



CONCHO

COG Operating L L C

Eddy County, NM (NAD 27 NME)

Sec. 29, T 25S. , R 27 E

Populus Federal 4H

Wellbore #1

Design: Wellbore #1

Survey Report - Geographic

09 May, 2017

**Please provide signature
page for directional survey**





Integrity Directional Services, LLC

Survey Report - Geographic



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 29, T 25S. , R 27 E
Well: Populus Federal 4H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Populus Federal 4H
TVD Reference: KB=20' @ 3157.90ft (Patriot 2)
MD Reference: KB=20' @ 3157.90ft (Patriot 2)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Project Eddy County, NM (NAD 27 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. 29, T 25S. , R 27 E

Site Position: **Map** **Northing:** 402,936.9200 usft **Latitude:** 32° 6' 27.829 N
From: **Easting:** 538,041.2700 usft **Longitude:** 104° 12' 37.705 W
Position Uncertainty: 0.00 ft **Slot Radius:** 13-3/16 " **Grid Convergence:** 0.07 °

Well Populus Federal 4H, ACITVE

Well Position **+N/-S** 0.00 ft **Northing:** 402,840.3300 usft **Latitude:** 32° 6' 26.895 N
+E/-W 0.00 ft **Easting:** 536,054.6500 usft **Longitude:** 104° 13' 0.804 W
Position Uncertainty 0.00 ft **Wellhead Elevation:** 0.00 ft **Ground Level:** 3,137.90 ft

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	5/1/2017	7.47	59.83	48,031

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	184.26

Survey Program Date 5/9/2017

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
125.00	6,710.00	Gyro Surveys (Wellbore #1)	Keeper	Standard Wireline Keeper ver 1.0.2
6,841.00	12,105.00	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	402,840.3300	536,054.6500	32° 6' 26.895 N	104° 13' 0.804 W
125.00	0.97	314.19	124.99	0.74	-0.76	402,841.0675	536,053.8914	32° 6' 26.902 N	104° 13' 0.813 W
150.00	0.96	315.85	149.99	1.04	-1.06	402,841.3653	536,053.5938	32° 6' 26.905 N	104° 13' 0.816 W
175.00	0.86	319.28	174.99	1.33	-1.32	402,841.6577	536,053.3255	32° 6' 26.908 N	104° 13' 0.819 W
200.00	0.94	323.71	199.98	1.64	-1.57	402,841.9652	536,053.0817	32° 6' 26.911 N	104° 13' 0.822 W
225.00	0.96	333.25	224.98	1.99	-1.78	402,842.3175	536,052.8661	32° 6' 26.914 N	104° 13' 0.825 W
250.00	0.97	333.75	249.98	2.36	-1.97	402,842.6943	536,052.6782	32° 6' 26.918 N	104° 13' 0.827 W
275.00	0.98	334.50	274.97	2.75	-2.16	402,843.0771	536,052.4926	32° 6' 26.922 N	104° 13' 0.829 W
300.00	1.05	336.70	299.97	3.15	-2.34	402,843.4804	536,052.3100	32° 6' 26.926 N	104° 13' 0.831 W
325.00	0.97	333.73	324.97	3.55	-2.52	402,843.8806	536,052.1257	32° 6' 26.930 N	104° 13' 0.833 W
350.00	0.83	336.12	349.96	3.91	-2.69	402,844.2359	536,051.9587	32° 6' 26.933 N	104° 13' 0.835 W



