

30015.39438



COG OPERATING LLC

Eddy County, NM (NAN27 NME)

Burch Keely Unit #505

#505

OH - Job #32D0112011

Survey: MWD Survey

SDI Standard Survey Report

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

Clayton

Notarized this date 17th of February, 2012.

Carrie Reed

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 #505
Project:	Eddy County, NM (NAN27 NME)	TVD Reference:	RF @ 3651 0usft (SO #4)
Site:	Burch Keely Unit #505	MD Reference:	RF @ 3651 0usft (SO #4)
Well:	#505	North Reference:	Grid
Wellbore:	OH - Job #32D0112011	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 #505		
Site Position:		Northing:	669,813 30 usft
From:	Map	Easting:	591,546.50 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 50' 27 770 N
		Longitude:	104° 2' 6 953 W
		Grid Convergence:	0 16 °

Well	#505		
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' 27 770 N
		Longitude:	104° 2' 6 953 W
		Ground Level:	3,633 0 usft

Wellbore	OH - Job #32D0112011		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2010	1/5/2012	7 78
			Dip Angle (°)
			60 66
			Field Strength (nT)
			48,879

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 (°)
			161 57

Survey Program	Date 2/15/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
100 0	955 0	Gyro Survey (OH - Job #32D0112011)	Keeper
1,040 0	4,617 0	MWD Survey (OH - Job #32D0112011)	MWD
			Description
			Standard Wireline Keeper ver 1 0 2
			MWD - Standard

Survey								
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
0 0	0 00	0 00	0 0	0 0	0 0	0 0	0 00	0 0
100 0	0 18	130.52	100 0	-0 1	0 1	130 52		0 2
200 0	0 55	101 08	200 0	-0 3	0 7	112 66		0 8
300 0	1 08	82 95	300 0	-0 3	2 1	97 35		2 1
400 0	1 16	68 25	400 0	0 2	4 0	86 88		4 0
500 0	1 30	56 94	499 9	1 2	5 9	78 36		6 0
600 0	1 42	59 45	599 9	2 5	7 9	72 70		8 3
700 0	1 85	56 68	699 9	4 0	10 3	68 92		11 1
800 0	2 21	64 56	799 8	5 7	13 4	67 00		14 6
900 0	2 69	79 72	899 7	6 9	17 5	68 32		18 8
955 0	2 45	79 26	954 7	7 4	19 9	69 61		21 2



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Site:	Burch Keely Unit #505	MD Reference:	RF @ 3651 0usft (SO #4)
Well:	#505	North Reference:	Grid
Wellbore:	OH - Job #32D0112011	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)		
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Site	Burch Keely Unit #505		
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From:	Map	Easting:	591,546 50 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16"
		Latitude:	32° 50' 27 770 N
		Longitude:	104° 2' 6 953 W
		Grid Convergence:	0 16 °

Well	#505		
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' 27 770 N
		Longitude:	104° 2' 6 953 W
		Ground Level:	3,633 0 usft

Wellbore	OH - Job #32D0112011				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	1/5/2012	7 78	60 66	48,879

Design	Actual			
Audit Notes:				
Version:	1 0	Phase:	ACTUAL	Tie On Depth: 0 0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction
	(usft)	(usft)	(usft)	(°)
	0 0	0 0	0 0	161 57

Survey Program	Date 2/15/2012				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100 0	955 0	Gyro Survey (OH - Job #32D0112011)	Keeper	Standard Wireline Keeper ver 1 0 2	
1,040 0	4,617 0	MWD Survey (OH - Job #32D0112011)	MWD	MWD - Standard	

