



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

COG OPERATING LLC
RECEIVED
APR 11 2014
ARTESIA WEST

NM OIL CONSERVATION
ARTESIA DISTRICT
AUG 05 2014
RECEIVED

March 28, 2014

30-015-41935

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

RE: Graham Cracker 16 State 1H
190' FNL & 800' FWL
Sec. 16, T26S, R28E
Eddy County, New Mexico

Dear Sir,

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

Very truly yours,

Chris Graham
Drilling Superintendent

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 28th day of March, 2014.

Notary Public

OFFICIAL SEAL
REGINIA L. GARNER
NOTARY PUBLIC - STATE OF NEW MEXICO
My commission expires *Aug. 30, 2016*

Graham Cracker 16 St 1H

Date	Depth	Dev	Dir	TVD	Horiz Disp
3/11/2014	147	0.70	0.00	0.00	0.00
3/11/2014	452	1.70	0.00	0.00	0.00
3/13/2014	622	0.19	0.00	0.00	0.00
3/13/2014	683	1.20	0.00	0.00	0.00
3/13/2014	866	0.30	0.00	0.00	0.00
3/13/2014	1111	0.20	0.00	0.00	0.00
3/13/2014	1295	0.00	0.00	0.00	0.00
3/14/2014	1540	0.30	0.00	0.00	0.00
3/14/2014	1784	0.40	0.00	0.00	0.00
3/14/2014	2028	0.10	0.00	0.00	0.00
3/14/2014	2280	0.20	0.00	0.00	0.00
3/14/2014	2400	0.00	0.00	0.00	0.00
3/16/2014	2739	0.10	0.00	0.00	0.00
3/16/2014	3181	0.20	0.00	0.00	0.00
3/16/2014	3623	0.00	0.00	0.00	0.00
3/16/2014	4033	0.30	0.00	0.00	0.00
3/17/2014	4442	0.70	0.00	0.00	0.00
3/17/2014	4883	1.00	0.00	0.00	0.00
3/17/2014	5133	0.90	0.00	0.00	0.00
3/17/2014	5542	1.00	0.00	0.00	0.00
3/18/2014	5952	2.10	0.00	0.00	0.00
3/18/2014	6109	0.90	0.00	0.00	0.00
3/18/2014	6297	0.90	0.00	0.00	0.00
3/18/2014	6709	2.10	0.00	0.00	0.00
3/18/2014	6867	3.10	0.00	0.00	0.00
3/19/2014	6961	2.60	0.00	0.00	0.00
3/19/2014	7024	2.30	0.00	0.00	0.00
3/19/2014	7119	1.90	0.00	0.00	0.00
3/19/2014	7213	2.20	0.00	0.00	0.00
3/19/2014	7306	2.10	0.00	0.00	0.00
3/19/2014	7424	0.60	0.00	0.00	0.00
3/21/2014	7477	0.50	13.90	7475.50	58.80
3/21/2014	7603	14.80	175.00	7600.02	72.31
3/21/2014	7666	22.10	173.90	7659.78	92.04
3/21/2014	7729	30.00	174.70	7716.40	119.40
3/21/2014	7887	49.80	179.40	7836.30	220.90
3/21/2014	7982	60.50	181.00	7890.20	298.90
3/21/2014	8045	64.20	182.40	7919.50	354.70
3/21/2014	8172	71.80	182.40	7966.00	472.70
3/21/2014	8329	77.80	179.80	8007.31	623.97
3/22/2014	8361	80.50	178.70	8013.33	655.39
3/22/2014	8550	90.20	179.20	8022.76	843.89
3/22/2014	8645	92.10	178.60	8020.85	938.84

Date	Depth	Dev	Dir	TVD	Horiz Disp
3/22/2014	8834	90.00	181.40	8018.00	1127.80
3/22/2014	8929	89.70	181.80	8018.20	1222.70
3/22/2014	9119	90.30	181.60	8017.70	1412.70
3/22/2014	9213	88.90	181.20	8018.40	1506.70
3/22/2014	9403	90.50	181.30	8020.19	1696.59
3/22/2014	9592	90.30	179.50	8020.68	1885.58
3/23/2014	9685	91.40	179.60	8019.30	1978.56
3/23/2014	9874	90.30	179.60	8014.06	2167.55
3/23/2014	9969	91.50	179.50	8017.57	2262.53
3/23/2014	10160	89.00	180.00	8017.80	2453.50
3/23/2014	10254	89.30	179.30	8019.10	2547.50
3/23/2014	10349	90.50	179.00	8019.10	2642.50
3/23/2014	10538	90.80	180.20	8019.30	2831.50
3/23/2014	10727	90.20	179.60	8019.47	3020.46
3/23/2014	10821	91.30	179.70	8018.24	3114.45
3/24/2014	10916	89.70	179.80	8017.40	3209.44
3/24/2014	11102	88.00	180.50	8023.82	3395.31
3/24/2014	11197	89.20	180.20	8026.65	3490.28
3/24/2014	11292	90.50	178.90	8026.40	3585.30
3/24/2014	11386	90.10	180.30	8025.90	3679.30
3/24/2014	11481	91.30	179.60	8024.70	3774.30
3/24/2014	11576	91.40	180.70	8022.50	3869.20
3/24/2014	11671	89.20	180.70	8022.00	3964.20
3/24/2014	11860	91.20	180.20	8021.35	4153.19
3/25/2014	11955	89.80	180.80	8020.53	4248.18
3/25/2014	12144	91.40	180.70	8018.87	4437.16
3/25/2014	12238	90.40	179.40	8017.39	4531.15
3/25/2014	12332	89.60	178.70	8017.40	4623.10
3/25/2014	12426	90.60	178.20	8017.20	4719.10