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Survey Calculation Method: Minimum Curvature
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Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
375.00	0.65	335.28	374.96	4.20	-2.82	402,844.5303	536,051.8261	32° 6' 26.936 N	104° 13' 0.837 W
400.00	0.67	337.38	399.96	4.46	-2.94	402,844.7940	536,051.7106	32° 6' 26.939 N	104° 13' 0.838 W
425.00	0.61	333.85	424.96	4.72	-3.05	402,845.0484	536,051.5957	32° 6' 26.941 N	104° 13' 0.840 W
450.00	0.64	336.03	449.96	4.97	-3.17	402,845.2954	536,051.4804	32° 6' 26.944 N	104° 13' 0.841 W
475.00	0.59	337.17	474.95	5.21	-3.28	402,845.5416	536,051.3737	32° 6' 26.946 N	104° 13' 0.842 W
500.00	0.65	334.53	499.95	5.46	-3.39	402,845.7883	536,051.2628	32° 6' 26.949 N	104° 13' 0.843 W
525.00	0.64	333.36	524.95	5.71	-3.51	402,846.0411	536,051.1392	32° 6' 26.951 N	104° 13' 0.845 W
550.00	0.60	334.10	549.95	5.95	-3.63	402,846.2837	536,051.0194	32° 6' 26.954 N	104° 13' 0.846 W
575.00	0.60	338.62	574.95	6.19	-3.74	402,846.5233	536,050.9145	32° 6' 26.956 N	104° 13' 0.847 W
600.00	0.60	334.83	599.95	6.43	-3.84	402,846.7637	536,050.8111	32° 6' 26.958 N	104° 13' 0.849 W
625.00	0.55	332.17	624.95	6.66	-3.95	402,846.9882	536,050.6994	32° 6' 26.961 N	104° 13' 0.850 W
650.00	0.56	336.95	649.94	6.88	-4.05	402,847.2068	536,050.5956	32° 6' 26.963 N	104° 13' 0.851 W
675.00	0.50	341.53	674.94	7.09	-4.14	402,847.4227	536,050.5132	32° 6' 26.965 N	104° 13' 0.852 W
700.00	0.54	341.10	699.94	7.31	-4.21	402,847.6376	536,050.4405	32° 6' 26.967 N	104° 13' 0.853 W
725.00	0.58	344.48	724.94	7.54	-4.28	402,847.8709	536,050.3685	32° 6' 26.969 N	104° 13' 0.854 W
750.00	0.53	343.07	749.94	7.77	-4.35	402,848.1035	536,050.3009	32° 6' 26.972 N	104° 13' 0.855 W
775.00	0.53	338.02	774.94	7.99	-4.43	402,848.3213	536,050.2240	32° 6' 26.974 N	104° 13' 0.855 W
800.00	0.53	345.32	799.94	8.21	-4.50	402,848.5404	536,050.1514	32° 6' 26.976 N	104° 13' 0.856 W
825.00	0.49	340.31	824.94	8.42	-4.56	402,848.7529	536,050.0861	32° 6' 26.978 N	104° 13' 0.857 W
850.00	0.49	350.87	849.94	8.63	-4.62	402,848.9591	536,050.0331	32° 6' 26.980 N	104° 13' 0.858 W
875.00	0.60	344.85	874.94	8.86	-4.67	402,849.1910	536,049.9819	32° 6' 26.982 N	104° 13' 0.858 W
900.00	0.56	350.07	899.93	9.11	-4.72	402,849.4377	536,049.9267	32° 6' 26.985 N	104° 13' 0.859 W
925.00	0.61	351.74	924.93	9.36	-4.76	402,849.6897	536,049.8865	32° 6' 26.987 N	104° 13' 0.859 W
950.00	0.48	7.29	949.93	9.60	-4.77	402,849.9253	536,049.8806	32° 6' 26.990 N	104° 13' 0.859 W
975.00	0.47	15.03	974.93	9.80	-4.73	402,850.1282	536,049.9205	32° 6' 26.992 N	104° 13' 0.859 W
1,000.00	0.44	6.24	999.93	9.99	-4.69	402,850.3226	536,049.9575	32° 6' 26.994 N	104° 13' 0.859 W
1,025.00	0.48	9.31	1,024.93	10.19	-4.67	402,850.5214	536,049.9849	32° 6' 26.996 N	104° 13' 0.858 W
1,050.00	0.44	24.33	1,049.93	10.38	-4.61	402,850.7122	536,050.0414	32° 6' 26.997 N	104° 13' 0.858 W
1,075.00	0.48	26.19	1,074.93	10.56	-4.52	402,850.8936	536,050.1272	32° 6' 26.999 N	104° 13' 0.857 W
1,100.00	0.51	33.31	1,099.93	10.75	-4.42	402,851.0806	536,050.2345	32° 6' 27.001 N	104° 13' 0.855 W
1,125.00	0.47	27.80	1,124.93	10.93	-4.31	402,851.2643	536,050.3434	32° 6' 27.003 N	104° 13' 0.854 W
1,150.00	0.47	35.89	1,149.92	11.11	-4.20	402,851.4380	536,050.4513	32° 6' 27.005 N	104° 13' 0.853 W
1,175.00	0.51	59.36	1,174.92	11.25	-4.04	402,851.5778	536,050.6072	32° 6' 27.006 N	104° 13' 0.851 W
1,200.00	0.62	60.39	1,199.92	11.37	-3.83	402,851.7014	536,050.8205	32° 6' 27.007 N	104° 13' 0.848 W
1,225.00	0.85	69.12	1,224.92	11.50	-3.54	402,851.8343	536,051.1114	32° 6' 27.009 N	104° 13' 0.845 W
1,250.00	0.89	69.68	1,249.92	11.64	-3.18	402,851.9678	536,051.4667	32° 6' 27.010 N	104° 13' 0.841 W
1,275.00	1.26	79.52	1,274.91	11.76	-2.73	402,852.0852	536,051.9191	32° 6' 27.011 N	104° 13' 0.836 W
1,300.00	1.42	85.38	1,299.91	11.83	-2.15	402,852.1602	536,052.4981	32° 6' 27.012 N	104° 13' 0.829 W
1,325.00	1.45	88.32	1,324.90	11.86	-1.53	402,852.1944	536,053.1230	32° 6' 27.012 N	104° 13' 0.822 W
1,350.00	1.45	81.47	1,349.89	11.92	-0.90	402,852.2506	536,053.7520	32° 6' 27.013 N	104° 13' 0.814 W
1,375.00	1.49	86.71	1,374.88	11.99	-0.26	402,852.3161	536,054.3893	32° 6' 27.013 N	104° 13' 0.807 W
1,400.00	1.17	86.84	1,399.88	12.02	0.32	402,852.3489	536,054.9686	32° 6' 27.014 N	104° 13' 0.800 W
1,425.00	1.17	91.46	1,424.87	12.03	0.83	402,852.3564	536,055.4786	32° 6' 27.014 N	104° 13' 0.794 W
1,450.00	1.13	90.83	1,449.87	12.02	1.33	402,852.3464	536,055.9803	32° 6' 27.014 N	104° 13' 0.788 W
1,475.00	1.14	91.46	1,474.86	12.01	1.83	402,852.3365	536,056.4754	32° 6' 27.013 N	104° 13' 0.783 W
1,500.00	1.18	94.92	1,499.86	11.98	2.33	402,852.3080	536,056.9805	32° 6' 27.013 N	104° 13' 0.777 W
1,525.00	1.34	96.96	1,524.85	11.92	2.88	402,852.2505	536,057.5271	32° 6' 27.013 N	104° 13' 0.771 W
1,550.00	1.61	95.72	1,549.84	11.85	3.52	402,852.1801	536,058.1667	32° 6' 27.012 N	104° 13' 0.763 W
1,575.00	1.87	95.12	1,574.83	11.78	4.27	402,852.1087	536,058.9224	32° 6' 27.011 N	104° 13' 0.754 W
1,600.00	2.18	94.99	1,599.81	11.70	5.15	402,852.0309	536,059.8024	32° 6' 27.010 N	104° 13' 0.744 W
1,625.00	2.41	93.95	1,624.79	11.62	6.15	402,851.9534	536,060.8005	32° 6' 27.010 N	104° 13' 0.732 W
1,650.00	2.54	92.99	1,649.77	11.56	7.23	402,851.8883	536,061.8780	32° 6' 27.009 N	104° 13' 0.720 W
1,675.00	2.62	92.97	1,674.75	11.50	8.35	402,851.8298	536,063.0019	32° 6' 27.008 N	104° 13' 0.707 W
1,700.00	2.54	90.47	1,699.72	11.47	9.48	402,851.7956	536,064.1264	32° 6' 27.008 N	104° 13' 0.694 W
1,725.00	2.42	86.37	1,724.70	11.49	10.56	402,851.8245	536,065.2071	32° 6' 27.008 N	104° 13' 0.681 W



