

COG OPERATING, LLC

Eddy County, NM (NAD83) NMEZ

Graham Cracker 2 State 1H

#1H

30-015-42282

OH

Design: OH

Survey Report - Geographic

14 December, 2017

Survey Report - Geographic

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well #1H
Project:	Eddy County, NM (NAD83) NMEZ	TVD Reference:	RKB @ 2974.00usft (Precision 595 - KB=25')
Site:	Graham Cracker 2 State 1H	MD Reference:	RKB @ 2974.00usft (Precision 595 - KB=25')
Well:	#1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.14 Single User Db

Project	Eddy County, NM (NAD83) NMEZ		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Eastern Zone		

Site		Graham Cracker 2 State 1H			
Site Position:		Northing:	388,038.62 usft	Latitude:	32° 3' 59.348 N
From:	Map	Easting:	628,487.35 usft	Longitude:	104° 3' 7.169 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.15 °

Well	#1H					
Well Position	+N/-S	0.00 usft	Northing:	388,039.40 usft	Latitude:	32° 3' 59.356 N
	+E/-W	0.00 usft	Easting:	628,488.60 usft	Longitude:	104° 3' 7.154 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	2,949.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/21/17	7.12	59.83	47,752.39257522

Design	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	359.53	

Survey Program	Date	12/14/17			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.00	1,643.00	Survey #1 - Gyro (OH)	GYD_DP_MS	Gyrodata gyro-compassing and drop	
1,817.00	15,040.00	Survey #2 - VON MWD (OH)	MWD	MWD v3: standard declination	
15,084.00	15,084.00	Survey #3 - PTB (OH)	Projection	Projection	

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	388,039.40	628,488.60	32° 3' 59.356 N	104° 3' 7.154 W
SHL(GC2#1)									
100.00	0.14	181.21	100.00	-0.12	0.00	388,039.28	628,488.60	32° 3' 59.355 N	104° 3' 7.154 W
125.00	0.11	168.07	125.00	-0.18	0.00	388,039.22	628,488.61	32° 3' 59.354 N	104° 3' 7.154 W
150.00	0.13	208.57	150.00	-0.22	-0.01	388,039.17	628,488.60	32° 3' 59.354 N	104° 3' 7.154 W
175.00	0.13	195.35	175.00	-0.28	-0.03	388,039.12	628,488.58	32° 3' 59.353 N	104° 3' 7.154 W
200.00	0.12	163.35	200.00	-0.33	-0.03	388,039.07	628,488.58	32° 3' 59.353 N	104° 3' 7.154 W
225.00	0.15	139.24	225.00	-0.38	0.00	388,039.02	628,488.60	32° 3' 59.352 N	104° 3' 7.154 W
250.00	0.17	197.00	250.00	-0.44	0.01	388,038.96	628,488.62	32° 3' 59.352 N	104° 3' 7.154 W
275.00	0.12	194.89	275.00	-0.50	-0.01	388,038.90	628,488.60	32° 3' 59.351 N	104° 3' 7.154 W

