

Results of Directional Survey

API number:	30-025-41412		
OGRID:		Operator:	COG PRODUCTION, LLC
		Property:	WINDWARD FEDERAL # 4H

surface	ULSTR:	A	30	T 24S	R 32E
				190 FNL	430 FEL

BH Loc	ULSTR:	P	31	T 24S	R 32E
20361	MD	10515.6	TVD	345 FSL	318 FEL
				4935 FNL	

Top Perf/OH	ULSTR:	A	30	T 24S	R 32E
10715	MD	10547.6	TVD	97 FNL	566 FEL

Bot Perf/OH	ULSTR:	P	31	T 24S	R 32E
20105	MD	10519.2	TVD	601 FSL	327 FEL
				4679 FNL	

	MD	N/S	E/W	VD
	10712	-392.00	-135.44	10546.87
TOP PERFS/OH	10715	93.00	-136.06	10547.55
	10743	-422.42	-141.85	10553.89
	20083	-9747.15	102.51	10519.43
BOT PERFS/OH	20105	-9769.14	103.16	10519.22
	20177	-9841.10	105.30	10518.53

NEXT TO LAST	20318	-9981.99	110.47	10516.40
LAST READING	20361	-10024.95	112.27	10515.57
TD	20361	-10024.95	112.27	10515.57

Surface Location	190	FN	430	FE
Projected BHL	10215	FN	318	FE
Location of				
Top Perfs/OH	97	FN	566	FE
Bottom Perfs/OH	9959	FN	327	FE

SUMMARY of Subsurface Locations

Surface Location	A-30-24S-32E	190	FN	430	FE	Vert. Depth
Top Perfs/OH	A-30-24S-32E	97	FN	566	FE	10547.55
Bottom Perfs/OH	P-31-24S-32E	9959	FN	327	FE	10519.22
Projected TD	P-31-24S-32E	10215	FN	318	FE	10515.57

SEP 23 2014



A GYRO TECHNOLOGIES INC. COMPANY

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

May 13, 2014

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

HOBBS OCD
SEP 19 2014
RECEIVED

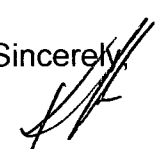
Attn: Kanicia Castillo

Re: **Windward Federal No 004H**

Please find enclosed a copy of the survey from 0' to 9,903' ran on the above referenced well.

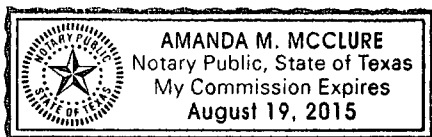
If I can be of any further service, please do not hesitate to call me at 800-606-4976.

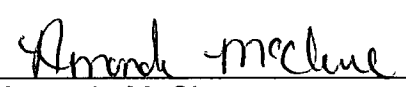
Sincerely,


Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 13 day of May,
A.D., 2014, by Keith Havelka.




Amanda McClure
Notary Public, State of Texas

Company: COG Operating-Concho
Lease/Well: Windward Federal/No 004H



Rig Name: Independence 205
State/County: New Mexico/Lea
Latitude: 32.19, Longitude: -103.71
GRID North is 0.33 Degrees East of True North
VS-Azi: 0.00 Degrees



Depth Reference : RKB 26FT

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey2.ut
Minimum Curvature Method
Report Date/Time: 5/13/2014 / 13:40

VES Survey International
Midland, Texas
(432) 563-5444

Surveyor: Tim Dillon

Windward Federal No 004H / API 30-025-41412

HOBBS OCD

SEP 19 2014

RECEIVED

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	0.21	324.17	100.00	0.15	-0.11	0.15	0.19	324.17	0.21
200.00	0.33	325.93	200.00	0.54	-0.38	0.54	0.66	324.94	0.11
300.00	0.29	328.00	300.00	0.99	-0.67	0.99	1.20	325.83	0.03
400.00	0.49	340.12	399.99	1.61	-0.96	1.61	1.88	329.36	0.21
500.00	0.62	0.94	499.99	2.56	-1.09	2.56	2.78	336.83	0.23
600.00	0.69	18.23	599.98	3.66	-0.90	3.66	3.77	346.26	0.21
700.00	0.67	21.85	699.98	4.78	-0.49	4.78	4.81	354.16	0.05
800.00	0.73	25.08	799.97	5.90	0.00	5.90	5.90	359.97	0.07
900.00	0.46	328.03	899.96	6.82	0.05	6.82	6.82	0.43	0.61
1000.00	0.20	226.75	999.96	7.04	-0.29	7.04	7.05	357.65	0.54
1100.00	0.04	214.48	1099.96	6.89	-0.44	6.89	6.91	356.39	0.15
1200.00	0.02	210.71	1199.96	6.85	-0.46	6.85	6.87	356.13	0.03
1300.00	0.01	221.92	1299.96	6.83	-0.48	6.83	6.85	356.00	0.00
1400.00	0.07	230.84	1399.96	6.79	-0.53	6.79	6.81	355.53	0.06
1500.00	0.02	219.94	1499.96	6.74	-0.59	6.74	6.76	355.02	0.05
1600.00	0.03	224.49	1599.96	6.71	-0.61	6.71	6.73	354.76	0.01
1700.00	0.03	214.21	1699.96	6.67	-0.65	6.67	6.70	354.47	0.01
1800.00	0.02	236.16	1799.96	6.64	-0.67	6.64	6.67	354.19	0.01

