



COG Operating LLC.

Lea County, NM

Banter State ✓

#4H ✓

OH

Survey: MWD #1

Survey Report - Geographic

26 August, 2015

FEB 15 2016

cyf



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC.	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	WELL @ 3377.5usft (Original Well Elev)
Site:	Banter State	MD Reference:	WELL @ 3377.5usft (Original Well Elev)
Well:	#4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Project	Lea County, NM		
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		Banter State			
Site Position:		Northing:	478,116.50 usft	Latitude:	32° 18' 40.405 N
From:	Map	Easting:	779,178.30 usft	Longitude:	103° 25' 46.896 W
Position Uncertainty:	3.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.48 °

Well	#4H					
Well Position	+N/-S	0.0 usft	Northing:	478,116.50 usft	Latitude:	32° 18' 40.405 N
	+E/-W	0.0 usft	Easting:	779,178.30 usft	Longitude:	103° 25' 46.896 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	3,359.5 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	6/18/2015	7.03	60.19	48,283

Design	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	179.47	

Survey Program	Date	8/26/2015			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	15,891.0	MWD #1 (OH)	MWD	MWD - Standard	

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
0.0	0.00	0.00	0.0	0.0	0.0	478,116.50	779,178.30	32° 18' 40.405 N	103° 25' 46.896 W	
100.0	0.18	194.06	100.0	-0.2	0.0	478,116.35	779,178.26	32° 18' 40.403 N	103° 25' 46.896 W	
200.0	0.13	51.09	200.0	-0.2	0.0	478,116.27	779,178.31	32° 18' 40.402 N	103° 25' 46.896 W	
300.0	0.06	30.95	300.0	-0.1	0.1	478,116.38	779,178.42	32° 18' 40.404 N	103° 25' 46.895 W	
400.0	0.27	59.41	400.0	0.0	0.4	478,116.55	779,178.65	32° 18' 40.405 N	103° 25' 46.892 W	
500.0	0.74	64.86	500.0	0.4	1.1	478,116.94	779,179.44	32° 18' 40.409 N	103° 25' 46.883 W	
600.0	0.85	82.68	600.0	0.8	2.5	478,117.31	779,180.76	32° 18' 40.412 N	103° 25' 46.867 W	
700.0	1.42	99.54	700.0	0.7	4.4	478,117.20	779,182.72	32° 18' 40.411 N	103° 25' 46.844 W	
800.0	3.09	105.51	799.9	-0.2	8.2	478,116.27	779,186.54	32° 18' 40.402 N	103° 25' 46.800 W	
900.0	1.74	108.11	899.8	-1.4	12.3	478,115.08	779,190.58	32° 18' 40.390 N	103° 25' 46.753 W	
1,000.0	1.30	111.10	999.8	-2.3	14.8	478,114.20	779,193.08	32° 18' 40.381 N	103° 25' 46.724 W	
1,100.0	1.10	195.06	1,099.7	-3.6	15.6	478,112.87	779,193.89	32° 18' 40.367 N	103° 25' 46.715 W	



