

COG

SURVEY REPORT

WINDWARD FEDERAL #12H

MCVAY #8

5/12/2017



The **Ultimate Partner** In Wellbore Placement

CUSTOMER
PROJECT
FIELD

COG
Lea County, New Mexico
N/A

SDI JOB NO.
SDI DISTRICT
SDI KIT/UNIT

OP.001339
Midland

SITE INFORMATION

Site Name
Lat/Long
Northing
Easting

Lea County, New Mexico
32.16716° N, 103.70625° W
435,203.4 ft
69,391.3 ft

Section
Township
Range

MAP INFORMATION

North Reference
Grid Correction
System
Datum
Map Zone

Grid North
0.33 deg
US State Plane 1927
North American Datum 1927 (Clarke 1866)
New Mexico East: 3001



WELL INFORMATION

Lat/Long
Northing
Easting
UWI

32.16716° N, 103.70625° W
435,203.4 ft
69,391.3 ft
30-025-43708

DEPTH AND ELEVATION REFERENCE

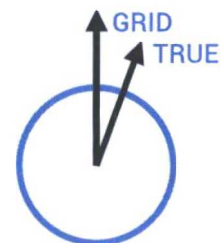
Ground Level
Reference Datum
Reference Height
Reference Elevation

3548 ft above Mean Sea Level
RKB
26 ft above G.L.
3574 ft

VERTICAL SECTION REFERENCE

+N/-S
+E/-W
Proposal Direction
Calculation Method

0 ft
0 ft
178.45°
Minimum Curvature



LOCAL GRAVITY REFERENCE INFORMATION

Local Gravity
True to Grid

998.482 mG [computed]
add 0.33°

WELL NOTES

Wireline Survey

OPERATORS

Jeffrey Loyd

SDI Operator Name (Printed)

SIGNATURE

DATE

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	°/100ft	ft	deg
0.00	0.00	0.00	0.00	0.00	0.00	0.00	Invalid	0.00	0.00
100.00	0.28	0.92	100.00	-0.25	0.25	0.00	0.28	0.25	0.92
125.00	0.36	21.90	125.00	-0.38	0.38	0.03	0.56	0.38	5.13
150.00	0.30	18.63	150.00	-0.52	0.52	0.08	0.26	0.52	9.28
175.00	0.30	41.97	175.00	-0.62	0.63	0.15	0.48	0.65	13.33
200.00	0.49	30.52	200.00	-0.76	0.77	0.25	0.81	0.81	17.77
225.00	0.59	25.86	225.00	-0.96	0.97	0.36	0.44	1.04	20.06
250.00	0.63	14.98	250.00	-1.21	1.22	0.45	0.49	1.30	20.09
275.00	0.41	11.73	274.99	-1.43	1.44	0.50	0.88	1.53	19.14
300.00	0.48	20.34	299.99	-1.61	1.63	0.55	0.38	1.72	18.83
325.00	0.62	32.40	324.99	-1.82	1.84	0.66	0.73	1.96	19.83
350.00	0.63	32.90	349.99	-2.05	2.07	0.81	0.05	2.22	21.39
375.00	0.75	26.41	374.99	-2.30	2.33	0.96	0.57	2.52	22.34
400.00	0.84	22.86	399.99	-2.61	2.64	1.10	0.40	2.86	22.61
425.00	0.84	26.38	424.98	-2.94	2.98	1.25	0.21	3.23	22.84
450.00	0.70	35.26	449.98	-3.23	3.27	1.42	0.74	3.56	23.55
475.00	0.87	42.84	474.98	-3.49	3.53	1.64	0.78	3.89	24.93
500.00	0.88	47.96	499.98	-3.75	3.80	1.91	0.31	4.25	26.72
525.00	1.00	47.06	524.97	-4.01	4.07	2.21	0.48	4.64	28.51
550.00	1.06	42.09	549.97	-4.32	4.39	2.53	0.44	5.07	29.90
575.00	0.98	36.66	574.97	-4.66	4.74	2.81	0.51	5.51	30.67
600.00	0.88	29.33	599.96	-4.99	5.07	3.03	0.60	5.91	30.84
625.00	0.42	15.45	624.96	-5.24	5.33	3.15	1.95	6.19	30.57
650.00	0.40	274.83	649.96	-5.34	5.43	3.09	2.52	6.24	29.63
675.00	0.73	260.36	674.96	-5.33	5.41	2.84	1.41	6.11	27.74
700.00	1.22	255.80	699.95	-5.25	5.32	2.43	2.01	5.84	24.57
725.00	1.44	257.30	724.95	-5.13	5.18	1.87	0.87	5.51	19.80
750.00	1.47	250.95	749.94	-4.97	5.01	1.26	0.65	5.16	14.10
775.00	1.29	249.76	774.93	-4.79	4.81	0.69	0.70	4.86	8.18
800.00	1.28	258.59	799.93	-4.65	4.65	0.15	0.80	4.66	1.86
825.00	1.25	260.40	824.92	-4.56	4.55	-0.39	0.22	4.57	355.08
850.00	1.37	258.48	849.91	-4.47	4.45	-0.95	0.52	4.55	347.92

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	°/100ft	ft	deg
875.00	1.32	255.73	874.91	-4.36	4.32	-1.52	0.33	4.58	340.57
900.00	1.11	257.37	899.90	-4.25	4.19	-2.04	0.84	4.66	334.09
925.00	1.02	260.98	924.90	-4.17	4.11	-2.49	0.45	4.80	328.73
950.00	1.05	261.30	949.89	-4.11	4.04	-2.94	0.13	4.99	323.93
975.00	1.05	264.21	974.89	-4.07	3.98	-3.39	0.21	5.23	319.52
1000.00	1.17	264.44	999.88	-4.03	3.93	-3.88	0.47	5.52	315.38
1025.00	1.18	266.48	1024.88	-4.01	3.89	-4.39	0.17	5.86	311.54
1050.00	1.21	260.02	1049.87	-3.96	3.83	-4.91	0.56	6.22	307.96
1075.00	1.18	257.45	1074.87	-3.87	3.73	-5.42	0.24	6.58	304.51
1100.00	1.05	262.71	1099.86	-3.80	3.64	-5.90	0.68	6.93	301.69
1125.00	1.10	266.43	1124.86	-3.77	3.60	-6.36	0.35	7.31	299.47
1150.00	1.16	267.70	1149.85	-3.76	3.57	-6.86	0.26	7.73	297.51
1175.00	1.23	264.49	1174.85	-3.73	3.54	-7.38	0.39	8.18	295.60
1200.00	1.18	259.64	1199.84	-3.68	3.46	-7.90	0.45	8.62	293.68
1225.00	1.12	258.00	1224.84	-3.59	3.37	-8.39	0.27	9.04	291.86
1250.00	0.97	263.01	1249.83	-3.53	3.29	-8.84	0.72	9.43	290.41
1275.00	0.93	261.46	1274.83	-3.48	3.23	-9.25	0.19	9.80	289.27
1300.00	1.12	258.03	1299.83	-3.41	3.15	-9.69	0.80	10.19	288.03
1325.00	1.13	249.62	1324.82	-3.29	3.02	-10.16	0.66	10.60	286.54
1350.00	0.74	242.42	1349.82	-3.14	2.86	-10.53	1.64	10.91	285.18
1375.00	0.66	189.88	1374.82	-2.93	2.64	-10.70	2.49	11.02	283.86
1400.00	1.06	163.11	1399.81	-2.56	2.28	-10.66	2.20	10.90	282.06
1425.00	1.57	160.83	1424.81	-2.01	1.73	-10.48	2.08	10.62	279.38
1450.00	1.75	155.99	1449.80	-1.33	1.06	-10.21	0.89	10.26	275.92
1475.00	1.60	150.64	1474.79	-0.67	0.41	-9.88	0.86	9.89	272.36
1500.00	1.57	151.62	1499.78	-0.06	-0.20	-9.55	0.17	9.55	268.82
1525.00	1.46	156.25	1524.77	0.54	-0.79	-9.26	0.65	9.29	265.14
1550.00	1.64	158.33	1549.76	1.17	-1.41	-9.00	0.77	9.11	261.08
1575.00	1.71	157.76	1574.75	1.85	-2.09	-8.73	0.27	8.97	256.54
1600.00	1.73	152.82	1599.74	2.54	-2.77	-8.41	0.60	8.86	251.77
1625.00	1.58	149.83	1624.73	3.19	-3.40	-8.07	0.70	8.76	247.12
1650.00	1.58	150.86	1649.72	3.79	-4.00	-7.73	0.11	8.70	242.60

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	"/100ft	ft	deg
1675.00	1.58	152.53	1674.71	4.41	-4.61	-7.40	0.18	8.72	238.06
1700.00	1.65	159.68	1699.70	5.06	-5.26	-7.11	0.86	8.84	233.54
1725.00	1.76	157.22	1724.69	5.76	-5.95	-6.84	0.52	9.06	228.99
1750.00	1.76	154.68	1749.67	6.47	-6.65	-6.53	0.31	9.32	224.47
1775.00	1.64	151.59	1774.66	7.14	-7.31	-6.19	0.61	9.58	220.27
1800.00	1.66	154.95	1799.65	7.79	-7.95	-5.87	0.39	9.88	216.44
1825.00	1.74	156.71	1824.64	8.47	-8.63	-5.57	0.41	10.27	212.83
1850.00	1.83	155.31	1849.63	9.19	-9.34	-5.25	0.38	10.71	209.34
1875.00	1.73	148.65	1874.62	9.89	-10.02	-4.89	0.92	11.15	205.99
1900.00	1.61	155.01	1899.61	10.54	-10.66	-4.54	0.89	11.59	203.07
1925.00	1.57	154.60	1924.60	11.17	-11.29	-4.25	0.15	12.06	200.61
1950.00	1.24	144.67	1949.59	11.71	-11.82	-3.94	1.63	12.46	198.45
1975.00	0.89	122.66	1974.59	12.05	-12.15	-3.62	2.15	12.68	196.61
2000.00	0.65	113.03	1999.58	12.21	-12.31	-3.33	1.07	12.75	195.14
2025.00	0.59	97.75	2024.58	12.29	-12.38	-3.07	0.71	12.76	193.94
2050.00	0.57	109.59	2049.58	12.36	-12.44	-2.83	0.48	12.76	192.81
2075.00	0.58	116.12	2074.58	12.46	-12.54	-2.60	0.26	12.80	191.71
2100.00	0.60	117.16	2099.58	12.58	-12.65	-2.37	0.11	12.87	190.61
2125.00	0.74	118.20	2124.58	12.73	-12.79	-2.11	0.58	12.96	189.37
2150.00	0.87	112.08	2149.57	12.88	-12.94	-1.79	0.60	13.06	187.88
2175.00	0.77	100.28	2174.57	12.99	-13.04	-1.45	0.78	13.12	186.35
2200.00	0.78	97.27	2199.57	13.05	-13.09	-1.12	0.17	13.14	184.88
2225.00	0.86	101.00	2224.57	13.12	-13.15	-0.76	0.39	13.17	183.33
2250.00	0.90	96.68	2249.56	13.19	-13.21	-0.38	0.32	13.21	181.67
2275.00	1.02	95.46	2274.56	13.25	-13.25	0.03	0.46	13.25	179.86
2300.00	1.06	88.92	2299.56	13.27	-13.27	0.48	0.50	13.27	177.91
2325.00	0.82	66.99	2324.55	13.21	-13.19	0.88	1.70	13.22	176.18
2350.00	0.75	70.94	2349.55	13.10	-13.07	1.20	0.35	13.12	174.74
2375.00	0.83	76.85	2374.55	13.01	-12.97	1.53	0.45	13.06	173.25
2400.00	0.97	72.47	2399.55	12.91	-12.87	1.91	0.61	13.01	171.54
2425.00	0.94	64.76	2424.54	12.77	-12.72	2.30	0.53	12.92	169.74
2450.00	0.85	65.55	2449.54	12.62	-12.55	2.66	0.37	12.83	168.05

