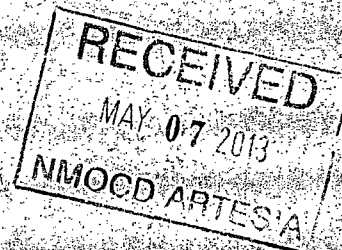


A GYRO TECHNOLOGIES INC. COMPANY

PO Box 261021
Corpus Christi, Texas 78426
(361) 767-0602 • (800) 606-GYRO • Fax (361) 767-0612

February 14, 2013

30-015-40946



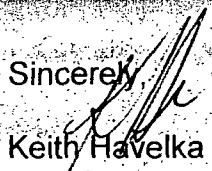
Concho Resources, Inc.
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701

Attn: Kanicia Castillo

RE: **Momba 24 Federal Com No. 003H**

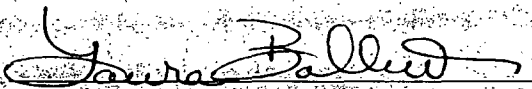
Please find enclosed a copy of the survey from 0.00' to 7080.00' ran on the above referenced well.

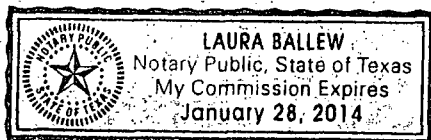
Sincerely,


Keith Havelka
Operations

STATE OF TEXAS §
§
COUNTY OF NUECES §

This instrument was acknowledged before me on the 14th day of February
A.D., 2013, by Keith Havelka.


Laura Ballew
Notary Public, State of Texas



Company: COG Operating LLC (Concho)
Lease/Well: Momba 24 Federal Com / No. 003H



Rig Name: Patriot 2
State/County: New Mexico / Eddy
Latitude: 32.04, Longitude: -104.04
GRID North is 0.16 Degrees East of True North
VS-Azi: 0.00 Degrees



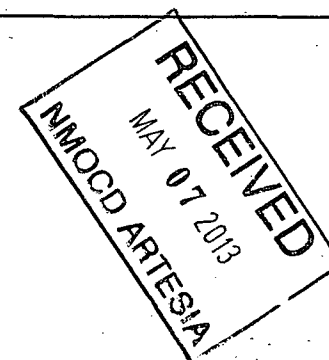
Depth Reference : RKB = 16'

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut
Minimum Curvature Method
Report Date/Time: 2/19/2013 / 08:09

Vaughn Energy Services
Midland, Texas
432-563-5444

Surveyor: Tim Dillon
Momba 24 Federal Com No. 003H / API 03-015-40946



Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.70	200.86	100.00	-0.57	-0.22	-0.57	0.61	200.86	0.70
200.00	1.67	201.21	199.97	-2.51	-0.97	-2.51	2.69	201.05	0.97
300.00	1.90	202.29	299.93	-5.40	-2.12	-5.40	5.80	201.44	0.23
400.00	2.00	217.61	399.87	-8.32	-3.81	-8.32	9.15	204.64	0.53
500.00	1.45	207.69	499.82	-10.82	-5.47	-10.82	12.13	206.81	0.62
600.00	0.21	129.43	599.81	-12.06	-5.91	-12.06	13.44	206.11	1.43
700.00	0.89	28.40	699.81	-11.50	-5.40	-11.50	12.71	205.15	0.95
800.00	0.66	3.96	799.80	-10.25	-4.99	-10.25	11.40	205.97	0.40
900.00	0.30	333.09	899.80	-9.45	-5.07	-9.45	10.72	208.23	0.43
1000.00	0.55	323.60	999.79	-8.83	-5.47	-8.83	10.39	211.79	0.26
1100.00	0.32	304.92	1099.79	-8.29	-5.99	-8.29	10.22	215.86	0.26
1200.00	0.34	303.28	1199.79	-7.96	-6.47	-7.96	10.26	219.08	0.02
1300.00	0.35	301.00	1299.79	-7.64	-6.98	-7.64	10.35	222.40	0.02
1400.00	0.60	297.56	1399.78	-7.24	-7.71	-7.24	10.57	226.79	0.25
1500.00	0.89	291.99	1499.77	-6.70	-8.90	-6.70	11.14	232.99	0.30
1600.00	0.81	310.01	1599.76	-5.96	-10.16	-5.96	11.78	239.62	0.28
1700.00	0.88	313.96	1699.75	-4.97	-11.26	-4.97	12.30	246.19	0.09
1800.00	1.01	311.75	1799.74	-3.85	-12.46	-3.85	13.04	252.83	0.13

