



CONCHO

COG Operating L L C

Lea County, NM (NAD27 NME)

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

Columbus Fee 24H

Wellbore #1

Survey: IDS MWD Surveys

Survey Report - Geographic

27 February, 2017

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Integrity Directional Services, LLC
Survey Report - Geographic



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Columbus Fee 24H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3353.00ft (Scandrill Freedom)
Site:	Sec. 34, T 25 S. , R 33 E	MD Reference:	KB=26' @ 3353.00ft (Scandrill Freedom)
Well:	Columbus Fee 24H	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	Latitude:	32° 5' 36.830 N
From:	Map	Easting:	739,904.9000 usft	Longitude:	103° 33' 31.161 W
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.41 °

Well	Columbus Fee 24H, ACTIVE					
Well Position	+N/-S	0.00 ft	Northing:	398,624.5000 usft	Latitude:	32° 5' 36.830 N
	+E/-W	0.00 ft	Easting:	740,007.8000 usft	Longitude:	103° 33' 29.965 W
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	3,327.00 ft

Wellbore	Wellbore #1				
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Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	11/9/2016	7.00	59.95	47,925

Design	Wellbore #1				
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Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.00	0.00	0.00	180.15

Survey Program	Date	From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
	2/27/2017	146.00	22,326.00	IDS MWD Surveys (Wellbore #1)	MWD	MWD - Standard

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	398,624.5000	740,007.8000	32° 5' 36.830 N	103° 33' 29.965 W
146.00	0.40	261.50	146.00	-0.08	-0.50	398,624.4246	740,007.2960	32° 5' 36.829 N	103° 33' 29.971 W
First IDS MWD Survey									
239.00	1.00	34.80	238.99	0.54	-0.36	398,625.0431	740,007.4381	32° 5' 36.835 N	103° 33' 29.969 W
333.00	1.10	47.40	332.98	1.83	0.77	398,626.3274	740,008.5704	32° 5' 36.848 N	103° 33' 29.956 W
426.00	1.10	52.30	425.96	2.98	2.13	398,627.4775	740,009.9338	32° 5' 36.859 N	103° 33' 29.940 W
519.00	0.70	52.60	518.95	3.87	3.29	398,628.3684	740,011.0914	32° 5' 36.868 N	103° 33' 29.927 W
613.00	0.50	72.00	612.95	4.34	4.14	398,628.8439	740,011.9376	32° 5' 36.872 N	103° 33' 29.917 W
706.00	0.40	114.60	705.94	4.33	4.82	398,628.8342	740,012.6187	32° 5' 36.872 N	103° 33' 29.909 W
802.00	0.20	230.60	801.94	4.09	4.99	398,628.5883	740,012.7939	32° 5' 36.870 N	103° 33' 29.907 W
896.00	0.40	246.70	895.94	3.85	4.57	398,628.3544	740,012.3658	32° 5' 36.867 N	103° 33' 29.912 W
989.00	0.40	264.60	988.94	3.70	3.94	398,628.1955	740,011.7444	32° 5' 36.866 N	103° 33' 29.919 W



