

**McVAY DRILLING COMPANY**

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

Well Name and Num: Warbler State Com #2Y
Location: Sec 28, T21S, R33E
Operator: COG
Drilling Contractor: McVay Drilling Company

HOBBS OCD**MAY 27 2016****RECEIVED**

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>
0.50	190	0.60	5998	85.50	11182		
1.20	568	0.40	6315	91.10	11313		
1.20	752	0.10	5791	90.00	11505		
0.80	1153	2.02	7107	90.20	11887		
0.50	1353	1.50	7436	87.80	12174		
2.20	1687	1.50	7722	90.00	12554		
2.80	1797	1.10	8008	89.50	12933		
1.80	2238	1.10	8577	89.24	13217		
1.70	2616	0.80	8863	89.30	13546		
0.20	2994	1.10	9148	86.90	13785		
1.90	3448	2.10	9432	87.50	13879		
0.60	3743	1.10	9750	90.30	14445		
1.10	4148	1.30	9941	89.50	14728		
1.70	4623	1.20	10179	90.60	15202		
1.10	5043	17.50	10515	90.30	15305		
1.30	5402	41.50	10770				
1.30	5684	66.60	11025				

By: *M. A. Bann*

Subscribed and sworn to before me this 8th day of December, 2015

Tina Flemens
Notary Public, Lea County, New Mexico



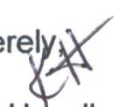
November 23, 2015

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

Attn: Kanicia Castillo

RE: **Warbler State Com No 002Y**

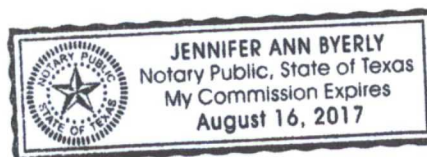
Please find enclosed a copy of the survey from 0' to 9400' ran on the above referenced well.

Sincerely, 
Keith Havelka
Operations

STATE OF TEXAS §
 §
COUNTY OF NUECES §

This instrument was acknowledged before me on the 23 day of November
A.D., 2015, by Keith Havelka.


Jennifer Ann Byerly
Notary Public, State of Texas





Company: Concho
Lease/Well: Warbler State Com No/002Y



Rig Name: McVay 7
State/County: New Mexico/Lea
VS-Azi: 178.82 Degrees
Latitude: 32.45645, Longitude: -103.57041
Grid North = True North -0.41 degs (NAD 27)
Grid Correction Applied = -0.41 degs

Depth Reference : RKB = 17 Foot

DRILLOG HA GYRO SURVEY CALCULATIONS

Filename: ...state com 002y_gyro survey.ut

Minimum Curvature Method

Report Date/Time: 11/23/2015 / 14:47

VES Survey International
West Texas

(432) 563-5444

Surveyor: Gene Heiss

Warbler State Com No 002Y / API 30-025-42904

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	0.21	76.06	100.00	0.04	0.18	-0.04	0.19	76.06	0.21
200.00	0.12	127.64	200.00	0.02	0.45	-0.01	0.45	86.93	0.17
300.00	0.31	119.63	300.00	-0.18	0.77	0.19	0.79	102.88	0.19
400.00	0.47	215.17	400.00	-0.64	0.77	0.66	1.00	129.91	0.59
500.00	0.76	216.26	499.99	-1.51	0.14	1.52	1.52	174.66	0.29
600.00	1.24	223.43	599.98	-2.83	-1.00	2.81	3.00	199.36	0.49
700.00	1.16	226.41	699.95	-4.32	-2.48	4.27	4.98	209.81	0.10
800.00	1.60	234.46	799.92	-5.83	-4.34	5.74	7.27	216.69	0.47
900.00	1.40	224.53	899.89	-7.51	-6.34	7.38	9.83	220.14	0.32
1000.00	1.57	222.55	999.86	-9.39	-8.12	9.22	12.42	220.84	0.18
1100.00	1.22	237.15	1099.83	-10.98	-9.95	10.78	14.82	222.16	0.50
1200.00	0.82	262.20	1199.81	-11.66	-11.55	11.42	16.41	224.73	0.59
1300.00	0.66	257.35	1299.80	-11.88	-12.82	11.62	17.48	227.17	0.17
1400.00	0.69	236.02	1399.80	-12.34	-13.88	12.06	18.57	228.35	0.25
1500.00	1.35	248.42	1499.78	-13.11	-15.47	12.79	20.28	229.72	0.70
1600.00	2.07	250.57	1599.73	-14.15	-18.27	13.77	23.11	232.25	0.72

