

May 10, 2017

Concho Resources, Inc.
One Concho Center
600 W. Illinois Avenue
Midland, Texas 79701

Attn: Kanicia Castillo

RE: **Columbus Federal Com No. 022H**

Please find enclosed a copy of the survey from 0' to 11,645' ran on the above referenced well.

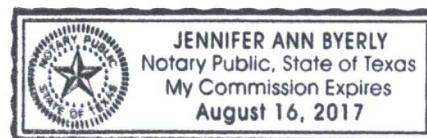
Sincerely,

Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 10th day of May, A.D., 2017, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas





Company: COG OPERATING
Lease/Well: COLUMBUS FEDERAL COM No./022H

Rig Name: SCAN FREEDOM
State/County: NEW MEXICO/LEA

VS-Azi: 0.00 Degrees
Latitude: 32.09369, Longitude: -103.55585
Grid North = True North -0.41 degs (NAD 83)
Grid Correction Applied = -0.41 degs



Depth Reference : RKB = 27 FEET

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: e-line gyro-de_01.ut
Minimum Curvature Method
Report Date/Time: 5/10/2017 / 16:42

VES Survey International
Midland, TX
(432)-563-5444

Surveyor: Christopher Hair
Columbus Federal Com No. 022H / API 30-025-43693

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.56	138.22	100.00	-0.36	0.32	-0.36	0.49	138.22	0.56
200.00	0.52	170.29	199.99	-1.17	0.72	-1.17	1.37	148.25	0.30
300.00	0.33	176.63	299.99	-1.90	0.82	-1.90	2.07	156.74	0.20
400.00	0.46	178.96	399.99	-2.59	0.84	-2.59	2.72	162.02	0.14
500.00	0.25	203.08	499.99	-3.19	0.76	-3.19	3.28	166.55	0.26
600.00	0.46	247.36	599.99	-3.54	0.31	-3.54	3.56	175.05	0.33
700.00	0.37	251.56	699.98	-3.80	-0.37	-3.80	3.82	185.57	0.10
800.00	0.61	290.50	799.98	-3.72	-1.17	-3.72	3.90	197.51	0.40
900.00	0.54	259.44	899.97	-3.62	-2.13	-3.62	4.20	210.50	0.31
1000.00	0.65	243.46	999.97	-3.96	-3.10	-3.96	5.03	218.06	0.20
1100.00	0.32	224.24	1099.97	-4.41	-3.80	-4.41	5.82	220.74	0.36
1200.00	0.05	205.26	1199.96	-4.65	-4.01	-4.65	6.14	220.79	0.27
1300.00	0.22	157.95	1299.96	-4.86	-3.96	-4.86	6.27	219.15	0.19
1400.00	0.17	142.44	1399.96	-5.15	-3.79	-5.15	6.40	216.35	0.07
1500.00	0.24	155.53	1499.96	-5.46	-3.62	-5.46	6.55	213.52	0.08
1600.00	0.24	203.57	1599.96	-5.84	-3.62	-5.84	6.87	211.76	0.20

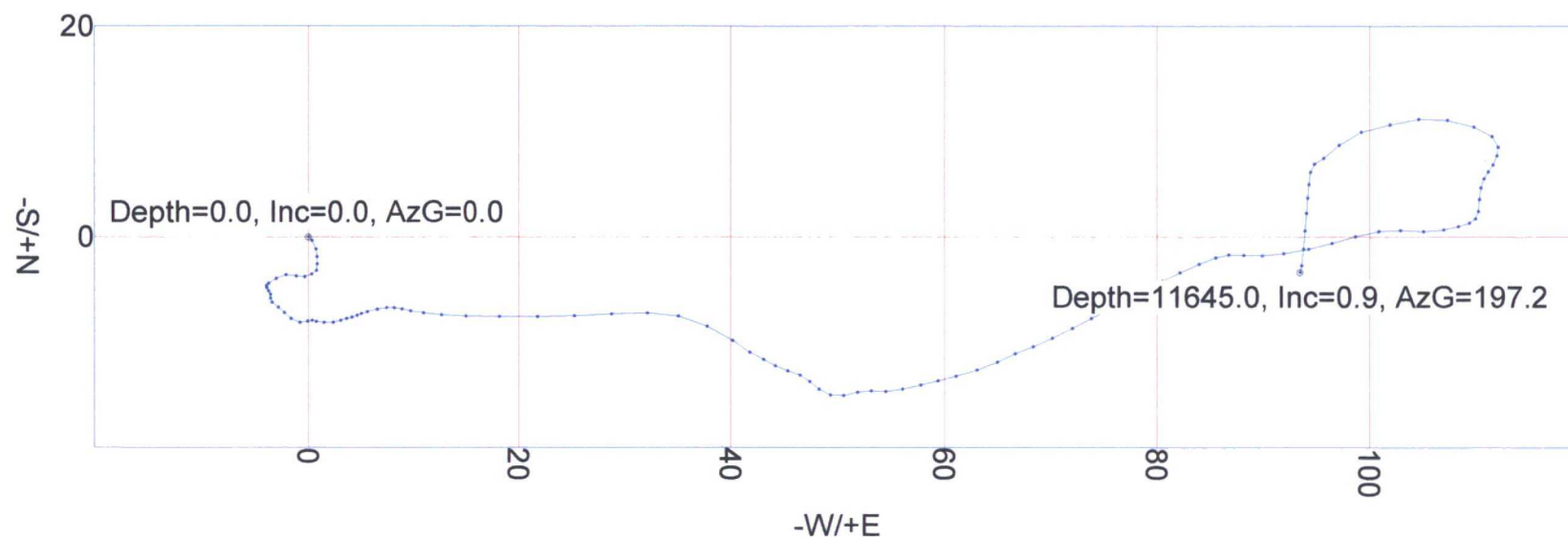
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1700.00	0.34	130.33	1699.96	-6.23	-3.48	-6.23	7.14	209.17	0.36
1800.00	0.51	125.95	1799.96	-6.68	-2.89	-6.68	7.28	203.41	0.17
1900.00	0.39	133.94	1899.96	-7.18	-2.29	-7.18	7.54	197.66	0.13
2000.00	0.60	131.86	1999.95	-7.77	-1.65	-7.77	7.94	191.96	0.21
2100.00	0.49	91.81	2099.95	-8.14	-0.83	-8.14	8.18	185.82	0.39
2200.00	0.40	69.59	2199.94	-8.03	-0.07	-8.03	8.03	180.53	0.19
2300.00	0.12	107.68	2299.94	-7.94	0.36	-7.94	7.94	177.43	0.32
2400.00	0.33	103.70	2399.94	-8.04	0.73	-8.04	8.07	174.78	0.21
2500.00	0.53	93.16	2499.94	-8.13	1.47	-8.13	8.26	169.72	0.22
2600.00	0.47	84.32	2599.94	-8.11	2.35	-8.11	8.45	163.85	0.10
2700.00	0.39	63.61	2699.93	-7.92	3.07	-7.92	8.49	158.83	0.18
2800.00	0.27	81.92	2799.93	-7.74	3.60	-7.74	8.53	155.02	0.16
2900.00	0.31	75.21	2899.93	-7.63	4.09	-7.63	8.66	151.79	0.05
3000.00	0.30	63.77	2999.93	-7.45	4.59	-7.45	8.75	148.37	0.06
3100.00	0.22	72.00	3099.93	-7.28	5.00	-7.28	8.83	145.49	0.09
3200.00	0.50	74.98	3199.93	-7.10	5.61	-7.10	9.05	141.73	0.29
3300.00	0.59	76.46	3299.92	-6.87	6.53	-6.87	9.48	136.47	0.08
3400.00	0.46	85.30	3399.92	-6.72	7.42	-6.72	10.01	132.15	0.15
3500.00	0.39	96.74	3499.91	-6.73	8.16	-6.73	10.58	129.49	0.11
3600.00	0.41	103.74	3599.91	-6.85	8.85	-6.85	11.19	127.74	0.05
3700.00	0.56	101.25	3699.91	-7.03	9.68	-7.03	11.97	125.99	0.15
3800.00	0.88	97.17	3799.90	-7.22	10.93	-7.22	13.10	123.47	0.33
3900.00	1.09	95.10	3899.89	-7.41	12.64	-7.41	14.65	120.37	0.21
4000.00	1.59	90.86	3999.86	-7.51	14.97	-7.51	16.75	116.64	0.51
4100.00	2.09	90.66	4099.81	-7.55	18.19	-7.55	19.69	112.55	0.50
4200.00	2.03	89.20	4199.74	-7.55	21.79	-7.55	23.06	109.11	0.08
4300.00	1.97	88.81	4299.68	-7.49	25.28	-7.49	26.36	106.50	0.07
4400.00	2.01	85.38	4399.62	-7.31	28.74	-7.31	29.66	104.27	0.13
4500.00	1.87	91.24	4499.56	-7.20	32.13	-7.20	32.93	102.64	0.24
4600.00	1.51	101.83	4599.52	-7.51	35.05	-7.51	35.85	102.09	0.48
4700.00	1.83	115.89	4699.48	-8.48	37.78	-8.48	38.72	102.65	0.52
4800.00	1.33	124.84	4799.44	-9.84	40.17	-9.84	41.35	103.76	0.55
4900.00	0.91	122.10	4899.42	-10.92	41.79	-10.92	43.20	104.65	0.43
5000.00	0.76	114.80	4999.41	-11.62	43.06	-11.62	44.60	105.10	0.18
5100.00	0.69	122.59	5099.40	-12.22	44.18	-12.22	45.84	105.47	0.12
5200.00	0.74	102.49	5199.39	-12.69	45.32	-12.69	47.06	105.64	0.25
5300.00	0.67	119.29	5299.39	-13.12	46.46	-13.12	48.28	105.77	0.22
5400.00	0.57	126.04	5399.38	-13.70	47.37	-13.70	49.31	106.13	0.13
5500.00	0.75	133.84	5499.37	-14.44	48.25	-14.44	50.36	106.67	0.20