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Well:	Columbus Fee 24H	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
1,083.00	0.20	258.70	1,082.94	3.63	3.46	398,628.1324	740,011.2569	32° 5' 36.865 N	103° 33' 29.925 W
1,158.00	0.20	254.10	1,157.94	3.57	3.20	398,628.0709	740,011.0026	32° 5' 36.865 N	103° 33' 29.928 W
1,248.00	0.10	353.70	1,247.94	3.61	3.04	398,628.1060	740,010.8429	32° 5' 36.865 N	103° 33' 29.930 W
1,278.00	0.20	9.00	1,277.94	3.68	3.05	398,628.1837	740,010.8483	32° 5' 36.866 N	103° 33' 29.930 W
1,370.00	0.20	318.70	1,369.94	3.96	2.97	398,628.4629	740,010.7674	32° 5' 36.869 N	103° 33' 29.930 W
1,461.00	0.30	307.80	1,460.93	4.23	2.67	398,628.7283	740,010.4743	32° 5' 36.871 N	103° 33' 29.934 W
1,552.00	0.20	335.50	1,551.93	4.52	2.42	398,629.0188	740,010.2202	32° 5' 36.874 N	103° 33' 29.937 W
1,643.00	0.30	335.00	1,642.93	4.88	2.25	398,629.3792	740,010.0537	32° 5' 36.878 N	103° 33' 29.939 W
1,734.00	0.30	335.70	1,733.93	5.31	2.05	398,629.8123	740,009.8550	32° 5' 36.882 N	103° 33' 29.941 W
1,826.00	0.30	337.10	1,825.93	5.75	1.86	398,630.2537	740,009.6621	32° 5' 36.886 N	103° 33' 29.943 W
1,916.00	0.30	344.70	1,915.93	6.20	1.71	398,630.6980	740,009.5083	32° 5' 36.891 N	103° 33' 29.945 W
2,006.00	0.40	336.40	2,005.93	6.71	1.52	398,631.2131	740,009.3203	32° 5' 36.896 N	103° 33' 29.947 W
2,098.00	0.50	340.80	2,097.92	7.39	1.26	398,631.8865	740,009.0597	32° 5' 36.903 N	103° 33' 29.950 W
2,189.00	0.40	354.90	2,188.92	8.08	1.10	398,632.5779	740,008.9009	32° 5' 36.910 N	103° 33' 29.952 W
2,281.00	0.60	357.90	2,280.92	8.88	1.05	398,633.3791	740,008.8547	32° 5' 36.917 N	103° 33' 29.952 W
2,372.00	0.60	2.70	2,371.91	9.83	1.06	398,634.3312	740,008.8597	32° 5' 36.927 N	103° 33' 29.952 W
2,463.00	0.90	16.90	2,462.91	10.99	1.29	398,635.4910	740,009.0899	32° 5' 36.938 N	103° 33' 29.949 W
2,555.00	0.70	1.70	2,554.90	12.24	1.52	398,636.7440	740,009.3166	32° 5' 36.951 N	103° 33' 29.947 W
2,647.00	0.70	351.80	2,646.89	13.36	1.45	398,637.8620	740,009.2532	32° 5' 36.962 N	103° 33' 29.947 W
2,741.00	0.90	10.50	2,740.88	14.66	1.51	398,639.1562	740,009.3058	32° 5' 36.975 N	103° 33' 29.947 W
2,834.00	1.10	15.40	2,833.87	16.24	1.88	398,640.7350	740,009.6759	32° 5' 36.990 N	103° 33' 29.942 W
2,928.00	1.10	20.50	2,927.85	17.95	2.43	398,642.4500	740,010.2315	32° 5' 37.007 N	103° 33' 29.936 W
3,022.00	1.40	32.30	3,021.83	19.77	3.36	398,644.2658	740,011.1611	32° 5' 37.025 N	103° 33' 29.925 W
3,116.00	0.90	71.10	3,115.81	20.98	4.67	398,645.4756	740,012.4732	32° 5' 37.037 N	103° 33' 29.909 W
3,210.00	1.30	78.00	3,209.79	21.44	6.41	398,645.9364	740,014.2146	32° 5' 37.041 N	103° 33' 29.889 W
3,303.00	0.70	62.00	3,302.78	21.92	7.95	398,646.4224	740,015.7482	32° 5' 37.046 N	103° 33' 29.871 W
3,396.00	0.70	47.20	3,395.77	22.58	8.87	398,647.0751	740,016.6666	32° 5' 37.052 N	103° 33' 29.860 W
3,490.00	0.90	47.80	3,489.76	23.46	9.83	398,647.9611	740,017.6348	32° 5' 37.061 N	103° 33' 29.849 W
3,583.00	1.10	42.80	3,582.75	24.61	10.98	398,649.1067	740,018.7824	32° 5' 37.072 N	103° 33' 29.836 W
3,677.00	0.40	328.30	3,676.74	25.55	11.42	398,650.0480	740,019.2230	32° 5' 37.082 N	103° 33' 29.830 W
3,770.00	0.80	287.10	3,769.73	26.02	10.63	398,650.5151	740,018.4319	32° 5' 37.086 N	103° 33' 29.840 W
3,864.00	0.50	120.70	3,863.73	26.00	10.36	398,650.4986	740,018.1573	32° 5' 37.086 N	103° 33' 29.843 W
3,957.00	1.10	115.90	3,956.72	25.40	11.51	398,649.9015	740,019.3093	32° 5' 37.080 N	103° 33' 29.829 W
4,051.00	0.40	40.90	4,050.72	25.26	12.54	398,649.7554	740,020.3358	32° 5' 37.079 N	103° 33' 29.817 W
4,144.00	0.50	17.00	4,143.71	25.89	12.87	398,650.3888	740,020.6670	32° 5' 37.085 N	103° 33' 29.814 W
4,238.00	1.00	231.90	4,237.71	25.78	12.34	398,650.2749	740,020.1414	32° 5' 37.084 N	103° 33' 29.820 W
4,331.00	1.20	226.70	4,330.69	24.61	10.99	398,649.1063	740,018.7940	32° 5' 37.072 N	103° 33' 29.835 W
4,424.00	1.00	168.60	4,423.68	23.14	10.45	398,647.6429	740,018.2457	32° 5' 37.058 N	103° 33' 29.842 W
4,518.00	0.80	167.70	4,517.67	21.70	10.75	398,646.1976	740,018.5476	32° 5' 37.044 N	103° 33' 29.839 W
4,612.00	1.50	160.50	4,611.65	19.90	11.30	398,644.3967	740,019.0981	32° 5' 37.026 N	103° 33' 29.832 W
4,706.00	2.00	148.00	4,705.60	17.35	12.58	398,641.8459	740,020.3780	32° 5' 37.000 N	103° 33' 29.818 W
4,799.00	1.00	110.00	4,798.57	15.69	14.20	398,640.1921	740,022.0007	32° 5' 36.984 N	103° 33' 29.799 W
4,893.00	0.70	91.10	4,892.56	15.40	15.55	398,639.9005	740,023.3455	32° 5' 36.981 N	103° 33' 29.783 W
4,986.00	0.80	93.40	4,985.55	15.35	16.76	398,639.8511	740,024.5616	32° 5' 36.980 N	103° 33' 29.769 W
5,080.00	0.90	98.10	5,079.54	15.21	18.15	398,639.7081	740,025.9476	32° 5' 36.979 N	103° 33' 29.753 W
5,174.00	0.90	102.60	5,173.53	14.94	19.60	398,639.4431	740,027.3989	32° 5' 36.976 N	103° 33' 29.736 W
5,268.00	0.80	91.10	5,267.52	14.77	20.98	398,639.2694	740,028.7755	32° 5' 36.974 N	103° 33' 29.720 W
5,362.00	1.00	95.40	5,361.51	14.68	22.45	398,639.1796	740,030.2482	32° 5' 36.973 N	103° 33' 29.703 W
5,457.00	0.90	97.60	5,456.50	14.50	24.01	398,639.0029	740,031.8131	32° 5' 36.971 N	103° 33' 29.685 W
5,551.00	0.80	94.70	5,550.49	14.35	25.40	398,638.8515	740,033.1988	32° 5' 36.970 N	103° 33' 29.669 W
5,645.00	0.90	99.80	5,644.48	14.17	26.78	398,638.6721	740,034.5803	32° 5' 36.968 N	103° 33' 29.653 W
5,738.00	0.80	99.70	5,737.47	13.94	28.14	398,638.4384	740,035.9400	32° 5' 36.966 N	103° 33' 29.637 W
5,832.00	0.90	97.30	5,831.46	13.73	29.52	398,638.2340	740,037.3191	32° 5' 36.963 N	103° 33' 29.621 W
5,926.00	0.80	105.40	5,925.44	13.47	30.88	398,637.9660	740,038.6840	32° 5' 36.961 N	103° 33' 29.605 W
6,019.00	0.60	84.70	6,018.44	13.34	31.99	398,637.8385	740,039.7948	32° 5' 36.959 N	103° 33' 29.592 W

