

**McVAY DRILLING COMPANY**

P.O. Box 2450
Hobbs, New Mexico 88241
(575) 397-3311
FAX: 39-DRILL

30-025-42295

Well Name and Num: Black Pearl 1 Federal # 4H
Location: Sec 1, T2OS, R34E
Operator: COG
Drilling Contractor: McVay Drilling Company

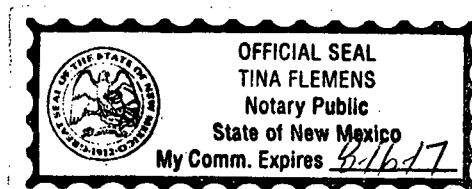
The undersigned certifies that he is an authorized representative of the drilling contractor who drilled the above described well and that he has conducted deviation tests and obtained the following results:

<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>	<u>Degrees @</u>	<u>Depth</u>
0.10	864	2.90	6557	85.50	11171		
0.30	583	3.20	6935	89.20	11611		
0.10	736	2.90	7313	88.40	12110		
0.30	1179	2.90	7502	89.00	12462		
0.50	1559	3.40	7880	88.50	12840		
1.30	1870	2.90	8257	90.20	13312		
0.50	2201	2.50	8541	88.60	14377		
0.10	2578	2.30	9013	90.10	14761		
0.10	2767	1.20	9198	89.70	15015		
0.40	3144	0.90	9480	88.40	15269		
0.40	3430	0.70	9669	87.80	15362		
0.50	3723	1.50	10142	88.30	15479		
1.30	4103	0.70	10331				
1.50	4857	11.20	10514				
1.50	5235	22.30	10608				
1.20	5613	45.50	10797				
2.20	6110	60.40	10923				

By: M. A. Camacho

Subscribed and sworn to before me this 15th day of July, 2015

Tina Flemens
Notary Public, Lea County, New Mexico



SEP 16 2015

hm



July 2, 2015

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

Attn: Kanicia Castillo

RE: **Black Pearl 1 Federal 4H**

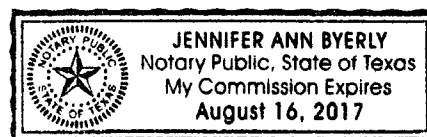
Please find enclosed a copy of the survey from 0' to 10,200' ran on the above referenced well.

Sincerely, 
Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 2 day of July,
A.D., 2015, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas





Company: Concho
Lease/Well: Black Pearl 1 Federal/4H

Rig Name: McVay 6
State/County: New Mexico/Lea

VS-Azi: 184.13 Degrees
Latitude: 32.60889, Longitude: -103.51805
Grid Convergence Applied = -0.44 degs (NAD 27)
Grid North = True North -0.44 degs



Depth Reference : RKB = 18 feet

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: gyro survey.ut
Minimum Curvature Method
Report Date/Time: 7/2/2015 / 13:59

VES Survey International
Midland, Texas
432-563-5444
Surveyor: Adam Askew
Black Pearl 1 Federal 4H / API 30-025-42295

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	****
100.00	0.62	278.30	100.00	0.08	-0.53	-0.04	0.54	278.30	0.62
200.00	0.29	279.71	199.99	0.20	-1.31	-0.10	1.33	278.57	0.33
300.00	0.60	281.53	299.99	0.34	-2.07	-0.19	2.10	279.44	0.31
400.00	0.56	257.51	399.99	0.34	-3.06	-0.12	3.08	276.41	0.24
500.00	0.56	292.41	499.98	0.42	-3.98	-0.13	4.01	276.06	0.33
600.00	0.29	243.82	599.98	0.49	-4.66	-0.16	4.69	276.06	0.42
700.00	0.11	208.73	699.98	0.30	-4.94	0.06	4.95	273.44	0.21
800.00	0.24	269.54	799.98	0.21	-5.19	0.16	5.19	272.31	0.21
900.00	0.28	213.34	899.98	0.00	-5.53	0.40	5.53	270.01	0.25
1000.00	0.45	243.51	999.98	-0.38	-6.02	0.81	6.03	266.38	0.25
1100.00	0.28	202.52	1099.97	-0.78	-6.46	1.24	6.51	263.12	0.30
1200.00	0.23	255.56	1199.97	-1.05	-6.75	1.54	6.84	261.12	0.23
1300.00	0.13	198.78	1299.97	-1.21	-6.99	1.71	7.09	260.18	0.20
1400.00	0.42	205.47	1399.97	-1.65	-7.18	2.16	7.37	257.09	0.30
1500.00	0.53	256.24	1499.97	-2.09	-7.78	2.64	8.06	254.99	0.42
1600.00	0.44	236.80	1599.96	-2.41	-8.55	3.02	8.88	254.28	0.18

