

30-015-40009

COG Operating, LLC

EDDY COUNTY, NEW MEXICO

TEX-MACK 11 FEDERAL #32

TEX-MACK 11 FEDERAL #32

ORIGINAL HOLE

Plan: OH

Surface: 307' FNL, 1873' FWL, Sec 11, T17S, R31E, Unit C

PBHL: 940' FNL, 2260' FWL, Sec 11, T17S, R31E, Unit C @ 7000' TVD

Top of Paddock @ 5200' TVD

Final Survey Report

18 April, 2012



Childress Directional Drilling Survey Report

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well TEX-MACK 11 FEDERAL #32
Project:	EDDY COUNTY, NEW MEXICO	TVD Reference:	WELL @ 3960 00usft (Original Well Elev)
Site:	TEX-MACK 11 FEDERAL #32	MD Reference:	WELL @ 3960 00usft (Original Well Elev)
Well:	TEX-MACK 11 FEDERAL #32	North Reference:	Grid
Wellbore:	ORIGINAL HOLE	Survey Calculation Method:	Minimum Curvature
Design:	ORIGINAL HOLE	Database:	EDM 5000 1 Single User Db

Project	EDDY COUNTY, NEW MEXICO		
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 FEDERAL #32		
Site Position:		Northing:	675,273.70 usft
From:	Map	Easting:	650,786.60 usft
Position Uncertainty:	0 00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 51' 19.612 N
		Longitude:	103° 50' 32.301 W
		Grid Convergence:	0 27 °

Well:	TEX-MACK 11 FEDERAL #32		
Well Position	+N/-S	0.00 usft	Northing:
	+E/-W	0 00 usft	Easting:
Position Uncertainty	0 00 usft	Wellhead Elevation:	usf
		Latitude:	32° 51' 19.612 N
		Longitude:	103° 50' 32.301 W
		Ground Level:	3,960 00 usf

Wellbore	ORIGINAL HOLE		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	4/4/2012	7 66
			Dip Angle
			(°)
			60.70
			Field Strength
			(nT)
			48,882

Design	ORIGINAL HOLE		
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
			(°)
			148.18

Survey Program	Date 4/18/2012		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100 00	1,900.00	VES GYRO (ORIGINAL HOLE)	NS-GYRO-MS
2,006 00	6,818 00	MWD Surveys (ORIGINAL HOLE)	MWD
			Description
			North sensing gyrocompassing m/s
			MWD - Standard

Survey	Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn
	Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate
	(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 06	242.40	100 00	-0.02	-0 05	0.00	0 06	0 06	0 00
	200.00	0 04	199.94	200 00	-0 08	-0 10	0.01	0 04	-0 02	-42 46
	300 00	0 05	167 95	300.00	-0 16	-0 11	0 08	0 03	0 01	-31 99
	400 00	0 01	206 43	400 00	-0.21	-0.10	0.12	0 04	-0 04	38 48
	500 00	0 06	222.94	500.00	-0.25	-0 14	0.14	0 05	0 05	16.51
	600 00	0 14	199.35	600 00	-0.41	-0 22	0 23	0 09	0 08	-23.59
	700 00	0 09	198 52	700.00	-0 60	-0.28	0 36	0.05	-0.05	-0 83
	800.00	0 06	231 83	800 00	-0 70	-0 35	0.41	0 05	-0 03	33 31
	900.00	0.12	271 89	900.00	-0 73	-0 50	0.36	0 08	0 06	40.06



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Site:	TEX-MACK 11 FEDERAL #32	MD Reference:	WELL @ 3960.00usft (Original Well Elev)
Well:	TEX-MACK 11 FEDERAL #32	North Reference:	Grid
Wellbore:	ORIGINAL HOLE	Survey Calculation Method:	Minimum Curvature
Design:	ORIGINAL HOLE	Database:	EDM 5000 1 Single User Db

