



A GYRO TECHNOLOGIES INC. COMPANY

PO Box 261021
Corpus Christi, Texas 78426
(361) 767-0602 • (800) 606-GYRO • Fax (361) 767-0612

30-015-42029

April 17, 2014

COG Operating LLC (Concho)
One Concho Center
600 W. Illinois Avenue
Midland, TX 79701

Attn: Kanicia Castillo

Re: **Kudu Fee No 001H**

Please find enclosed a copy of the survey from 0' to 5,200' ran on the above referenced well.

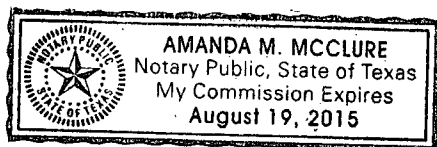
If I can be of any further service, please do not hesitate to call me at 800-606-4976.

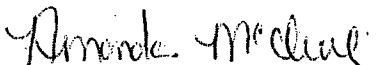
Sincerely,


Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 17 day of April,
A.D., 2014, by Keith Havelka.




Amanda McClure
Notary Public, State of Texas



Company: COG Operating-Concho
Lease/Well: Kudu Fee/No 001H
Location: Sec13 T24S R27E
Rig Name: Patriot 2
State/County: New Mexico/Eddy
Latitude: 32.21, Longitude: -104.14
GRID North is 0.10 Degrees East of True North
VS-Azi: 0.00 Degrees



Depth Reference : RKB = 17 Feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: kudu fee #1h gyro-de_01.ut