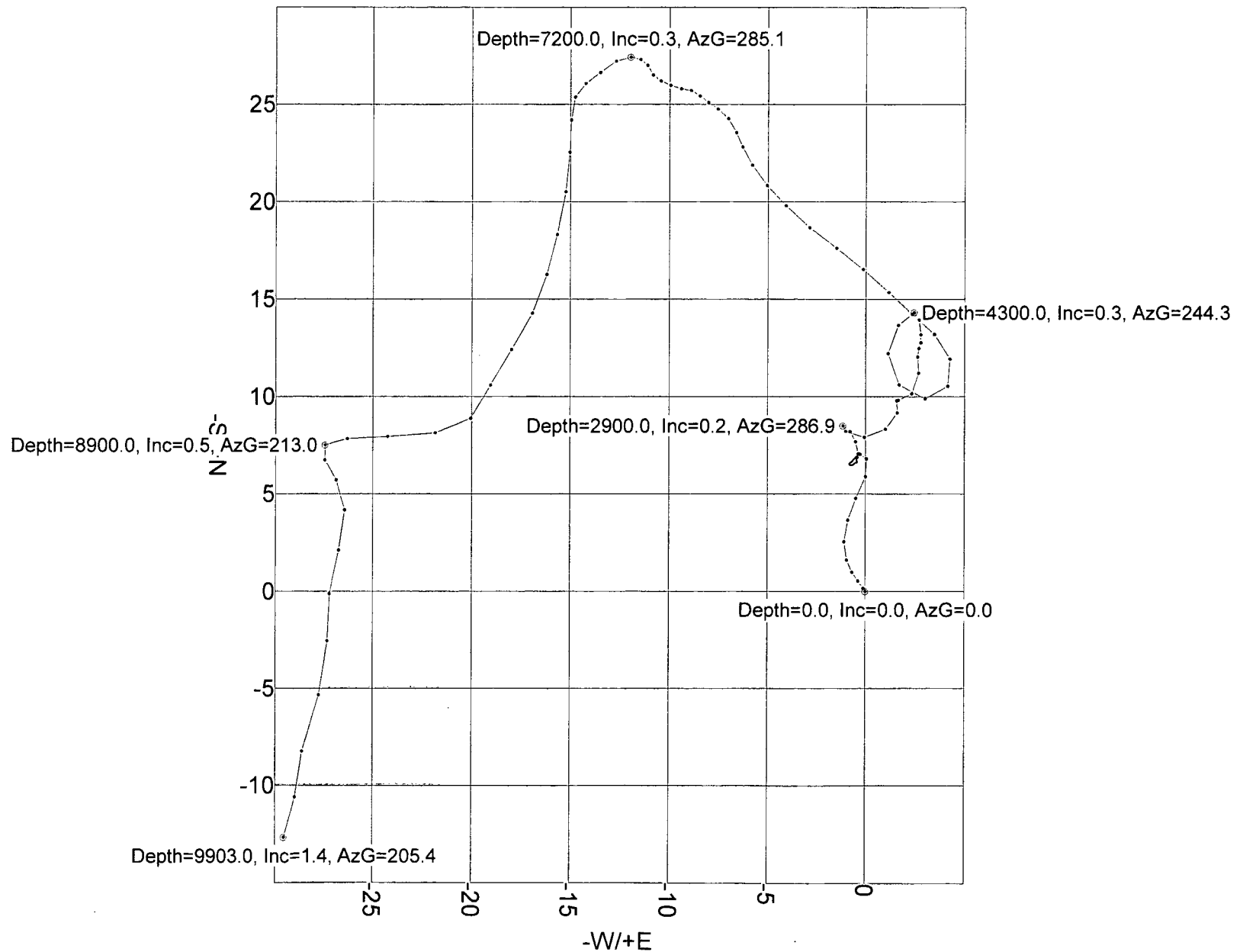
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1900.00	0.03	218.80	1899.96	6.61	-0.70	6.61	6.65	353.93	0.01
2000.00	0.05	234.17	1999.96	6.57	-0.75	6.57	6.61	353.46	0.03
2100.00	0.00	257.34	2099.96	6.54	-0.79	6.54	6.59	353.10	0.05
2200.00	0.04	122.14	2199.96	6.52	-0.76	6.52	6.57	353.31	0.04
2300.00	0.09	60.84	2299.96	6.54	-0.67	6.54	6.57	354.15	0.08
2400.00	0.01	63.78	2399.96	6.58	-0.60	6.58	6.61	354.78	0.08
2500.00	0.18	59.64	2499.96	6.66	-0.46	6.66	6.67	356.02	0.17
2600.00	0.39	352.90	2599.96	7.07	-0.37	7.07	7.08	356.99	0.36
2700.00	0.35	341.06	2699.96	7.69	-0.51	7.69	7.71	356.20	0.09
2800.00	0.33	322.96	2799.96	8.21	-0.78	8.21	8.24	354.55	0.11
2900.00	0.24	286.95	2899.96	8.50	-1.16	8.50	8.58	352.26	0.20
3000.00	0.54	135.36	2999.96	8.23	-1.02	8.23	8.29	352.91	0.75
3100.00	0.71	88.50	3099.95	7.91	-0.07	7.91	7.91	359.48	0.52
3200.00	0.69	47.19	3199.94	8.33	0.99	8.33	8.39	6.79	0.50
3300.00	0.53	20.87	3299.94	9.17	1.60	9.17	9.31	9.87	0.32
3400.00	0.32	315.09	3399.94	9.79	1.57	9.79	9.92	9.08	0.49
3500.00	0.37	123.01	3499.93	9.81	1.64	9.81	9.95	9.50	0.68
3600.00	0.75	38.61	3599.93	10.15	2.32	10.15	10.41	12.90	0.81
3700.00	0.64	352.97	3699.92	11.22	2.67	11.22	11.53	13.36	0.55
3800.00	0.31	4.74	3799.92	12.05	2.62	12.05	12.33	12.27	0.35
3900.00	0.19	13.49	3899.92	12.48	2.68	12.48	12.77	12.12	0.12
4000.00	0.16	24.80	3999.92	12.77	2.78	12.77	13.07	12.28	0.05
4100.00	0.34	348.63	4099.92	13.19	2.78	13.19	13.48	11.91	0.23
4200.00	0.54	355.71	4199.92	13.95	2.69	13.95	14.21	10.91	0.21
4300.00	0.27	244.25	4299.91	14.32	2.44	14.32	14.53	9.67	0.69
4400.00	0.92	226.81	4399.91	13.67	1.65	13.67	13.77	6.86	0.67
4500.00	1.03	175.72	4499.90	12.22	1.13	12.22	12.27	5.27	0.85
4600.00	0.99	145.36	4599.88	10.61	1.69	10.61	10.74	9.04	0.53
4700.00	0.94	91.16	4699.87	9.88	3.00	9.88	10.33	16.90	0.88
4800.00	0.85	25.06	4799.86	10.54	4.14	10.54	11.32	21.44	0.98
4900.00	0.87	344.19	4899.85	11.94	4.25	11.94	12.67	19.58	0.60
5000.00	0.89	312.82	4999.84	13.19	3.47	13.19	13.64	14.73	0.48
5100.00	0.88	313.08	5099.82	14.25	2.34	14.25	14.44	9.33	0.01
5200.00	0.98	312.96	5199.81	15.35	1.15	15.35	15.40	4.29	0.10
5300.00	1.01	311.51	5299.80	16.52	-0.14	16.52	16.52	359.52	0.04
5400.00	0.99	306.29	5399.78	17.62	-1.49	17.62	17.68	355.15	0.09
5500.00	1.01	308.32	5499.77	18.67	-2.88	18.67	18.90	351.23	0.04
5600.00	0.90	317.68	5599.75	19.80	-4.10	19.80	20.22	348.31	0.19
5700.00	0.71	315.51	5699.74	20.82	-5.06	20.82	21.43	346.34	0.19

