



COG OPERATING LLC

Eddy County, NM (NAN27 NME)

Burch Keely Unit #612

Burch Keely Unit #612

OH - Job #32D0611581

30-015-38479

RECEIVED

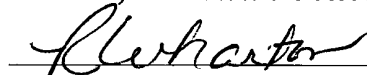
AUG 11 2011

NMOCD ARTESIA

Survey: MWD Survey

SDI Standard Survey Report

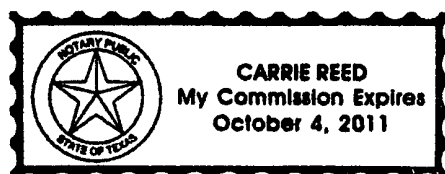
This survey is correct to the best of my knowledge and is supported by actual field data.



Notarized this date 22nd of July, 2011.



Notary Signature
County of Midland
State of Texas



Scientific Drilling
Directional Drilling Operations



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Burch Keely Unit #612
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (13') @ 3588 0usft (Cavaloz #1)
Site:	Burch Keely Unit #612	MD Reference:	KB Elev (13') @ 3588 0usft (Cavaloz #1)
Well:	Burch Keely Unit #612	North Reference:	Grid
Wellbore:	OH - Job #32D0611581	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 #612		
Site Position:		Northing:	660,373 60 usft
From:	Map	Easting:	589,069 20 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 48' 54 430 N
		Longitude:	104° 2' 36 294 W
		Grid Convergence:	0 16 °

Well	Burch Keely Unit #612		
Well Position	+N/-S	0 0 usft	Northing:
	+E/-W	0 0 usft	Easting:
Position Uncertainty	0 0 usft	Wellhead Elevation:	usft
		Latitude:	32° 48' 54 430 N
		Longitude:	104° 2' 36 294 W
		Ground Level:	3,575 0 usft

Wellbore	OH - Job #32D0611581		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	6/19/2011	(°)
			7 85
			Dip Angle
			(°)
			60 65
			Field Strength
			(nT)
			48,918

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
			(°)
			140.26

Survey Program	Date 7/22/2011		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		Description
100 0	800 0	Gyro Survey (OH - Job #32D0611581)	Keeper
928 0	4,827 0	MWD Survey (OH - Job #32D0611581)	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 78	234 13	100 0
200 0	0 19	237 36	200 0
300 0	0 61	231 79	300 0
400 0	0 50	205 81	400 0
500 0	0 10	172 01	500 0
600 0	0 35	77 21	600 0
700 0	0 63	78 95	700 0
800 0	0 94	86 69	800 0
			North/South
			(usft)
			0 0
			-0 4
			-0 9
			-1 3
			-2 0
			-2 5
			-2 5
			-2 4
			-2 2
			East/West
			(usft)
			0 0
			-0 6
			-1 2
			-1 8
			-2 4
			-2 6
			-2 3
			-1 4
			-0 1
			Closure Azimuth
			(°)
			0 00
			234 13
			234 48
			234 05
			229 91
			225 90
			222 03
			211 46
			182 10
			Closure Distance
			(usft)
			0 0
			0 7
			1 5
			2 2
			3 1
			3 6
			3 4
			2 8
			2 2



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SDI Standard Survey Report



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Well:	Burch Keely Unit #612	North Reference:	Grid
Wellbore:	OH - Job #32D0611581	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		

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Site Position:		Northing:	660,373 60 usft
From:	Map	Easting:	589,069 20 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 48' 54 430 N
		Longitude:	104° 2' 36 294 W
		Grid Convergence:	0 16 °

Well	Burch Keely Unit #612		
Well Position	+N/-S	0 0 usft	Northing:
	+E/-W	0 0 usft	Easting:
Position Uncertainty	0 0 usft	Wellhead Elevation:	usft
		Latitude:	32° 48' 54 430 N
		Longitude:	104° 2' 36 294 W
		Ground Level:	3,575 0 usft

Wellbore	OH - Job #32D0611581		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	6/19/2011	(°)
			7 85
			Dip Angle
			(°)
			60 65
			Field Strength
			(nT)
			48,918

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
			(°)
			140 26

Survey Program	Date	7/22/2011
From	To	Survey (Wellbore)
(usft)	(usft)	
100 0	800 0	Gyro Survey (OH - Job #32D0611581)
928 0	4,827 0	MWD Survey (OH - Job #32D0611581)
		Tool Name
		Keeper
		MWD
		Description
		Standard Wireline Keeper ver 1 0 2
		MWD - Standard

