



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

30-015-39440

February 9, 2012

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

RE: Burch Keely Unit #513
710' FNL & 2310' FEL
Sec. 13, T17S, R29E
Eddy County, New Mexico

Dear Sir,

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

Very truly yours,

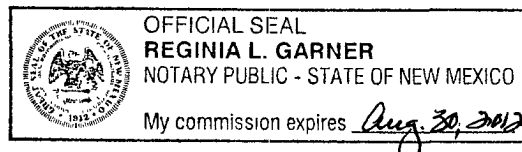
A handwritten signature in black ink, appearing to read "Eddie C. LaRue".

Eddie C. LaRue
Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 9th day of February, 2012.

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

Notary Public

Burch Keely Unit #513

Date	Depth	Dev/Inc	Dir/AZ
2/2/2012	158	0.20	0
2/2/2012	252	0.20	0
2/3/2012	404	0.90	0
2/4/2012	650	0.50	0
2/4/2012	1000	1.60	0.00
2/5/2012	1066	1.58	295.10
2/5/2012	1321	2.90	295.10
2/5/2012	1353	3.43	43.36
2/5/2012	1417	4.13	35.10
2/5/2012	1481	4.84	19.89
2/6/2012	2531	7.39	71.21
2/6/2012	3105	6.51	5.57
2/6/2012	3201	6.42	2.76
2/6/2012	3296	6.95	6.89
2/7/2012	3933	3.57	359.50
2/7/2012	4125	7.55	6.71
2/7/2012	4316	0.79	323.03
2/7/2012	4571	0.62	319.60



COG Operating LLC

Eddy County, NM (NAN27 NME)

Burch Keely Unit #513

Burch Keely Unit #513

OH

Design: Actual

Standard Survey Report

08 February, 2012





SDI
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Burch Keely Unit #513
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	RF @ 3656.00usft (SO #4)
Site:	Burch Keely Unit #513	MD Reference:	RF @ 3656.00usft (SO #4)
Well:	Burch Keely Unit #513	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 5000 1 Single User Db

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 #513		
Site Position:		Northing:	669,339 30 usft
From:	Map	Easting:	594,187 20 usft
Position Uncertainty:	0 00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 50' 23.005 N
		Longitude:	104° 1' 36.017 W
		Grid Convergence:	0.17 °

Well:	Burch Keely Unit #513		
Well Position	+N-S	0.00 usft	Northing: 669,339 30 usft
	+E-W	0 00 usft	Easting: 594,187 20 usft
Position Uncertainty	0 00 usft	Wellhead Elevation:	usft
		Latitude:	32° 50' 23.005 N
		Longitude:	104° 1' 36.017 W
		Ground Level:	3,638 00 usft

Wellbore	OH		
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Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	02/04/12	7 76	60 66	48,871

Design	Actual		
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Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0 00

Vertical Section:	Depth From (TVD)	+N-S	+E-W	Direction
	(usft)	(usft)	(usft)	(°)
	0 00	0 00	0 00	8 40

Survey Program	Date	02/08/12		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.00	937 00	Gyro (OH)	Keeper	Standard Wireline Keeper ver 1 0.2
1,066 00	4,618 00	MWD (OH)	MWD	MWD - Standard

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)
	0 00	0 00	0 00	0 00	0 00	0.00	0 00	0 00	0 00	0.00
	100.00	0 15	83 08	100 00	0 02	0 13	0 03	0 15	0 15	0 00
	200.00	0 62	17 41	200 00	0 55	0 42	0 60	0 57	0 47	-65 67
	300.00	0 99	342.20	299 99	1 89	0 32	1.91	0 60	0 37	-35 21
	400.00	0 78	326.51	399 98	3 28	-0 32	3 19	0 32	-0.21	-15 69
	500.00	0 51	12 69	499 97	4 28	-0 60	4 15	0 56	-0 27	46 18
	600.00	0 62	2 15	599 97	5 25	-0 48	5 13	0 15	0 11	-10 54
	700.00	0 86	18 54	699 96	6 51	-0 22	6.40	0 32	0 24	16.39
	800.00	1 17	37 91	799 94	8 02	0 64	8.03	0 46	0 31	19 37
	900.00	1 50	53 67	899 91	9 60	2 33	9 84	0 49	0 33	15.76



