

OPERATOR COG OPERATING LLC
WELL/LEASE HONEY GRAHAM STATE COM 3H
COUNTY EDDY

STATE OF NEW MEXICO
DEVIATION REPORT

15-38274

149	1.00	6,515	1.70
307	1.50	6,610	1.30
446	0.80	6,704	1.50
637	0.30	6,799	2.10
858	0.50	6,893	3.70
1,233	0.60		
1,521	0.30		
1,650	0.60		
1,804	0.10		
1,898	0.30		
1,993	0.40		
2,087	0.40		
2,282	0.10		
2,462	0.50		
2,841	0.20		
3,314	0.50		
3,597	0.50		
3,878	1.00		
4,101	1.00		
4,635	1.13		
4,880	1.40		
5,107	1.00		
5,295	1.30		
5,574	1.80		
5,668	1.60		
5,761	1.60		
5,856	1.60		
5,950	1.50		
6,044	2.10		
6,326	1.70		

NM OIL CONSERVATION
ARTESIA DISTRICT

OCT 14 2014

RECEIVED

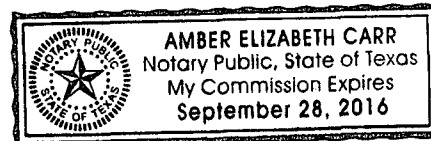
STATE OF TEXAS

COUNTY OF MIDLAND

BY: Dora Garcia

The foregoing instrument was acknowledged before me on
Dora Garcia on behalf of Patterson-UTi Drilling Company LLC.

Amber Elizabeth Carr
Notary Public for Midland County, Texas
My Commission Expires: 1.30





June 27, 2014

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

Attn: Kanicia Castillo

RE: Honey Graham State Com No. 003H

Please find enclosed a copy of the survey from 0.00' to 7,170.00' ran on the above referenced well.

Sincerely,

Keith Havelka
Operations

NM OIL CONSERVATION

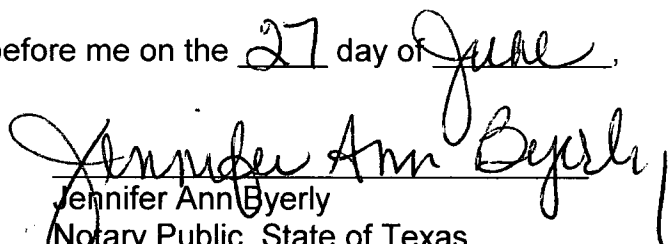
ARTESIA DISTRICT

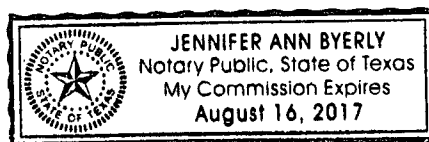
OCT 14 2014

RECEIVED

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 27 day of June,
A.D., 2014, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas



Company: COG OPERATING, LLC
Lease/Well: HONEY GRAHAM STATE COM/NO. 003H



Rig Name: PATTERSON 79
State/County: NEW MEXICO/EDDY
Latitude: 32.02, Longitude: -104.12
GRID North is 0.11 Degrees East of True North
VS-Azi: 0.00 Degrees



Depth Reference : R.K.B= 17.5

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ... graham state com 3h-de_01.ut

Minimum Curvature Method

Report Date/Time: 6/27/2014 / 13:49

VES Survey International

(432) 563-5444

West Texas

Surveyor: Javier Estrada

Honey Graham State Com No. 003H / API 30-015-38274

NM OIL CONSERVATION

ARTESIA DISTRICT

OCT 14 2014

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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	0.89	307.63	100.00	0.47	-0.61	0.47	0.77	307.63	0.89
200.00	1.35	311.98	199.98	1.73	-2.10	1.73	2.72	309.51	0.47
300.00	1.32	308.25	299.95	3.23	-3.88	3.23	5.05	309.79	0.09
400.00	0.71	302.59	399.93	4.28	-5.31	4.28	6.82	308.88	0.62
500.00	0.19	305.02	499.93	4.71	-5.96	4.71	7.60	308.28	0.52
600.00	0.15	24.75	599.93	4.92	-6.04	4.92	7.79	309.15	0.22
700.00	0.27	357.94	699.93	5.28	-6.00	5.28	7.99	311.34	0.15
800.00	0.21	314.63	799.93	5.64	-6.14	5.64	8.33	312.59	0.19
900.00	0.36	335.30	899.93	6.06	-6.40	6.06	8.81	313.43	0.18
1000.00	0.36	327.70	999.93	6.61	-6.70	6.61	9.42	314.63	0.05
1100.00	0.56	304.88	1099.92	7.17	-7.28	7.17	10.21	314.56	0.27
1200.00	0.60	294.18	1199.92	7.66	-8.16	7.66	11.19	313.21	0.11
1300.00	0.46	278.65	1299.91	7.93	-9.03	7.93	12.02	311.32	0.20
1400.00	0.27	263.99	1399.91	7.97	-9.66	7.97	12.52	309.53	0.21
1500.00	0.27	299.19	1499.91	8.06	-10.10	8.06	12.92	308.59	0.16
1600.00	0.39	36.75	1599.91	8.45	-10.10	8.45	13.17	309.91	0.50
1700.00	0.31	37.49	1699.91	8.94	-9.73	8.94	13.21	312.57	0.08
1800.00	0.15	323.64	1799.91	9.26	-9.64	9.26	13.37	313.85	0.31

