



C O N C H O

HOBBS OCD

OCT 03 2018

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COG Operating L L C

Lea County, NM (NAD27 NME)

Sec. 12, T 21 S. , R 33 E

Bobwhite 12 State Com 12H

Wellbore #1

Design: Wellbore #1

Standard Survey Report

16 April, 2018



INTEGRITY
DIRECTIONAL

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3798.80ft (Scandriil Freedom)
Site:	Sec. 12, T 21 S., R 33 E	MD Reference:	KB=26' @ 3798.80ft (Scandriil Freedom)
Well:	Bobwhite 12 State Com 12H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Project	Lea County, NM (NAD27 NME)		
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. 12, T 21 S., R 33 E		
Site Position:		Northing:	546,532.40 usft
From:	Map	Easting:	749,682.10 usft
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "
		Latitude:	32.499922
		Longitude:	-103.523480
		Grid Convergence:	0.44 °

Well	Bobwhite 12 State Com 12H, Active		
Well Position	+N/-S	0.00 ft	Northing: 546,529.10 usft
	+E/-W	0.00 ft	Easting: 750,362.10 usft
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft
		Latitude:	32.499898
		Longitude:	-103.521275
		Ground Level:	3,772.80 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	12/6/2017	6.75	60.42	48,239

Design	Wellbore #1				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)	
	0.00	0.00	0.00	179.56	

Survey Program	Date 4/16/2018				
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100.00	10,309.00	VES Gyro (Wellbore #1)	CB-GYRO-MS	Camera based gyro multishot	
10,313.00	15,601.00	MWD Surveys (Wellbore #1)	MWD	MWD - Standard	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Bulld Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.16	300.80	100.00	0.07	-0.12	-0.07	0.16	0.16	0.00	
125.00	0.28	293.95	125.00	0.11	-0.21	-0.12	0.49	0.48	-27.40	
150.00	0.26	327.49	150.00	0.19	-0.29	-0.19	0.63	-0.08	134.16	
175.00	0.36	334.60	175.00	0.31	-0.36	-0.31	0.43	0.40	28.44	
200.00	0.33	353.85	200.00	0.45	-0.40	-0.45	0.48	-0.12	77.00	
225.00	0.35	6.67	225.00	0.60	-0.40	-0.60	0.31	0.08	51.28	
250.00	0.41	12.51	250.00	0.76	-0.37	-0.76	0.29	0.24	23.36	
275.00	0.52	22.29	275.00	0.95	-0.31	-0.95	0.54	0.44	39.12	
300.00	0.57	26.43	300.00	1.17	-0.21	-1.17	0.25	0.20	16.56	

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 12H
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Site:	Sec. 12, T 21 S. , R 33 E	MD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Well:	Bobwhite 12 State Com 12H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Buird Rate (°/100usft)	Turn Rate (°/100usft)
325.00	0.54	21.18	324.99	1.39	-0.11	-1.39	0.24	-0.12	-21.00
350.00	0.55	23.33	349.99	1.61	-0.02	-1.61	0.09	0.04	8.60
375.00	0.58	30.67	374.99	1.83	0.09	-1.83	0.31	0.12	29.36
400.00	0.57	25.12	399.99	2.05	0.21	-2.05	0.23	-0.04	-22.20
425.00	0.56	24.10	424.99	2.27	0.31	-2.27	0.06	-0.04	-4.08
450.00	0.60	24.01	449.99	2.50	0.42	-2.50	0.16	0.16	-0.36
475.00	0.59	21.68	474.99	2.74	0.52	-2.74	0.10	-0.04	-9.32
500.00	0.52	25.99	499.99	2.96	0.61	-2.96	0.33	-0.28	17.24
525.00	0.54	28.20	524.98	3.17	0.72	-3.17	0.11	0.08	8.84
550.00	0.59	26.20	549.98	3.39	0.83	-3.38	0.21	0.20	-8.00
575.00	0.51	23.84	574.98	3.61	0.93	-3.60	0.33	-0.32	-9.44
600.00	0.47	19.77	599.98	3.81	1.01	-3.80	0.21	-0.16	-16.28
625.00	0.43	13.76	624.98	3.99	1.07	-3.98	0.25	-0.16	-24.04
650.00	0.44	9.08	649.98	4.18	1.11	-4.17	0.15	0.04	-18.72
675.00	0.51	25.17	674.98	4.37	1.17	-4.37	0.60	0.28	64.36
700.00	0.47	16.81	699.98	4.57	1.25	-4.56	0.33	-0.16	-33.44
725.00	0.46	3.30	724.98	4.77	1.28	-4.76	0.44	-0.04	-54.04
750.00	0.43	12.89	749.98	4.96	1.31	-4.95	0.32	-0.12	38.36
775.00	0.41	5.43	774.98	5.14	1.34	-5.13	0.23	-0.08	-29.84
800.00	0.40	359.13	799.98	5.32	1.35	-5.31	0.18	-0.04	-25.20
825.00	0.36	2.22	824.97	5.49	1.35	-5.48	0.18	-0.16	12.36
850.00	0.34	5.19	849.97	5.64	1.36	-5.63	0.11	-0.08	11.88
875.00	0.34	3.98	874.97	5.79	1.37	-5.78	0.03	0.00	-4.84
900.00	0.35	356.90	899.97	5.94	1.37	-5.93	0.18	0.04	-28.32
925.00	0.36	350.59	924.97	6.09	1.35	-6.08	0.16	0.04	-25.24
950.00	0.38	358.61	949.97	6.25	1.34	-6.24	0.22	0.08	32.08
975.00	0.35	0.63	974.97	6.41	1.34	-6.40	0.13	-0.12	8.08
1,000.00	0.34	2.24	999.97	6.56	1.34	-6.55	0.06	-0.04	6.44
1,025.00	0.31	351.61	1,024.97	6.70	1.33	-6.69	0.27	-0.12	-42.52
1,050.00	0.32	356.87	1,049.97	6.84	1.32	-6.83	0.12	0.04	21.04
1,075.00	0.29	358.88	1,074.97	6.97	1.32	-6.96	0.13	-0.12	8.04
1,100.00	0.28	349.45	1,099.97	7.09	1.30	-7.08	0.19	-0.04	-37.72
1,125.00	0.19	4.69	1,124.97	7.20	1.29	-7.19	0.44	-0.36	60.96
1,150.00	0.15	356.83	1,149.97	7.27	1.30	-7.26	0.18	-0.16	-31.44
1,175.00	0.12	336.80	1,174.97	7.33	1.28	-7.32	0.22	-0.12	-80.12
1,200.00	0.09	286.31	1,199.97	7.36	1.26	-7.35	0.37	-0.12	-201.96
1,225.00	0.09	270.80	1,224.97	7.36	1.22	-7.35	0.10	0.00	-62.04
1,250.00	0.06	240.93	1,249.97	7.36	1.19	-7.35	0.19	-0.12	-119.48
1,275.00	0.06	246.71	1,274.97	7.34	1.16	-7.33	0.02	0.00	23.12
1,300.00	0.12	248.62	1,299.97	7.33	1.13	-7.32	0.24	0.24	7.64
1,325.00	0.11	222.58	1,324.97	7.30	1.09	-7.29	0.21	-0.04	-104.16
1,350.00	0.13	218.90	1,349.97	7.26	1.05	-7.25	0.09	0.08	-14.72
1,375.00	0.15	237.23	1,374.97	7.22	1.01	-7.21	0.20	0.08	73.32