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	"/100ft	ft	deg
2475.00	0.79	71.52	2474.54	12.50	-12.42	2.99	0.41	12.77	166.47
2500.00	1.06	76.41	2499.53	12.40	-12.31	3.38	1.12	12.77	164.65
2525.00	1.27	68.96	2524.53	12.26	-12.16	3.86	1.04	12.76	162.37
2550.00	1.11	69.91	2549.52	12.09	-11.97	4.35	0.68	12.74	160.04
2575.00	1.10	74.56	2574.52	11.95	-11.83	4.81	0.36	12.77	157.88
2600.00	1.21	81.55	2599.51	11.86	-11.72	5.30	0.71	12.87	155.67
2625.00	1.43	79.34	2624.51	11.78	-11.63	5.87	0.90	13.02	153.22
2650.00	1.34	77.98	2649.50	11.68	-11.51	6.46	0.37	13.20	150.69
2675.00	1.38	87.80	2674.49	11.62	-11.44	7.05	0.95	13.43	148.35
2700.00	1.64	86.07	2699.48	11.60	-11.40	7.71	1.03	13.76	145.94
2725.00	1.65	84.00	2724.47	11.56	-11.34	8.42	0.24	14.12	143.40
2750.00	1.51	82.55	2749.46	11.50	-11.26	9.11	0.58	14.48	141.03
2775.00	1.58	87.36	2774.45	11.46	-11.20	9.78	0.59	14.87	138.88
2800.00	1.72	89.90	2799.44	11.46	-11.18	10.50	0.64	15.34	136.81
2825.00	1.79	86.14	2824.43	11.46	-11.16	11.26	0.53	15.85	134.73
2850.00	1.81	84.70	2849.42	11.41	-11.09	12.04	0.19	16.37	132.65
2875.00	1.54	82.19	2874.41	11.35	-11.01	12.77	1.11	16.86	130.78
2900.00	1.40	83.98	2899.40	11.29	-10.93	13.40	0.57	17.30	129.20
2925.00	1.31	82.48	2924.39	11.24	-10.86	13.99	0.41	17.71	127.83
2950.00	1.46	83.44	2949.39	11.18	-10.79	14.59	0.61	18.15	126.48
2975.00	1.49	84.16	2974.38	11.13	-10.72	15.23	0.13	18.62	125.14
3000.00	1.27	90.26	2999.37	11.11	-10.69	15.83	1.04	19.10	124.03
3025.00	1.37	80.84	3024.36	11.08	-10.64	16.40	0.96	19.55	122.98
3050.00	1.18	78.71	3049.36	11.00	-10.54	16.95	0.78	19.96	121.88
3075.00	0.95	60.77	3074.35	10.86	-10.39	17.39	1.62	20.25	120.87
3100.00	1.11	25.21	3099.35	10.55	-10.07	17.67	2.58	20.34	119.68
3125.00	1.51	3.37	3124.34	10.00	-9.52	17.79	2.55	20.18	118.16
3150.00	1.43	357.61	3149.34	9.36	-8.88	17.80	0.68	19.89	116.52
3175.00	1.28	1.99	3174.33	8.77	-8.29	17.79	0.72	19.63	114.98
3200.00	1.34	9.56	3199.32	8.20	-7.72	17.85	0.73	19.45	113.40
3225.00	1.47	11.83	3224.31	7.61	-7.12	17.97	0.57	19.33	111.63
3250.00	1.28	10.01	3249.31	7.02	-6.54	18.08	0.78	19.23	109.87

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	"/100ft	ft	deg
3275.00	1.37	19.44	3274.30	6.47	-5.98	18.23	0.94	19.18	108.16
3300.00	1.44	26.98	3299.29	5.92	-5.42	18.47	0.80	19.25	106.35
3325.00	1.41	26.21	3324.29	5.37	-4.86	18.75	0.16	19.37	104.54
3350.00	1.37	32.78	3349.28	4.85	-4.34	19.05	0.65	19.53	102.82
3375.00	1.53	47.13	3374.27	4.38	-3.86	19.45	1.58	19.83	101.22
3400.00	1.63	44.44	3399.26	3.91	-3.38	19.95	0.51	20.23	99.61
3425.00	1.44	40.03	3424.25	3.43	-2.88	20.40	0.90	20.60	98.04
3450.00	1.01	42.24	3449.25	3.04	-2.48	20.75	1.74	20.90	96.80
3475.00	0.40	355.48	3474.24	2.79	-2.23	20.89	3.17	21.01	96.08
3500.00	0.81	262.95	3499.24	2.72	-2.16	20.71	3.66	20.82	95.96
3525.00	1.27	257.23	3524.24	2.79	-2.24	20.26	1.92	20.39	96.32
3550.00	1.08	250.53	3549.23	2.92	-2.38	19.77	0.96	19.91	96.88
3575.00	1.10	253.93	3574.23	3.05	-2.53	19.32	0.28	19.48	97.46
3600.00	1.22	250.99	3599.22	3.19	-2.68	18.84	0.54	19.03	98.11
3625.00	1.01	240.26	3624.22	3.38	-2.88	18.39	1.18	18.62	98.90
3650.00	0.76	223.77	3649.22	3.60	-3.11	18.09	1.42	18.35	99.76
3675.00	0.80	224.70	3674.21	3.84	-3.35	17.85	0.16	18.16	100.64
3700.00	0.89	213.49	3699.21	4.12	-3.64	17.62	0.75	17.99	101.68
3725.00	0.90	202.16	3724.21	4.45	-3.98	17.44	0.71	17.88	102.87
3750.00	0.89	184.37	3749.20	4.83	-4.36	17.35	1.11	17.89	104.11
3775.00	1.20	179.01	3774.20	5.28	-4.81	17.34	1.28	17.99	105.52
3800.00	1.36	175.05	3799.19	5.84	-5.37	17.37	0.75	18.18	107.19
3825.00	1.55	165.51	3824.19	6.47	-6.00	17.48	1.23	18.48	108.94
3850.00	1.53	161.83	3849.18	7.12	-6.64	17.67	0.41	18.87	110.60
3875.00	1.64	162.93	3874.17	7.78	-7.30	17.87	0.44	19.31	112.21
3900.00	1.74	162.57	3899.16	8.49	-8.00	18.09	0.43	19.78	113.86
3925.00	1.81	165.55	3924.14	9.24	-8.75	18.31	0.45	20.29	115.54
3950.00	1.89	169.18	3949.13	10.03	-9.53	18.48	0.56	20.80	117.29
3975.00	2.05	170.62	3974.12	10.88	-10.38	18.63	0.70	21.33	119.12
4000.00	2.12	169.59	3999.10	11.78	-11.28	18.79	0.29	21.91	120.97
4025.00	1.44	151.91	4024.09	12.52	-12.01	19.02	3.45	22.49	122.26
4050.00	0.87	143.44	4049.08	12.95	-12.44	19.28	2.39	22.94	122.82

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	"/100ft	ft	deg
4075.00	0.60	125.92	4074.08	13.19	-12.66	19.50	1.37	23.25	123.00
4100.00	0.66	129.10	4099.08	13.36	-12.83	19.72	0.26	23.53	123.06
4125.00	0.83	124.93	4124.08	13.56	-13.03	19.98	0.72	23.85	123.11
4150.00	0.82	110.76	4149.08	13.74	-13.20	20.29	0.82	24.21	123.03
4175.00	0.73	111.59	4174.07	13.87	-13.32	20.61	0.37	24.54	122.87
4200.00	0.57	112.69	4199.07	13.98	-13.42	20.87	0.64	24.82	122.75
4225.00	0.09	160.12	4224.07	14.05	-13.49	21.00	2.06	24.96	122.72
4250.00	0.29	288.19	4249.07	14.05	-13.49	20.94	1.40	24.91	122.79
4275.00	0.47	275.81	4274.07	14.02	-13.46	20.78	0.80	24.76	122.93
4300.00	0.68	260.46	4299.07	14.02	-13.47	20.53	1.02	24.56	123.27
4325.00	0.64	235.51	4324.07	14.12	-13.58	20.27	1.15	24.40	123.81
4350.00	0.55	249.42	4349.07	14.24	-13.70	20.04	0.69	24.28	124.35
4375.00	0.62	249.31	4374.06	14.32	-13.79	19.81	0.29	24.13	124.85
4400.00	0.76	238.61	4399.06	14.45	-13.92	19.54	0.74	23.99	125.47
4425.00	0.58	237.35	4424.06	14.59	-14.08	19.29	0.72	23.88	126.12
4450.00	0.60	250.07	4449.06	14.70	-14.19	19.06	0.53	23.76	126.66
4475.00	0.67	245.48	4474.06	14.80	-14.29	18.81	0.37	23.62	127.24
4500.00	0.73	245.23	4499.06	14.92	-14.42	18.53	0.24	23.48	127.90
4525.00	0.49	235.50	4524.05	15.04	-14.55	18.29	1.07	23.38	128.50
4550.00	0.51	240.12	4549.05	15.15	-14.67	18.11	0.19	23.30	129.00
4575.00	0.73	246.61	4574.05	15.26	-14.78	17.87	0.92	23.19	129.61
4600.00	0.71	235.90	4599.05	15.40	-14.93	17.59	0.54	23.08	130.33
4625.00	0.61	230.69	4624.05	15.57	-15.11	17.36	0.48	23.01	131.02
4650.00	0.64	232.39	4649.05	15.73	-15.27	17.15	0.15	22.97	131.69
4675.00	0.64	221.54	4674.05	15.92	-15.47	16.94	0.49	22.94	132.39
4700.00	0.69	225.59	4699.04	16.12	-15.68	16.74	0.27	22.94	133.11
4725.00	0.77	226.73	4724.04	16.34	-15.90	16.51	0.31	22.92	133.91
4750.00	0.82	222.22	4749.04	16.58	-16.14	16.27	0.34	22.92	134.77
4775.00	0.67	220.77	4774.04	16.82	-16.39	16.06	0.62	22.94	135.59
4800.00	0.70	226.78	4799.04	17.03	-16.60	15.85	0.31	22.95	136.33
4825.00	0.86	230.39	4824.03	17.24	-16.83	15.59	0.67	22.94	137.18
4850.00	0.83	216.35	4849.03	17.50	-17.09	15.34	0.84	22.97	138.09

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	"/100ft	ft	deg
4875.00	0.73	210.00	4874.03	17.78	-17.38	15.16	0.51	23.06	138.90
4900.00	0.79	219.78	4899.03	18.04	-17.65	14.96	0.57	23.14	139.70
4925.00	0.80	223.06	4924.02	18.30	-17.91	14.74	0.19	23.19	140.55
4950.00	0.99	206.75	4949.02	18.61	-18.23	14.52	1.28	23.30	141.46
4975.00	0.98	193.55	4974.02	19.01	-18.63	14.37	0.91	23.53	142.35
5000.00	0.85	193.75	4999.01	19.39	-19.02	14.28	0.51	23.78	143.10
5025.00	0.85	200.54	5024.01	19.75	-19.37	14.17	0.40	24.00	143.82
5050.00	0.99	196.97	5049.01	20.12	-19.75	14.04	0.59	24.23	144.59
5075.00	0.99	195.13	5074.00	20.53	-20.16	13.92	0.13	24.50	145.38
5100.00	0.81	193.45	5099.00	20.91	-20.55	13.82	0.73	24.76	146.07
5125.00	0.77	204.96	5124.00	21.23	-20.87	13.71	0.65	24.97	146.70
5150.00	0.96	203.82	5149.00	21.58	-21.22	13.55	0.76	25.18	147.43
5175.00	1.06	197.36	5173.99	21.98	-21.63	13.40	0.58	25.44	148.22
5200.00	1.03	195.44	5198.99	22.42	-22.07	13.27	0.17	25.75	148.98
5225.00	0.87	201.53	5223.98	22.81	-22.46	13.14	0.76	26.02	149.67
5250.00	0.95	209.27	5248.98	23.16	-22.82	12.97	0.60	26.25	150.38
5275.00	1.06	205.63	5273.98	23.54	-23.21	12.77	0.50	26.49	151.18
5300.00	0.99	196.36	5298.97	23.96	-23.62	12.61	0.72	26.78	151.91
5325.00	0.90	196.24	5323.97	24.35	-24.02	12.49	0.36	27.07	152.52
5350.00	0.83	207.18	5348.97	24.69	-24.37	12.35	0.72	27.32	153.11
5375.00	0.55	241.82	5373.97	24.90	-24.58	12.17	1.95	27.43	153.67
5400.00	0.64	280.95	5398.96	24.93	-24.61	11.92	1.63	27.35	154.15
5425.00	0.73	308.79	5423.96	24.79	-24.49	11.66	1.37	27.12	154.53
5450.00	0.77	320.60	5448.96	24.56	-24.26	11.43	0.64	26.81	154.77
5475.00	0.93	310.16	5473.96	24.29	-24.00	11.17	0.89	26.47	155.04
5500.00	0.88	308.44	5498.95	24.03	-23.75	10.86	0.25	26.11	155.42
5525.00	0.75	311.58	5523.95	23.80	-23.52	10.59	0.52	25.79	155.76
5550.00	0.94	315.13	5548.95	23.53	-23.26	10.32	0.80	25.45	156.07
5575.00	0.98	309.04	5573.95	23.25	-22.98	10.01	0.43	25.07	156.46
5600.00	0.84	309.59	5598.94	22.99	-22.73	9.71	0.57	24.72	156.88
5625.00	0.84	321.46	5623.94	22.72	-22.47	9.45	0.69	24.38	157.19
5650.00	1.00	315.40	5648.94	22.41	-22.17	9.18	0.73	24.00	157.50