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
5800.00	0.79	333.17	5799.73	21.88	-5.81	21.88	22.64	345.13	0.24
5900.00	0.42	330.16	5899.73	22.81	-6.30	22.81	23.67	344.56	0.37
6000.00	0.52	340.88	5999.72	23.55	-6.63	23.55	24.47	344.28	0.13
6100.00	0.44	318.62	6099.72	24.27	-7.03	24.27	25.27	343.84	0.20
6200.00	0.41	308.43	6199.72	24.78	-7.56	24.78	25.90	343.03	0.08
6300.00	0.27	296.99	6299.72	25.11	-8.05	25.11	26.36	342.22	0.15
6400.00	0.35	315.89	6399.72	25.44	-8.48	25.44	26.81	341.56	0.13
6500.00	0.27	286.10	6499.71	25.72	-8.92	25.72	27.23	340.87	0.18
6600.00	0.32	274.87	6599.71	25.81	-9.43	25.81	27.48	339.93	0.08
6700.00	0.34	301.60	6699.71	25.99	-9.96	25.99	27.83	339.03	0.15
6800.00	0.29	284.99	6799.71	26.21	-10.45	26.21	28.21	338.26	0.10
6900.00	0.33	328.54	6899.71	26.52	-10.84	26.52	28.65	337.77	0.23
7000.00	0.34	332.10	6999.71	27.02	-11.13	27.02	29.22	337.62	0.02
7100.00	0.23	279.74	7099.71	27.32	-11.47	27.32	29.63	337.23	0.27
7200.00	0.35	285.15	7199.70	27.43	-11.96	27.43	29.93	336.44	0.12
7300.00	0.61	238.55	7299.70	27.23	-12.71	27.23	30.05	334.98	0.45
7400.00	0.53	227.68	7399.70	26.65	-13.50	26.65	29.87	333.12	0.14
7500.00	0.55	237.73	7499.69	26.08	-14.25	26.08	29.72	331.35	0.10
7600.00	0.53	196.11	7599.69	25.38	-14.78	25.38	29.37	329.78	0.38
7700.00	0.86	183.94	7699.68	24.19	-14.96	24.19	28.44	328.26	0.36
7800.00	1.05	182.01	7799.67	22.53	-15.04	22.53	27.09	326.26	0.20
7900.00	1.28	188.59	7899.65	20.51	-15.24	20.51	25.55	323.37	0.26
8000.00	1.27	193.84	7999.62	18.32	-15.68	18.32	24.11	319.45	0.12
8100.00	1.15	194.78	8099.60	16.27	-16.20	16.27	22.96	315.13	0.12
8200.00	1.29	204.94	8199.58	14.28	-16.93	14.28	22.15	310.15	0.25
8300.00	1.17	214.30	8299.55	12.42	-17.98	12.42	21.85	304.64	0.23
8400.00	1.27	206.51	8399.53	10.58	-19.05	10.58	21.79	299.05	0.19
8500.00	1.00	215.78	8499.51	8.88	-20.05	8.88	21.93	293.90	0.33
8600.00	1.47	267.93	8599.49	8.13	-21.85	8.13	23.31	290.42	1.17
8700.00	1.31	263.03	8699.46	7.95	-24.27	7.95	25.53	288.13	0.20
8800.00	1.03	272.34	8799.44	7.84	-26.31	7.84	27.45	286.60	0.34
8900.00	0.50	213.02	8899.43	7.52	-27.45	7.52	28.46	285.32	0.89
9000.00	0.53	152.58	8999.43	6.75	-27.47	6.75	28.29	283.80	0.52
9100.00	0.85	146.16	9099.42	5.72	-26.85	5.72	27.45	282.03	0.33
9200.00	1.06	179.82	9199.41	4.18	-26.43	4.18	26.76	278.99	0.59
9300.00	1.34	194.39	9299.39	2.12	-26.72	2.12	26.80	274.53	0.41
9400.00	1.29	190.15	9399.36	-0.12	-27.21	-0.12	27.21	269.74	0.11
9500.00	1.51	176.57	9499.33	-2.54	-27.33	-2.54	27.44	264.69	0.40
9600.00	1.79	199.32	9599.29	-5.33	-27.76	-5.33	28.27	259.14	0.71

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
9700.00	1.69	193.10	9699.24	-8.24	-28.62	-8.24	29.78	253.93	0.21
9800.00	1.06	181.84	9799.21	-10.61	-28.98	-10.61	30.86	249.90	0.69
9903.00	1.38	205.36	9902.19	-12.68	-29.54	-12.68	32.15	246.78	0.57



VES Survey International
Midland, Texas
(432) 563-5444
Surveyor: Tim Dillon
Windward Federal No 004H / API 30-025-41412



VES Survey Date: 05/06/2014

SEP 19 2014



Survey Report - Geographic



RECEIVED

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Winward Federal Well No. 4H
Project:	Lea County, New Mexico	TVD Reference:	RKB=3550.3+26 @ 3576.30usft (Independence 205)
Site:	Winward Federal	MD Reference:	RKB=3550.3+26 @ 3576.30usft (Independence 205)
Well:	Winward Federal Well No. 4H	North Reference:	Grid
Wellbore:	Original hole	Survey Calculation Method:	Minimum Curvature
Design:	Surveys Original hole	Database:	EDM 5000.1 Ddatabase

Project	Lea 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	Winward Federal				
Site Position:		Northing:	435,224.40 usft	Latitude:	32.19499358
From:	Map	Easting:	694,014.30 usft	Longitude:	-103.70614454
Position Uncertainty:	0.00 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.33 °

Well	Winward Federal Well No. 4H, 190 FNL 430 FEL Sect 30					
Well Position	+N/-S	0.00 usft	Northing:	435,224.40 usft	Latitude:	32.19499358
	+E/-W	0.00 usft	Easting:	694,014.30 usft	Longitude:	-103.70614454
Position Uncertainty	0.00 usft		Wellhead Elevation:	usft	Ground Level:	3,550.30 usft

Wellbore	Original hole				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/26/2014	7.30	60.07	48,305

Design	Surveys Original hole				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.00	0.00	0.00	179.30	

Survey Program	Date 6/1/2014	
From (usft)	To (usft)	Survey (Wellbore)
100.00	9,903.00	Gyro (Original hole)
9,967.00	20,361.00	MWD (Original hole)
		Tool Name
		NS-GYRO-MS
		MWD
		Description
		North sensing gyrocompassing m/s
		MWD - Standard

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
0.00	0.00	0.00	0.00	0.00	0.00	435,224.40	694,014.30	32.19499358	-103.70614454
100.00	0.21	324.17	100.00	0.15	-0.11	435,224.55	694,014.19	32.19499399	-103.70614489
Gyro									
200.00	0.33	325.93	200.00	0.54	-0.38	435,224.94	694,013.92	32.19499506	-103.70614575
300.00	0.29	328.00	300.00	0.99	-0.67	435,225.39	694,013.62	32.19499631	-103.70614670
400.00	0.49	340.12	399.99	1.61	-0.95	435,226.01	694,013.34	32.19499801	-103.70614759
500.00	0.62	0.94	499.99	2.55	-1.09	435,226.95	694,013.21	32.19500060	-103.70614801
600.00	0.69	18.23	599.98	3.66	-0.89	435,228.06	694,013.41	32.19500366	-103.70614735
700.00	0.67	21.85	699.98	4.78	-0.48	435,229.18	694,013.81	32.19500672	-103.70614602

