



HOBBS OCD

MAR 30 2015

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COG Operating LLC

Lea County, NM

Black Pearl 1 Federal

#3H

OH

Design: OH

Survey Report - Geographic

06 February, 2015



MAR 31 2015

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TDS
Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3H
Project:	Lea County, NM	TVD Reference:	KB @ 3712.4usft
Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3712.4usft
Well:	#3H	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	Black Pearl 1 Federal		
Site Position:		Northing:	586,220.00 usft
From:	Map	Easting:	754,185.00 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 36' 32.078 N
		Longitude:	103° 30' 28.361 W
		Grid Convergence:	0.44 °

Well	#3H		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	0.0 usft
		Latitude:	32° 36' 32.005 N
		Longitude:	103° 31' 3.808 W
		Ground Level:	3,695.4 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination (°)
	IGRF2010	12/15/2014	7.16
			Dip Angle (°)
			60.46
			Field Strength (nT)
			48,501

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)
	0.0	0.0	0.0
			Direction (°)
			171.13

Survey Program	Date 2/6/2015		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
100.0	10,200.0	GYRO #1 (OH)	Good_gyro
10,290.0	15,559.0	MWD #1 (OH)	MWD
			Description
			Good Gyro
			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	586,189.20	751,153.00	32° 36' 32.005 N	103° 31' 3.808 W
100.0	0.16	244.81	100.0	-0.1	-0.1	586,189.14	751,152.87	32° 36' 32.005 N	103° 31' 3.809 W
200.0	0.19	40.39	200.0	0.0	-0.1	586,189.21	751,152.85	32° 36' 32.005 N	103° 31' 3.809 W
300.0	0.12	332.49	300.0	0.2	-0.1	586,189.43	751,152.91	32° 36' 32.007 N	103° 31' 3.809 W
400.0	0.13	266.14	400.0	0.3	-0.2	586,189.51	751,152.75	32° 36' 32.008 N	103° 31' 3.810 W
500.0	0.18	230.49	500.0	0.2	-0.5	586,189.41	751,152.51	32° 36' 32.007 N	103° 31' 3.813 W
600.0	0.26	227.62	600.0	0.0	-0.8	586,189.15	751,152.23	32° 36' 32.005 N	103° 31' 3.817 W
700.0	0.21	173.17	700.0	-0.4	-0.9	586,188.82	751,152.08	32° 36' 32.002 N	103° 31' 3.818 W
800.0	0.25	165.29	800.0	-0.8	-0.8	586,188.43	751,152.16	32° 36' 31.998 N	103° 31' 3.817 W
900.0	0.16	148.76	900.0	-1.1	-0.7	586,188.10	751,152.29	32° 36' 31.994 N	103° 31' 3.816 W
1,000.0	0.05	89.16	1,000.0	-1.2	-0.6	586,187.98	751,152.40	32° 36' 31.993 N	103° 31' 3.815 W



