

COG

SURVEY REPORT

WINDWARD FEDERAL #7H

MCBAY 8

1/10/2017



Scientific Drilling

The **Ultimate Partner** In Wellbore Placement

CUSTOMER
PROJECT
FIELD

COG
Windward Federal #7H
Windward Federal #7H

SDI JOB NO. 410373
SDI DISTRICT Midland
SDI KIT/UNIT

NOV 06 2017

RECEIVED

SITE INFORMATION

Site Name Windward Federal #7H
Lat/Long 32.1949078° N, 103.7165108° W
Northing 435,174.7 ft
Easting 690,807.6 ft

Section
Township
Range

MAP INFORMATION

North Reference Grid North
Grid Correction -0.33 deg
System US State Plane 1927
Datum North American Datum 1927 (Clarke 1866)
Map Zone New Mexico East: 3001



WELL INFORMATION

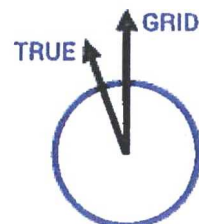
Lat/Long 32.1949078° N, 103.7165108° W
Northing 435,174.7 ft
Easting 690,807.6 ft
UWI 30-025-43516

DEPTH AND ELEVATION REFERENCE

Ground Level 3542.8 ft above Mean Sea
Level
Reference Datum KB
Reference Height 26 ft above G.L.
Reference Elevation 3568.8 ft

VERTICAL SECTION REFERENCE

+N/-S 0 ft
+E/-W 0 ft
Proposal Direction 180.78°
Calculation Method Minimum Curvature



LOCAL GRAVITY REFERENCE INFORMATION

Local Gravity 998.485 mG [computed]
True to Grid subtract 0.33°

WELL NOTES

Wireline Gyro Survey

OPERATORS

C. Booher

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	1.27	240.27	99.99	0.56	-0.55	-0.96	1.27	1.10	240.27
125.00	1.49	235.34	124.98	0.89	-0.87	-1.47	1.00	1.70	239.33
150.00	1.37	239.97	149.98	1.23	-1.20	-1.99	0.65	2.33	238.86
175.00	1.41	243.98	174.97	1.52	-1.49	-2.53	0.42	2.93	239.51
200.00	1.46	240.92	199.96	1.82	-1.78	-3.08	0.38	3.56	240.02
225.00	1.46	245.34	224.95	2.12	-2.07	-3.65	0.45	4.20	240.49
250.00	1.41	243.03	249.95	2.40	-2.34	-4.22	0.33	4.82	240.97
275.00	1.46	244.45	274.94	2.68	-2.62	-4.78	0.25	5.45	241.29
300.00	1.63	241.46	299.93	3.00	-2.92	-5.38	0.75	6.12	241.47
325.00	1.52	244.17	324.92	3.32	-3.24	-5.99	0.53	6.80	241.60
350.00	1.52	248.16	349.91	3.59	-3.50	-6.59	0.42	7.47	242.00
375.00	1.47	247.18	374.90	3.85	-3.75	-7.20	0.21	8.12	242.46
400.00	1.50	247.36	399.89	4.11	-4.00	-7.79	0.12	8.76	242.81
425.00	1.50	247.82	424.89	4.37	-4.25	-8.40	0.06	9.41	243.15
450.00	1.45	246.63	449.88	4.62	-4.50	-8.99	0.22	10.05	243.41
475.00	1.49	249.45	474.87	4.87	-4.74	-9.59	0.33	10.69	243.69
500.00	1.44	246.10	499.86	5.12	-4.98	-10.18	0.40	11.33	243.92
525.00	1.44	245.34	524.85	5.39	-5.24	-10.75	0.08	11.96	244.01
550.00	1.48	244.15	549.84	5.67	-5.51	-11.33	0.20	12.60	244.05
575.00	1.53	242.33	574.84	5.97	-5.81	-11.91	0.28	13.25	244.01
600.00	1.53	240.49	599.83	6.30	-6.13	-12.50	0.20	13.92	243.88
625.00	1.42	241.30	624.82	6.62	-6.44	-13.06	0.45	14.56	243.75
650.00	1.45	238.13	649.81	6.94	-6.76	-13.60	0.34	15.18	243.58
675.00	1.54	239.93	674.80	7.28	-7.09	-14.16	0.41	15.83	243.40
700.00	1.65	242.22	699.79	7.63	-7.43	-14.77	0.52	16.53	243.30
725.00	1.54	238.20	724.78	7.98	-7.77	-15.37	0.63	17.23	243.18
750.00	1.57	239.35	749.77	8.34	-8.12	-15.95	0.16	17.90	243.01
775.00	1.56	237.52	774.76	8.70	-8.48	-16.53	0.20	18.58	242.85
800.00	1.61	235.55	799.75	9.09	-8.86	-17.11	0.31	19.27	242.62
825.00	1.64	237.56	824.74	9.49	-9.25	-17.70	0.24	19.97	242.40
850.00	1.43	235.18	849.74	9.87	-9.62	-18.26	0.85	20.64	242.21

MD ft	INC deg	AZIM deg	TVD ft	VS ft	+N/-S ft	+E/-W ft	DLS %/100ft	CLOSURE DIST ft	CLOSURE DIR deg
875.00	1.47	236.78	874.73	10.23	-9.98	-18.78	0.21	21.27	242.03
900.00	1.47	245.35	899.72	10.55	-10.29	-19.34	0.88	21.91	242.00
925.00	1.49	238.10	924.71	10.86	-10.59	-19.91	0.76	22.55	241.99
950.00	1.39	240.36	949.70	11.19	-10.91	-20.45	0.46	23.18	241.91
975.00	1.24	237.55	974.70	11.49	-11.21	-20.94	0.66	23.76	241.84
1000.00	1.12	244.91	999.69	11.75	-11.46	-21.39	0.77	24.27	241.83
1025.00	1.10	241.69	1024.69	11.97	-11.68	-21.83	0.26	24.75	241.86
1050.00	1.14	240.04	1049.68	12.22	-11.91	-22.25	0.21	25.24	241.84
1075.00	1.20	237.40	1074.68	12.49	-12.18	-22.69	0.32	25.75	241.77
1100.00	1.10	246.75	1099.67	12.73	-12.42	-23.13	0.85	26.25	241.78
1125.00	1.12	242.69	1124.67	12.94	-12.62	-23.57	0.33	26.74	241.83
1150.00	1.01	242.75	1149.66	13.16	-12.84	-23.99	0.44	27.20	241.84
1175.00	1.12	238.96	1174.66	13.39	-13.06	-24.39	0.50	27.67	241.83
1200.00	1.16	237.38	1199.65	13.66	-13.33	-24.81	0.23	28.16	241.76
1225.00	1.15	233.71	1224.65	13.95	-13.61	-25.23	0.30	28.67	241.65
1250.00	1.02	234.81	1249.64	14.23	-13.89	-25.61	0.51	29.13	241.53
1275.00	0.85	227.16	1274.64	14.49	-14.14	-25.93	0.86	29.53	241.39
1300.00	0.23	208.28	1299.64	14.66	-14.31	-26.09	2.53	29.76	241.25
1325.00	0.55	87.80	1324.64	14.70	-14.35	-25.99	2.78	29.69	241.10
1350.00	0.57	85.45	1349.64	14.69	-14.34	-25.75	0.11	29.47	240.89
1375.00	0.66	82.16	1374.64	14.65	-14.31	-25.48	0.41	29.22	240.69
1400.00	0.77	79.26	1399.63	14.60	-14.26	-25.17	0.47	28.93	240.48
1425.00	0.78	97.81	1424.63	14.58	-14.25	-24.84	1.00	28.64	240.16
1450.00	0.69	78.20	1449.63	14.57	-14.24	-24.52	1.07	28.36	239.86
1475.00	0.59	86.31	1474.63	14.53	-14.20	-24.25	0.54	28.10	239.64
1500.00	0.67	79.66	1499.63	14.49	-14.17	-23.98	0.45	27.85	239.42
1525.00	0.60	74.80	1524.63	14.43	-14.11	-23.71	0.36	27.59	239.25
1550.00	0.63	60.80	1549.62	14.32	-14.00	-23.46	0.61	27.32	239.16
1575.00	0.65	64.13	1574.62	14.19	-13.88	-23.21	0.17	27.04	239.13
1600.00	0.66	77.63	1599.62	14.09	-13.78	-22.94	0.62	26.77	239.01
1625.00	0.78	67.02	1624.62	13.99	-13.69	-22.65	0.73	26.46	238.86
1650.00	0.83	70.32	1649.62	13.86	-13.56	-22.32	0.27	26.11	238.72

MD ft	INC deg	AZIM deg	TVD ft	VS ft	+N/-S ft	+E/-W ft	DLS "/100ft	CLOSURE DIST ft	CLOSURE DIR deg
1675.00	0.75	67.94	1674.61	13.73	-13.43	-21.99	0.34	25.77	238.58
1700.00	0.85	65.56	1699.61	13.59	-13.30	-21.67	0.39	25.43	238.47
1725.00	0.80	63.54	1724.61	13.43	-13.14	-21.35	0.22	25.07	238.38
1750.00	0.89	60.13	1749.61	13.25	-12.97	-21.03	0.42	24.70	238.33
1775.00	0.95	62.15	1774.60	13.05	-12.77	-20.67	0.27	24.30	238.29
1800.00	0.92	57.06	1799.60	12.84	-12.57	-20.32	0.36	23.90	238.26
1825.00	0.99	67.32	1824.60	12.65	-12.38	-19.96	0.74	23.48	238.19
1850.00	1.00	57.80	1849.59	12.44	-12.18	-19.57	0.66	23.05	238.11
1875.00	1.03	59.19	1874.59	12.21	-11.95	-19.20	0.17	22.61	238.10
1900.00	1.03	51.87	1899.58	11.95	-11.69	-18.82	0.53	22.16	238.16
1925.00	1.17	52.55	1924.58	11.65	-11.40	-18.44	0.53	21.68	238.29
1950.00	1.12	53.48	1949.57	11.34	-11.10	-18.05	0.19	21.19	238.41
1975.00	1.25	52.06	1974.57	11.02	-10.78	-17.63	0.53	20.67	238.55
2000.00	1.32	53.88	1999.56	10.68	-10.45	-17.19	0.32	20.11	238.71
2025.00	1.44	49.49	2024.56	10.30	-10.07	-16.71	0.66	19.52	238.93
2050.00	1.49	51.60	2049.55	9.89	-9.67	-16.22	0.29	18.88	239.21
2075.00	1.53	58.49	2074.54	9.50	-9.29	-15.68	0.74	18.23	239.36
2100.00	1.54	59.85	2099.53	9.15	-8.95	-15.11	0.16	17.56	239.36
2125.00	1.61	53.43	2124.52	8.76	-8.57	-14.53	0.76	16.87	239.48
2150.00	1.57	54.12	2149.51	8.35	-8.16	-13.97	0.17	16.18	239.72
2175.00	1.66	50.28	2174.50	7.91	-7.72	-13.42	0.56	15.48	240.07
2200.00	1.52	53.42	2199.49	7.47	-7.29	-12.87	0.66	14.79	240.45
2225.00	1.77	52.88	2224.48	7.03	-6.86	-12.30	1.00	14.08	240.83
2250.00	1.75	57.23	2249.47	6.58	-6.42	-11.67	0.54	13.32	241.16
2275.00	1.79	55.99	2274.46	6.15	-6.00	-11.02	0.23	12.55	241.44
2300.00	1.76	58.21	2299.45	5.72	-5.58	-10.37	0.30	11.77	241.73
2325.00	1.22	57.84	2324.44	5.37	-5.23	-9.82	2.20	11.12	241.94
2350.00	1.28	55.83	2349.43	5.06	-4.93	-9.36	0.31	10.58	242.21
2375.00	1.28	56.32	2374.42	4.74	-4.62	-8.90	0.04	10.03	242.55
2400.00	1.32	56.14	2399.42	4.42	-4.31	-8.43	0.17	9.46	242.92
2425.00	1.25	57.17	2424.41	4.11	-4.00	-7.96	0.30	8.90	243.32
2450.00	1.35	59.54	2449.41	3.80	-3.70	-7.47	0.46	8.34	243.66

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	1.38	54.58	2474.40	3.47	-3.38	-6.97	0.49	7.75	244.16
2500.00	1.42	51.11	2499.39	3.09	-3.01	-6.49	0.37	7.15	245.13
2525.00	1.56	57.73	2524.38	2.71	-2.63	-5.96	0.90	6.51	246.17
2550.00	1.43	55.19	2549.37	2.34	-2.27	-5.41	0.60	5.87	247.24
2575.00	1.31	55.99	2574.37	2.00	-1.93	-4.92	0.47	5.29	248.55
2600.00	0.88	52.24	2599.36	1.72	-1.66	-4.53	1.77	4.82	249.92
2625.00	0.64	60.47	2624.36	1.53	-1.47	-4.26	1.04	4.51	250.95
2650.00	0.69	43.44	2649.36	1.35	-1.29	-4.03	0.81	4.24	252.24
2675.00	0.65	47.05	2674.36	1.14	-1.09	-3.83	0.23	3.98	254.15
2700.00	0.75	55.76	2699.35	0.95	-0.90	-3.59	0.57	3.70	255.95
2725.00	0.84	51.50	2724.35	0.74	-0.69	-3.31	0.44	3.38	258.18
2750.00	0.75	48.18	2749.35	0.51	-0.47	-3.05	0.41	3.08	261.24
2775.00	0.92	49.33	2774.35	0.27	-0.23	-2.77	0.67	2.78	265.26
2800.00	1.02	53.11	2799.34	0.00	0.03	-2.44	0.48	2.44	270.78
2825.00	1.24	55.18	2824.34	-0.29	0.32	-2.04	0.90	2.07	278.91
2850.00	1.19	63.40	2849.33	-0.57	0.59	-1.59	0.72	1.70	290.38
2875.00	1.25	60.50	2874.33	-0.83	0.84	-1.12	0.35	1.40	306.93
2900.00	1.17	64.51	2899.32	-1.08	1.09	-0.65	0.49	1.27	329.01
2925.00	1.13	61.79	2924.32	-1.31	1.31	-0.20	0.25	1.33	351.14
2950.00	1.04	63.89	2949.31	-1.53	1.53	0.22	0.41	1.54	8.10
2975.00	0.65	64.98	2974.31	-1.70	1.69	0.55	1.56	1.78	18.04
3000.00	0.14	20.42	2999.31	-1.79	1.78	0.69	2.23	1.91	21.20
3025.00	0.23	285.67	3024.31	-1.83	1.82	0.65	1.13	1.94	19.69
3050.00	0.50	277.92	3049.31	-1.86	1.85	0.49	1.10	1.92	14.96
3075.00	0.62	269.20	3074.31	-1.87	1.86	0.25	0.57	1.88	7.67
3100.00	0.56	278.09	3099.31	-1.88	1.88	-0.01	0.42	1.88	359.84
3125.00	0.48	282.88	3124.30	-1.92	1.92	-0.23	0.38	1.93	353.18
3150.00	0.42	275.03	3149.30	-1.95	1.95	-0.42	0.35	2.00	347.79
3175.00	0.51	276.29	3174.30	-1.96	1.97	-0.62	0.38	2.07	342.44
3200.00	0.51	294.17	3199.30	-2.02	2.03	-0.84	0.64	2.20	337.60
3225.00	0.50	285.51	3224.30	-2.09	2.10	-1.04	0.31	2.35	333.62
3250.00	0.39	278.63	3249.30	-2.13	2.15	-1.23	0.48	2.48	330.11