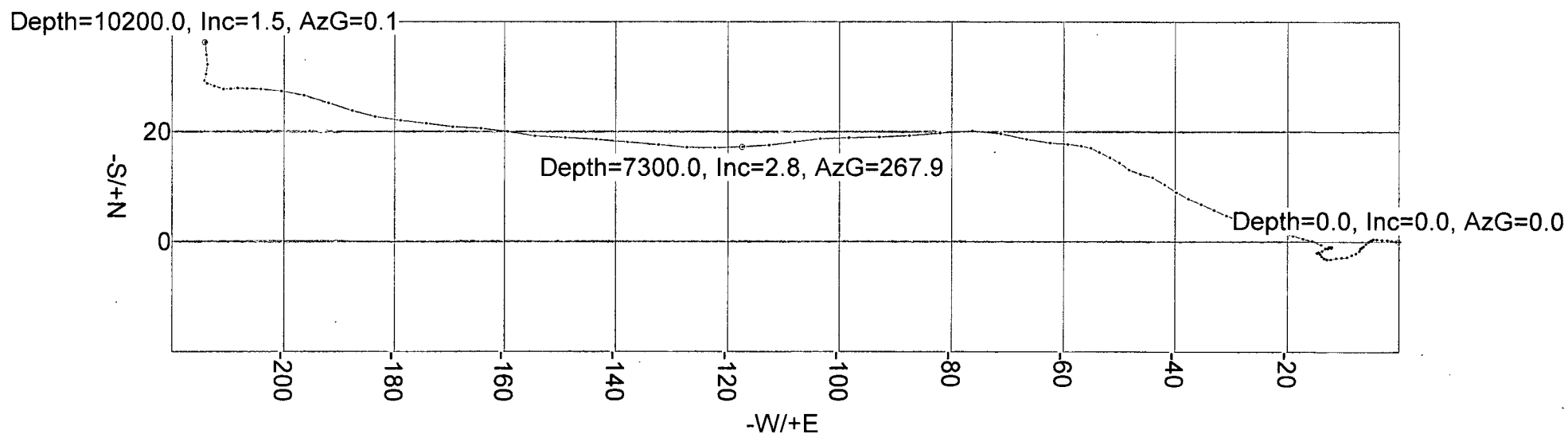
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
1700.00	0.62	250.63	1699.96	-2.80	-9.38	3.46	9.79	253.41	0.22
1800.00	0.56	282.78	1799.96	-2.87	-10.36	3.61	10.75	254.54	0.33
1900.00	0.59	247.54	1899.95	-2.95	-11.32	3.76	11.70	255.37	0.35
2000.00	0.56	267.85	1999.95	-3.17	-12.28	4.05	12.68	255.53	0.20
2100.00	0.24	278.87	2099.94	-3.15	-12.97	4.08	13.35	256.33	0.32
2200.00	0.36	298.17	2199.94	-2.97	-13.46	3.94	13.79	257.54	0.15
2300.00	0.34	317.82	2299.94	-2.61	-13.93	3.61	14.17	259.39	0.12
2400.00	0.24	343.10	2399.94	-2.19	-14.19	3.20	14.36	261.24	0.16
2500.00	0.17	298.30	2499.94	-1.91	-14.38	2.95	14.51	262.42	0.17
2600.00	0.03	140.29	2599.94	-1.87	-14.49	2.91	14.61	262.66	0.20
2700.00	0.20	264.24	2699.94	-1.91	-14.65	2.96	14.77	262.58	0.22
2800.00	0.07	146.14	2799.94	-1.97	-14.78	3.03	14.91	262.39	0.24
2900.00	0.08	86.75	2899.94	-2.02	-14.68	3.07	14.81	262.16	0.08
3000.00	0.28	70.02	2999.94	-1.93	-14.37	2.96	14.50	262.34	0.20
3100.00	0.47	54.77	3099.94	-1.61	-13.81	2.60	13.90	263.34	0.21
3200.00	0.36	53.29	3199.93	-1.19	-13.22	2.14	13.27	264.87	0.11
3300.00	0.36	79.58	3299.93	-0.94	-12.66	1.85	12.70	265.74	0.16
3400.00	0.08	105.61	3399.93	-0.91	-12.29	1.79	12.32	265.78	0.29
3500.00	0.03	203.31	3499.93	-0.95	-12.23	1.83	12.26	265.56	0.09
3600.00	0.21	63.34	3599.93	-0.89	-12.08	1.76	12.11	265.78	0.23
3700.00	0.45	219.03	3699.93	-1.11	-12.16	1.99	12.21	264.77	0.64
3800.00	0.51	301.86	3799.93	-1.18	-12.78	2.10	12.84	264.72	0.63
3900.00	1.08	297.36	3899.92	-0.51	-13.99	1.52	14.00	267.90	0.57
4000.00	0.91	283.48	3999.90	0.10	-15.60	1.02	15.60	270.38	0.29
4100.00	1.09	288.11	4099.89	0.58	-17.28	0.66	17.29	271.94	0.20
4200.00	1.02	282.77	4199.87	1.08	-19.05	0.30	19.08	273.24	0.12
4300.00	1.09	282.80	4299.85	1.48	-20.84	0.02	20.90	274.07	0.07
4400.00	1.40	289.47	4399.83	2.10	-22.92	-0.45	23.02	275.24	0.34
4500.00	1.87	287.16	4499.79	2.99	-25.63	-1.14	25.80	276.65	0.47
4600.00	1.57	287.71	4599.74	3.89	-28.49	-1.82	28.76	277.77	0.30
4700.00	1.29	292.11	4699.71	4.73	-30.84	-2.49	31.21	278.72	0.30
4800.00	1.49	296.60	4799.68	5.73	-33.05	-3.34	33.54	279.84	0.22
4900.00	1.42	293.91	4899.65	6.82	-35.34	-4.25	35.99	280.92	0.09
5000.00	1.46	294.12	4999.62	7.84	-37.64	-5.11	38.44	281.76	0.03
5100.00	1.37	302.75	5099.59	9.00	-39.80	-6.11	40.81	282.75	0.23
5200.00	1.50	303.94	5199.56	10.39	-41.90	-7.34	43.16	283.92	0.14
5300.00	1.40	298.02	5299.52	11.69	-44.07	-8.49	45.59	284.86	0.18
5400.00	1.27	271.91	5399.50	12.31	-46.26	-8.94	47.87	284.90	0.62
5500.00	1.36	307.07	5499.47	13.06	-48.32	-9.54	50.05	285.12	0.80

