

30-015-39579

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NM OGD ARTESIA

WELL NAME AND NUMBER Burch Keely Unit 19 Federal 6HLOCATION Section 19, T17S, R30E, Lot 3, 1728 FSL, 245 FWL, Eddy CountyOPERATOR COG Operating LLCDRILLING CONTRACTOR United Drilling, Inc.

The undersigned hereby certifies that he is an authorized representative of the drilling contractor who drilled the above described well and had conducted deviation test and obtained the following results:

Degrees @ Depth	Degrees @ Depth	Degrees @ Depth
.6° @ 109'		
.5° @ 205'		
.6° @ 305'		
.8° @ 425'		
.6° @ 763'		
1.2° @ 1104'		
.7° @ 1298'		
1.1° @ 1716'		
1.5° @ 2154'		
1.8° @ 2347'		
1.2° @ 2728'		
.9° @ 3108'		
.5° @ 3552'		

Drilling Contractor- UNITED DRILLING, INC.By: Luisa Noriega

(Luisa Noriega)

Title: Asst. Office ManagerSubscribed and sworn to before me this 2nd day of April, 2012.Daniel G. Alho
Notary PublicChaves NM
County State

My Commission Expires:

10-8-12

COG Operating LLC

Eddy County, NM

Burch Keely Unit 19 Federal 6H

Burch Keely Unit 19 Federal 6H

Wellbore #1

Survey: MWD Surveys

Standard Survey Report

27 March, 2012



COG Operating LLC
Burch Keely Unit 19 Federal 6H
Eddy County, NM
Plan #1



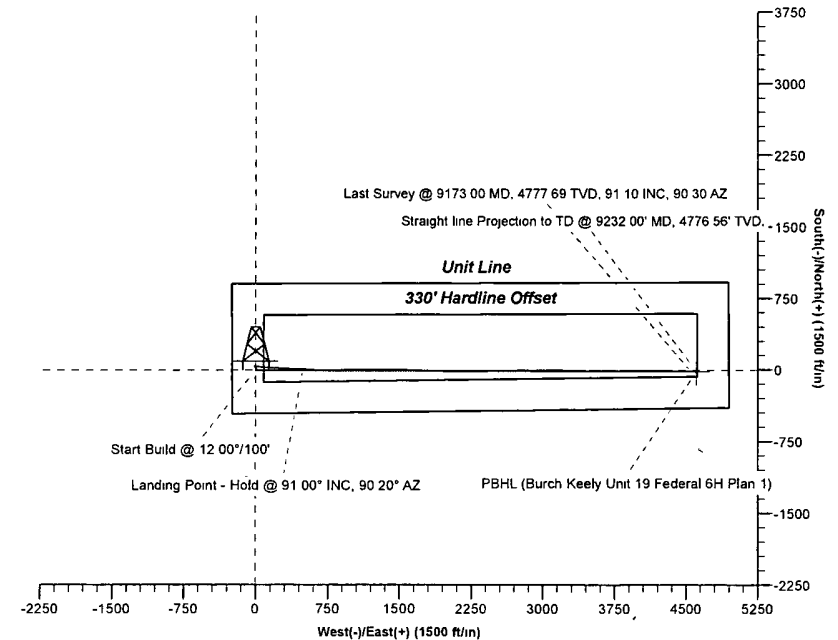
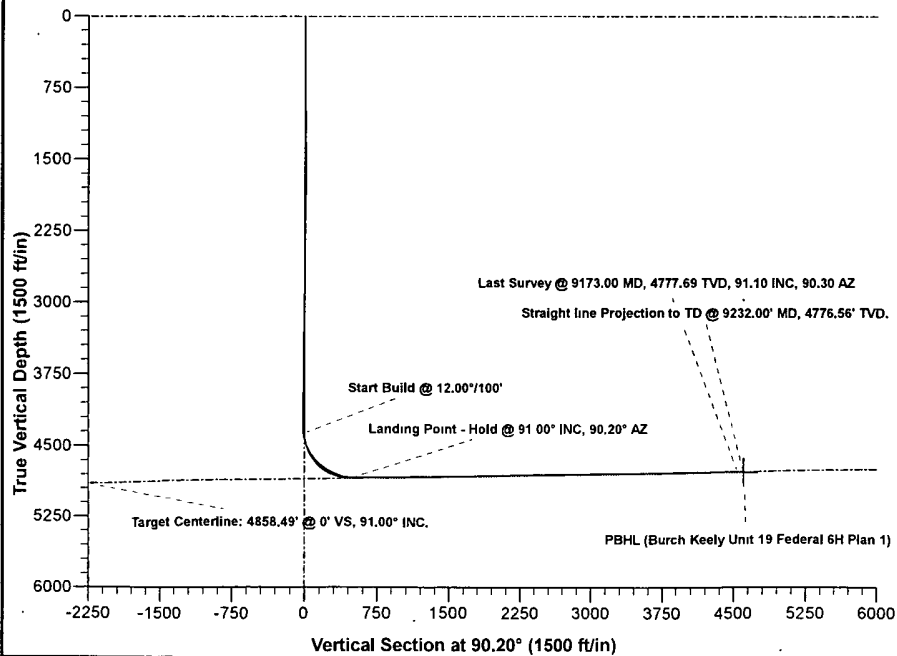
Surface Location		Ground Elev: 3622.00 WELL @ 3636.00ft (United #40)			
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.00	0.00	661231.80	596768.90	32° 49' 2.69 N	104° 1' 6.05 W

