



30-015-38558

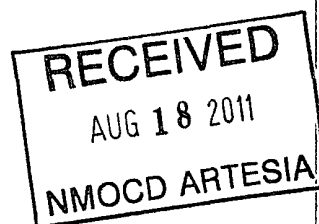
COG OPERATING LLC

Eddy County, NM (NAN27 NME)

Burch Keely Unit #636

Burch Keely Unit #636

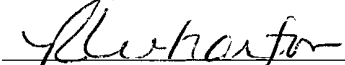
OH - Job #32D0611587



Survey: MWD Survey

SDI Standard Survey Report

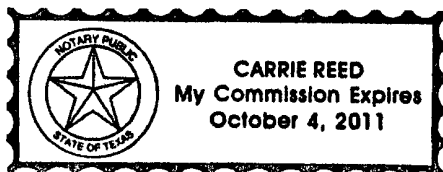
This survey is correct to the best of my knowledge and is supported by actual field data.



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 #636
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (13') @ 3611 0usft (Cavaloz #3)
Site:	Burch Keely Unit #636	MD Reference:	KB Elev (13') @ 3611 0usft (Cavaloz #3)
Well:	Burch Keely Unit #636	North Reference:	Grid
Wellbore:	OH - Job #32D0611587	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 #636		
Site Position:		Northing:	659,507 20 usft
From:	Map	Easting:	594,231 10 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 48' 45 712 N
		Longitude:	104° 1' 35 837 W
		Grid Convergence:	0 17 °

Well	Burch Keely Unit #636		
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' 45 712 N
		Longitude:	104° 1' 35 837 W
		Ground Level:	3,598 0 usft

Wellbore	OH - Job #32D0611587		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	6/21/2011	(°)
			7 84
			Dip Angle
			(°)
			60 65
			Field Strength
			(nT)
			48,917

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
			(°)
			301 21

Survey Program	Date 7/22/2011		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100 0	907 0	Gyro Survey (OH - Job #32D0611587)	Keeper
1,062 0	4,836 0	MWD Survey (OH - Job #32D0611587)	MWD
			Description
			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 39	67 58	100 0
200 0	0 42	350 47	200 0
300 0	1 22	309 62	300 0
400 0	1 96	321 67	399 9
500 0	1 90	326 36	499 9
600 0	1 80	341 47	599 8
700 0	2 06	356 77	699 8
800 0	2 19	9 55	799 7
900 0	2 04	15 62	899 6
			North/South
			(usft)
			0 0
			0 1
			0 6
			1 7
			3 7
			6 4
			9 3
			12 6
			16 2
			19 8
			East/West
			(usft)
			0 0
			0 3
			0 6
			-0 3
			-2 2
			-4 2
			-5 6
			-6 2
			-6 0
			-5 2
			Closure Azimuth
			(°)
			0 00
			67 58
			42 47
			349 36
			329 22
			326 92
			328 92
			333 76
			339 80
			345 37
			Closure Distance
			(usft)
			0 0
			0 3
			0 8
			1 7
			4 3
			7 6
			10 8
			14 0
			17 3
			20 5



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Burch Keely Unit #636
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (13') @ 3611 0usft (Cavaloz #3)
Site:	Burch Keely Unit #636	MD Reference:	KB Elev (13') @ 3611 0usft (Cavaloz #3)
Well:	Burch Keely Unit #636	North Reference:	Grid
Wellbore:	OH - Job #32D0611587	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)
907 0	2 06	21 42	906 6	20 1	-5 1	345 75	20 7
Gyro Tie-in							

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
907 0	906 6	20 1	-5 1	Gyro Tie-in



Scientific Drilling International, Inc.
SDI Standard Survey Report



Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Burch Keely Unit #636
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (13') @ 3611.0usft (Cavaloz #3)
Site:	Burch Keely Unit #636	MD Reference:	KB Elev (13') @ 3611.0usft (Cavaloz #3)
Well:	Burch Keely Unit #636	North Reference:	Grid
Wellbore:	OH - Job #32D0611587	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 #636		
Site Position:		Northing:	659,507 20 usft
From:	Map	Easting:	594,231 10 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 48' 45 712 N
		Longitude:	104° 1' 35 837 W
		Grid Convergence:	0 17 °

Well	Burch Keely Unit #636		
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' 45 712 N
		Longitude:	104° 1' 35 837 W
		Ground Level:	3,598 0 usft