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	1.13	316.42	1899.72	-2.55	-13.80	-2.55	14.03	259.54	0.16
2000.00	1.19	5.99	1999.70	-0.80	-14.38	-0.80	14.40	266.81	0.97
2100.00	2.02	25.79	2099.66	1.82	-13.50	1.82	13.62	277.68	0.99
2200.00	1.76	41.50	2199.61	4.56	-11.71	4.56	12.57	291.26	0.58
2300.00	2.50	48.21	2299.54	7.16	-9.07	7.16	11.56	308.30	0.79
2400.00	2.00	68.04	2399.46	9.27	-5.82	9.27	10.95	327.88	0.92
2500.00	1.82	96.00	2499.41	9.76	-2.63	9.76	10.11	344.94	0.94
2600.00	1.37	103.23	2599.37	9.32	0.11	9.32	9.32	0.70	0.49
2700.00	1.00	110.77	2699.35	8.74	2.10	8.74	8.98	13.49	0.40
2800.00	1.09	121.63	2799.33	7.93	3.72	7.93	8.76	25.17	0.22
2900.00	1.08	94.32	2899.32	7.36	5.48	7.36	9.17	36.68	0.51
3000.00	0.90	88.16	2999.30	7.31	7.21	7.31	10.27	44.60	0.21
3100.00	0.78	93.24	3099.29	7.30	8.67	7.30	11.33	49.92	0.14
3200.00	0.80	85.38	3199.28	7.31	10.04	7.31	12.42	53.94	0.11
3300.00	0.63	93.24	3299.27	7.34	11.29	7.34	13.46	56.97	0.19
3400.00	0.42	100.97	3399.27	7.24	12.19	7.24	14.18	59.31	0.22
3500.00	0.57	107.65	3499.27	7.02	13.03	7.02	14.80	61.69	0.16
3600.00	0.34	131.21	3599.26	6.67	13.72	6.67	15.26	64.07	0.30
3700.00	0.17	188.02	3699.26	6.33	13.92	6.33	15.30	65.55	0.28
3800.00	0.12	163.39	3799.26	6.09	13.93	6.09	15.20	66.40	0.08
3900.00	0.07	83.91	3899.26	5.99	14.02	5.99	15.25	66.85	0.13
4000.00	0.15	257.22	3999.26	5.97	13.95	5.97	15.18	66.83	0.22
4100.00	0.44	271.36	4099.26	5.95	13.44	5.95	14.70	66.12	0.29
4200.00	0.53	248.11	4199.26	5.79	12.64	5.79	13.90	65.39	0.21
4300.00	0.51	244.02	4299.25	5.42	11.81	5.42	13.00	65.34	0.04
4400.00	0.68	223.06	4399.25	4.80	11.01	4.80	12.01	66.46	0.27
4500.00	0.60	225.21	4499.24	3.99	10.23	3.99	10.98	68.68	0.08
4600.00	0.65	247.26	4599.23	3.40	9.33	3.40	9.93	69.98	0.24
4700.00	0.76	234.60	4699.23	2.80	8.27	2.80	8.73	71.31	0.19
4800.00	0.87	229.73	4799.22	1.92	7.15	1.92	7.40	74.94	0.13
4900.00	0.88	219.38	4899.21	-0.84	6.08	0.84	6.14	82.14	0.16
5000.00	0.95	217.95	4999.19	-0.40	5.09	-0.40	5.11	94.53	0.07
5100.00	0.98	218.56	5099.18	-1.72	4.05	-1.72	4.40	113.07	0.04
5200.00	1.09	206.14	5199.16	-3.25	3.09	-3.25	4.49	136.42	0.25
5300.00	1.14	202.19	5299.14	-5.03	2.30	-5.03	5.53	155.44	0.09
5400.00	1.04	207.93	5399.13	-6.75	1.50	-6.75	6.92	167.50	0.15
5500.00	1.35	200.38	5499.10	-8.66	0.66	-8.66	8.69	175.64	0.35
5600.00	1.40	210.88	5599.07	-10.82	-0.38	-10.82	10.82	182.00	0.26
5700.00	1.47	211.89	5699.04	-12.95	-1.68	-12.95	13.06	187.40	0.07

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
5800.00	1.40	215.31	5799.01	-15.03	-3.06	-15.03	15.34	191.52	0.11
5900.00	1.50	206.77	5898.98	-17.20	-4.36	-17.20	17.74	194.22	0.24
6000.00	1.56	202.80	5998.94	-19.62	-5.47	-19.62	20.37	195.59	0.12
6100.00	1.66	202.83	6098.91	-22.21	-6.56	-22.21	23.16	196.46	0.10
6200.00	1.29	197.35	6198.87	-24.62	-7.46	-24.62	25.72	196.86	0.39
6300.00	1.25	188.55	6298.85	-26.77	-7.96	-26.77	27.93	196.56	0.20
6400.00	1.30	171.02	6398.82	-28.96	-7.94	-28.96	30.03	195.34	0.39
6500.00	2.16	164.39	6498.78	-31.89	-7.26	-31.89	32.71	192.83	0.88
6600.00	1.50	171.38	6598.73	-34.99	-6.56	-34.99	35.60	190.62	0.70
6700.00	1.48	184.30	6698.69	-37.57	-6.46	-37.57	38.12	189.76	0.34
6800.00	1.30	185.13	6798.66	-39.99	-6.66	-39.99	40.54	189.45	0.19
6900.00	1.24	179.61	6898.64	-42.20	-6.75	-42.20	42.74	189.09	0.14
7000.00	1.44	181.53	6998.61	-44.54	-6.78	-44.54	45.05	188.65	0.21
7080.00	1.68	187.67	7078.58	-46.70	-6.96	-46.70	47.22	188.48	0.36



Archer Directional Drilling Services
911 Regional Park Drive
Houston, Texas 77060
Tel: 281-934-9600
Fax: 281-951-2101

COG Operating, LLC
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701

March 27, 2013

Re: COG Operating, LLC
Momba 24 Fed Com #3H
Field: Hay Hollow
Rig: Patriot Drilling #2
Eddy County, New Mexico
API # 30-015-40946

Enclosed please find the original of the surveys performed on the referenced well by Archer Directional Drilling Services. Other information required by your office is as follows:

<u>Name & Title Of Surveyor</u>	<u>Wellhole Number</u>	<u>Survey Depths</u>	<u>Dates Performed</u>	<u>Type Survey</u>
Geo Davila Field Engineer	Original Hole	7236-12777	02/07/13-02/15/13	MWD

If additional information is required, please contact the undersigned at the letterhead address and phone number.

Amador Baggerly
MWD Coordinator

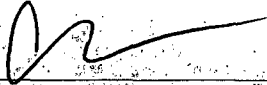
Archer

Archer Directional Drilling Services
911 Regional Park Drive
Houston, Texas 77060
Tel: 281-934-9600
Fax: 281-951-2101

MWD Survey Certification

State of New Mexico
County of Eddy

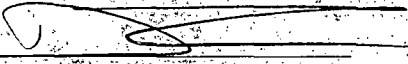
I, Amador Baggerly, certify that: I am employed by Archer Directional Drilling Services; that I did on the day(s) of 02/07/13 through 02/15/13, conduct or supervise the taking of MWD surveys from a depth of 7236 feet to a depth of 12777 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Archer Directional Drilling Services; that I am authorized and qualified to make this report; that these surveys were conducted at the request of COG Operating, LLC for the Momba 24 Fed Com #3H (API # 30-015-40946), Well located in Eddy County, New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Archer Directional Drilling Services.



