



COG Operating LLC

15-39798

Eddy County, NM

Trigg 5 Federal Com 1H

Trigg 5 Federal Com 1H

Wellbore #1

Design: Original Hole

Standard Survey Report

01 October, 2012



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Trigg 5 Federal Com 1H
Project:	Eddy County NM	TVD Reference:	WELL @ 4098.0usft (Silver Oak #12)
Site:	Trigg 5 Federal Com 1H	MD Reference:	WELL @ 4098.0usft (Silver Oak #12)
Well:	Trigg 5 Federal Com 1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Original Hole	Database:	Houston R5000 Database

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		Trigg 5 Federal Com 1H			
Site Position:		Northings:	714,671.17 usft	Latitude:	32° 57' 50.222 N
From:	Map	Easting:	632,945.44 usft	Longitude:	103° 53' 59.552 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.24 °

Well	Trigg 5 Federal Com 1H					
Well Position	+N/-S	0.0 usft	Northings:	714,671.17 usft	Latitude:	32° 57' 50.222 N
	+E/-W	0.0 usft	Easting:	632,945.44 usft	Longitude:	103° 53' 59.552 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,050.0 usft

Wellbore		Wellbore #1			
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	7/24/2012	7.66	60.79	48,909

Design		Original Hole	
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
			89.82

Survey Program		Date	10/1/2012	
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	7,642.0	VES Gyro (Wellbore #1)	Good_gyro	Good Gyro
7,660.0	12,534.0	MWD Surveys (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)
	0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
	100.0	0.32	192.53	100.0	-0.3	-0.1	-0.1	0.32	0.32	0.00
	200.0	0.24	232.68	200.0	-0.7	-0.3	-0.3	0.21	-0.08	40.15
	300.0	0.30	224.79	300.0	-1.0	-0.6	-0.6	0.07	0.06	-7.89
	400.0	0.31	237.77	400.0	-1.3	-1.1	-1.1	0.07	0.01	12.98
	500.0	0.47	227.05	500.0	-1.7	-1.6	-1.6	0.18	0.16	-10.72
	600.0	0.69	231.08	600.0	-2.4	-2.3	-2.4	0.22	0.22	4.03
	700.0	0.85	228.76	700.0	-3.3	-3.4	-3.4	0.16	0.16	-2.32
	800.0	0.82	231.45	800.0	-4.2	-4.5	-4.5	0.05	-0.03	2.69
	900.0	0.96	220.32	900.0	-5.3	-5.6	-5.6	0.22	0.14	-11.13



Survey Report



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Well:	Trigg 5 Federal Com 1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Original Hole	Database:	Houston R5000 Database