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Well:	Bobwhite 12 State Com 12H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,400.00	0.15	238.71	1,399.97	7.19	0.95	-7.18	0.02	0.00	5.92
1,425.00	0.16	230.79	1,424.97	7.15	0.90	-7.14	0.09	0.04	-31.68
1,450.00	0.21	224.07	1,449.97	7.09	0.84	-7.09	0.22	0.20	-26.88
1,475.00	0.20	222.61	1,474.97	7.03	0.78	-7.02	0.05	-0.04	-5.84
1,500.00	0.22	220.45	1,499.97	6.96	0.71	-6.95	0.09	0.08	-8.64
1,525.00	0.18	221.24	1,524.97	6.89	0.66	-6.89	0.16	-0.16	3.16
1,550.00	0.13	189.13	1,549.97	6.84	0.63	-6.83	0.39	-0.20	-128.44
1,575.00	0.16	192.88	1,574.97	6.77	0.61	-6.77	0.13	0.12	15.00
1,600.00	0.19	213.83	1,599.97	6.71	0.58	-6.70	0.28	0.12	83.80
1,625.00	0.23	212.98	1,624.97	6.63	0.53	-6.63	0.16	0.16	-3.40
1,650.00	0.28	216.41	1,649.97	6.54	0.47	-6.53	0.21	0.20	13.72
1,675.00	0.30	214.27	1,674.97	6.43	0.40	-6.43	0.09	0.08	-8.56
1,700.00	0.25	211.88	1,699.97	6.33	0.33	-6.33	0.21	-0.20	-9.56
1,725.00	0.23	205.57	1,724.97	6.24	0.28	-6.24	0.13	-0.08	-25.24
1,750.00	0.24	198.26	1,749.97	6.15	0.24	-6.15	0.13	0.04	-29.24
1,775.00	0.29	194.76	1,774.97	6.04	0.21	-6.04	0.21	0.20	-14.00
1,800.00	0.25	191.14	1,799.97	5.92	0.18	-5.92	0.17	-0.16	-14.48
1,825.00	0.22	188.77	1,824.97	5.82	0.17	-5.82	0.13	-0.12	-9.48
1,850.00	0.25	180.82	1,849.97	5.72	0.16	-5.72	0.18	0.12	-31.80
1,875.00	0.26	177.51	1,874.97	5.61	0.16	-5.61	0.07	0.04	-13.24
1,900.00	0.26	190.85	1,899.97	5.50	0.15	-5.49	0.24	0.00	53.36
1,925.00	0.26	184.11	1,924.97	5.38	0.14	-5.38	0.12	0.00	-26.96
1,950.00	0.34	155.88	1,949.96	5.26	0.16	-5.26	0.66	0.32	-112.92
1,975.00	0.36	152.50	1,974.96	5.12	0.23	-5.12	0.11	0.08	-13.52
2,000.00	0.43	145.56	1,999.96	4.97	0.32	-4.97	0.34	0.28	-27.76
2,025.00	0.52	147.11	2,024.96	4.80	0.43	-4.80	0.36	0.36	6.20
2,050.00	0.51	144.91	2,049.96	4.62	0.56	-4.61	0.09	-0.04	-8.80
2,075.00	0.63	143.94	2,074.96	4.41	0.70	-4.41	0.48	0.48	-3.88
2,100.00	0.65	135.94	2,099.96	4.20	0.88	-4.19	0.37	0.08	-32.00
2,125.00	0.68	135.08	2,124.96	3.99	1.09	-3.99	0.13	0.12	-3.44
2,150.00	0.73	137.17	2,149.96	3.77	1.30	-3.76	0.22	0.20	8.36
2,175.00	0.76	145.27	2,174.95	3.52	1.50	-3.51	0.44	0.12	32.40
2,200.00	0.78	145.78	2,199.95	3.24	1.69	-3.23	0.08	0.08	2.04
2,225.00	0.80	140.26	2,224.95	2.97	1.90	-2.95	0.31	0.08	-22.08
2,250.00	0.75	141.02	2,249.95	2.71	2.11	-2.69	0.20	-0.20	3.04
2,275.00	0.80	146.50	2,274.94	2.43	2.31	-2.42	0.36	0.20	21.92
2,300.00	0.83	146.42	2,299.94	2.14	2.51	-2.12	0.12	0.12	-0.32
2,325.00	0.82	145.91	2,324.94	1.84	2.71	-1.82	0.05	-0.04	-2.04
2,350.00	0.80	145.69	2,349.94	1.55	2.91	-1.52	0.08	-0.08	-0.88
2,375.00	0.84	147.34	2,374.93	1.25	3.11	-1.22	0.19	0.16	6.60
2,400.00	0.86	145.94	2,399.93	0.94	3.31	-0.91	0.12	0.08	-5.60
2,425.00	0.85	144.60	2,424.93	0.63	3.52	-0.60	0.09	-0.04	-5.36
2,450.00	0.81	145.69	2,449.93	0.33	3.73	-0.30	0.17	-0.16	4.36

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Design:	Wellbore #1	Database:	EDM 5000.1

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
2,475.00	0.87	148.35	2,474.92	0.03	3.93	0.00	0.29	0.24	10.64
2,500.00	0.95	149.75	2,499.92	-0.31	4.13	0.35	0.33	0.32	5.60
2,525.00	0.92	147.21	2,524.92	-0.66	4.35	0.70	0.20	-0.12	-10.16
2,550.00	0.90	146.45	2,549.91	-0.99	4.56	1.03	0.09	-0.08	-3.04
2,575.00	0.89	149.00	2,574.91	-1.32	4.77	1.36	0.16	-0.04	10.20
2,600.00	0.90	147.12	2,599.91	-1.66	4.98	1.69	0.12	0.04	-7.52
2,625.00	0.92	145.52	2,624.90	-1.99	5.20	2.03	0.13	0.08	-6.40
2,650.00	0.96	144.18	2,649.90	-2.32	5.43	2.36	0.18	0.16	-5.36
2,675.00	0.99	140.66	2,674.90	-2.66	5.69	2.70	0.27	0.12	-14.08
2,700.00	1.02	140.26	2,699.89	-3.00	5.97	3.04	0.12	0.12	-1.60
2,725.00	0.98	142.12	2,724.89	-3.34	6.25	3.38	0.21	-0.16	7.44
2,750.00	1.03	141.75	2,749.89	-3.68	6.52	3.73	0.20	0.20	-1.48
2,775.00	1.02	144.74	2,774.88	-4.04	6.78	4.09	0.22	-0.04	11.96
2,800.00	0.97	144.06	2,799.88	-4.39	7.04	4.45	0.21	-0.20	-2.72
2,825.00	1.09	139.59	2,824.87	-4.75	7.32	4.80	0.58	0.48	-17.88
2,850.00	1.04	139.83	2,849.87	-5.10	7.62	5.16	0.20	-0.20	0.96
2,875.00	1.06	140.00	2,874.87	-5.45	7.91	5.51	0.08	0.08	0.68
2,900.00	1.10	137.20	2,899.86	-5.80	8.22	5.87	0.26	0.16	-11.20
2,925.00	1.16	135.98	2,924.86	-6.16	8.56	6.23	0.26	0.24	-4.88
2,950.00	1.23	136.05	2,949.85	-6.54	8.92	6.61	0.28	0.28	0.28
2,975.00	1.31	129.98	2,974.84	-6.91	9.33	6.98	0.63	0.32	-24.28
3,000.00	1.34	127.41	2,999.84	-7.27	9.78	7.35	0.27	0.12	-10.28
3,025.00	1.41	127.45	3,024.83	-7.64	10.26	7.72	0.28	0.28	0.16
3,050.00	1.50	125.08	3,049.82	-8.01	10.77	8.10	0.43	0.36	-9.48
3,075.00	1.64	123.74	3,074.81	-8.40	11.33	8.49	0.58	0.56	-5.36
3,100.00	1.76	120.47	3,099.80	-8.79	11.96	8.89	0.62	0.48	-13.08
3,125.00	1.88	117.32	3,124.79	-9.18	12.66	9.27	0.62	0.48	-12.60
3,150.00	2.08	116.38	3,149.77	-9.57	13.43	9.67	0.81	0.80	-3.76
3,175.00	2.31	116.00	3,174.76	-9.99	14.29	10.10	0.92	0.92	-1.52
3,200.00	2.45	113.57	3,199.73	-10.42	15.23	10.54	0.69	0.56	-9.72
3,225.00	2.51	110.91	3,224.71	-10.83	16.23	10.96	0.52	0.24	-10.64
3,250.00	2.50	109.97	3,249.69	-11.21	17.25	11.35	0.17	-0.04	-3.76
3,275.00	2.57	109.39	3,274.66	-11.59	18.30	11.73	0.30	0.28	-2.32
3,300.00	2.69	109.30	3,299.64	-11.97	19.38	12.12	0.48	0.48	-0.36
3,325.00	2.57	107.40	3,324.61	-12.33	20.47	12.49	0.59	-0.48	-7.60
3,350.00	2.42	104.06	3,349.59	-12.62	21.51	12.79	0.84	-0.60	-13.36
3,375.00	2.14	99.73	3,374.57	-12.83	22.49	13.00	1.31	-1.12	-17.32
3,400.00	1.97	95.30	3,399.55	-12.95	23.37	13.13	0.93	-0.68	-17.72
3,425.00	1.84	93.40	3,424.54	-13.01	24.20	13.20	0.58	-0.52	-7.60
3,450.00	1.60	91.34	3,449.53	-13.05	24.95	13.24	0.99	-0.96	-8.24
3,475.00	1.57	91.69	3,474.52	-13.06	25.64	13.26	0.13	-0.12	1.40
3,500.00	1.61	91.22	3,499.51	-13.08	26.34	13.28	0.17	0.16	-1.88
3,525.00	1.73	92.91	3,524.50	-13.11	27.06	13.32	0.52	0.48	6.76
3,550.00	1.67	91.30	3,549.48	-13.14	27.81	13.35	0.31	-0.24	-6.44

