

30-015-39288

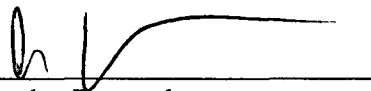
Archer

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 10/31/12 through 11/10/12, conduct or supervise the taking of MWD surveys from a depth of 5050 feet to a depth of 10017 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 Carmen 3 Federal Com #11H (API # 30-015-39288), 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:

03958-433-22

Calculation Method

Minimum Curvature

Well: Carmen 3 Federal Com #11H

Mag Decl.:

7.46

Proposed Azimuth

90.4

Location: Eddy County, New Mexico

Dir Driller:

Cody Styles

Depth Reference

KBG

Rig: JW 2

MWD Eng:

Justin Warnack

Tie Into: Previous MWD Survey

Job Date: 10/31/2012 - 11/10/2012

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	4995.00	0.4	323.21	0	4994.7	15.3	26.20 N	15.10 W					
1	5050	0.5	24.4	55	5049.70	-15.32	26.57 N	15.12 W	30.57	330.37	0.85	0.18	-543.29
2	5082	1.6	82.7	32	5081.69	-14.82	26.76 N	14.62 W	30.49	331.36	4.39	3.44	182.19
3	5113	4.3	85.7	31	5112.65	-13.23	26.90 N	13.03 W	29.89	334.16	8.72	8.71	9.68
4	5145	7.9	88.1	32	5144.46	-9.84	27.06 N	9.63 W	28.72	340.41	11.28	11.25	7.50
5	5176	11.8	88.8	31	5175.00	-4.54	27.20 N	4.33 W	27.54	350.95	12.59	12.58	2.26
6	5207	15.6	90.6	31	5205.11	2.80	27.22 N	3.01 E	27.39	6.31	12.33	12.26	5.81
7	5238	18.9	91.7	31	5234.71	11.99	27.03 N	12.20 E	29.65	24.29	10.70	10.65	3.55
8	5270	21.8	93.9	32	5264.71	23.10	26.47 N	23.31 E	35.27	41.37	9.37	9.06	6.88
9	5300	24.2	93.3	30	5292.33	34.81	25.74 N	35.01 E	43.45	53.68	8.04	8.00	-2.00
10	5332	27.3	93.3	32	5321.15	48.69	24.94 N	48.88 E	54.88	62.97	9.69	9.69	0.00
11	5363	30.3	93.2	31	5348.31	63.61	24.09 N	63.79 E	68.19	69.31	9.68	9.68	-0.32
12	5395	33.0	94.1	32	5375.55	80.37	23.02 N	80.55 E	83.77	74.05	8.57	8.44	2.81
13	5426	35.9	94.9	31	5401.11	97.86	21.64 N	98.03 E	100.39	77.55	9.47	9.35	2.58
14	5457	38.9	95.3	31	5425.73	116.62	19.96 N	116.78 E	118.47	80.30	9.71	9.68	1.29
15	5489	42.7	95.7	32	5449.95	137.45	17.95 N	137.59 E	138.76	82.57	11.90	11.88	1.25
16	5520	45.6	95.6	31	5472.19	158.95	15.83 N	159.07 E	159.86	84.32	9.36	9.35	-0.32
17	5551	48.7	95.7	31	5493.27	181.58	13.59 N	181.69 E	182.20	85.72	10.00	10.00	0.32
18	5582	52.0	95.9	31	5513.05	205.34	11.18 N	205.43 E	205.74	86.89	10.66	10.65	0.65
19	5613	55.3	96.1	31	5531.42	230.19	8.57 N	230.26 E	230.42	87.87	10.66	10.65	0.65
20	5644	58.5	96.0	31	5548.35	256.03	5.83 N	256.08 E	256.15	88.70	10.33	10.32	-0.32
21	5676	61.5	95.5	32	5564.35	283.62	3.06 N	283.65 E	283.67	89.38	9.47	9.38	-1.56
22	5707	64.0	94.5	31	5578.54	311.09	0.66 N	311.10 E	311.10	89.88	8.56	8.06	-3.23
23	5738	66.7	93.6	31	5591.47	339.20	1.33 S	339.20 E	339.21	90.22	9.10	8.71	-2.90
24	5770	69.4	93.6	32	5603.43	368.84	3.19 S	368.82 E	368.84	90.50	8.44	8.44	0.00
25	5801	72.1	94.0	31	5613.65	398.05	5.13 S	398.02 E	398.06	90.74	8.79	8.71	1.29
26	5832	74.7	93.9	31	5622.50	427.70	7.18 S	427.66 E	427.72	90.96	8.39	8.39	-0.32
27	5863	77.2	93.9	31	5630.03	457.72	9.22 S	457.66 E	457.75	91.15	8.06	8.06	0.00
28	5894	79.6	94.3	31	5636.26	488.02	11.39 S	487.95 E	488.08	91.34	7.84	7.74	1.29
29	5926	82.0	94.5	32	5641.38	519.53	13.82 S	519.44 E	519.62	91.52	7.53	7.50	0.63
30	5957	84.9	94.8	31	5644.91	550.24	16.31 S	550.13 E	550.37	91.70	9.40	9.35	0.97
31	5989	87.4	95.2	32	5647.06	582.06	19.10 S	581.93 E	582.25	91.88	7.91	7.81	1.25
32	6020	89.0	95.0	31	5648.04	612.95	21.85 S	612.80 E	613.19	92.04	5.20	5.16	-0.65
33	6051	89.3	94.9	31	5648.50	643.85	24.53 S	643.68 E	644.14	92.18	1.02	0.97	-0.32
34	6129	89.8	94.7	78	5649.11	721.62	31.05 S	721.40 E	722.07	92.46	0.69	0.64	-0.26
35	6224	91.3	93.2	95	5648.20	816.43	37.60 S	816.16 E	817.03	92.64	2.23	1.58	-1.58
36	6317	91.6	91.6	93	5645.84	909.34	41.49 S	909.05 E	910.00	92.61	1.75	0.32	-1.72