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	2.59	247.04	1699.65	-15.63	-22.06	15.17	27.04	234.68	0.54
1800.00	2.78	231.47	1799.54	-18.02	-26.04	17.48	31.67	235.31	0.75
1900.00	1.48	214.56	1899.47	-20.59	-28.66	20.00	35.30	234.31	1.43
2000.00	1.13	197.23	1999.45	-22.60	-29.69	21.98	37.31	232.72	0.52
2100.00	1.59	197.11	2099.42	-24.87	-30.39	24.24	39.27	230.70	0.46
2200.00	1.73	195.84	2199.38	-27.65	-31.21	27.00	41.70	228.46	0.14
2300.00	1.59	194.65	2299.33	-30.44	-31.97	29.78	44.15	226.41	0.14
2400.00	1.62	194.76	2399.30	-33.15	-32.69	32.47	46.56	224.59	0.03
2500.00	1.52	203.85	2499.26	-35.73	-33.58	35.03	49.04	223.22	0.27
2600.00	1.56	198.13	2599.22	-38.24	-34.54	37.52	51.53	222.09	0.16
2700.00	1.38	203.56	2699.19	-40.63	-35.44	39.90	53.92	221.10	0.23
2800.00	1.39	199.37	2799.16	-42.88	-36.33	42.12	56.20	220.27	0.10
2900.00	1.55	196.38	2899.13	-45.32	-37.11	44.55	58.58	219.31	0.18
3000.00	1.82	188.63	2999.08	-48.19	-37.73	47.40	61.20	218.06	0.35
3100.00	1.99	187.40	3099.03	-51.48	-38.19	50.68	64.10	216.57	0.18
3200.00	1.71	159.91	3198.98	-54.60	-37.90	53.81	66.47	214.77	0.92
3300.00	1.55	131.85	3298.94	-56.91	-36.38	56.15	67.54	212.59	0.81
3400.00	1.73	86.69	3398.90	-57.72	-33.87	57.01	66.92	210.40	1.27
3500.00	1.95	82.92	3498.85	-57.43	-30.67	56.78	65.10	208.11	0.25
3600.00	1.51	85.30	3598.81	-57.11	-27.67	56.53	63.46	205.85	0.44
3700.00	0.73	65.47	3698.79	-56.74	-25.78	56.19	62.32	204.44	0.86
3800.00	0.71	51.92	3798.78	-56.09	-24.72	55.57	61.30	203.78	0.17
3900.00	0.85	7.78	3898.77	-54.97	-24.13	54.47	60.04	203.70	0.60
4000.00	0.75	16.96	3998.76	-53.62	-23.84	53.11	58.68	203.97	0.16
4100.00	0.81	29.85	4098.75	-52.38	-23.30	51.89	57.32	203.98	0.19
4200.00	1.01	47.15	4198.74	-51.16	-22.29	50.69	55.81	203.55	0.34
4300.00	0.55	78.04	4298.73	-50.46	-21.17	50.01	54.72	202.77	0.61
4400.00	0.79	155.45	4398.72	-50.98	-20.42	50.55	54.92	201.82	0.86
4500.00	2.06	242.38	4498.70	-52.44	-21.73	51.98	56.76	202.50	2.17
4600.00	2.09	241.17	4598.63	-54.15	-24.92	53.63	59.61	204.71	0.05
4700.00	1.34	234.39	4698.59	-55.71	-27.46	55.14	62.12	206.24	0.77
4800.00	1.28	240.09	4798.56	-56.95	-29.38	56.33	64.08	207.29	0.15
4900.00	1.19	236.03	4898.54	-58.09	-31.21	57.43	65.94	208.25	0.12
5000.00	1.31	229.96	4998.51	-59.40	-32.94	58.71	67.92	209.01	0.18
5100.00	1.42	240.83	5098.49	-60.74	-34.90	60.01	70.06	209.88	0.28
5200.00	1.13	235.88	5198.46	-61.90	-36.80	61.13	72.01	210.73	0.31
5300.00	1.22	247.06	5298.44	-62.87	-38.60	62.06	73.77	211.55	0.25
5400.00	1.16	247.94	5398.42	-63.66	-40.51	62.81	75.46	212.47	0.06
5500.00	1.33	251.42	5498.40	-64.41	-42.55	63.52	77.20	213.45	0.19

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	0.97	238.46	5598.38	-65.22	-44.38	64.30	78.89	214.23	0.45
5700.00	1.03	245.41	5698.36	-66.04	-45.91	65.08	80.43	214.81	0.13
5800.00	1.04	236.94	5798.34	-66.91	-47.49	65.92	82.05	215.37	0.15
5900.00	1.01	244.94	5898.33	-67.78	-49.05	66.75	83.67	215.89	0.15
6000.00	0.60	260.71	5998.32	-68.24	-50.37	67.19	84.81	216.43	0.46
6100.00	0.51	247.20	6098.31	-68.49	-51.29	67.42	85.57	216.83	0.16
6200.00	0.47	250.21	6198.31	-68.80	-52.08	67.72	86.29	217.13	0.04
6300.00	0.42	260.77	6298.31	-69.00	-52.83	67.90	86.90	217.44	0.10
6400.00	0.45	257.98	6398.30	-69.14	-53.57	68.02	87.47	217.77	0.04
6500.00	0.39	266.99	6498.30	-69.24	-54.30	68.11	87.99	218.10	0.09
6600.00	0.42	264.22	6598.30	-69.30	-55.01	68.15	88.48	218.45	0.04
6700.00	0.43	263.78	6698.30	-69.37	-55.75	68.21	89.00	218.79	0.01
6800.00	0.48	286.54	6798.29	-69.30	-56.53	68.12	89.43	219.20	0.18
6900.00	0.48	275.02	6898.29	-69.14	-57.34	67.95	89.83	219.67	0.10
7000.00	0.67	293.24	6998.28	-68.87	-58.30	67.66	90.23	220.25	0.26
7100.00	0.81	243.62	7098.28	-68.95	-59.47	67.71	91.05	220.78	0.63
7200.00	1.01	218.17	7198.26	-69.95	-60.64	68.69	92.58	220.92	0.44
7300.00	1.20	217.45	7298.25	-71.47	-61.82	70.18	94.50	220.86	0.19
7400.00	1.23	223.89	7398.22	-73.07	-63.19	71.76	96.61	220.85	0.14
7500.00	1.15	248.82	7498.20	-74.21	-64.88	72.86	98.57	221.16	0.52
7600.00	1.01	237.82	7598.19	-75.05	-66.56	73.66	100.31	221.57	0.25
7700.00	1.32	234.49	7698.16	-76.19	-68.25	74.76	102.29	221.85	0.32
7800.00	1.25	247.61	7798.14	-77.27	-70.20	75.81	104.39	222.25	0.30
7900.00	1.06	251.17	7898.12	-77.98	-72.08	76.48	106.19	222.75	0.20
8000.00	1.02	265.25	7998.10	-78.36	-73.84	76.82	107.67	223.30	0.26
8100.00	0.97	272.69	8098.09	-78.39	-75.56	76.82	108.88	223.95	0.14
8200.00	1.16	269.06	8198.07	-78.37	-77.42	76.76	110.16	224.65	0.21
8300.00	1.26	272.78	8298.05	-78.33	-79.54	76.68	111.63	225.44	0.12
8400.00	1.10	274.14	8398.03	-78.21	-81.60	76.51	113.02	226.21	0.16
8500.00	0.93	268.17	8498.01	-78.16	-83.37	76.43	114.28	226.84	0.21
8600.00	0.87	247.78	8598.00	-78.48	-84.88	76.71	115.60	227.24	0.32
8700.00	1.33	264.28	8697.98	-78.88	-86.74	77.08	117.25	227.72	0.56
8800.00	1.03	266.18	8797.96	-79.06	-88.80	77.21	118.89	228.32	0.31
8900.00	0.77	253.24	8897.95	-79.31	-90.34	77.43	120.21	228.72	0.32
9000.00	0.71	250.84	8997.94	-79.71	-91.57	77.81	121.40	228.96	0.07
9100.00	1.01	261.14	9097.93	-80.05	-93.02	78.11	122.72	229.29	0.34
9200.00	1.13	263.36	9197.91	-80.30	-94.87	78.33	124.29	229.76	0.13
9300.00	1.61	258.69	9297.88	-80.69	-97.23	78.67	126.35	230.31	0.50
9400.00	1.94	264.41	9397.83	-81.13	-100.29	79.04	129.00	231.03	0.37