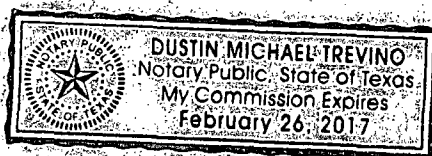
Amador Baggerly
MWD Coordinator

State of Texas
County of Harris

Before me, a notary public, on this day personally appeared Amador Baggerly, on this 27 day of March, 2013, known to me to be the person whose name is subscribed to the foregoing document and, being by me first duly sworn, declared that the statement therein contained are true and correct.



Notary Public's Signature





Company: COG Operating, LLC

Job Number: 04084-433-22

Calculation Method

Minimum Curvature

Well: Momba 24 Fed Com #3H

Mag Decl: 7.49

Proposed Azimuth

177.9

Location: Eddy County, New Mexico

Dir Driller: Levi Galvin

Depth Reference

KRG

Rig: Patriot Drilling #2

MWD Eng: Geo Davila

Tie Into: Previous MWD Survey

Job Date: 02/07/13 - 02/15/13

Survey Number	Survey Depth (ft)	Inclination (deg)	Azimuth (deg)	Course Length (ft)	True Vertical Depth (ft)	Vertical Section (ft)	Coordinates		Closure		Dogleg Severity (d/100')	Build Rate (d/100')	Walk Rate (d/100')
							N/S (ft)	E/W (ft)	Distance (ft)	Direction Azimuth			
Tie In	7080.00	1.68	187.67	0	7078.58	46.42	46.72 S	6.96 W	0.00	0.00	0	0	0
1	7236	1.1	201.6	156	7234.53	50.05	50.38 S	7.82 W	50.98	188.82	0.43	-0.37	8.93
2	7331	1.2	221.7	95	7329.52	51.60	51.97 S	8.81 W	52.71	189.63	0.43	0.11	21.16
3	7426	1.1	223.1	95	7424.50	52.96	53.38 S	10.10 W	54.32	190.71	0.11	-0.11	1.47
4	7520	1.2	220.8	94	7518.48	54.32	54.78 S	11.36 W	55.95	191.71	0.12	0.11	-2.45
5	7614	2.2	201.5	94	7612.44	56.69	57.21 S	12.66 W	58.59	192.48	1.21	1.06	-20.53
6	7646	2.9	209.4	32	7644.40	57.95	58.48 S	13.29 W	59.97	192.80	2.44	2.19	24.69
7	7678	4.9	192.9	32	7676.33	59.96	60.52 S	13.99 W	62.12	193.01	7.10	6.25	-51.56
8	7709	7.9	176.2	31	7707.13	63.36	63.94 S	14.14 W	65.48	192.47	11.29	9.68	-53.87
9	7740	11.3	174.3	31	7737.70	68.53	69.09 S	13.70 W	70.43	191.22	11.01	10.97	-6.13
10	7772	14.2	170.1	32	7768.90	75.55	76.07 S	12.71 W	77.13	189.49	9.51	9.06	-13.13
11	7803	16.9	171.0	31	7798.77	83.79	84.27 S	11.35 W	85.03	187.67	8.74	8.71	2.90
12	7835	16.4	176.4	32	7829.43	92.92	93.38 S	10.34 W	93.95	186.32	5.08	-1.56	16.88
13	7867	18.2	177.2	32	7859.98	102.44	102.88 S	9.81 W	103.34	185.45	5.67	5.63	2.50
14	7899	20.9	180.1	32	7890.13	113.14	113.58 S	9.58 W	113.98	184.82	8.96	8.44	9.06
15	7931	23.8	182.2	32	7919.72	125.28	125.74 S	9.84 W	126.12	184.47	9.40	9.06	6.56
16	7963	28.0	182.0	32	7948.50	139.22	139.70 S	10.35 W	140.09	184.24	13.13	13.13	-0.62
17	7994	32.9	179.5	31	7975.22	154.90	155.41 S	10.53 W	155.76	183.88	16.32	15.81	-8.06
18	8026	38.9	177.4	32	8001.13	173.66	174.15 S	10.00 W	174.44	183.29	19.14	18.75	-6.56
19	8058	44.2	176.2	32	8025.07	194.87	195.33 S	8.80 W	195.53	182.58	16.75	16.56	-3.75
20	8089	49.1	175.9	31	8046.35	217.39	217.82 S	7.25 W	217.94	181.91	15.82	15.81	-0.97
21	8121	53.1	176.0	32	8066.44	242.28	242.65 S	5.49 W	242.71	181.30	12.50	12.50	0.31
22	8153	56.3	175.0	32	8084.93	268.37	268.68 S	3.44 W	268.71	180.73	10.32	10.00	-3.13
23	8184	59.6	173.6	31	8101.37	294.59	294.82 S	0.82 W	294.83	180.16	11.31	10.65	-4.52
24	8216	64.3	173.3	32	8116.42	322.74	322.87 S	2.40 E	322.88	179.57	14.71	14.69	-0.94
25	8248	68.9	173.8	32	8129.12	352.01	352.05 S	5.70 E	352.09	179.07	14.45	14.38	1.56
26	8274	72.0	174.4	26	8137.82	376.46	376.42 S	8.21 E	376.51	178.75	12.12	11.92	2.31
27	8305	74.8	174.6	31	8146.68	406.11	405.98 S	11.06 E	406.14	178.44	9.05	9.03	0.65
28	8337	77.4	175.5	32	8154.36	437.14	436.93 S	13.74 E	437.14	178.20	8.57	8.13	2.81
29	8369	79.3	174.7	32	8160.83	468.44	468.15 S	16.42 E	468.44	177.99	6.42	5.94	-2.50
30	8400	81.2	174.1	31	8166.08	498.93	498.56 S	19.40 E	498.94	177.77	6.42	6.13	-1.94
31	8432	84.2	172.7	32	8170.14	530.57	530.08 S	23.05 E	530.58	177.51	10.33	9.38	-4.38
32	8464	85.9	172.6	32	8172.90	562.32	561.70 S	27.13 E	562.36	177.24	5.32	5.31	-0.31
33	8495	88.3	172.8	31	8174.47	593.15	592.41 S	31.06 E	593.22	177.00	7.77	7.74	0.65
34	8527	90.4	174.5	32	8174.83	625.06	624.21 S	34.60 E	625.17	176.83	8.44	6.56	5.31
35	8590	90.5	176.5	63	8174.34	688.00	687.01 S	39.54 E	688.14	176.71	3.18	0.16	3.17
36	8685	88.7	176.6	95	8175.00	782.97	781.83 S	45.26 E	783.14	176.69	1.90	-1.89	0.11
37	8781	89.3	177.3	96	8176.68	878.95	877.68 S	50.36 E	879.12	176.72	0.96	0.62	0.73