Company: COG Operating, LLC

Job Number: 03958-433-22

Calculation Method

Minimum Curvature

Well: Carmen 3 Federal Com #11H

Mag Decl.: 7.46

Proposed Azimuth

90.4

Location: Eddy County, New Mexico

Dir Driller: Cody Styles

Depth Reference

KGB

Rig: JW 2

MWD Eng: Justin Warnack

Tie Into: Previous MWD Survey

Job Date: 10/31/2012 - 11/10/2012

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	6412	92.0	89.8	95	5642.86	1004.29	42.65 S	1003.99 E	1004.90	92.43	1.94	0.42	-1.89
38	6506	92.4	89.3	94	5639.25	1098.21	41.91 S	1097.92 E	1098.72	92.19	0.68	0.43	-0.53
39	6599	92.6	89.0	93	5635.19	1191.10	40.53 S	1190.82 E	1191.51	91.95	0.39	0.22	-0.32
40	6693	92.3	89.4	94	5631.18	1284.99	39.22 S	1284.73 E	1285.32	91.75	0.53	-0.32	0.43
41	6787	91.3	90.0	94	5628.22	1378.93	38.73 S	1378.68 E	1379.22	91.61	1.24	-1.06	0.64
42	6880	91.0	90.7	93	5626.36	1471.91	39.30 S	1471.66 E	1472.18	91.53	0.82	-0.32	0.75
43	6973	91.1	91.6	93	5624.65	1564.89	41.16 S	1564.62 E	1565.16	91.51	0.97	0.11	0.97
44	7066	90.6	90.3	93	5623.27	1657.87	42.71 S	1657.59 E	1658.14	91.48	1.50	-0.54	-1.40
45	7161	90.3	88.8	95	5622.53	1752.86	41.96 S	1752.59 E	1753.09	91.37	1.61	-0.32	-1.58
46	7254	90.9	88.4	93	5621.55	1845.80	39.69 S	1845.55 E	1845.98	91.23	0.78	0.65	-0.43
47	7348	90.0	88.3	94	5620.81	1939.74	36.98 S	1939.51 E	1939.86	91.09	0.96	-0.96	-0.11
48	7441	90.2	88.3	93	5620.65	2032.67	34.22 S	2032.47 E	2032.76	90.96	0.22	0.22	0.00
49	7536	90.7	88.7	95	5619.91	2127.61	31.74 S	2127.43 E	2127.67	90.85	0.67	0.53	0.42
50	7630	92.0	89.1	94	5617.69	2221.55	29.93 S	2221.39 E	2221.59	90.77	1.45	1.38	0.43
51	7725	90.5	88.7	95	5615.62	2316.49	28.11 S	2316.34 E	2316.51	90.70	1.63	-1.58	-0.42
52	7819	90.0	89.5	94	5615.21	2410.46	26.63 S	2410.33 E	2410.48	90.63	1.00	-0.53	0.85
53	7913	90.5	89.6	94	5614.80	2504.45	25.89 S	2504.33 E	2504.46	90.59	0.54	0.53	0.11