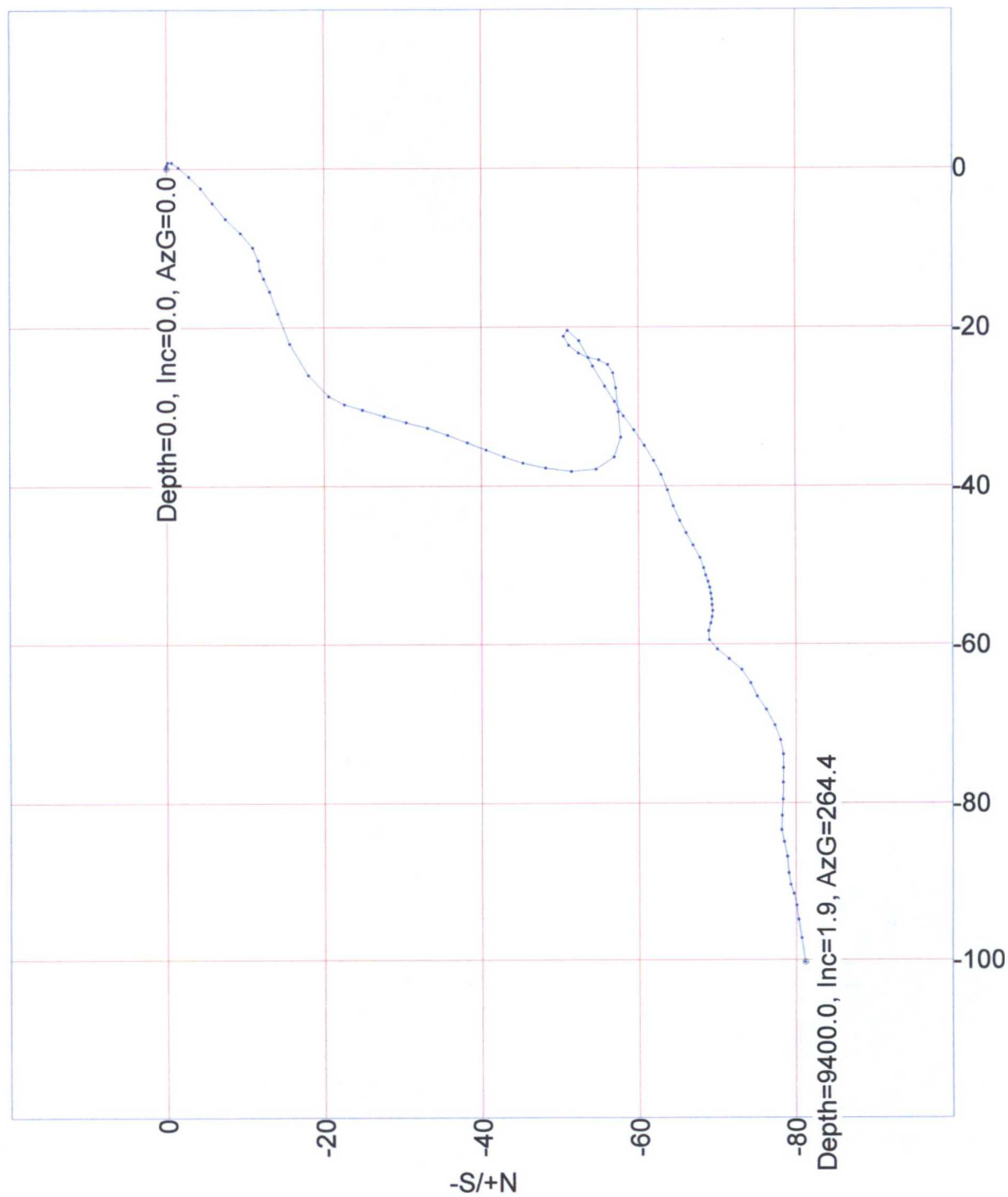


VES Survey International
West Texas

(432) 563-5444

Surveyor: Gene Heiss

Warbler State Com No 002Y / API 30-025-42904



VES Survey Date: 11/17/2015



I Gene Heiss certify that I am employed by Vaughn Energy Services. That I did on the day(s) of 11/17/15 through 11/17/15 conduct or supervise the taking of a Rate Gyro survey from a depth of 0 feet to a depth of 9400 feet; that the data is true, correct, complete and within the limitations of the tool as set forth by Vaughn Energy Services, that I am authorized and qualified to make this report; that this survey was conducted at the request of Concho for the Warbler State Com Well # 002Y API # 30-025-42904 in Lea County / Parish New Mexico; and that I have reviewed this report and find that it conforms to the principles and procedures as set forth by Vaughn Energy Services

A handwritten signature in blue ink, appearing to read "Gene Heiss", written over a horizontal line.

Gene Heiss
Service Technician
Vaughn Energy Services



COG Operating, LLC

Lea County, NM

Sec 28, T21S, R33E

Warbler State Com #2Y

Wellbore #1

Design: Wellbore #1

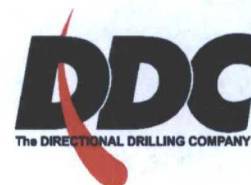
Survey Report - Geographic

01 December, 2015

HOBBS OCD

MAY 27 2016

RECEIVED





HP
Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Warbler State Com #2Y
Project:	Lea County, NM	TVD Reference:	well @ 3715.0usft (McVay #7)
Site:	Sec 28, T21S, R33E	MD Reference:	well @ 3715.0usft (McVay #7)
Well:	Warbler State Com #2Y	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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	Sec 28, T21S, R33E		
Site Position:		Northing:	530,440.50 usft
From:	Map	Easting:	730,845.20 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 27' 21.849 N
		Longitude:	103° 35' 5.783 W
		Grid Convergence:	0.40 °

