



30-015-40881

COG Operating, LLC

Eddy County(NM27E)

Sec.22-T17S-R29E

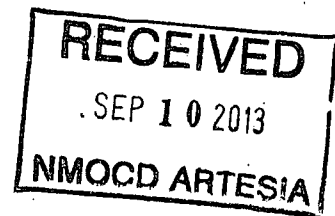
Dodd Federal Unit #642

Wellbore #1

Survey: Survey #2-Archer MWD

Standard Survey Report

13 May, 2013



Archer

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Dodd Federal Unit #642
Project:	Eddy County(NM27E)	TVD Reference:	WELL @ 3586.00usft
Site:	Sec.22-T17S-R29E	MD Reference:	WELL @ 3586.00usft
Well:	Dodd Federal Unit #642	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000:1 Single User.Db

Project		Eddy County(NM27E)	
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		Sec.22-T17S-R29E			
Site Position:		Northing:	664,489.600 usft	Latitude:	32° 49' 35.269 N
From:	Map	Easting:	584,926.700 usft	Longitude:	104° 3' 24.709 W
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16"	Grid Convergence:	0.15 °

Well: Dodd Federal Unit #642						
Well Position	+N-S	0.00 usft	Northing:	664,489.600 usft	Latitude:	32° 49' 35.269 N
	+E-W	0.00 usft	Easting:	584,926.700 usft	Longitude:	104° 3' 24.709 W
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level:	3,569.00 usft

Wellbore		Wellbore #1			
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	2013/04/26	7.63	60.61	48,738

Design:	Wellbore #1			
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	152.49

Survey Program		Date	2013/05/13		
From	To	Survey (Wellbore)	Tool Name	Description	
(usft)	(usft)				
100.00	818.00	Survey #1-VES Gyro (Wellbore #1)	GYD_DP_MS	Gyrodata gyro-compassing and drop	
883.00	4,095.00	Survey #2-Archer MWD (Wellbore #1)	MWD	MWD - Standard	

Survey									
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)
Tie-In / VES Survey									
818.00	0.42	24.23	817.93	6.29	-4.79	-7.79	0.00	0.00	0.00
First Archer Survey									
883.00	0.60	38.60	882.93	6.77	-4.48	-8.08	0.34	0.28	22.11
946.00	0.50	40.00	945.92	7.24	-4.10	-8.32	0.16	-0.16	2.22
1,042.00	1.50	158.30	1,041.91	6.40	-3.37	-7.23	1.87	1.04	123.23
1,137.00	1.30	160.40	1,136.88	4.23	-2.55	-4.92	0.22	-0.21	2.21
1,201.00	1.90	165.90	1,200.86	2.51	-2.04	-3.17	0.97	0.94	8.59
1,265.00	1.80	165.80	1,264.83	0.51	-1.54	-1.16	0.16	-0.16	-0.16
1,328.00	1.60	168.10	1,327.80	-1.31	-1.11	0.65	0.34	-0.32	3.65
1,392.00	1.60	168.30	1,391.77	-3.06	-0.75	2.37	0.01	0.00	0.31
1,456.00	1.50	169.10	1,455.75	-4.76	-0.41	4.03	0.16	-0.16	1.25

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Site:	Sec.22-T17S-R29E	MD Reference:	WELL @ 3586.00usft
Well:	Dodd Federal Unit #642	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM-5000.1 Single User Db