MD ft	INC deg	AZIM deg	TVD ft	VS ft	+N/-S ft	+E/-W ft	DLS %/100ft	CLOSURE DIST ft	CLOSURE DIR deg
5675.00	0.88	306.61	5673.93	22.14	-21.90	8.88	0.74	23.64	157.94
5700.00	0.79	309.55	5698.93	21.91	-21.68	8.59	0.40	23.32	158.38
5725.00	0.97	318.73	5723.93	21.63	-21.41	8.32	0.93	22.97	158.77
5750.00	1.17	311.14	5748.92	21.29	-21.09	7.99	0.96	22.55	159.25
5775.00	1.01	302.94	5773.92	21.00	-20.80	7.61	0.87	22.15	159.90
5800.00	0.81	306.15	5798.92	20.76	-20.57	7.28	0.85	21.83	160.51
5825.00	0.97	307.21	5823.91	20.52	-20.34	6.97	0.66	21.50	161.08
5850.00	1.07	308.24	5848.91	20.24	-20.07	6.62	0.38	21.13	161.75
5875.00	0.98	296.64	5873.90	19.99	-19.83	6.25	0.89	20.79	162.52
5900.00	0.89	303.76	5898.90	19.78	-19.63	5.89	0.60	20.49	163.28
5925.00	1.03	307.01	5923.90	19.53	-19.38	5.55	0.62	20.16	164.01
5950.00	1.14	305.50	5948.89	19.24	-19.10	5.17	0.44	19.79	164.85
5975.00	0.98	299.33	5973.89	18.98	-18.85	4.78	0.80	19.45	165.77
6000.00	0.97	298.09	5998.89	18.76	-18.65	4.41	0.09	19.17	166.70
6025.00	0.92	316.86	6023.88	18.51	-18.40	4.09	1.25	18.85	167.48
6050.00	0.89	319.79	6048.88	18.21	-18.11	3.82	0.23	18.51	168.08
6075.00	1.02	315.43	6073.88	17.89	-17.81	3.54	0.59	18.15	168.74
6100.00	0.99	315.19	6098.87	17.57	-17.49	3.24	0.10	17.79	169.52
6125.00	0.94	304.83	6123.87	17.30	-17.22	2.92	0.73	17.47	170.39
6150.00	0.71	317.48	6148.87	17.06	-16.99	2.64	1.16	17.20	171.16
6175.00	0.91	321.09	6173.86	16.78	-16.72	2.41	0.81	16.90	171.79
6200.00	0.98	322.84	6198.86	16.45	-16.40	2.16	0.30	16.54	172.49
6225.00	1.02	312.16	6223.86	16.13	-16.08	1.87	0.76	16.19	173.37
6250.00	0.99	304.49	6248.85	15.85	-15.81	1.53	0.54	15.88	174.49
6275.00	0.85	306.91	6273.85	15.60	-15.58	1.20	0.58	15.62	175.60
6300.00	0.86	312.35	6298.85	15.36	-15.34	0.91	0.33	15.37	176.60
6325.00	0.82	315.23	6323.84	15.10	-15.08	0.65	0.24	15.10	177.55
6350.00	0.89	321.41	6348.84	14.81	-14.81	0.40	0.46	14.81	178.46
6375.00	1.03	314.91	6373.84	14.49	-14.50	0.12	0.70	14.50	179.53
6400.00	0.96	311.08	6398.83	14.19	-14.20	-0.20	0.39	14.20	180.80
6425.00	0.91	309.63	6423.83	13.92	-13.94	-0.51	0.20	13.95	182.09
6450.00	0.79	309.34	6448.83	13.67	-13.70	-0.79	0.51	13.72	183.31

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	"/100ft	ft	deg
6475.00	0.73	312.49	6473.83	13.45	-13.48	-1.04	0.29	13.53	184.42
6500.00	0.74	317.63	6498.82	13.22	-13.26	-1.27	0.27	13.32	185.47
6525.00	0.79	306.44	6523.82	12.99	-13.04	-1.52	0.62	13.12	186.64
6550.00	0.76	321.89	6548.82	12.75	-12.80	-1.76	0.84	12.92	187.81
6575.00	0.91	315.75	6573.82	12.47	-12.53	-2.00	0.72	12.69	189.06
6600.00	0.99	306.82	6598.81	12.19	-12.26	-2.31	0.67	12.47	190.67
6625.00	0.90	309.87	6623.81	11.93	-12.00	-2.63	0.41	12.29	192.38
6650.00	0.70	307.10	6648.81	11.70	-11.78	-2.91	0.81	12.14	193.86
6675.00	0.72	318.36	6673.80	11.48	-11.57	-3.13	0.56	11.99	195.16
6700.00	0.48	356.86	6698.80	11.26	-11.35	-3.25	1.83	11.81	195.95
6725.00	0.64	12.69	6723.80	11.02	-11.11	-3.22	0.90	11.57	196.16
6750.00	0.62	14.49	6748.80	10.75	-10.84	-3.16	0.12	11.29	196.23
6775.00	0.72	4.42	6773.80	10.47	-10.56	-3.11	0.62	11.01	196.41
6800.00	0.68	355.77	6798.80	10.16	-10.25	-3.11	0.45	10.71	196.87
6825.00	0.61	354.18	6823.80	9.88	-9.97	-3.13	0.31	10.45	197.44
6850.00	0.62	2.62	6848.79	9.62	-9.70	-3.14	0.37	10.20	197.93
6875.00	0.77	358.58	6873.79	9.31	-9.40	-3.14	0.63	9.91	198.46
6900.00	0.88	5.98	6898.79	8.95	-9.04	-3.12	0.61	9.57	199.05
6925.00	0.96	3.16	6923.79	8.56	-8.64	-3.09	0.38	9.18	199.68
6950.00	0.89	3.02	6948.78	8.15	-8.24	-3.07	0.28	8.79	200.43
6975.00	1.04	2.85	6973.78	7.73	-7.82	-3.05	0.60	8.39	201.30
7000.00	1.01	4.57	6998.78	7.29	-7.37	-3.02	0.18	7.96	202.27
7025.00	1.07	3.42	7023.77	6.84	-6.92	-2.99	0.25	7.54	203.35
7050.00	0.98	5.87	7048.77	6.39	-6.47	-2.95	0.38	7.11	204.51
7075.00	1.07	5.12	7073.76	5.95	-6.03	-2.91	0.36	6.69	205.76
7100.00	0.93	4.96	7098.76	5.51	-5.59	-2.87	0.55	6.28	207.17
7125.00	0.92	351.63	7123.76	5.11	-5.19	-2.88	0.86	5.94	209.05
7150.00	0.72	354.20	7148.75	4.75	-4.83	-2.93	0.83	5.65	211.20
7175.00	0.72	356.00	7173.75	4.44	-4.52	-2.95	0.09	5.40	213.16
7200.00	0.80	7.09	7198.75	4.11	-4.19	-2.94	0.68	5.12	215.07
7225.00	0.92	4.66	7223.75	3.74	-3.82	-2.91	0.48	4.80	217.27
7250.00	0.79	352.99	7248.74	3.37	-3.45	-2.91	0.87	4.51	220.15

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	"/100ft	ft	deg
7275.00	0.77	1.42	7273.74	3.03	-3.11	-2.93	0.46	4.27	223.25
7300.00	0.88	1.95	7298.74	2.67	-2.75	-2.92	0.46	4.01	226.66
7325.00	0.88	352.21	7323.74	2.29	-2.37	-2.94	0.60	3.77	231.10
7350.00	0.71	1.50	7348.73	1.94	-2.02	-2.96	0.86	3.58	235.63
7375.00	0.76	10.21	7373.73	1.63	-1.70	-2.92	0.48	3.38	239.76
7400.00	0.82	359.47	7398.73	1.28	-1.36	-2.90	0.63	3.20	244.79
7425.00	0.71	2.60	7423.73	0.95	-1.03	-2.89	0.44	3.07	250.39
7450.00	0.84	5.07	7448.73	0.61	-0.69	-2.87	0.52	2.95	256.43
7475.00	0.78	359.88	7473.72	0.26	-0.34	-2.85	0.37	2.87	263.23
7500.00	0.73	20.27	7498.72	-0.06	-0.02	-2.80	1.09	2.80	269.62
7525.00	0.78	10.32	7523.72	-0.37	0.30	-2.71	0.55	2.73	276.26
7550.00	0.55	24.39	7548.72	-0.64	0.57	-2.63	1.10	2.69	282.30
7575.00	0.61	18.39	7573.72	-0.88	0.81	-2.54	0.34	2.67	287.71
7600.00	0.56	23.86	7598.71	-1.11	1.05	-2.45	0.32	2.66	293.19
7625.00	0.56	29.20	7623.71	-1.33	1.27	-2.34	0.21	2.66	298.43
7650.00	0.53	19.37	7648.71	-1.54	1.48	-2.24	0.39	2.69	303.48
7675.00	0.56	30.55	7673.71	-1.76	1.70	-2.14	0.45	2.73	308.42
7700.00	0.38	29.00	7698.71	-1.93	1.88	-2.04	0.73	2.77	312.65
7725.00	0.41	40.66	7723.71	-2.07	2.02	-1.94	0.34	2.80	316.13
7750.00	0.33	36.35	7748.71	-2.19	2.14	-1.84	0.31	2.82	319.38
7775.00	0.39	41.26	7773.71	-2.31	2.27	-1.74	0.26	2.86	322.51
7800.00	0.14	65.56	7798.71	-2.39	2.34	-1.65	1.09	2.87	324.76
7825.00	0.16	87.04	7823.71	-2.40	2.36	-1.59	0.24	2.84	325.96
7850.00	0.28	145.72	7848.71	-2.35	2.31	-1.52	0.97	2.76	326.59
7875.00	0.24	165.38	7873.71	-2.24	2.21	-1.47	0.39	2.65	326.24
7900.00	0.35	154.97	7898.71	-2.12	2.08	-1.43	0.46	2.53	325.58
7925.00	0.56	171.51	7923.71	-1.93	1.89	-1.38	1.00	2.34	323.96
7950.00	0.45	175.37	7948.71	-1.71	1.68	-1.35	0.48	2.15	321.10
7975.00	0.66	180.68	7973.70	-1.47	1.44	-1.35	0.86	1.97	316.84
8000.00	0.67	175.20	7998.70	-1.18	1.15	-1.34	0.26	1.76	310.66
8025.00	0.61	173.76	8023.70	-0.91	0.87	-1.31	0.26	1.57	303.62
8050.00	0.67	173.12	8048.70	-0.63	0.59	-1.28	0.26	1.41	294.93

MD	INC	AZIM	TVD	VS	+N/-S	+E/-W	DLS	CLOSURE DIST	CLOSURE DIR
ft	deg	deg	ft	ft	ft	ft	°/100ft	ft	deg
8075.00	0.71	175.14	8073.70	-0.33	0.29	-1.25	0.18	1.28	283.29
8100.00	0.81	182.51	8098.70	0.00	-0.04	-1.24	0.55	1.24	268.38
8125.00	0.84	191.93	8123.69	0.35	-0.39	-1.29	0.56	1.34	253.15
8150.00	0.78	189.74	8148.69	0.70	-0.74	-1.35	0.25	1.54	241.42
8175.00	0.79	185.88	8173.69	1.04	-1.08	-1.40	0.21	1.77	232.43
8200.00	0.93	188.02	8198.69	1.41	-1.45	-1.45	0.57	2.05	224.95
8225.00	1.05	188.93	8223.68	1.83	-1.88	-1.51	0.49	2.41	218.84
8250.00	0.87	184.96	8248.68	2.25	-2.29	-1.56	0.77	2.77	214.28
8275.00	1.02	201.24	8273.67	2.64	-2.69	-1.66	1.23	3.16	211.69
8300.00	1.03	207.49	8298.67	3.04	-3.09	-1.84	0.45	3.60	210.78
8325.00	0.99	203.32	8323.67	3.44	-3.49	-2.03	0.33	4.04	210.20
8350.00	1.46	209.19	8348.66	3.91	-3.97	-2.27	1.94	4.58	209.80
8375.00	1.37	203.20	8373.65	4.45	-4.52	-2.55	0.70	5.19	209.39
8400.00	1.27	206.56	8398.65	4.97	-5.05	-2.79	0.51	5.77	208.93
8425.00	1.39	212.70	8423.64	5.46	-5.55	-3.08	0.74	6.35	209.01
8450.00	1.13	214.11	8448.63	5.92	-6.01	-3.38	1.02	6.89	209.35
8475.00	1.35	210.54	8473.63	6.37	-6.47	-3.67	0.92	7.43	209.56
8500.00	1.23	214.33	8498.62	6.83	-6.94	-3.97	0.59	8.00	209.75
8511.44	1.30	208.53	8510.06	7.04	-7.16	-4.10	1.25	8.25	209.80