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	0.08	359.69	1899.91	9.43	-9.72	9.43	13.54	314.15	0.10
2000.00	0.33	43.40	1999.90	9.71	-9.52	9.71	13.60	315.57	0.28
2100.00	0.34	35.19	2099.90	10.17	-9.15	10.17	13.68	318.03	0.05
2200.00	0.29	64.12	2199.90	10.52	-8.75	10.52	13.68	320.27	0.17
2300.00	0.32	72.34	2299.90	10.72	-8.26	10.72	13.53	322.39	0.05
2400.00	0.34	103.28	2399.90	10.73	-7.71	10.73	13.21	324.32	0.17
2500.00	0.17	165.90	2499.90	10.52	-7.39	10.52	12.86	324.93	0.30
2600.00	0.12	312.36	2599.90	10.45	-7.43	10.45	12.82	324.59	0.28
2700.00	0.22	5.73	2699.90	10.71	-7.49	10.71	13.07	325.05	0.18
2800.00	0.29	66.61	2799.90	11.00	-7.24	11.00	13.17	326.66	0.26
2900.00	0.37	319.79	2899.90	11.35	-7.22	11.35	13.45	327.54	0.53
3000.00	0.55	336.57	2999.89	12.03	-7.62	12.03	14.24	327.67	0.22
3100.00	0.64	334.63	3099.89	12.98	-8.05	12.98	15.27	328.20	0.09
3200.00	0.39	334.98	3199.88	13.80	-8.43	13.80	16.17	328.57	0.25
3300.00	0.25	337.16	3299.88	14.31	-8.66	14.31	16.72	328.81	0.15
3400.00	0.19	266.80	3399.88	14.50	-8.91	14.50	17.02	328.41	0.26
3500.00	0.25	321.88	3499.88	14.66	-9.22	14.66	17.32	327.83	0.21
3600.00	0.39	252.92	3599.88	14.74	-9.68	14.74	17.63	326.69	0.38
3700.00	0.69	252.14	3699.87	14.45	-10.58	14.45	17.91	323.80	0.30
3800.00	0.81	261.95	3799.87	14.17	-11.85	14.17	18.47	320.09	0.18
3900.00	0.79	259.08	3899.86	13.94	-13.24	13.94	19.22	316.48	0.04
4000.00	0.79	241.90	3999.85	13.48	-14.53	13.48	19.82	312.86	0.24
4100.00	1.04	249.70	4099.83	12.84	-15.99	12.84	20.51	308.75	0.28
4200.00	0.80	253.70	4199.82	12.32	-17.52	12.32	21.42	305.12	0.25
4300.00	0.93	257.53	4299.81	11.95	-18.99	11.95	22.44	302.18	0.14
4400.00	0.99	246.04	4399.79	11.42	-20.58	11.42	23.54	299.04	0.20
4500.00	1.13	237.60	4499.78	10.54	-22.20	10.54	24.58	295.40	0.21
4600.00	1.37	224.15	4599.75	9.16	-23.87	9.16	25.57	290.99	0.38
4700.00	0.99	214.01	4699.73	7.58	-25.19	7.58	26.30	286.76	0.43
4800.00	1.49	208.62	4799.71	5.72	-26.29	5.72	26.91	282.28	0.51
4900.00	0.94	208.33	4899.69	3.86	-27.31	3.86	27.58	278.04	0.55
5000.00	1.07	196.32	4999.67	2.24	-27.96	2.24	28.05	274.57	0.25
5100.00	1.02	198.26	5099.65	0.49	-28.50	0.49	28.51	270.98	0.07
5200.00	0.84	177.76	5199.64	-1.09	-28.75	-1.09	28.77	267.84	0.38
5300.00	1.22	173.63	5299.62	-2.88	-28.60	-2.88	28.75	264.26	0.39
5400.00	1.31	186.01	5399.60	-5.07	-28.61	-5.07	29.05	259.95	0.29
5500.00	1.17	183.71	5499.58	-7.22	-28.79	-7.22	29.68	255.92	0.15
5600.00	1.20	186.69	5599.56	-9.28	-28.98	-9.28	30.43	252.24	0.07
5700.00	1.55	195.03	5699.53	-11.64	-29.45	-11.64	31.67	248.44	0.40

