



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

January 24, 2012

30-015-39439

COG, LLC
Fasken Center, Tower II
550 West Texas Ave, Suite 1300
Midland, TX 79701

RE: Burch Keely Unit #509
274' FNL & 1545' FWL
Sec. 13, T17S, R29E
Eddy County, New Mexico

Dear Sir,

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

Very truly yours,

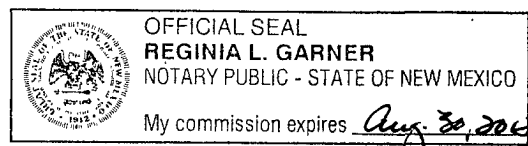
A handwritten signature in black ink, appearing to read "Eddie C. LaRue".

Eddie C. LaRue
Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 24th day of January, 2012.

A handwritten signature in black ink, appearing to read "Regina L. Garner".

Notary Public

Burch Keely Unit #509

Date	Depth	Dev/Inc	Dir/AZ
1/16/2012	99	0.20	
1/16/2012	224	0.20	
1/17/2012	360	0.40	
1/18/2012	652	0.50	
1/18/2012	904	1.60	
1/19/2012	1069	1.38	64.52
1/19/2012	1192	1.53	141.40
1/19/2012	1256	2.19	137.20
1/19/2012	1320	1.30	128.70
1/20/2012	1796	3.05	132.77
1/20/2012	1892	2.76	131.30
1/20/2012	1987	2.53	131.60
1/20/2012	2178	3.60	135.20
1/20/2012	2465	2.76	138.60
1/20/2012	2561	2.61	136.30
1/20/2012	2656	2.38	131.53
1/20/2012	2752	3.26	140.90
1/21/2012	3327	3.58	147.70
1/21/2012	3423	3.34	150.80
1/21/2012	3709	2.76	133.50
1/21/2012	3901	2.71	137.70
1/21/2012	3996	2.51	136.02
1/21/2012	4091	1.89	121.90
1/21/2012	4187	0.44	123.57
1/22/2012	4566	0.70	

30-015-39439



COG OPERATING LLC

Eddy County, NM (NAN27 NME)

Burch Keely Unit #509

Burch Keely Unit #509

OH - Job #32D0112056

Design: Actual

SDI Standard Survey Report

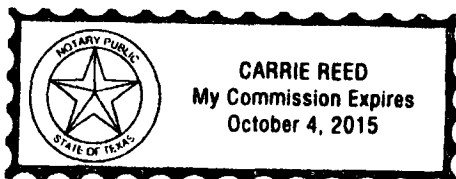
This survey is correct to the best of my knowledge and is supported by actual field data.

[Signature]

Notarized this date 15th of March, 2012.

[Signature]

Notary Signature
County of Midland
State of Texas





Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Burch Keely Unit #509
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	RF @ 3656 0usft (SO #4)
Site:	Burch Keely Unit #509	MD Reference:	RF @ 3656 0usft (SO #4)
Well:	Burch Keely Unit #509	North Reference:	Grid
Wellbore:	OH - Job #32D0112056	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Project	Eddy County, NM (NAN27 NME)		
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	Burch Keely Unit #509		
Site Position:		Northing:	669,772 00 usft
From:	Map	Easting:	592,761 30 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 50' 27.327 N
		Longitude:	104° 1' 52.716 W
		Grid Convergence:	0.16 °

Well	Burch Keely Unit #509		
Well Position	+N/-S	0 0 usft	Northing:
	+E/-W	0 0 usft	Easting:
Position Uncertainty	0 0 usft	Wellhead Elevation:	usft
		Latitude:	32° 50' 27.327 N
		Longitude:	104° 1' 52.716 W
		Ground Level:	3,638 0 usft

Wellbore	OH - Job #32D0112056		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	1/19/2012	7 77
			Dip Angle
			(°)
			60 66
			Field Strength
			(nT)
			48,875

Design	Actual		
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
			(°)
			132 59

Survey Program	Date 1/22/2012		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		Description
100 0	953 0	Gyro (OH - Job #32D0112056)	Keeper
1,065 0	4,237 0	MWD (OH - Job #32D0112056)	MWD
			Standard Wireline Keeper ver 1 0 2
			MWD - Standard