CONCHO

COG Operating L L C

Lea County, NM (NAD27 NME)

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

Windward Federal 12H

Wellbore #1

Design: Wellbore #1

Survey Report - Geographic

23 May, 2017



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3574.00ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26 @ 3574.00ft (McVay 8)
Well:	Windward Federal 12H	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	Latitude:	32.19490
From:	Map	Easting:	689,517.6000 usft	Longitude:	-103.72068
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.33 °

Well	Windward Federal 12H, ACTIVE					
Well Position	+N/-S	0.00 ft	Northing:	435,203.4000 usf	Latitude:	32.19494
	+E/-W	0.00 ft	Easting:	693,914.3000 usf	Longitude:	-103.70647
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	3,548.00 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	5/9/2017	6.92	59.93	48,105

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	178.45	

Survey Program	Date 5/23/2017			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
100.00	8,511.44	Keeper Gyros (Wellbore #1)	Keeper	Standard Wireline Keeper ver 1.0.2
8,511.44	19,062.00	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	435,203.4000	693,914.3000	32.19494	-103.70647	
100.00	0.28	0.92	100.00	0.24	0.00	435,203.6443	693,914.3040	32.19494	-103.70647	
125.00	0.36	21.90	125.00	0.38	0.03	435,203.7783	693,914.3342	32.19494	-103.70647	
150.00	0.30	18.63	150.00	0.51	0.08	435,203.9131	693,914.3844	32.19494	-103.70647	
175.00	0.30	41.97	175.00	0.62	0.15	435,204.0238	693,914.4491	32.19494	-103.70647	
200.00	0.49	30.52	200.00	0.76	0.25	435,204.1646	693,914.5472	32.19494	-103.70647	
225.00	0.59	25.86	225.00	0.97	0.36	435,204.3725	693,914.6576	32.19494	-103.70647	
250.00	0.63	14.98	250.00	1.22	0.45	435,204.6211	693,914.7493	32.19494	-103.70647	
275.00	0.41	11.73	274.99	1.44	0.50	435,204.8414	693,914.8030	32.19494	-103.70647	
300.00	0.48	20.34	299.99	1.63	0.56	435,205.0272	693,914.8576	32.19494	-103.70647	
325.00	0.62	32.40	324.99	1.84	0.67	435,205.2396	693,914.9664	32.19494	-103.70647	

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3574.00ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26 @ 3574.00ft (McVay 8)
Well:	Windward Federal 12H	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	0.63	32.90	349.99	2.07	0.81	435,205.4692	693,915.1136	32.19494	-103.70647
375.00	0.75	26.41	374.99	2.33	0.96	435,205.7311	693,915.2610	32.19494	-103.70647
400.00	0.84	22.86	399.99	2.65	1.10	435,206.0466	693,915.4050	32.19495	-103.70647
425.00	0.84	26.38	424.98	2.98	1.26	435,206.3796	693,915.5576	32.19495	-103.70647
450.00	0.70	35.26	449.98	3.27	1.43	435,206.6684	693,915.7272	32.19495	-103.70647
475.00	0.87	42.84	474.98	3.53	1.64	435,206.9323	693,915.9444	32.19495	-103.70647
500.00	0.88	47.96	499.98	3.80	1.92	435,207.2000	693,916.2160	32.19495	-103.70646
525.00	1.00	47.06	524.97	4.08	2.22	435,207.4772	693,916.5183	32.19495	-103.70646
550.00	1.06	42.09	549.97	4.40	2.53	435,207.7974	693,916.8330	32.19495	-103.70646
575.00	0.98	36.66	574.97	4.74	2.82	435,208.1405	693,917.1156	32.19495	-103.70646
600.00	0.88	29.33	599.96	5.08	3.04	435,208.4794	693,917.3373	32.19495	-103.70646
625.00	0.42	15.45	624.96	5.34	3.16	435,208.7351	693,917.4558	32.19495	-103.70646
650.00	0.40	274.83	649.96	5.43	3.09	435,208.8308	693,917.3932	32.19495	-103.70646
675.00	0.73	260.36	674.96	5.41	2.85	435,208.8114	693,917.1493	32.19495	-103.70646
700.00	1.22	255.80	699.95	5.32	2.43	435,208.7195	693,916.7342	32.19495	-103.70646
725.00	1.44	257.30	724.95	5.19	1.87	435,208.5851	693,916.1698	32.19495	-103.70646
750.00	1.47	250.95	749.94	5.01	1.26	435,208.4114	693,915.5602	32.19495	-103.70647
775.00	1.29	249.76	774.93	4.81	0.69	435,208.2094	693,914.9931	32.19495	-103.70647
800.00	1.28	258.59	799.93	4.66	0.16	435,208.0568	693,914.4554	32.19495	-103.70647
825.00	1.25	260.40	824.92	4.56	-0.39	435,207.9561	693,913.9128	32.19495	-103.70647
850.00	1.37	258.48	849.91	4.45	-0.95	435,207.8509	693,913.3511	32.19495	-103.70647
875.00	1.32	255.73	874.91	4.32	-1.52	435,207.7203	693,912.7792	32.19495	-103.70648
900.00	1.11	257.37	899.90	4.20	-2.04	435,207.5963	693,912.2638	32.19495	-103.70648
925.00	1.02	260.98	924.90	4.11	-2.49	435,207.5085	693,911.8078	32.19495	-103.70648
950.00	1.05	261.30	949.89	4.04	-2.94	435,207.4390	693,911.3616	32.19495	-103.70648
975.00	1.05	264.21	974.89	3.98	-3.39	435,207.3812	693,910.9072	32.19495	-103.70648
1,000.00	1.17	264.44	999.88	3.93	-3.87	435,207.3334	693,910.4253	32.19495	-103.70648
1,025.00	1.18	266.48	1,024.88	3.89	-4.39	435,207.2928	693,909.9143	32.19495	-103.70648
1,050.00	1.21	260.02	1,049.87	3.83	-4.90	435,207.2313	693,909.3975	32.19495	-103.70649
1,075.00	1.18	257.45	1,074.87	3.73	-5.41	435,207.1296	693,908.8862	32.19495	-103.70649
1,100.00	1.05	262.71	1,099.86	3.64	-5.89	435,207.0446	693,908.4077	32.19495	-103.70649
1,125.00	1.10	266.43	1,124.86	3.60	-6.36	435,207.0006	693,907.9410	32.19495	-103.70649
1,150.00	1.16	267.70	1,149.85	3.58	-6.85	435,206.9755	693,907.4487	32.19495	-103.70649
1,175.00	1.23	264.49	1,174.85	3.54	-7.37	435,206.9396	693,906.9287	32.19495	-103.70649
1,200.00	1.18	259.64	1,199.84	3.47	-7.89	435,206.8675	693,906.4084	32.19495	-103.70650
1,225.00	1.12	258.00	1,224.84	3.37	-8.38	435,206.7704	693,905.9162	32.19495	-103.70650
1,250.00	0.97	263.01	1,249.83	3.29	-8.83	435,206.6939	693,905.4672	32.19495	-103.70650
1,275.00	0.93	261.46	1,274.83	3.24	-9.24	435,206.6380	693,905.0565	32.19495	-103.70650
1,300.00	1.12	258.03	1,299.83	3.16	-9.68	435,206.5572	693,904.6169	32.19495	-103.70650
1,325.00	1.13	249.62	1,324.82	3.02	-10.15	435,206.4207	693,904.1468	32.19495	-103.70650
1,350.00	0.74	242.42	1,349.82	2.86	-10.53	435,206.2601	693,903.7726	32.19495	-103.70650
1,375.00	0.66	189.88	1,374.82	2.64	-10.70	435,206.0435	693,903.6048	32.19495	-103.70651
1,400.00	1.06	163.11	1,399.81	2.28	-10.65	435,205.6804	693,903.6473	32.19494	-103.70651
1,425.00	1.57	160.83	1,424.81	1.74	-10.47	435,205.1356	693,903.8269	32.19494	-103.70650
1,450.00	1.75	155.99	1,449.80	1.06	-10.21	435,204.4634	693,904.0947	32.19494	-103.70650
1,475.00	1.60	150.64	1,474.79	0.41	-9.88	435,203.8105	693,904.4212	32.19494	-103.70650
1,500.00	1.57	151.62	1,499.78	-0.19	-9.54	435,203.2050	693,904.7551	32.19494	-103.70650
1,525.00	1.46	156.25	1,524.77	-0.79	-9.25	435,202.6122	693,905.0461	32.19494	-103.70650
1,550.00	1.64	158.33	1,549.76	-1.41	-8.99	435,201.9882	693,905.3065	32.19493	-103.70650
1,575.00	1.71	157.76	1,574.75	-2.09	-8.72	435,201.3105	693,905.5798	32.19493	-103.70650
1,600.00	1.73	152.82	1,599.74	-2.77	-8.41	435,200.6295	693,905.8933	32.19493	-103.70650
1,625.00	1.58	149.83	1,624.73	-3.40	-8.06	435,199.9959	693,906.2389	32.19493	-103.70650
1,650.00	1.58	150.86	1,649.72	-4.00	-7.72	435,199.3969	693,906.5800	32.19493	-103.70650
1,675.00	1.58	152.53	1,674.71	-4.61	-7.39	435,198.7900	693,906.9068	32.19493	-103.70649
1,700.00	1.65	159.68	1,699.70	-5.25	-7.11	435,198.1467	693,907.1907	32.19492	-103.70649