Company: COG Operating, LLC

Job Number: 04084-433-22

Calculation Method

Minimum Curvature

Well: Momba 24 Fed Com #3H

Mag Decl: 7.49

Proposed Azimuth

177.9

Location: Eddy County, New Mexico

Dir Driller: Levi Galvin

Depth Reference

KBG

Rig: Patriot Drilling #2

MWD Eng: Geo Davila

Tie Into: Previous MWD Survey

Job Date: 02/07/13 - 02/15/13

Survey Number	Survey Depth (ft)	Inclination (deg)	Azimuth (deg)	Course Length (ft)	True Vertical Depth (ft)	Vertical Section (ft)	Coordinates		Closure		Dogleg Severity (d/100')	Build Rate (d/100')	Walk Rate (d/100')
							N/S (ft)	E/W (ft)	Distance (ft)	Direction Azimuth			
38	8876	89.1	177.3	95	8178.00	973.93	972.56 S	54.84 E	974.11	176.77	0.21	-0.21	0.00
39	8971	88.5	177.3	95	8179.99	1068.91	1067.44 S	59.31 E	1069.08	176.82	0.63	-0.63	0.00
40	9066	90.0	177.5	95	8181.24	1163.89	1162.33 S	63.62 E	1164.07	176.87	1.59	1.58	0.21
41	9161	90.2	177.6	95	8181.07	1258.89	1257.24 S	67.68 E	1259.06	176.92	0.24	0.21	0.11
42	9256	90.2	177.8	95	8180.74	1353.89	1352.16 S	71.50 E	1354.05	176.97	0.21	0.00	0.21
43	9350	89.7	177.9	94	8180.82	1447.89	1446.10 S	75.02 E	1448.04	177.03	0.54	-0.53	0.11
44	9446	89.4	177.8	96	8181.58	1543.89	1542.03 S	78.62 E	1544.03	177.08	0.33	-0.31	-0.10
45	9541	90.0	178.4	95	8182.07	1638.88	1636.97 S	81.77 E	1639.01	177.14	0.89	0.63	0.63
46	9636	89.8	178.6	95	8182.24	1733.88	1731.94 S	84.26 E	1733.99	177.21	0.30	-0.21	0.21
47	9731	89.1	178.9	95	8183.15	1828.86	1826.91 S	86.33 E	1828.95	177.29	0.80	-0.74	0.32
48	9826	89.2	179.5	95	8184.56	1923.82	1921.89 S	87.66 E	1923.89	177.39	0.64	0.11	0.63
49	9922	88.8	179.1	96	8186.24	2019.78	2017.87 S	88.83 E	2019.82	177.48	0.59	-0.42	-0.42
50	10017	90.5	179.5	95	8186.82	2114.74	2112.86 S	89.99 E	2114.77	177.56	1.84	1.79	0.42
51	10112	91.2	178.9	95	8185.41	2209.71	2207.84 S	91.32 E	2209.72	177.63	0.97	0.74	-0.63
52	10207	89.4	179.3	95	8184.91	2304.68	2302.82 S	92.81 E	2304.69	177.69	1.94	-1.89	0.42
53	10301	89.1	179.8	94	8186.14	2398.63	2396.81 S	93.55 E	2398.63	177.76	0.62	-0.32	0.53
54	10396	89.6	180.1	95	8187.22	2493.56	2491.80 S	93.63 E	2493.56	177.85	0.61	0.53	-0.32
55	10491	90.6	180.5	95	8187.05	2588.47	2586.80 S	93.13 E	2588.47	177.94	1.13	1.05	0.42
56	10585	90.0	180.5	94	8186.56	2682.37	2680.79 S	92.31 E	2682.38	178.03	0.64	-0.64	0.00
57	10679	90.1	180.1	94	8186.48	2776.28	2774.79 S	91.82 E	2776.31	178.10	0.44	0.11	-0.43
58	10774	89.1	180.7	95	8187.14	2871.19	2869.78 S	91.16 E	2871.23	178.18	1.23	-1.05	0.63
59	10870	89.8	180.6	96	8188.06	2967.07	2965.77 S	90.07 E	2967.14	178.26	0.74	0.73	-0.10
60	10965	88.4	180.1	95	8189.55	3061.96	3060.76 S	89.49 E	3062.06	178.33	1.56	-1.47	-0.53
61	11060	88.0	179.8	95	8192.54	3156.85	3155.71 S	89.57 E	3156.98	178.37	0.53	-0.42	-0.32
62	11155	87.6	179.8	95	8196.19	3251.73	3250.64 S	89.90 E	3251.88	178.42	0.42	-0.42	0.00
63	11249	88.7	178.1	94	8199.22	3345.66	3344.57 S	91.63 E	3345.82	178.43	2.15	1.17	-1.81
64	11348	89.6	177.3	99	8200.69	3444.64	3443.48 S	95.60 E	3444.80	178.41	1.22	0.91	-0.81
65	11444	89.1	178.3	96	8201.78	3540.64	3539.40 S	99.28 E	3540.79	178.39	1.16	-0.52	1.04
66	11539	89.5	176.2	95	8202.94	3635.62	3634.28 S	103.84 E	3635.76	178.36	2.25	0.42	-2.21
67	11634	89.9	178.0	95	8203.44	3730.61	3729.15 S	108.65 E	3730.73	178.33	1.94	0.42	-1.89
68	11729	89.5	175.0	95	8203.93	3825.57	3823.96 S	114.45 E	3825.67	178.29	3.19	-0.42	-3.16
69	11824	89.5	175.4	95	8204.76	3920.46	3918.62 S	122.39 E	3920.53	178.21	0.42	0.00	0.42
70	11919	89.5	175.4	95	8205.59	4015.37	4013.31 S	130.01 E	4015.42	178.14	0.00	0.00	0.00
71	12014	88.6	174.8	95	8207.17	4110.24	4107.95 S	138.13 E	4110.27	178.07	1.14	-0.95	-0.63
72	12109	89.8	176.3	95	8208.49	4205.15	4202.65 S	145.50 E	4205.17	178.02	2.02	1.26	1.58
73	12204	90.5	176.7	95	8208.24	4300.13	4297.47 S	151.30 E	4300.14	177.98	0.85	0.74	0.42
74	12299	91.3	176.0	95	8206.75	4395.08	4392.27 S	157.34 E	4395.08	177.95	1.12	0.84	-0.74
75	12394	90.5	177.3	95	8205.26	4490.04	4487.09 S	162.89 E	4490.05	177.92	1.61	-0.84	1.37
76	12489	91.6	177.9	95	8203.52	4585.02	4581.99 S	166.87 E	4585.03	177.91	1.32	1.16	0.63