Minimum Curvature Method

Report Date/Time: 4/17/2014 / 13:06

VES Survey International

West Texas

Surveyor: Chris Bankson

432-563-5444

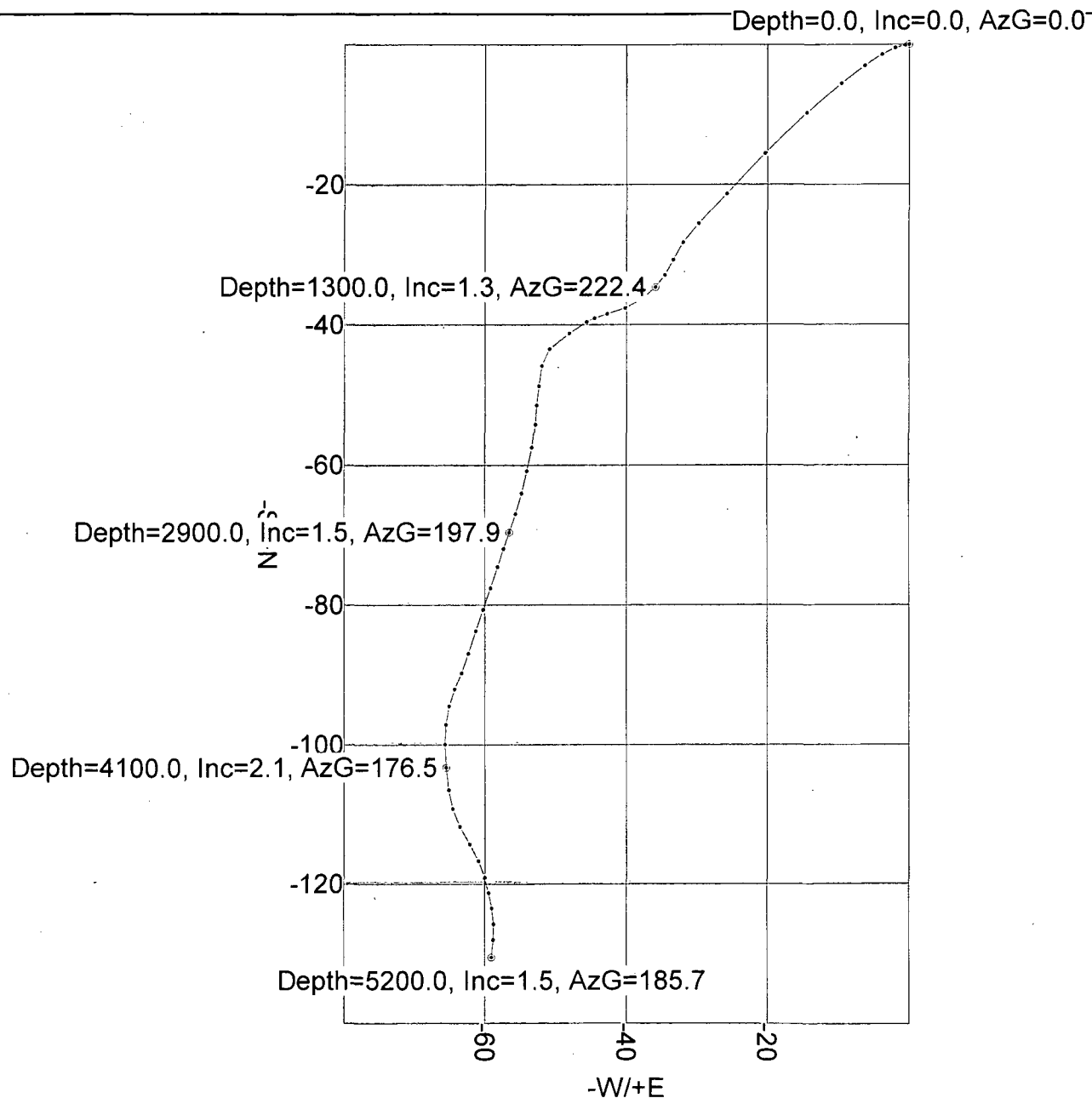
Kudu Fee No 001H / API 30-015-42029

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section 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	0.00	****
100.00	0.70	260.01	100.00	-0.11	-0.60	-0.11	0.61	260.01	0.70
200.00	0.93	249.39	199.99	-0.50	-1.97	-0.50	2.03	255.78	0.27
300.00	1.45	240.56	299.97	-1.41	-3.83	-1.41	4.08	249.85	0.55
400.00	1.91	232.80	399.92	-3.03	-6.25	-3.03	6.95	244.14	0.51
500.00	2.87	231.54	499.83	-5.59	-9.53	-5.59	11.05	239.61	0.96
600.00	4.56	228.57	599.62	-9.77	-14.47	-9.77	17.46	235.96	1.70
700.00	4.94	223.03	699.28	-15.55	-20.38	-15.55	25.64	232.66	0.60
800.00	4.15	222.71	798.96	-21.35	-25.77	-21.35	33.47	230.36	0.80
900.00	2.47	223.24	898.79	-25.58	-29.70	-25.58	39.20	229.26	1.67
1000.00	1.55	214.21	998.73	-28.27	-31.94	-28.27	42.65	228.49	0.97
1100.00	1.72	205.74	1098.69	-30.74	-33.35	-30.74	45.36	227.33	0.29
1200.00	1.14	212.59	1198.66	-32.93	-34.54	-32.93	47.72	226.37	0.60
1300.00	1.34	222.37	1298.64	-34.63	-35.86	-34.63	49.86	226.00	0.29
1400.00	1.61	233.41	1398.60	-36.33	-37.78	-36.33	52.42	226.12	0.39
1500.00	1.53	250.83	1498.57	-37.61	-40.17	-37.61	55.03	226.88	0.48
1600.00	1.51	253.18	1598.53	-38.43	-42.69	-38.43	57.44	228.01	0.07
1700.00	0.68	246.63	1698.51	-39.05	-44.50	-39.05	59.20	228.73	0.84
1800.00	0.74	239.02	1798.50	-39.61	-45.59	-39.61	60.40	229.02	0.11