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
5600.00	0.68	99.16	5599.37	-14.99	49.31	-14.99	51.54	106.91	0.43
5700.00	0.75	85.79	5699.36	-15.04	50.55	-15.04	52.74	106.57	0.18
5800.00	0.82	70.50	5799.35	-14.75	51.88	-14.75	53.94	105.87	0.22
5900.00	0.70	99.25	5899.34	-14.61	53.17	-14.61	55.14	105.36	0.40
6000.00	0.85	86.72	5999.33	-14.66	54.51	-14.66	56.45	105.06	0.22
6100.00	1.00	78.02	6099.32	-14.44	56.11	-14.44	57.94	104.43	0.20
6200.00	0.98	76.30	6199.30	-14.06	57.79	-14.06	59.47	103.67	0.04
6300.00	0.94	75.51	6299.29	-13.65	59.41	-13.65	60.96	102.94	0.04
6400.00	1.08	74.32	6399.27	-13.19	61.11	-13.19	62.52	102.18	0.14
6500.00	1.25	73.51	6499.25	-12.63	63.07	-12.63	64.32	101.32	0.17
6600.00	1.12	62.67	6599.23	-11.87	64.98	-11.87	66.06	100.35	0.26
6700.00	1.01	67.43	6699.21	-11.08	66.67	-11.08	67.58	99.43	0.14
6800.00	1.07	68.31	6799.20	-10.39	68.35	-10.39	69.14	98.65	0.06
6900.00	1.20	64.73	6899.18	-9.60	70.16	-9.60	70.81	97.79	0.15
7000.00	1.20	63.42	6999.16	-8.69	72.04	-8.69	72.56	96.88	0.03
7100.00	1.11	61.05	7099.14	-7.75	73.82	-7.75	74.23	95.99	0.10
7200.00	0.98	64.99	7199.12	-6.92	75.45	-6.92	75.76	95.24	0.15
7300.00	1.15	59.30	7299.10	-6.05	77.09	-6.05	77.32	94.49	0.20
7400.00	1.18	61.11	7399.08	-5.04	78.85	-5.04	79.01	93.66	0.05
7500.00	0.97	64.46	7499.06	-4.18	80.51	-4.18	80.62	92.97	0.22
7600.00	1.12	65.45	7599.05	-3.41	82.16	-3.41	82.24	92.37	0.16
7700.00	1.13	66.88	7699.03	-2.61	83.97	-2.61	84.01	91.78	0.03
7800.00	0.80	70.87	7799.01	-1.99	85.54	-1.99	85.56	91.33	0.34
7900.00	0.63	85.00	7899.01	-1.71	86.75	-1.71	86.77	91.13	0.25
8000.00	1.01	95.44	7998.99	-1.75	88.17	-1.75	88.19	91.14	0.41
8100.00	0.97	88.22	8098.98	-1.81	89.90	-1.81	89.92	91.15	0.13
8200.00	1.38	80.79	8198.96	-1.59	91.94	-1.59	91.95	90.99	0.43
8300.00	1.33	79.39	8298.93	-1.18	94.27	-1.18	94.28	90.72	0.06
8400.00	1.28	72.27	8398.90	-0.63	96.48	-0.63	96.48	90.37	0.17
8500.00	1.35	75.66	8498.88	0.01	98.69	0.01	98.69	90.00	0.11
8600.00	1.21	78.41	8598.85	0.51	100.87	0.51	100.87	89.71	0.15
8700.00	1.16	96.78	8698.83	0.60	102.91	0.60	102.91	89.66	0.38
8800.00	1.30	88.37	8798.81	0.52	105.05	0.52	105.05	89.72	0.23
8900.00	0.87	80.81	8898.79	0.67	106.94	0.67	106.94	89.64	0.45
9000.00	0.79	72.31	8998.78	1.00	108.35	1.00	108.35	89.47	0.15
9100.00	0.43	73.74	9098.77	1.32	109.37	1.32	109.37	89.31	0.36
9200.00	0.45	36.34	9198.77	1.74	109.96	1.74	109.97	89.09	0.28
9300.00	0.44	7.94	9298.77	2.43	110.24	2.43	110.27	88.74	0.22
9400.00	0.87	2.44	9398.76	3.57	110.33	3.57	110.39	88.15	0.44