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	0.38	290.77	3274.30	-2.17	2.19	-1.40	0.33	2.60	327.47
3300.00	0.44	290.53	3299.30	-2.23	2.25	-1.56	0.24	2.74	325.23
3325.00	0.50	294.42	3324.30	-2.31	2.33	-1.75	0.25	2.92	323.06
3350.00	0.34	301.54	3349.30	-2.39	2.41	-1.91	0.65	3.08	321.59
3375.00	0.46	284.58	3374.30	-2.45	2.48	-2.08	0.66	3.23	320.07
3400.00	0.34	301.08	3399.30	-2.51	2.54	-2.23	0.67	3.38	318.68
3425.00	0.46	294.21	3424.30	-2.59	2.62	-2.39	0.55	3.55	317.64
3450.00	0.48	293.17	3449.30	-2.67	2.70	-2.58	0.06	3.74	316.37
3475.00	0.42	309.97	3474.29	-2.77	2.80	-2.74	0.57	3.92	315.62
3500.00	0.49	311.62	3499.29	-2.89	2.93	-2.89	0.28	4.12	315.39
3525.00	0.41	332.98	3524.29	-3.04	3.08	-3.01	0.73	4.31	315.66
3550.00	0.44	325.25	3549.29	-3.20	3.24	-3.11	0.26	4.49	316.21
3575.00	0.39	313.40	3574.29	-3.34	3.38	-3.23	0.41	4.67	316.35
3600.00	0.44	320.55	3599.29	-3.47	3.51	-3.35	0.28	4.85	316.38
3625.00	0.48	326.75	3624.29	-3.63	3.68	-3.47	0.28	5.05	316.67
3650.00	0.43	336.72	3649.29	-3.80	3.85	-3.56	0.38	5.25	317.23
3675.00	0.49	354.54	3674.29	-3.99	4.04	-3.61	0.61	5.42	318.24
3700.00	0.45	338.75	3699.29	-4.19	4.24	-3.66	0.54	5.60	319.24
3725.00	0.36	353.26	3724.29	-4.36	4.41	-3.70	0.54	5.76	320.01
3750.00	0.46	341.14	3749.29	-4.53	4.59	-3.74	0.52	5.92	320.79
3775.00	0.48	356.07	3774.29	-4.74	4.79	-3.78	0.50	6.10	321.69
3800.00	0.54	3.91	3799.28	-4.96	5.01	-3.78	0.36	6.28	322.95
3825.00	0.63	356.93	3824.28	-5.21	5.27	-3.78	0.47	6.48	324.32
3850.00	0.53	5.82	3849.28	-5.47	5.52	-3.78	0.54	6.69	325.61
3875.00	0.55	27.04	3874.28	-5.69	5.74	-3.71	0.80	6.84	327.13
3900.00	0.59	29.81	3899.28	-5.91	5.96	-3.59	0.18	6.96	328.94
3925.00	0.67	34.53	3924.28	-6.14	6.19	-3.44	0.36	7.09	330.92
3950.00	0.58	35.40	3949.28	-6.37	6.42	-3.29	0.34	7.21	332.86
3975.00	0.67	41.09	3974.28	-6.59	6.63	-3.12	0.43	7.33	334.80
4000.00	0.66	41.09	3999.27	-6.81	6.85	-2.93	0.05	7.45	336.84
4025.00	0.80	52.75	4024.27	-7.02	7.06	-2.70	0.81	7.56	339.10
4050.00	0.87	55.06	4049.27	-7.24	7.27	-2.40	0.31	7.66	341.73

MD ft	INC deg	AZIM deg	TVD ft	VS ft	+N/-S ft	+E/-W ft	DLS "/100ft	CLOSURE DIST ft	CLOSURE DIR deg
4075.00	0.79	55.38	4074.27	-7.45	7.48	-2.11	0.31	7.77	344.28
4100.00	0.86	49.92	4099.26	-7.67	7.70	-1.82	0.43	7.91	346.71
4125.00	0.96	61.15	4124.26	-7.90	7.92	-1.49	0.81	8.06	349.34
4150.00	1.00	60.99	4149.26	-8.11	8.13	-1.12	0.18	8.21	352.17
4175.00	0.99	63.69	4174.25	-8.32	8.33	-0.73	0.19	8.36	354.97
4200.00	0.83	70.58	4199.25	-8.48	8.49	-0.37	0.78	8.49	357.50
4225.00	0.91	77.59	4224.25	-8.59	8.59	-0.01	0.54	8.59	359.96
4250.00	0.99	75.70	4249.24	-8.69	8.68	0.40	0.36	8.69	2.61
4275.00	1.03	85.98	4274.24	-8.76	8.75	0.83	0.74	8.79	5.41
4300.00	1.04	89.59	4299.24	-8.79	8.77	1.28	0.27	8.86	8.31
4325.00	1.09	93.16	4324.23	-8.78	8.76	1.75	0.33	8.93	11.28
4350.00	0.97	93.59	4349.23	-8.76	8.73	2.20	0.48	9.00	14.12
4375.00	0.70	101.85	4374.22	-8.72	8.69	2.56	1.19	9.06	16.41
4400.00	0.48	143.82	4399.22	-8.61	8.57	2.77	1.88	9.01	17.91
4425.00	0.41	189.56	4424.22	-8.44	8.40	2.82	1.41	8.86	18.54
4450.00	0.53	193.46	4449.22	-8.24	8.20	2.78	0.48	8.66	18.70
4475.00	0.58	197.62	4474.22	-8.00	7.97	2.71	0.27	8.42	18.79
4500.00	0.60	193.33	4499.22	-7.75	7.72	2.64	0.20	8.16	18.90
4525.00	0.68	203.94	4524.22	-7.49	7.46	2.55	0.56	7.88	18.90
4550.00	0.56	207.72	4549.22	-7.25	7.21	2.44	0.47	7.61	18.66
4575.00	0.46	206.55	4574.22	-7.04	7.01	2.33	0.40	7.39	18.40
4600.00	0.44	212.47	4599.21	-6.87	6.84	2.24	0.21	7.20	18.10
4625.00	0.46	193.95	4624.21	-6.69	6.66	2.16	0.59	7.00	17.96
4650.00	0.47	197.14	4649.21	-6.49	6.47	2.11	0.11	6.80	18.04
4675.00	0.51	196.61	4674.21	-6.29	6.26	2.04	0.16	6.58	18.07
4700.00	0.52	208.94	4699.21	-6.08	6.05	1.96	0.44	6.36	17.91
4725.00	0.50	195.41	4724.21	-5.88	5.85	1.87	0.48	6.14	17.75
4750.00	0.43	198.52	4749.21	-5.68	5.66	1.81	0.31	5.94	17.78
4775.00	0.54	200.23	4774.21	-5.48	5.46	1.74	0.45	5.73	17.72
4800.00	0.45	204.94	4799.21	-5.28	5.26	1.66	0.38	5.52	17.54
4825.00	0.43	215.21	4824.21	-5.12	5.10	1.57	0.33	5.33	17.10
4850.00	0.41	196.90	4849.21	-4.96	4.94	1.49	0.54	5.16	16.78

MD ft	INC deg	AZIM deg	TVD ft	VS ft	+N/-S ft	+E/-W ft	DLS "/100ft	CLOSURE DIST ft	CLOSURE DIR deg
4875.00	0.48	200.49	4874.21	-4.77	4.75	1.43	0.33	4.96	16.70
4900.00	0.46	195.58	4899.20	-4.58	4.56	1.36	0.19	4.76	16.64
4925.00	0.44	199.63	4924.20	-4.39	4.37	1.30	0.14	4.56	16.60
4950.00	0.48	196.79	4949.20	-4.20	4.18	1.24	0.16	4.36	16.53
4975.00	0.59	195.05	4974.20	-3.97	3.96	1.18	0.46	4.13	16.57
5000.00	0.43	200.67	4999.20	-3.76	3.74	1.11	0.66	3.90	16.52
5025.00	0.47	201.75	5024.20	-3.57	3.56	1.04	0.15	3.71	16.27
5050.00	0.44	203.32	5049.20	-3.39	3.38	0.96	0.12	3.51	15.92
5075.00	0.37	204.69	5074.20	-3.23	3.21	0.89	0.28	3.33	15.49
5100.00	0.46	197.69	5099.20	-3.05	3.04	0.83	0.42	3.15	15.18
5125.00	0.51	204.37	5124.20	-2.85	2.84	0.75	0.30	2.94	14.75
5150.00	0.54	197.28	5149.20	-2.64	2.63	0.67	0.28	2.71	14.24
5175.00	0.54	196.41	5174.19	-2.41	2.40	0.60	0.04	2.48	14.00
5200.00	0.56	199.03	5199.19	-2.18	2.17	0.53	0.12	2.24	13.59
5225.00	0.66	195.40	5224.19	-1.93	1.92	0.45	0.42	1.97	13.12
5250.00	0.75	206.44	5249.19	-1.64	1.63	0.34	0.66	1.67	11.62
5275.00	0.53	202.14	5274.19	-1.38	1.38	0.22	0.93	1.40	9.03
5300.00	0.68	204.95	5299.19	-1.14	1.14	0.11	0.62	1.14	5.68
5325.00	0.68	192.17	5324.19	-0.86	0.86	0.02	0.61	0.86	1.29
5350.00	0.62	196.70	5349.18	-0.58	0.58	-0.05	0.33	0.59	355.05
5375.00	0.81	200.22	5374.18	-0.29	0.29	-0.15	0.81	0.33	332.49
5400.00	0.76	204.00	5399.18	0.03	-0.03	-0.28	0.29	0.28	263.98
5425.00	0.79	210.08	5424.18	0.34	-0.33	-0.43	0.35	0.55	232.67
5450.00	0.94	216.84	5449.17	0.65	-0.64	-0.64	0.72	0.91	224.95
5475.00	0.86	213.04	5474.17	0.98	-0.97	-0.87	0.39	1.30	221.96
5500.00	0.79	213.57	5499.17	1.28	-1.27	-1.07	0.28	1.66	220.08
5525.00	0.88	214.29	5524.17	1.59	-1.57	-1.27	0.33	2.02	218.98
5550.00	1.21	218.40	5549.16	1.96	-1.94	-1.54	1.39	2.47	218.55
5575.00	0.86	215.89	5574.16	2.32	-2.29	-1.82	1.45	2.93	218.37
5600.00	0.97	219.02	5599.15	2.64	-2.61	-2.06	0.50	3.32	218.27
5625.00	1.02	231.83	5624.15	2.94	-2.91	-2.37	0.91	3.75	219.11
5650.00	0.92	217.14	5649.15	3.25	-3.21	-2.66	1.07	4.17	219.69

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	0.94	220.43	5674.14	3.57	-3.53	-2.92	0.23	4.58	219.61
5700.00	0.93	218.28	5699.14	3.89	-3.84	-3.18	0.14	4.99	219.59
5725.00	0.85	221.99	5724.14	4.19	-4.14	-3.43	0.40	5.38	219.62
5750.00	0.99	220.75	5749.13	4.49	-4.44	-3.69	0.57	5.78	219.74
5775.00	1.01	222.60	5774.13	4.82	-4.77	-3.98	0.14	6.21	219.88
5800.00	0.99	220.22	5799.13	5.15	-5.09	-4.27	0.18	6.65	219.98
5825.00	0.87	228.57	5824.12	5.45	-5.39	-4.55	0.72	7.05	220.22
5850.00	0.96	231.53	5849.12	5.71	-5.64	-4.86	0.41	7.45	220.75
5875.00	0.80	221.75	5874.12	5.97	-5.90	-5.14	0.89	7.83	221.06
5900.00	0.83	223.52	5899.11	6.24	-6.16	-5.38	0.18	8.18	221.13
5925.00	0.85	220.52	5924.11	6.51	-6.44	-5.63	0.19	8.55	221.16
5950.00	0.85	234.88	5949.11	6.76	-6.68	-5.90	0.85	8.91	221.43
5975.00	0.82	222.82	5974.11	7.00	-6.92	-6.17	0.72	9.27	221.73
6000.00	0.86	230.12	5999.10	7.26	-7.17	-6.44	0.46	9.64	221.91
6025.00	0.87	235.96	6024.10	7.49	-7.40	-6.74	0.36	10.01	222.33
6050.00	0.86	225.13	6049.10	7.73	-7.64	-7.03	0.66	10.38	222.63
6075.00	0.95	227.00	6074.10	8.01	-7.91	-7.31	0.37	10.77	222.75
6100.00	0.88	225.61	6099.09	8.29	-8.19	-7.60	0.28	11.17	222.88
6125.00	0.89	227.79	6124.09	8.56	-8.45	-7.88	0.14	11.56	223.01
6150.00	1.02	229.43	6149.09	8.84	-8.73	-8.20	0.51	11.97	223.21
6175.00	0.83	227.69	6174.08	9.11	-8.99	-8.50	0.74	12.37	223.38
6200.00	0.90	227.18	6199.08	9.37	-9.25	-8.78	0.28	12.75	223.50
6225.00	0.98	232.41	6224.08	9.64	-9.51	-9.09	0.46	13.16	223.70
6250.00	0.90	240.86	6249.07	9.87	-9.74	-9.43	0.64	13.56	224.08
6275.00	1.00	233.96	6274.07	10.10	-9.96	-9.78	0.61	13.96	224.47
6300.00	1.04	243.69	6299.07	10.33	-10.19	-10.16	0.71	14.39	224.91
6325.00	0.95	240.42	6324.06	10.54	-10.40	-10.54	0.42	14.81	225.41
6350.00	1.15	237.97	6349.06	10.78	-10.63	-10.94	0.83	15.25	225.81
6375.00	1.08	240.33	6374.05	11.04	-10.88	-11.36	0.35	15.73	226.22
6400.00	1.19	243.69	6399.05	11.27	-11.11	-11.79	0.54	16.20	226.70
6425.00	1.11	240.21	6424.04	11.51	-11.35	-12.24	0.43	16.69	227.16
6450.00	1.09	237.63	6449.04	11.77	-11.60	-12.65	0.21	17.16	227.48