Survey								
Measured Depth (usft)	Inclination (°)	Azimuth (°)	True Vertical Depth	North/South (usft)	East/West (usft)	Closure Azimuth (°)	Closure Distance (usft)	
955 0	2 45	79 26	954 7	7 4	19 9	69 61	21 2	
Gyro Tie-in								
1,040 0	2 15	86 73	1,039 6	7 8	23 3	71 42	24 5	
1,103 0	2 25	76 51	1,102 6	8 2	25 6	72 32	26 9	
1,167 0	1 36	90 21	1,166 5	8 5	27 6	72 96	28 9	
1,231 0	1 39	115 50	1,230 5	8 1	29 1	74 39	30 2	
1,295 0	1 61	134 71	1,294 5	7 2	30 4	76 76	31 3	
1,358 0	2 48	147 27	1,357 4	5 4	31 8	80 37	32 2	
1,422 0	3 37	159 22	1,421 4	2 5	33 2	85 75	33 3	
1,486 0	3 88	164 13	1,485 2	-1 4	34 5	92 28	34 5	
1,550 0	3 97	182 09	1,549 1	-5 7	35 0	99 21	35 4	



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Site:	Burch Keely Unit #505	MD Reference:	RF @ 3651 0usft (SO #4)
Well:	#505	North Reference:	Grid
Wellbore:	OH - Job #32D0112011	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)
1,613 0	3 85	187 43	1,611 9	-9 9	34 6	106 03	36 0
1,677 0	3 43	173 50	1,675 8	-14 0	34 6	112 03	37 3
1,741 0	3 26	170 40	1,739 7	-17 7	35 1	116 74	39 3
1,836 0	2 60	177 80	1,834 6	-22 5	35 6	122 28	42 1
1,900 0	2 67	168 70	1,898 5	-25 4	36 0	125 24	44 0
1,964 0	2 78	163 50	1,962 4	-28 4	36 7	127 70	46 4
2,028 0	3 04	163 10	2,026 4	-31 5	37 6	129 91	49 1
2,091 0	3 36	165 57	2,089 3	-34 9	38 6	132 10	52 0
2,155 0	3 83	159 69	2,153 1	-38 7	39 8	134 19	55 5
2,219 0	3 30	164 64	2,217 0	-42 5	41 0	135 99	59 0
2,283 0	3 55	171 14	2,280 9	-46 2	41 8	137 85	62 3
2,346 0	3 42	175 71	2,343 8	-50 0	42 2	139 80	65 5
2,442 0	3 00	170 35	2,439 6	-55 3	42 9	142 22	70 0
2,538 0	4 22	171 52	2,535 4	-61 3	43 8	144 44	75 3
2,633 0	3 90	168 57	2,630 2	-67 9	45 0	146 48	81 5
2,729 0	4 01	179 38	2,726 0	-74 5	45 7	148 49	87 4
2,824 0	4 01	175 28	2,820 7	-81 1	46 0	150 45	93 2
2,920 0	4 07	174 38	2,916 5	-87 8	46 6	152 06	99 4
3,015 0	3 43	175 78	3,011 3	-94 0	47 1	153 38	105 2
3,110 0	3 79	177 91	3,106 1	-100 0	47 4	154 62	110 7
3,205 0	3 67	177 63	3,200 9	-106 2	47 7	155 81	116 4
3,300 0	2 96	184 68	3,295 7	-111 7	47 6	156 91	121 4
3,396 0	2 61	183 35	3,391 6	-116 3	47 3	157 88	125 6
3,491 0	2 98	183 49	3,486 5	-120 9	47 0	158 76	129 8
3,587 0	3 02	179 82	3,582 4	-126 0	46 9	159 59	134 4
3,682 0	2 90	183 70	3,677 3	-130 9	46 7	160 35	138 9
3,778 0	2 95	187 30	3,773 1	-135 7	46 2	161 19	143 4
3,874 0	2 71	177 50	3,869 0	-140 4	46 0	161 86	147 8
3,937 0	2 44	171 90	3,932 0	-143 3	46 3	162 10	150 6
4,001 0	2 81	182 00	3,995 9	-146 2	46 4	162 38	153 4
4,065 0	1 79	192 40	4,059 8	-148 7	46 1	162 76	155 7
4,129 0	1 03	200 50	4,123 8	-150 2	45 7	163 07	157 0
4,192 0	0 11	246 08	4,186 8	-150 8	45 5	163 22	157 5
4,288 0	0 48	286 40	4,282 8	-150 7	45 0	163 37	157 3
4,383 0	0 08	38 84	4,377 8	-150 6	44 7	163 47	157 0
4,478 0	0 20	185 93	4,472 8	-150 7	44 7	163 48	157 2
4,572 0	0 08	127 42	4,566 8	-150 9	44 7	163 49	157 4
Last MWD Survey							
4,617 0	0 08	127 42	4,611 8	-150 9	44 8	163 47	157 4
Projection to Bit							