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC.	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	WELL @ 3377.5usft (Original Well Elev)
Site:	Banter State	MD Reference:	WELL @ 3377.5usft (Original Well Elev)
Well:	#4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
1,200.0	1.70	208.20	1,199.7	-5.9	14.6	478,110.63	779,192.94	32° 18' 40.345 N	103° 25' 46.726 W
1,300.0	1.37	213.78	1,299.7	-8.2	13.3	478,108.33	779,191.57	32° 18' 40.323 N	103° 25' 46.742 W
1,400.0	1.25	198.03	1,399.7	-10.2	12.3	478,106.30	779,190.57	32° 18' 40.303 N	103° 25' 46.754 W
1,500.0	2.15	211.85	1,499.6	-12.8	10.9	478,103.67	779,189.24	32° 18' 40.277 N	103° 25' 46.770 W
1,600.0	3.18	210.14	1,599.5	-16.8	8.6	478,099.68	779,186.86	32° 18' 40.237 N	103° 25' 46.798 W
1,700.0	3.24	207.15	1,699.3	-21.7	5.9	478,094.76	779,184.18	32° 18' 40.189 N	103° 25' 46.830 W
1,800.0	1.80	206.10	1,799.2	-25.7	3.9	478,090.84	779,182.20	32° 18' 40.150 N	103° 25' 46.853 W
1,900.0	1.68	213.22	1,899.2	-28.3	2.4	478,088.20	779,180.70	32° 18' 40.124 N	103° 25' 46.871 W
2,000.0	0.19	282.84	1,999.2	-29.5	1.4	478,087.01	779,179.74	32° 18' 40.113 N	103° 25' 46.882 W
2,100.0	0.67	316.11	2,099.2	-29.0	0.9	478,087.47	779,179.17	32° 18' 40.117 N	103° 25' 46.889 W
2,200.0	1.18	276.43	2,199.2	-28.5	-0.6	478,088.01	779,177.74	32° 18' 40.123 N	103° 25' 46.905 W
2,300.0	1.51	272.17	2,299.1	-28.3	-2.9	478,088.17	779,175.40	32° 18' 40.125 N	103° 25' 46.932 W
2,400.0	1.68	256.62	2,399.1	-28.6	-5.6	478,087.88	779,172.66	32° 18' 40.122 N	103° 25' 46.964 W
2,500.0	1.71	232.47	2,499.1	-29.9	-8.2	478,086.64	779,170.05	32° 18' 40.110 N	103° 25' 46.995 W
2,600.0	2.04	240.04	2,599.0	-31.7	-11.0	478,084.84	779,167.33	32° 18' 40.092 N	103° 25' 47.027 W
2,700.0	1.35	236.32	2,699.0	-33.2	-13.5	478,083.30	779,164.80	32° 18' 40.077 N	103° 25' 47.056 W
2,800.0	0.91	230.55	2,798.9	-34.4	-15.1	478,082.14	779,163.21	32° 18' 40.066 N	103° 25' 47.075 W
2,900.0	0.84	248.85	2,898.9	-35.1	-16.4	478,081.37	779,161.91	32° 18' 40.058 N	103° 25' 47.090 W
3,000.0	0.96	213.50	2,998.9	-36.1	-17.5	478,080.41	779,160.77	32° 18' 40.049 N	103° 25' 47.104 W
3,100.0	0.39	243.94	3,098.9	-36.9	-18.3	478,079.56	779,160.00	32° 18' 40.041 N	103° 25' 47.113 W
3,200.0	0.11	4.89	3,198.9	-37.0	-18.6	478,079.50	779,159.70	32° 18' 40.040 N	103° 25' 47.116 W
3,300.0	0.60	137.16	3,298.9	-37.3	-18.2	478,079.22	779,160.07	32° 18' 40.037 N	103° 25' 47.112 W
3,400.0	1.05	85.75	3,398.9	-37.6	-17.0	478,078.90	779,161.34	32° 18' 40.034 N	103° 25' 47.097 W
3,500.0	1.28	70.29	3,498.9	-37.2	-15.0	478,079.34	779,163.30	32° 18' 40.038 N	103° 25' 47.074 W
3,600.0	1.85	49.78	3,598.8	-35.7	-12.7	478,080.76	779,165.59	32° 18' 40.052 N	103° 25' 47.048 W
3,700.0	1.36	55.93	3,698.8	-34.0	-10.5	478,082.47	779,167.80	32° 18' 40.069 N	103° 25' 47.022 W