MD ft	INC deg	AZIM deg	TVD ft	VS ft	+N/-S ft	+E/-W ft	DLS "/100ft	CLOSURE DIST ft	CLOSURE DIR deg
6475.00	1.22	248.54	6474.03	12.00	-11.82	-13.10	1.02	17.64	227.93
6500.00	1.12	245.49	6499.03	12.20	-12.02	-13.57	0.46	18.13	228.46
6525.00	1.19	247.83	6524.02	12.41	-12.22	-14.03	0.33	18.61	228.95
6550.00	1.12	243.66	6549.02	12.62	-12.43	-14.49	0.45	19.09	229.39
6575.00	1.14	242.58	6574.01	12.85	-12.65	-14.93	0.12	19.57	229.73
6600.00	1.19	246.55	6599.01	13.08	-12.87	-15.39	0.39	20.06	230.10
6625.00	1.23	247.81	6624.00	13.29	-13.07	-15.88	0.17	20.57	230.53
6650.00	1.19	247.36	6649.00	13.50	-13.27	-16.37	0.16	21.07	230.95
6675.00	1.24	252.06	6673.99	13.69	-13.46	-16.86	0.46	21.57	231.41
6700.00	1.17	251.33	6698.99	13.86	-13.62	-17.36	0.28	22.07	231.88
6725.00	1.32	254.91	6723.98	14.02	-13.78	-17.88	0.65	22.58	232.38
6750.00	1.36	258.56	6748.97	14.16	-13.91	-18.45	0.37	23.11	232.98
6775.00	1.46	258.62	6773.96	14.29	-14.04	-19.05	0.40	23.66	233.62
6800.00	1.53	262.90	6798.96	14.41	-14.14	-19.70	0.53	24.24	234.33
6825.00	1.59	265.78	6823.95	14.48	-14.21	-20.37	0.41	24.84	235.11
6850.00	1.62	272.32	6848.94	14.50	-14.22	-21.07	0.74	25.42	235.99
6875.00	1.76	273.10	6873.93	14.48	-14.18	-21.81	0.56	26.01	236.96
6900.00	1.84	278.47	6898.91	14.41	-14.10	-22.59	0.75	26.63	238.02
6925.00	1.54	277.01	6923.90	14.32	-14.00	-23.31	1.22	27.20	239.01
6950.00	0.71	299.50	6948.90	14.21	-13.89	-23.78	3.68	27.54	239.72
6975.00	0.38	287.78	6973.90	14.11	-13.78	-24.00	1.38	27.67	240.13
7000.00	0.45	299.96	6998.90	14.04	-13.71	-24.16	0.44	27.78	240.43
7025.00	0.44	309.15	7023.90	13.93	-13.60	-24.32	0.29	27.86	240.79
7050.00	0.47	304.62	7048.90	13.81	-13.48	-24.48	0.19	27.94	241.16
7075.00	0.36	312.17	7073.89	13.70	-13.37	-24.62	0.51	28.02	241.50
7100.00	0.34	301.95	7098.89	13.61	-13.28	-24.74	0.26	28.08	241.78
7125.00	0.51	307.81	7123.89	13.51	-13.17	-24.89	0.71	28.16	242.12
7150.00	0.46	314.70	7148.89	13.37	-13.03	-25.05	0.31	28.24	242.52
7175.00	0.38	313.22	7173.89	13.24	-12.90	-25.18	0.34	28.30	242.87
7200.00	0.45	306.27	7198.89	13.13	-12.79	-25.32	0.36	28.37	243.21
7225.00	0.39	304.82	7223.89	13.03	-12.68	-25.47	0.23	28.46	243.53
7250.00	0.53	302.92	7248.89	12.92	-12.57	-25.64	0.57	28.56	243.89

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	0.49	282.28	7273.89	12.83	-12.48	-25.84	0.75	28.70	244.22
7300.00	0.58	268.49	7298.89	12.82	-12.46	-26.08	0.63	28.90	244.45
7325.00	0.57	262.39	7323.89	12.84	-12.48	-26.33	0.25	29.14	244.63
7350.00	0.62	255.82	7348.88	12.89	-12.53	-26.58	0.32	29.39	244.76
7375.00	0.82	248.90	7373.88	12.99	-12.63	-26.88	0.87	29.70	244.83
7400.00	0.81	246.56	7398.88	13.13	-12.76	-27.21	0.14	30.05	244.87
7425.00	0.89	245.07	7423.88	13.29	-12.92	-27.54	0.36	30.42	244.88
7450.00	0.98	245.61	7448.87	13.46	-13.09	-27.91	0.34	30.83	244.88
7475.00	0.90	244.17	7473.87	13.64	-13.26	-28.28	0.31	31.24	244.88
7500.00	0.86	246.13	7498.87	13.81	-13.42	-28.63	0.20	31.62	244.89
7525.00	0.69	217.98	7523.87	14.01	-13.62	-28.90	1.65	31.94	244.77
7550.00	0.80	160.73	7548.86	14.29	-13.90	-28.93	2.88	32.10	244.34
7575.00	0.97	149.10	7573.86	14.64	-14.25	-28.77	1.01	32.10	243.65
7600.00	0.94	142.41	7598.86	14.98	-14.59	-28.53	0.47	32.05	242.92
7625.00	1.24	147.59	7623.85	15.36	-14.98	-28.26	1.29	31.99	242.07
7650.00	1.36	147.77	7648.85	15.84	-15.46	-27.96	0.46	31.95	241.06
7675.00	1.33	148.63	7673.84	16.33	-15.96	-27.65	0.13	31.93	240.01
7700.00	1.40	150.59	7698.83	16.84	-16.47	-27.35	0.33	31.93	238.94
7725.00	1.44	155.71	7723.83	17.39	-17.02	-27.07	0.53	31.98	237.84
7750.00	1.55	156.26	7748.82	17.98	-17.62	-26.81	0.44	32.08	236.69
7775.00	1.58	157.18	7773.81	18.60	-18.24	-26.54	0.17	32.20	235.49
7800.00	1.65	153.76	7798.80	19.24	-18.88	-26.24	0.48	32.33	234.26
7825.00	1.64	151.74	7823.79	19.87	-19.52	-25.92	0.24	32.45	233.01
7850.00	1.65	155.39	7848.78	20.51	-20.16	-25.60	0.42	32.58	231.77
7875.00	1.68	153.98	7873.77	21.16	-20.82	-25.29	0.20	32.75	230.53
7900.00	1.84	153.77	7898.75	21.85	-21.51	-24.95	0.62	32.94	229.23
7925.00	1.77	154.66	7923.74	22.55	-22.22	-24.61	0.27	33.15	227.92
7950.00	1.82	154.11	7948.73	23.25	-22.92	-24.27	0.21	33.38	226.63
7975.00	1.87	158.17	7973.72	23.99	-23.66	-23.94	0.56	33.66	225.34
8000.00	1.98	158.51	7998.70	24.76	-24.44	-23.63	0.44	34.00	224.03
8025.00	1.97	159.70	8023.69	25.56	-25.25	-23.32	0.17	34.37	222.73
8050.00	1.56	157.28	8048.68	26.28	-25.97	-23.04	1.66	34.72	221.59

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	0.61	158.93	8073.67	26.71	-26.40	-22.86	3.81	34.93	220.89
8100.00	0.16	127.76	8098.67	26.86	-26.55	-22.79	1.91	34.99	220.64
8125.00	0.25	6.02	8123.67	26.83	-26.52	-22.75	1.45	34.94	220.63
8150.00	0.24	350.78	8148.67	26.72	-26.41	-22.76	0.26	34.86	220.75
8175.00	0.21	356.73	8173.67	26.62	-26.31	-22.77	0.18	34.80	220.87
8200.00	0.21	346.82	8198.67	26.53	-26.22	-22.78	0.15	34.74	220.98
8225.00	0.14	307.78	8223.67	26.47	-26.16	-22.82	0.54	34.71	221.09
8250.00	0.14	230.45	8248.67	26.47	-26.16	-22.86	0.71	34.74	221.15
8275.00	0.31	215.76	8273.67	26.55	-26.24	-22.93	0.71	34.84	221.15
8300.00	0.48	218.45	8298.67	26.68	-26.37	-23.03	0.68	35.01	221.13
8325.00	0.59	209.73	8323.67	26.88	-26.57	-23.16	0.56	35.25	221.08
8350.00	0.57	205.77	8348.67	27.11	-26.79	-23.28	0.19	35.49	220.99
8375.00	0.72	216.69	8373.66	27.35	-27.03	-23.43	0.79	35.77	220.92
8400.00	0.83	213.98	8398.66	27.62	-27.31	-23.62	0.46	36.11	220.86
8425.00	0.88	212.57	8423.66	27.94	-27.62	-23.83	0.21	36.48	220.79
8450.00	1.06	219.09	8448.66	28.28	-27.96	-24.08	0.86	36.90	220.73
8475.00	1.23	216.04	8473.65	28.68	-28.35	-24.38	0.70	37.39	220.69
8500.00	1.30	225.40	8498.65	29.10	-28.77	-24.74	0.87	37.94	220.69
8525.00	1.63	229.48	8523.64	29.54	-29.20	-25.21	1.40	38.58	220.81
8543.00	1.73	231.46	8541.63	29.88	-29.54	-25.62	0.64	39.10	220.94



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COG Operating L L C

Lea County, NM (NAD27 NME)

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

Windward Federal 7H

Wellbore #1

Design: Wellbore #1

Survey Report - Geographic

30 January, 2017





Integrity Directional Services, LLC
Survey Report - Geographic



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 7H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3568.80ft (McVay #8)
Site:	Sec. 30, T 24 S., R 32 E	MD Reference:	KB=26 @ 3568.80ft (McVay #8)
Well:	Windward Federal 7H	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:		Northings:	435,165.5000 usft
From:	Map	Eastings:	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 7H		
Well Position	+N/-S	0.00 ft	Northings:
	+E/-W	0.00 ft	Eastings:
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft
		Ground Level:	3,542.80 ft
		Latitude:	32° 11' 41.669 N
		Longitude:	103° 42' 59.440 W

Wellbore	Wellbore #1		
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	1/4/2017	7.07	60.02	47,951

Design	Wellbore #1		
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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	180.78

Survey Program	Date 1/30/2017		
From (ft)	To (ft)	Survey (Wellbore)	Tool Name
100.00	8,543.00	Gyros (Wellbore #1)	Keeper
8,543.00	19,120.00	IDS MWD Surveys (Wellbore #1)	MWD
			Description
			Standard Wireline Keeper ver 1.0.2
			MWD - Standard

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.00	0.00	0.00	0.00	0.00	0.00	435,174.7000	690,807.6000	32° 11' 41.669 N	103° 42' 59.440 W	
100.00	1.27	240.27	99.99	-0.55	-0.96	435,174.1504	690,806.6376	32° 11' 41.663 N	103° 42' 59.452 W	
125.00	1.49	235.34	124.98	-0.87	-1.47	435,173.8282	690,806.1297	32° 11' 41.660 N	103° 42' 59.458 W	
150.00	1.37	239.97	149.98	-1.21	-2.00	435,173.4938	690,805.6036	32° 11' 41.657 N	103° 42' 59.464 W	
175.00	1.41	243.98	174.97	-1.49	-2.53	435,173.2093	690,805.0684	32° 11' 41.654 N	103° 42' 59.470 W	
200.00	1.46	240.92	199.96	-1.78	-3.09	435,172.9195	690,804.5137	32° 11' 41.651 N	103° 42' 59.476 W	
225.00	1.46	245.34	224.95	-2.07	-3.65	435,172.6319	690,803.9459	32° 11' 41.648 N	103° 42' 59.483 W	
250.00	1.41	243.03	249.95	-2.34	-4.22	435,172.3595	690,803.3823	32° 11' 41.646 N	103° 42' 59.490 W	
275.00	1.46	244.45	274.94	-2.62	-4.78	435,172.0826	690,802.8208	32° 11' 41.643 N	103° 42' 59.496 W	
300.00	1.63	241.46	299.93	-2.92	-5.38	435,171.7754	690,802.2211	32° 11' 41.640 N	103° 42' 59.503 W	
325.00	1.52	244.17	324.92	-3.24	-5.99	435,171.4610	690,801.6103	32° 11' 41.637 N	103° 42' 59.510 W	