A GYRO TECHNOLOGIES INC. COMPANY

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

April 1, 2014

COG Operating LLC (Concho)
One Concho Center
600 W. Illinois Avenue
Midland, TX 79701

NM OIL CONSERVATION
ARTESIA DISTRICT
AUG 05 2014
RECEIVED

Attn: Kanicia Castillo

Re: **Graham Cracker 16 State No 001H**

Please find enclosed a copy of the survey from 0' to 7,387' ran on the above referenced well.

If I can be of any further service, please do not hesitate to call me at 800-606-4976.

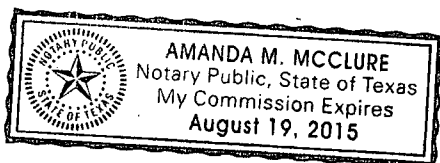
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 1 day of April, A.D., 2014, by Keith Havelka.

Amanda McClure
Amanda McClure
Notary Public, State of Texas





Company: COG Operating-Concho
 Lease/Well: Graham Cracker 16 State/No 001H



Rig Name: Silver Oak 7
 State/County: New Mexico/Eddy
 Latitude: 32.05, Longitude: -104.10
 GRID North is 0.12 Degrees East of True North
 VS-Azi: 0.00 Degrees

Depth Reference : RKB: 18'

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut
 Minimum Curvature Method
 Report Date/Time: 4/1/2014 / 12:53

Vaughn Energy Services
 Midland,Tx
 (432)-563-5444

Surveyor: Tim Dillon

Graham Cracker 16 State No 001H / API 30-015-41935

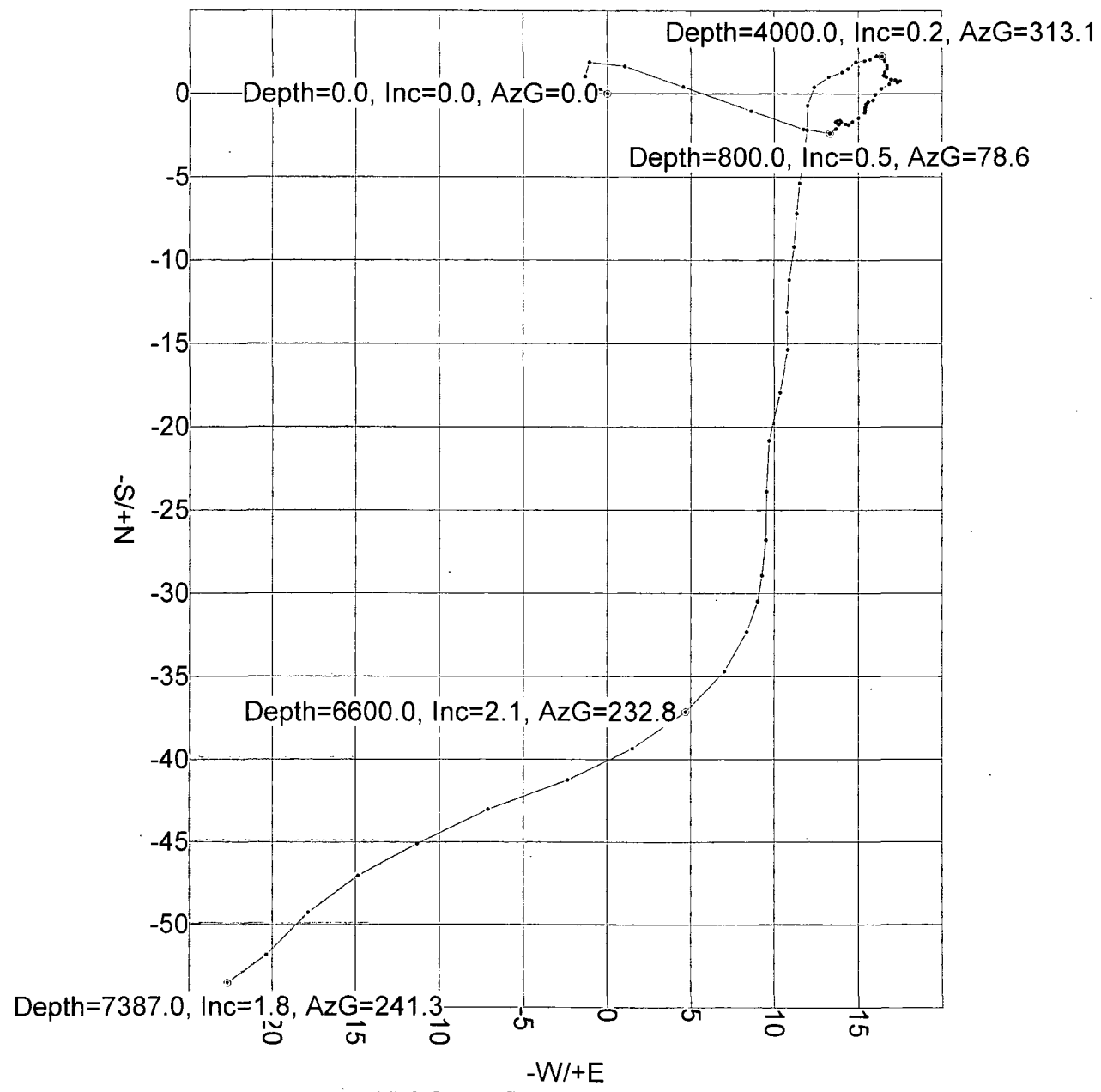
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.57	302.47	100.00	0.27	-0.42	0.50	302.47	0.57
200.00	0.82	315.25	199.99	1.04	-1.34	1.70	307.81	0.29
300.00	0.94	65.55	299.98	1.89	-1.10	2.19	329.84	1.45
400.00	1.71	112.75	399.96	1.65	1.03	1.95	31.82	1.27
500.00	2.54	107.44	499.89	0.41	4.52	4.54	84.81	0.86
600.00	2.43	111.62	599.80	-1.04	8.61	8.67	96.87	0.21
700.00	1.37	105.47	699.74	-2.14	11.73	11.93	100.33	1.09
800.00	0.46	78.60	799.73	-2.38	13.27	13.48	100.15	0.98
900.00	0.21	348.33	899.72	-2.12	13.63	13.79	98.85	0.50
1000.00	0.28	65.97	999.72	-1.85	13.81	13.94	97.61	0.31
1100.00	0.24	310.74	1099.72	-1.61	13.88	13.97	96.63	0.44
1200.00	0.19	171.76	1199.72	-1.64	13.75	13.85	96.82	0.40
1300.00	0.20	317.14	1299.72	-1.68	13.65	13.75	97.02	0.38
1400.00	0.22	148.42	1399.72	-1.71	13.63	13.74	97.16	0.42
1500.00	0.11	14.99	1499.72	-1.79	13.75	13.87	97.39	0.30
1600.00	0.20	84.23	1599.72	-1.68	13.95	14.05	96.86	0.19
1700.00	0.21	148.90	1699.72	-1.82	14.22	14.34	97.28	0.22
1800.00	0.15	39.42	1799.72	-1.87	14.40	14.52	97.41	0.29