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Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,750.00	2.15	80.47	1,749.68	11.61	11.55	402,851.9356	536,066.1963	32° 6' 27.009 N	104° 13' 0.670 W
1,775.00	1.54	71.61	1,774.66	11.79	12.33	402,852.1192	536,066.9776	32° 6' 27.011 N	104° 13' 0.661 W
1,800.00	0.93	49.16	1,799.66	12.03	12.80	402,852.3578	536,067.4499	32° 6' 27.014 N	104° 13' 0.655 W
1,825.00	0.67	14.72	1,824.66	12.30	12.99	402,852.6319	536,067.6405	32° 6' 27.016 N	104° 13' 0.653 W
1,850.00	0.70	334.49	1,849.65	12.58	12.96	402,852.9111	536,067.6119	32° 6' 27.019 N	104° 13' 0.653 W
1,875.00	0.79	322.83	1,874.65	12.86	12.79	402,853.1862	536,067.4420	32° 6' 27.022 N	104° 13' 0.655 W
1,900.00	0.83	315.82	1,899.65	13.12	12.56	402,853.4534	536,067.2117	32° 6' 27.024 N	104° 13' 0.658 W
1,925.00	0.87	315.06	1,924.65	13.39	12.30	402,853.7176	536,066.9514	32° 6' 27.027 N	104° 13' 0.661 W
1,950.00	0.89	317.36	1,949.64	13.66	12.04	402,853.9948	536,066.6858	32° 6' 27.030 N	104° 13' 0.664 W
1,975.00	0.88	316.85	1,974.64	13.95	11.77	402,854.2777	536,066.4230	32° 6' 27.033 N	104° 13' 0.667 W
2,000.00	0.79	315.12	1,999.64	14.21	11.52	402,854.5399	536,066.1701	32° 6' 27.035 N	104° 13' 0.670 W
2,025.00	0.89	313.94	2,024.64	14.47	11.26	402,854.7967	536,065.9087	32° 6' 27.038 N	104° 13' 0.673 W
2,050.00	0.89	315.48	2,049.63	14.74	10.98	402,855.0699	536,065.6327	32° 6' 27.040 N	104° 13' 0.676 W
2,075.00	0.95	315.84	2,074.63	15.03	10.70	402,855.3570	536,065.3522	32° 6' 27.043 N	104° 13' 0.679 W
2,100.00	1.00	315.41	2,099.63	15.33	10.40	402,855.6611	536,065.0547	32° 6' 27.046 N	104° 13' 0.683 W
2,125.00	1.00	317.89	2,124.62	15.65	10.11	402,855.9783	536,064.7552	32° 6' 27.049 N	104° 13' 0.686 W
2,150.00	0.96	317.69	2,149.62	15.97	9.82	402,856.2950	536,064.4680	32° 6' 27.053 N	104° 13' 0.690 W
2,175.00	1.04	315.42	2,174.61	16.28	9.52	402,856.6114	536,064.1678	32° 6' 27.056 N	104° 13' 0.693 W
2,200.00	1.03	321.12	2,199.61	16.62	9.22	402,856.9480	536,063.8675	32° 6' 27.059 N	104° 13' 0.697 W
2,225.00	1.05	317.97	2,224.61	16.96	8.92	402,857.2930	536,063.5731	32° 6' 27.062 N	104° 13' 0.700 W
2,250.00	0.98	318.01	2,249.60	17.29	8.63	402,857.6221	536,063.2767	32° 6' 27.066 N	104° 13' 0.704 W
2,275.00	1.01	315.46	2,274.60	17.61	8.33	402,857.9380	536,062.9791	32° 6' 27.069 N	104° 13' 0.707 W
2,300.00	1.04	318.31	2,299.59	17.93	8.02	402,858.2645	536,062.6737	32° 6' 27.072 N	104° 13' 0.711 W
2,325.00	1.06	319.21	2,324.59	18.28	7.72	402,858.6090	536,062.3717	32° 6' 27.075 N	104° 13' 0.714 W
2,350.00	1.07	318.08	2,349.59	18.63	7.41	402,858.9578	536,062.0647	32° 6' 27.079 N	104° 13' 0.718 W
2,375.00	1.08	319.18	2,374.58	18.98	7.10	402,859.3097	536,061.7547	32° 6' 27.082 N	104° 13' 0.721 W
2,400.00	1.10	319.18	2,399.58	19.34	6.79	402,859.6696	536,061.4439	32° 6' 27.086 N	104° 13' 0.725 W
2,425.00	1.11	316.95	2,424.57	19.70	6.47	402,860.0282	536,061.1217	32° 6' 27.090 N	104° 13' 0.729 W
2,450.00	1.02	319.90	2,449.57	20.05	6.16	402,860.3754	536,060.8131	32° 6' 27.093 N	104° 13' 0.732 W
2,475.00	0.85	324.47	2,474.56	20.37	5.91	402,860.6965	536,060.5620	32° 6' 27.096 N	104° 13' 0.735 W
2,500.00	1.14	312.87	2,499.56	20.69	5.62	402,861.0166	536,060.2719	32° 6' 27.099 N	104° 13' 0.738 W
2,525.00	1.48	299.52	2,524.55	21.01	5.16	402,861.3448	536,059.8087	32° 6' 27.103 N	104° 13' 0.744 W
2,550.00	1.92	289.52	2,549.54	21.31	4.48	402,861.6439	536,059.1331	32° 6' 27.106 N	104° 13' 0.752 W
2,575.00	2.07	278.84	2,574.53	21.52	3.64	402,861.8532	536,058.2922	32° 6' 27.108 N	104° 13' 0.761 W
2,600.00	2.43	271.64	2,599.51	21.61	2.67	402,861.9377	536,057.3163	32° 6' 27.108 N	104° 13' 0.773 W
2,625.00	2.59	272.59	2,624.48	21.65	1.57	402,861.9784	536,056.2222	32° 6' 27.109 N	104° 13' 0.786 W
2,650.00	3.04	267.02	2,649.45	21.64	0.35	402,861.9695	536,054.9959	32° 6' 27.109 N	104° 13' 0.800 W
2,675.00	3.45	265.46	2,674.41	21.55	-1.07	402,861.8755	536,053.5840	32° 6' 27.108 N	104° 13' 0.816 W
2,700.00	3.60	267.06	2,699.37	21.45	-2.60	402,861.7757	536,052.0503	32° 6' 27.107 N	104° 13' 0.834 W
2,725.00	3.76	268.55	2,724.32	21.38	-4.20	402,861.7147	536,050.4470	32° 6' 27.106 N	104° 13' 0.853 W
2,750.00	4.03	266.28	2,749.26	21.31	-5.90	402,861.6370	536,048.7510	32° 6' 27.106 N	104° 13' 0.872 W
2,775.00	4.15	265.63	2,774.19	21.18	-7.68	402,861.5110	536,046.9724	32° 6' 27.104 N	104° 13' 0.893 W
2,800.00	4.16	265.35	2,799.13	21.04	-9.48	402,861.3686	536,045.1666	32° 6' 27.103 N	104° 13' 0.914 W
2,825.00	4.14	264.53	2,824.06	20.88	-11.29	402,861.2091	536,043.3645	32° 6' 27.101 N	104° 13' 0.935 W
2,850.00	4.04	263.72	2,849.00	20.70	-13.06	402,861.0267	536,041.5908	32° 6' 27.100 N	104° 13' 0.956 W
2,875.00	3.88	263.44	2,873.94	20.50	-14.77	402,860.8337	536,039.8751	32° 6' 27.098 N	104° 13' 0.976 W
2,900.00	3.86	264.13	2,898.88	20.32	-16.45	402,860.6510	536,038.1978	32° 6' 27.096 N	104° 13' 0.995 W
2,925.00	3.74	263.40	2,923.83	20.14	-18.10	402,860.4713	536,036.5507	32° 6' 27.094 N	104° 13' 1.014 W
2,950.00	3.80	263.15	2,948.77	19.95	-19.73	402,860.2787	536,034.9183	32° 6' 27.092 N	104° 13' 1.033 W
2,975.00	3.92	262.60	2,973.72	19.74	-21.40	402,860.0699	536,033.2483	32° 6' 27.090 N	104° 13' 1.053 W
3,000.00	3.79	263.70	2,998.66	19.54	-23.07	402,859.8691	536,031.5797	32° 6' 27.088 N	104° 13' 1.072 W
3,025.00	3.80	263.61	3,023.61	19.36	-24.71	402,859.6863	536,029.9351	32° 6' 27.086 N	104° 13' 1.091 W
3,050.00	3.82	263.68	3,048.55	19.17	-26.37	402,859.5024	536,028.2841	32° 6' 27.085 N	104° 13' 1.110 W
3,075.00	3.75	262.97	3,073.50	18.98	-28.01	402,859.3107	536,026.6450	32° 6' 27.083 N	104° 13' 1.129 W
3,100.00	3.74	262.63	3,098.44	18.78	-29.63	402,859.1060	536,025.0250	32° 6' 27.081 N	104° 13' 1.148 W