3,800.0	1.11	23.39	3,798.8	-32.5	-9.1	478,084.02	779,169.17	32° 18' 40.084 N	103° 25' 47.006 W
3,900.0	1.25	24.96	3,898.8	-30.6	-8.3	478,085.90	779,170.01	32° 18' 40.103 N	103° 25' 46.995 W
4,000.0	1.54	12.59	3,998.7	-28.3	-7.5	478,088.20	779,170.77	32° 18' 40.125 N	103° 25' 46.986 W
4,100.0	1.82	344.32	4,098.7	-25.5	-7.7	478,091.04	779,170.63	32° 18' 40.153 N	103° 25' 46.988 W
4,200.0	1.92	351.28	4,198.6	-22.3	-8.4	478,094.23	779,169.95	32° 18' 40.185 N	103° 25' 46.995 W
4,300.0	1.42	346.49	4,298.6	-19.4	-8.9	478,097.09	779,169.40	32° 18' 40.213 N	103° 25' 47.002 W
4,400.0	1.22	29.84	4,398.6	-17.3	-8.7	478,099.22	779,169.64	32° 18' 40.234 N	103° 25' 46.998 W
4,500.0	1.14	29.94	4,498.5	-15.5	-7.6	478,101.00	779,170.67	32° 18' 40.252 N	103° 25' 46.986 W
4,600.0	1.49	34.90	4,598.5	-13.6	-6.4	478,102.93	779,171.91	32° 18' 40.271 N	103° 25' 46.972 W
4,700.0	1.53	37.02	4,698.5	-11.4	-4.8	478,105.06	779,173.46	32° 18' 40.292 N	103° 25' 46.953 W
4,800.0	2.17	37.36	4,798.4	-8.9	-2.9	478,107.63	779,175.41	32° 18' 40.317 N	103° 25' 46.930 W
4,900.0	1.29	33.41	4,898.4	-6.4	-1.1	478,110.08	779,177.18	32° 18' 40.341 N	103° 25' 46.910 W
5,000.0	0.86	30.43	4,998.4	-4.8	-0.1	478,111.66	779,178.18	32° 18' 40.357 N	103° 25' 46.898 W
5,100.0	1.00	38.05	5,098.4	-3.5	0.8	478,113.00	779,179.10	32° 18' 40.370 N	103° 25' 46.887 W
5,200.0	0.71	21.69	5,198.3	-2.2	1.6	478,114.26	779,179.86	32° 18' 40.382 N	103° 25' 46.878 W
5,300.0	0.69	38.03	5,298.3	-1.2	2.2	478,115.31	779,180.46	32° 18' 40.393 N	103° 25' 46.871 W
5,400.0	0.83	30.77	5,398.3	-0.1	2.9	478,116.41	779,181.21	32° 18' 40.404 N	103° 25' 46.862 W
5,500.0	0.92	34.85	5,498.3	1.2	3.7	478,117.69	779,182.04	32° 18' 40.416 N	103° 25' 46.852 W
5,600.0	0.73	24.06	5,598.3	2.4	4.5	478,118.93	779,182.75	32° 18' 40.428 N	103° 25' 46.844 W
5,700.0	0.73	21.55	5,698.3	3.6	4.9	478,120.10	779,183.25	32° 18' 40.440 N	103° 25' 46.838 W
5,800.0	0.81	34.17	5,798.3	4.8	5.6	478,121.28	779,183.88	32° 18' 40.452 N	103° 25' 46.830 W
5,900.0	0.83	45.47	5,898.3	5.9	6.5	478,122.37	779,184.79	32° 18' 40.462 N	103° 25' 46.820 W
6,000.0	0.72	32.30	5,998.3	6.9	7.3	478,123.41	779,185.64	32° 18' 40.472 N	103° 25' 46.810 W
6,100.0	0.53	28.71	6,098.3	7.8	7.9	478,124.35	779,186.20	32° 18' 40.482 N	103° 25' 46.803 W
6,200.0	0.58	45.26	6,198.3	8.6	8.5	478,125.11	779,186.78	32° 18' 40.489 N	103° 25' 46.796 W
6,300.0	0.75	58.54	6,298.2	9.3	9.4	478,125.81	779,187.70	32° 18' 40.496 N	103° 25' 46.785 W
6,400.0	0.59	47.94	6,398.2	10.0	10.3	478,126.50	779,188.64	32° 18' 40.503 N	103° 25' 46.774 W
6,500.0	0.89	15.70	6,498.2	11.1	10.9	478,127.59	779,189.23	32° 18' 40.513 N	103° 25' 46.767 W
6,600.0	0.92	33.00	6,598.2	12.5	11.6	478,129.01	779,189.88	32° 18' 40.527 N	103° 25' 46.760 W



