

**McVAY DRILLING COMPANY**

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

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: *Tina Flemens*

Subscribed and sworn to

, 2015

Notary Public, Lea County, New Mexico



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 AS §
COUNTY OF DALLAS §

This instrument was acknowledged by
A.D., 2015 Keith Havelka.

2

B



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
432-863-5444

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	199.98	0.20	-1.31	-0.10	1.33	278.57	0.33
300.00	0.50	281.53	299.99	0.34	-2.07	-0.19	2.10	279.44	0.31
400.00	0.55	257.51	399.99	0.34	-3.05	-0.12	3.08	276.41	0.24
500.00	0.56	282.41	499.98	0.42	-3.98	-0.13	4.01	276.06	0.33
600.00	0.29	243.82	599.98	0.49	-4.86	-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	268.54	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	-6.45	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	0.82	250.63	1699.96	-2.80	-9.36	3.46	9.79	253.41	0.22
1800.00	0.55	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	255.33	0.32
2200.00	0.36	298.17	2199.94	-2.97	-13.45	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	14.35	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	265.55	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	286.11	4099.89	0.58	-17.28	0.68	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	288.47	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	-53.82	-12.34	56.03	286.86	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	286.66	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	286.59	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	6499.96	20.14	-76.40	-14.59	79.01	284.77	0.93
6600.00	3.27	261.78	6599.80	19.73	-82.09	-13.77	84.42	283.52	0.47
6700.00	3.03	269.04	6699.65	19.28	-87.55	-12.92	89.65	282.42	0.47
6800.00	3.13	265.44	6799.50	19.02	-92.91	-12.28	94.84	281.57	0.22
6900.00	3.08	271.33	6899.36	18.86	-98.32	-11.73	100.11	280.86	0.32
7000.00	2.81	284.65	6999.22	18.70	-103.44	-11.20	105.11	280.25	0.44
7100.00	2.57	261.11	7099.11	18.12	-108.09	-10.29	109.60	279.52	0.29
7200.00	2.70	264.35	7199.01	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	-8.46	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

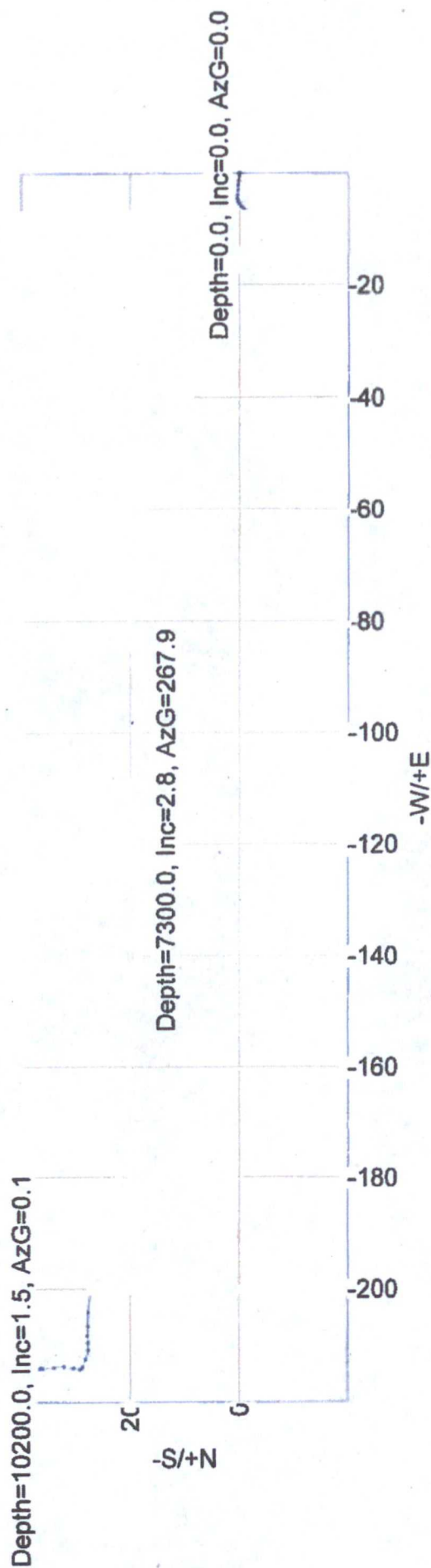
Measured Depth FT	Incl Angle Deg	Drift Direction Deg	TVD FT	+N/S FT	+E/W FT	Vertical Section FT	Closure Distance FT	Closure Direction Deg	Dogleg Severity Deg/100
9500.00	1.00	286.66	9495.67	27.77	-210.82	-12.51	212.64	277.50	0.76
9600.00	0.97	288.53	9595.65	28.28	-212.46	-12.91	214.33	277.58	0.06
9700.00	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



ES Survey International
Midland, Texas
432-563-5444

Surveyor: Adam Askew
Black Pearl 1 Federal 4H / API 30-025-42295

VES SURVEY
INTERNATIONAL



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



Company: COG Operating LLC
Project: Lea County, NM
Site: Black Pearl 1 Federal
Well: #4H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #4H
TVD Reference: KB @ 3713.7usft (McVay 6)
MD Reference: KB @ 3713.7usft (McVay 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Single User Db

