



COG Operating LLC

Eddy County, NM (NAN27 NME)

Burch Keely Unit #602

Burch Keely Unit #602

OH

30-015-38644

Design: Actual

Standard Survey Report

01 July, 2011



Scientific Drilling
Directional Drilling Operations



Scientific Drilling
Survey Report



Company: COG Operating LLC	Local Co-ordinate Reference: Site Burch Keely Unit #602
Project: Eddy County, NM (NAN27 NME)	TVD Reference: KB Elev (13') @ 3609 00usft (Cavaloz #1)
Site: Burch Keely Unit #602	MD Reference: KB Elev (13') @ 3609 00usft (Cavaloz #1)
Well: Burch Keely Unit #602	North Reference: Grid
Wellbore: OH	Survey Calculation Method: Minimum Curvature
Design: Actual	Database: EDM-Julio

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 #602		
Site Position:	Northing: 662,762 40 usft	Latitude: 32° 49' 18 108 N
From: Map	Easting: 587,562 80 usft	Longitude: 104° 2' 53 870 W
Position Uncertainty: 0 00 usft	Slot Radius: 13-3/16 "	Grid Convergence: 0 15 °

Well Burch Keely Unit #602			
Well Position	+N/-S 0 00 usft	Northing: 662,762 40 usft	Latitude: 32° 49' 18 108 N
	+E/-W 0 00 usft	Easting: 587,562 80 usft	Longitude: 104° 2' 53 870 W
Position Uncertainty	0 00 usft	Wellhead Elevation: usft	Ground Level: 3,596 00 usft

Wellbore OH					
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
	IGRF2010	2011/06/26	(°) 7 85	(°) 60 66	(nT) 48,919

Design Actual				
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	250 30

Survey Program	Date 2011/07/01			
From	To	Survey (Wellbore)	Tool Name	Description
100 00	810 00	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1 0 2
958 00	4,755 00	MWD Survey (OH)	MWD	MWD - Standard

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 43	177 02	100 00	-0 37	0 02	0 11	0 43	0 43	0 00
200 00	1 07	152 94	199 99	-1 58	0 46	0 10	0 70	0 64	-24 08
300 00	0 94	142 32	299 97	-3 06	1 39	-0 28	0 23	-0 13	-10 62
400 00	0 76	150 18	399 96	-4 29	2 22	-0 65	0 21	-0 18	7 86
500 00	0 82	134 73	499 95	-5 37	3 06	-1 07	0 22	0 06	-15 45
600 00	0 78	103 72	599 95	-6 03	4 23	-1 95	0 43	-0 04	-31 01
700 00	0 96	110 76	699 93	-6 49	5 67	-3 15	0 21	0 18	7 04
800 00	0 94	102 69	799 92	-6 97	7 26	-4 48	0 14	-0 02	-8 07
810 00	1 00	100 85	809 92	-7 00	7 42	-4 63	0 68	0 60	-18 40



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Wellbore: OH	Survey Calculation Method: Minimum Curvature
Design: Actual	Database: EDM-Julio