ArcherCompany: COG Operating, LLCJob Number: 04084-433-22

Calculation Method

Minimum Curvature

Well: Momba 24 Fed Com #3HMag Decl: 7.49Proposed Azimuth 177.9Location: Eddy County, New MexicoDir Driller: Levi GalvinDepth Reference KBGRig: Patriot Drilling #2MWD Eng: Geo DavilaTie Into: Previous MWD SurveyJob Date: 02/07/13 - 02/15/13

Survey Number	Survey Depth (ft)	Inclination (deg)	Azimuth (deg)	Course Length (ft)	True Vertical Depth (ft)	Vertical Section (ft)	Coordinates		Closure		Dogleg Severity (d/100')	Build Rate (d/100')	Walk Rate (d/100')
							N/S (ft)	E/W (ft)	Distance (ft)	Direction Azimuth			
77	12584	90.7	176.5	95	8201.61	4680.00	4676.85 S	171.51 E	4680.00	177.90	1.75	-0.95	-1.47
78	12727	88.0	176.3	143	8203.23	4822.93	4819.55 S	180.49 E	4822.93	177.86	1.89	-1.89	-0.14
Proj	12777	88.0	176.3	50	8204.98	4872.88	4869.41 S	183.71 E	4872.88	177.84	0.00	0.00	0.00



COG Operating, LLC

Eddy County (NM83E)

Sec.24-T26S-R28E

Momba 24 Federal Com #3H

Wellbore #1

Survey: Survey #2-Archer MWD

Standard Survey Report

15 February, 2013

Archer



Archer
Survey Report

Archer

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Momba 24 Federal Com #3H
Project:	Eddy County (NM83E)	TVD Reference:	WELL @ 2941.00usft (Original Well Elev)
Site:	Sec 24-T26S-R28E	MD Reference:	WELL @ 2941.00usft (Original Well Elev)
Well:	Momba 24 Federal Com #3H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM:5000.1/Single User Db

Project: Eddy County (NM83E)			
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site:		Sec 24-T26S-R28E			
Site Position:		Northing:	376,682.606 usft	Latitude:	32° 2' 6.862 N
From:	Map	Easting:	632,469.291 usft	Longitude:	104° 2' 21.251 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"	Grid Convergence:	0.16 °

Well:	Momba 24 Federal Com #3H					
Well Position	+N/-S	0.00 usft	Northing:	376,682.606 usft	Latitude:	32° 2' 6.862 N
	+E/-W	0.00 usft	Easting:	632,469.291 usft	Longitude:	104° 2' 21.251 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	2,923.00 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2013/02/08	7.58	59.89	48,289

Design:	Wellbore #1			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0.00	0.00	0.00	188.47

Survey Program		Date: 2013/02/15		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	7,080.00	Survey #1-VES Gyro (Wellbore #1)	GYD_DP_MS	Gyrodata gyro-compassing and drop
7,236.00	12,777.00	Survey #2-Archer MWD (Wellbore #1)	MWD	MWD - Standard

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)
Tie-In / VES Gyro									
7,080.00	1.68	187.67	7,078.58	-46.72	-6.96	47.23	0.00	0.00	0.00
First Archer Survey									
7,236.00	1.10	201.60	7,234.54	-50.38	-7.81	50.98	0.43	-0.37	8.93
7,331.00	1.20	221.70	7,329.52	-51.97	-8.81	52.70	0.43	0.11	21.16
7,426.00	1.10	223.10	7,424.50	-53.37	-10.10	54.28	0.11	-0.11	1.47
7,520.00	1.20	220.80	7,518.48	-54.78	-11.36	55.85	0.12	0.11	-2.45
7,614.00	2.20	201.50	7,612.44	-57.20	-12.66	58.44	1.21	1.06	-20.53
7,646.00	2.90	209.40	7,644.40	-58.48	-13.28	59.80	2.44	2.19	24.69
7,678.00	4.90	192.90	7,676.33	-60.52	-13.99	61.92	7.10	6.25	-51.56
7,709.00	7.90	176.20	7,707.14	-63.93	-14.14	65.32	11.29	9.68	-53.87
7,740.00	11.30	174.30	7,737.70	-69.08	-13.70	70.35	11.01	10.97	-6.13

