

30-015-39842

RECEIVED
FEB 1 2013
NMOCD ARTESIA



Company: COG Operating LLC (Concho)
Lease/Well: Patton 5 Fee/No. 004H
Location: S5, T19s, R26e
Rig Name: JW Drilling #4
State/County: New Mexico/Eddy
Latitude: 32.69
GRID North is 0.04 Degrees West of True North
VS-Azi: 0.00 Degrees



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FEB 1 2013
NMOCD ARTESIA

Depth Reference : RKB= 13 Feet
DRILLOG HA GYRO SURVEY CALCULATIONS
Filename: patton 5 fee #004h_ed.ut
Minimum Curvature Method
Report Date/Time: 5/22/2012 / 14:42
Vaughn Energy Services
Gardendale, Texas
432-563-5444
Surveyor: Seth Hardin
Patton 5 Fee No. 004H / API 30-015-39842

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	----
100.00	0.65	205.08	100.00	-0.51	-0.24	0.56	205.08	0.65
200.00	0.77	129.29	199.99	-1.44	0.04	1.44	178.42	0.87
300.00	1.04	192.03	299.98	-2.76	0.37	2.78	172.40	-0.97
400.00	1.39	173.49	399.96	-4.85	0.32	4.86	176.27	0.52
500.00	1.38	173.32	499.93	-7.26	0.59	7.28	175.32	0.01
600.00	1.11	180.45	599.91	-9.43	0.73	9.46	175.59	0.31
700.00	0.99	190.29	699.89	-11.25	0.56	11.27	177.13	0.22
800.00	0.80	196.85	799.88	-12.77	0.21	12.77	179.06	0.22
900.00	0.85	193.88	899.87	-14.16	-0.17	14.16	180.69	0.07
1000.00	0.83	187.35	999.86	-15.60	-0.44	15.60	181.62	0.10
1100.00	0.65	176.12	1099.85	-16.89	-0.50	16.89	181.69	0.23
1200.00	0.82	180.41	1199.84	-18.17	-0.46	18.18	181.46	0.18
1300.00	0.86	167.46	1299.83	-19.61	-0.31	19.61	180.90	0.19
1400.00	0.86	173.98	1399.82	-21.08	-0.07	21.08	180.19	0.10
1500.00	0.64	166.74	1499.81	-22.37	0.14	22.37	179.65	0.24
1600.00	0.65	176.25	1599.80	-23.48	0.30	23.48	179.26	0.11
1700.00	0.71	154.07	1699.80	-24.60	0.61	24.60	178.58	0.27
1800.00	0.48	169.42	1799.79	-25.56	0.96	25.58	177.86	0.28

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	0.36	173.06	1899.79	-26.28	1.07	26.30	177.67	0.12
2000.00	0.42	150.74	1999.79	-26.91	1.28	26.94	177.27	0.16
2063.00	0.39	175.99	2062.78	-27.32	1.41	27.36	177.04	0.28

CRESCENT

DIRECTIONAL DRILLING

Minimum Curvature Calculation

Client: Concho Oil and Gas
Well: Patton 5 Fee #4H
County: Eddy
Rig: JW #4

M.W.D. OPERATORS: Matt Rainey/CJ Hall
DIRECTIONAL DRILLERS: Derek Patterson/Derek Orona
Tool Azimuth to Grid North: 7.94
Job #: PB-12286