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
9500.00	0.41	16.25	9498.76	4.67	110.46	4.67	110.56	87.58	0.48
9600.00	0.63	20.43	9598.75	5.53	110.75	5.53	110.89	87.14	0.22
9700.00	0.27	56.35	9698.75	6.18	111.14	6.18	111.32	86.82	0.44
9800.00	0.68	25.50	9798.74	6.85	111.60	6.85	111.81	86.49	0.47
9900.00	0.40	16.68	9898.74	7.72	111.96	7.72	112.22	86.05	0.29
10000.00	0.55	2.95	9998.74	8.54	112.08	8.54	112.41	85.64	0.19
10100.00	0.93	311.29	10098.73	9.56	111.50	9.56	111.91	85.10	0.73
10200.00	1.30	288.14	10198.71	10.45	109.81	10.45	110.30	84.56	0.58
10300.00	1.70	280.96	10298.68	11.08	107.27	11.08	107.84	84.10	0.44
10400.00	1.42	262.18	10398.64	11.20	104.59	11.20	105.19	83.89	0.58
10500.00	1.73	255.88	10498.60	10.66	101.90	10.66	102.46	84.03	0.36
10600.00	1.47	253.93	10598.56	9.94	99.20	9.94	99.70	84.28	0.27
10700.00	1.39	223.47	10698.53	8.70	97.13	8.70	97.52	84.88	0.76
10800.00	0.79	240.65	10798.51	7.47	95.69	7.47	95.98	85.53	0.68
10900.00	0.40	230.54	10898.51	6.91	94.82	6.91	95.07	85.83	0.41
11000.00	0.64	188.69	10998.51	6.14	94.47	6.14	94.67	86.28	0.44
11100.00	0.72	186.78	11098.50	4.96	94.31	4.96	94.44	86.99	0.08
11200.00	0.74	185.05	11198.49	3.69	94.18	3.69	94.25	87.76	0.03
11300.00	0.92	184.45	11298.48	2.24	94.06	2.24	94.08	88.64	0.18
11400.00	1.00	183.56	11398.47	0.57	93.94	0.57	93.94	89.65	0.07
11500.00	1.02	186.29	11498.45	-1.18	93.79	-1.18	93.80	90.72	0.05
11600.00	0.78	187.43	11598.44	-2.73	93.60	-2.73	93.64	91.67	0.24
11645.00	0.88	197.18	11643.43	-3.36	93.46	-3.36	93.52	92.06	0.38



VES Survey International
Midland, TX
(432)-563-5444
Surveyor: Christopher Hair
Columbus Federal Com No. 022H / API 30-025-43693





I Christopher Hair certify that I am employed by VES Survey International. That I did on the day(s) of 05/03/17 through 05/03/17 conduct or supervise the taking of a Rate Gyro survey from a depth of 0.00 feet to a depth of 11,645.00 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Vaughn Energy Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of COG Operating for the Columbus Federal Com Well # 22H API # 30-025-43693 in Lea County / Parish New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by VES Survey International.

A handwritten signature in blue ink, appearing to read "Chris Hair", is written over a horizontal line.

Christopher Hair
Service Technician
VES Survey International



CONCHO

COG Operating L L C

Lea County, NM (NAD27 NME)

Sec. 34, T 25 S. , R 33 E

Columbus Federal Com 22H

Wellbore #1

Design: Wellbore #1

Survey Report - Geographic

01 June, 2017

HOBBS OCD
APR 03 2018
RECEIVED





Integrity Directional Services, LLC
Survey Report - Geographic



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Columbus Federal Com 22H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3351.00ft
Site:	Sec. 34, T 25 S. , R 33 E	MD Reference:	KB=26' @ 3351.00ft
Well:	Columbus Federal Com 22H	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. 34, T 25 S. , R 33 E		
Site Position:		Northing:	398,623.8000 usft
From:	Map	Easting:	739,904.9000 usft
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "
		Latitude:	32.0935639
		Longitude:	-103.5586559
		Grid Convergence:	0.41 °

Well	Columbus Federal Com 22H, ACTIVE		
Well Position	+N/-S	0.00 ft	Northing: 398,630.6000 usft
	+E/-W	0.00 ft	Easting: 740,917.6000 usft
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft
		Latitude:	32.0935626
		Longitude:	-103.5553859
		Ground Level:	3,325.00 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	4/11/2017	6.85	59.80	47,990

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	177.83	

Survey Program	Date 6/1/2017				
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100.00	11,645.00	VES Gyros (Wellbore #1)	VESSI_GYROFLEX	VESSI Gyroflex Gyro	
11,798.00	22,360.00	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	398,630.6000	740,917.6000	32.0935626	-103.5553859
100.00	0.56	138.22	100.00	-0.36	0.33	398,630.2356	740,917.9256	32.0935616	-103.5553849
200.00	0.52	170.29	199.99	-1.18	0.73	398,629.4239	740,918.3277	32.0935593	-103.5553836
300.00	0.33	176.63	299.99	-1.91	0.82	398,628.6891	740,918.4212	32.0935573	-103.5553833
400.00	0.46	178.96	399.99	-2.60	0.85	398,628.0003	740,918.4454	32.0935554	-103.5553833
500.00	0.25	203.08	499.99	-3.20	0.77	398,627.3982	740,918.3672	32.0935538	-103.5553835
600.00	0.46	247.36	599.99	-3.56	0.31	398,627.0430	740,917.9112	32.0935528	-103.5553850
700.00	0.37	251.56	699.98	-3.81	-0.37	398,626.7863	740,917.2344	32.0935521	-103.5553872
800.00	0.61	290.50	799.98	-3.73	-1.17	398,626.8706	740,916.4295	32.0935524	-103.5553898
900.00	0.54	259.44	899.97	-3.63	-2.13	398,626.9707	740,915.4676	32.0935526	-103.5553929
1,000.00	0.65	243.46	999.97	-3.97	-3.10	398,626.6309	740,914.4969	32.0935517	-103.5553960

