

C O N C H O

HOBBS OCD

SEP 06 2018

RECEIVED

COG Operating L L C

Lea County, NM (NAD27 NME)

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

Bobwhite 12 State Com 2H

Wellbore #1

Design: Wellbore #1

Standard Survey Report

12 June, 2017



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 2H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Site:	Sec. 12, T 21 S. , R 33 E	MD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Well:	Bobwhite 12 State Com 2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	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	Latitude:	32.4999217
From:	Map	Easting:	749,682.1000 usft	Longitude:	-103.5234801
Position Uncertainty:	0.00 ft	Slot Radius:	13-3/16 "	Grid Convergence:	0.44 °

Well	Bobwhite 12 State Com 2H, ACTIVE					
Well Position	+N/-S	0.00 ft	Northing:	546,532.4000 usfl	Latitude:	32.4999217
	+E/-W	0.00 ft	Easting:	749,682.1000 usfl	Longitude:	-103.5234801
Position Uncertainty		0.00 ft	Wellhead Elevation:	0.00 ft	Ground Level:	3,772.50 ft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	HDGM	5/8/2017	6.80	60.43	48,307

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

Survey Program	Date 6/12/2017				
From	To	Survey (Wellbore)	Tool Name	Description	
(ft)	(ft)				
100.00	10,100.00	Phoenix Surveys (Wellbore #1)	MWD	MWD - Standard	
10,303.00	15,495.00	IDS MWD Surveys (Wellbore #1)	MWD	MWD - Standard	

Survey										
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn	
Depth	(°)	(°)	Depth	(ft)	(ft)	Section	Rate	Rate	Rate	
(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	0.48	220.67	100.00	-0.32	-0.27	0.32	0.48	0.48	0.00	
125.00	0.49	160.74	125.00	-0.50	-0.31	0.50	1.94	0.04	-239.72	
150.00	0.58	185.00	150.00	-0.73	-0.28	0.72	0.97	0.36	97.04	
175.00	0.44	167.01	175.00	-0.94	-0.27	0.94	0.84	-0.56	-71.96	
200.00	0.36	145.35	200.00	-1.10	-0.20	1.10	0.68	-0.32	-86.64	
225.00	0.46	148.01	224.99	-1.25	-0.11	1.25	0.41	0.40	10.64	
250.00	0.09	262.99	249.99	-1.34	-0.07	1.34	2.02	-1.48	459.92	
275.00	0.11	86.69	274.99	-1.34	-0.07	1.34	0.80	0.08	-705.20	
300.00	0.30	175.98	299.99	-1.40	-0.04	1.40	1.27	0.76	357.16	

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Well:	Bobwhite 12 State Com 2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

