



CONCHO

COG Operating L L C

Lea County, NM (NAD27 NME)

Sec. 30, T 24 S. , R 32 E

Windward Federal 11H

Wellbore #1

Design: Wellbore #1

Standard Survey Report

05 May, 2017

HOBBS OCD
AUG 31 2017
RECEIVED



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 11H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3573.80ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3573.80ft (McVay 8)
Well:	Windward Federal 11H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Project	Lea County, NM (NAD27 NME)		
Map System:	US State Plane 1927 (Exact solution)	System Datum:	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	New Mexico East 3001		

Site	Sec. 30, T 24 S. , R 32 E		
Site Position:		Northing:	435,165.5000 usft
From:	Map	Easting:	689,517.6000 usft
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "
		Latitude:	32° 11' 41.651 N
		Longitude:	103° 43' 14.453 W
		Grid Convergence:	0.33 °

Well	Windward Federal 11H, ACTIVE		
Well Position	+N/-S	0.00 ft	Northing: 435,203.1000 usft
	+E/-W	0.00 ft	Easting: 693,884.3000 usft
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft
		Latitude:	32° 11' 41.774 N
		Longitude:	103° 42' 23.635 W
		Ground Level:	3,547.80 ft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination (°)
	HDGM	4/7/2017	6.92
			Dip Angle (°) 59.93
			Field Strength (nT) 48,115

Design	Wellbore #1		
Audit Notes:			
Version:	1.0	Phase:	ACTUAL
		Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)
	0.00	0.00	0.00
			Direction (°) 182.01

Survey Program	Date 5/5/2017		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name
100.00	8,555.00	Keeper Gyro (Wellbore #1)	Keeper
8,607.00	19,115.00	IDS MWD Surveys (Wellbore #1)	MWD
			Description
			Standard Wireline Keeper ver 1.0.2
			MWD - Standard

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.67	167.70	100.00	-0.57	0.12	0.57	0.67	0.67	0.00	
125.00	0.55	150.28	125.00	-0.82	0.22	0.81	0.88	-0.48	-69.68	
150.00	0.40	176.71	150.00	-1.01	0.28	1.00	1.05	-0.60	105.72	
175.00	0.47	181.09	174.99	-1.20	0.28	1.19	0.31	0.28	17.52	
200.00	0.61	165.58	199.99	-1.43	0.31	1.42	0.80	0.56	-62.04	
225.00	0.60	162.78	224.99	-1.68	0.39	1.67	0.12	-0.04	-11.20	
250.00	0.53	165.26	249.99	-1.92	0.45	1.90	0.30	-0.28	9.92	
275.00	0.49	147.91	274.99	-2.12	0.54	2.10	0.64	-0.16	-69.40	
300.00	0.49	150.71	299.99	-2.31	0.65	2.28	0.10	0.00	11.20	

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
325.00	0.42	163.45	324.99	-2.49	0.73	2.46	0.49	-0.28	50.96
350.00	0.40	169.27	349.99	-2.66	0.77	2.63	0.18	-0.08	23.28
375.00	0.26	171.39	374.99	-2.80	0.79	2.77	0.56	-0.56	8.48
400.00	0.43	152.44	399.99	-2.94	0.85	2.91	0.81	0.68	-75.80
425.00	0.50	136.83	424.99	-3.11	0.96	3.07	0.58	0.28	-62.44
450.00	0.43	122.00	449.99	-3.24	1.12	3.19	0.55	-0.28	-59.32
475.00	0.50	106.02	474.98	-3.32	1.30	3.27	0.59	0.28	-63.92
500.00	0.45	85.62	499.98	-3.34	1.51	3.28	0.70	-0.20	-81.60
525.00	0.55	79.59	524.98	-3.31	1.72	3.25	0.45	0.40	-24.12
550.00	0.52	83.09	549.98	-3.27	1.95	3.20	0.18	-0.12	14.00
575.00	0.58	95.41	574.98	-3.27	2.19	3.19	0.53	0.24	49.28
600.00	0.69	104.07	599.98	-3.32	2.46	3.23	0.58	0.44	34.64
625.00	0.66	98.36	624.98	-3.38	2.75	3.28	0.29	-0.12	-22.84
650.00	0.71	89.89	649.98	-3.40	3.05	3.29	0.45	0.20	-33.88
675.00	0.58	86.30	674.97	-3.39	3.33	3.27	0.54	-0.52	-14.36
700.00	0.56	95.75	699.97	-3.39	3.58	3.27	0.38	-0.08	37.80
725.00	0.47	84.13	724.97	-3.40	3.80	3.26	0.55	-0.36	-46.48
750.00	0.65	101.63	749.97	-3.41	4.04	3.27	0.99	0.72	70.00
775.00	0.66	98.08	774.97	-3.46	4.32	3.31	0.17	0.04	-14.20
800.00	0.67	96.98	799.97	-3.50	4.61	3.34	0.06	0.04	-4.40
825.00	0.54	88.77	824.97	-3.52	4.87	3.34	0.62	-0.52	-32.84
850.00	0.63	91.12	849.96	-3.52	5.13	3.33	0.37	0.36	9.40
875.00	0.45	87.62	874.96	-3.51	5.37	3.32	0.73	-0.72	-14.00
900.00	0.41	112.13	899.96	-3.54	5.55	3.35	0.75	-0.16	98.04
925.00	0.40	97.97	924.96	-3.59	5.72	3.39	0.40	-0.04	-56.64
950.00	0.37	85.57	949.96	-3.60	5.88	3.39	0.35	-0.12	-49.60
975.00	0.75	46.33	974.96	-3.48	6.08	3.26	2.08	1.52	-156.96
1,000.00	0.87	44.92	999.96	-3.23	6.33	3.01	0.49	0.48	-5.64
1,025.00	0.98	39.45	1,024.95	-2.93	6.60	2.70	0.56	0.44	-21.88
1,050.00	1.03	37.66	1,049.95	-2.59	6.88	2.34	0.24	0.20	-7.16
1,075.00	1.07	31.55	1,074.95	-2.21	7.14	1.96	0.48	0.16	-24.44
1,100.00	1.05	32.47	1,099.94	-1.82	7.38	1.56	0.11	-0.08	3.68
1,125.00	1.01	27.08	1,124.94	-1.43	7.60	1.16	0.42	-0.16	-21.56
1,150.00	0.91	33.37	1,149.93	-1.07	7.81	0.79	0.58	-0.40	25.16
1,175.00	0.75	28.54	1,174.93	-0.76	8.00	0.48	0.70	-0.64	-19.32
1,200.00	0.74	10.38	1,199.93	-0.45	8.11	0.17	0.94	-0.04	-72.64
1,225.00	1.05	352.57	1,224.93	-0.07	8.11	-0.22	1.65	1.24	-71.24
1,250.00	1.35	336.87	1,249.92	0.43	7.96	-0.71	1.77	1.20	-62.80
1,275.00	1.94	332.53	1,274.91	1.08	7.65	-1.34	2.41	2.36	-17.36
1,300.00	2.23	324.35	1,299.89	1.85	7.17	-2.10	1.66	1.16	-32.72
1,325.00	2.37	317.92	1,324.87	2.63	6.54	-2.85	1.17	0.56	-25.72
1,350.00	2.41	321.57	1,349.85	3.42	5.87	-3.62	0.63	0.16	14.60
1,375.00	2.37	323.73	1,374.83	4.25	5.24	-4.43	0.39	-0.16	8.64

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Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,400.00	2.42	322.82	1,399.81	5.09	4.61	-5.25	0.25	0.20	-3.64
1,425.00	2.39	322.83	1,424.79	5.92	3.98	-6.06	0.12	-0.12	0.04
1,450.00	2.29	323.40	1,449.77	6.74	3.37	-6.85	0.41	-0.40	2.28
1,475.00	1.87	321.12	1,474.75	7.46	2.81	-7.55	1.71	-1.68	-9.12
1,500.00	1.77	317.11	1,499.74	8.06	2.29	-8.13	0.65	-0.40	-16.04
1,525.00	1.80	314.85	1,524.72	8.62	1.75	-8.67	0.31	0.12	-9.04
1,550.00	1.59	313.87	1,549.71	9.13	1.22	-9.17	0.85	-0.84	-3.92
1,575.00	1.61	320.08	1,574.70	9.64	0.75	-9.66	0.70	0.08	24.84
1,600.00	1.75	319.76	1,599.69	10.21	0.28	-10.21	0.56	0.56	-1.28
1,625.00	1.80	318.71	1,624.68	10.79	-0.23	-10.78	0.24	0.20	-4.20
1,650.00	1.79	314.69	1,649.67	11.36	-0.77	-11.33	0.51	-0.04	-16.08
1,675.00	1.69	313.44	1,674.66	11.89	-1.31	-11.84	0.43	-0.40	-5.00
1,700.00	1.67	318.15	1,699.65	12.41	-1.82	-12.34	0.56	-0.08	18.84
1,725.00	1.80	319.50	1,724.64	12.98	-2.32	-12.90	0.55	0.52	5.40
1,750.00	1.80	319.50	1,749.62	13.58	-2.83	-13.47	0.00	0.00	0.00
1,775.00	1.85	314.76	1,774.61	14.16	-3.37	-14.04	0.64	0.20	-18.96
1,800.00	1.62	313.22	1,799.60	14.69	-3.92	-14.54	0.94	-0.92	-6.16
1,825.00	1.72	307.51	1,824.59	15.16	-4.47	-14.99	0.78	0.40	-22.84
1,850.00	1.76	296.66	1,849.58	15.56	-5.11	-15.37	1.33	0.16	-43.40
1,875.00	1.92	298.36	1,874.56	15.93	-5.82	-15.72	0.68	0.64	6.80
1,900.00	2.01	295.72	1,899.55	16.32	-6.59	-16.08	0.51	0.36	-10.56
1,925.00	2.07	293.93	1,924.53	16.70	-7.39	-16.43	0.35	0.24	-7.16
1,950.00	1.93	294.45	1,949.52	17.05	-8.19	-16.76	0.56	-0.56	2.08
1,975.00	1.92	292.00	1,974.50	17.38	-8.96	-17.06	0.33	-0.04	-9.80
2,000.00	1.80	289.71	1,999.49	17.67	-9.72	-17.32	0.56	-0.48	-9.16
2,025.00	1.72	272.75	2,024.48	17.82	-10.46	-17.45	2.10	-0.32	-67.84
2,050.00	1.70	252.31	2,049.47	17.73	-11.19	-17.33	2.43	-0.08	-81.76
2,075.00	1.70	245.98	2,074.46	17.47	-11.88	-17.04	0.75	0.00	-25.32
2,100.00	1.55	242.17	2,099.45	17.16	-12.52	-16.71	0.74	-0.60	-15.24
2,125.00	1.59	244.61	2,124.44	16.85	-13.13	-16.38	0.31	0.16	9.76
2,150.00	1.63	245.25	2,149.43	16.55	-13.77	-16.06	0.18	0.16	2.56
2,175.00	1.55	245.16	2,174.42	16.26	-14.40	-15.75	0.32	-0.32	-0.36
2,200.00	1.56	249.87	2,199.41	16.00	-15.03	-15.47	0.51	0.04	18.84
2,225.00	1.62	246.89	2,224.40	15.75	-15.67	-15.19	0.41	0.24	-11.92
2,250.00	1.57	244.05	2,249.39	15.46	-16.30	-14.88	0.37	-0.20	-11.36
2,275.00	1.41	238.09	2,274.38	15.15	-16.87	-14.55	0.89	-0.64	-23.84
2,300.00	1.16	243.35	2,299.38	14.87	-17.36	-14.25	1.10	-1.00	21.04
2,325.00	1.27	248.69	2,324.37	14.65	-17.84	-14.02	0.63	0.44	21.36
2,350.00	1.20	242.58	2,349.36	14.43	-18.34	-13.78	0.60	-0.28	-24.44
2,375.00	1.32	243.97	2,374.36	14.19	-18.83	-13.52	0.50	0.48	5.56
2,400.00	1.26	243.43	2,399.35	13.94	-19.33	-13.25	0.24	-0.24	-2.16
2,425.00	1.21	239.47	2,424.35	13.68	-19.80	-12.98	0.40	-0.20	-15.84
2,450.00	1.06	228.08	2,449.34	13.39	-20.20	-12.68	1.08	-0.60	-45.56