Integrity Directional Services, LLC

Survey Report - Geographic



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 29, T 25S., R 27 E
Well: Populus Federal 4H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Populus Federal 4H
TVD Reference: KB=20' @ 3157.90ft (Patriot 2)
MD Reference: KB=20' @ 3157.90ft (Patriot 2)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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
3,125.00	3.76	262.14	3,123.39	18.56	-31.25	402,858.8893	536,023.4044	32° 6' 27.079 N	104° 13' 1.167 W
3,150.00	3.77	263.07	3,148.33	18.35	-32.87	402,858.6781	536,021.7765	32° 6' 27.077 N	104° 13' 1.186 W
3,175.00	3.77	261.06	3,173.28	18.12	-34.50	402,858.4512	536,020.1487	32° 6' 27.074 N	104° 13' 1.205 W
3,200.00	3.77	262.17	3,198.23	17.88	-36.13	402,858.2115	536,018.5225	32° 6' 27.072 N	104° 13' 1.224 W
3,225.00	3.73	262.49	3,223.17	17.66	-37.75	402,857.9932	536,016.9021	32° 6' 27.070 N	104° 13' 1.243 W
3,250.00	3.59	261.91	3,248.12	17.45	-39.33	402,857.7768	536,015.3210	32° 6' 27.068 N	104° 13' 1.261 W
3,275.00	3.53	261.05	3,273.07	17.22	-40.86	402,857.5469	536,013.7858	32° 6' 27.065 N	104° 13' 1.279 W
3,300.00	3.44	261.15	3,298.03	16.98	-42.37	402,857.3118	536,012.2844	32° 6' 27.063 N	104° 13' 1.296 W
3,325.00	3.24	261.69	3,322.99	16.76	-43.81	402,857.0943	536,010.8443	32° 6' 27.061 N	104° 13' 1.313 W
3,350.00	3.09	261.85	3,347.95	16.57	-45.17	402,856.8967	536,009.4782	32° 6' 27.059 N	104° 13' 1.329 W
3,375.00	3.05	260.21	3,372.91	16.36	-46.49	402,856.6881	536,008.1558	32° 6' 27.057 N	104° 13' 1.344 W
3,400.00	3.04	261.56	3,397.88	16.15	-47.81	402,856.4777	536,006.8446	32° 6' 27.055 N	104° 13' 1.360 W
3,425.00	2.95	260.92	3,422.84	15.95	-49.10	402,856.2789	536,005.5537	32° 6' 27.053 N	104° 13' 1.375 W
3,450.00	3.05	261.24	3,447.81	15.75	-50.39	402,856.0760	536,004.2611	32° 6' 27.051 N	104° 13' 1.390 W
3,475.00	3.48	258.62	3,472.77	15.50	-51.79	402,855.8250	536,002.8599	32° 6' 27.049 N	104° 13' 1.406 W
3,500.00	3.89	258.46	3,497.72	15.18	-53.36	402,855.5057	536,001.2852	32° 6' 27.045 N	104° 13' 1.424 W
3,525.00	3.99	258.32	3,522.66	14.83	-55.05	402,855.1599	535,999.6026	32° 6' 27.042 N	104° 13' 1.444 W
3,550.00	3.96	259.19	3,547.60	14.49	-56.75	402,854.8220	535,997.9029	32° 6' 27.039 N	104° 13' 1.464 W
3,575.00	4.01	258.43	3,572.54	14.15	-58.45	402,854.4847	535,996.1986	32° 6' 27.035 N	104° 13' 1.484 W
3,600.00	4.06	258.27	3,597.47	13.80	-60.17	402,854.1295	535,994.4757	32° 6' 27.032 N	104° 13' 1.504 W
3,625.00	4.07	258.54	3,622.41	13.44	-61.91	402,853.7733	535,992.7396	32° 6' 27.028 N	104° 13' 1.524 W
3,650.00	4.13	258.02	3,647.35	13.08	-63.66	402,853.4102	535,990.9895	32° 6' 27.025 N	104° 13' 1.544 W
3,675.00	4.32	256.57	3,672.28	12.67	-65.46	402,853.0046	535,989.1930	32° 6' 27.021 N	104° 13' 1.565 W
3,700.00	4.42	255.13	3,697.21	12.21	-67.30	402,852.5387	535,987.3461	32° 6' 27.016 N	104° 13' 1.586 W
3,725.00	4.46	255.73	3,722.13	11.72	-69.18	402,852.0519	535,985.4730	32° 6' 27.011 N	104° 13' 1.608 W
3,750.00	4.48	255.91	3,747.05	11.24	-71.07	402,851.5746	535,983.5839	32° 6' 27.007 N	104° 13' 1.630 W
3,775.00	4.52	255.57	3,771.98	10.76	-72.97	402,851.0914	535,981.6829	32° 6' 27.002 N	104° 13' 1.652 W
3,800.00	4.40	255.06	3,796.90	10.27	-74.85	402,850.5987	535,979.8023	32° 6' 26.997 N	104° 13' 1.674 W
3,825.00	4.26	255.26	3,821.83	9.79	-76.67	402,850.1152	535,977.9778	32° 6' 26.992 N	104° 13' 1.695 W
3,850.00	4.11	255.07	3,846.76	9.32	-78.44	402,849.6481	535,976.2142	32° 6' 26.988 N	104° 13' 1.716 W
3,875.00	4.08	254.01	3,871.70	8.84	-80.16	402,849.1723	535,974.4936	32° 6' 26.983 N	104° 13' 1.736 W
3,900.00	4.16	254.18	3,896.64	8.35	-81.88	402,848.6801	535,972.7662	32° 6' 26.978 N	104° 13' 1.756 W
3,925.00	3.97	254.10	3,921.57	7.87	-83.59	402,848.1959	535,971.0615	32° 6' 26.973 N	104° 13' 1.776 W
3,950.00	3.88	254.54	3,946.51	7.40	-85.24	402,847.7333	535,969.4139	32° 6' 26.969 N	104° 13' 1.795 W
3,975.00	3.78	255.08	3,971.46	6.97	-86.85	402,847.2956	535,967.8024	32° 6' 26.965 N	104° 13' 1.814 W
4,000.00	3.74	255.93	3,996.40	6.56	-88.44	402,846.8853	535,966.2152	32° 6' 26.960 N	104° 13' 1.832 W
4,025.00	3.80	255.70	4,021.35	6.15	-90.03	402,846.4824	535,964.6216	32° 6' 26.956 N	104° 13' 1.851 W
4,050.00	3.97	261.63	4,046.29	5.82	-91.69	402,846.1518	535,962.9626	32° 6' 26.953 N	104° 13' 1.870 W
4,075.00	3.99	263.14	4,071.23	5.59	-93.41	402,845.9220	535,961.2428	32° 6' 26.951 N	104° 13' 1.890 W
4,100.00	4.02	264.58	4,096.17	5.41	-95.14	402,845.7353	535,959.5069	32° 6' 26.949 N	104° 13' 1.910 W
4,125.00	3.97	265.03	4,121.11	5.25	-96.88	402,845.5775	535,957.7723	32° 6' 26.948 N	104° 13' 1.930 W
4,150.00	3.73	265.76	4,146.05	5.11	-98.55	402,845.4424	535,956.0992	32° 6' 26.946 N	104° 13' 1.950 W
4,175.00	3.65	265.51	4,171.00	4.99	-100.16	402,845.3200	535,954.4949	32° 6' 26.945 N	104° 13' 1.969 W
4,200.00	3.68	266.66	4,195.95	4.88	-101.75	402,845.2110	535,952.9007	32° 6' 26.944 N	104° 13' 1.987 W
4,225.00	3.89	267.50	4,220.90	4.80	-103.40	402,845.1273	535,951.2525	32° 6' 26.943 N	104° 13' 2.006 W
4,250.00	4.22	271.94	4,245.83	4.79	-105.16	402,845.1214	535,949.4860	32° 6' 26.943 N	104° 13' 2.027 W
4,275.00	4.34	274.68	4,270.76	4.90	-107.03	402,845.2297	535,947.6239	32° 6' 26.944 N	104° 13' 2.048 W
4,300.00	4.39	273.55	4,295.69	5.04	-108.92	402,845.3661	535,945.7262	32° 6' 26.946 N	104° 13' 2.070 W
4,325.00	4.27	274.32	4,320.62	5.17	-110.81	402,845.4955	535,943.8431	32° 6' 26.947 N	104° 13' 2.092 W
4,350.00	4.13	274.67	4,345.55	5.31	-112.63	402,845.6389	535,942.0178	32° 6' 26.948 N	104° 13' 2.114 W
4,375.00	4.04	274.53	4,370.49	5.45	-114.41	402,845.7818	535,940.2426	32° 6' 26.950 N	104° 13' 2.134 W
4,400.00	3.97	275.76	4,395.43	5.61	-116.15	402,845.9382	535,938.5037	32° 6' 26.951 N	104° 13' 2.154 W
4,425.00	3.95	274.44	4,420.37	5.76	-117.87	402,846.0917	535,936.7841	32° 6' 26.953 N	104° 13' 2.174 W
4,450.00	3.95	275.16	4,445.31	5.91	-119.58	402,846.2358	535,935.0681	32° 6' 26.954 N	104° 13' 2.194 W
4,475.00	3.88	274.95	4,470.25	6.06	-121.28	402,846.3862	535,933.3678	32° 6' 26.956 N	104° 13' 2.214 W



