

30-015-40546

Archer

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

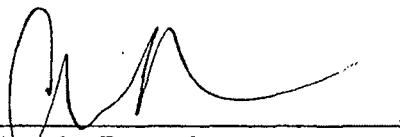
February 19, 2013

Re: COG Operating, LLC
Submarine 11 Fed Com #3H
Field: Dodd
Rig: United 40
Eddy County, New Mexico
API # 30-015-40546

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>
Justin Warnack Field Engineer	Original Hole	4659-9869	01/28/13-02/05/13	MWD

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


Amador Baggerly
MWD Coordinator

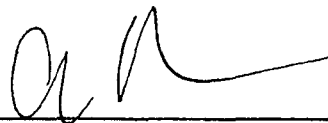


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911 Regional Park Drive
Houston, Texas 77060
Tel: 281-934-9600
Fax: 281-951-2101

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 01/28/13 through 02/05/13, conduct or supervise the taking of MWD surveys from a depth of 4659 feet to a depth of 9869 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 Submarine 11 Fed Com #3H (API # 30-015-40546), 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



Company: COG Operating, LLC

Job Number: 04074-433-22

Calculation Method

Minimum Curvature

Well: Submarine 11 Fed Com #3H

Mag Decl.: 7.51

Proposed Azimuth

91.2

Location: Eddy County, New Mexico

Dir Driller: Cody Styles

Depth Reference

KBG

Rig: UDI 40

MWD Eng: Justin Warnack

Tie Into: Previous MWD Survey

Job Date: 01/28/13 - 02/05/13

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	4426.00	0.24	81.91	0	4425.71	40.48	9.01 N	40.68 E	0.00	0.00	0	0	0
1	4659	0.2	16.2	233	4658.71	41.07	9.47 N	41.28 E	42.35	77.08	0.10	-0.02	-28.20
2	4690	0.2	17.4	31	4689.71	41.10	9.57 N	41.31 E	42.40	76.95	0.01	0.00	3.87
3	4722	0.7	95.8	32	4721.71	41.31	9.61 N	41.52 E	42.62	76.97	2.15	1.56	245.00
4	4754	3.9	107.0	32	4753.68	42.55	9.27 N	42.75 E	43.75	77.77	10.05	10.00	35.00
5	4785	7.4	105.2	31	4784.52	45.50	8.44 N	45.69 E	46.46	79.54	11.30	11.29	-5.81
6	4817	10.7	102.8	32	4816.12	50.41	7.24 N	50.58 E	51.09	81.86	10.38	10.31	-7.50
7	4849	14.2	100.5	32	4847.36	57.20	5.86 N	57.34 E	57.63	84.16	11.04	10.94	-7.19
8	4880	17.8	100.1	31	4877.16	65.64	4.34 N	65.74 E	65.88	86.22	11.62	11.61	-1.29
9	4912	20.6	100.1	32	4907.37	76.03	2.49 N	76.10 E	76.14	88.12	8.75	8.75	0.00