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Site:	Sec. 34, T 25 S., R 33 E	MD Reference:	KB=26' @ 3353.00ft (Scandril Freedom)
Well:	Columbus Fee 24H	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
6,112.00	0.80	21.10	6,111.43	13.99	32.71	398,638.4892	740,040.5134	32° 5' 36.966 N	103° 33' 29.584 W
6,206.00	0.90	343.70	6,205.42	15.31	32.74	398,639.8100	740,040.5424	32° 5' 36.979 N	103° 33' 29.583 W
6,299.00	0.80	335.60	6,298.41	16.60	32.27	398,641.1023	740,040.0692	32° 5' 36.992 N	103° 33' 29.589 W
6,393.00	0.90	336.30	6,392.40	17.88	31.70	398,642.3759	740,039.5014	32° 5' 37.004 N	103° 33' 29.595 W
6,486.00	0.90	331.00	6,485.39	19.18	31.05	398,643.6835	740,038.8537	32° 5' 37.017 N	103° 33' 29.603 W
6,579.00	0.90	329.10	6,578.38	20.45	30.32	398,644.9490	740,038.1245	32° 5' 37.030 N	103° 33' 29.611 W
6,673.00	0.90	329.00	6,672.37	21.72	29.57	398,646.2153	740,037.3652	32° 5' 37.042 N	103° 33' 29.620 W
6,767.00	0.90	328.80	6,766.36	22.98	28.80	398,647.4796	740,036.6026	32° 5' 37.055 N	103° 33' 29.629 W
6,861.00	1.00	321.20	6,860.34	24.25	27.91	398,648.7503	740,035.7061	32° 5' 37.068 N	103° 33' 29.639 W
6,955.00	0.80	315.70	6,954.33	25.36	26.93	398,649.8592	740,034.7339	32° 5' 37.079 N	103° 33' 29.650 W
7,049.00	0.80	312.40	7,048.32	26.27	25.99	398,650.7714	740,033.7909	32° 5' 37.088 N	103° 33' 29.661 W
7,142.00	0.80	302.40	7,141.31	27.06	24.96	398,651.5570	740,032.7633	32° 5' 37.096 N	103° 33' 29.673 W
7,236.00	0.80	297.90	7,235.30	27.72	23.83	398,652.2157	740,031.6293	32° 5' 37.102 N	103° 33' 29.686 W
7,329.00	1.00	301.20	7,328.29	28.44	22.56	398,652.9399	740,030.3614	32° 5' 37.109 N	103° 33' 29.701 W
7,423.00	1.00	300.00	7,422.28	29.28	21.15	398,653.7750	740,028.9494	32° 5' 37.118 N	103° 33' 29.717 W
7,516.00	1.00	298.50	7,515.26	30.07	19.73	398,654.5680	740,027.5334	32° 5' 37.126 N	103° 33' 29.733 W
7,611.00	1.00	299.00	7,610.25	30.87	18.28	398,655.3654	740,026.0798	32° 5' 37.134 N	103° 33' 29.750 W
7,705.00	1.10	293.40	7,704.23	31.62	16.73	398,656.1214	740,024.5343	32° 5' 37.141 N	103° 33' 29.768 W
7,798.00	1.10	291.20	7,797.22	32.30	15.08	398,656.7988	740,022.8828	32° 5' 37.148 N	103° 33' 29.787 W
7,893.00	1.10	292.70	7,892.20	32.98	13.39	398,657.4804	740,021.1914	32° 5' 37.155 N	103° 33' 29.807 W
8,079.00	1.10	291.30	8,078.16	34.32	10.08	398,658.8179	740,017.8809	32° 5' 37.169 N	103° 33' 29.845 W
8,172.00	1.20	292.70	8,171.15	35.02	8.35	398,659.5180	740,016.1509	32° 5' 37.176 N	103° 33' 29.865 W
8,265.00	1.10	290.80	8,264.13	35.71	6.62	398,660.2108	740,014.4180	32° 5' 37.183 N	103° 33' 29.885 W
8,359.00	1.00	285.90	8,358.11	36.26	4.99	398,660.7559	740,012.7856	32° 5' 37.188 N	103° 33' 29.904 W
8,453.00	1.00	280.40	8,452.10	36.63	3.39	398,661.1287	740,011.1899	32° 5' 37.192 N	103° 33' 29.923 W
8,547.00	0.70	271.80	8,546.09	36.79	2.01	398,661.2948	740,009.8092	32° 5' 37.194 N	103° 33' 29.939 W
8,640.00	0.50	266.50	8,639.08	36.79	1.04	398,661.2879	740,008.8364	32° 5' 37.194 N	103° 33' 29.950 W
8,734.00	0.70	266.80	8,733.08	36.73	0.05	398,661.2308	740,007.8537	32° 5' 37.193 N	103° 33' 29.962 W
8,827.00	0.50	259.50	8,826.07	36.63	-0.91	398,661.1251	740,006.8875	32° 5' 37.192 N	103° 33' 29.973 W
8,920.00	0.70	268.90	8,919.07	36.54	-1.88	398,661.0403	740,005.9206	32° 5' 37.191 N	103° 33' 29.984 W
9,015.00	0.50	264.80	9,014.06	36.49	-2.87	398,660.9916	740,004.9276	32° 5' 37.191 N	103° 33' 29.996 W
9,106.00	0.80	277.50	9,105.06	36.54	-3.90	398,661.0385	740,003.9023	32° 5' 37.192 N	103° 33' 30.008 W
9,202.00	0.80	287.00	9,201.05	36.82	-5.20	398,661.3219	740,002.5969	32° 5' 37.194 N	103° 33' 30.023 W
9,296.00	0.80	296.80	9,295.04	37.31	-6.42	398,661.8097	740,001.3837	32° 5' 37.199 N	103° 33' 30.037 W
9,389.00	0.70	294.90	9,388.03	37.84	-7.51	398,662.3416	740,000.2889	32° 5' 37.205 N	103° 33' 30.049 W
9,483.00	0.60	301.50	9,482.02	38.34	-8.45	398,662.8405	739,999.3484	32° 5' 37.210 N	103° 33' 30.060 W
9,575.00	0.40	310.30	9,574.02	38.80	-9.11	398,663.2999	739,998.6928	32° 5' 37.214 N	103° 33' 30.068 W
9,668.00	0.60	176.30	9,667.02	38.52	-9.32	398,663.0239	739,998.4766	32° 5' 37.212 N	103° 33' 30.070 W
9,762.00	0.70	176.90	9,761.01	37.46	-9.26	398,661.9594	739,998.5394	32° 5' 37.201 N	103° 33' 30.070 W
9,855.00	0.60	208.50	9,854.01	36.46	-9.46	398,660.9642	739,998.3378	32° 5' 37.191 N	103° 33' 30.072 W
9,950.00	1.00	233.10	9,949.00	35.53	-10.36	398,660.0294	739,997.4375	32° 5' 37.182 N	103° 33' 30.083 W
10,044.00	1.10	230.50	10,042.98	34.46	-11.71	398,658.9629	739,996.0853	32° 5' 37.172 N	103° 33' 30.099 W
10,137.00	1.00	234.70	10,135.97	33.43	-13.07	398,657.9262	739,994.7342	32° 5' 37.161 N	103° 33' 30.114 W
10,231.00	1.10	234.40	10,229.95	32.43	-14.47	398,656.9269	739,993.3311	32° 5' 37.152 N	103° 33' 30.131 W
10,325.00	1.40	228.10	10,323.93	31.13	-16.06	398,655.6348	739,991.7428	32° 5' 37.139 N	103° 33' 30.149 W
10,418.00	1.30	221.60	10,416.90	29.59	-17.60	398,654.0872	739,990.1967	32° 5' 37.124 N	103° 33' 30.167 W
10,512.00	1.20	238.40	10,510.88	28.27	-19.15	398,652.7741	739,988.6504	32° 5' 37.111 N	103° 33' 30.186 W
10,605.00	1.40	236.60	10,603.86	27.14	-20.93	398,651.6384	739,986.8725	32° 5' 37.100 N	103° 33' 30.206 W
10,698.00	1.10	232.20	10,696.83	25.97	-22.58	398,650.4659	739,985.2187	32° 5' 37.088 N	103° 33' 30.226 W
10,791.00	1.10	218.10	10,789.82	24.72	-23.84	398,649.2163	739,983.9625	32° 5' 37.076 N	103° 33' 30.240 W
10,885.00	1.00	218.90	10,883.80	23.37	-24.91	398,647.8679	739,982.8907	32° 5' 37.063 N	103° 33' 30.253 W
10,979.00	0.60	194.60	10,977.79	22.25	-25.55	398,646.7532	739,982.2515	32° 5' 37.052 N	103° 33' 30.260 W
11,072.00	0.60	150.80	11,070.79	21.36	-25.43	398,645.8569	739,982.3664	32° 5' 37.043 N	103° 33' 30.259 W
11,166.00	0.40	191.40	11,164.78	20.61	-25.26	398,645.1057	739,982.5416	32° 5' 37.035 N	103° 33' 30.257 W
11,259.00	1.10	242.70	11,257.78	19.88	-26.12	398,644.4378	739,981.6842	32° 5' 37.028 N	103° 33' 30.267 W