Vertical Section Angle: 89.03

API#: 30-015-39842

Sur #	Meas. Depth	Inc.	Azm.	T.V.D.	Ver.Sect.	+N/-S	+E/-W	DLS
Tie In	2063.00	0.39	175.99	2062.78	0.96	-27.32	1.41	0.00
1	2100.00	0.40	197.60	2099.78	0.91	-27.57	1.38	0.40
2	2131.00	1.00	89.60	2130.78	1.15	-27.67	1.62	3.83
3	2162.00	4.20	68.20	2161.74	2.48	-27.25	2.94	10.61
4	2193.00	7.70	70.10	2192.57	5.51	-26.12	5.95	11.31
5	2224.00	11.30	67.60	2223.14	10.30	-24.25	10.71	11.69
6	2256.00	14.50	65.90	2254.33	16.90	-21.42	17.27	10.07
7	2287.00	18.00	64.70	2284.09	24.84	-17.79	25.15	11.34
8	2318.00	21.00	65.80	2313.30	34.31	-13.46	34.54	9.75
9	2349.00	24.60	68.30	2341.88	45.45	-8.80	45.61	12.02
10	2380.00	28.10	70.20	2369.65	58.40	-3.94	58.48	11.61
11	2411.00	31.80	71.00	2396.51	73.08	1.20	73.08	12.00
12	2443.00	35.30	71.70	2423.17	89.93	6.84	89.83	11.00
13	2474.00	39.00	71.50	2447.88	107.79	12.75	107.59	11.94
14	2505.00	41.90	71.20	2471.47	126.95	19.19	126.64	9.38
15	2536.00	45.10	71.60	2493.95	147.29	25.99	146.87	10.36
16	2567.00	48.50	71.70	2515.17	168.85	33.10	168.31	10.97
17	2598.00	51.60	73.40	2535.07	191.64	40.22	190.98	10.85
18	2630.00	54.60	74.90	2554.28	216.37	47.20	215.60	10.10
19	2661.00	57.90	76.10	2571.50	241.42	53.65	240.55	11.12
20	2692.00	61.00	77.90	2587.26	267.53	59.65	266.56	11.18
21	2724.00	64.00	80.40	2602.04	295.49	64.98	294.43	11.66
22	2755.00	67.20	82.30	2614.84	323.46	69.22	322.34	11.73
23	2787.00	69.40	84.00	2626.67	353.03	72.76	351.85	8.46
24	2818.00	72.20	85.30	2636.87	382.22	75.49	381.00	9.86
25	2849.00	74.70	86.20	2645.70	411.89	77.69	410.63	8.53
26	2880.00	77.50	86.30	2653.14	441.94	79.66	440.65	9.04
27	2911.00	79.30	87.00	2659.38	472.28	81.43	470.97	6.21
28	2942.00	81.30	88.60	2664.60	502.83	82.60	501.50	8.22
29	3036.00	86.30	91.60	2674.75	596.22	82.43	594.91	6.19
30	3130.00	89.40	91.50	2678.28	690.05	79.89	688.80	3.30
31	3224.00	89.80	91.20	2678.93	783.97	77.67	782.77	0.53
32	3319.00	90.10	90.60	2679.02	878.92	76.18	877.76	0.71
33	3412.00	90.00	90.40	2678.94	971.89	75.37	970.75	0.24
34	3506.00	90.30	89.90	2678.69	1065.87	75.12	1064.75	0.62
35	3600.00	90.70	89.90	2677.87	1159.86	75.29	1158.75	0.43
36	3693.00	91.30	89.90	2676.25	1252.83	75.45	1251.73	0.65
37	3787.00	89.10	90.00	2675.92	1346.81	75.53	1345.73	2.34
38	3880.00	87.20	89.40	2678.92	1439.75	76.02	1438.67	2.14
39	3974.00	87.90	89.90	2682.94	1533.66	76.59	1532.58	0.91

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County: Eddy
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M.W.D. OPERATORS: Matt Rainey/CJ Hall
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Tool Azimuth to Grid North: 7.94
Job #: PB-12286

Vertical Section Angle: 89.03

API#: 30-015-39842

Sur. #	Meas. Depth	Inc.	Azm.	T.V.D.	Ver. Sect.	+N/-S	+E/-W	DLS
40	4067.00	88.40	89.90	2685.94	1626.60	76.75	1625.53	0.54
41	4161.00	88.90	90.30	2688.16	1720.56	76.59	1719.51	0.68
42	4254.00	89.50	90.60	2689.45	1813.52	75.86	1812.49	0.72
43	4348.00	90.20	90.60	2689.70	1907.48	74.88	1906.49	0.74
44	4442.00	90.70	90.30	2688.96	2001.45	74.14	2000.48	0.62
45	4536.00	89.00	90.70	2689.21	2095.42	73.32	2094.47	1.86
46	4629.00	89.20	90.60	2690.67	2188.37	72.26	2187.46	0.24
47	4723.00	88.30	89.90	2692.72	2282.32	71.85	2281.43	1.21
48	4816.00	88.50	89.50	2695.32	2375.28	72.34	2374.39	0.48
49	4910.00	88.70	88.80	2697.61	2469.25	73.73	2468.36	0.77
50	5004.00	89.10	88.70	2699.42	2563.23	75.78	2562.32	0.44