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)
1,000.0	0.89	239.48	999.9	-6.3	-6.8	-6.8	0.32	-0.07	19.16
1,100.0	0.51	227.99	1,099.9	-7.0	-7.8	-7.8	0.40	-0.38	-11.49
1,200.0	0.38	196.27	1,199.9	-7.6	-8.2	-8.3	0.27	-0.13	-31.72
1,300.0	0.19	228.02	1,299.9	-8.1	-8.4	-8.5	0.24	-0.19	31.75
1,400.0	0.48	80.31	1,399.9	-8.1	-8.2	-8.2	0.65	0.29	-147.71
1,500.0	0.88	85.84	1,499.9	-8.0	-7.0	-7.0	0.40	0.40	5.53
1,600.0	1.01	73.16	1,599.9	-7.7	-5.4	-5.4	0.25	0.13	-12.68
1,700.0	1.10	82.24	1,699.9	-7.3	-3.6	-3.6	0.19	0.09	9.08
1,800.0	1.07	47.32	1,799.9	-6.5	-1.9	-2.0	0.65	-0.03	-34.92
1,900.0	0.57	80.27	1,899.9	-5.8	-0.8	-0.8	0.67	-0.50	32.95
2,000.0	0.56	50.15	1,999.9	-5.4	0.1	0.1	0.29	-0.01	-30.12
2,100.0	0.32	99.67	2,099.9	-5.1	0.8	0.7	0.43	-0.24	49.52
2,200.0	0.31	27.09	2,199.9	-4.9	1.2	1.1	0.37	-0.01	-72.58
2,300.0	0.13	92.06	2,299.9	-4.7	1.4	1.4	0.28	-0.18	64.97
2,400.0	0.11	328.42	2,399.9	-4.6	1.5	1.4	0.21	-0.02	-123.64
2,500.0	0.07	356.67	2,499.9	-4.5	1.4	1.4	0.06	-0.04	28.25
2,600.0	0.28	266.23	2,599.9	-4.4	1.2	1.1	0.29	0.21	-90.44
2,700.0	0.29	272.29	2,699.9	-4.4	0.7	0.6	0.03	0.01	6.06
2,800.0	0.20	298.71	2,799.8	-4.3	0.3	0.2	0.14	-0.09	26.42
2,900.0	0.27	300.31	2,899.8	-4.1	-0.1	-0.1	0.07	0.07	1.60
3,000.0	0.68	265.64	2,999.8	-4.1	-0.9	-0.9	0.48	0.41	-34.67
3,100.0	0.51	285.30	3,099.8	-4.0	-1.9	-1.9	0.26	-0.17	19.66
3,200.0	0.67	287.28	3,199.8	-3.7	-2.9	-2.9	0.16	0.16	1.98
3,300.0	0.50	265.92	3,299.8	-3.6	-3.9	-3.9	0.27	-0.17	-21.36
3,400.0	0.67	282.06	3,399.8	-3.5	-4.9	-4.9	0.24	0.17	16.14
3,500.0	0.51	293.36	3,499.8	-3.2	-5.9	-5.9	0.20	-0.16	11.30
3,600.0	0.68	286.92	3,599.8	-2.8	-6.9	-6.9	0.18	0.17	-6.44
3,700.0	0.66	298.12	3,699.8	-2.4	-7.9	-7.9	0.13	-0.02	11.20
3,800.0	0.60	301.01	3,799.8	-1.8	-8.9	-8.9	0.07	-0.06	2.89
3,900.0	0.74	259.18	3,899.8	-1.7	-10.0	-10.0	0.50	0.14	-41.83
4,000.0	0.58	316.38	3,999.8	-1.4	-11.0	-11.0	0.65	-0.16	57.20
4,100.0	0.50	280.33	4,099.8	-1.0	-11.7	-11.7	0.34	-0.08	-36.05
4,200.0	0.24	316.91	4,199.8	-0.8	-12.3	-12.3	0.34	-0.26	36.58
4,300.0	0.32	305.37	4,299.8	-0.5	-12.7	-12.7	0.10	0.08	-11.54
4,400.0	0.33	290.05	4,399.8	-0.2	-13.2	-13.2	0.09	0.01	-15.32
4,500.0	0.18	334.20	4,499.8	0.0	-13.5	-13.5	0.24	-0.15	44.15
4,600.0	0.27	303.00	4,599.8	0.3	-13.8	-13.8	0.15	0.09	-31.20
4,700.0	0.30	295.96	4,699.8	0.6	-14.2	-14.2	0.05	0.03	-7.04
4,800.0	0.26	282.07	4,799.8	0.7	-14.7	-14.7	0.08	-0.04	-13.89
4,900.0	0.28	294.86	4,899.8	0.9	-15.1	-15.1	0.06	0.02	12.79
5,000.0	0.27	270.00	4,999.8	1.0	-15.6	-15.6	0.12	-0.01	-24.86
5,100.0	0.14	260.72	5,099.8	1.0	-15.9	-15.9	0.13	-0.13	-9.28
5,200.0	0.27	201.21	5,199.8	0.7	-16.1	-16.1	0.23	0.13	-59.51

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Design:	Original Hole	Database:	Houston R5000 Database

