



CONCHO

COG Operating L L C

Lea County, NM (NAD27 NME)

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

Windward Federal 8H

Wellbore #1

Design: Wellbore #1

Survey Report - Geographic

21 February, 2017

HOBBS OCD
OCT 02 2017
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Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 8H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3569.20ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3569.20ft (McVay 8)
Well:	Windward Federal 8H	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 8H, ACTIVE		
Well Position	+N/-S	0.00 ft	Northing: 435,175.1000 usft
	+E/-W	0.00 ft	Easting: 690,857.6000 usft
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft
		Latitude:	32° 11' 41.670 N
		Longitude:	103° 42' 58.859 W
		Ground Level:	3,543.20 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	1/23/2017	7.06	60.02	47,945

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)	Direction (°)	
	0.00	0.00	0.00	177.34	

Survey Program	Date 2/21/2017			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
100.00	8,510.00	Gyros (Wellbore #1)	Keeper	Standard Wireline Keeper ver 1.0.2
8,684.00	19,115.00	IDS MWD Surveys (Wellbore #1)	MWD	MWD - Standard

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	435,175.1000	690,857.6000	32° 11' 41.670 N	103° 42' 58.859 W	
100.00	0.18	42.86	100.00	0.12	0.11	435,175.2151	690,857.7068	32° 11' 41.671 N	103° 42' 58.857 W	
125.00	0.29	345.29	125.00	0.21	0.12	435,175.3051	690,857.7174	32° 11' 41.672 N	103° 42' 58.857 W	
150.00	0.18	7.65	150.00	0.31	0.11	435,175.4052	690,857.7066	32° 11' 41.673 N	103° 42' 58.857 W	
175.00	0.22	359.40	175.00	0.39	0.11	435,175.4921	690,857.7113	32° 11' 41.674 N	103° 42' 58.857 W	
200.00	0.23	330.28	200.00	0.48	0.09	435,175.5837	690,857.6860	32° 11' 41.675 N	103° 42' 58.857 W	
225.00	0.12	74.97	225.00	0.53	0.09	435,175.6341	690,857.6864	32° 11' 41.675 N	103° 42' 58.857 W	
250.00	0.40	297.59	250.00	0.58	0.03	435,175.6813	690,857.6343	32° 11' 41.676 N	103° 42' 58.858 W	
275.00	0.12	347.51	275.00	0.65	-0.05	435,175.7473	690,857.5513	32° 11' 41.676 N	103° 42' 58.859 W	
300.00	0.18	260.95	300.00	0.67	-0.09	435,175.7666	690,857.5069	32° 11' 41.676 N	103° 42' 58.860 W	
325.00	0.31	264.23	325.00	0.65	-0.20	435,175.7537	690,857.4008	32° 11' 41.676 N	103° 42' 58.861 W	

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Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3569.20ft (McVay 8)
Well:	Windward Federal 8H	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)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
350.00	0.26	246.19	350.00	0.62	-0.32	435,175.7240	690,857.2816	32° 11' 41.676 N	103° 42' 58.862 W
375.00	0.26	232.27	375.00	0.57	-0.42	435,175.6664	690,857.1848	32° 11' 41.675 N	103° 42' 58.863 W
400.00	0.38	193.37	400.00	0.45	-0.48	435,175.5510	690,857.1208	32° 11' 41.674 N	103° 42' 58.864 W
425.00	0.29	248.47	425.00	0.35	-0.56	435,175.4471	690,857.0428	32° 11' 41.673 N	103° 42' 58.865 W
450.00	0.24	210.61	450.00	0.28	-0.64	435,175.3788	690,856.9573	32° 11' 41.673 N	103° 42' 58.866 W
475.00	0.34	219.03	475.00	0.18	-0.72	435,175.2762	690,856.8839	32° 11' 41.672 N	103° 42' 58.867 W
500.00	0.38	208.79	500.00	0.05	-0.80	435,175.1459	690,856.7973	32° 11' 41.670 N	103° 42' 58.868 W
525.00	0.40	232.95	525.00	-0.08	-0.91	435,175.0206	690,856.6877	32° 11' 41.669 N	103° 42' 58.869 W
550.00	0.36	218.31	549.99	-0.19	-1.03	435,174.9064	690,856.5694	32° 11' 41.668 N	103° 42' 58.871 W
575.00	0.26	225.59	574.99	-0.29	-1.12	435,174.8051	690,856.4802	32° 11' 41.667 N	103° 42' 58.872 W
600.00	0.39	233.02	599.99	-0.39	-1.23	435,174.7142	690,856.3717	32° 11' 41.666 N	103° 42' 58.873 W
625.00	0.48	223.21	624.99	-0.51	-1.37	435,174.5867	690,856.2320	32° 11' 41.665 N	103° 42' 58.874 W
650.00	0.53	210.38	649.99	-0.69	-1.50	435,174.4107	690,856.1018	32° 11' 41.663 N	103° 42' 58.876 W
675.00	0.52	202.34	674.99	-0.89	-1.60	435,174.2060	690,856.0002	32° 11' 41.661 N	103° 42' 58.877 W
700.00	0.60	198.64	699.99	-1.12	-1.68	435,173.9770	690,855.9153	32° 11' 41.659 N	103° 42' 58.878 W
725.00	0.60	234.45	724.99	-1.32	-1.83	435,173.7769	690,855.7669	32° 11' 41.657 N	103° 42' 58.880 W
750.00	0.65	225.70	749.99	-1.50	-2.04	435,173.6017	690,855.5589	32° 11' 41.655 N	103° 42' 58.882 W
775.00	0.62	213.63	774.99	-1.71	-2.22	435,173.3901	690,855.3825	32° 11' 41.653 N	103° 42' 58.884 W
800.00	0.71	216.19	799.98	-1.95	-2.38	435,173.1525	690,855.2162	32° 11' 41.651 N	103° 42' 58.886 W
825.00	0.73	206.14	824.98	-2.22	-2.55	435,172.8845	690,855.0545	32° 11' 41.648 N	103° 42' 58.888 W
850.00	0.81	218.58	849.98	-2.50	-2.73	435,172.6034	690,854.8742	32° 11' 41.645 N	103° 42' 58.890 W
875.00	0.71	216.97	874.98	-2.76	-2.93	435,172.3415	690,854.6708	32° 11' 41.643 N	103° 42' 58.893 W
900.00	0.67	221.77	899.98	-2.99	-3.12	435,172.1087	690,854.4803	32° 11' 41.640 N	103° 42' 58.895 W
925.00	0.91	223.53	924.97	-3.24	-3.35	435,171.8558	690,854.2462	32° 11' 41.638 N	103° 42' 58.898 W
950.00	0.82	221.78	949.97	-3.52	-3.61	435,171.5784	690,853.9903	32° 11' 41.635 N	103° 42' 58.901 W
975.00	0.71	220.88	974.97	-3.77	-3.83	435,171.3279	690,853.7697	32° 11' 41.633 N	103° 42' 58.903 W
1,000.00	0.74	223.83	999.97	-4.01	-4.04	435,171.0943	690,853.5566	32° 11' 41.630 N	103° 42' 58.906 W
1,025.00	0.78	217.06	1,024.96	-4.26	-4.26	435,170.8421	690,853.3422	32° 11' 41.628 N	103° 42' 58.908 W
1,050.00	0.76	223.45	1,049.96	-4.51	-4.47	435,170.5859	690,853.1256	32° 11' 41.625 N	103° 42' 58.911 W
1,075.00	0.63	215.26	1,074.96	-4.75	-4.67	435,170.3533	690,852.9323	32° 11' 41.623 N	103° 42' 58.913 W
1,100.00	0.60	229.81	1,099.96	-4.94	-4.85	435,170.1566	690,852.7529	32° 11' 41.621 N	103° 42' 58.915 W
1,125.00	0.59	223.70	1,124.96	-5.12	-5.04	435,169.9791	690,852.5640	32° 11' 41.619 N	103° 42' 58.917 W
1,150.00	0.60	221.31	1,149.96	-5.31	-5.21	435,169.7877	690,852.3887	32° 11' 41.617 N	103° 42' 58.920 W
1,175.00	0.60	223.89	1,174.95	-5.50	-5.39	435,169.5951	690,852.2115	32° 11' 41.616 N	103° 42' 58.922 W
1,200.00	0.57	229.39	1,199.95	-5.68	-5.57	435,169.4198	690,852.0264	32° 11' 41.614 N	103° 42' 58.924 W
1,225.00	0.62	224.90	1,224.95	-5.86	-5.76	435,169.2430	690,851.8365	32° 11' 41.612 N	103° 42' 58.926 W
1,250.00	0.64	239.04	1,249.95	-6.02	-5.98	435,169.0754	690,851.6213	32° 11' 41.610 N	103° 42' 58.928 W
1,275.00	0.60	246.33	1,274.95	-6.15	-6.22	435,168.9510	690,851.3817	32° 11' 41.609 N	103° 42' 58.931 W
1,300.00	0.56	226.74	1,299.95	-6.29	-6.43	435,168.8148	690,851.1728	32° 11' 41.608 N	103° 42' 58.934 W
1,325.00	0.40	250.53	1,324.95	-6.40	-6.60	435,168.7019	690,851.0016	32° 11' 41.607 N	103° 42' 58.936 W
1,350.00	0.52	244.10	1,349.95	-6.48	-6.78	435,168.6233	690,850.8172	32° 11' 41.606 N	103° 42' 58.938 W
1,375.00	0.49	242.12	1,374.95	-6.58	-6.98	435,168.5238	690,850.6207	32° 11' 41.605 N	103° 42' 58.940 W
1,400.00	0.49	253.41	1,399.94	-6.66	-7.18	435,168.4432	690,850.4238	32° 11' 41.604 N	103° 42' 58.942 W
1,425.00	0.50	252.06	1,424.94	-6.72	-7.38	435,168.3791	690,850.2175	32° 11' 41.604 N	103° 42' 58.945 W
1,450.00	0.55	250.67	1,449.94	-6.79	-7.60	435,168.3058	690,850.0005	32° 11' 41.603 N	103° 42' 58.947 W
1,475.00	0.52	262.92	1,474.94	-6.85	-7.83	435,168.2521	690,849.7747	32° 11' 41.602 N	103° 42' 58.950 W
1,500.00	0.57	260.37	1,499.94	-6.88	-8.06	435,168.2173	690,849.5395	32° 11' 41.602 N	103° 42' 58.953 W
1,525.00	0.49	254.49	1,524.94	-6.93	-8.29	435,168.1679	690,849.3139	32° 11' 41.602 N	103° 42' 58.955 W
1,550.00	0.59	267.63	1,549.94	-6.97	-8.52	435,168.1340	690,849.0823	32° 11' 41.601 N	103° 42' 58.958 W
1,575.00	0.54	272.73	1,574.94	-6.97	-8.76	435,168.1343	690,848.8360	32° 11' 41.601 N	103° 42' 58.961 W
1,600.00	0.51	279.02	1,599.94	-6.94	-8.99	435,168.1574	690,848.6085	32° 11' 41.602 N	103° 42' 58.964 W
1,625.00	0.57	270.92	1,624.93	-6.92	-9.23	435,168.1768	690,848.3743	32° 11' 41.602 N	103° 42' 58.966 W
1,650.00	0.47	274.14	1,649.93	-6.91	-9.45	435,168.1862	690,848.1477	32° 11' 41.602 N	103° 42' 58.969 W
1,675.00	0.59	281.24	1,674.93	-6.88	-9.68	435,168.2187	690,847.9191	32° 11' 41.602 N	103° 42' 58.972 W
1,700.00	0.46	279.61	1,699.93	-6.84	-9.91	435,168.2605	690,847.6939	32° 11' 41.603 N	103° 42' 58.974 W