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Site:	Sec. 12, T 21 S., R 33 E	MD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Well:	Bobwhite 12 State Com 12H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
3,575.00	1.67	90.57	3,574.47	-13.15	28.53	13.37	0.09	0.00	-2.92
3,600.00	1.74	89.39	3,599.46	-13.15	29.28	13.37	0.31	0.28	-4.72
3,625.00	1.77	88.14	3,624.45	-13.13	30.04	13.36	0.19	0.12	-5.00
3,650.00	1.83	88.25	3,649.44	-13.11	30.83	13.34	0.24	0.24	0.44
3,675.00	1.79	86.20	3,674.43	-13.07	31.62	13.31	0.30	-0.16	-8.20
3,700.00	1.41	84.85	3,699.42	-13.01	32.31	13.26	1.53	-1.52	-5.40
3,725.00	0.48	90.01	3,724.41	-12.99	32.72	13.24	3.73	-3.72	20.64
3,750.00	0.13	236.93	3,749.41	-13.00	32.80	13.25	2.37	-1.40	587.68
3,775.00	0.49	251.60	3,774.41	-13.05	32.68	13.30	1.46	1.44	58.68
3,800.00	0.67	247.01	3,799.41	-13.14	32.44	13.39	0.74	0.72	-18.36
3,825.00	0.87	249.56	3,824.41	-13.27	32.13	13.51	0.81	0.80	10.20
3,850.00	0.92	248.28	3,849.41	-13.41	31.77	13.65	0.22	0.20	-5.12
3,875.00	0.93	247.33	3,874.40	-13.56	31.39	13.80	0.07	0.04	-3.80
3,900.00	1.03	249.22	3,899.40	-13.72	31.00	13.95	0.42	0.40	7.56
3,925.00	1.16	245.94	3,924.39	-13.90	30.55	14.13	0.58	0.52	-13.12
3,950.00	1.23	242.83	3,949.39	-14.12	30.08	14.36	0.38	0.28	-12.44
3,975.00	1.26	242.38	3,974.38	-14.37	29.60	14.60	0.13	0.12	-1.80
4,000.00	1.30	239.56	3,999.38	-14.65	29.11	14.87	0.30	0.16	-11.28
4,025.00	1.45	237.65	4,024.37	-14.96	28.60	15.18	0.63	0.60	-7.64
4,050.00	1.52	235.97	4,049.36	-15.31	28.06	15.53	0.33	0.28	-6.72
4,075.00	1.52	239.41	4,074.35	-15.67	27.50	15.88	0.36	0.00	13.76
4,100.00	1.50	237.29	4,099.34	-16.01	26.94	16.22	0.24	-0.08	-8.48
4,125.00	1.61	231.51	4,124.33	-16.41	26.39	16.61	0.77	0.44	-23.12
4,150.00	1.77	235.19	4,149.32	-16.85	25.80	17.05	0.77	0.64	14.72
4,175.00	1.75	234.76	4,174.31	-17.29	25.17	17.48	0.10	-0.08	-1.72
4,200.00	1.72	233.30	4,199.30	-17.73	24.56	17.92	0.21	-0.12	-5.84
4,225.00	1.70	233.29	4,224.29	-18.18	23.96	18.36	0.08	-0.08	-0.04
4,250.00	1.71	230.34	4,249.28	-18.64	23.37	18.82	0.35	0.04	-11.80
4,275.00	1.69	227.32	4,274.27	-19.13	22.82	19.30	0.37	-0.08	-12.08
4,300.00	1.73	227.54	4,299.26	-19.63	22.27	19.80	0.16	0.16	0.88
4,325.00	1.67	225.39	4,324.25	-20.14	21.73	20.31	0.35	-0.24	-8.60
4,350.00	1.57	222.95	4,349.24	-20.65	21.24	20.81	0.49	-0.40	-9.76
4,375.00	1.43	218.56	4,374.23	-21.14	20.81	21.30	0.72	-0.56	-17.56
4,400.00	1.42	215.92	4,399.22	-21.64	20.43	21.79	0.27	-0.04	-10.56
4,425.00	1.35	211.24	4,424.21	-22.14	20.10	22.29	0.53	-0.28	-18.72
4,450.00	1.31	206.83	4,449.20	-22.65	19.82	22.80	0.44	-0.16	-17.64
4,475.00	1.32	204.28	4,474.20	-23.16	19.57	23.31	0.24	0.04	-10.20
4,500.00	1.41	202.47	4,499.19	-23.71	19.33	23.86	0.40	0.36	-7.24
4,525.00	1.56	203.10	4,524.18	-24.31	19.08	24.45	0.60	0.60	2.52
4,550.00	1.73	198.60	4,549.17	-24.98	18.83	25.12	0.85	0.68	-18.00
4,575.00	1.84	197.94	4,574.16	-25.72	18.58	25.86	0.45	0.44	-2.64
4,600.00	1.90	197.79	4,599.15	-26.50	18.33	26.64	0.24	0.24	-0.60
4,625.00	1.83	190.83	4,624.13	-27.28	18.13	27.42	0.95	-0.28	-27.84

