	(usft)	(°)	(usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.0	0.0
100.0	0.51	201.18	100.0	-0.4	-0.2	201.18	0.4	
200.0	0.60	210.07	200.0	-1.3	-0.6	204.47	1.4	
300.0	0.70	193.05	300.0	-2.3	-1.0	202.89	2.5	
400.0	0.74	196.80	400.0	-3.5	-1.3	200.27	3.8	
500.0	0.74	195.37	500.0	-4.8	-1.7	199.20	5.1	
600.0	0.76	186.40	600.0	-6.1	-1.9	197.49	6.4	
700.0	0.62	199.75	700.0	-7.2	-2.2	196.68	7.6	
800.0	0.46	204.36	800.0	-8.1	-2.5	197.24	8.5	
900.0	0.22	214.32	899.9	-8.6	-2.8	197.91	9.1	
1,000.0	0.24	30.83	999.9	-8.6	-2.8	197.96	9.1	



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North Reference: Grid
Survey Calculation Method: Minimum Curvature
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 49	24 10	1,099 9	-8 0	-2 5	197 33	8 4
1,200 0	0 61	29 57	1,199 9	-7 2	-2 1	196 08	7 5
1,300 0	0 67	36 47	1,299 9	-6 3	-1 5	193 15	6 4
1,400 0	0 60	56 07	1,399 9	-5 5	-0 7	187 06	5 5
1,500 0	0 30	42 84	1,499 9	-5 0	-0 1	180 77	5 0
1,600 0	0 28	53 79	1,599 9	-4 7	0 3	176 24	4 7
1,700 0	0 24	289 04	1,699 9	-4 5	0 3	176 07	4 5
1,762 0	0 26	295 83	1,761 9	-4 4	0 1	179 25	4 4



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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 #23		
Site Position:		Northing:	669 104 30 usft
From:	Map	Easting:	637,180 30 usft
Position Uncertainty	0 0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 50' 19.163 N
		Longitude:	103° 53' 12.111 W
		Grid Convergence:	0 24

Well	Foster Eddy #23		
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' 19.163 N
		Longitude:	103° 53' 12.111 W
		Ground Level:	3,758.0 usft

Wellbore	OH - Job #32D0811740		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	8/7/2011	(°)
			7 76
			Dip Angle
			(°)
			60.70
			Field Strength
			(nT)
			48,935

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
			(°)
			61 59

Survey Program	Date 10/9/2011		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.0	1 762.0	Gyro Survey (OH - Job #32D0811740)	Keeper
1,896.0	5,205.0	MWD Survey (OH - Job #32D0811740)	MWD
			Description
			Standard Wireline Keeper ver 1 0 2
			MWD - Standard

Survey	Measured Depth	Inclination	Azimuth	True Vertical	North/South	East/West	Closure Azimuth	Closure Distance
	(usft)	(°)	(°)	Depth	(usft)	(usft)	(°)	(usft)
	1,762.0	0 26	295 83	1 761 9	-4 4	0 1	179 25	4.4
Gyro Tie-in								
	1,896.0	0,24	335 96	1,895 9	-4 0	-0 3	184.76	4 0
	1 958 0	0 24	98 43	1,957 9	-3 9	-0 3	183 77	3 9
	2,021 0	0 59	73 27	2,020 9	-3 8	0 2	177 19	3 8
	2,083 0	1 60	53 48	2,082 9	-3 2	1 2	159 57	3 4
	2,146 0	2 10	62 37	2,145 9	-2 1	2 9	126 13	3 6
	2 209 0	2 94	57 45	2,208 8	-0 7	5 3	97 78	5 4
	2,270 0	3 49	60 01	2,269 7	1 0	8 2	82.76	8 3
	2,333.0	3 55	67 81	2,332 6	2 7	11 7	76.81	12 0
	2,394 0	4 37	75 66	2,393 5	4 0	15 7	75.60	16 2



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Wellbore: OH - Job #32D0811740
Design: Actual

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MD Reference: KB Elev (13') @ 3771.0usft (JW #4)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM-Regulatory