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	1.45	208.72	5799.49	-14.06	-30.41	-14.06	33.51	245.19	0.37
5900.00	1.75	209.41	5899.45	-16.50	-31.77	-16.50	35.80	242.56	0.30
6000.00	1.66	209.77	5999.41	-19.08	-33.24	-19.08	38.33	240.14	0.09
6100.00	2.03	216.73	6099.36	-21.76	-35.02	-21.76	41.23	238.14	0.44
6200.00	1.98	224.03	6199.30	-24.42	-37.28	-24.42	44.57	236.77	0.26
6300.00	1.77	229.58	6299.24	-26.67	-39.66	-26.67	47.79	236.08	0.28
6400.00	1.80	233.39	6399.19	-28.60	-42.09	-28.60	50.89	235.80	0.12
6500.00	1.39	235.84	6499.16	-30.22	-44.35	-30.22	53.67	235.73	0.41
6600.00	1.55	227.51	6599.12	-31.81	-46.36	-31.81	56.22	235.54	0.26
6700.00	1.27	219.27	6699.09	-33.58	-48.05	-33.58	58.62	235.05	0.34
6800.00	1.65	204.64	6799.06	-35.75	-49.35	-35.75	60.94	234.08	0.53
6900.00	2.98	205.14	6898.98	-39.40	-51.05	-39.40	64.49	232.34	1.33
7000.00	3.00	206.59	6998.84	-44.10	-53.33	-44.10	69.20	230.41	0.08
7100.00	2.64	213.97	7098.72	-48.35	-55.79	-48.35	73.82	229.09	0.51
7170.00	2.19	213.79	7168.66	-50.80	-57.43	-50.80	76.67	228.51	0.65



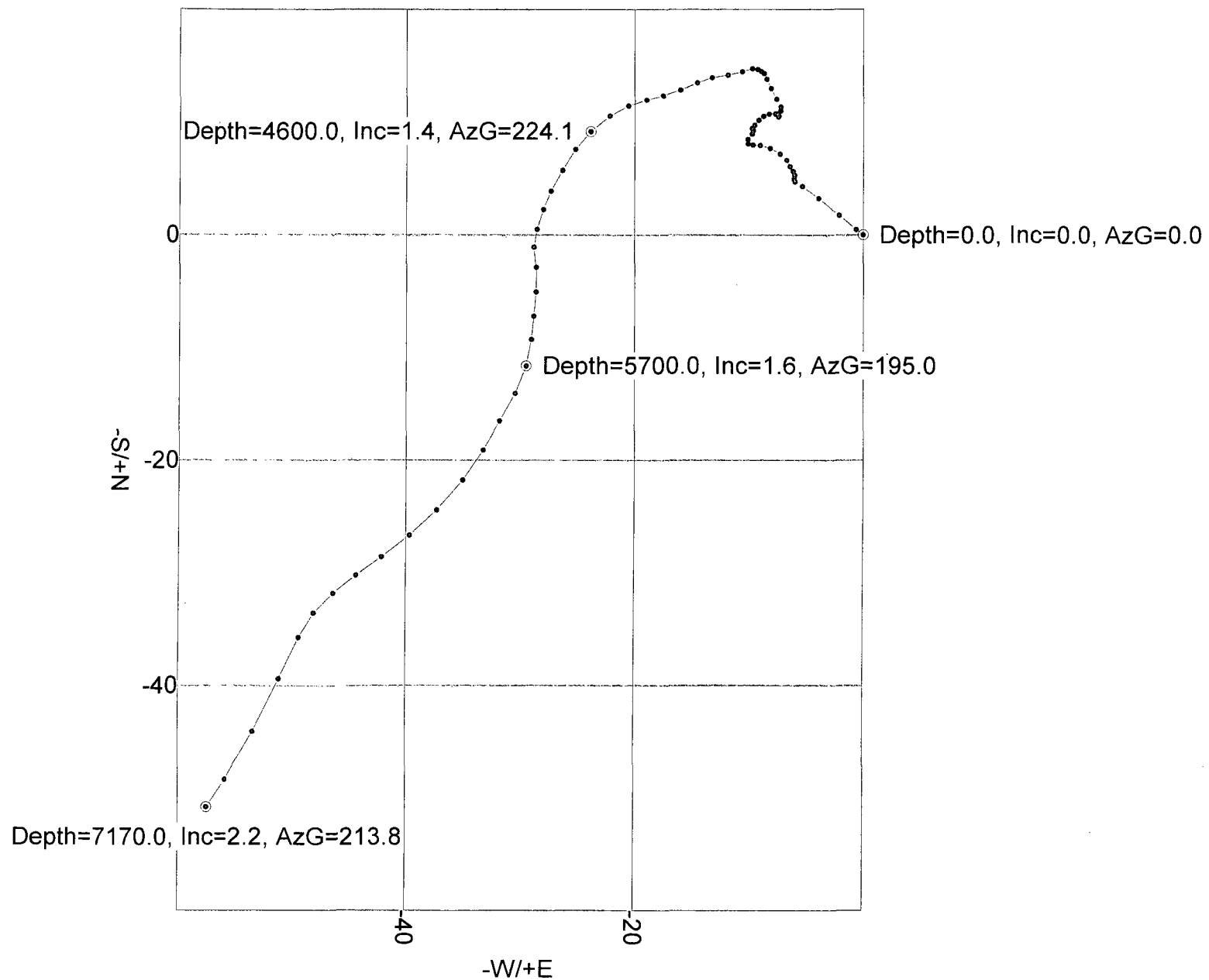
VES Survey International

(432) 563-5444

West Texas

Surveyor: Javier Estrada

Honey Graham State Com No. 003H / API 30-015-38274



VES Survey Date: 06/16/2014



COG Operating, LLC

Eddy County, NM (NAD 27)