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3798.80ft (Scandrill Freedom)
Site:	Sec. 12, T 21 S. , R 33 E	MD Reference:	KB=26' @ 3798.80ft (Scandrill Freedom)
Well:	Bobwhite 12 State Com 12H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,650.00	1.80	183.30	4,649.12	-28.07	18.03	28.20	0.96	-0.12	-30.12
4,675.00	1.77	195.56	4,674.11	-28.83	17.91	28.97	1.53	-0.12	49.04
4,700.00	1.79	194.68	4,699.10	-29.58	17.71	29.71	0.14	0.08	-3.52
4,725.00	1.77	189.68	4,724.09	-30.34	17.54	30.47	0.63	-0.08	-20.00
4,750.00	1.67	188.41	4,749.07	-31.08	17.42	31.21	0.43	-0.40	-5.08
4,775.00	1.67	190.56	4,774.06	-31.80	17.30	31.93	0.25	0.00	8.60
4,800.00	1.49	190.86	4,799.05	-32.47	17.18	32.61	0.72	-0.72	1.20
4,825.00	1.22	194.04	4,824.05	-33.05	17.05	33.18	1.12	-1.08	12.72
4,850.00	1.05	194.75	4,849.04	-33.53	16.93	33.66	0.68	-0.68	2.84
4,875.00	1.03	196.21	4,874.04	-33.97	16.81	34.10	0.13	-0.08	5.84
4,900.00	0.99	198.53	4,899.03	-34.39	16.67	34.52	0.23	-0.16	9.28
4,925.00	0.94	190.48	4,924.03	-34.80	16.57	34.92	0.58	-0.20	-32.20
4,950.00	0.95	188.03	4,949.03	-35.20	16.50	35.33	0.17	0.04	-9.80
4,975.00	0.92	180.73	4,974.02	-35.61	16.47	35.73	0.49	-0.12	-29.20
5,000.00	0.98	192.12	4,999.02	-36.02	16.42	36.14	0.79	0.24	45.56
5,025.00	0.96	196.41	5,024.02	-36.43	16.32	36.55	0.30	-0.08	17.16
5,050.00	1.00	196.32	5,049.01	-36.84	16.20	36.96	0.16	0.16	-0.36
5,075.00	1.08	193.00	5,074.01	-37.28	16.08	37.40	0.40	0.32	-13.28
5,100.00	1.00	198.07	5,099.00	-37.71	15.96	37.84	0.49	-0.32	20.28
5,125.00	1.00	194.91	5,124.00	-38.13	15.84	38.25	0.22	0.00	-12.64
5,150.00	1.00	194.45	5,149.00	-38.56	15.73	38.67	0.03	0.00	-1.84
5,175.00	0.97	196.77	5,173.99	-38.97	15.61	39.09	0.20	-0.12	9.28
5,200.00	0.97	193.95	5,198.99	-39.38	15.50	39.49	0.19	0.00	-11.28
5,225.00	1.00	194.58	5,223.99	-39.79	15.40	39.91	0.13	0.12	2.52
5,250.00	1.01	193.99	5,248.98	-40.22	15.29	40.33	0.06	0.04	-2.36
5,275.00	1.04	194.71	5,273.98	-40.65	15.18	40.77	0.13	0.12	2.88
5,300.00	1.03	193.69	5,298.97	-41.09	15.07	41.20	0.08	-0.04	-4.08
5,325.00	1.07	192.21	5,323.97	-41.54	14.96	41.65	0.19	0.16	-5.92
5,350.00	1.06	191.02	5,348.97	-41.99	14.87	42.10	0.10	-0.04	-4.76
5,375.00	1.06	188.89	5,373.96	-42.45	14.79	42.56	0.16	0.00	-8.52
5,400.00	1.05	192.29	5,398.96	-42.90	14.71	43.01	0.25	-0.04	13.60
5,425.00	1.10	192.71	5,423.95	-43.36	14.60	43.47	0.20	0.20	1.68
5,450.00	1.12	192.29	5,448.95	-43.83	14.50	43.94	0.09	0.08	-1.68
5,475.00	1.12	189.91	5,473.94	-44.31	14.40	44.42	0.19	0.00	-9.52
5,500.00	1.09	188.64	5,498.94	-44.78	14.33	44.89	0.15	-0.12	-5.08
5,525.00	1.12	188.56	5,523.93	-45.26	14.25	45.37	0.12	0.12	-0.32
5,550.00	1.11	193.24	5,548.93	-45.74	14.16	45.85	0.37	-0.04	18.72
5,575.00	1.11	191.27	5,573.92	-46.21	14.06	46.32	0.15	0.00	-7.88
5,600.00	1.12	190.48	5,598.92	-46.69	13.97	46.80	0.07	0.04	-3.16
5,625.00	1.20	191.73	5,623.91	-47.19	13.87	47.29	0.34	0.32	5.00
5,650.00	1.17	191.61	5,648.91	-47.69	13.77	47.80	0.12	-0.12	-0.48
5,675.00	1.18	192.57	5,673.90	-48.19	13.66	48.30	0.09	0.04	3.84
5,700.00	1.19	190.03	5,698.90	-48.70	13.56	48.80	0.21	0.04	-10.16