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Site:	Burch Keely Unit #505	MD Reference:	RF @ 3651 0usft (SO #4)
Well:	#505	North Reference:	Grid
Wellbore:	OH - Job #32D0112011	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)	
955 0	954 7	7 4	19 9	Gyro Tie-in
4,572 0	4,566 8	-150 9	44 7	Last MWD Survey
4,617 0	4,611 8	-150 9	44.8	Projection to Bit



Annual to Grid North
True North: 0.10°
Magnetic North: 7.52°
Magnetic Field
Strength: 48578 Deit.
Dip Angle: 60.68°
Date: 2012/01/05
Model: IGRF2010

Burch Keely Unit #505
Eddy County, NM (NAN27 NME)
Northing (Y) 669813.30
Easting (X) 591546.50
Plan #3 vs Actual 7-7/8" Hole

WELL DETAILS

				Ground Level	3633.00				
				Existing	501546.50	Latitude	32° 50' 27.70" N	Longitude	104° 2' 6.953" W
+N/S	+E/W	Northing							Slot
0.00	0.00	669813.30							

SITE DETAILS

Burch Keely Unit #505
See Centre Northing 669813.30
Easting 591546.50

Positional Uncertainty: 0.00
Convergence: 0.18
Local North: Grid

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/S	+E/W	Disg	IFace	VSec	Target
1	955.00	2.45	79.26	954.67	7.39	19.88	0.00	0.00	-0.72	
2	1150.00	2.45	79.26	1149.49	8.84	26.07	0.00	0.00	0.39	
3	1350.00	3.21	173.74	1358.68	3.95	33.11	2.00	100.12	6.72	
4	4044.45	3.21	173.74	4039.56	-145.53	49.51	0.00	0.00	153.72	
5	4204.98	0.00	0.00	4200.00	-150.00	50.00	2.00	180.00	158.11	T1-BK #505
6	4004.98	0.00	0.00	4000.00	-150.00	50.00	0.00	0.00	158.11	PBHL-BK #505

DESIGN TARGET DETAILS

Name	TVD	+N/S	+E/W	Northing	Existing	Latitude	Longitude	Shape
North HL-BK #505	-1.00	-100.00	0.00	669713.30	591546.50	32° 50' 28.780" N	104° 2' 6.957" W	Rectangle (Sides: L0.00 W150.00)
plan manes target center by 961 Rhalt at 955.00alt MD (954.67 TVD 7.39 N 19.88 E)								
West HL-BK #505	-1.00	-100.00	0.00	669713.30	591546.50	32° 50' 28.780" N	104° 2' 6.957" W	Rectangle (Sides: L150.00 W0.00)
plan manes target center by 961 Rhalt at 955.00alt MD (954.67 TVD 7.39 N 19.88 E)								
T1-BK #505	4200.00	-150.00	50.00	669813.30	591546.50	32° 50' 26.284" N	104° 2' 6.372" W	Point
plan hals target center								
PBHL-BK #505	4000.00	-150.00	50.00	669813.30	591546.50	32° 50' 26.284" N	104° 2' 6.372" W	Circle (Radius: 50.00)
plan hals target center								