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Columbus Federal Com 22H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3351.00ft
Site:	Sec. 34, T 25 S. , R 33 E	MD Reference:	KB=26' @ 3351.00ft
Well:	Columbus Federal Com 22H	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
1,100.00	0.32	224.24	1,099.97	-4.42	-3.81	398,626.1774	740,913.7946	32.0935505	-103.5553983
1,200.00	0.05	205.26	1,199.96	-4.66	-4.02	398,625.9378	740,913.5812	32.0935498	-103.5553990
1,300.00	0.22	157.95	1,299.96	-4.88	-3.97	398,625.7204	740,913.6347	32.0935492	-103.5553989
1,400.00	0.17	142.44	1,399.96	-5.18	-3.80	398,625.4249	740,913.7972	32.0935484	-103.5553983
1,500.00	0.24	155.53	1,499.96	-5.48	-3.63	398,625.1167	740,913.9744	32.0935476	-103.5553978
1,600.00	0.24	203.57	1,599.96	-5.87	-3.62	398,624.7341	740,913.9774	32.0935465	-103.5553978
1,700.00	0.34	130.33	1,699.96	-6.25	-3.48	398,624.3501	740,914.1198	32.0935455	-103.5553973
1,800.00	0.51	125.95	1,799.96	-6.70	-2.89	398,623.8968	740,914.7063	32.0935442	-103.5553954
1,900.00	0.39	133.94	1,899.96	-7.20	-2.29	398,623.3993	740,915.3116	32.0935428	-103.5553935
2,000.00	0.60	131.86	1,999.95	-7.79	-1.65	398,622.8138	740,915.9466	32.0935412	-103.5553915
2,100.00	0.49	91.81	2,099.95	-8.15	-0.84	398,622.4509	740,916.7640	32.0935402	-103.5553888
2,200.00	0.40	69.59	2,199.94	-8.04	-0.08	398,622.5591	740,917.5185	32.0935405	-103.5553864
2,300.00	0.12	107.68	2,299.94	-7.95	0.35	398,622.6490	740,917.9454	32.0935407	-103.5553850
2,400.00	0.33	103.70	2,399.94	-8.05	0.72	398,622.5490	740,918.3250	32.0935404	-103.5553838
2,500.00	0.53	93.16	2,499.94	-8.14	1.47	398,622.4553	740,919.0666	32.0935402	-103.5553814
2,600.00	0.47	84.32	2,599.94	-8.13	2.34	398,622.4704	740,919.9365	32.0935402	-103.5553786
2,700.00	0.39	63.61	2,699.93	-7.94	3.05	398,622.6623	740,920.6495	32.0935407	-103.5553763
2,800.00	0.27	81.92	2,799.93	-7.75	3.59	398,622.8467	740,921.1877	32.0935412	-103.5553745
2,900.00	0.31	75.21	2,899.93	-7.65	4.08	398,622.9488	740,921.6825	32.0935415	-103.5553729
3,000.00	0.30	63.77	2,999.93	-7.47	4.58	398,623.1336	740,922.1789	32.0935420	-103.5553713
3,100.00	0.22	72.00	3,099.93	-7.29	5.00	398,623.3086	740,922.5963	32.0935424	-103.5553700
3,200.00	0.50	74.98	3,199.93	-7.12	5.60	398,623.4810	740,923.2003	32.0935429	-103.5553680
3,300.00	0.59	76.46	3,299.92	-6.89	6.52	398,623.7147	740,924.1223	32.0935435	-103.5553650
3,400.00	0.46	85.30	3,399.92	-6.73	7.42	398,623.8681	740,925.0229	32.0935439	-103.5553621
3,500.00	0.39	96.74	3,499.91	-6.74	8.16	398,623.8610	740,925.7610	32.0935439	-103.5553597
3,600.00	0.41	103.74	3,599.91	-6.86	8.85	398,623.7361	740,926.4465	32.0935435	-103.5553575
3,700.00	0.56	101.25	3,699.91	-7.04	9.67	398,623.5558	740,927.2734	32.0935430	-103.5553549
3,800.00	0.88	97.17	3,799.90	-7.24	10.91	398,623.3646	740,928.5146	32.0935425	-103.5553509
3,900.00	1.09	95.10	3,899.89	-7.42	12.62	398,623.1842	740,930.2239	32.0935419	-103.5553453
4,000.00	1.59	90.86	3,999.86	-7.52	14.96	398,623.0789	740,932.5585	32.0935416	-103.5553378
4,100.00	2.09	90.66	4,099.81	-7.56	18.17	398,623.0370	740,935.7690	32.0935414	-103.5553274
4,200.00	2.03	89.20	4,199.74	-7.56	21.76	398,623.0407	740,939.3633	32.0935414	-103.5553158
4,300.00	1.97	88.81	4,299.68	-7.50	25.25	398,623.1012	740,942.8527	32.0935415	-103.5553046
4,400.00	2.01	85.38	4,399.62	-7.32	28.72	398,623.2781	740,946.3192	32.0935419	-103.5552934
4,500.00	1.87	91.24	4,499.56	-7.22	32.10	398,623.3841	740,949.6984	32.0935421	-103.5552825
4,600.00	1.51	101.83	4,599.52	-7.52	35.02	398,623.0786	740,952.6192	32.0935412	-103.5552730
4,700.00	1.83	115.89	4,699.48	-8.49	37.75	398,622.1113	740,955.3452	32.0935385	-103.5552643
4,800.00	1.33	124.84	4,799.44	-9.85	40.13	398,620.7511	740,957.7342	32.0935347	-103.5552566
4,900.00	0.91	122.10	4,899.42	-10.93	41.76	398,619.6662	740,959.3594	32.0935317	-103.5552514
5,000.00	0.76	114.80	4,999.41	-11.63	43.03	398,618.9660	740,960.6341	32.0935297	-103.5552473
5,100.00	0.69	122.59	5,099.40	-12.24	44.14	398,618.3635	740,961.7435	32.0935281	-103.5552437
5,200.00	0.74	102.49	5,199.39	-12.70	45.28	398,617.8995	740,962.8813	32.0935268	-103.5552400
5,300.00	0.67	119.29	5,299.39	-13.13	46.42	398,617.4738	740,964.0217	32.0935256	-103.5552364
5,400.00	0.57	126.04	5,399.38	-13.70	47.33	398,616.8951	740,964.9338	32.0935240	-103.5552334
5,500.00	0.75	133.84	5,499.37	-14.45	48.21	398,616.1492	740,965.8081	32.0935219	-103.5552306
5,600.00	0.68	99.16	5,599.37	-15.00	49.27	398,615.6014	740,966.8660	32.0935204	-103.5552272
5,700.00	0.75	85.79	5,699.36	-15.05	50.50	398,615.5549	740,968.1045	32.0935202	-103.5552232
5,800.00	0.82	70.50	5,799.35	-14.76	51.83	398,615.8419	740,969.4318	32.0935210	-103.5552189
5,900.00	0.70	99.25	5,899.34	-14.62	53.11	398,615.9825	740,970.7092	32.0935213	-103.5552148
6,000.00	0.85	86.72	5,999.33	-14.67	54.45	398,615.9268	740,972.0526	32.0935212	-103.5552105
6,100.00	1.00	78.02	6,099.32	-14.45	56.05	398,616.1503	740,973.6467	32.0935217	-103.5552053
6,200.00	0.98	76.30	6,199.30	-14.07	57.73	398,616.5340	740,975.3312	32.0935228	-103.5551999
6,300.00	0.94	75.51	6,299.29	-13.66	59.36	398,616.9418	740,976.9562	32.0935239	-103.5551946
6,400.00	1.08	74.32	6,399.27	-13.20	61.06	398,617.4017	740,978.6577	32.0935251	-103.5551891
6,500.00	1.25	73.51	6,499.25	-12.63	63.01	398,617.9660	740,980.6110	32.0935266	-103.5551828