Integrity Directional Services, LLC

Survey Report - Geographic



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 7H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3568.80ft (McVay #8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26 @ 3568.80ft (McVay #8)
Well:	Windward Federal 7H	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	1.52	248.16	349.91	-3.51	-6.60	435,171.1932	690,801.0041	32° 11' 41.634 N	103° 42' 59.517 W
375.00	1.47	247.18	374.90	-3.75	-7.20	435,170.9455	690,800.4008	32° 11' 41.632 N	103° 42' 59.524 W
400.00	1.50	247.36	399.89	-4.00	-7.80	435,170.6952	690,799.8032	32° 11' 41.629 N	103° 42' 59.531 W
425.00	1.50	247.82	424.89	-4.25	-8.40	435,170.4457	690,799.1982	32° 11' 41.627 N	103° 42' 59.538 W
450.00	1.45	246.63	449.88	-4.50	-9.00	435,170.1967	690,798.6049	32° 11' 41.625 N	103° 42' 59.545 W
475.00	1.49	249.45	474.87	-4.74	-9.59	435,169.9571	690,798.0102	32° 11' 41.622 N	103° 42' 59.552 W
500.00	1.44	246.10	499.86	-4.98	-10.18	435,169.7158	690,797.4186	32° 11' 41.620 N	103° 42' 59.559 W
525.00	1.44	245.34	524.85	-5.24	-10.75	435,169.4574	690,796.8460	32° 11' 41.617 N	103° 42' 59.566 W
550.00	1.48	244.15	549.84	-5.51	-11.33	435,169.1856	690,796.2699	32° 11' 41.615 N	103° 42' 59.573 W
575.00	1.53	242.33	574.84	-5.81	-11.92	435,168.8899	690,795.6838	32° 11' 41.612 N	103° 42' 59.579 W
600.00	1.53	240.49	599.83	-6.13	-12.50	435,168.5705	690,795.0978	32° 11' 41.609 N	103° 42' 59.586 W
625.00	1.42	241.30	624.82	-6.44	-13.06	435,168.2573	690,794.5356	32° 11' 41.606 N	103° 42' 59.593 W
650.00	1.45	238.13	649.81	-6.76	-13.60	435,167.9415	690,793.9953	32° 11' 41.603 N	103° 42' 59.599 W
675.00	1.54	239.93	674.80	-7.09	-14.16	435,167.6062	690,793.4359	32° 11' 41.599 N	103° 42' 59.606 W
700.00	1.65	242.22	699.79	-7.43	-14.77	435,167.2701	690,792.8268	32° 11' 41.596 N	103° 42' 59.613 W
725.00	1.54	238.20	724.78	-7.77	-15.38	435,166.9254	690,792.2228	32° 11' 41.593 N	103° 42' 59.620 W
750.00	1.57	239.35	749.77	-8.13	-15.96	435,166.5737	690,791.6427	32° 11' 41.589 N	103° 42' 59.627 W
775.00	1.56	237.52	774.76	-8.48	-16.54	435,166.2164	690,791.0610	32° 11' 41.586 N	103° 42' 59.633 W
800.00	1.61	235.55	799.75	-8.87	-17.12	435,165.8350	690,790.4843	32° 11' 41.582 N	103° 42' 59.640 W
825.00	1.64	237.56	824.74	-9.26	-17.71	435,165.4444	690,789.8928	32° 11' 41.578 N	103° 42' 59.647 W
850.00	1.43	235.18	849.74	-9.63	-18.27	435,165.0744	690,789.3348	32° 11' 41.574 N	103° 42' 59.654 W
875.00	1.47	236.78	874.73	-9.98	-18.79	435,164.7206	690,788.8104	32° 11' 41.571 N	103° 42' 59.660 W
900.00	1.47	245.35	899.72	-10.29	-19.35	435,164.4112	690,788.2507	32° 11' 41.568 N	103° 42' 59.666 W
925.00	1.49	238.10	924.71	-10.59	-19.92	435,164.1057	690,787.6833	32° 11' 41.565 N	103° 42' 59.673 W
950.00	1.39	240.36	949.70	-10.92	-20.46	435,163.7840	690,787.1438	32° 11' 41.562 N	103° 42' 59.679 W
975.00	1.24	237.55	974.70	-11.21	-20.95	435,163.4889	690,786.6520	32° 11' 41.559 N	103° 42' 59.685 W
1,000.00	1.12	244.91	999.69	-11.46	-21.40	435,163.2401	690,786.2025	32° 11' 41.556 N	103° 42' 59.690 W
1,025.00	1.10	241.69	1,024.69	-11.68	-21.83	435,163.0227	690,785.7699	32° 11' 41.554 N	103° 42' 59.695 W
1,050.00	1.14	240.04	1,049.68	-11.92	-22.26	435,162.7847	690,785.3432	32° 11' 41.552 N	103° 42' 59.700 W
1,075.00	1.20	237.40	1,074.68	-12.18	-22.69	435,162.5195	690,784.9072	32° 11' 41.549 N	103° 42' 59.705 W
1,100.00	1.10	246.75	1,099.67	-12.42	-23.13	435,162.2837	690,784.4662	32° 11' 41.547 N	103° 42' 59.710 W
1,125.00	1.12	242.69	1,124.67	-12.62	-23.57	435,162.0769	690,784.0286	32° 11' 41.545 N	103° 42' 59.716 W
1,150.00	1.01	242.75	1,149.66	-12.84	-23.98	435,161.8639	690,783.6156	32° 11' 41.543 N	103° 42' 59.720 W
1,175.00	1.12	238.96	1,174.66	-13.06	-24.39	435,161.6370	690,783.2104	32° 11' 41.541 N	103° 42' 59.725 W
1,200.00	1.16	237.38	1,199.65	-13.33	-24.81	435,161.3746	690,782.7879	32° 11' 41.538 N	103° 42' 59.730 W
1,225.00	1.15	233.71	1,224.65	-13.61	-25.23	435,161.0897	690,782.3726	32° 11' 41.535 N	103° 42' 59.735 W
1,250.00	1.02	234.81	1,249.64	-13.89	-25.61	435,160.8130	690,781.9885	32° 11' 41.533 N	103° 42' 59.739 W
1,275.00	0.85	227.16	1,274.64	-14.14	-25.93	435,160.5587	690,781.6707	32° 11' 41.530 N	103° 42' 59.743 W
1,300.00	0.23	208.28	1,299.64	-14.31	-26.09	435,160.3884	690,781.5109	32° 11' 41.528 N	103° 42' 59.745 W
1,325.00	0.55	87.80	1,324.64	-14.35	-25.99	435,160.3488	690,781.6071	32° 11' 41.528 N	103° 42' 59.744 W
1,350.00	0.57	85.45	1,349.64	-14.34	-25.75	435,160.3633	690,781.8509	32° 11' 41.528 N	103° 42' 59.741 W
1,375.00	0.66	82.16	1,374.64	-14.31	-25.48	435,160.3928	690,782.1175	32° 11' 41.529 N	103° 42' 59.738 W
1,400.00	0.77	79.26	1,399.63	-14.26	-25.17	435,160.4438	690,782.4252	32° 11' 41.529 N	103° 42' 59.734 W
1,425.00	0.78	97.81	1,424.63	-14.25	-24.84	435,160.4519	690,782.7588	32° 11' 41.529 N	103° 42' 59.730 W
1,450.00	0.69	78.20	1,449.63	-14.24	-24.53	435,160.4596	690,783.0748	32° 11' 41.529 N	103° 42' 59.727 W
1,475.00	0.59	86.31	1,474.63	-14.20	-24.25	435,160.4987	690,783.3506	32° 11' 41.529 N	103° 42' 59.724 W
1,500.00	0.67	79.66	1,499.63	-14.17	-23.98	435,160.5332	690,783.6228	32° 11' 41.530 N	103° 42' 59.720 W
1,525.00	0.60	74.80	1,524.63	-14.11	-23.71	435,160.5937	690,783.8929	32° 11' 41.530 N	103° 42' 59.717 W
1,550.00	0.63	60.80	1,549.62	-14.00	-23.46	435,160.6951	690,784.1392	32° 11' 41.531 N	103° 42' 59.714 W
1,575.00	0.65	64.13	1,574.62	-13.88	-23.21	435,160.8240	690,784.3868	32° 11' 41.533 N	103° 42' 59.711 W
1,600.00	0.66	77.63	1,599.62	-13.78	-22.94	435,160.9168	690,784.6550	32° 11' 41.534 N	103° 42' 59.708 W
1,625.00	0.78	67.02	1,624.62	-13.69	-22.65	435,161.0140	690,784.9523	32° 11' 41.534 N	103° 42' 59.705 W
1,650.00	0.83	70.32	1,649.62	-13.56	-22.32	435,161.1414	690,785.2795	32° 11' 41.536 N	103° 42' 59.701 W
1,675.00	0.75	67.94	1,674.61	-13.44	-22.00	435,161.2639	690,785.6016	32° 11' 41.537 N	103° 42' 59.697 W
1,700.00	0.85	65.56	1,699.61	-13.30	-21.68	435,161.4021	690,785.9221	32° 11' 41.538 N	103° 42' 59.694 W



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Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3568.80ft (McVay #8)
Site:	Sec. 30, T 24 S., R 32 E	MD Reference:	KB=26 @ 3568.80ft (McVay #8)
Well:	Windward Federal 7H	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	0.80	63.54	1,724.61	-13.14	-21.35	435,161.5565	690,786.2471	32° 11' 41.540 N	103° 42' 59.690 W
1,750.00	0.89	60.13	1,749.61	-12.97	-21.03	435,161.7310	690,786.5717	32° 11' 41.541 N	103° 42' 59.686 W
1,775.00	0.95	62.15	1,774.60	-12.78	-20.68	435,161.9245	690,786.9234	32° 11' 41.543 N	103° 42' 59.682 W
1,800.00	0.92	57.06	1,799.60	-12.57	-20.32	435,162.1305	690,787.2750	32° 11' 41.545 N	103° 42' 59.678 W
1,825.00	0.99	67.32	1,824.60	-12.38	-19.96	435,162.3229	690,787.6428	32° 11' 41.547 N	103° 42' 59.673 W
1,850.00	1.00	57.80	1,849.59	-12.18	-19.57	435,162.5224	690,788.0266	32° 11' 41.549 N	103° 42' 59.669 W
1,875.00	1.03	59.19	1,874.59	-11.95	-19.20	435,162.7537	690,788.4042	32° 11' 41.552 N	103° 42' 59.665 W
1,900.00	1.03	51.87	1,899.58	-11.69	-18.83	435,163.0076	690,788.7740	32° 11' 41.554 N	103° 42' 59.660 W
1,925.00	1.17	52.55	1,924.58	-11.40	-18.45	435,163.3015	690,789.1533	32° 11' 41.557 N	103° 42' 59.656 W
1,950.00	1.12	53.48	1,949.57	-11.10	-18.05	435,163.6021	690,789.5523	32° 11' 41.560 N	103° 42' 59.651 W
1,975.00	1.25	52.06	1,974.57	-10.78	-17.64	435,163.9152	690,789.9637	32° 11' 41.563 N	103° 42' 59.646 W
2,000.00	1.32	53.88	1,999.56	-10.45	-17.19	435,164.2526	690,790.4114	32° 11' 41.566 N	103° 42' 59.641 W
2,025.00	1.44	49.49	2,024.46	-10.07	-16.72	435,164.6264	690,790.8828	32° 11' 41.570 N	103° 42' 59.636 W
2,050.00	1.49	51.60	2,049.55	-9.67	-16.22	435,165.0323	690,791.3764	32° 11' 41.574 N	103° 42' 59.630 W
2,075.00	1.53	58.49	2,074.54	-9.29	-15.68	435,165.4086	690,791.9156	32° 11' 41.578 N	103° 42' 59.624 W
2,100.00	1.54	59.85	2,099.53	-8.95	-15.11	435,165.7518	690,792.4907	32° 11' 41.581 N	103° 42' 59.617 W
2,125.00	1.61	53.43	2,124.52	-8.57	-14.54	435,166.1298	690,793.0632	32° 11' 41.585 N	103° 42' 59.610 W
2,150.00	1.57	54.12	2,149.51	-8.16	-13.98	435,166.5397	690,793.6228	32° 11' 41.589 N	103° 42' 59.604 W
2,175.00	1.66	50.28	2,174.50	-7.73	-13.42	435,166.9719	690,794.1788	32° 11' 41.593 N	103° 42' 59.597 W
2,200.00	1.52	53.42	2,199.49	-7.30	-12.88	435,167.4009	690,794.7236	32° 11' 41.597 N	103° 42' 59.591 W
2,225.00	1.77	52.88	2,224.48	-6.87	-12.30	435,167.8315	690,795.2977	32° 11' 41.601 N	103° 42' 59.584 W
2,250.00	1.75	57.23	2,249.47	-6.43	-11.67	435,168.2711	690,795.9265	32° 11' 41.606 N	103° 42' 59.577 W
2,275.00	1.79	55.99	2,274.46	-6.00	-11.03	435,168.6961	690,796.5712	32° 11' 41.610 N	103° 42' 59.569 W
2,300.00	1.76	58.21	2,299.45	-5.58	-10.38	435,169.1167	690,797.2211	32° 11' 41.614 N	103° 42' 59.562 W
2,325.00	1.22	57.84	2,324.44	-5.24	-9.83	435,169.4607	690,797.7728	32° 11' 41.617 N	103° 42' 59.555 W
2,350.00	1.28	55.83	2,349.43	-4.94	-9.37	435,169.7591	690,798.2291	32° 11' 41.620 N	103° 42' 59.550 W
2,375.00	1.28	56.32	2,374.42	-4.63	-8.91	435,170.0708	690,798.6925	32° 11' 41.623 N	103° 42' 59.544 W
2,400.00	1.32	56.14	2,399.42	-4.31	-8.44	435,170.3861	690,799.1640	32° 11' 41.626 N	103° 42' 59.539 W
2,425.00	1.25	57.17	2,424.41	-4.01	-7.97	435,170.6944	690,799.6322	32° 11' 41.629 N	103° 42' 59.533 W
2,450.00	1.35	59.54	2,449.41	-3.71	-7.48	435,170.9915	690,800.1152	32° 11' 41.632 N	103° 42' 59.528 W
2,475.00	1.38	54.58	2,474.40	-3.38	-6.99	435,171.3153	690,800.6144	32° 11' 41.636 N	103° 42' 59.522 W
2,500.00	1.42	51.11	2,499.39	-3.02	-6.50	435,171.6842	690,801.1008	32° 11' 41.639 N	103° 42' 59.516 W
2,525.00	1.56	57.73	2,524.38	-2.64	-5.97	435,172.0604	690,801.6296	32° 11' 41.643 N	103° 42' 59.510 W
2,550.00	1.43	55.19	2,549.37	-2.28	-5.43	435,172.4202	690,802.1735	32° 11' 41.646 N	103° 42' 59.504 W
2,575.00	1.31	55.99	2,574.37	-1.94	-4.93	435,172.7581	690,802.6665	32° 11' 41.650 N	103° 42' 59.498 W
2,600.00	0.88	52.24	2,599.36	-1.66	-4.54	435,173.0355	690,803.0552	32° 11' 41.652 N	103° 42' 59.493 W
2,625.00	0.64	60.47	2,624.36	-1.48	-4.27	435,173.2219	690,803.3284	32° 11' 41.654 N	103° 42' 59.490 W
2,650.00	0.69	43.44	2,649.36	-1.30	-4.05	435,173.4000	690,803.5534	32° 11' 41.656 N	103° 42' 59.488 W
2,675.00	0.65	47.05	2,674.36	-1.09	-3.84	435,173.6059	690,803.7607	32° 11' 41.658 N	103° 42' 59.485 W
2,700.00	0.75	55.76	2,699.36	-0.91	-3.60	435,173.7946	690,803.9998	32° 11' 41.660 N	103° 42' 59.482 W
2,725.00	0.84	51.50	2,724.35	-0.70	-3.32	435,174.0007	690,804.2785	32° 11' 41.662 N	103° 42' 59.479 W
2,750.00	0.75	48.18	2,749.35	-0.48	-3.06	435,174.2239	690,804.5438	32° 11' 41.664 N	103° 42' 59.476 W
2,775.00	0.92	49.33	2,774.35	-0.24	-2.78	435,174.4638	690,804.8180	32° 11' 41.666 N	103° 42' 59.473 W
2,800.00	1.02	53.11	2,799.34	0.03	-2.45	435,174.7282	690,805.1482	32° 11' 41.669 N	103° 42' 59.469 W
2,825.00	1.24	55.18	2,824.34	0.32	-2.05	435,175.0162	690,805.5482	32° 11' 41.672 N	103° 42' 59.464 W
2,850.00	1.19	63.40	2,849.33	0.59	-1.60	435,175.2869	690,806.0024	32° 11' 41.675 N	103° 42' 59.459 W
2,875.00	1.25	60.50	2,874.33	0.84	-1.13	435,175.5374	690,806.4719	32° 11' 41.677 N	103° 42' 59.453 W
2,900.00	1.17	64.51	2,899.32	1.08	-0.66	435,175.7815	690,806.9396	32° 11' 41.679 N	103° 42' 59.448 W
2,925.00	1.13	61.79	2,924.32	1.31	-0.21	435,176.0079	690,807.3872	32° 11' 41.682 N	103° 42' 59.443 W
2,950.00	1.04	63.89	2,949.31	1.52	0.21	435,176.2243	690,807.8082	32° 11' 41.684 N	103° 42' 59.438 W
2,975.00	0.65	64.98	2,974.31	1.68	0.54	435,176.3841	690,808.1404	32° 11' 41.685 N	103° 42' 59.434 W
3,000.00	0.14	20.42	2,999.31	1.77	0.68	435,176.4727	690,808.2795	32° 11' 41.686 N	103° 42' 59.432 W
3,025.00	0.23	285.67	3,024.31	1.81	0.64	435,176.5149	690,808.2419	32° 11' 41.687 N	103° 42' 59.433 W
3,050.00	0.50	277.92	3,049.31	1.84	0.49	435,176.5434	690,808.0855	32° 11' 41.687 N	103° 42' 59.435 W
3,075.00	0.62	269.20	3,074.31	1.86	0.24	435,176.5566	690,807.8422	32° 11' 41.687 N	103° 42' 59.437 W