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
5600.00	1.08	307.21	5599.45	14.34	-50.01	-10.71	52.03	286.00	0.28
5700.00	1.21	291.83	5699.43	15.31	-51.75	-11.54	53.96	286.48	0.33
5800.00	1.20	301.20	5799.41	16.24	-53.62	-12.34	56.03	286.85	0.20
5900.00	0.75	288.12	5899.39	16.99	-55.14	-12.97	57.70	287.12	0.50
6000.00	1.27	281.00	5999.38	17.41	-56.85	-13.27	59.46	287.02	0.53
6100.00	1.55	274.94	6099.35	17.73	-59.28	-13.42	61.88	286.65	0.32
6200.00	2.15	274.12	6199.30	17.98	-62.50	-13.44	65.04	286.05	0.60
6300.00	2.74	281.85	6299.20	18.61	-66.71	-13.76	69.25	285.59	0.67
6400.00	2.64	283.13	6399.09	19.62	-71.29	-14.44	73.94	285.39	0.11
6500.00	3.28	269.92	6498.96	20.14	-76.40	-14.59	79.01	284.77	0.93
6600.00	3.27	261.78	6598.80	19.73	-82.09	-13.77	84.42	283.52	0.47
6700.00	3.03	269.04	6698.65	19.28	-87.55	-12.92	89.65	282.42	0.47
6800.00	3.13	265.44	6798.50	19.02	-92.91	-12.28	94.84	281.57	0.22
6900.00	3.08	271.33	6898.36	18.86	-98.32	-11.73	100.11	280.86	0.32
7000.00	2.81	264.65	6998.22	18.70	-103.44	-11.20	105.11	280.25	0.44
7100.00	2.57	261.11	7098.11	18.12	-108.09	-10.29	109.60	279.52	0.29
7200.00	2.70	264.35	7198.01	17.54	-112.64	-9.39	114.00	278.85	0.20
7300.00	2.78	267.87	7297.90	17.22	-117.40	-8.72	118.66	278.35	0.19
7400.00	2.96	268.41	7397.77	17.06	-122.41	-8.20	123.59	277.93	0.18
7500.00	2.68	273.77	7497.65	17.14	-127.32	-7.93	128.47	277.67	0.38
7600.00	3.18	276.46	7597.52	17.61	-132.41	-8.03	133.58	277.58	0.51
7700.00	3.18	273.32	7697.36	18.08	-137.94	-8.10	139.12	277.47	0.17
7800.00	3.20	277.44	7797.21	18.61	-143.48	-8.22	144.68	277.39	0.23
7900.00	3.20	268.73	7897.05	18.91	-149.04	-8.12	150.24	277.23	0.49
8000.00	3.08	277.47	7996.90	19.19	-154.50	-8.02	155.68	277.08	0.49
8100.00	2.66	281.08	8096.78	19.99	-159.43	-8.45	160.68	277.15	0.46
8200.00	3.01	272.78	8196.66	20.56	-164.32	-8.67	165.60	277.13	0.54
8300.00	2.87	273.94	8296.53	20.86	-169.44	-8.60	170.72	277.02	0.15
8400.00	2.73	280.43	8396.41	21.46	-174.28	-8.85	175.59	277.02	0.34
8500.00	2.67	272.65	8496.30	22.00	-178.94	-9.06	180.29	277.01	0.37
8600.00	2.69	284.52	8596.19	22.70	-183.54	-9.42	184.93	277.05	0.55
8700.00	2.23	284.80	8696.09	23.78	-187.69	-10.20	189.19	277.22	0.45
8800.00	2.94	290.89	8795.99	25.19	-191.97	-11.30	193.62	277.48	0.76
8900.00	2.40	283.43	8895.88	26.59	-196.40	-12.38	198.19	277.71	0.64
9000.00	2.36	277.09	8995.80	27.33	-200.47	-12.83	202.33	277.76	0.27
9100.00	1.84	275.35	9095.73	27.74	-204.11	-12.97	205.99	277.74	0.52
9200.00	1.04	266.87	9195.70	27.84	-206.62	-12.89	208.48	277.67	0.82
9300.00	0.92	280.05	9295.68	27.93	-208.32	-12.85	210.18	277.64	0.25
9400.00	0.59	237.67	9395.68	27.79	-209.54	-12.63	211.38	277.56	0.63

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/-S FT	+E/-W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
9500.00	1.00	286.66	9495.67	27.77	-210.82	-12.51	212.64	277.50	0.76
9600.00	0.97	288.53	9595.65	28.28	-212.46	-12.91	214.33	277.58	0.05
9700.00	0.63	291.10	9695.64	28.75	-213.77	-13.28	215.70	277.66	0.34
9800.00	0.36	11.14	9795.64	29.26	-214.23	-13.75	216.21	277.78	0.67
9900.00	1.05	14.91	9895.63	30.45	-213.93	-14.97	216.09	278.10	0.69
10000.00	0.96	0.59	9995.62	32.18	-213.68	-16.70	216.09	278.56	0.27
10100.00	1.12	349.53	10095.60	33.98	-213.85	-18.49	216.54	279.03	0.26
10200.00	1.53	0.10	10195.57	36.28	-214.03	-20.77	217.08	279.62	0.48



VES Survey International
Midland, Texas
432-563-5444
Surveyor: Adam Askew
Black Pearl 1 Federal 4H / API 30-025-42295



VES Survey Date: 6/30/2015



COG Operating LLC

Lea County, NM

Black Pearl 1 Federal

#4H

OH

Design: OH

Survey Report - Geographic

09 July, 2015





TDS
Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
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	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	#4H		
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' 32.002 N
		Longitude:	103° 31' 4.978 W
		Ground Level:	3,695.7 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	5/25/2015	7.10	60.45	48,456

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	184.13	

Survey Program	Date 7/9/2015				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	10,200.0	Gyro #3 (OH)	NS-GYRO-SS	NS Gyro single shots	
10,237.0	15,535.0	MWD #4 (OH)	MWD	MWD - Standard	