Integrity Directional Services, LLC

Survey Report - Geographic



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Columbus Federal Com 22H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3351.00ft
Site:	Sec. 34, T 25 S. , R 33 E	MD Reference:	KB=26' @ 3351.00ft
Well:	Columbus Federal Com 22H	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	
6,600.00	1.12	62.67	6,599.23	-11.88	64.93	398,618.7243	740,982.5251	32.0935286	-103.5551766	
6,700.00	1.01	67.43	6,699.22	-11.09	66.61	398,619.5113	740,984.2072	32.0935308	-103.5551711	
6,800.00	1.07	68.31	6,799.20	-10.41	68.29	398,620.1947	740,985.8886	32.0935326	-103.5551657	
6,900.00	1.20	64.73	6,899.18	-9.61	70.10	398,620.9867	740,987.7031	32.0935348	-103.5551598	
7,000.00	1.20	63.42	6,999.16	-8.70	71.99	398,621.9023	740,989.5864	32.0935372	-103.5551533	
7,100.00	1.11	61.05	7,099.14	-7.76	73.77	398,622.8396	740,991.3705	32.0935398	-103.5551479	
7,200.00	0.98	64.99	7,199.12	-6.93	75.39	398,623.6700	740,992.9930	32.0935420	-103.5551427	
7,300.00	1.15	59.30	7,299.10	-6.06	77.03	398,624.5439	740,994.6308	32.0935444	-103.5551374	
7,400.00	1.18	61.11	7,399.08	-5.05	78.80	398,625.5537	740,996.3952	32.0935471	-103.5551316	
7,500.00	0.97	64.46	7,499.06	-4.18	80.46	398,626.4161	740,998.0605	32.0935495	-103.5551262	
7,600.00	1.12	65.45	7,599.05	-3.41	82.11	398,627.1871	740,999.7132	32.0935516	-103.5551209	
7,700.00	1.13	66.88	7,699.03	-2.62	83.91	398,627.9803	741,001.5090	32.0935537	-103.5551151	
7,800.00	0.80	70.87	7,799.01	-2.00	85.48	398,628.5963	741,003.0754	32.0935554	-103.5551100	
7,900.00	0.63	85.00	7,899.01	-1.73	86.68	398,628.8730	741,004.2827	32.0935561	-103.5551061	
8,000.00	1.01	95.44	7,999.00	-1.76	88.11	398,628.8374	741,005.7077	32.0935560	-103.5551015	
8,100.00	0.97	88.22	8,098.98	-1.82	89.83	398,628.7801	741,007.4311	32.0935558	-103.5550959	
8,200.00	1.38	80.79	8,198.96	-1.60	91.87	398,628.9991	741,009.4658	32.0935564	-103.5550894	
8,300.00	1.33	79.39	8,298.93	-1.19	94.20	398,629.4055	741,011.7951	32.0935574	-103.5550818	
8,400.00	1.28	72.27	8,398.91	-0.64	96.40	398,629.9594	741,013.9997	32.0935589	-103.5550747	
8,500.00	1.35	75.66	8,498.88	-0.01	98.61	398,630.5912	741,016.2048	32.0935606	-103.5550676	
8,600.00	1.21	78.41	8,598.85	0.50	100.78	398,631.0951	741,018.3804	32.0935619	-103.5550605	
8,700.00	1.16	96.78	8,698.83	0.59	102.82	398,631.1878	741,020.4199	32.0935622	-103.5550539	
8,800.00	1.30	88.37	8,798.81	0.50	104.96	398,631.1005	741,022.5590	32.0935619	-103.5550470	
8,900.00	0.87	80.81	8,898.79	0.65	106.84	398,631.2540	741,024.4423	32.0935623	-103.5550409	
9,000.00	0.79	72.31	8,998.78	0.98	108.25	398,631.5848	741,025.8485	32.0935631	-103.5550364	
9,100.00	0.43	73.74	9,098.78	1.30	109.27	398,631.8993	741,026.8656	32.0935640	-103.5550331	
9,200.00	0.45	36.34	9,198.77	1.72	109.86	398,632.3207	741,027.4585	32.0935651	-103.5550312	
9,300.00	0.44	7.94	9,298.77	2.42	110.14	398,633.0173	741,027.7442	32.0935670	-103.5550302	
9,400.00	0.87	2.44	9,398.76	3.56	110.23	398,634.1561	741,027.8296	32.0935702	-103.5550299	
9,500.00	0.41	16.25	9,498.76	4.66	110.36	398,635.2581	741,027.9620	32.0935732	-103.5550295	
9,600.00	0.63	20.43	9,598.75	5.52	110.65	398,636.1168	741,028.2541	32.0935755	-103.5550285	
9,700.00	0.27	56.35	9,698.75	6.16	111.04	398,636.7625	741,028.6421	32.0935773	-103.5550273	
9,800.00	0.68	25.50	9,798.75	6.83	111.49	398,637.4287	741,029.0937	32.0935791	-103.5550258	
9,900.00	0.40	16.68	9,898.74	7.70	111.85	398,638.2987	741,029.4494	32.0935815	-103.5550246	
10,000.00	0.55	2.95	9,998.74	8.51	111.97	398,639.1124	741,029.5743	32.0935838	-103.5550242	
10,100.00	0.93	311.29	10,098.73	9.53	111.39	398,640.1272	741,028.9892	32.0935866	-103.5550261	
10,200.00	1.30	288.14	10,198.71	10.42	109.70	398,641.0159	741,027.3014	32.0935890	-103.5550315	
10,300.00	1.70	280.96	10,298.68	11.05	107.17	398,641.6511	741,024.7671	32.0935908	-103.5550397	
10,400.00	1.42	262.18	10,398.64	11.16	104.48	398,641.7645	741,022.0833	32.0935912	-103.5550483	
10,500.00	1.73	255.88	10,498.60	10.63	101.79	398,641.2277	741,019.3919	32.0935898	-103.5550570	
10,600.00	1.47	253.93	10,598.57	9.90	99.10	398,640.5044	741,016.6955	32.0935878	-103.5550657	
10,700.00	1.39	223.47	10,698.54	8.67	97.03	398,639.2691	741,014.6285	32.0935845	-103.5550724	
10,800.00	0.79	240.65	10,798.52	7.45	95.59	398,638.0509	741,013.1931	32.0935812	-103.5550771	
10,900.00	0.40	230.54	10,898.51	6.89	94.72	398,637.4912	741,012.3227	32.0935796	-103.5550799	
11,000.00	0.64	188.69	10,998.51	6.12	94.37	398,636.7173	741,011.9689	32.0935775	-103.5550811	
11,100.00	0.72	186.78	11,098.50	4.94	94.21	398,635.5413	741,011.8103	32.0935743	-103.5550816	
11,200.00	0.74	185.05	11,198.49	3.67	94.08	398,634.2741	741,011.6793	32.0935708	-103.5550821	
11,300.00	0.92	184.45	11,298.48	2.23	93.96	398,632.8305	741,011.5602	32.0935668	-103.5550825	
11,400.00	1.00	183.56	11,398.47	0.56	93.84	398,631.1591	741,011.4437	32.0935623	-103.5550829	
11,500.00	1.02	186.29	11,498.45	-1.20	93.69	398,629.4035	741,011.2920	32.0935574	-103.5550834	
11,600.00	0.78	187.43	11,598.44	-2.76	93.51	398,627.8438	741,011.1064	32.0935531	-103.5550841	
11,645.00	0.88	197.18	11,643.44	-3.39	93.36	398,627.2100	741,010.9648	32.0935514	-103.5550846	
11,798.00	0.40	179.97	11,796.43	-5.05	93.02	398,625.5534	741,010.6180	32.0935469	-103.5550857	
First IDS MWD Survey										
11,891.00	0.77	151.87	11,889.42	-5.92	93.31	398,624.6777	741,010.9128	32.0935444	-103.5550848	