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Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3569.20ft (McVay 8)
Well:	Windward Federal 8H	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)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,725.00	0.40	279.65	1,724.93	-6.81	-10.09	435,168.2919	690,847.5090	32° 11' 41.603 N	103° 42' 58.976 W
1,750.00	0.57	288.86	1,749.93	-6.75	-10.29	435,168.3468	690,847.3053	32° 11' 41.604 N	103° 42' 58.979 W
1,775.00	0.45	271.40	1,774.93	-6.71	-10.51	435,168.3893	690,847.0894	32° 11' 41.604 N	103° 42' 58.981 W
1,800.00	0.37	281.14	1,799.93	-6.69	-10.69	435,168.4073	690,846.9121	32° 11' 41.604 N	103° 42' 58.983 W
1,825.00	0.58	293.85	1,824.93	-6.63	-10.88	435,168.4741	690,846.7172	32° 11' 41.605 N	103° 42' 58.986 W
1,850.00	0.35	292.94	1,849.93	-6.54	-11.07	435,168.5550	690,846.5311	32° 11' 41.606 N	103° 42' 58.988 W
1,875.00	0.43	304.12	1,874.93	-6.46	-11.22	435,168.6374	690,846.3831	32° 11' 41.606 N	103° 42' 58.989 W
1,900.00	0.41	314.81	1,899.93	-6.35	-11.36	435,168.7531	690,846.2420	32° 11' 41.608 N	103° 42' 58.991 W
1,925.00	0.55	314.56	1,924.92	-6.20	-11.51	435,168.9003	690,846.0931	32° 11' 41.609 N	103° 42' 58.993 W
1,950.00	0.53	330.59	1,949.92	-6.01	-11.65	435,169.0852	690,845.9508	32° 11' 41.611 N	103° 42' 58.994 W
1,975.00	0.50	336.21	1,974.92	-5.81	-11.75	435,169.2858	690,845.8500	32° 11' 41.613 N	103° 42' 58.996 W
2,000.00	0.62	328.96	1,999.92	-5.60	-11.86	435,169.5015	690,845.7363	32° 11' 41.615 N	103° 42' 58.997 W
2,025.00	0.52	2.92	2,024.92	-5.37	-11.93	435,169.7306	690,845.6723	32° 11' 41.617 N	103° 42' 58.998 W
2,050.00	0.65	348.57	2,049.92	-5.12	-11.95	435,169.9829	690,845.6500	32° 11' 41.620 N	103° 42' 58.998 W
2,075.00	0.65	358.71	2,074.92	-4.84	-11.98	435,170.2637	690,845.6187	32° 11' 41.623 N	103° 42' 58.998 W
2,100.00	0.57	349.51	2,099.92	-4.57	-12.01	435,170.5277	690,845.5928	32° 11' 41.625 N	103° 42' 58.999 W
2,125.00	0.72	3.81	2,124.91	-4.29	-12.02	435,170.8067	690,845.5806	32° 11' 41.628 N	103° 42' 58.999 W
2,150.00	0.76	19.68	2,149.91	-3.98	-11.95	435,171.1196	690,845.6469	32° 11' 41.631 N	103° 42' 58.998 W
2,175.00	0.71	6.09	2,174.91	-3.67	-11.88	435,171.4297	690,845.7192	32° 11' 41.634 N	103° 42' 58.997 W
2,200.00	0.74	11.52	2,199.91	-3.36	-11.83	435,171.7419	690,845.7679	32° 11' 41.637 N	103° 42' 58.996 W
2,225.00	0.87	16.49	2,224.91	-3.02	-11.75	435,172.0821	690,845.8540	32° 11' 41.641 N	103° 42' 58.995 W
2,250.00	1.02	12.78	2,249.90	-2.62	-11.64	435,172.4811	690,845.9571	32° 11' 41.645 N	103° 42' 58.994 W
2,275.00	1.28	18.74	2,274.90	-2.14	-11.50	435,172.9625	690,846.0960	32° 11' 41.649 N	103° 42' 58.993 W
2,300.00	1.17	21.02	2,299.89	-1.63	-11.32	435,173.4652	690,846.2773	32° 11' 41.654 N	103° 42' 58.990 W
2,325.00	1.28	23.77	2,324.89	-1.14	-11.12	435,173.9590	690,846.4814	32° 11' 41.659 N	103° 42' 58.988 W
2,350.00	1.19	27.88	2,349.88	-0.66	-10.88	435,174.4440	690,846.7153	32° 11' 41.664 N	103° 42' 58.985 W
2,375.00	1.57	24.36	2,374.87	-0.11	-10.62	435,174.9855	690,846.9780	32° 11' 41.669 N	103° 42' 58.982 W
2,400.00	1.54	27.26	2,399.86	0.50	-10.33	435,175.5961	690,847.2731	32° 11' 41.675 N	103° 42' 58.979 W
2,425.00	1.53	29.60	2,424.85	1.08	-10.01	435,176.1849	690,847.5918	32° 11' 41.681 N	103° 42' 58.975 W
2,450.00	1.53	33.49	2,449.85	1.65	-9.66	435,176.7534	690,847.9408	32° 11' 41.687 N	103° 42' 58.971 W
2,475.00	1.47	30.74	2,474.84	2.21	-9.31	435,177.3074	690,848.2889	32° 11' 41.692 N	103° 42' 58.967 W
2,500.00	1.14	31.21	2,499.83	2.70	-9.02	435,177.7957	690,848.5817	32° 11' 41.697 N	103° 42' 58.963 W
2,525.00	0.76	49.31	2,524.83	3.02	-8.76	435,178.1165	690,848.8363	32° 11' 41.700 N	103° 42' 58.960 W
2,550.00	0.76	76.42	2,549.82	3.16	-8.48	435,178.2635	690,849.1231	32° 11' 41.702 N	103° 42' 58.957 W
2,575.00	0.65	81.95	2,574.82	3.22	-8.18	435,178.3223	690,849.4247	32° 11' 41.702 N	103° 42' 58.953 W
2,600.00	0.79	84.07	2,599.82	3.26	-7.86	435,178.3600	690,849.7365	32° 11' 41.702 N	103° 42' 58.950 W
2,625.00	0.74	83.66	2,624.82	3.30	-7.53	435,178.3956	690,850.0684	32° 11' 41.703 N	103° 42' 58.946 W
2,650.00	1.06	66.10	2,649.82	3.41	-7.16	435,178.5071	690,850.4403	32° 11' 41.704 N	103° 42' 58.942 W
2,675.00	1.10	73.34	2,674.81	3.57	-6.72	435,178.6696	690,850.8816	32° 11' 41.705 N	103° 42' 58.936 W
2,700.00	1.09	66.37	2,699.81	3.73	-6.27	435,178.8337	690,851.3293	32° 11' 41.707 N	103° 42' 58.931 W
2,725.00	1.18	70.68	2,724.80	3.91	-5.81	435,179.0142	690,851.7901	32° 11' 41.709 N	103° 42' 58.926 W
2,750.00	1.30	65.18	2,749.80	4.12	-5.31	435,179.2184	690,852.2904	32° 11' 41.711 N	103° 42' 58.920 W
2,775.00	1.28	70.85	2,774.79	4.33	-4.79	435,179.4291	690,852.8116	32° 11' 41.713 N	103° 42' 58.914 W
2,800.00	1.37	71.60	2,799.78	4.52	-4.24	435,179.6150	690,853.3590	32° 11' 41.715 N	103° 42' 58.908 W
2,825.00	1.70	73.09	2,824.77	4.72	-3.60	435,179.8172	690,853.9973	32° 11' 41.717 N	103° 42' 58.900 W
2,850.00	1.59	71.68	2,849.76	4.93	-2.92	435,180.0341	690,854.6814	32° 11' 41.719 N	103° 42' 58.892 W
2,875.00	1.69	74.08	2,874.75	5.14	-2.23	435,180.2442	690,855.3652	32° 11' 41.721 N	103° 42' 58.884 W
2,900.00	1.81	73.81	2,899.74	5.36	-1.50	435,180.4554	690,856.0988	32° 11' 41.723 N	103° 42' 58.876 W
2,925.00	1.83	79.65	2,924.73	5.54	-0.73	435,180.6372	690,856.8707	32° 11' 41.725 N	103° 42' 58.867 W
2,950.00	2.02	76.67	2,949.71	5.71	0.09	435,180.8105	690,857.6921	32° 11' 41.726 N	103° 42' 58.857 W
2,975.00	2.20	77.74	2,974.70	5.91	0.99	435,181.0140	690,858.5897	32° 11' 41.728 N	103° 42' 58.847 W
3,000.00	2.17	84.26	2,999.68	6.06	1.93	435,181.1632	690,859.5295	32° 11' 41.730 N	103° 42' 58.836 W
3,025.00	2.21	86.26	3,024.66	6.14	2.88	435,181.2420	690,860.4815	32° 11' 41.730 N	103° 42' 58.825 W
3,050.00	1.51	96.32	3,049.65	6.14	3.69	435,181.2372	690,861.2899	32° 11' 41.730 N	103° 42' 58.815 W
3,075.00	0.70	117.99	3,074.64	6.03	4.15	435,181.1293	690,861.7521	32° 11' 41.729 N	103° 42' 58.810 W