Integrity Directional Services, LLC
Survey Report - Geographic



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 7H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3568.80ft (McVay #8)
Site:	Sec. 30, T 24 S., R 32 E	MD Reference:	KB=26 @ 3568.80ft (McVay #8)
Well:	Windward Federal 7H	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	0.56	278.09	3,099.31	1.87	-0.01	435,176.5719	690,807.5860	32° 11' 41.687 N	103° 42' 59.440 W
3,125.00	0.48	282.88	3,124.31	1.91	-0.24	435,176.6124	690,807.3630	32° 11' 41.688 N	103° 42' 59.443 W
3,150.00	0.42	275.03	3,149.30	1.94	-0.43	435,176.6438	690,807.1696	32° 11' 41.688 N	103° 42' 59.445 W
3,175.00	0.51	276.29	3,174.30	1.96	-0.63	435,176.6640	690,806.9678	32° 11' 41.688 N	103° 42' 59.448 W
3,200.00	0.51	294.17	3,199.30	2.02	-0.84	435,176.7218	690,806.7557	32° 11' 41.689 N	103° 42' 59.450 W
3,225.00	0.50	285.51	3,224.30	2.10	-1.05	435,176.7965	690,806.5491	32° 11' 41.689 N	103° 42' 59.452 W
3,250.00	0.39	278.63	3,249.30	2.14	-1.24	435,176.8384	690,806.3598	32° 11' 41.690 N	103° 42' 59.455 W
3,275.00	0.38	290.77	3,274.30	2.18	-1.40	435,176.8806	690,806.1982	32° 11' 41.690 N	103° 42' 59.457 W
3,300.00	0.44	290.53	3,299.30	2.24	-1.57	435,176.9437	690,806.0308	32° 11' 41.691 N	103° 42' 59.459 W
3,325.00	0.50	294.42	3,324.30	2.32	-1.76	435,177.0224	690,805.8416	32° 11' 41.692 N	103° 42' 59.461 W
3,350.00	0.34	301.54	3,349.30	2.41	-1.92	435,177.1063	690,805.6790	32° 11' 41.693 N	103° 42' 59.463 W
3,375.00	0.46	284.58	3,374.30	2.47	-2.08	435,177.1704	690,805.5187	32° 11' 41.693 N	103° 42' 59.464 W
3,400.00	0.34	301.08	3,399.30	2.53	-2.24	435,177.2339	690,805.3580	32° 11' 41.694 N	103° 42' 59.466 W
3,425.00	0.46	294.21	3,424.30	2.61	-2.40	435,177.3134	690,805.2030	32° 11' 41.695 N	103° 42' 59.468 W
3,450.00	0.48	293.17	3,449.30	2.70	-2.58	435,177.3957	690,805.0152	32° 11' 41.695 N	103° 42' 59.470 W
3,475.00	0.42	309.97	3,474.29	2.80	-2.75	435,177.4958	690,804.8487	32° 11' 41.696 N	103° 42' 59.472 W
3,500.00	0.49	311.62	3,499.29	2.93	-2.90	435,177.6257	690,804.6985	32° 11' 41.698 N	103° 42' 59.474 W
3,525.00	0.41	332.98	3,524.29	3.08	-3.02	435,177.7764	690,804.5780	32° 11' 41.699 N	103° 42' 59.475 W
3,550.00	0.44	325.25	3,549.29	3.23	-3.12	435,177.9349	690,804.4826	32° 11' 41.701 N	103° 42' 59.476 W
3,575.00	0.39	313.40	3,574.29	3.37	-3.23	435,178.0722	690,804.3661	32° 11' 41.702 N	103° 42' 59.478 W
3,600.00	0.44	320.55	3,599.29	3.50	-3.36	435,178.2048	690,804.2433	32° 11' 41.704 N	103° 42' 59.479 W
3,625.00	0.48	326.75	3,624.29	3.67	-3.48	435,178.3665	690,804.1249	32° 11' 41.705 N	103° 42' 59.481 W
3,650.00	0.43	336.72	3,649.29	3.84	-3.57	435,178.5403	690,804.0304	32° 11' 41.707 N	103° 42' 59.482 W
3,675.00	0.49	354.54	3,674.29	4.03	-3.62	435,178.7329	690,803.9831	32° 11' 41.709 N	103° 42' 59.482 W
3,700.00	0.45	338.75	3,699.29	4.23	-3.66	435,178.9308	690,803.9374	32° 11' 41.711 N	103° 42' 59.483 W
3,725.00	0.36	353.26	3,724.29	4.40	-3.71	435,179.1003	690,803.8926	32° 11' 41.712 N	103° 42' 59.483 W
3,750.00	0.46	341.14	3,749.29	4.57	-3.75	435,179.2732	690,803.8509	32° 11' 41.714 N	103° 42' 59.484 W
3,775.00	0.48	356.07	3,774.29	4.77	-3.79	435,179.4727	690,803.8113	32° 11' 41.716 N	103° 42' 59.484 W
3,800.00	0.54	3.91	3,799.28	4.99	-3.79	435,179.6947	690,803.8122	32° 11' 41.718 N	103° 42' 59.484 W
3,825.00	0.63	356.93	3,824.28	5.25	-3.79	435,179.9495	690,803.8128	32° 11' 41.721 N	103° 42' 59.484 W
3,850.00	0.53	5.82	3,849.28	5.50	-3.78	435,180.2017	690,803.8172	32° 11' 41.723 N	103° 42' 59.484 W
3,875.00	0.55	27.04	3,874.28	5.72	-3.72	435,180.4236	690,803.8835	32° 11' 41.725 N	103° 42' 59.483 W
3,900.00	0.59	29.81	3,899.28	5.94	-3.60	435,180.6422	690,804.0020	32° 11' 41.728 N	103° 42' 59.482 W
3,925.00	0.67	34.53	3,924.28	6.17	-3.45	435,180.8743	690,804.1489	32° 11' 41.730 N	103° 42' 59.480 W
3,950.00	0.58	35.40	3,949.28	6.40	-3.29	435,181.0978	690,804.3050	32° 11' 41.732 N	103° 42' 59.478 W
3,975.00	0.67	41.09	3,974.28	6.61	-3.13	435,181.3112	690,804.4744	32° 11' 41.734 N	103° 42' 59.476 W
4,000.00	0.66	41.09	3,999.27	6.83	-2.93	435,181.5298	690,804.6651	32° 11' 41.736 N	103° 42' 59.474 W
4,025.00	0.80	52.75	4,024.27	7.04	-2.70	435,181.7440	690,804.8986	32° 11' 41.738 N	103° 42' 59.471 W
4,050.00	0.87	55.06	4,049.27	7.26	-2.41	435,181.9583	690,805.1931	32° 11' 41.741 N	103° 42' 59.468 W
4,075.00	0.79	55.38	4,074.27	7.46	-2.11	435,182.1650	690,805.4906	32° 11' 41.743 N	103° 42' 59.464 W
4,100.00	0.86	49.92	4,099.26	7.68	-1.82	435,182.3837	690,805.7759	32° 11' 41.745 N	103° 42' 59.461 W
4,125.00	0.96	61.15	4,124.26	7.91	-1.50	435,182.6055	690,806.1029	32° 11' 41.747 N	103° 42' 59.457 W
4,150.00	1.00	60.99	4,149.26	8.11	-1.12	435,182.8124	690,806.4771	32° 11' 41.749 N	103° 42' 59.453 W
4,175.00	0.99	63.69	4,174.25	8.31	-0.74	435,183.0139	690,806.8615	32° 11' 41.751 N	103° 42' 59.448 W
4,200.00	0.83	70.58	4,199.25	8.47	-0.37	435,183.1698	690,807.2259	32° 11' 41.752 N	103° 42' 59.444 W
4,225.00	0.91	77.59	4,224.25	8.57	-0.01	435,183.2727	690,807.5906	32° 11' 41.753 N	103° 42' 59.440 W
4,250.00	0.99	75.70	4,249.24	8.67	0.39	435,183.3687	690,807.9937	32° 11' 41.754 N	103° 42' 59.435 W
4,275.00	1.03	85.98	4,274.24	8.74	0.83	435,183.4378	690,808.4272	32° 11' 41.755 N	103° 42' 59.430 W
4,300.00	1.04	89.59	4,299.24	8.76	1.28	435,183.4552	690,808.8782	32° 11' 41.755 N	103° 42' 59.425 W
4,325.00	1.09	93.16	4,324.23	8.74	1.74	435,183.4437	690,809.3425	32° 11' 41.755 N	103° 42' 59.420 W
4,350.00	0.97	93.59	4,349.23	8.72	2.19	435,183.4173	690,809.7911	32° 11' 41.755 N	103° 42' 59.414 W
4,375.00	0.70	101.85	4,374.23	8.67	2.55	435,183.3727	690,810.1517	32° 11' 41.754 N	103° 42' 59.410 W
4,400.00	0.48	143.82	4,399.22	8.56	2.76	435,183.2568	690,810.3630	32° 11' 41.753 N	103° 42' 59.408 W
4,425.00	0.41	189.56	4,424.22	8.38	2.81	435,183.0841	690,810.4100	32° 11' 41.751 N	103° 42' 59.407 W
4,450.00	0.53	193.46	4,449.22	8.18	2.77	435,182.8834	690,810.3682	32° 11' 41.749 N	103° 42' 59.408 W



Integrity Directional Services, LLC
Survey Report - Geographic



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 7H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3568.80ft (McVay #8)
Site:	Sec. 30, T 24 S., R 32 E	MD Reference:	KB=26 @ 3568.80ft (McVay #8)
Well:	Windward Federal 7H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Mult 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	0.58	197.62	4,474.22	7.95	2.70	435,182.6504	690,810.3030	32° 11' 41.747 N	103° 42' 59.408 W
4,500.00	0.60	193.33	4,499.22	7.70	2.63	435,182.4024	690,810.2345	32° 11' 41.745 N	103° 42' 59.409 W
4,525.00	0.68	203.94	4,524.22	7.44	2.54	435,182.1395	690,810.1441	32° 11' 41.742 N	103° 42' 59.410 W
4,550.00	0.56	207.72	4,549.22	7.20	2.43	435,181.8957	690,810.0271	32° 11' 41.740 N	103° 42' 59.412 W
4,575.00	0.46	206.55	4,574.22	7.00	2.33	435,181.6978	690,809.9254	32° 11' 41.738 N	103° 42' 59.413 W
4,600.00	0.44	212.47	4,599.21	6.83	2.23	435,181.5271	690,809.8290	32° 11' 41.736 N	103° 42' 59.414 W
4,625.00	0.46	193.95	4,624.21	6.65	2.15	435,181.3487	690,809.7533	32° 11' 41.734 N	103° 42' 59.415 W
4,650.00	0.47	197.14	4,649.21	6.45	2.10	435,181.1533	690,809.6989	32° 11' 41.732 N	103° 42' 59.416 W
4,675.00	0.51	196.61	4,674.21	6.25	2.04	435,180.9487	690,809.6369	32° 11' 41.730 N	103° 42' 59.416 W
4,700.00	0.52	208.94	4,699.21	6.04	1.95	435,180.7428	690,809.5502	32° 11' 41.728 N	103° 42' 59.417 W
4,725.00	0.50	195.41	4,724.21	5.84	1.87	435,180.5384	690,809.4663	32° 11' 41.726 N	103° 42' 59.418 W
4,750.00	0.43	198.52	4,749.21	5.64	1.81	435,180.3442	690,809.4075	32° 11' 41.724 N	103° 42' 59.419 W
4,775.00	0.54	200.23	4,774.21	5.44	1.74	435,180.1448	690,809.3370	32° 11' 41.722 N	103° 42' 59.420 W
4,800.00	0.45	204.94	4,799.21	5.25	1.65	435,179.9452	690,809.2548	32° 11' 41.720 N	103° 42' 59.421 W
4,825.00	0.43	215.21	4,824.21	5.08	1.56	435,179.7795	690,809.1594	32° 11' 41.719 N	103° 42' 59.422 W
4,850.00	0.41	196.90	4,849.21	4.92	1.48	435,179.6173	690,809.0793	32° 11' 41.717 N	103° 42' 59.423 W
4,875.00	0.48	200.49	4,874.21	4.73	1.42	435,179.4336	690,809.0166	32° 11' 41.715 N	103° 42' 59.424 W
4,900.00	0.46	195.58	4,899.20	4.54	1.35	435,179.2389	690,808.9530	32° 11' 41.713 N	103° 42' 59.424 W
4,925.00	0.44	199.63	4,924.20	4.35	1.29	435,179.0518	690,808.8938	32° 11' 41.712 N	103° 42' 59.425 W
4,950.00	0.48	196.79	4,949.20	4.16	1.23	435,178.8611	690,808.8313	32° 11' 41.710 N	103° 42' 59.426 W
4,975.00	0.59	195.05	4,974.20	3.94	1.17	435,178.6366	690,808.7676	32° 11' 41.708 N	103° 42' 59.427 W
5,000.00	0.43	200.67	4,999.20	3.72	1.10	435,178.4245	690,808.7011	32° 11' 41.705 N	103° 42' 59.427 W
5,025.00	0.47	201.75	5,024.20	3.54	1.03	435,178.2415	690,808.6300	32° 11' 41.704 N	103° 42' 59.428 W
5,050.00	0.44	203.32	5,049.20	3.36	0.95	435,178.0581	690,808.5540	32° 11' 41.702 N	103° 42' 59.429 W
5,075.00	0.37	204.69	5,074.20	3.20	0.88	435,177.8966	690,808.4823	32° 11' 41.700 N	103° 42' 59.430 W
5,100.00	0.46	197.69	5,099.20	3.03	0.82	435,177.7276	690,808.4181	32° 11' 41.699 N	103° 42' 59.431 W
5,125.00	0.51	204.37	5,124.20	2.83	0.74	435,177.5307	690,808.3417	32° 11' 41.697 N	103° 42' 59.432 W
5,150.00	0.54	197.28	5,149.20	2.62	0.66	435,177.3168	690,808.2607	32° 11' 41.694 N	103° 42' 59.433 W
5,175.00	0.54	196.41	5,174.20	2.39	0.59	435,177.0913	690,808.1925	32° 11' 41.692 N	103° 42' 59.433 W
5,200.00	0.56	199.03	5,199.19	2.16	0.52	435,176.8628	690,808.1194	32° 11' 41.690 N	103° 42' 59.434 W
5,225.00	0.66	195.40	5,224.19	1.91	0.44	435,176.6085	690,808.0413	32° 11' 41.687 N	103° 42' 59.435 W
5,250.00	0.75	206.44	5,249.19	1.62	0.33	435,176.3232	690,807.9302	32° 11' 41.685 N	103° 42' 59.436 W
5,275.00	0.53	202.14	5,274.19	1.37	0.21	435,176.0696	690,807.8138	32° 11' 41.682 N	103° 42' 59.438 W
5,300.00	0.68	204.95	5,299.19	1.13	0.11	435,175.8280	690,807.7076	32° 11' 41.680 N	103° 42' 59.439 W
5,325.00	0.68	192.17	5,324.19	0.85	0.01	435,175.5485	690,807.6138	32° 11' 41.677 N	103° 42' 59.440 W
5,350.00	0.62	196.70	5,349.18	0.57	-0.06	435,175.2739	690,807.5436	32° 11' 41.674 N	103° 42' 59.441 W
5,375.00	0.81	200.22	5,374.18	0.28	-0.16	435,174.9785	690,807.4437	32° 11' 41.671 N	103° 42' 59.442 W
5,400.00	0.76	204.00	5,399.18	-0.04	-0.28	435,174.6612	690,807.3152	32° 11' 41.668 N	103° 42' 59.444 W
5,425.00	0.79	210.08	5,424.18	-0.34	-0.44	435,174.3606	690,807.1613	32° 11' 41.665 N	103° 42' 59.446 W
5,450.00	0.94	216.84	5,449.18	-0.65	-0.65	435,174.0474	690,806.9520	32° 11' 41.662 N	103° 42' 59.448 W
5,475.00	0.86	213.04	5,474.17	-0.97	-0.87	435,173.7260	690,806.7268	32° 11' 41.659 N	103° 42' 59.451 W
5,500.00	0.79	213.57	5,499.17	-1.27	-1.07	435,173.4251	690,806.5292	32° 11' 41.656 N	103° 42' 59.453 W
5,525.00	0.88	214.29	5,524.17	-1.58	-1.27	435,173.1229	690,806.3257	32° 11' 41.653 N	103° 42' 59.455 W
5,550.00	1.21	218.40	5,549.16	-1.94	-1.55	435,172.7574	690,806.0536	32° 11' 41.650 N	103° 42' 59.459 W
5,575.00	0.86	215.89	5,574.16	-2.30	-1.82	435,172.3986	690,805.7796	32° 11' 41.646 N	103° 42' 59.462 W
5,600.00	0.97	219.02	5,599.16	-2.62	-2.06	435,172.0822	690,805.5364	32° 11' 41.643 N	103° 42' 59.465 W
5,625.00	1.02	231.83	5,624.15	-2.92	-2.37	435,171.7802	690,805.2283	32° 11' 41.640 N	103° 42' 59.468 W
5,650.00	0.92	217.14	5,649.15	-3.22	-2.67	435,171.4827	690,804.9322	32° 11' 41.637 N	103° 42' 59.472 W
5,675.00	0.94	220.43	5,674.14	-3.53	-2.92	435,171.1666	690,804.6780	32° 11' 41.634 N	103° 42' 59.475 W
5,700.00	0.93	218.28	5,699.14	-3.85	-3.18	435,170.8513	690,804.4193	32° 11' 41.631 N	103° 42' 59.478 W
5,725.00	0.85	221.99	5,724.14	-4.15	-3.43	435,170.5542	690,804.1696	32° 11' 41.628 N	103° 42' 59.481 W
5,750.00	0.99	220.75	5,749.14	-4.45	-3.70	435,170.2528	690,803.9045	32° 11' 41.625 N	103° 42' 59.484 W
5,775.00	1.01	222.60	5,774.13	-4.77	-3.99	435,169.9270	690,803.6144	32° 11' 41.622 N	103° 42' 59.487 W
5,800.00	0.99	220.22	5,799.13	-5.10	-4.27	435,169.5999	690,803.3258	32° 11' 41.618 N	103° 42' 59.490 W
5,825.00	0.87	228.57	5,824.12	-5.39	-4.56	435,169.3094	690,803.0440	32° 11' 41.616 N	103° 42' 59.494 W