10	4944	23.4	97.9	32	4937.04	87.91	0.63 N	87.94 E	87.94	89.59	9.12	8.75	-6.87
11	4975	26.9	96.6	31	4965.10	101.01	1.02 S	101.01 E	101.01	90.58	11.43	11.29	-4.19
12	5007	30.0	97.2	32	4993.23	116.17	2.85 S	116.14 E	116.17	91.41	9.73	9.69	1.88
13	5039	32.7	98.1	32	5020.56	132.71	5.08 S	132.64 E	132.73	92.19	8.56	8.44	2.81
14	5071	35.9	99.0	32	5046.99	150.60	7.76 S	150.47 E	150.67	92.95	10.12	10.00	2.81
15	5102	39.6	99.4	31	5071.49	169.39	10.80 S	169.20 E	169.54	93.65	11.96	11.94	1.29
16	5134	42.9	99.3	32	5095.55	190.27	14.23 S	190.01 E	190.54	94.28	10.31	10.31	-0.31
17	5166	45.8	99.4	32	5118.43	212.41	17.86 S	212.08 E	212.83	94.81	9.07	9.06	0.31
18	5198	48.9	99.1	32	5140.11	235.71	21.64 S	235.31 E	236.30	95.25	9.71	9.69	-0.94
19	5229	52.2	98.1	31	5159.80	259.45	25.21 S	258.97 E	260.20	95.56	10.93	10.65	-3.23
20	5261	54.8	98.0	32	5178.84	284.98	28.82 S	284.44 E	285.90	95.78	8.13	8.12	-0.31
21	5292	57.4	98.5	31	5196.13	310.52	32.51 S	309.90 E	311.60	95.99	8.49	8.39	1.61
22	5324	60.4	98.7	32	5212.65	337.69	36.61 S	336.99 E	338.98	96.20	9.39	9.38	0.63
23	5356	63.6	98.4	32	5227.67	365.70	40.81 S	364.93 E	367.20	96.38	10.03	10.00	-0.94
24	5388	66.5	97.6	32	5241.17	394.51	44.84 S	393.66 E	396.20	96.50	9.34	9.06	-2.50
25	5419	69.2	96.8	31	5252.86	423.06	48.44 S	422.14 E	424.91	96.55	9.03	8.71	-2.58
26	5451	71.8	96.8	32	5263.54	453.08	52.01 S	452.09 E	455.07	96.56	8.12	8.12	0.00
27	5483	74.5	96.6	32	5272.81	483.56	55.58 S	482.51 E	485.70	96.57	8.46	8.44	-0.63
28	5514	77.4	96.4	31	5280.34	513.50	58.99 S	512.38 E	515.77	96.57	9.38	9.35	-0.65
29	5546	80.0	95.6	32	5286.61	544.77	62.26 S	543.59 E	547.14	96.53	8.49	8.12	-2.50
30	5578	82.5	94.5	32	5291.48	576.32	65.05 S	575.09 E	578.76	96.45	8.52	7.81	-3.44
31	5610	85.1	92.9	32	5294.93	608.10	67.10 S	606.83 E	610.53	96.31	9.52	8.12	-5.00
32	5641	88.0	92.5	31	5296.80	639.03	68.56 S	637.74 E	641.41	96.14	9.44	9.35	-1.29
33	5673	90.0	92.0	32	5297.36	671.02	69.81 S	669.71 E	673.34	95.95	6.44	6.25	-1.56
34	5705	90.0	92.0	32	5297.36	703.02	70.93 S	701.69 E	705.26	95.77	0.00	0.00	0.00
35	5800	89.9	92.8	95	5297.44	798.00	74.91 S	796.60 E	800.12	95.37	0.85	-0.11	0.84
36	5895	91.5	92.9	95	5296.28	892.95	79.63 S	891.47 E	895.02	95.10	1.69	1.68	0.11