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Columbus Fee 24H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3353.00ft (Scandril Freedom)
Site:	Sec. 34, T 25 S. , R 33 E	MD Reference:	KB=26' @ 3353.00ft (Scandril Freedom)
Well:	Columbus Fee 24H	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
11,353.00	1.40	247.30	11,351.75	19.02	-27.98	398,643.5210	739,979.8230	32° 5' 37.020 N	103° 33' 30.289 W
11,446.00	1.80	248.30	11,444.72	18.04	-30.38	398,642.5425	739,977.4179	32° 5' 37.010 N	103° 33' 30.317 W
11,540.00	1.80	249.50	11,538.67	16.98	-33.14	398,641.4797	739,974.6634	32° 5' 37.000 N	103° 33' 30.349 W
11,634.00	2.20	244.70	11,632.61	15.69	-36.15	398,640.1916	739,971.6494	32° 5' 36.988 N	103° 33' 30.384 W
11,668.00	2.20	244.60	11,666.59	15.13	-37.33	398,639.6328	739,970.4699	32° 5' 36.982 N	103° 33' 30.398 W
11,728.00	1.90	233.90	11,726.55	14.05	-39.17	398,638.5528	739,968.6259	32° 5' 36.972 N	103° 33' 30.419 W
11,823.00	1.80	241.80	11,821.50	12.42	-41.76	398,636.9198	739,966.0385	32° 5' 36.956 N	103° 33' 30.450 W
11,888.00	1.70	234.20	11,886.47	11.37	-43.44	398,635.8734	739,964.3568	32° 5' 36.945 N	103° 33' 30.469 W
11,920.00	4.70	181.00	11,918.42	9.78	-43.85	398,634.2843	739,963.9488	32° 5' 36.930 N	103° 33' 30.474 W
11,951.00	10.30	182.30	11,949.14	5.74	-43.98	398,630.2421	739,963.8153	32° 5' 36.890 N	103° 33' 30.476 W
11,982.00	14.30	181.90	11,979.43	-0.86	-44.22	398,623.6438	739,963.5770	32° 5' 36.824 N	103° 33' 30.479 W
12,020.00	19.60	177.40	12,015.76	-11.92	-44.09	398,612.5780	739,963.7107	32° 5' 36.715 N	103° 33' 30.479 W
12,054.00	22.60	178.90	12,047.48	-24.15	-43.71	398,600.3466	739,964.0949	32° 5' 36.594 N	103° 33' 30.475 W
12,101.00	28.30	180.30	12,089.90	-44.34	-43.59	398,580.1596	739,964.2100	32° 5' 36.394 N	103° 33' 30.476 W
12,132.00	32.40	178.60	12,116.65	-60.00	-43.43	398,564.5015	739,964.3745	32° 5' 36.239 N	103° 33' 30.475 W
12,163.00	35.60	177.40	12,142.35	-77.32	-42.81	398,547.1804	739,964.9869	32° 5' 36.068 N	103° 33' 30.469 W
12,194.00	36.00	177.90	12,167.49	-95.44	-42.07	398,529.0622	739,965.7301	32° 5' 35.888 N	103° 33' 30.462 W
12,218.00	37.50	176.90	12,186.72	-109.78	-41.42	398,514.7181	739,966.3836	32° 5' 35.746 N	103° 33' 30.456 W
12,238.00	39.60	176.30	12,202.36	-122.22	-40.68	398,502.2770	739,967.1243	32° 5' 35.623 N	103° 33' 30.448 W
12,268.00	42.30	176.10	12,225.02	-141.84	-39.37	398,482.6602	739,968.4281	32° 5' 35.429 N	103° 33' 30.435 W
12,287.00	44.30	176.10	12,238.84	-154.84	-38.49	398,469.6605	739,969.3144	32° 5' 35.300 N	103° 33' 30.426 W
12,318.00	48.60	176.00	12,260.20	-177.25	-36.94	398,447.2513	739,970.8624	32° 5' 35.078 N	103° 33' 30.409 W
12,349.00	52.30	176.50	12,279.93	-201.10	-35.38	398,423.4034	739,972.4227	32° 5' 34.842 N	103° 33' 30.393 W
12,381.00	55.70	177.30	12,298.74	-226.94	-33.98	398,397.5568	739,973.8186	32° 5' 34.586 N	103° 33' 30.379 W
12,428.00	61.10	178.30	12,323.36	-266.93	-32.46	398,357.5704	739,975.3446	32° 5' 34.191 N	103° 33' 30.365 W
12,474.00	67.70	179.00	12,343.22	-308.38	-31.49	398,316.1208	739,976.3144	32° 5' 33.780 N	103° 33' 30.357 W