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	0.18	57.11	1899.72	-1.69	14.61	14.71	96.59	0.06
2000.00	0.32	58.81	1999.72	-1.46	14.99	15.06	95.55	0.15
2100.00	0.25	34.84	2099.72	-1.13	15.35	15.40	94.20	0.14
2200.00	0.13	258.22	2199.72	-0.97	15.37	15.40	93.60	0.36
2300.00	0.24	37.71	2299.72	-0.83	15.39	15.41	93.07	0.34
2400.00	0.12	294.23	2399.72	-0.62	15.43	15.44	92.30	0.29
2500.00	0.27	68.69	2499.72	-0.49	15.56	15.56	91.81	0.37
2600.00	0.11	69.58	2599.72	-0.37	15.87	15.87	91.34	0.17
2700.00	0.33	5.62	2699.72	-0.05	15.98	15.98	90.18	0.30
2800.00	0.39	80.14	2799.71	0.29	16.35	16.35	88.97	0.44
2900.00	0.29	31.55	2899.71	0.57	16.82	16.83	88.05	0.30
3000.00	0.27	83.02	2999.71	0.82	17.19	17.21	87.27	0.25
3100.00	0.11	142.72	3099.71	0.77	17.48	17.50	87.48	0.24
3200.00	0.27	266.59	3199.71	0.68	17.31	17.32	87.75	0.35
3300.00	0.25	323.46	3299.71	0.84	16.94	16.96	87.16	0.25
3400.00	0.20	268.44	3399.71	1.01	16.64	16.67	86.53	0.21
3500.00	0.08	12.29	3499.71	1.08	16.48	16.51	86.27	0.23
3600.00	0.17	21.97	3599.71	1.28	16.55	16.60	85.57	0.09
3700.00	0.14	47.38	3699.71	1.50	16.69	16.76	84.86	0.07
3800.00	0.17	320.98	3799.71	1.70	16.69	16.77	84.19	0.21
3900.00	0.19	345.02	3899.71	1.97	16.55	16.67	83.20	0.08
4000.00	0.19	313.13	3999.71	2.25	16.39	16.54	82.19	0.10
4100.00	0.26	249.58	4099.71	2.28	16.05	16.21	81.90	0.24
4200.00	0.25	231.85	4199.71	2.07	15.67	15.80	82.48	0.08
4300.00	0.19	290.72	4299.71	1.99	15.34	15.47	82.61	0.22
4400.00	0.44	248.71	4399.70	1.91	14.83	14.95	82.66	0.32
4500.00	0.32	203.82	4499.70	1.52	14.36	14.44	83.96	0.31
4600.00	0.29	274.65	4599.70	1.29	14.00	14.06	84.75	0.35
4700.00	0.68	240.99	4699.70	1.02	13.23	13.27	85.59	0.46
4800.00	0.56	226.29	4799.69	0.40	12.36	12.37	88.16	0.19
4900.00	0.88	182.49	4899.68	-0.71	11.97	11.99	93.40	0.61
5000.00	0.80	180.13	4999.67	-2.18	11.94	12.14	100.35	0.08
5100.00	0.94	191.74	5099.66	-3.69	11.77	12.33	107.39	0.22
5200.00	1.02	186.24	5199.65	-5.37	11.51	12.70	115.03	0.12
5300.00	1.08	184.14	5299.63	-7.19	11.34	13.43	122.39	0.07
5400.00	1.21	185.24	5399.61	-9.18	11.18	14.47	129.41	0.14
5500.00	1.08	190.88	5499.59	-11.16	10.90	15.60	135.67	0.17
5600.00	1.18	177.12	5599.57	-13.11	10.78	16.97	140.58	0.29
5700.00	1.39	180.93	5699.55	-15.35	10.81	18.78	144.86	0.23