COG Operating LLC

Eddy County, NM

Patton 5 Fee 4H

Patton 5 Fee 4H

Wellbore #1

Survey: Survey #2

Standard Survey Report

08 January, 2013



Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Patton 5 Fee 4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3385.00ft (Silver Oak #8)
Site:	Patton 5 Fee 4H	MD Reference:	WELL @ 3385.00ft (Silver Oak #8)
Well:	Patton 5 Fee 4H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Houston R5000 Database

Project:	Eddy County, NM	System Datum:	Mean Sea Level
Map System:	US State Plane 1927 (Exact solution)		
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site:	Patton 5 Fee 4H		
Site Position:		Northings:	614,892.20 ft
From:	Map	Easting:	475,942.20 ft
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in
		Grid Convergence:	-0.04 °

Well:	Patton 5 Fee 4H		
Well Position	+N/-S	0.00 ft	Northings:
	+E/-W	0.00 ft	Easting:
Position Uncertainty	0.00 ft	Wellhead Elevation:	ft
		Ground Level:	3,368.00 ft

Wellbore:	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination
	IGRF2010	4/23/2012	7.90
			Dip Angle
			60.45
			Field Strength
			48,717

Design:	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(ft)	(ft)	(ft)
	0.00	0.00	0.00
			89.03

Survey Program	Date	1/8/2013	
From	To	Survey (Wellbore)	Tool Name
(ft)	(ft)		Description
100.00	2,063.00	Gyro Surveys (Wellbore #1)	Good_mag
2,100.00	5,064.00	Survey #2 (Wellbore #1)	Good_mag

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Built Rate (°/100ft)	Turn Rate (°/100ft)
2,063.00	0.39	175.99	2,062.78	-27.33	1.42	0.96	0.00	0.00	0.00
2,100.00	0.40	197.60	2,099.78	-27.57	1.39	0.92	0.40	0.03	58.41
2,131.00	1.00	89.60	2,130.78	-27.68	1.63	1.16	3.83	1.94	-348.39
2,162.00	4.20	68.20	2,161.75	-27.25	2.95	2.49	10.61	10.32	-69.03
2,193.00	7.70	70.10	2,192.57	-26.12	5.96	5.52	11.31	11.29	6.13
2,224.00	11.30	67.60	2,223.14	-24.26	10.72	10.31	11.69	11.81	-8.06
2,256.00	14.50	65.90	2,254.33	-21.43	17.28	16.92	10.07	10.00	-5.31
2,287.00	18.00	64.70	2,284.09	-17.79	25.16	24.85	11.34	11.29	-3.87
2,318.00	21.00	65.80	2,313.31	-13.47	34.56	34.32	9.75	9.68	3.55
2,349.00	24.60	68.30	2,341.88	-8.81	45.62	45.47	12.02	11.61	8.06

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Patton 5 Fee 4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3386.00ft (Silver Oak #8)
Site:	Patton 5 Fee 4H	MD Reference:	WELL @ 3386.00ft (Silver Oak #8)
Well:	Patton 5 Fee 4H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Houston R5000 Database