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Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,475.00	0.95	234.00	2,474.34	13.12	-20.54	-12.39	0.60	-0.44	23.68
2,500.00	0.86	236.50	2,499.33	12.89	-20.87	-12.15	0.39	-0.36	10.00
2,525.00	0.91	239.66	2,524.33	12.69	-21.20	-11.94	0.28	0.20	12.64
2,550.00	1.00	251.76	2,549.33	12.52	-21.57	-11.75	0.88	0.36	48.40
2,575.00	1.04	236.33	2,574.32	12.32	-21.97	-11.55	1.11	0.16	-61.72
2,600.00	1.02	231.62	2,599.32	12.06	-22.33	-11.27	0.35	-0.08	-18.84
2,625.00	0.87	226.37	2,624.32	11.79	-22.64	-10.99	0.69	-0.60	-21.00
2,650.00	0.86	228.05	2,649.31	11.53	-22.92	-10.72	0.11	-0.04	6.72
2,675.00	0.80	228.48	2,674.31	11.29	-23.19	-10.47	0.24	-0.24	1.72
2,700.00	0.85	234.92	2,699.31	11.07	-23.47	-10.24	0.42	0.20	25.76
2,725.00	0.89	235.67	2,724.31	10.85	-23.79	-10.02	0.17	0.16	3.00
2,750.00	1.04	235.28	2,749.30	10.62	-24.13	-9.76	0.60	0.60	-1.56
2,775.00	1.17	238.19	2,774.30	10.35	-24.54	-9.49	0.57	0.52	11.64
2,800.00	1.30	254.73	2,799.29	10.14	-25.03	-9.26	1.51	0.52	66.16
2,825.00	1.51	257.91	2,824.28	10.00	-25.62	-9.10	0.90	0.84	12.72
2,850.00	1.50	257.99	2,849.28	9.86	-26.26	-8.94	0.04	-0.04	0.32
2,875.00	1.50	255.73	2,874.27	9.71	-26.90	-8.77	0.24	0.00	-9.04
2,900.00	1.47	257.21	2,899.26	9.56	-27.53	-8.59	0.19	-0.12	5.92
2,925.00	1.36	249.62	2,924.25	9.39	-28.12	-8.40	0.87	-0.44	-30.36
2,950.00	1.16	257.19	2,949.24	9.23	-28.65	-8.22	1.04	-0.80	30.28
2,975.00	0.98	250.07	2,974.24	9.10	-29.10	-8.08	0.89	-0.72	-28.48
3,000.00	0.83	227.46	2,999.24	8.90	-29.43	-7.87	1.54	-0.60	-90.44
3,025.00	0.88	207.16	3,024.23	8.61	-29.65	-7.57	1.22	0.20	-81.20
3,050.00	0.87	209.37	3,049.23	8.27	-29.83	-7.22	0.14	-0.04	8.84
3,075.00	0.86	198.37	3,074.23	7.93	-29.98	-6.88	0.66	-0.04	-44.00
3,100.00	0.69	187.80	3,099.23	7.60	-30.06	-6.55	0.89	-0.68	-42.28
3,125.00	0.77	189.92	3,124.22	7.29	-30.11	-6.23	0.34	0.32	8.48
3,150.00	0.69	181.66	3,149.22	6.97	-30.15	-5.91	0.53	-0.32	-33.04
3,175.00	0.70	179.02	3,174.22	6.67	-30.15	-5.61	0.13	0.04	-10.56
3,200.00	0.71	179.61	3,199.22	6.36	-30.14	-5.30	0.05	0.04	2.36
3,225.00	0.80	172.29	3,224.22	6.03	-30.12	-4.98	0.53	0.36	-29.28
3,250.00	0.72	165.88	3,249.21	5.71	-30.06	-4.65	0.47	-0.32	-25.64
3,275.00	0.20	170.73	3,274.21	5.51	-30.01	-4.46	2.08	-2.08	19.40
3,300.00	0.11	214.16	3,299.21	5.45	-30.02	-4.40	0.57	-0.36	173.72
3,325.00	0.22	198.17	3,324.21	5.39	-30.05	-4.33	0.47	0.44	-63.96
3,350.00	0.19	192.76	3,349.21	5.30	-30.07	-4.24	0.14	-0.12	-21.64
3,375.00	0.42	159.12	3,374.21	5.17	-30.05	-4.12	1.13	0.92	-134.56
3,400.00	0.53	147.88	3,399.21	4.99	-29.95	-3.94	0.57	0.44	-44.96
3,425.00	0.75	136.47	3,424.21	4.77	-29.78	-3.73	1.01	0.88	-45.64
3,450.00	0.82	133.13	3,449.21	4.53	-29.54	-3.50	0.33	0.28	-13.36
3,475.00	0.88	128.92	3,474.21	4.29	-29.26	-3.26	0.35	0.24	-16.84
3,500.00	0.81	128.51	3,499.20	4.06	-28.97	-3.04	0.28	-0.28	-1.64
3,525.00	0.60	126.54	3,524.20	3.87	-28.73	-2.86	0.85	-0.84	-7.88
3,550.00	0.12	243.96	3,549.20	3.78	-28.64	-2.78	2.66	-1.92	469.68