Survey			
Measured Depth	Inclination	Azimuth	True Vertical
(usft)	(°)	(°)	Depth
0 0	0 00	0 00	0 0
100 0	0 29	350 28	100 0
200 0	0 21	12 07	200 0
300 0	0 22	42 50	300 0
400 0	0 44	153 75	400 0
500 0	0 49	170 36	500 0
600 0	0 44	140 99	600 0
700 0	0 53	88 64	700 0
800 0	1 09	69 02	800 0
900 0	1 70	62 45	899 9
			North/South
			(usft)
			0 0
			0 2
			0 7
			1.0
			0 8
			0 0
			-0.7
			-1.0
			-0.6
			0 4
			East/West
			(usft)
			0 0
			0 0
			0 0
			0 1
			0 4
			0 7
			1.0
			1.7
			3.0
			5 2
			Closure Azimuth
			(°)
			0 00
			350 28
			356 02
			6 90
			27 84
			87 40
			125 28
			120 20
			101 67
			85 62
			Closure Distance
			(usft)
			0 0
			0 3
			0 7
			1 0
			0 9
			0 7
			1.2
			1 9
			3 1
			5 2



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Site:	Burch Keely Unit #509	MD Reference:	RF @ 3656 0usft (SO #4)
Well:	Burch Keely Unit #509	North Reference:	Grid
Wellbore:	OH - Job #32D0112056	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)
953 0	1 64	66 45	952.9	1 1	6 6	80 85	6 7
Gyro Tie-in							
1,065 0	1 38	64 52	1,064 9	2 3	9 3	76 19	9 6
1,128 0	0 99	104 14	1,127.9	2 5	10 5	76 73	10 8
1,192 0	1 53	141 48	1,191 9	1 7	11 6	81 76	11 7
1,256 0	2 19	137 23	1,255 8	0 1	13 0	89 51	13 0
1,320 0	2 92	133 98	1,319 8	-1 9	15 0	97 31	15 1
1,415 0	3 12	128 23	1,414 6	-5 2	18 7	105 51	19 4
1,511 0	2 78	124 85	1,510 5	-8 1	22 7	109 74	24 1
1,607 0	3 06	122 63	1,606 4	-10 9	26 8	112 08	28 9
1,702 0	3 51	130 67	1,701.2	-14 1	31 1	114 42	34 2
1,796 0	3 05	132 77	1,795 1	-17.7	35 1	116 74	39 3
1,892 0	2 76	131 37	1,890 9	-21 0	38 7	118 41	44 0
1,987 0	2 53	131 69	1,985 8	-23 9	42 0	119 59	48 3
2,083 0	2 68	130 97	2,081 7	-26 7	45 3	120 56	52 6
2,178 0	3 60	135 29	2,176.6	-30 3	49 1	121 71	57 7
2,274 0	3 31	134 54	2,272.4	-34 4	53 2	122 91	63 3
2,369 0	2 86	137 70	2,367 3	-38 1	56 7	123 88	68 3
2,465 0	2 76	138 61	2,463.2	-41 6	59 9	124 79	72 9
2,561 0	2 61	136 30	2,559 1	-44 9	62 9	125 53	77 3
2,656 0	2 38	131 53	2,654 0	-47.8	65 9	125 96	81 4
2,752 0	3 26	140 90	2,749 9	-51 2	69 1	126 55	86 0
2,848 0	3 23	139 31	2,845 7	-55 4	72 6	127 35	91 3
2,943 0	3 25	142 07	2,940 6	-59.5	76 0	128 09	96 5
3,040 0	3 31	141 45	3,037 4	-63 9	79 4	128 83	101 9
3,136 0	3 51	139 41	3,133 2	-68.3	83 0	129 44	107 5
3,231 0	3 52	143 17	3,228 0	-72 8	86 7	130 04	113 2
3,327 0	3 58	147 71	3,323 9	-77 7	90 0	130 80	118 9
3,422 0	3 34	150 85	3,418.7	-82 7	93 0	131 64	124 4
3,518 0	3 00	143 61	3,514 5	-87.1	95 8	132 27	129 5
3,614 0	2 91	144 31	3,610 4	-91.1	98 7	132 70	134 4
3,709 0	2 76	133 56	3,705 3	-94 7	101 8	132 92	139 0
3,805 0	2 72	132 45	3,801 2	-97 8	105 2	132 92	143 6
3,901 0	2 71	137 72	3,897 1	-101 0	108 4	132 98	148 1
3,996 0	2 51	136 02	3,992 0	-104 2	111 3	133 10	152 5
4,091.0	1 89	121 90	4,086 9	-106 5	114 1	133 02	156 1
4,187 0	0 44	123 57	4,182.9	-107 5	115 7	132 89	158 0
Last MWD Survey							
4,237 0	0 44	123 57	4,232 9	-107 7	116 1	132 87	158 4
Projection to Bit							