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Well:	#3H	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	
1,100.0	0.25	239.29	1,100.0	-1.3	-0.7	586,187.87	751,152.26	32° 36' 31.992 N	103° 31' 3.816 W	
1,200.0	0.13	125.82	1,200.0	-1.5	-0.8	586,187.69	751,152.16	32° 36' 31.990 N	103° 31' 3.817 W	
1,300.0	0.28	298.51	1,300.0	-1.5	-1.0	586,187.74	751,152.04	32° 36' 31.991 N	103° 31' 3.819 W	
1,400.0	0.37	294.93	1,400.0	-1.2	-1.5	586,187.99	751,151.53	32° 36' 31.993 N	103° 31' 3.825 W	
1,500.0	0.10	187.65	1,500.0	-1.2	-1.8	586,188.04	751,151.23	32° 36' 31.994 N	103° 31' 3.828 W	
1,600.0	0.31	254.53	1,600.0	-1.3	-2.0	586,187.88	751,150.95	32° 36' 31.992 N	103° 31' 3.832 W	
1,700.0	0.34	235.30	1,700.0	-1.6	-2.5	586,187.64	751,150.45	32° 36' 31.990 N	103° 31' 3.837 W	
1,800.0	0.31	180.47	1,800.0	-2.0	-2.8	586,187.20	751,150.20	32° 36' 31.986 N	103° 31' 3.840 W	
1,900.0	0.32	147.13	1,900.0	-2.5	-2.6	586,186.70	751,150.35	32° 36' 31.981 N	103° 31' 3.839 W	
2,000.0	0.47	70.79	2,000.0	-2.6	-2.1	586,186.60	751,150.89	32° 36' 31.980 N	103° 31' 3.832 W	
2,100.0	0.79	60.82	2,100.0	-2.1	-1.1	586,187.07	751,151.88	32° 36' 31.984 N	103° 31' 3.821 W	
2,200.0	0.57	59.01	2,200.0	-1.5	-0.1	586,187.66	751,152.91	32° 36' 31.990 N	103° 31' 3.809 W	
2,300.0	0.59	57.30	2,300.0	-1.0	0.8	586,188.20	751,153.77	32° 36' 31.995 N	103° 31' 3.799 W	
2,400.0	0.71	83.50	2,400.0	-0.7	1.8	586,188.54	751,154.82	32° 36' 31.999 N	103° 31' 3.786 W	
2,500.0	0.83	56.11	2,500.0	-0.2	3.0	586,189.02	751,156.03	32° 36' 32.003 N	103° 31' 3.772 W	
2,600.0	0.65	75.96	2,599.9	0.4	4.2	586,189.56	751,157.19	32° 36' 32.008 N	103° 31' 3.759 W	
2,700.0	1.16	65.26	2,699.9	0.9	5.7	586,190.12	751,158.66	32° 36' 32.014 N	103° 31' 3.741 W	
2,800.0	1.33	62.66	2,799.9	1.9	7.6	586,191.08	751,160.61	32° 36' 32.023 N	103° 31' 3.718 W	
2,900.0	2.07	73.60	2,899.9	2.9	10.4	586,192.12	751,163.37	32° 36' 32.033 N	103° 31' 3.686 W	
3,000.0	2.22	73.27	2,999.8	4.0	14.0	586,193.19	751,166.96	32° 36' 32.044 N	103° 31' 3.644 W	
3,100.0	1.89	71.36	3,099.7	5.1	17.4	586,194.27	751,170.37	32° 36' 32.054 N	103° 31' 3.604 W	
3,200.0	1.63	73.56	3,199.7	6.0	20.3	586,195.20	751,173.30	32° 36' 32.063 N	103° 31' 3.570 W	
3,300.0	2.12	76.38	3,299.6	6.8	23.5	586,196.04	751,176.46	32° 36' 32.071 N	103° 31' 3.533 W	
3,400.0	1.60	73.82	3,399.6	7.7	26.6	586,196.86	751,179.60	32° 36' 32.079 N	103° 31' 3.496 W	
3,500.0	1.23	67.21	3,499.5	8.5	28.9	586,197.67	751,181.93	32° 36' 32.087 N	103° 31' 3.469 W	
3,600.0	0.92	53.31	3,599.5	9.4	30.6	586,198.56	751,183.56	32° 36' 32.096 N	103° 31' 3.449 W	
3,700.0	0.78	31.81	3,699.5	10.4	31.6	586,199.62	751,184.57	32° 36' 32.106 N	103° 31' 3.438 W	