SDI
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Burch Keely Unit #513
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	RF @ 3656 00usft (SO #4)
Site:	Burch Keely Unit #513	MD Reference:	RF @ 3656 00usft (SO #4)
Well:	Burch Keely Unit #513	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	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)
937 00	1 54	53 67	936 90	10 19	3 12	10 53	0 11	0 11	0 00
Gyro Tie-in									
1,066 00	1.58	58.22	1,065 85	12 15	6 03	12 90	0 10	0 03	3 53
1,130 00	1.76	81.59	1,129 83	12 76	7.75	13 75	1 09	0 28	36.52
1,194 00	1 76	91.88	1,193.80	12.87	9 70	14 15	0 49	0 00	16 08
1,289 00	2 90	53 12	1,288 72	14 26	13 08	16 02	1 98	1 20	-40.80
1,353 00	3.43	43.36	1,352 63	16 63	15.69	18 74	1 18	0.83	-15 25
1,417 00	4.13	35 10	1,416 49	19 90	18.33	22 37	1 38	1.09	-12 91
1,481 00	4 84	19 89	1,480 29	24 33	20.58	27 07	2 15	1.11	-23 77
1,544 00	5 19	12 95	1,543 05	29 61	22 12	32 52	1.11	0 56	-11 02
1,608 00	5 63	8 03	1,606 77	35 53	23 21	38.54	1.00	0 69	-7 69
1,672 00	5 80	3 72	1,670 45	41 87	23 85	44 91	0 72	0 27	-6 73
1,735 00	6 16	1 88	1,733 11	48 43	24.17	51 44	0 65	0 57	-2 92
1,799 00	6.51	2 76	1,796 72	55 48	24 46	58 46	0 57	0 55	1 38
1,863 00	7 03	5 22	1,860 27	63 01	24 99	65 98	0 93	0 81	3 84
1,958 00	6 16	7 94	1,954 64	73 84	26 22	76 88	0 97	-0 92	2 86
2,053 00	6 60	7 50	2,049 05	84 30	27 64	87.44	0 47	0 46	-0 46
2,149 00	5 54	8 91	2,144 51	94 35	29.08	97 59	1 11	-1 10	1 47
2,245 00	5 28	359 15	2,240 09	103 35	29 73	106 58	0 99	-0 27	-10 17
2,340 00	5 54	0 82	2,334 66	112 30	29.73	115 44	0 32	0 27	1.76
2,436 00	6 33	5 30	2,430 15	122 21	30 29	125 32	0 95	0 82	4 67
2,531 00	7 39	7 15	2,524 47	133 48	31 53	136 66	1.14	1 12	1 95
2,627 00	7 21	7 15	2,619 69	145 59	33.05	148 85	0 19	-0 19	0 00
2,723 00	6 86	5 39	2,714 97	157 27	34 34	160 60	0 43	-0 36	-1 83
2,818 00	7 03	3 46	2,809 27	168 72	35.22	172 06	0 30	0 18	-2 03
2,914 00	6 60	4.69	2,904 59	180 09	36 03	183.42	0 47	-0 45	1 28
3,009.00	6 68	6.01	2,998 95	191 02	37 05	194 39	0.18	0.08	1 39
3,105 00	6 51	5.57	3,094.32	201 99	38.16	205 40	0.18	-0.18	-0.46
3,201 00	6 42	2 76	3,189.71	212 77	38 95	216.18	0 34	-0 09	-2 93
3,296.00	6 95	6 89	3,284 06	223 78	39 90	227 21	0.75	0 56	4.35
3,392 00	6 86	6 62	3,379 37	235 24	41 25	238.74	0 10	-0 09	-0 28
3,487 00	7 03	6 27	3,473 67	246 66	42.54	250 22	0 18	0 18	-0 37
3,583 00	6 95	4 43	3,568 95	258 29	43 63	261.89	0 25	-0 08	-1 92
3,679 00	6 60	5 39	3,664 28	269 57	44 60	273 19	0 38	-0 36	1 00
3,742 00	5 63	2 05	3,726 93	276.26	45 05	279.88	1 64	-1 54	-5 30
3,806 00	5.28	1 26	3,790 64	282 34	45.23	285 92	0 56	-0 55	-1.23
3,870 00	4 66	358 89	3,854 39	287 89	45 24	291 41	1 02	-0.97	-3 70
3,933.00	3 52	359 50	3,917.23	292 38	45 18	295.84	1 81	-1 81	0 97
3,997 00	2 90	0 38	3,981 13	295 96	45 17	299 39	0 97	-0.97	1 38
4,061 00	2 37	0 91	4,045 06	298 91	45 20	302.30	0 83	-0 83	0.83
4,125 00	2 55	6 71	4,109 01	301 64	45 39	305 04	0 48	0.28	9.06
4,188 00	1 93	3 81	4,171 96	304 09	45 62	307 50	1 00	-0 98	-4 60
4,252 00	1 76	359 50	4,235 92	306 15	45 69	309.54	0 34	-0 27	-6 73



SDI
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Burch Keely Unit #513
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	RF @ 3656 00usft (SO #4)
Site:	Burch Keely Unit #513	MD Reference:	RF @ 3656 00usft (SO #4)
Well:	Burch Keely Unit #513	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 5000 1 Single User Db