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Site:	Sec. 12, T 21 S. , R 33 E	MD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Well:	Bobwhite 12 State Com 12H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
5,725.00	1.19	190.23	5,723.89	-49.21	13.47	49.31	0.02	0.00	0.80
5,750.00	1.23	190.26	5,748.89	-49.73	13.37	49.83	0.16	0.16	0.12
5,775.00	1.26	191.50	5,773.88	-50.26	13.27	50.36	0.16	0.12	4.96
5,800.00	1.17	189.65	5,798.88	-50.79	13.17	50.89	0.39	-0.36	-7.40
5,825.00	1.12	190.16	5,823.87	-51.28	13.09	51.38	0.20	-0.20	2.04
5,850.00	0.99	186.85	5,848.87	-51.73	13.02	51.83	0.57	-0.52	-13.24
5,875.00	0.46	167.75	5,873.87	-52.05	13.01	52.14	2.30	-2.12	-76.40
5,900.00	0.35	66.18	5,898.86	-52.11	13.10	52.21	2.53	-0.44	-406.28
5,925.00	0.42	63.21	5,923.86	-52.04	13.26	52.14	0.29	0.28	-11.88
5,950.00	0.45	62.03	5,948.86	-51.95	13.42	52.05	0.13	0.12	-4.72
5,975.00	0.46	63.91	5,973.86	-51.86	13.60	51.97	0.07	0.04	7.52
6,000.00	0.49	60.36	5,998.86	-51.77	13.78	51.87	0.17	0.12	-14.20
6,025.00	0.45	65.48	6,023.86	-51.67	13.97	51.78	0.23	-0.16	20.48
6,050.00	0.44	64.52	6,048.86	-51.59	14.14	51.70	0.05	-0.04	-3.84
6,075.00	0.45	54.44	6,073.86	-51.49	14.31	51.60	0.32	0.04	-40.32
6,100.00	0.47	54.68	6,098.86	-51.38	14.47	51.48	0.08	0.08	0.96
6,125.00	0.53	59.46	6,123.86	-51.26	14.66	51.37	0.29	0.24	19.12
6,150.00	0.49	65.95	6,148.86	-51.15	14.85	51.27	0.28	-0.16	25.96
6,175.00	0.48	64.73	6,173.86	-51.07	15.05	51.18	0.06	-0.04	-4.88
6,200.00	0.47	57.28	6,198.85	-50.97	15.23	51.08	0.25	-0.04	-29.80
6,225.00	0.48	55.04	6,223.85	-50.85	15.40	50.97	0.08	0.04	-8.96
6,250.00	0.47	63.79	6,248.85	-50.75	15.58	50.86	0.29	-0.04	35.00
6,275.00	0.47	61.12	6,273.85	-50.65	15.76	50.77	0.09	0.00	-10.68
6,300.00	0.44	58.65	6,298.85	-50.55	15.93	50.67	0.14	-0.12	-9.88
6,325.00	0.48	58.18	6,323.85	-50.45	16.10	50.57	0.16	0.16	-1.88
6,350.00	0.48	58.25	6,348.85	-50.34	16.28	50.46	0.00	0.00	0.28
6,375.00	0.50	62.82	6,373.85	-50.23	16.46	50.36	0.18	0.08	18.28
6,400.00	0.54	63.02	6,398.85	-50.13	16.67	50.25	0.16	0.16	0.80
6,425.00	0.52	62.55	6,423.85	-50.02	16.87	50.15	0.08	-0.08	-1.88
6,450.00	0.48	61.88	6,448.85	-49.92	17.07	50.05	0.16	-0.16	-2.68
6,475.00	0.47	56.58	6,473.85	-49.81	17.24	49.95	0.18	-0.04	-21.20
6,500.00	0.51	39.09	6,498.84	-49.67	17.40	49.80	0.62	0.16	-69.96
6,525.00	0.74	15.33	6,523.84	-49.43	17.51	49.56	1.37	0.92	-95.04
6,550.00	0.94	1.31	6,548.84	-49.07	17.56	49.20	1.14	0.80	-56.08
6,575.00	0.98	356.90	6,573.84	-48.65	17.55	48.78	0.34	0.16	-17.64
6,600.00	0.96	356.45	6,598.83	-48.23	17.53	48.36	0.09	-0.08	-1.80
6,625.00	1.12	356.26	6,623.83	-47.78	17.50	47.91	0.64	0.64	-0.76
6,650.00	1.09	355.86	6,648.82	-47.29	17.47	47.43	0.12	-0.12	-1.60
6,675.00	1.06	356.33	6,673.82	-46.83	17.43	46.96	0.13	-0.12	1.88
6,700.00	1.11	354.95	6,698.82	-46.35	17.40	46.49	0.23	0.20	-5.52
6,725.00	1.08	353.22	6,723.81	-45.88	17.35	46.01	0.18	-0.12	-6.92
6,750.00	1.12	358.33	6,748.81	-45.40	17.31	45.53	0.42	0.16	20.44
6,775.00	1.13	354.41	6,773.80	-44.91	17.28	45.04	0.31	0.04	-15.68
6,800.00	1.15	352.88	6,798.80	-44.42	17.23	44.55	0.15	0.08	-6.12

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Site:	Sec. 12, T 21 S. , R 33 E	MD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Well:	Bobwhite 12 State Com 12H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,825.00	1.14	354.04	6,823.79	-43.92	17.17	44.05	0.10	-0.04	4.64
6,850.00	1.13	356.76	6,848.79	-43.43	17.13	43.56	0.22	-0.04	10.88
6,875.00	1.09	357.36	6,873.78	-42.94	17.11	43.07	0.17	-0.16	2.40
6,900.00	1.08	357.79	6,898.78	-42.47	17.09	42.60	0.05	-0.04	1.72
6,925.00	1.08	359.76	6,923.77	-42.00	17.08	42.13	0.15	0.00	7.88
6,950.00	1.07	0.30	6,948.77	-41.53	17.08	41.66	0.06	-0.04	2.16
6,975.00	1.12	2.07	6,973.76	-41.05	17.09	41.18	0.24	0.20	7.08
7,000.00	1.13	5.36	6,998.76	-40.56	17.12	40.69	0.26	0.04	13.16
7,025.00	1.11	8.56	7,023.75	-40.08	17.18	40.21	0.26	-0.08	12.80
7,050.00	1.10	8.20	7,048.75	-39.60	17.25	39.73	0.05	-0.04	-1.44
7,075.00	1.06	8.06	7,073.75	-39.14	17.31	39.27	0.16	-0.16	-0.56
7,100.00	1.04	9.33	7,098.74	-38.68	17.38	38.81	0.12	-0.08	5.08
7,125.00	1.09	13.48	7,123.74	-38.23	17.48	38.36	0.37	0.20	16.60
7,150.00	1.10	11.86	7,148.73	-37.76	17.58	37.90	0.13	0.04	-6.48
7,175.00	1.06	12.61	7,173.73	-37.30	17.68	37.44	0.17	-0.16	3.00
7,200.00	1.02	14.57	7,198.72	-36.86	17.79	37.00	0.21	-0.16	7.84
7,225.00	1.02	15.73	7,223.72	-36.43	17.90	36.57	0.08	0.00	4.64
7,250.00	0.99	17.99	7,248.72	-36.01	18.03	36.15	0.20	-0.12	9.04
7,275.00	0.93	22.55	7,273.71	-35.62	18.17	35.76	0.39	-0.24	18.24
7,300.00	0.95	17.35	7,298.71	-35.23	18.31	35.37	0.35	0.08	-20.80
7,325.00	0.92	19.16	7,323.71	-34.84	18.44	34.99	0.17	-0.12	7.24
7,350.00	0.90	19.40	7,348.70	-34.47	18.57	34.61	0.08	-0.08	0.96
7,375.00	0.92	19.87	7,373.70	-34.10	18.71	34.24	0.09	0.08	1.88
7,400.00	0.91	22.05	7,398.70	-33.72	18.85	33.87	0.14	-0.04	8.72
7,425.00	0.82	21.10	7,423.69	-33.37	18.99	33.52	0.36	-0.36	-3.80
7,450.00	0.79	18.70	7,448.69	-33.04	19.11	33.19	0.18	-0.12	-9.60
7,475.00	0.84	23.77	7,473.69	-32.71	19.24	32.86	0.35	0.20	20.28
7,500.00	0.76	23.41	7,498.69	-32.39	19.38	32.54	0.32	-0.32	-1.44
7,525.00	0.71	24.42	7,523.68	-32.10	19.51	32.25	0.21	-0.20	4.04
7,550.00	0.66	26.08	7,548.68	-31.83	19.63	31.98	0.22	-0.20	6.64
7,575.00	0.65	27.20	7,573.68	-31.57	19.76	31.72	0.06	-0.04	4.48
7,600.00	0.65	32.41	7,598.68	-31.33	19.90	31.48	0.24	0.00	20.84
7,625.00	0.60	36.64	7,623.68	-31.10	20.06	31.26	0.27	-0.20	16.92
7,650.00	0.53	37.96	7,648.68	-30.91	20.21	31.06	0.28	-0.28	5.28
7,675.00	0.49	37.46	7,673.68	-30.73	20.34	30.89	0.16	-0.16	-2.00
7,700.00	0.44	51.64	7,698.67	-30.59	20.48	30.74	0.50	-0.20	56.72
7,725.00	0.47	48.59	7,723.67	-30.46	20.63	30.62	0.15	0.12	-12.20
7,750.00	0.49	46.99	7,748.67	-30.32	20.79	30.48	0.10	0.08	-6.40
7,775.00	0.45	41.14	7,773.67	-30.17	20.93	30.33	0.25	-0.16	-23.40
7,800.00	0.48	43.04	7,798.67	-30.02	21.07	30.18	0.13	0.12	7.60
7,825.00	0.48	47.17	7,823.67	-29.87	21.22	30.03	0.14	0.00	16.52
7,850.00	0.46	57.24	7,848.67	-29.75	21.38	29.91	0.34	-0.08	40.28
7,875.00	0.48	52.34	7,873.67	-29.63	21.55	29.79	0.18	0.08	-19.60