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	2.64	237.06	1898.46	-41.19	-48.08	-41.19	63.31	229.41	1.91
2000.00	1.55	221.06	1998.39	-43.47	-50.90	-43.47	66.93	229.50	1.23
2100.00	1.59	188.42	2098.35	-45.86	-51.99	-45.86	69.33	228.59	0.88
2200.00	1.77	188.61	2198.31	-48.76	-52.42	-48.76	71.59	227.08	0.18
2300.00	1.38	184.68	2298.27	-51.49	-52.75	-51.49	73.71	225.70	0.41
2400.00	1.76	183.37	2398.23	-54.22	-52.94	-54.22	75.78	224.32	0.38
2500.00	2.04	191.79	2498.18	-57.50	-53.40	-57.50	78.47	222.88	0.39
2600.00	1.90	191.31	2598.12	-60.86	-54.09	-60.86	81.42	221.63	0.15
2700.00	1.85	194.07	2698.07	-64.04	-54.80	-64.04	84.29	220.55	0.10
2800.00	1.69	199.35	2798.02	-67.00	-55.68	-67.00	87.12	219.73	0.22
2900.00	1.47	197.87	2897.98	-69.62	-56.57	-69.62	89.70	219.10	0.22
3000.00	1.39	199.18	2997.95	-71.99	-57.36	-71.99	92.04	218.55	0.09
3100.00	1.76	198.03	3097.91	-74.59	-58.23	-74.59	94.63	217.98	0.36
3200.00	1.86	199.07	3197.86	-77.58	-59.24	-77.58	97.61	217.36	0.11
3300.00	1.85	197.49	3297.81	-80.66	-60.25	-80.66	100.68	216.76	0.05
3400.00	1.85	199.19	3397.76	-83.72	-61.27	-83.72	103.74	216.20	0.06
3500.00	2.01	196.27	3497.70	-86.92	-62.29	-86.92	106.94	215.63	0.18
3600.00	1.42	203.95	3597.66	-89.74	-63.28	-89.74	109.81	215.19	0.63
3700.00	1.42	201.81	3697.63	-92.02	-64.25	-92.02	112.23	214.92	0.05
3800.00	1.52	193.01	3797.59	-94.46	-65.01	-94.46	114.67	214.53	0.25
3900.00	1.54	186.83	3897.56	-97.09	-65.46	-97.09	117.10	213.99	0.17
4000.00	1.72	178.45	3997.52	-99.93	-65.58	-99.93	119.53	213.28	0.30
4100.00	2.07	176.53	4097.46	-103.23	-65.43	-103.23	122.22	212.37	0.36
4200.00	1.67	169.76	4197.41	-106.47	-65.07	-106.47	124.78	211.43	0.46
4300.00	1.49	167.51	4297.37	-109.17	-64.53	-109.17	126.81	210.59	0.19
4400.00	1.71	151.04	4397.33	-111.74	-63.52	-111.74	128.54	209.62	0.51
4500.00	1.61	150.65	4497.29	-114.28	-62.11	-114.28	130.06	208.52	0.10
4600.00	1.47	156.10	4597.25	-116.68	-60.90	-116.68	131.61	207.56	0.20
4700.00	1.45	163.59	4697.22	-119.06	-60.02	-119.06	133.34	206.75	0.19
4800.00	1.19	166.76	4797.19	-121.29	-59.43	-121.29	135.06	206.10	0.26
4900.00	1.37	171.58	4897.17	-123.49	-59.01	-123.49	136.86	205.54	0.21
5000.00	1.25	176.38	4997.14	-125.76	-58.77	-125.76	138.81	205.05	0.16
5100.00	1.37	185.62	5097.12	-128.04	-58.82	-128.04	140.90	204.67	0.24
5200.00	1.50	185.70	5197.09	-130.53	-59.07	-130.53	143.27	204.35	0.12



VES Survey International
West Texas
Surveyor: Chris Bankson
432-563-5444
Kudu Fee No 001H / API 30-015-42029



VES Survey Date: 04/09/2014



Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Kudu Fee Well No. 1
Project:	Eddy County, New Mexico	TVD Reference:	RKB=3117.1+17 @ 3134.10usft (Patriot 2)
Site:	Kudu Fee	MD Reference:	RKB=3117.1+17 @ 3134.10usft (Patriot 2)
Well:	Kudu Fee Well No. 1	North Reference:	Grid
Wellbore:	Original hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original hole	Database:	EDM 5000.1 Ddatabase

Project	Eddy County, New Mexico		
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	Kudu Fee				
Site Position:		Northing:	440,411.00 usft	Latitude:	32.21066306
From:	Map	Easting:	558,989.60 usft	Longitude:	-104.14260384
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.10 °

Well	Kudu Fee Well No. 1				
Well Position	+N/-S	0.00 usft	Northing:	440,411.00 usft	Latitude: 32.21066306
	+E/-W	0.00 usft	Easting:	558,989.60 usft	Longitude: -104.14260384
Position Uncertainty		0.00 usft	Wellhead Elevation:	usft	Ground Level: 3,117.10 usft

Wellbore	Original hole				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	3/31/2014	7.50	60.01	48,269

Design	Surveys Original hole				
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	2.25	

Survey Program	Date	4/20/2014			
From	To	Survey (Wellbore)	Tool Name	Description	
(usft)	(usft)				
100.00	5,200.00	Gyro (Original hole)	NS-GYRO-MS	North sensing gyrocompassing m/s	
5,266.00	10,592.00	MWD TIP=5200 (Original hole)	MWD	MWD - Standard	