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Site:	Graham Cracker 2 State 1H	MD Reference:	RKB @ 2974.00usft (Precision 595 - KB=25')
Well:	#1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.14 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
300.00	0.11	190.30	300.00	-0.55	-0.02	388,038.85	628,488.59	32° 3' 59.351 N	104° 3' 7.154 W
325.00	0.13	203.44	325.00	-0.60	-0.03	388,038.80	628,488.57	32° 3' 59.350 N	104° 3' 7.154 W
350.00	0.18	114.45	350.00	-0.64	-0.01	388,038.76	628,488.60	32° 3' 59.350 N	104° 3' 7.154 W
375.00	0.24	101.25	375.00	-0.67	0.08	388,038.73	628,488.68	32° 3' 59.350 N	104° 3' 7.153 W
400.00	0.45	85.21	400.00	-0.67	0.23	388,038.73	628,488.83	32° 3' 59.349 N	104° 3' 7.151 W
425.00	0.54	71.02	425.00	-0.62	0.44	388,038.78	628,489.04	32° 3' 59.350 N	104° 3' 7.149 W
450.00	0.66	82.24	450.00	-0.57	0.69	388,038.83	628,489.30	32° 3' 59.350 N	104° 3' 7.146 W
475.00	0.79	80.60	474.99	-0.52	1.00	388,038.88	628,489.61	32° 3' 59.351 N	104° 3' 7.142 W
500.00	0.89	55.28	499.99	-0.38	1.33	388,039.02	628,489.94	32° 3' 59.352 N	104° 3' 7.138 W
525.00	1.25	31.91	524.99	-0.04	1.64	388,039.36	628,490.24	32° 3' 59.356 N	104° 3' 7.135 W
550.00	1.15	46.57	549.98	0.37	1.96	388,039.77	628,490.57	32° 3' 59.360 N	104° 3' 7.131 W
575.00	1.16	48.64	574.98	0.71	2.34	388,040.11	628,490.94	32° 3' 59.363 N	104° 3' 7.127 W
600.00	1.20	44.11	599.97	1.06	2.71	388,040.46	628,491.31	32° 3' 59.367 N	104° 3' 7.122 W
625.00	1.27	44.08	624.97	1.45	3.08	388,040.85	628,491.69	32° 3' 59.370 N	104° 3' 7.118 W
650.00	1.30	49.41	649.96	1.83	3.49	388,041.23	628,492.10	32° 3' 59.374 N	104° 3' 7.113 W
675.00	1.31	50.43	674.95	2.20	3.93	388,041.60	628,492.53	32° 3' 59.378 N	104° 3' 7.108 W
700.00	1.39	51.38	699.95	2.57	4.38	388,041.97	628,492.99	32° 3' 59.381 N	104° 3' 7.103 W
725.00	1.23	41.81	724.94	2.96	4.80	388,042.36	628,493.40	32° 3' 59.385 N	104° 3' 7.098 W
750.00	1.16	40.19	749.93	3.35	5.14	388,042.75	628,493.75	32° 3' 59.389 N	104° 3' 7.094 W
775.00	1.22	50.48	774.93	3.72	5.51	388,043.11	628,494.11	32° 3' 59.393 N	104° 3' 7.090 W
800.00	1.28	51.63	799.92	4.06	5.93	388,043.46	628,494.54	32° 3' 59.396 N	104° 3' 7.085 W
825.00	1.19	50.87	824.92	4.40	6.35	388,043.79	628,494.96	32° 3' 59.399 N	104° 3' 7.080 W
850.00	1.21	52.78	849.91	4.72	6.77	388,044.12	628,495.37	32° 3' 59.403 N	104° 3' 7.075 W
875.00	1.27	54.89	874.91	5.04	7.20	388,044.44	628,495.81	32° 3' 59.406 N	104° 3' 7.070 W
900.00	1.32	50.87	899.90	5.38	7.65	388,044.78	628,496.26	32° 3' 59.409 N	104° 3' 7.065 W
925.00	1.28	56.84	924.89	5.71	8.11	388,045.11	628,496.71	32° 3' 59.412 N	104° 3' 7.060 W
950.00	1.23	56.43	949.89	6.01	8.57	388,045.41	628,497.17	32° 3' 59.415 N	104° 3' 7.054 W
975.00	1.32	55.17	974.88	6.33	9.03	388,045.73	628,497.63	32° 3' 59.418 N	104° 3' 7.049 W
1,000.00	1.36	54.28	999.87	6.67	9.51	388,046.06	628,498.11	32° 3' 59.422 N	104° 3' 7.043 W
1,025.00	1.32	50.35	1,024.87	7.02	9.97	388,046.42	628,498.57	32° 3' 59.425 N	104° 3' 7.038 W
1,050.00	1.38	51.45	1,049.86	7.39	10.42	388,046.79	628,499.03	32° 3' 59.429 N	104° 3' 7.033 W
1,075.00	1.42	54.44	1,074.85	7.76	10.91	388,047.16	628,499.52	32° 3' 59.433 N	104° 3' 7.027 W
1,100.00	1.45	54.64	1,099.84	8.12	11.42	388,047.52	628,500.03	32° 3' 59.436 N	104° 3' 7.021 W
1,125.00	1.36	51.03	1,124.84	8.49	11.91	388,047.89	628,500.51	32° 3' 59.440 N	104° 3' 7.015 W
1,150.00	1.31	52.76	1,149.83	8.85	12.37	388,048.25	628,500.97	32° 3' 59.443 N	104° 3' 7.010 W
1,175.00	1.48	50.72	1,174.82	9.23	12.85	388,048.63	628,501.45	32° 3' 59.447 N	104° 3' 7.004 W
1,200.00	1.37	52.39	1,199.82	9.62	13.33	388,049.02	628,501.94	32° 3' 59.451 N	104° 3' 6.999 W
1,225.00	1.22	48.15	1,224.81	9.98	13.77	388,049.38	628,502.37	32° 3' 59.454 N	104° 3' 6.994 W
1,250.00	1.26	50.54	1,249.80	10.33	14.18	388,049.73	628,502.78	32° 3' 59.458 N	104° 3' 6.989 W
1,275.00	1.29	49.37	1,274.80	10.69	14.60	388,050.09	628,503.21	32° 3' 59.461 N	104° 3' 6.984 W
1,300.00	1.34	48.91	1,299.79	11.06	15.04	388,050.46	628,503.64	32° 3' 59.465 N	104° 3' 6.979 W
1,325.00	1.40	51.52	1,324.78	11.45	15.50	388,050.84	628,504.10	32° 3' 59.469 N	104° 3' 6.974 W
1,350.00	1.44	46.63	1,349.78	11.85	15.96	388,051.25	628,504.57	32° 3' 59.473 N	104° 3' 6.968 W
1,375.00	1.29	43.01	1,374.77	12.27	16.39	388,051.67	628,504.99	32° 3' 59.477 N	104° 3' 6.963 W
1,400.00	1.25	45.53	1,399.76	12.67	16.77	388,052.07	628,505.38	32° 3' 59.481 N	104° 3' 6.959 W
1,425.00	1.20	41.59	1,424.76	13.06	17.14	388,052.45	628,505.74	32° 3' 59.485 N	104° 3' 6.954 W
1,450.00	1.06	41.08	1,449.75	13.43	17.47	388,052.82	628,506.07	32° 3' 59.489 N	104° 3' 6.951 W
1,475.00	1.07	50.11	1,474.75	13.75	17.80	388,053.15	628,506.40	32° 3' 59.492 N	104° 3' 6.947 W
1,500.00	0.95	48.34	1,499.74	14.04	18.13	388,053.44	628,506.73	32° 3' 59.495 N	104° 3' 6.943 W
1,525.00	0.98	42.68	1,524.74	14.33	18.43	388,053.73	628,507.03	32° 3' 59.497 N	104° 3' 6.939 W
1,550.00	1.14	45.26	1,549.74	14.66	18.75	388,054.06	628,507.36	32° 3' 59.501 N	104° 3' 6.936 W
1,575.00	1.24	44.87	1,574.73	15.03	19.12	388,054.43	628,507.72	32° 3' 59.504 N	104° 3' 6.931 W
1,600.00	1.41	44.45	1,599.72	15.44	19.53	388,054.84	628,508.13	32° 3' 59.508 N	104° 3' 6.927 W
1,625.00	1.42	41.87	1,624.72	15.89	19.95	388,055.29	628,508.55	32° 3' 59.513 N	104° 3' 6.922 W
1,643.00	1.52	45.97	1,642.71	16.23	20.27	388,055.62	628,508.87	32° 3' 59.516 N	104° 3' 6.918 W