Survey			
Measured Depth	Inclination	Azimuth	True Vertical
(usft)	(°)	(°)	Depth
800 0	0 94	86 69	800 0
			North/South
			(usft)
			East/West
			(usft)
			Closure Azimuth
			(°)
			Closure Distance
			(usft)
Gyro Tie-in			
928 0	1 07	72 97	928 0
1,022 0	0 90	87 93	1,021 9
1,083 0	1 84	111 88	1,082 9
1,147 0	3 01	131 10	1,146 9
1,211 0	3 69	150 52	1,210 8
1,274 0	4 11	145 36	1,273 6
1,336 0	5 17	136 15	1,335 4
1,400 0	6 20	126 24	1,399 1
1,494 0	6 13	122 52	1,492 5
			-2 2
			-0 1
			182 10
			2 2
			-1 8
			2 1
			130 30
			2 8
			-1 5
			3 7
			112 22
			4 0
			-1 9
			5 1
			110 06
			5 4
			-3 3
			7 3
			114 61
			8 0
			-6 2
			9 6
			123 09
			11 4
			-9 9
			11 9
			129 75
			15 4
			-13 7
			15 1
			132 31
			20 4
			-17 8
			19 8
			131 94
			26 7
			-23 5
			28 2
			129 87
			36 7



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Site:	Burch Keely Unit #612	MD Reference:	KB Elev (13') @ 3588 0usft (Cavaloz #1)
Well:	Burch Keely Unit #612	North Reference:	Grid
Wellbore:	OH - Job #32D0611581	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)
1,587 0	5 32	119 94	1,585 1	-28 3	36 1	128 15	45 9
1,682 0	5 04	131 82	1,679 7	-33 3	43 0	127 77	54 4
1,783 0	5 51	140 56	1,780 3	-40 0	49 4	129 02	63 6
1,876 0	6 52	150 99	1,872 8	-48 1	54 8	131 27	72 9
1,970 0	6 72	148 61	1,966 1	-57 5	60 3	133 64	83 3
2,064 0	6 18	152 11	2,059 5	-66 6	65 5	135 50	93 4
2,158 0	5 71	151 30	2,153 0	-75 2	70 1	137 01	102 8
2,251 0	6 81	147 81	2,245 5	-83 9	75 3	138 12	112 7
2,346 0	7 10	148 81	2,339 8	-93 7	81 3	139 06	124 1
2,440 0	7 10	147 73	2,433 1	-103 6	87 4	139 84	135 5
2,535 0	6 86	148 10	2,527 4	-113 4	93 5	140 48	147 0
2,630 0	6 78	148 79	2,621 7	-123 0	99 4	141 04	158 2
2,723 0	6 81	147 30	2,714 0	-132 3	105 3	141 50	169 1
2,816 0	6 74	147 32	2,806 4	-141 6	111 2	141 85	180 0
2,910 0	6 54	138 05	2,899 8	-150 2	117 7	141 90	190 8
3,102 0	6 06	139 94	3,090 6	-166 1	131 6	141 61	211 9
3,196 0	6 31	141 19	3,184 0	-173 9	138 0	141 56	222 0
3,288 0	6 31	141 33	3,275 5	-181 8	144 3	141 55	232 1
3,383 0	6 03	140 41	3,369 9	-189 7	150 8	141 52	242 3
3,478 0	6 97	136 85	3,464 3	-197 8	157 9	141 39	253 1
3,573 0	6 69	135 28	3,558 7	-205 9	165 7	141 17	264 3
3,635 0	5 99	135 68	3,620 3	-210 8	170 5	141 02	271 1
3,697 0	4 89	136 99	3,682 0	-215 0	174 6	140 92	277 0
3,760 0	3 85	139 15	3,744 8	-218 6	177 8	140 87	281 8
3,824 0	3 25	147 86	3,808 7	-221 7	180 2	140 90	285 7
3,887 0	2 22	150 14	3,871 6	-224 3	181 7	140 98	288 7
3,949 0	1 12	144 24	3,933 6	-225 8	182 7	141 03	290 5
4,013 0	0 20	52 98	3,997 6	-226 3	183 2	141 01	291 1
4,107 0	0 51	324 24	4,091 6	-225 8	183 0	140 98	290 7
4,200 0	0 41	315 50	4,184 6	-225 3	182 6	140 98	290 0
4,265 0	0 45	297 16	4,249 6	-225 0	182 2	141 00	289 5
4,389 0	0 14	269 60	4,373 6	-224 8	181 6	141 07	289 0
4,482 0	0 57	258 22	4,466 6	-224 9	181 0	141 17	288 7
4,579 0	0 34	263 11	4,563 6	-225 0	180 3	141 30	288 3
4,673 0	0 27	224 01	4,657 6	-225 2	179 8	141 39	288 2
4,780 0	0 27	238 24	4,764 6	-225 5	179 4	141 49	288 2
Last MWD Survey							
4,827 0	0 27	238 24	4,811 6	-225 6	179 3	141 53	288 2
Projection to Bit							