Well	Warbler State Com #2Y		
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° 27' 23.202 N
		Longitude:	103° 34' 44.548 W
		Ground Level:	3,698.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2015	10/27/2015	7.15	60.30	48,243

Design	Wellbore #1				
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	179.82	

Survey Program	Date 12/1/2015				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	9,400.0	Gyro (Wellbore #1)	Good_gyro	Good Gyro	
9,433.0	15,351.0	MWD (Wellbore #1)	MWD default	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	530,590.07	732,663.75	32° 27' 23.202 N	103° 34' 44.548 W
100.0	0.21	76.06	100.0	0.0	0.2	530,590.11	732,663.93	32° 27' 23.202 N	103° 34' 44.546 W
200.0	0.12	127.64	200.0	0.0	0.4	530,590.09	732,664.19	32° 27' 23.202 N	103° 34' 44.542 W
300.0	0.31	119.63	300.0	-0.2	0.8	530,589.89	732,664.51	32° 27' 23.200 N	103° 34' 44.539 W
400.0	0.47	215.17	400.0	-0.6	0.8	530,589.42	732,664.51	32° 27' 23.196 N	103° 34' 44.539 W
500.0	0.76	216.26	500.0	-1.5	0.1	530,588.55	732,663.88	32° 27' 23.187 N	103° 34' 44.546 W
600.0	1.24	223.43	600.0	-2.8	-1.0	530,587.23	732,662.74	32° 27' 23.174 N	103° 34' 44.560 W
700.0	1.16	226.41	700.0	-4.3	-2.5	530,585.75	732,661.27	32° 27' 23.159 N	103° 34' 44.577 W
800.0	1.60	234.46	799.9	-5.8	-4.4	530,584.24	732,659.40	32° 27' 23.145 N	103° 34' 44.599 W
900.0	1.40	224.53	899.9	-7.5	-6.3	530,582.56	732,657.40	32° 27' 23.128 N	103° 34' 44.622 W
1,000.0	1.57	222.55	999.9	-9.4	-8.1	530,580.68	732,655.62	32° 27' 23.110 N	103° 34' 44.643 W

