



COG Operating L L C

Lea County, NM (NAD27 NME)

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

Bobwhite 12 State Com 7H

Wellbore #1

Plan: Plan #1

Standard Survey Report

02 June, 2017





Integrity Directional Services, LLC
Survey Report



Company: COG Operating L L C
Project: Lea County, NM (NAD27 NME)
Site: Sec. 12, T 21 S. , R 33 E
Well: Bobwhite 12 State Com 7H
Wellbore: Wellbore #1
Design: Plan #1

Local Co-ordinate Reference: Well Bobwhite 12 State Com 7H
TVD Reference: KB=20' @ 3787.70ft
MD Reference: KB=20' @ 3787.70ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

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:	546,532.4000 usft
From:	Map	Easting:	749,682.1000 usft
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "
		Latitude:	32.4999217
		Longitude:	-103.5234801
		Grid Convergence:	0.44 °

Well	Bobwhite 12 State Com 7H		
Well Position	+N/-S	0.00 ft	Northing: 546,526.8000 usft
	+E/-W	0.00 ft	Easting: 750,082.4000 usft
Position Uncertainty	0.00 ft	Wellhead Elevation:	0.00 ft
		Latitude:	32.4998979
		Longitude:	-103.5221819
		Ground Level:	3,767.70 ft

Wellbore	Wellbore #1		
Magnetics	Model Name	Sample Date	Declination (°)
	HDGM	6/1/2017	6.80
			Dip Angle (°)
			60.43
			Field Strength (nT)
			48,299

Design	Plan #1		
Audit Notes:			
Version:	Phase:	PLAN	Tie On Depth: 0.00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(ft)	(ft)	(ft)
	0.00	0.00	0.00
			Direction (°)
			180.39

Survey Tool Program	Date 6/2/2017		
From	To	Survey (Wellbore)	Tool Name
(ft)	(ft)		
0.00	15,244.42	Plan #1 (Wellbore #1)	MWD
			Description
			MWD - Standard

Planned Survey									
Measured Depth	Inclination	Azimuth	Vertical Depth	+N/-S	+E/-W	Vertical Section	Dogleg Rate	Build Rate	Turn Rate
(ft)	(°)	(°)	(ft)	(ft)	(ft)	(ft)	(°/100usft)	(°/100usft)	(°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00