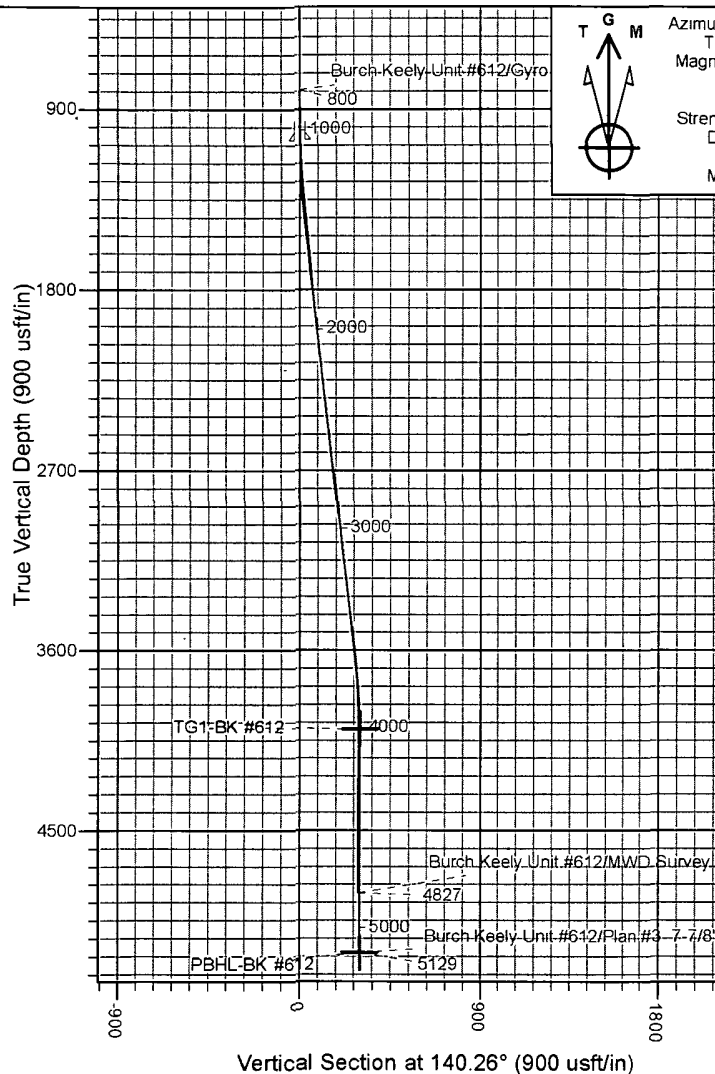


Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Burch Keely Unit #612
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (13') @ 3588 0usft (Cavaloz #1)
Site:	Burch Keely Unit #612	MD Reference:	KB Elev (13') @ 3588 0usft (Cavaloz #1)
Well:	Burch Keely Unit #612	North Reference:	Grid
Wellbore:	OH - Job #32D0611581	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Regulatory

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
800 0	800 0	-2 2	-0 1	Gyro Tie-in
4,780 0	4,764 6	-225 5	179 4	Last MWD Survey
4,827 0	4,811 6	-225 6	179 3	Projection to Bit



Project: Eddy County, NM (NAN27 NME)
 Site: Burch Keely Unit #612
 Well: Burch Keely Unit #612
 Wellbore: OH - Job #32D0611581
 Design: Plan #3 7-7/8" Hole



Azimuths to Grid North
 True North -0 16°
 Magnetic North 7 69°
 Magnetic Field
 Strength 48917 7nT
 Dip Angle 60 65°
 Date 6/19/2011
 Model IGRF2010

+N/-S
 0 0

+E/-W
 0.0

Northing
 660373.60

WELL DETAILS: Burch Keely Unit #612

KB Elev (13') @ 3588.0usft (Cavaloz #1)