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)
Gyro Tie-in									
958 00	0 71	109 65	957 90	-7 55	9 55	-6 45	0 21	-0 20	5 95
1,053 00	0 56	120 91	1,052 90	-7 99	10 51	-7 20	0 20	-0 16	11 85
1,116 00	1 21	164 64	1,115 89	-8 79	10 95	-7 34	1 42	1 03	69 41
1,180 00	1 95	196 00	1,179 87	-10 49	10 83	-6 66	1 74	1 16	49 00
1,243 00	3 05	216 08	1,242 81	-12 87	9 54	-4 65	2 21	1 75	31 87
1,305 00	3 97	227 10	1,304 69	-15 67	7 00	-1 31	1 83	1 48	17 77
1,367 00	4 55	235 80	1,366 52	-18 51	3 39	3 04	1 40	0 94	14 03
1,427 00	5 12	237 11	1,426 30	-21 30	-0 82	7 95	0 97	0 95	2 18
1,491 00	5 34	239 84	1,490 04	-24 35	-5 80	13 66	0 52	0 34	4 27
1,553 00	5 99	246 95	1,551 74	-27 06	-11 27	19 73	1 54	1 05	11 47
1,617 00	7 27	250 47	1,615 31	-29 72	-18 16	27 11	2 10	2 00	5 50
1,680 00	7 09	251 56	1,677 81	-32 29	-25 60	34 99	0 36	-0 29	1 73
1,773 00	6 22	250 54	1,770 19	-35 78	-35 80	45 76	0 94	-0 94	-1 10
1,869 00	6 91	253 82	1,865 56	-39 12	-46 25	56 73	0 82	0 72	3 42
1,970 00	7 30	255 30	1,965 78	-42 44	-58 29	69 18	0 43	0 39	1 47
2,063 00	6 48	256 65	2,058 11	-45 16	-69 11	80 29	0 90	-0 88	1 45
2,158 00	5 88	255 39	2,152 56	-47 62	-79 03	90 46	0 65	-0 63	-1 33
2,252 00	6 07	252 36	2,246 04	-50 34	-88 43	100 22	0 39	0 20	-3 22
2,346 00	7 36	256 07	2,339 40	-53 30	-99 01	111 18	1 45	1 37	3 95
2,441 00	7 38	254 99	2,433 61	-56 34	-110 81	123 32	0 15	0 02	-1 14
2,535 00	7 25	253 76	2,526 85	-59 56	-122 34	135 25	0 22	-0 14	-1 31
2,630 00	7 29	251 16	2,621 08	-63 19	-133 80	147 26	0 35	0 04	-2 74
2,724 00	6 99	250 56	2,714 36	-67 02	-144 83	158 95	0 33	-0 32	-0 64
2,818 00	7 53	253 73	2,807 60	-70 65	-156 14	170 81	0 72	0 57	3 37
2,912 00	7 46	254 36	2,900 80	-74 02	-167 93	183 05	0 11	-0 07	0 67
3,007 00	7 33	255 02	2,995 01	-77 25	-179 72	195 24	0 16	-0 14	0 69
3,100 00	7 29	255 00	3,087 25	-80 31	-191 15	207 03	0 04	-0 04	-0 02
3,194 00	7 31	255 42	3,180 49	-83 35	-202 70	218 93	0 06	0 02	0 45
3,289 00	7 15	255 88	3,274 74	-86 32	-214 28	230 84	0 18	-0 17	0 48
3,382 00	7 16	254 65	3,367 01	-89 26	-225 48	242 38	0 17	0 01	-1 32
3,476 00	6 83	252 51	3,460 31	-92 50	-236 46	253 80	0 45	-0 35	-2 28
3,571 00	6 61	252 05	3,554 66	-95 88	-247 05	264 91	0 24	-0 23	-0 48
3,634 00	6 13	253 42	3,617 27	-97 96	-253 73	271 90	0 80	-0 76	2 17
3,696 00	5 62	257 51	3,678 94	-99 56	-259 86	278 21	1 06	-0 82	6 60
3,758 00	4 85	257 21	3,740 69	-100 79	-265 38	283 83	1 24	-1 24	-0 48
3,821 00	4 02	256 93	3,803 50	-101 88	-270 13	288 67	1 32	-1 32	-0 44
3,884 00	3 25	258 56	3,866 37	-102 74	-274 03	292 63	1 23	-1 22	2 59
3,947 00	1 98	259 05	3,929 30	-103 30	-276 85	295 47	2 02	-2 02	0 78
4,009 00	0 89	260 31	3,991 28	-103 58	-278 38	297 00	1 76	-1 76	2 03
4,103 00	0 74	255 33	4,085 27	-103 86	-279 69	298 33	0 18	-0 16	-5 30
4,197 00	0 89	253 08	4,179 26	-104 22	-280 97	299 66	0 16	0 16	-2 39
4,291 00	1 01	265 99	4,273 25	-104 49	-282 50	301 19	0 26	0 13	13 73