Company: COG Operating, LLC

Job Number: 04074-433-22

Calculation Method

Minimum Curvature

Well: Submarine 11 Fed Com #3H

Mag Decl.: 7.51

Proposed Azimuth

91.2

Location: Eddy County, New Mexico

Dir Driller: Cody Styles

Depth Reference

KBG

Rig: UDI 40

MWD Eng: Justin Warnack

Tie Into: Previous MWD Survey

Job Date: 01/28/13 - 02/05/13

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			
37	5990	91.3	93.1	95	5293.96	987.87	84.60 S	986.32 E	989.94	94.90	0.30	-0.21	0.21
38	6085	91.1	92.9	95	5291.97	1082.80	89.57 S	1081.17 E	1084.87	94.74	0.30	-0.21	-0.21
39	6180	91.2	92.1	95	5290.06	1177.76	93.71 S	1176.05 E	1179.78	94.56	0.85	0.11	-0.84
40	6276	91.1	92.3	96	5288.13	1273.73	97.40 S	1271.96 E	1275.69	94.38	0.23	-0.10	0.21
41	6371	91.4	91.9	95	5286.06	1368.69	100.88 S	1366.88 E	1370.60	94.22	0.53	0.32	-0.42
42	6466	91.5	92.0	95	5283.66	1463.65	104.11 S	1461.79 E	1465.50	94.07	0.15	0.11	0.11
43	6561	91.6	91.9	95	5281.09	1558.61	107.34 S	1556.70 E	1560.40	93.94	0.15	0.11	-0.11
44	6656	91.3	91.0	95	5278.68	1653.58	109.74 S	1651.64 E	1655.28	93.80	1.00	-0.32	-0.95
45	6751	90.4	90.0	95	5277.27	1748.56	110.57 S	1746.62 E	1750.12	93.62	1.42	-0.95	-1.05
46	6846	90.9	90.2	95	5276.20	1843.53	110.74 S	1841.62 E	1844.94	93.44	0.57	0.53	0.21
47	6910	90.9	90.0	64	5275.19	1907.51	110.85 S	1905.61 E	1908.83	93.33	0.31	0.00	-0.31
48	7005	91.1	90.4	95	5273.53	2002.48	111.18 S	2000.59 E	2003.68	93.18	0.47	0.21	0.42
49	7100	90.9	90.4	95	5271.88	2097.46	111.85 S	2095.58 E	2098.56	93.06	0.21	-0.21	0.00
50	7195	90.8	90.1	95	5270.47	2192.44	112.26 S	2190.57 E	2193.44	92.93	0.33	-0.11	-0.32
51	7290	90.8	90.0	95	5269.14	2287.41	112.34 S	2285.56 E	2288.32	92.81	0.11	0.00	-0.11
52	7386	90.7	90.2	96	5267.88	2383.38	112.51 S	2381.55 E	2384.20	92.70	0.23	-0.10	0.21
53	7481	90.6	90.4	95	5266.81	2478.36	113.01 S	2476.54 E	2479.12	92.61	0.24	-0.11	0.21
54	7576	91.1	90.0	95	5265.40	2573.34	113.34 S	2571.53 E	2574.03	92.52	0.67	0.53	-0.42
55	7671	91.1	90.0	95	5263.57	2668.30	113.34 S	2666.51 E	2668.92	92.43	0.00	0.00	0.00
56	7766	90.9	90.4	95	5261.91	2763.27	113.67 S	2761.50 E	2763.83	92.36	0.47	-0.21	0.42
57	7861	90.8	88.7	95	5260.51	2858.22	112.93 S	2856.48 E	2858.71	92.26	1.79	-0.11	-1.79
58	7956	90.6	89.0	95	5259.34	2953.13	111.02 S	2951.45 E	2953.54	92.15	0.38	-0.21	0.32
59	8052	90.5	89.5	96	5258.42	3049.07	109.76 S	3047.44 E	3049.42	92.06	0.53	-0.10	0.52
60	8147	90.5	89.3	95	5257.59	3144.02	108.77 S	3142.43 E	3144.31	91.98	0.21	0.00	-0.21
61	8242	90.4	89.6	95	5256.85	3238.97	107.86 S	3237.42 E	3239.22	91.91	0.33	-0.11	0.32
62	8337	91.6	89.7	95	5255.19	3333.92	107.28 S	3332.41 E	3334.13	91.84	1.27	1.26	0.11
63	8432	91.5	89.7	95	5252.62	3428.85	106.78 S	3427.37 E	3429.03	91.78	0.11	-0.11	0.00
64	8527	91.2	89.6	95	5250.38	3523.79	106.20 S	3522.34 E	3523.94	91.73	0.33	-0.32	-0.11
65	8622	91.0	89.9	95	5248.56	3618.74	105.78 S	3617.32 E	3618.87	91.68	0.38	-0.21	0.32
66	8718	90.9	90.1	96	5246.97	3714.71	105.78 S	3713.31 E	3714.82	91.63	0.23	-0.10	0.21
67	8812	90.6	90.3	94	5245.74	3808.69	106.11 S	3807.30 E	3808.78	91.60	0.38	-0.32	0.21
68	8908	91.6	89.5	96	5243.89	3904.64	105.94 S	3903.28 E	3904.72	91.55	1.33	1.04	-0.83
69	9003	91.5	89.7	95	5241.32	3999.57	105.28 S	3998.24 E	3999.63	91.51	0.24	-0.11	0.21
70	9098	91.3	89.5	95	5239.00	4094.51	104.62 S	4093.21 E	4094.55	91.46	0.30	-0.21	-0.21
71	9193	91.3	89.4	95	5236.85	4189.44	103.71 S	4188.18 E	4189.47	91.42	0.11	0.00	-0.11
72	9288	91.2	89.2	95	5234.77	4284.36	102.55 S	4283.15 E	4284.38	91.37	0.24	-0.11	-0.21
73	9383	91.2	89.1	95	5232.79	4379.28	101.14 S	4378.12 E	4379.29	91.32	0.11	0.00	-0.11
74	9479	91.0	89.2	96	5230.94	4475.20	99.71 S	4474.09 E	4475.21	91.28	0.23	-0.21	0.10