Integrity Directional Services, LLC

Survey Report - Geographic



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 29, T 25S., R 27 E
Well: Populus Federal 4H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Populus Federal 4H
TVD Reference: KB=20' @ 3157.90ft (Patriot 2)
MD Reference: KB=20' @ 3157.90ft (Patriot 2)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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
4,500.00	3.83	275.27	4,495.20	6.21	-122.96	402,846.5359	535,931.6937	32° 6' 26.957 N	104° 13' 2.234 W
4,525.00	3.85	275.66	4,520.14	6.37	-124.62	402,846.6953	535,930.0270	32° 6' 26.959 N	104° 13' 2.253 W
4,550.00	3.93	275.16	4,545.08	6.53	-126.31	402,846.8552	535,928.3386	32° 6' 26.961 N	104° 13' 2.273 W
4,575.00	3.90	275.24	4,570.02	6.68	-128.01	402,847.0099	535,926.6387	32° 6' 26.962 N	104° 13' 2.292 W
4,600.00	3.88	276.37	4,594.97	6.85	-129.70	402,847.1814	535,924.9515	32° 6' 26.964 N	104° 13' 2.312 W
4,625.00	4.16	281.31	4,619.90	7.12	-131.43	402,847.4530	535,923.2217	32° 6' 26.967 N	104° 13' 2.332 W
4,650.00	4.22	282.46	4,644.84	7.50	-133.22	402,847.8293	535,921.4343	32° 6' 26.970 N	104° 13' 2.353 W
4,675.00	4.25	283.65	4,669.77	7.92	-135.01	402,848.2464	535,919.6360	32° 6' 26.974 N	104° 13' 2.374 W
4,700.00	4.21	282.81	4,694.70	8.34	-136.81	402,848.6685	535,917.8410	32° 6' 26.979 N	104° 13' 2.395 W
4,725.00	4.15	282.10	4,719.63	8.73	-138.59	402,849.0616	535,916.0617	32° 6' 26.983 N	104° 13' 2.415 W
4,750.00	4.01	283.03	4,744.57	9.12	-140.32	402,849.4483	535,914.3256	32° 6' 26.986 N	104° 13' 2.435 W
4,775.00	3.99	283.00	4,769.51	9.51	-142.02	402,849.8410	535,912.6264	32° 6' 26.990 N	104° 13' 2.455 W
4,800.00	3.93	282.82	4,794.45	9.90	-143.71	402,850.2268	535,910.9436	32° 6' 26.994 N	104° 13' 2.475 W
4,825.00	3.84	283.27	4,819.39	10.28	-145.36	402,850.6090	535,909.2935	32° 6' 26.998 N	104° 13' 2.494 W
4,850.00	3.78	283.48	4,844.34	10.66	-146.97	402,850.9933	535,907.6773	32° 6' 27.002 N	104° 13' 2.513 W
4,875.00	3.80	282.57	4,869.28	11.04	-148.58	402,851.3656	535,906.0674	32° 6' 27.005 N	104° 13' 2.531 W
4,900.00	3.83	283.97	4,894.23	11.42	-150.20	402,851.7475	535,904.4486	32° 6' 27.009 N	104° 13' 2.550 W
4,925.00	3.72	282.27	4,919.17	11.79	-151.80	402,852.1214	535,902.8458	32° 6' 27.013 N	104° 13' 2.569 W
4,950.00	3.69	281.82	4,944.12	12.13	-153.38	402,852.4586	535,901.2659	32° 6' 27.016 N	104° 13' 2.587 W
4,975.00	3.66	282.64	4,969.07	12.47	-154.95	402,852.7980	535,899.6999	32° 6' 27.020 N	104° 13' 2.606 W
5,000.00	3.53	281.97	4,994.02	12.80	-156.48	402,853.1322	535,898.1684	32° 6' 27.023 N	104° 13' 2.623 W
5,025.00	3.47	280.68	5,018.97	13.10	-157.98	402,853.4320	535,896.6720	32° 6' 27.026 N	104° 13' 2.641 W
5,050.00	3.37	281.21	5,043.93	13.39	-159.44	402,853.7151	535,895.2078	32° 6' 27.029 N	104° 13' 2.658 W
5,075.00	3.34	280.83	5,068.89	13.66	-160.88	402,853.9948	535,893.7717	32° 6' 27.032 N	104° 13' 2.674 W
5,100.00	3.33	280.68	5,093.84	13.94	-162.31	402,854.2662	535,892.3429	32° 6' 27.034 N	104° 13' 2.691 W
5,125.00	3.30	281.66	5,118.80	14.22	-163.73	402,854.5462	535,890.9247	32° 6' 27.037 N	104° 13' 2.708 W
5,150.00	3.39	281.98	5,143.76	14.52	-165.15	402,854.8450	535,889.4970	32° 6' 27.040 N	104° 13' 2.724 W
5,175.00	3.41	282.79	5,168.72	14.83	-166.60	402,855.1630	535,888.0488	32° 6' 27.043 N	104° 13' 2.741 W
5,200.00	3.56	283.23	5,193.67	15.18	-168.08	402,855.5053	535,886.5682	32° 6' 27.047 N	104° 13' 2.758 W
5,225.00	3.70	283.66	5,218.62	15.54	-169.62	402,855.8734	535,885.0288	32° 6' 27.050 N	104° 13' 2.776 W
5,250.00	3.73	284.24	5,243.57	15.93	-171.19	402,856.2639	535,883.4568	32° 6' 27.054 N	104° 13' 2.794 W
5,275.00	4.16	278.24	5,268.51	16.26	-172.88	402,856.5939	535,881.7712	32° 6' 27.057 N	104° 13' 2.814 W
5,300.00	4.25	278.05	5,293.44	16.52	-174.69	402,856.8536	535,879.9565	32° 6' 27.060 N	104° 13' 2.835 W
5,325.00	4.27	277.87	5,318.37	16.78	-176.53	402,857.1108	535,878.1174	32° 6' 27.063 N	104° 13' 2.856 W
5,350.00	4.35	278.07	5,343.30	17.04	-178.39	402,857.3713	535,876.2567	32° 6' 27.065 N	104° 13' 2.878 W
5,375.00	4.26	275.91	5,368.23	17.27	-180.26	402,857.6000	535,874.3944	32° 6' 27.067 N	104° 13' 2.900 W
5,400.00	4.21	277.05	5,393.16	17.48	-182.09	402,857.8082	535,872.5601	32° 6' 27.070 N	104° 13' 2.921 W
5,425.00	4.20	276.17	5,418.09	17.69	-183.91	402,858.0193	535,870.7392	32° 6' 27.072 N	104° 13' 2.942 W
5,450.00	4.24	275.02	5,443.03	17.87	-185.74	402,858.1985	535,868.9084	32° 6' 27.073 N	104° 13' 2.963 W
5,475.00	4.14	276.73	5,467.96	18.06	-187.56	402,858.3851	535,867.0915	32° 6' 27.075 N	104° 13' 2.985 W
5,500.00	4.19	274.99	5,492.89	18.24	-189.36	402,858.5703	535,865.2855	32° 6' 27.077 N	104° 13' 3.006 W
5,525.00	4.17	274.56	5,517.83	18.39	-191.18	402,858.7220	535,863.4696	32° 6' 27.079 N	104° 13' 3.027 W
5,550.00	4.06	272.99	5,542.76	18.51	-192.97	402,858.8405	535,861.6797	32° 6' 27.080 N	104° 13' 3.047 W
5,575.00	3.99	271.53	5,567.70	18.58	-194.72	402,858.9099	535,859.9264	32° 6' 27.081 N	104° 13' 3.068 W
5,600.00	3.81	269.47	5,592.64	18.60	-196.42	402,858.9254	535,858.2264	32° 6' 27.081 N	104° 13' 3.088 W
5,625.00	3.79	267.22	5,617.59	18.55	-198.08	402,858.8776	535,856.5706	32° 6' 27.080 N	104° 13' 3.107 W
5,650.00	3.84	266.61	5,642.53	18.46	-199.74	402,858.7881	535,854.9096	32° 6' 27.079 N	104° 13' 3.126 W
5,675.00	3.88	266.44	5,667.48	18.36	-201.42	402,858.6860	535,853.2298	32° 6' 27.078 N	104° 13' 3.146 W
5,700.00	3.89	264.27	5,692.42	18.22	-203.11	402,858.5489	535,851.5418	32° 6' 27.077 N	104° 13' 3.165 W
5,725.00	3.95	263.44	5,717.36	18.04	-204.81	402,858.3658	535,849.8426	32° 6' 27.075 N	104° 13' 3.185 W
5,750.00	3.83	263.26	5,742.30	17.84	-206.49	402,858.1695	535,848.1579	32° 6' 27.073 N	104° 13' 3.205 W
5,775.00	3.70	262.63	5,767.25	17.64	-208.12	402,857.9680	535,846.5288	32° 6' 27.071 N	104° 13' 3.224 W
5,800.00	3.59	261.49	5,792.20	17.42	-209.70	402,857.7487	535,844.9547	32° 6' 27.069 N	104° 13' 3.242 W
5,825.00	3.63	262.04	5,817.15	17.19	-211.25	402,857.5233	535,843.3968	32° 6' 27.067 N	104° 13' 3.260 W
5,850.00	3.56	261.32	5,842.10	16.97	-212.80	402,857.2965	535,841.8458	32° 6' 27.065 N	104° 13' 3.278 W