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)
4,316 00	0.79	323 03	4,299.91	307 49	45 41	310 82	1 90	-1 52	-56 98
4,411 00	0.35	332 08	4,394.90	308 27	44 88	311.52	0.47	-0 46	9.53
4,507.00	0 70	341.22	4,490.90	309 08	44 56	312 27	0 37	0.36	9 52
4,567 00	0 62	319.69	4,550 90	309 68	44 23	312 81	0 43	-0.13	-35 88
Last MWD Survey									
4,618 00	0 62	319 69	4,601 89	310.10	43 87	313.18	0.00	0 00	0 00
Projection to Bit									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
937 00	936 90	10.19	3 12	Gyro Tie-in
4,567 00	4,550 90	309 68	44 23	Last MWD Survey
4,618 00	4,601.89	310.10	43 87	Projection to Bit

Checked By: _____	Approved By: _____	Date: _____
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Azimuths to Grid North
True North -0.17°
Magnetic North 7.00°
Magnetic Field Strength 48870 Gauss
To convert a Magnetic Direction to a Grid Direction Add 7.00°
To convert a True Direction to a Grid Direction Subtract 0.17° Model IGRF 2010

Burch Keely Unit #513
Eddy County, NM (NAN27 NME)
Northing (Y) 669339.30
Easting (X) 594187.20
Plan #5 vs Actual 7-7/8" Hole

WELL DETAILS Burch Keely Unit #513

	+N/-S	+E/-W	Northing	Ground Level	Easting	Latitude	Longitude	Slot
	0.00	0.00	669339.30	3638.00	594187.20	32° 50' 23.005 N	104° 1' 36.017 W	

SECTION DETAILS

Sec	MD	Inc	Az	TVD	+N/-S	+E/-W	Dleg	TFace	V Sct	Target
1	937.00	1.54	53.67	936.90	10.19	3.12	0.00	0.00	10.53	
2	1150.00	1.54	53.67	1149.82	13.58	7.73	0.00	0.00	14.58	
3	1631.66	0.57	6.86	1430.71	31.84	12.71	2.00	-58.23	33.38	
4	3889.11	0.57	6.86	3872.02	31.19	46.44	0.00	0.00	314.64	
5	4217.81	0.00	0.00	4200.00	329.90	48.70	2.00	-180.00	333.47	T1-BK #513
6	4617.81	0.00	0.00	4600.00	329.90	48.70	0.00	0.00	333.48	PBHL-BK #513

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
North HL-BK #513	-1.00	379.90	-1.30	669719.20	594185.9032° 50' 26.784 N	104° 1' 36.020 W	Rectangle (Sides L0.00 W150.00)	
- plan mass target center by 1008 15usft at 937.00usft MD (936.90 TVD 10 19 N 3 12 E)								
West HL-BK #513	-1.00	379.90	-1.30	669719.20	594185.9032° 50' 26.784 N	104° 1' 36.020 W	Rectangle (Sides L200.00 W0.00)	
- plan mass target center by 1008 15usft at 937.00usft MD (936.90 TVD 10 19 N 3 12 E)								
T1-BK #513	4200.00	329.90	48.70	669699.20	594235.9032° 50' 26.268 N	104° 1' 35.435 W	Point	
- plan hit target center								
PBHL-BK #513	4600.00	329.90	48.70	669699.20	594235.9032° 50' 26.268 N	104° 1' 35.435 W	Circle (Radius 50.00)	
- plan hit target center								

FORMATION TOP DETAILS

TVDPath	MDPath	Formation	DipAngle	DpDir
4200.00	4217.81	Top of Paddock	0.00	

CASING DETAILS

TVD	MD	Name	Size
1035.87	1036.00	8 5/8" Casing	8 5/8"

SITE DETAILS Burch Keely Unit #513

Site Centre Northing 669339.30
Easting 594187.20

Positional Uncertainty 0.00
Convergence 0.17
Local North Grid

Map System US State Plane 1927 (Exact solution)
Datum NAD 1927 (NADCON CONUS)
Ellipsoid Clarke 1866
Zone Name New Mexico East 3001

Local Origin Site Burch Keely Unit #513 Grid North
Latitude 32° 50' 23.005 N
Longitude 104° 1' 36.017 W

Grid East 594187.20
Grid North 669339.30
Scale Factor 1.000

Geomagnetic Model IGRF2010
Sample Date 04/14/12
Magnetic Declination 7.00°
Dip Angle from Horizontal 60.66°
Magnetic Field Strength 48871

To convert a Magnetic Direction to a Grid Direction Add 7.00°
To convert a Magnetic Direction to a True Direction Add 7.00° East
To convert a True Direction to a Grid Direction Subtract 0.17°

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