Archer

Company: COG Operating, LLC

Job Number: 04074-433-22

Calculation Method

Minimum Curvature

Well: Submarine 11 Fed Com #3H

Mag Decl.: 7.51

Proposed Azimuth

91.2

Location: Eddy County, New Mexico

Dir Driller: Cody Styles

Depth Reference

KBG

Rig: UDI 40

MWD Eng: Justin Warnack

Tie Into: Previous MWD Survey

Job Date: 01/28/13 - 02/05/13

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			
75	9574	91.1	88.8	95	5229.20	4570.12	98.06 S	4569.06 E	4570.12	91.23	0.43	0.11	-0.42
76	9669	90.8	89.1	95	5227.63	4665.03	96.32 S	4664.03 E	4665.03	91.18	0.45	-0.32	0.32
77	9764	90.7	88.9	95	5226.38	4759.95	94.66 S	4759.01 E	4759.95	91.14	0.24	-0.11	-0.21
78	9806	90.5	89.0	42	5225.94	4801.92	93.89 S	4801.00 E	4801.92	91.12	0.53	-0.48	0.24
Proj.	9869	90.5	89.0	63	5225.39	4864.87	92.79 S	4863.99 E	4864.88	91.09	0.00	0.00	0.00

WELL NAME AND NUMBER Submarine 11 Federal Com 3H
LOCATION Section 11, T17S, R29E, Lot E, 1605 FNL, 85 FWL, Eddy County
OPERATOR COG Operating LLC
DRILLING CONTRACTOR United Drilling, Inc.

The undersigned hereby certifies that he is an authorized representative of the drilling contractor who drilled the above described well and had conducted deviation test and obtained the following results:

Degrees @ Depth	Degrees @ Depth	Degrees @ Depth
.03° @ 250'		
.09° @ 345'		
.9° @ 607'		
1.1° @ 1007'		
.7° @ 1315'		
.6° @ 1587'		
.7° @ 2054'		
.7° @ 2499'		
.6° @ 2970'		
.7° @ 3420'		
.1° @ 3863'		
.4° @ 4338'		
90.5° @ 9806'		

Drilling Contractor- UNITED DRILLING, INC.

By: *Luisa Noriega*
(Luisa Noriega)

Title: Asst. Office Manager

Subscribed and sworn to before me this 14th day of February, 2013.

Carline Marten
Notary Public
Chaves New Mexico
County State

My Commission Expires: 10/8/16



A GYRO TECHNOLOGIES INC. COMPANY

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

February 6, 2013

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

Attn: Kanicia Castillo

RE: Submarine 11 Federal Com No. 003H

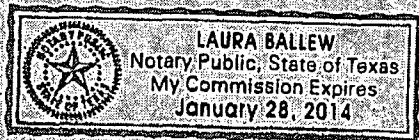
Please find enclosed a copy of the survey from 0.00' to 4426.00' ran on the
above referenced well.

Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 6th day of January
A.D., 2013, by Keith Havelka.



Laura Ballew
Laura Ballew
Notary Public, State of Texas

Company: COG Operating LLC (Concho)
Lease/Well: Submarine 11 Federal Com/ No. 003H



Rig Name: UDI 40
State/County: New Mexico / Eddy
Latitude: 32.85, Longitude: -104.05
GRID North is 0.15 Degrees East of True North
VS-Azi: 0.00 Degrees



Depth Reference : RKB = 14'

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: submarine 11 fed com 3h_ed.ut