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
5800.00	1.66	198.08	5799.51	-17.94	10.34	20.71	150.05	0.52
5900.00	1.75	187.95	5899.47	-20.83	9.68	22.97	155.08	0.32
6000.00	1.77	177.67	5999.42	-23.89	9.53	25.72	158.25	0.32
6100.00	1.58	184.28	6099.38	-26.80	9.49	28.43	160.50	0.27
6200.00	0.89	189.24	6199.35	-28.94	9.26	30.39	162.25	0.69
6300.00	0.89	190.34	6299.34	-30.47	9.00	31.77	163.55	0.02
6400.00	1.37	205.49	6399.32	-32.31	8.35	33.37	165.52	0.56
6500.00	1.78	212.34	6499.28	-34.70	7.00	35.40	168.59	0.45
6600.00	2.14	232.76	6599.23	-37.14	4.68	37.43	172.81	0.78
6700.00	2.30	237.58	6699.15	-39.34	1.51	39.37	177.81	0.24
6800.00	2.69	249.16	6799.06	-41.25	-2.38	41.32	183.30	0.64
6900.00	3.09	249.31	6898.93	-43.04	-7.09	43.62	189.36	0.40
7000.00	2.34	236.94	6998.82	-45.11	-11.33	46.51	194.09	0.95
7100.00	2.28	245.46	7098.74	-47.05	-14.85	49.33	197.52	0.35
7200.00	2.09	220.65	7198.67	-49.25	-17.84	52.39	199.91	0.96
7300.00	2.04	227.89	7298.60	-51.83	-20.35	55.68	201.44	0.26
7387.00	1.76	241.30	7385.55	-53.51	-22.67	58.11	202.96	0.60



Vaughn Energy Services
Midland, Tx
(432)-563-5444
Surveyor: Tim Dillon
Graham Cracker 16 State No 001H / API 30-015-41935



VES Survey Date: 03/19/2014



COG Operating, LLC.

Eddy County, N.M.

Section 16-26S-28E Graham Cracker 16 State

Graham Cracker 16 State #1H

Original Hole

Design: Original Hole

Standard Survey Report

25 March, 2014





Stryker Directional Survey Report



Company:	COG Operating, LLC.	Local Co-ordinate Reference:	Well Graham Cracker 16 State #1H
Project:	Eddy County, N.M.	TVD Reference:	GL 3063.2 + 18 @ 3081.2usft (Silver Oak #7)
Site:	Section 16-26S-28E Graham Cracker 16 State	MD Reference:	GL 3063.2 + 18 @ 3081.2usft (Silver Oak #7)
Well:	Graham Cracker 16 State #1H	North Reference:	Grid
Wellbore:	Original Hole	Survey Calculation Method:	Minimum Curvature
Design:	Original Hole	Database:	EDM 5000.1 Single User Db

Project	Eddy County, N.M.		
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	Section 16-26S-28E Graham Cracker 16 State		
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Site Position:		Northing:	381,702.30 usft	Latitude:	32° 2' 57.106 N
From:	Map	Easting:	572,917.00 usft	Longitude:	104° 5' 52.756 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.12 °

Well	Graham Cracker 16 State #1H				
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Well Position	+N/-S	0.0 usft	Northing:	381,702.30 usft	Latitude:	32° 2' 57.106 N
	+E/-W	0.0 usft	Easting:	572,917.00 usft	Longitude:	104° 5' 52.756 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	3,063.2 usft

Wellbore	Original Hole				
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/4/2014	7.48	59.87	48,184

Design	Original Hole				
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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	180.20

Survey Program	Date 3/25/2014				
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From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	7,387.0	VES Gyro Survey #1 (Original Hole)		
7,477.0	12,477.0	MWD Survey #2 (Original Hole)	MWD	MWD - Standard

Survey									
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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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.57	302.47	100.0	0.3	-0.4	-0.3	0.57	0.57	0.00
200.0	0.82	315.25	200.0	1.0	-1.3	-1.0	0.29	0.25	12.78
300.0	0.94	65.55	300.0	1.9	-1.1	-1.9	1.45	0.12	110.30
400.0	1.71	112.75	400.0	1.7	1.0	-1.7	1.27	0.77	47.20
500.0	2.54	107.44	499.9	0.4	4.5	-0.4	0.85	0.83	-5.31
600.0	2.43	111.62	599.8	-1.0	8.6	1.0	0.21	-0.11	4.18
700.0	1.37	105.47	699.7	-2.1	11.7	2.1	1.08	-1.06	-6.15
800.0	0.46	78.60	799.7	-2.4	13.3	2.3	0.98	-0.91	-26.87