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 11H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3573.80ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3573.80ft (McVay 8)
Well:	Windward Federal 11H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
3,575.00	0.24	271.82	3,574.20	3.77	-28.72	-2.76	0.58	0.48	111.44
3,600.00	0.28	283.55	3,599.20	3.79	-28.83	-2.78	0.27	0.16	46.92
3,625.00	0.31	277.41	3,624.20	3.81	-28.96	-2.79	0.17	0.12	-24.56
3,650.00	0.35	273.95	3,649.20	3.82	-29.10	-2.80	0.18	0.16	-13.84
3,675.00	0.24	172.78	3,674.20	3.78	-29.17	-2.75	1.84	-0.44	-404.68
3,700.00	0.38	162.77	3,699.20	3.65	-29.14	-2.62	0.60	0.56	-40.04
3,725.00	0.57	151.58	3,724.20	3.46	-29.06	-2.44	0.84	0.76	-44.76
3,750.00	0.75	155.76	3,749.20	3.20	-28.93	-2.19	0.74	0.72	16.72
3,775.00	0.93	150.35	3,774.19	2.87	-28.76	-1.87	0.79	0.72	-21.64
3,800.00	1.24	144.89	3,799.19	2.48	-28.51	-1.48	1.31	1.24	-21.84
3,825.00	1.26	146.21	3,824.18	2.03	-28.20	-1.04	0.14	0.08	5.28
3,850.00	1.33	143.38	3,849.18	1.57	-27.87	-0.59	0.38	0.28	-11.32
3,875.00	1.52	144.99	3,874.17	1.06	-27.51	-0.10	0.78	0.76	6.44
3,900.00	1.37	149.67	3,899.16	0.53	-27.17	0.42	0.76	-0.60	18.72
3,925.00	0.62	179.64	3,924.16	0.14	-27.02	0.81	3.55	-3.00	119.88
3,950.00	0.69	252.75	3,949.16	-0.04	-27.16	0.99	3.13	0.28	292.44
3,975.00	0.98	290.78	3,974.15	-0.01	-27.50	0.97	2.44	1.16	152.12
4,000.00	1.18	296.37	3,999.15	0.18	-27.93	0.80	0.90	0.80	22.36
4,025.00	1.35	300.56	4,024.14	0.44	-28.42	0.55	0.77	0.68	16.76
4,050.00	1.22	301.78	4,049.14	0.73	-28.90	0.28	0.53	-0.52	4.88
4,075.00	1.17	303.98	4,074.13	1.02	-29.33	0.01	0.27	-0.20	8.80
4,100.00	1.13	306.03	4,099.13	1.30	-29.75	-0.26	0.23	-0.16	8.20
4,125.00	0.82	305.77	4,124.12	1.55	-30.09	-0.50	1.24	-1.24	-1.04
4,150.00	0.77	307.36	4,149.12	1.76	-30.37	-0.70	0.22	-0.20	6.36
4,175.00	0.71	302.67	4,174.12	1.95	-30.63	-0.87	0.34	-0.24	-18.76
4,200.00	0.57	293.85	4,199.12	2.08	-30.88	-1.00	0.68	-0.56	-35.28
4,225.00	0.63	295.11	4,224.11	2.19	-31.11	-1.10	0.25	0.24	5.04
4,250.00	0.56	285.08	4,249.11	2.28	-31.36	-1.18	0.50	-0.28	-40.12
4,275.00	0.64	276.69	4,274.11	2.33	-31.61	-1.22	0.47	0.32	-33.56
4,300.00	0.72	270.93	4,299.11	2.35	-31.91	-1.23	0.42	0.32	-23.04
4,325.00	0.71	262.52	4,324.11	2.33	-32.22	-1.20	0.42	-0.04	-33.64
4,350.00	0.71	265.74	4,349.11	2.30	-32.53	-1.16	0.16	0.00	12.88
4,375.00	0.77	266.48	4,374.10	2.27	-32.85	-1.12	0.24	0.24	2.96
4,400.00	0.78	257.16	4,399.10	2.23	-33.18	-1.06	0.51	0.04	-37.28
4,425.00	0.79	259.61	4,424.10	2.16	-33.52	-0.98	0.14	0.04	9.80
4,450.00	0.81	253.46	4,449.10	2.08	-33.86	-0.89	0.35	0.08	-24.60
4,475.00	0.83	244.21	4,474.09	1.95	-34.19	-0.75	0.53	0.08	-37.00
4,500.00	0.86	247.26	4,499.09	1.80	-34.53	-0.59	0.22	0.12	12.20
4,525.00	0.92	259.39	4,524.09	1.69	-34.90	-0.46	0.79	0.24	48.52
4,550.00	0.95	259.56	4,549.09	1.61	-35.30	-0.37	0.12	0.12	0.68
4,575.00	1.01	259.51	4,574.08	1.53	-35.72	-0.28	0.24	0.24	-0.20
4,600.00	1.02	261.66	4,599.08	1.46	-36.16	-0.19	0.16	0.04	8.60
4,625.00	1.03	252.98	4,624.07	1.36	-36.59	-0.08	0.62	0.04	-34.72

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 11H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3573.80ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3573.80ft (McVay 8)
Well:	Windward Federal 11H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
4,650.00	1.10	261.06	4,649.07	1.26	-37.04	0.04	0.66	0.28	32.32	
4,675.00	0.96	251.91	4,674.07	1.16	-37.48	0.15	0.86	-0.56	-36.60	
4,700.00	1.18	262.52	4,699.06	1.06	-37.93	0.27	1.18	0.88	42.44	
4,725.00	1.27	261.38	4,724.06	0.98	-38.46	0.36	0.37	0.36	-4.56	
4,750.00	1.95	268.98	4,749.05	0.94	-39.16	0.44	2.85	2.72	30.40	
4,775.00	2.38	274.13	4,774.03	0.97	-40.10	0.44	1.89	1.72	20.60	
4,800.00	2.49	273.65	4,799.01	1.04	-41.16	0.40	0.45	0.44	-1.92	
4,825.00	2.61	273.70	4,823.98	1.11	-42.27	0.37	0.48	0.48	0.20	
4,850.00	2.83	278.79	4,848.95	1.24	-43.45	0.28	1.31	0.88	20.36	
4,875.00	2.84	274.24	4,873.92	1.38	-44.68	0.19	0.90	0.04	-18.20	
4,900.00	2.80	273.45	4,898.89	1.46	-45.91	0.15	0.22	-0.16	-3.16	
4,925.00	2.86	272.88	4,923.86	1.53	-47.14	0.12	0.27	0.24	-2.28	
4,950.00	3.04	271.76	4,948.83	1.58	-48.42	0.11	0.76	0.72	-4.48	
4,975.00	3.53	276.26	4,973.79	1.69	-49.85	0.06	2.21	1.96	18.00	
5,000.00	3.71	273.00	4,998.74	1.81	-51.42	-0.01	1.09	0.72	-13.04	
5,025.00	3.73	274.20	5,023.68	1.91	-53.04	-0.06	0.32	0.08	4.80	
5,050.00	3.88	277.58	5,048.63	2.09	-54.69	-0.17	1.08	0.60	13.52	
5,075.00	3.90	275.81	5,073.57	2.28	-56.38	-0.31	0.49	0.08	-7.08	
5,100.00	3.87	274.89	5,098.51	2.44	-58.06	-0.41	0.28	-0.12	-3.68	
5,125.00	3.88	275.26	5,123.46	2.59	-59.75	-0.50	0.11	0.04	1.48	
5,150.00	3.94	275.64	5,148.40	2.75	-61.44	-0.60	0.26	0.24	1.52	
5,175.00	3.98	275.57	5,173.34	2.92	-63.16	-0.71	0.16	0.16	-0.28	
5,200.00	3.88	272.98	5,198.28	3.05	-64.87	-0.78	0.81	-0.40	-10.36	
5,225.00	3.97	276.21	5,223.22	3.19	-66.57	-0.85	0.95	0.36	12.92	
5,250.00	4.07	277.56	5,248.16	3.40	-68.31	-1.00	0.55	0.40	5.40	
5,275.00	4.01	275.16	5,273.10	3.59	-70.06	-1.14	0.72	-0.24	-9.60	
5,300.00	3.95	275.10	5,298.04	3.75	-71.79	-1.23	0.24	-0.24	-0.24	
5,325.00	4.01	278.56	5,322.98	3.95	-73.52	-1.38	0.99	0.24	13.84	
5,350.00	3.84	275.98	5,347.92	4.17	-75.21	-1.54	0.98	-0.68	-10.32	
5,375.00	3.89	278.45	5,372.86	4.38	-76.88	-1.69	0.70	0.20	9.88	
5,400.00	3.86	278.82	5,397.80	4.64	-78.55	-1.88	0.16	-0.12	1.48	
5,425.00	3.78	277.55	5,422.75	4.87	-80.20	-2.06	0.47	-0.32	-5.08	
5,450.00	3.85	279.41	5,447.69	5.12	-81.85	-2.25	0.57	0.28	7.44	
5,475.00	3.70	277.21	5,472.64	5.36	-83.48	-2.43	0.83	-0.60	-8.80	
5,500.00	3.75	279.22	5,497.59	5.59	-85.08	-2.61	0.56	0.20	8.04	
5,525.00	3.69	278.87	5,522.53	5.85	-86.68	-2.81	0.26	-0.24	-1.40	
5,550.00	3.49	276.71	5,547.49	6.06	-88.24	-2.97	0.97	-0.80	-8.64	
5,575.00	3.68	280.89	5,572.44	6.30	-89.78	-3.15	1.29	0.76	16.72	
5,600.00	3.87	282.90	5,597.38	6.64	-91.39	-3.44	0.93	0.76	8.04	
5,625.00	3.63	280.17	5,622.33	6.97	-92.99	-3.71	1.20	-0.96	-10.92	
5,650.00	3.72	281.58	5,647.28	7.27	-94.56	-3.95	0.51	0.36	5.64	
5,675.00	4.02	283.29	5,672.22	7.63	-96.21	-4.26	1.29	1.20	6.84	
5,700.00	3.85	282.23	5,697.16	8.01	-97.88	-4.58	0.74	-0.68	-4.24	