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Site:	Burch Keely Unit #509	MD Reference:	RF @ 3656 0usft (SO #4)
Well:	Burch Keely Unit #509	North Reference:	Grid
Wellbore:	OH - Job #32D0112056	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
953 0	952 9	1 1	6 6	Gyro Tie-in
4,187 0	4,182 9	-107 5	115 7	Last MWD Survey
4,237 0	4,232 9	-107 7	116 1	Projection to Bit



Azimuth to Grid North
True North -0.10°
Magnetic North 7.01°
Magnetic Field
Strength 68.72 kA/m
Dip Angle 90.66°
Date 2012/01/01
Model IGRF2010

Burch Keely Unit #509
Eddy County, NM (NAN27 NME)
Northing (Y) 669772.00
Easting (X) 592761.30
Plan #2 vs Actual 7-7/8" Hole

WELL DETAILS

	N-S	E-W	Northing	Ground Level	Easting	Latitude	Longitude	Slot
	0.00	0.00	669772.00	5627.30	592761.30	32° 50' 27.32" N	104° 1' 52.716" W	

SITE DETAILS

Burch Keely Unit #509
Site Centre Northing: 669772.00
Easting: 592761.30
Positional Uncertainty: 0.00
Convergence: 0.16
Local North: Grid

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	N-S	E-W	Dleg	TFace	VSeal	Target
1	953.00	1.64	66.45	952.92	1.07	8.83	0.00	0.00	4.10	
2	1150.00	1.64	66.45	1149.84	3.32	11.79	0.00	0.00	6.44	
3	1293.23	2.95	137.31	1293.98	1.43	18.17	2.00	103.57	10.94	
4	4076.58	2.95	137.31	4052.68	-103.01	112.53	0.00	0.00	152.56	
5	4203.97	0.00	0.00	4200.00	-105.80	115.10	2.00	180.00	156.34	TG1-BK #509
6	4803.97	0.00	0.00	4800.00	-105.80	115.10	0.00	0.00	156.34	PBHL-BK #509

DESIGN TARGET DETAILS

Name	TVD	N-S	E-W	Northing	Easting	Latitude	Longitude	Shape
North HL BK #509	-1.00	-55.80	105.10	669719.20	592889.40	32° 50' 26.772" N	104° 1' 51.486" W	Rectangle (Sides: 1.00 W150.00)
- plan mass target center by 960.68 offset at 953.00 offset MD (952.92 TVD 1.07 N 8.83 E)								
West HL BK #509	-1.00	-55.80	105.10	669719.20	592889.40	32° 50' 26.772" N	104° 1' 51.486" W	Rectangle (Sides: 1.50 W150.00)
- plan mass target center by 960.68 offset at 953.00 offset MD (952.92 TVD 1.07 N 8.83 E)								
TG1-BK #509	4200.00	-105.80	115.10	669666.20	592676.40	32° 50' 26.277" N	104° 1' 51.370" W	Point
- plan hole target center								
PBHL-BK #509	4800.00	-105.80	115.10	669666.20	592676.40	32° 50' 26.277" N	104° 1' 51.370" W	Circle (Radius: 50.00)
- plan hole target center								

FORMATION TOP DETAILS

TVDPath	MDPath	Formation	DipAngle	DipDir
4200.00	4203.97	Top of Padlock	0.00	

CASING DETAILS

TVD	MD	Name	Size
1050.00	1050.12	8-5/8" Casing	8-5/8"

PROJECT DETAILS

Eddy County NM (NAN27 NME)
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