Integrity Directional Services, LLC
Survey Report - Geographic



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 7H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3568.80ft (McVay #8)
Site:	Sec. 30, T 24 S. , R 32 E	MD Reference:	KB=26 @ 3568.80ft (McVay #8)
Well:	Windward Federal 7H	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	0.96	231.53	5,849.12	-5.65	-4.86	435,169.0535	690,802.7378	32° 11' 41.613 N	103° 42' 59.497 W	
5,875.00	0.80	221.75	5,874.12	-5.91	-5.14	435,168.7930	690,802.4576	32° 11' 41.610 N	103° 42' 59.501 W	
5,900.00	0.83	223.52	5,899.12	-6.17	-5.38	435,168.5315	690,802.2167	32° 11' 41.608 N	103° 42' 59.503 W	
5,925.00	0.85	220.52	5,924.11	-6.44	-5.63	435,168.2592	690,801.9715	32° 11' 41.605 N	103° 42' 59.506 W	
5,950.00	0.85	234.88	5,949.11	-6.69	-5.90	435,168.0116	690,801.6994	32° 11' 41.603 N	103° 42' 59.510 W	
5,975.00	0.82	222.82	5,974.11	-6.93	-6.17	435,167.7737	690,801.4261	32° 11' 41.600 N	103° 42' 59.513 W	
6,000.00	0.86	230.12	5,999.10	-7.18	-6.44	435,167.5222	690,801.1605	32° 11' 41.598 N	103° 42' 59.516 W	
6,025.00	0.87	235.96	6,024.10	-7.40	-6.74	435,167.2956	690,800.8593	32° 11' 41.596 N	103° 42' 59.519 W	
6,050.00	0.86	225.13	6,049.10	-7.64	-7.03	435,167.0570	690,800.5690	32° 11' 41.593 N	103° 42' 59.523 W	
6,075.00	0.95	227.00	6,074.10	-7.92	-7.32	435,166.7833	690,800.2845	32° 11' 41.591 N	103° 42' 59.526 W	
6,100.00	0.88	225.61	6,099.09	-8.19	-7.60	435,166.5077	690,799.9958	32° 11' 41.588 N	103° 42' 59.529 W	
6,125.00	0.89	227.79	6,124.09	-8.46	-7.89	435,166.2429	690,799.7148	32° 11' 41.585 N	103° 42' 59.533 W	
6,150.00	1.02	229.43	6,149.09	-8.73	-8.20	435,165.9678	690,799.4019	32° 11' 41.583 N	103° 42' 59.537 W	
6,175.00	0.83	227.69	6,174.08	-9.00	-8.50	435,165.7012	690,799.0990	32° 11' 41.580 N	103° 42' 59.540 W	
6,200.00	0.90	227.18	6,199.08	-9.25	-8.78	435,165.4458	690,798.8211	32° 11' 41.578 N	103° 42' 59.543 W	
6,225.00	0.98	232.41	6,224.08	-9.52	-9.09	435,165.1820	690,798.5076	32° 11' 41.575 N	103° 42' 59.547 W	
6,250.00	0.90	240.86	6,249.07	-9.74	-9.43	435,164.9559	690,798.1667	32° 11' 41.573 N	103° 42' 59.551 W	
6,275.00	1.00	233.96	6,274.07	-9.97	-9.78	435,164.7320	690,797.8189	32° 11' 41.571 N	103° 42' 59.555 W	
6,300.00	1.04	243.69	6,299.07	-10.20	-10.16	435,164.5031	690,797.4391	32° 11' 41.568 N	103° 42' 59.559 W	
6,325.00	0.95	240.42	6,324.06	-10.40	-10.54	435,164.3002	690,797.0555	32° 11' 41.566 N	103° 42' 59.564 W	
6,350.00	1.15	237.97	6,349.06	-10.64	-10.94	435,164.0648	690,796.6625	32° 11' 41.564 N	103° 42' 59.568 W	
6,375.00	1.08	240.33	6,374.05	-10.88	-11.35	435,163.8152	690,796.2451	32° 11' 41.562 N	103° 42' 59.573 W	
6,400.00	1.19	243.69	6,399.05	-11.12	-11.79	435,163.5835	690,795.8077	32° 11' 41.559 N	103° 42' 59.578 W	
6,425.00	1.11	240.21	6,424.04	-11.35	-12.24	435,163.3481	690,795.3649	32° 11' 41.557 N	103° 42' 59.584 W	
6,450.00	1.09	237.63	6,449.04	-11.60	-12.65	435,163.1005	690,794.9539	32° 11' 41.555 N	103° 42' 59.588 W	
6,475.00	1.22	248.54	6,474.03	-11.82	-13.09	435,162.8758	690,794.5053	32° 11' 41.552 N	103° 42' 59.594 W	
6,500.00	1.12	245.49	6,499.03	-12.02	-13.56	435,162.6771	690,794.0353	32° 11' 41.550 N	103° 42' 59.599 W	
6,525.00	1.19	247.83	6,524.02	-12.22	-14.03	435,162.4778	690,793.5726	32° 11' 41.548 N	103° 42' 59.604 W	
6,550.00	1.12	243.66	6,549.02	-12.43	-14.49	435,162.2714	690,793.1133	32° 11' 41.546 N	103° 42' 59.610 W	
6,575.00	1.14	242.58	6,574.01	-12.65	-14.93	435,162.0485	690,792.6735	32° 11' 41.544 N	103° 42' 59.615 W	
6,600.00	1.19	246.55	6,599.01	-12.87	-15.39	435,161.8306	690,792.2146	32° 11' 41.542 N	103° 42' 59.620 W	
6,625.00	1.23	247.81	6,624.00	-13.07	-15.87	435,161.6260	690,791.7280	32° 11' 41.540 N	103° 42' 59.626 W	
6,650.00	1.19	247.36	6,649.00	-13.28	-16.36	435,161.4247	690,791.2400	32° 11' 41.538 N	103° 42' 59.632 W	
6,675.00	1.24	252.06	6,673.99	-13.46	-16.86	435,161.2415	690,790.7430	32° 11' 41.536 N	103° 42' 59.637 W	
6,700.00	1.17	251.33	6,698.99	-13.62	-17.36	435,161.0764	690,790.2439	32° 11' 41.535 N	103° 42' 59.643 W	
6,725.00	1.32	254.91	6,723.98	-13.78	-17.88	435,160.9198	690,789.7240	32° 11' 41.533 N	103° 42' 59.649 W	
6,750.00	1.36	258.56	6,748.97	-13.91	-18.44	435,160.7860	690,789.1552	32° 11' 41.532 N	103° 42' 59.656 W	
6,775.00	1.46	258.62	6,773.97	-14.04	-19.05	435,160.6643	690,788.5522	32° 11' 41.531 N	103° 42' 59.663 W	
6,800.00	1.53	262.90	6,798.96	-14.14	-19.69	435,160.5602	690,787.9088	32° 11' 41.530 N	103° 42' 59.670 W	
6,825.00	1.59	265.78	6,823.95	-14.21	-20.37	435,160.4934	690,787.2317	32° 11' 41.529 N	103° 42' 59.678 W	
6,850.00	1.62	272.32	6,848.94	-14.22	-21.07	435,160.4822	690,786.5327	32° 11' 41.529 N	103° 42' 59.687 W	
6,875.00	1.76	273.10	6,873.93	-14.18	-21.80	435,160.5173	690,785.7963	32° 11' 41.530 N	103° 42' 59.695 W	
6,900.00	1.84	278.47	6,898.92	-14.10	-22.58	435,160.5971	690,785.0159	32° 11' 41.530 N	103° 42' 59.704 W	
6,925.00	1.54	277.01	6,923.90	-14.00	-23.31	435,160.6972	690,784.2855	32° 11' 41.531 N	103° 42' 59.713 W	
6,950.00	0.71	299.50	6,948.90	-13.89	-23.78	435,160.8145	690,783.8173	32° 11' 41.533 N	103° 42' 59.718 W	
6,975.00	0.38	287.78	6,973.90	-13.78	-24.00	435,160.9161	690,783.6035	32° 11' 41.534 N	103° 42' 59.721 W	
7,000.00	0.45	299.96	6,998.90	-13.71	-24.16	435,160.9905	690,783.4395	32° 11' 41.534 N	103° 42' 59.722 W	
7,025.00	0.44	309.15	7,023.90	-13.60	-24.32	435,161.1001	690,783.2800	32° 11' 41.535 N	103° 42' 59.724 W	
7,050.00	0.47	304.62	7,048.90	-13.48	-24.48	435,161.2189	690,783.1212	32° 11' 41.537 N	103° 42' 59.726 W	
7,075.00	0.36	312.17	7,073.90	-13.37	-24.62	435,161.3299	690,782.9786	32° 11' 41.538 N	103° 42' 59.728 W	
7,100.00	0.34	301.95	7,098.89	-13.28	-24.74	435,161.4219	690,782.8575	32° 11' 41.539 N	103° 42' 59.729 W	
7,125.00	0.51	307.81	7,123.89	-13.17	-24.89	435,161.5294	690,782.7066	32° 11' 41.540 N	103° 42' 59.731 W	
7,150.00	0.46	314.70	7,148.89	-13.03	-25.05	435,161.6682	690,782.5474	32° 11' 41.541 N	103° 42' 59.733 W	
7,175.00	0.38	313.22	7,173.89	-12.90	-25.18	435,161.7955	690,782.4157	32° 11' 41.542 N	103° 42' 59.734 W	
7,200.00	0.45	306.27	7,198.89	-12.79	-25.32	435,161.9104	690,782.2761	32° 11' 41.544 N	103° 42' 59.736 W	