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 8H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3569.20ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3569.20ft (McVay 8)
Well:	Windward Federal 8H	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)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
3,100.00	0.25	149.76	3,099.64	5.91	4.31	435,181.0105	690,861.9145	32° 11' 41.728 N	103° 42' 58.808 W
3,125.00	0.26	200.89	3,124.64	5.81	4.32	435,180.9104	690,861.9217	32° 11' 41.727 N	103° 42' 58.808 W
3,150.00	0.29	218.46	3,149.64	5.71	4.26	435,180.8078	690,861.8621	32° 11' 41.726 N	103° 42' 58.809 W
3,175.00	0.39	189.36	3,174.64	5.57	4.21	435,180.6743	690,861.8089	32° 11' 41.725 N	103° 42' 58.809 W
3,200.00	0.15	177.00	3,199.64	5.46	4.20	435,180.5577	690,861.7968	32° 11' 41.724 N	103° 42' 58.809 W
3,225.00	0.28	95.81	3,224.64	5.42	4.26	435,180.5188	690,861.8593	32° 11' 41.723 N	103° 42' 58.809 W
3,250.00	0.20	84.65	3,249.64	5.42	4.36	435,180.5167	690,861.9635	32° 11' 41.723 N	103° 42' 58.807 W
3,275.00	0.24	53.63	3,274.64	5.45	4.45	435,180.5518	690,862.0491	32° 11' 41.723 N	103° 42' 58.806 W
3,300.00	0.26	70.53	3,299.64	5.50	4.54	435,180.6018	690,862.1447	32° 11' 41.724 N	103° 42' 58.805 W
3,325.00	0.28	61.29	3,324.64	5.55	4.65	435,180.6500	690,862.2518	32° 11' 41.724 N	103° 42' 58.804 W
3,350.00	0.21	33.88	3,349.64	5.62	4.73	435,180.7174	690,862.3309	32° 11' 41.725 N	103° 42' 58.803 W
3,375.00	0.12	27.63	3,374.64	5.68	4.77	435,180.7786	690,862.3686	32° 11' 41.726 N	103° 42' 58.803 W
3,400.00	0.17	16.94	3,399.64	5.74	4.79	435,180.8373	690,862.3915	32° 11' 41.726 N	103° 42' 58.802 W
3,425.00	0.11	98.18	3,424.64	5.77	4.83	435,180.8694	690,862.4261	32° 11' 41.727 N	103° 42' 58.802 W
3,450.00	0.16	52.60	3,449.64	5.79	4.88	435,180.8872	690,862.4776	32° 11' 41.727 N	103° 42' 58.801 W
3,475.00	0.24	30.34	3,474.64	5.85	4.93	435,180.9536	690,862.5318	32° 11' 41.727 N	103° 42' 58.801 W
3,500.00	0.20	122.67	3,499.64	5.88	5.00	435,180.9752	690,862.5950	32° 11' 41.728 N	103° 42' 58.800 W
3,525.00	0.17	90.49	3,524.64	5.85	5.07	435,180.9513	690,862.6688	32° 11' 41.727 N	103° 42' 58.799 W
3,550.00	0.24	32.20	3,549.64	5.90	5.13	435,180.9953	690,862.7338	32° 11' 41.728 N	103° 42' 58.798 W
3,575.00	0.20	24.92	3,574.64	5.98	5.18	435,181.0792	690,862.7800	32° 11' 41.729 N	103° 42' 58.798 W
3,600.00	0.18	337.29	3,599.64	6.06	5.18	435,181.1550	690,862.7833	32° 11' 41.729 N	103° 42' 58.798 W
3,625.00	0.24	349.88	3,624.64	6.14	5.16	435,181.2428	690,862.7589	32° 11' 41.730 N	103° 42' 58.798 W
3,650.00	0.35	18.10	3,649.64	6.27	5.17	435,181.3669	690,862.7734	32° 11' 41.731 N	103° 42' 58.798 W
3,675.00	0.39	14.76	3,674.64	6.42	5.22	435,181.5217	690,862.8188	32° 11' 41.733 N	103° 42' 58.797 W
3,700.00	0.52	20.52	3,699.64	6.61	5.28	435,181.7103	690,862.8803	32° 11' 41.735 N	103° 42' 58.797 W
3,725.00	0.66	21.41	3,724.64	6.85	5.37	435,181.9506	690,862.9726	32° 11' 41.737 N	103° 42' 58.796 W
3,750.00	0.75	15.16	3,749.63	7.14	5.47	435,182.2425	690,863.0679	32° 11' 41.740 N	103° 42' 58.794 W
3,775.00	0.69	29.66	3,774.63	7.43	5.59	435,182.5313	690,863.1852	32° 11' 41.743 N	103° 42' 58.793 W
3,800.00	0.88	30.07	3,799.63	7.73	5.76	435,182.8282	690,863.3559	32° 11' 41.746 N	103° 42' 58.791 W
3,825.00	0.92	36.72	3,824.63	8.06	5.97	435,183.1552	690,863.5721	32° 11' 41.749 N	103° 42' 58.788 W
3,850.00	0.90	35.19	3,849.62	8.38	6.21	435,183.4766	690,863.8053	32° 11' 41.752 N	103° 42' 58.786 W
3,875.00	1.00	41.72	3,874.62	8.70	6.46	435,183.7999	690,864.0636	32° 11' 41.755 N	103° 42' 58.783 W
3,900.00	1.09	42.43	3,899.62	9.04	6.77	435,184.1382	690,864.3692	32° 11' 41.759 N	103° 42' 58.779 W
3,925.00	1.05	43.07	3,924.61	9.38	7.09	435,184.4811	690,864.6861	32° 11' 41.762 N	103° 42' 58.775 W
3,950.00	1.29	52.85	3,949.61	9.72	7.47	435,184.8183	690,865.0668	32° 11' 41.766 N	103° 42' 58.771 W
3,975.00	1.07	66.52	3,974.60	9.98	7.91	435,185.0813	690,865.5052	32° 11' 41.768 N	103° 42' 58.766 W
4,000.00	1.07	48.34	3,999.60	10.23	8.29	435,185.3294	690,865.8937	32° 11' 41.771 N	103° 42' 58.761 W
4,025.00	1.05	53.65	4,024.59	10.52	8.65	435,185.6204	690,866.2525	32° 11' 41.773 N	103° 42' 58.757 W
4,050.00	1.01	51.41	4,049.59	10.79	9.01	435,185.8936	690,866.6093	32° 11' 41.776 N	103° 42' 58.753 W
4,075.00	1.13	55.54	4,074.58	11.07	9.38	435,186.1705	690,866.9847	32° 11' 41.779 N	103° 42' 58.749 W
4,100.00	1.27	57.34	4,099.58	11.36	9.82	435,186.4595	690,867.4212	32° 11' 41.782 N	103° 42' 58.743 W
4,125.00	1.26	58.98	4,124.57	11.65	10.29	435,186.7506	690,867.8900	32° 11' 41.784 N	103° 42' 58.738 W
4,150.00	1.36	62.88	4,149.57	11.93	10.79	435,187.0275	690,868.3896	32° 11' 41.787 N	103° 42' 58.732 W
4,175.00	1.25	66.79	4,174.56	12.17	11.30	435,187.2702	690,868.9043	32° 11' 41.790 N	103° 42' 58.726 W
4,200.00	1.31	76.67	4,199.55	12.34	11.83	435,187.4436	690,869.4330	32° 11' 41.791 N	103° 42' 58.720 W
4,225.00	1.21	87.89	4,224.55	12.42	12.37	435,187.5192	690,869.9749	32° 11' 41.792 N	103° 42' 58.714 W
4,250.00	1.30	93.45	4,249.54	12.41	12.92	435,187.5119	690,870.5217	32° 11' 41.792 N	103° 42' 58.707 W
4,275.00	1.34	101.89	4,274.53	12.33	13.49	435,187.4346	690,871.0908	32° 11' 41.791 N	103° 42' 58.701 W
4,300.00	1.82	106.15	4,299.53	12.16	14.16	435,187.2639	690,871.7582	32° 11' 41.789 N	103° 42' 58.693 W
4,325.00	1.12	106.82	4,324.52	11.98	14.77	435,187.0828	690,872.3734	32° 11' 41.787 N	103° 42' 58.686 W
4,350.00	1.12	105.66	4,349.51	11.85	15.24	435,186.9461	690,872.8426	32° 11' 41.786 N	103° 42' 58.680 W
4,375.00	1.02	102.29	4,374.51	11.73	15.70	435,186.8328	690,873.2952	32° 11' 41.785 N	103° 42' 58.675 W
4,400.00	1.20	101.27	4,399.50	11.63	16.17	435,186.7343	690,873.7694	32° 11' 41.784 N	103° 42' 58.670 W
4,425.00	1.44	110.42	4,424.50	11.47	16.72	435,186.5735	690,874.3205	32° 11' 41.782 N	103° 42' 58.663 W
4,450.00	1.29	110.89	4,449.49	11.26	17.28	435,186.3636	690,874.8778	32° 11' 41.780 N	103° 42' 58.657 W