3,800.0	0.98	30.38	3,799.5	11.7	32.4	586,200.94	751,185.36	32° 36' 32.119 N	103° 31' 3.428 W	
3,900.0	0.98	10.84	3,899.5	13.3	33.0	586,202.52	751,185.95	32° 36' 32.134 N	103° 31' 3.421 W	
4,000.0	0.74	5.40	3,999.5	14.8	33.2	586,204.00	751,186.17	32° 36' 32.149 N	103° 31' 3.418 W	
4,100.0	0.75	17.47	4,099.5	16.1	33.4	586,205.27	751,186.43	32° 36' 32.162 N	103° 31' 3.415 W	
4,200.0	1.00	0.75	4,199.5	17.6	33.6	586,206.76	751,186.64	32° 36' 32.176 N	103° 31' 3.413 W	
4,300.0	0.62	15.81	4,299.4	19.0	33.8	586,208.16	751,186.80	32° 36' 32.190 N	103° 31' 3.411 W	
4,400.0	0.88	335.26	4,399.4	20.2	33.6	586,209.37	751,186.62	32° 36' 32.202 N	103° 31' 3.413 W	
4,500.0	0.86	308.22	4,499.4	21.3	32.7	586,210.54	751,185.71	32° 36' 32.214 N	103° 31' 3.423 W	
4,600.0	1.21	323.61	4,599.4	22.6	31.5	586,211.85	751,184.50	32° 36' 32.227 N	103° 31' 3.437 W	
4,700.0	1.01	324.13	4,699.4	24.2	30.4	586,213.41	751,183.35	32° 36' 32.243 N	103° 31' 3.451 W	
4,800.0	1.21	327.89	4,799.4	25.8	29.3	586,215.02	751,182.28	32° 36' 32.259 N	103° 31' 3.463 W	
4,900.0	1.13	328.19	4,899.4	27.6	28.2	586,216.76	751,181.20	32° 36' 32.276 N	103° 31' 3.475 W	
5,000.0	1.23	327.02	4,999.3	29.3	27.1	586,218.49	751,180.09	32° 36' 32.293 N	103° 31' 3.488 W	
5,100.0	1.10	321.48	5,099.3	30.9	25.9	586,220.14	751,178.91	32° 36' 32.309 N	103° 31' 3.502 W	
5,200.0	0.94	333.98	5,199.3	32.4	25.0	586,221.63	751,177.95	32° 36' 32.324 N	103° 31' 3.513 W	
5,300.0	0.93	340.92	5,299.3	33.9	24.3	586,223.14	751,177.33	32° 36' 32.339 N	103° 31' 3.520 W	
5,400.0	1.16	349.23	5,399.3	35.7	23.9	586,224.90	751,176.87	32° 36' 32.357 N	103° 31' 3.525 W	
5,500.0	0.86	359.74	5,499.3	37.4	23.7	586,226.64	751,176.68	32° 36' 32.374 N	103° 31' 3.527 W	
5,600.0	0.63	350.08	5,599.2	38.7	23.6	586,227.94	751,176.58	32° 36' 32.387 N	103° 31' 3.528 W	
5,700.0	0.46	12.17	5,699.2	39.7	23.6	586,228.87	751,176.57	32° 36' 32.396 N	103° 31' 3.528 W	
5,800.0	0.36	51.74	5,799.2	40.3	23.9	586,229.46	751,176.90	32° 36' 32.402 N	103° 31' 3.525 W	
5,900.0	0.23	90.06	5,899.2	40.4	24.4	586,229.65	751,177.35	32° 36' 32.404 N	103° 31' 3.519 W	
6,000.0	0.30	32.08	5,999.2	40.7	24.7	586,229.87	751,177.69	32° 36' 32.406 N	103° 31' 3.515 W	
6,100.0	0.31	186.31	6,099.2	40.6	24.8	586,229.82	751,177.80	32° 36' 32.405 N	103° 31' 3.514 W	
6,200.0	0.06	327.19	6,199.2	40.4	24.7	586,229.60	751,177.74	32° 36' 32.403 N	103° 31' 3.515 W	
6,300.0	0.31	172.37	6,299.2	40.2	24.8	586,229.38	751,177.75	32° 36' 32.401 N	103° 31' 3.515 W	
6,400.0	0.18	242.91	6,399.2	39.8	24.6	586,229.04	751,177.64	32° 36' 32.398 N	103° 31' 3.516 W	
6,500.0	0.40	229.13	6,499.2	39.5	24.2	586,228.74	751,177.24	32° 36' 32.395 N	103° 31' 3.521 W	