Stryker Directional Survey Report



Company:	COG Operating, LLC.	Local Co-ordinate Reference:	Well Graham Cracker 16 State #1H
Project:	Eddy County, N.M.	TVD Reference:	GL 3063.2 +18 @ 3081.2usft (Silver Oak #7)
Site:	Section 16-26S-28E Graham Cracker 16 State	MD Reference:	GL 3063.2 + 18 @ 3081.2usft (Silver Oak #7)
Well:	Graham Cracker 16 State #1H	North Reference:	Grid
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)	
900.0	0.21	348.33	899.7	-2.1	13.6	2.1	0.51	-0.25	-90.27	
1,000.0	0.28	65.97	999.7	-1.8	13.8	1.8	0.31	0.07	77.64	
1,100.0	0.24	310.74	1,099.7	-1.6	13.9	1.6	0.44	-0.04	-115.23	
1,200.0	0.19	171.76	1,199.7	-1.6	13.7	1.6	0.40	-0.05	-138.98	
1,300.0	0.20	317.14	1,299.7	-1.7	13.6	1.6	0.37	0.01	145.38	
1,400.0	0.22	148.42	1,399.7	-1.7	13.6	1.7	0.42	0.02	-168.72	
1,500.0	0.11	14.99	1,499.7	-1.8	13.8	1.7	0.31	-0.11	-133.43	
1,600.0	0.20	84.23	1,599.7	-1.7	13.9	1.6	0.19	0.09	69.24	
1,700.0	0.21	148.90	1,699.7	-1.8	14.2	1.7	0.22	0.01	64.67	
1,800.0	0.15	39.42	1,799.7	-1.9	14.4	1.8	0.30	-0.06	-109.48	
1,900.0	0.18	57.11	1,899.7	-1.7	14.6	1.6	0.06	0.03	17.69	
2,000.0	0.32	58.81	1,999.7	-1.4	15.0	1.4	0.14	0.14	1.70	
2,100.0	0.25	34.84	2,099.7	-1.1	15.3	1.1	0.14	-0.07	-23.97	
2,200.0	0.13	258.22	2,199.7	-1.0	15.4	0.9	0.36	-0.12	-136.62	
2,300.0	0.24	37.71	2,299.7	-0.8	15.4	0.8	0.35	0.11	139.49	
2,400.0	0.12	294.23	2,399.7	-0.6	15.4	0.6	0.29	-0.12	-103.48	
2,500.0	0.27	68.69	2,499.7	-0.5	15.5	0.4	0.36	0.15	134.46	
2,600.0	0.11	69.58	2,599.7	-0.4	15.8	0.3	0.16	-0.16	0.89	
2,700.0	0.33	5.62	2,699.7	0.0	16.0	0.0	0.30	0.22	-63.96	
2,800.0	0.39	80.14	2,799.7	0.3	16.3	-0.4	0.44	0.06	74.52	
2,900.0	0.29	31.55	2,899.7	0.6	16.8	-0.6	0.29	-0.10	-48.59	
3,000.0	0.27	83.02	2,999.7	0.8	17.2	-0.9	0.24	-0.02	51.47	
3,100.0	0.11	142.72	3,099.7	0.8	17.4	-0.8	0.23	-0.16	59.70	
3,200.0	0.27	266.59	3,199.7	0.7	17.3	-0.7	0.34	0.16	123.87	
3,300.0	0.25	323.46	3,299.7	0.8	16.9	-0.9	0.25	-0.02	56.87	
3,400.0	0.20	268.44	3,399.7	1.0	16.6	-1.1	0.21	-0.05	-55.02	
3,500.0	0.08	12.29	3,499.7	1.1	16.4	-1.1	0.23	-0.12	103.85	
3,600.0	0.17	21.97	3,599.7	1.3	16.5	-1.3	0.09	0.09	9.68	
3,700.0	0.14	47.38	3,699.7	1.5	16.7	-1.6	0.07	-0.03	25.41	
3,800.0	0.17	320.98	3,799.7	1.7	16.7	-1.8	0.21	0.03	-86.40	
3,900.0	0.19	345.02	3,899.7	2.0	16.5	-2.0	0.08	0.02	24.04	
4,000.0	0.19	313.13	3,999.7	2.3	16.4	-2.3	0.10	0.00	-31.89	
4,100.0	0.26	249.58	4,099.7	2.3	16.0	-2.3	0.24	0.07	-63.55	
4,200.0	0.25	231.85	4,199.7	2.1	15.6	-2.1	0.08	-0.01	-17.73	
4,300.0	0.19	290.72	4,299.7	2.0	15.3	-2.1	0.22	-0.06	58.87	
4,400.0	0.44	248.71	4,399.7	1.9	14.8	-2.0	0.32	0.25	-42.01	
4,500.0	0.32	203.82	4,499.7	1.5	14.3	-1.6	0.31	-0.12	-44.89	
4,600.0	0.29	274.65	4,599.7	1.3	14.0	-1.3	0.35	-0.03	70.83	
4,700.0	0.68	240.99	4,699.7	1.0	13.2	-1.1	0.47	0.39	-33.66	
4,800.0	0.56	226.29	4,799.7	0.4	12.3	-0.4	0.20	-0.12	-14.70	
4,900.0	0.88	182.49	4,899.7	-0.7	11.9	0.7	0.61	0.32	-43.80	
5,000.0	0.80	180.13	4,999.7	-2.2	11.9	2.1	0.09	-0.08	-2.36	