Integrity Directional Services, LLC

Survey Report - Geographic



Company: COG Operating L L C
Project: Eddy County, NM (NAD 27 NME)
Site: Sec. 29, T 25S., R 27 E
Well: Populus Federal 4H
Wellbore: Wellbore #1
Design: Wellbore #1

Local Co-ordinate Reference: Well Populus Federal 4H
TVD Reference: KB=20' @ 3157.90ft (Patriot 2)
MD Reference: KB=20' @ 3157.90ft (Patriot 2)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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
5,875.00	3.64	262.83	5,867.05	16.75	-214.36	402,857.0803	535,840.2911	32° 6' 27.063 N	104° 13' 3.296 W
5,900.00	3.67	263.44	5,892.00	16.56	-215.94	402,856.8899	535,838.7088	32° 6' 27.061 N	104° 13' 3.315 W
5,925.00	3.36	263.47	5,916.95	16.39	-217.46	402,856.7152	535,837.1861	32° 6' 27.059 N	104° 13' 3.332 W
5,950.00	3.13	264.91	5,941.91	16.24	-218.87	402,856.5713	535,835.7784	32° 6' 27.058 N	104° 13' 3.349 W
5,975.00	2.92	263.90	5,966.88	16.11	-220.19	402,856.4431	535,834.4654	32° 6' 27.056 N	104° 13' 3.364 W
6,000.00	2.90	261.80	5,991.85	15.96	-221.44	402,856.2852	535,833.2063	32° 6' 27.055 N	104° 13' 3.379 W
6,025.00	3.24	259.80	6,016.81	15.74	-222.77	402,856.0699	535,831.8850	32° 6' 27.053 N	104° 13' 3.394 W
6,050.00	3.72	258.08	6,041.76	15.45	-224.25	402,855.7773	535,830.3962	32° 6' 27.050 N	104° 13' 3.411 W
6,075.00	3.80	256.21	6,066.71	15.08	-225.85	402,855.4123	535,828.7981	32° 6' 27.046 N	104° 13' 3.430 W
6,100.00	3.60	256.56	6,091.66	14.70	-227.42	402,855.0324	535,827.2302	32° 6' 27.043 N	104° 13' 3.448 W
6,125.00	3.25	258.24	6,116.61	14.38	-228.88	402,854.7055	535,825.7730	32° 6' 27.039 N	104° 13' 3.465 W
6,150.00	2.97	259.83	6,141.58	14.12	-230.21	402,854.4468	535,824.4417	32° 6' 27.037 N	104° 13' 3.480 W
6,175.00	2.73	267.53	6,166.54	13.98	-231.44	402,854.3067	535,823.2094	32° 6' 27.035 N	104° 13' 3.495 W
6,200.00	2.69	268.85	6,191.52	13.94	-232.62	402,854.2693	535,822.0281	32° 6' 27.035 N	104° 13' 3.509 W
6,225.00	2.62	271.38	6,216.49	13.94	-233.78	402,854.2713	535,820.8703	32° 6' 27.035 N	104° 13' 3.522 W
6,250.00	2.49	274.43	6,241.47	14.00	-234.89	402,854.3270	535,819.7577	32° 6' 27.036 N	104° 13' 3.535 W
6,275.00	2.39	275.73	6,266.44	14.09	-235.95	402,854.4210	535,818.6976	32° 6' 27.037 N	104° 13' 3.547 W
6,300.00	2.33	275.93	6,291.42	14.20	-236.98	402,854.5255	535,817.6734	32° 6' 27.038 N	104° 13' 3.559 W
6,325.00	2.24	278.81	6,316.40	14.32	-237.97	402,854.6529	535,816.6852	32° 6' 27.039 N	104° 13' 3.571 W
6,350.00	2.17	284.19	6,341.38	14.51	-238.91	402,854.8437	535,815.7435	32° 6' 27.041 N	104° 13' 3.582 W
6,375.00	2.26	294.94	6,366.36	14.84	-239.81	402,855.1676	535,814.8377	32° 6' 27.044 N	104° 13' 3.592 W
6,400.00	2.52	294.38	6,391.34	15.27	-240.76	402,855.6023	535,813.8901	32° 6' 27.048 N	104° 13' 3.603 W
6,425.00	3.31	303.37	6,416.31	15.90	-241.86	402,856.2262	535,812.7868	32° 6' 27.055 N	104° 13' 3.616 W
6,450.00	3.66	306.56	6,441.26	16.77	-243.11	402,857.0985	535,811.5431	32° 6' 27.063 N	104° 13' 3.630 W
6,475.00	3.64	304.40	6,466.21	17.69	-244.40	402,858.0221	535,810.2473	32° 6' 27.072 N	104° 13' 3.645 W
6,500.00	3.38	303.21	6,491.17	18.54	-245.67	402,858.8741	535,808.9759	32° 6' 27.081 N	104° 13' 3.660 W
6,525.00	3.19	300.00	6,516.13	19.30	-246.89	402,859.6256	535,807.7569	32° 6' 27.088 N	104° 13' 3.674 W
6,550.00	3.20	297.99	6,541.09	19.97	-248.11	402,860.3008	535,806.5384	32° 6' 27.095 N	104° 13' 3.689 W
6,575.00	3.19	297.86	6,566.05	20.62	-249.34	402,860.9534	535,805.3073	32° 6' 27.101 N	104° 13' 3.703 W
6,600.00	3.19	294.85	6,591.01	21.24	-250.59	402,861.5708	535,804.0611	32° 6' 27.108 N	104° 13' 3.717 W
6,625.00	3.29	292.96	6,615.97	21.81	-251.88	402,862.1429	535,802.7694	32° 6' 27.113 N	104° 13' 3.732 W
6,650.00	3.36	291.49	6,640.93	22.36	-253.22	402,862.6911	535,801.4272	32° 6' 27.119 N	104° 13' 3.748 W
6,675.00	3.40	290.82	6,665.88	22.89	-254.60	402,863.2230	535,800.0526	32° 6' 27.124 N	104° 13' 3.764 W
6,700.00	3.41	289.71	6,690.84	23.41	-255.99	402,863.7373	535,798.6597	32° 6' 27.129 N	104° 13' 3.780 W
6,710.00	3.30	285.94	6,700.82	23.59	-256.55	402,863.9166	535,798.1030	32° 6' 27.131 N	104° 13' 3.787 W
6,841.00	3.50	284.30	6,831.59	25.61	-264.05	402,865.9398	535,790.6027	32° 6' 27.151 N	104° 13' 3.874 W
First IDS MWD Survey									
6,872.00	3.90	260.90	6,862.53	25.68	-266.01	402,866.0067	535,788.6447	32° 6' 27.152 N	104° 13' 3.897 W
6,904.00	6.00	236.40	6,894.41	24.58	-268.47	402,864.9089	535,786.1766	32° 6' 27.141 N	104° 13' 3.925 W
6,935.00	7.80	229.50	6,925.19	22.32	-271.42	402,862.6459	535,783.2272	32° 6' 27.118 N	104° 13' 3.960 W
6,967.00	9.00	213.80	6,956.85	18.83	-274.47	402,859.1551	535,780.1832	32° 6' 27.084 N	104° 13' 3.995 W
6,998.00	12.30	202.10	6,987.31	13.75	-277.06	402,854.0789	535,777.5910	32° 6' 27.034 N	104° 13' 4.025 W
7,030.00	16.10	199.50	7,018.33	6.41	-279.82	402,846.7355	535,774.8265	32° 6' 26.961 N	104° 13' 4.057 W
7,061.00	18.50	199.20	7,047.92	-2.29	-282.88	402,838.0378	535,771.7738	32° 6' 26.875 N	104° 13' 4.093 W
7,092.00	22.20	196.80	7,076.98	-12.55	-286.19	402,827.7828	535,768.4624	32° 6' 26.774 N	104° 13' 4.132 W
7,124.00	25.70	197.50	7,106.22	-24.96	-290.02	402,815.3741	535,764.6274	32° 6' 26.651 N	104° 13' 4.176 W
7,155.00	28.70	194.40	7,133.79	-38.58	-293.90	402,801.7501	535,760.7540	32° 6' 26.516 N	104° 13' 4.222 W
7,187.00	31.90	193.50	7,161.42	-54.25	-297.78	402,786.0824	535,756.8684	32° 6' 26.361 N	104° 13' 4.267 W
7,218.00	34.80	191.50	7,187.31	-70.88	-301.46	402,769.4454	535,753.1917	32° 6' 26.196 N	104° 13' 4.310 W
7,250.00	38.30	190.20	7,213.02	-89.60	-305.04	402,750.7315	535,749.6140	32° 6' 26.011 N	104° 13' 4.352 W
7,281.00	42.60	189.40	7,236.60	-109.41	-308.45	402,730.9167	535,746.1977	32° 6' 25.815 N	104° 13' 4.392 W
7,313.00	47.10	189.90	7,259.28	-131.66	-312.24	402,708.6745	535,742.4118	32° 6' 25.595 N	104° 13' 4.436 W
7,344.00	50.70	188.00	7,279.66	-154.73	-315.86	402,685.6026	535,738.7889	32° 6' 25.367 N	104° 13' 4.478 W
7,376.00	53.80	185.50	7,299.25	-179.85	-318.82	402,660.4812	535,735.8273	32° 6' 25.118 N	104° 13' 4.513 W
7,407.00	57.30	183.70	7,316.78	-205.33	-320.86	402,635.0053	535,733.7860	32° 6' 24.866 N	104° 13' 4.537 W