Sec 29, T26S, R28E

Honey Graham State Com #3H

Wellbore #1

Design: Wellbore #1

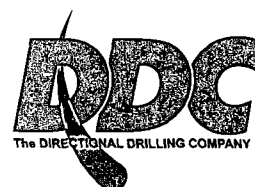
DDC Survey Report

28 June, 2014

NM OIL CONSERVATION
ARTESIA DISTRICT

OCT 14 2014

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DDC
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Honey Graham State Com #3H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	WELL @ 3021.0usft (Patterson #79)
Site:	Sec 29, T26S, R28E	MD Reference:	WELL @ 3021.0usft (Patterson #79)
Well:	Honey Graham State 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, NM (NAD 27)		
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	Sec 29, T26S, R28E		
Site Position:		Northing:	371,191.10 usft
From:	Map	Easting:	568,843.40 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 1' 13.166 N
		Longitude:	104° 6' 40.339 W
		Grid Convergence:	0.12 °

Well	Honey Graham State Com #3H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	32° 1' 12.389 N
		Longitude:	104° 6' 59.504 W
		Ground Level:	3,002.9 usft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	6/7/2014	7.46
			Dip Angle
			(°)
			59.83
			Field Strength
			(nT)
			48,140

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0.0	0.0	0.0
			Direction
			(°)
			177.39

Survey Program	Date 6/28/2014		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100.0	7,170.0	Gyro Survey (Wellbore #1)	Good_gyro
7,201.0	14,550.0	MWD (Wellbore #1)	MWD default
			Description
			Good Gyro
			MWD - Standard

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate
(usft)			(usft)			(usft)	(°/100usft)	(°/100usft)	(°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
100.0	0.89	307.63	100.0	0.5	-0.6	-0.5	0.89	0.89	0.00
200.0	1.35	311.98	200.0	1.7	-2.1	-1.8	0.47	0.46	4.35
300.0	1.32	308.25	299.9	3.2	-3.9	-3.4	0.09	-0.03	-3.73
400.0	0.71	302.59	399.9	4.3	-5.3	-4.5	0.62	-0.61	-5.66
500.0	0.19	305.02	499.9	4.7	-6.0	-5.0	0.52	-0.52	2.43
600.0	0.15	24.75	599.9	4.9	-6.1	-5.2	0.22	-0.04	79.73
700.0	0.27	357.94	699.9	5.3	-6.0	-5.5	0.15	0.12	-26.81
800.0	0.21	314.63	799.9	5.6	-6.1	-5.9	0.19	-0.06	-43.31
900.0	0.36	335.30	899.9	6.1	-6.4	-6.3	0.18	0.15	20.67



DDC
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Honey Graham State Com #3H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	WELL @ 3021.0usft. (Patterson #79)
Site:	Sec 29, T26S, R28E	MD Reference:	WELL @ 3021.0usft (Patterson #79)
Well:	Honey Graham State 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)
1,000.0	0.36	327.70	999.9	6.6	-6.7	-6.9	0.05	0.00	-7.60
1,100.0	0.56	304.88	1,099.9	7.2	-7.3	-7.5	0.27	0.20	-22.82
1,200.0	0.60	294.18	1,199.9	7.6	-8.2	-8.0	0.12	0.04	-10.70
1,300.0	0.46	278.65	1,299.9	7.9	-9.0	-8.3	0.20	-0.14	-15.53
1,400.0	0.27	263.99	1,399.9	8.0	-9.7	-8.4	0.21	-0.19	-14.66
1,500.0	0.27	299.19	1,499.9	8.1	-10.1	-8.5	0.16	0.00	35.20
1,600.0	0.39	36.75	1,599.9	8.4	-10.1	-8.9	0.50	0.12	97.56
1,700.0	0.31	37.49	1,699.9	8.9	-9.7	-9.4	0.08	-0.08	0.74
1,800.0	0.15	323.64	1,799.9	9.2	-9.6	-9.7	0.30	-0.16	-73.85
1,900.0	0.08	359.69	1,899.9	9.4	-9.7	-9.9	0.10	-0.07	36.05
2,000.0	0.33	43.40	1,999.9	9.7	-9.5	-10.1	0.28	0.25	43.71
2,100.0	0.34	35.19	2,099.9	10.2	-9.2	-10.6	0.05	0.01	-8.21
2,200.0	0.29	64.12	2,199.9	10.5	-8.8	-10.9	0.16	-0.05	28.93
2,300.0	0.32	72.34	2,299.9	10.7	-8.3	-11.1	0.05	0.03	8.22
2,400.0	0.34	103.28	2,399.9	10.7	-7.7	-11.1	0.18	0.02	30.94
2,500.0	0.17	165.90	2,499.9	10.5	-7.4	-10.8	0.30	-0.17	62.62
2,600.0	0.12	312.36	2,599.9	10.4	-7.4	-10.8	0.28	-0.05	146.46
2,700.0	0.22	5.73	2,699.9	10.7	-7.5	-11.0	0.18	0.10	53.37
2,800.0	0.29	66.61	2,799.9	11.0	-7.2	-11.3	0.27	0.07	60.88
2,900.0	0.37	319.79	2,899.9	11.3	-7.2	-11.6	0.53	0.08	-106.82
3,000.0	0.55	336.57	2,999.9	12.0	-7.6	-12.4	0.22	0.18	16.78
3,100.0	0.64	334.63	3,099.9	13.0	-8.0	-13.3	0.09	0.09	-1.94
3,200.0	0.39	334.98	3,199.9	13.8	-8.4	-14.1	0.25	-0.25	0.35
3,300.0	0.25	337.16	3,299.9	14.3	-8.6	-14.7	0.14	-0.14	2.18
3,400.0	0.19	266.80	3,399.9	14.5	-8.9	-14.9	0.26	-0.06	-70.36
3,500.0	0.25	321.88	3,499.9	14.6	-9.2	-15.0	0.21	0.06	55.08
3,600.0	0.39	252.92	3,599.9	14.7	-9.7	-15.1	0.38	0.14	-68.96
3,700.0	0.69	252.14	3,699.9	14.4	-10.6	-14.9	0.30	0.30	-0.78
3,800.0	0.81	261.95	3,799.9	14.1	-11.8	-14.7	0.18	0.12	9.81
3,900.0	0.79	259.08	3,899.9	13.9	-13.2	-14.5	0.04	-0.02	-2.87
4,000.0	0.79	241.90	3,999.8	13.5	-14.5	-14.1	0.24	0.00	-17.18
4,100.0	1.04	249.70	4,099.8	12.8	-16.0	-13.5	0.28	0.25	7.80
4,200.0	0.80	253.70	4,199.8	12.3	-17.5	-13.1	0.25	-0.24	4.00
4,300.0	0.93	257.53	4,299.8	11.9	-18.9	-12.8	0.14	0.13	3.83
4,400.0	0.99	246.04	4,399.8	11.4	-20.5	-12.3	0.20	0.06	-11.49
4,500.0	1.13	237.60	4,499.8	10.5	-22.1	-11.5	0.21	0.14	-8.44
4,600.0	1.37	224.15	4,599.8	9.1	-23.8	-10.2	0.38	0.24	-13.45
4,700.0	0.99	214.01	4,699.7	7.6	-25.1	-8.7	0.43	-0.38	-10.14
4,800.0	1.49	208.62	4,799.7	5.7	-26.2	-6.9	0.51	0.50	-5.39
4,900.0	0.94	208.33	4,899.7	3.9	-27.2	-5.1	0.55	-0.55	-0.29
5,000.0	1.07	196.32	4,999.7	2.2	-27.9	-3.5	0.25	0.13	-12.01
5,100.0	1.02	198.26	5,099.7	0.5	-28.4	-1.8	0.06	-0.05	1.94
5,200.0	0.84	177.76	5,199.6	-1.1	-28.7	-0.2	0.38	-0.18	-20.50