12,505.00	71.90	179.30	12,353.93	-337.46	-31.06	398,287.0373	739,976.7449	32° 5' 33.492 N	103° 33' 30.354 W
12,536.00	73.30	178.90	12,363.20	-367.04	-30.59	398,257.4604	739,977.2099	32° 5' 33.200 N	103° 33' 30.352 W
12,568.00	75.20	178.50	12,371.88	-397.83	-29.89	398,226.6713	739,977.9091	32° 5' 32.895 N	103° 33' 30.346 W
12,615.00	78.40	178.20	12,382.61	-443.56	-28.57	398,180.9382	739,979.2273	32° 5' 32.442 N	103° 33' 30.334 W
12,661.00	83.90	178.40	12,389.69	-488.98	-27.23	398,135.5234	739,980.5746	32° 5' 31.993 N	103° 33' 30.323 W
12,692.00	86.50	177.60	12,392.28	-519.85	-26.15	398,104.6539	739,981.6530	32° 5' 31.687 N	103° 33' 30.313 W
12,755.00	86.50	177.50	12,396.13	-582.67	-23.46	398,041.8290	739,984.3410	32° 5' 31.065 N	103° 33' 30.287 W
12,849.00	89.90	178.60	12,399.08	-676.56	-20.26	397,947.9452	739,987.5367	32° 5' 30.136 N	103° 33' 30.257 W
12,942.00	90.50	179.80	12,398.75	-769.54	-18.96	397,854.9571	739,988.8351	32° 5' 29.216 N	103° 33' 30.250 W
13,035.00	91.70	181.30	12,396.97	-862.52	-19.86	397,761.9832	739,987.9428	32° 5' 28.296 N	103° 33' 30.268 W
13,128.00	91.90	179.20	12,394.05	-955.47	-20.26	397,669.0354	739,987.5372	32° 5' 27.376 N	103° 33' 30.281 W
13,222.00	91.30	179.40	12,391.42	-1,049.42	-19.11	397,575.0797	739,988.6851	32° 5' 26.446 N	103° 33' 30.275 W
13,316.00	90.60	179.50	12,389.86	-1,143.40	-18.21	397,481.0978	739,989.5873	32° 5' 25.516 N	103° 33' 30.272 W
13,409.00	91.50	180.90	12,388.16	-1,236.39	-18.54	397,388.1174	739,989.2629	32° 5' 24.596 N	103° 33' 30.284 W
13,503.00	89.50	178.60	12,387.34	-1,330.37	-18.13	397,294.1331	739,989.6733	32° 5' 23.666 N	103° 33' 30.287 W
13,597.00	90.20	177.70	12,387.59	-1,424.32	-15.09	397,200.1842	739,992.7078	32° 5' 22.736 N	103° 33' 30.260 W
13,690.00	90.60	177.60	12,386.94	-1,517.24	-11.28	397,107.2651	739,996.5210	32° 5' 21.816 N	103° 33' 30.223 W
13,784.00	89.40	178.90	12,386.94	-1,611.19	-8.41	397,013.3128	739,999.3915	32° 5' 20.886 N	103° 33' 30.198 W
13,877.00	92.10	182.10	12,385.72	-1,704.16	-9.22	396,920.3452	739,998.5810	32° 5' 19.967 N	103° 33' 30.215 W
13,971.00	90.40	182.60	12,383.67	-1,798.05	-13.07	396,826.4505	739,994.7276	32° 5' 19.038 N	103° 33' 30.267 W
14,077.00	89.80	181.70	12,383.48	-1,903.98	-17.05	396,720.5271	739,990.7510	32° 5' 17.990 N	103° 33' 30.322 W
14,171.00	90.70	185.30	12,383.07	-1,997.78	-22.79	396,626.7199	739,985.0136	32° 5' 17.062 N	103° 33' 30.397 W
14,266.00	89.40	184.90	12,382.99	-2,092.41	-31.23	396,532.0984	739,976.5689	32° 5' 16.126 N	103° 33' 30.503 W
14,359.00	87.90	183.40	12,385.18	-2,185.13	-37.96	396,439.3735	739,969.8406	32° 5' 15.209 N	103° 33' 30.589 W
14,452.00	86.60	181.80	12,389.64	-2,277.92	-42.17	396,346.5815	739,965.6262	32° 5' 14.291 N	103° 33' 30.646 W
14,546.00	86.80	180.60	12,395.05	-2,371.74	-44.14	396,252.7599	739,963.6610	32° 5' 13.363 N	103° 33' 30.676 W
14,640.00	86.10	179.50	12,400.87	-2,465.56	-44.22	396,158.9425	739,963.5788	32° 5' 12.434 N	103° 33' 30.685 W
14,733.00	85.50	177.80	12,407.69	-2,558.28	-42.04	396,066.2221	739,965.7634	32° 5' 11.517 N	103° 33' 30.668 W
14,826.00	86.30	178.60	12,414.34	-2,651.00	-39.12	395,973.5075	739,968.6767	32° 5' 10.599 N	103° 33' 30.641 W