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 11H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3573.80ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3573.80ft (McVay 8)
Well:	Windward Federal 11H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,725.00	3.71	279.28	5,722.11	8.32	-99.50	-4.83	0.96	-0.56	-11.80
5,750.00	3.26	274.80	5,747.06	8.51	-101.01	-4.97	2.10	-1.80	-17.92
5,775.00	2.85	269.16	5,772.03	8.56	-102.34	-4.97	2.03	-1.64	-22.56
5,800.00	2.90	272.12	5,796.99	8.58	-103.59	-4.94	0.63	0.20	11.84
5,825.00	2.87	270.33	5,821.96	8.60	-104.85	-4.93	0.38	-0.12	-7.16
5,850.00	2.89	269.71	5,846.93	8.60	-106.11	-4.88	0.15	0.08	-2.48
5,875.00	2.75	269.29	5,871.90	8.59	-107.34	-4.83	0.57	-0.56	-1.68
5,900.00	2.83	268.60	5,896.87	8.57	-108.55	-4.76	0.35	0.32	-2.76
5,925.00	2.89	271.79	5,921.84	8.58	-109.80	-4.73	0.68	0.24	12.76
5,950.00	2.74	270.60	5,946.81	8.60	-111.03	-4.71	0.64	-0.60	-4.76
5,975.00	2.79	271.91	5,971.78	8.63	-112.23	-4.69	0.32	0.20	5.24
6,000.00	2.81	273.31	5,996.75	8.68	-113.45	-4.71	0.29	0.08	5.60
6,025.00	2.75	270.93	6,021.72	8.73	-114.66	-4.71	0.52	-0.24	-9.52
6,050.00	2.90	272.93	6,046.69	8.77	-115.90	-4.71	0.72	0.60	8.00
6,075.00	2.94	272.01	6,071.66	8.83	-117.17	-4.72	0.25	0.16	-3.68
6,100.00	2.89	270.99	6,096.63	8.86	-118.44	-4.71	0.29	-0.20	-4.08
6,125.00	3.01	271.53	6,121.59	8.89	-119.73	-4.69	0.49	0.48	2.16
6,150.00	2.92	270.80	6,146.56	8.91	-121.02	-4.67	0.39	-0.36	-2.92
6,175.00	2.89	267.89	6,171.53	8.90	-122.28	-4.61	0.60	-0.12	-11.64
6,200.00	2.93	268.01	6,196.49	8.85	-123.55	-4.52	0.16	0.16	0.48
6,225.00	2.89	266.52	6,221.46	8.79	-124.82	-4.42	0.34	-0.16	-5.96
6,250.00	2.86	268.19	6,246.43	8.74	-126.07	-4.32	0.36	-0.12	6.68
6,275.00	2.97	267.58	6,271.40	8.69	-127.34	-4.22	0.46	0.44	-2.44
6,300.00	2.81	262.60	6,296.37	8.58	-128.60	-4.07	1.19	-0.64	-19.92
6,325.00	2.88	268.73	6,321.34	8.49	-129.83	-3.94	1.25	0.28	24.52
6,350.00	3.11	268.37	6,346.30	8.46	-131.14	-3.86	0.92	0.92	-1.44
6,375.00	2.93	266.07	6,371.27	8.39	-132.45	-3.75	0.87	-0.72	-9.20
6,400.00	2.84	264.07	6,396.24	8.29	-133.71	-3.60	0.54	-0.36	-8.00
6,425.00	2.79	263.42	6,421.21	8.15	-134.93	-3.42	0.24	-0.20	-2.60
6,450.00	2.82	265.08	6,446.18	8.03	-136.15	-3.26	0.35	0.12	6.64
6,475.00	2.81	265.89	6,471.15	7.93	-137.37	-3.12	0.16	-0.04	3.24
6,500.00	2.80	264.73	6,496.12	7.83	-138.59	-2.97	0.23	-0.04	-4.64
6,525.00	2.88	268.01	6,521.08	7.75	-139.82	-2.85	0.72	0.32	13.12
6,550.00	3.06	267.96	6,546.05	7.71	-141.12	-2.76	0.72	0.72	-0.20
6,575.00	3.08	266.98	6,571.02	7.65	-142.46	-2.66	0.22	0.08	-3.92
6,600.00	3.11	266.10	6,595.98	7.57	-143.80	-2.53	0.22	0.12	-3.52
6,625.00	3.07	266.05	6,620.94	7.48	-145.15	-2.39	0.16	-0.16	-0.20
6,650.00	3.09	264.06	6,645.91	7.36	-146.49	-2.23	0.44	0.08	-7.96
6,675.00	3.01	265.01	6,670.87	7.23	-147.81	-2.05	0.38	-0.32	3.80
6,700.00	3.07	265.41	6,695.84	7.12	-149.13	-1.90	0.25	0.24	1.60
6,725.00	3.15	266.39	6,720.80	7.03	-150.48	-1.75	0.38	0.32	3.92
6,750.00	3.00	263.97	6,745.76	6.91	-151.82	-1.59	0.79	-0.60	-9.68
6,775.00	3.05	265.24	6,770.73	6.79	-153.13	-1.42	0.33	0.20	5.08
6,800.00	3.08	264.52	6,795.69	6.67	-154.47	-1.26	0.20	0.12	-2.88

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 11H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3573.80ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3573.80ft (McVay 8)
Well:	Windward Federal 11H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,825.00	3.07	263.86	6,820.66	6.53	-155.80	-1.08	0.15	-0.04	-2.64
6,850.00	3.03	264.49	6,845.62	6.40	-157.12	-0.89	0.21	-0.16	2.52
6,875.00	2.96	265.86	6,870.59	6.29	-158.42	-0.74	0.40	-0.28	5.48
6,900.00	2.89	266.09	6,895.55	6.20	-159.70	-0.60	0.28	-0.28	0.92
6,925.00	2.82	265.62	6,920.52	6.11	-160.94	-0.47	0.30	-0.28	-1.88
6,950.00	2.86	264.04	6,945.49	6.00	-162.17	-0.32	0.35	0.16	-6.32
6,975.00	2.84	265.62	6,970.46	5.89	-163.41	-0.16	0.32	-0.08	6.32
7,000.00	2.97	265.11	6,995.43	5.78	-164.67	-0.01	0.53	0.52	-2.04
7,025.00	2.89	264.42	7,020.40	5.67	-165.95	0.15	0.35	-0.32	-2.76
7,050.00	2.95	266.27	7,045.36	5.56	-167.22	0.29	0.45	0.24	7.40
7,075.00	2.83	260.55	7,070.33	5.42	-168.47	0.48	1.25	-0.48	-22.88
7,100.00	2.82	261.40	7,095.30	5.23	-169.68	0.72	0.17	-0.04	3.40
7,125.00	2.80	262.89	7,120.27	5.06	-170.90	0.93	0.30	-0.08	5.96
7,150.00	2.76	263.06	7,145.24	4.91	-172.10	1.12	0.16	-0.16	0.68
7,175.00	2.75	264.18	7,170.21	4.78	-173.29	1.29	0.22	-0.04	4.48
7,200.00	2.81	263.79	7,195.18	4.65	-174.50	1.46	0.25	0.24	-1.56
7,225.00	2.80	261.59	7,220.15	4.50	-175.71	1.66	0.43	-0.04	-8.80
7,250.00	2.79	263.30	7,245.12	4.34	-176.92	1.86	0.34	-0.04	6.84
7,275.00	2.79	262.49	7,270.09	4.18	-178.13	2.05	0.16	0.00	-3.24
7,300.00	2.71	261.73	7,295.07	4.02	-179.32	2.26	0.35	-0.32	-3.04
7,325.00	2.66	260.63	7,320.04	3.84	-180.47	2.48	0.29	-0.20	-4.40
7,350.00	2.67	261.56	7,345.01	3.66	-181.62	2.70	0.18	0.04	3.72
7,375.00	2.67	260.66	7,369.98	3.48	-182.77	2.92	0.17	0.00	-3.60
7,400.00	2.71	263.05	7,394.96	3.32	-183.93	3.13	0.48	0.16	9.56
7,425.00	2.85	263.59	7,419.93	3.17	-185.14	3.31	0.57	0.56	2.16
7,450.00	3.09	266.17	7,444.89	3.06	-186.43	3.47	1.10	0.96	10.32
7,475.00	3.21	266.91	7,469.86	2.98	-187.80	3.60	0.51	0.48	2.96
7,500.00	3.34	266.60	7,494.82	2.90	-189.23	3.73	0.52	0.52	-1.24
7,525.00	3.38	267.17	7,519.77	2.82	-190.69	3.86	0.21	0.16	2.28
7,550.00	3.36	266.56	7,544.73	2.74	-192.16	3.99	0.16	-0.08	-2.44
7,575.00	3.29	263.95	7,569.69	2.62	-193.60	4.16	0.67	-0.28	-10.44
7,600.00	3.29	264.57	7,594.65	2.47	-195.03	4.36	0.14	0.00	2.48
7,625.00	3.30	263.52	7,619.60	2.32	-196.46	4.56	0.24	0.04	-4.20
7,650.00	3.28	262.47	7,644.56	2.15	-197.88	4.78	0.25	-0.08	-4.20
7,675.00	3.16	260.34	7,669.52	1.94	-199.27	5.04	0.68	-0.48	-8.52
7,700.00	3.14	259.89	7,694.49	1.70	-200.62	5.32	0.13	-0.08	-1.80
7,725.00	3.06	259.40	7,719.45	1.46	-201.95	5.61	0.34	-0.32	-1.96
7,750.00	2.92	258.70	7,744.42	1.21	-203.23	5.90	0.58	-0.56	-2.80
7,775.00	2.86	258.58	7,769.38	0.97	-204.47	6.19	0.24	-0.24	-0.48
7,800.00	2.93	259.98	7,794.35	0.73	-205.71	6.47	0.40	0.28	5.60
7,825.00	2.88	260.29	7,819.32	0.51	-206.96	6.73	0.21	-0.20	1.24
7,850.00	2.89	260.29	7,844.29	0.30	-208.20	6.99	0.04	0.04	0.00
7,875.00	2.96	260.47	7,869.26	0.09	-209.46	7.25	0.28	0.28	0.72