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Warbler State Com #2Y
Project:	Lea County, NM	TVD Reference:	well @ 3715.0usft (McVay #7)
Site:	Sec 28, T21S, R33E	MD Reference:	well @ 3715.0usft (McVay #7)
Well:	Warbler State Com #2Y	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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	1.22	237.15	1,099.8	-11.0	-10.0	530,579.09	732,653.80	32° 27' 23.094 N	103° 34' 44.665 W
1,200.0	0.82	262.20	1,199.8	-11.6	-11.6	530,578.42	732,652.20	32° 27' 23.088 N	103° 34' 44.683 W
1,300.0	0.66	257.35	1,299.8	-11.9	-12.8	530,578.19	732,650.93	32° 27' 23.085 N	103° 34' 44.698 W
1,400.0	0.69	236.02	1,399.8	-12.3	-13.9	530,577.73	732,649.86	32° 27' 23.081 N	103° 34' 44.711 W
1,500.0	1.35	248.42	1,499.8	-13.1	-15.5	530,576.96	732,648.27	32° 27' 23.073 N	103° 34' 44.729 W
1,600.0	2.07	250.57	1,599.7	-14.1	-18.3	530,575.93	732,645.47	32° 27' 23.063 N	103° 34' 44.762 W
1,700.0	2.59	247.04	1,699.7	-15.6	-22.1	530,574.45	732,641.69	32° 27' 23.049 N	103° 34' 44.806 W
1,800.0	2.78	231.47	1,799.5	-18.0	-26.0	530,572.05	732,637.71	32° 27' 23.026 N	103° 34' 44.853 W
1,900.0	1.48	214.56	1,899.5	-20.6	-28.7	530,569.48	732,635.08	32° 27' 23.000 N	103° 34' 44.884 W
2,000.0	1.13	197.23	1,999.4	-22.6	-29.7	530,567.47	732,634.06	32° 27' 22.981 N	103° 34' 44.896 W
2,100.0	1.59	197.11	2,099.4	-24.9	-30.4	530,565.21	732,633.36	32° 27' 22.958 N	103° 34' 44.904 W
2,200.0	1.73	195.84	2,199.4	-27.6	-31.2	530,562.43	732,632.54	32° 27' 22.931 N	103° 34' 44.914 W
2,300.0	1.59	194.65	2,299.3	-30.4	-32.0	530,559.63	732,631.77	32° 27' 22.903 N	103° 34' 44.923 W
2,400.0	1.62	194.76	2,399.3	-33.1	-32.7	530,556.92	732,631.06	32° 27' 22.876 N	103° 34' 44.932 W
2,500.0	1.52	203.85	2,499.3	-35.7	-33.6	530,554.34	732,630.16	32° 27' 22.851 N	103° 34' 44.943 W
2,600.0	1.56	198.13	2,599.2	-38.2	-34.5	530,551.84	732,629.21	32° 27' 22.826 N	103° 34' 44.954 W
2,700.0	1.38	203.56	2,699.2	-40.6	-35.5	530,549.44	732,628.30	32° 27' 22.802 N	103° 34' 44.965 W
2,800.0	1.39	199.37	2,799.2	-42.9	-36.3	530,547.19	732,627.42	32° 27' 22.780 N	103° 34' 44.975 W
2,900.0	1.55	196.38	2,899.1	-45.3	-37.1	530,544.75	732,626.63	32° 27' 22.756 N	103° 34' 44.985 W
3,000.0	1.82	188.63	2,999.1	-48.2	-37.7	530,541.88	732,626.01	32° 27' 22.728 N	103° 34' 44.992 W
3,100.0	1.99	187.40	3,099.0	-51.5	-38.2	530,538.59	732,625.55	32° 27' 22.695 N	103° 34' 44.998 W
3,200.0	1.71	159.91	3,199.0	-54.6	-37.9	530,535.47	732,625.84	32° 27' 22.664 N	103° 34' 44.995 W
3,300.0	1.55	131.85	3,298.9	-56.9	-36.4	530,533.16	732,627.36	32° 27' 22.641 N	103° 34' 44.977 W
3,400.0	1.73	86.69	3,398.9	-57.7	-33.9	530,532.35	732,629.87	32° 27' 22.633 N	103° 34' 44.948 W
3,500.0	1.95	82.92	3,498.9	-57.4	-30.7	530,532.65	732,633.07	32° 27' 22.636 N	103° 34' 44.910 W
3,600.0	1.51	85.30	3,598.8	-57.1	-27.7	530,532.96	732,636.07	32° 27' 22.639 N	103° 34' 44.875 W
3,700.0	0.73	65.47	3,698.8	-56.7	-25.8	530,533.34	732,637.96	32° 27' 22.642 N	103° 34' 44.853 W
3,800.0	0.71	51.92	3,798.8	-56.1	-24.7	530,533.98	732,639.03	32° 27' 22.649 N	103° 34' 44.841 W
3,900.0	0.85	7.78	3,898.8	-55.0	-24.1	530,535.10	732,639.62	32° 27' 22.660 N	103° 34' 44.834 W
4,000.0	0.75	16.96	3,998.8	-53.6	-23.8	530,536.46	732,639.91	32° 27' 22.673 N	103° 34' 44.830 W
4,100.0	0.81	29.85	4,098.8	-52.4	-23.3	530,537.70	732,640.45	32° 27' 22.685 N	103° 34' 44.824 W
4,200.0	1.01	47.15	4,198.7	-51.2	-22.3	530,538.91	732,641.45	32° 27' 22.697 N	103° 34' 44.812 W
4,300.0	0.55	78.04	4,298.7	-50.5	-21.2	530,539.61	732,642.57	32° 27' 22.704 N	103° 34' 44.799 W
4,400.0	0.79	155.45	4,398.7	-51.0	-20.4	530,539.08	732,643.32	32° 27' 22.699 N	103° 34' 44.790 W
4,500.0	2.06	242.38	4,498.7	-52.4	-21.7	530,537.62	732,642.02	32° 27' 22.685 N	103° 34' 44.806 W
4,600.0	2.09	241.17	4,598.6	-54.2	-24.9	530,535.91	732,638.83	32° 27' 22.668 N	103° 34' 44.843 W
4,700.0	1.34	234.39	4,698.6	-55.7	-27.5	530,534.35	732,636.28	32° 27' 22.653 N	103° 34' 44.873 W
4,800.0	1.28	240.09	4,798.6	-57.0	-29.4	530,533.11	732,634.36	32° 27' 22.640 N	103° 34' 44.895 W
4,900.0	1.19	236.03	4,898.5	-58.1	-31.2	530,531.98	732,632.53	32° 27' 22.629 N	103° 34' 44.917 W
5,000.0	1.31	229.96	4,998.5	-59.4	-33.0	530,530.66	732,630.79	32° 27' 22.616 N	103° 34' 44.937 W
5,100.0	1.42	240.83	5,098.5	-60.7	-34.9	530,529.32	732,628.84	32° 27' 22.603 N	103° 34' 44.960 W
5,200.0	1.13	235.88	5,198.5	-61.9	-36.8	530,528.16	732,626.94	32° 27' 22.592 N	103° 34' 44.982 W
5,300.0	1.22	247.06	5,298.4	-62.9	-38.6	530,527.20	732,625.14	32° 27' 22.583 N	103° 34' 45.003 W
5,400.0	1.16	247.94	5,398.4	-63.7	-40.5	530,526.40	732,623.22	32° 27' 22.575 N	103° 34' 45.026 W
5,500.0	1.33	251.42	5,498.4	-64.4	-42.6	530,525.65	732,621.19	32° 27' 22.568 N	103° 34' 45.050 W
5,600.0	0.97	238.46	5,598.4	-65.2	-44.4	530,524.84	732,619.36	32° 27' 22.560 N	103° 34' 45.071 W
5,700.0	1.03	245.41	5,698.4	-66.0	-45.9	530,524.02	732,617.83	32° 27' 22.552 N	103° 34' 45.089 W
5,800.0	1.04	236.94	5,798.3	-66.9	-47.5	530,523.15	732,616.25	32° 27' 22.543 N	103° 34' 45.107 W
5,900.0	1.01	244.94	5,898.3	-67.8	-49.1	530,522.28	732,614.69	32° 27' 22.535 N	103° 34' 45.126 W
6,000.0	0.60	260.71	5,998.3	-68.2	-50.4	530,521.83	732,613.37	32° 27' 22.530 N	103° 34' 45.141 W
6,100.0	0.51	247.20	6,098.3	-68.5	-51.3	530,521.57	732,612.45	32° 27' 22.528 N	103° 34' 45.152 W
6,200.0	0.47	250.21	6,198.3	-68.8	-52.1	530,521.26	732,611.65	32° 27' 22.525 N	103° 34' 45.161 W
6,300.0	0.42	260.77	6,298.3	-69.0	-52.8	530,521.06	732,610.90	32° 27' 22.523 N	103° 34' 45.170 W
6,400.0	0.45	257.98	6,398.3	-69.1	-53.6	530,520.92	732,610.16	32° 27' 22.522 N	103° 34' 45.179 W
6,500.0	0.39	266.99	6,498.3	-69.2	-54.3	530,520.82	732,609.43	32° 27' 22.521 N	103° 34' 45.187 W

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Warbler State Com #2Y
Project:	Lea County, NM	TVD Reference:	well @ 3715.0usft (McVay #7)
Site:	Sec 28, T21S, R33E	MD Reference:	well @ 3715.0usft (McVay #7)
Well:	Warbler State Com #2Y	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

