

30-015-37823

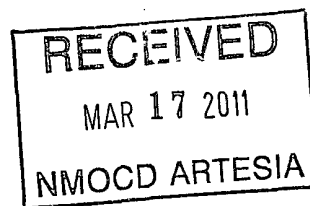
COG OPERATING LLC

Eddy County, NM (NAN27 NME)

Tex Mack 11 Fed #39

Tex Mack 11 Fed #39

DH - Job #32D0111027



Survey: MWD Survey

SDI Standard Survey Report

03 February, 2011

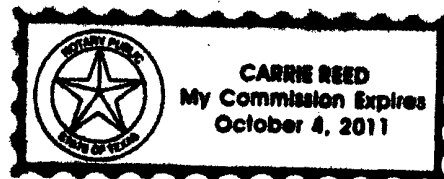
This survey is correct to the best of my knowledge and is supported by actual field data.

[Signature]

Notarized this date 3rd of February, 2011.

[Signature]

Notary Signature
County of Midland
State of Texas



Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Tex Mack 11 Fed #39
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (12') @ 3948.0usft (Basic #35)
Site:	Tex Mack 11 Fed #39	MD Reference:	KB Elev (12') @ 3948.0usft (Basic #35)
Well:	Tex Mack 11 Fed #39	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	Tex Mack 11 Fed #39		
Site Position:		Northing:	671,251.60 usft
From:	Map	Easting:	650,994.20 usft
Position Uncertainty:	0.0 usft	Slot Radius:	0"
		Latitude:	32° 50' 39.804 N
		Longitude:	103° 50' 30.086 W
		Grid Convergence:	0.27 °

Well	Tex Mack 11 Fed #39		
Well Position	+N/-S	0.0 usft	Northing: 671,251.60 usft
	+E/-W	0.0 usft	Easting: 650,994.20 usft
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Ground Level:	3,936.0 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	1/13/2011	7.81
			Dip Angle (°)
			60.72
			Field Strength (nT)
			48,999

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
			(°)
			82.48

Survey Program	Date 2/3/2011		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.0	1,830.0	Gyro Survey (OH)	Keeper
1,940.0	5,684.0	MWD Survey (OH)	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	0.10	57.80	100.0	0.0	0.1	57.80	0.1	0.1
200.0	0.06	41.34	200.0	0.1	0.2	54.02	0.2	0.2
300.0	0.17	319.78	300.0	0.3	0.1	23.02	0.3	0.3
400.0	0.23	319.37	400.0	0.6	-0.1	349.16	0.6	0.6
500.0	0.28	331.09	500.0	0.9	-0.4	338.87	1.0	1.0
600.0	0.20	327.03	600.0	1.3	-0.6	336.05	1.4	1.4
700.0	0.24	331.44	700.0	1.6	-0.8	334.62	1.8	1.8
800.0	0.39	357.03	800.0	2.1	-0.9	337.56	2.3	2.3
900.0	0.37	356.68	900.0	2.8	-0.9	341.83	2.9	2.9
1,000.0	0.53	13.62	1,000.0	3.6	-0.8	346.95	3.7	3.7

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Site:	Tex Mack 11 Fed #39	MD Reference:	KB Elev (12') @ 3948.0usft (Basic #35)
Well:	Tex Mack 11 Fed #39	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	0.64	18.00	1,100.0	4.5	-0.5	353.17	4.6
1,200.0	0.70	11.14	1,200.0	5.7	-0.3	357.44	5.7
1,300.0	0.81	11.44	1,300.0	7.0	0.0	0.03	7.0
1,400.0	0.72	5.05	1,400.0	8.3	0.2	1.38	8.3
1,500.0	0.74	39.48	1,500.0	9.4	0.7	4.04	9.4
1,600.0	0.93	54.95	1,599.9	10.4	1.7	9.52	10.5
1,700.0	1.40	55.46	1,699.9	11.5	3.4	16.47	12.0
1,800.0	1.36	72.55	1,799.9	12.6	5.5	23.80	13.8
1,830.0	1.32	68.41	1,829.9	12.8	6.2	25.85	14.2