Integrity Directional Services, LLC
Survey Report - Geographic



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Columbus Fee 24H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3353.00ft (Scandrift Freedom)
Site:	Sec. 34, T 25 S. , R 33 E	MD Reference:	KB=26' @ 3353.00ft (Scandrift Freedom)
Well:	Columbus Fee 24H	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	
14,920.00	88.90	180.40	12,418.27	-2,744.90	-38.31	395,879.6057	739,969.4948	32° 5' 9.670 N	103° 33' 30.640 W	
15,013.00	89.90	182.30	12,419.25	-2,837.86	-40.50	395,786.6422	739,967.3038	32° 5' 8.750 N	103° 33' 30.673 W	
15,106.00	88.40	182.10	12,420.63	-2,930.78	-44.07	395,693.7239	739,963.7342	32° 5' 7.831 N	103° 33' 30.722 W	
15,200.00	90.40	183.30	12,421.61	-3,024.67	-48.49	395,599.8400	739,959.3066	32° 5' 6.902 N	103° 33' 30.782 W	
15,294.00	89.40	179.90	12,421.77	-3,118.61	-51.12	395,505.8920	739,956.6824	32° 5' 5.973 N	103° 33' 30.820 W	
15,387.00	90.00	179.80	12,422.26	-3,211.61	-50.87	395,412.8942	739,956.9258	32° 5' 5.052 N	103° 33' 30.825 W	
15,481.00	88.60	180.30	12,423.41	-3,305.60	-50.96	395,318.9041	739,956.8439	32° 5' 4.122 N	103° 33' 30.834 W	
15,574.00	88.70	177.20	12,425.60	-3,398.54	-48.93	395,225.9636	739,958.8719	32° 5' 3.202 N	103° 33' 30.818 W	
15,668.00	89.80	176.80	12,426.83	-3,492.40	-44.01	395,132.1023	739,963.7910	32° 5' 2.273 N	103° 33' 30.768 W	
15,761.00	88.50	177.70	12,428.21	-3,585.28	-39.55	395,039.2227	739,968.2524	32° 5' 1.354 N	103° 33' 30.724 W	
15,855.00	86.80	178.50	12,432.07	-3,679.15	-36.43	394,945.3578	739,971.3667	32° 5' 0.425 N	103° 33' 30.696 W	
15,948.00	87.20	178.10	12,436.93	-3,771.98	-33.68	394,852.5267	739,974.1219	32° 4' 59.506 N	103° 33' 30.672 W	
16,042.00	86.40	177.70	12,442.18	-3,865.77	-30.24	394,758.7374	739,977.5609	32° 4' 58.577 N	103° 33' 30.640 W	
16,136.00	85.50	178.00	12,448.82	-3,959.47	-26.72	394,665.0395	739,981.0786	32° 4' 57.650 N	103° 33' 30.607 W	
16,229.00	86.20	176.60	12,455.55	-4,052.12	-22.35	394,572.3894	739,985.4484	32° 4' 56.733 N	103° 33' 30.563 W	
16,322.00	89.20	177.20	12,459.28	-4,144.90	-17.33	394,479.6115	739,990.4726	32° 4' 55.814 N	103° 33' 30.513 W	
16,402.00	87.30	175.60	12,461.72	-4,224.70	-12.31	394,399.8129	739,995.4925	32° 4' 55.024 N	103° 33' 30.461 W	
16,495.00	89.40	179.00	12,464.40	-4,317.54	-7.93	394,306.9737	739,999.8692	32° 4' 54.105 N	103° 33' 30.418 W	
16,590.00	92.70	181.50	12,462.66	-4,412.50	-8.34	394,212.0114	739,999.4560	32° 4' 53.166 N	103° 33' 30.431 W	
16,683.00	91.50	180.50	12,459.25	-4,505.42	-9.97	394,119.0910	739,997.8343	32° 4' 52.246 N	103° 33' 30.457 W	
16,777.00	91.90	180.20	12,456.47	-4,599.37	-10.54	394,025.1346	739,997.2604	32° 4' 51.317 N	103° 33' 30.472 W	
16,871.00	89.60	178.60	12,455.23	-4,693.35	-9.56	393,931.1574	739,998.2449	32° 4' 50.386 N	103° 33' 30.468 W	
16,964.00	88.00	180.00	12,457.18	-4,786.32	-8.42	393,838.1904	739,999.3811	32° 4' 49.466 N	103° 33' 30.463 W	
17,058.00	90.40	181.40	12,458.49	-4,880.29	-9.57	393,744.2159	739,998.2326	32° 4' 48.537 N	103° 33' 30.484 W	
17,151.00	90.40	181.50	12,457.85	-4,973.26	-11.92	393,651.2482	739,995.8793	32° 4' 47.617 N	103° 33' 30.519 W	
17,245.00	91.10	181.60	12,456.62	-5,067.22	-14.46	393,557.2914	739,993.3369	32° 4' 46.687 N	103° 33' 30.557 W	