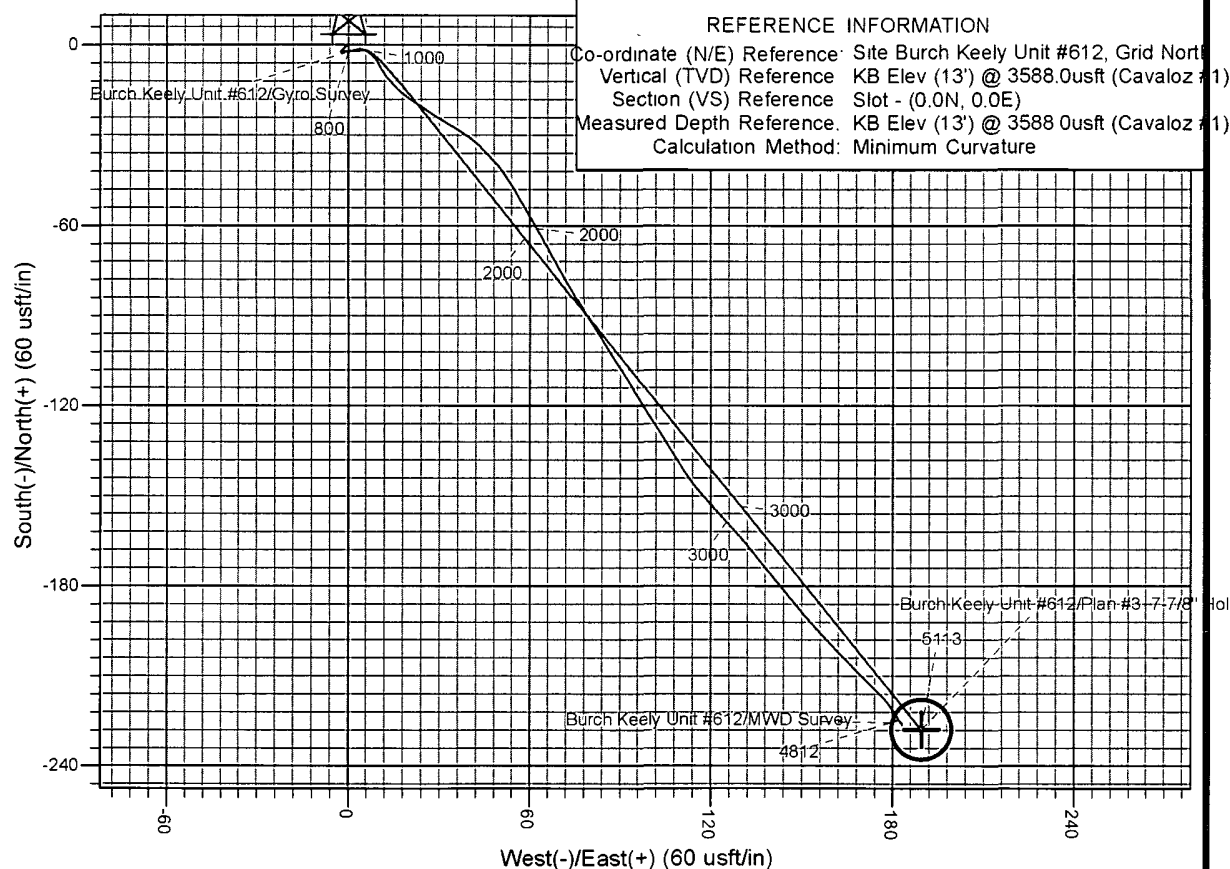
Ground Level: 3575 0

Easting 589069.20

Latitude 32° 48' 54.430 N

Longitude 104° 2' 36.294 W

Slot



REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Site Burch Keely Unit #612, Grid North
 Vertical (TVD) Reference: KB Elev (13') @ 3588.0usft (Cavaloz #1)
 Section (VS) Reference: Slot - (0.0N, 0.0E)
 Measured Depth Reference: KB Elev (13') @ 3588.0usft (Cavaloz #1)
 Calculation Method: Minimum Curvature

COMPANY DETAILS: COG OPERATING LLC
 223032

Calculation Method: Minimum Curvature
 Error System: ISWISA
 Scan Method: Closest Approach 3D
 Error Surface: Elliptical Conic
 Warning Method: Error Ratio

PROJECT DETAILS: Eddy County, NM (NAN27 NME)
 Geodetic System: NAD State Plane 1927 (Exact solution)
 Datum: NAD 1927 (NADCON CONUS)
 Ellipsoid: Clarke 1866
 Zone: New Mexico East 3001
 System Datum: Mean Sea Level

SITE DETAILS: Burch Keely Unit #612
 Site Centre Latitude: 32° 48' 54.430 N
 Longitude: 104° 2' 36.294 W
 Positional Uncertainty: 0.0
 Convergence: 0.16
 Local North: Grid