Stryker Directional Survey Report



Company:	COG Operating, LLC.	Local Co-ordinate Reference:	Well Graham Cracker 16 State #1H
Project:	Eddy County, N.M.	TVD Reference:	GL 3063.2 + 18 @ 3081.2usft (Silver Oak #7)
Site:	Section 16-26S-28E Graham Cracker 16 State	MD Reference:	GL 3063.2 + 18 @ 3081.2usft (Silver Oak #7)
Well:	Graham Cracker 16 State #1H	North Reference:	Grid
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)
5,100.0	0.94	191.74	5,099.7	-3.7	11.7	3.6	0.22	0.14	11.61
5,200.0	1.02	186.24	5,199.6	-5.4	11.5	5.3	0.12	0.08	-5.50
5,300.0	1.08	184.14	5,299.6	-7.2	11.3	7.1	0.07	0.06	-2.10
5,400.0	1.21	185.24	5,399.6	-9.2	11.1	9.1	0.13	0.13	1.10
5,500.0	1.08	190.88	5,499.6	-11.2	10.9	11.1	0.17	-0.13	5.64
5,600.0	1.18	177.12	5,599.6	-13.1	10.7	13.1	0.29	0.10	-13.76
5,700.0	1.39	180.93	5,699.5	-15.4	10.8	15.3	0.23	0.21	3.81
5,800.0	1.66	198.08	5,799.5	-17.9	10.3	17.9	0.53	0.27	17.15
5,900.0	1.75	187.95	5,899.5	-20.8	9.6	20.8	0.31	0.09	-10.13
6,000.0	1.77	177.67	5,999.4	-23.9	9.5	23.9	0.32	0.02	-10.28
6,100.0	1.58	184.28	6,099.4	-26.8	9.4	26.8	0.27	-0.19	6.61
6,200.0	0.89	189.24	6,199.4	-28.9	9.2	28.9	0.70	-0.69	4.96
6,300.0	0.89	190.34	6,299.3	-30.5	9.0	30.4	0.02	0.00	1.10
6,400.0	1.37	205.49	6,399.3	-32.3	8.3	32.3	0.56	0.48	15.15
6,500.0	1.78	212.34	6,499.3	-34.7	7.0	34.7	0.45	0.41	6.85
6,600.0	2.14	232.76	6,599.2	-37.2	4.6	37.1	0.78	0.36	20.42
6,700.0	2.30	237.58	6,699.2	-39.4	1.5	39.4	0.25	0.16	4.82
6,800.0	2.69	249.16	6,799.1	-41.3	-2.4	41.3	0.64	0.39	11.58
6,900.0	3.09	249.31	6,898.9	-43.1	-7.1	43.1	0.40	0.40	0.15
7,000.0	2.34	236.94	6,998.8	-45.1	-11.4	45.2	0.95	-0.75	-12.37
7,100.0	2.28	245.46	7,098.7	-47.1	-14.9	47.1	0.35	-0.06	8.52
7,200.0	2.09	220.65	7,198.7	-49.3	-17.9	49.3	0.96	-0.19	-24.81
7,300.0	2.04	227.89	7,298.6	-51.8	-20.4	51.9	0.27	-0.05	7.24
7,387.0	1.76	241.30	7,385.6	-53.5	-22.7	53.6	0.60	-0.32	15.41
7387' MD VES Gyro Survey									
7,477.0	1.50	138.90	7,475.5	-55.1	-23.2	55.2	2.83	-0.29	-113.78
7,509.0	4.20	173.10	7,507.5	-56.6	-22.7	56.6	9.62	8.44	106.88
7,540.0	8.00	174.80	7,538.3	-59.8	-22.4	59.9	12.27	12.26	5.48
7,572.0	11.50	174.90	7,569.8	-65.2	-21.9	65.3	10.94	10.94	0.31
7,603.0	14.80	175.00	7,600.0	-72.3	-21.3	72.3	10.65	10.65	0.32
7,635.0	18.30	175.20	7,630.7	-81.3	-20.5	81.4	10.94	10.94	0.63
7,666.0	22.10	173.90	7,659.8	-92.0	-19.5	92.1	12.34	12.26	-4.19
7,698.0	25.90	174.00	7,689.0	-104.9	-18.1	105.0	11.88	11.88	0.31
7,729.0	30.00	174.70	7,716.4	-119.4	-16.7	119.4	13.27	13.23	2.26
7,761.0	34.30	175.10	7,743.5	-136.3	-15.2	136.4	13.45	13.44	1.25
7,792.0	38.40	176.60	7,768.4	-154.7	-13.9	154.7	13.53	13.23	4.84
7,824.0	42.60	176.90	7,792.8	-175.4	-12.7	175.5	13.14	13.13	0.94
7,855.0	46.20	178.60	7,814.9	-197.1	-11.9	197.1	12.23	11.61	5.48
7,887.0	49.80	179.40	7,836.3	-220.9	-11.5	220.9	11.40	11.25	2.50
7,919.0	53.50	180.40	7,856.2	-245.9	-11.4	246.0	11.82	11.56	3.13
7,950.0	57.50	181.10	7,873.7	-271.5	-11.8	271.5	13.04	12.90	2.26
7,982.0	60.50	181.00	7,890.2	-298.9	-12.3	298.9	9.38	9.38	-0.31
8,014.0	62.30	182.10	7,905.5	-327.0	-13.0	327.0	6.38	5.63	3.44