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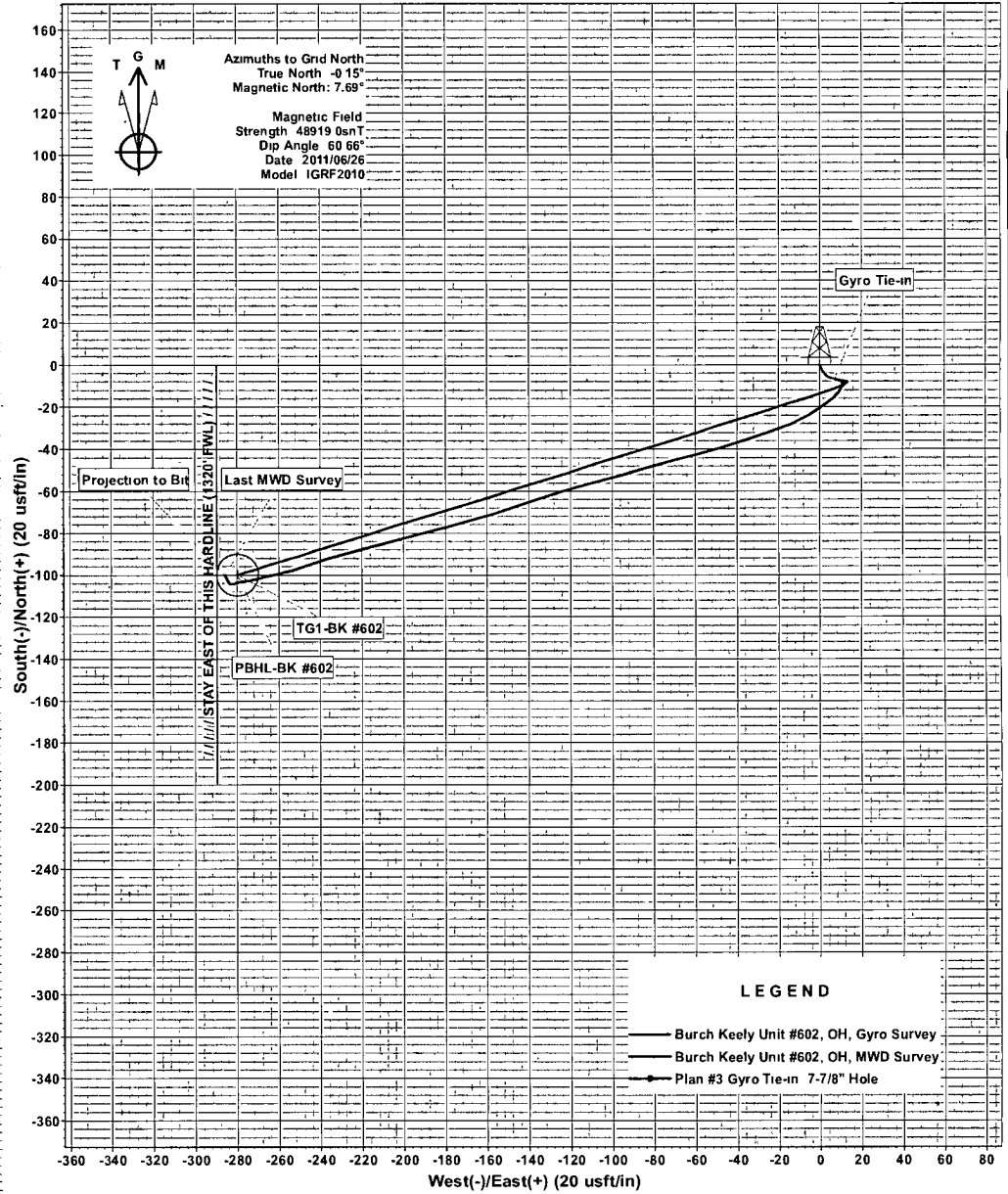
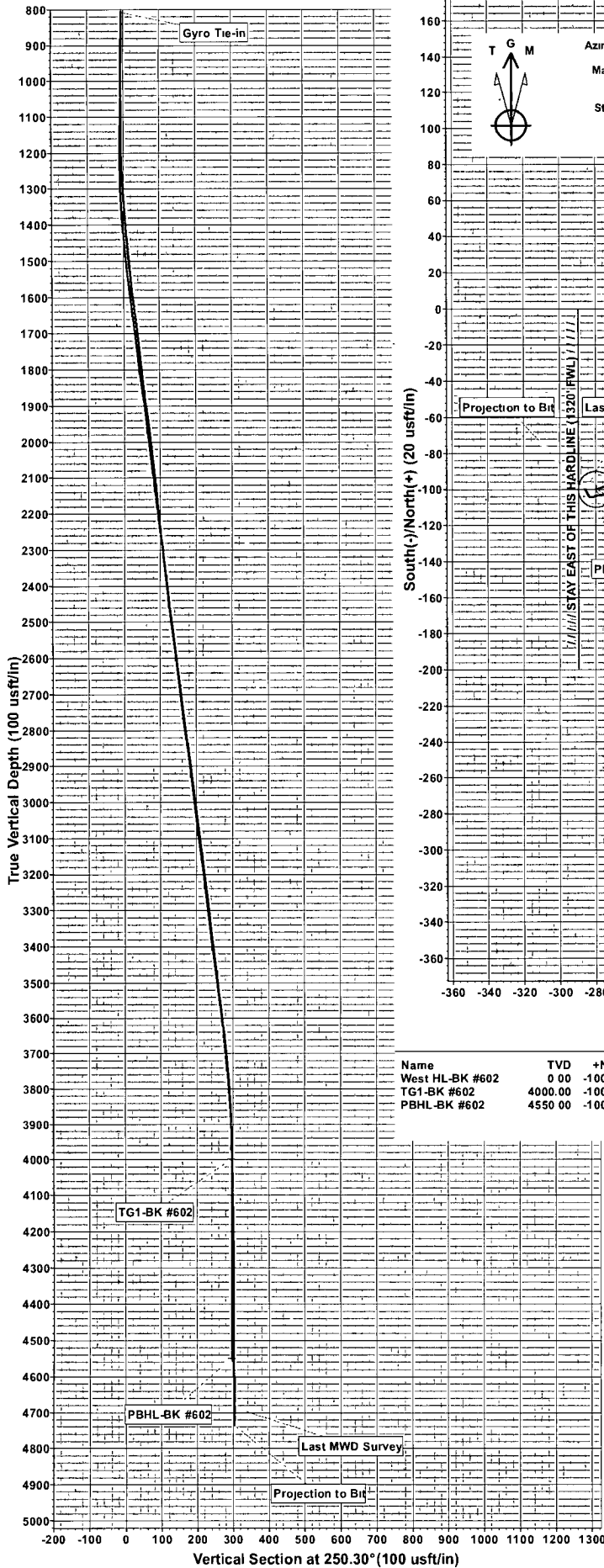
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
4,387 00	0 69	323 12	4,369 24	-104 09	-283 69	302 17	0 90	-0 33	59 51	
4,482 00	0 71	335 26	4,464 23	-103 10	-284 28	302 39	0 16	0 02	12 78	
4,574 00	0 71	329 07	4,556 23	-102 09	-284 81	302 55	0 08	0 00	-6 73	
4,669 00	0 68	332 23	4,651 22	-101 09	-285 37	302 75	0 05	-0 03	3 33	
4,705 00	0 64	331 52	4,687 22	-100 72	-285 57	302 81	0 11	-0 11	-1 97	
Last MWD Survey										
4,755 00	0 63	335 78	4,737 21	-100 23	-285 82	302 87	0 10	-0 02	8 52	
Projection to Bit										