54	8006	91.1	89.3	93	5613.50	2597.43	25.00 S	2597.31 E	2597.43	90.55	0.72	0.65	-0.32
55	8100	90.6	90.1	94	5612.11	2691.41	24.51 S	2691.30 E	2691.41	90.52	1.00	-0.53	0.85
56	8193	91.2	90.3	93	5610.64	2784.40	24.83 S	2784.29 E	2784.40	90.51	0.68	0.65	0.22
57	8287	92.2	90.0	94	5607.86	2878.35	25.08 S	2878.24 E	2878.35	90.50	1.11	1.06	-0.32
58	8395	90.8	89.7	108	5605.03	2986.31	24.80 S	2986.20 E	2986.31	90.48	1.33	-1.30	-0.28
59	8475	90.6	91.0	80	5604.05	3066.30	25.29 S	3066.19 E	3066.30	90.47	1.64	-0.25	1.63
60	8568	91.1	91.0	93	5602.67	3159.28	26.91 S	3159.17 E	3159.28	90.49	0.54	0.54	0.00
61	8662	92.2	90.8	94	5599.97	3253.24	28.38 S	3253.12 E	3253.24	90.50	1.19	1.17	-0.21
62	8756	91.0	91.9	94	5597.34	3347.19	30.60 S	3347.05 E	3347.19	90.52	1.73	-1.28	1.17
63	8849	91.3	92.5	93	5595.47	3440.12	34.17 S	3439.96 E	3440.13	90.57	0.72	0.32	0.65
64	8942	92.0	92.6	93	5592.80	3533.02	38.30 S	3532.83 E	3533.04	90.62	0.76	0.75	0.11
65	9069	90.3	92.6	127	5590.25	3659.90	44.06 S	3659.67 E	3659.94	90.69	1.34	-1.34	0.00
66	9163	90.2	90.8	94	5589.84	3753.87	46.85 S	3753.63 E	3753.92	90.72	1.92	-0.11	-1.91
67	9256	90.7	91.0	93	5589.11	3846.87	48.31 S	3846.61 E	3846.91	90.72	0.58	0.54	0.22
68	9350	89.9	90.9	94	5588.61	3940.86	49.87 S	3940.60 E	3940.91	90.73	0.86	-0.85	-0.11
69	9444	88.5	89.1	94	5589.93	4034.84	49.87 S	4034.58 E	4034.89	90.71	2.43	-1.49	-1.91
70	9538	89.5	89.1	94	5591.57	4128.80	48.40 S	4128.55 E	4128.84	90.67	1.06	1.06	0.00
71	9631	91.6	89.9	93	5590.68	4221.78	47.58 S	4221.54 E	4221.81	90.65	2.42	2.26	0.86
72	9725	92.1	89.8	94	5587.64	4315.73	47.34 S	4315.49 E	4315.75	90.63	0.54	0.53	-0.11
73	9818	92.7	90.0	93	5583.75	4408.64	47.18 S	4408.41 E	4408.66	90.61	0.68	0.65	0.22
74	9958	93.4	89.8	140	5576.30	4548.43	46.93 S	4548.21 E	4548.45	90.59	0.52	0.50	-0.14