TARGET DETAILS						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude Longitude
PBHL (Burch Keely Unit 19 Federal 6H Plan 1)	4778.00	-15.70	4609.20	661216.10	601378.10	32° 49' 2.40 N 104° 0' 12.04 W



Azimuths to Grd North
 True North -0 17°
 Magnetic North: 7.58°

Magnetic Field
 Strength: 48850.0nT
 Dip Angle: 60.64°
 Date: 3/6/2012
 Model: IGRF2010



SECTION DETAILS										
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Annotation
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	4372.61	0.00	0.00	4372.61	0.00	0.00	0.00	0.00	0.00	Start Build @ 12.00°/100'
3	5130.95	91.00	90.20	4850.00	-1.65	485.80	12.00	90.20	485.80	Landing Point - Hold @ 91.00° INC, 90.20° AZ
4	9255.00	91.00	90.20	4778.00	-15.70	4609.20	0.00	0.00	4609.23	TD @ 9255.00' MD, 4778.00' TVD

Crescent Directional Drilling

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Burch Keely Unit 19 Federal 6H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3636.00ft (United #40)
Site:	Burch Keely Unit 19 Federal 6H	MD Reference:	WELL @ 3636.00ft (United #40)
Well:	Burch Keely Unit 19 Federal 6H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	R5000 Houston DB

Project		Eddy County, NM	
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 19 Federal 6H					
Site Position:		Northing:	661,231.80 ft	Latitude:	32° 49' 2.69 N
From:	Map	Easting:	596,768.90 ft	Longitude:	104° 1' 6.05 W
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	0.17 °

Well: Burch Keely Unit 19 Federal 6H						
Well Position	+N/-S	0.00 ft	Northing:	661,231.80 ft	Latitude:	32° 49' 2.69 N
	+E/-W	0.00 ft	Easting:	596,768.90 ft	Longitude:	104° 1' 6.05 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	3,622.00 ft

Wellbore:	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	3/6/2012	7.75	60.64	48,850

Design:		Wellbore #1							
Audit Notes:									
Version:		1 0	Phase:		ACTUAL	Tie On Depth:			
Vertical Section:		Depth From (TVD)		+N/-S		+E/-W		Direction	
		(ft)		(ft)		(ft)		(°)	
		0 00		0 00		0 00		87 99	