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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)	Map Northing (usft)	Map Easting (usft)	Latitude		Longitude
1,725.00	1.76	157.22	1,724.69	-5.94	-6.84	435,197.4552	693,907.4644	32.19492		-103.70649
1,750.00	1.76	154.68	1,749.67	-6.65	-6.52	435,196.7542	693,907.7772	32.19492		-103.70649
1,775.00	1.64	151.59	1,774.66	-7.31	-6.19	435,196.0925	693,908.1116	32.19492		-103.70649
1,800.00	1.66	154.95	1,799.65	-7.95	-5.86	435,195.4498	693,908.4351	32.19492		-103.70649
1,825.00	1.74	156.71	1,824.64	-8.63	-5.56	435,194.7732	693,908.7385	32.19491		-103.70649
1,850.00	1.83	155.31	1,849.63	-9.34	-5.24	435,194.0619	693,909.0553	32.19491		-103.70649
1,875.00	1.73	148.65	1,874.62	-10.02	-4.88	435,193.3769	693,909.4184	32.19491		-103.70649
1,900.00	1.61	155.01	1,899.61	-10.66	-4.54	435,192.7363	693,909.7631	32.19491		-103.70649
1,925.00	1.57	154.60	1,924.60	-11.29	-4.24	435,192.1086	693,910.0584	32.19491		-103.70648
1,950.00	1.24	144.67	1,949.59	-11.82	-3.94	435,191.5786	693,910.3617	32.19491		-103.70648
1,975.00	0.89	122.66	1,974.59	-12.15	-3.62	435,191.2531	693,910.6816	32.19490		-103.70648
2,000.00	0.65	113.03	1,999.58	-12.31	-3.32	435,191.0928	693,910.9756	32.19490		-103.70648
2,025.00	0.59	97.75	2,024.58	-12.38	-3.07	435,191.0200	693,911.2336	32.19490		-103.70648
2,050.00	0.57	109.59	2,049.58	-12.44	-2.82	435,190.9609	693,911.4783	32.19490		-103.70648
2,075.00	0.58	116.12	2,074.58	-12.54	-2.59	435,190.8635	693,911.7091	32.19490		-103.70648
2,100.00	0.60	117.16	2,099.58	-12.65	-2.36	435,190.7481	693,911.9391	32.19490		-103.70648
2,125.00	0.74	118.20	2,124.58	-12.79	-2.10	435,190.6120	693,912.1979	32.19490		-103.70648
2,150.00	0.87	112.08	2,149.57	-12.94	-1.78	435,190.4644	693,912.5160	32.19490		-103.70648
2,175.00	0.77	100.28	2,174.57	-13.04	-1.44	435,190.3631	693,912.8572	32.19490		-103.70648
2,200.00	0.78	97.27	2,199.57	-13.09	-1.11	435,190.3116	693,913.1913	32.19490		-103.70647
2,225.00	0.86	101.00	2,224.57	-13.15	-0.76	435,190.2542	693,913.5442	32.19490		-103.70647
2,250.00	0.90	96.68	2,249.56	-13.20	-0.38	435,190.1956	693,913.9234	32.19490		-103.70647
2,275.00	1.02	95.46	2,274.56	-13.25	0.04	435,190.1516	693,914.3399	32.19490		-103.70647
2,300.00	1.06	88.92	2,299.56	-13.27	0.49	435,190.1348	693,914.7926	32.19490		-103.70647
2,325.00	0.82	66.99	2,324.55	-13.19	0.89	435,190.2091	693,915.1885	32.19490		-103.70647
2,350.00	0.75	70.94	2,349.55	-13.07	1.21	435,190.3324	693,915.5078	32.19490		-103.70647
2,375.00	0.83	76.85	2,374.55	-12.97	1.54	435,190.4270	693,915.8388	32.19490		-103.70647
2,400.00	0.97	72.47	2,399.55	-12.87	1.92	435,190.5320	693,916.2169	32.19490		-103.70646
2,425.00	0.94	64.76	2,424.54	-12.72	2.30	435,190.6832	693,916.6042	32.19490		-103.70646
2,450.00	0.85	65.55	2,449.54	-12.55	2.66	435,190.8474	693,916.9585	32.19490		-103.70646
2,475.00	0.79	71.52	2,474.54	-12.42	2.99	435,190.9787	693,917.2907	32.19490		-103.70646
2,500.00	1.06	76.41	2,499.53	-12.31	3.38	435,191.0877	693,917.6789	32.19490		-103.70646
2,525.00	1.27	68.96	2,524.53	-12.16	3.86	435,191.2415	693,918.1623	32.19490		-103.70646
2,550.00	1.11	69.91	2,549.52	-11.98	4.35	435,191.4241	693,918.6483	32.19491		-103.70646
2,575.00	1.10	74.56	2,574.52	-11.83	4.81	435,191.5712	693,919.1070	32.19491		-103.70646
2,600.00	1.21	81.55	2,599.51	-11.73	5.30	435,191.6739	693,919.5994	32.19491		-103.70645
2,625.00	1.43	79.34	2,624.51	-11.63	5.87	435,191.7704	693,920.1671	32.19491		-103.70645
2,650.00	1.34	77.98	2,649.50	-11.51	6.46	435,191.8890	693,920.7595	32.19491		-103.70645
2,675.00	1.38	87.80	2,674.49	-11.44	7.05	435,191.9614	693,921.3463	32.19491		-103.70645
2,700.00	1.64	86.07	2,699.48	-11.40	7.70	435,191.9975	693,922.0040	32.19491		-103.70645
2,725.00	1.65	84.00	2,724.47	-11.34	8.42	435,192.0596	693,922.7188	32.19491		-103.70644
2,750.00	1.51	82.55	2,749.46	-11.26	9.10	435,192.1399	693,923.4034	32.19491		-103.70644
2,775.00	1.58	87.36	2,774.45	-11.20	9.77	435,192.1985	693,924.0743	32.19491		-103.70644
2,800.00	1.72	89.90	2,799.44	-11.18	10.49	435,192.2150	693,924.7938	32.19491		-103.70644
2,825.00	1.79	86.14	2,824.43	-11.16	11.26	435,192.2420	693,925.5585	32.19491		-103.70643
2,850.00	1.81	84.70	2,849.42	-11.10	12.04	435,192.3047	693,926.3412	32.19491		-103.70643
2,875.00	1.54	82.19	2,874.41	-11.01	12.77	435,192.3869	693,927.0672	32.19491		-103.70643
2,900.00	1.40	83.98	2,899.40	-10.94	13.40	435,192.4645	693,927.7037	32.19491		-103.70643
2,925.00	1.31	82.48	2,924.39	-10.87	13.99	435,192.5340	693,928.2907	32.19491		-103.70643
2,950.00	1.46	83.44	2,949.39	-10.79	14.59	435,192.6078	693,928.8905	32.19491		-103.70642
2,975.00	1.49	84.16	2,974.38	-10.72	15.23	435,192.6772	693,929.5302	32.19491		-103.70642
3,000.00	1.27	90.26	2,999.37	-10.69	15.83	435,192.7090	693,930.1306	32.19491		-103.70642
3,025.00	1.37	80.84	3,024.36	-10.64	16.40	435,192.7553	693,930.7027	32.19491		-103.70642
3,050.00	1.18	78.71	3,049.36	-10.55	16.95	435,192.8533	693,931.2502	32.19491		-103.70642
3,075.00	0.95	60.77	3,074.35	-10.40	17.38	435,193.0049	693,931.6835	32.19491		-103.70641

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3574.00ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26 @ 3574.00ft (McVay 8)
Well:	Windward Federal 12H	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	1.11	25.21	3,099.35	-10.07	17.67	435,193.3252	693,931.9675	32.19491	-103.70641
3,125.00	1.51	3.37	3,124.34	-9.53	17.79	435,193.8731	693,932.0900	32.19491	-103.70641
3,150.00	1.43	357.61	3,149.34	-8.89	17.80	435,194.5136	693,932.0963	32.19491	-103.70641
3,175.00	1.28	1.99	3,174.33	-8.30	17.79	435,195.1044	693,932.0930	32.19492	-103.70641
3,200.00	1.34	9.56	3,199.32	-7.73	17.85	435,195.6717	693,932.1513	32.19492	-103.70641
3,225.00	1.47	11.83	3,224.31	-7.13	17.97	435,196.2738	693,932.2656	32.19492	-103.70641
3,250.00	1.28	10.01	3,249.31	-6.54	18.08	435,196.8626	693,932.3798	32.19492	-103.70641
3,275.00	1.37	19.44	3,274.30	-5.98	18.23	435,197.4194	693,932.5278	32.19492	-103.70641
3,300.00	1.44	26.98	3,299.29	-5.42	18.47	435,197.9812	693,932.7698	32.19492	-103.70641
3,325.00	1.41	26.21	3,324.29	-4.86	18.75	435,198.5371	693,933.0482	32.19492	-103.70641
3,350.00	1.37	32.78	3,349.28	-4.34	19.05	435,199.0643	693,933.3458	32.19493	-103.70641
3,375.00	1.53	47.13	3,374.27	-3.86	19.45	435,199.5426	693,933.7522	32.19493	-103.70641
3,400.00	1.63	44.44	3,399.26	-3.38	19.95	435,200.0236	693,934.2458	32.19493	-103.70641
3,425.00	1.44	40.03	3,424.25	-2.88	20.40	435,200.5180	693,934.6968	32.19493	-103.70640
3,450.00	1.01	42.24	3,449.25	-2.48	20.75	435,200.9216	693,935.0470	32.19493	-103.70640
3,475.00	0.40	355.48	3,474.24	-2.23	20.89	435,201.1717	693,935.1882	32.19493	-103.70640
3,500.00	0.81	262.95	3,499.24	-2.16	20.71	435,201.2370	693,935.0059	32.19493	-103.70640
3,525.00	1.27	257.23	3,524.24	-2.25	20.26	435,201.1541	693,934.5604	32.19493	-103.70641
3,550.00	1.08	250.53	3,549.23	-2.39	19.77	435,201.0143	693,934.0680	32.19493	-103.70641
3,575.00	1.10	253.93	3,574.23	-2.53	19.32	435,200.8694	693,933.6153	32.19493	-103.70641
3,600.00	1.22	250.99	3,599.22	-2.68	18.83	435,200.7163	693,933.1331	32.19493	-103.70641
3,625.00	1.01	240.26	3,624.22	-2.88	18.39	435,200.5203	693,932.6902	32.19493	-103.70641
3,650.00	0.76	223.77	3,649.22	-3.11	18.08	435,200.2912	693,932.3841	32.19493	-103.70641
3,675.00	0.80	224.70	3,674.21	-3.35	17.85	435,200.0475	693,932.1467	32.19493	-103.70641
3,700.00	0.89	213.49	3,699.21	-3.64	17.62	435,199.7615	693,931.9168	32.19493	-103.70641
3,725.00	0.90	202.16	3,724.21	-3.98	17.44	435,199.4177	693,931.7356	32.19493	-103.70641
3,750.00	0.89	184.37	3,749.20	-4.36	17.35	435,199.0423	693,931.6467	32.19493	-103.70641
3,775.00	1.20	179.01	3,774.20	-4.81	17.34	435,198.5869	693,931.6365	32.19492	-103.70641
3,800.00	1.36	175.05	3,799.19	-5.37	17.37	435,198.0296	693,931.6666	32.19492	-103.70641
3,825.00	1.55	165.51	3,824.19	-5.99	17.48	435,197.4067	693,931.7768	32.19492	-103.70641
3,850.00	1.53	161.83	3,849.18	-6.64	17.67	435,196.7622	693,931.9655	32.19492	-103.70641
3,875.00	1.64	162.93	3,874.17	-7.30	17.87	435,196.1031	693,932.1746	32.19492	-103.70641
3,900.00	1.74	162.57	3,899.16	-8.00	18.09	435,195.3990	693,932.3933	32.19492	-103.70641
3,925.00	1.81	165.55	3,924.14	-8.75	18.31	435,194.6546	693,932.6055	32.19491	-103.70641
3,950.00	1.89	169.18	3,949.13	-9.53	18.48	435,193.8673	693,932.7814	32.19491	-103.70641
3,975.00	2.05	170.62	3,974.12	-10.38	18.63	435,193.0212	693,932.9317	32.19491	-103.70641
4,000.00	2.12	169.59	3,999.10	-11.27	18.79	435,192.1253	693,933.0881	32.19491	-103.70641
4,025.00	1.44	151.91	4,024.09	-12.01	19.02	435,191.3933	693,933.3195	32.19490	-103.70641
4,050.00	0.87	143.44	4,049.08	-12.44	19.28	435,190.9638	693,933.5805	32.19490	-103.70641
4,075.00	0.60	125.92	4,074.08	-12.67	19.50	435,190.7345	693,933.7996	32.19490	-103.70641
4,100.00	0.66	129.10	4,099.08	-12.83	19.72	435,190.5669	693,934.0173	32.19490	-103.70641
4,125.00	0.83	124.93	4,124.08	-13.03	19.98	435,190.3724	693,934.2775	32.19490	-103.70641
4,150.00	0.82	110.76	4,149.08	-13.19	20.29	435,190.2053	693,934.5932	32.19490	-103.70641
4,175.00	0.73	111.59	4,174.07	-13.32	20.61	435,190.0833	693,934.9086	32.19490	-103.70640
4,200.00	0.57	112.69	4,199.07	-13.42	20.87	435,189.9768	693,935.1714	32.19490	-103.70640
4,225.00	0.09	160.12	4,224.07	-13.49	20.99	435,189.9103	693,935.2928	32.19490	-103.70640
4,250.00	0.29	288.19	4,249.07	-13.49	20.94	435,189.9116	693,935.2394	32.19490	-103.70640
4,275.00	0.47	275.81	4,274.07	-13.46	20.78	435,189.9417	693,935.0773	32.19490	-103.70640
4,300.00	0.68	260.46	4,299.07	-13.47	20.53	435,189.9275	693,934.8290	32.19490	-103.70640
4,325.00	0.64	235.51	4,324.07	-13.58	20.27	435,189.8239	693,934.5676	32.19490	-103.70641
4,350.00	0.55	249.42	4,349.07	-13.70	20.04	435,189.7027	693,934.3402	32.19490	-103.70641
4,375.00	0.62	249.31	4,374.06	-13.79	19.80	435,189.6127	693,934.1013	32.19490	-103.70641
4,400.00	0.76	238.61	4,399.06	-13.92	19.53	435,189.4785	693,933.8332	32.19490	-103.70641
4,425.00	0.58	237.35	4,424.06	-14.08	19.29	435,189.3239	693,933.5852	32.19490	-103.70641
4,450.00	0.60	250.07	4,449.06	-14.19	19.06	435,189.2110	693,933.3556	32.19490	-103.70641