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 8H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3569.20ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3569.20ft (McVay 8)
Well:	Windward Federal 8H	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)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
4,475.00	1.31	109.15	4,474.48	11.07	17.81	435,186.1695	690,875.4107	32° 11' 41.778 N	103° 42' 58.651 W
4,500.00	1.23	112.58	4,499.48	10.87	18.33	435,185.9727	690,875.9284	32° 11' 41.776 N	103° 42' 58.645 W
4,525.00	1.23	108.54	4,524.47	10.68	18.83	435,185.7844	690,876.4306	32° 11' 41.774 N	103° 42' 58.639 W
4,550.00	1.23	106.24	4,549.47	10.52	19.34	435,185.6240	690,876.9426	32° 11' 41.773 N	103° 42' 58.633 W
4,575.00	1.18	108.92	4,574.46	10.37	19.84	435,185.4655	690,877.4437	32° 11' 41.771 N	103° 42' 58.627 W
4,600.00	1.04	99.21	4,599.45	10.25	20.31	435,185.3457	690,877.9112	32° 11' 41.770 N	103° 42' 58.621 W
4,625.00	1.05	108.49	4,624.45	10.14	20.75	435,185.2368	690,878.3524	32° 11' 41.769 N	103° 42' 58.616 W
4,650.00	0.77	108.14	4,649.45	10.01	21.13	435,185.1118	690,878.7292	32° 11' 41.768 N	103° 42' 58.612 W
4,675.00	0.75	96.11	4,674.45	9.94	21.45	435,185.0421	690,879.0515	32° 11' 41.767 N	103° 42' 58.608 W
4,700.00	0.74	96.82	4,699.44	9.91	21.77	435,185.0055	690,879.3745	32° 11' 41.767 N	103° 42' 58.604 W
4,725.00	0.69	93.97	4,724.44	9.88	22.09	435,184.9759	690,879.6850	32° 11' 41.766 N	103° 42' 58.601 W
4,750.00	0.64	105.12	4,749.44	9.83	22.37	435,184.9291	690,879.9700	32° 11' 41.766 N	103° 42' 58.598 W
4,775.00	0.45	87.48	4,774.44	9.80	22.60	435,184.8970	690,880.2028	32° 11' 41.765 N	103° 42' 58.595 W
4,800.00	0.55	80.14	4,799.44	9.82	22.82	435,184.9219	690,880.4191	32° 11' 41.766 N	103° 42' 58.592 W
4,825.00	0.43	76.37	4,824.44	9.86	23.03	435,184.9645	690,880.6285	32° 11' 41.766 N	103° 42' 58.590 W
4,850.00	0.58	78.63	4,849.44	9.91	23.24	435,185.0116	690,880.8437	32° 11' 41.767 N	103° 42' 58.587 W
4,875.00	0.51	82.18	4,874.43	9.95	23.48	435,185.0516	690,881.0780	32° 11' 41.767 N	103° 42' 58.585 W
4,900.00	0.44	70.71	4,899.43	10.00	23.68	435,185.0985	690,881.2788	32° 11' 41.767 N	103° 42' 58.582 W
4,925.00	0.44	71.00	4,924.43	10.06	23.86	435,185.1615	690,881.4602	32° 11' 41.768 N	103° 42' 58.580 W
4,950.00	0.66	78.64	4,949.43	10.12	24.09	435,185.2211	690,881.6921	32° 11' 41.769 N	103° 42' 58.577 W
4,975.00	0.60	68.45	4,974.43	10.20	24.36	435,185.2975	690,881.9550	32° 11' 41.769 N	103° 42' 58.574 W
5,000.00	0.69	72.56	4,999.43	10.29	24.62	435,185.3907	690,882.2204	32° 11' 41.770 N	103° 42' 58.571 W
5,025.00	0.63	77.60	5,024.43	10.37	24.90	435,185.4653	690,882.4982	32° 11' 41.771 N	103° 42' 58.568 W
5,050.00	0.65	72.67	5,049.43	10.44	25.17	435,185.5371	690,882.7678	32° 11' 41.772 N	103° 42' 58.565 W
5,075.00	0.62	71.53	5,074.42	10.52	25.43	435,185.6222	690,883.0315	32° 11' 41.772 N	103° 42' 58.562 W
5,100.00	0.39	70.77	5,099.42	10.59	25.64	435,185.6931	690,883.2401	32° 11' 41.773 N	103° 42' 58.559 W
5,125.00	0.51	49.21	5,124.42	10.69	25.80	435,185.7938	690,883.4047	32° 11' 41.774 N	103° 42' 58.558 W
5,150.00	0.58	50.26	5,149.42	10.85	25.99	435,185.9473	690,883.5863	32° 11' 41.776 N	103° 42' 58.555 W
5,175.00	0.63	51.88	5,174.42	11.01	26.19	435,186.1131	690,883.7917	32° 11' 41.777 N	103° 42' 58.553 W
5,200.00	0.60	51.39	5,199.42	11.18	26.40	435,186.2796	690,884.0021	32° 11' 41.779 N	103° 42' 58.551 W
5,225.00	0.68	48.03	5,224.42	11.36	26.61	435,186.4605	690,884.2147	32° 11' 41.781 N	103° 42' 58.548 W
5,250.00	0.60	54.86	5,249.42	11.54	26.83	435,186.6350	690,884.4320	32° 11' 41.782 N	103° 42' 58.546 W
5,275.00	0.58	51.30	5,274.41	11.69	27.04	435,186.7895	690,884.6378	32° 11' 41.784 N	103° 42' 58.543 W
5,300.00	0.54	41.29	5,299.41	11.86	27.21	435,186.9571	690,884.8143	32° 11' 41.786 N	103° 42' 58.541 W
5,325.00	0.45	47.28	5,324.41	12.01	27.36	435,187.1123	690,884.9642	32° 11' 41.787 N	103° 42' 58.539 W
5,350.00	0.63	28.61	5,349.41	12.20	27.50	435,187.2995	690,885.1021	32° 11' 41.789 N	103° 42' 58.538 W
5,375.00	0.72	27.60	5,374.41	12.46	27.64	435,187.5594	690,885.2407	32° 11' 41.791 N	103° 42' 58.536 W
5,400.00	0.76	39.78	5,399.41	12.73	27.82	435,187.8260	690,885.4195	32° 11' 41.794 N	103° 42' 58.534 W
5,425.00	0.62	50.42	5,424.40	12.94	28.03	435,188.0396	690,885.6299	32° 11' 41.796 N	103° 42' 58.531 W
5,450.00	0.62	31.13	5,449.40	13.14	28.20	435,188.2416	690,885.8041	32° 11' 41.798 N	103° 42' 58.529 W
5,475.00	0.66	33.72	5,474.40	13.38	28.35	435,188.4771	690,885.9539	32° 11' 41.801 N	103° 42' 58.528 W
5,500.00	0.50	37.90	5,499.40	13.58	28.50	435,188.6829	690,886.1008	32° 11' 41.803 N	103° 42' 58.526 W
5,525.00	0.50	33.75	5,524.40	13.76	28.63	435,188.8597	690,886.2285	32° 11' 41.804 N	103° 42' 58.524 W
5,550.00	0.59	12.46	5,549.40	13.98	28.72	435,189.0761	690,886.3168	32° 11' 41.806 N	103° 42' 58.523 W
5,575.00	0.59	22.95	5,574.40	14.22	28.79	435,189.3203	690,886.3948	32° 11' 41.809 N	103° 42' 58.522 W
5,600.00	0.59	31.78	5,599.40	14.45	28.91	435,189.5483	690,886.5128	32° 11' 41.811 N	103° 42' 58.521 W
5,625.00	0.59	23.10	5,624.39	14.68	29.03	435,189.7761	690,886.6311	32° 11' 41.813 N	103° 42' 58.520 W
5,650.00	0.65	32.97	5,649.39	14.91	29.16	435,190.0134	690,886.7587	32° 11' 41.816 N	103° 42' 58.518 W
5,675.00	0.60	23.43	5,674.39	15.15	29.29	435,190.2525	690,886.8879	32° 11' 41.818 N	103° 42' 58.517 W
5,700.00	0.59	33.22	5,699.39	15.38	29.41	435,190.4803	690,887.0105	32° 11' 41.820 N	103° 42' 58.515 W
5,725.00	0.66	11.74	5,724.39	15.63	29.51	435,190.7289	690,887.1103	32° 11' 41.823 N	103° 42' 58.514 W
5,750.00	0.67	24.05	5,749.39	15.90	29.60	435,191.0034	690,887.1992	32° 11' 41.825 N	103° 42' 58.513 W
5,775.00	0.83	27.15	5,774.39	16.20	29.74	435,191.2980	690,887.3414	32° 11' 41.828 N	103° 42' 58.511 W
5,800.00	0.82	19.15	5,799.38	16.53	29.88	435,191.6281	690,887.4827	32° 11' 41.832 N	103° 42' 58.510 W
5,825.00	0.82	28.29	5,824.38	16.85	30.03	435,191.9546	690,887.6262	32° 11' 41.835 N	103° 42' 58.508 W