Wellbore	OH - Job #32D0611587		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	6/21/2011	7 84
			Dip Angle
			(°)
			60 65
			Field Strength
			(nT)
			48,917

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
			(°)
			301 21

Survey Program	Date 7/22/2011		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100 0	907 0	Gyro Survey (OH - Job #32D0611587)	Keeper
1,062 0	4,836 0	MWD Survey (OH - Job #32D0611587)	MWD
			Description
			Standard Wireline Keeper ver 1 0 2
			MWD - Standard

Survey			
Measured Depth	Inclination	Azimuth	True Vertical
(usft)	(°)	(°)	Depth
907 0	2 06	21 42	906 6
1,062 0	2 10	9 61	1,061 5
1,156 0	2 84	345 20	1,155 5
1,251 0	3 32	332 40	1,250 3
1,345 0	4 28	314 41	1,344 1
1,439 0	4 23	287 44	1,437 9
1,533 0	5 04	271 81	1,531 6
1,627 0	6 21	262 30	1,625 1
1,722 0	7 44	257 70	1,719 4
1,817 0	6 45	256 10	1,813 7
1,911 0	6 50	258 16	1,907 1
			North/South
			(usft)
			20 1
			25 5
			29 4
			34 1
			39 0
			42 5
			43 7
			43 1
			41 1
			38 5
			36 2
			East/West
			(usft)
			-5 1
			-3 6
			-3 9
			-5 8
			-9 6
			-15 4
			-22 8
			-32 0
			-43 1
			-54 3
			-64 6
			Closure Azimuth
			(°)
			345 75
			351 94
			352 42
			350 37
			346 23
			340 11
			332 42
			323 44
			313 66
			305 37
			299 24
			Closure Distance
			(usft)
			20 7
			25 7
			29 7
			34 6
			40 1
			45 2
			49 3
			53 7
			59 5
			66 5
			74 0



Scientific Drilling International, Inc.