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Winward Federal Well No. 4H
Project:	Lea County, New Mexico	TVD Reference:	RKB=3550.3+26 @ 3576.30usft (Independence 205)
Site:	Winward Federal	MD Reference:	RKB=3550.3+26 @ 3576.30usft (Independence 205)
Well:	Winward Federal Well No. 4H	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
800.00	0.73	25.08	799.97	5.90	0.00	435,230.30	694,014.30	32.19500979	-103.70614442
900.00	0.46	328.03	899.96	6.81	0.06	435,231.21	694,014.36	32.19501231	-103.70614422
1,000.00	0.20	226.75	999.96	7.03	-0.28	435,231.43	694,014.02	32.19501292	-103.70614531
1,100.00	0.04	214.48	1,099.96	6.89	-0.43	435,231.29	694,013.87	32.19501252	-103.70614579
1,200.00	0.02	210.71	1,199.96	6.84	-0.45	435,231.24	694,013.84	32.19501240	-103.70614588
1,300.00	0.01	221.92	1,299.96	6.82	-0.47	435,231.22	694,013.83	32.19501234	-103.70614593
1,400.00	0.07	230.84	1,399.96	6.78	-0.52	435,231.18	694,013.77	32.19501221	-103.70614610
1,500.00	0.02	219.94	1,499.96	6.72	-0.58	435,231.12	694,013.71	32.19501207	-103.70614629
1,600.00	0.03	224.49	1,599.96	6.69	-0.61	435,231.09	694,013.69	32.19501198	-103.70614639
1,700.00	0.03	214.21	1,699.96	6.65	-0.64	435,231.05	694,013.65	32.19501187	-103.70614650
1,800.00	0.02	236.16	1,799.96	6.62	-0.67	435,231.02	694,013.62	32.19501179	-103.70614659
1,900.00	0.03	218.80	1,899.96	6.59	-0.70	435,230.99	694,013.59	32.19501171	-103.70614669
2,000.00	0.05	234.17	1,999.96	6.54	-0.76	435,230.94	694,013.54	32.19501158	-103.70614686
2,100.00	0.00	257.34	2,099.96	6.52	-0.79	435,230.92	694,013.50	32.19501151	-103.70614698
2,200.00	0.04	122.14	2,199.96	6.50	-0.76	435,230.90	694,013.53	32.19501146	-103.70614688
2,300.00	0.09	60.84	2,299.96	6.52	-0.66	435,230.92	694,013.63	32.19501151	-103.70614656
2,400.00	0.01	63.78	2,399.96	6.56	-0.59	435,230.96	694,013.71	32.19501163	-103.70614632
2,500.00	0.18	59.64	2,499.96	6.64	-0.44	435,231.04	694,013.85	32.19501185	-103.70614585
2,600.00	0.39	352.90	2,599.96	7.06	-0.35	435,231.46	694,013.95	32.19501300	-103.70614554
2,700.00	0.35	341.06	2,699.96	7.69	-0.49	435,232.09	694,013.80	32.19501472	-103.70614599
2,800.00	0.33	322.96	2,799.96	8.21	-0.76	435,232.61	694,013.53	32.19501615	-103.70614686
2,900.00	0.24	286.95	2,899.96	8.50	-1.14	435,232.90	694,013.16	32.19501696	-103.70614806
3,000.00	0.54	135.36	2,999.96	8.22	-1.01	435,232.62	694,013.29	32.19501620	-103.70614764
3,100.00	0.71	88.50	3,099.95	7.90	-0.06	435,232.30	694,014.24	32.19501531	-103.70614458
3,200.00	0.69	47.19	3,199.94	8.33	1.01	435,232.73	694,015.30	32.19501646	-103.70614114
3,300.00	0.53	20.87	3,299.94	9.17	1.61	435,233.57	694,015.91	32.19501877	-103.70613916
3,400.00	0.32	315.09	3,399.94	9.80	1.58	435,234.20	694,015.87	32.19502050	-103.70613925
3,500.00	0.37	123.01	3,499.93	9.82	1.65	435,234.22	694,015.95	32.19502056	-103.70613902
3,600.00	0.75	38.61	3,599.93	10.16	2.33	435,234.56	694,016.63	32.19502147	-103.70613681
3,700.00	0.64	352.97	3,699.92	11.22	2.67	435,235.62	694,016.97	32.19502439	-103.70613570
3,800.00	0.31	4.74	3,799.92	12.05	2.63	435,236.45	694,016.92	32.19502666	-103.70613583
3,900.00	0.19	13.49	3,899.92	12.48	2.69	435,236.88	694,016.98	32.19502784	-103.70613562
4,000.00	0.16	24.80	3,999.92	12.77	2.78	435,237.17	694,017.08	32.19502863	-103.70613530
4,100.00	0.34	348.63	4,099.92	13.18	2.78	435,237.58	694,017.08	32.19502978	-103.70613530
4,200.00	0.54	355.71	4,199.92	13.95	2.69	435,238.35	694,016.99	32.19503187	-103.70613558
4,300.00	0.27	244.25	4,299.91	14.31	2.44	435,238.71	694,016.74	32.19503289	-103.70613638
4,400.00	0.92	226.81	4,399.91	13.66	1.65	435,238.06	694,015.94	32.19503111	-103.70613897
4,500.00	1.03	175.72	4,499.90	12.22	1.13	435,236.62	694,015.42	32.19502714	-103.70614067
4,600.00	0.99	145.36	4,599.88	10.61	1.69	435,235.01	694,015.98	32.19502272	-103.70613890
4,700.00	0.94	91.16	4,699.87	9.88	3.00	435,234.28	694,017.29	32.19502070	-103.70613467
4,800.00	0.85	25.06	4,799.86	10.54	4.13	435,234.94	694,018.43	32.19502248	-103.70613099
4,900.00	0.87	344.19	4,899.85	11.94	4.24	435,236.34	694,018.53	32.19502633	-103.70613062
5,000.00	0.89	312.82	4,999.84	13.20	3.46	435,237.60	694,017.76	32.19502980	-103.70613311
5,100.00	0.88	313.08	5,099.83	14.25	2.33	435,238.65	694,016.63	32.19503271	-103.70613674
5,200.00	0.98	312.96	5,199.81	15.36	1.14	435,239.76	694,015.44	32.19503578	-103.70614056
5,300.00	1.01	311.51	5,299.80	16.52	-0.14	435,240.92	694,014.15	32.19503900	-103.70614469
5,400.00	0.99	306.29	5,399.78	17.62	-1.50	435,242.02	694,012.80	32.19504204	-103.70614905
5,500.00	1.01	308.32	5,499.77	18.68	-2.89	435,243.08	694,011.41	32.19504497	-103.70615352
5,600.00	0.90	317.68	5,599.75	19.80	-4.11	435,244.20	694,010.19	32.19504809	-103.70615744
5,700.00	0.71	315.51	5,699.74	20.83	-5.07	435,245.23	694,009.23	32.19505091	-103.70616054
5,800.00	0.79	333.17	5,799.73	21.88	-5.81	435,246.28	694,008.48	32.19505383	-103.70616293
5,900.00	0.42	330.16	5,899.73	22.82	-6.31	435,247.22	694,007.99	32.19505640	-103.70616450
6,000.00	0.52	340.88	5,999.73	23.56	-6.64	435,247.96	694,007.66	32.19505846	-103.70616556