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 8H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3569.20ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3569.20ft (McVay 8)
Well:	Windward Federal 8H	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)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
5,850.00	0.81	21.54	5,849.38	17.18	30.18	435,192.2765	690,887.7758	32° 11' 41.838 N	103° 42' 58.506 W
5,875.00	0.71	19.72	5,874.38	17.49	30.29	435,192.5867	690,887.8930	32° 11' 41.841 N	103° 42' 58.505 W
5,900.00	0.79	15.77	5,899.37	17.80	30.39	435,192.8984	690,887.9921	32° 11' 41.844 N	103° 42' 58.504 W
5,925.00	0.78	16.73	5,924.37	18.13	30.49	435,193.2272	690,888.0879	32° 11' 41.847 N	103° 42' 58.503 W
5,950.00	0.71	10.67	5,949.37	18.44	30.57	435,193.5423	690,888.1656	32° 11' 41.851 N	103° 42' 58.502 W
5,975.00	0.73	15.93	5,974.37	18.75	30.64	435,193.8477	690,888.2379	32° 11' 41.854 N	103° 42' 58.501 W
6,000.00	0.76	16.82	5,999.36	19.06	30.73	435,194.1596	690,888.3296	32° 11' 41.857 N	103° 42' 58.500 W
6,025.00	0.87	11.87	6,024.36	19.40	30.82	435,194.5040	690,888.4167	32° 11' 41.860 N	103° 42' 58.499 W
6,050.00	0.86	8.10	6,049.36	19.78	30.88	435,194.8755	690,888.4821	32° 11' 41.864 N	103° 42' 58.498 W
6,075.00	0.87	8.84	6,074.36	20.15	30.94	435,195.2488	690,888.5377	32° 11' 41.867 N	103° 42' 58.497 W
6,100.00	0.87	7.45	6,099.35	20.52	30.99	435,195.6245	690,888.5915	32° 11' 41.871 N	103° 42' 58.496 W
6,125.00	0.96	1.22	6,124.35	20.92	31.02	435,196.0221	690,888.6206	32° 11' 41.875 N	103° 42' 58.496 W
6,150.00	0.93	359.18	6,149.35	21.33	31.02	435,196.4343	690,888.6221	32° 11' 41.879 N	103° 42' 58.496 W
6,175.00	0.83	358.32	6,174.34	21.72	31.01	435,196.8182	690,888.6139	32° 11' 41.883 N	103° 42' 58.496 W
6,200.00	0.82	358.55	6,199.34	22.08	31.00	435,197.1780	690,888.6041	32° 11' 41.886 N	103° 42' 58.496 W
6,225.00	0.79	358.51	6,224.34	22.43	31.00	435,197.5291	690,888.5951	32° 11' 41.890 N	103° 42' 58.496 W
6,250.00	0.91	7.77	6,249.34	22.80	31.02	435,197.8981	690,888.6174	32° 11' 41.894 N	103° 42' 58.496 W
6,275.00	0.88	3.11	6,274.33	23.19	31.05	435,198.2865	690,888.6547	32° 11' 41.897 N	103° 42' 58.496 W
6,300.00	0.89	2.31	6,299.33	23.57	31.07	435,198.6722	690,888.6729	32° 11' 41.901 N	103° 42' 58.495 W
6,325.00	0.83	6.54	6,324.33	23.95	31.10	435,199.0461	690,888.7014	32° 11' 41.905 N	103° 42' 58.495 W
6,350.00	0.80	2.66	6,349.32	24.30	31.13	435,199.4003	690,888.7301	32° 11' 41.908 N	103° 42' 58.495 W
6,375.00	0.74	355.51	6,374.32	24.64	31.13	435,199.7356	690,888.7256	32° 11' 41.912 N	103° 42' 58.495 W
6,400.00	0.73	348.08	6,399.32	24.95	31.08	435,200.0524	690,888.6800	32° 11' 41.915 N	103° 42' 58.495 W
6,425.00	0.61	355.49	6,424.32	25.24	31.04	435,200.3409	690,888.6367	32° 11' 41.918 N	103° 42' 58.496 W
6,450.00	0.60	343.12	6,449.32	25.50	30.99	435,200.5988	690,888.5882	32° 11' 41.920 N	103° 42' 58.496 W
6,475.00	0.52	340.71	6,474.32	25.73	30.91	435,200.8311	690,888.5127	32° 11' 41.923 N	103° 42' 58.497 W
6,500.00	0.48	353.73	6,499.32	25.94	30.86	435,201.0423	690,888.4638	32° 11' 41.925 N	103° 42' 58.498 W
6,525.00	0.45	336.75	6,524.31	26.14	30.81	435,201.2366	690,888.4136	32° 11' 41.927 N	103° 42' 58.498 W
6,550.00	0.58	345.68	6,549.31	26.35	30.74	435,201.4494	690,888.3436	32° 11' 41.929 N	103° 42' 58.499 W
6,575.00	0.43	351.82	6,574.31	26.56	30.70	435,201.6649	690,888.2989	32° 11' 41.931 N	103° 42' 58.500 W
6,600.00	0.31	3.78	6,599.31	26.73	30.69	435,201.8252	690,888.2900	32° 11' 41.932 N	103° 42' 58.500 W
6,625.00	0.32	358.97	6,624.31	26.86	30.69	435,201.9625	690,888.2932	32° 11' 41.934 N	103° 42' 58.500 W
6,650.00	0.36	1.34	6,649.31	27.01	30.69	435,202.1108	690,888.2938	32° 11' 41.935 N	103° 42' 58.500 W
6,675.00	0.35	359.79	6,674.31	27.17	30.70	435,202.2657	690,888.2954	32° 11' 41.937 N	103° 42' 58.500 W
6,700.00	0.30	358.69	6,699.31	27.31	30.69	435,202.4075	690,888.2936	32° 11' 41.938 N	103° 42' 58.500 W
6,725.00	0.23	341.05	6,724.31	27.42	30.68	435,202.5204	690,888.2758	32° 11' 41.939 N	103° 42' 58.500 W
6,750.00	0.31	343.03	6,749.31	27.53	30.64	435,202.6325	690,888.2398	32° 11' 41.940 N	103° 42' 58.500 W
6,775.00	0.36	336.61	6,774.31	27.67	30.59	435,202.7693	690,888.1889	32° 11' 41.942 N	103° 42' 58.501 W
6,800.00	0.29	347.10	6,799.31	27.80	30.54	435,202.9030	690,888.1435	32° 11' 41.943 N	103° 42' 58.501 W
6,825.00	0.30	308.49	6,824.31	27.91	30.48	435,203.0054	690,888.0782	32° 11' 41.944 N	103° 42' 58.502 W
6,850.00	0.29	287.15	6,849.31	27.96	30.37	435,203.0648	690,887.9665	32° 11' 41.945 N	103° 42' 58.503 W
6,875.00	0.44	253.92	6,874.31	27.96	30.21	435,203.0569	690,887.8138	32° 11' 41.945 N	103° 42' 58.505 W
6,900.00	0.44	243.34	6,899.31	27.89	30.04	435,202.9872	690,887.6358	32° 11' 41.944 N	103° 42' 58.507 W
6,925.00	0.55	247.10	6,924.31	27.80	29.84	435,202.8975	690,887.4395	32° 11' 41.943 N	103° 42' 58.509 W
6,950.00	0.67	239.09	6,949.30	27.68	29.60	435,202.7757	690,887.2035	32° 11' 41.942 N	103° 42' 58.512 W
6,975.00	0.80	237.02	6,974.30	27.51	29.33	435,202.6056	690,886.9317	32° 11' 41.940 N	103° 42' 58.515 W
7,000.00	0.91	235.01	6,999.30	27.30	29.02	435,202.3968	690,886.6227	32° 11' 41.938 N	103° 42' 58.519 W
7,025.00	1.09	232.54	7,024.30	27.04	28.67	435,202.1383	690,886.2713	32° 11' 41.936 N	103° 42' 58.523 W
7,050.00	1.04	233.49	7,049.29	26.76	28.30	435,201.8587	690,885.9002	32° 11' 41.933 N	103° 42' 58.527 W
7,075.00	1.11	230.63	7,074.29	26.47	27.93	435,201.5701	690,885.5306	32° 11' 41.930 N	103° 42' 58.532 W
7,100.00	1.08	225.97	7,099.28	26.15	27.57	435,201.2528	690,885.1740	32° 11' 41.927 N	103° 42' 58.536 W
7,125.00	1.12	224.51	7,124.28	25.81	27.23	435,200.9148	690,884.8334	32° 11' 41.924 N	103° 42' 58.540 W
7,150.00	1.14	225.18	7,149.27	25.47	26.89	435,200.5652	690,884.4857	32° 11' 41.920 N	103° 42' 58.544 W
7,175.00	1.04	228.19	7,174.27	25.14	26.54	435,200.2387	690,884.1402	32° 11' 41.917 N	103° 42' 58.548 W
7,200.00	1.07	230.29	7,199.26	24.84	26.19	435,199.9383	690,883.7915	32° 11' 41.914 N	103° 42' 58.552 W