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3574.00ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26 @ 3574.00ft (McVay 8)
Well:	Windward Federal 12H	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	0.67	245.48	4,474.06	-14.29	18.80	435,189.1057	693,933.0995	32.19490	-103.70641
4,500.00	0.73	245.23	4,499.06	-14.42	18.52	435,188.9784	693,932.8219	32.19490	-103.70641
4,525.00	0.49	235.50	4,524.05	-14.55	18.29	435,188.8511	693,932.5892	32.19490	-103.70641
4,550.00	0.51	240.12	4,549.05	-14.66	18.10	435,188.7351	693,932.4047	32.19490	-103.70641
4,575.00	0.73	246.61	4,574.05	-14.78	17.86	435,188.6165	693,932.1620	32.19490	-103.70641
4,600.00	0.71	235.90	4,599.05	-14.93	17.59	435,188.4664	693,931.8876	32.19490	-103.70641
4,625.00	0.61	230.69	4,624.05	-15.10	17.36	435,188.2952	693,931.6563	32.19490	-103.70641
4,650.00	0.64	232.39	4,649.05	-15.27	17.14	435,188.1257	693,931.4428	32.19490	-103.70642
4,675.00	0.64	221.54	4,674.05	-15.46	16.94	435,187.9360	693,931.2396	32.19490	-103.70642
4,700.00	0.69	225.59	4,699.04	-15.67	16.74	435,187.7262	693,931.0395	32.19489	-103.70642
4,725.00	0.77	226.73	4,724.04	-15.89	16.51	435,187.5057	693,930.8096	32.19489	-103.70642
4,750.00	0.82	222.22	4,749.04	-16.14	16.27	435,187.2581	693,930.5671	32.19489	-103.70642
4,775.00	0.67	220.77	4,774.04	-16.39	16.05	435,187.0149	693,930.3514	32.19489	-103.70642
4,800.00	0.70	226.78	4,799.04	-16.60	15.84	435,186.7996	693,930.1447	32.19489	-103.70642
4,825.00	0.86	230.39	4,824.03	-16.82	15.59	435,186.5754	693,929.8889	32.19489	-103.70642
4,850.00	0.83	216.35	4,849.03	-17.09	15.34	435,186.3100	693,929.6370	32.19489	-103.70642
4,875.00	0.73	210.00	4,874.03	-17.37	15.15	435,186.0262	693,929.4500	32.19489	-103.70642
4,900.00	0.79	219.78	4,899.03	-17.64	14.96	435,185.7558	693,929.2601	32.19489	-103.70642
4,925.00	0.80	223.06	4,924.02	-17.90	14.73	435,185.4959	693,929.0307	32.19489	-103.70642
4,950.00	0.99	206.75	4,949.02	-18.22	14.51	435,185.1755	693,928.8143	32.19489	-103.70642
4,975.00	0.98	193.55	4,974.02	-18.63	14.37	435,184.7748	693,928.6670	32.19489	-103.70642
5,000.00	0.85	193.75	4,999.01	-19.01	14.27	435,184.3868	693,928.5729	32.19489	-103.70643
5,025.00	0.85	200.54	5,024.01	-19.37	14.16	435,184.0331	693,928.4637	32.19488	-103.70643
5,050.00	0.99	196.97	5,049.01	-19.75	14.04	435,183.6528	693,928.3356	32.19488	-103.70643
5,075.00	0.99	195.13	5,074.00	-20.16	13.92	435,183.2378	693,928.2162	32.19488	-103.70643
5,100.00	0.81	193.45	5,099.00	-20.54	13.82	435,182.8574	693,928.1188	32.19488	-103.70643
5,125.00	0.77	204.96	5,124.00	-20.87	13.71	435,182.5333	693,928.0068	32.19488	-103.70643
5,150.00	0.96	203.82	5,149.00	-21.21	13.55	435,182.1894	693,927.8513	32.19488	-103.70643
5,175.00	1.06	197.36	5,173.99	-21.62	13.40	435,181.7771	693,927.6977	32.19488	-103.70643
5,200.00	1.03	195.44	5,198.99	-22.06	13.27	435,181.3398	693,927.5689	32.19488	-103.70643
5,225.00	0.87	201.53	5,223.98	-22.45	13.14	435,180.9467	693,927.4394	32.19488	-103.70643
5,250.00	0.95	209.27	5,248.98	-22.81	12.97	435,180.5893	693,927.2685	32.19488	-103.70643
5,275.00	1.06	205.63	5,273.98	-23.20	12.77	435,180.2000	693,927.0671	32.19487	-103.70643
5,300.00	0.99	196.36	5,298.97	-23.62	12.61	435,179.7843	693,926.9062	32.19487	-103.70643
5,325.00	0.90	196.24	5,323.97	-24.01	12.49	435,179.3886	693,926.7905	32.19487	-103.70643
5,350.00	0.83	207.18	5,348.97	-24.36	12.35	435,179.0390	693,926.6529	32.19487	-103.70643
5,375.00	0.55	241.82	5,373.97	-24.58	12.16	435,178.8213	693,926.4644	32.19487	-103.70643
5,400.00	0.64	280.95	5,398.96	-24.61	11.92	435,178.7911	693,926.2215	32.19487	-103.70643
5,425.00	0.73	308.79	5,423.96	-24.48	11.66	435,178.9174	693,925.9603	32.19487	-103.70643
5,450.00	0.77	320.60	5,448.96	-24.25	11.43	435,179.1470	693,925.7296	32.19487	-103.70643
5,475.00	0.93	310.16	5,473.96	-23.99	11.17	435,179.4076	693,925.4679	32.19487	-103.70644
5,500.00	0.88	308.44	5,498.95	-23.74	10.86	435,179.6578	693,925.1625	32.19487	-103.70644
5,525.00	0.75	311.58	5,523.95	-23.51	10.59	435,179.8858	693,924.8897	32.19487	-103.70644
5,550.00	0.94	315.13	5,548.95	-23.26	10.32	435,180.1397	693,924.6226	32.19487	-103.70644
5,575.00	0.98	309.04	5,573.95	-22.98	10.01	435,180.4197	693,924.3119	32.19487	-103.70644
5,600.00	0.84	309.59	5,598.94	-22.73	9.70	435,180.6711	693,924.0046	32.19488	-103.70644
5,625.00	0.84	321.46	5,623.94	-22.47	9.45	435,180.9313	693,923.7492	32.19488	-103.70644
5,650.00	1.00	315.40	5,648.94	-22.17	9.18	435,181.2299	693,923.4819	32.19488	-103.70644
5,675.00	0.88	306.61	5,673.93	-21.90	8.87	435,181.4997	693,923.1746	32.19488	-103.70644
5,700.00	0.79	309.55	5,698.93	-21.68	8.59	435,181.7240	693,922.8876	32.19488	-103.70644
5,725.00	0.97	318.73	5,723.93	-21.41	8.32	435,181.9928	693,922.6151	32.19488	-103.70644
5,750.00	1.17	311.14	5,748.92	-21.08	7.98	435,182.3197	693,922.2833	32.19488	-103.70645
5,775.00	1.01	302.94	5,773.92	-20.79	7.61	435,182.6075	693,921.9062	32.19488	-103.70645
5,800.00	0.81	306.15	5,798.92	-20.57	7.28	435,182.8315	693,921.5786	32.19488	-103.70645
5,825.00	0.97	307.21	5,823.91	-20.34	6.97	435,183.0637	693,921.2674	32.19488	-103.70645

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3574.00ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26 @ 3574.00ft (McVay 8)
Well:	Windward Federal 12H	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	1.07	308.24	5,848.91	-20.06	6.62	435,183.3362	693,920.9155	32.19488	-103.70645
5,875.00	0.98	296.64	5,873.90	-19.82	6.24	435,183.5765	693,920.5411	32.19488	-103.70645
5,900.00	0.89	303.76	5,898.90	-19.62	5.89	435,183.7803	693,920.1886	32.19488	-103.70645
5,925.00	1.03	307.01	5,923.90	-19.38	5.55	435,184.0234	693,919.8477	32.19488	-103.70645
5,950.00	1.14	305.50	5,948.89	-19.10	5.17	435,184.3031	693,919.4658	32.19489	-103.70645
5,975.00	0.98	299.33	5,973.89	-18.85	4.78	435,184.5522	693,919.0770	32.19489	-103.70646
6,000.00	0.97	298.09	5,998.89	-18.64	4.40	435,184.7566	693,918.7039	32.19489	-103.70646
6,025.00	0.92	316.86	6,023.88	-18.40	4.08	435,185.0027	693,918.3800	32.19489	-103.70646
6,050.00	0.89	319.79	6,048.88	-18.10	3.82	435,185.2974	693,918.1174	32.19489	-103.70646
6,075.00	1.02	315.43	6,073.88	-17.80	3.54	435,185.6042	693,917.8359	32.19489	-103.70646
6,100.00	0.99	315.19	6,098.87	-17.48	3.23	435,185.9160	693,917.5275	32.19489	-103.70646
6,125.00	0.94	304.83	6,123.87	-17.21	2.91	435,186.1863	693,917.2070	32.19489	-103.70646
6,150.00	0.71	317.48	6,148.87	-16.98	2.63	435,186.4176	693,916.9340	32.19489	-103.70646
6,175.00	0.91	321.09	6,173.86	-16.71	2.40	435,186.6862	693,916.7046	32.19489	-103.70646
6,200.00	0.98	322.84	6,198.86	-16.39	2.15	435,187.0111	693,916.4508	32.19489	-103.70646
6,225.00	1.02	312.16	6,223.86	-16.07	1.86	435,187.3308	693,916.1567	32.19489	-103.70647
6,250.00	0.99	304.49	6,248.85	-15.80	1.51	435,187.6025	693,915.8137	32.19489	-103.70647
6,275.00	0.85	306.91	6,273.85	-15.56	1.19	435,187.8361	693,915.4874	32.19490	-103.70647
6,300.00	0.86	312.35	6,298.85	-15.33	0.90	435,188.0739	693,915.2005	32.19490	-103.70647
6,325.00	0.82	315.23	6,323.84	-15.07	0.64	435,188.3273	693,914.9359	32.19490	-103.70647
6,350.00	0.89	321.41	6,348.84	-14.79	0.39	435,188.6060	693,914.6888	32.19490	-103.70647
6,375.00	1.03	314.91	6,373.84	-14.48	0.11	435,188.9164	693,914.4085	32.19490	-103.70647
6,400.00	0.96	311.08	6,398.83	-14.19	-0.21	435,189.2127	693,914.0915	32.19490	-103.70647
6,425.00	0.91	309.63	6,423.83	-13.92	-0.52	435,189.4769	693,913.7808	32.19490	-103.70647
6,450.00	0.79	309.34	6,448.83	-13.69	-0.81	435,189.7128	693,913.4946	32.19490	-103.70647
6,475.00	0.73	312.49	6,473.83	-13.47	-1.06	435,189.9296	693,913.2439	32.19490	-103.70647
6,500.00	0.74	317.63	6,498.82	-13.24	-1.28	435,190.1565	693,913.0176	32.19490	-103.70648
6,525.00	0.79	306.44	6,523.82	-13.02	-1.53	435,190.3781	693,912.7702	32.19490	-103.70648
6,550.00	0.76	321.89	6,548.82	-12.79	-1.77	435,190.6110	693,912.5292	32.19490	-103.70648
6,575.00	0.91	315.75	6,573.82	-12.52	-2.01	435,190.8836	693,912.2884	32.19490	-103.70648
6,600.00	0.99	306.82	6,598.81	-12.24	-2.32	435,191.1552	693,911.9769	32.19490	-103.70648
6,625.00	0.90	309.87	6,623.81	-11.99	-2.65	435,191.4105	693,911.6534	32.19491	-103.70648
6,650.00	0.70	307.10	6,648.81	-11.77	-2.92	435,191.6285	693,911.3809	32.19491	-103.70648
6,675.00	0.72	318.36	6,673.80	-11.56	-3.15	435,191.8380	693,911.1547	32.19491	-103.70648
6,700.00	0.48	356.86	6,698.80	-11.34	-3.26	435,192.0600	693,911.0446	32.19491	-103.70648
6,725.00	0.64	12.69	6,723.80	-11.10	-3.23	435,192.3008	693,911.0695	32.19491	-103.70648
6,750.00	0.62	14.49	6,748.80	-10.83	-3.17	435,192.5679	693,911.1340	32.19491	-103.70648
6,775.00	0.72	4.42	6,773.80	-10.54	-3.12	435,192.8555	693,911.1800	32.19491	-103.70648
6,800.00	0.68	355.77	6,798.80	-10.24	-3.12	435,193.1600	693,911.1811	32.19491	-103.70648
6,825.00	0.61	354.18	6,823.80	-9.96	-3.14	435,193.4404	693,911.1567	32.19491	-103.70648
6,850.00	0.62	2.62	6,848.79	-9.69	-3.15	435,193.7079	693,911.1494	32.19491	-103.70648
6,875.00	0.77	358.58	6,873.79	-9.39	-3.15	435,194.0109	693,911.1514	32.19491	-103.70648
6,900.00	0.88	5.98	6,898.79	-9.03	-3.13	435,194.3698	693,911.1673	32.19491	-103.70648
6,925.00	0.96	3.16	6,923.79	-8.63	-3.10	435,194.7699	693,911.1988	32.19491	-103.70648
6,950.00	0.89	3.02	6,948.78	-8.23	-3.08	435,195.1729	693,911.2206	32.19492	-103.70648
6,975.00	1.04	2.85	6,973.78	-7.81	-3.06	435,195.5933	693,911.2421	32.19492	-103.70648
7,000.00	1.01	4.57	6,998.78	-7.36	-3.03	435,196.0396	693,911.2709	32.19492	-103.70648
7,025.00	1.07	3.42	7,023.77	-6.91	-3.00	435,196.4922	693,911.3024	32.19492	-103.70648
7,050.00	0.98	5.87	7,048.77	-6.46	-2.96	435,196.9379	693,911.3382	32.19492	-103.70648
7,075.00	1.07	5.12	7,073.76	-6.02	-2.92	435,197.3831	693,911.3809	32.19492	-103.70648
7,100.00	0.93	4.96	7,098.76	-5.58	-2.88	435,197.8177	693,911.4193	32.19492	-103.70648
7,125.00	0.92	351.63	7,123.76	-5.18	-2.89	435,198.2184	693,911.4076	32.19492	-103.70648
7,150.00	0.72	354.20	7,148.75	-4.83	-2.94	435,198.5732	693,911.3625	32.19493	-103.70648
7,175.00	0.72	356.00	7,173.75	-4.51	-2.96	435,198.8862	693,911.3357	32.19493	-103.70648
7,200.00	0.80	7.09	7,198.75	-4.18	-2.95	435,199.2161	693,911.3463	32.19493	-103.70648