Company: COG Operating LLC
Project: Lea County, New Mexico

Site: Winward Federal

Well: Winward Federal Well No. 4H

Wellbore: Original hole

Design: Surveys Original hole

Local Co-ordinate Reference: Well Winward Federal Well No. 4H
TVD Reference: RKB=3550.3+26 @ 3576.30usft (Independence 205)

MD Reference: RKB=3550.3+26 @ 3576.30usft (Independence 205)

North Reference: Grid

Survey Calculation Method: Minimum Curvature

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
6,100.00	0.44	318.62	6,099.72	24.28	-7.04	435,248.68	694,007.25	32.19506044	-103.70616685
6,200.00	0.41	308.43	6,199.72	24.79	-7.58	435,249.19	694,006.72	32.19506185	-103.70616856
6,300.00	0.27	296.99	6,299.72	25.12	-8.07	435,249.52	694,006.23	32.19506276	-103.70617014
6,400.00	0.35	315.89	6,399.72	25.45	-8.49	435,249.85	694,005.81	32.19506367	-103.70617150
6,500.00	0.27	286.10	6,499.71	25.73	-8.93	435,250.13	694,005.37	32.19506446	-103.70617292
6,600.00	0.32	274.87	6,599.71	25.82	-9.43	435,250.22	694,004.86	32.19506471	-103.70617454
6,700.00	0.34	301.60	6,699.71	26.00	-9.96	435,250.40	694,004.33	32.19506521	-103.70617626
6,800.00	0.29	284.99	6,799.71	26.22	-10.46	435,250.62	694,003.84	32.19506583	-103.70617786
6,900.00	0.33	328.54	6,899.71	26.53	-10.85	435,250.93	694,003.44	32.19506669	-103.70617913
7,000.00	0.34	332.10	6,999.71	27.04	-11.14	435,251.44	694,003.15	32.19506809	-103.70618006
7,100.00	0.23	279.74	7,099.71	27.34	-11.48	435,251.74	694,002.82	32.19506891	-103.70618114
7,200.00	0.35	285.15	7,199.70	27.45	-11.97	435,251.85	694,002.32	32.19506923	-103.70618273
7,300.00	0.61	238.55	7,299.70	27.25	-12.72	435,251.65	694,001.57	32.19506870	-103.70618515
7,400.00	0.53	227.68	7,399.70	26.66	-13.52	435,251.06	694,000.78	32.19506709	-103.70618774
7,500.00	0.55	237.73	7,499.69	26.09	-14.27	435,250.49	694,000.03	32.19506554	-103.70619017
7,600.00	0.53	196.11	7,599.69	25.39	-14.80	435,249.79	693,999.50	32.19506362	-103.70619191
7,700.00	0.86	183.94	7,699.68	24.20	-14.98	435,248.60	693,999.32	32.19506035	-103.70619251
7,800.00	1.05	182.01	7,799.67	22.54	-15.06	435,246.94	693,999.23	32.19505577	-103.70619281
7,900.00	1.28	188.59	7,899.65	20.52	-15.26	435,244.92	693,999.03	32.19505022	-103.70619349
8,000.00	1.27	193.84	7,999.62	18.34	-15.69	435,242.74	693,998.60	32.19504424	-103.70619493
8,100.00	1.15	194.78	8,099.60	16.29	-16.22	435,240.69	693,998.08	32.19503862	-103.70619665
8,200.00	1.29	204.94	8,199.58	14.30	-16.95	435,238.70	693,997.35	32.19503316	-103.70619905
8,300.00	1.17	214.30	8,299.55	12.43	-18.00	435,236.83	693,996.30	32.19502805	-103.70620248
8,400.00	1.27	206.51	8,399.53	10.60	-19.07	435,235.00	693,995.23	32.19502302	-103.70620598
8,500.00	1.00	215.78	8,499.51	8.90	-20.07	435,233.30	693,994.22	32.19501837	-103.70620926
8,600.00	1.47	267.93	8,599.49	8.15	-21.86	435,232.55	693,992.43	32.19501632	-103.70621506
8,700.00	1.31	263.03	8,699.46	7.96	-24.28	435,232.36	693,990.02	32.19501585	-103.70622288
8,800.00	1.03	272.34	8,799.44	7.86	-26.31	435,232.26	693,987.98	32.19501561	-103.70622945
8,900.00	0.50	213.02	8,899.43	7.53	-27.45	435,231.93	693,986.85	32.19501472	-103.70623313
9,000.00	0.53	152.58	8,999.43	6.75	-27.47	435,231.15	693,986.82	32.19501259	-103.70623322
9,100.00	0.85	146.16	9,099.42	5.73	-26.85	435,230.13	693,987.45	32.19500975	-103.70623122
9,200.00	1.06	179.82	9,199.41	4.19	-26.43	435,228.59	693,987.86	32.19500551	-103.70622990
9,300.00	1.34	194.39	9,299.39	2.13	-26.72	435,226.53	693,987.58	32.19499986	-103.70623087
9,400.00	1.29	190.15	9,399.36	-0.11	-27.21	435,224.29	693,987.09	32.19499371	-103.70623249
9,500.00	1.51	176.57	9,499.33	-2.54	-27.33	435,221.86	693,986.97	32.19498705	-103.70623293
9,600.00	1.79	199.32	9,599.29	-5.32	-27.76	435,219.07	693,986.53	32.19497939	-103.70623440
9,700.00	1.69	193.10	9,699.24	-8.23	-28.62	435,216.16	693,985.68	32.19497140	-103.70623720
9,800.00	1.06	181.84	9,799.21	-10.60	-28.98	435,213.80	693,985.32	32.19496492	-103.70623842
9,903.00	1.38	205.36	9,902.19	-12.67	-29.54	435,211.73	693,984.75	32.19495923	-103.70624028
9,967.00	3.20	217.90	9,966.14	-14.77	-30.97	435,209.62	693,983.33	32.19495346	-103.70624493
MWD surveys									
9,998.00	5.60	207.00	9,997.05	-16.81	-32.19	435,207.59	693,982.11	32.19494790	-103.70624891
10,029.00	8.80	200.00	10,027.80	-20.38	-33.69	435,204.02	693,980.61	32.19493809	-103.70625382
10,061.00	10.70	196.80	10,059.33	-25.53	-35.38	435,198.87	693,978.91	32.19492398	-103.70625940
10,092.00	12.50	196.10	10,089.70	-31.51	-37.14	435,192.89	693,977.15	32.19490757	-103.70626521
10,123.00	14.80	196.50	10,119.82	-38.53	-39.20	435,185.87	693,975.10	32.19488831	-103.70627198
10,155.00	17.10	194.70	10,150.59	-47.00	-41.55	435,177.40	693,972.74	32.19486506	-103.70627975
10,186.00	19.00	194.40	10,180.06	-56.29	-43.97	435,168.11	693,970.33	32.19483954	-103.70628773
10,218.00	22.20	196.50	10,210.01	-67.14	-46.98	435,157.26	693,967.32	32.19480978	-103.70629767
10,249.00	24.60	196.10	10,238.46	-78.96	-50.43	435,145.44	693,963.86	32.19477735	-103.70630906
10,280.00	26.60	195.10	10,266.42	-91.86	-54.03	435,132.54	693,960.27	32.19474195	-103.70632093
10,307.00	28.30	196.10	10,290.38	-103.84	-57.38	435,120.56	693,956.92	32.19470905	-103.70633198
10,338.00	31.70	196.50	10,317.22	-118.72	-61.73	435,105.68	693,952.56	32.19466824	-103.70634633