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 11H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3573.80ft (McVay 8)
Site:	Sec. 30, T 24 S., R 32 E	MD Reference:	KB=26' @ 3573.80ft (McVay 8)
Well:	Windward Federal 11H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
7,900.00	2.99	261.33	7,894.22	-0.12	-210.74	7.50	0.22	0.12	3.44
7,925.00	3.06	258.64	7,919.19	-0.35	-212.04	7.77	0.63	0.28	-10.76
7,950.00	3.07	257.35	7,944.15	-0.62	-213.34	8.09	0.28	0.04	-5.16
7,975.00	3.07	256.41	7,969.12	-0.93	-214.65	8.44	0.20	0.00	-3.76
8,000.00	3.18	260.20	7,994.08	-1.20	-215.98	8.77	0.94	0.44	15.16
8,025.00	3.13	265.23	8,019.04	-1.38	-217.35	8.99	1.12	-0.20	20.12
8,050.00	3.26	267.86	8,044.00	-1.46	-218.74	9.12	0.78	0.52	10.52
8,075.00	3.31	269.87	8,068.96	-1.49	-220.17	9.20	0.50	0.20	8.04
8,100.00	3.23	269.71	8,093.92	-1.50	-221.59	9.25	0.32	-0.32	-0.64
8,125.00	3.27	271.30	8,118.88	-1.48	-223.01	9.29	0.39	0.16	6.36
8,150.00	3.27	271.22	8,143.84	-1.45	-224.44	9.31	0.02	0.00	-0.32
8,175.00	3.31	272.29	8,168.80	-1.41	-225.87	9.32	0.29	0.16	4.28
8,200.00	3.40	272.24	8,193.75	-1.35	-227.33	9.31	0.36	0.36	-0.20
8,225.00	3.43	271.24	8,218.71	-1.30	-228.82	9.32	0.27	0.12	-4.00
8,250.00	3.42	270.63	8,243.67	-1.28	-230.31	9.34	0.15	-0.04	-2.44
8,275.00	3.43	270.34	8,268.62	-1.27	-231.81	9.38	0.08	0.04	-1.16
8,300.00	3.44	267.66	8,293.58	-1.29	-233.30	9.46	0.64	0.04	-10.72
8,325.00	3.47	269.31	8,318.53	-1.33	-234.81	9.55	0.42	0.12	6.60
8,350.00	3.38	268.59	8,343.49	-1.36	-236.30	9.63	0.40	-0.36	-2.88
8,375.00	3.38	266.22	8,368.44	-1.43	-237.78	9.75	0.56	0.00	-9.48
8,400.00	3.34	265.44	8,393.40	-1.53	-239.24	9.91	0.24	-0.16	-3.12
8,425.00	3.25	266.05	8,418.36	-1.64	-240.67	10.07	0.39	-0.36	2.44
8,450.00	3.07	265.61	8,443.32	-1.74	-242.04	10.21	0.73	-0.72	-1.76
8,475.00	3.17	268.03	8,468.28	-1.82	-243.40	10.34	0.66	0.40	9.68
8,500.00	3.39	267.11	8,493.24	-1.88	-244.83	10.45	0.90	0.88	-3.68
8,525.00	3.39	265.02	8,518.20	-1.98	-246.31	10.60	0.49	0.00	-8.36
8,550.00	3.29	265.11	8,543.16	-2.10	-247.76	10.78	0.40	-0.40	0.36
8,555.00	3.23	266.52	8,548.15	-2.12	-248.04	10.81	2.00	-1.20	28.20
8,607.00	3.35	264.94	8,600.06	-2.35	-251.02	11.13	0.29	0.23	-3.04
First IDS MWD Survey									
8,700.00	7.22	202.24	8,692.71	-8.00	-255.94	16.96	6.89	4.16	-67.42
8,747.00	13.25	191.85	8,738.95	-16.02	-258.17	25.05	13.37	12.83	-22.11
8,794.00	19.64	189.22	8,784.00	-29.10	-260.54	38.20	13.68	13.60	-5.60
8,840.00	24.41	189.86	8,826.63	-46.10	-263.41	55.30	10.38	10.37	1.39
8,888.00	27.35	189.70	8,869.81	-66.75	-266.97	76.05	6.13	6.13	-0.33
8,935.00	31.77	193.37	8,910.69	-89.44	-271.65	98.90	10.16	9.40	7.81
8,983.00	36.40	197.17	8,950.44	-115.36	-278.78	125.05	10.61	9.65	7.92
9,034.00	39.79	192.02	8,990.58	-145.79	-286.65	155.74	9.11	6.65	-10.10
9,077.00	44.53	189.77	9,022.44	-174.13	-292.08	184.25	11.57	11.02	-5.23
9,124.00	48.56	190.71	9,054.76	-207.69	-298.15	218.01	8.70	8.57	2.00
9,171.00	52.45	194.68	9,084.66	-243.05	-306.15	253.62	10.53	8.28	8.45
9,218.00	57.77	195.35	9,111.53	-280.27	-316.14	291.17	11.38	11.32	1.43
9,266.00	65.17	196.00	9,134.44	-320.84	-327.54	332.11	15.46	15.42	1.35

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 11H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3573.80ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3573.80ft (McVay 8)
Well:	Windward Federal 11H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
9,313.00	71.79	196.09	9,151.67	-362.84	-339.61	374.51	14.09	14.09	0.19	
9,360.00	75.09	195.27	9,165.07	-406.21	-351.79	418.27	7.22	7.02	-1.74	
9,408.00	77.37	194.47	9,176.49	-451.26	-363.75	463.72	5.02	4.75	-1.67	
9,437.00	80.65	193.90	9,182.02	-478.86	-370.72	491.55	11.47	11.31	-1.97	
9,475.00	83.70	193.29	9,187.19	-515.45	-379.57	528.42	8.18	8.03	-1.61	
9,522.00	88.95	191.86	9,190.20	-561.21	-389.78	574.51	11.58	11.17	-3.04	
9,569.00	90.74	189.01	9,190.33	-607.42	-398.29	621.00	7.16	3.81	-6.06	
9,663.00	91.67	183.45	9,188.35	-700.81	-408.48	714.68	6.00	0.99	-5.91	
9,757.00	89.99	181.79	9,186.99	-794.69	-412.78	808.66	2.51	-1.79	-1.77	
9,852.00	89.73	179.47	9,187.22	-889.68	-413.82	903.63	2.46	-0.27	-2.44	
9,946.00	89.71	178.98	9,187.68	-983.67	-412.55	997.51	0.52	-0.02	-0.52	
10,040.00	88.92	179.05	9,188.81	-1,077.65	-410.94	1,091.38	0.84	-0.84	0.07	
10,135.00	91.02	180.58	9,188.86	-1,172.64	-410.63	1,186.30	2.73	2.21	1.61	
10,229.00	91.89	181.46	9,186.47	-1,266.60	-412.30	1,280.25	1.32	0.93	0.94	
10,324.00	91.53	182.37	9,183.63	-1,361.50	-415.47	1,375.21	1.03	-0.38	0.96	
10,418.00	92.34	181.21	9,180.46	-1,455.40	-418.41	1,469.15	1.50	0.86	-1.23	
10,512.00	92.23	178.82	9,176.71	-1,549.32	-418.43	1,563.02	2.54	-0.12	-2.54	
10,607.00	92.68	178.79	9,172.64	-1,644.21	-416.45	1,657.78	0.47	0.47	-0.03	
10,701.00	90.83	178.62	9,169.76	-1,738.13	-414.33	1,751.58	1.98	-1.97	-0.18	
10,795.00	90.57	179.20	9,168.62	-1,832.11	-412.54	1,845.43	0.68	-0.28	0.62	
10,890.00	91.30	179.88	9,167.07	-1,927.09	-411.78	1,940.33	1.05	0.77	0.72	
10,984.00	91.89	180.11	9,164.45	-2,021.06	-411.77	2,034.24	0.67	0.63	0.24	
11,078.00	91.64	179.63	9,161.55	-2,115.01	-411.56	2,128.12	0.58	-0.27	-0.51	
11,173.00	90.21	180.03	9,160.02	-2,210.00	-411.28	2,223.04	1.56	-1.51	0.42	
11,267.00	88.92	180.36	9,160.73	-2,303.99	-411.60	2,316.99	1.42	-1.37	0.35	
11,362.00	92.31	180.70	9,159.71	-2,398.97	-412.48	2,411.94	3.59	3.57	0.36	
11,456.00	93.01	180.96	9,155.35	-2,492.86	-413.84	2,505.82	0.79	0.74	0.28	
11,550.00	90.18	181.01	9,152.74	-2,586.80	-415.45	2,599.76	3.01	-3.01	0.05	
11,645.00	89.37	180.94	9,153.11	-2,681.78	-417.07	2,694.74	0.86	-0.85	-0.07	
11,739.00	89.40	181.65	9,154.12	-2,775.75	-419.19	2,788.73	0.76	0.03	0.76	
11,833.00	91.25	180.77	9,153.58	-2,869.72	-421.18	2,882.71	2.18	1.97	-0.94	
11,928.00	90.66	179.15	9,152.00	-2,964.71	-421.11	2,977.63	1.81	-0.62	-1.71	
12,022.00	90.88	179.48	9,150.74	-3,058.69	-419.99	3,071.52	0.42	0.23	0.35	
12,116.00	91.05	179.91	9,149.15	-3,152.68	-419.49	3,165.43	0.49	0.18	0.46	
12,211.00	91.05	180.05	9,147.41	-3,247.66	-419.45	3,260.35	0.15	0.00	0.15	
12,305.00	91.13	180.36	9,145.63	-3,341.64	-419.79	3,354.29	0.34	0.09	0.33	
12,399.00	91.36	180.84	9,143.58	-3,435.61	-420.77	3,448.24	0.57	0.24	0.51	
12,493.00	90.94	180.66	9,141.70	-3,529.59	-422.00	3,542.20	0.49	-0.45	-0.19	
12,588.00	92.20	178.58	9,139.09	-3,624.54	-421.37	3,637.07	2.56	1.33	-2.19	
12,683.00	92.54	178.74	9,135.17	-3,719.43	-419.15	3,731.83	0.40	0.36	0.17	
12,778.00	92.03	178.53	9,131.38	-3,814.33	-416.89	3,826.59	0.58	-0.54	-0.22	
12,873.00	91.89	178.34	9,128.13	-3,909.24	-414.30	3,921.35	0.25	-0.15	-0.20	
12,968.00	88.87	179.57	9,127.50	-4,004.21	-412.57	4,016.20	3.43	-3.18	1.29	
13,063.00	89.71	180.17	9,128.68	-4,099.20	-412.35	4,111.13	1.09	0.88	0.63	