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Well:	#3H	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
6,600.0	0.44	233.33	6,599.2	39.1	23.7	586,228.28	751,176.67	32° 36' 32.390 N	103° 31' 3.527 W
6,700.0	0.55	220.86	6,699.2	38.5	23.0	586,227.69	751,176.05	32° 36' 32.384 N	103° 31' 3.535 W
6,800.0	0.92	260.69	6,799.2	38.0	21.9	586,227.19	751,174.94	32° 36' 32.379 N	103° 31' 3.548 W
6,900.0	1.33	258.03	6,899.2	37.6	20.0	586,226.82	751,173.01	32° 36' 32.376 N	103° 31' 3.570 W
7,000.0	1.24	256.66	6,999.2	37.1	17.8	586,226.33	751,170.82	32° 36' 32.371 N	103° 31' 3.596 W
7,100.0	0.82	247.31	7,099.2	36.6	16.1	586,225.81	751,169.11	32° 36' 32.366 N	103° 31' 3.616 W
7,200.0	1.13	270.58	7,199.1	36.3	14.5	586,225.54	751,167.47	32° 36' 32.364 N	103° 31' 3.635 W
7,300.0	0.78	275.30	7,299.1	36.4	12.8	586,225.61	751,165.80	32° 36' 32.365 N	103° 31' 3.655 W
7,400.0	1.05	239.47	7,399.1	36.0	11.3	586,225.21	751,164.33	32° 36' 32.361 N	103° 31' 3.672 W
7,500.0	0.38	323.51	7,499.1	35.8	10.4	586,225.01	751,163.35	32° 36' 32.359 N	103° 31' 3.683 W
7,600.0	0.18	127.63	7,599.1	36.0	10.3	586,225.18	751,163.28	32° 36' 32.360 N	103° 31' 3.684 W
7,700.0	0.41	339.60	7,699.1	36.2	10.3	586,225.42	751,163.28	32° 36' 32.363 N	103° 31' 3.684 W
7,800.0	0.30	58.27	7,799.1	36.7	10.4	586,225.90	751,163.37	32° 36' 32.368 N	103° 31' 3.683 W
7,900.0	0.37	357.84	7,899.1	37.2	10.6	586,226.36	751,163.58	32° 36' 32.372 N	103° 31' 3.680 W
8,000.0	0.24	254.93	7,999.1	37.4	10.4	586,226.62	751,163.37	32° 36' 32.375 N	103° 31' 3.683 W
8,100.0	0.49	166.35	8,099.1	37.0	10.3	586,226.15	751,163.27	32° 36' 32.370 N	103° 31' 3.684 W
8,200.0	0.44	231.31	8,199.1	36.3	10.1	586,225.50	751,163.07	32° 36' 32.364 N	103° 31' 3.687 W
8,300.0	0.80	261.07	8,299.1	35.9	9.1	586,225.15	751,162.08	32° 36' 32.360 N	103° 31' 3.698 W
8,400.0	0.85	286.27	8,399.1	36.0	7.7	586,225.25	751,160.68	32° 36' 32.361 N	103° 31' 3.715 W
8,500.0	0.88	263.02	8,499.1	36.2	6.2	586,225.36	751,159.20	32° 36' 32.363 N	103° 31' 3.732 W
8,600.0	0.99	323.05	8,599.1	36.8	4.9	586,225.96	751,157.92	32° 36' 32.369 N	103° 31' 3.747 W
8,700.0	1.00	358.23	8,699.0	38.3	4.4	586,227.52	751,157.38	32° 36' 32.384 N	103° 31' 3.753 W
8,800.0	0.84	37.61	8,799.0	39.8	4.8	586,228.98	751,157.80	32° 36' 32.398 N	103° 31' 3.748 W
8,900.0	1.12	30.70	8,899.0	41.2	5.7	586,230.40	751,158.74	32° 36' 32.412 N	103° 31' 3.737 W
9,000.0	1.38	24.57	8,999.0	43.1	6.7	586,232.33	751,159.74	32° 36' 32.431 N	103° 31' 3.725 W
9,100.0	1.02	40.68	9,099.0	44.9	7.8	586,234.10	751,160.82	32° 36' 32.449 N	103° 31' 3.712 W
9,200.0	0.96	11.96	9,199.0	46.4	8.6	586,235.60	751,161.58	32° 36' 32.464 N	103° 31' 3.703 W