Company: COG Operating LLC
Project: Lea County, New Mexico
Site: Winward Federal
Well: Winward Federal Well No. 4H
Wellbore: Original hole
Design: Surveys Original hole

Local Co-ordinate Reference: Well Winward Federal Well No. 4H
TVD Reference: RKB=3550.3+26 @ 3576.30usft (Independence 205)
MD Reference: RKB=3550.3+26 @ 3576.30usft (Independence 205)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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
10,369.00	34.50	196.80	10,343.18	-134.93	-66.58	435,089.47	693,947.71	32.19462374	-103.70636232
10,380.00	35.70	197.31	10,352.18	-140.98	-68.44	435,083.42	693,945.86	32.19460714	-103.70636843
330 Hard line intercept @ 10380 MD 330 FNL 500 FEL									
10,401.00	38.00	198.20	10,368.99	-152.97	-72.28	435,071.43	693,942.01	32.19457424	-103.70638108
10,432.00	41.30	199.30	10,392.85	-171.70	-78.64	435,052.70	693,935.65	32.19452287	-103.70640200
10,463.00	44.00	198.60	10,415.65	-191.56	-85.46	435,032.84	693,928.83	32.19446837	-103.70642441
10,494.00	46.10	196.50	10,437.55	-212.48	-92.07	435,011.92	693,922.23	32.19441098	-103.70644616
10,524.00	48.60	195.10	10,457.88	-233.71	-98.07	434,990.69	693,916.22	32.19435272	-103.70646597
10,555.00	52.40	195.40	10,477.59	-256.78	-104.36	434,967.62	693,909.93	32.19428940	-103.70648674
10,586.00	56.10	194.70	10,495.70	-281.08	-110.89	434,943.32	693,903.40	32.19422273	-103.70650830
10,618.00	61.20	192.60	10,512.35	-307.62	-117.32	434,916.78	693,896.97	32.19414985	-103.70652960
10,649.00	66.50	191.90	10,526.00	-334.81	-123.22	434,889.59	693,891.07	32.19407522	-103.70654917
10,681.00	70.90	191.50	10,537.62	-364.00	-129.27	434,860.40	693,885.03	32.19399508	-103.70656926
10,712.00	74.40	192.60	10,546.87	-392.93	-135.44	434,831.47	693,878.85	32.19391565	-103.70658978
10,743.00	79.40	191.90	10,553.89	-422.42	-141.85	434,801.97	693,872.45	32.19383467	-103.70661103
10,801.00	89.40	190.80	10,559.54	-478.95	-153.19	434,745.45	693,861.11	32.19367948	-103.70664875
10,832.00	90.30	191.20	10,559.63	-509.38	-159.10	434,715.02	693,855.19	32.19359593	-103.70666845
10,863.00	90.60	190.80	10,559.38	-539.81	-165.02	434,684.59	693,849.28	32.19351238	-103.70668814
10,957.00	91.00	189.40	10,558.07	-632.34	-181.50	434,592.06	693,832.80	32.19325829	-103.70674316
11,051.00	90.40	187.70	10,556.92	-725.28	-195.47	434,499.12	693,818.82	32.19300302	-103.70679008
11,145.00	90.60	185.60	10,556.10	-818.64	-206.36	434,405.76	693,807.94	32.19274657	-103.70682702
11,238.00	91.00	183.80	10,554.80	-911.32	-213.98	434,313.08	693,800.32	32.19249194	-103.70685340
11,333.00	90.80	182.80	10,553.31	-1,006.15	-219.45	434,218.25	693,794.85	32.19223136	-103.70687286
11,427.00	91.00	180.30	10,551.83	-1,100.09	-221.99	434,124.31	693,792.31	32.19197316	-103.70688284
11,521.00	90.60	178.90	10,550.52	-1,194.08	-221.33	434,030.32	693,792.96	32.19171479	-103.70688249
11,615.00	91.50	178.50	10,548.80	-1,288.04	-219.20	433,936.36	693,795.10	32.19145648	-103.70687737
11,709.00	90.80	177.50	10,546.91	-1,381.96	-215.92	433,842.44	693,798.38	32.19119825	-103.70686853
11,803.00	91.70	177.10	10,544.86	-1,475.83	-211.49	433,748.57	693,802.80	32.19094014	-103.70685599
11,897.00	90.80	176.80	10,542.81	-1,569.67	-206.49	433,654.73	693,807.80	32.19068210	-103.70684160
11,991.00	89.60	177.50	10,542.48	-1,663.56	-201.82	433,560.84	693,812.48	32.19042396	-103.70682826
12,085.00	90.40	177.10	10,542.48	-1,757.45	-197.39	433,466.95	693,816.90	32.19016579	-103.70681571
12,179.00	89.40	177.80	10,542.65	-1,851.36	-193.21	433,373.04	693,821.09	32.18990759	-103.70680396
12,273.00	90.40	177.50	10,542.81	-1,945.27	-189.35	433,279.13	693,824.94	32.18964936	-103.70679327
12,367.00	89.90	178.20	10,542.56	-2,039.21	-185.83	433,185.19	693,828.47	32.18939110	-103.70678364
12,463.00	91.10	178.90	10,541.73	-2,135.17	-183.40	433,089.23	693,830.90	32.18912727	-103.70677760
12,557.00	90.30	178.50	10,540.58	-2,229.14	-181.27	432,995.26	693,833.03	32.18886893	-103.70677248
12,651.00	89.00	178.50	10,541.15	-2,323.10	-178.81	432,901.30	693,835.49	32.18861060	-103.70676629
12,745.00	90.80	178.20	10,541.32	-2,417.06	-176.10	432,807.34	693,838.20	32.18835228	-103.70675931
12,839.00	89.20	178.20	10,541.32	-2,511.01	-173.15	432,713.39	693,841.15	32.18809398	-103.70675154
12,933.00	90.80	177.80	10,541.32	-2,604.95	-169.87	432,619.45	693,844.43	32.18783570	-103.70674270
13,027.00	89.60	177.10	10,540.99	-2,698.85	-165.68	432,525.55	693,848.61	32.18757751	-103.70673095
13,121.00	91.10	177.10	10,540.41	-2,792.73	-160.93	432,431.67	693,853.37	32.18731938	-103.70671735
13,215.00	89.90	177.10	10,539.59	-2,886.60	-156.17	432,337.80	693,858.12	32.18706126	-103.70670375
13,309.00	91.70	176.80	10,538.28	-2,980.46	-151.17	432,243.94	693,863.12	32.18680319	-103.70668935
13,403.00	89.90	177.50	10,536.97	-3,074.33	-146.50	432,150.07	693,867.80	32.18654508	-103.70667602
13,497.00	88.90	177.80	10,537.95	-3,168.24	-142.65	432,056.16	693,871.65	32.18628686	-103.70666533
13,591.00	89.90	177.50	10,538.94	-3,262.16	-138.79	431,962.24	693,875.50	32.18602864	-103.70665464
13,685.00	88.90	176.40	10,539.92	-3,356.01	-133.79	431,868.38	693,880.51	32.18577056	-103.70664024
13,779.00	90.10	176.40	10,540.74	-3,449.82	-127.89	431,774.58	693,886.41	32.18551260	-103.70662293
13,873.00	88.50	177.10	10,541.89	-3,543.66	-122.56	431,680.74	693,891.74	32.18525457	-103.70660748
13,967.00	90.10	177.10	10,543.04	-3,637.53	-117.80	431,586.87	693,896.49	32.18499646	-103.70659387
14,061.00	88.50	177.50	10,544.19	-3,731.42	-113.38	431,492.98	693,900.92	32.18473831	-103.70658133
14,155.00	89.20	177.10	10,546.07	-3,825.29	-108.95	431,399.11	693,905.35	32.18448019	-103.70656879