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

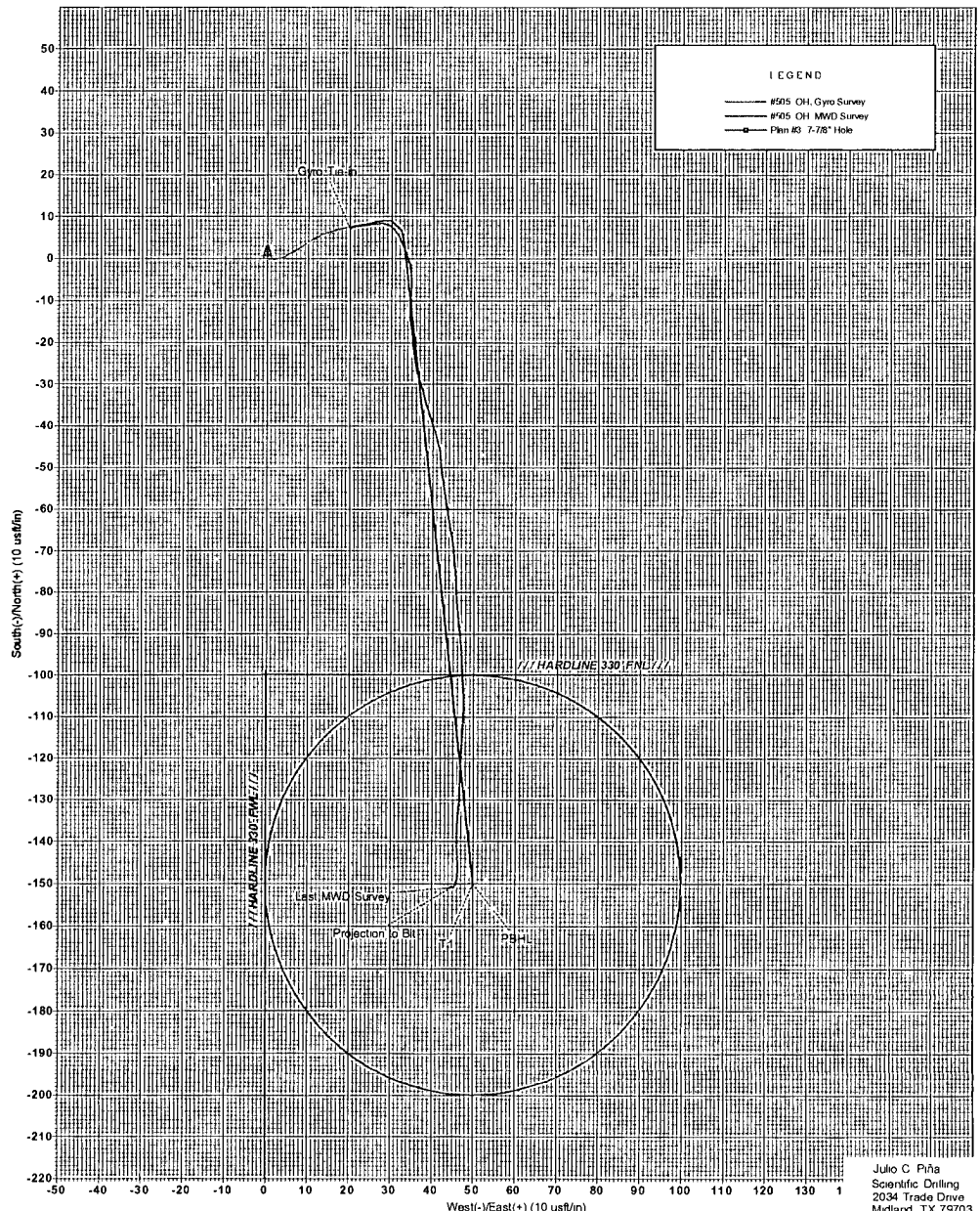
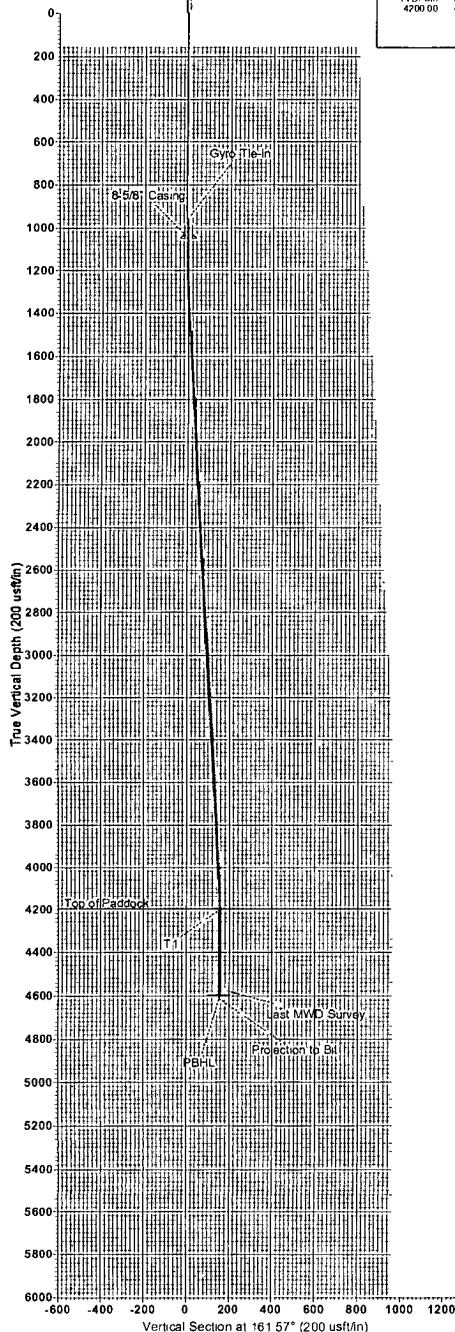
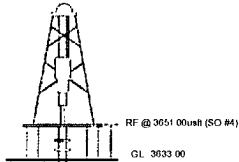
System Datum: Mean Sea Level