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)
2,300.00	28.10	70.20	2,369.66	-3.94	58.49	58.41	11.81	11.29	8.13
2,411.00	31.80	71.00	2,396.51	1.19	73.09	73.10	12.00	11.94	2.58
2,443.00	35.30	71.70	2,423.18	6.84	89.84	89.94	11.00	10.94	2.19
2,474.00	39.00	71.50	2,447.88	12.75	107.60	107.80	11.94	11.94	-0.65
2,505.00	41.90	71.20	2,471.47	19.16	126.66	126.98	9.38	9.35	-0.97
2,536.00	45.10	71.60	2,493.95	25.98	146.88	147.30	10.36	10.32	1.29
2,567.00	48.50	71.70	2,515.17	33.10	168.32	168.86	10.97	10.97	0.32
2,598.00	51.60	73.40	2,535.08	40.21	190.99	191.65	10.85	10.00	5.48
2,630.00	54.60	74.90	2,554.29	47.20	215.61	216.38	10.10	9.38	4.69
2,661.00	57.90	76.10	2,571.51	53.64	240.56	241.43	11.12	10.65	3.87
2,692.00	61.00	77.90	2,587.27	59.64	266.57	267.54	11.18	10.00	5.81
2,724.00	64.00	80.40	2,602.04	64.98	294.44	295.50	11.66	9.38	7.81
2,755.00	67.20	82.30	2,614.85	69.21	322.35	323.47	11.73	10.32	6.13
2,787.00	69.40	84.00	2,626.68	72.76	351.86	353.05	8.46	6.88	5.31
2,818.00	72.20	85.30	2,636.87	75.48	381.01	382.23	9.86	9.03	4.19
2,849.00	74.70	86.20	2,645.70	77.68	410.64	411.90	8.53	8.06	2.90
2,880.00	77.50	86.30	2,653.15	79.65	440.67	441.95	9.04	9.03	0.32
2,911.00	79.30	87.00	2,659.38	81.43	470.98	472.29	6.21	5.81	2.26
2,942.00	81.30	88.60	2,664.61	82.60	501.51	502.84	8.22	6.45	5.16
3,036.00	86.30	91.60	2,674.76	82.42	594.92	596.23	6.19	5.32	3.19
3,130.00	89.40	91.50	2,678.28	79.88	688.81	690.06	3.30	3.30	-0.11
3,224.00	89.80	91.20	2,678.94	77.67	782.78	783.98	0.53	0.43	-0.32
3,319.00	90.10	90.60	2,679.02	76.18	877.77	878.93	0.71	0.32	-0.63
3,412.00	90.00	90.40	2,678.94	75.36	970.76	971.90	0.24	-0.11	-0.22
3,506.00	90.30	89.90	2,678.69	75.12	1,064.76	1,065.88	0.62	0.32	-0.53
3,600.00	90.70	89.90	2,677.87	75.28	1,158.76	1,159.87	0.43	0.43	0.00
3,693.00	91.30	89.90	2,676.25	75.44	1,251.74	1,252.84	0.65	0.65	0.00
3,787.00	89.10	90.00	2,675.92	75.53	1,345.74	1,346.82	2.34	-2.34	0.11
3,880.00	87.20	89.40	2,678.93	76.01	1,438.68	1,439.76	2.14	-2.04	-0.85
3,974.00	87.90	89.90	2,682.94	76.59	1,532.59	1,533.67	0.91	0.74	0.53
4,067.00	88.40	89.90	2,685.95	76.75	1,625.55	1,626.61	0.54	0.54	0.00
4,161.00	88.90	90.30	2,688.16	76.58	1,719.52	1,720.57	0.68	0.53	0.43
4,254.00	89.50	90.60	2,689.46	75.85	1,812.51	1,813.53	0.72	0.65	0.32
4,348.00	90.20	90.60	2,689.71	74.87	1,906.50	1,907.49	0.74	0.74	0.00
4,442.00	90.70	90.30	2,688.97	74.13	2,000.49	2,001.46	0.62	0.53	-0.32
4,536.00	89.00	90.70	2,689.21	73.31	2,094.49	2,095.43	1.86	-1.81	0.43
4,629.00	89.20	90.60	2,690.87	72.26	2,187.47	2,188.38	0.24	0.22	-0.11
4,723.00	88.30	89.90	2,692.72	71.85	2,281.44	2,282.33	1.21	-0.96	-0.74
4,816.00	88.50	89.50	2,695.32	72.33	2,374.41	2,375.29	0.48	0.22	-0.43
4,910.00	88.70	88.80	2,697.62	73.73	2,468.37	2,469.28	0.77	0.21	-0.74
5,004.00	89.10	88.70	2,699.42	75.78	2,562.33	2,563.24	0.44	0.43	-0.11
Last Survey @ 5004.00 MD, 2699.42 TVD, 89.10° INC, 88.70° AZ									
5,064.00	88.10	88.70	2,700.36	77.14	2,622.30	2,623.23	0.00	0.00	0.00

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Patton 5 Fee 4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3388.00ft (Silver Oak #8)
Site:	Patton 5 Fee 4H	MD Reference:	WELL @ 3388.00ft (Silver Oak #8)
Well:	Patton 5 Fee 4H	North Reference:	Gnd
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Houston R5000 Database

Survey									
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)
Straight line Projection to TD @ 5064.00' MD, 2700.36' TVD									

Survey Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
5,004.00	2,699.42	75.78	2,562.33	Last Survey @ 5004.00' MD, 2699.42' TVD, 88.10° INC, 88.70° AZ
5,084.00	2,700.36	77.14	2,622.30	Straight line Projection to TD @ 5064.00' MD, 2700.36' TVD