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Site:	Graham Cracker 2 State 1H	MD Reference:	RKB @ 2974.00usft (Precision 595 - KB=25')
Well:	#1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.14 Single User Db

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
1,817.00	2.27	45.66	1,816.61	20.24	24.39	388,059.64	628,513.00	32° 3' 59.556 N	104° 3' 6.870 W	
1,906.00	1.54	37.06	1,905.56	22.42	26.37	388,061.82	628,514.98	32° 3' 59.577 N	104° 3' 6.847 W	
1,996.00	2.14	51.48	1,995.52	24.44	28.42	388,063.83	628,517.02	32° 3' 59.597 N	104° 3' 6.823 W	
2,086.00	2.11	58.82	2,085.46	26.34	31.15	388,065.74	628,519.75	32° 3' 59.616 N	104° 3' 6.791 W	
2,175.00	1.87	58.91	2,174.40	27.94	33.79	388,067.34	628,522.40	32° 3' 59.632 N	104° 3' 6.760 W	
2,265.00	2.50	73.34	2,264.34	29.26	36.93	388,068.66	628,525.54	32° 3' 59.645 N	104° 3' 6.724 W	
2,354.00	1.88	102.06	2,353.27	29.51	40.22	388,068.91	628,528.82	32° 3' 59.647 N	104° 3' 6.686 W	
2,444.00	2.16	106.30	2,443.22	28.73	43.29	388,068.12	628,531.90	32° 3' 59.639 N	104° 3' 6.650 W	
2,534.00	0.95	145.79	2,533.19	27.63	45.34	388,067.03	628,533.94	32° 3' 59.628 N	104° 3' 6.626 W	
2,638.00	0.36	167.71	2,637.18	26.60	45.89	388,066.00	628,534.50	32° 3' 59.618 N	104° 3' 6.620 W	
2,781.00	3.60	184.11	2,780.07	21.68	45.67	388,061.08	628,534.27	32° 3' 59.570 N	104° 3' 6.623 W	
2,961.00	3.71	187.95	2,959.71	10.28	44.46	388,049.68	628,533.06	32° 3' 59.457 N	104° 3' 6.637 W	
3,140.00	5.07	158.69	3,138.20	-2.83	46.53	388,036.57	628,535.13	32° 3' 59.327 N	104° 3' 6.613 W	
3,319.00	6.81	146.60	3,316.24	-19.06	55.25	388,020.34	628,543.85	32° 3' 59.166 N	104° 3' 6.512 W	
3,498.00	7.57	133.50	3,493.84	-36.04	69.64	388,003.36	628,558.25	32° 3' 58.998 N	104° 3' 6.346 W	
3,588.00	7.12	134.05	3,583.10	-43.99	77.95	387,995.40	628,566.56	32° 3' 58.919 N	104° 3' 6.249 W	
3,677.00	5.16	129.11	3,671.59	-50.36	85.02	387,989.04	628,573.63	32° 3' 58.856 N	104° 3' 6.167 W	
3,767.00	4.96	126.12	3,761.24	-55.20	91.31	387,984.20	628,579.91	32° 3' 58.807 N	104° 3' 6.095 W	
3,856.00	5.10	127.86	3,849.90	-59.90	97.54	387,979.50	628,586.14	32° 3' 58.761 N	104° 3' 6.022 W	
3,946.00	4.00	131.22	3,939.61	-64.42	103.06	387,974.98	628,591.66	32° 3' 58.716 N	104° 3' 5.958 W	
4,035.00	3.55	130.87	4,028.42	-68.27	107.48	387,971.13	628,596.08	32° 3' 58.678 N	104° 3' 5.907 W	
4,125.00	3.33	130.25	4,118.26	-71.78	111.58	387,967.62	628,600.18	32° 3' 58.643 N	104° 3' 5.859 W	
4,215.00	3.41	131.43	4,208.10	-75.24	115.58	387,964.16	628,604.18	32° 3' 58.609 N	104° 3' 5.813 W	
4,304.00	3.26	134.93	4,296.95	-78.78	119.36	387,960.62	628,607.96	32° 3' 58.573 N	104° 3' 5.769 W	
4,394.00	3.47	136.35	4,386.79	-82.56	123.05	387,956.84	628,611.65	32° 3' 58.536 N	104° 3' 5.726 W	
4,483.00	3.42	138.57	4,475.63	-86.50	126.66	387,952.90	628,615.27	32° 3' 58.497 N	104° 3' 5.685 W	