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	586,188.10	751,052.90	32° 36' 32.002 N	103° 31' 4.978 W
100.0	0.62	278.30	100.0	0.1	-0.5	586,188.18	751,052.36	32° 36' 32.003 N	103° 31' 4.984 W
200.0	0.29	279.71	200.0	0.2	-1.3	586,188.30	751,051.58	32° 36' 32.004 N	103° 31' 4.993 W
300.0	0.60	281.53	300.0	0.3	-2.1	586,188.45	751,050.81	32° 36' 32.006 N	103° 31' 5.002 W
400.0	0.56	257.51	400.0	0.3	-3.1	586,188.45	751,049.82	32° 36' 32.006 N	103° 31' 5.014 W
500.0	0.56	292.41	500.0	0.4	-4.0	586,188.53	751,048.90	32° 36' 32.006 N	103° 31' 5.025 W
600.0	0.29	243.82	600.0	0.5	-4.7	586,188.60	751,048.22	32° 36' 32.007 N	103° 31' 5.033 W
700.0	0.11	208.73	700.0	0.3	-5.0	586,188.41	751,047.94	32° 36' 32.005 N	103° 31' 5.036 W
800.0	0.24	269.54	800.0	0.2	-5.2	586,188.32	751,047.69	32° 36' 32.005 N	103° 31' 5.039 W
900.0	0.28	213.34	900.0	0.0	-5.6	586,188.12	751,047.34	32° 36' 32.003 N	103° 31' 5.043 W
1,000.0	0.45	243.51	1,000.0	-0.4	-6.0	586,187.74	751,046.86	32° 36' 31.999 N	103° 31' 5.048 W



TDS
Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
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
1,100.0	0.28	202.52	1,100.0	-0.8	-6.5	586,187.34	751,046.41	32° 36' 31.995 N	103° 31' 5.054 W
1,200.0	0.23	255.56	1,200.0	-1.0	-6.8	586,187.06	751,046.12	32° 36' 31.992 N	103° 31' 5.057 W
1,300.0	0.13	198.78	1,300.0	-1.2	-7.0	586,186.90	751,045.89	32° 36' 31.991 N	103° 31' 5.060 W
1,400.0	0.42	205.47	1,400.0	-1.6	-7.2	586,186.46	751,045.70	32° 36' 31.986 N	103° 31' 5.062 W
1,500.0	0.53	256.24	1,500.0	-2.1	-7.8	586,186.02	751,045.09	32° 36' 31.982 N	103° 31' 5.069 W
1,600.0	0.44	236.80	1,600.0	-2.4	-8.6	586,185.70	751,044.32	32° 36' 31.979 N	103° 31' 5.078 W
1,700.0	0.62	250.63	1,700.0	-2.8	-9.4	586,185.31	751,043.49	32° 36' 31.975 N	103° 31' 5.088 W
1,800.0	0.56	282.78	1,800.0	-2.9	-10.4	586,185.24	751,042.50	32° 36' 31.974 N	103° 31' 5.100 W
1,900.0	0.59	247.54	1,900.0	-2.9	-11.3	586,185.15	751,041.55	32° 36' 31.974 N	103° 31' 5.111 W
2,000.0	0.56	267.85	1,999.9	-3.2	-12.3	586,184.94	751,040.59	32° 36' 31.972 N	103° 31' 5.122 W
2,100.0	0.24	278.87	2,099.9	-3.2	-13.0	586,184.95	751,039.89	32° 36' 31.972 N	103° 31' 5.130 W
2,200.0	0.36	298.17	2,199.9	-3.0	-13.5	586,185.13	751,039.41	32° 36' 31.974 N	103° 31' 5.136 W
2,300.0	0.34	317.82	2,299.9	-2.6	-14.0	586,185.50	751,038.93	32° 36' 31.977 N	103° 31' 5.141 W
2,400.0	0.24	343.10	2,399.9	-2.2	-14.2	586,185.92	751,038.67	32° 36' 31.981 N	103° 31' 5.144 W
2,500.0	0.17	298.30	2,499.9	-1.9	-14.4	586,186.19	751,038.48	32° 36' 31.984 N	103° 31' 5.147 W
2,600.0	0.03	140.29	2,599.9	-1.9	-14.5	586,186.24	751,038.37	32° 36' 31.985 N	103° 31' 5.148 W
2,700.0	0.20	264.24	2,699.9	-1.9	-14.7	586,186.20	751,038.21	32° 36' 31.984 N	103° 31' 5.150 W
2,800.0	0.07	146.14	2,799.9	-2.0	-14.8	586,186.14	751,038.07	32° 36' 31.984 N	103° 31' 5.151 W
2,900.0	0.08	86.75	2,899.9	-2.0	-14.7	586,186.09	751,038.17	32° 36' 31.983 N	103° 31' 5.150 W
3,000.0	0.28	70.02	2,999.9	-1.9	-14.4	586,186.18	751,038.47	32° 36' 31.984 N	103° 31' 5.147 W
3,100.0	0.47	54.77	3,099.9	-1.6	-13.9	586,186.50	751,039.04	32° 36' 31.987 N	103° 31' 5.140 W
3,200.0	0.36	53.29	3,199.9	-1.2	-13.3	586,186.92	751,039.62	32° 36' 31.991 N	103° 31' 5.133 W