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Survey

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7,439.00	61.40	182.30	7,333.09	-232.81	-322.30	402,607.5201	535,732.3527	32° 6' 24.594 N	104° 13' 4.554 W
7,470.00	65.50	182.40	7,346.95	-260.51	-323.44	402,579.8186	535,731.2154	32° 6' 24.320 N	104° 13' 4.568 W
7,502.00	68.30	182.00	7,359.50	-289.92	-324.56	402,550.4090	535,730.0867	32° 6' 24.029 N	104° 13' 4.581 W
7,533.00	72.30	181.50	7,369.95	-319.09	-325.45	402,521.2431	535,729.1972	32° 6' 23.740 N	104° 13' 4.592 W
7,565.00	77.10	181.60	7,378.39	-349.93	-326.29	402,490.3976	535,728.3622	32° 6' 23.435 N	104° 13' 4.602 W
7,596.00	82.00	181.30	7,384.01	-380.40	-327.06	402,459.9309	535,727.5916	32° 6' 23.133 N	104° 13' 4.611 W
7,659.00	88.30	181.30	7,389.33	-443.13	-328.48	402,397.2044	535,726.1682	32° 6' 22.513 N	104° 13' 4.629 W
7,785.00	89.40	178.90	7,391.86	-569.09	-328.70	402,271.2414	535,725.9488	32° 6' 21.266 N	104° 13' 4.633 W
7,879.00	88.70	178.60	7,393.42	-663.05	-326.65	402,177.2775	535,727.9991	32° 6' 20.336 N	104° 13' 4.610 W
7,974.00	88.30	178.30	7,395.91	-757.99	-324.08	402,082.3453	535,730.5679	32° 6' 19.397 N	104° 13' 4.582 W
8,068.00	89.20	177.60	7,397.96	-851.90	-320.72	401,988.4296	535,733.9296	32° 6' 18.467 N	104° 13' 4.544 W
8,162.00	88.70	177.60	7,399.68	-945.80	-316.79	401,894.5283	535,737.8653	32° 6' 17.538 N	104° 13' 4.499 W
8,257.00	88.60	178.00	7,401.92	-1,040.71	-313.14	401,799.6250	535,741.5111	32° 6' 16.599 N	104° 13' 4.458 W
8,352.00	88.60	178.40	7,404.24	-1,135.63	-310.16	401,704.7007	535,744.4942	32° 6' 15.659 N	104° 13' 4.424 W
8,446.00	89.70	178.80	7,405.64	-1,229.59	-307.86	401,610.7410	535,746.7905	32° 6' 14.729 N	104° 13' 4.399 W
8,541.00	89.30	178.50	7,406.47	-1,324.56	-305.62	401,515.7714	535,749.0286	32° 6' 13.789 N	104° 13' 4.374 W
8,635.00	90.40	180.20	7,406.71	-1,418.55	-304.56	401,421.7829	535,750.0948	32° 6' 12.859 N	104° 13' 4.363 W
8,730.00	89.90	180.50	7,406.46	-1,513.55	-305.14	401,326.7856	535,749.5145	32° 6' 11.919 N	104° 13' 4.371 W
8,824.00	90.40	180.40	7,406.22	-1,607.54	-305.87	401,232.7893	535,748.7763	32° 6' 10.989 N	104° 13' 4.380 W
8,919.00	90.30	181.20	7,405.64	-1,702.53	-307.20	401,137.8013	535,747.4499	32° 6' 10.049 N	104° 13' 4.397 W
9,013.00	89.90	182.00	7,405.47	-1,796.49	-309.83	401,043.8392	535,744.8253	32° 6' 9.119 N	104° 13' 4.429 W
9,107.00	90.10	182.30	7,405.47	-1,890.43	-313.35	400,949.9057	535,741.2988	32° 6' 8.189 N	104° 13' 4.471 W
9,202.00	90.10	182.30	7,405.31	-1,985.35	-317.16	400,854.9826	535,737.4863	32° 6' 7.250 N	104° 13' 4.516 W
9,296.00	90.50	182.60	7,404.81	-2,079.26	-321.18	400,761.0703	535,733.4681	32° 6' 6.321 N	104° 13' 4.564 W
9,391.00	90.40	182.50	7,404.07	-2,174.17	-325.41	400,666.1675	535,729.2416	32° 6' 5.381 N	104° 13' 4.615 W
9,485.00	90.90	181.00	7,403.00	-2,268.11	-328.28	400,572.2206	535,726.3712	32° 6' 4.452 N	104° 13' 4.649 W
9,580.00	91.10	181.00	7,401.34	-2,363.09	-329.94	400,477.2497	535,724.7135	32° 6' 3.512 N	104° 13' 4.670 W
9,674.00	90.90	181.40	7,399.70	-2,457.05	-331.91	400,383.2851	535,722.7452	32° 6' 2.582 N	104° 13' 4.694 W
