

**McVAY DRILLING COMPANY**

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

Well Name and Num: Windward Federal #7H
Location: Sec 24, T20S, R34E
Operator: COG
Drilling Contractor: McVay Drilling Company

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

<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>
1.50	180	1.10	6493	89.10	12773	89.50	18710
1.90	664	1.80	6871	90.90	13245	90.30	19065
1.90	743	0.40	7249	92.00	13434		
1.10	1225	1.30	7650	90.20	13717		
0.60	1599	2.10	8003	89.50	14089		
1.10	1976	0.80	8380	91.40	14377		
1.20	2353	1.90	8569	91.20	14660		
0.60	2730	12.70	8809	93.80	15216		
0.70	3107	27.70	8966	89.40	15504		
0.40	3485	92.50	9403	88.80	15653		
0.40	3674	90.90	9848	88.50	16078		
0.90	4051	92.00	10131	90.40	16353		
0.70	4492	91.70	10602	90.90	16824		
0.40	4985	90.20	11074	90.70	17296		
0.80	5362	92.60	11546	90.10	17768		
0.90	5739	90.10	12018	90.00	17956		
1.00	6116	90.00	12490	89.80	18333		

By: *Mario A. Garcia*

Subscribed and sworn to before me this 14th day of February, 2017

Tina Flemens
Notary Public, Lea County, New Mexico



COG

SURVEY REPORT

WINDWARD FEDERAL #7H

MCBAY 8

1/10/2017



The **Ultimate Partner** In Wellbore Placement

SURVEY REPORT

WINDWARD FEDERAL #7H

DEFINITIVE GYRO SURVEY

CUSTOMER
PROJECT
FIELD

COG
Windward Federal #7H
Windward Federal #7H

SDI JOB NO.
SDI DISTRICT
SDI KIT/UNIT

410373
Midland

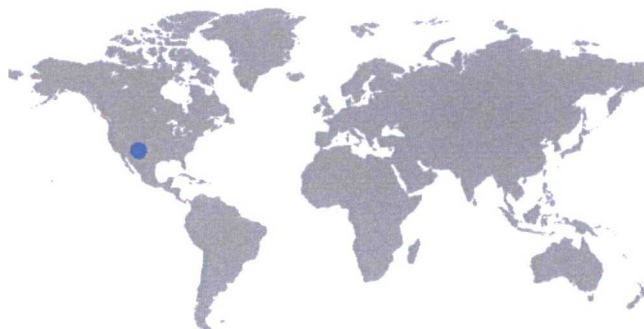
SITE INFORMATION

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

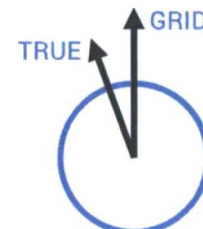
Lat/Long 32.1949078° N, 103.7165108° W
Northing 435,174.7 ft
Easting 690,807.6 ft
UWI 30-025-43516

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	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	1.47	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	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	0.79	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	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	0.48	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 ft	INC deg	AZIM deg	TVD ft	VS ft	+N/-S ft	+E/-W ft	DLS °/100ft	CLOSURE DIST ft	CLOSURE DIR 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 ft	INC deg	AZIM deg	TVD ft	VS ft	+N/-S ft	+E/-W ft	DLS °/100ft	CLOSURE DIST ft	CLOSURE DIR 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



CONCHO

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

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OCT 27 2017
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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:		Northing:	435,165.5000 usft
From:	Map	Easting:	689,517.6000 usft
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "
		Latitude:	32° 11' 41.651 N
		Longitude:	103° 43' 14.453 W
		Grid Convergence:	0.33 °

Well	Windward Federal 7H		
Well Position	+N/-S	0.00 ft	Northing:
	+E/-W	0.00 ft	Easting:
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft
		Latitude:	32° 11' 41.669 N
		Longitude:	103° 42' 59.440 W
		Ground Level:	3,542.80 ft

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

Design	Wellbore #1			
Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth:
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	Description
100.00	8,543.00	Gyros (Wellbore #1)	Keeper	Standard Wireline Keeper ver 1.0.2
8,543.00	19,120.00	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	435,174.7000	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



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
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	2,024.56	-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 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	0.58	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	

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' 59.536 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

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



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
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: _____
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