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 11H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3573.80ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3573.80ft (McVay 8)
Well:	Windward Federal 11H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
13,158.00	89.68	179.71	9,129.18	-4,194.20	-412.25	4,206.06	0.49	-0.03	-0.48
13,253.00	89.34	179.56	9,129.99	-4,289.19	-411.65	4,300.98	0.39	-0.36	-0.16
13,349.00	89.82	179.88	9,130.70	-4,385.19	-411.18	4,396.90	0.60	0.50	0.33
13,444.00	89.68	179.16	9,131.11	-4,480.18	-410.38	4,491.81	0.77	-0.15	-0.76
13,539.00	89.17	178.24	9,132.07	-4,575.15	-408.23	4,586.64	1.11	-0.54	-0.97
13,634.00	89.57	176.59	9,133.11	-4,670.05	-403.94	4,681.33	1.79	0.42	-1.74
13,729.00	90.10	177.88	9,133.38	-4,764.94	-399.36	4,776.00	1.47	0.56	1.36
13,824.00	88.25	176.21	9,134.75	-4,859.79	-394.46	4,870.62	2.62	-1.95	-1.76
13,919.00	88.36	178.45	9,137.56	-4,954.64	-390.04	4,965.26	2.36	0.12	2.36
14,015.00	87.91	180.40	9,140.69	-5,050.58	-389.08	5,061.11	2.08	-0.47	2.03
14,110.00	88.98	180.72	9,143.26	-5,145.54	-390.01	5,156.04	1.18	1.13	0.34
14,205.00	91.02	179.94	9,143.26	-5,240.53	-390.55	5,250.99	2.30	2.15	-0.82
14,300.00	90.83	179.71	9,141.73	-5,335.52	-390.26	5,345.91	0.31	-0.20	-0.24
14,395.00	90.55	179.91	9,140.59	-5,430.51	-389.95	5,440.84	0.36	-0.29	0.21
14,490.00	90.38	180.02	9,139.82	-5,525.51	-389.89	5,535.77	0.21	-0.18	0.12
14,585.00	89.23	179.98	9,140.14	-5,620.51	-389.89	5,630.71	1.21	-1.21	-0.04
14,680.00	88.92	179.90	9,141.67	-5,715.49	-389.79	5,725.64	0.34	-0.33	-0.08
14,775.00	88.16	179.99	9,144.09	-5,810.46	-389.70	5,820.54	0.81	-0.80	0.09
14,871.00	89.82	179.24	9,145.79	-5,906.44	-389.05	5,916.44	1.90	1.73	-0.78
14,966.00	89.48	179.39	9,146.37	-6,001.43	-387.92	6,011.33	0.39	-0.36	0.16
15,061.00	89.23	179.86	9,147.44	-6,096.42	-387.30	6,106.25	0.56	-0.26	0.49
15,156.00	87.88	178.52	9,149.83	-6,191.38	-385.95	6,201.10	2.00	-1.42	-1.41
15,251.00	89.12	177.41	9,152.32	-6,286.28	-382.58	6,295.82	1.75	1.31	-1.17
15,347.00	90.80	177.08	9,152.38	-6,382.17	-377.97	6,391.49	1.78	1.75	-0.34
15,442.00	92.87	178.35	9,149.34	-6,477.04	-374.18	6,486.17	2.56	2.18	1.34
15,537.00	89.82	178.62	9,147.11	-6,571.97	-371.67	6,580.95	3.22	-3.21	0.28
15,632.00	90.27	178.63	9,147.04	-6,666.94	-369.39	6,675.79	0.47	0.47	0.01
15,727.00	90.32	178.58	9,146.55	-6,761.91	-367.08	6,770.62	0.07	0.05	-0.05
15,823.00	88.72	180.66	9,147.35	-6,857.90	-366.44	6,866.52	2.73	-1.67	2.17
15,917.00	87.74	180.71	9,150.26	-6,951.84	-367.57	6,960.45	1.04	-1.04	0.05
16,013.00	87.44	180.21	9,154.29	-7,047.76	-368.34	7,056.33	0.61	-0.31	-0.52
16,111.00	89.96	180.39	9,156.52	-7,145.72	-368.85	7,154.25	2.58	2.57	0.18
16,206.00	90.07	180.97	9,156.49	-7,240.71	-369.98	7,249.23	0.62	0.12	0.61
16,301.00	89.85	181.28	9,156.56	-7,335.70	-371.84	7,344.22	0.40	-0.23	0.33
16,391.00	90.57	181.66	9,156.23	-7,425.66	-374.15	7,434.21	0.90	0.80	0.42
16,485.00	90.29	182.20	9,155.52	-7,519.61	-377.32	7,528.21	0.65	-0.30	0.57
16,580.00	91.05	182.88	9,154.41	-7,614.51	-381.53	7,623.20	1.07	0.80	0.72
16,685.00	90.85	182.50	9,152.67	-7,719.38	-386.45	7,728.17	0.41	-0.19	-0.36
16,781.00	89.76	181.55	9,152.16	-7,815.31	-389.85	7,824.17	1.51	-1.14	-0.99
16,876.00	90.21	179.27	9,152.19	-7,910.30	-390.52	7,919.13	2.45	0.47	-2.40
16,971.00	90.32	178.87	9,151.75	-8,005.29	-388.98	8,014.00	0.44	0.12	-0.42
17,066.00	90.43	179.47	9,151.12	-8,100.28	-387.61	8,108.88	0.64	0.12	0.63
17,162.00	90.07	180.04	9,150.71	-8,196.27	-387.20	8,204.81	0.70	-0.38	0.59

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 11H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3573.80ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3573.80ft (McVay 8)
Well:	Windward Federal 11H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
17,257.00	89.23	180.34	9,151.29	-8,291.27	-387.51	8,299.76	0.94	-0.88	0.32
17,352.00	90.01	179.75	9,151.92	-8,386.27	-387.59	8,394.70	1.03	0.82	-0.62
17,447.00	89.82	177.73	9,152.06	-8,481.24	-385.50	8,489.54	2.14	-0.20	-2.13
17,542.00	88.44	177.48	9,153.50	-8,576.14	-381.53	8,584.24	1.48	-1.45	-0.26
17,637.00	89.37	176.64	9,155.31	-8,671.00	-376.66	8,678.87	1.32	0.98	-0.88
17,732.00	87.80	178.70	9,157.66	-8,765.88	-372.79	8,773.56	2.73	-1.65	2.17
17,828.00	88.08	178.35	9,161.11	-8,861.79	-370.33	8,869.32	0.47	0.29	-0.36
17,923.00	88.19	177.50	9,164.20	-8,956.68	-366.89	8,964.03	0.90	0.12	-0.89
18,018.00	89.45	178.67	9,166.16	-9,051.60	-363.71	9,058.78	1.81	1.33	1.23
18,113.00	88.98	178.49	9,167.46	-9,146.56	-361.36	9,153.61	0.53	-0.49	-0.19
18,208.00	89.23	179.77	9,168.95	-9,241.54	-359.92	9,248.47	1.37	0.26	1.35
18,303.00	89.90	179.81	9,169.67	-9,336.53	-359.57	9,343.40	0.71	0.71	0.04
18,398.00	89.31	179.21	9,170.32	-9,431.53	-358.76	9,438.30	0.89	-0.62	-0.63
18,494.00	88.84	179.78	9,171.87	-9,527.51	-357.91	9,534.20	0.77	-0.49	0.59
18,589.00	88.44	179.45	9,174.13	-9,622.48	-357.27	9,629.09	0.55	-0.42	-0.35
18,684.00	88.67	179.53	9,176.52	-9,717.45	-356.43	9,723.97	0.26	0.24	0.08
18,779.00	88.08	179.05	9,179.22	-9,812.40	-355.25	9,818.82	0.80	-0.62	-0.51
18,874.00	89.76	177.53	9,181.01	-9,907.33	-352.42	9,913.60	2.38	1.77	-1.60
18,969.00	89.29	178.02	9,181.79	-10,002.26	-348.73	10,008.34	0.71	-0.49	0.52
19,055.00	89.96	177.68	9,182.36	-10,088.20	-345.50	10,094.11	0.87	0.78	-0.40
Final IDS MWD Survey									
19,115.00	89.96	177.68	9,182.40	-10,148.15	-343.07	10,153.94	0.00	0.00	0.00
Projection to TD									

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
8,607.00	8,600.06	-2.35	-251.02	First IDS MWD Survey
19,055.00	9,182.36	-10,088.20	-345.50	Final IDS MWD Survey
19,115.00	9,182.40	-10,148.15	-343.07	Projection to TD

Checked By: _____ Approved By: _____ Date: _____

WINDWARD FEDERAL #11H

<u>Perfs</u>	<u>7 1/2% Acid (Gal)</u>	<u>Sand (#)</u>	<u>Fluid (Gal)</u>
1	1554	450823	453180
2	3024	450057	475734
3	3024	449536	508788
4	3024	447598	421176
5	3024	445637	417690
6	3024	449320	448686
7	3024	448702	416766
8	3024	450714	434364
9	3024	451036	423192
10	3024	449671	424410
11	3024	449683	417984
12	2982	451260	420336
13	3024	451363	422226
14	3150	451914	418543
15	3150	452939	418446
16	3024	449584	416430
17	3024	449460	422688
18	2982	449780	414246
19	3024	450883	411894
20	3024	450006	411180
21	3024	448190	413364
22	3024	450861	415254
23	3024	451070	411180
24	3024	450825	413574
25	3024	451128	446208
26	3024	450967	466956
27	3024	450698	410130
28	4536	450292	430038
29	3024	450383	410256
30	3024	449157	406686
31	3024	451678	405090
32	3024	445813	408702
33	3024	451706	421260
34	3024	451398	404502
35	3024	449628	405846
36	3024	450648	386079
37	3024	449798	404628
38	3024	447184	410550
39	3024	450237	407148
40	3024	450798	406770
41	3024	450949	397194
42	3024	450365	402360
43	2982	450165	406812
44	3024	449922	399672
45	3066	449883	405048
46	3024	448647	399966
47	3024	449454	400848
48	3024	451709	402570
49	3024	449900	405510
50	3024	450589	403704
51	3024	450805	401100
52	3024	447679	404754
53	3024	449518	410130
54	3024	449725	406224
55	3024	450117	401982
56	3024	418581	391608
57	3024	450391	399798
58	3024	450774	396690
59	3024	425884	389886
60	3024	450547	401352
61	3024	450586	407316
62	3024	449707	396144
63	3024	451909	401436
64	3024	452587	405006
Totals	193,746	28,752,818	26,519,290