4,573.00	3.44	137.41	4,565.47	-90.50	130.27	387,948.90	628,618.87	32° 3' 58.457 N	104° 3' 5.643 W	
4,663.00	3.50	139.56	4,655.31	-94.58	133.88	387,944.82	628,622.48	32° 3' 58.417 N	104° 3' 5.601 W	
4,753.00	3.05	143.00	4,745.16	-98.58	137.10	387,940.82	628,625.70	32° 3' 58.377 N	104° 3' 5.564 W	
4,842.00	2.76	148.07	4,834.05	-102.29	139.66	387,937.11	628,628.26	32° 3' 58.340 N	104° 3' 5.534 W	
4,932.00	2.67	146.94	4,923.95	-105.89	141.95	387,933.51	628,630.55	32° 3' 58.305 N	104° 3' 5.508 W	
5,022.00	1.15	162.84	5,013.89	-108.51	143.36	387,930.89	628,631.96	32° 3' 58.279 N	104° 3' 5.491 W	
5,111.00	3.18	154.02	5,102.83	-111.58	144.70	387,927.82	628,633.31	32° 3' 58.248 N	104° 3' 5.476 W	
5,201.00	3.83	158.65	5,192.66	-116.62	146.89	387,922.78	628,635.49	32° 3' 58.198 N	104° 3' 5.450 W	
5,291.00	3.55	161.74	5,282.47	-122.07	148.86	387,917.33	628,637.46	32° 3' 58.144 N	104° 3' 5.428 W	
5,380.00	3.38	163.69	5,371.31	-127.20	150.46	387,912.20	628,639.06	32° 3' 58.093 N	104° 3' 5.409 W	
5,560.00	3.56	168.64	5,550.98	-137.77	153.05	387,901.62	628,641.65	32° 3' 57.989 N	104° 3' 5.379 W	
5,739.00	6.09	138.29	5,729.36	-150.31	160.46	387,889.08	628,649.07	32° 3' 57.864 N	104° 3' 5.294 W	
5,919.00	6.98	130.55	5,908.19	-164.55	175.13	387,874.85	628,663.73	32° 3' 57.723 N	104° 3' 5.124 W	
6,098.00	6.63	130.77	6,085.93	-178.37	191.22	387,861.03	628,679.82	32° 3' 57.586 N	104° 3' 4.937 W	
6,277.00	5.68	134.15	6,263.89	-191.29	205.40	387,848.11	628,694.00	32° 3' 57.458 N	104° 3' 4.773 W	
6,456.00	3.91	129.36	6,442.26	-201.33	216.47	387,838.07	628,705.08	32° 3' 57.358 N	104° 3' 4.644 W	
6,546.00	3.28	125.29	6,532.08	-204.77	220.95	387,834.63	628,709.55	32° 3' 57.324 N	104° 3' 4.592 W	
6,635.00	2.75	135.50	6,620.96	-207.76	224.52	387,831.64	628,713.13	32° 3' 57.294 N	104° 3' 4.551 W	
6,725.00	2.35	145.76	6,710.87	-210.82	227.07	387,828.57	628,715.68	32° 3' 57.264 N	104° 3' 4.521 W	
6,815.00	3.42	135.46	6,800.76	-214.26	230.00	387,825.14	628,718.60	32° 3' 57.230 N	104° 3' 4.488 W	
6,904.00	3.78	136.48	6,889.58	-218.28	233.88	387,821.12	628,722.48	32° 3' 57.190 N	104° 3' 4.443 W	
6,994.00	2.93	134.14	6,979.43	-222.04	237.57	387,817.36	628,726.18	32° 3' 57.153 N	104° 3' 4.400 W	
7,084.00	4.79	138.89	7,069.22	-226.47	241.69	387,812.93	628,730.30	32° 3' 57.109 N	104° 3' 4.352 W	
7,174.00	5.01	141.53	7,158.89	-232.38	246.61	387,807.02	628,735.21	32° 3' 57.050 N	104° 3' 4.295 W	
7,263.00	4.46	143.36	7,247.59	-238.20	251.09	387,801.20	628,739.70	32° 3' 56.992 N	104° 3' 4.243 W	
7,443.00	3.61	149.59	7,427.14	-248.70	258.14	387,790.70	628,746.74	32° 3' 56.888 N	104° 3' 4.162 W	
7,622.00	4.59	153.52	7,605.68	-259.97	264.18	387,779.43	628,752.79	32° 3' 56.777 N	104° 3' 4.092 W	
7,801.00	4.28	153.52	7,784.14	-272.36	270.36	387,767.04	628,758.96	32° 3' 56.654 N	104° 3' 4.020 W	
7,981.00	5.38	146.54	7,963.50	-285.41	278.00	387,753.99	628,766.61	32° 3' 56.524 N	104° 3' 3.932 W	