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	0.42	264.22	6,598.3	-69.3	-55.0	530,520.76	732,608.73	32° 27' 22.520 N	103° 34' 45.195 W
6,700.0	0.43	263.78	6,698.3	-69.4	-55.8	530,520.69	732,607.99	32° 27' 22.519 N	103° 34' 45.204 W
6,800.0	0.48	286.54	6,798.3	-69.3	-56.5	530,520.77	732,607.22	32° 27' 22.520 N	103° 34' 45.213 W
6,900.0	0.48	275.02	6,898.3	-69.1	-57.4	530,520.92	732,606.40	32° 27' 22.522 N	103° 34' 45.223 W
7,000.0	0.67	293.24	6,998.3	-68.9	-58.3	530,521.19	732,605.44	32° 27' 22.525 N	103° 34' 45.234 W
7,100.0	0.81	243.62	7,098.3	-69.0	-59.5	530,521.11	732,604.27	32° 27' 22.524 N	103° 34' 45.247 W
7,200.0	1.01	218.17	7,198.3	-70.0	-60.7	530,520.10	732,603.09	32° 27' 22.514 N	103° 34' 45.261 W
7,300.0	1.20	217.45	7,298.2	-71.5	-61.8	530,518.57	732,601.91	32° 27' 22.499 N	103° 34' 45.275 W
7,400.0	1.23	223.89	7,398.2	-73.1	-63.2	530,516.97	732,600.53	32° 27' 22.483 N	103° 34' 45.291 W
7,500.0	1.15	248.82	7,498.2	-74.2	-64.9	530,515.83	732,598.85	32° 27' 22.472 N	103° 34' 45.311 W
7,600.0	1.01	237.82	7,598.2	-75.1	-66.6	530,515.00	732,597.17	32° 27' 22.464 N	103° 34' 45.331 W
7,700.0	1.32	234.49	7,698.2	-76.2	-68.3	530,513.86	732,595.49	32° 27' 22.453 N	103° 34' 45.351 W
7,800.0	1.25	247.61	7,798.1	-77.3	-70.2	530,512.78	732,593.54	32° 27' 22.442 N	103° 34' 45.373 W
7,900.0	1.06	251.17	7,898.1	-78.0	-72.1	530,512.06	732,591.66	32° 27' 22.435 N	103° 34' 45.395 W
8,000.0	1.02	265.25	7,998.1	-78.4	-73.9	530,511.69	732,589.90	32° 27' 22.432 N	103° 34' 45.416 W
8,100.0	0.97	272.69	8,098.1	-78.4	-75.6	530,511.66	732,588.16	32° 27' 22.431 N	103° 34' 45.436 W
8,200.0	1.16	269.06	8,198.1	-78.4	-77.4	530,511.68	732,586.30	32° 27' 22.432 N	103° 34' 45.458 W
8,300.0	1.26	272.78	8,298.0	-78.3	-79.6	530,511.72	732,584.19	32° 27' 22.432 N	103° 34' 45.483 W
8,400.0	1.10	274.14	8,398.0	-78.2	-81.6	530,511.84	732,582.14	32° 27' 22.434 N	103° 34' 45.506 W
8,500.0	0.93	268.17	8,498.0	-78.2	-83.4	530,511.88	732,580.37	32° 27' 22.434 N	103° 34' 45.527 W
8,600.0	0.87	247.78	8,598.0	-78.5	-84.9	530,511.57	732,578.86	32° 27' 22.431 N	103° 34' 45.545 W
8,700.0	1.33	264.28	8,698.0	-78.9	-86.8	530,511.17	732,577.00	32° 27' 22.427 N	103° 34' 45.567 W
8,800.0	1.03	266.18	8,798.0	-79.1	-88.8	530,510.99	732,574.95	32° 27' 22.426 N	103° 34' 45.590 W
8,900.0	0.77	253.24	8,897.9	-79.3	-90.3	530,510.74	732,573.41	32° 27' 22.423 N	103° 34' 45.608 W
9,000.0	0.71	250.84	8,997.9	-79.7	-91.6	530,510.34	732,572.18	32° 27' 22.420 N	103° 34' 45.623 W
9,100.0	1.01	261.14	9,097.9	-80.1	-93.0	530,510.00	732,570.72	32° 27' 22.416 N	103° 34' 45.640 W
9,200.0	1.13	263.36	9,197.9	-80.3	-94.9	530,509.75	732,568.87	32° 27' 22.414 N	103° 34' 45.661 W
9,300.0	1.61	258.69	9,297.9	-80.7	-97.2	530,509.36	732,566.52	32° 27' 22.410 N	103° 34' 45.689 W
9,400.0	1.94	264.41	9,397.8	-81.1	-100.3	530,508.92	732,563.45	32° 27' 22.406 N	103° 34' 45.725 W
Gyro Tie-in @ 9400' MD / 9398' TVD									
9,433.0	2.10	266.20	9,430.8	-81.2	-101.5	530,508.83	732,562.29	32° 27' 22.405 N	103° 34' 45.738 W
9,560.0	1.20	288.00	9,557.8	-81.0	-105.0	530,509.09	732,558.71	32° 27' 22.408 N	103° 34' 45.780 W
9,750.0	1.10	292.00	9,747.7	-79.7	-108.6	530,510.38	732,555.12	32° 27' 22.421 N	103° 34' 45.822 W
9,941.0	1.30	305.90	9,938.7	-77.7	-112.1	530,512.34	732,551.67	32° 27' 22.441 N	103° 34' 45.862 W
10,069.0	1.30	303.50	10,066.6	-76.1	-114.5	530,513.99	732,549.28	32° 27' 22.457 N	103° 34' 45.890 W
10,179.0	1.20	306.80	10,176.6	-74.7	-116.4	530,515.37	732,547.32	32° 27' 22.471 N	103° 34' 45.913 W
10,261.0	1.20	303.60	10,258.6	-73.7	-117.8	530,516.36	732,545.92	32° 27' 22.481 N	103° 34' 45.929 W
10,293.0	1.10	304.00	10,290.6	-73.3	-118.4	530,516.72	732,545.38	32° 27' 22.484 N	103° 34' 45.935 W
10,325.0	1.00	302.10	10,322.6	-73.0	-118.9	530,517.04	732,544.89	32° 27' 22.488 N	103° 34' 45.941 W
10,357.0	2.00	196.20	10,354.6	-73.4	-119.3	530,516.65	732,544.50	32° 27' 22.484 N	103° 34' 45.945 W
10,389.0	5.90	184.60	10,386.5	-75.6	-119.5	530,514.48	732,544.21	32° 27' 22.462 N	103° 34' 45.949 W
10,421.0	10.60	182.20	10,418.2	-80.2	-119.8	530,509.89	732,543.97	32° 27' 22.417 N	103° 34' 45.952 W
10,453.0	14.00	178.30	10,449.4	-87.0	-119.8	530,503.08	732,543.97	32° 27' 22.350 N	103° 34' 45.953 W
10,485.0	15.50	172.00	10,480.4	-95.1	-119.1	530,494.98	732,544.68	32° 27' 22.269 N	103° 34' 45.945 W
10,515.0	17.50	168.10	10,509.1	-103.5	-117.6	530,486.59	732,546.17	32° 27' 22.186 N	103° 34' 45.928 W
10,547.0	19.90	165.50	10,539.4	-113.5	-115.2	530,476.61	732,548.52	32° 27' 22.087 N	103° 34' 45.902 W
10,579.0	23.00	164.60	10,569.2	-124.8	-112.2	530,465.31	732,551.55	32° 27' 21.975 N	103° 34' 45.867 W
10,606.9	25.53	165.84	10,594.7	-135.8	-109.3	530,454.22	732,554.47	32° 27' 21.865 N	103° 34' 45.834 W
Crossed 330' Hard Line @ 10607' MD / 10595									
10,611.0	25.90	166.00	10,598.4	-137.6	-108.9	530,452.50	732,554.90	32° 27' 21.848 N	103° 34' 45.829 W
10,642.0	28.60	168.30	10,625.9	-151.4	-105.7	530,438.66	732,558.04	32° 27' 21.711 N	103° 34' 45.794 W
10,674.0	32.10	167.90	10,653.5	-167.2	-102.4	530,422.84	732,561.38	32° 27' 21.554 N	103° 34' 45.756 W
10,706.0	35.30	168.60	10,680.1	-184.6	-98.8	530,405.46	732,564.99	32° 27' 21.382 N	103° 34' 45.715 W
10,738.0	37.70	170.60	10,705.9	-203.3	-95.3	530,386.74	732,568.42	32° 27' 21.197 N	103° 34' 45.677 W
10,770.0	41.50	172.70	10,730.5	-223.5	-92.4	530,366.56	732,571.36	32° 27' 20.997 N	103° 34' 45.644 W

Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Warbler State Com #2Y
Project:	Lea County, NM	TVD Reference:	well @ 3715.0usft (McVay #7)
Site:	Sec 28, T21S, R33E	MD Reference:	well @ 3715.0usft (McVay #7)
Well:	Warbler State Com #2Y	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude	
10,802.0	45.50	173.90	10,753.7	-245.4	-89.8	530,344.69	732,573.92	32° 27' 20.780 N	103° 34' 45.616 W	
10,834.0	48.50	172.50	10,775.5	-268.6	-87.1	530,321.45	732,576.70	32° 27' 20.550 N	103° 34' 45.586 W	
10,866.0	51.20	172.00	10,796.2	-292.8	-83.8	530,297.22	732,580.00	32° 27' 20.310 N	103° 34' 45.549 W	
10,898.0	54.10	170.20	10,815.6	-318.0	-79.8	530,272.09	732,583.94	32° 27' 20.061 N	103° 34' 45.505 W	
10,930.0	57.90	169.40	10,833.5	-344.1	-75.1	530,245.99	732,588.64	32° 27' 19.803 N	103° 34' 45.452 W	
10,962.0	61.20	169.40	10,849.7	-371.2	-70.0	530,218.88	732,593.72	32° 27' 19.534 N	103° 34' 45.396 W	
10,993.0	63.70	169.00	10,864.0	-398.2	-64.9	530,191.88	732,598.87	32° 27' 19.266 N	103° 34' 45.338 W	
11,025.0	66.60	168.10	10,877.5	-426.6	-59.1	530,163.43	732,604.63	32° 27' 18.984 N	103° 34' 45.273 W	
11,057.0	70.00	168.10	10,889.3	-455.7	-53.0	530,134.34	732,610.76	32° 27' 18.696 N	103° 34' 45.204 W	
11,089.0	72.90	169.90	10,899.5	-485.5	-47.2	530,104.56	732,616.55	32° 27' 18.401 N	103° 34' 45.138 W	
11,121.0	76.80	171.60	10,907.8	-516.0	-42.2	530,074.08	732,621.51	32° 27' 18.099 N	103° 34' 45.083 W	
11,153.0	81.20	172.70	10,914.0	-547.1	-38.0	530,042.97	732,625.80	32° 27' 17.791 N	103° 34' 45.036 W	
11,182.0	85.50	173.70	10,917.3	-575.7	-34.5	530,014.38	732,629.20	32° 27' 17.508 N	103° 34' 44.998 W	
11,220.0	89.60	175.10	10,918.9	-613.5	-30.8	529,976.60	732,632.91	32° 27' 17.134 N	103° 34' 44.958 W	
11,313.0	92.10	175.10	10,917.6	-706.1	-22.9	529,883.96	732,640.85	32° 27' 16.217 N	103° 34' 44.873 W	
11,409.0	90.00	175.10	10,915.8	-801.7	-14.7	529,788.33	732,649.05	32° 27' 15.270 N	103° 34' 44.785 W	
11,505.0	90.00	176.40	10,915.8	-897.5	-7.6	529,692.60	732,656.16	32° 27' 14.322 N	103° 34' 44.710 W	
11,600.0	89.80	177.60	10,916.0	-992.3	-2.6	529,597.73	732,661.13	32° 27' 13.383 N	103° 34' 44.660 W	
11,696.0	88.90	178.50	10,917.1	-1,088.3	0.6	529,501.79	732,664.40	32° 27' 12.433 N	103° 34' 44.630 W	
11,792.0	90.80	177.80	10,917.3	-1,184.2	3.7	529,405.85	732,667.50	32° 27' 11.484 N	103° 34' 44.602 W	
11,887.0	90.20	178.00	10,916.5	-1,279.2	7.2	529,310.92	732,670.98	32° 27' 10.544 N	103° 34' 44.569 W	
11,983.0	89.30	178.70	10,916.9	-1,375.1	10.0	529,214.96	732,673.74	32° 27' 9.594 N	103° 34' 44.544 W	
12,079.0	88.90	178.80	10,918.4	-1,471.1	12.1	529,118.99	732,675.84	32° 27' 8.645 N	103° 34' 44.528 W	
12,174.0	87.70	179.90	10,921.2	-1,566.0	13.2	529,024.05	732,676.92	32° 27' 7.705 N	103° 34' 44.523 W	
12,270.0	88.80	179.20	10,924.2	-1,662.0	13.9	528,928.10	732,677.67	32° 27' 6.756 N	103° 34' 44.522 W	
12,365.0	89.70	178.10	10,925.4	-1,756.9	16.2	528,833.13	732,679.91	32° 27' 5.816 N	103° 34' 44.504 W	
12,461.0	89.30	178.50	10,926.2	-1,852.9	19.0	528,737.18	732,682.76	32° 27' 4.866 N	103° 34' 44.479 W	
12,554.0	90.00	178.50	10,926.8	-1,945.9	21.4	528,644.21	732,685.19	32° 27' 3.946 N	103° 34' 44.458 W	
12,649.0	88.40	180.30	10,928.1	-2,040.8	22.4	528,549.23	732,686.18	32° 27' 3.006 N	103° 34' 44.454 W	
12,744.0	89.50	179.70	10,929.9	-2,135.8	22.4	528,454.25	732,686.18	32° 27' 2.066 N	103° 34' 44.462 W	
12,838.0	88.60	180.30	10,931.4	-2,229.8	22.4	528,360.27	732,686.18	32° 27' 1.136 N	103° 34' 44.470 W	
12,933.0	89.50	179.70	10,933.0	-2,324.8	22.4	528,265.28	732,686.18	32° 27' 0.196 N	103° 34' 44.477 W	
13,028.0	88.20	180.10	10,934.9	-2,419.8	22.6	528,170.30	732,686.35	32° 26' 59.256 N	103° 34' 44.483 W	
13,123.0	89.80	179.90	10,936.6	-2,514.7	22.6	528,075.32	732,686.35	32° 26' 58.317 N	103° 34' 44.491 W	
13,217.0	89.40	180.80	10,937.2	-2,608.7	22.0	527,981.32	732,685.78	32° 26' 57.387 N	103° 34' 44.506 W	
13,311.0	88.60	181.30	10,938.9	-2,702.7	20.3	527,887.36	732,684.05	32° 26' 56.457 N	103° 34' 44.533 W	
13,406.0	89.40	181.30	10,940.5	-2,797.7	18.1	527,792.40	732,681.90	32° 26' 55.517 N	103° 34' 44.566 W	
13,501.0	89.30	181.50	10,941.6	-2,892.6	15.8	527,697.43	732,679.58	32° 26' 54.578 N	103° 34' 44.601 W	
13,595.0	88.30	181.10	10,943.6	-2,986.6	13.7	527,603.48	732,677.45	32° 26' 53.648 N	103° 34' 44.634 W	
13,690.0	89.60	180.40	10,945.3	-3,081.6	12.5	527,508.50	732,676.20	32° 26' 52.709 N	103° 34' 44.656 W	
13,785.0	86.90	180.30	10,948.2	-3,176.5	11.9	527,413.56	732,675.62	32° 26' 51.769 N	103° 34' 44.671 W	
13,879.0	87.50	179.70	10,952.8	-3,270.4	11.9	527,319.67	732,675.62	32° 26' 50.840 N	103° 34' 44.679 W	
13,970.0	88.60	181.50	10,955.9	-3,361.3	10.9	527,228.73	732,674.67	32° 26' 49.940 N	103° 34' 44.697 W	
14,065.0	88.50	180.90	10,958.3	-3,456.3	8.9	527,133.79	732,672.68	32° 26' 49.001 N	103° 34' 44.728 W	
14,160.0	89.60	181.50	10,959.9	-3,551.2	6.9	527,038.82	732,670.69	32° 26' 48.061 N	103° 34' 44.759 W	
14,255.0	89.40	181.30	10,960.7	-3,646.2	4.6	526,943.85	732,668.37	32° 26' 47.122 N	103° 34' 44.794 W	
14,350.0	90.30	180.90	10,961.0	-3,741.2	2.8	526,848.87	732,666.55	32° 26' 46.182 N	103° 34' 44.823 W	
14,445.0	90.00	180.10	10,960.7	-3,836.2	2.0	526,753.88	732,665.72	32° 26' 45.242 N	103° 34' 44.841 W	
14,539.0	89.80	179.70	10,960.9	-3,930.2	2.1	526,659.88	732,665.88	32° 26' 44.312 N	103° 34' 44.847 W	
14,633.0	89.30	179.40	10,961.6	-4,024.2	2.9	526,565.88	732,666.62	32° 26' 43.382 N	103° 34' 44.846 W	
14,728.0	89.50	179.70	10,962.6	-4,119.2	3.6	526,470.89	732,667.37	32° 26' 42.442 N	103° 34' 44.845 W	
14,823.0	89.50	179.00	10,963.4	-4,214.2	4.7	526,375.90	732,668.44	32° 26' 41.502 N	103° 34' 44.840 W	
14,917.0	89.70	179.20	10,964.1	-4,308.2	6.2	526,281.92	732,669.92	32° 26' 40.572 N	103° 34' 44.831 W	
15,012.0	89.70	178.80	10,964.6	-4,403.1	7.8	526,186.93	732,671.58	32° 26' 39.632 N	103° 34' 44.819 W	
15,107.0	90.30	178.70	10,964.6	-4,498.1	9.9	526,091.96	732,673.65	32° 26' 38.692 N	103° 34' 44.803 W	