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)
1,519.00	1.30	164.90	1,518.73	-6.26	-0.07	5.52	0.36	-0.32	-6.67
1,583.00	1.20	154.80	1,582.72	-7.56	0.41	6.90	0.38	-0.16	-15.78
1,647.00	1.10	149.70	1,646.70	-8.70	1.00	8.18	0.22	-0.16	-7.97
1,711.00	1.60	152.00	1,710.68	-10.02	1.73	9.69	0.79	0.78	3.59
1,774.00	1.60	153.60	1,773.66	-11.58	2.54	11.45	0.07	0.00	2.54
1,838.00	2.10	144.70	1,837.63	-13.34	3.61	13.50	0.90	0.78	-13.91
1,902.00	1.80	138.10	1,901.59	-15.05	4.96	15.64	0.58	-0.47	-10.31
1,995.00	2.10	161.30	1,994.54	-17.75	6.48	18.74	0.90	0.32	24.95
2,091.00	2.30	152.80	2,090.47	-21.13	7.93	22.40	0.40	0.21	-8.85
2,186.00	2.00	151.00	2,185.40	-24.27	9.60	25.96	0.32	-0.32	-1.89
2,282.00	2.00	153.80	2,281.34	-27.24	11.15	29.31	0.10	0.00	2.92
2,378.00	2.20	148.60	2,377.28	-30.32	12.85	32.83	0.29	0.21	-5.42
2,473.00	1.10	151.20	2,472.24	-32.67	14.24	35.56	1.16	-1.16	2.74
2,569.00	1.70	147.80	2,568.21	-34.68	15.44	37.90	0.63	0.62	-3.54
2,665.00	2.00	147.40	2,664.16	-37.30	17.11	40.98	0.31	0.31	-0.42
2,761.00	2.20	148.60	2,760.09	-40.28	18.97	44.49	0.21	0.21	1.25
2,856.00	1.90	140.90	2,855.03	-43.06	20.91	47.85	0.43	-0.32	-8.11
2,952.00	1.80	140.60	2,950.98	-45.46	22.87	50.89	0.10	-0.10	-0.31
3,047.00	2.00	143.50	3,045.93	-47.95	24.81	53.99	0.23	0.21	3.05
3,143.00	1.70	139.50	3,141.88	-50.38	26.73	57.03	0.34	-0.31	-4.17
3,238.00	1.80	143.40	3,236.83	-52.65	28.53	59.87	0.16	0.11	4.11
3,334.00	2.20	160.70	3,332.78	-55.60	30.04	63.19	0.75	0.42	18.02
3,430.00	2.10	156.80	3,428.71	-58.95	31.34	66.76	0.18	-0.10	-4.06
3,525.00	1.60	142.40	3,523.66	-61.60	32.84	69.81	0.71	-0.53	-15.16
3,621.00	1.50	142.80	3,619.63	-63.67	34.41	72.36	0.10	-0.10	0.42
3,716.00	1.50	142.50	3,714.59	-65.64	35.92	74.81	0.01	0.00	-0.32
3,812.00	1.70	142.50	3,810.56	-67.77	37.55	77.45	0.21	0.21	0.00
3,908.00	1.00	157.70	3,906.53	-69.67	38.74	79.69	0.81	-0.73	15.83
4,003.00	0.30	199.00	4,001.52	-70.68	38.97	80.69	0.84	-0.74	43.47
Last Archer Survey									
4,035.00	0.40	200.30	4,033.52	-70.86	38.91	80.82	0.31	0.31	4.06
PTB									
4,095.00	0.40	200.30	4,093.52	-71.25	38.76	81.10	0.00	0.00	0.00

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
818.00	817.93	6.29	-4.79	Tie-In / VES Survey
883.00	882.93	6.77	-4.48	First Archer Survey
4,035.00	4,033.52	-70.86	38.91	Last Archer Survey
4,095.00	4,093.52	-71.25	38.76	PTB

Checked By: _____ Approved By: _____ Date: _____



Company: COG Operating, LLC
 Well: Dodd Federal Unit #642
 Location: Eddy County, New Mexico
 Rig: United 40

Job Number: 04234-433-22
 Mag Decl.: 7.63
 Dir Driller: Marty Schmidt
 MWD Eng: James Dennehy

Calculation Method: Minimum Curvature
 Proposed Azimuth: 152.5
 Depth Reference: KBG
 Tie Into: Gyro Survey