9,300.0	1.39	39.05	9,298.9	48.2	9.5	586,237.36	751,162.51	32° 36' 32.481 N	103° 31' 3.692 W
9,400.0	0.61	60.97	9,398.9	49.4	10.7	586,238.56	751,163.74	32° 36' 32.493 N	103° 31' 3.678 W
9,500.0	0.83	38.97	9,498.9	50.2	11.7	586,239.38	751,164.67	32° 36' 32.501 N	103° 31' 3.667 W
9,600.0	1.14	85.19	9,598.9	50.8	13.1	586,240.03	751,166.11	32° 36' 32.507 N	103° 31' 3.650 W
9,700.0	0.81	87.48	9,698.9	50.9	14.8	586,240.14	751,167.81	32° 36' 32.508 N	103° 31' 3.630 W
9,800.0	0.88	35.99	9,798.9	51.6	16.0	586,240.79	751,168.97	32° 36' 32.515 N	103° 31' 3.616 W
9,900.0	0.83	71.52	9,898.9	52.4	17.1	586,241.65	751,170.11	32° 36' 32.523 N	103° 31' 3.603 W
10,000.0	0.83	11.23	9,998.9	53.4	17.9	586,242.59	751,170.93	32° 36' 32.532 N	103° 31' 3.593 W
10,100.0	1.44	18.90	10,098.8	55.3	18.5	586,244.48	751,171.48	32° 36' 32.551 N	103° 31' 3.587 W
10,200.0	1.66	26.64	10,198.8	57.8	19.5	586,246.97	751,172.54	32° 36' 32.575 N	103° 31' 3.574 W
10,290.0	1.10	32.50	10,288.8	59.7	20.6	586,248.86	751,173.59	32° 36' 32.594 N	103° 31' 3.562 W
10,321.0	1.30	29.80	10,319.8	60.2	20.9	586,249.42	751,173.92	32° 36' 32.599 N	103° 31' 3.558 W
10,353.0	2.20	87.20	10,351.8	60.6	21.7	586,249.76	751,174.72	32° 36' 32.603 N	103° 31' 3.548 W
10,385.0	5.40	121.00	10,383.7	59.8	23.6	586,249.02	751,176.62	32° 36' 32.595 N	103° 31' 3.526 W
10,416.0	9.10	129.00	10,414.4	57.5	26.8	586,246.72	751,179.78	32° 36' 32.572 N	103° 31' 3.489 W
10,447.0	12.50	128.30	10,444.9	53.9	31.3	586,243.10	751,184.32	32° 36' 32.536 N	103° 31' 3.437 W
10,479.0	15.70	126.70	10,475.9	49.2	37.5	586,238.36	751,190.51	32° 36' 32.489 N	103° 31' 3.365 W
10,511.0	18.50	126.50	10,506.5	43.6	45.1	586,232.76	751,198.06	32° 36' 32.433 N	103° 31' 3.277 W
10,542.0	21.00	127.20	10,535.7	37.3	53.4	586,226.47	751,206.44	32° 36' 32.370 N	103° 31' 3.179 W
10,574.0	22.80	133.60	10,565.4	29.5	62.5	586,218.73	751,215.50	32° 36' 32.293 N	103° 31' 3.074 W
10,606.0	24.70	135.00	10,594.7	20.5	71.7	586,209.72	751,224.72	32° 36' 32.203 N	103° 31' 2.967 W
10,637.0	26.50	133.70	10,622.6	11.2	81.3	586,200.36	751,234.30	32° 36' 32.110 N	103° 31' 2.856 W
10,669.0	29.70	134.80	10,650.8	0.6	92.1	586,189.84	751,245.09	32° 36' 32.005 N	103° 31' 2.731 W
10,701.0	33.60	135.30	10,678.1	-11.2	103.9	586,177.96	751,256.95	32° 36' 31.886 N	103° 31' 2.593 W
10,732.0	37.70	136.50	10,703.3	-24.2	116.5	586,164.98	751,269.51	32° 36' 31.757 N	103° 31' 2.448 W
10,764.0	41.70	137.70	10,727.9	-39.2	130.4	586,150.00	751,283.41	32° 36' 31.607 N	103° 31' 2.287 W
10,796.0	45.80	138.40	10,751.0	-55.7	145.2	586,133.55	751,298.20	32° 36' 31.444 N	103° 31' 2.115 W
10,828.0	49.70	138.30	10,772.5	-73.4	160.9	586,115.85	751,313.94	32° 36' 31.267 N	103° 31' 1.933 W