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	0.13	285.26	1,000.00	-0.70	-0.71	0.22	0.03	0.01	13.37
1,100.00	0.09	307.77	1,100.00	-0.62	-0.88	0.06	0.06	-0.04	22.51
1,200.00	0.10	267.09	1,200.00	-0.58	-1.03	-0.05	0.07	0.01	-40.68
1,300.00	0.06	249.09	1,300.00	-0.60	-1.17	-0.10	0.05	-0.04	-18.00
1,400.00	0.34	97.53	1,400.00	-0.66	-0.92	0.07	0.39	0.28	-151.56
1,500.00	0.93	59.81	1,499.99	-0.29	0.07	0.28	0.69	0.59	-37.72
1,600.00	1.22	35.20	1,599.97	0.99	1.39	-0.11	0.54	0.29	-24.61
1,700.00	1.46	25.15	1,699.95	3.01	2.54	-1.22	0.34	0.24	-10.05
1,800.00	1.77	35.60	1,799.91	5.42	3.99	-2.51	0.43	0.31	10.45
1,900.00	1.53	59.57	1,899.87	7.35	6.04	-3.07	0.72	-0.24	23.97
2,006.00	1.50	70.20	2,005.83	8.54	8.56	-2.74	0.27	-0.03	10.03
2,101.00	1.80	77.80	2,100.79	9.28	11.19	-1.98	0.39	0.32	8.00
2,195.00	2.20	99.10	2,194.74	9.30	14.41	-0.31	0.89	0.43	22.66
2,288.00	2.80	119.80	2,287.65	7.89	18.15	2.86	1.16	0.65	22.26
2,389.00	3.40	119.60	2,388.50	5.19	22.89	7.66	0.59	0.59	-0.20
2,483.00	4.20	119.50	2,482.29	2.11	28.31	13.13	0.85	0.85	-0.11
2,577.00	4.70	125.80	2,576.01	-1.83	34.43	19.71	0.74	0.53	6.70
2,671.00	5.60	131.80	2,669.63	-7.14	40.97	27.67	1.11	0.96	6.38
2,765.00	6.70	131.90	2,763.09	-13.86	48.47	37.34	1.17	1.17	0.11
2,859.00	7.80	129.70	2,856.33	-21.60	57.46	48.65	1.21	1.17	-2.34
2,952.00	8.90	127.40	2,948.35	-30.00	68.04	61.36	1.24	1.18	-2.47
3,046.00	9.20	130.70	3,041.18	-39.32	79.51	75.33	0.64	0.32	3.51
3,141.00	9.10	140.90	3,134.98	-50.10	90.01	90.03	1.71	-0.11	10.74
3,235.00	9.20	146.90	3,227.78	-62.16	98.80	104.91	1.02	0.11	6.38
3,329.00	8.80	150.40	3,320.62	-74.71	106.45	119.61	0.72	-0.43	3.72
3,423.00	8.80	149.90	3,413.52	-87.18	113.61	133.98	0.08	0.00	-0.53
3,517.00	9.10	150.90	3,506.37	-99.90	120.83	148.59	0.36	0.32	1.06
3,611.00	9.70	153.90	3,599.11	-113.51	127.93	163.90	0.82	0.64	3.19
3,705.00	9.30	153.60	3,691.82	-127.42	134.79	179.34	0.43	-0.43	-0.32
3,799.00	9.10	154.10	3,784.61	-140.91	141.42	194.29	0.23	-0.21	0.53
3,893.00	8.90	153.00	3,877.46	-154.08	147.96	208.93	0.28	-0.21	-1.17
4,081.00	9.20	150.60	4,063.12	-180.13	161.94	238.44	0.26	0.16	-1.28
4,175.00	8.90	151.40	4,155.95	-193.06	169.11	253.21	0.35	-0.32	0.85
4,269.00	9.30	151.40	4,248.76	-206.11	176.23	268.05	0.43	0.43	0.00
4,363.00	9.10	150.90	4,341.55	-219.28	183.48	283.06	0.23	-0.21	-0.53
4,458.00	8.70	151.40	4,435.41	-232.15	190.57	297.74	0.43	-0.42	0.53
4,551.00	9.50	151.80	4,527.24	-245.09	197.57	312.42	0.86	0.86	0.43
4,645.00	9.30	150.00	4,619.98	-258.50	205.03	327.75	0.38	-0.21	-1.91
4,739.00	9.40	151.10	4,712.73	-271.80	212.54	343.01	0.22	0.11	1.17
4,833.00	8.90	151.10	4,805.53	-284.89	219.76	357.94	0.53	-0.53	0.00
4,926.00	9.00	152.20	4,897.40	-297.62	226.63	372.38	0.21	0.11	1.18
5,020.00	8.60	152.20	4,990.29	-310.34	233.34	386.73	0.43	-0.43	0.00
5,114.00	9.20	151.40	5,083.16	-323.15	240.21	401.24	0.65	0.64	-0.85