HP
Survey Report - Geographic



Company:	COG Operating, LLC	Local Co-ordinate Reference:	Well Warbler State Com #2Y
Project:	Lea County, NM	TVD Reference:	well @ 3715.0usft (McVay #7)
Site:	Sec 28, T21S, R33E	MD Reference:	well @ 3715.0usft (McVay #7)
Well:	Warbler State Com #2Y	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	Compass

Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Map Northing (usft)	Map Easting (usft)	Latitude	Longitude
15,202.0	90.60	178.50	10,963.8	-4,593.1	12.2	525,996.99	732,675.97	32° 26' 37.752 N	103° 34' 44.784 W
15,305.0	90.30	178.50	10,963.0	-4,696.0	14.9	525,894.03	732,678.67	32° 26' 36.733 N	103° 34' 44.761 W
15,351.0	90.30	178.50	10,962.8	-4,742.0	16.1	525,848.04	732,679.87	32° 26' 36.278 N	103° 34' 44.750 W
TD @ 15351' MD / 10963' TVD									

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
9,400.0	9,397.8	-81.1	-100.3	Gyro Tie-in @ 9400' MD / 9398' TVD
10,606.9	10,594.7	-135.8	-109.3	Crossed 330' Hard Line @ 10607' MD / 10595
15,351.0	10,962.8	-4,742.0	16.1	TD @ 15351' MD / 10963' TVD

Checked By: _____ Approved By: _____ Date: _____