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Site:	Sec. 12, T 21 S. , R 33 E	MD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Well:	Bobwhite 12 State Com 12H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
7,900.00	0.45	50.05	7,898.67	-29.50	21.70	29.67	0.14	-0.12	-9.16	
7,925.00	0.41	48.55	7,923.67	-29.38	21.85	29.55	0.17	-0.16	-6.00	
7,950.00	0.43	48.22	7,948.67	-29.26	21.98	29.43	0.08	0.08	-1.32	
7,975.00	0.39	49.81	7,973.67	-29.14	22.12	29.31	0.17	-0.16	6.36	
8,000.00	0.31	57.65	7,998.67	-29.05	22.24	29.22	0.37	-0.32	31.36	
8,025.00	0.34	53.58	8,023.66	-28.97	22.36	29.14	0.15	0.12	-16.28	
8,050.00	0.35	40.97	8,048.66	-28.87	22.47	29.04	0.31	0.04	-50.44	
8,075.00	0.37	38.68	8,073.66	-28.75	22.57	28.92	0.10	0.08	-9.16	
8,100.00	0.35	43.67	8,098.66	-28.63	22.67	28.80	0.15	-0.08	19.96	
8,125.00	0.48	43.43	8,123.66	-28.50	22.79	28.67	0.52	0.52	-0.96	
8,150.00	0.52	43.58	8,148.66	-28.34	22.94	28.51	0.16	0.16	0.60	
8,175.00	0.48	46.31	8,173.66	-28.18	23.10	28.36	0.19	-0.16	10.92	
8,200.00	0.50	46.75	8,198.66	-28.04	23.25	28.21	0.08	0.08	1.76	
8,225.00	0.55	45.04	8,223.66	-27.88	23.42	28.06	0.21	0.20	-6.84	
8,250.00	0.55	45.92	8,248.66	-27.71	23.59	27.89	0.03	0.00	3.52	
8,275.00	0.51	46.64	8,273.66	-27.55	23.76	27.73	0.16	-0.16	2.88	
8,300.00	0.54	48.67	8,298.66	-27.40	23.93	27.58	0.14	0.12	8.12	
8,325.00	0.58	47.88	8,323.65	-27.23	24.11	27.42	0.16	0.16	-3.16	
8,350.00	0.53	45.08	8,348.65	-27.07	24.28	27.25	0.23	-0.20	-11.20	
8,375.00	0.48	31.37	8,373.65	-26.89	24.42	27.08	0.52	-0.20	-54.84	
8,400.00	0.54	7.41	8,398.65	-26.69	24.49	26.88	0.88	0.24	-95.84	
8,425.00	0.79	331.28	8,423.65	-26.42	24.42	26.61	1.90	1.00	-144.52	
8,450.00	1.01	324.75	8,448.65	-26.09	24.21	26.27	0.97	0.88	-26.12	
8,475.00	0.95	323.42	8,473.64	-25.74	23.96	25.93	0.26	-0.24	-5.32	
8,500.00	0.90	321.37	8,498.64	-25.42	23.72	25.60	0.24	-0.20	-8.20	
8,525.00	0.95	321.02	8,523.64	-25.11	23.46	25.29	0.20	0.20	-1.40	
8,550.00	0.96	322.42	8,548.63	-24.78	23.20	24.96	0.10	0.04	5.60	
8,575.00	0.94	319.94	8,573.63	-24.46	22.94	24.63	0.18	-0.08	-9.92	
8,600.00	1.07	320.49	8,598.63	-24.12	22.66	24.30	0.52	0.52	2.20	
8,625.00	1.05	319.18	8,623.62	-23.77	22.37	23.94	0.13	-0.08	-5.24	
8,650.00	1.10	316.87	8,648.62	-23.42	22.05	23.59	0.26	0.20	-9.24	
8,675.00	1.13	316.05	8,673.61	-23.07	21.72	23.23	0.14	0.12	-3.28	
8,700.00	1.18	317.03	8,698.61	-22.70	21.37	22.87	0.22	0.20	3.92	
8,725.00	1.14	315.06	8,723.60	-22.34	21.02	22.50	0.23	-0.16	-7.88	
8,750.00	1.10	311.66	8,748.60	-22.00	20.66	22.16	0.31	-0.16	-13.60	
8,775.00	1.14	314.52	8,773.59	-21.67	20.31	21.82	0.27	0.16	11.44	
8,800.00	1.13	314.70	8,798.59	-21.32	19.96	21.47	0.04	-0.04	0.72	
8,825.00	1.11	313.37	8,823.58	-20.98	19.60	21.13	0.13	-0.08	-5.32	
8,850.00	1.06	312.80	8,848.58	-20.66	19.26	20.80	0.20	-0.20	-2.28	
8,875.00	1.14	313.33	8,873.57	-20.33	18.91	20.47	0.32	0.32	2.12	
8,900.00	1.16	311.96	8,898.57	-19.99	18.54	20.13	0.14	0.08	-5.48	
8,925.00	1.19	311.13	8,923.56	-19.65	18.16	19.79	0.14	0.12	-3.32	
8,950.00	1.35	313.55	8,948.56	-19.28	17.75	19.41	0.67	0.64	9.68	