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC.	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	WELL @ 3377.5usft (Original Well Elev)
Site:	Banter State	MD Reference:	WELL @ 3377.5usft (Original Well Elev)
Well:	#4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
6,700.0	1.04	29.24	6,698.2	14.0	12.5	478,130.47	779,190.76	32° 18' 40.542 N	103° 25' 46.749 W
6,800.0	1.10	31.13	6,798.2	15.6	13.4	478,132.09	779,191.70	32° 18' 40.558 N	103° 25' 46.738 W
6,900.0	0.62	33.31	6,898.2	16.9	14.2	478,133.36	779,192.49	32° 18' 40.570 N	103° 25' 46.729 W
7,000.0	0.47	36.63	6,998.2	17.6	14.7	478,134.14	779,193.04	32° 18' 40.578 N	103° 25' 46.723 W
7,100.0	0.47	30.62	7,098.2	18.3	15.2	478,134.83	779,193.49	32° 18' 40.585 N	103° 25' 46.717 W
7,200.0	0.27	63.63	7,198.2	18.8	15.6	478,135.28	779,193.91	32° 18' 40.589 N	103° 25' 46.712 W
7,300.0	0.43	22.72	7,298.2	19.2	16.0	478,135.73	779,194.27	32° 18' 40.594 N	103° 25' 46.708 W
7,400.0	0.54	53.49	7,398.2	19.9	16.5	478,136.36	779,194.79	32° 18' 40.600 N	103° 25' 46.702 W
7,500.0	0.20	65.63	7,498.2	20.2	17.0	478,136.71	779,195.33	32° 18' 40.603 N	103° 25' 46.696 W
7,600.0	0.15	355.86	7,598.2	20.4	17.2	478,136.91	779,195.48	32° 18' 40.605 N	103° 25' 46.694 W
7,700.0	0.19	61.53	7,698.2	20.6	17.3	478,137.12	779,195.61	32° 18' 40.607 N	103° 25' 46.692 W
7,800.0	0.16	187.16	7,798.2	20.6	17.4	478,137.06	779,195.74	32° 18' 40.607 N	103° 25' 46.691 W
7,900.0	0.17	41.59	7,898.2	20.5	17.5	478,137.04	779,195.82	32° 18' 40.606 N	103° 25' 46.690 W
8,000.0	0.26	168.29	7,998.2	20.4	17.7	478,136.93	779,195.97	32° 18' 40.605 N	103° 25' 46.688 W
8,100.0	0.23	178.66	8,098.2	20.0	17.7	478,136.50	779,196.02	32° 18' 40.601 N	103° 25' 46.688 W
8,200.0	0.13	180.84	8,198.2	19.7	17.7	478,136.19	779,196.02	32° 18' 40.598 N	103° 25' 46.688 W
8,300.0	0.33	192.48	8,298.2	19.3	17.7	478,135.79	779,195.96	32° 18' 40.594 N	103° 25' 46.688 W
8,400.0	0.31	185.53	8,398.2	18.7	17.6	478,135.24	779,195.87	32° 18' 40.589 N	103° 25' 46.689 W
8,500.0	0.73	180.53	8,498.2	17.8	17.5	478,134.34	779,195.84	32° 18' 40.580 N	103° 25' 46.690 W
8,600.0	0.91	190.68	8,598.1	16.4	17.4	478,132.92	779,195.68	32° 18' 40.566 N	103° 25' 46.692 W
8,700.0	0.91	188.82	8,698.1	14.9	17.1	478,131.36	779,195.42	32° 18' 40.550 N	103° 25' 46.695 W
8,800.0	0.39	182.27	8,798.1	13.7	17.0	478,130.23	779,195.28	32° 18' 40.539 N	103° 25' 46.697 W
8,900.0	0.43	182.27	8,898.1	13.0	17.0	478,129.52	779,195.25	32° 18' 40.532 N	103° 25' 46.697 W
9,000.0	0.67	189.30	8,998.1	12.1	16.8	478,128.56	779,195.14	32° 18' 40.523 N	103° 25' 46.699 W
9,100.0	0.42	205.33	9,098.1	11.2	16.6	478,127.66	779,194.89	32° 18' 40.514 N	103° 25' 46.702 W
9,200.0	0.87	197.08	9,198.1	10.1	16.2	478,126.60	779,194.51	32° 18' 40.503 N	103° 25' 46.706 W
9,300.0	0.89	198.12	9,298.1	8.6	15.7	478,125.13	779,194.05	32° 18' 40.489 N	103° 25' 46.712 W
9,400.0	0.77	204.81	9,398.1	7.3	15.2	478,123.79	779,193.52	32° 18' 40.476 N	103° 25' 46.718 W
9,500.0	0.75	208.60	9,498.1	6.1	14.6	478,122.60	779,192.93	32° 18' 40.464 N	103° 25' 46.725 W
9,600.0	0.63	225.26	9,598.1	5.1	13.9	478,121.64	779,192.22	32° 18' 40.454 N	103° 25' 46.733 W
9,700.0	0.90	244.50	9,698.1	4.4	12.8	478,120.92	779,191.12	32° 18' 40.447 N	103° 25' 46.746 W
9,800.0	0.98	231.64	9,798.0	3.5	11.4	478,120.05	779,189.75	32° 18' 40.439 N	103° 25' 46.762 W
9,900.0	1.01	223.76	9,898.0	2.4	10.2	478,118.88	779,188.47	32° 18' 40.427 N	103° 25' 46.777 W
10,000.0	0.87	221.61	9,998.0	1.2	9.1	478,117.68	779,187.35	32° 18' 40.416 N	103° 25' 46.790 W
10,100.0	1.14	204.59	10,098.0	-0.3	8.1	478,116.20	779,186.43	32° 18' 40.401 N	103° 25' 46.801 W
10,200.0	1.08	200.72	10,198.0	-2.1	7.4	478,114.42	779,185.69	32° 18' 40.383 N	103° 25' 46.810 W
10,300.0	1.02	201.27	10,298.0	-3.8	6.7	478,112.71	779,185.03	32° 18' 40.367 N	103° 25' 46.818 W
10,400.0	0.98	205.45	10,397.9	-5.4	6.0	478,111.10	779,184.34	32° 18' 40.351 N	103° 25' 46.826 W
10,500.0	1.03	207.74	10,497.9	-7.0	5.3	478,109.54	779,183.55	32° 18' 40.335 N	103° 25' 46.835 W
10,600.0	1.00	207.20	10,597.9	-8.5	4.4	478,107.97	779,182.74	32° 18' 40.320 N	103° 25' 46.845 W
10,700.0	1.27	209.92	10,697.9	-10.3	3.5	478,106.23	779,181.78	32° 18' 40.303 N	103° 25' 46.856 W
10,730.0	1.14	203.20	10,727.9	-10.8	3.2	478,105.67	779,181.50	32° 18' 40.297 N	103° 25' 46.860 W
10,816.0	0.80	168.70	10,813.9	-12.2	3.0	478,104.29	779,181.28	32° 18' 40.284 N	103° 25' 46.862 W
10,848.0	3.30	173.60	10,845.9	-13.3	3.1	478,103.16	779,181.43	32° 18' 40.272 N	103° 25' 46.861 W
10,880.0	7.50	170.70	10,877.7	-16.3	3.6	478,100.18	779,181.87	32° 18' 40.243 N	103° 25' 46.856 W
10,911.0	11.50	172.90	10,908.3	-21.4	4.3	478,095.11	779,182.58	32° 18' 40.193 N	103° 25' 46.848 W
10,943.0	15.70	174.50	10,939.4	-28.9	5.1	478,087.64	779,183.39	32° 18' 40.119 N	103° 25' 46.840 W
10,975.0	19.40	175.70	10,969.9	-38.5	5.9	478,078.02	779,184.20	32° 18' 40.023 N	103° 25' 46.831 W
11,006.0	22.00	178.90	10,998.9	-49.4	6.4	478,067.08	779,184.70	32° 18' 39.915 N	103° 25' 46.826 W
11,038.0	25.10	179.10	11,028.2	-62.2	6.6	478,054.30	779,184.92	32° 18' 39.789 N	103° 25' 46.825 W
11,070.0	26.30	181.10	11,057.0	-76.1	6.6	478,040.42	779,184.89	32° 18' 39.651 N	103° 25' 46.827 W
11,101.0	27.70	182.90	11,084.7	-90.1	6.1	478,026.36	779,184.39	32° 18' 39.512 N	103° 25' 46.834 W
11,133.0	29.20	182.00	11,112.8	-105.4	5.4	478,011.13	779,183.75	32° 18' 39.362 N	103° 25' 46.843 W
11,165.0	30.50	181.90	11,140.6	-121.3	4.9	477,995.21	779,183.20	32° 18' 39.204 N	103° 25' 46.851 W
11,196.0	32.70	180.90	11,167.0	-137.5	4.5	477,978.98	779,182.81	32° 18' 39.043 N	103° 25' 46.857 W