DDC
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Honey Graham State Com #3H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	WELL @ 3021.0usft (Patterson #79)
Site:	Sec 29, T26S, R28E	MD Reference:	WELL @ 3021.0usft (Patterson #79)
Well:	Honey Graham State 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)
5,300.0	1.22	173.63	5,299.6	-2.9	-28.5	1.6	0.39	0.38	-4.13
5,400.0	1.31	186.01	5,399.6	-5.1	-28.5	3.8	0.29	0.09	12.38
5,500.0	1.17	183.71	5,499.6	-7.2	-28.7	5.9	0.15	-0.14	-2.30
5,600.0	1.20	186.69	5,599.6	-9.3	-28.9	8.0	0.07	0.03	2.98
5,700.0	1.55	195.03	5,699.5	-11.6	-29.4	10.3	0.40	0.35	8.34
5,800.0	1.45	208.72	5,799.5	-14.0	-30.3	12.7	0.37	-0.10	13.69
5,900.0	1.75	209.41	5,899.5	-16.5	-31.7	15.0	0.30	0.30	0.69
6,000.0	1.66	209.77	5,999.4	-19.1	-33.2	17.5	0.09	-0.09	0.36
6,100.0	2.03	216.73	6,099.4	-21.8	-34.9	20.1	0.43	0.37	6.96
6,200.0	1.98	224.03	6,199.3	-24.4	-37.2	22.7	0.26	-0.05	7.30
6,300.0	1.77	229.58	6,299.2	-26.7	-39.6	24.8	0.28	-0.21	5.55
6,400.0	1.80	233.39	6,399.2	-28.6	-42.0	26.7	0.12	0.03	3.81
6,500.0	1.39	235.84	6,499.2	-30.2	-44.3	28.2	0.42	-0.41	2.45
6,600.0	1.55	227.51	6,599.1	-31.8	-46.3	29.7	0.27	0.16	-8.33
6,700.0	1.27	219.27	6,699.1	-33.6	-48.0	31.4	0.35	-0.28	-8.24
6,800.0	1.65	204.64	6,799.1	-35.7	-49.3	33.5	0.53	0.38	-14.63
6,900.0	2.98	205.14	6,899.0	-39.4	-51.0	37.0	1.33	1.33	0.50
7,000.0	3.00	206.59	6,998.8	-44.1	-53.3	41.6	0.08	0.02	1.45
7,100.0	2.64	213.97	7,098.7	-48.4	-55.7	45.8	0.51	-0.36	7.38
Tie In @ 7170' MD / 7169' TVD									
7,170.0	2.19	213.79	7,168.7	-50.8	-57.4	48.1	0.64	-0.64	-0.26
7,201.0	2.50	217.80	7,199.6	-51.8	-58.1	49.1	1.13	1.00	12.94
7,233.0	2.80	185.90	7,231.6	-53.2	-58.6	50.4	4.64	0.94	-99.69
7,264.0	5.70	160.80	7,262.5	-55.4	-58.2	52.7	10.90	9.35	-80.97
7,296.0	9.20	158.80	7,294.2	-59.2	-56.7	56.6	10.97	10.94	-6.25
7,327.0	12.80	160.20	7,324.7	-64.8	-54.7	62.2	11.64	11.61	4.52
7,359.0	15.70	160.40	7,355.7	-72.2	-52.0	69.8	9.06	9.06	0.63
7,390.0	18.90	159.10	7,385.3	-80.9	-48.8	78.5	10.40	10.32	-4.19
7,422.0	21.90	157.30	7,415.3	-91.2	-44.7	89.1	9.58	9.38	-5.63
7,453.0	24.80	154.80	7,443.7	-102.4	-39.7	100.5	9.88	9.35	-8.06
7,485.0	28.10	153.90	7,472.4	-115.3	-33.5	113.6	10.39	10.31	-2.81
7,516.0	31.00	153.00	7,499.3	-128.9	-26.7	127.6	9.46	9.35	-2.90
7,548.0	34.40	152.70	7,526.3	-144.3	-18.8	143.3	10.64	10.63	-0.94
7,579.0	37.50	151.80	7,551.3	-160.4	-10.3	159.8	10.14	10.00	-2.90
7,611.0	41.40	152.40	7,576.1	-178.4	-0.8	178.2	12.25	12.19	1.88
Crossed 330' Hard Line @ 7614' MD / 7579' TVD									
7,614.3	41.77	152.43	7,578.5	-180.3	0.2	180.1	11.27	11.25	1.00
7,643.0	45.00	152.70	7,599.4	-197.8	9.3	198.0	11.27	11.25	0.93
7,674.0	49.10	153.80	7,620.5	-218.1	19.5	218.7	13.48	13.23	3.55
7,705.0	53.00	155.10	7,640.0	-239.8	29.9	240.9	13.00	12.58	4.19
7,737.0	56.40	157.40	7,658.5	-263.7	40.4	265.3	12.14	10.63	7.19
7,769.0	58.50	161.40	7,675.7	-289.0	49.9	290.9	12.41	6.56	12.50
7,800.0	60.10	165.50	7,691.5	-314.5	57.5	316.8	12.49	5.16	13.23
7,832.0	61.20	170.00	7,707.2	-341.8	63.4	344.3	12.73	3.44	14.06