Survey Report - Geographic

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well #1H
Project:	Eddy County, NM (NAD83) NMEZ	TVD Reference:	RKB @ 2974.00usft (Precision 595 - KB=25°)
Site:	Graham Cracker 2 State 1H	MD Reference:	RKB @ 2974.00usft (Precision 595 - KB=25°)
Well:	#1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.14 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
8,070.00	7.00	150.99	8,051.98	-293.64	282.93	387,745.76	628,771.54	32° 3' 56.443 N	104° 3' 3.875 W
8,160.00	6.57	155.37	8,141.35	-303.11	287.74	387,736.28	628,776.34	32° 3' 56.349 N	104° 3' 3.819 W
8,249.00	5.51	158.41	8,229.86	-311.72	291.43	387,727.68	628,780.04	32° 3' 56.264 N	104° 3' 3.777 W
8,339.00	4.81	164.89	8,319.49	-319.38	294.01	387,720.02	628,782.61	32° 3' 56.188 N	104° 3' 3.747 W
8,429.00	4.03	166.85	8,409.22	-326.10	295.71	387,713.30	628,784.31	32° 3' 56.121 N	104° 3' 3.727 W
8,518.00	3.16	168.19	8,498.05	-331.55	296.92	387,707.85	628,785.53	32° 3' 56.067 N	104° 3' 3.713 W
8,608.00	4.91	142.95	8,587.83	-337.05	299.75	387,702.35	628,788.36	32° 3' 56.013 N	104° 3' 3.681 W
8,787.00	4.71	135.38	8,766.20	-348.39	309.53	387,691.00	628,798.13	32° 3' 55.900 N	104° 3' 3.567 W
8,966.00	2.81	144.36	8,944.81	-357.19	317.25	387,682.21	628,805.85	32° 3' 55.813 N	104° 3' 3.478 W
9,146.00	2.78	158.88	9,124.59	-364.85	321.39	387,674.55	628,810.00	32° 3' 55.737 N	104° 3' 3.430 W
9,235.00	3.14	141.93	9,213.48	-368.78	323.67	387,670.62	628,812.28	32° 3' 55.698 N	104° 3' 3.404 W
9,325.00	3.67	140.59	9,303.32	-372.95	327.02	387,666.45	628,815.63	32° 3' 55.657 N	104° 3' 3.365 W
9,414.00	5.17	146.99	9,392.05	-378.51	331.02	387,660.89	628,819.62	32° 3' 55.602 N	104° 3' 3.319 W
9,504.00	4.80	147.70	9,481.71	-385.09	335.24	387,654.30	628,823.84	32° 3' 55.536 N	104° 3' 3.270 W
9,594.00	4.31	151.63	9,571.43	-391.25	338.86	387,648.15	628,827.46	32° 3' 55.475 N	104° 3' 3.228 W
9,683.00	3.92	151.92	9,660.20	-396.88	341.88	387,642.52	628,830.48	32° 3' 55.420 N	104° 3' 3.193 W
9,773.00	3.71	158.53	9,750.00	-402.30	344.39	387,637.09	628,833.00	32° 3' 55.366 N	104° 3' 3.164 W
9,889.00	4.20	157.20	9,865.72	-409.71	347.41	387,629.69	628,836.02	32° 3' 55.293 N	104° 3' 3.129 W
9,956.00	6.20	165.10	9,932.44	-415.47	349.29	387,623.93	628,837.90	32° 3' 55.235 N	104° 3' 3.107 W
KOP: 9956.00' MD, 9932.44' TVD									
9,987.00	2.80	182.90	9,963.34	-417.85	349.68	387,621.55	628,838.29	32° 3' 55.212 N	104° 3' 3.103 W
10,020.00	1.80	171.30	9,996.32	-419.16	349.72	387,620.24	628,838.33	32° 3' 55.199 N	104° 3' 3.102 W
10,051.00	0.60	89.50	10,027.31	-419.64	349.96	387,619.76	628,838.56	32° 3' 55.194 N	104° 3' 3.100 W
10,081.00	1.90	10.50	10,057.30	-419.15	350.21	387,620.25	628,838.81	32° 3' 55.199 N	104° 3' 3.097 W
10,114.00	3.90	355.40	10,090.26	-417.50	350.22	387,621.90	628,838.82	32° 3' 55.215 N	104° 3' 3.097 W
10,176.00	8.80	349.20	10,151.86	-410.73	349.16	387,628.67	628,837.76	32° 3' 55.282 N	104° 3' 3.109 W