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Momba 24 Federal Com #3H
Project:	Eddy County (NM83E)	TVD Reference:	WELL @ 2941.00usft (Original Well Elev)
Site:	Sec 24-T26S-R28E	MD Reference:	WELL @ 2941.00usft (Original Well Elev)
Well:	Momba 24 Federal Com #3H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	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)
7,772.00	14.20	170.10	7,768.91	-76.07	-12.71	77.11	9.51	9.06	-13.12
7,803.00	16.90	171.00	7,798.77	-84.27	-11.35	85.02	8.74	8.71	2.90
7,835.00	16.40	176.40	7,829.43	-93.37	-10.34	93.88	5.08	-1.56	16.87
7,867.00	18.20	177.20	7,859.98	-102.87	-9.81	103.20	5.67	5.62	2.50
7,899.00	20.90	180.10	7,890.13	-113.57	-9.58	113.75	8.96	8.44	9.06
7,931.00	23.80	182.20	7,919.73	-125.74	-9.84	125.81	9.40	9.06	6.56
7,963.00	28.00	182.00	7,948.51	-139.70	-10.35	139.70	13.13	13.12	-0.62
7,994.00	32.90	179.50	7,975.22	-155.40	-10.53	155.26	16.32	15.81	-8.06
8,026.00	38.90	177.40	8,001.13	-174.15	-9.99	173.72	19.14	18.75	-6.56
8,058.00	44.20	176.20	8,025.07	-195.33	-8.80	194.50	16.75	16.56	-3.75
8,089.00	49.10	175.90	8,046.35	-217.81	-7.24	216.50	15.82	15.81	-0.97
8,121.00	53.10	176.00	8,066.44	-242.65	-5.49	240.81	12.50	12.50	0.31
8,153.00	56.30	175.00	8,084.93	-268.68	-3.43	266.26	10.32	10.00	-3.12
8,184.00	59.60	173.60	8,101.38	-294.82	-0.82	291.73	11.31	10.65	-4.52
8,216.00	64.30	173.30	8,116.42	-322.87	2.40	318.99	14.71	14.69	-0.94
8,248.00	68.90	173.80	8,129.12	-352.04	5.70	347.36	14.45	14.37	1.56
8,274.00	72.00	174.40	8,137.82	-376.41	8.22	371.10	12.12	11.92	2.31
8,305.00	74.80	174.60	8,146.68	-405.98	11.06	399.92	9.05	9.03	0.65
8,337.00	77.40	175.50	8,154.37	-436.93	13.74	430.13	8.57	8.12	2.81
8,369.00	79.30	174.70	8,160.83	-468.15	16.42	460.62	6.42	5.94	-2.50
8,400.00	81.20	174.10	8,166.08	-498.55	19.40	490.26	6.42	6.13	-1.94
8,432.00	84.20	172.70	8,170.14	-530.08	23.05	520.90	10.33	9.37	-4.37
8,464.00	85.90	172.60	8,172.90	-561.70	27.13	551.57	5.32	5.31	-0.31
8,495.00	88.30	172.80	8,174.47	-592.40	31.06	581.37	7.77	7.74	0.65
8,527.00	90.40	174.50	8,174.84	-624.20	34.60	612.30	8.44	6.56	5.31
8,590.00	90.50	176.50	8,174.34	-687.00	39.54	673.69	3.18	0.16	3.17
8,685.00	88.70	176.60	8,175.00	-781.83	45.26	766.63	1.90	-1.89	0.11
8,781.00	89.30	177.30	8,176.68	-877.67	50.37	860.68	0.96	0.62	0.73
8,876.00	89.10	177.30	8,178.01	-972.56	54.84	953.87	0.21	-0.21	0.00
8,971.00	88.50	177.30	8,180.00	-1,067.43	59.32	1,047.05	0.63	-0.63	0.00
9,066.00	90.00	177.50	8,181.24	-1,162.32	63.63	1,140.27	1.59	1.58	0.21
9,161.00	90.20	177.60	8,181.07	-1,257.24	67.69	1,233.55	0.24	0.21	0.11
9,256.00	90.20	177.80	8,180.74	-1,352.16	71.50	1,326.88	0.21	0.00	0.21
9,350.00	89.70	177.90	8,180.82	-1,446.09	75.03	1,419.27	0.54	-0.53	0.11
9,446.00	89.40	177.80	8,181.58	-1,542.02	78.63	1,513.62	0.33	-0.31	-0.10
9,541.00	90.00	178.40	8,182.07	-1,636.97	81.78	1,607.07	0.89	0.63	0.63
9,636.00	89.80	178.60	8,182.24	-1,731.94	84.26	1,700.63	0.30	-0.21	0.21
9,731.00	89.10	178.90	8,183.15	-1,826.91	86.34	1,794.26	0.80	-0.74	0.32
9,826.00	89.20	179.50	8,184.56	-1,921.89	87.66	1,888.01	0.64	0.11	0.63
9,922.00	88.80	179.10	8,186.24	-2,017.87	88.83	1,982.77	0.59	-0.42	-0.42
10,017.00	90.50	179.50	8,186.82	-2,112.85	89.99	2,076.55	1.84	1.79	0.42
10,112.00	91.20	178.90	8,185.41	-2,207.83	91.32	2,170.30	0.97	0.74	-0.63
10,207.00	89.40	179.30	8,184.91	-2,302.82	92.81	2,264.02	1.94	-1.89	0.42
10,301.00	89.10	179.80	8,186.14	-2,396.80	93.55	2,356.88	0.62	-0.32	0.53
10,396.00	89.60	180.10	8,187.22	-2,491.80	93.63	2,450.82	0.61	0.53	0.32
10,491.00	90.60	180.50	8,187.05	-2,586.79	93.14	2,544.86	1.13	1.05	0.42
10,585.00	90.00	180.50	8,186.56	-2,680.79	92.32	2,637.95	0.64	-0.64	0.00
10,679.00	90.10	180.10	8,186.48	-2,774.79	91.82	2,730.99	0.44	0.11	-0.43
10,775.00	89.10	180.70	8,187.15	-2,870.78	91.15	2,826.04	1.21	-1.04	0.62
10,870.00	89.80	180.60	8,188.06	-2,965.77	90.08	2,920.15	0.74	0.74	-0.11
10,965.00	88.40	180.10	8,189.55	-3,060.75	89.50	3,014.18	1.56	-1.47	-0.53
11,060.00	88.00	179.80	8,192.54	-3,155.71	89.58	3,108.09	0.53	-0.42	-0.32
11,155.00	87.60	179.80	8,196.18	-3,250.64	89.91	3,201.93	0.42	-0.42	0.00
11,249.00	88.70	178.10	8,199.22	-3,344.57	91.63	3,294.59	2.15	1.17	-1.81