3,300.0	0.36	79.58	3,299.9	-0.9	-12.7	586,187.17	751,040.19	32° 36' 31.994 N	103° 31' 5.127 W
3,400.0	0.08	105.61	3,399.9	-0.9	-12.3	586,187.20	751,040.56	32° 36' 31.994 N	103° 31' 5.122 W
3,500.0	0.03	203.31	3,499.9	-0.9	-12.3	586,187.16	751,040.62	32° 36' 31.994 N	103° 31' 5.121 W
3,600.0	0.21	63.34	3,599.9	-0.9	-12.1	586,187.22	751,040.77	32° 36' 31.994 N	103° 31' 5.120 W
3,700.0	0.45	219.03	3,699.9	-1.1	-12.2	586,187.00	751,040.69	32° 36' 31.992 N	103° 31' 5.121 W
3,800.0	0.51	301.86	3,799.9	-1.2	-12.8	586,186.93	751,040.06	32° 36' 31.991 N	103° 31' 5.128 W
3,900.0	1.08	297.36	3,899.9	-0.5	-14.0	586,187.59	751,038.85	32° 36' 31.998 N	103° 31' 5.142 W
4,000.0	0.91	283.48	3,999.9	0.1	-15.7	586,188.21	751,037.24	32° 36' 32.004 N	103° 31' 5.161 W
4,100.0	1.09	288.11	4,099.9	0.6	-17.3	586,188.69	751,035.56	32° 36' 32.009 N	103° 31' 5.180 W
4,200.0	1.02	282.77	4,199.9	1.1	-19.1	586,189.19	751,033.79	32° 36' 32.014 N	103° 31' 5.201 W
4,300.0	1.09	282.80	4,299.9	1.5	-20.9	586,189.59	751,031.99	32° 36' 32.018 N	103° 31' 5.222 W
4,400.0	1.40	289.47	4,399.8	2.1	-23.0	586,190.21	751,029.92	32° 36' 32.025 N	103° 31' 5.246 W
4,500.0	1.87	287.16	4,499.8	3.0	-25.7	586,191.10	751,027.20	32° 36' 32.034 N	103° 31' 5.278 W
4,600.0	1.57	287.71	4,599.7	3.9	-28.6	586,192.00	751,024.34	32° 36' 32.043 N	103° 31' 5.311 W
4,700.0	1.29	292.11	4,699.7	4.7	-30.9	586,192.84	751,021.99	32° 36' 32.051 N	103° 31' 5.339 W
4,800.0	1.49	296.60	4,799.7	5.7	-33.1	586,193.84	751,019.79	32° 36' 32.061 N	103° 31' 5.364 W
4,900.0	1.42	293.91	4,899.6	6.8	-35.4	586,194.93	751,017.49	32° 36' 32.072 N	103° 31' 5.391 W
5,000.0	1.46	294.12	4,999.6	7.8	-37.7	586,195.95	751,015.20	32° 36' 32.082 N	103° 31' 5.418 W
5,100.0	1.37	302.75	5,099.6	9.0	-39.9	586,197.12	751,013.03	32° 36' 32.094 N	103° 31' 5.443 W
5,200.0	1.50	303.94	5,199.6	10.4	-42.0	586,198.50	751,010.94	32° 36' 32.108 N	103° 31' 5.467 W
5,300.0	1.40	298.02	5,299.5	11.7	-44.1	586,199.80	751,008.77	32° 36' 32.121 N	103° 31' 5.493 W
5,400.0	1.27	271.91	5,399.5	12.3	-46.3	586,200.41	751,006.59	32° 36' 32.127 N	103° 31' 5.518 W
5,500.0	1.36	307.07	5,499.5	13.1	-48.4	586,201.16	751,004.53	32° 36' 32.135 N	103° 31' 5.542 W
5,600.0	1.08	307.21	5,599.4	14.3	-50.1	586,202.45	751,002.84	32° 36' 32.148 N	103° 31' 5.562 W
5,700.0	1.21	291.83	5,699.4	15.3	-51.8	586,203.41	751,001.10	32° 36' 32.157 N	103° 31' 5.582 W
5,800.0	1.20	301.20	5,799.4	16.2	-53.7	586,204.35	750,999.23	32° 36' 32.167 N	103° 31' 5.604 W
5,900.0	0.75	288.12	5,899.4	17.0	-55.2	586,205.09	750,997.71	32° 36' 32.174 N	103° 31' 5.621 W
6,000.0	1.27	281.00	5,999.4	17.4	-56.9	586,205.51	750,996.00	32° 36' 32.178 N	103° 31' 5.641 W
6,100.0	1.55	274.94	6,099.3	17.7	-59.3	586,205.84	750,993.57	32° 36' 32.182 N	103° 31' 5.670 W
6,200.0	2.15	274.12	6,199.3	18.0	-62.5	586,206.09	750,990.35	32° 36' 32.185 N	103° 31' 5.707 W
6,300.0	2.74	281.85	6,299.2	18.6	-66.8	586,206.71	750,986.14	32° 36' 32.191 N	103° 31' 5.757 W
6,400.0	2.64	283.13	6,399.1	19.6	-71.3	586,207.73	750,981.56	32° 36' 32.202 N	103° 31' 5.810 W
6,500.0	3.28	269.92	6,499.0	20.1	-76.4	586,208.25	750,976.45	32° 36' 32.207 N	103° 31' 5.870 W