9,769.00	89.00	180.10	7,399.79	-2,552.04	-333.15	400,288.2998	535,721.5018	32° 6' 1.642 N	104° 13' 4.709 W
9,863.00	89.00	181.20	7,401.43	-2,646.01	-334.22	400,194.3218	535,720.4356	32° 6' 0.712 N	104° 13' 4.723 W
9,958.00	88.90	181.60	7,403.17	-2,740.97	-336.54	400,099.3665	535,718.1149	32° 5' 59.772 N	104° 13' 4.751 W
10,052.00	88.90	181.70	7,404.97	-2,834.91	-339.24	400,005.4230	535,715.4088	32° 5' 58.842 N	104° 13' 4.784 W
10,147.00	89.10	181.70	7,406.63	-2,929.86	-342.06	399,910.4795	535,712.5909	32° 5' 57.903 N	104° 13' 4.818 W
10,242.00	89.10	181.90	7,408.12	-3,024.80	-345.04	399,815.5384	535,709.6073	32° 5' 56.963 N	104° 13' 4.853 W
10,336.00	89.00	181.60	7,409.68	-3,118.74	-347.91	399,721.5954	535,706.7371	32° 5' 56.034 N	104° 13' 4.888 W
10,430.00	88.70	182.50	7,411.57	-3,212.66	-351.28	399,627.6758	535,703.3753	32° 5' 55.104 N	104° 13' 4.928 W
10,525.00	89.50	181.30	7,413.06	-3,307.59	-354.42	399,532.7424	535,700.2261	32° 5' 54.165 N	104° 13' 4.966 W
10,619.00	88.80	181.70	7,414.45	-3,401.55	-356.88	399,438.7859	535,697.7658	32° 5' 53.235 N	104° 13' 4.996 W
10,714.00	89.70	180.80	7,415.70	-3,496.52	-358.96	399,343.8188	535,695.6937	32° 5' 52.295 N	104° 13' 5.021 W
10,807.00	89.50	181.40	7,416.35	-3,589.50	-360.74	399,250.8389	535,693.9084	32° 5' 51.375 N	104° 13' 5.043 W
10,901.00	89.80	180.80	7,416.92	-3,683.48	-362.55	399,156.8587	535,692.1039	32° 5' 50.445 N	104° 13' 5.065 W
10,994.00	90.20	179.30	7,416.92	-3,776.48	-362.63	399,063.8617	535,692.0228	32° 5' 49.524 N	104° 13' 5.067 W
11,090.00	90.40	179.40	7,416.42	-3,872.47	-361.54	398,967.8695	535,693.1118	32° 5' 48.574 N	104° 13' 5.056 W
11,185.00	90.40	179.90	7,415.75	-3,967.46	-360.96	398,872.8740	535,693.6921	32° 5' 47.634 N	104° 13' 5.050 W
11,279.00	90.50	180.40	7,415.02	-4,061.46	-361.20	398,778.8778	535,693.4460	32° 5' 46.704 N	104° 13' 5.054 W
11,373.00	90.20	180.10	7,414.44	-4,155.46	-361.61	398,684.8808	535,693.0359	32° 5' 45.774 N	104° 13' 5.060 W
11,467.00	90.10	180.10	7,414.20	-4,249.46	-361.78	398,590.8815	535,692.8718	32° 5' 44.844 N	104° 13' 5.063 W
11,561.00	90.70	180.70	7,413.54	-4,343.45	-362.44	398,496.8871	535,692.2156	32° 5' 43.913 N	104° 13' 5.072 W
11,655.00	91.00	181.40	7,412.15	-4,437.42	-364.16	398,402.9141	535,690.4933	32° 5' 42.983 N	104° 13' 5.093 W
11,749.00	90.80	181.30	7,410.67	-4,531.39	-366.37	398,308.9520	535,688.2790	32° 5' 42.053 N	104° 13' 5.120 W
11,844.00	90.50	181.20	7,409.59	-4,626.36	-368.44	398,213.9811	535,686.2067	32° 5' 41.114 N	104° 13' 5.145 W
11,939.00	90.50	181.10	7,408.76	-4,721.34	-370.35	398,119.0040	535,684.3001	32° 5' 40.174 N	104° 13' 5.169 W
12,035.00	89.90	181.40	7,408.43	-4,817.31	-372.44	398,023.0282	535,682.2059	32° 5' 39.224 N	104° 13' 5.194 W

Final IDS MWD Survey



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12,105.00	89.90	181.40	7,408.55	-4,887.29	-374.16	397,953.0493	535,680.4957	32° 5' 38.531 N	104° 13' 5.215 W
Projection to TD									

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
6,841.00	6,831.59	25.61	-264.05	First IDS MWD Survey
12,035.00	7,408.43	-4,817.31	-372.44	Final IDS MWD Survey
12,105.00	7,408.55	-4,887.29	-374.16	Projection to TD

Checked By: _____ Approved By: _____ Date: _____