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)
5,300.0	0.27	247.47	5,299.8	0.4	-16.4	-16.4	0.21	0.00	46.26
5,400.0	0.25	259.58	5,399.8	0.3	-16.9	-16.9	0.06	-0.02	12.11
5,500.0	0.18	302.12	5,499.8	0.3	-17.2	-17.2	0.17	-0.07	42.54
5,600.0	0.30	304.06	5,599.8	0.5	-17.6	-17.6	0.12	0.12	1.94
5,700.0	0.15	272.63	5,699.8	0.7	-17.9	-17.9	0.19	-0.15	-31.43
5,800.0	0.31	266.32	5,799.8	0.7	-18.3	-18.3	0.16	0.16	-6.31
5,900.0	0.19	267.22	5,899.8	0.7	-18.8	-18.8	0.12	-0.12	0.90
6,000.0	0.51	294.92	5,999.8	0.8	-19.3	-19.3	0.35	0.32	27.70
6,100.0	0.46	285.72	6,099.8	1.1	-20.1	-20.1	0.09	-0.05	-9.20
6,200.0	0.78	277.54	6,199.7	1.3	-21.2	-21.2	0.33	0.32	-8.18
6,300.0	0.93	260.28	6,299.7	1.3	-22.7	-22.7	0.30	0.15	-17.26
6,400.0	0.79	273.80	6,399.7	1.2	-24.1	-24.1	0.25	-0.14	13.52
6,500.0	0.99	336.14	6,499.7	2.0	-25.2	-25.2	0.94	0.20	62.34
6,600.0	0.92	246.27	6,599.7	2.5	-26.3	-26.3	1.35	-0.07	-89.87
6,700.0	1.04	254.16	6,699.7	1.9	-27.9	-27.9	0.18	0.12	7.89
6,800.0	0.91	233.99	6,799.7	1.2	-29.4	-29.4	0.36	-0.13	-20.17
6,900.0	0.73	202.61	6,899.7	0.2	-30.3	-30.3	0.48	-0.18	-31.38
7,000.0	0.60	300.43	6,999.7	-0.2	-31.0	-31.0	1.01	-0.13	97.82
7,100.0	0.58	223.12	7,099.7	-0.3	-31.8	-31.8	0.74	-0.02	-77.31
7,200.0	0.44	265.78	7,199.7	-0.7	-32.5	-32.5	0.39	-0.14	42.66
7,300.0	0.20	1.54	7,299.7	-0.5	-32.9	-32.9	0.50	-0.24	95.76
7,400.0	0.11	278.69	7,399.7	-0.3	-33.0	-33.0	0.22	-0.09	-82.85
7,500.0	0.29	111.71	7,499.7	-0.4	-32.8	-32.8	0.40	0.18	-166.98
7,600.0	0.42	138.53	7,599.6	-0.8	-32.3	-32.3	0.21	0.13	26.82
7,642.0	0.45	130.77	7,641.7	-1.0	-32.1	-32.1	0.16	0.08	-18.45
7,660.0	2.20	83.90	7,659.6	-1.0	-31.7	-31.7	10.68	9.73	-260.99
7,692.0	8.20	80.60	7,691.5	-0.6	-28.9	-28.9	18.77	18.75	-10.31
7,724.0	14.90	82.20	7,722.8	0.4	-22.5	-22.5	20.96	20.94	5.00
7,755.0	17.40	83.50	7,752.6	1.4	-14.0	-14.0	8.15	8.06	4.19
7,787.0	19.00	86.40	7,783.0	2.3	-4.0	-4.0	5.74	5.00	9.06
7,818.0	20.50	89.90	7,812.2	2.6	6.5	6.5	6.16	4.84	11.29
7,849.0	21.70	93.60	7,841.1	2.3	17.6	17.6	5.78	3.87	11.94
7,881.0	22.90	93.20	7,870.7	1.6	29.7	29.7	3.78	3.75	-1.25
7,913.0	25.10	92.50	7,899.9	0.9	42.7	42.7	6.93	6.88	-2.19
7,945.0	27.00	89.10	7,928.7	0.7	56.8	56.8	7.55	5.94	-10.63
7,977.0	29.50	91.30	7,956.9	0.7	71.9	71.9	8.46	7.81	6.88
8,009.0	32.80	92.60	7,984.3	0.1	88.4	88.4	10.52	10.31	4.06
8,040.0	38.10	92.80	8,009.5	-0.8	106.4	106.4	17.10	17.10	0.65
8,072.0	43.30	92.10	8,033.8	-1.6	127.2	127.2	16.31	16.25	-2.19
8,104.0	46.30	92.10	8,056.5	-2.5	149.8	149.8	9.38	9.38	0.00
8,136.0	50.00	90.80	8,077.8	-3.1	173.6	173.6	11.95	11.56	-4.06
8,167.0	53.80	90.20	8,096.9	-3.3	198.0	198.0	12.35	12.26	-1.94
8,199.0	56.40	91.30	8,115.2	-3.6	224.2	224.2	8.60	8.13	3.44



Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Trigg 5 Federal Com 1H
Project:	Eddy County, NM	TVD Reference:	WELL @ 4098.0usft (Silver Oak #12)
Site:	Trigg 5 Federal Com 1H	MD Reference:	WELL @ 4098.0usft (Silver Oak #12)
Well:	Trigg 5 Federal Com 1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Original Hole	Database:	Houston R5000 Database