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 8H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3569.20ft (McVay 8)
Site:	Sec. 30, T 24 S., R 32 E	MD Reference:	KB=26' @ 3569.20ft (McVay 8)
Well:	Windward Federal 8H	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)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
7,225.00	1.17	228.18	7,224.26	24.52	25.82	435,199.6190	690,883.4217	32° 11' 41.911 N	103° 42' 58.556 W
7,250.00	1.20	226.00	7,249.25	24.17	25.44	435,199.2669	690,883.0432	32° 11' 41.907 N	103° 42' 58.561 W
7,275.00	1.18	223.33	7,274.25	23.80	25.08	435,198.8978	690,882.6782	32° 11' 41.904 N	103° 42' 58.565 W
7,300.00	1.19	219.29	7,299.24	23.41	24.74	435,198.5097	690,882.3372	32° 11' 41.900 N	103° 42' 58.569 W
7,325.00	1.18	219.80	7,324.24	23.01	24.41	435,198.1110	690,882.0080	32° 11' 41.896 N	103° 42' 58.573 W
7,350.00	1.18	219.20	7,349.23	22.61	24.08	435,197.7137	690,881.6806	32° 11' 41.892 N	103° 42' 58.577 W
7,375.00	1.34	213.93	7,374.23	22.17	23.75	435,197.2717	690,881.3547	32° 11' 41.888 N	103° 42' 58.581 W
7,400.00	1.25	215.38	7,399.22	21.71	23.43	435,196.8068	690,881.0337	32° 11' 41.883 N	103° 42' 58.584 W
7,425.00	1.31	209.50	7,424.21	21.24	23.14	435,196.3358	690,880.7351	32° 11' 41.879 N	103° 42' 58.588 W
7,450.00	1.27	211.51	7,449.21	20.75	22.85	435,195.8509	690,880.4495	32° 11' 41.874 N	103° 42' 58.591 W
7,475.00	1.26	211.75	7,474.20	20.28	22.56	435,195.3809	690,880.1601	32° 11' 41.869 N	103° 42' 58.595 W
7,500.00	1.27	210.20	7,499.20	19.81	22.28	435,194.9077	690,879.8761	32° 11' 41.865 N	103° 42' 58.598 W
7,525.00	1.27	212.50	7,524.19	19.33	21.99	435,194.4346	690,879.5879	32° 11' 41.860 N	103° 42' 58.601 W
7,550.00	1.18	212.69	7,549.18	18.88	21.70	435,193.9843	690,879.3000	32° 11' 41.855 N	103° 42' 58.605 W
7,575.00	1.19	211.07	7,574.18	18.45	21.43	435,193.5453	690,879.0270	32° 11' 41.851 N	103° 42' 58.608 W
7,600.00	1.31	218.31	7,599.17	18.00	21.12	435,193.0987	690,878.7159	32° 11' 41.847 N	103° 42' 58.612 W
7,625.00	1.35	219.28	7,624.17	17.55	20.75	435,192.6465	690,878.3523	32° 11' 41.842 N	103° 42' 58.616 W
7,650.00	1.40	214.65	7,649.16	17.07	20.39	435,192.1674	690,877.9922	32° 11' 41.837 N	103° 42' 58.620 W
7,675.00	1.44	211.76	7,674.15	16.55	20.05	435,191.6490	690,877.6532	32° 11' 41.832 N	103° 42' 58.624 W
7,700.00	1.48	211.69	7,699.14	16.01	19.72	435,191.1072	690,877.3182	32° 11' 41.827 N	103° 42' 58.628 W
7,725.00	1.38	205.94	7,724.14	15.46	19.42	435,190.5618	690,877.0170	32° 11' 41.822 N	103° 42' 58.632 W
7,750.00	1.37	203.93	7,749.13	14.92	19.16	435,190.0179	690,876.7641	32° 11' 41.816 N	103° 42' 58.635 W
7,775.00	1.40	200.26	7,774.12	14.36	18.94	435,189.4582	690,876.5371	32° 11' 41.811 N	103° 42' 58.637 W
7,800.00	1.44	196.56	7,799.11	13.77	18.74	435,188.8706	690,876.3418	32° 11' 41.805 N	103° 42' 58.640 W
7,825.00	1.28	196.08	7,824.11	13.20	18.57	435,188.3012	690,876.1749	32° 11' 41.799 N	103° 42' 58.641 W
7,850.00	1.31	193.39	7,849.10	12.65	18.43	435,187.7549	690,876.0314	32° 11' 41.794 N	103° 42' 58.643 W
7,875.00	1.13	194.63	7,874.09	12.14	18.30	435,187.2384	690,875.9030	32° 11' 41.789 N	103° 42' 58.645 W
7,900.00	1.01	194.31	7,899.09	11.69	18.19	435,186.7864	690,875.7862	32° 11' 41.784 N	103° 42' 58.646 W
7,925.00	1.07	198.64	7,924.09	11.25	18.06	435,186.3517	690,875.6572	32° 11' 41.780 N	103° 42' 58.648 W
7,950.00	0.96	203.87	7,949.08	10.84	17.90	435,185.9390	690,875.4978	32° 11' 41.776 N	103° 42' 58.650 W
7,975.00	1.09	200.44	7,974.08	10.42	17.73	435,185.5247	690,875.3300	32° 11' 41.772 N	103° 42' 58.651 W
8,000.00	1.18	194.76	7,999.07	9.95	17.58	435,185.0529	690,875.1814	32° 11' 41.767 N	103° 42' 58.653 W
8,025.00	1.10	192.53	8,024.07	9.47	17.46	435,184.5698	690,875.0638	32° 11' 41.762 N	103° 42' 58.655 W
8,050.00	0.96	190.45	8,049.06	9.03	17.37	435,184.1296	690,874.9737	32° 11' 41.758 N	103° 42' 58.656 W
8,075.00	0.95	193.54	8,074.06	8.62	17.29	435,183.7221	690,874.8872	32° 11' 41.754 N	103° 42' 58.657 W
8,100.00	0.95	198.10	8,099.06	8.22	17.17	435,183.3236	690,874.7743	32° 11' 41.750 N	103° 42' 58.658 W
8,125.00	1.13	203.18	8,124.05	7.80	17.01	435,182.9000	690,874.6129	32° 11' 41.746 N	103° 42' 58.660 W
8,150.00	1.22	199.65	8,149.05	7.32	16.83	435,182.4228	690,874.4263	32° 11' 41.741 N	103° 42' 58.662 W
8,175.00	1.20	194.47	8,174.04	6.82	16.67	435,181.9187	690,874.2714	32° 11' 41.736 N	103° 42' 58.664 W
8,200.00	1.12	189.34	8,199.04	6.32	16.57	435,181.4241	690,874.1664	32° 11' 41.731 N	103° 42' 58.665 W
8,225.00	1.17	197.33	8,224.03	5.84	16.45	435,180.9394	690,874.0507	32° 11' 41.727 N	103° 42' 58.667 W
8,250.00	0.99	193.46	8,249.03	5.39	16.32	435,180.4857	690,873.9244	32° 11' 41.722 N	103° 42' 58.668 W
8,275.00	1.41	194.44	8,274.02	4.88	16.20	435,179.9778	690,873.7974	32° 11' 41.717 N	103° 42' 58.670 W
8,300.00	1.28	186.23	8,299.01	4.30	16.09	435,179.4023	690,873.6904	32° 11' 41.711 N	103° 42' 58.671 W
8,325.00	1.20	180.79	8,324.01	3.76	16.06	435,178.8630	690,873.6565	32° 11' 41.706 N	103° 42' 58.671 W
8,350.00	1.19	185.94	8,349.00	3.24	16.03	435,178.3430	690,873.6260	32° 11' 41.701 N	103° 42' 58.672 W
8,375.00	1.17	180.65	8,374.00	2.73	16.00	435,177.8296	690,873.5963	32° 11' 41.696 N	103° 42' 58.672 W
8,400.00	1.33	180.92	8,398.99	2.18	15.99	435,177.2843	690,873.5887	32° 11' 41.690 N	103° 42' 58.672 W
8,425.00	1.53	184.56	8,423.98	1.56	15.96	435,176.6615	690,873.5575	32° 11' 41.684 N	103° 42' 58.673 W
8,450.00	1.57	181.06	8,448.98	0.89	15.92	435,175.9864	690,873.5246	32° 11' 41.678 N	103° 42' 58.673 W
8,475.00	1.47	176.33	8,473.97	0.22	15.94	435,175.3239	690,873.5388	32° 11' 41.671 N	103° 42' 58.673 W
8,500.00	1.37	184.75	8,498.96	-0.39	15.93	435,174.7061	690,873.5346	32° 11' 41.665 N	103° 42' 58.673 W
8,510.00	1.66	173.21	8,508.96	-0.66	15.94	435,174.4431	690,873.5418	32° 11' 41.662 N	103° 42' 58.673 W
8,684.00	7.70	161.30	8,682.30	-14.21	19.98	435,160.8864	690,877.5809	32° 11' 41.528 N	103° 42' 58.627 W