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC.	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	WELL @ 3377.5usft (Original Well Elev)
Site:	Banter State	MD Reference:	WELL @ 3377.5usft (Original Well Elev)
Well:	#4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
11,228.0	35.10	178.80	11,193.5	-155.4	4.6	477,961.13	779,182.87	32° 18' 38.867 N	103° 25' 46.858 W
11,260.0	38.20	177.50	11,219.2	-174.5	5.2	477,942.04	779,183.49	32° 18' 38.678 N	103° 25' 46.853 W
11,292.0	42.00	178.50	11,243.7	-195.1	5.9	477,921.45	779,184.21	32° 18' 38.474 N	103° 25' 46.846 W
11,323.0	45.30	180.20	11,266.1	-216.4	6.1	477,900.06	779,184.44	32° 18' 38.262 N	103° 25' 46.846 W
11,355.0	48.80	182.00	11,287.9	-239.9	5.7	477,876.64	779,183.98	32° 18' 38.031 N	103° 25' 46.853 W
11,386.0	52.70	181.60	11,307.5	-263.8	4.9	477,852.65	779,183.23	32° 18' 37.794 N	103° 25' 46.864 W
11,418.0	56.80	181.60	11,326.0	-290.0	4.2	477,826.54	779,182.50	32° 18' 37.535 N	103° 25' 46.876 W
11,450.0	61.10	180.70	11,342.5	-317.4	3.7	477,799.13	779,181.95	32° 18' 37.264 N	103° 25' 46.885 W
11,482.0	65.50	179.90	11,356.8	-345.9	3.5	477,770.55	779,181.81	32° 18' 36.981 N	103° 25' 46.889 W
11,514.0	69.70	179.40	11,369.0	-375.5	3.7	477,740.98	779,181.99	32° 18' 36.689 N	103° 25' 46.890 W
11,545.0	73.20	179.50	11,378.9	-404.9	4.0	477,711.59	779,182.27	32° 18' 36.398 N	103° 25' 46.889 W
11,577.0	76.80	179.30	11,387.2	-435.8	4.3	477,680.69	779,182.59	32° 18' 36.092 N	103° 25' 46.889 W
11,608.0	79.70	178.70	11,393.5	-466.2	4.8	477,650.35	779,183.13	32° 18' 35.792 N	103° 25' 46.886 W
11,640.0	83.40	178.20	11,398.2	-497.8	5.7	477,618.71	779,183.98	32° 18' 35.479 N	103° 25' 46.879 W
11,671.0	86.00	178.90	11,401.0	-528.6	6.5	477,587.86	779,184.76	32° 18' 35.173 N	103° 25' 46.873 W
11,703.0	87.70	178.70	11,402.8	-560.6	7.1	477,555.91	779,185.43	32° 18' 34.857 N	103° 25' 46.868 W
11,734.0	89.00	178.90	11,403.7	-591.6	7.8	477,524.93	779,186.08	32° 18' 34.550 N	103° 25' 46.863 W
11,766.0	90.10	178.70	11,403.9	-623.6	8.5	477,492.94	779,186.75	32° 18' 34.234 N	103° 25' 46.859 W
11,798.0	90.50	178.50	11,403.8	-655.5	9.2	477,460.95	779,187.53	32° 18' 33.917 N	103° 25' 46.853 W
11,829.0	90.90	178.40	11,403.4	-686.5	10.1	477,429.97	779,188.37	32° 18' 33.611 N	103° 25' 46.846 W
11,924.0	91.30	178.10	11,401.6	-781.5	13.0	477,335.03	779,191.27	32° 18' 32.671 N	103° 25' 46.822 W
12,019.0	91.80	178.20	11,399.0	-876.4	16.0	477,240.11	779,194.34	32° 18' 31.731 N	103° 25' 46.795 W
12,114.0	91.20	178.90	11,396.5	-971.3	18.4	477,145.18	779,196.74	32° 18' 30.792 N	103° 25' 46.777 W
12,209.0	91.50	179.40	11,394.3	-1,066.3	19.9	477,050.21	779,198.15	32° 18' 29.852 N	103° 25' 46.769 W
12,304.0	91.20	180.10	11,392.0	-1,161.3	20.3	476,955.24	779,198.56	32° 18' 28.912 N	103° 25' 46.774 W
12,399.0	92.00	180.30	11,389.4	-1,256.2	19.9	476,860.28	779,198.23	32° 18' 27.973 N	103° 25' 46.787 W