Survey

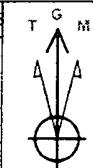
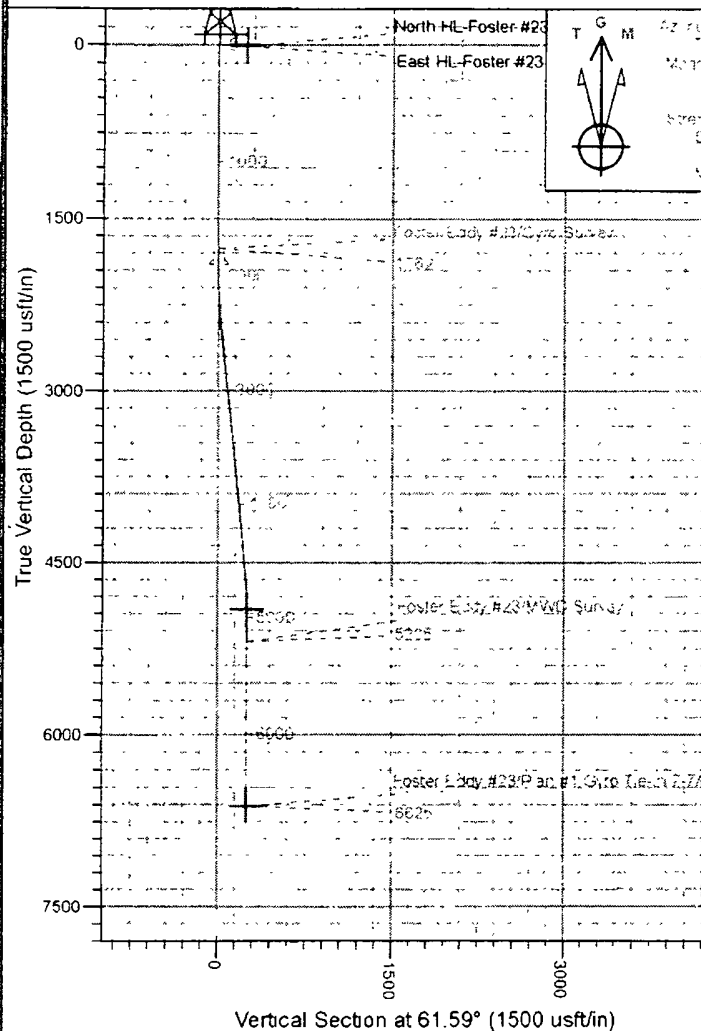
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
2,456.0	5.12	71.72	2,455.2	5.5	20.6	75.11	21.3
2,518.0	5.81	65.50	2,517.0	7.7	26.1	73.66	27.2
2,661.0	6.37	61.65	2,659.2	14.4	39.7	70.02	42.2
2,706.0	6.23	61.83	2,703.9	16.8	44.0	69.15	47.1
2,799.0	5.78	58.31	2,796.4	21.6	52.4	67.61	56.7
2,894.0	5.23	60.66	2,890.9	26.2	60.3	66.48	65.7
2,987.0	5.85	52.45	2,983.5	31.2	67.7	65.27	74.6
3,081.0	6.65	55.11	3,076.9	37.2	76.0	63.90	84.6
3,174.0	6.24	52.95	3,169.4	43.4	84.5	62.82	94.9
3,268.0	6.19	52.31	3,262.8	49.5	92.5	61.84	105.0
3,361.0	6.50	58.19	3,355.2	55.4	101.0	61.26	115.2
3,456.0	6.13	59.18	3,449.7	60.8	109.9	61.05	125.6
3,548.0	6.60	61.00	3,541.1	65.9	118.8	60.98	135.8
3,642.0	6.31	58.54	3,634.5	71.2	127.9	60.89	146.4
3,736.0	6.02	65.33	3,727.9	76.0	136.8	60.95	156.4
3,860.0	5.73	63.54	3,851.3	81.4	148.2	61.22	169.1
3,954.0	5.53	63.04	3,944.8	85.6	156.5	61.32	178.3
4,047.0	5.07	62.67	4,037.4	89.5	164.1	61.39	186.9
4,140.0	4.90	63.47	4,130.1	93.2	171.3	61.46	195.0
4,235.0	5.17	61.10	4,224.7	97.0	178.7	61.50	203.3
4,329.0	5.50	59.18	4,318.3	101.4	186.3	61.44	212.1
4,422.0	5.96	59.54	4,410.9	106.1	194.2	61.35	221.3
4,578.0	5.25	61.63	4,566.1	113.6	207.5	61.30	236.6
4,641.0	4.62	63.44	4,628.9	116.1	212.3	61.32	242.0
4,702.0	3.78	57.28	4,689.7	118.3	216.2	61.31	246.5
4,765.0	2.84	75.01	4,752.6	119.8	219.5	61.36	250.0
4,827.0	2.03	78.25	4,814.6	120.5	222.0	61.52	252.6
4,889.0	1.07	42.40	4,876.5	121.1	223.5	61.55	254.2
4,985.0	0.98	22.40	4,972.5	122.5	224.4	61.37	255.7
5,016.0	0.95	20.37	5,003.5	123.0	224.6	61.29	256.1
5,078.0	0.96	43.13	5,065.5	123.9	225.1	61.18	257.0
5,141.0	0.81	77.61	5,128.5	124.4	225.9	61.17	257.9
5,156.0	0.80	74.58	5,143.5	124.4	226.1	61.18	258.1
Last MWD Survey							
5,205.0	0.73	77.13	5,192.5	124.6	226.8	61.22	258.7
Projection to Bit							