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
810.00	809 92	-7 00	7 42	Gyro Tie-in
4,705.00	4,687 22	-100 72	-285 57	Last MWD Survey
4,755.00	4,737 21	-100 23	-285.82	Projection to Bit

Checked By: _____ Approved By _____ Date: _____



Scientific Drilling for COG Operating LLC
 Site: Eddy County, NM (NAN27 NME)
 Well: Burch Keely Unit #602
 Wellbore: OH
 Design: Plan #3 Gyro Tie-in 7-7/8" Hole



Azimuths to Grid North
 True North: -0.15°
 Magnetic North: 7.69°
 Magnetic Field
 Strength: 48919.0snT
 Dip Angle: 60.66°
 Date: 2011/06/26
 Model: IGRF2010

LEGEND

- Burch Keely Unit #602, OH, Gyro Survey
- Burch Keely Unit #602, OH, MWD Survey
- Plan #3 Gyro Tie-in 7-7/8" Hole

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
West HL-BK #602	0 00	-100 10	-289.60	662662.30	587273.20	32°49' 17.125 N	104°2' 57.267 W	Rectangle (Sides: L 200 00 W0 00)
TG1-BK #602	4000.00	-100 10	-279.60	662662.30	587283.20	32°49' 17.125 N	104°2' 57.150 W	Point
PBHL-BK #602	4550.00	-100 10	-279.60	662662.30	587283.20	32°49' 17.125 N	104°2' 57.150 W	Circle (Radius 10 00)

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dlog	TFace	VSect	Target
1	810.00	1.00	100.85	809.92	-7.00	7.42	0.00	0.00	0.00	-4.63
	2115.00	1.00	100.85	1149.87	-8.12	13.25	0.00	0.00	0.00	-9.74
	31552.68	7.16	252.87	1551.61	-16.18	-7.30	2.00	155.34	12.33	
	43660.58	7.16	252.87	3643.09	-93.53	-258.27	0.00	0.00	274.68	
	54018.42	0.00	0.00	4000.00	-100 10	-279.60	2.00	180.00	296.98	TG1-BK #602
	64568.42	0.00	0.00	4550.00	-100 10	-279.60	0.00	0.00	296.98	PBHL-BK #602

WELL DETAILS. Burch Keely Unit #602

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0 00	0.00	662762.40	587562.80	32°49' 18.108 N	104°2' 5.3870 W	

PROJECT DETAILS Eddy County, NM (NAN27 NME)an. Plan #3 Gyro Tie-in 7-7/8" Hole (Burch Keely Unit #602/07)

Geodetic System:	US State Plane 1927 (Exact solution)	Created By:	Julio Pina	Date:	26-Jun-11
Datum:	NAD 1927 (NADCON CONUS)	Checked:		Date:	
Ellipsoid:	Clarke 1866	Reviewed:		Date:	
Zone:	New Mexico East 3001	Approved:		Date:	
System Datum:	Mean Sea Level				