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)
8,231.0	59.90	91.30	8,132.1	-4.2	251.4	251.4	10.94	10.94	0.00
8,263.0	63.10	90.90	8,147.4	-4.8	279.5	279.5	10.06	10.00	-1.25
8,294.0	66.20	91.00	8,160.7	-5.2	307.5	307.5	10.00	10.00	0.32
8,325.0	69.40	91.00	8,172.4	-5.7	336.2	336.2	10.32	10.32	0.00
8,357.0	72.60	91.10	8,182.8	-6.3	366.5	366.4	10.00	10.00	0.31
8,389.0	75.60	91.00	8,191.6	-6.9	397.2	397.2	9.38	9.38	-0.31
8,421.0	78.60	90.50	8,198.7	-7.3	428.4	428.4	9.50	9.38	-1.56
8,453.0	80.70	89.90	8,204.4	-7.4	459.9	459.9	6.82	6.56	-1.88
8,485.0	82.50	89.20	8,209.1	-7.1	491.5	491.5	6.03	5.63	-2.19
8,516.0	86.30	89.00	8,212.1	-6.6	522.4	522.4	12.27	12.26	-0.65
8,548.0	91.60	89.30	8,212.7	-6.2	554.4	554.3	16.59	16.56	0.94
8,580.0	92.20	89.20	8,211.7	-5.7	586.3	586.3	1.90	1.88	-0.31
8,612.0	91.90	89.30	8,210.5	-5.3	618.3	618.3	0.99	-0.94	0.31
8,681.0	91.40	90.00	8,208.5	-4.9	687.3	687.3	1.25	-0.72	1.01
8,745.0	91.50	90.00	8,206.9	-4.9	751.3	751.2	0.16	0.16	0.00
8,776.0	91.10	89.90	8,206.2	-4.9	782.3	782.2	1.33	-1.29	-0.32
8,840.0	91.00	89.50	8,205.0	-4.5	846.2	846.2	0.64	-0.16	-0.63
8,903.0	89.80	89.70	8,204.6	-4.1	909.2	909.2	1.93	-1.90	0.32
8,967.0	89.40	89.70	8,205.0	-3.8	973.2	973.2	0.63	-0.63	0.00
9,030.0	89.10	89.20	8,205.9	-3.2	1,036.2	1,036.2	0.93	-0.48	-0.79
9,094.0	89.00	89.20	8,206.9	-2.3	1,100.2	1,100.2	0.16	-0.16	0.00
9,158.0	88.40	89.50	8,208.4	-1.5	1,164.2	1,164.2	1.05	-0.94	0.47
9,222.0	88.20	89.30	8,210.3	-0.9	1,228.2	1,228.2	0.44	-0.31	-0.31
9,285.0	88.40	89.90	8,212.2	-0.4	1,291.1	1,291.1	1.00	0.32	0.95
9,348.0	88.20	90.30	8,214.0	-0.5	1,354.1	1,354.1	0.71	-0.32	0.63
9,411.0	87.70	90.30	8,216.3	-0.9	1,417.1	1,417.1	0.79	-0.79	0.00
9,506.0	87.60	91.30	8,220.2	-2.2	1,512.0	1,512.0	1.06	-0.11	1.05
9,570.0	87.70	91.00	8,222.8	-3.5	1,575.9	1,575.9	0.49	0.16	-0.47
9,634.0	88.40	91.50	8,225.0	-4.9	1,639.9	1,639.8	1.34	1.09	0.78
9,729.0	89.80	91.70	8,226.5	-7.5	1,734.8	1,734.8	1.49	1.47	0.21
9,792.0	90.00	91.60	8,226.6	-9.3	1,797.8	1,797.7	0.35	0.32	-0.16
9,887.0	90.90	91.40	8,225.8	-11.8	1,892.7	1,892.7	0.97	0.95	-0.21
9,951.0	91.70	90.90	8,224.4	-13.1	1,956.7	1,956.7	1.47	1.25	-0.78
10,016.0	91.90	90.30	8,222.3	-13.8	2,021.7	2,021.6	0.97	0.31	-0.92
10,079.0	92.60	89.30	8,219.9	-13.6	2,084.6	2,084.6	1.94	1.11	-1.59
10,142.0	92.40	89.20	8,217.1	-12.8	2,147.6	2,147.5	0.35	-0.32	-0.16
10,206.0	91.90	89.40	8,214.7	-12.0	2,211.5	2,211.5	0.84	-0.78	0.31
10,301.0	91.20	89.40	8,212.1	-11.0	2,306.5	2,306.4	0.74	-0.74	0.00
10,396.0	90.90	89.30	8,210.4	-9.9	2,401.4	2,401.4	0.33	-0.32	-0.11
10,493.0	91.30	89.40	8,208.5	-8.8	2,498.4	2,498.4	0.43	0.41	0.10
10,588.0	90.70	89.20	8,206.9	-7.6	2,593.4	2,593.4	0.67	-0.63	-0.21
10,683.0	90.50	89.30	8,205.9	-6.4	2,688.4	2,688.4	0.24	-0.21	0.11
10,779.0	90.20	89.90	8,205.3	-5.7	2,784.4	2,784.3	0.70	-0.31	0.63
10,874.0	90.50	89.90	8,204.7	-5.6	2,879.4	2,879.3	0.32	0.32	0.00