hildress Directional DrillingSurvey Report

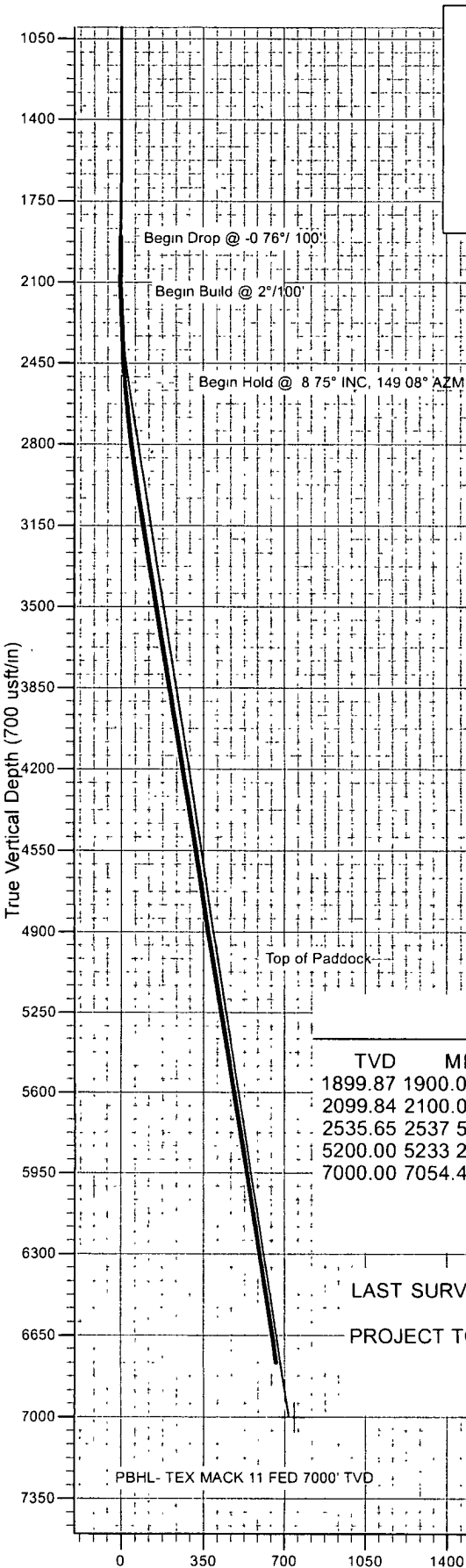
Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well TEX-MACK 11 FEDERAL #32
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Site:	TEX-MACK 11 FEDERAL #32	MD Reference:	WELL @ 3960 00usft (Original Well Elev)
Well:	TEX-MACK 11 FEDERAL #32	North Reference:	Gnd
Wellbore:	ORIGINAL HOLE	Survey Calculation Method:	Minimum Curvature
Design:	ORIGINAL HOLE	Database:	EDM 5000 1 Single User Db

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)
5,207.00	8.80	150.40	5,175.01	-335.87	247.29	415.77	0.46	-0.43	-1.08
5,302.00	9.30	151.30	5,268.83	-348.92	254.56	430.70	0.55	0.53	0.95
5,396.00	9.10	152.90	5,361.62	-362.20	261.60	445.69	0.35	-0.21	1.70
5,490.00	9.10	151.80	5,454.44	-375.37	268.49	460.52	0.19	0.00	-1.17
5,584.00	8.60	151.30	5,547.32	-388.08	275.38	474.95	0.54	-0.53	-0.53
5,678.00	9.20	151.60	5,640.19	-400.86	282.33	489.47	0.64	0.64	0.32
5,771.00	9.00	149.90	5,732.02	-413.69	289.52	504.16	0.36	-0.22	-1.83
5,866.00	8.80	150.00	5,825.87	-426.41	296.88	518.86	0.21	-0.21	0.11
5,960.00	9.20	149.70	5,918.72	-439.13	304.26	533.55	0.43	0.43	-0.32
6,053.00	9.10	150.40	6,010.53	-451.94	311.65	548.33	0.16	-0.11	0.75
6,147.00	8.70	149.70	6,103.40	-464.54	318.90	562.87	0.44	-0.43	-0.74
6,241.00	9.00	148.80	6,196.28	-476.97	326.30	577.33	0.35	0.32	-0.96
6,336.00	9.10	148.30	6,290.10	-489.72	334.10	592.27	0.13	0.11	-0.53
6,430.00	8.60	148.50	6,382.98	-502.03	341.68	606.73	0.53	-0.53	0.21
6,525.00	8.90	149.50	6,476.87	-514.42	349.12	621.18	0.35	0.32	1.05
6,618.00	8.80	149.30	6,568.77	-526.74	356.40	635.49	0.11	-0.11	-0.22
6,713.00	7.70	147.40	6,662.78	-538.35	363.54	649.12	1.19	-1.16	-2.00
6,818.00	7.70	145.60	6,766.84	-550.08	371.30	663.18	0.23	0.00	-1.71
PBHL- TEX MACK 11 FED									