SDI Standard Survey Report



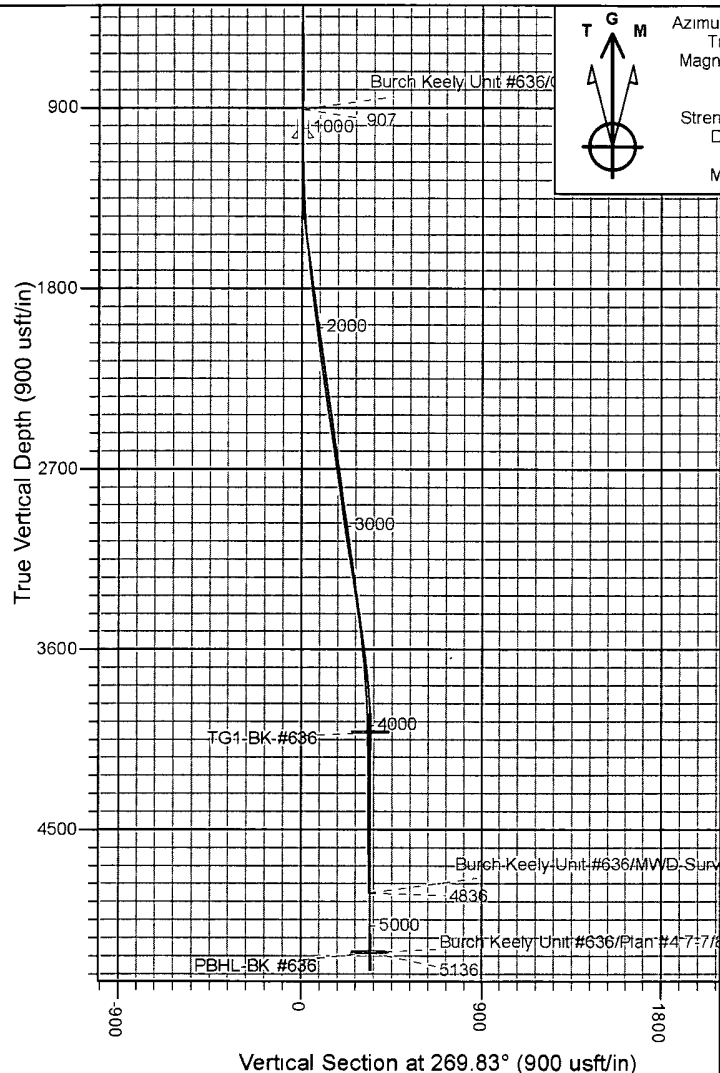
Company:	COG OPERATING LLC	Local Co-ordinate Reference:	Site Burch Keely Unit #636
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	KB Elev (13') @ 3611 0usft (Cavaloz #3)
Site:	Burch Keely Unit #636	MD Reference:	KB Elev (13') @ 3611 0usft (Cavaloz #3)
Well:	Burch Keely Unit #636	North Reference:	Grid
Wellbore:	OH - Job #32D0611587	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)
2,005 0	7 64	261 66	2,000 4	34 2	-76 0	294 21	83 3
2,100 0	6 72	261 85	2,094 7	32 5	-87 7	290 30	93 5
2,194 0	7 47	267 16	2,188 0	31 4	-99 3	287 54	104 1
2,289 0	8 42	266 41	2,282 0	30 6	-112 4	285 24	116 5
2,383 0	8 02	266 34	2,375 1	29 8	-125 8	283 32	129 3
2,478 0	8 73	266 06	2,469 1	28 9	-139 6	281 68	142 6
2,572 0	8 55	265 70	2,562 0	27 8	-153 7	280 27	156 2
2,666 0	8 31	265 50	2,655 0	26 8	-167 4	279 09	169 6
2,760 0	8 17	265 40	2,748 0	25 7	-180 9	278 09	182 7
2,855 0	7 90	264 60	2,842 1	24 6	-194 1	277 21	195 6
2,949 0	7 72	263 40	2,935 2	23 2	-206 8	276 41	208 1
3,043 0	9 60	263 80	3,028 1	21 7	-220 9	275 60	221 9
3,137 0	8 82	265 50	3,120 9	20 2	-235 8	274 91	236 7
3,232 0	8 73	265 53	3,214 8	19 1	-250 3	274 37	251 0
3,325 0	8 66	265 36	3,306 7	18 0	-264 3	273 90	264 9
3,388 0	8 16	265 62	3,369 1	17 3	-273 5	273 61	274 0
3,482 0	7 76	266 40	3,462 2	16 4	-286 5	273 27	286 9
3,576 0	6 55	263 16	3,555 4	15 3	-298 1	272 94	298 5
3,670 0	5 80	266 70	3,648 9	14 4	-308 2	272 68	308 5
3,751 0	4 38	266 70	3,729 6	14 0	-315 4	272 54	315 7
3,772 0	4 28	269 40	3,750 5	13 9	-317 0	272 52	317 3
3,865 0	3 09	257 72	3,843 3	13 4	-322 9	272 37	323 2
3,960 0	2 08	258 61	3,938 2	12 5	-327 1	272 19	327 3
4,055 0	0 75	300 01	4,033 2	12 5	-329 3	272 17	329 5
4,149 0	0 59	245 10	4,127 2	12 6	-330 3	272 18	330 5
4,244 0	0 38	242 30	4,222 2	12 2	-331 0	272 11	331 2
4,387 0	0 41	296 60	4,365 2	12 2	-331 9	272 11	332 1
4,433 0	0 31	221 30	4,411 2	12 2	-332 1	272 10	332 3
4,528 0	0 51	216 50	4,506 2	11 7	-332 5	272 01	332 7
4,622 0	0 34	215 50	4,600 2	11 1	-332 9	271 91	333 1
4,715 0	0 41	197 42	4,693 2	10 6	-333 2	271 82	333 4
4,787 0	0 53	202 56	4,765 2	10 0	-333 4	271 72	333 5
Last MWD Survey 4,836 0	0 53	202 56	4,814 1	9 6	-333 6	271 65	333 7
Projection to Bit							

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
4,787 0	4,765 2	10 0	-333 4	Last MWD Survey
4,836 0	4,814 1	9 6	-333 6	Projection to Bit



Project: Eddy County, NM (NAN27 NME)
 Site: Burch Keely Unit #636
 Well: Burch Keely Unit #636
 Wellbore: OH - Job #32D0611587
 Design Plan #4 7-7/8" Hole



Azimuths to Grid North
 True North -0 17°
 Magnetic North 7 67°
 Magnetic Field
 Strength 48917 5nT
 Dip Angle 60 65°
 Date 6/21/2011
 Model IGRF2010