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)
325.00	0.36	172.66	324.99	-1.55	-0.03	1.55	0.25	0.24	-13.28
350.00	0.39	163.62	349.99	-1.71	0.01	1.71	0.26	0.12	-36.16
375.00	0.41	137.67	374.99	-1.86	0.09	1.86	0.72	0.08	-103.80
400.00	0.56	110.47	399.99	-1.96	0.27	1.97	1.08	0.60	-108.80
425.00	0.49	186.59	424.99	-2.11	0.37	2.12	2.60	-0.28	304.48
450.00	0.49	83.98	449.99	-2.21	0.46	2.21	3.06	0.00	-410.44
475.00	0.42	52.78	474.99	-2.14	0.64	2.15	1.02	-0.28	-124.80
500.00	0.20	106.92	499.99	-2.10	0.76	2.10	1.37	-0.88	216.56
525.00	0.23	87.87	524.99	-2.11	0.85	2.12	0.31	0.12	-76.20
550.00	0.27	4.94	549.99	-2.05	0.90	2.06	1.33	0.16	-331.72
575.00	0.40	144.62	574.99	-2.06	0.96	2.07	2.52	0.52	558.72
600.00	0.46	157.64	599.99	-2.23	1.05	2.23	0.46	0.24	52.08
625.00	0.53	98.64	624.99	-2.34	1.20	2.34	1.97	0.28	-236.00
650.00	0.38	72.93	649.99	-2.33	1.39	2.34	1.00	-0.60	-102.84
675.00	0.39	67.40	674.99	-2.27	1.55	2.28	0.15	0.04	-22.12
700.00	0.19	52.61	699.99	-2.21	1.66	2.23	0.85	-0.80	-59.16
725.00	0.12	80.32	724.99	-2.18	1.72	2.20	0.40	-0.28	110.84
750.00	0.33	155.95	749.99	-2.25	1.78	2.26	1.29	0.84	302.52
775.00	0.45	108.78	774.99	-2.34	1.90	2.36	1.32	0.48	-188.68
800.00	0.32	94.88	799.98	-2.38	2.06	2.40	0.64	-0.52	-55.60
825.00	0.40	165.83	824.98	-2.47	2.15	2.49	1.69	0.32	283.80
850.00	0.23	96.83	849.98	-2.56	2.22	2.58	1.53	-0.68	-276.00
875.00	0.23	92.56	874.98	-2.57	2.32	2.59	0.07	0.00	-17.08
900.00	0.09	74.76	899.98	-2.57	2.39	2.59	0.59	-0.56	-71.20
925.00	0.01	232.44	924.98	-2.56	2.41	2.58	0.40	-0.32	630.72
950.00	0.26	102.63	949.98	-2.58	2.46	2.60	1.07	1.00	-519.24
975.00	0.27	187.89	974.98	-2.65	2.51	2.67	1.44	0.04	341.04
1,000.00	0.25	178.44	999.98	-2.76	2.51	2.78	0.19	-0.08	-37.80
1,025.00	0.78	230.45	1,024.98	-2.92	2.38	2.94	2.63	2.12	208.04
1,050.00	0.27	77.89	1,049.98	-3.02	2.30	3.04	4.11	-2.04	-610.24
1,075.00	0.19	340.98	1,074.98	-2.97	2.35	2.99	1.39	-0.32	-387.64
1,100.00	0.15	66.98	1,099.98	-2.92	2.36	2.93	0.93	-0.16	344.00
1,125.00	0.14	157.82	1,124.98	-2.93	2.40	2.95	0.83	-0.04	363.36
1,150.00	0.31	140.19	1,149.98	-3.01	2.46	3.03	0.73	0.68	-70.52
1,175.00	0.37	142.00	1,174.98	-3.13	2.55	3.15	0.24	0.24	7.24
1,200.00	0.45	120.08	1,199.98	-3.24	2.69	3.26	0.70	0.32	-87.68
1,225.00	0.46	103.00	1,224.98	-3.31	2.87	3.33	0.54	0.04	-68.32
1,250.00	0.40	78.08	1,249.98	-3.32	3.05	3.34	0.78	-0.24	-99.68
1,275.00	0.33	206.09	1,274.98	-3.36	3.11	3.39	2.63	-0.28	512.04
1,300.00	0.44	45.63	1,299.98	-3.36	3.14	3.38	3.04	0.44	-641.84
1,325.00	0.12	184.96	1,324.98	-3.32	3.21	3.34	2.15	-1.28	557.32
1,350.00	0.16	122.63	1,349.98	-3.36	3.24	3.39	0.60	0.16	-249.32
1,375.00	0.38	45.34	1,374.98	-3.32	3.33	3.35	1.51	0.88	-309.16



Integrity Directional Services, LLC

Survey Report



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Well:	Bobwhite 12 State Com 2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