12,494.0	91.80	181.00	11,386.2	-1,351.2	18.9	476,765.34	779,197.16	32° 18' 27.033 N	103° 25' 46.809 W
12,589.0	91.00	180.60	11,383.9	-1,446.1	17.5	476,670.38	779,195.83	32° 18' 26.094 N	103° 25' 46.834 W
12,683.0	90.90	179.80	11,382.4	-1,540.1	17.2	476,576.39	779,195.50	32° 18' 25.164 N	103° 25' 46.847 W
12,778.0	90.70	180.50	11,381.0	-1,635.1	17.0	476,481.40	779,195.25	32° 18' 24.224 N	103° 25' 46.859 W
12,873.0	90.40	181.10	11,380.1	-1,730.1	15.6	476,386.42	779,193.93	32° 18' 23.284 N	103° 25' 46.884 W
12,967.0	90.70	180.40	11,379.2	-1,824.1	14.4	476,292.43	779,192.70	32° 18' 22.354 N	103° 25' 46.907 W
13,061.0	90.60	180.30	11,378.2	-1,918.1	13.8	476,198.44	779,192.12	32° 18' 21.424 N	103° 25' 46.923 W
13,156.0	90.90	179.30	11,376.9	-2,013.1	14.2	476,103.45	779,192.45	32° 18' 20.484 N	103° 25' 46.929 W
13,251.0	91.40	178.80	11,375.0	-2,108.0	15.7	476,008.48	779,194.03	32° 18' 19.544 N	103° 25' 46.920 W
13,346.0	91.70	177.80	11,372.4	-2,202.9	18.5	475,913.56	779,196.85	32° 18' 18.605 N	103° 25' 46.960 W
13,441.0	93.00	177.70	11,368.5	-2,297.8	22.3	475,818.71	779,200.57	32° 18' 17.666 N	103° 25' 46.862 W
13,536.0	91.80	178.20	11,364.6	-2,392.6	25.7	475,723.86	779,203.97	32° 18' 16.727 N	103° 25' 46.832 W
13,630.0	91.80	179.20	11,361.6	-2,486.6	27.8	475,629.93	779,206.10	32° 18' 15.798 N	103° 25' 46.816 W
13,725.0	91.00	179.80	11,359.3	-2,581.5	28.6	475,534.97	779,206.93	32° 18' 14.858 N	103° 25' 46.816 W
13,820.0	90.90	179.90	11,357.7	-2,676.5	28.9	475,439.98	779,207.18	32° 18' 13.918 N	103° 25' 46.822 W
13,915.0	89.60	180.10	11,357.3	-2,771.5	28.9	475,344.98	779,207.18	32° 18' 12.978 N	103° 25' 46.832 W
14,010.0	89.40	180.20	11,358.1	-2,866.5	28.6	475,249.99	779,206.93	32° 18' 12.038 N	103° 25' 46.844 W
14,105.0	90.20	180.40	11,358.5	-2,961.5	28.1	475,154.99	779,206.43	32° 18' 11.098 N	103° 25' 46.859 W
14,200.0	89.60	181.10	11,358.6	-3,056.5	26.9	475,060.00	779,205.19	32° 18' 10.158 N	103° 25' 46.883 W
14,295.0	90.50	180.80	11,358.5	-3,151.5	25.3	474,965.01	779,203.61	32° 18' 9.219 N	103° 25' 46.911 W
14,389.0	88.90	180.40	11,359.0	-3,245.5	24.3	474,871.02	779,202.63	32° 18' 8.289 N	103° 25' 46.931 W
14,484.0	90.40	180.30	11,359.6	-3,340.5	23.7	474,776.03	779,202.05	32° 18' 7.349 N	103° 25' 46.947 W
14,579.0	90.30	180.00	11,359.0	-3,435.5	23.5	474,681.03	779,201.80	32° 18' 6.409 N	103° 25' 46.960 W
14,674.0	90.70	179.60	11,358.2	-3,530.5	23.8	474,586.03	779,202.13	32° 18' 5.469 N	103° 25' 46.965 W
14,769.0	89.60	178.90	11,358.0	-3,625.5	25.1	474,491.04	779,203.37	32° 18' 4.529 N	103° 25' 46.960 W
14,864.0	90.50	178.70	11,357.9	-3,720.4	27.1	474,396.07	779,205.36	32° 18' 3.589 N	103° 25' 46.946 W
14,959.0	90.20	178.40	11,357.3	-3,815.4	29.5	474,301.10	779,207.77	32° 18' 2.649 N	103° 25' 46.927 W
15,053.0	89.50	178.10	11,357.5	-3,909.4	32.3	474,207.14	779,210.64	32° 18' 1.719 N	103° 25' 46.903 W
15,201.0	90.30	177.80	11,357.8	-4,057.3	37.6	474,059.24	779,215.93	32° 18' 0.255 N	103° 25' 46.856 W