+N/-S +E/-W
 0.0 0.0

Northing
 659507.20

WELL DETAILS: Burch Keely Unit #636
 KB Elev (13') @ 3611 0usft (Cavaloz #3)
 Ground Level: 3598 0
 Easting
 594231.10

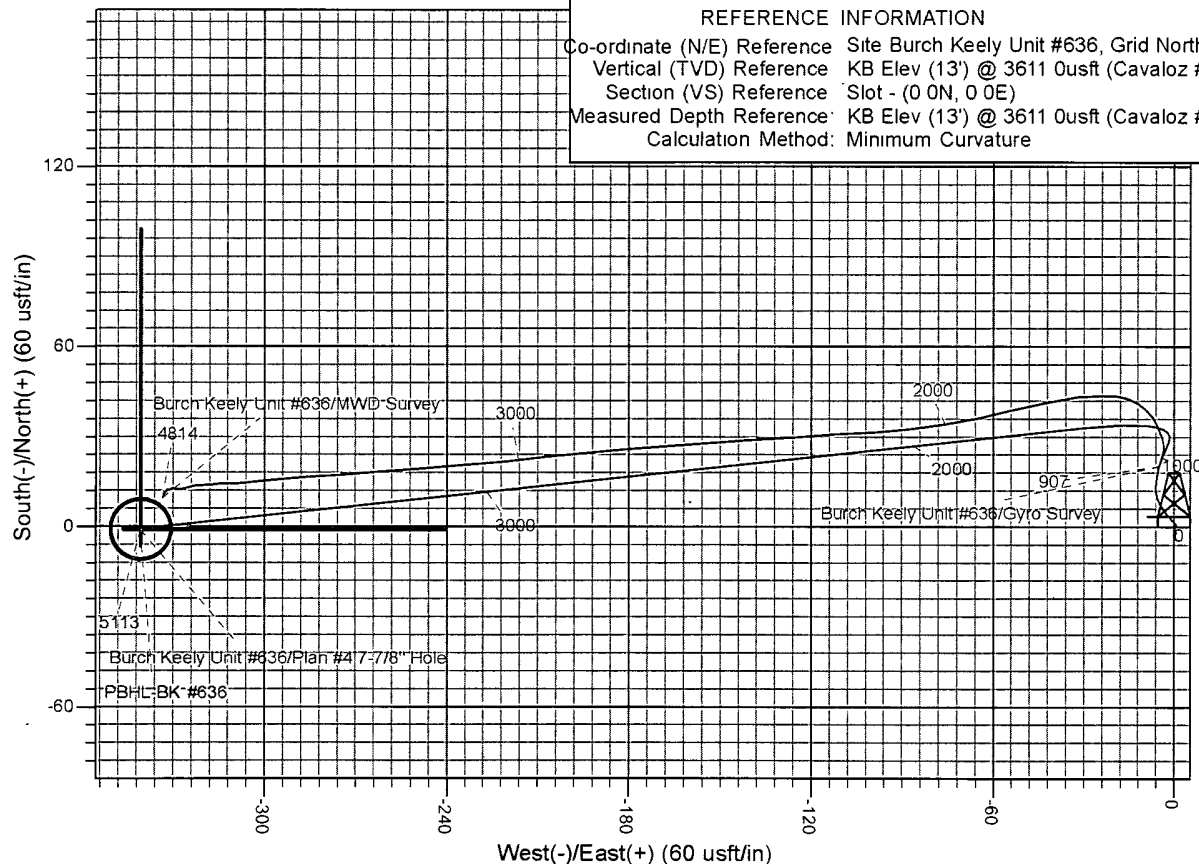
Latitude
 32° 48' 45 712 N

Longitude
 104° 1' 35.837 W

Slot

REFERENCE INFORMATION

Co-ordinate (N/E) Reference Site Burch Keely Unit #636, Grid North
 Vertical (TVD) Reference KB Elev (13') @ 3611 0usft (Cavaloz #3)
 Section (VS) Reference Slot - (0 0N, 0 0E)
 Measured Depth Reference KB Elev (13') @ 3611 0usft (Cavaloz #3)
 Calculation Method: Minimum Curvature



COMPANY DETAILS: COG OPERATING LLC
 223032

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

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

SITE DETAILS: Burch Keely Unit #636
 Site Centre Latitude: 32° 48' 45 712 N
 Longitude: 104° 1' 35 837 W
 Positional Uncertainty: 0.0
 Convergence: 0 17
 Local North: Grid