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	0.47	347.65	1,399.98	-3.17	3.36	3.19	1.67	0.36	-230.76
1,425.00	0.36	34.79	1,424.98	-3.00	3.39	3.03	1.39	-0.44	188.56
1,450.00	0.53	357.28	1,449.98	-2.82	3.42	2.85	1.31	0.68	-150.04
1,475.00	0.31	304.40	1,474.97	-2.67	3.36	2.69	1.69	-0.88	-211.52
1,500.00	0.12	167.23	1,499.97	-2.66	3.31	2.68	1.63	-0.76	-548.68
1,525.00	0.26	44.69	1,524.97	-2.64	3.36	2.67	1.36	0.56	-490.16
1,550.00	0.26	270.37	1,549.97	-2.60	3.34	2.63	1.92	0.00	-537.28
1,575.00	0.17	335.76	1,574.97	-2.57	3.27	2.59	0.98	-0.36	261.56
1,600.00	0.41	348.80	1,599.97	-2.44	3.24	2.47	0.99	0.96	52.16
1,625.00	0.45	306.56	1,624.97	-2.30	3.14	2.32	1.25	0.16	-168.96
1,650.00	0.14	337.21	1,649.97	-2.21	3.05	2.23	1.35	-1.24	122.60
1,675.00	0.19	5.00	1,674.97	-2.14	3.04	2.17	0.37	0.20	111.16
1,700.00	0.41	307.49	1,699.97	-2.05	2.98	2.07	1.39	0.88	-230.04
1,725.00	0.24	252.36	1,724.97	-2.01	2.85	2.03	1.35	-0.68	-220.52
1,750.00	0.17	310.08	1,749.97	-2.00	2.78	2.02	0.83	-0.28	230.88
1,775.00	0.19	346.51	1,774.97	-1.94	2.74	1.96	0.46	0.08	145.72
1,800.00	0.32	339.86	1,799.97	-1.83	2.70	1.85	0.53	0.52	-26.60
1,825.00	0.15	155.16	1,824.97	-1.79	2.69	1.81	1.88	-0.68	701.20
1,850.00	0.25	213.39	1,849.97	-1.87	2.68	1.89	0.85	0.40	232.92
1,875.00	0.45	236.86	1,874.97	-1.97	2.57	1.99	0.97	0.80	93.88
1,900.00	0.14	42.32	1,899.97	-2.00	2.50	2.02	2.35	-1.24	661.84
1,925.00	0.46	236.05	1,924.97	-2.03	2.44	2.05	2.39	1.28	-665.08
1,950.00	0.36	177.74	1,949.97	-2.17	2.36	2.19	1.64	-0.40	-233.24
1,975.00	0.06	351.38	1,974.97	-2.23	2.36	2.25	1.68	-1.20	694.56
2,000.00	0.44	105.87	1,999.97	-2.25	2.45	2.26	1.87	1.52	457.96
2,025.00	0.17	222.36	2,024.97	-2.30	2.52	2.32	2.15	-1.08	465.96
2,050.00	0.50	124.74	2,049.97	-2.39	2.58	2.41	2.20	1.32	-390.48
2,075.00	0.20	111.26	2,074.97	-2.47	2.71	2.49	1.24	-1.20	-53.92
2,100.00	0.22	295.11	2,099.97	-2.46	2.71	2.48	1.68	0.08	-704.60
2,125.00	0.37	95.00	2,124.97	-2.45	2.75	2.47	2.33	0.60	639.56
2,150.00	0.19	95.50	2,149.97	-2.46	2.87	2.48	0.72	-0.72	2.00
2,175.00	0.32	26.54	2,174.97	-2.40	2.94	2.42	1.23	0.52	-275.84
2,200.00	0.33	57.93	2,199.97	-2.30	3.04	2.32	0.70	0.04	125.56
2,225.00	0.21	157.99	2,224.97	-2.31	3.11	2.33	1.68	-0.48	400.24
2,250.00	0.41	70.37	2,249.97	-2.32	3.21	2.34	1.81	0.80	-350.48
2,275.00	0.02	71.62	2,274.97	-2.29	3.30	2.31	1.56	-1.56	5.00
2,300.00	0.21	140.89	2,299.97	-2.32	3.34	2.35	0.82	0.76	277.08
2,325.00	0.35	130.94	2,324.97	-2.41	3.42	2.43	0.59	0.56	-39.80
2,350.00	0.47	40.90	2,349.97	-2.38	3.55	2.41	2.34	0.48	-360.16
2,375.00	0.19	123.95	2,374.97	-2.32	3.65	2.35	1.94	-1.12	332.20
2,400.00	0.50	138.69	2,399.97	-2.43	3.76	2.46	1.28	1.24	58.96
2,425.00	0.19	106.58	2,424.96	-2.52	3.87	2.55	1.42	-1.24	-128.44
2,450.00	0.59	134.77	2,449.96	-2.63	4.00	2.66	1.73	1.60	112.76