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3574.00ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26 @ 3574.00ft (McVay 8)
Well:	Windward Federal 12H	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	0.92	4.66	7,223.75	-3.81	-2.92	435,199.5893	693,911.3841	32.19493	-103.70648
7,250.00	0.79	352.99	7,248.74	-3.44	-2.92	435,199.9604	693,911.3794	32.19493	-103.70648
7,275.00	0.77	1.42	7,273.74	-3.10	-2.94	435,200.2994	693,911.3625	32.19493	-103.70648
7,300.00	0.88	1.95	7,298.74	-2.74	-2.93	435,200.6592	693,911.3732	32.19493	-103.70648
7,325.00	0.88	352.21	7,323.74	-2.36	-2.95	435,201.0413	693,911.3537	32.19493	-103.70648
7,350.00	0.71	1.50	7,348.73	-2.01	-2.97	435,201.3863	693,911.3317	32.19493	-103.70648
7,375.00	0.76	10.21	7,373.73	-1.70	-2.93	435,201.7043	693,911.3652	32.19493	-103.70648
7,400.00	0.82	359.47	7,398.73	-1.35	-2.91	435,202.0464	693,911.3929	32.19493	-103.70648
7,425.00	0.71	2.60	7,423.73	-1.02	-2.90	435,202.3800	693,911.3983	32.19494	-103.70648
7,450.00	0.84	5.07	7,448.73	-0.68	-2.88	435,202.7173	693,911.4215	32.19494	-103.70648
7,475.00	0.78	359.88	7,473.72	-0.33	-2.86	435,203.0700	693,911.4374	32.19494	-103.70648
7,500.00	0.73	20.27	7,498.72	-0.01	-2.81	435,203.3895	693,911.4922	32.19494	-103.70648
7,525.00	0.78	10.32	7,523.72	0.31	-2.72	435,203.7063	693,911.5778	32.19494	-103.70648
7,550.00	0.55	24.39	7,548.72	0.58	-2.64	435,203.9830	693,911.6579	32.19494	-103.70648
7,575.00	0.61	18.39	7,573.72	0.82	-2.55	435,204.2186	693,911.7494	32.19494	-103.70648
7,600.00	0.56	23.86	7,598.71	1.06	-2.46	435,204.4566	693,911.8408	32.19494	-103.70648
7,625.00	0.56	29.20	7,623.71	1.27	-2.35	435,204.6750	693,911.9498	32.19494	-103.70648
7,650.00	0.53	19.37	7,648.71	1.49	-2.25	435,204.8907	693,912.0478	32.19494	-103.70648
7,675.00	0.56	30.55	7,673.71	1.70	-2.15	435,205.1050	693,912.1482	32.19494	-103.70648
7,700.00	0.38	29.00	7,698.71	1.88	-2.05	435,205.2827	693,912.2505	32.19494	-103.70648
7,725.00	0.41	40.66	7,723.71	2.02	-1.95	435,205.4231	693,912.3490	32.19494	-103.70648
7,750.00	0.33	36.35	7,748.71	2.15	-1.85	435,205.5489	693,912.4499	32.19494	-103.70648
7,775.00	0.39	41.26	7,773.71	2.27	-1.75	435,205.6709	693,912.5487	32.19494	-103.70648
7,800.00	0.14	65.56	7,798.71	2.35	-1.67	435,205.7475	693,912.6326	32.19494	-103.70648
7,825.00	0.16	87.04	7,823.71	2.36	-1.60	435,205.7619	693,912.6953	32.19494	-103.70648
7,850.00	0.28	145.72	7,848.71	2.31	-1.54	435,205.7132	693,912.7646	32.19494	-103.70648
7,875.00	0.24	165.38	7,873.71	2.21	-1.49	435,205.6121	693,912.8122	32.19494	-103.70648
7,900.00	0.35	154.97	7,898.71	2.09	-1.44	435,205.4922	693,912.8577	32.19494	-103.70648
7,925.00	0.56	171.51	7,923.71	1.90	-1.39	435,205.3022	693,912.9081	32.19494	-103.70648
7,950.00	0.45	175.37	7,948.71	1.68	-1.37	435,205.0835	693,912.9340	32.19494	-103.70648
7,975.00	0.66	180.68	7,973.70	1.44	-1.36	435,204.8417	693,912.9402	32.19494	-103.70648
8,000.00	0.67	175.20	7,998.70	1.15	-1.35	435,204.5521	693,912.9508	32.19494	-103.70648
8,025.00	0.61	173.76	8,023.70	0.87	-1.32	435,204.2741	693,912.9774	32.19494	-103.70648
8,050.00	0.67	173.12	8,048.70	0.60	-1.29	435,203.9967	693,913.0094	32.19494	-103.70647
8,075.00	0.71	175.14	8,073.70	0.30	-1.26	435,203.6973	693,913.0401	32.19494	-103.70647
8,100.00	0.81	182.51	8,098.70	-0.03	-1.25	435,203.3664	693,913.0454	32.19494	-103.70647
8,125.00	0.84	191.93	8,123.69	-0.39	-1.30	435,203.0106	693,912.9998	32.19494	-103.70648
8,150.00	0.78	189.74	8,148.69	-0.74	-1.37	435,202.6635	693,912.9331	32.19494	-103.70648
8,175.00	0.79	185.88	8,173.69	-1.08	-1.41	435,202.3244	693,912.8867	32.19494	-103.70648
8,200.00	0.93	188.02	8,198.69	-1.45	-1.46	435,201.9521	693,912.8407	32.19493	-103.70648
8,225.00	1.05	188.93	8,223.68	-1.88	-1.52	435,201.5249	693,912.7769	32.19493	-103.70648
8,250.00	0.87	184.96	8,248.68	-2.29	-1.58	435,201.1095	693,912.7249	32.19493	-103.70648
8,275.00	1.02	201.24	8,273.67	-2.69	-1.67	435,200.7130	693,912.6279	32.19493	-103.70648
8,300.00	1.03	207.49	8,298.67	-3.09	-1.86	435,200.3063	693,912.4436	32.19493	-103.70648
8,325.00	0.99	203.32	8,323.67	-3.49	-2.05	435,199.9086	693,912.2543	32.19493	-103.70648
8,350.00	1.46	209.19	8,348.66	-3.97	-2.29	435,199.4322	693,912.0135	32.19493	-103.70648
8,375.00	1.37	203.20	8,373.65	-4.52	-2.56	435,198.8795	693,911.7405	32.19493	-103.70648
8,400.00	1.27	206.56	8,398.65	-5.04	-2.80	435,198.3570	693,911.4988	32.19492	-103.70648
8,425.00	1.39	212.70	8,423.64	-5.55	-3.09	435,197.8540	693,911.2112	32.19492	-103.70648
8,450.00	1.13	214.11	8,448.63	-6.01	-3.39	435,197.3948	693,910.9091	32.19492	-103.70648
8,475.00	1.35	210.54	8,473.63	-6.46	-3.68	435,196.9370	693,910.6212	32.19492	-103.70648
8,500.00	1.23	214.33	8,498.62	-6.94	-3.98	435,196.4618	693,910.3202	32.19492	-103.70648
8,511.44	1.30	208.53	8,510.06	-7.15	-4.11	435,196.2464	693,910.1890	32.19492	-103.70648
8,582.00	1.10	225.69	8,580.60	-8.33	-4.98	435,195.0701	693,909.3221	32.19492	-103.70649

First IDS MWD Survey

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3574.00ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26 @ 3574.00ft (McVay 8)
Well:	Windward Federal 12H	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
8,606.00	0.93	213.99	8,604.60	-8.65	-5.25	435,194.7477	693,909.0483	32.19491	-103.70649
8,700.00	10.93	161.38	8,698.00	-17.76	-2.83	435,185.6450	693,911.4739	32.19489	-103.70648
8,747.00	18.10	158.20	8,743.47	-28.77	1.31	435,174.6291	693,915.6134	32.19486	-103.70647
8,794.00	22.00	158.29	8,787.61	-43.73	7.28	435,159.6658	693,921.5834	32.19482	-103.70645
8,841.00	25.30	160.02	8,830.66	-61.36	13.97	435,142.0434	693,928.2733	32.19477	-103.70643
8,889.00	29.69	162.97	8,873.23	-82.37	20.96	435,121.0268	693,935.2631	32.19471	-103.70640
8,936.00	33.46	164.26	8,913.26	-105.98	27.89	435,097.4178	693,942.1895	32.19465	-103.70638
8,961.64	34.22	163.29	8,934.56	-119.69	31.88	435,083.7089	693,946.1800	32.19461	-103.70637
Hardline Crossing Point 8961.64' MD / 120.51' VS									
8,983.00	34.86	162.51	8,952.15	-131.27	35.44	435,072.1339	693,949.7417	32.19458	-103.70636
9,030.00	39.17	162.88	8,989.67	-158.28	43.85	435,045.1248	693,958.1519	32.19450	-103.70633
9,077.00	45.79	163.11	9,024.32	-188.61	53.13	435,014.7877	693,967.4256	32.19442	-103.70630
9,124.00	50.64	163.40	9,055.63	-222.16	63.22	434,981.2373	693,977.5164	32.19433	-103.70627
9,172.00	52.67	164.53	9,085.40	-258.34	73.61	434,945.0577	693,987.9093	32.19423	-103.70624
9,218.00	57.16	164.73	9,111.84	-294.63	83.58	434,908.7711	693,997.8820	32.19413	-103.70621
9,266.00	63.65	162.40	9,135.53	-334.63	95.41	434,868.7719	694,009.7094	32.19402	-103.70617
9,313.00	71.00	160.61	9,153.64	-375.72	109.17	434,827.6808	694,023.4734	32.19390	-103.70612
9,360.00	75.73	160.22	9,167.09	-418.13	124.27	434,785.2661	694,038.5661	32.19379	-103.70608
9,407.00	79.18	161.55	9,177.30	-461.48	139.28	434,741.9242	694,053.5835	32.19367	-103.70603
9,455.00	82.80	164.42	9,184.82	-506.80	153.15	434,696.6025	694,067.4465	32.19354	-103.70599
9,550.00	91.11	169.30	9,189.86	-599.08	174.67	434,604.3260	694,088.9718	32.19329	-103.70592
9,644.00	91.30	171.39	9,187.89	-691.72	190.43	434,511.6834	694,104.7327	32.19303	-103.70587
9,738.00	91.47	176.13	9,185.61	-785.11	200.64	434,418.2945	694,114.9441	32.19278	-103.70584
9,833.00	90.55	178.72	9,183.94	-879.99	204.91	434,323.4144	694,119.2108	32.19252	-103.70583
9,945.00	91.02	178.16	9,182.40	-991.93	207.96	434,211.4674	694,122.2595	32.19221	-103.70582
10,039.00	93.26	178.00	9,178.89	-1,085.81	211.11	434,117.5919	694,125.4064	32.19195	-103.70581
10,133.00	92.00	179.23	9,174.58	-1,179.68	213.38	434,023.7222	694,127.6754	32.19169	-103.70580
10,228.00	91.47	180.01	9,171.70	-1,274.63	214.01	433,928.7692	694,128.3051	32.19143	-103.70580
10,322.00	89.23	179.91	9,171.13	-1,368.63	214.07	433,834.7771	694,128.3707	32.19117	-103.70580
10,417.00	90.24	179.88	9,171.57	-1,463.62	214.25	433,739.7797	694,128.5448	32.19091	-103.70581
10,511.00	90.88	180.98	9,170.65	-1,557.61	213.54	433,645.7890	694,127.8395	32.19065	-103.70581
10,605.00	92.39	181.02	9,167.97	-1,651.56	211.90	433,551.8444	694,126.1997	32.19040	-103.70582
10,700.00	93.93	180.89	9,162.73	-1,746.40	210.32	433,457.0051	694,124.6187	32.19013	-103.70582
10,794.00	92.61	180.85	9,157.37	-1,840.23	208.89	433,363.1714	694,123.1938	32.18988	-103.70583
10,888.00	89.90	181.46	9,155.31	-1,934.18	207.00	433,269.2224	694,121.2994	32.18962	-103.70584
10,983.00	90.21	181.21	9,155.22	-2,029.16	204.79	433,174.2486	694,119.0861	32.18936	-103.70585
11,077.00	91.38	180.97	9,153.92	-2,123.13	203.00	433,080.2766	694,117.2981	32.18910	-103.70585
11,171.00	92.34	181.78	9,150.86	-2,217.05	200.74	432,986.3552	694,115.0439	32.18884	-103.70586
11,266.00	91.89	179.97	9,147.36	-2,311.97	199.29	432,891.4354	694,113.5944	32.18858	-103.70587
11,360.00	91.08	178.84	9,144.92	-2,405.93	200.27	432,797.4745	694,114.5704	32.18832	-103.70587
11,454.00	90.80	178.59	9,143.38	-2,499.89	202.38	432,703.5111	694,116.6781	32.18806	-103.70586
11,549.00	90.60	178.20	9,142.22	-2,594.85	205.04	432,608.5559	694,119.3387	32.18780	-103.70586
11,643.00	91.69	177.99	9,140.34	-2,688.78	208.16	432,514.6283	694,122.4628	32.18754	-103.70585
11,738.00	90.46	179.94	9,138.56	-2,783.74	209.88	432,419.6671	694,124.1781	32.18728	-103.70584
11,832.00	87.83	179.07	9,139.96	-2,877.72	210.69	432,325.6904	694,124.9897	32.18702	-103.70584
11,926.00	87.86	180.02	9,143.50	-2,971.64	211.44	432,231.7611	694,125.7357	32.18677	-103.70584
12,021.00	88.53	179.90	9,146.49	-3,066.60	211.50	432,136.8090	694,125.8020	32.18651	-103.70584
12,115.00	89.73	180.13	9,147.92	-3,160.58	211.48	432,042.8218	694,125.7773	32.18625	-103.70585
12,209.00	90.63	179.05	9,147.62	-3,254.58	212.15	431,948.8272	694,126.4499	32.18599	-103.70585
12,304.00	88.62	180.42	9,148.24	-3,349.57	212.59	431,853.8376	694,126.8894	32.18573	-103.70585
12,398.00	89.01	180.79	9,150.19	-3,443.54	211.60	431,759.8635	694,125.8971	32.18547	-103.70585
12,492.00	90.29	180.90	9,150.76	-3,537.53	210.21	431,665.8776	694,124.5109	32.18521	-103.70586
12,586.00	89.68	179.42	9,150.78	-3,631.53	209.95	431,571.8812	694,124.2484	32.18495	-103.70586
12,681.00	87.41	178.95	9,153.20	-3,726.48	211.30	431,476.9281	694,125.5989	32.18469	-103.70586
12,775.00	86.85	178.38	9,157.90	-3,820.34	213.49	431,383.0725	694,127.7860	32.18443	-103.70585