Survey Program		Date	3/27/2012		
From	To	Survey (Wellbore)	Tool Name	Description	
(ft)	(ft)				
100 00	4,280 00	Gyro Surveys (Wellbore #1)	Good__mag	Good Magnetic	
4,323 00	9,232 00	MWD Surveys (Wellbore #1)	Good__mag	Good Magnetic	

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn	
Depth	(°)	(°)	Depth	(ft)	(ft)	Section	Rate	Rate	Rate	
(ft)			(ft)			(ft)	(°/100ft)	(°/100ft)	(°/100ft)	
4,280.00	0.72	294.49	4,279.51	39.87	-11.11	-9.71	0.00	0.00	0.00	
4,323.00	0.40	120.10	4,322.51	39.90	-11.23	-9.83	2.60	-0.74	-405.56	
4,355.00	3.80	102.30	4,354.48	39.62	-10.10	-8.70	10.69	10.63	-55.63	
4,386.00	7.60	99.30	4,385.32	39.07	-7.07	-5.70	12.29	12.26	-9.68	
4,418.00	11.10	96.30	4,416.89	38.39	-1.92	-0.57	11.04	10.94	-9.38	
4,450.00	14.90	94.40	4,448.07	37.74	5.25	6.57	11.95	11.88	-5.94	
4,482.00	18.60	93.90	4,478.71	37.07	14.45	15.73	11.57	11.56	-1.56	
4,513.00	22.30	93.00	4,507.75	36.43	25.25	26.51	11.98	11.94	-2.90	
4,545.00	26.20	93.40	4,536.92	35.69	38.37	39.60	12.20	12.19	1.25	
4,577.00	29.50	95.60	4,565.21	34.51	53.27	54.45	10.80	10.31	6.88	

Crescent Directional Drilling

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Site Burch Keely Unit 19-Federal 6H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3636.00ft (United #40)
Site:	Burch Keely Unit 19 Federal 6H	MD Reference:	WELL @ 3636.00ft (United #40)
Well:	Burch Keely Unit 19 Federal 6H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	R5000 Houston DB