Job Date: 04/29/13 - 05/01/13

Survey Number	Survey Depth (ft)	Inclination (deg)	Azimuth (deg)	Course Length (ft)	True Vertical Depth (ft)	Vertical Section (ft)	Coordinates		Closure		Dogleg Severity (d/100')	Build Rate (d/100')	Walk Rate (d/100')
							N/S (ft)	E/W (ft)	Distance (ft)	Direction Azimuth			
Tie In	818.00	0.42	24.23	0	817.93	7.79	6.29 N	4.79 W	0.00	0.00	0	0	0
1	883	0.6	38.6	65	882.93	-8.08	6.77 N	4.48 W	8.12	326.52	0.34	0.28	22.11
2	946	0.5	40.0	63	945.92	-8.32	7.24 N	4.10 W	8.32	330.50	0.16	-0.16	2.22
3	1042	1.5	158.3	96	1041.91	-7.23	6.39 N	3.36 W	7.23	332.26	1.87	1.04	123.23
4	1137	1.3	160.4	95	1136.89	-4.92	4.22 N	2.54 W	4.93	328.96	0.22	-0.21	2.21
5	1201	1.9	165.9	64	1200.86	-3.17	2.51 N	2.04 W	3.24	320.91	0.97	0.94	8.59
6	1265	1.8	165.8	64	1264.83	-1.16	0.51 N	1.54 W	1.62	288.31	0.16	-0.16	-0.16
7	1328	1.6	168.1	63	1327.80	0.65	1.31 S	1.11 W	1.72	220.27	0.34	-0.32	3.65
8	1392	1.6	168.3	64	1391.77	2.37	3.06 S	0.75 W	3.15	193.69	0.01	0.00	0.31
9	1456	1.5	169.1	64	1455.75	4.03	4.76 S	0.41 W	4.78	184.88	0.16	-0.16	1.25
10	1519	1.3	164.9	63	1518.73	5.52	6.26 S	0.06 W	6.26	180.59	0.36	-0.32	-6.67
11	1583	1.2	154.8	64	1582.72	6.90	7.57 S	0.41 E	7.58	176.89	0.38	-0.16	-15.78
12	1647	1.1	149.7	64	1646.70	8.18	8.70 S	1.01 E	8.76	173.41	0.22	-0.16	-7.97
13	1711	1.6	152.0	64	1710.69	9.69	10.02 S	1.74 E	10.17	170.18	0.79	0.78	3.59
14	1774	1.6	153.6	63	1773.66	11.45	11.59 S	2.54 E	11.86	167.64	0.07	0.00	2.54
15	1838	2.1	144.7	64	1837.63	13.50	13.34 S	3.61 E	13.82	164.85	0.90	0.78	-13.91
16	1902	1.8	138.1	64	1901.59	15.64	15.05 S	4.96 E	15.85	161.75	0.58	-0.47	-10.31
17	1995	2.1	161.3	93	1994.54	18.74	17.75 S	6.48 E	18.90	159.93	0.90	0.32	24.95
18	2091	2.3	152.8	96	2090.47	22.40	21.13 S	7.93 E	22.57	159.43	0.40	0.21	-8.85
19	2186	2.0	151.0	95	2185.40	25.97	24.27 S	9.60 E	26.11	158.41	0.32	-0.32	-1.89
20	2282	2.0	153.8	96	2281.34	29.32	27.24 S	11.16 E	29.44	157.73	0.10	0.00	2.92
21	2378	2.2	148.6	96	2377.28	32.83	30.32 S	12.86 E	32.93	157.02	0.29	0.21	-5.42
22	2473	1.1	151.2	95	2472.24	35.56	32.67 S	14.24 E	35.64	156.44	1.16	-1.16	2.74
23	2569	1.7	147.8	96	2568.21	37.90	34.69 S	15.45 E	37.97	155.99	0.63	0.63	-3.54
24	2665	2.0	147.4	96	2664.16	40.99	37.30 S	17.11 E	41.04	155.36	0.31	0.31	-0.42
25	2761	2.2	148.6	96	2760.09	44.49	40.29 S	18.97 E	44.53	154.78	0.21	0.21	1.25
26	2856	1.9	140.9	95	2855.03	47.86	43.07 S	20.91 E	47.88	154.10	0.43	-0.32	-8.11
27	2952	1.8	140.6	96	2950.98	50.89	45.47 S	22.88 E	50.90	153.29	0.10	-0.10	-0.31
28	3047	2.0	143.5	95	3045.93	53.99	47.95 S	24.81 E	53.99	152.64	0.23	0.21	3.05
29	3143	1.7	139.5	96	3141.88	57.03	50.38 S	26.73 E	57.03	152.05	0.34	-0.31	-4.17
30	3238	1.8	143.4	95	3236.84	59.88	52.65 S	28.53 E	59.88	151.54	0.16	0.11	4.11
31	3334	2.2	160.7	96	3332.78	63.19	55.60 S	30.04 E	63.20	151.62	0.75	0.42	18.02
32	3430	2.1	156.8	96	3428.71	66.77	58.95 S	31.34 E	66.77	152.00	0.18	-0.10	-4.06
33	3525	1.6	142.4	95	3523.66	69.81	61.61 S	32.84 E	69.81	151.94	0.71	-0.53	-15.16
34	3621	1.5	142.8	96	3619.63	72.37	63.67 S	34.42 E	72.37	151.61	0.10	-0.10	0.42
35	3716	1.5	142.5	95	3714.59	74.82	65.64 S	35.93 E	74.83	151.31	0.01	0.00	-0.32
36	3812	1.7	142.5	96	3810.56	77.46	67.77 S	37.56 E	77.48	151.01	0.21	0.21	0.00

Archer

Company: COG Operating, LLC

Job Number:

04234-433-22

Calculation Method

Minimum Curvature

Well: Dodd Federal Unit #642

Mag Decl.:

7.63

Proposed Azimuth

152.5

Location: Eddy County, New Mexico

Dir Driller:

Marty Schmidt

Depth Reference

KBG

Rig: United 40

MWD Eng:

James Dennehy

Tie Into: Gyro Survey

Job Date: 04/29/13 - 05/01/13

Survey Number	Survey Depth (ft)	Inclination (deg)	Azimuth (deg)	Course Length (ft)	True Vertical Depth (ft)	Vertical Section (ft)	Coordinates		Closure		Dogleg Severity (d/100')	Build Rate (d/100')	Walk Rate (d/100')
							N/S (ft)	E/W (ft)	Distance (ft)	Direction Azimuth			
37	3908	1.0	157.7	96	3906.53	79.69	69.68 S	38.74 E	79.72	150.92	0.81	-0.73	15.83
38	4003	0.3	199.0	95	4001.52	80.69	70.68 S	38.98 E	80.71	151.13	0.84	-0.74	43.47
39	4035	0.4	200.3	32	4033.52	80.82	70.86 S	38.91 E	80.84	151.23	0.31	0.31	4.06
Proj.	4095	0.4	200.3	60	4093.52	81.10	71.26 S	38.76 E	81.12	151.45	0.00	0.00	0.00