TDS
Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3H
Project:	Lea County, NM	TVD Reference:	KB @ 3712.4usft
Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3712.4usft
Well:	#3H	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
10,859.0	53.50	139.00	10,791.7	-91.6	177.0	586,097.61	751,329.98	32° 36' 31.086 N	103° 31' 1.747 W
10,891.0	57.80	139.20	10,809.8	-111.6	194.3	586,077.65	751,347.28	32° 36' 30.887 N	103° 31' 1.547 W
10,923.0	62.50	139.50	10,825.7	-132.6	212.4	586,056.60	751,365.35	32° 36' 30.677 N	103° 31' 1.337 W
10,955.0	67.20	139.30	10,839.3	-154.6	231.2	586,034.61	751,384.20	32° 36' 30.458 N	103° 31' 1.119 W
10,986.0	70.70	139.50	10,850.4	-176.6	250.0	586,012.65	751,403.02	32° 36' 30.239 N	103° 31' 0.901 W
11,018.0	73.50	139.90	10,860.3	-199.8	269.7	585,989.42	751,422.71	32° 36' 30.008 N	103° 31' 0.673 W
11,050.0	74.10	140.10	10,869.2	-223.3	289.5	585,965.88	751,442.46	32° 36' 29.774 N	103° 31' 0.444 W
11,082.0	75.00	141.40	10,877.7	-247.2	309.0	585,942.00	751,461.98	32° 36' 29.536 N	103° 31' 0.218 W
11,113.0	78.10	142.30	10,884.9	-270.9	327.6	585,918.29	751,480.60	32° 36' 29.300 N	103° 31' 0.002 W
11,145.0	81.00	143.00	10,890.7	-295.9	346.7	585,893.28	751,499.69	32° 36' 29.051 N	103° 30' 59.781 W
11,176.0	85.20	144.70	10,894.5	-320.8	364.8	585,868.43	751,517.84	32° 36' 28.804 N	103° 30' 59.571 W
11,208.0	88.60	147.30	10,896.2	-347.3	382.7	585,841.95	751,535.70	32° 36' 28.540 N	103° 30' 59.365 W
11,240.0	90.10	147.70	10,896.6	-374.2	399.9	585,814.96	751,552.89	32° 36' 28.272 N	103° 30' 59.167 W
11,271.0	91.40	148.30	10,896.2	-400.5	416.3	585,788.68	751,569.32	32° 36' 28.010 N	103° 30' 58.977 W
11,303.0	90.30	150.50	10,895.7	-428.1	432.6	585,761.14	751,585.60	32° 36' 27.737 N	103° 30' 58.789 W
11,334.0	90.50	150.80	10,895.5	-455.1	447.8	585,734.12	751,600.80	32° 36' 27.468 N	103° 30' 58.614 W
11,398.0	90.90	152.90	10,894.7	-511.5	478.0	585,677.69	751,630.99	32° 36' 26.908 N	103° 30' 58.266 W
11,493.0	90.50	154.00	10,893.5	-596.5	520.4	585,592.72	751,673.45	32° 36' 26.064 N	103° 30' 57.777 W
11,588.0	88.80	154.70	10,894.1	-682.1	561.6	585,507.09	751,714.57	32° 36' 25.213 N	103° 30' 57.304 W
11,683.0	88.40	156.10	10,896.4	-768.5	601.1	585,420.74	751,754.10	32° 36' 24.356 N	103° 30' 56.850 W
11,777.0	89.20	157.90	10,898.4	-855.0	637.8	585,334.23	751,790.82	32° 36' 23.497 N	103° 30' 56.428 W
11,870.0	89.20	160.50	10,899.7	-941.9	670.8	585,247.31	751,823.84	32° 36' 22.634 N	103° 30' 56.050 W
11,963.0	88.40	164.10	10,901.6	-1,030.5	699.1	585,158.75	751,852.10	32° 36' 21.756 N	103° 30' 55.728 W
12,057.0	88.30	167.70	10,904.3	-1,121.6	722.0	585,067.63	751,874.99	32° 36' 20.853 N	103° 30' 55.468 W
12,152.0	88.50	172.60	10,907.0	-1,215.1	738.2	584,974.10	751,891.23	32° 36' 19.926 N	103° 30' 55.287 W
12,246.0	88.30	177.00	10,909.6	-1,308.7	746.7	584,880.55	751,899.74	32° 36' 19.000 N	103° 30' 55.196 W
12,373.0	88.40	180.30	10,913.3	-1,435.6	749.7	584,753.65	751,902.73	32° 36' 17.744 N	103° 30' 55.172 W