TDS
Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
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
6,600.0	3.27	261.78	6,598.8	19.7	-82.1	586,207.83	750,970.77	32° 36' 32.203 N	103° 31' 5.936 W
6,700.0	3.03	269.04	6,698.6	19.3	-87.6	586,207.38	750,965.30	32° 36' 32.199 N	103° 31' 6.000 W
6,800.0	3.13	265.44	6,798.5	19.0	-93.0	586,207.12	750,959.94	32° 36' 32.197 N	103° 31' 6.063 W
6,900.0	3.08	271.33	6,898.4	18.9	-98.4	586,206.97	750,954.53	32° 36' 32.196 N	103° 31' 6.126 W
7,000.0	2.81	264.65	6,998.2	18.7	-103.5	586,206.80	750,949.41	32° 36' 32.195 N	103° 31' 6.186 W
7,100.0	2.57	261.11	7,098.1	18.1	-108.1	586,206.22	750,944.75	32° 36' 32.189 N	103° 31' 6.240 W
7,200.0	2.70	264.35	7,198.0	17.5	-112.7	586,205.65	750,940.19	32° 36' 32.184 N	103° 31' 6.294 W
7,300.0	2.78	267.87	7,297.9	17.2	-117.5	586,205.32	750,935.42	32° 36' 32.181 N	103° 31' 6.350 W
7,400.0	2.96	268.41	7,397.8	17.1	-122.5	586,205.16	750,930.42	32° 36' 32.180 N	103° 31' 6.408 W
7,500.0	2.68	273.77	7,497.6	17.1	-127.4	586,205.24	750,925.51	32° 36' 32.181 N	103° 31' 6.465 W
7,600.0	3.18	276.46	7,597.5	17.6	-132.5	586,205.71	750,920.42	32° 36' 32.186 N	103° 31' 6.525 W
7,700.0	3.18	273.32	7,697.4	18.1	-138.0	586,206.18	750,914.89	32° 36' 32.191 N	103° 31' 6.589 W
7,800.0	3.20	277.44	7,797.2	18.6	-143.5	586,206.71	750,909.35	32° 36' 32.197 N	103° 31' 6.654 W
7,900.0	3.20	268.73	7,897.1	18.9	-149.1	586,207.00	750,903.80	32° 36' 32.200 N	103° 31' 6.719 W
8,000.0	3.08	277.47	7,996.9	19.2	-154.6	586,207.29	750,898.34	32° 36' 32.204 N	103° 31' 6.783 W
8,100.0	2.66	281.08	8,096.8	20.0	-159.5	586,208.09	750,893.40	32° 36' 32.212 N	103° 31' 6.841 W
8,200.0	3.01	272.78	8,196.7	20.6	-164.4	586,208.66	750,888.50	32° 36' 32.218 N	103° 31' 6.898 W
8,300.0	2.87	273.94	8,296.5	20.9	-169.5	586,208.96	750,883.38	32° 36' 32.221 N	103° 31' 6.958 W
8,400.0	2.73	280.43	8,396.4	21.5	-174.4	586,209.56	750,878.54	32° 36' 32.228 N	103° 31' 7.014 W
8,500.0	2.67	272.65	8,496.3	22.0	-179.0	586,210.10	750,873.87	32° 36' 32.233 N	103° 31' 7.069 W
8,600.0	2.69	284.52	8,596.2	22.7	-183.6	586,210.80	750,869.27	32° 36' 32.240 N	103° 31' 7.122 W
8,700.0	2.23	284.80	8,696.1	23.8	-187.8	586,211.88	750,865.12	32° 36' 32.252 N	103° 31' 7.171 W
8,800.0	2.94	290.89	8,796.0	25.2	-192.1	586,213.29	750,860.85	32° 36' 32.266 N	103° 31' 7.221 W
8,900.0	2.40	283.43	8,895.9	26.6	-196.5	586,214.70	750,856.41	32° 36' 32.280 N	103° 31' 7.272 W
9,000.0	2.36	277.09	8,995.8	27.3	-200.6	586,215.44	750,852.33	32° 36' 32.288 N	103° 31' 7.320 W
9,100.0	1.84	275.35	9,095.7	27.7	-204.2	586,215.84	750,848.69	32° 36' 32.292 N	103° 31' 7.362 W
9,200.0	1.04	266.87	9,195.7	27.8	-206.7	586,215.94	750,846.19	32° 36' 32.293 N	103° 31' 7.392 W
9,300.0	0.92	280.05	9,295.7	27.9	-208.4	586,216.03	750,844.49	32° 36' 32.294 N	103° 31' 7.412 W
9,400.0	0.59	237.67	9,395.7	27.8	-209.6	586,215.90	750,843.26	32° 36' 32.293 N	103° 31' 7.426 W
9,500.0	1.00	286.66	9,495.7	27.8	-210.9	586,215.87	750,841.99	32° 36' 32.293 N	103° 31' 7.441 W
9,600.0	0.97	288.53	9,595.6	28.3	-212.5	586,216.39	750,840.35	32° 36' 32.298 N	103° 31' 7.460 W
9,700.0	0.63	291.10	9,695.6	28.8	-213.9	586,216.86	750,839.04	32° 36' 32.303 N	103° 31' 7.475 W
9,800.0	0.36	11.14	9,795.6	29.3	-214.3	586,217.36	750,838.59	32° 36' 32.308 N	103° 31' 7.480 W
9,900.0	1.05	14.91	9,895.6	30.5	-214.0	586,218.56	750,838.88	32° 36' 32.320 N	103° 31' 7.477 W
10,000.0	0.96	0.59	9,995.6	32.2	-213.8	586,220.28	750,839.13	32° 36' 32.337 N	103° 31' 7.474 W
10,100.0	1.12	349.53	10,095.6	34.0	-213.9	586,222.08	750,838.96	32° 36' 32.354 N	103° 31' 7.476 W
10,200.0	1.53	0.10	10,195.6	36.3	-214.1	586,224.37	750,838.78	32° 36' 32.377 N	103° 31' 7.478 W
TIE-IN to VES Gyro									
10,237.0	1.10	341.30	10,232.6	37.1	-214.2	586,225.20	750,838.67	32° 36' 32.385 N	103° 31' 7.479 W
10,331.0	0.70	180.10	10,326.6	37.4	-214.5	586,225.48	750,838.38	32° 36' 32.388 N	103° 31' 7.482 W
10,388.0	1.10	189.10	10,383.5	36.5	-214.6	586,224.60	750,838.29	32° 36' 32.379 N	103° 31' 7.483 W
10,420.0	3.00	173.30	10,415.5	35.4	-214.6	586,223.46	750,838.34	32° 36' 32.368 N	103° 31' 7.483 W
10,451.0	5.10	175.10	10,446.4	33.2	-214.3	586,221.28	750,838.55	32° 36' 32.347 N	103° 31' 7.480 W
10,483.0	7.50	175.80	10,478.3	29.7	-214.1	586,217.78	750,838.83	32° 36' 32.312 N	103° 31' 7.478 W
10,514.0	11.20	178.60	10,508.8	24.6	-213.8	586,212.75	750,839.05	32° 36' 32.262 N	103° 31' 7.475 W
10,546.0	14.90	180.00	10,540.0	17.4	-213.8	586,205.53	750,839.13	32° 36' 32.191 N	103° 31' 7.475 W
10,577.0	18.50	180.90	10,569.7	8.5	-213.8	586,196.62	750,839.05	32° 36' 32.102 N	103° 31' 7.477 W
10,609.0	22.30	182.10	10,599.7	-2.6	-214.1	586,185.48	750,838.75	32° 36' 31.992 N	103° 31' 7.481 W
10,640.0	27.10	183.50	10,627.8	-15.6	-214.8	586,172.54	750,838.10	32° 36' 31.864 N	103° 31' 7.490 W
10,672.0	32.10	183.90	10,655.6	-31.3	-215.8	586,156.77	750,837.08	32° 36' 31.708 N	103° 31' 7.504 W
10,703.0	35.70	183.30	10,681.4	-48.6	-216.9	586,139.52	750,836.00	32° 36' 31.538 N	103° 31' 7.518 W
10,734.0	38.00	182.30	10,706.2	-67.1	-217.8	586,120.95	750,835.09	32° 36' 31.354 N	103° 31' 7.530 W
10,766.0	41.10	181.70	10,730.9	-87.5	-218.5	586,100.59	750,834.38	32° 36' 31.153 N	103° 31' 7.540 W
10,797.0	45.50	181.80	10,753.4	-108.8	-219.2	586,079.35	750,833.73	32° 36' 30.942 N	103° 31' 7.550 W
10,829.0	50.00	182.30	10,774.9	-132.4	-220.0	586,055.68	750,832.88	32° 36' 30.708 N	103° 31' 7.562 W