Archer

Company: COG Operating, LLC

Job Number:

03958-433-22

Well: Carmen 3 Federal Com #11H

Mag Decl.:

7.46

Location: Eddy County, New Mexico

Dir Driller:

Cody Styles

Rig: JW 2

MWD Eng:

Justin Warnack

Calculation Method

Minimum Curvature

Proposed Azimuth

90.4

Depth Reference

KBG

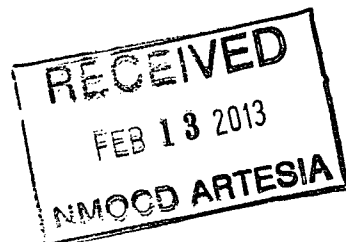
Tie Into: Previous MWD Survey

Job Date: 10/31/2012 - 11/10/2012

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			
Proj.	10017	93.4	89.8	59	5572.80	4607.33	46.73 S	4607.10 E	4607.34	90.58	0.00	0.00	0.00



Company: COG Operating, LLC (Concho)
Lease/Well: Carmen 3 Federal Com / No. 011H
Location: SEC3 T17S R30E
Rig Name: JW 2
State/County: New Mexico/ Eddy
Latitude: 32.87, Longitude: -103.97
GRID North is 0.20 Degrees East of True North
VS-Azi: 0.00 Degrees



Depth Reference : RKB= 18.5'

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut

Minimum Curvature Method

Report Date/Time: 11/6/2012 / 16:23

Vaughn Energy Services

Gardendale, Texas

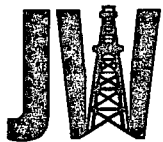
(432) 563-5444

Surveyor: Colby Ware

Carmen 3 Federal Com No. 011H / API 30-015-39288

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W 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	****
100.00	0.44	164.50	100.00	-0.37	0.10	0.38	164.50	0.44
200.00	0.35	201.75	200.00	-1.02	0.09	1.03	175.02	0.26
300.00	0.86	233.22	299.99	-1.76	-0.63	1.87	199.63	0.59
400.00	1.37	264.69	399.97	-2.32	-2.42	3.35	226.18	0.78
500.00	0.85	272.20	499.95	-2.40	-4.35	4.97	241.06	0.54
600.00	0.33	279.71	599.95	-2.33	-5.37	5.85	246.56	0.53
700.00	0.23	300.72	699.95	-2.18	-5.82	6.21	249.48	0.14
800.00	0.13	321.73	799.95	-1.99	-6.06	6.38	251.82	0.12
900.00	0.40	9.35	899.95	-1.55	-6.07	6.26	255.64	0.33
1000.00	0.68	56.97	999.94	-0.88	-5.51	5.58	260.92	0.51
1100.00	0.87	63.24	1099.93	-0.22	-4.34	4.34	267.15	0.20
1200.00	1.05	69.51	1199.92	0.44	-2.81	2.84	278.99	0.21
1300.00	0.89	69.57	1299.90	1.04	-1.22	1.60	310.34	0.15
1400.00	0.72	69.64	1399.89	1.53	0.10	1.53	3.70	0.17
1500.00	0.51	69.61	1499.89	1.90	1.10	2.20	30.17	0.21
1600.00	0.32	69.57	1599.89	2.15	1.79	2.80	39.66	0.19
1700.00	0.22	52.87	1699.88	2.37	2.21	3.24	42.94	0.13
1800.00	0.13	36.17	1799.88	2.58	2.43	3.54	43.27	0.11