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2,475.00	0.12	192.31	2,474.96	-2.74	4.08	2.77	2.14	-1.88	230.16
2,500.00	0.25	161.79	2,499.96	-2.82	4.10	2.85	0.64	0.52	-122.08
2,525.00	0.56	121.91	2,524.96	-2.94	4.22	2.97	1.61	1.24	-159.52
2,550.00	0.50	104.72	2,549.96	-3.03	4.43	3.06	0.68	-0.24	-68.76
2,575.00	0.48	154.41	2,574.96	-3.15	4.58	3.19	1.65	-0.08	198.76
2,600.00	0.65	115.73	2,599.96	-3.31	4.75	3.34	1.63	0.68	-154.72
2,625.00	0.31	215.06	2,624.96	-3.42	4.84	3.46	3.06	-1.36	397.32
2,650.00	0.73	127.09	2,649.96	-3.57	4.93	3.61	3.13	1.68	-351.88
2,675.00	0.52	112.08	2,674.96	-3.71	5.16	3.75	1.06	-0.84	-60.04
2,700.00	0.63	157.72	2,699.96	-3.88	5.32	3.92	1.83	0.44	182.56
2,725.00	0.76	136.06	2,724.95	-4.13	5.48	4.17	1.16	0.52	-86.64
2,750.00	0.82	106.70	2,749.95	-4.30	5.77	4.34	1.62	0.24	-117.44
2,775.00	0.54	115.61	2,774.95	-4.40	6.05	4.45	1.19	-1.12	35.64
2,800.00	0.69	134.03	2,799.95	-4.56	6.26	4.61	0.99	0.60	73.68
2,825.00	1.10	178.91	2,824.95	-4.90	6.37	4.95	3.13	1.64	179.52
2,850.00	0.72	109.18	2,849.94	-5.19	6.53	5.24	4.34	-1.52	-278.92
2,875.00	0.85	144.75	2,874.94	-5.40	6.78	5.45	1.98	0.52	142.28
2,900.00	1.05	129.07	2,899.94	-5.69	7.07	5.75	1.30	0.80	-62.72
2,925.00	0.88	117.49	2,924.93	-5.93	7.42	5.98	1.03	-0.68	-46.32
2,950.00	1.02	104.69	2,949.93	-6.07	7.80	6.13	1.01	0.56	-51.20
2,975.00	0.81	113.41	2,974.93	-6.20	8.18	6.26	1.01	-0.84	34.88
3,000.00	1.22	129.28	2,999.92	-6.44	8.55	6.50	1.97	1.64	63.48
3,025.00	0.93	102.94	3,024.92	-6.65	8.95	6.72	2.26	-1.16	-105.36
3,050.00	1.37	111.74	3,049.91	-6.81	9.43	6.88	1.89	1.76	35.20
3,075.00	1.26	120.54	3,074.91	-7.06	9.94	7.13	0.92	-0.44	35.20
3,100.00	1.36	102.80	3,099.90	-7.26	10.47	7.34	1.66	0.40	-70.96
3,125.00	1.68	108.21	3,124.89	-7.44	11.10	7.53	1.40	1.28	21.64
3,150.00	1.82	111.62	3,149.88	-7.70	11.82	7.79	0.70	0.56	13.64
3,175.00	1.89	106.61	3,174.87	-7.97	12.58	8.06	0.71	0.28	-20.04
3,200.00	2.14	100.86	3,199.85	-8.17	13.44	8.28	1.28	1.00	-23.00
3,225.00	2.26	104.61	3,224.83	-8.39	14.37	8.50	0.75	0.48	15.00
3,250.00	1.96	99.08	3,249.82	-8.58	15.27	8.69	1.45	-1.20	-22.12
3,275.00	2.29	93.04	3,274.80	-8.67	16.19	8.80	1.59	1.32	-24.16
3,300.00	2.23	102.07	3,299.78	-8.80	17.17	8.93	1.44	-0.24	36.12
3,325.00	2.02	90.50	3,324.76	-8.90	18.08	9.04	1.91	-0.84	-46.28
3,350.00	2.14	94.04	3,349.75	-8.94	18.99	9.09	0.70	0.48	14.16
3,375.00	1.51	77.03	3,374.73	-8.90	19.78	9.05	3.30	-2.52	-68.04
3,400.00	1.21	73.82	3,399.73	-8.75	20.35	8.91	1.24	-1.20	-12.84
3,425.00	1.31	62.41	3,424.72	-8.55	20.86	8.71	1.08	0.40	-45.64
3,450.00	0.96	19.27	3,449.72	-8.22	21.18	8.38	3.58	-1.40	-172.56
3,475.00	1.10	47.71	3,474.71	-7.86	21.43	8.02	2.10	0.56	113.76
3,500.00	1.19	25.02	3,499.71	-7.46	21.71	7.63	1.84	0.36	-90.76
3,525.00	1.04	43.02	3,524.70	-7.06	21.98	7.23	1.52	-0.60	72.00
3,550.00	1.17	19.95	3,549.70	-6.65	22.22	6.82	1.84	0.52	-92.28