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Columbus Federal Com 22H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3351.00ft
Site:	Sec. 34, T 25 S. , R 33 E	MD Reference:	KB=26' @ 3351.00ft
Well:	Columbus Federal Com 22H	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
11,953.00	3.80	163.16	11,951.36	-8.26	94.10	398,622.3434	741,011.7046	32.0935380	-103.5550823
11,984.00	8.98	167.49	11,982.16	-11.60	94.93	398,618.9959	741,012.5268	32.0935288	-103.5550797
12,031.00	14.73	180.42	12,028.15	-21.17	95.68	398,609.4303	741,013.2783	32.0935025	-103.5550775
12,078.00	20.38	176.08	12,072.94	-35.32	96.19	398,595.2786	741,013.7944	32.0934636	-103.5550762
12,125.00	25.74	171.06	12,116.17	-53.58	98.34	398,577.0171	741,015.9416	32.0934133	-103.5550697
12,171.00	30.84	170.22	12,156.67	-75.08	101.90	398,555.5162	741,019.4991	32.0933542	-103.5550587
12,218.00	35.25	171.28	12,196.06	-100.37	106.00	398,530.2254	741,023.6037	32.0932846	-103.5550460
12,250.91	36.43	170.17	12,222.73	-119.39	109.11	398,511.2094	741,026.7113	32.0932322	-103.5550364
Hardline Crossing 12250.91' MD / 123.43° VS									
12,264.00	36.90	169.75	12,233.23	-127.09	110.47	398,503.5128	741,028.0739	32.0932111	-103.5550322
12,311.00	40.45	164.16	12,269.93	-155.66	117.15	398,474.9427	741,034.7504	32.0931324	-103.5550113
12,357.00	44.49	163.20	12,303.86	-185.46	125.89	398,445.1446	741,043.4857	32.0930503	-103.5549838
12,404.00	48.38	163.57	12,336.24	-218.08	135.62	398,412.5161	741,053.2183	32.0929604	-103.5549531
12,451.00	54.10	163.46	12,365.66	-253.21	146.02	398,377.3882	741,063.6151	32.0928637	-103.5549204
12,498.00	61.78	165.81	12,390.59	-291.60	156.53	398,339.0037	741,074.1272	32.0927579	-103.5548873
12,545.00	66.64	167.48	12,411.03	-332.76	166.29	398,297.8411	741,083.8864	32.0926446	-103.5548568
12,592.00	70.19	165.76	12,428.32	-375.27	176.41	398,255.3341	741,094.0055	32.0925275	-103.5548251
12,639.00	74.28	164.46	12,442.66	-418.51	187.91	398,212.0900	741,105.5098	32.0924085	-103.5547890
12,686.00	79.14	163.49	12,453.46	-462.46	200.54	398,168.1411	741,118.1368	32.0922874	-103.5547492
12,733.00	85.84	165.29	12,459.60	-507.31	213.06	398,123.2890	741,130.6623	32.0921639	-103.5547098
12,760.00	86.57	165.44	12,461.39	-533.38	219.87	398,097.2225	741,137.4691	32.0920921	-103.5546884
12,855.00	86.94	166.11	12,466.76	-625.32	243.18	398,005.2839	741,160.7757	32.0918389	-103.5546153
12,920.00	89.23	168.50	12,468.94	-688.68	257.45	397,941.9171	741,175.0493	32.0916644	-103.5545707
13,013.00	91.22	171.91	12,468.57	-780.31	273.27	397,850.2918	741,190.8677	32.0914122	-103.5545218
13,107.00	89.76	172.52	12,467.77	-873.44	286.00	397,757.1648	741,203.5996	32.0911560	-103.5544829
13,200.00	88.81	173.26	12,468.93	-965.71	297.51	397,664.8890	741,215.1096	32.0909021	-103.5544478
13,294.00	90.07	176.89	12,469.85	-1,059.34	305.58	397,571.2583	741,223.1774	32.0906446	-103.5544240
13,387.00	89.87	176.99	12,469.89	-1,152.21	310.54	397,478.3911	741,228.1419	32.0903892	-103.5544101
13,481.00	89.45	178.38	12,470.45	-1,246.13	314.34	397,384.4722	741,231.9387	32.0901310	-103.5544000
13,574.00	90.43	179.76	12,470.55	-1,339.11	315.85	397,291.4881	741,233.4481	32.0898754	-103.5543973
13,667.00	91.22	179.08	12,469.21	-1,432.10	316.79	397,198.5039	741,234.3894	32.0896197	-103.5543965
13,760.00	91.70	179.02	12,466.84	-1,525.06	318.33	397,105.5474	741,235.9308	32.0893642	-103.5543937
13,854.00	92.62	180.18	12,463.30	-1,618.98	318.99	397,011.6193	741,236.5868	32.0891060	-103.5543937
13,947.00	90.80	179.98	12,460.52	-1,711.94	318.86	396,918.6649	741,236.4571	32.0888505	-103.5543963
14,041.00	88.75	177.35	12,460.89	-1,805.90	321.05	396,824.7046	741,238.6466	32.0885922	-103.5543914
14,135.00	90.66	178.87	12,461.38	-1,899.84	324.15	396,730.7642	741,241.7464	32.0883339	-103.5543836
14,228.00	89.79	179.97	12,461.01	-1,992.83	325.09	396,637.7722	741,242.6878	32.0880782	-103.5543828
14,322.00	89.93	178.72	12,461.24	-2,086.82	326.16	396,543.7807	741,243.7623	32.0878199	-103.5543815
14,415.00	89.12	176.69	12,462.01	-2,179.74	329.89	396,450.8643	741,247.4860	32.0875644	-103.5543716
14,508.00	93.99	179.68	12,459.49	-2,272.62	332.83	396,357.9840	741,250.4321	32.0873090	-103.5543643
14,602.00	91.39	178.32	12,455.08	-2,366.49	334.47	396,264.1124	741,252.0718	32.0870509	-103.5543612
14,696.00	90.27	179.82	12,453.71	-2,460.47	336.00	396,170.1390	741,253.5971	32.0867926	-103.5543584
14,789.00	90.13	180.36	12,453.39	-2,553.46	335.85	396,077.1402	741,253.4510	32.0865370	-103.5543611
14,884.00	88.39	179.48	12,454.62	-2,648.45	335.98	395,982.1530	741,253.5835	32.0862759	-103.5543629
14,977.00	88.11	180.09	12,457.46	-2,741.41	336.33	395,889.1977	741,253.9323	32.0860203	-103.5543639
15,070.00	89.12	181.63	12,459.71	-2,834.37	334.94	395,796.2396	741,252.5367	32.0857648	-103.5543706
15,164.00	91.81	183.72	12,458.94	-2,928.25	330.55	395,702.3591	741,248.1508	32.0855069	-103.5543869
15,258.00	93.52	184.17	12,454.57	-3,021.92	324.09	395,608.6871	741,241.6912	32.0852495	-103.5544100
15,352.00	89.54	182.10	12,452.06	-3,115.72	318.96	395,514.8853	741,236.5552	32.0849918	-103.5544287
15,445.00	90.71	182.48	12,451.86	-3,208.64	315.24	395,421.9618	741,232.8392	32.0847364	-103.5544429
15,539.00	90.66	183.28	12,450.74	-3,302.52	310.52	395,328.0882	741,228.1166	32.0844785	-103.5544603
15,567.00	91.02	183.59	12,450.32	-3,330.47	308.84	395,300.1416	741,226.4392	32.0844017	-103.5544664
15,661.00	90.15	182.79	12,449.37	-3,424.31	303.61	395,206.2940	741,221.2088	32.0841438	-103.5544855
15,754.00	89.29	183.61	12,449.82	-3,517.17	298.42	395,113.4420	741,216.0176	32.0838887	-103.5545044
15,847.00	91.41	184.89	12,449.25	-3,609.90	291.53	395,020.7068	741,209.1263	32.0836339	-103.5545288