Wellplanning
Survey Report - Geographic

Company:	COG Operating LLC.	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	WELL @ 3377.5usft (Original Well Elev)
Site:	Banter State	MD Reference:	WELL @ 3377.5usft (Original Well Elev)
Well:	#4H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
15,243.0	90.60	178.90	11,357.5	-4,099.2	38.8	474,017.26	779,217.14	32° 17' 59.839 N	103° 25' 46.846 W
15,338.0	89.50	178.80	11,357.4	-4,194.2	40.7	473,922.28	779,219.05	32° 17' 58.899 N	103° 25' 46.833 W
15,434.0	90.50	178.20	11,357.4	-4,290.2	43.3	473,826.32	779,221.56	32° 17' 57.950 N	103° 25' 46.813 W
15,529.0	91.20	178.70	11,356.0	-4,385.1	45.8	473,731.36	779,224.13	32° 17' 57.010 N	103° 25' 46.793 W
15,624.0	91.60	178.90	11,353.7	-4,480.1	47.8	473,636.41	779,226.12	32° 17' 56.070 N	103° 25' 46.779 W
15,719.0	90.90	178.40	11,351.6	-4,575.0	50.1	473,541.46	779,228.36	32° 17' 55.130 N	103° 25' 46.762 W
15,814.0	90.90	178.90	11,350.1	-4,670.0	52.3	473,446.50	779,230.59	32° 17' 54.191 N	103° 25' 46.745 W
15,838.0	90.90	179.00	11,349.7	-4,694.0	52.7	473,422.51	779,231.03	32° 17' 53.953 N	103° 25' 46.743 W
15,891.0	90.90	179.00	11,348.9	-4,747.0	53.7	473,369.52	779,231.96	32° 17' 53.429 N	103° 25' 46.737 W
PBHL(BS#4H)									

Checked By: _____ Approved By: _____ Date: _____



COG Operating LLC.
Project: Lea County, NM
Site: Banter State

Well: #4H
Wellbore: OH
Plan: Plan #3 (#4H/OH)

Section Details

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSecl
1	13251.0	91.40	178.80	11375.0	-2108.0	15.7	0.00	0.00	2108.1
2	13421.0	91.40	178.80	11370.9	-2277.9	19.3	0.00	0.00	2278.0
3	13497.9	90.00	179.43	11369.9	-2354.8	20.5	2.00	155.72	2354.9
4	15903.1	90.00	179.43	11370.0	-4759.9	44.3	0.00	0.00	4760.1

PBHL(BS#4H)

WELL DETAILS: #4H

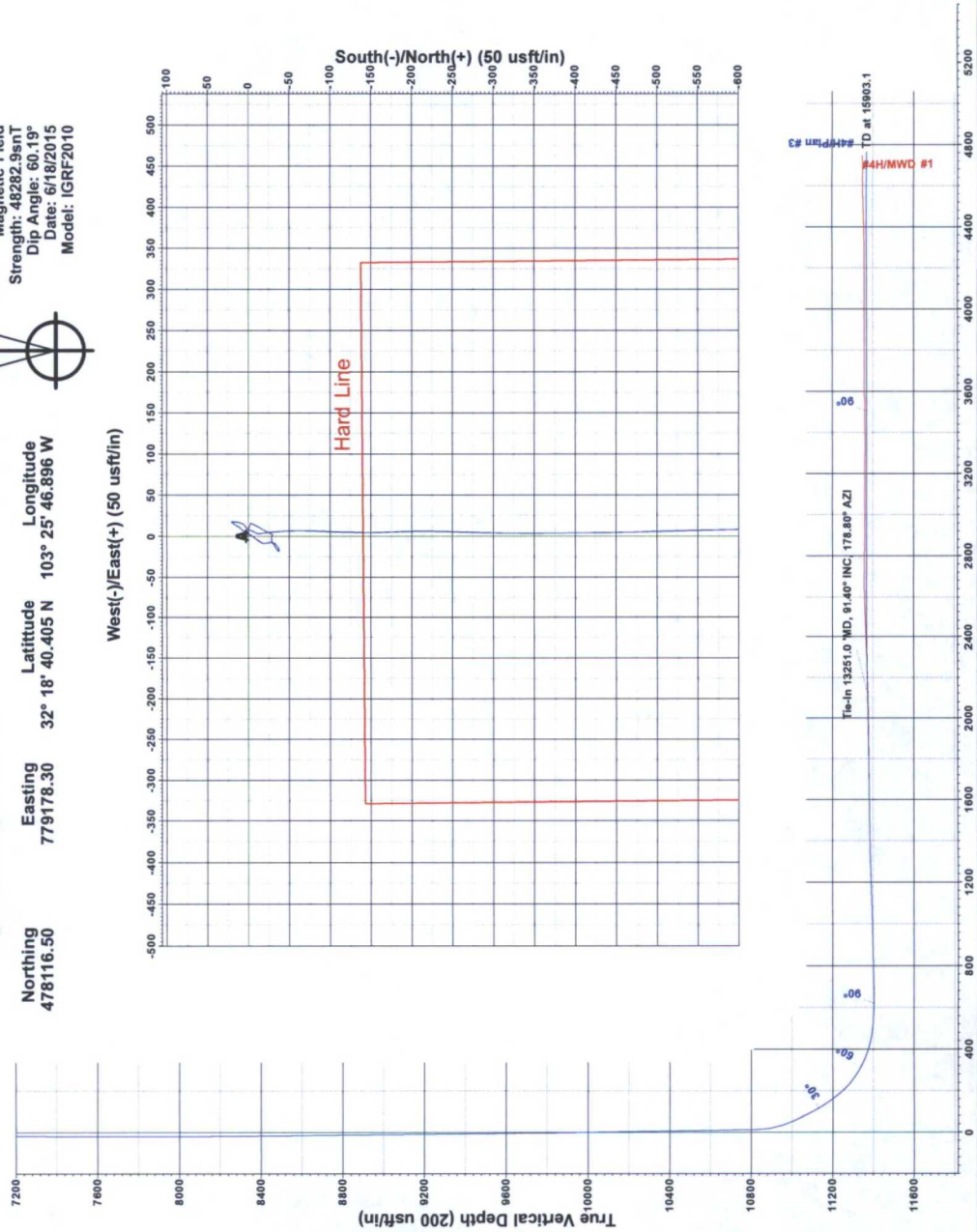
Ground Elevation: 3359.5
RKB Elevation: WELL @ 3377.5usft (Original Well Elev)