10,207.00	13.80	357.40	10,182.25	-404.70	348.54	387,634.69	628,837.15	32° 3' 55.342 N	104° 3' 3.116 W
10,238.00	17.40	357.90	10,212.11	-396.38	348.21	387,643.02	628,836.81	32° 3' 55.424 N	104° 3' 3.119 W
10,270.00	22.60	0.80	10,242.17	-385.44	348.12	387,653.96	628,836.72	32° 3' 55.533 N	104° 3' 3.120 W
10,301.00	26.80	3.90	10,270.33	-372.50	348.68	387,666.89	628,837.28	32° 3' 55.661 N	104° 3' 3.113 W
10,332.00	29.90	9.10	10,297.61	-357.90	350.37	387,681.50	628,838.98	32° 3' 55.805 N	104° 3' 3.093 W
10,359.00	34.00	10.90	10,320.51	-343.83	352.87	387,695.57	628,841.47	32° 3' 55.944 N	104° 3' 3.064 W
10,390.00	42.00	12.80	10,344.92	-325.18	356.81	387,714.22	628,845.41	32° 3' 56.129 N	104° 3' 3.017 W
10,421.00	52.70	11.20	10,365.90	-302.90	361.52	387,736.50	628,850.12	32° 3' 56.349 N	104° 3' 2.962 W
10,468.00	64.56	9.98	10,390.32	-263.52	368.85	387,775.88	628,857.46	32° 3' 56.739 N	104° 3' 2.875 W
10,500.00	68.43	9.81	10,403.08	-234.62	373.89	387,804.78	628,862.50	32° 3' 57.025 N	104° 3' 2.816 W
10,531.00	72.23	10.16	10,413.51	-205.88	378.95	387,833.52	628,867.56	32° 3' 57.309 N	104° 3' 2.756 W
10,563.00	75.33	10.16	10,422.45	-175.64	384.37	387,863.76	628,872.98	32° 3' 57.608 N	104° 3' 2.692 W
10,594.00	76.65	10.07	10,429.96	-146.03	389.66	387,893.37	628,878.26	32° 3' 57.901 N	104° 3' 2.630 W
10,625.00	78.94	9.28	10,436.51	-116.16	394.75	387,923.24	628,883.35	32° 3' 58.196 N	104° 3' 2.570 W
10,656.00	79.81	9.28	10,442.22	-86.09	399.66	387,953.31	628,888.26	32° 3' 58.494 N	104° 3' 2.512 W
10,687.00	81.55	8.93	10,447.25	-55.89	404.50	387,983.51	628,893.11	32° 3' 58.793 N	104° 3' 2.455 W
10,719.00	82.58	8.58	10,451.66	-24.56	409.32	388,014.84	628,897.93	32° 3' 59.102 N	104° 3' 2.398 W
10,750.00	83.57	8.84	10,455.40	5.86	413.99	388,045.26	628,902.59	32° 3' 59.403 N	104° 3' 2.343 W
10,781.00	84.36	8.84	10,458.66	36.32	418.72	388,075.72	628,907.33	32° 3' 59.705 N	104° 3' 2.287 W
10,813.00	84.89	8.58	10,461.66	67.81	423.55	388,107.21	628,912.15	32° 4' 0.016 N	104° 3' 2.230 W
10,844.00	84.63	8.40	10,464.49	98.34	428.10	388,137.74	628,916.71	32° 4' 0.318 N	104° 3' 2.176 W
10,849.01	84.83	8.56	10,464.95	103.28	428.84	388,142.68	628,917.44	32° 4' 0.367 N	104° 3' 2.167 W
FTP(GC2#1)									
10,849.14	84.83	8.56	10,464.96	103.41	428.86	388,142.80	628,917.46	32° 4' 0.368 N	104° 3' 2.167 W
LP(GC2#1)									
10,875.00	85.84	9.37	10,467.06	128.86	432.88	388,168.26	628,921.48	32° 4' 0.620 N	104° 3' 2.119 W
EOC: 10875.00' MD, 10467.06' TVD, 85.84° INC, 9.37° AZ, 125.31' VS									
10,907.00	87.02	6.99	10,469.06	160.47	437.42	388,199.87	628,926.02	32° 4' 0.933 N	104° 3' 2.066 W

Survey Report - Geographic

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well #1H
Project:	Eddy County, NM (NAD83) NMEZ	TVD Reference:	RKB @ 2974.00usft (Precision 595 - KB=25')
Site:	Graham Cracker 2 State 1H	MD Reference:	RKB @ 2974.00usft (Precision 595 - KB=25')
Well:	#1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.14 Single User Db