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,830.0	1,829.9	12.8	6.2	Gyro tie-in

Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Tex Mack 11 Fed #39
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (12') @ 3948.0usft (Basic #35)
Site:	Tex Mack 11 Fed #39	MD Reference:	KB Elev (12') @ 3948.0usft (Basic #35)
Well:	Tex Mack 11 Fed #39	North Reference:	Grid
Wellbore:	DH - Job #32D0111027	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	Tex Mack 11 Fed #39		
Site Position:		Northing:	671,251.60 usft
From:	Map	Easting:	650,994.20 usft
Position Uncertainty:	0.0 usft	Slot Radius:	0"
		Latitude:	32° 50' 39.804 N
		Longitude:	103° 50' 30.086 W
		Grid Convergence:	0.27 °

Well	Tex Mack 11 Fed #39		
Well Position	+N/-S	0.0 usft	Latitude: 32° 50' 39.804 N
	+E/-W	0.0 usft	Longitude: 103° 50' 30.086 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Ground Level:	3,936.0 usft

Wellbore	DH - Job #32D0111027				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	1/13/2011	7.81	60.72	48,999

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	82.48

Survey Program	Date	2/3/2011			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	1,830.0	Gyro Survey (DH - Job #32D0111027)	Keeper	Standard Wireline Keeper ver 1.0.2	
1,940.0	5,584.0	MWD Survey (DH - Job #32D0111027)	MWD	MWD - Standard	

Survey							
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
1,830.0	1.32	68.41	1,829.9	12.8	6.2	25.85	14.2
1,940.0	0.95	77.08	1,939.9	13.5	8.3	31.54	15.8
2,004.0	2.14	81.05	2,003.8	13.8	10.0	35.88	17.0
2,067.0	4.26	82.09	2,066.7	14.3	13.5	43.26	19.6
2,131.0	4.66	80.86	2,130.5	15.0	18.4	50.71	23.7
2,194.0	4.66	77.64	2,193.3	16.0	23.4	55.65	28.3
2,257.0	4.44	87.43	2,256.1	16.6	28.3	59.57	32.9
2,320.0	4.07	86.85	2,319.0	16.9	33.0	62.91	37.1
2,384.0	4.59	85.96	2,382.8	17.2	37.8	65.57	41.5
2,447.0	4.41	87.91	2,445.6	17.5	42.8	67.80	46.2
2,510.0	4.11	90.04	2,508.4	17.5	47.4	69.71	50.6