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Momba 24 Federal Com #3H
Project:	Eddy County (NM83E)	TVD Reference:	WELL @ 2941.00usft (Original Well Elev)
Site:	Sec 24-T26S-R28E	MD Reference:	WELL @ 2941.00usft (Original Well Elev)
Well:	Momba 24 Federal Com #3H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	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)	
11,348.00	89.60	177.30	8,200.69	-3,443.47	95.61	3,391.83	1.22	0.91	-0.81	
11,444.00	89.10	178.30	8,201.78	-3,539.40	99.29	3,486.16	1.16	-0.52	1.04	
11,539.00	89.50	176.20	8,202.94	-3,634.27	103.85	3,579.33	2.25	0.42	-2.21	
11,634.00	89.90	178.00	8,203.43	-3,729.15	108.65	3,672.46	1.94	0.42	1.89	
11,729.00	89.50	175.00	8,203.93	-3,823.96	114.45	3,765.39	3.19	-0.42	-3.16	
11,824.00	89.50	175.40	8,204.76	-3,918.62	122.40	3,857.85	0.42	0.00	0.42	
11,919.00	89.50	175.40	8,205.59	-4,013.31	130.02	3,950.38	0.00	0.00	0.00	
12,014.00	88.60	174.80	8,207.17	-4,107.95	138.13	4,042.79	1.14	-0.95	-0.63	
12,109.00	89.80	176.30	8,208.49	-4,202.65	145.50	4,135.37	2.02	1.26	1.58	
12,204.00	90.50	176.70	8,208.24	-4,297.47	151.30	4,228.31	0.85	0.74	0.42	
12,299.00	91.30	176.00	8,206.75	-4,392.26	157.35	4,321.18	1.12	0.84	-0.74	
12,394.00	90.50	177.30	8,205.26	-4,487.09	162.90	4,414.15	1.61	-0.84	1.37	
12,489.00	91.60	177.90	8,203.52	-4,581.99	166.88	4,507.43	1.32	1.16	0.63	
12,584.00	90.70	176.50	8,201.61	-4,676.85	171.52	4,600.57	1.75	-0.95	-1.47	
Last Archer Survey										
12,727.00	88.00	176.30	8,203.23	-4,819.55	180.49	4,740.39	1.89	-1.89	-0.14	
PTB										
12,777.00	88.00	176.30	8,204.98	-4,869.41	183.72	4,789.23	0.00	0.00	0.00	

Survey Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates			
		N/S (usft)	E/W (usft)	Comment	
7,080.00	7,078.58	-46.72	-6.96	Tie-In / VES Gyro	
7,236.00	7,234.54	-50.38	-7.81	First Archer Survey	
12,727.00	8,203.23	-4,819.55	180.49	Last Archer Survey	
12,777.00	8,204.98	-4,869.41	183.72	PTB	

Checked By: _____ Approved By: _____ Date: _____



Project: Eddy County (NM83E)
 Site: Sec.24-T26S-R28E
 Well: Momba 24 Federal Com #3H
 Wellbore: Wellbore #1
 Design: Design #4
 Lat: 32° 2' 6.862 N
 Long: 104° 2' 21.251 W
 GL: 2923.00
 KB: WELL @ 2941.00usft (Original Well Elev)

Archer

SECTION DETAILS

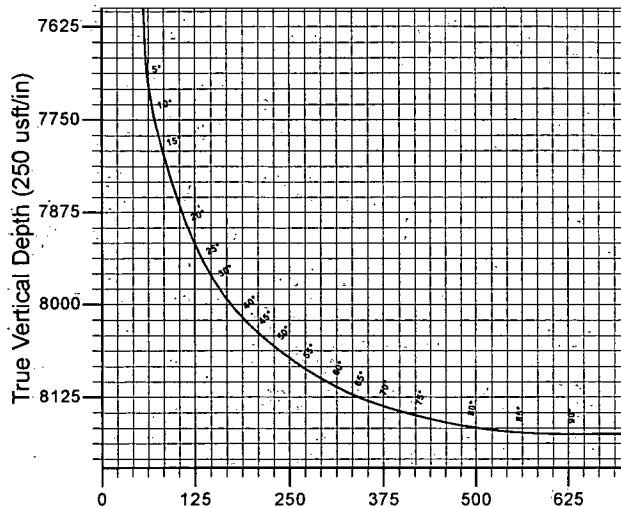
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSeet	Annotation
8527.00	90.40	174.50	8174.84	-624.20	34.60	0.00	0.00	625.06	Tie-In / Start DLS 2.00' TFO 103.97
8712.04	89.51	178.09	8174.99	-808.82	46.55	2.00	103.97	810.00	Start 4063.11' hold at 8712.04 MD
12775.15	89.51	178.09	8210.00	-4869.53	181.88	0.00	0.00	4872.92	TD at 12775.15