DDC
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Honey Graham State Com #3H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	WELL @ 3021.0usft (Patterson #79)
Site:	Sec 29, T26S, R28E	MD Reference:	WELL @ 3021.0usft (Patterson #79)
Well:	Honey Graham State 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)
7,862.0	63.10	173.40	7,721.2	-368.0	67.2	370.7	11.85	6.33	11.33
7,894.0	64.00	175.40	7,735.5	-396.5	70.0	399.3	6.26	2.81	6.25
7,925.0	65.40	176.00	7,748.7	-424.5	72.1	427.3	4.84	4.52	1.94
7,957.0	67.40	176.30	7,761.5	-453.7	74.1	456.6	6.31	6.25	0.94
7,989.0	69.60	177.00	7,773.3	-483.4	75.8	486.4	7.17	6.88	2.19
8,020.0	71.30	178.10	7,783.6	-512.6	77.0	515.6	6.42	5.48	3.55
8,052.0	73.40	178.60	7,793.3	-543.1	77.9	546.1	6.73	6.56	1.56
8,084.0	76.10	178.70	7,801.8	-574.0	78.6	577.0	8.44	8.44	0.31
8,115.0	78.90	178.80	7,808.5	-604.2	79.3	607.2	9.04	9.03	0.32
8,147.0	82.00	178.50	7,813.8	-635.8	80.0	638.8	9.73	9.69	-0.94
8,179.0	84.80	177.80	7,817.5	-667.5	81.1	670.5	9.02	8.75	-2.19
8,211.0	88.00	178.00	7,819.5	-699.5	82.2	702.5	10.02	10.00	0.63
8,306.0	93.60	178.50	7,818.1	-794.4	85.1	797.4	5.92	5.89	0.53
8,401.0	92.40	177.70	7,813.2	-889.2	88.3	892.3	1.52	-1.26	-0.84
8,497.0	93.10	177.00	7,808.6	-985.0	92.7	988.2	1.03	0.73	-0.73
8,591.0	94.60	176.40	7,802.2	-1,078.6	98.1	1,081.9	1.72	1.60	-0.64
8,685.0	91.90	176.80	7,796.9	-1,172.3	103.7	1,175.8	2.90	-2.87	0.43
8,719.0	90.10	177.10	7,796.3	-1,206.2	105.5	1,209.8	5.37	-5.29	0.88
8,781.0	90.40	176.90	7,796.1	-1,268.1	108.7	1,271.8	0.58	0.48	-0.32
8,876.0	89.60	177.10	7,796.1	-1,363.0	113.7	1,366.8	0.87	-0.84	0.21
8,971.0	90.70	176.80	7,795.8	-1,457.9	118.8	1,461.8	1.20	1.16	-0.32
9,066.0	89.40	177.30	7,795.7	-1,552.7	123.7	1,556.7	1.47	-1.37	0.53
9,162.0	90.50	177.50	7,795.8	-1,648.6	128.0	1,652.7	1.16	1.15	0.21
9,257.0	90.30	177.40	7,795.1	-1,743.5	132.2	1,747.7	0.24	-0.21	-0.11
9,353.0	89.00	176.90	7,795.7	-1,839.4	137.0	1,843.7	1.45	-1.35	-0.52
9,448.0	89.10	176.40	7,797.3	-1,934.2	142.6	1,938.7	0.54	0.11	-0.53
9,544.0	89.00	177.30	7,798.9	-2,030.1	147.8	2,034.7	0.94	-0.10	0.94
9,639.0	89.50	177.40	7,800.1	-2,125.0	152.2	2,129.7	0.54	0.53	0.11
9,734.0	90.20	177.10	7,800.4	-2,219.9	156.8	2,224.7	0.80	0.74	-0.32
9,830.0	90.80	178.40	7,799.6	-2,315.8	160.6	2,320.7	1.49	0.63	1.35
9,925.0	91.70	178.70	7,797.5	-2,410.7	163.0	2,415.6	1.00	0.95	0.32
10,019.0	90.90	178.80	7,795.3	-2,504.7	165.0	2,509.6	0.86	-0.85	0.11
10,115.0	91.40	179.10	7,793.4	-2,600.6	166.8	2,605.5	0.61	0.52	0.31
10,211.0	90.50	178.30	7,791.8	-2,696.6	168.9	2,701.5	1.25	-0.94	-0.83
10,306.0	91.30	177.30	7,790.3	-2,791.5	172.6	2,796.5	1.35	0.84	-1.05
10,401.0	89.80	177.30	7,789.4	-2,886.4	177.1	2,891.5	1.58	-1.58	0.00
10,495.0	90.40	177.70	7,789.3	-2,980.3	181.2	2,985.5	0.77	0.64	0.43
10,686.0	91.80	177.90	7,785.6	-3,171.1	188.5	3,176.4	0.74	0.73	0.10
10,782.0	89.90	178.60	7,784.2	-3,267.1	191.4	3,272.4	2.11	-1.98	0.73
10,878.0	91.50	181.00	7,783.0	-3,363.0	191.8	3,368.3	3.00	1.67	2.50
10,973.0	90.30	178.90	7,781.5	-3,458.0	191.8	3,463.2	2.55	-1.26	-2.21
11,069.0	91.50	180.00	7,780.0	-3,554.0	192.8	3,559.1	1.70	1.25	1.15
11,164.0	89.90	178.60	7,778.8	-3,649.0	193.9	3,654.0	2.24	-1.68	-1.47