Scientific Drilling International, Inc.
SDI Standard Survey Report

Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Tex Mack 11 Fed #39
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (12') @ 3948.0usft (Basic #35)
Site:	Tex Mack 11 Fed #39	MD Reference:	KB Elev (12') @ 3948.0usft (Basic #35)
Well:	Tex Mack 11 Fed #39	North Reference:	Grid
Wellbore:	DH - Job #32D0111027	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)
2,574.0	3.83	89.92	2,572.3	17.5	51.9	71.32	54.8
2,637.0	4.20	83.03	2,635.1	17.8	56.3	72.42	59.0
2,701.0	3.81	85.55	2,698.9	18.3	60.7	73.25	63.4
2,764.0	4.41	81.50	2,761.8	18.8	65.2	73.92	67.9
2,828.0	4.16	83.19	2,825.6	19.4	69.9	74.47	72.6
2,892.0	3.83	81.20	2,889.5	20.0	74.4	74.92	77.0
2,955.0	4.48	81.23	2,952.3	20.7	78.9	75.27	81.5
3,018.0	4.39	77.84	3,015.1	21.6	83.7	75.51	86.4
3,081.0	4.50	86.39	3,077.9	22.3	88.5	75.87	91.2
3,144.0	4.25	92.95	3,140.7	22.3	93.3	76.55	95.9
3,208.0	3.99	89.22	3,204.6	22.2	97.9	77.21	100.4
3,269.0	4.62	86.16	3,265.4	22.4	102.4	77.66	104.9
3,332.0	4.27	87.23	3,328.2	22.7	107.3	78.06	109.7
3,396.0	3.99	86.86	3,392.0	22.9	111.9	78.42	114.2
3,460.0	5.45	85.76	3,455.8	23.3	117.2	78.76	119.5
3,523.0	5.25	86.04	3,518.5	23.7	123.0	79.10	125.3
3,587.0	5.17	85.70	3,582.3	24.1	128.8	79.40	131.1
3,651.0	5.31	83.44	3,646.0	24.7	134.6	79.62	136.9
3,715.0	4.37	84.95	3,709.8	25.2	140.0	79.79	142.3
3,779.0	4.16	87.57	3,773.6	25.5	144.8	79.99	147.0
3,842.0	3.99	83.41	3,836.4	25.9	149.2	80.16	151.5
3,906.0	3.88	84.83	3,900.3	26.3	153.6	80.27	155.8
3,969.0	4.09	86.11	3,963.1	26.7	158.0	80.41	160.2
4,032.0	3.97	83.88	4,026.0	27.1	162.4	80.53	164.6
4,096.0	4.16	85.22	4,089.8	27.5	166.9	80.64	169.1
4,157.0	4.19	86.37	4,150.7	27.8	171.3	80.77	173.6
4,220.0	3.76	89.35	4,213.5	28.0	175.7	80.95	177.9
4,284.0	3.65	88.08	4,277.4	28.1	179.8	81.12	182.0
4,347.0	3.79	83.60	4,340.2	28.4	183.9	81.22	186.1
4,411.0	3.70	84.39	4,404.1	28.8	188.0	81.29	190.2
4,475.0	4.11	84.42	4,468.0	29.2	192.4	81.36	194.6
4,538.0	3.94	81.04	4,530.8	29.8	196.8	81.39	199.0
4,599.0	4.88	77.49	4,591.6	30.7	201.4	81.33	203.7
4,664.0	5.51	82.83	4,656.4	31.7	207.2	81.31	209.6
4,727.0	5.32	93.77	4,719.1	31.9	213.1	81.49	215.4
4,791.0	5.32	95.94	4,782.8	31.4	219.0	81.85	221.2
4,855.0	4.35	92.51	4,846.6	31.0	224.4	82.15	226.5
4,918.0	4.35	94.19	4,909.4	30.7	229.1	82.38	231.2
4,981.0	3.44	88.90	4,972.2	30.5	233.4	82.55	235.4
5,045.0	2.40	93.24	5,036.2	30.5	236.7	82.66	238.6
5,108.0	1.38	102.27	5,099.1	30.3	238.7	82.78	240.6
5,172.0	1.11	112.94	5,163.1	29.9	240.0	82.91	241.9
5,235.0	0.45	125.83	5,226.1	29.5	240.8	83.02	242.6
5,297.0	0.38	179.30	5,288.1	29.1	241.0	83.11	242.8