Design Targets									
Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
hit/miss target									
Shape									
PBHL- TEX MACK 11	0.00	0.00	7,000.00	-629.50	390.60	674,644.20	651,177.20	32° 51' 13.365 N	103° 50' 27.756 W
- actual wellpath misses target center by 247.07usft at 6818.00usft MD (6766.84 TVD, -550.08 N, 371.30 E)									
- Circle (radius 50.00)									



WELL DETAILS TEX-MACK 11 FEDERAL #32			
Ground Level	3960.00		
Northing	Easting	Latitude	Longitude
675273.70	650786.60	32° 51' 19.612 N	103° 50' 32.301 W

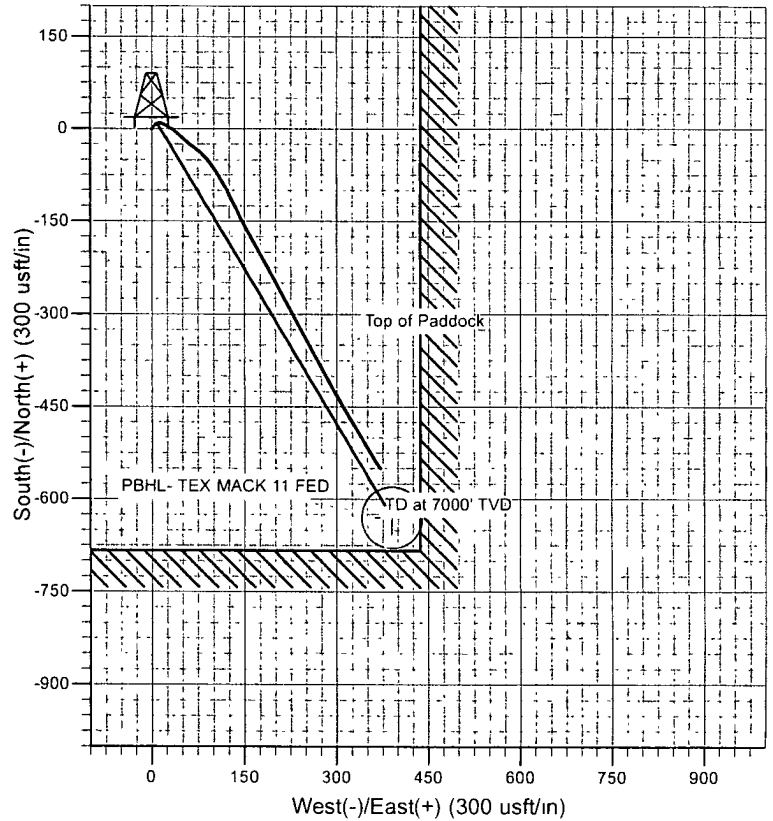


Azimuths to Grid North
True North: -0.27°
Magnetic North: 7.39°

Magnetic Field
Strength: 48882.3snT
Dip Angle: 60.70°
Date: 4/4/2012
Model: IGRF2010

LEGEND

- TEX-MACK 11 FEDERAL #32, ORIGINAL HOLE, Plan1Rev1 V0
- MWD Surveys



ANNOTATIONS

TVD	MD	Inc	Azi	+N/-S	+E/-W	V	Departure	Annotation
1899.87	1900.00	1.53	59.57	7.35	6.03	-3.06	0.00	Begin Drop @ -0.76°/ 100'
2099.84	2100.00	0.00	0.00	8.71	8.33	-3.00	2.67	Begin Build @ 2°/100'
2535.65	2537.50	8.75	149.08	-19.90	25.46	30.34	36.01	Begin Hold @ 8.75° INC, 149.08° AZM
5200.00	5233.23	8.75	149.08	-371.70	236.19	440.37	446.10	Top of Paddock
7000.00	7054.43	8.75	149.08	-609.37	378.55	717.38	723.14	TD at 7000' TVD