Checked By: _____	Approved By: _____	Date: _____
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Survey Report

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Well:	Patton 5 Fee 4H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Houston R5000 Database

Project:	Eddy County, NM	System Datum:	Mean Sea Level
Map System:	US State Plane 1927 (Exact solution)		
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site:	Patton 5 Fee 4H				
Site Position:		Northing:	614,892.20 ft	Latitude:	32.6904098
From:	Map	Easting:	475,942.20 ft	Longitude:	-104.4115351
Position Uncertainty:	0.00 ft	Slot Radius:	13.200 in	Grid Convergence:	-0.04 °

Well	Patton 5 Fee 4H					
Well Position	+N/-S	0.00 ft	Northing:	614,892.20 ft	Latitude:	32.6904098
	+E/-W	0.00 ft	Easting:	475,942.20 ft	Longitude:	-104.4115351
Position Uncertainty		0.00 ft	Wellhead Elevation:	ft	Ground Level:	3,368.00 ft

Wellbore:	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	4/23/2012	7.90	60.45	48,717

Design:	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00		89.03

Survey Program	Date	1/8/2013			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100.00	2,063.00	Gyro Surveys (Wellbore #1)	Good_mag	Good Magnetic	
2,100.00	5,064.00	Survey #2 (Wellbore #1)	Good_mag	Good Magnetic	

Measured	Inclination (°)	Azimuth (°)	Vertical	+N/-S (ft)	+E/-W (ft)	Vertical	Oogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
Depth (ft)			Depth (ft)			Section (ft)			
2,063.00	0.39	175.99	2,062.78	-27.33	1.42	0.96	0.00	0.00	0.00
2,100.00	0.40	197.60	2,099.78	-27.57	1.39	0.92	0.40	0.03	58.41
2,131.00	1.00	89.80	2,130.78	-27.68	1.63	1.16	3.83	1.94	-348.39
2,162.00	4.20	68.20	2,161.75	-27.25	2.95	2.49	10.61	10.32	-69.03
2,193.00	7.70	70.10	2,192.57	-26.12	5.96	5.52	11.31	11.29	6.13
2,224.00	11.30	67.60	2,223.14	-24.26	10.72	10.31	11.69	11.61	-8.06
2,256.00	14.50	65.90	2,254.33	-21.43	17.28	16.92	10.07	10.00	-5.31
2,287.00	18.00	64.70	2,284.09	-17.79	25.16	24.85	11.34	11.29	-3.87
2,318.00	21.00	65.80	2,313.31	-13.47	34.56	34.32	9.75	9.68	3.55
2,349.00	24.80	68.30	2,341.88	-8.81	45.62	45.47	12.02	11.61	8.06

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well: Patton 5 Fee 4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3386.00ft (Silver Oak #8)
Site:	Patton 5 Fee 4H	MD Reference:	WELL @ 3386.00ft (Silver Oak #8)
Well:	Patton 5 Fee 4H	North Reference:	Grd
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Houston R5000 Database