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3798.80ft (Scandrift Freedom)
Site:	Sec. 12, T 21 S., R 33 E	MD Reference:	KB=26' @ 3798.80ft (Scandrift Freedom)
Well:	Bobwhite 12 State Com 12H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
8,975.00	1.30	309.57	8,973.55	-18.89	17.31	19.02	0.42	-0.20	-15.92
9,000.00	1.19	308.35	8,998.54	-18.55	16.89	18.68	0.45	-0.44	-4.88
9,025.00	1.16	307.73	9,023.54	-18.23	16.49	18.36	0.13	-0.12	-2.48
9,050.00	1.22	307.12	9,048.53	-17.92	16.08	18.04	0.25	0.24	-2.44
9,075.00	1.15	309.68	9,073.53	-17.60	15.67	17.72	0.35	-0.28	10.24
9,100.00	1.09	313.97	9,098.52	-17.27	15.31	17.39	0.41	-0.24	17.16
9,125.00	1.09	317.40	9,123.52	-16.93	14.97	17.05	0.26	0.00	13.72
9,150.00	1.12	315.45	9,148.51	-16.58	14.64	16.70	0.19	0.12	-7.80
9,175.00	1.04	311.41	9,173.51	-16.26	14.30	16.37	0.44	-0.32	-16.16
9,200.00	0.92	309.02	9,198.51	-15.98	13.97	16.09	0.51	-0.48	-9.56
9,225.00	0.89	302.21	9,223.50	-15.75	13.65	15.86	0.45	-0.12	-27.24
9,250.00	0.79	297.70	9,248.50	-15.57	13.34	15.67	0.48	-0.40	-18.04
9,275.00	0.80	296.78	9,273.50	-15.41	13.03	15.51	0.06	0.04	-3.68
9,300.00	0.91	297.06	9,298.50	-15.24	12.70	15.34	0.44	0.44	1.12
9,325.00	0.91	293.21	9,323.49	-15.07	12.34	15.17	0.24	0.00	-15.40
9,350.00	1.00	293.23	9,348.49	-14.91	11.95	15.00	0.36	0.36	0.08
9,375.00	1.10	291.58	9,373.48	-14.73	11.53	14.82	0.42	0.40	-6.60
9,400.00	1.12	292.93	9,398.48	-14.55	11.08	14.64	0.13	0.08	5.40
9,425.00	1.20	295.61	9,423.47	-14.34	10.62	14.42	0.39	0.32	10.72
9,450.00	1.38	296.79	9,448.47	-14.09	10.12	14.17	0.73	0.72	4.72
9,475.00	1.57	298.30	9,473.46	-13.80	9.55	13.87	0.78	0.76	6.04
9,500.00	1.65	299.47	9,498.45	-13.46	8.93	13.52	0.35	0.32	4.68
9,525.00	1.75	297.85	9,523.44	-13.10	8.28	13.16	0.44	0.40	-6.48
9,550.00	1.77	297.37	9,548.43	-12.75	7.60	12.80	0.10	0.08	-1.92
9,575.00	1.76	299.92	9,573.42	-12.38	6.92	12.43	0.32	-0.04	10.20
9,600.00	1.60	299.80	9,598.40	-12.01	6.29	12.06	0.64	-0.64	-0.48
9,625.00	1.21	301.49	9,623.40	-11.70	5.76	11.74	1.57	-1.56	6.76
9,650.00	0.93	307.75	9,648.39	-11.44	5.38	11.48	1.21	-1.12	25.04
9,675.00	0.93	316.00	9,673.39	-11.17	5.07	11.21	0.54	0.00	33.00
9,700.00	1.04	322.43	9,698.39	-10.84	4.79	10.88	0.62	0.44	25.72
9,725.00	1.20	333.17	9,723.38	-10.43	4.54	10.46	1.05	0.64	42.96
9,750.00	1.30	336.88	9,748.38	-9.93	4.31	9.97	0.51	0.40	14.84
9,775.00	1.37	338.45	9,773.37	-9.40	4.09	9.43	0.32	0.28	6.28
9,800.00	1.31	339.89	9,798.36	-8.85	3.88	8.88	0.28	-0.24	5.76
9,825.00	1.25	338.99	9,823.36	-8.33	3.68	8.35	0.25	-0.24	-3.60
9,850.00	1.21	338.69	9,848.35	-7.83	3.49	7.85	0.16	-0.16	-1.20
9,875.00	1.12	338.87	9,873.34	-7.35	3.31	7.38	0.36	-0.36	0.72
9,900.00	1.02	331.47	9,898.34	-6.93	3.11	6.95	0.68	-0.40	-29.60
9,925.00	0.89	331.34	9,923.34	-6.56	2.91	6.58	0.52	-0.52	-0.52
9,950.00	0.87	331.64	9,948.33	-6.23	2.73	6.25	0.08	-0.08	1.20
9,975.00	0.82	332.69	9,973.33	-5.90	2.56	5.92	0.21	-0.20	4.20
10,000.00	0.71	335.35	9,998.33	-5.60	2.41	5.62	0.46	-0.44	10.64
10,025.00	0.60	338.87	10,023.33	-5.34	2.30	5.35	0.47	-0.44	14.08
10,050.00	0.54	342.65	10,048.33	-5.10	2.22	5.12	0.28	-0.24	15.12

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Site:	Sec. 12, T 21 S., R 33 E	MD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Well:	Bobwhite 12 State Com 12H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,075.00	0.55	340.61	10,073.32	-4.88	2.14	4.89	0.09	0.04	-8.16
10,100.00	0.52	341.44	10,098.32	-4.66	2.06	4.67	0.12	-0.12	3.32
10,125.00	0.53	340.26	10,123.32	-4.44	1.99	4.45	0.06	0.04	-4.72
10,150.00	0.48	343.25	10,148.32	-4.23	1.92	4.24	0.23	-0.20	11.96
10,175.00	0.40	336.34	10,173.32	-4.05	1.86	4.06	0.38	-0.32	-27.64
10,200.00	0.44	338.68	10,198.32	-3.88	1.79	3.89	0.17	0.16	9.36
10,225.00	0.38	341.38	10,223.32	-3.71	1.72	3.73	0.25	-0.24	10.80
10,250.00	0.26	346.91	10,248.32	-3.58	1.68	3.59	0.50	-0.48	22.12
10,275.00	0.23	357.90	10,273.32	-3.47	1.67	3.49	0.22	-0.12	43.96
10,300.00	0.18	22.33	10,298.32	-3.39	1.68	3.40	0.40	-0.20	97.72
10,309.00	0.15	39.43	10,307.32	-3.36	1.70	3.38	0.64	-0.33	190.00
10,313.00	0.16	94.43	10,311.32	-3.36	1.70	3.37	3.59	0.25	1,375.00
First MWD Survey @ 10313'MD									
10,344.00	0.14	75.56	10,342.32	-3.36	1.78	3.37	0.17	-0.06	-60.87
10,376.00	0.13	34.22	10,374.32	-3.32	1.84	3.33	0.30	-0.03	-129.19
10,407.00	0.32	11.12	10,405.32	-3.20	1.88	3.22	0.67	0.61	-74.52
10,469.00	2.49	190.72	10,467.30	-4.36	1.66	4.37	4.53	3.50	289.68
10,500.00	7.91	186.34	10,498.16	-7.14	1.30	7.15	17.52	17.48	-14.13
10,547.00	15.34	183.72	10,544.17	-16.57	0.54	16.57	15.84	15.81	-5.57
10,594.00	19.13	181.23	10,589.05	-30.48	-0.03	30.48	8.21	8.06	-5.30
10,641.00	24.48	181.47	10,632.67	-47.93	-0.44	47.92	11.38	11.38	0.51
10,687.00	29.31	184.50	10,673.68	-68.69	-1.57	68.68	10.91	10.50	6.59
10,734.00	32.20	180.59	10,714.07	-92.69	-2.61	92.67	7.47	6.15	-8.32
10,781.00	38.49	178.10	10,752.39	-119.86	-2.25	119.84	13.73	13.38	-5.30
10,797.14	40.37	177.62	10,764.86	-130.10	-1.87	130.08	11.79	11.64	-2.96
North 330' Hardline Crossing @ 10797.14'MD									
10,821.00	43.15	176.98	10,782.66	-145.97	-1.12	145.96	11.79	11.66	-2.69
10,829.00	43.85	176.95	10,788.46	-151.47	-0.82	151.46	8.80	8.80	-0.41
Bobwhite 12 St 12H FTP									
10,871.00	47.55	176.79	10,817.79	-181.48	0.82	181.48	8.80	8.80	-0.38
10,918.00	52.16	176.90	10,848.08	-217.34	2.80	217.36	9.81	9.81	0.23
10,965.00	56.79	177.97	10,875.38	-255.55	4.50	255.57	10.02	9.85	2.28
11,012.00	60.25	179.44	10,899.92	-295.61	5.39	295.64	7.83	7.36	3.13
11,059.00	65.11	180.71	10,921.49	-337.36	5.33	337.39	10.62	10.34	2.70
11,106.00	70.37	181.26	10,939.29	-380.83	4.58	380.85	11.24	11.19	1.17
11,153.00	76.14	181.51	10,952.82	-425.81	3.49	425.82	12.29	12.28	0.53
11,206.00	84.99	181.14	10,961.50	-478.02	2.28	478.03	16.71	16.70	-0.70
11,278.00	93.21	180.12	10,962.63	-549.95	1.49	549.94	11.50	11.42	-1.42
11,372.00	91.55	180.15	10,958.73	-643.86	1.27	643.85	1.77	-1.77	0.03
11,465.00	88.64	180.00	10,958.57	-736.85	1.15	736.84	3.13	-3.13	-0.16
11,558.00	89.23	180.29	10,960.30	-829.84	0.91	829.82	0.71	0.63	0.31
11,651.00	90.43	180.66	10,960.58	-922.83	0.14	922.80	1.35	1.29	0.40
11,745.00	89.57	180.57	10,960.58	-1,016.82	-0.87	1,016.79	0.92	-0.91	-0.10