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	0.22	21.64	1899.88	2.84	2.56	3.82	42.02	0.10
2000.00	0.31	7.11	1999.88	3.28	2.66	4.23	39.03	0.11
2100.00	0.29	340.60	2099.88	3.79	2.61	4.60	34.61	0.14
2200.00	0.26	314.09	2199.88	4.18	2.37	4.80	29.51	0.13
2300.00	0.29	320.05	2299.88	4.53	2.04	4.97	24.24	0.04
2400.00	0.28	326.02	2399.88	4.93	1.75	5.23	19.51	0.03
2500.00	0.46	305.76	2499.88	5.36	1.28	5.51	13.46	0.23
2600.00	0.65	285.50	2599.87	5.75	0.41	5.76	4.05	0.27
2700.00	0.74	277.33	2699.86	5.98	-0.78	6.03	352.55	0.13
2800.00	0.83	269.17	2799.85	6.06	-2.15	6.43	340.46	0.14
2900.00	0.76	265.45	2899.84	5.99	-3.54	6.96	329.45	0.09
3000.00	0.69	261.72	2999.84	5.85	-4.80	7.57	320.67	0.08
3100.00	0.76	276.10	3099.83	5.84	-6.05	8.41	313.98	0.19
3200.00	0.82	290.47	3199.82	6.16	-7.38	9.61	309.85	0.21
3300.00	0.79	312.88	3299.81	6.88	-8.56	10.98	308.79	0.32
3400.00	0.76	335.28	3399.80	7.96	-9.34	12.27	310.41	0.30
3500.00	0.84	329.58	3499.79	9.19	-9.99	13.58	312.61	0.11
3600.00	0.92	323.87	3599.78	10.48	-10.84	15.08	314.03	0.12
3700.00	0.78	333.18	3699.77	11.74	-11.62	16.52	315.27	0.20
3800.00	0.63	342.50	3799.76	12.86	-12.09	17.65	316.76	0.19
3900.00	0.84	348.55	3899.75	14.11	-12.40	18.78	318.67	0.23
4000.00	1.06	354.61	3999.74	15.75	-12.64	20.20	321.26	0.24
4100.00	0.93	343.40	4099.72	17.46	-12.96	21.74	323.41	0.23
4200.00	0.80	332.18	4199.71	18.86	-13.52	23.20	324.36	0.21
4300.00	0.72	337.62	4299.70	20.06	-14.09	24.51	324.92	0.11
4400.00	0.64	343.05	4399.70	21.18	-14.49	25.66	325.62	0.10
4500.00	0.60	353.32	4499.69	22.23	-14.71	26.66	326.51	0.12
4600.00	0.56	3.60	4599.68	23.24	-14.74	27.52	327.61	0.11
4700.00	0.46	1.73	4699.68	24.13	-14.70	28.25	328.65	0.10
4800.00	0.37	359.86	4799.68	24.85	-14.69	28.87	329.42	0.09
4900.00	0.44	346.09	4899.68	25.55	-14.78	29.51	329.95	0.12
4995.00	0.40	323.21	4994.67	26.17	-15.07	30.19	330.06	0.18



DRILLING INC. Oil Well Drilling Contractor

Post Office Box 160 Artesia, New Mexico 88211-0160 Office (575) 748-8704 Fax (575) 748-8719

November 5, 2012

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

Re: Carmen 3 Fed. Com # 11 H
Sec. 3, T-17-S, R-30-E
Eddy County, New Mexico

Attn: Jim Evans

The following is a Deviation Survey on the referenced well in Eddy County, New Mexico:

187' - 0.75°	1503' - 0.5°	2657' - 0.5°	4061' - 0.5°
458' - 2°	1752' - 0.25°	3124' - 1.5°	4558' - 0.25°
913' - 1°	2222' - 0.25°	3593' - 0.5°	4996' - 1°
1277' - 0.25°			

Sincerely,

Gary W. Chappell
Contracts Manager

STATE OF NEW MEXICO)
COUNTY OF EDDY)

The foregoing was acknowledged before me this 5th day of November, 2012 by Gary W. Chappell.

NOTARY PUBLIC