WELL DETAILS: Momba 24 Federal Com #3H

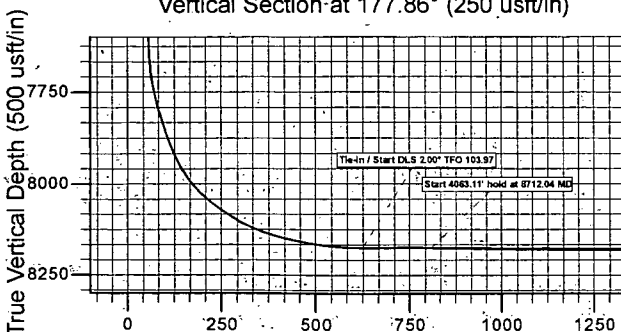
+N/-S	+E/-W	Northing	Ground Level: Easting	2923.00 Latitude	Longitude	Slot
0.00	0.00	376682.606	632469.291	32° 2' 6.862 N	104° 2' 21.251 W	

WELLBORE TARGET DETAILS (LAT/LONG)

Name	TVD	+N/-S	+E/-W	Latitude	Longitude	Shape
Momba 24 Fed Com #3H PBHL	8210.00	-4869.53	181.88	32° 1' 18.667 N	104° 2' 19.293 W	Point



Vertical Section at 177.86° (250 usft/in)



Vertical Section at 177.86° (500 usft/in)

PROJECT DETAILS: Eddy County (NM83E)

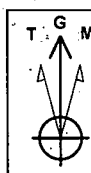
Geodetic System: US State Plane 1983
 Datum: North American Datum 1983
 Ellipsoid: GRS 1980
 Zone: New Mexico Eastern Zone

System Datum: Mean Sea Level

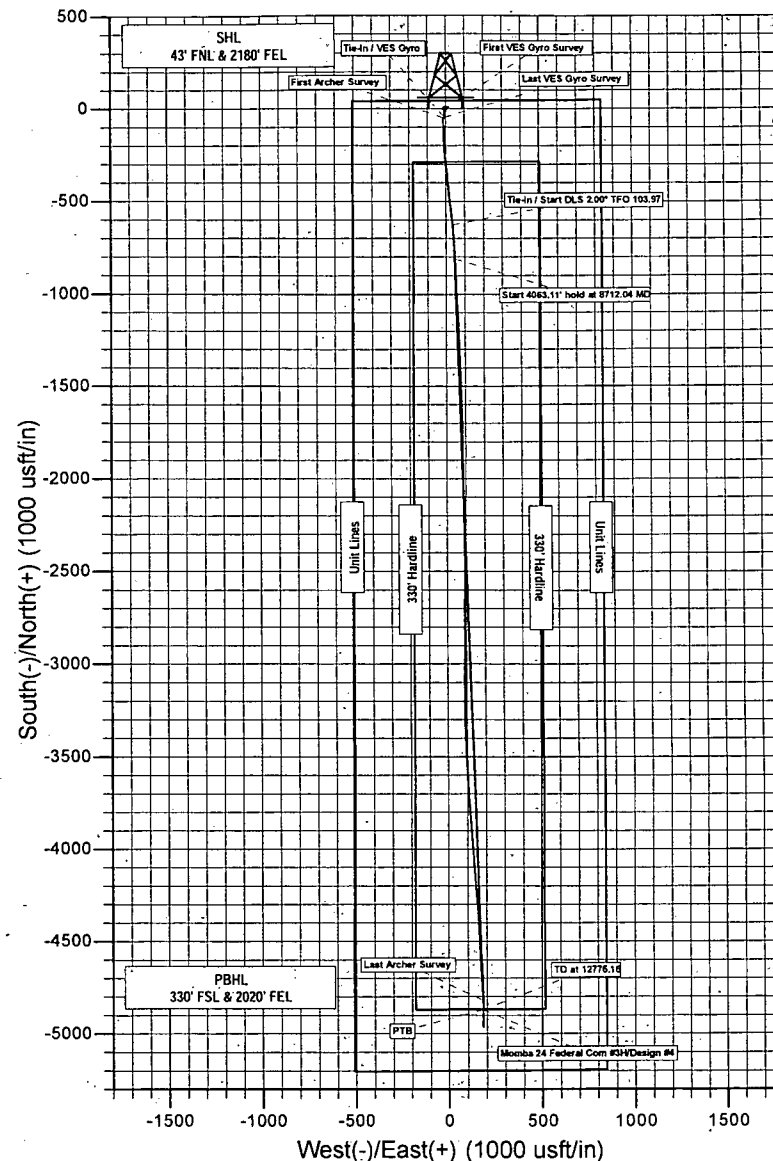
SITE DETAILS: Sec.24-T26S-R28E

Site Centre Latitude: 32° 2' 6.862 N
 Longitude: 104° 2' 21.251 W

Positional Uncertainty: 0.00
 Convergence: 0.16
 Local North: Grid



Azimuths to Grid North
 True North: -0.16°
 Magnetic North: 7.43°
 Magnetic Field
 Strength: 48289.2snT
 Dip Angle: 59.89°
 Date: 02/08/2013
 Model: IGRF2010



West(-)/East(+) (1000 usft/in)

Plan: Design #4 (Momba 24 Federal Com #3H/Wellbore #1)

Created By: Bret Wolford Date: 8:34, February 15 2013