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,762.0	1,761.9	-4.4	0.1	Gyro Tie-in
5,156.0	5,143.5	124.4	226.1	Last MWD Survey
5,205.0	5,192.5	124.6	226.8	Projection to Bit



Project: Eddy County, NM (NAN27 NME)
 Site: Foster Eddy #23
 Well: Foster Eddy #23
 Wellbore: OH - Job #32D0811740
 Design: Plan #1 Gyro Tie-in 7-7/8" Hole

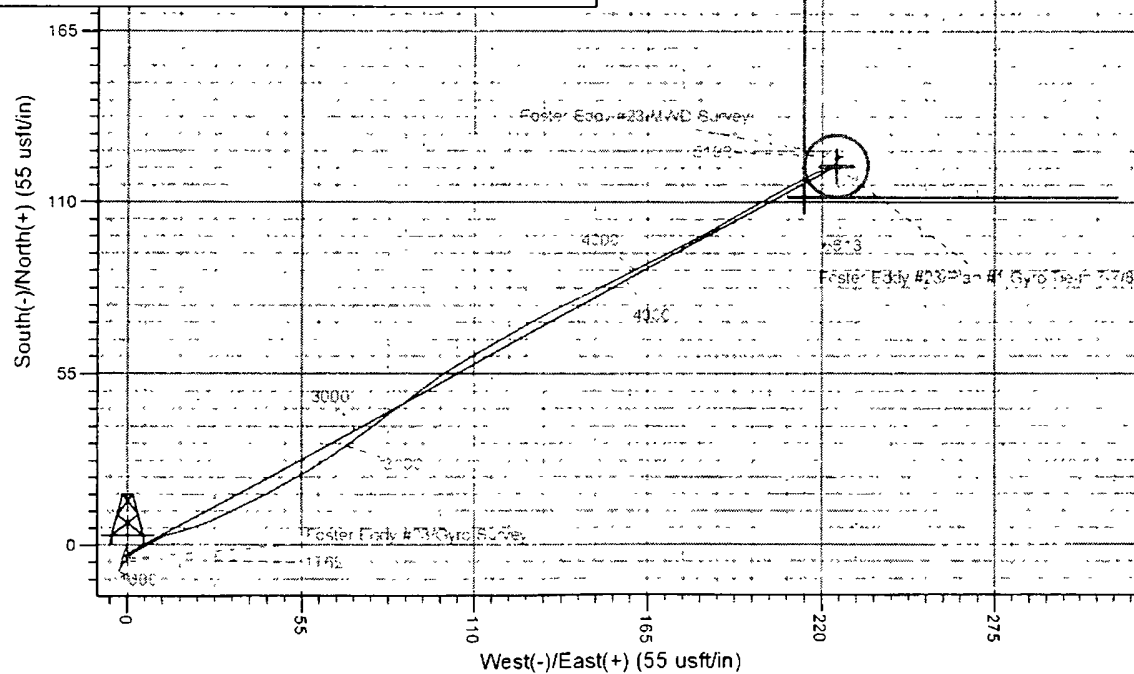


7.25 ft to Grid North
 True North -0.24
 Magnetic North -7.52
 Magnetic Field
 Strength: 43934 Gauss
 Distance: 6070
 Date: 8/7/2011
 User: GPR2010

+N/-S +E/-W Northing
 0.0 0.0 669104.30

WELL DETAILS: Foster Eddy #23
 KB Elev (13') @ 3771.0usft (JW #4)
 Ground Level: 3758.0
 Easting 637180.30
 Latitude 32° 50' 19.163 N
 Longitude 103° 53' 12.111 W
 Slot

REFERENCE INFORMATION
 Co-ordinate (N/E): Reference: Well: Foster Eddy #23, Grid North
 Vertical (TVD): Reference: KB Elev (13') @ 3771.0usft (JW #4)
 Section (VS): Reference: Slot: (0.0in, 0.0CE)
 Measured Depth Reference: KB Elev (13') @ 3771.0usft (JW #4)
 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: NAD 83 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 #23
 Site Centre Latitude: 32° 50' 19.163 N
 Longitude: 103° 53' 12.111 W
 Positional Uncertainty: 0.0
 Convergence: 0.24
 Local North: Grid