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Map	Map	Latitude	Longitude
Depth	(°)	(°)	Depth	(usft)	(usft)	Northing	Easting		
(usft)			(usft)			(usft)	(usft)		
0.00	0.00	0.00	0.00	0.00	0.00	440,411.00	558,989.60	32.21066306	-104.14260384
100.00	0.70	260.01	100.00	-0.11	-0.60	440,410.89	558,989.00	32.21066277	-104.14260578
Gyro									
200.00	0.93	249.39	199.99	-0.50	-1.96	440,410.50	558,987.64	32.21066170	-104.14261019
300.00	1.45	240.56	299.97	-1.41	-3.82	440,409.59	558,985.78	32.21065922	-104.14261621
400.00	1.91	232.80	399.92	-3.03	-6.25	440,407.97	558,983.35	32.21065475	-104.14262407
500.00	2.87	231.54	499.83	-5.60	-9.54	440,405.40	558,980.06	32.21064772	-104.14263472
600.00	4.56	228.57	599.62	-9.79	-14.48	440,401.21	558,975.12	32.21063623	-104.14265072
700.00	4.94	223.03	699.28	-15.56	-20.40	440,395.43	558,969.20	32.21062037	-104.14266989
800.00	4.15	222.71	798.96	-21.37	-25.79	440,389.63	558,963.81	32.21060444	-104.14268736
900.00	2.47	223.24	898.79	-25.60	-29.72	440,385.40	558,959.88	32.21059283	-104.14270009



Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Kudu Fee Well No. 1
Project:	Eddy County, New Mexico	TVD Reference:	RKB=3117.1+17 @ 3134.10usft (Patriot 2)
Site:	Kudu Fee	MD Reference:	RKB=3117.1+17 @ 3134.10usft (Patriot 2)
Well:	Kudu Fee Well No. 1	North Reference:	Grid
Wellbore:	Original hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original hole	Database:	EDM 5000.1 Ddatabase