12,468.0	89.00	181.00	10,915.4	-1,530.5	748.7	584,658.68	751,901.66	32° 36' 16.804 N	103° 30' 55.194 W
12,562.0	90.10	180.00	10,916.2	-1,624.5	747.8	584,564.69	751,900.84	32° 36' 15.874 N	103° 30' 55.212 W
12,657.0	91.30	179.30	10,915.0	-1,719.5	748.4	584,469.70	751,901.42	32° 36' 14.934 N	103° 30' 55.213 W
12,752.0	90.80	180.30	10,913.3	-1,814.5	748.8	584,374.72	751,901.75	32° 36' 13.994 N	103° 30' 55.218 W
12,847.0	91.90	180.00	10,911.0	-1,909.5	748.5	584,279.75	751,901.50	32° 36' 13.055 N	103° 30' 55.229 W
12,941.0	90.60	180.20	10,909.0	-2,003.4	748.3	584,185.77	751,901.33	32° 36' 12.125 N	103° 30' 55.240 W
13,035.0	89.40	180.80	10,909.0	-2,097.4	747.5	584,091.78	751,900.51	32° 36' 11.195 N	103° 30' 55.258 W
13,130.0	90.60	180.20	10,909.0	-2,192.4	746.7	583,996.79	751,899.69	32° 36' 10.255 N	103° 30' 55.276 W
13,226.0	90.10	180.70	10,908.4	-2,288.4	745.9	583,900.79	751,898.93	32° 36' 9.305 N	103° 30' 55.294 W
13,321.0	89.80	181.50	10,908.5	-2,383.4	744.1	583,805.81	751,897.11	32° 36' 8.366 N	103° 30' 55.323 W
13,416.0	89.20	181.70	10,909.3	-2,478.4	741.5	583,710.85	751,894.46	32° 36' 7.426 N	103° 30' 55.363 W
13,511.0	88.40	181.90	10,911.3	-2,573.3	738.5	583,615.92	751,891.47	32° 36' 6.487 N	103° 30' 55.406 W
13,607.0	86.30	180.70	10,915.7	-2,669.2	736.3	583,520.05	751,889.30	32° 36' 5.539 N	103° 30' 55.440 W
13,702.0	87.00	180.00	10,921.3	-2,764.0	735.7	583,425.22	751,888.72	32° 36' 4.600 N	103° 30' 55.456 W
13,796.0	87.40	179.30	10,925.9	-2,857.9	736.3	583,331.33	751,889.29	32° 36' 3.671 N	103° 30' 55.457 W
13,892.0	88.10	178.80	10,929.7	-2,953.8	737.9	583,235.42	751,890.88	32° 36' 2.722 N	103° 30' 55.447 W
13,987.0	88.60	178.10	10,932.4	-3,048.7	740.5	583,140.50	751,893.45	32° 36' 1.783 N	103° 30' 55.426 W
14,082.0	89.40	177.50	10,934.0	-3,143.6	744.1	583,045.58	751,897.10	32° 36' 0.843 N	103° 30' 55.392 W
14,177.0	90.00	176.70	10,934.5	-3,238.5	748.9	582,950.71	751,901.90	32° 35' 59.904 N	103° 30' 55.344 W
14,272.0	90.70	176.20	10,934.0	-3,333.3	754.8	582,855.89	751,907.78	32° 35' 58.966 N	103° 30' 55.284 W
14,367.0	90.30	176.40	10,933.1	-3,428.1	760.9	582,761.09	751,913.91	32° 35' 58.027 N	103° 30' 55.221 W
14,462.0	89.90	177.80	10,933.0	-3,523.0	765.7	582,666.22	751,918.72	32° 35' 57.088 N	103° 30' 55.173 W
14,557.0	89.10	178.00	10,933.8	-3,617.9	769.2	582,571.29	751,922.20	32° 35' 56.148 N	103° 30' 55.141 W
14,653.0	88.40	178.30	10,935.9	-3,713.8	772.3	582,475.36	751,925.30	32° 35' 55.199 N	103° 30' 55.113 W
14,747.0	88.30	179.10	10,938.6	-3,807.8	774.4	582,381.42	751,927.43	32° 35' 54.269 N	103° 30' 55.097 W
14,842.0	87.90	180.00	10,941.8	-3,902.7	775.2	582,286.48	751,928.18	32° 35' 53.330 N	103° 30' 55.097 W
14,969.0	88.30	181.40	10,946.0	-4,029.6	773.6	582,159.56	751,926.63	32° 35' 52.074 N	103° 30' 55.126 W
15,063.0	89.80	181.20	10,947.5	-4,123.6	771.5	582,065.60	751,924.49	32° 35' 51.145 N	103° 30' 55.160 W