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
4,609.00	32.70	96.00	4,592.60	32.83	69.71	70.82	10.02	10.00	1.25
4,640.00	35.80	96.30	4,618.23	30.96	87.06	88.09	10.01	10.00	0.97
4,672.00	39.10	96.30	4,643.63	28.83	106.40	107.34	10.31	10.31	0.00
4,704.00	42.60	95.80	4,667.83	26.62	127.21	128.06	10.99	10.94	-1.56
4,735.00	46.00	94.60	4,690.01	24.67	148.77	149.54	11.30	10.97	-3.87
4,767.00	49.40	93.70	4,711.55	22.96	172.37	173.07	10.83	10.63	-2.81
4,799.00	52.40	93.40	4,731.72	21.43	197.15	197.78	9.40	9.38	-0.94
4,830.00	55.70	92.52	4,749.92	20.13	222.21	222.78	10.89	10.65	-2.84
4,862.00	59.00	92.10	4,767.18	19.05	249.13	249.64	10.37	10.31	-1.31
4,894.00	62.30	92.50	4,782.87	17.93	276.99	277.45	10.37	10.31	1.25
4,926.00	65.30	92.30	4,796.99	16.73	305.68	306.08	9.39	9.38	-0.63
4,957.00	68.10	92.30	4,809.25	15.59	334.12	334.46	9.03	9.03	0.00
4,989.00	71.50	91.10	4,820.30	14.70	364.14	364.43	11.19	10.63	-3.75
5,021.00	75.60	89.80	4,829.36	14.46	394.82	395.08	13.39	12.81	-4.06
5,052.00	79.90	88.60	4,835.94	14.89	425.10	425.36	14.38	13.87	-3.87
5,084.00	83.40	94.20	4,840.59	14.11	456.74	456.95	20.48	10.94	17.50
5,116.00	87.30	94.20	4,843.18	11.77	488.54	488.65	12.19	12.19	0.00
5,148.00	90.40	94.70	4,843.82	9.29	520.43	520.44	9.81	9.69	1.56
5,179.00	91.00	94.90	4,843.45	6.69	551.32	551.22	2.04	1.94	0.65
5,211.00	91.10	94.90	4,842.86	3.96	583.20	582.98	0.31	0.31	0.00
5,243.00	91.60	94.30	4,842.11	1.40	615.09	614.76	2.44	1.56	-1.88
5,274.00	92.00	92.60	4,841.13	-0.47	646.01	645.60	5.63	1.29	-5.48
5,306.00	91.70	90.20	4,840.10	-1.25	677.98	677.53	7.55	-0.94	-7.50
5,338.00	91.00	89.40	4,839.34	-1.14	709.97	709.50	3.32	-2.19	-2.50
5,370.00	91.10	89.10	4,838.76	-0.72	741.97	741.49	0.99	0.31	-0.94
5,401.00	90.20	89.30	4,838.41	-0.29	772.96	772.48	2.97	-2.90	0.65
5,496.00	89.80	88.60	4,838.41	1.45	867.94	867.46	0.85	-0.42	-0.74
5,592.00	91.30	89.30	4,837.48	3.21	963.92	963.44	1.72	1.56	0.73
5,687.00	92.30	88.60	4,834.50	4.95	1,058.86	1,058.38	1.28	1.05	-0.74
5,782.00	92.20	89.10	4,830.77	6.86	1,153.76	1,153.30	0.54	-0.11	0.53
5,877.00	90.70	91.10	4,828.37	6.69	1,248.73	1,248.19	2.63	-1.58	2.11
5,972.00	90.00	90.20	4,827.79	5.61	1,343.72	1,343.09	1.20	-0.74	-0.95
6,067.00	89.00	90.50	4,828.62	5.03	1,438.71	1,438.00	1.10	-1.05	0.32
6,162.00	90.10	91.30	4,829.36	3.54	1,533.69	1,532.88	1.43	1.16	0.84
6,257.00	90.40	91.50	4,828.95	1.22	1,628.66	1,627.71	0.38	0.32	0.21
6,352.00	91.10	92.60	4,827.70	-2.18	1,723.59	1,722.46	1.37	0.74	1.16
6,447.00	91.30	92.30	4,825.71	-6.24	1,818.48	1,817.15	0.38	0.21	-0.32
6,542.00	91.50	92.00	4,823.39	-9.80	1,913.39	1,911.87	0.38	0.21	-0.32
6,605.00	91.30	92.70	4,821.85	-12.38	1,976.32	1,974.67	1.16	-0.32	1.11
6,668.00	91.60	89.20	4,820.26	-13.43	2,039.28	2,037.56	5.57	0.48	-5.56
6,732.00	92.00	89.80	4,818.25	-12.87	2,103.24	2,101.50	1.13	0.63	0.94
6,826.00	91.50	90.10	4,815.38	-12.79	2,197.20	2,195.41	0.62	-0.53	0.32
6,921.00	91.50	89.50	4,812.89	-12.45	2,292.17	2,290.33	0.63	0.00	-0.63