First IDS MWD Survey

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 8H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3569.20ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3569.20ft (McVay 8)
Well:	Windward Federal 8H	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)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
8,736.00	10.50	160.30	8,733.64	-21.98	22.70	435,153.1243	690,880.2956	32° 11' 41.451 N	103° 42' 58.596 W
8,783.00	16.00	161.10	8,779.37	-32.14	26.24	435,142.9564	690,883.8401	32° 11' 41.350 N	103° 42' 58.555 W
8,831.00	23.50	165.40	8,824.52	-47.69	30.80	435,127.4138	690,888.4019	32° 11' 41.196 N	103° 42' 58.503 W
8,879.00	29.60	164.10	8,867.43	-68.37	36.47	435,106.7321	690,894.0673	32° 11' 40.991 N	103° 42' 58.439 W
8,943.00	35.00	156.50	8,921.53	-100.44	48.13	435,074.6616	690,905.7298	32° 11' 40.673 N	103° 42' 58.305 W
8,974.00	36.50	157.30	8,946.69	-117.10	55.23	435,058.0019	690,912.8332	32° 11' 40.508 N	103° 42' 58.224 W
9,027.00	42.90	157.80	8,987.45	-148.37	68.15	435,026.7257	690,925.7455	32° 11' 40.198 N	103° 42' 58.075 W
9,070.00	49.80	159.10	9,017.11	-177.30	79.55	434,997.7984	690,937.1477	32° 11' 39.911 N	103° 42' 57.945 W
9,118.00	56.00	157.70	9,046.05	-212.87	93.65	434,962.2289	690,951.2513	32° 11' 39.558 N	103° 42' 57.783 W
9,165.00	60.70	151.90	9,070.72	-249.02	110.72	434,926.0831	690,968.3168	32° 11' 39.199 N	103° 42' 57.587 W
9,213.00	63.80	150.30	9,093.07	-286.20	131.25	434,888.9043	690,988.8502	32° 11' 38.830 N	103° 42' 57.350 W
9,259.00	66.70	151.00	9,112.33	-322.61	151.72	434,852.4946	691,009.3208	32° 11' 38.469 N	103° 42' 57.114 W
9,307.00	72.20	151.70	9,129.17	-362.04	173.26	434,813.0651	691,030.8575	32° 11' 38.077 N	103° 42' 56.867 W
9,355.00	77.80	152.80	9,141.59	-403.05	194.83	434,772.0475	691,052.4312	32° 11' 37.670 N	103° 42' 56.618 W
9,403.00	79.70	152.10	9,150.95	-444.79	216.61	434,730.3108	691,074.2054	32° 11' 37.256 N	103° 42' 56.368 W
9,481.00	84.50	149.70	9,161.67	-512.27	254.17	434,662.8330	691,111.7738	32° 11' 36.586 N	103° 42' 55.935 W
9,576.00	91.20	153.50	9,165.24	-595.72	299.29	434,579.3850	691,156.8862	32° 11' 35.758 N	103° 42' 55.416 W
9,671.00	92.00	157.10	9,162.58	-681.98	338.96	434,493.1257	691,196.5616	32° 11' 34.902 N	103° 42' 54.960 W
9,767.00	89.80	164.80	9,161.07	-772.63	370.26	434,402.4678	691,227.8641	32° 11' 34.003 N	103° 42' 54.601 W
9,861.00	93.20	173.40	9,158.61	-864.80	388.02	434,310.2967	691,245.6191	32° 11' 33.090 N	103° 42' 54.401 W
9,958.00	92.00	175.60	9,154.21	-961.25	397.31	434,213.8505	691,254.9049	32° 11' 32.135 N	103° 42' 54.299 W
10,053.00	90.20	177.60	9,152.38	-1,056.06	402.94	434,119.0441	691,260.5369	32° 11' 31.196 N	103° 42' 54.240 W
10,149.00	89.10	178.20	9,152.97	-1,151.99	406.46	434,023.1124	691,264.0546	32° 11' 30.247 N	103° 42' 54.206 W
10,244.00	89.00	178.50	9,154.54	-1,246.94	409.19	433,928.1652	691,266.7896	32° 11' 29.307 N	103° 42' 54.180 W
10,341.00	89.40	178.40	9,155.90	-1,343.89	411.81	433,831.2105	691,269.4132	32° 11' 28.347 N	103° 42' 54.156 W
10,436.00	89.80	178.50	9,156.56	-1,438.85	414.38	433,736.2480	691,271.9828	32° 11' 27.408 N	103° 42' 54.133 W
10,531.00	90.50	178.30	9,156.31	-1,533.82	417.04	433,641.2862	691,274.6353	32° 11' 26.468 N	103° 42' 54.108 W
10,626.00	89.70	179.20	9,156.15	-1,628.79	419.11	433,546.3109	691,276.7077	32° 11' 25.528 N	103° 42' 54.090 W
10,721.00	89.90	179.70	9,156.48	-1,723.79	420.02	433,451.3165	691,277.6196	32° 11' 24.588 N	103° 42' 54.086 W
10,816.00	90.20	180.10	9,156.40	-1,818.79	420.19	433,356.3171	691,277.7854	32° 11' 23.647 N	103° 42' 54.090 W
10,910.00	91.60	180.80	9,154.92	-1,912.77	419.45	433,262.3347	691,277.0473	32° 11' 22.717 N	103° 42' 54.105 W
11,004.00	93.20	180.80	9,150.98	-2,006.67	418.14	433,168.4296	691,275.7361	32° 11' 21.788 N	103° 42' 54.127 W
11,099.00	93.10	180.40	9,145.76	-2,101.53	417.14	433,073.5787	691,274.7428	32° 11' 20.850 N	103° 42' 54.145 W
11,193.00	93.70	180.70	9,140.19	-2,195.36	416.24	432,979.7492	691,273.8421	32° 11' 19.921 N	103° 42' 54.162 W
11,287.00	92.40	181.50	9,135.19	-2,289.20	414.44	432,885.9026	691,272.0398	32° 11' 18.993 N	103° 42' 54.189 W
11,381.00	91.00	180.30	9,132.40	-2,383.15	412.97	432,791.9598	691,270.5644	32° 11' 18.063 N	103° 42' 54.212 W
11,476.00	93.30	180.60	9,128.83	-2,478.07	412.22	432,697.0363	691,269.8190	32° 11' 17.124 N	103° 42' 54.227 W
11,570.00	91.70	179.30	9,124.73	-2,571.97	412.30	432,603.1311	691,269.9016	32° 11' 16.194 N	103° 42' 54.233 W
11,664.00	87.70	179.30	9,125.23	-2,665.95	413.45	432,509.1587	691,271.0498	32° 11' 15.264 N	103° 42' 54.226 W
11,759.00	89.70	178.30	9,127.38	-2,760.90	415.44	432,414.2102	691,273.0390	32° 11' 14.325 N	103° 42' 54.209 W
11,853.00	92.90	178.70	9,125.25	-2,854.83	417.90	432,320.2791	691,275.4989	32° 11' 13.395 N	103° 42' 54.186 W
11,947.00	92.10	178.80	9,121.15	-2,948.71	419.95	432,226.3919	691,277.5475	32° 11' 12.466 N	103° 42' 54.169 W
12,042.00	91.10	178.90	9,118.50	-3,043.66	421.85	432,131.4495	691,279.4533	32° 11' 11.526 N	103° 42' 54.153 W
12,136.00	93.80	179.30	9,114.48	-3,137.55	423.33	432,037.5561	691,280.9286	32° 11' 10.597 N	103° 42' 54.142 W
12,231.00	94.10	179.30	9,107.93	-3,232.32	424.49	431,942.7891	691,282.0865	32° 11' 9.659 N	103° 42' 54.135 W
12,325.00	92.20	179.20	9,102.77	-3,326.16	425.72	431,848.9437	691,283.3151	32° 11' 8.730 N	103° 42' 54.127 W
12,419.00	93.30	179.40	9,098.26	-3,420.05	426.86	431,755.0606	691,284.4622	32° 11' 7.801 N	103° 42' 54.120 W
12,513.00	93.20	180.30	9,092.93	-3,513.89	427.11	431,661.2133	691,284.7079	32° 11' 6.873 N	103° 42' 54.123 W
12,608.00	93.10	181.30	9,087.71	-3,608.74	425.78	431,566.3675	691,283.3834	32° 11' 5.934 N	103° 42' 54.145 W
12,702.00	92.70	181.40	9,082.95	-3,702.59	423.57	431,472.5143	691,281.1716	32° 11' 5.005 N	103° 42' 54.177 W
12,796.00	93.10	181.50	9,078.20	-3,796.44	421.20	431,378.6651	691,278.7961	32° 11' 4.077 N	103° 42' 54.211 W
12,890.00	92.80	180.30	9,073.36	-3,890.30	419.72	431,284.8033	691,277.3217	32° 11' 3.148 N	103° 42' 54.234 W
12,985.00	93.10	180.10	9,068.47	-3,985.18	419.39	431,189.9301	691,276.9905	32° 11' 2.209 N	103° 42' 54.245 W
13,079.00	90.50	179.10	9,065.52	-4,079.12	420.05	431,095.9882	691,277.6470	32° 11' 1.280 N	103° 42' 54.243 W
13,174.00	90.50	179.00	9,064.69	-4,174.10	421.62	431,001.0051	691,279.2220	32° 11' 0.340 N	103° 42' 54.231 W