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Winward Federal Well No. 4H
Project:	Lea County, New Mexico	TVD Reference:	RKB=3550.3+26 @ 3576.30usft (Independence 205)
Site:	Winward Federal	MD Reference:	RKB=3550.3+26 @ 3576.30usft (Independence 205)
Well:	Winward Federal Well No. 4H	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
14,249.00	89.70	177.10	10,546.98	-3,919.17	-104.19	431,305.23	693,910.10	32.18422206	-103.70655519
14,343.00	90.30	176.80	10,546.98	-4,013.03	-99.19	431,211.37	693,915.10	32.18396396	-103.70654079
14,437.00	91.10	176.80	10,545.83	-4,106.88	-93.95	431,117.52	693,920.35	32.18370591	-103.70652560
14,532.00	91.80	176.80	10,543.42	-4,201.70	-88.64	431,022.70	693,925.65	32.18344517	-103.70651025
14,626.00	90.30	177.10	10,541.70	-4,295.55	-83.64	430,928.85	693,930.65	32.18318712	-103.70649586
14,720.00	91.00	177.50	10,540.63	-4,389.44	-79.22	430,834.96	693,935.08	32.18292896	-103.70648331
14,815.00	89.60	177.80	10,540.14	-4,484.35	-75.32	430,740.05	693,938.97	32.18266799	-103.70647251
14,909.00	89.70	178.20	10,540.71	-4,578.30	-72.04	430,646.10	693,942.25	32.18240971	-103.70646368
15,003.00	89.70	177.80	10,541.20	-4,672.24	-68.76	430,552.16	693,945.54	32.18215143	-103.70645484
15,097.00	89.90	177.50	10,541.53	-4,766.16	-64.91	430,458.24	693,949.39	32.18189319	-103.70644416
15,191.00	89.70	177.50	10,541.86	-4,860.07	-60.81	430,364.33	693,953.49	32.18163498	-103.70643267
15,285.00	89.70	177.80	10,542.35	-4,953.99	-56.95	430,270.41	693,957.34	32.18137675	-103.70642198
15,379.00	89.70	177.50	10,542.84	-5,047.91	-53.10	430,176.49	693,961.20	32.18111852	-103.70641130
15,473.00	89.60	177.50	10,543.42	-5,141.81	-49.00	430,082.59	693,965.30	32.18086031	-103.70639981
15,567.00	89.90	177.50	10,543.83	-5,235.72	-44.90	429,988.68	693,969.40	32.18060210	-103.70638833
15,661.00	89.20	177.10	10,544.57	-5,329.62	-40.47	429,894.78	693,973.83	32.18034393	-103.70637579
15,755.00	90.10	177.50	10,545.14	-5,423.51	-36.04	429,800.89	693,978.25	32.18008577	-103.70636325
15,849.00	89.70	177.80	10,545.31	-5,517.43	-32.19	429,706.97	693,982.11	32.17982753	-103.70635256
15,944.00	90.60	177.80	10,545.06	-5,612.36	-28.54	429,612.04	693,985.76	32.17956653	-103.70634256
16,038.00	90.40	178.90	10,544.24	-5,706.31	-25.83	429,518.09	693,988.46	32.17930821	-103.70633558
16,132.00	91.80	178.50	10,542.43	-5,800.27	-23.70	429,424.13	693,990.59	32.17904991	-103.70633046
16,226.00	93.30	178.90	10,538.25	-5,894.15	-21.57	429,330.25	693,992.72	32.17879181	-103.70632534
16,321.00	92.00	178.90	10,533.86	-5,989.03	-19.75	429,235.37	693,994.55	32.17853098	-103.70632124
16,415.00	91.50	178.30	10,530.99	-6,082.96	-17.45	429,141.44	693,996.84	32.17827275	-103.70631559
16,509.00	89.90	177.20	10,529.84	-6,176.87	-13.76	429,047.53	694,000.53	32.17801453	-103.70630544
16,604.00	89.30	176.80	10,530.50	-6,271.74	-8.79	428,952.66	694,005.50	32.17775367	-103.70629115
16,698.00	89.40	176.70	10,531.57	-6,365.58	-3.46	428,858.82	694,010.83	32.17749563	-103.70627570
16,792.00	90.00	176.30	10,532.06	-6,459.40	2.28	428,765.00	694,016.57	32.17723763	-103.70625892
16,886.00	91.10	176.10	10,531.16	-6,553.19	8.50	428,671.21	694,022.80	32.17697972	-103.70624056
16,980.00	90.70	176.20	10,529.68	-6,646.97	14.82	428,577.43	694,029.11	32.17672185	-103.70622193
17,074.00	89.30	175.70	10,529.68	-6,740.73	21.45	428,483.67	694,035.75	32.17646400	-103.70620224
17,168.00	89.50	175.50	10,530.67	-6,834.45	28.67	428,389.95	694,042.96	32.17620627	-103.70618070
17,262.00	90.20	175.50	10,530.91	-6,928.16	36.04	428,296.24	694,050.34	32.17594856	-103.70615863
17,356.00	90.40	175.70	10,530.42	-7,021.88	43.25	428,202.52	694,057.55	32.17569081	-103.70613709
17,450.00	89.00	176.40	10,530.91	-7,115.65	49.73	428,108.75	694,064.02	32.17543294	-103.70611793
17,544.00	89.10	176.20	10,532.47	-7,209.44	55.79	428,014.96	694,070.09	32.17517503	-103.70610009
17,638.00	89.20	175.90	10,533.86	-7,303.21	62.27	427,921.19	694,076.56	32.17491718	-103.70608093
17,732.00	89.10	177.00	10,535.26	-7,397.02	68.09	427,827.38	694,082.38	32.17465922	-103.70606389
17,827.00	88.60	177.40	10,537.17	-7,491.88	72.73	427,732.52	694,087.02	32.17439837	-103.70605069
17,920.00	89.40	177.00	10,538.79	-7,584.76	77.27	427,639.64	694,091.56	32.17414300	-103.70603776
18,014.00	90.60	177.40	10,538.79	-7,678.64	81.86	427,545.76	694,096.16	32.17388485	-103.70602469
18,108.00	90.90	177.80	10,537.56	-7,772.55	85.80	427,451.85	694,100.09	32.17362664	-103.70601373
18,202.00	90.20	179.10	10,536.66	-7,866.51	88.34	427,357.89	694,102.63	32.17336832	-103.70600729
18,296.00	89.80	180.00	10,536.66	-7,960.51	89.08	427,263.89	694,103.37	32.17310993	-103.70600667
18,390.00	90.20	180.80	10,536.66	-8,054.50	88.42	427,169.90	694,102.72	32.17285156	-103.70601057
18,485.00	89.70	180.70	10,536.74	-8,149.50	87.18	427,074.90	694,101.47	32.17259046	-103.70601637
18,579.00	89.80	180.80	10,537.15	-8,243.49	85.95	426,980.91	694,100.24	32.17233211	-103.70602212
18,673.00	90.20	180.50	10,537.15	-8,337.48	84.88	426,886.92	694,099.18	32.17207375	-103.70602734
18,767.00	90.50	180.00	10,536.58	-8,431.48	84.47	426,792.92	694,098.77	32.17181538	-103.70603044
18,861.00	90.90	179.90	10,535.43	-8,525.47	84.55	426,698.93	694,098.85	32.17155700	-103.70603194
18,955.00	91.20	179.90	10,533.70	-8,619.45	84.72	426,604.95	694,099.01	32.17129865	-103.70603318
19,049.00	91.30	179.70	10,531.65	-8,713.43	85.04	426,510.97	694,099.34	32.17104032	-103.70603389
19,143.00	91.00	179.70	10,529.77	-8,807.41	85.54	426,416.99	694,099.83	32.17078197	-103.70603407