DDC
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Honey Graham State Com #3H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	WELL @ 3021.0usft (Patterson #79)
Site:	Sec 29, T26S, R28E	MD Reference:	WELL @ 3021.0usft (Patterson #79)
Well:	Honey Graham State 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)	
11,259.0	88.20	178.90	7,780.4	-3,744.0	196.0	3,749.0	1.82	-1.79	0.32	
11,354.0	88.70	176.40	7,783.0	-3,838.8	199.9	3,844.0	2.68	0.53	-2.63	
11,450.0	89.60	177.10	7,784.4	-3,934.7	205.3	3,939.9	1.19	0.94	0.73	
11,543.0	90.80	176.10	7,784.1	-4,027.5	210.9	4,032.9	1.68	1.29	-1.08	
11,639.0	90.60	177.90	7,782.9	-4,123.4	215.9	4,128.9	1.89	-0.21	1.88	
11,734.0	91.30	177.10	7,781.3	-4,218.2	220.0	4,223.9	1.12	0.74	-0.84	
11,829.0	90.60	177.90	7,779.8	-4,313.1	224.2	4,318.9	1.12	-0.74	0.84	
11,924.0	91.30	178.20	7,778.2	-4,408.1	227.4	4,413.9	0.80	0.74	0.32	
12,019.0	89.20	178.90	7,777.8	-4,503.0	229.8	4,508.8	2.33	-2.21	0.74	
12,114.0	90.30	178.90	7,778.2	-4,598.0	231.6	4,603.8	1.16	1.16	0.00	
12,210.0	91.30	178.60	7,776.8	-4,694.0	233.7	4,699.8	1.09	1.04	-0.31	
12,305.0	89.90	177.90	7,775.8	-4,788.9	236.6	4,794.7	1.65	-1.47	-0.74	
12,400.0	88.50	178.20	7,777.2	-4,883.9	239.8	4,889.7	1.51	-1.47	0.32	
12,495.0	89.60	178.20	7,778.7	-4,978.8	242.8	4,984.7	1.16	1.16	0.00	
12,591.0	90.40	176.80	7,778.7	-5,074.7	247.0	5,080.7	1.68	0.83	-1.46	
12,685.0	89.90	178.60	7,778.5	-5,168.6	250.8	5,174.7	1.99	-0.53	1.91	
12,780.0	91.00	178.20	7,777.8	-5,263.6	253.4	5,269.7	1.23	1.16	-0.42	
12,875.0	90.80	178.60	7,776.3	-5,358.5	256.1	5,364.6	0.47	-0.21	0.42	
12,970.0	89.60	176.40	7,775.9	-5,453.4	260.2	5,459.6	2.64	-1.26	-2.32	
13,065.0	90.80	176.40	7,775.6	-5,548.2	266.2	5,554.6	1.26	1.26	0.00	
13,160.0	92.20	175.70	7,773.1	-5,643.0	272.7	5,649.6	1.65	1.47	-0.74	
13,256.0	90.40	176.40	7,770.9	-5,738.7	279.4	5,745.5	2.01	-1.88	0.73	
13,351.0	89.00	176.80	7,771.4	-5,833.6	285.0	5,840.5	1.53	-1.47	0.42	
13,446.0	90.10	176.80	7,772.2	-5,928.4	290.3	5,935.5	1.16	1.16	0.00	
13,541.0	89.40	179.60	7,772.6	-6,023.4	293.3	6,030.5	3.04	-0.74	2.95	
13,637.0	90.60	179.30	7,772.6	-6,119.3	294.2	6,126.4	1.29	1.25	-0.31	
13,732.0	89.00	177.90	7,772.9	-6,214.3	296.5	6,221.4	2.24	-1.68	-1.47	
13,827.0	89.90	178.60	7,773.8	-6,309.3	299.4	6,316.3	1.20	0.95	0.74	
13,923.0	88.30	179.60	7,775.3	-6,405.2	300.9	6,412.3	1.97	-1.67	1.04	
14,018.0	89.40	179.30	7,777.3	-6,500.2	301.8	6,507.2	1.20	1.16	-0.32	
14,113.0	90.10	178.20	7,777.7	-6,595.2	303.9	6,602.2	1.37	0.74	-1.16	
14,207.0	90.60	177.90	7,777.1	-6,689.1	307.1	6,696.2	0.62	0.53	-0.32	
14,303.0	91.50	178.20	7,775.3	-6,785.1	310.4	6,792.1	0.99	0.94	0.31	
14,398.0	92.60	177.50	7,771.9	-6,879.9	313.9	6,887.1	1.37	1.16	-0.74	
TD @ 14550' MD / 7765' TVD										
14,550.0	92.60	177.50	7,765.0	-7,031.6	320.6	7,038.9	0.00	0.00	0.00	