LAST SURVEY

MD: 6818' INC: 7.70° AZM:145.60° TVD: 6766.90' N/S: -550.08 E/W: 371.30 VS: 663.18

PROJECT TO BHL

MD: 6872' INC: 7.70° AZM 145.60° TVD: 6820.41' N/S: -555.85 E/W: 374.92 VS: 693.18

PBHL- TEX MACK 11 FED 7000' TVD



PO Box 1370
Artesia, NM 88211-1370
(575) 748-1288

April 20, 2012

COG, LLC
Fasken Center, Tower II
550 West Texas Ave, Suite 1300
Midland, TX 79701

RE: Tex Mack 11 Federal #32
307' FNL & 1873' FWL
Sec. 11, T17S, R31E
Eddy County, New Mexico

Dear Sir,

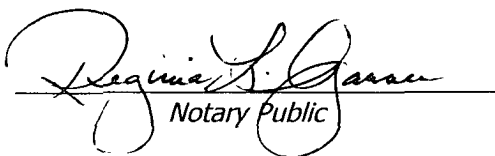
The attached is the Deviation Survey for the above captioned well.

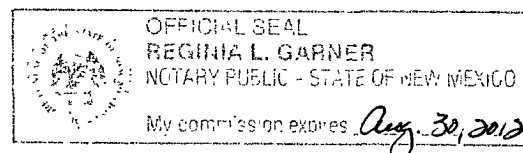
Very truly yours,


Eddie C. LaRue
Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 20th day of April, 2012.


Regina L. Garner
Notary Public



Pason DataHub Deviation Survey
 # Well Dossier 1334013007 - Tex Mack 11 Federal #32
 #

# Date	Depth	Deviation	Direction
4/9/2012	176	0.5	0.0
4/10/2012	263	0.7	0.0
4/10/2012	372	0.6	0.0
4/10/2012	457	0.6	0.0
4/10/2012	547	0.6	0.0
4/10/2012	662	0.0	0.0
4/12/2012	909	0.6	0.0
4/12/2012	1378	1.1	0.0
4/12/2012	1503	0.5	0.0
4/12/2012	1940	1.4	0.0
4/13/2012	2006	1.5	70.2
4/13/2012	2101	1.8	77.8
4/13/2012	2195	2.2	99.1
4/14/2012	2288	2.8	119.8
4/14/2012	2389	3.4	119.6
4/14/2012	2483	4.2	119.5
4/14/2012	2577	4.7	125.8
4/14/2012	2671	5.6	131.8
4/14/2012	2765	6.7	131.9
4/14/2012	2859	7.8	129.7
4/14/2012	2952	8.9	127.4
4/14/2012	3046	9.2	130.7
4/15/2012	3141	9.1	140.9
4/15/2012	3235	9.2	146.9
4/15/2012	3329	8.8	150.4
4/15/2012	3423	8.8	149.9
4/15/2012	3518	9.1	150.9
4/15/2012	3611	9.7	153.9
4/15/2012	3709	9.3	153.6
4/15/2012	3799	9.1	154.1
4/15/2012	3893	8.9	153.0
4/15/2012	3988	8.8	153.0
4/15/2012	4081	9.2	150.6
4/16/2012	4175	8.9	151.4
4/16/2012	4269	9.3	151.4
4/16/2012	4363	9.1	150.9
4/16/2012	4458	8.7	151.4
4/16/2012	4551	9.5	151.8
4/16/2012	4739	9.4	151.1
4/16/2012	4833	8.9	151.1
4/16/2012	4926	9.0	152.2

#	Date	Depth	Deviation	Direction
	4/16/2012	5020	8.6	152.2
	4/16/2012	5114	9.2	151.4
	4/16/2012	5207	8.8	150.4
	4/16/2012	5302	9.3	151.3
	4/16/2012	5396	9.1	152.9
	4/17/2012	5584	8.6	151.3
	4/17/2012	5678	9.2	151.6
	4/17/2012	5771	9.0	149.9
	4/17/2012	5866	8.8	150.0
	4/17/2012	5960	9.2	149.7
	4/17/2012	6053	9.1	150.4
	4/17/2012	6148	8.7	149.7
	4/17/2012	6241	9.0	148.8
	4/17/2012	6337	9.1	148.3
	4/17/2012	6430	8.6	148.5
	4/17/2012	6525	8.9	149.5
	4/18/2012	6618	8.5	149.5
	4/18/2012	6713	7.8	146.0
	4/18/2012	6818	7.7	145.6

EOF