TDS
Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #3H
Project:	Lea County, NM	TVD Reference:	KB @ 3712.4usft
Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3712.4usft
Well:	#3H	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
15,158.0	91.30	180.90	10,946.6	-4,218.6	769.8	581,970.62	751,922.75	32° 35' 50.205 N	103° 30' 55.189 W
15,253.0	93.00	181.00	10,943.0	-4,313.5	768.2	581,875.71	751,921.18	32° 35' 49.266 N	103° 30' 55.216 W
15,348.0	93.60	181.00	10,937.6	-4,408.3	766.5	581,780.88	751,919.52	32° 35' 48.328 N	103° 30' 55.243 W
15,411.0	94.30	180.90	10,933.2	-4,471.2	765.5	581,718.04	751,918.48	32° 35' 47.706 N	103° 30' 55.261 W
15,474.0	95.40	180.70	10,927.9	-4,533.9	764.6	581,655.27	751,917.61	32° 35' 47.085 N	103° 30' 55.277 W
15,506.0	96.00	180.50	10,924.7	-4,565.8	764.3	581,623.43	751,917.27	32° 35' 46.770 N	103° 30' 55.284 W
Final MWD Survey									
15,559.0	96.00	180.00	10,919.2	-4,618.5	764.0	581,570.72	751,917.04	32° 35' 46.248 N	103° 30' 55.291 W
Projection to Bit/TD									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
15,506.0	10,924.7	-4,565.8	764.3	Final MWD Survey
15,559.0	10,919.2	-4,618.5	764.0	Projection to Bit/TD

Checked By: _____ Approved By: _____ Date: _____