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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)
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00
1,900.00	0.00	0.00	1,900.00	0.00	0.00	0.00	0.00	0.00	0.00
2,000.00	0.00	0.00	2,000.00	0.00	0.00	0.00	0.00	0.00	0.00
2,100.00	0.00	0.00	2,100.00	0.00	0.00	0.00	0.00	0.00	0.00
2,200.00	0.00	0.00	2,200.00	0.00	0.00	0.00	0.00	0.00	0.00
2,300.00	0.00	0.00	2,300.00	0.00	0.00	0.00	0.00	0.00	0.00
2,400.00	0.00	0.00	2,400.00	0.00	0.00	0.00	0.00	0.00	0.00
2,500.00	0.00	0.00	2,500.00	0.00	0.00	0.00	0.00	0.00	0.00
2,600.00	0.00	0.00	2,600.00	0.00	0.00	0.00	0.00	0.00	0.00
2,700.00	0.00	0.00	2,700.00	0.00	0.00	0.00	0.00	0.00	0.00
2,800.00	0.00	0.00	2,800.00	0.00	0.00	0.00	0.00	0.00	0.00
2,900.00	0.00	0.00	2,900.00	0.00	0.00	0.00	0.00	0.00	0.00
3,000.00	0.00	0.00	3,000.00	0.00	0.00	0.00	0.00	0.00	0.00
3,100.00	0.00	0.00	3,100.00	0.00	0.00	0.00	0.00	0.00	0.00
3,200.00	0.00	0.00	3,200.00	0.00	0.00	0.00	0.00	0.00	0.00
3,300.00	0.00	0.00	3,300.00	0.00	0.00	0.00	0.00	0.00	0.00
3,400.00	0.00	0.00	3,400.00	0.00	0.00	0.00	0.00	0.00	0.00
3,500.00	0.00	0.00	3,500.00	0.00	0.00	0.00	0.00	0.00	0.00
3,600.00	0.00	0.00	3,600.00	0.00	0.00	0.00	0.00	0.00	0.00
3,700.00	0.00	0.00	3,700.00	0.00	0.00	0.00	0.00	0.00	0.00
3,800.00	0.00	0.00	3,800.00	0.00	0.00	0.00	0.00	0.00	0.00
3,900.00	0.00	0.00	3,900.00	0.00	0.00	0.00	0.00	0.00	0.00
4,000.00	0.00	0.00	4,000.00	0.00	0.00	0.00	0.00	0.00	0.00
4,100.00	0.00	0.00	4,100.00	0.00	0.00	0.00	0.00	0.00	0.00
4,200.00	0.00	0.00	4,200.00	0.00	0.00	0.00	0.00	0.00	0.00
4,300.00	0.00	0.00	4,300.00	0.00	0.00	0.00	0.00	0.00	0.00
4,400.00	0.00	0.00	4,400.00	0.00	0.00	0.00	0.00	0.00	0.00
4,500.00	0.00	0.00	4,500.00	0.00	0.00	0.00	0.00	0.00	0.00
4,600.00	0.00	0.00	4,600.00	0.00	0.00	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,700.00	0.00	0.00	0.00	0.00	0.00	0.00
4,800.00	0.00	0.00	4,800.00	0.00	0.00	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,900.00	0.00	0.00	0.00	0.00	0.00	0.00
5,000.00	0.00	0.00	5,000.00	0.00	0.00	0.00	0.00	0.00	0.00
5,100.00	0.00	0.00	5,100.00	0.00	0.00	0.00	0.00	0.00	0.00
5,200.00	0.00	0.00	5,200.00	0.00	0.00	0.00	0.00	0.00	0.00
5,300.00	0.00	0.00	5,300.00	0.00	0.00	0.00	0.00	0.00	0.00