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)
2,380.00	28.10	70.20	2,369.66	-3.94	58.49	58.41	11.61	11.29	6.13
2,411.00	31.80	71.00	2,396.51	1.19	73.09	73.10	12.00	11.94	2.58
2,443.00	35.30	71.70	2,423.18	6.84	89.84	89.94	11.00	10.94	2.19
2,474.00	39.00	71.50	2,447.88	12.75	107.60	107.80	11.94	11.94	-0.65
2,505.00	41.90	71.20	2,471.47	19.18	126.66	126.96	9.38	9.35	-0.97
2,536.00	45.10	71.60	2,493.95	25.98	146.88	147.30	10.36	10.32	1.29
2,567.00	48.50	71.70	2,515.17	33.10	168.32	168.86	10.97	10.97	0.32
2,598.00	51.60	73.40	2,535.08	40.21	190.99	191.65	10.85	10.00	5.48
2,630.00	54.60	74.90	2,554.29	47.20	215.61	216.38	10.10	9.38	4.69
2,661.00	57.90	76.10	2,571.51	53.64	240.56	241.43	11.12	10.65	3.87
2,692.00	61.00	77.90	2,587.27	59.64	266.57	267.54	11.18	10.00	5.81
2,724.00	64.00	80.40	2,602.04	64.98	294.44	295.50	11.66	9.38	7.81
2,755.00	67.20	82.30	2,614.85	69.21	322.35	323.47	11.73	10.32	6.13
2,787.00	69.40	84.00	2,626.68	72.76	351.86	353.05	8.46	6.88	5.31
2,818.00	72.20	85.30	2,636.87	75.48	381.01	382.23	9.86	9.03	4.19
2,849.00	74.70	86.20	2,645.70	77.68	410.64	411.90	8.53	8.06	2.80
2,880.00	77.50	86.30	2,653.15	79.65	440.87	441.95	9.04	9.03	0.32
2,911.00	79.30	87.00	2,659.38	81.43	470.98	472.29	6.21	5.81	2.28
2,942.00	81.30	88.60	2,664.61	82.60	501.51	502.84	8.22	8.45	5.16
3,036.00	86.30	91.60	2,674.76	82.42	594.92	596.23	6.19	5.32	3.19
3,130.00	89.40	91.50	2,678.28	79.88	688.81	690.06	3.30	3.30	-0.11
3,224.00	89.80	91.20	2,678.94	77.67	782.78	783.98	0.53	0.43	-0.32
3,319.00	90.10	90.90	2,679.02	76.18	877.77	878.93	0.71	0.32	-0.63
3,412.00	90.00	90.40	2,678.94	75.36	970.76	971.90	0.24	-0.11	-0.22
3,506.00	90.30	89.90	2,678.68	75.12	1,064.76	1,065.88	0.62	0.32	-0.53
3,600.00	90.70	89.90	2,677.87	75.28	1,158.76	1,159.87	0.43	0.43	0.00
3,693.00	91.30	89.90	2,676.25	75.44	1,251.74	1,252.84	0.65	0.65	0.00
3,787.00	89.10	90.00	2,675.92	75.53	1,345.74	1,346.82	2.34	-2.34	0.11
3,880.00	87.20	89.40	2,678.93	76.01	1,438.68	1,439.76	2.14	-2.04	-0.65
3,974.00	87.90	89.90	2,682.94	76.59	1,532.59	1,533.67	0.91	0.74	0.53
4,067.00	88.40	89.90	2,685.95	76.75	1,625.55	1,626.61	0.54	0.54	0.00
4,161.00	88.90	90.30	2,688.16	76.58	1,719.52	1,720.57	0.68	0.53	0.43
4,254.00	89.50	90.60	2,689.46	75.85	1,812.51	1,813.53	0.72	0.65	0.32
4,348.00	90.20	90.60	2,689.71	74.87	1,906.50	1,907.49	0.74	0.74	0.00
4,442.00	90.70	90.30	2,688.97	74.13	2,000.49	2,001.46	0.62	0.53	-0.32
4,536.00	89.00	90.70	2,689.21	73.31	2,094.49	2,095.43	1.86	-1.81	0.43
4,629.00	89.20	90.60	2,690.67	72.26	2,187.47	2,188.38	0.24	0.22	-0.11
4,723.00	88.30	89.90	2,692.72	71.85	2,281.44	2,282.33	1.21	-0.96	-0.74
4,816.00	88.50	89.50	2,695.32	72.33	2,374.41	2,375.29	0.48	0.22	-0.43
4,910.00	88.70	88.80	2,697.62	73.73	2,468.37	2,469.26	0.77	0.21	-0.74
5,004.00	89.10	88.70	2,699.42	75.78	2,562.33	2,563.24	0.44	0.43	-0.11
Last Survey @ 5004.00' MD; 2699.42' TVD, 89.10° INC, 88.70° AZ									
5,064.00	89.10	88.70	2,700.36	77.14	2,622.30	2,623.23	0.00	0.00	0.00

Survey Report

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Patton 5 Fee 4H
Project:	Eddy County, NM	TVD Reference:	WELL @ 3386.00ft (Silver Oak #8)
Site:	Patton 5 Fee 4H	MD Reference:	WELL @ 3386.00ft (Silver Oak #8)
Well:	Patton 5 Fee 4H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Houston R5000 Database

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)
Straight line Projection to TD @ 5064.00' MD, 2700.36' TVD.									

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
5,004.00	2,699.42	75.78	2,562.33	Last Survey @ 5004.00' MD, 2699.42' TVD, 89.10° INC, 88.70° AZ
5,064.00	2,700.36	77.14	2,622.30	Straight line Projection to TD @ 5064.00' MD, 2700.36' TVD,

Checked By: _____	Approved By: _____	Date: _____
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