17,339.00	91.50	182.80	12,454.48	-5,161.12	-18.07	393,463.3870	739,989.7295	32° 4' 45.758 N	103° 33' 30.606 W	
17,433.00	91.10	180.60	12,452.35	-5,255.05	-20.86	393,369.4587	739,986.9420	32° 4' 44.829 N	103° 33' 30.647 W	
17,526.00	90.10	179.60	12,451.38	-5,348.04	-21.02	393,276.4664	739,986.7797	32° 4' 43.909 N	103° 33' 30.656 W	
17,619.00	89.60	178.50	12,451.62	-5,441.03	-19.48	393,183.4815	739,988.3216	32° 4' 42.988 N	103° 33' 30.646 W	
17,713.00	92.00	181.20	12,450.31	-5,535.00	-19.23	393,089.5067	739,988.5683	32° 4' 42.058 N	103° 33' 30.651 W	
17,806.00	91.20	179.80	12,447.71	-5,627.96	-20.04	392,996.5498	739,987.7573	32° 4' 41.139 N	103° 33' 30.668 W	
17,899.00	89.30	178.90	12,447.30	-5,720.95	-18.99	392,903.5620	739,988.8123	32° 4' 40.218 N	103° 33' 30.664 W	
17,993.00	91.80	181.10	12,446.40	-5,814.93	-18.99	392,809.5798	739,988.8127	32° 4' 39.288 N	103° 33' 30.672 W	
18,086.00	93.40	182.60	12,442.18	-5,907.78	-21.99	392,716.7298	739,985.8144	32° 4' 38.370 N	103° 33' 30.714 W	
18,179.00	93.30	182.40	12,436.75	-6,000.53	-26.04	392,623.9773	739,981.7647	32° 4' 37.452 N	103° 33' 30.769 W	
18,273.00	90.70	182.00	12,433.47	-6,094.40	-29.64	392,530.1122	739,978.1591	32° 4' 36.524 N	103° 33' 30.819 W	
18,367.00	89.90	181.50	12,432.98	-6,188.35	-32.51	392,436.1586	739,975.2885	32° 4' 35.594 N	103° 33' 30.860 W	
18,460.00	89.40	182.00	12,433.54	-6,281.31	-35.35	392,343.2045	739,972.4486	32° 4' 34.674 N	103° 33' 30.901 W	
18,553.00	89.50	180.70	12,434.44	-6,374.28	-37.54	392,250.2368	739,970.2577	32° 4' 33.755 N	103° 33' 30.934 W	
18,646.00	92.20	180.60	12,433.06	-6,467.25	-38.60	392,157.2618	739,969.2028	32° 4' 32.835 N	103° 33' 30.954 W	
18,740.00	92.00	180.60	12,429.61	-6,561.18	-39.58	392,063.3303	739,968.2191	32° 4' 31.905 N	103° 33' 30.973 W	
18,834.00	92.00	180.40	12,426.33	-6,655.12	-40.40	391,969.3914	739,967.3993	32° 4' 30.976 N	103° 33' 30.991 W	
18,927.00	91.70	180.70	12,423.33	-6,748.07	-41.29	391,876.4445	739,966.5071	32° 4' 30.056 N	103° 33' 31.009 W	
19,021.00	90.70	180.90	12,421.36	-6,842.04	-42.61	391,782.4757	739,965.1949	32° 4' 29.126 N	103° 33' 31.032 W	
19,114.00	90.00	181.10	12,420.79	-6,935.02	-44.23	391,689.4924	739,963.5719	32° 4' 28.206 N	103° 33' 31.058 W	
19,208.00	90.10	181.90	12,420.71	-7,028.99	-46.69	391,595.5256	739,961.1113	32° 4' 27.276 N	103° 33' 31.095 W	
19,302.00	90.50	180.50	12,420.22	-7,122.96	-48.66	391,501.5503	739,959.1427	32° 4' 26.347 N	103° 33' 31.126 W	
19,396.00	90.40	181.00	12,419.48	-7,216.95	-49.89	391,407.5617	739,957.9123	32° 4' 25.417 N	103° 33' 31.148 W	
19,490.00	90.30	181.70	12,418.91	-7,310.92	-52.10	391,313.5903	739,955.6978	32° 4' 24.487 N	103° 33' 31.181 W	
19,583.00	90.80	180.50	12,418.01	-7,403.90	-53.89	391,220.6139	739,953.9125	32° 4' 23.567 N	103° 33' 31.210 W	
19,677.00	90.30	179.50	12,417.11	-7,497.90	-53.89	391,126.6199	739,953.9125	32° 4' 22.637 N	103° 33' 31.218 W	
19,772.00	89.30	178.90	12,417.44	-7,592.88	-52.56	391,031.6316	739,955.2389	32° 4' 21.697 N	103° 33' 31.210 W	
19,865.00	88.70	178.90	12,419.07	-7,685.85	-50.78	390,938.6635	739,957.0240	32° 4' 20.777 N	103° 33' 31.197 W	
19,960.00	87.50	178.30	12,422.22	-7,780.77	-48.46	390,843.7464	739,959.3435	32° 4' 19.837 N	103° 33' 31.178 W	