Integrity Directional Services, LLC

Survey Report - Geographic



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Columbus Federal Com 22H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3351.00ft
Site:	Sec. 34, T 25 S. , R 33 E	MD Reference:	KB=26' @ 3351.00ft
Well:	Columbus Federal Com 22H	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	
15,940.00	92.09	179.91	12,446.41	-3,702.75	287.63	394,927.8618	741,205.2342	32.0833788	-103.5545435	
16,034.00	89.51	176.12	12,445.10	-3,796.65	290.89	394,833.9527	741,208.4899	32.0831206	-103.5545352	
16,128.00	89.93	175.84	12,445.56	-3,890.42	297.48	394,740.1855	741,215.0796	32.0828627	-103.5545161	
16,221.00	87.04	174.23	12,448.01	-3,983.03	305.52	394,647.5799	741,223.1237	32.0826080	-103.5544923	
16,315.00	87.32	173.96	12,452.64	-4,076.42	315.18	394,554.1922	741,232.7827	32.0823511	-103.5544633	
16,409.00	88.36	176.34	12,456.18	-4,170.00	323.12	394,460.6035	741,240.7231	32.0820937	-103.5544399	
16,502.00	89.90	176.62	12,457.59	-4,262.82	328.83	394,367.7927	741,246.4321	32.0818384	-103.5544236	
16,597.00	91.50	177.85	12,456.43	-4,357.69	333.42	394,272.9155	741,251.0145	32.0815776	-103.5544110	
16,692.00	91.75	179.25	12,453.74	-4,452.62	335.82	394,177.9868	741,253.4175	32.0813166	-103.5544055	
16,786.00	90.49	179.24	12,451.90	-4,546.59	337.06	394,084.0150	741,254.6558	32.0810582	-103.5544037	
16,880.00	91.11	184.24	12,450.59	-4,640.51	334.20	393,990.0979	741,251.8031	32.0808001	-103.5544151	
16,974.00	90.10	182.90	12,449.60	-4,734.32	328.35	393,896.2891	741,245.9506	32.0805424	-103.5544361	
17,067.00	89.68	183.04	12,449.78	-4,827.20	323.53	393,803.4147	741,241.1320	32.0802872	-103.5544539	
17,160.00	90.21	182.55	12,449.86	-4,920.08	319.00	393,710.5262	741,236.5971	32.0800319	-103.5544707	
17,254.00	90.38	182.28	12,449.38	-5,014.00	315.04	393,616.6112	741,232.6363	32.0797739	-103.5544856	
17,348.00	90.46	179.78	12,448.69	-5,107.97	313.35	393,522.6366	741,230.9467	32.0795156	-103.5544933	
17,441.00	89.59	178.42	12,448.65	-5,200.96	314.81	393,429.6513	741,232.4074	32.0792600	-103.5544907	
17,534.00	89.45	177.57	12,449.43	-5,293.90	318.06	393,336.7126	741,235.6610	32.0790044	-103.5544824	
17,627.00	89.03	177.30	12,450.66	-5,386.80	322.22	393,243.8144	741,239.8226	32.0787490	-103.5544711	
17,721.00	89.37	177.97	12,451.98	-5,480.71	326.10	393,149.9045	741,243.7012	32.0784908	-103.5544608	
17,815.00	88.45	177.90	12,453.76	-5,574.63	329.49	393,055.9837	741,247.0876	32.0782325	-103.5544521	
17,908.00	88.11	176.61	12,456.56	-5,667.48	333.94	392,963.1346	741,251.5393	32.0779772	-103.5544398	
18,002.00	91.72	177.57	12,456.70	-5,761.34	338.71	392,869.2727	741,256.3105	32.0777191	-103.5544266	
18,096.00	91.16	177.64	12,454.33	-5,855.23	342.64	392,775.3850	741,260.2373	32.0774610	-103.5544161	
18,189.00	90.13	177.24	12,453.29	-5,948.13	346.79	392,682.4853	741,264.3909	32.0772055	-103.5544049	
18,282.00	90.21	177.28	12,453.01	-6,041.02	351.24	392,589.5923	741,268.8367	32.0769501	-103.5543927	
18,375.00	90.07	177.89	12,452.78	-6,133.94	355.16	392,496.6758	741,272.7554	32.0766946	-103.5543822	
18,469.00	90.71	178.05	12,452.14	-6,227.87	358.49	392,402.7377	741,276.0850	32.0764363	-103.5543737	
18,562.00	90.99	178.73	12,450.76	-6,320.83	361.10	392,309.7854	741,278.6977	32.0761807	-103.5543674	
18,656.00	90.80	179.03	12,449.30	-6,414.80	362.94	392,215.8152	741,280.5348	32.0759224	-103.5543637	
18,749.00	90.85	179.72	12,447.96	-6,507.78	363.95	392,122.8311	741,281.5491	32.0756668	-103.5543626	
18,843.00	90.24	179.45	12,447.06	-6,601.77	364.63	392,028.8385	741,282.2300	32.0754084	-103.5543625	
18,937.00	90.97	179.86	12,446.07	-6,695.77	365.20	391,934.8465	741,282.7959	32.0751500	-103.5543629	
19,030.00	89.99	180.01	12,445.29	-6,788.76	365.30	391,841.8512	741,282.9014	32.0748944	-103.5543647	
19,124.00	89.15	179.54	12,446.00	-6,882.76	365.67	391,747.8558	741,283.2705	32.0746360	-103.5543657	
19,218.00	88.16	178.99	12,448.20	-6,976.72	366.88	391,653.8912	741,284.4759	32.0743777	-103.5543640	
19,311.00	87.58	178.62	12,451.66	-7,069.64	368.81	391,560.9764	741,286.4140	32.0741223	-103.5543599	
19,404.00	87.49	178.98	12,455.66	-7,162.53	370.76	391,468.0832	741,288.3599	32.0738669	-103.5543558	
19,497.00	86.73	178.91	12,460.35	-7,255.40	372.47	391,375.2181	741,290.0700	32.0736116	-103.5543525	
19,591.00	85.64	178.99	12,466.60	-7,349.17	374.19	391,281.4437	741,291.7887	32.0733538	-103.5543491	
19,682.00	85.81	178.85	12,473.39	-7,439.90	375.90	391,190.7133	741,293.4992	32.0731043	-103.5543457	
19,776.00	85.87	178.98	12,480.20	-7,533.64	377.68	391,096.9779	741,295.2744	32.0728466	-103.5543422	
19,869.00	87.72	178.90	12,485.40	-7,626.47	379.39	391,004.1435	741,296.9922	32.0725914	-103.5543388	
19,962.00	88.64	178.87	12,488.36	-7,719.41	381.20	390,911.2092	741,298.8009	32.0723359	-103.5543351	
20,055.00	89.76	178.98	12,489.66	-7,812.38	382.95	390,818.2363	741,300.5455	32.0720803	-103.5543316	
20,149.00	87.66	177.58	12,491.77	-7,906.31	385.77	390,724.3103	741,303.3655	32.0718221	-103.5543247	
20,243.00	89.15	181.83	12,494.39	-8,000.24	386.25	390,630.3723	741,303.8479	32.0715639	-103.5543254	
20,336.00	90.91	184.21	12,494.34	-8,093.10	381.35	390,537.5120	741,298.9488	32.0713087	-103.5543433	
20,430.00	89.79	186.02	12,493.77	-8,186.72	372.97	390,443.8937	741,290.5688	32.0710515	-103.5543726	
20,523.00	88.89	184.52	12,494.84	-8,279.32	364.43	390,351.2967	741,282.0277	32.0707972	-103.5544023	
20,617.00	91.61	183.11	12,494.43	-8,373.10	358.17	390,257.5173	741,275.7740	32.0705395	-103.5544247	
20,710.00	90.29	181.66	12,492.89	-8,466.00	354.31	390,164.6153	741,271.9049	32.0702842	-103.5544393	
20,804.00	90.71	182.16	12,492.07	-8,559.95	351.17	390,070.6718	741,268.7721	32.0700261	-103.5544516	
20,899.00	88.70	180.71	12,492.55	-8,654.91	348.79	389,975.7104	741,266.3931	32.0697651	-103.5544615	
20,992.00	89.40	180.53	12,494.10	-8,747.89	347.79	389,882.7296	741,265.3869	32.0695095	-103.5544669	