FORMATION TOP DETAILS

TVDPath	MDPath	Formation	DipAngle	DipDir
4200.00	4204.98	Top of Paddock	0.00	

CASING DETAILS

TVD	MD	Name	Size
1050.00	1050.42	8-5/8" Casing	8-5/8"





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

January 10, 2012

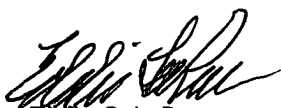
COG, LLC
Fasken Center, Tower II
550 West Texas Ave, Suite 1300
Midland, TX 79701

RE: Burch Keely Unit #505
230' FNL & 330' FWL
Sec. 13, T17S, R29E
Eddy County, New Mexico

Dear Sir,

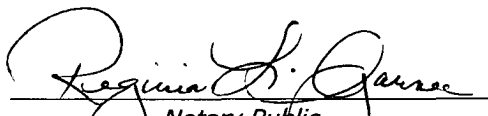
The attached is the Deviation Survey for the above captioned well.

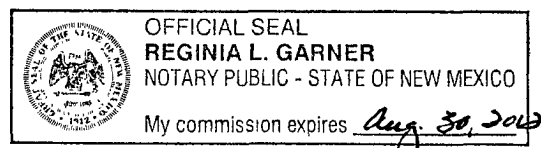
Very truly yours,


Eddie C. LaRue
Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 10th day of January, 2012.


Regina L. Garner
Notary Public



Burch Keely Unit #505

Date	Depth	Dev/Inc	Dir/AZ	TVD
1/3/2012	99	0.30		
1/3/2012	191	0.40		
1/4/2012	311	1.00		
1/4/2012	558	1.40		
1/4/2012	714	1.80		
1/4/2012	873	2.50		
1/4/2012	968	2.50		
1/5/2012	1040	2.15	86.73	
1/5/2012	1103	2.25	76.51	
1/5/2012	1167	1.36	90.21	
1/5/2012	1231	1.90	115.50	
1/6/2012	1486	3.80	164.10	
1/6/2012	1836	2.60	177.80	
1/6/2012	2442	3.00	170.35	
1/6/2012	2538	4.20	171.50	
1/6/2012	2633	3.90	168.51	
1/7/2012	2739	4.10	179.30	
1/7/2012	3110	3.79	177.91	
1/7/2012	3682	2.90	183.70	
1/7/2012	3778	2.95	187.30	
1/7/2012	3874	2.71	177.50	
1/7/2012	3937	2.44	171.90	
1/7/2012	4001	2.81	182.60	
1/7/2012	4065	1.79	192.00	
1/7/2012	4129	1.03	200.50	
1/7/2012	4192	1.11	246.08	
1/7/2012	4383	0.08	38.48	