HOBBS OCD
AUG 31 2017
RECEIVED

WINDWARD FEDERAL 11H

From Bottom to Top	Stage 1	Distance Between Perfs	Shots	Stage 2	Distance Between Perfs	Shots	Stage 3	Distance Between Perfs	Shots	Stage 4	Distance Between Perfs	Shots	Stage 5	Distance Between Perfs	Shots
	18,940	19	6	18,762	47	6	18,658	18	6	18,503	17	6	18,347	27	6
	18,921	18	6	18,752	15	6	18,639	19	6	18,488	20	6	18,336	21	6
	18,903	19	6	18,737	8	6	18,620	19	6	18,468	15	6	18,315	17	6
	18,884	19	6	18,729	10	6	18,601	19	6	18,453	22	6	18,298	21	6
	18,865	19	5	18,710	12	5	18,582	19	5	18,431	19	5	18,277	16	5
	18,846	18	5	18,707	14	5	18,563	19	5	18,412	19	5	18,261	18	5
	18,828	19	5	18,693	17	5	18,544	24	5	18,393	19	5	18,243	20	5
	18,809		5	18,676		5	18,520		5	18,374		5	18,223		5
	Plug to Plug	196	44	Plug to Plug	102	44	Plug to Plug	157	44	Plug to Plug	156	44	Plug to Plug	141	44
	Frac Plug	18,965	Total Shots	Frac Plug	18,789	Total Shots	Frac Plug	18,667	Total Shots	Frac Plug	18,510	Total Shots	Frac Plug	18,354	Total Shots

From Bottom to Top	Stage 6	Distance Between Perfs	Shots	Stage 7	Distance Between Perfs	Shots	Stage 8	Distance Between Perfs	Shots	Stage 9	Distance Between Perfs	Shots	Stage 10	Distance Between Perfs	Shots
	18,204	19	6	18,047	25	6	17,896	24	6	17,747	20	6	17,593	25	6
	18,185	19	6	18,034	19	6	17,882	18	6	17,734	22	6	17,580	19	6
	18,166	19	6	18,015	19	6	17,864	19	6	17,712	19	6	17,561	19	6
	18,147	19	6	17,996	21	6	17,845	19	6	17,693	18	6	17,542	19	6
	18,128	23	5	17,975	17	5	17,826	19	5	17,675	19	5	17,523	19	5
	18,105	15	5	17,958	21	5	17,807	19	5	17,656	22	5	17,504	19	5
	18,090	18	5	17,937	17	5	17,788	21	5	17,634	16	5	17,485	22	5
	18,072		5	17,920		5	17,767		5	17,618		5	17,463		5
	Plug to Plug	157	44	Plug to Plug	145	44	Plug to Plug	157	44	Plug to Plug	146	44	Plug to Plug	155	44
	Frac Plug	18,213	Total Shots	Frac Plug	18,056	Total Shots	Frac Plug	17,911	Total Shots	Frac Plug	17,754	Total Shots	Frac Plug	17,608	Total Shots

From Bottom to Top	Stage 11	Distance Between Perfs	Shots	Stage 12	Distance Between Perfs	Shots	Stage 13	Distance Between Perfs	Shots	Stage 14	Distance Between Perfs	Shots	Stage 15	Distance Between Perfs	Shots
	17,446	17	6	17,293	25	6	17,145	19	6	16,989	24	6	16,845	17	6
	17,431	21	6	17,278	23	6	17,126	19	6	16,975	19	6	16,824	19	6
	17,410	18	6	17,255	15	6	17,107	22	6	16,956	19	6	16,805	19	6
	17,392	20	6	17,240	17	6	17,085	15	6	16,937	22	6	16,786	19	6
	17,372	19	5	17,223	21	5	17,070	17	5	16,915	16	5	16,767	21	5
	17,353	19	5	17,202	19	5	17,053	21	5	16,899	24	5	16,746	17	5
	17,334	16	5	17,183	19	5	17,032	19	5	16,875	13	5	16,729	16	5
	17,318		5	17,164		5	17,013		5	16,862		5	16,713		5
	Plug to Plug	145	44	Plug to Plug	156	44	Plug to Plug	156	44	Plug to Plug	144	44	Plug to Plug	154	44
	Frac Plug	17,453	Total Shots	Frac Plug	17,308	Total Shots	Frac Plug	17,152	Total Shots	Frac Plug	16,996	Total Shots	Frac Plug	16,852	Total Shots

From Bottom to Top	Stage 16	Distance Between Perfs	Shots	Stage 17	Distance Between Perfs	Shots	Stage 18	Distance Between Perfs	Shots	Stage 19	Distance Between Perfs	Shots	Stage 20	Distance Between Perfs	Shots
	16,691	22	6	16,543	16	6	16,389	17	6	16,235	27	6	16,087	18	6
	16,673	19	6	16,521	19	6	16,372	21	6	16,219	14	6	16,068	19	6
	16,654	19	6	16,502	18	6	16,351	19	6	16,205	24	6	16,049	15	6
	16,635	19	6	16,484	19	6	16,332	19	6	16,181	16	6	16,034	23	6
	16,616	19	5	16,465	19	5	16,313	18	5	16,163	20	5	16,011	18	5
	16,597	22	5	16,446	19	5	16,295	19	5	16,143	19	5	15,993	20	5
	16,575	16	5	16,427	21	5	16,276	14	5	16,124	19	5	15,973	19	5
	16,559		5	16,406		5	16,262		5	16,105		5	15,954		5
	Plug to Plug	148	44	Plug to Plug	154	44	Plug to Plug	145	44	Plug to Plug	157	44	Plug to Plug	158	44
	Frac Plug	16,698	Total Shots	Frac Plug	16,550	Total Shots	Frac Plug	16,396	Total Shots	Frac Plug	16,251	Total Shots	Frac Plug	16,094	Total Shots

From Bottom to Top	Stage 21	Distance Between Perfs	Shots	Stage 22	Distance Between Perfs	Shots	Stage 23	Distance Between Perfs	Shots	Stage 24	Distance Between Perfs	Shots	Stage 25	Distance Between Perfs	Shots
	15,929	25	6	15,784	19	6	15,633	26	6	15,485	19	6	15,330	19	6
	15,916	18	6	15,765	19	6	15,615	20	6	15,463	16	6	15,312	19	6
	15,898	19	6	15,746	19	6	15,595	19	6	15,447	22	6	15,293	21	6
	15,879	23	6	15,727	18	6	15,576	24	6	15,425	16	6	15,272	17	6
	15,856	15	5	15,709	20	5	15,552	14	5	15,407	20	5	15,255	23	5
	15,841	19	5	15,689	18	5	15,538	19	5	15,387	19	5	15,232	15	5
	15,822	19	5	15,671	12	5	15,519	15	5	15,368	19	5	15,217	18	5
	15,803		5	15,659		5	15,504		5	15,349		5	15,199		5
	Plug to Plug	145	44	Plug to Plug	151	44	Plug to Plug	148	44	Plug to Plug	155	44	Plug to Plug	153	44
	Frac Plug	15,936	Total Shots	Frac Plug	15,791	Total Shots	Frac Plug	15,640	Total Shots	Frac Plug	15,492	Total Shots	Frac Plug	15,337	Total Shots

From Bottom to Top	Stage 26	Distance Between Perfs	Shots	Stage 27	Distance Between Perfs	Shots	Stage 28	Distance Between Perfs	Shots	Stage 29	Distance Between Perfs	Shots	Stage 30	Distance Between Perfs	Shots
	15,177	22	6	15,030	17	6	14,841	55	6	14,717	27	6	14,574	19	6
	15,160	19	6	15,009	19	6	14,828	14	6	14,701	15	6	14,555	19	6
	15,141	19	6	14,990	19	6	14,814	14	6	14,686	17	6	14,536	21	6
	15,122	18	6	14,971	19	6	14,800	14	6	14,669	16	6	14,515	16	6
	15,104	19	5	14,952	19	5	14,786	18	5	14,653	22	5	14,499	16	5
	15,085	24	5	14,933	18	5	14,768	12	5	14,631	19	5	14,483	22	5
	15,061	14	5	14,915	19	5	14,756	12	5	14,612	19	5	14,461	19	5
	15,047		5	14,896		5	14,744		5	14,593		5	14,442		5
	Plug to Plug	147	44	Plug to Plug	189	44	Plug to Plug	124	44	Plug to Plug	143	44	Plug to Plug	156	44
	Frac Plug	15,184	Total Shots	Frac Plug	15,037	Total Shots	Frac Plug	14,848	Total Shots	Frac Plug	14,724	Total Shots	Frac Plug	14,581	Total Shots

From Bottom to Top	Stage 31	Distance Between Perfs	Shots	Stage 32	Distance Between Perfs	Shots	Stage 33	Distance Between Perfs	Shots	Stage 34	Distance Between Perfs	Shots	Stage 35	Distance Between Perfs	Shots
	14,417	25	6	14,272	19	6	14,121	22	6	13,969	19	6	13,818	19	6
	14,404	19	6	14,253	19	6	14,102	19	6	13,950	18	6	13,804	24	6
	14,385	19	6	14,234	19	6	14,083	19	6	13,932	19	6	13,780	18	6
	14,366	21	6	14,215	19	6	14,064	19	6	13,913	19	6	13,762	20	6
	14,345	16	5	14,196	21	5	14,045	19	5	13,894	19	5	13,742	18	5
	14,329	17	5	14,175	17	5	14,026	22	5	13,875	19	5	13,724	19	5
	14,312	21	5	14,158	15	5	14,004	16	5	13,856	19	5	13,705	19	5
	14,291		5	14,143		5	13,988		5	13,837		5	13,688		5
	Plug to Plug	146	44	Plug to Plug	151	44	Plug to Plug	152	44	Plug to Plug	151	44	Plug to Plug	164	44
	Frac Plug	14,425	Total Shots	Frac Plug	14,279	Total Shots	Frac Plug	14,128	Total Shots	Frac Plug	13,976	Total Shots	Frac Plug	13,825	Total Shots