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5,400.00	0.00	0.00	5,400.00	0.00	0.00	0.00	0.00	0.00	0.00
5,500.00	0.00	0.00	5,500.00	0.00	0.00	0.00	0.00	0.00	0.00
5,600.00	0.00	0.00	5,600.00	0.00	0.00	0.00	0.00	0.00	0.00
5,700.00	0.00	0.00	5,700.00	0.00	0.00	0.00	0.00	0.00	0.00
5,800.00	0.00	0.00	5,800.00	0.00	0.00	0.00	0.00	0.00	0.00
5,900.00	0.00	0.00	5,900.00	0.00	0.00	0.00	0.00	0.00	0.00
6,000.00	0.00	0.00	6,000.00	0.00	0.00	0.00	0.00	0.00	0.00
6,100.00	0.00	0.00	6,100.00	0.00	0.00	0.00	0.00	0.00	0.00
6,200.00	0.00	0.00	6,200.00	0.00	0.00	0.00	0.00	0.00	0.00
6,300.00	0.00	0.00	6,300.00	0.00	0.00	0.00	0.00	0.00	0.00
6,400.00	0.00	0.00	6,400.00	0.00	0.00	0.00	0.00	0.00	0.00
6,500.00	0.00	0.00	6,500.00	0.00	0.00	0.00	0.00	0.00	0.00
6,600.00	0.00	0.00	6,600.00	0.00	0.00	0.00	0.00	0.00	0.00
6,700.00	0.00	0.00	6,700.00	0.00	0.00	0.00	0.00	0.00	0.00
6,800.00	0.00	0.00	6,800.00	0.00	0.00	0.00	0.00	0.00	0.00
6,900.00	0.00	0.00	6,900.00	0.00	0.00	0.00	0.00	0.00	0.00
7,000.00	0.00	0.00	7,000.00	0.00	0.00	0.00	0.00	0.00	0.00
7,100.00	0.00	0.00	7,100.00	0.00	0.00	0.00	0.00	0.00	0.00
7,200.00	0.00	0.00	7,200.00	0.00	0.00	0.00	0.00	0.00	0.00
7,300.00	0.00	0.00	7,300.00	0.00	0.00	0.00	0.00	0.00	0.00
7,400.00	0.00	0.00	7,400.00	0.00	0.00	0.00	0.00	0.00	0.00
7,500.00	0.00	0.00	7,500.00	0.00	0.00	0.00	0.00	0.00	0.00
7,600.00	0.00	0.00	7,600.00	0.00	0.00	0.00	0.00	0.00	0.00
7,700.00	0.00	0.00	7,700.00	0.00	0.00	0.00	0.00	0.00	0.00
7,800.00	0.00	0.00	7,800.00	0.00	0.00	0.00	0.00	0.00	0.00
7,900.00	0.00	0.00	7,900.00	0.00	0.00	0.00	0.00	0.00	0.00
8,000.00	0.00	0.00	8,000.00	0.00	0.00	0.00	0.00	0.00	0.00
8,100.00	0.00	0.00	8,100.00	0.00	0.00	0.00	0.00	0.00	0.00
8,200.00	0.00	0.00	8,200.00	0.00	0.00	0.00	0.00	0.00	0.00
8,300.00	0.00	0.00	8,300.00	0.00	0.00	0.00	0.00	0.00	0.00
8,400.00	0.00	0.00	8,400.00	0.00	0.00	0.00	0.00	0.00	0.00
8,500.00	0.00	0.00	8,500.00	0.00	0.00	0.00	0.00	0.00	0.00
8,600.00	0.00	0.00	8,600.00	0.00	0.00	0.00	0.00	0.00	0.00
8,700.00	0.00	0.00	8,700.00	0.00	0.00	0.00	0.00	0.00	0.00
8,800.00	0.00	0.00	8,800.00	0.00	0.00	0.00	0.00	0.00	0.00
8,900.00	0.00	0.00	8,900.00	0.00	0.00	0.00	0.00	0.00	0.00
9,000.00	0.00	0.00	9,000.00	0.00	0.00	0.00	0.00	0.00	0.00
9,100.00	0.00	0.00	9,100.00	0.00	0.00	0.00	0.00	0.00	0.00
9,200.00	0.00	0.00	9,200.00	0.00	0.00	0.00	0.00	0.00	0.00
9,300.00	0.00	0.00	9,300.00	0.00	0.00	0.00	0.00	0.00	0.00
9,400.00	0.00	0.00	9,400.00	0.00	0.00	0.00	0.00	0.00	0.00
9,500.00	0.00	0.00	9,500.00	0.00	0.00	0.00	0.00	0.00	0.00
9,600.00	0.00	0.00	9,600.00	0.00	0.00	0.00	0.00	0.00	0.00