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Columbus Fee 24H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3353.00ft (Scandrift Freedom)
Site:	Sec. 34, T 25 S. , R 33 E	MD Reference:	KB=26' @ 3353.00ft (Scandrift Freedom)
Well:	Columbus Fee 24H	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
20,053.00	88.50	178.40	12,425.46	-7,873.67	-45.78	390,750.8430	739,962.0197	32° 4' 18.918 N	103° 33' 31.155 W
20,146.00	90.70	179.00	12,426.11	-7,966.64	-43.67	390,657.8755	739,964.1293	32° 4' 17.997 N	103° 33' 31.138 W
20,240.00	88.70	177.90	12,426.60	-8,060.60	-41.13	390,563.9176	739,966.6717	32° 4' 17.067 N	103° 33' 31.116 W
20,335.00	90.90	179.60	12,426.93	-8,155.57	-39.06	390,468.9503	739,968.7438	32° 4' 16.128 N	103° 33' 31.100 W
20,429.00	90.80	180.10	12,425.54	-8,249.56	-38.81	390,374.9615	739,968.9898	32° 4' 15.197 N	103° 33' 31.105 W
20,523.00	89.40	179.70	12,425.38	-8,343.55	-38.65	390,280.9645	739,969.1539	32° 4' 14.267 N	103° 33' 31.111 W
20,617.00	88.10	178.70	12,427.43	-8,437.52	-37.33	390,186.9994	739,970.4658	32° 4' 13.337 N	103° 33' 31.104 W
20,710.00	88.70	179.00	12,430.02	-8,530.46	-35.47	390,094.0551	739,972.3315	32° 4' 12.417 N	103° 33' 31.090 W
20,803.00	91.30	181.60	12,430.02	-8,623.44	-35.96	390,001.0725	739,971.8446	32° 4' 11.497 N	103° 33' 31.103 W
20,897.00	88.50	181.00	12,430.19	-8,717.41	-38.09	389,907.1069	739,969.7122	32° 4' 10.568 N	103° 33' 31.136 W
20,990.00	92.20	184.90	12,429.62	-8,810.25	-42.87	389,814.2661	739,964.9285	32° 4' 9.649 N	103° 33' 31.199 W
21,084.00	88.60	183.00	12,428.96	-8,904.01	-49.34	389,720.5115	739,958.4551	32° 4' 8.722 N	103° 33' 31.282 W
21,179.00	87.70	181.80	12,432.03	-8,998.87	-53.32	389,625.6473	739,954.4789	32° 4' 7.783 N	103° 33' 31.336 W
21,272.00	89.60	182.70	12,434.22	-9,091.77	-56.97	389,532.7502	739,950.8287	32° 4' 6.864 N	103° 33' 31.386 W
21,367.00	90.20	181.50	12,434.39	-9,186.70	-60.45	389,437.8165	739,947.3476	32° 4' 5.925 N	103° 33' 31.435 W
21,460.00	87.80	176.80	12,436.01	-9,279.64	-59.07	389,344.8739	739,948.7251	32° 4' 5.005 N	103° 33' 31.427 W
21,554.00	88.20	177.40	12,439.29	-9,373.47	-54.32	389,251.0523	739,953.4779	32° 4' 4.077 N	103° 33' 31.379 W
21,648.00	87.80	177.90	12,442.57	-9,467.33	-50.47	389,157.1892	739,957.3299	32° 4' 3.148 N	103° 33' 31.342 W
21,741.00	87.90	178.80	12,446.06	-9,560.22	-47.79	389,064.2944	739,960.0058	32° 4' 2.228 N	103° 33' 31.319 W
21,835.00	89.30	178.70	12,448.36	-9,654.17	-45.74	388,970.3473	739,962.0558	32° 4' 1.298 N	103° 33' 31.303 W
21,930.00	89.10	179.70	12,449.68	-9,749.15	-44.42	388,875.3673	739,963.3820	32° 4' 0.358 N	103° 33' 31.295 W
22,025.00	90.40	180.30	12,450.10	-9,844.15	-44.42	388,780.3709	739,963.3820	32° 3' 59.418 N	103° 33' 31.303 W
22,119.00	91.40	180.30	12,448.62	-9,938.13	-44.91	388,686.3851	739,962.8899	32° 3' 58.488 N	103° 33' 31.317 W
22,214.00	90.80	180.30	12,446.80	-10,033.12	-45.41	388,591.4046	739,962.3926	32° 3' 57.548 N	103° 33' 31.331 W
22,273.00	90.50	180.70	12,446.13	-10,092.11	-45.92	388,532.4109	739,961.8777	32° 3' 56.965 N	103° 33' 31.341 W
Final IDS MWD Survey									
22,326.00	90.50	180.70	12,445.67	-10,145.10	-46.57	388,479.4170	739,961.2303	32° 3' 56.440 N	103° 33' 31.353 W
Projection to TD									

Survey Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
146.00	146.00	-0.08	-0.50	First IDS MWD Survey
22,273.00	12,446.13	-10,092.11	-45.92	Final IDS MWD Survey
22,326.00	12,445.67	-10,145.10	-46.57	Projection to TD

Checked By: _____ Approved By: _____ Date: _____