Stryker Directional Survey Report



Company:	COG Operating, LLC.	Local Co-ordinate Reference:	Well Graham Cracker 16 State #1H
Project:	Eddy County, N.M.	TVD Reference:	GL 3063.2 + 18 @ 3081.2usft (Silver Oak #7)
Site:	Section 16-26S-28E Graham Cracker 16 State	MD Reference:	GL 3063.2 + 18 @ 3081.2usft (Silver Oak #7)
Well:	Graham Cracker 16 State #1H	North Reference:	Grid
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)
8,045.0	64.20	182.40	7,919.5	-354.6	-14.1	354.7	6.19	6.13	0.97
8,077.0	66.60	182.40	7,932.8	-383.7	-15.3	383.8	7.50	7.50	0.00
8,108.0	68.80	182.30	7,944.6	-412.4	-16.5	412.4	7.10	7.10	-0.32
8,140.0	70.50	182.40	7,955.7	-442.3	-17.7	442.4	5.32	5.31	0.31
8,172.0	71.80	182.40	7,966.0	-472.6	-19.0	472.7	4.06	4.06	0.00
8,203.0	73.10	182.40	7,975.4	-502.1	-20.2	502.2	4.19	4.19	0.00
8,235.0	74.20	182.40	7,984.4	-532.8	-21.5	532.9	3.44	3.44	0.00
8,266.0	75.00	182.40	7,992.6	-562.7	-22.8	562.7	2.58	2.58	0.00
8,297.0	76.60	181.30	8,000.2	-592.7	-23.7	592.8	6.20	5.16	-3.55
8,329.0	77.80	179.80	8,007.3	-623.9	-24.0	624.0	5.91	3.75	-4.69
8,361.0	80.50	178.70	8,013.3	-655.3	-23.6	655.4	9.09	8.44	-3.44
8,392.0	83.80	178.40	8,017.6	-686.0	-22.8	686.1	10.69	10.65	-0.97
8,424.0	86.60	178.40	8,020.2	-717.9	-22.0	718.0	8.75	8.75	0.00
8,455.0	88.30	179.00	8,021.6	-748.9	-21.3	748.9	5.81	5.48	1.94
8,550.0	90.20	179.20	8,022.9	-843.8	-19.8	843.9	2.01	2.00	0.21
8,645.0	92.10	178.60	8,021.0	-938.8	-17.9	938.9	2.10	2.00	-0.63
8,740.0	90.70	178.20	8,018.6	-1,033.7	-15.3	1,033.8	1.53	-1.47	-0.42
8,834.0	90.00	181.40	8,018.1	-1,127.7	-15.0	1,127.8	3.48	-0.74	3.40
8,929.0	89.70	181.80	8,018.3	-1,222.7	-17.6	1,222.7	0.53	-0.32	0.42
9,024.0	90.30	181.10	8,018.3	-1,317.6	-20.0	1,317.7	0.97	0.63	-0.74
9,119.0	90.30	181.60	8,017.8	-1,412.6	-22.3	1,412.7	0.53	0.00	0.53
9,213.0	88.90	181.20	8,018.5	-1,506.6	-24.6	1,506.7	1.55	-1.49	-0.43
9,308.0	89.20	181.60	8,020.0	-1,601.5	-26.9	1,601.6	0.53	0.32	0.42
9,403.0	90.50	181.30	8,020.3	-1,696.5	-29.3	1,696.6	1.40	1.37	-0.32
9,496.0	89.30	179.70	8,020.5	-1,789.5	-30.1	1,789.6	2.15	-1.29	-1.72
9,592.0	90.30	179.50	8,020.8	-1,885.5	-29.4	1,885.6	1.06	1.04	-0.21
9,685.0	91.40	179.60	8,019.4	-1,978.5	-28.7	1,978.6	1.19	1.18	0.11
9,779.0	89.30	180.10	8,018.8	-2,072.5	-28.4	2,072.6	2.30	-2.23	0.53
9,874.0	90.30	179.60	8,019.2	-2,167.5	-28.2	2,167.6	1.18	1.05	-0.53
9,969.0	91.50	179.50	8,017.7	-2,262.5	-27.4	2,262.5	1.27	1.26	-0.11
10,064.0	89.60	180.40	8,016.8	-2,357.4	-27.4	2,357.5	2.21	-2.00	0.95
10,160.0	89.00	180.00	8,017.9	-2,453.4	-27.7	2,453.5	0.75	-0.63	-0.42
10,254.0	89.50	179.30	8,019.2	-2,547.4	-27.1	2,547.5	0.92	0.53	-0.74
10,349.0	90.50	179.00	8,019.2	-2,642.4	-25.7	2,642.5	1.10	1.05	-0.32
10,443.0	89.20	180.40	8,019.4	-2,736.4	-25.2	2,736.5	2.03	-1.38	1.49
10,538.0	90.80	180.20	8,019.4	-2,831.4	-25.7	2,831.5	1.70	1.68	-0.21
10,632.0	89.40	180.50	8,019.3	-2,925.4	-26.3	2,925.5	1.52	-1.49	0.32
10,727.0	90.20	179.60	8,019.6	-3,020.4	-26.4	3,020.5	1.27	0.84	-0.95
10,821.0	91.30	179.70	8,018.4	-3,114.4	-25.8	3,114.5	1.18	1.17	0.11
10,916.0	89.70	179.80	8,017.5	-3,209.4	-25.4	3,209.4	1.69	-1.68	0.11
11,009.0	87.20	180.00	8,020.0	-3,302.3	-25.2	3,302.4	2.70	-2.69	0.22
11,102.0	88.00	180.50	8,023.9	-3,395.3	-25.6	3,395.3	1.01	0.86	0.54