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9,700.00	0.00	0.00	9,700.00	0.00	0.00	0.00	0.00	0.00	0.00
9,800.00	0.00	0.00	9,800.00	0.00	0.00	0.00	0.00	0.00	0.00
9,900.00	0.00	0.00	9,900.00	0.00	0.00	0.00	0.00	0.00	0.00
10,000.00	0.00	0.00	10,000.00	0.00	0.00	0.00	0.00	0.00	0.00
10,087.53	0.00	0.00	10,087.53	0.00	0.00	0.00	0.00	0.00	0.00
Start Build 12.00									
10,100.00	1.50	186.75	10,100.00	-0.16	-0.02	0.16	12.00	12.00	0.00
10,200.00	13.50	186.75	10,198.96	-13.09	-1.55	13.10	12.00	12.00	0.00
10,300.00	25.50	186.75	10,293.06	-46.18	-5.47	46.21	12.00	12.00	0.00
10,400.00	37.50	186.75	10,378.17	-97.96	-11.59	98.04	12.00	12.00	0.00
10,500.00	49.50	186.75	10,450.58	-166.19	-19.67	166.32	12.00	12.00	0.00
10,600.00	61.50	186.75	10,507.12	-247.88	-29.34	248.07	12.00	12.00	0.00
10,700.00	73.50	186.75	10,545.32	-339.46	-40.18	339.72	12.00	12.00	0.00
10,800.00	85.50	186.75	10,563.52	-436.92	-51.71	437.26	12.00	12.00	0.00
10,832.57	89.41	186.75	10,564.97	-469.23	-55.54	469.59	12.00	12.00	0.00
Start DLS 4.00 TFO -90.03									
10,900.00	89.40	184.05	10,565.67	-536.35	-61.88	536.75	4.00	0.00	-4.00
11,000.00	89.41	180.05	10,566.71	-636.26	-65.46	636.69	4.00	0.00	-4.00
11,012.33	89.41	179.56	10,566.84	-648.59	-65.42	649.01	4.00	0.00	-4.00
Start 1751.26 hold at 11012.33 MD									
11,100.00	89.41	179.56	10,567.75	-736.25	-64.75	736.67	0.00	0.00	0.00
11,200.00	89.41	179.56	10,568.78	-836.24	-63.98	836.65	0.00	0.00	0.00
11,300.00	89.41	179.56	10,569.82	-936.24	-63.21	936.64	0.00	0.00	0.00
11,400.00	89.41	179.56	10,570.86	-1,036.23	-62.44	1,036.62	0.00	0.00	0.00
11,500.00	89.41	179.56	10,571.90	-1,136.22	-61.67	1,136.61	0.00	0.00	0.00
11,600.00	89.41	179.56	10,572.93	-1,236.21	-60.90	1,236.59	0.00	0.00	0.00
11,700.00	89.41	179.56	10,573.97	-1,336.20	-60.13	1,336.58	0.00	0.00	0.00
11,800.00	89.41	179.56	10,575.01	-1,436.19	-59.36	1,436.56	0.00	0.00	0.00
11,900.00	89.41	179.56	10,576.04	-1,536.19	-58.60	1,536.54	0.00	0.00	0.00
12,000.00	89.41	179.56	10,577.08	-1,636.18	-57.83	1,636.53	0.00	0.00	0.00
12,100.00	89.41	179.56	10,578.12	-1,736.17	-57.06	1,736.51	0.00	0.00	0.00
12,200.00	89.41	179.56	10,579.16	-1,836.16	-56.29	1,836.50	0.00	0.00	0.00
12,300.00	89.41	179.56	10,580.19	-1,936.15	-55.52	1,936.48	0.00	0.00	0.00
12,400.00	89.41	179.56	10,581.23	-2,036.14	-54.75	2,036.47	0.00	0.00	0.00
12,500.00	89.41	179.56	10,582.27	-2,136.14	-53.98	2,136.45	0.00	0.00	0.00
12,600.00	89.41	179.56	10,583.30	-2,236.13	-53.21	2,236.43	0.00	0.00	0.00
12,700.00	89.41	179.56	10,584.34	-2,336.12	-52.44	2,336.42	0.00	0.00	0.00
12,763.59	89.41	179.56	10,585.00	-2,399.70	-51.95	2,400.00	0.00	0.00	0.00
Start DLS 2.00 TFO -0.40									
12,776.01	89.65	179.56	10,585.10	-2,412.12	-51.86	2,412.42	2.00	2.00	-0.01
Start 2468.40 hold at 12776.01 MD									
12,800.00	89.65	179.56	10,585.25	-2,436.11	-51.67	2,436.40	0.00	0.00	0.00
12,900.00	89.65	179.56	10,585.85	-2,536.11	-50.90	2,536.39	0.00	0.00	0.00
13,000.00	89.65	179.56	10,586.45	-2,636.10	-50.13	2,636.38	0.00	0.00	0.00



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Database: EDM 5000.1 Multi User Db