Integrity Directional Services, LLC

Survey Report - Geographic



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Columbus Federal Com 22H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3351.00ft
Site:	Sec. 34, T 25 S. , R 33 E	MD Reference:	KB=26' @ 3351.00ft
Well:	Columbus Federal Com 22H	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
21,086.00	91.41	179.70	12,493.43	-8,841.88	347.60	389,788.7379	741,265.1982	32.0692511	-103.5544697
21,180.00	91.81	178.02	12,490.79	-8,935.82	349.47	389,694.7974	741,267.0674	32.0689929	-103.5544659
21,273.00	91.51	178.23	12,488.10	-9,028.73	352.51	389,601.8865	741,270.1090	32.0687374	-103.5544582
21,368.00	89.76	176.99	12,487.04	-9,123.64	356.47	389,506.9807	741,274.0703	32.0684765	-103.5544477
21,462.00	89.17	176.28	12,487.92	-9,217.47	361.99	389,413.1481	741,279.5874	32.0682184	-103.5544320
21,556.00	91.19	176.78	12,487.63	-9,311.29	367.68	389,319.3262	741,285.2765	32.0679604	-103.5544159
21,650.00	91.78	178.54	12,485.19	-9,405.18	371.51	389,225.4405	741,289.1132	32.0677023	-103.5544057
21,745.00	90.94	177.88	12,482.94	-9,500.10	374.48	389,130.5151	741,292.0799	32.0674413	-103.5543983
21,839.00	90.01	177.86	12,482.16	-9,594.03	377.97	389,036.5845	741,295.5734	32.0671830	-103.5543892
21,934.00	89.99	178.39	12,482.16	-9,688.98	381.08	388,941.6359	741,298.6817	32.0669220	-103.5543814
22,029.00	89.85	177.89	12,482.29	-9,783.93	384.17	388,846.6866	741,301.7652	32.0666609	-103.5543736
22,124.00	90.13	178.21	12,482.31	-9,878.88	387.40	388,751.7420	741,304.9977	32.0663998	-103.5543654
22,219.00	89.65	178.23	12,482.49	-9,973.83	390.35	388,656.7885	741,307.9486	32.0661388	-103.5543581
22,259.99	89.81	178.59	12,482.68	-10,014.81	391.49	388,615.8149	741,309.0868	32.0660261	-103.5543554
Hardline Crossing 22259.99'MD / 10022.45'VS									
22,305.00	89.99	178.98	12,482.76	-10,059.81	392.44	388,570.8153	741,310.0422	32.0659024	-103.5543534
Final IDS MWD Survey									
22,360.00	89.99	178.98	12,482.77	-10,114.80	393.42	388,515.8241	741,311.0213	32.0657512	-103.5543515
Projection to TD									

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
11,798.00	11,796.43	-5.05	93.02	First IDS MWD Survey
12,250.91	12,222.73	-119.39	109.11	Hardline Crossing 12250.91'MD / 123.43'VS
22,259.99	12,482.68	-10,014.81	391.49	Hardline Crossing 22259.99'MD / 10022.45'VS
22,305.00	12,482.76	-10,059.81	392.44	Final IDS MWD Survey
22,360.00	12,482.77	-10,114.80	393.42	Projection to TD

Checked By: _____ Approved By: _____ Date: _____