Minimum Curvature Method

Report Date/Time: 2/6/2013 / 09:38

Vaughn Energy Services

Fort Worth, Texas

817-741-3610

Surveyor: Robert Hooper

Submarine 11 Federal Com No. 003H / API 30-015-40546

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	0.54	28.89	100.00	0.41	0.23	0.41	0.47	28.89	0.54
200.00	1.06	26.01	199.99	1.66	0.86	1.66	1.87	27.46	0.53
300.00	0.38	49.18	299.98	2.71	1.52	2.71	3.10	29.28	0.73
400.00	1.09	47.64	399.97	3.57	2.47	3.57	4.34	34.74	0.71
500.00	0.69	54.83	499.96	4.55	3.67	4.55	5.85	38.85	0.42
600.00	0.45	58.66	599.95	5.10	4.49	5.10	6.80	41.35	0.25
700.00	1.08	75.41	699.94	5.54	5.74	5.54	7.98	45.99	0.67
800.00	1.22	78.89	799.92	5.99	7.69	5.99	9.75	52.12	0.15
900.00	1.19	76.93	899.90	6.42	9.75	6.42	11.67	56.61	0.05
1000.00	0.87	53.73	999.89	7.11	11.37	7.11	13.41	57.99	0.52
1100.00	0.97	54.86	1099.87	8.04	12.67	8.04	15.01	57.60	0.11
1200.00	0.95	57.70	1199.86	8.97	14.07	8.97	16.68	57.47	0.05
1300.00	0.69	54.78	1299.85	9.76	15.26	9.76	18.11	57.39	0.27
1400.00	0.53	64.20	1399.84	10.31	16.16	10.31	19.17	57.47	0.18
1500.00	0.25	71.57	1499.84	10.58	16.79	10.58	19.85	57.79	0.28
1600.00	0.60	88.52	1599.84	10.67	17.53	10.67	20.52	58.68	0.36
1700.00	0.93	90.21	1699.83	10.68	18.86	10.68	21.67	60.48	0.33
1800.00	0.96	92.55	1799.82	10.64	20.50	10.64	23.10	62.58	0.05

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	1.06	82.18	1899.80	10.73	22.26	10.73	24.71	64.27	0.21
2000.00	0.64	78.34	1999.79	10.96	23.72	10.96	26.13	65.19	0.43
2100.00	0.51	77.57	2099.78	11.17	24.69	11.17	27.10	65.66	0.13
2200.00	0.54	79.80	2199.78	11.35	25.59	11.35	27.99	66.08	0.04
2300.00	0.64	78.74	2299.77	11.54	26.60	11.54	29.00	66.54	0.10
2400.00	0.46	91.66	2399.77	11.64	27.55	11.64	29.91	67.10	0.21
2500.00	0.38	84.75	2499.77	11.66	28.28	11.66	30.59	67.60	0.10
2600.00	0.36	89.19	2599.77	11.69	28.92	11.69	31.20	67.99	0.03
2700.00	0.32	64.98	2699.76	11.81	29.49	11.81	31.77	68.17	0.15
2800.00	0.44	65.64	2799.76	12.09	30.09	12.09	32.43	68.11	0.12
2900.00	0.29	73.06	2899.76	12.32	30.67	12.32	33.05	68.12	0.16
3000.00	0.46	87.97	2999.76	12.40	31.31	12.40	33.68	68.39	0.19
3100.00	0.72	90.05	3099.75	12.42	32.34	12.42	34.65	69.00	0.27
3200.00	0.62	88.03	3199.74	12.44	33.52	12.44	35.75	69.64	0.10
3300.00	0.73	112.09	3299.74	12.22	34.65	12.22	36.74	70.58	0.30
3400.00	0.73	122.14	3399.73	11.64	35.77	11.64	37.62	71.98	0.13
3500.00	0.67	131.36	3499.72	10.91	36.75	10.91	38.34	73.46	0.13
3600.00	0.37	156.55	3599.72	10.23	37.32	10.23	38.70	74.68	0.37
3700.00	0.21	160.58	3699.72	9.76	37.51	9.76	38.76	75.42	0.16
3800.00	0.15	148.87	3799.72	9.47	37.64	9.47	38.82	75.87	0.07
3900.00	0.25	113.24	3899.72	9.28	37.91	9.28	39.03	76.25	0.15
4000.00	0.50	115.78	3999.71	9.00	38.50	9.00	39.54	76.84	0.25
4100.00	0.39	93.00	4099.71	8.79	39.23	8.79	40.21	77.36	0.20
4200.00	0.07	87.99	4199.71	8.78	39.63	8.78	40.59	77.51	0.32
4300.00	0.38	75.22	4299.71	8.87	40.01	8.87	40.98	77.51	0.31
4400.00	0.24	79.63	4399.71	8.99	40.54	8.99	41.52	77.50	0.14
4426.00	0.24	81.91	4425.71	9.00	40.64	9.00	41.63	77.51	0.04



Vaughn Energy Services
Fort Worth, Texas
817-741-3610

Surveyor: Robert Hooper
Submarine 11 Federal Com No. 003H / API 30-015-40546