Integrity Directional Services, LLC
Survey Report - Geographic



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 7H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3568.80ft (McVay #8)
Site:	Sec. 30, T 24 S., R 32 E	MD Reference:	KB=26 @ 3568.80ft (McVay #8)
Well:	Windward Federal 7H	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	0.39	304.82	7,223.89	-12.68	-25.47	435,162.0170	690,782.1271	32° 11' 41.545 N	103° 42' 59.738 W	
7,250.00	0.53	302.92	7,248.89	-12.57	-25.64	435,162.1285	690,781.9602	32° 11' 41.546 N	103° 42' 59.740 W	
7,275.00	0.49	282.28	7,273.89	-12.49	-25.84	435,162.2140	690,781.7587	32° 11' 41.547 N	103° 42' 59.742 W	
7,300.00	0.58	268.49	7,298.89	-12.47	-26.07	435,162.2334	690,781.5277	32° 11' 41.547 N	103° 42' 59.745 W	
7,325.00	0.57	262.39	7,323.89	-12.49	-26.32	435,162.2136	690,781.2780	32° 11' 41.547 N	103° 42' 59.748 W	
7,350.00	0.62	255.82	7,348.89	-12.54	-26.58	435,162.1640	690,781.0236	32° 11' 41.546 N	103° 42' 59.751 W	
7,375.00	0.82	248.90	7,373.88	-12.63	-26.87	435,162.0665	690,780.7255	32° 11' 41.545 N	103° 42' 59.754 W	
7,400.00	0.81	246.56	7,398.88	-12.77	-27.20	435,161.9318	690,780.3965	32° 11' 41.544 N	103° 42' 59.758 W	
7,425.00	0.89	245.07	7,423.88	-12.92	-27.54	435,161.7797	690,780.0583	32° 11' 41.542 N	103° 42' 59.762 W	
7,450.00	0.98	245.61	7,448.88	-13.09	-27.91	435,161.6095	690,779.6876	32° 11' 41.541 N	103° 42' 59.766 W	
7,475.00	0.90	244.17	7,473.87	-13.26	-28.28	435,161.4357	690,779.3161	32° 11' 41.539 N	103° 42' 59.770 W	
7,500.00	0.86	246.13	7,498.87	-13.43	-28.63	435,161.2742	690,778.9678	32° 11' 41.537 N	103° 42' 59.774 W	
7,525.00	0.69	217.98	7,523.87	-13.62	-28.90	435,161.0797	690,778.7036	32° 11' 41.535 N	103° 42' 59.778 W	
7,550.00	0.80	160.73	7,548.86	-13.90	-28.93	435,160.7963	690,778.6686	32° 11' 41.533 N	103° 42' 59.778 W	
7,575.00	0.97	149.10	7,573.86	-14.25	-28.77	435,160.4499	690,778.8348	32° 11' 41.529 N	103° 42' 59.776 W	
7,600.00	0.94	142.41	7,598.86	-14.59	-28.53	435,160.1059	690,779.0686	32° 11' 41.526 N	103° 42' 59.773 W	
7,625.00	1.24	147.59	7,623.85	-14.99	-28.26	435,159.7150	690,779.3387	32° 11' 41.522 N	103° 42' 59.770 W	
7,650.00	1.36	147.77	7,648.85	-15.46	-27.96	435,159.2357	690,779.6419	32° 11' 41.517 N	103° 42' 59.767 W	
7,675.00	1.33	148.63	7,673.84	-15.96	-27.65	435,158.7370	690,779.9512	32° 11' 41.512 N	103° 42' 59.763 W	
7,700.00	1.40	150.59	7,698.83	-16.48	-27.35	435,158.2232	690,780.2522	32° 11' 41.507 N	103° 42' 59.760 W	
7,725.00	1.44	155.71	7,723.83	-17.03	-27.07	435,157.6709	690,780.5313	32° 11' 41.502 N	103° 42' 59.757 W	
7,750.00	1.55	156.26	7,748.82	-17.62	-26.80	435,157.0750	690,780.7967	32° 11' 41.496 N	103° 42' 59.753 W	
7,775.00	1.58	157.18	7,773.81	-18.25	-26.53	435,156.4479	690,781.0665	32° 11' 41.490 N	103° 42' 59.750 W	
7,800.00	1.65	153.76	7,798.80	-18.89	-26.24	435,155.8073	690,781.3593	32° 11' 41.483 N	103° 42' 59.747 W	
7,825.00	1.64	151.74	7,823.79	-19.53	-25.91	435,155.1694	690,781.6878	32° 11' 41.477 N	103° 42' 59.743 W	
7,850.00	1.65	155.39	7,848.78	-20.17	-25.59	435,154.5271	690,782.0071	32° 11' 41.470 N	103° 42' 59.740 W	
7,875.00	1.68	153.98	7,873.77	-20.83	-25.28	435,153.8705	690,782.3177	32° 11' 41.464 N	103° 42' 59.736 W	
7,900.00	1.84	153.77	7,898.76	-21.52	-24.94	435,153.1812	690,782.6559	32° 11' 41.457 N	103° 42' 59.732 W	
7,925.00	1.77	154.66	7,923.74	-22.23	-24.60	435,152.4722	690,782.9985	32° 11' 41.450 N	103° 42' 59.728 W	
7,950.00	1.82	154.11	7,948.73	-22.93	-24.26	435,151.7661	690,783.3371	32° 11' 41.443 N	103° 42' 59.724 W	
7,975.00	1.87	158.17	7,973.72	-23.67	-23.94	435,151.0303	690,783.6621	32° 11' 41.436 N	103° 42' 59.721 W	
8,000.00	1.98	158.51	7,998.70	-24.45	-23.63	435,150.2498	690,783.9720	32° 11' 41.428 N	103° 42' 59.717 W	
8,025.00	1.97	159.70	8,023.69	-25.26	-23.32	435,149.4449	690,784.2793	32° 11' 41.420 N	103° 42' 59.713 W	
8,050.00	1.56	157.28	8,048.68	-25.97	-23.04	435,148.7280	690,784.5598	32° 11' 41.413 N	103° 42' 59.710 W	
8,075.00	0.61	158.93	8,073.67	-26.41	-22.86	435,148.2899	690,784.7391	32° 11' 41.409 N	103° 42' 59.708 W	
8,100.00	0.16	127.76	8,098.67	-26.56	-22.79	435,148.1444	690,784.8145	32° 11' 41.407 N	103° 42' 59.707 W	
8,125.00	0.25	6.02	8,123.67	-26.52	-22.75	435,148.1772	690,784.8478	32° 11' 41.407 N	103° 42' 59.707 W	
8,150.00	0.24	350.78	8,148.67	-26.42	-22.75	435,148.2832	690,784.8452	32° 11' 41.409 N	103° 42' 59.707 W	
8,175.00	0.21	356.73	8,173.67	-26.32	-22.77	435,148.3806	690,784.8342	32° 11' 41.409 N	103° 42' 59.707 W	
8,200.00	0.21	346.82	8,198.67	-26.23	-22.78	435,148.4709	690,784.8211	32° 11' 41.410 N	103° 42' 59.707 W	
8,225.00	0.14	307.78	8,223.67	-26.17	-22.81	435,148.5343	690,784.7865	32° 11' 41.411 N	103° 42' 59.708 W	
8,250.00	0.14	230.45	8,248.67	-26.17	-22.86	435,148.5335	690,784.7388	32° 11' 41.411 N	103° 42' 59.708 W	
8,275.00	0.31	215.76	8,273.67	-26.24	-22.92	435,148.4592	690,784.6758	32° 11' 41.410 N	103° 42' 59.709 W	
8,300.00	0.48	218.45	8,298.67	-26.38	-23.03	435,148.3223	690,784.5711	32° 11' 41.409 N	103° 42' 59.710 W	
8,325.00	0.59	209.73	8,323.67	-26.57	-23.16	435,148.1285	690,784.4422	32° 11' 41.407 N	103° 42' 59.712 W	
8,350.00	0.57	205.77	8,348.67	-26.80	-23.28	435,147.9048	690,784.3243	32° 11' 41.405 N	103° 42' 59.713 W	
8,375.00	0.72	216.69	8,373.67	-27.03	-23.42	435,147.6668	690,784.1764	32° 11' 41.402 N	103° 42' 59.715 W	
8,400.00	0.83	213.98	8,398.66	-27.31	-23.62	435,147.3907	690,783.9813	32° 11' 41.400 N	103° 42' 59.717 W	
8,425.00	0.88	212.57	8,423.66	-27.62	-23.82	435,147.0788	690,783.7768	32° 11' 41.397 N	103° 42' 59.719 W	
8,450.00	1.06	219.09	8,448.66	-27.96	-24.07	435,146.7375	690,783.5276	32° 11' 41.393 N	103° 42' 59.722 W	
8,475.00	1.23	216.04	8,473.65	-28.36	-24.38	435,146.3411	690,783.2239	32° 11' 41.389 N	103° 42' 59.726 W	
8,500.00	1.30	225.40	8,498.65	-28.78	-24.74	435,145.9250	690,782.8641	32° 11' 41.385 N	103° 42' 59.730 W	
8,525.00	1.63	229.48	8,523.64	-29.21	-25.21	435,145.4948	690,782.3919	32° 11' 41.381 N	103° 42' 59.736 W	
8,543.00	1.73	231.46	8,541.63	-29.54	-25.62	435,145.1592	690,781.9848	32° 11' 41.378 N	103° 42' 59.740 W	



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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	
8,608.00	2.20	235.20	8,606.59	-30.86	-27.41	435,143.8359	690,780.1929	32° 11' 41.365 N	103° 42' 59.761 W	
First IDS MWD Survey										
8,683.00	2.90	227.40	8,681.52	-32.97	-29.99	435,141.7301	690,777.6142	32° 11' 41.344 N	103° 42' 59.792 W	
8,730.00	6.80	214.50	8,728.34	-36.07	-32.44	435,138.6309	690,775.1620	32° 11' 41.314 N	103° 42' 59.820 W	
8,777.00	9.90	209.10	8,774.84	-41.89	-35.98	435,132.8060	690,771.6201	32° 11' 41.256 N	103° 42' 59.862 W	
8,809.00	12.70	208.50	8,806.21	-47.39	-39.00	435,127.3100	690,768.6033	32° 11' 41.202 N	103° 42' 59.897 W	
8,872.00	18.50	211.00	8,866.87	-62.06	-47.46	435,112.6439	690,760.1437	32° 11' 41.057 N	103° 42' 59.997 W	
8,917.00	23.10	209.50	8,908.92	-75.87	-55.48	435,098.8336	690,752.1155	32° 11' 40.921 N	103° 43' 0.091 W	
8,967.00	27.60	209.80	8,954.10	-94.46	-66.08	435,080.2365	690,741.5240	32° 11' 40.738 N	103° 43' 0.216 W	
9,031.00	34.90	209.90	9,008.78	-123.24	-82.59	435,051.4608	690,725.0072	32° 11' 40.454 N	103° 43' 0.410 W	
9,061.00	38.70	209.80	9,032.79	-138.82	-91.54	435,035.8768	690,716.0649	32° 11' 40.300 N	103° 43' 0.515 W	
9,094.00	42.20	209.90	9,057.90	-157.39	-102.19	435,017.3106	690,705.4096	32° 11' 40.117 N	103° 43' 0.640 W	
9,126.00	46.20	208.40	9,080.84	-176.87	-113.05	434,997.8269	690,694.5548	32° 11' 39.925 N	103° 43' 0.768 W	
9,154.00	49.60	207.70	9,099.61	-195.21	-122.81	434,979.4932	690,684.7900	32° 11' 39.744 N	103° 43' 0.883 W	
9,188.00	53.70	206.40	9,120.70	-218.95	-134.93	434,955.7481	690,672.6747	32° 11' 39.510 N	103° 43' 1.025 W	
9,220.00	58.20	205.10	9,138.61	-242.83	-146.43	434,931.8710	690,661.1666	32° 11' 39.274 N	103° 43' 1.161 W	
9,249.00	61.40	204.00	9,153.20	-265.63	-156.84	434,909.0747	690,650.7580	32° 11' 39.049 N	103° 43' 1.283 W	
9,283.00	64.90	203.40	9,168.55	-293.40	-169.03	434,881.3021	690,638.5694	32° 11' 38.775 N	103° 43' 1.427 W	
9,314.00	68.20	201.30	9,180.89	-319.70	-179.84	434,855.0020	690,627.7632	32° 11' 38.515 N	103° 43' 1.555 W	
9,345.00	72.50	200.50	9,191.31	-346.97	-190.25	434,827.7340	690,617.3534	32° 11' 38.246 N	103° 43' 1.677 W	
9,377.00	78.10	200.80	9,199.43	-375.92	-201.16	434,798.7820	690,606.4411	32° 11' 37.960 N	103° 43' 1.806 W	
9,402.00	82.50	200.30	9,203.64	-398.99	-209.81	434,775.7131	690,597.7938	32° 11' 37.732 N	103° 43' 1.909 W	
9,470.00	90.30	195.20	9,207.91	-463.56	-230.46	434,711.1455	690,577.1392	32° 11' 37.094 N	103° 43' 2.153 W	
9,502.00	89.80	194.70	9,207.88	-494.47	-238.72	434,680.2289	690,568.8840	32° 11' 36.789 N	103° 43' 2.251 W	
9,533.00	89.50	193.70	9,208.07	-524.52	-246.32	434,650.1771	690,561.2797	32° 11' 36.492 N	103° 43' 2.342 W	
9,565.00	89.40	191.30	9,208.38	-555.76	-253.25	434,618.9395	690,554.3545	32° 11' 36.183 N	103° 43' 2.425 W	
9,596.00	90.60	189.00	9,208.38	-586.27	-258.71	434,588.4273	690,548.8920	32° 11' 35.882 N	103° 43' 2.490 W	
9,659.00	92.80	186.50	9,206.51	-648.66	-267.20	434,526.0392	690,540.4006	32° 11' 35.265 N	103° 43' 2.593 W	
9,691.00	92.70	186.60	9,204.97	-680.42	-270.85	434,494.2848	690,536.7545	32° 11' 34.951 N	103° 43' 2.638 W	
9,754.00	91.80	183.40	9,202.50	-743.12	-276.33	434,431.5818	690,531.2693	32° 11' 34.331 N	103° 43' 2.706 W	
9,848.00	90.90	182.30	9,200.28	-836.97	-281.00	434,337.7267	690,526.5970	32° 11' 33.402 N	103° 43' 2.766 W	
9,942.00	90.60	180.40	9,199.05	-930.94	-283.22	434,243.7655	690,524.3828	32° 11' 32.472 N	103° 43' 2.798 W	
10,036.00	90.30	178.70	9,198.32	-1,024.93	-282.48	434,149.7750	690,525.1210	32° 11' 31.542 N	103° 43' 2.796 W	
10,131.00	92.00	177.40	9,196.41	-1,119.85	-279.25	434,054.8548	690,528.3525	32° 11' 30.603 N	103° 43' 2.765 W	
10,225.00	91.40	178.70	9,193.62	-1,213.75	-276.05	433,960.9532	690,531.5494	32° 11' 29.673 N	103° 43' 2.734 W	
10,319.00	90.50	179.30	9,192.06	-1,307.72	-274.41	433,866.9821	690,533.1896	32° 11' 28.743 N	103° 43' 2.721 W	
10,414.00	91.30	178.80	9,190.57	-1,402.69	-272.84	433,772.0081	690,534.7644	32° 11' 27.803 N	103° 43' 2.709 W	
10,508.00	91.80	175.00	9,188.03	-1,496.51	-267.76	433,678.1977	690,539.8446	32° 11' 26.875 N	103° 43' 2.656 W	
10,602.00	91.70	175.50	9,185.16	-1,590.14	-259.98	433,584.5647	690,547.6249	32° 11' 25.948 N	103° 43' 2.572 W	
10,697.00	91.20	176.00	9,182.75	-1,684.85	-252.94	433,489.8571	690,554.6629	32° 11' 25.010 N	103° 43' 2.496 W	
10,791.00	90.20	176.40	9,181.60	-1,778.63	-246.71	433,396.0724	690,560.8920	32° 11' 24.082 N	103° 43' 2.430 W	
10,885.00	89.90	176.40	9,181.52	-1,872.45	-240.81	433,302.2582	690,566.7943	32° 11' 23.153 N	103° 43' 2.368 W	
10,980.00	89.50	176.40	9,182.02	-1,967.26	-234.84	433,207.4473	690,572.7593	32° 11' 22.214 N	103° 43' 2.304 W	
11,074.00	90.20	175.50	9,182.26	-2,061.02	-228.20	433,113.6841	690,579.3981	32° 11' 21.286 N	103° 43' 2.233 W	
11,169.00	89.80	175.80	9,182.26	-2,155.75	-221.00	433,018.9583	690,586.6037	32° 11' 20.348 N	103° 43' 2.156 W	
11,263.00	89.00	175.90	9,183.25	-2,249.49	-214.19	432,925.2109	690,593.4058	32° 11' 19.420 N	103° 43' 2.083 W	
11,357.00	88.70	176.90	9,185.14	-2,343.29	-208.29	432,831.4167	690,599.3069	32° 11' 18.492 N	103° 43' 2.021 W	
11,452.00	89.70	175.70	9,186.46	-2,438.08	-202.16	432,736.6271	690,605.4368	32° 11' 17.553 N	103° 43' 1.956 W	
11,546.00	92.60	175.40	9,184.58	-2,531.77	-194.87	432,642.9396	690,612.7278	32° 11' 16.626 N	103° 43' 1.877 W	
11,640.00	91.90	176.20	9,180.88	-2,625.44	-187.99	432,549.2659	690,619.6066	32° 11' 15.698 N	103° 43' 1.803 W	
11,735.00	91.30	176.50	9,178.23	-2,720.21	-181.95	432,454.4963	690,625.6520	32° 11' 14.760 N	103° 43' 1.739 W	
11,829.00	90.00	178.70	9,177.17	-2,814.11	-178.01	432,360.5927	690,629.5875	32° 11' 13.831 N	103° 43' 1.700 W	
11,924.00	90.30	178.30	9,176.92	-2,909.08	-175.53	432,265.6261	690,632.0743	32° 11' 12.891 N	103° 43' 1.677 W	
12,018.00	90.10	179.00	9,176.59	-3,003.05	-173.31	432,171.6536	690,634.2888	32° 11' 11.961 N	103° 43' 1.657 W	
12,112.00	88.30	180.00	9,177.90	-3,097.03	-172.49	432,077.6716	690,635.1092	32° 11' 11.031 N	103° 43' 1.654 W	