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,000.00	1.55	214.21	998.73	-28.29	-31.96	440,382.71	558,957.64	32.21058545	-104.14270734
1,100.00	1.72	205.74	1,098.69	-30.76	-33.37	440,380.24	558,956.23	32.21057867	-104.14271192
1,200.00	1.14	212.59	1,198.66	-32.95	-34.56	440,378.05	558,955.04	32.21057265	-104.14271577
1,300.00	1.34	222.37	1,298.63	-34.65	-35.88	440,376.35	558,953.72	32.21056798	-104.14272006
1,400.00	1.61	233.41	1,398.60	-36.35	-37.80	440,374.65	558,951.80	32.21056331	-104.14272626
1,500.00	1.53	250.83	1,498.56	-37.63	-40.19	440,373.37	558,949.41	32.21055982	-104.14273400
1,600.00	1.51	253.18	1,598.53	-38.45	-42.71	440,372.55	558,946.89	32.21055758	-104.14274216
1,700.00	0.68	246.63	1,698.51	-39.06	-44.52	440,371.94	558,945.09	32.21055589	-104.14274800
1,800.00	0.74	239.02	1,798.50	-39.63	-45.62	440,371.37	558,943.99	32.21055434	-104.14275155
1,900.00	2.64	237.06	1,898.45	-41.22	-48.10	440,369.78	558,941.50	32.21054999	-104.14275960
2,000.00	1.55	221.06	1,998.39	-43.49	-50.92	440,367.51	558,938.68	32.21054376	-104.14276874
2,100.00	1.59	188.42	2,098.35	-45.88	-52.02	440,365.12	558,937.59	32.21053719	-104.14277228
2,200.00	1.77	188.61	2,198.31	-48.78	-52.45	440,362.22	558,937.15	32.21052922	-104.14277370
2,300.00	1.38	184.68	2,298.27	-51.51	-52.78	440,359.49	558,936.82	32.21052173	-104.14277478
2,400.00	1.76	183.37	2,398.23	-54.24	-52.97	440,356.76	558,936.63	32.21051421	-104.14277541
2,500.00	2.04	191.79	2,498.18	-57.52	-53.42	440,353.48	558,936.18	32.21050521	-104.14277689
2,600.00	1.90	191.31	2,598.12	-60.88	-54.11	440,350.12	558,935.49	32.21049596	-104.14277914
2,700.00	1.85	194.07	2,698.06	-64.08	-54.83	440,346.92	558,934.77	32.21048719	-104.14278148
2,800.00	1.69	199.35	2,798.02	-67.03	-55.71	440,343.97	558,933.89	32.21047906	-104.14278434
2,900.00	1.47	197.87	2,897.98	-69.64	-56.59	440,341.36	558,933.01	32.21047189	-104.14278721
3,000.00	1.39	199.18	2,997.95	-72.01	-57.38	440,338.99	558,932.22	32.21046538	-104.14278978
3,100.00	1.76	198.03	3,097.91	-74.62	-58.26	440,336.38	558,931.35	32.21045823	-104.14279262
3,200.00	1.86	199.07	3,197.86	-77.61	-59.26	440,333.39	558,930.34	32.21045000	-104.14279589
3,300.00	1.85	197.49	3,297.81	-80.68	-60.28	440,330.32	558,929.32	32.21044156	-104.14279919
3,400.00	1.85	199.19	3,397.76	-83.75	-61.29	440,327.25	558,928.31	32.21043314	-104.14280250
3,500.00	2.01	196.27	3,497.70	-86.96	-62.32	440,324.04	558,927.29	32.21042433	-104.14280582
3,600.00	1.42	203.95	3,597.65	-89.77	-63.31	440,321.23	558,926.29	32.21041659	-104.14280905
3,700.00	1.42	201.81	3,697.62	-92.05	-64.27	440,318.95	558,925.33	32.21041032	-104.14281218
3,800.00	1.52	193.01	3,797.59	-94.50	-65.03	440,316.50	558,924.57	32.21040361	-104.14281464
3,900.00	1.54	186.83	3,897.55	-97.12	-65.49	440,313.88	558,924.11	32.21039639	-104.14281614
4,000.00	1.72	178.45	3,997.51	-99.96	-65.61	440,311.04	558,923.99	32.21038860	-104.14281654
4,100.00	2.07	176.53	4,097.46	-103.26	-65.46	440,307.74	558,924.14	32.21037952	-104.14281608
4,200.00	1.67	169.76	4,197.41	-106.50	-65.09	440,304.50	558,924.51	32.21037062	-104.14281490
4,300.00	1.49	167.51	4,297.37	-109.20	-64.55	440,301.80	558,925.05	32.21036318	-104.14281317
4,400.00	1.71	151.04	4,397.33	-111.78	-63.55	440,299.22	558,926.06	32.21035610	-104.14280994
4,500.00	1.61	150.65	4,497.29	-114.31	-62.14	440,296.69	558,927.47	32.21034914	-104.14280540
4,600.00	1.47	156.10	4,597.25	-116.70	-60.93	440,294.30	558,928.67	32.21034254	-104.14280150
4,700.00	1.45	163.59	4,697.22	-119.09	-60.05	440,291.91	558,929.55	32.21033598	-104.14279868
4,800.00	1.19	166.76	4,797.19	-121.31	-59.46	440,289.69	558,930.15	32.21032986	-104.14279677
4,900.00	1.37	171.58	4,897.17	-123.51	-59.04	440,287.49	558,930.56	32.21032383	-104.14279545
5,000.00	1.25	176.38	4,997.14	-125.78	-58.80	440,285.22	558,930.80	32.21031759	-104.14279467
5,100.00	1.37	185.62	5,097.12	-128.06	-58.85	440,282.94	558,930.76	32.21031132	-104.14279484
5,200.00	1.50	185.70	5,197.08	-130.55	-59.09	440,280.45	558,930.51	32.21030447	-104.14279565
5,266.00	1.40	189.20	5,263.06	-132.20	-59.31	440,278.80	558,930.29	32.21029992	-104.14279636
MWD surveys									
5,298.00	0.70	182.50	5,295.06	-132.78	-59.38	440,278.21	558,930.22	32.21029833	-104.14279659
5,330.00	1.60	26.40	5,327.05	-132.58	-59.19	440,278.42	558,930.41	32.21029889	-104.14279597
5,361.00	4.60	355.80	5,358.01	-130.95	-59.09	440,280.05	558,930.51	32.21030336	-104.14279564
5,393.00	5.80	7.80	5,389.88	-128.07	-58.96	440,282.93	558,930.64	32.21031129	-104.14279521
5,425.00	9.50	16.50	5,421.59	-123.93	-57.99	440,287.07	558,931.61	32.21032265	-104.14279205
5,456.00	13.00	12.30	5,451.99	-118.07	-56.52	440,292.93	558,933.08	32.21033875	-104.14278727
5,488.00	15.80	2.10	5,482.98	-110.20	-55.60	440,300.80	558,934.01	32.21036039	-104.14278423
5,519.00	19.70	358.60	5,512.50	-100.76	-55.57	440,310.24	558,934.03	32.21038636	-104.14278409
5,551.00	23.90	357.90	5,542.21	-88.88	-55.94	440,322.12	558,933.66	32.21041900	-104.14278521
5,583.00	28.00	359.70	5,570.98	-74.88	-56.22	440,336.12	558,933.39	32.21045748	-104.14278603



Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Kudu Fee Well No. 1
Project:	Eddy County, New Mexico	TVD Reference:	RKB=3117.1+17 @ 3134.10usft (Patriot 2)
Site:	Kudu Fee	MD Reference:	RKB=3117.1+17 @ 3134.10usft (Patriot 2)
Well:	Kudu Fee Well No. 1	North Reference:	Grid
Wellbore:	Original hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original hole	Database:	EDM 5000.1 Ddatabase

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
5,614.00	30.60	1.80	5,598.01	-59.72	-56.01	440,351.28	558,933.60	32.21049917	-104.14278526
5,646.00	35.00	3.90	5,624.90	-42.41	-55.13	440,368.59	558,934.48	32.21054674	-104.14278232
5,677.00	39.60	5.60	5,649.55	-23.70	-53.56	440,387.30	558,936.05	32.21059817	-104.14277713
5,709.00	43.80	6.70	5,673.44	-2.54	-51.27	440,408.46	558,938.33	32.21065633	-104.14276961
5,740.00	48.40	8.50	5,694.93	19.59	-48.30	440,430.59	558,941.30	32.21071715	-104.14275990
5,772.00	53.00	9.90	5,715.20	44.03	-44.33	440,455.03	558,945.27	32.21078430	-104.14274693
5,804.00	57.50	10.60	5,733.43	69.89	-39.65	440,480.89	558,949.95	32.21085538	-104.14273164
5,835.00	62.50	10.20	5,748.93	96.29	-34.81	440,507.29	558,954.79	32.21092793	-104.14271583
5,867.00	67.70	10.20	5,762.39	124.85	-29.67	440,535.85	558,959.93	32.21100640	-104.14269906
5,898.00	71.30	9.50	5,773.25	153.45	-24.71	440,564.45	558,964.90	32.21108501	-104.14268284
5,930.00	73.50	8.50	5,782.92	183.57	-19.94	440,594.57	558,969.67	32.21116780	-104.14266725
5,962.00	76.90	8.50	5,791.10	214.17	-15.36	440,625.17	558,974.24	32.21125188	-104.14265229
5,993.00	80.80	8.50	5,797.09	244.24	-10.87	440,655.24	558,978.73	32.21133453	-104.14263758
6,026.00	83.00	8.80	5,801.74	276.54	-5.96	440,687.54	558,983.65	32.21142329	-104.14262151
6,057.00	84.60	9.50	5,805.09	306.97	-1.06	440,717.97	558,988.55	32.21150691	-104.14260549
6,071.00	85.78	9.98	5,806.26	320.71	1.30	440,731.71	558,990.91	32.21154469	-104.14259778
330 Hard line intercept @ 6071 MD 520 FSL 330 FWL									
6,089.00	87.30	10.60	5,807.35	338.39	4.51	440,749.39	558,994.12	32.21159327	-104.14258730
6,121.00	88.70	10.60	5,808.47	369.83	10.40	440,780.83	559,000.00	32.21167966	-104.14256810
6,216.00	89.20	10.20	5,810.21	463.25	27.54	440,874.25	559,017.15	32.21193639	-104.14251212
6,311.00	89.90	10.60	5,810.95	556.68	44.69	440,967.68	559,034.29	32.21219316	-104.14245614
6,406.00	89.40	9.20	5,811.53	650.27	61.02	441,061.27	559,050.63	32.21245033	-104.14240279
6,501.00	89.40	7.40	5,812.53	744.26	74.74	441,155.26	559,064.34	32.21270866	-104.14237592
6,596.00	89.00	5.60	5,813.85	838.64	85.49	441,249.64	559,075.09	32.21296805	-104.14232261
6,692.00	89.90	3.50	5,814.78	934.32	93.10	441,345.32	559,082.71	32.21323105	-104.14229744
6,787.00	89.90	2.50	5,814.94	1,029.19	98.08	441,440.19	559,087.68	32.21349182	-104.14228082