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3574.00ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26 @ 3574.00ft (McVay 8)
Well:	Windward Federal 12H	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
12,871.00	88.64	179.98	9,161.68	-3,916.24	214.86	431,287.1638	694,129.1579	32.18417	-103.70585
12,967.00	89.85	180.47	9,162.95	-4,012.23	214.48	431,191.1752	694,128.7809	32.18391	-103.70585
13,062.00	90.18	180.72	9,162.92	-4,107.23	213.49	431,096.1807	694,127.7944	32.18364	-103.70586
13,157.00	89.96	180.72	9,162.80	-4,202.22	212.30	431,001.1885	694,126.6006	32.18338	-103.70586
13,252.00	90.24	180.40	9,162.64	-4,297.22	211.37	430,906.1936	694,125.6721	32.18312	-103.70587
13,347.00	90.71	180.20	9,161.85	-4,392.21	210.88	430,811.1987	694,125.1747	32.18286	-103.70587
13,442.00	89.23	180.57	9,161.90	-4,487.21	210.24	430,716.2038	694,124.5364	32.18260	-103.70588
13,538.00	89.51	180.14	9,162.96	-4,583.20	209.64	430,620.2120	694,123.9416	32.18234	-103.70588
13,633.00	89.73	180.51	9,163.59	-4,678.19	209.10	430,525.2160	694,123.4028	32.18208	-103.70588
13,728.00	90.15	179.56	9,163.69	-4,773.19	209.05	430,430.2176	694,123.3448	32.18181	-103.70589
13,823.00	88.53	178.49	9,164.78	-4,868.17	210.66	430,335.2423	694,124.9610	32.18155	-103.70588
13,918.00	87.52	177.35	9,168.05	-4,963.05	214.11	430,240.3643	694,128.4065	32.18129	-103.70587
14,013.00	89.40	177.57	9,170.61	-5,057.91	218.32	430,145.4964	694,132.6148	32.18103	-103.70586
14,108.00	90.15	177.74	9,170.98	-5,152.83	222.20	430,050.5776	694,136.5018	32.18077	-103.70585
14,204.00	87.32	177.57	9,173.10	-5,248.72	226.13	429,954.6913	694,140.4284	32.18051	-103.70584
14,299.00	87.24	177.39	9,177.61	-5,343.52	230.30	429,859.8904	694,144.6006	32.18025	-103.70583
14,394.00	88.36	178.53	9,181.25	-5,438.39	233.68	429,765.0238	694,147.9794	32.17999	-103.70582
14,489.00	90.74	178.92	9,182.00	-5,533.35	235.79	429,670.0575	694,150.0930	32.17972	-103.70581
14,584.00	91.25	179.05	9,180.35	-5,628.32	237.48	429,575.0872	694,151.7756	32.17946	-103.70581
14,679.00	92.14	178.89	9,177.54	-5,723.27	239.18	429,480.1454	694,153.4825	32.17920	-103.70581
14,774.00	92.48	179.60	9,173.71	-5,818.18	240.43	429,385.2318	694,154.7333	32.17894	-103.70580
14,869.00	89.82	179.30	9,171.81	-5,913.15	241.35	429,290.2641	694,155.6451	32.17868	-103.70580
14,965.00	87.24	178.78	9,174.27	-6,009.09	242.95	429,194.3178	694,157.2526	32.17842	-103.70580
15,060.00	89.93	178.67	9,176.61	-6,104.03	245.07	429,099.3792	694,159.3656	32.17816	-103.70579
15,155.00	89.85	178.94	9,176.80	-6,199.01	247.05	429,004.4003	694,161.3469	32.17789	-103.70579
15,250.00	90.97	179.54	9,176.12	-6,294.00	248.31	428,909.4133	694,162.6069	32.17763	-103.70579
15,345.00	90.83	179.25	9,174.62	-6,388.98	249.31	428,814.4306	694,163.6099	32.17737	-103.70579
15,441.00	93.26	179.66	9,171.20	-6,484.91	250.22	428,718.5037	694,164.5227	32.17711	-103.70578
15,536.00	93.80	180.01	9,165.35	-6,579.73	250.50	428,623.6850	694,164.7958	32.17685	-103.70579
15,631.00	93.86	180.09	9,159.00	-6,674.52	250.41	428,528.8974	694,164.7131	32.17659	-103.70579
15,726.00	92.40	180.66	9,153.82	-6,769.37	249.79	428,434.0443	694,164.0920	32.17633	-103.70579
15,821.00	91.36	180.56	9,150.70	-6,864.31	248.78	428,339.1023	694,163.0811	32.17607	-103.70580
15,916.00	89.90	180.10	9,149.66	-6,959.30	248.23	428,244.1126	694,162.5341	32.17580	-103.70580
16,011.00	89.37	180.17	9,150.26	-7,054.30	248.01	428,149.1154	694,162.3103	32.17554	-103.70580
16,106.00	89.48	180.56	9,151.21	-7,149.29	247.41	428,054.1225	694,161.7051	32.17528	-103.70581
16,201.00	89.87	180.09	9,151.75	-7,244.29	246.87	427,959.1261	694,161.1663	32.17502	-103.70581
16,297.00	90.07	180.63	9,151.80	-7,340.29	246.26	427,863.1286	694,160.5631	32.17476	-103.70581
16,392.00	90.29	180.43	9,151.50	-7,435.28	245.38	427,768.1335	694,159.6843	32.17450	-103.70582
16,486.00	91.58	180.51	9,149.97	-7,529.26	244.61	427,674.1513	694,158.9134	32.17424	-103.70582
16,581.00	89.62	178.03	9,148.98	-7,624.24	245.82	427,579.1765	694,160.1239	32.17398	-103.70582
16,677.00	90.18	177.80	9,149.14	-7,720.17	249.32	427,483.2408	694,163.6165	32.17371	-103.70581
16,772.00	90.71	177.81	9,148.41	-7,815.10	252.96	427,388.3139	694,167.2550	32.17345	-103.70580
16,867.00	92.00	178.97	9,146.16	-7,910.03	255.62	427,293.3818	694,169.9235	32.17319	-103.70579
16,962.00	89.87	178.60	9,144.61	-8,004.99	257.64	427,198.4216	694,171.9376	32.17293	-103.70579
17,058.00	89.45	178.05	9,145.18	-8,100.95	260.44	427,102.4651	694,174.7436	32.17267	-103.70578
17,153.00	89.90	178.50	9,145.72	-8,195.91	263.30	427,007.5104	694,177.6032	32.17240	-103.70577
17,248.00	89.45	178.05	9,146.26	-8,290.86	266.16	426,912.5556	694,180.4629	32.17214	-103.70577
17,343.00	89.82	178.01	9,146.86	-8,385.80	269.43	426,817.6141	694,183.7286	32.17188	-103.70576
17,438.00	90.07	178.02	9,146.95	-8,480.75	272.72	426,722.6714	694,187.0191	32.17162	-103.70575
17,534.00	89.09	179.34	9,147.66	-8,576.71	274.93	426,626.7029	694,189.2306	32.17136	-103.70574
17,629.00	89.90	179.53	9,148.49	-8,671.71	275.87	426,531.7122	694,190.1673	32.17110	-103.70574
17,724.00	89.96	179.65	9,148.61	-8,766.70	276.55	426,436.7149	694,190.8471	32.17084	-103.70574
17,819.00	87.60	179.43	9,150.63	-8,861.67	277.31	426,341.7465	694,191.6095	32.17057	-103.70574
17,914.00	88.16	179.56	9,154.15	-8,956.60	278.15	426,246.8158	694,192.4462	32.17031	-103.70574
18,009.00	88.16	179.25	9,157.20	-9,051.55	279.13	426,151.8702	694,193.4322	32.17005	-103.70574

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3574.00ft (McVay 8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26 @ 3574.00ft (McVay 8)
Well:	Windward Federal 12H	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
18,104.00	88.53	178.82	9,159.94	-9,146.49	280.73	426,056.9239	694,195.0315	32.16979	-103.70574
18,200.00	89.09	179.06	9,161.93	-9,242.46	282.51	425,960.9617	694,196.8071	32.16953	-103.70573
18,295.00	89.40	179.14	9,163.19	-9,337.44	284.00	425,865.9819	694,198.2991	32.16927	-103.70573
18,390.00	89.09	179.37	9,164.44	-9,432.42	285.23	425,770.9986	694,199.5342	32.16901	-103.70573
18,485.00	89.20	179.57	9,165.86	-9,527.41	286.11	425,676.0135	694,200.4129	32.16874	-103.70573
18,580.00	90.15	179.31	9,166.39	-9,622.40	287.04	425,581.0209	694,201.3414	32.16848	-103.70572
18,675.00	88.75	179.14	9,167.31	-9,717.38	288.33	425,486.0366	694,202.6262	32.16822	-103.70572
18,770.00	88.56	178.91	9,169.54	-9,812.34	289.94	425,391.0769	694,204.2423	32.16796	-103.70572
18,865.00	88.53	179.11	9,171.95	-9,907.30	291.58	425,296.1219	694,205.8832	32.16770	-103.70572
18,960.00	88.39	178.88	9,174.50	-10,002.25	293.25	425,201.1711	694,207.5488	32.16744	-103.70571
Final IDS MWD Survey									
18,972.94	88.39	178.88	9,174.87	-10,015.18	293.50	425,188.2387	694,207.8016	32.16740	-103.70571
Hardline Crossing Point 18972.94'MD / 10019.45'VS									
19,062.00	88.39	178.88	9,177.37	-10,104.19	295.24	425,099.2310	694,209.5418	32.16716	-103.70571
Projection to TD									

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Comment
8,582.00	8,580.60	-8.33	-4.98	First IDS MWD Survey
8,961.64	8,934.56	-119.69	31.88	Hardline Crossing Point 8961.64'MD / 120.51'VS
18,960.00	9,174.50	-10,002.25	293.25	Final IDS MWD Survey
18,972.94	9,174.87	-10,015.18	293.50	Hardline Crossing Point 18972.94'MD / 10019.45'VS
19,062.00	9,177.37	-10,104.19	295.24	Projection to TD

Checked By: _____	Approved By: _____	Date: _____
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