Planned 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)
13,100.00	89.65	179.56	10,587.06	-2,736.10	-49.36	2,736.37	0.00	0.00	0.00
13,200.00	89.65	179.56	10,587.66	-2,836.09	-48.59	2,836.35	0.00	0.00	0.00
13,300.00	89.65	179.56	10,588.26	-2,936.09	-47.81	2,936.34	0.00	0.00	0.00
13,400.00	89.65	179.56	10,588.87	-3,036.08	-47.04	3,036.33	0.00	0.00	0.00
13,500.00	89.65	179.56	10,589.47	-3,136.08	-46.27	3,136.32	0.00	0.00	0.00
13,600.00	89.65	179.56	10,590.08	-3,236.07	-45.50	3,236.31	0.00	0.00	0.00
13,700.00	89.65	179.56	10,590.68	-3,336.07	-44.72	3,336.29	0.00	0.00	0.00
13,800.00	89.65	179.56	10,591.28	-3,436.06	-43.95	3,436.28	0.00	0.00	0.00
13,900.00	89.65	179.56	10,591.89	-3,536.06	-43.18	3,536.27	0.00	0.00	0.00
14,000.00	89.65	179.56	10,592.49	-3,636.05	-42.41	3,636.26	0.00	0.00	0.00
14,100.00	89.65	179.56	10,593.09	-3,736.05	-41.64	3,736.24	0.00	0.00	0.00
14,200.00	89.65	179.56	10,593.70	-3,836.04	-40.86	3,836.23	0.00	0.00	0.00
14,300.00	89.65	179.56	10,594.30	-3,936.04	-40.09	3,936.22	0.00	0.00	0.00
14,400.00	89.65	179.56	10,594.90	-4,036.03	-39.32	4,036.21	0.00	0.00	0.00
14,500.00	89.65	179.56	10,595.51	-4,136.03	-38.55	4,136.20	0.00	0.00	0.00
14,600.00	89.65	179.56	10,596.11	-4,236.03	-37.78	4,236.18	0.00	0.00	0.00
14,700.00	89.65	179.56	10,596.71	-4,336.02	-37.00	4,336.17	0.00	0.00	0.00
14,800.00	89.65	179.56	10,597.32	-4,436.02	-36.23	4,436.16	0.00	0.00	0.00
14,900.00	89.65	179.56	10,597.92	-4,536.01	-35.46	4,536.15	0.00	0.00	0.00
15,000.00	89.65	179.56	10,598.53	-4,636.01	-34.69	4,636.13	0.00	0.00	0.00
15,100.00	89.65	179.56	10,599.13	-4,736.00	-33.92	4,736.12	0.00	0.00	0.00
15,200.00	89.65	179.56	10,599.73	-4,836.00	-33.14	4,836.11	0.00	0.00	0.00
15,244.42	89.65	179.56	10,600.00	-4,880.41	-32.80	4,880.52	0.00	0.00	0.00
TD at 15244.42									

Design Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
Bobwhite 12 State Co	0.00	0.00	10,585.00	-2,399.70	-51.95	544,127.1000	750,030.4458	32.4933032	-103.5224096
- plan hits target center									
- Point									
Bobwhite 12 State Co	0.00	0.00	10,599.21	-4,750.28	-33.89	541,776.5307	750,048.5140	32.4868420	-103.5224090
- plan misses target center by 0.08ft at 15114.28ft MD (10599.21 TVD, -4750.28 N, -33.80 E)									
- Point									
Bobwhite 12 State Co	0.00	0.00	10,600.00	-4,880.41	-32.80	541,646.4000	750,049.6000	32.4864843	-103.5224087
- plan hits target center									
- Point									



Integrity Directional Services, LLC
Survey Report



Company: COG Operating L L C
Project: Lea County, NM (NAD27 NME)
Site: Sec. 12, T 21 S. , R 33 E
Well: Bobwhite 12 State Com 7H
Wellbore: Wellbore #1
Design: Plan #1

Local Co-ordinate Reference: Well Bobwhite 12 State Com 7H
TVD Reference: KB=20' @ 3787.70ft
MD Reference: KB=20' @ 3787.70ft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM 5000.1 Multi User Db

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
10,088	10,088	0	0	Start Build 12.00
10,833	10,565	-469	-56	Start DLS 4.00 TFO -90.03
11,012	10,567	-649	-65	Start 1751.26 hold at 11012.33 MD
12,764	10,585	-2400	-52	Start DLS 2.00 TFO -0.40
12,776	10,585	-2412	-52	Start 2468.40 hold at 12776.01 MD
15,244	10,600	-4880	-33	TD at 15244.42

Checked By: _____ Approved By: _____ Date: _____