Crescent Directional Drilling

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	R5000 Houston DB

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N-S (ft)	+E/W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
6,954.00	91.40	89.20	4,812.06	-12.08	2,325.15	2,323.31	0.96	-0.30	-0.91
7,049.00	91.60	89.10	4,809.57	-10.67	2,420.11	2,418.25	0.24	0.21	-0.11
7,144.00	91.70	88.30	4,806.83	-8.52	2,515.04	2,513.21	0.85	0.11	-0.84
7,176.00	91.70	88.30	4,805.88	-7.57	2,547.02	2,545.19	0.00	0.00	0.00
7,207.00	91.60	88.40	4,804.99	-6.68	2,577.99	2,576.18	0.46	-0.32	0.32
7,239.00	91.50	88.20	4,804.13	-5.73	2,609.97	2,608.17	0.70	-0.31	-0.63
7,271.00	91.50	88.00	4,803.29	-4.67	2,641.94	2,640.16	0.62	0.00	-0.63
7,303.00	90.80	88.90	4,802.65	-3.80	2,673.92	2,672.15	3.56	-2.19	2.81
7,334.00	90.70	89.30	4,802.24	-3.31	2,704.91	2,703.14	1.33	-0.32	1.29
7,393.00	90.70	89.30	4,801.52	-2.59	2,763.90	2,762.12	0.00	0.00	0.00
7,429.00	90.00	89.90	4,801.30	-2.34	2,799.90	2,798.10	2.56	-1.94	1.67
7,524.00	89.80	89.80	4,801.47	-2.09	2,894.90	2,893.05	0.24	-0.21	-0.11
7,619.00	90.40	90.50	4,801.30	-2.34	2,989.90	2,987.99	0.97	0.63	0.74
7,714.00	90.80	90.80	4,800.31	-3.42	3,084.89	3,082.88	0.53	0.42	0.32
7,809.00	90.60	90.70	4,799.14	-4.66	3,179.87	3,177.76	0.24	-0.21	-0.11
7,905.00	90.30	90.70	4,798.39	-5.84	3,275.86	3,273.65	0.31	-0.31	0.00
8,000.00	90.40	90.60	4,797.81	-6.91	3,370.85	3,368.55	0.15	0.11	-0.11
8,095.00	90.60	90.40	4,796.98	-7.74	3,465.85	3,463.45	0.30	0.21	-0.21
8,190.00	90.60	90.30	4,795.99	-8.32	3,560.84	3,558.37	0.11	0.00	-0.11
8,285.00	90.60	90.00	4,794.99	-8.57	3,655.83	3,653.29	0.32	0.00	-0.32
8,380.00	90.70	90.20	4,793.91	-8.74	3,750.83	3,748.22	0.24	0.11	0.21
8,475.00	90.80	90.10	4,792.67	-8.99	3,845.82	3,843.15	0.15	0.11	-0.11
8,570.00	91.30	89.80	4,790.93	-8.90	3,940.80	3,938.08	0.61	0.53	-0.32
8,665.00	91.40	89.40	4,788.69	-8.24	4,035.77	4,033.01	0.43	0.11	-0.42
8,761.00	91.40	90.50	4,786.35	-8.16	4,131.74	4,128.93	1.15	0.00	1.15
8,856.00	91.30	90.50	4,784.11	-8.99	4,226.71	4,223.81	0.11	-0.11	0.00
8,951.00	91.10	90.50	4,782.12	-9.81	4,321.69	4,318.70	0.21	-0.21	0.00
9,046.00	91.20	90.40	4,780.21	-10.56	4,416.67	4,413.59	0.15	0.11	-0.11
9,141.00	91.10	90.00	4,778.30	-10.89	4,511.65	4,508.50	0.43	-0.11	-0.42
9,173.00	91.10	90.30	4,777.69	-10.98	4,543.64	4,540.47	0.94	0.00	0.94
Last Survey @ 9173.00 MD, 4777.69 TVD, 91.10 INC, 90.30 AZ									
9,232.00	91.10	90.30	4,776.56	-11.28	4,602.63	4,599.41	0.00	0.00	0.00
Straight line Projection to TD @ 9232.00' MD, 4776.56' TVD.									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates	Comment
9,173.00	4,777.69	-10.98 4,543.64	Last Survey @ 9173.00 MD, 4777.69 TVD, 91.10 INC, 90.30 AZ
9,232.00	4,776.56	-11.28 4,602.63	Straight line Projection to TD @ 9232.00' MD, 4776.56' TVD.

Checked By: _____ Approved By: _____ Date: _____