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
10,938.00	87.90	4.97	10,470.43	191.27	440.65	388,230.67	628,929.25	32° 4' 1.238 N	104° 3' 2.027 W	
10,969.00	89.22	2.95	10,471.21	222.19	442.79	388,261.59	628,931.39	32° 4' 1.543 N	104° 3' 2.001 W	
11,032.00	91.64	2.51	10,470.74	285.11	445.79	388,324.51	628,934.39	32° 4' 2.166 N	104° 3' 1.965 W	
11,060.00	92.14	1.98	10,469.81	313.07	446.88	388,352.47	628,935.49	32° 4' 2.443 N	104° 3' 1.951 W	
11,091.00	92.21	2.34	10,468.64	344.03	448.05	388,383.43	628,936.65	32° 4' 2.749 N	104° 3' 1.936 W	
11,122.00	90.93	2.78	10,467.79	374.98	449.43	388,414.38	628,938.04	32° 4' 3.055 N	104° 3' 1.919 W	
11,185.00	88.96	2.16	10,467.85	437.92	452.15	388,477.32	628,940.75	32° 4' 3.678 N	104° 3' 1.886 W	
11,279.00	87.90	359.88	10,470.42	531.86	453.82	388,571.26	628,942.43	32° 4' 4.608 N	104° 3' 1.864 W	
11,373.00	87.24	359.88	10,474.41	625.78	453.63	388,665.18	628,942.23	32° 4' 5.537 N	104° 3' 1.863 W	
11,466.00	87.84	359.26	10,478.40	718.69	452.93	388,758.09	628,941.53	32° 4' 6.457 N	104° 3' 1.868 W	
11,561.00	88.52	1.46	10,481.42	813.63	453.52	388,853.03	628,942.13	32° 4' 7.396 N	104° 3' 1.858 W	
11,654.00	91.68	2.25	10,481.26	906.57	456.53	388,945.97	628,945.14	32° 4' 8.316 N	104° 3' 1.821 W	
11,748.00	89.99	359.96	10,479.89	1,000.53	458.35	389,039.93	628,946.95	32° 4' 9.246 N	104° 3' 1.797 W	
11,842.00	89.13	0.23	10,480.61	1,094.53	458.50	389,133.93	628,947.11	32° 4' 10.176 N	104° 3' 1.792 W	
11,936.00	89.40	358.65	10,481.81	1,188.52	457.58	389,227.91	628,946.19	32° 4' 11.106 N	104° 3' 1.800 W	
11,967.00	89.79	357.94	10,482.03	1,219.50	456.66	389,258.90	628,945.27	32° 4' 11.413 N	104° 3' 1.810 W	
11,999.00	92.27	357.50	10,481.46	1,251.47	455.39	389,290.87	628,943.99	32° 4' 11.729 N	104° 3' 1.823 W	
12,030.00	92.10	356.98	10,480.28	1,282.41	453.90	389,321.81	628,942.50	32° 4' 12.035 N	104° 3' 1.840 W	
12,061.00	92.34	356.80	10,479.07	1,313.34	452.22	389,352.74	628,940.82	32° 4' 12.341 N	104° 3' 1.858 W	
12,124.00	91.53	357.77	10,476.95	1,376.23	449.23	389,415.63	628,937.84	32° 4' 12.964 N	104° 3' 1.891 W	
12,219.00	91.09	357.50	10,474.78	1,471.13	445.32	389,510.53	628,933.92	32° 4' 13.903 N	104° 3' 1.934 W	
12,313.00	92.08	359.26	10,472.18	1,565.05	442.66	389,604.45	628,931.26	32° 4' 14.833 N	104° 3' 1.962 W	
12,407.00	90.98	358.47	10,469.67	1,658.99	440.80	389,698.39	628,929.40	32° 4' 15.762 N	104° 3' 1.981 W	
12,500.00	90.80	356.98	10,468.22	1,751.91	437.11	389,791.31	628,925.71	32° 4' 16.682 N	104° 3' 2.021 W	
12,595.00	93.02	359.88	10,465.05	1,846.80	434.50	389,886.20	628,923.11	32° 4' 17.621 N	104° 3' 2.048 W	
12,687.00	92.12	1.28	10,460.93	1,938.70	435.43	389,978.10	628,924.04	32° 4' 18.531 N	104° 3' 2.034 W	
12,781.00	89.68	1.19	10,459.45	2,032.66	437.46	390,072.06	628,926.06	32° 4' 19.460 N	104° 3' 2.008 W	
12,874.00	89.86	1.72	10,459.83	2,125.63	439.82	390,165.03	628,928.43	32° 4' 20.380 N	104° 3' 1.978 W	
12,968.00	89.15	1.72	10,460.64	2,219.58	442.64	390,258.98	628,931.25	32° 4' 21.310 N	104° 3' 1.942 W	
13,062.00	87.84	1.19	10,463.11	2,313.52	445.03	390,352.92	628,933.63	32° 4' 22.240 N	104° 3' 1.912 W	
13,156.00	88.43	359.35	10,466.17	2,407.46	445.47	390,446.86	628,934.07	32° 4' 23.169 N	104° 3' 1.904 W	