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 8H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3569.20ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3569.20ft (McVay 8)
Well:	Windward Federal 8H	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)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
13,255.00	89.90	179.30	9,064.41	-4,255.09	422.82	430,920.0151	691,280.4236	32° 10' 59.538 N	103° 42' 54.223 W
13,349.00	88.50	179.30	9,065.72	-4,349.07	423.97	430,826.0338	691,281.5718	32° 10' 58.608 N	103° 42' 54.216 W
13,444.00	87.00	179.70	9,069.45	-4,444.00	424.80	430,731.1138	691,282.4004	32° 10' 57.669 N	103° 42' 54.212 W
13,538.00	89.00	179.30	9,072.73	-4,537.93	425.62	430,637.1798	691,283.2203	32° 10' 56.739 N	103° 42' 54.209 W
13,633.00	89.00	177.10	9,074.39	-4,632.86	428.60	430,542.2471	691,286.2037	32° 10' 55.799 N	103° 42' 54.181 W
13,727.00	91.20	177.30	9,074.22	-4,726.74	433.20	430,448.3655	691,290.7953	32° 10' 54.870 N	103° 42' 54.134 W
13,821.00	89.70	178.40	9,073.49	-4,820.67	436.72	430,354.4389	691,294.3214	32° 10' 53.940 N	103° 42' 54.099 W
13,916.00	89.20	179.20	9,074.40	-4,915.64	438.71	430,259.4653	691,296.3108	32° 10' 53.000 N	103° 42' 54.082 W
14,010.00	91.60	178.80	9,073.74	-5,009.62	440.35	430,165.4892	691,297.9511	32° 10' 52.070 N	103° 42' 54.069 W
14,104.00	91.60	178.30	9,071.12	-5,103.55	442.73	430,071.5564	691,300.3288	32° 10' 51.141 N	103° 42' 54.048 W
14,198.00	91.60	178.30	9,068.49	-5,197.48	445.52	429,977.6346	691,303.1164	32° 10' 50.211 N	103° 42' 54.022 W
14,295.00	89.70	179.10	9,067.39	-5,294.44	447.72	429,880.6712	691,305.3166	32° 10' 49.251 N	103° 42' 54.003 W
14,389.00	88.80	179.50	9,068.62	-5,388.42	448.87	429,786.6877	691,306.4650	32° 10' 48.321 N	103° 42' 53.996 W
14,484.00	88.40	179.70	9,070.94	-5,483.39	449.53	429,691.7188	691,307.1280	32° 10' 47.381 N	103° 42' 53.994 W
14,578.00	88.70	179.50	9,073.32	-5,577.36	450.18	429,597.7515	691,307.7840	32° 10' 46.451 N	103° 42' 53.993 W
14,672.00	88.90	179.20	9,075.29	-5,671.33	451.25	429,503.7785	691,308.8502	32° 10' 45.521 N	103° 42' 53.987 W
14,766.00	89.10	179.30	9,076.93	-5,765.31	452.48	429,409.8012	691,310.0804	32° 10' 44.591 N	103° 42' 53.979 W
14,861.00	88.30	179.30	9,079.09	-5,860.28	453.64	429,314.8337	691,311.2407	32° 10' 43.652 N	103° 42' 53.972 W
14,955.00	87.30	179.30	9,082.69	-5,954.20	454.79	429,220.9114	691,312.3882	32° 10' 42.722 N	103° 42' 53.964 W
15,049.00	89.20	180.10	9,085.57	-6,048.15	455.28	429,126.9618	691,312.8798	32° 10' 41.792 N	103° 42' 53.965 W
15,143.00	88.60	180.30	9,087.37	-6,142.13	454.95	429,032.9803	691,312.5518	32° 10' 40.862 N	103° 42' 53.975 W
15,238.00	90.80	181.00	9,087.87	-6,237.12	453.88	428,937.9943	691,311.4741	32° 10' 39.922 N	103° 42' 53.994 W
15,332.00	90.90	181.40	9,086.47	-6,331.09	451.91	428,844.0257	691,309.5057	32° 10' 38.993 N	103° 42' 54.023 W
15,427.00	90.80	181.80	9,085.06	-6,426.04	449.25	428,749.0736	691,306.8535	32° 10' 38.053 N	103° 42' 54.060 W
15,521.00	90.90	181.60	9,083.67	-6,519.99	446.47	428,655.1255	691,304.0652	32° 10' 37.124 N	103° 42' 54.099 W
15,615.00	91.60	181.50	9,081.62	-6,613.93	443.92	428,561.1831	691,301.5232	32° 10' 36.194 N	103° 42' 54.135 W
15,709.00	89.60	180.50	9,080.63	-6,707.90	442.28	428,467.2087	691,299.8830	32° 10' 35.264 N	103° 42' 54.160 W
15,804.00	91.60	180.80	9,079.64	-6,802.89	441.21	428,372.2251	691,298.8054	32° 10' 34.324 N	103° 42' 54.179 W
15,898.00	91.00	179.50	9,077.51	-6,896.86	440.96	428,278.2523	691,298.5595	32° 10' 33.394 N	103° 42' 54.188 W
15,993.00	88.70	178.60	9,077.76	-6,991.84	442.54	428,183.2732	691,300.1344	32° 10' 32.454 N	103° 42' 54.176 W
16,087.00	89.50	178.90	9,079.23	-7,085.81	444.59	428,089.3082	691,302.1847	32° 10' 31.524 N	103° 42' 54.159 W
16,181.00	88.60	178.60	9,080.79	-7,179.77	446.64	427,995.3448	691,304.2350	32° 10' 30.594 N	103° 42' 54.141 W
16,276.00	89.10	179.20	9,082.70	-7,274.73	448.46	427,900.3823	691,306.0583	32° 10' 29.655 N	103° 42' 54.126 W
16,370.00	88.90	178.90	9,084.34	-7,368.71	450.02	427,806.4099	691,307.6166	32° 10' 28.725 N	103° 42' 54.115 W
16,465.00	88.50	179.20	9,086.49	-7,463.67	451.59	427,711.4479	691,309.1913	32° 10' 27.785 N	103° 42' 54.103 W
16,559.00	90.40	179.20	9,087.39	-7,557.65	452.90	427,617.4659	691,310.5036	32° 10' 26.855 N	103° 42' 54.094 W
16,654.00	89.90	179.10	9,087.15	-7,652.64	454.31	427,522.4772	691,311.9129	32° 10' 25.915 N	103° 42' 54.084 W
16,748.00	89.70	179.00	9,087.47	-7,746.62	455.87	427,428.4909	691,313.4714	32° 10' 24.984 N	103° 42' 54.072 W
16,842.00	89.50	179.10	9,088.13	-7,840.61	457.43	427,334.5064	691,315.0299	32° 10' 24.054 N	103° 42' 54.060 W
16,937.00	89.90	179.30	9,088.63	-7,935.60	458.76	427,239.5173	691,316.3562	32° 10' 23.114 N	103° 42' 54.051 W
17,031.00	89.80	179.00	9,088.87	-8,029.59	460.15	427,145.5283	691,317.7507	32° 10' 22.184 N	103° 42' 54.041 W
17,125.00	88.00	179.20	9,090.68	-8,123.56	461.63	427,051.5613	691,319.2269	32° 10' 21.254 N	103° 42' 54.030 W
17,220.00	89.50	179.30	9,092.75	-8,218.52	462.87	426,956.5950	691,320.4700	32° 10' 20.314 N	103° 42' 54.022 W
17,314.00	88.00	179.60	9,094.80	-8,312.49	463.77	426,862.6247	691,321.3722	32° 10' 19.384 N	103° 42' 54.018 W
17,408.00	88.00	179.30	9,098.08	-8,406.43	464.67	426,768.6866	691,322.2740	32° 10' 18.455 N	103° 42' 54.013 W
17,503.00	87.80	179.50	9,101.56	-8,501.36	465.67	426,673.7558	691,323.2681	32° 10' 17.515 N	103° 42' 54.008 W
17,597.00	87.00	178.90	9,105.83	-8,595.25	466.98	426,579.8631	691,324.5790	32° 10' 16.586 N	103° 42' 53.999 W
17,692.00	86.50	179.40	9,111.21	-8,690.09	468.39	426,485.0272	691,325.9862	32° 10' 15.647 N	103° 42' 53.989 W
17,798.00	85.60	178.40	9,118.52	-8,795.82	470.42	426,379.3011	691,328.0157	32° 10' 14.601 N	103° 42' 53.973 W
17,892.00	86.00	179.10	9,125.40	-8,889.54	472.46	426,285.5768	691,330.0606	32° 10' 13.673 N	103° 42' 53.955 W
17,987.00	85.80	178.60	9,132.19	-8,984.28	474.36	426,190.8395	691,331.9623	32° 10' 12.736 N	103° 42' 53.939 W
18,081.00	87.40	178.70	9,137.77	-9,078.08	476.57	426,097.0343	691,334.1729	32° 10' 11.807 N	103° 42' 53.920 W
18,175.00	88.90	179.80	9,140.80	-9,172.02	477.80	426,003.0956	691,335.4023	32° 10' 10.878 N	103° 42' 53.912 W
18,270.00	89.90	179.70	9,141.80	-9,267.02	478.22	425,908.1032	691,335.8167	32° 10' 9.938 N	103° 42' 53.913 W
18,364.00	90.40	181.10	9,141.55	-9,361.01	477.56	425,814.1086	691,335.1605	32° 10' 9.007 N	103° 42' 53.927 W

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 8H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3569.20ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26' @ 3569.20ft (McVay 8)
Well:	Windward Federal 8H	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)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
18,459.00	90.20	180.00	9,141.05	-9,456.00	476.65	425,719.1160	691,334.2487	32° 10' 8.067 N	103° 42' 53.944 W
18,553.00	90.20	180.90	9,140.72	-9,550.00	475.91	425,625.1206	691,333.5104	32° 10' 7.137 N	103° 42' 53.959 W
18,647.00	90.50	180.70	9,140.15	-9,643.99	474.60	425,531.1320	691,332.1980	32° 10' 6.207 N	103° 42' 53.981 W
18,742.00	90.50	180.10	9,139.32	-9,738.98	473.94	425,436.1385	691,331.5348	32° 10' 5.267 N	103° 42' 53.995 W
18,836.00	90.80	180.40	9,138.25	-9,832.97	473.53	425,342.1459	691,331.1247	32° 10' 4.337 N	103° 42' 54.006 W
18,930.00	91.20	180.20	9,136.61	-9,926.96	473.03	425,248.1619	691,330.6326	32° 10' 3.407 N	103° 42' 54.018 W
19,025.00	91.10	180.10	9,134.71	-10,021.94	472.78	425,153.1816	691,330.3839	32° 10' 2.467 N	103° 42' 54.027 W
19,062.00	91.30	182.20	9,133.93	-10,058.92	472.04	425,116.1993	691,329.6416	32° 10' 2.101 N	103° 42' 54.038 W
Final IDS MWD Survey									
19,115.00	91.30	182.20	9,132.73	-10,111.87	470.01	425,063.2521	691,327.6075	32° 10' 1.577 N	103° 42' 54.065 W
Projection to TD									

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
8,684.00	8,682.30	-14.21	19.98	First IDS MWD Survey
19,062.00	9,133.93	-10,058.92	472.04	Final IDS MWD Survey
19,115.00	9,132.73	-10,111.87	470.01	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
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