6,882.00	90.40	1.10	5,814.69	1,124.14	101.06	441,535.14	559,090.66	32.21375282	-104.14227062
6,977.00	90.60	0.70	5,813.86	1,219.13	102.55	441,630.13	559,092.16	32.21401392	-104.14226525
7,072.00	91.50	0.40	5,812.12	1,314.11	103.46	441,725.11	559,093.07	32.21427501	-104.14226176
7,167.00	91.00	0.00	5,810.05	1,409.08	103.80	441,820.08	559,093.40	32.21453610	-104.14226014
7,262.00	89.90	359.70	5,809.30	1,504.08	103.55	441,915.08	559,093.15	32.21479724	-104.14226040
7,357.00	88.90	0.00	5,810.30	1,599.07	103.30	442,010.07	559,092.90	32.21505838	-104.14226066
7,453.00	87.30	359.30	5,813.48	1,695.01	102.71	442,106.01	559,092.32	32.21532212	-104.14226200
7,548.00	87.80	358.60	5,817.54	1,789.91	100.97	442,200.91	559,090.58	32.21558300	-104.14226708
7,643.00	87.30	358.60	5,821.60	1,884.79	98.65	442,295.79	559,088.26	32.21584385	-104.14227403
7,738.00	87.40	359.30	5,826.00	1,979.68	96.92	442,390.68	559,086.52	32.21610469	-104.14227911
7,833.00	87.80	359.00	5,829.97	2,074.58	95.51	442,485.58	559,085.11	32.21636559	-104.14228311
7,930.00	89.90	359.70	5,831.92	2,171.55	94.41	442,582.55	559,084.01	32.21663216	-104.14228611
8,025.00	92.90	0.40	5,829.60	2,266.51	94.49	442,677.51	559,084.09	32.21689320	-104.14228530
8,120.00	93.60	0.70	5,824.21	2,361.35	95.40	442,772.35	559,085.00	32.21715391	-104.14228181
8,215.00	93.30	1.10	5,818.50	2,456.17	96.89	442,867.17	559,086.49	32.21741455	-104.14227645
8,310.00	91.00	0.40	5,814.93	2,551.09	98.13	442,962.09	559,087.73	32.21767548	-104.14227189
8,405.00	88.20	0.00	5,815.60	2,646.07	98.46	443,057.07	559,088.07	32.21793659	-104.14227027
8,501.00	87.30	1.10	5,819.37	2,741.99	99.38	443,152.99	559,088.99	32.21820027	-104.14226674
8,596.00	88.20	1.10	5,823.10	2,836.90	101.21	443,247.90	559,090.81	32.21846116	-104.14226030
8,691.00	88.50	1.40	5,825.83	2,931.84	103.28	443,342.84	559,092.88	32.21872213	-104.14225306
8,786.00	88.50	0.40	5,828.32	3,026.79	104.77	443,437.79	559,094.37	32.21898315	-104.14224769
8,882.00	87.60	0.40	5,831.58	3,122.73	105.44	443,533.73	559,095.04	32.21924689	-104.14224497
9,009.00	84.60	0.00	5,840.22	3,249.42	105.88	443,660.42	559,095.48	32.21959516	-104.14224281
9,104.00	87.10	2.00	5,847.10	3,344.15	107.54	443,755.15	559,097.14	32.21985555	-104.14223691
9,199.00	92.20	3.80	5,847.68	3,438.99	112.34	443,849.99	559,101.95	32.22011624	-104.14222083
9,294.00	93.10	4.00	5,843.28	3,533.67	118.80	443,944.67	559,108.40	32.22037648	-104.14219941
9,389.00	90.60	2.80	5,840.22	3,628.44	124.43	444,039.44	559,114.03	32.22063698	-104.14218066
9,484.00	89.40	1.70	5,840.22	3,723.37	128.16	444,134.36	559,117.76	32.22089790	-104.14216806
9,580.00	90.80	2.10	5,840.05	3,819.31	131.34	444,230.31	559,120.94	32.22116164	-104.14215722



Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Kudu Fee Well No. 1
Project:	Eddy County, New Mexico	TVD Reference:	RKB=3117.1+17 @ 3134.10usft (Patriot 2)
Site:	Kudu Fee	MD Reference:	RKB=3117.1+17 @ 3134.10usft (Patriot 2)
Well:	Kudu Fee Well No. 1	North Reference:	Grid
Wellbore:	Original hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original hole	Database:	EDM 5000.1 Ddatabase

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
9,675.00	91.40	1.50	5,838.23	3,914.24	134.32	444,325.24	559,123.93	32.22142260	-104.14214702
9,770.00	91.80	0.80	5,835.57	4,009.19	136.23	444,420.19	559,125.83	32.22168359	-104.14214031
9,865.00	94.30	0.60	5,830.52	4,104.04	137.39	444,515.04	559,126.99	32.22194432	-104.14213602
9,960.00	93.40	0.40	5,824.14	4,198.82	138.22	444,609.82	559,127.82	32.22220487	-104.14213280
10,055.00	92.10	359.80	5,819.58	4,293.71	138.38	444,704.71	559,127.98	32.22246571	-104.14213172
10,150.00	91.60	359.30	5,816.52	4,388.65	137.64	444,799.65	559,127.24	32.22272673	-104.14213358
10,246.00	87.20	358.40	5,817.52	4,484.60	135.71	444,895.60	559,125.31	32.22299050	-104.14213926
10,341.00	89.20	359.20	5,820.51	4,579.53	133.72	444,990.53	559,123.32	32.22325146	-104.14214514
10,436.00	90.90	359.40	5,820.42	4,674.52	132.56	445,085.52	559,122.16	32.22351259	-104.14214835
10,547.00	92.60	359.10	5,817.03	4,785.46	131.11	445,196.46	559,120.71	32.22381756	-104.14215240
10,592.00	92.60	359.10	5,814.99	4,830.40	130.40	445,241.40	559,120.01	32.22394112	-104.14215443
Survey projected to 10592.00 MD									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
100.00	100.00	-0.11	-0.60	Gyro
5,266.00	5,263.06	-132.20	-59.31	MWD surveys
6,071.00	5,806.26	320.71	1.30	330 Hard line intercept @ 6071 MD 520 FSL 330 FWL
10,592.00	5,814.99	4,830.40	130.40	Survey projected to 10592.00 MD



COG Operating LLC

Well: Kudu Fee Well No. 1
Site: Kudu Fee
Project: Eddy County, New Mexico
Design: rev2
Rig: Patriot 2

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Annotation
1	5200.00	1.50	185.70	5197.08	-130.55	-59.09	0.00	0.00	-132.77	Survey @ 5200.00 MD
2	5322.96	1.50	185.70	5320.00	-133.75	-59.41	0.00	0.00	-135.98	KOP Begin 12°/100' build/turn
3	5377.12	5.00	7.75	5374.11	-132.12	-59.17	12.00	-178.42	-134.34	Begin 12°/100' build
4	6084.37	89.87	7.75	5809.96	338.11	4.83	12.00	0.00	338.04	Begin 3°/100' turn
5	6267.70	89.87	2.25	5810.37	520.67	20.80	3.00	-89.98	521.09	Begin 89.87° lateral
6	10582.26	89.87	2.25	5820.00	4831.90	190.20	0.00	0.00	4835.64	PBHL/TD

ANNOTATIONS

TVD	MD	Inc	Azi	+N/-S	+E/-W	VSec	Departure	Annotation
100.00	100.00	0.70	260.01	-0.11	-0.60	-0.13	0.61	Gyro
5263.06	5266.00	1.40	189.20	-132.20	-59.31	-134.43	160.76	MWD surveys
5806.26	6071.00	85.78	9.98	320.71	1.30	320.52	620.28	330 Hard line intercept @ 6071 MD 520 FSL 330 FWL
5814.99	10592.00	92.60	359.10	4830.40	130.40	4831.80	5138.42	Survey projected to 10592.00 MD

Surface Location: RKB=3117.1+17 @ 3134.10usft (Patriot 2)
US State Plane 1927 (Exact solution)
New Mexico East 3001

Northing 440411.00 Easting 558989.60 Latitude 32.21066307 Longitude -104.14260383
Total Correction (M => G) 10 to convert a Magnetic Direction to a Grid Direction, Add 7.40°



Azimuths to Grid North
True North: -0.10°
Magnetic North: 7.40°

Magnetic Field
Strength: 48269.1nT
Dip Angle: 60.01°
Date: 3/31/2014
Model: IGRF2010

N-ZONE