TDS
Survey Report - Geographic



Company: COG Operating LLC	Local Co-ordinate Reference: Well #4H	
Project: Lea County, NM	TVD Reference: KB @ 3713.7usft (McVay 6)	
Site: Black Pearl 1 Federal	MD Reference: KB @ 3713.7usft (McVay 6)	
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	
10,860.0	53.70	182.70	10,794.1	-156.8	-221.1	586,031.33	750,831.82	32° 36' 30.468 N	103° 31' 7.576 W	
10,892.0	57.30	183.50	10,812.2	-183.1	-222.5	586,005.00	750,830.39	32° 36' 30.207 N	103° 31' 7.595 W	
10,923.0	60.40	183.90	10,828.2	-209.6	-224.2	585,978.53	750,828.67	32° 36' 29.945 N	103° 31' 7.618 W	
10,955.0	62.90	183.80	10,843.4	-237.7	-226.1	585,950.44	750,826.78	32° 36' 29.667 N	103° 31' 7.642 W	
10,986.0	66.20	183.10	10,856.7	-265.6	-227.8	585,922.50	750,825.10	32° 36' 29.391 N	103° 31' 7.664 W	
11,018.0	71.00	182.60	10,868.4	-295.4	-229.3	585,892.75	750,823.62	32° 36' 29.097 N	103° 31' 7.684 W	
11,045.0	75.60	182.50	10,876.2	-321.2	-230.4	585,866.92	750,822.47	32° 36' 28.841 N	103° 31' 7.700 W	
11,076.0	80.30	181.70	10,882.6	-351.5	-231.5	585,836.63	750,821.36	32° 36' 28.542 N	103° 31' 7.716 W	
11,108.0	82.20	181.30	10,887.5	-383.1	-232.4	585,805.02	750,820.54	32° 36' 28.229 N	103° 31' 7.728 W	
11,139.0	84.10	180.90	10,891.2	-413.9	-233.0	585,774.25	750,819.95	32° 36' 27.925 N	103° 31' 7.738 W	
11,171.0	85.50	180.60	10,894.1	-445.7	-233.4	585,742.38	750,819.53	32° 36' 27.609 N	103° 31' 7.746 W	
11,234.0	89.50	180.00	10,896.8	-508.6	-233.7	585,679.46	750,819.20	32° 36' 26.987 N	103° 31' 7.755 W	
11,265.0	90.10	180.20	10,897.0	-539.6	-233.8	585,648.46	750,819.15	32° 36' 26.680 N	103° 31' 7.759 W	
11,328.0	89.70	180.40	10,897.1	-602.6	-234.1	585,585.46	750,818.82	32° 36' 26.057 N	103° 31' 7.768 W	
11,422.0	89.50	180.40	10,897.7	-696.6	-234.7	585,491.46	750,818.16	32° 36' 25.127 N	103° 31' 7.784 W	
11,517.0	89.10	181.60	10,898.9	-791.6	-236.4	585,396.49	750,816.50	32° 36' 24.187 N	103° 31' 7.812 W	
11,611.0	89.20	181.70	10,900.3	-885.6	-239.1	585,302.53	750,813.80	32° 36' 23.258 N	103° 31' 7.852 W	
11,706.0	89.00	181.40	10,901.8	-980.5	-241.7	585,207.58	750,811.23	32° 36' 22.318 N	103° 31' 7.891 W	
11,800.0	89.10	181.30	10,903.3	-1,074.5	-243.9	585,113.62	750,809.01	32° 36' 21.389 N	103° 31' 7.925 W	
11,894.0	89.30	181.70	10,904.6	-1,168.4	-246.3	585,019.66	750,806.55	32° 36' 20.459 N	103° 31' 7.962 W	
11,989.0	88.60	181.30	10,906.4	-1,263.4	-248.8	584,924.71	750,804.07	32° 36' 19.520 N	103° 31' 8.000 W	
12,083.0	88.70	181.70	10,908.6	-1,357.3	-251.3	584,830.77	750,801.61	32° 36' 18.591 N	103° 31' 8.037 W	
12,178.0	88.40	181.60	10,911.0	-1,452.3	-254.0	584,735.84	750,798.87	32° 36' 17.651 N	103° 31' 8.077 W	
12,273.0	89.50	181.20	10,912.7	-1,547.2	-256.3	584,640.89	750,796.55	32° 36' 16.712 N	103° 31' 8.113 W	
12,367.0	89.80	181.30	10,913.3	-1,641.2	-258.4	584,546.91	750,794.50	32° 36' 15.782 N	103° 31' 8.145 W	
12,462.0	89.00	181.80	10,914.3	-1,736.2	-261.0	584,451.95	750,791.93	32° 36' 14.843 N	103° 31' 8.184 W	
12,556.0	89.50	181.70	10,915.5	-1,830.1	-263.8	584,358.00	750,789.06	32° 36' 13.914 N	103° 31' 8.226 W	
12,651.0	88.70	181.70	10,917.0	-1,925.0	-266.7	584,263.06	750,786.24	32° 36' 12.974 N	103° 31' 8.267 W	
12,745.0	88.70	181.30	10,919.2	-2,019.0	-269.1	584,169.11	750,783.78	32° 36' 12.045 N	103° 31' 8.305 W	
12,840.0	88.50	180.60	10,921.5	-2,113.9	-270.7	584,074.16	750,782.21	32° 36' 11.105 N	103° 31' 8.331 W	
12,934.0	88.90	181.00	10,923.6	-2,207.9	-272.0	583,980.19	750,780.90	32° 36' 10.176 N	103° 31' 8.355 W	