Stryker Directional Survey Report



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Project:	Eddy County, N.M.	TVD Reference:	GL 3063.2 + 18 @ 3081.2usft (Silver Oak #7)
Site:	Section 16-26S-28E Graham Cracker 16 State	MD Reference:	GL 3063.2 + 18 @ 3081.2usft (Silver Oak #7)
Well:	Graham Cracker 16 State #1H	North Reference:	Grid
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)
11,197.0	89.20	180.20	8,026.3	-3,490.2	-26.2	3,490.3	1.30	1.26	-0.32
11,292.0	90.50	178.90	8,026.5	-3,585.2	-25.5	3,585.3	1.94	1.37	-1.37
11,386.0	90.10	180.30	8,026.0	-3,679.2	-24.8	3,679.3	1.55	-0.43	1.49
11,481.0	91.30	179.60	8,024.9	-3,774.2	-24.7	3,774.3	1.46	1.26	-0.74
11,576.0	91.40	180.70	8,022.6	-3,869.2	-25.0	3,869.2	1.16	0.11	1.16
11,671.0	89.20	180.70	8,022.1	-3,964.2	-26.1	3,964.2	2.32	-2.32	0.00
11,766.0	90.20	181.30	8,022.6	-4,059.1	-27.8	4,059.2	1.23	1.05	0.63
11,860.0	91.20	180.20	8,021.5	-4,153.1	-29.0	4,153.2	1.58	1.06	-1.17
11,955.0	89.80	180.80	8,020.6	-4,248.1	-29.9	4,248.2	1.60	-1.47	0.63
12,049.0	90.40	180.30	8,020.5	-4,342.1	-30.8	4,342.2	0.83	0.64	-0.53
12,144.0	91.40	180.70	8,019.0	-4,437.1	-31.6	4,437.2	1.13	1.05	0.42
12,238.0	90.40	179.40	8,017.5	-4,531.1	-31.7	4,531.2	1.74	-1.06	-1.38
12,332.0	89.60	178.70	8,017.5	-4,625.1	-30.1	4,625.1	1.13	-0.85	-0.74
12,426.0	90.60	178.20	8,017.3	-4,719.0	-27.6	4,719.1	1.19	1.06	-0.53
12,477.0	90.60	178.20	8,016.8	-4,770.0	-26.0	4,770.1	0.00	0.00	0.00

12477' Projected to Bit

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,387.0	7,385.6	-53.5	-22.7	7387' MD VES Gyro Survey
12,477.0	8,016.8	-4,770.0	-26.0	12477' Projected to Bit




COMPANY: COG Operating, LLC.
 WELL: Graham Cracker 16 State #1H
 COUNTY: Eddy County, N.M.
 DATUM: NAD 1927 (NADCON CONUS)
 RIG: Silver Oak #7



GRID CORRECTION: To convert a Magnetic Direction to a Grid Direction, Add 7.36°

GEODETTIC ZONE: New Mexico East 3001						
GL 3063.2 + 18 @ 3081.2usft (Silver Oak #7)						
GROUND ELEVATION: 3063.2						
+N-S	+E-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	381702.30	572917.00	32° 2' 57.106 N	104° 5' 52.756 W	

PLAN SECTIONS										
Sec	MD	Inc	Azi	TVD	+N-S	+E-W	Dleg	TFace	Vsect	Target
1	7387.0	1.76	241.30	7385.6	-53.5	-22.7	0.00	0.00	53.6	
2	7551.2	1.76	241.30	7549.7	-66.0	-27.1	0.00	0.00	56.0	
3	8294.2	90.00	179.72	8020.0	-533.4	-37.5	12.00	-61.59	533.5	
4	12552.1	90.00	179.72	8020.0	-4791.2	-16.7	0.00	0.00	4791.2	PBHL Graham Cracker 16 State #1H



Azimuths to Grid North
 True North: -0.12°
 Magnetic North: 7.36°

Magnetic Field
 Strength: 48184.5snT
 Dip Angle: 59.87°
 Date: 3/4/2014
 Model: IGRF2010