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Site:	Sec. 12, T 21 S., R 33 E	MD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Well:	Bobwhite 12 State Com 12H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
11,839.00	87.66	179.62	10,962.85	-1,110.79	-1.02	1,110.75	2.27	-2.03	-1.01
11,932.00	86.79	180.06	10,967.35	-1,203.68	-0.76	1,203.64	1.05	-0.94	0.47
12,025.00	87.27	179.20	10,972.17	-1,296.55	-0.16	1,296.51	1.06	0.52	-0.92
12,119.00	86.06	179.08	10,977.64	-1,390.38	1.25	1,390.35	1.29	-1.29	-0.13
12,213.00	85.95	178.81	10,984.19	-1,484.14	2.97	1,484.11	0.31	-0.12	-0.29
12,228.57	86.09	178.79	10,985.27	-1,499.66	3.30	1,499.64	0.88	0.87	-0.14
Bobwhite 12 St 12H T@ 1500' VS									
12,228.60	86.09	178.79	10,985.27	-1,499.69	3.30	1,499.67	0.88	0.87	-0.14
Bobwhite 12 St 12H T@1500' VS									
12,306.00	86.76	178.68	10,990.10	-1,576.92	5.00	1,576.92	0.88	0.87	-0.14
12,400.00	89.20	178.41	10,993.41	-1,670.83	7.39	1,670.84	2.61	2.60	-0.29
12,493.00	89.06	178.00	10,994.83	-1,763.77	10.30	1,763.80	0.47	-0.15	-0.44
12,587.00	89.93	177.74	10,995.66	-1,857.70	13.80	1,857.75	0.97	0.93	-0.28
12,680.00	90.83	177.59	10,995.04	-1,950.62	17.58	1,950.70	0.98	0.97	-0.16
12,773.00	90.46	177.06	10,993.99	-2,043.51	21.93	2,043.62	0.69	-0.40	-0.57
12,867.00	89.96	177.71	10,993.65	-2,137.42	26.21	2,137.55	0.87	-0.53	0.69
12,961.00	90.24	177.33	10,993.48	-2,231.33	30.28	2,231.49	0.50	0.30	-0.40
13,054.00	89.93	178.09	10,993.35	-2,324.25	34.00	2,324.44	0.88	-0.33	0.82
13,147.00	89.45	178.24	10,993.85	-2,417.20	36.98	2,417.42	0.54	-0.52	0.16
13,229.36	90.12	179.46	10,994.16	-2,499.54	38.63	2,499.76	1.69	0.82	1.48
Bobwhite 12 St 12H T@ 2500' VS									
13,240.00	90.21	179.62	10,994.12	-2,510.18	38.71	2,510.41	1.69	0.82	1.48
13,333.00	89.45	179.11	10,994.40	-2,603.18	39.74	2,603.40	0.98	-0.82	-0.55
13,427.00	88.22	179.82	10,996.31	-2,697.15	40.62	2,697.38	1.51	-1.31	0.76
13,520.00	89.76	180.33	10,997.95	-2,790.13	40.50	2,790.36	1.74	1.66	0.55
13,614.00	90.94	180.72	10,997.38	-2,884.12	39.64	2,884.34	1.32	1.26	0.41
13,707.00	91.16	180.62	10,995.67	-2,977.10	38.55	2,977.31	0.26	0.24	-0.11
13,801.00	91.72	180.92	10,993.31	-3,071.06	37.29	3,071.26	0.68	0.60	0.32
13,894.00	91.13	180.79	10,991.00	-3,164.02	35.90	3,164.21	0.65	-0.63	-0.14
13,988.00	90.32	180.40	10,989.81	-3,258.01	34.92	3,258.18	0.96	-0.86	-0.41
14,081.00	89.59	180.42	10,989.88	-3,351.01	34.26	3,351.17	0.79	-0.78	0.02
14,175.00	90.04	180.59	10,990.18	-3,445.00	33.43	3,445.16	0.51	0.48	0.18
14,269.00	90.80	180.60	10,989.50	-3,539.00	32.45	3,539.14	0.81	0.81	0.01
14,363.00	90.66	180.51	10,988.30	-3,632.98	31.54	3,633.12	0.18	-0.15	-0.10
14,457.00	90.13	180.25	10,987.65	-3,726.98	30.92	3,727.11	0.63	-0.56	-0.28
14,550.00	89.06	180.55	10,988.31	-3,819.97	30.27	3,820.09	1.19	-1.15	0.32
14,644.00	89.20	180.39	10,989.73	-3,913.96	29.50	3,914.07	0.23	0.15	-0.17
14,737.00	89.68	180.66	10,990.64	-4,006.95	28.65	4,007.05	0.59	0.52	0.29
14,831.00	88.73	179.93	10,991.95	-4,100.94	28.16	4,101.03	1.27	-1.01	-0.78
14,891.00	88.11	180.09	10,993.60	-4,160.91	28.15	4,161.01	1.07	-1.03	0.27
14,984.00	87.35	180.07	10,997.29	-4,253.84	28.02	4,253.93	0.82	-0.82	-0.02
15,078.00	86.82	179.58	11,002.07	-4,347.72	28.31	4,347.81	0.77	-0.56	-0.52
15,171.00	86.26	179.63	11,007.68	-4,440.55	28.95	4,440.64	0.60	-0.60	0.05
15,265.00	86.37	179.25	11,013.72	-4,534.35	29.87	4,534.44	0.42	0.12	-0.40

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 12H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Site:	Sec. 12, T 21 S. , R 33 E	MD Reference:	KB=26' @ 3798.80ft (Scandril Freedom)
Well:	Bobwhite 12 State Com 12H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
15,359.00	86.51	179.80	11,019.56	-4,628.16	30.64	4,628.26	0.60	0.15	0.59	
15,432.83	87.29	180.14	11,023.55	-4,701.88	30.68	4,701.98	1.15	1.05	0.46	
Bobwhite 12 St 12H LTP										
15,452.00	87.49	180.23	11,024.42	-4,721.03	30.62	4,721.13	1.15	1.05	0.46	
15,480.67	87.44	179.99	11,025.69	-4,749.67	30.57	4,749.77	0.87	-0.18	-0.85	
South 330' Hardline Crossing @ 15480.67'MD										
15,545.00	87.32	179.44	11,028.63	-4,813.94	30.89	4,814.03	0.87	-0.18	-0.85	
Final MWD Survey @ 15545'MD										
15,601.00	87.32	179.44	11,031.25	-4,869.87	31.43	4,869.97	0.00	0.00	0.00	
Projection to TD @ 15601'MD - Bobwhite 12 St 12H BHL										

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment	
		+N/-S (ft)	+E/-W (ft)		
10,313.00	10,311.32	-3.36	1.70	First MWD Survey @ 10313'MD	
10,797.14	10,764.86	-130.10	-1.87	North 330' Hardline Crossing @ 10797.14'MD	
15,480.67	11,025.69	-4,749.67	30.57	South 330' Hardline Crossing @ 15480.67'MD	
15,545.00	11,028.63	-4,813.94	30.89	Final MWD Survey @ 15545'MD	
15,601.00	11,031.25	-4,869.87	31.43	Projection to TD @ 15601'MD	

Checked By: _____ Approved By: _____ Date: _____