13,029.0	89.20	181.70	10,925.2	-2,302.9	-274.2	583,885.23	750,778.66	32° 36' 9.236 N	103° 31' 8.390 W	
13,123.0	89.60	182.50	10,926.2	-2,396.8	-277.7	583,791.30	750,775.21	32° 36' 8.307 N	103° 31' 8.438 W	
13,217.0	89.80	182.20	10,926.7	-2,490.7	-281.5	583,697.38	750,771.36	32° 36' 7.378 N	103° 31' 8.492 W	
13,312.0	90.20	182.10	10,926.7	-2,585.7	-285.1	583,602.45	750,767.80	32° 36' 6.439 N	103° 31' 8.542 W	
13,407.0	89.40	182.70	10,927.0	-2,680.6	-289.1	583,507.53	750,763.82	32° 36' 5.500 N	103° 31' 8.597 W	
13,502.0	89.10	182.10	10,928.2	-2,775.5	-293.1	583,412.62	750,759.84	32° 36' 4.561 N	103° 31' 8.652 W	
13,596.0	89.20	181.80	10,929.6	-2,869.4	-296.3	583,318.69	750,756.64	32° 36' 3.632 N	103° 31' 8.698 W	
13,690.0	89.50	181.40	10,930.7	-2,963.4	-298.9	583,224.73	750,754.02	32° 36' 2.703 N	103° 31' 8.737 W	
13,785.0	89.70	181.70	10,931.4	-3,058.3	-301.4	583,129.77	750,751.45	32° 36' 1.763 N	103° 31' 8.776 W	
13,879.0	88.60	181.30	10,932.8	-3,152.3	-303.9	583,035.81	750,748.99	32° 36' 0.834 N	103° 31' 8.813 W	
13,974.0	88.70	181.40	10,935.0	-3,247.2	-306.1	582,940.87	750,746.75	32° 35' 59.894 N	103° 31' 8.847 W	
14,040.0	88.70	181.40	10,936.5	-3,313.2	-307.8	582,874.90	750,745.14	32° 35' 59.242 N	103° 31' 8.872 W	
14,103.0	89.00	181.40	10,937.8	-3,376.2	-309.3	582,811.93	750,743.60	32° 35' 58.619 N	103° 31' 8.896 W	
14,198.0	89.00	181.80	10,939.4	-3,471.1	-312.0	582,716.99	750,740.95	32° 35' 57.680 N	103° 31' 8.935 W	
14,292.0	88.70	181.90	10,941.3	-3,565.0	-315.0	582,623.05	750,737.91	32° 35' 56.750 N	103° 31' 8.979 W	
14,387.0	88.60	182.20	10,943.5	-3,660.0	-318.4	582,528.14	750,734.51	32° 35' 55.812 N	103° 31' 9.027 W	
14,481.0	89.10	181.80	10,945.4	-3,753.9	-321.7	582,434.22	750,731.23	32° 35' 54.882 N	103° 31' 9.074 W	
14,575.0	89.00	182.00	10,947.0	-3,847.8	-324.8	582,340.28	750,728.12	32° 35' 53.953 N	103° 31' 9.119 W	
14,670.0	90.30	180.60	10,947.6	-3,942.8	-326.9	582,245.31	750,725.96	32° 35' 53.014 N	103° 31' 9.153 W	
14,764.0	90.10	180.80	10,947.2	-4,036.8	-328.1	582,151.32	750,724.82	32° 35' 52.084 N	103° 31' 9.174 W	
14,858.0	89.90	181.10	10,947.2	-4,130.8	-329.6	582,057.33	750,723.26	32° 35' 51.154 N	103° 31' 9.201 W	
15,015.0	89.70	181.00	10,947.8	-4,287.7	-332.5	581,900.36	750,720.38	32° 35' 49.601 N	103° 31' 9.249 W	
15,175.0	89.90	181.70	10,948.3	-4,447.7	-336.3	581,740.41	750,716.61	32° 35' 48.019 N	103° 31' 9.307 W	
15,269.0	88.40	181.50	10,949.7	-4,541.6	-338.9	581,646.46	750,713.99	32° 35' 47.089 N	103° 31' 9.346 W	



TDS
Survey Report - Geographic



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well #4H
Project:	Lea County, NM	TVD Reference:	KB @ 3713.7usft (McVay 6)
Site:	Black Pearl 1 Federal	MD Reference:	KB @ 3713.7usft (McVay 6)
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
15,362.0	87.80	182.00	10,952.8	-4,634.6	-341.7	581,553.55	750,711.15	32° 35' 46.170 N	103° 31' 9.388 W
15,479.0	88.30	182.30	10,956.8	-4,751.4	-346.1	581,436.70	750,706.76	32° 35' 45.014 N	103° 31' 9.449 W
Final MWD Survey									
15,535.0	88.30	182.30	10,958.5	-4,807.3	-348.4	581,380.77	750,704.51	32° 35' 44.461 N	103° 31' 9.481 W
Projection to Bit/TD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
10,200.0	10,195.6	36.3	-214.1	TIE-IN to VES Gyro
15,479.0	10,956.8	-4,751.4	-346.1	Final MWD Survey
15,535.0	10,958.5	-4,807.3	-348.4	Projection to Bit/TD

Checked By: _____ Approved By: _____ Date: _____