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SDI Standard Survey Report

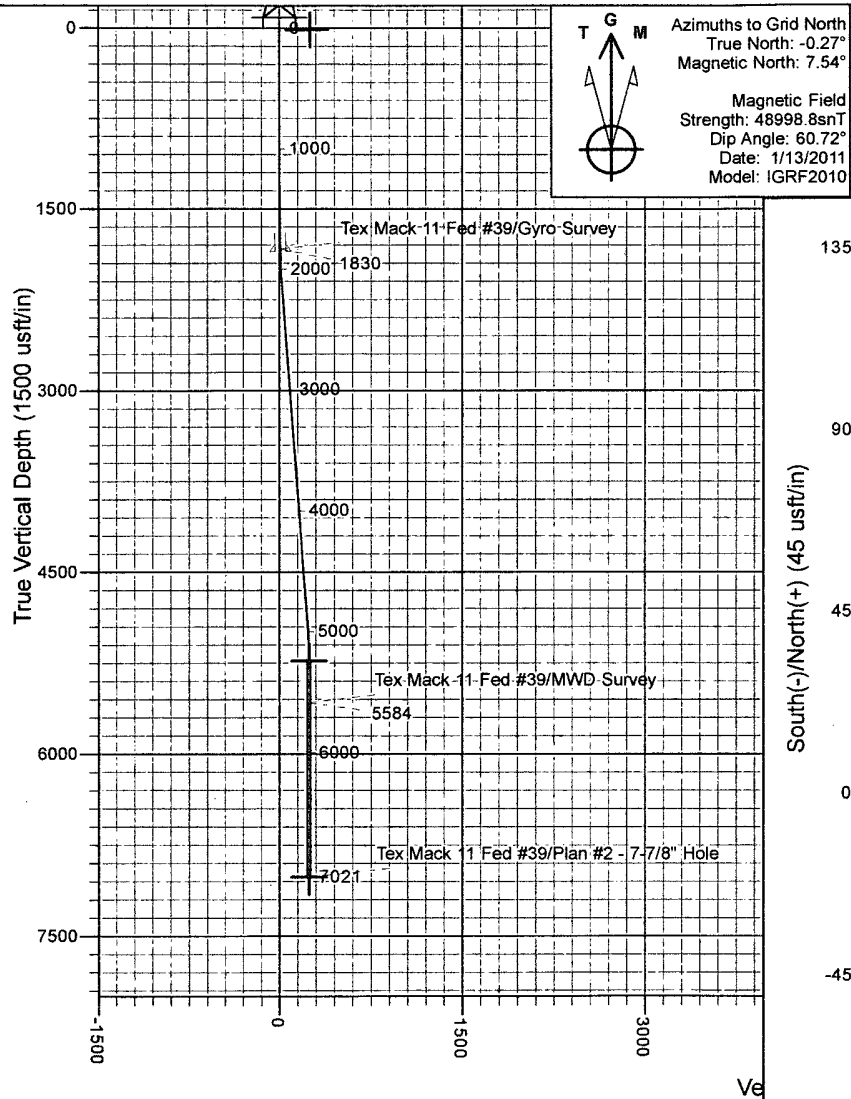
Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Tex Mack 11 Fed #39
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (12') @ 3948.0usft (Basic #35)
Site:	Tex Mack 11 Fed #39	MD Reference:	KB Elev (12') @ 3948.0usft (Basic #35)
Well:	Tex Mack 11 Fed #39	North Reference:	Grid
Wellbore:	DH - Job #32D0111027	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)
5,393.0	0.38	234.80	5,384.1	28.6	240.8	83.22	242.4
5,584.0	0.68	232.40	5,575.1	27.6	239.3	83.43	240.9

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,584.0	5,575.1	27.6	239.3	Last MWD Survey
5,684.0	5,675.1	26.8	238.4	Projection to Bit



Project: Eddy County, NM (NAN27 NME)
 Site: Tex Mack 11 Fed #39
 Well: Tex Mack 11 Fed #39
 Wellbore: DH - Job #32D0111027
 Design: Plan #2 - 7-7/8" Hole



Azimuths to Grid North
 True North: -0.27°
 Magnetic North: 7.54°
 Magnetic Field
 Strength: 48998.8snT
 Dip Angle: 60.72°
 Date: 1/13/2011
 Model: IGRF2010

+N/-S
 0.0

+E/-W
 0.0

Northing
 671251.60

WELL DETAILS: Tex Mack 11 Fed #39
 KB Elev (12') @ 3948.0usft (Basic #35)
 Ground Level: 3936.0