Integrity Directional Services, LLC
Survey Report - Geographic



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 7H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3568.80ft (McVay #8)
Site:	Sec. 30, T 24 S., R 32 E	MD Reference:	KB=26 @ 3568.80ft (McVay #8)
Well:	Windward Federal 7H	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	
12,207.00	89.50	180.10	9,179.73	-3,192.02	-172.57	431,982.6910	690,635.0263	32° 11' 10.091 N	103° 43' 1.662 W	
12,301.00	90.20	180.10	9,179.97	-3,286.01	-172.74	431,888.6923	690,634.8622	32° 11' 9.161 N	103° 43' 1.670 W	
12,396.00	90.90	180.80	9,179.06	-3,381.01	-173.48	431,793.7010	690,634.1162	32° 11' 8.221 N	103° 43' 1.685 W	
12,490.00	90.00	181.30	9,178.32	-3,474.99	-175.21	431,699.7211	690,632.3937	32° 11' 7.291 N	103° 43' 1.711 W	
12,584.00	88.90	181.50	9,179.22	-3,568.95	-177.50	431,605.7552	690,630.0972	32° 11' 6.361 N	103° 43' 1.744 W	
12,679.00	88.90	181.70	9,181.05	-3,663.90	-180.16	431,510.8099	690,627.4452	32° 11' 5.422 N	103° 43' 1.781 W	
12,773.00	89.10	180.20	9,182.69	-3,757.87	-181.71	431,416.8401	690,625.8870	32° 11' 4.492 N	103° 43' 1.806 W	
12,867.00	90.40	180.20	9,183.10	-3,851.86	-182.04	431,322.8437	690,625.5589	32° 11' 3.562 N	103° 43' 1.816 W	
12,962.00	90.70	180.10	9,182.19	-3,946.86	-182.29	431,227.8488	690,625.3102	32° 11' 2.621 N	103° 43' 1.825 W	
13,056.00	90.50	179.30	9,181.20	-4,040.85	-181.80	431,133.8562	690,625.8023	32° 11' 1.691 N	103° 43' 1.825 W	
13,150.00	89.20	179.00	9,181.45	-4,134.84	-180.40	431,039.8692	690,627.1968	32° 11' 0.761 N	103° 43' 1.815 W	
13,245.00	90.90	180.00	9,181.36	-4,229.83	-179.57	430,944.8777	690,628.0258	32° 10' 59.821 N	103° 43' 1.812 W	
13,339.00	89.10	180.20	9,181.36	-4,323.83	-179.74	430,850.8819	690,627.8617	32° 10' 58.891 N	103° 43' 1.820 W	
13,434.00	92.00	180.40	9,180.45	-4,418.81	-180.24	430,755.8980	690,627.3644	32° 10' 57.951 N	103° 43' 1.832 W	
13,528.00	89.80	180.30	9,178.98	-4,512.79	-180.81	430,661.9173	690,626.7903	32° 10' 57.021 N	103° 43' 1.845 W	
13,622.00	90.60	179.20	9,178.65	-4,606.79	-180.40	430,567.9212	690,627.2004	32° 10' 56.091 N	103° 43' 1.847 W	
13,717.00	90.90	179.30	9,177.40	-4,701.77	-179.16	430,472.9378	690,628.4438	32° 10' 55.151 N	103° 43' 1.839 W	
13,805.00	92.00	178.70	9,175.18	-4,789.73	-177.62	430,384.9813	690,629.9790	32° 10' 54.280 N	103° 43' 1.827 W	
13,900.00	92.30	178.90	9,171.61	-4,884.64	-175.63	430,290.0693	690,631.9672	32° 10' 53.341 N	103° 43' 1.810 W	
13,994.00	90.90	178.00	9,168.99	-4,978.57	-173.09	430,196.1438	690,634.5090	32° 10' 52.411 N	103° 43' 1.787 W	
14,089.00	89.50	177.50	9,168.66	-5,073.49	-169.36	430,101.2205	690,638.2385	32° 10' 51.472 N	103° 43' 1.750 W	
14,188.00	90.50	177.20	9,168.66	-5,172.38	-164.78	430,002.3279	690,642.8157	32° 10' 50.493 N	103° 43' 1.703 W	
14,282.00	90.50	178.00	9,167.84	-5,266.30	-160.85	429,908.4149	690,646.7518	32° 10' 49.563 N	103° 43' 1.663 W	
14,377.00	91.40	178.30	9,166.26	-5,361.23	-157.78	429,813.4788	690,649.8183	32° 10' 48.624 N	103° 43' 1.634 W	
14,471.00	91.60	178.00	9,163.80	-5,455.15	-154.75	429,719.5603	690,652.8518	32° 10' 47.694 N	103° 43' 1.605 W	
14,566.00	91.10	178.70	9,161.56	-5,550.08	-152.01	429,624.6271	690,655.5864	32° 10' 46.754 N	103° 43' 1.579 W	
14,660.00	91.20	179.00	9,159.68	-5,644.05	-150.13	429,530.6653	690,657.4726	32° 10' 45.825 N	103° 43' 1.564 W	
14,754.00	91.30	178.70	9,157.63	-5,738.00	-148.24	429,436.7070	690,659.3587	32° 10' 44.895 N	103° 43' 1.548 W	
14,839.00	92.30	180.00	9,154.96	-5,822.95	-147.28	429,351.7575	690,660.3227	32° 10' 44.054 N	103° 43' 1.543 W	
14,933.00	93.40	179.30	9,150.28	-5,916.83	-146.70	429,257.8777	690,660.8959	32° 10' 43.125 N	103° 43' 1.542 W	
15,028.00	94.40	180.10	9,143.82	-6,011.61	-146.21	429,163.1012	690,661.3926	32° 10' 42.187 N	103° 43' 1.543 W	
15,122.00	94.90	181.00	9,136.20	-6,105.30	-147.11	429,069.4163	690,660.4935	32° 10' 41.260 N	103° 43' 1.559 W	
15,216.00	93.80	182.00	9,129.07	-6,198.99	-149.56	428,975.7221	690,658.0394	32° 10' 40.333 N	103° 43' 1.594 W	
15,311.00	93.10	182.70	9,123.35	-6,293.74	-153.45	428,880.9754	690,654.1510	32° 10' 39.395 N	103° 43' 1.646 W	
15,405.00	91.50	183.00	9,119.58	-6,387.54	-158.12	428,787.1706	690,649.4810	32° 10' 38.467 N	103° 43' 1.706 W	
15,504.00	89.40	182.30	9,118.80	-6,486.43	-162.70	428,688.2859	690,644.9042	32° 10' 37.489 N	103° 43' 1.766 W	
15,598.00	88.80	181.80	9,120.28	-6,580.35	-166.06	428,594.3586	690,641.5421	32° 10' 36.560 N	103° 43' 1.812 W	
15,700.00	88.00	181.60	9,123.13	-6,682.27	-169.08	428,492.4443	690,638.5173	32° 10' 35.551 N	103° 43' 1.853 W	
15,795.00	88.10	181.70	9,126.36	-6,777.17	-171.82	428,397.5389	690,635.7835	32° 10' 34.612 N	103° 43' 1.892 W	
15,889.00	88.50	182.10	9,129.15	-6,871.08	-174.93	428,303.6325	690,632.6683	32° 10' 33.683 N	103° 43' 1.934 W	
15,983.00	88.40	181.80	9,131.69	-6,964.99	-178.13	428,209.7216	690,629.4709	32° 10' 32.754 N	103° 43' 1.978 W	
16,078.00	88.50	181.10	9,134.26	-7,059.93	-180.53	428,114.7875	690,627.0679	32° 10' 31.815 N	103° 43' 2.012 W	
16,164.00	88.90	180.50	9,136.21	-7,145.90	-181.73	428,028.8188	690,625.8675	32° 10' 30.964 N	103° 43' 2.032 W	
16,258.00	89.40	180.10	9,137.61	-7,239.88	-182.23	427,934.8311	690,625.3754	32° 10' 30.034 N	103° 43' 2.044 W	
16,353.00	90.40	180.50	9,137.77	-7,334.88	-182.72	427,839.8341	690,624.8780	32° 10' 29.094 N	103° 43' 2.056 W	
16,447.00	89.20	178.60	9,138.10	-7,428.87	-181.98	427,745.8438	690,625.6161	32° 10' 28.164 N	103° 43' 2.053 W	
16,541.00	88.80	178.60	9,139.74	-7,522.83	-179.69	427,651.8866	690,627.9124	32° 10' 27.234 N	103° 43' 2.033 W	
16,635.00	89.70	178.70	9,140.97	-7,616.79	-177.47	427,557.9219	690,630.1268	32° 10' 26.304 N	103° 43' 2.013 W	
16,730.00	90.30	179.30	9,140.97	-7,711.78	-175.82	427,462.9374	690,631.7847	32° 10' 25.364 N	103° 43' 2.000 W	
16,824.00	90.90	179.80	9,139.99	-7,805.77	-175.08	427,368.9464	690,632.5230	32° 10' 24.434 N	103° 43' 1.998 W	
16,918.00	89.50	178.60	9,139.66	-7,899.76	-173.77	427,274.9603	690,633.8354	32° 10' 23.504 N	103° 43' 1.989 W	
17,013.00	90.50	179.10	9,139.66	-7,994.73	-171.86	427,179.9812	690,635.7420	32° 10' 22.564 N	103° 43' 1.973 W	
17,107.00	91.10	179.40	9,138.35	-8,088.72	-170.63	427,085.9991	690,636.9723	32° 10' 21.634 N	103° 43' 1.965 W	
17,201.00	91.30	179.30	9,136.38	-8,182.69	-169.56	426,992.0260	690,638.0384	32° 10' 20.704 N	103° 43' 1.959 W	
17,296.00	90.70	178.10	9,134.72	-8,277.65	-167.41	426,897.0673	690,640.1934	32° 10' 19.764 N	103° 43' 1.940 W	



Integrity Directional Services, LLC
Survey Report - Geographic



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Windward Federal 7H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26 @ 3568.80ft (McVay #8)
Site:	Sec. 30, T 24 S., R 32 E	MD Reference:	KB=26 @ 3568.80ft (McVay #8)
Well:	Windward Federal 7H	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
17,390.00	90.80	178.00	9,133.49	-8,371.59	-164.21	426,803.1300	690,643.3917	32° 10' 18.834 N	103° 43' 1.909 W
17,484.00	90.70	178.40	9,132.26	-8,465.53	-161.26	426,709.1848	690,646.3441	32° 10' 17.904 N	103° 43' 1.881 W
17,579.00	90.60	178.30	9,131.18	-8,560.49	-158.52	426,614.2305	690,649.0793	32° 10' 16.964 N	103° 43' 1.856 W
17,673.00	90.70	178.10	9,130.12	-8,654.43	-155.57	426,520.2832	690,652.0317	32° 10' 16.034 N	103° 43' 1.828 W
17,768.00	90.10	177.70	9,129.45	-8,749.37	-152.09	426,425.3501	690,655.5128	32° 10' 15.095 N	103° 43' 1.793 W
17,862.00	90.40	177.90	9,129.04	-8,843.30	-148.48	426,331.4207	690,659.1212	32° 10' 14.165 N	103° 43' 1.758 W
17,956.00	90.00	178.60	9,128.71	-8,937.25	-145.61	426,237.4660	690,661.9918	32° 10' 13.235 N	103° 43' 1.731 W
18,050.00	89.80	178.90	9,128.88	-9,031.23	-143.56	426,143.4889	690,664.0424	32° 10' 12.305 N	103° 43' 1.713 W
18,144.00	90.20	178.80	9,128.88	-9,125.21	-141.67	426,049.5082	690,665.9289	32° 10' 11.375 N	103° 43' 1.697 W
18,238.00	90.70	179.20	9,128.14	-9,219.19	-140.03	425,955.5261	690,667.5694	32° 10' 10.445 N	103° 43' 1.685 W
18,333.00	89.80	178.60	9,127.73	-9,314.17	-138.21	425,860.5461	690,669.3931	32° 10' 9.505 N	103° 43' 1.670 W
18,427.00	89.50	179.20	9,128.30	-9,408.15	-136.40	425,766.5659	690,671.1976	32° 10' 8.575 N	103° 43' 1.655 W
18,522.00	89.20	178.90	9,129.38	-9,503.13	-134.83	425,671.5855	690,672.7726	32° 10' 7.635 N	103° 43' 1.643 W
18,616.00	89.30	179.20	9,130.61	-9,597.11	-133.27	425,577.6068	690,674.3310	32° 10' 6.705 N	103° 43' 1.631 W
18,710.00	89.50	179.40	9,131.59	-9,691.10	-132.12	425,483.6193	690,675.4793	32° 10' 5.774 N	103° 43' 1.624 W
18,804.00	89.30	179.00	9,132.58	-9,785.09	-130.81	425,389.6340	690,676.7917	32° 10' 4.844 N	103° 43' 1.615 W
18,899.00	89.50	179.40	9,133.57	-9,880.07	-129.48	425,294.6489	690,678.1180	32° 10' 3.904 N	103° 43' 1.606 W
18,993.00	90.20	179.30	9,133.82	-9,974.06	-128.42	425,200.6561	690,679.1844	32° 10' 2.974 N	103° 43' 1.600 W
19,065.00	90.30	179.40	9,133.50	-10,046.06	-127.60	425,128.6616	690,680.0011	32° 10' 2.262 N	103° 43' 1.595 W
Final IDS MWD Survey									
19,120.00	90.30	179.40	9,133.22	-10,101.06	-127.02	425,073.6655	690,680.5771	32° 10' 1.717 N	103° 43' 1.592 W
Projection to TD									

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
8,608.00	8,606.59	-30.86	-27.41	First IDS MWD Survey
19,065.00	9,133.50	-10,046.06	-127.60	Final IDS MWD Survey
19,120.00	9,133.22	-10,101.06	-127.02	Projection to TD

Checked By: _____ Approved By: _____ Date: _____