Rig Name: Original Well Elev

Northing 478116.50
Easting 779178.30
Latitude 32° 18' 40.405 N
Longitude 103° 25' 46.896 W

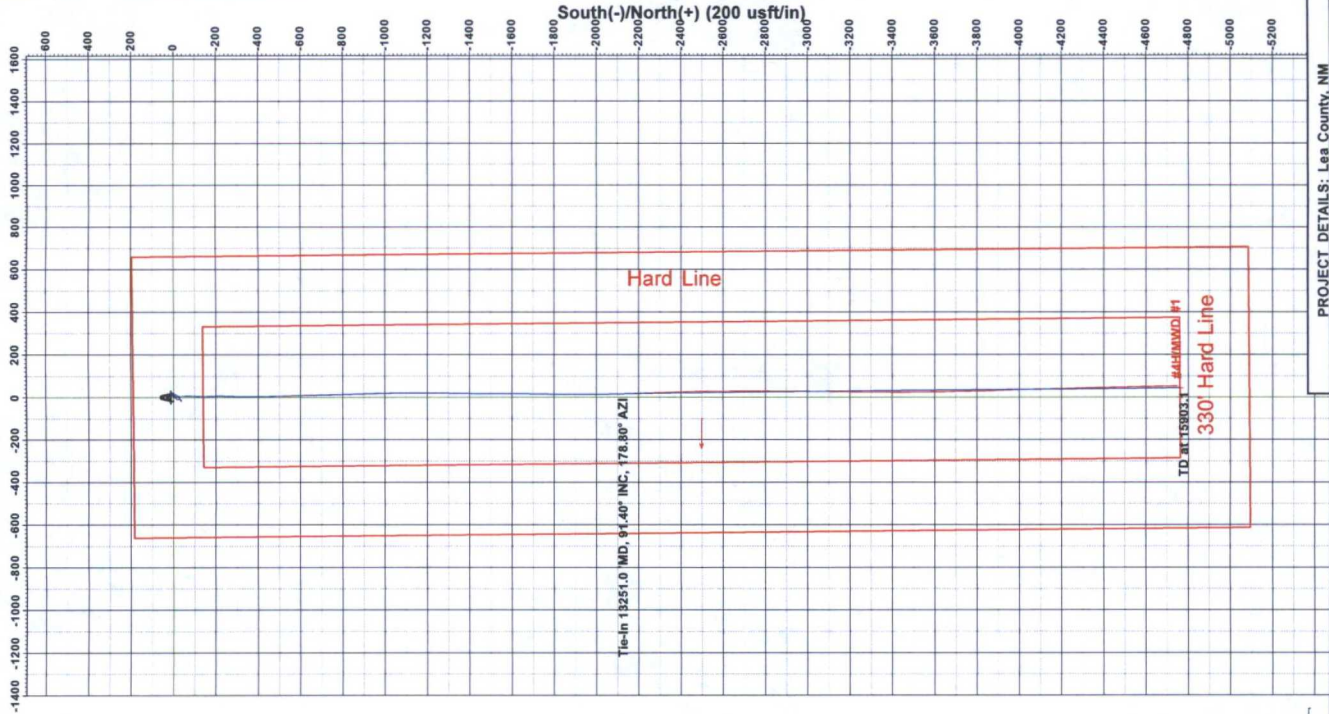


Magnetic Field
Strength: 48282.9nT
Dip Angle: 60.19°
Date: 6/18/2015
Model: IGRF2010



West(-)/East(+) (200 usft/in)

South(-)/North(+) (200 usft/in)



Vertical Section at 179.47° (200 usft/in)

Nexus Directional Solutions

PROJECT DETAILS: Lea County, NM
Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level
Local North: Grid