Company:	COG Operating LLC	Local Co-ordinate Reference:	Well Winward Federal Well No. 4H
Project:	Lea County, New Mexico	TVD Reference:	RKB=3550.3+26 @ 3576.30usft (Independence 205)
Site:	Winward Federal	MD Reference:	RKB=3550.3+26 @ 3576.30usft (Independence 205)
Well:	Winward Federal Well No. 4H	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
19,237.00	90.60	179.70	10,528.45	-8,901.40	86.03	426,323.00	694,100.32	32.17052360	-103.70603425
19,331.00	90.70	179.40	10,527.39	-8,995.39	86.77	426,229.01	694,101.06	32.17026522	-103.70603364
19,425.00	90.60	179.20	10,526.32	-9,089.38	87.92	426,135.02	694,102.21	32.17000685	-103.70603170
19,519.00	90.50	178.90	10,525.42	-9,183.36	89.47	426,041.04	694,103.77	32.16974848	-103.70602843
19,613.00	90.90	178.40	10,524.27	-9,277.33	91.69	425,947.07	694,105.98	32.16949014	-103.70602305
19,707.00	91.90	178.40	10,521.97	-9,371.26	94.31	425,853.14	694,108.61	32.16923189	-103.70601634
19,801.00	90.00	178.90	10,520.42	-9,465.22	96.53	425,759.18	694,110.82	32.16897358	-103.70601095
19,895.00	90.10	179.00	10,520.33	-9,559.20	98.25	425,665.20	694,112.54	32.16871521	-103.70600715
19,989.00	90.30	178.70	10,520.01	-9,653.18	100.14	425,571.22	694,114.43	32.16845684	-103.70600283
20,083.00	90.40	178.40	10,519.43	-9,747.15	102.51	425,477.25	694,116.81	32.16819850	-103.70599691
20,177.00	90.70	178.20	10,518.53	-9,841.10	105.30	425,383.30	694,119.60	32.16794019	-103.70598967
20,271.00	90.90	177.80	10,517.22	-9,935.04	108.58	425,289.36	694,122.88	32.16768192	-103.70598084
20,318.00	91.10	177.60	10,516.40	-9,981.99	110.47	425,242.41	694,124.76	32.16755282	-103.70597563
20,361.00	91.10	177.60	10,515.57	-10,024.95	112.27	425,199.45	694,126.56	32.16743472	-103.70597062

Survey projected to 20361.00 MD

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
100.00	100.00	0.15	-0.11	Gyro
9,967.00	9,966.14	-14.77	-30.97	MWD surveys
10,380.00	10,352.18	-140.98	-68.44	330 Hard line intercept @ 10380 MD 330 FNL 500 FEL
20,361.00	10,515.57	-10,024.95	112.27	Survey projected to 20361.00 MD



COG Operating LLC

Well: Winward Federal Well No. 4H
 Site: Winward Federal
 Project: Lea County, New Mexico
 Design: rev1
 Rig: Independence 205

SECTION DETAILS

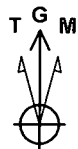
Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Annotation
1	9903.00	1.38	205.36	9902.19	-12.67	-29.54	0.00	0.00	12.30	Survey @ 9903.00 MD
2	9989.83	1.38	205.36	9989.00	-14.56	-30.44	0.00	0.00	14.18	KOP Begin 10°/100' build/turn
3	10879.25	90.18	179.09	10549.55	-589.20	-27.28	10.00	-26.28	588.82	Begin 90.18° lateral
4	20328.40	90.18	179.09	10520.00-10037.10	123.30	0.00	0.00	0.00	0037.86	PBHL/TD

ANNOTATIONS

TVD	MD	Inc	Azi	+N/-S	+E/-W	VSecDeparture	Annotation
100.00	100.00	0.21	324.17	0.15	-0.11	-0.15	0.18 Gyro
9986.14	9967.00	3.20	217.90	-14.77	-30.97	14.40	107.89 MWD surveys
10352.18	10380.00	35.70	197.31	-140.98	-68.44	140.13	239.86 330 Hard line intercept @ 10380 MD 330 FNL 500 FEL
10515.57	20361.00	91.10	177.60-10024.95	112.27	10025.57	10147.52	Survey projected to 20361.00 MD

Surface Location: RKB=3550.3+26 @ 3576.30usft (Independence 205)
 US State Plane 1927 (Exact solution)
 New Mexico East 3001
 Northing 435224.40 Easting 694014.30 Latitude 32.19499359 Longitude -103.70614454
 Total Correction (M => G) To convert a Magnetic Direction to a Grid Direction, Add 6.97°

N-ZONE



Azimuths to Grid North
 True North: -0.33°
 Magnetic North: 6.97°

Magnetic Field
 Strength: 48305.4snT
 Dip Angle: 60.07°
 Date: 3/26/2014
 Model: IGRF2010