13,250.00	88.30	359.52	10,468.85	2,501.42	444.54	390,540.82	628,933.15	32° 4' 24.099 N	104° 3' 1.911 W	
13,344.00	88.21	357.24	10,471.71	2,595.33	441.89	390,634.73	628,930.49	32° 4' 25.029 N	104° 3' 1.939 W	
13,438.00	89.68	357.85	10,473.44	2,689.23	437.86	390,728.63	628,926.47	32° 4' 25.958 N	104° 3' 1.983 W	
13,532.00	91.53	1.46	10,472.45	2,783.20	437.30	390,822.60	628,925.90	32° 4' 26.888 N	104° 3' 1.987 W	
13,626.00	89.73	359.96	10,471.42	2,877.18	438.46	390,916.58	628,927.06	32° 4' 27.818 N	104° 3' 1.971 W	
13,720.00	91.86	1.19	10,470.11	2,971.16	439.40	391,010.56	628,928.01	32° 4' 28.748 N	104° 3' 1.957 W	
13,814.00	91.35	358.73	10,467.48	3,065.12	439.34	391,104.51	628,927.94	32° 4' 29.678 N	104° 3' 1.955 W	
13,908.00	90.30	358.38	10,466.12	3,159.08	436.97	391,198.47	628,925.57	32° 4' 30.608 N	104° 3' 1.979 W	
14,003.00	90.12	358.12	10,465.78	3,254.03	434.07	391,293.43	628,922.67	32° 4' 31.547 N	104° 3' 2.010 W	
14,096.00	90.49	358.20	10,465.28	3,346.98	431.08	391,386.38	628,919.68	32° 4' 32.467 N	104° 3' 2.042 W	
14,191.00	91.09	359.08	10,463.97	3,441.94	428.83	391,481.34	628,917.43	32° 4' 33.407 N	104° 3' 2.065 W	
14,285.00	89.68	358.65	10,463.34	3,535.92	426.96	391,575.32	628,915.57	32° 4' 34.337 N	104° 3' 2.084 W	
14,379.00	91.97	0.31	10,461.99	3,629.90	426.11	391,669.30	628,914.71	32° 4' 35.267 N	104° 3' 2.091 W	
14,473.00	87.64	359.26	10,462.31	3,723.87	425.76	391,763.27	628,914.36	32° 4' 36.197 N	104° 3' 2.093 W	
14,566.00	88.63	0.14	10,465.33	3,816.82	425.27	391,856.22	628,913.88	32° 4' 37.117 N	104° 3' 2.095 W	
14,660.00	89.73	0.49	10,466.68	3,910.81	425.79	391,950.21	628,914.39	32° 4' 38.047 N	104° 3' 2.087 W	
14,754.00	91.53	2.42	10,465.64	4,004.76	428.17	392,044.16	628,916.78	32° 4' 38.977 N	104° 3' 2.056 W	
14,848.00	89.04	359.61	10,465.18	4,098.73	429.84	392,138.13	628,918.44	32° 4' 39.907 N	104° 3' 2.034 W	
14,942.00	89.02	0.14	10,466.77	4,192.72	429.63	392,232.11	628,918.24	32° 4' 40.837 N	104° 3' 2.033 W	
15,040.00	90.34	2.42	10,467.32	4,290.68	431.82	392,330.08	628,920.43	32° 4' 41.806 N	104° 3' 2.005 W	
Final MWD Survey: 15040.00' MD, 10467.31' TVD										
15,084.00	90.34	2.42	10,467.05	4,334.64	433.68	392,374.04	628,922.29	32° 4' 42.241 N	104° 3' 1.982 W	
BHL: 15084.00' MD, 10467.05' TVD, 199°FNL / 370°FEL - PBHL_P4(GC2#1)										

Survey Report - Geographic

Company:	COG OPERATING, LLC	Local Co-ordinate Reference:	Well #1H
Project:	Eddy County, NM (NAD83) NMEZ	TVD Reference:	RKB @ 2974.00usft (Precision 595 - KB=25')
Site:	Graham Cracker 2 State 1H	MD Reference:	RKB @ 2974.00usft (Precision 595 - KB=25')
Well:	#1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.14 Single User Db

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
9,956.00	9,932.44	-415.47	349.29	KOP: 9956.00' MD, 9932.44' TVD
10,875.00	10,467.06	128.86	432.88	EOC: 10875.00' MD, 10467.06' TVD, 85.84° INC, 9.37° AZ, 125.31' VS
15,040.00	10,467.32	4,290.68	431.82	Final MWD Survey: 15040.00' MD, 10467.31' TVD
15,084.00	10,467.05	4,334.64	433.68	BHL: 15084.00' MD, 10467.05' TVD, 199°FNL / 370°FEL

Checked By: _____	Approved By: _____	Date: _____
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