Easting
 650994.20

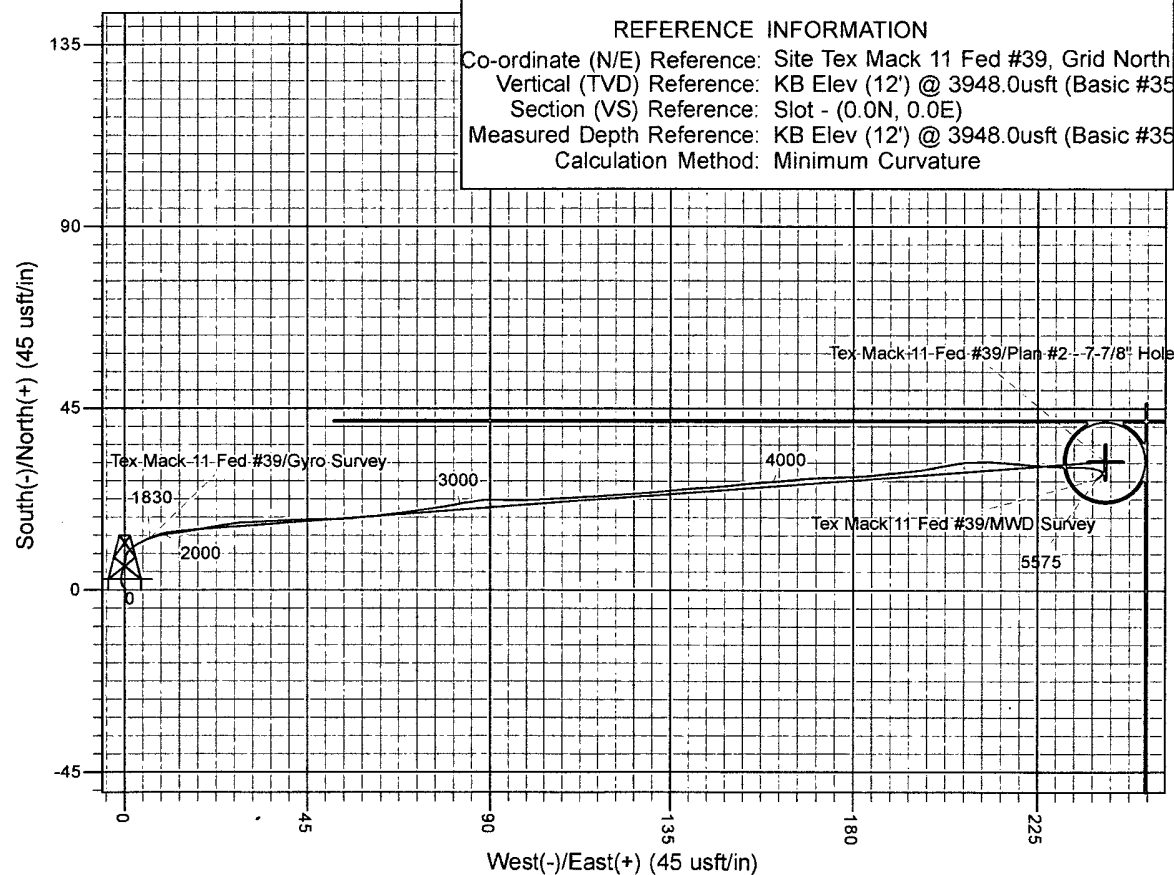
Latitude
 32° 50' 39.804 N

Longitude
 103° 50' 30.086 W

Slot

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Site Tex Mack 11 Fed #39, Grid North
 Vertical (TVD) Reference: KB Elev (12') @ 3948.0usft (Basic #35)
 Section (VS) Reference: Slot - (0.0N, 0.0E)
 Measured Depth Reference: KB Elev (12') @ 3948.0usft (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: 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: Tex Mack 11 Fed #39
 Site Centre Latitude: 32° 50' 39.804 N
 Longitude: 103° 50' 30.086 W
 Positional Uncertainty: 0.0
 Convergence: 0.27
 Local North: Grid