From Bottom to Top	Stage 36	Distance Between Perfs	Shots	Stage 37	Distance Between Perfs	Shots	Stage 38	Distance Between Perfs	Shots	Stage 39	Distance Between Perfs	Shots	Stage 40	Distance Between Perfs	Shots
	13,854	32	6	13,516	19	6	13,357	26	6	13,213	19	6	13,062	19	6
	13,839	15	6	13,496	18	6	13,342	16	6	13,194	19	6	13,047	23	6
	13,824	14	6	13,478	15	6	13,326	18	6	13,175	19	6	13,024	15	6
	13,810	19	6	13,463	23	6	13,308	24	6	13,156	18	6	13,009	23	6
	13,591	19	5	13,440	19	5	13,284	14	5	13,138	19	5	12,986	16	5
	13,572	19	5	13,421	19	5	13,270	18	5	13,119	19	5	12,970	21	5
	13,553	18	5	13,402	19	5	13,252	20	5	13,100	19	5	12,949	19	5
	13,535		5	13,383		5	13,232		5	13,081		5	12,930		5
	Plug to Plug	138	44	Plug to Plug	159	44	Plug to Plug	144	44	Plug to Plug	151	44	Plug to Plug	154	44
	Frac Plug	13,661	Total Shots	Frac Plug	13,523	Total Shots	Frac Plug	13,364	Total Shots	Frac Plug	13,220	Total Shots	Frac Plug	13,069	Total Shots

From Bottom to Top	Stage 41	Distance Between Perfs	Shots	Stage 42	Distance Between Perfs	Shots	Stage 43	Distance Between Perfs	Shots	Stage 44	Distance Between Perfs	Shots	Stage 45	Distance Between Perfs	Shots
	12,908	22	6	12,759	19	6	12,808	25	6	12,444	32	6	12,306	19	6
	12,892	19	6	12,741	19	6	12,594	24	6	12,429	15	6	12,287	19	6
	12,873	19	6	12,722	19	6	12,570	18	6	12,414	14	6	12,268	19	6
	12,854	19	6	12,703	19	6	12,552	19	6	12,400	19	6	12,249	19	6
	12,835	19	5	12,684	19	5	12,533	19	5	12,381	18	5	12,230	21	5
	12,816	14	5	12,665	19	5	12,514	19	5	12,363	19	5	12,209	17	5
	12,802	24	5	12,646	13	5	12,495	19	5	12,344	19	5	12,192	19	5
	12,778		5	12,633		5	12,478		5	12,325		5	12,173		5
	Plug to Plug	149	44	Plug to Plug	151	44	Plug to Plug	164	44	Plug to Plug	138	44	Plug to Plug	151	44
	Frac Plug	12,915	Total Shots	Frac Plug	12,766	Total Shots	Frac Plug	12,615	Total Shots	Frac Plug	12,451	Total Shots	Frac Plug	12,313	Total Shots
From Bottom to Top	Stage 46	Distance Between Perfs	Shots	Stage 47	Distance Between Perfs	Shots	Stage 48	Distance Between Perfs	Shots	Stage 49	Distance Between Perfs	Shots	Stage 50	Distance Between Perfs	Shots
	12,155	18	6	11,999	26	6	11,852	19	6	11,696	24	6	11,539	30	6
	12,139	22	6	11,984	16	6	11,833	19	6	11,683	20	6	11,524	16	6
	12,117	19	6	11,968	21	6	11,814	19	6	11,663	19	6	11,508	15	6
	12,098	19	6	11,947	19	6	11,795	19	6	11,644	19	6	11,493	18	6
	12,079	19	5	11,928	19	5	11,776	14	5	11,625	19	5	11,475	20	5
	12,060	19	5	11,909	19	5	11,762	23	5	11,606	19	5	11,455	17	5
	12,041	16	5	11,890	19	5	11,739	19	5	11,587	18	5	11,438	21	5
	12,025		5	11,871		5	11,720		5	11,569		5	11,417		5
	Plug to Plug	148	44	Plug to Plug	155	44	Plug to Plug	156	44	Plug to Plug	157	44	Plug to Plug	141	44
	Frac Plug	12,162	Total Shots	Frac Plug	12,014	Total Shots	Frac Plug	11,859	Total Shots	Frac Plug	11,703	Total Shots	Frac Plug	11,546	Total Shots
From Bottom to Top	Stage 51	Distance Between Perfs	Shots	Stage 52	Distance Between Perfs	Shots	Stage 53	Distance Between Perfs	Shots	Stage 54	Distance Between Perfs	Shots	Stage 55	Distance Between Perfs	Shots
	11,398	19	6	11,247	19	6	11,099	19	6	10,945	19	6	10,793	22	6
	11,379	18	6	11,228	19	6	11,077	19	6	10,926	19	6	10,775	19	6
	11,361	20	6	11,209	19	6	11,058	19	6	10,907	19	6	10,756	15	6
	11,341	18	6	11,190	18	6	11,039	19	6	10,888	19	6	10,741	23	6
	11,323	22	5	11,172	19	5	11,020	27	5	10,869	21	5	10,718	19	5
	11,301	16	5	11,153	21	5	10,993	12	5	10,848	17	5	10,699	19	5
	11,285	19	5	11,132	14	5	10,981	17	5	10,831	16	5	10,680	19	5
	11,266		5	11,118		5	10,964		5	10,815		5	10,661		5
	Plug to Plug	151	44	Plug to Plug	148	44	Plug to Plug	154	44	Plug to Plug	152	44	Plug to Plug	158	44
	Frac Plug	11,405	Total Shots	Frac Plug	11,254	Total Shots	Frac Plug	11,106	Total Shots	Frac Plug	10,952	Total Shots	Frac Plug	10,800	Total Shots
From Bottom to Top	Stage 56	Distance Between Perfs	Shots	Stage 57	Distance Between Perfs	Shots	Stage 58	Distance Between Perfs	Shots	Stage 59	Distance Between Perfs	Shots	Stage 60	Distance Between Perfs	Shots
	10,635	26	6	10,491	19	6	10,340	23	6	10,173	34	6	10,037	19	6
	10,623	19	6	10,472	19	6	10,321	19	6	10,158	15	6	10,014	14	6
	10,604	18	6	10,453	19	6	10,302	19	6	10,143	15	6	10,000	21	6
	10,586	23	6	10,434	19	6	10,283	19	6	10,128	15	6	9,979	17	6
	10,563	15	5	10,415	22	5	10,264	19	5	10,113	19	5	9,962	21	5
	10,548	18	5	10,393	15	5	10,245	19	5	10,094	19	5	9,941	17	5
	10,530	20	5	10,378	15	5	10,226	19	5	10,075	19	5	9,924	15	5
	10,510		5	10,363		5	10,207		5	10,056		5	9,909		5
	Plug to Plug	144	44	Plug to Plug	151	44	Plug to Plug	167	44	Plug to Plug	136	44	Plug to Plug	151	44
	Frac Plug	10,642	Total Shots	Frac Plug	10,498	Total Shots	Frac Plug	10,347	Total Shots	Frac Plug	10,180	Total Shots	Frac Plug	10,044	Total Shots
From Bottom to Top	Stage 61	Distance Between Perfs	Shots	Stage 62	Distance Between Perfs	Shots	Stage 63	Distance Between Perfs	Shots	Stage 64	Distance Between Perfs	Shots	Stage 65	Distance Between Perfs	Shots
	9,886	23	6	9,720	34	6	9,584	19	6	9,432	22	6	9300		
	9,871	23	6	9,708	13	6	9,565	19	6	9,413	18	6			
	9,848	19	6	9,695	17	6	9,546	19	6	9,395	19	6			
	9,829	19	6	9,678	16	6	9,527	19	6	9,376	19	6			
	9,810	28	5	9,662	22	5	9,508	24	5	9,357	19	5			
	9,782	9	5	9,640	17	5	9,484	14	5	9,338	19	5			
	9,773	19	5	9,623	20	5	9,470	16	5	9,319	19	5			
	9,754		5	9,603		5	9,454		5	9,300		5			
	Plug to Plug	166	44	Plug to Plug	136	44	Plug to Plug	152	44	Plug to Plug	63	44	Plug to Plug	0	0
	Frac Plug	9,893	Total Shots	Frac Plug	9,727	Total Shots	Frac Plug	9,591	Total Shots	Frac Plug	9,439	Total Shots	Frac Plug		Total Shots

**McVAY DRILLING COMPANY**

P.O. Box 2450
Hobbs, New Mexico 88241
(575) 397-3311
FAX: 39-DRILL

Well Name and Num: Windward Federal #11H
Location: Sec30, T24E,R32E
Operator: COG
Drilling Contractor: McVay Drilling Company

The undersigned certifies that he is an authorized representative of the drilling contractor who drilled the above described well and that he has conducted deviation tests and obtained the following results:

<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>
0.40	487	3.10	6632	91.36	12399	89.90	18303
1.00	665	3.00	7010	92.30	12778	88.80	18779
1.10	1039	2.60	7387	89.70	13063	89.96	19055
2.60	1409	3.00	7765	89.82	13349		
1.60	1788	3.30	8142	90.10	13729		
1.80	2166	3.20	8520	88.36	13919		
1.80	2544	19.64	8791	90.83	14300		
1.50	2923	44.53	9077	88.92	14680		
0.20	3302	80.60	9437	89.23	15061		
0.20	3681	89.99	9757	87.70	15917		
1.40	4060	88.92	10040	89.85	16301		
0.90	4438	91.89	10229	91.10	16580		
1.10	4538	92.23	10512	90.21	16876		
4.00	5121	91.89	10918	89.23	17257		
3.70	5499	90.21	11173	90.01	17352		
2.90	5878	83.37	11645	89.37	17637		
3.00	6255	91.05	12116	89.45	18018		

By: Maw A. Cam...

Subscribed and sworn to before me this 16th day of May, 2017

Tina Flemens
Notary Public, Lea County, New Mexico