DDC
Survey Report



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Honey Graham State Com #3H
Project:	Eddy County, NM (NAD 27)	TVD Reference:	WELL @ 3021.0usft (Patterson #79)
Site:	Sec 29, T26S, R28E	MD Reference:	WELL @ 3021.0usft (Patterson #79)
Well:	Honey Graham State Com #3H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

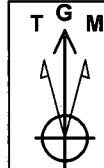
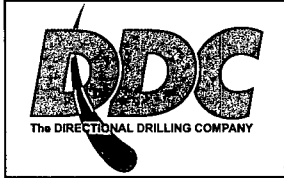
Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,170.0	7,168.7	-50.8	-57.4	Tie In @ 7170' MD / 7169' TVD
7,614.3	7,578.5	-180.3	0.2	Crossed 330' Hard Line @ 7614' MD / 7579' TVD
14,550.0	7,765.0	-7,031.6	320.6	TD @ 14550' MD / 7765' TVD

Checked By: _____	Approved By: _____	Date: _____
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Company Name: COG Operating, LLC
Honey Graham State Com #3H
Eddy County, NM (NAD 27)
Rig: Patterson #79
Created By: Kris Ray
Date: 06/28/2014

Honey Graham State Com #3H
Eddy County, NM (NAD 27)
Quote 140589 & WT-140547
Design #2 - Tied to Gyro

COG Operating, LLC.



Azimuths to Grid North

Magnetic North: 7.34°

Magnetic Field

Strength: 48139.5snT

Dip Angle: 59.83°

Date: 6/7/2014

Model: IGRF2010

PROJECT DETAILS: Eddy County, NM (NAD 27)

Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level

WELL DETAILS: Honey Graham State Com #3H

Ground Level: 3002.9
+N/-S +E/-W Northing Easting Latitude Longitude
0.0 0.0 371109.20 567193.80 32° 1' 12.389 N 104° 6' 59.504 W

DESIGN TARGET DETAILS

Name TVD +N/-S +E/-W Northing Easting Latitude Longitude
PBHL Honey Graham State Com #3H Design #2 7765.0 -7041.5 320.7 364067.30 567514.30 32° 0' 2.691 N 104° 6' 55.944 W
- plan hits target center

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Departure	Annotation
7170.0	2.19	213.79	7168.7	-50.8	-57.4	48.1	111.3	Tie In @ 7170' MD / 7169' TVD
7614.3	41.77	152.43	7578.5	-180.3	0.2	180.1	254.6	Crossed 330' Hard Line @ 7614' MD / 7579' TVD
14550.0	93.00	177.50	7764.5	-7031.6	320.6	7038.9	7124.5	TD @ 14550' MD / 7765' TVD