Project	Lea County, NM		
Map System:	US State Plane 1927 (Exact solut)	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 Latitude: 32° 36' 32.078 N
From: Map Easting: 754 185.00 usft Longitude: 103° 30' 28.361 W
Position Uncertainty: 0.0 usft Slot Radius: 13-3/16 " Grid Convergence: 0.44 "

Well #4H

Well Position: +N-S 0.0 usft Northing: 586,188.10 usft Latitude: 32° 36' 32.002 N
+E-W 0.0 usft Easting: 751,052.90 usft Longitude: 103° 31' 4.978 W
Position Uncertainty: 0.0 usft Wellhead Elevation: 0.0 usft 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 Data

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

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	586,188.10	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	751 048.88	32° 36' 31.999 N	103° 31' 5.045 W



TDS
Survey Report - Geographic



Company: COG Operating LLC
Project: Lea County, NM
Site: Black Pearl 1 Federal
Well: #4H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #4H
TVD Reference: KB @ 3713.7usft (McVay 6)
MD Reference: KB @ 3713.7usft (McVay 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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	-8.5	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 31 988 N	103° 31' 5 062 W
1,500.0	0.53	258.24	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.	-3.2	-12.3	586 184 84	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	75 038.67	32 36 31 981 N	103 31' 5 144 W
2,500.0	0.17	296.30	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	-14.7	586 186.20	751 038 21	32 36 31 984 N	03 31' 5 150 W
2,800.0	0.07	146.14	2,799.9	-2.	-14.8	586 186 14	751 038 7	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 38 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 38.47	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 39 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 08	32 36° 31.991 N	103° 31' 5.126 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	586,186.21	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	751 035.58	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	586,180.21	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	267.71	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 5.384 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. 82 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	586,199.60	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' 5.582 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	289.92	6 499.0	20.1	-78.4	586,208 25	750 976.45	32 36 32.207 N	103 31 5.870 W



TDS
Survey Report - Geographic

Company: COG Operating LLC
Project: Lea County, NM
Site: Black Pearl 1 Federal
Well: #4H
Wellbore: OH
Design: OH

Local Co-ordinates Reference: Well #4H
TVD Reference: KB @ 3713.7usft (McVay 6)
MD Reference: KB @ 3713.7usft (McVay 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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' 6.128 W
7,000.0	2.81	264.85	6,998.2	18.7	-103.5	586,206.80	750 949.41	32° 36' 32.195 N	103° 31' 6.188 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	2.98	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	586,211.68	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' 32.268 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	750,848.89	32° 36' 32.292 N	103° 31' 7.362 W
9,200.0	1.04	268.87	9,195.7	27.8	-206.7	586,215.94	750,848.19	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	586,215.80	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	-210.8	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	0.83	291.10	9,695.6	28.6	-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	750,839.96	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	750,839.78	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	10,328.6	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' 7.463 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' 32.282 N	103° 31' 7.475 W
10,546.0	14.80	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	586,198.62	750,839.05	32° 36' 32.102 N	103° 31' 7.477 W
10,609.0	22.30	182.10	10,599.7	-2.8	-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	-214.6	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' 7.516 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

Company: COG Operating LLC
Project: Lea County NM
Site: Black Pearl 1 Federal
Well: #4H
Wellbore: OH
Design: OH

Local Reference: Well #4H
TVD Reference: KB @ 3713 7usft (McVay 6)
MD Reference: KB @ 3713 7usft (McVay 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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	10,858.7	-265.6	-227.8	585,922.50	750,825.10	32° 36' 28.391 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	10,882.8	-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	-539.8	-233.8	585,648.46	750,819.15	32° 36' 26.680 N	103° 31' 7.758 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	-698.6	-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	585,019.86	750,808.55	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	750,801.81	32° 36' 18.581 N	103° 31' 8.037 W
12,178.0	88.40	181.60	10,911.0	-1,452.3	-254.0	584,735.64	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	750,798.55	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	750,789.08	32° 36' 13.914 N	103° 31' 8.228 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	750,783.76	32° 36' 12.045 N	103° 31' 8.305 W
12,840.0	88.50	180.80	10,921.5	-2,113.9	-270.7	584,074.18	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' 8.380 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	583,412.82	750,759.84	32° 36' 4.581 N	103° 31' 8.652 W
13,598.0	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' 1.783 N	103° 31' 8.778 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	750,725.98	32° 35' 53.014 N	103° 31' 9.153 W
14,764.0	90.10	180.80	10,947.2	-4,038.8	-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	-329.8	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	581,960.36	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	10,948.7	-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
Project: Lea County, NM
Site: Black Pearl 1 Federal
Well: #4H
Wellbore: OH
Design: OH

Local Co-ordinate Reference: Well #4H
TVD Reference: KB @ 3713.7usft (McVay 6)
MD Reference: KB @ 3713.7usft (McVay 6)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
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	03 31 9 388
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	03 31 9 448
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 44.481 N	3 31 9 481
Projection to BHTD									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
10 00.0	10 195.6	38.	-214.1	TIE-IN to VES Gyro
15 79.0	10,956.8	-4,751.4	346.1	Final MWD Survey
15, 35.0	10,958.5	-4,807.3	8.4	Projection to BHTD

Checked By _____ Approved By: _____ Date _____