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Trigg 5 Federal Com 1H
Project:	Eddy County, NM	TVD Reference:	WELL @ 4098.0usft (Silver Oak #12)
Site:	Trigg 5 Federal Com 1H	MD Reference:	WELL @ 4098.0usft (Silver Oak #12)
Well:	Trigg 5 Federal Com 1H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Original Hole	Database:	Houston R5000 Database

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)
10,970.0	91.10	89.80	8,203.4	-5.3	2,975.4	2,975.3	0.63	0.63	-0.10
11,064.0	90.70	89.60	8,201.9	-4.8	3,069.4	3,069.3	0.48	-0.43	-0.21
11,160.0	90.30	89.70	8,201.1	-4.2	3,165.3	3,165.3	0.43	-0.42	0.10
11,223.0	90.10	89.90	8,200.8	-4.0	3,228.3	3,228.3	0.45	-0.32	0.32
11,253.0	90.20	90.20	8,200.8	-4.0	3,258.3	3,258.3	1.05	0.33	1.00
11,349.0	89.70	90.10	8,200.9	-4.3	3,354.3	3,354.3	0.53	-0.52	-0.10
11,445.0	89.20	90.80	8,201.8	-5.0	3,450.3	3,450.3	0.90	-0.52	0.73
11,495.0	89.20	90.60	8,202.5	-5.7	3,500.3	3,500.3	0.40	0.00	-0.40
11,527.0	90.10	90.90	8,202.7	-6.1	3,532.3	3,532.3	2.96	2.81	0.94
11,559.0	91.10	90.20	8,202.3	-6.4	3,564.3	3,564.3	3.81	3.13	-2.19
11,622.0	92.90	88.80	8,200.1	-5.8	3,627.3	3,627.2	3.62	2.86	-2.22
11,717.0	93.10	88.10	8,195.2	-3.3	3,722.1	3,722.1	0.77	0.21	-0.74
11,813.0	92.70	89.00	8,190.3	-0.8	3,818.0	3,817.9	1.02	-0.42	0.94
11,908.0	92.40	89.70	8,186.1	0.2	3,912.9	3,912.8	0.80	-0.32	0.74
12,003.0	92.60	88.30	8,181.9	1.9	4,007.7	4,007.7	1.49	0.21	-1.47
12,099.0	92.90	87.20	8,177.3	5.7	4,103.6	4,103.6	1.19	0.31	-1.15
12,194.0	91.00	87.60	8,174.1	10.0	4,198.4	4,198.4	2.04	-2.00	0.42
12,290.0	91.10	87.60	8,172.3	14.0	4,294.3	4,294.3	0.10	0.10	0.00
12,385.0	91.30	87.90	8,170.3	17.7	4,389.2	4,389.3	0.38	0.21	0.32
12,534.0	91.30	87.90	8,167.0	23.2	4,538.1	4,538.1	0.00	0.00	0.00
BHL - 12534.0' MD, 8167.0' TVD, 91.30° INC, 87.90° AZI, 23.2' N, 4538.1' E, 4538.1' VS									

Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
12,534.0	8,167.0	23.2	4,538.1	BHL - 12534.0' MD, 8167.0' TVD, 91.30° INC, 87.90° AZI, 23.2' N, 4538.1' E, 4538.1' VS

Checked By: _____ Approved By: _____ Date: _____