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 2H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Site:	Sec. 12, T 21 S., R 33 E	MD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Well:	Bobwhite 12 State Com 2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

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	1.22	45.00	3,574.69	-6.23	22.50	6.40	2.08	0.20	100.20
3,600.00	1.02	22.66	3,599.69	-5.83	22.77	6.01	1.90	-0.80	-89.36
3,625.00	1.23	39.48	3,624.68	-5.42	23.03	5.60	1.56	0.84	67.28
3,650.00	1.22	19.31	3,649.68	-4.96	23.29	5.14	1.72	-0.04	-80.68
3,675.00	1.26	40.83	3,674.67	-4.50	23.55	4.68	1.86	0.16	86.08
3,700.00	1.14	21.75	3,699.67	-4.06	23.83	4.25	1.66	-0.48	-76.32
3,725.00	1.22	35.17	3,724.66	-3.62	24.07	3.80	1.15	0.32	53.68
3,750.00	1.15	23.49	3,749.66	-3.17	24.32	3.35	1.00	-0.28	-46.72
3,775.00	1.01	44.80	3,774.65	-2.78	24.58	2.97	1.69	-0.56	85.24
3,800.00	1.31	30.26	3,799.65	-2.38	24.88	2.57	1.67	1.20	-58.16
3,825.00	0.99	32.09	3,824.64	-1.95	25.14	2.14	1.29	-1.28	7.32
3,850.00	1.31	44.20	3,849.64	-1.56	25.45	1.76	1.60	1.28	48.44
3,875.00	1.02	28.19	3,874.63	-1.16	25.76	1.36	1.73	-1.16	-64.04
3,900.00	1.01	40.71	3,899.63	-0.80	26.00	1.00	0.89	-0.04	50.08
3,925.00	1.34	39.75	3,924.62	-0.40	26.33	0.61	1.32	1.32	-3.84
3,950.00	1.11	28.38	3,949.62	0.03	26.64	0.17	1.33	-0.92	-45.48
3,975.00	1.05	40.15	3,974.61	0.42	26.90	-0.21	0.92	-0.24	47.08
4,000.00	1.35	30.96	3,999.61	0.85	27.20	-0.64	1.42	1.20	-36.76
4,025.00	1.02	34.62	4,024.60	1.28	27.48	-1.07	1.35	-1.32	14.64
4,050.00	1.36	37.66	4,049.60	1.70	27.78	-1.49	1.38	1.36	12.16
4,075.00	1.31	35.18	4,074.59	2.17	28.13	-1.95	0.31	-0.20	-9.92
4,100.00	1.33	22.00	4,099.58	2.67	28.40	-2.46	1.21	0.08	-52.72
4,125.00	1.05	26.63	4,124.58	3.15	28.62	-2.93	1.18	-1.12	18.52
4,150.00	0.99	46.63	4,149.57	3.50	28.87	-3.28	1.44	-0.24	80.00
4,175.00	1.40	35.30	4,174.57	3.90	29.21	-3.67	1.89	1.64	-45.32
4,200.00	1.04	35.20	4,199.56	4.33	29.52	-4.11	1.44	-1.44	-0.40
4,225.00	1.35	37.89	4,224.56	4.75	29.83	-4.52	1.26	1.24	10.76
4,250.00	1.07	44.26	4,249.55	5.15	30.17	-4.92	1.24	-1.12	25.48
4,275.00	1.42	30.97	4,274.55	5.58	30.49	-5.35	1.81	1.40	-53.16
4,300.00	1.06	45.16	4,299.54	6.01	30.82	-5.77	1.88	-1.44	56.76
4,325.00	1.35	28.32	4,324.53	6.43	31.12	-6.19	1.82	1.16	-67.36
4,350.00	1.27	47.08	4,349.53	6.88	31.46	-6.64	1.74	-0.32	75.04
4,375.00	0.97	31.59	4,374.52	7.25	31.78	-7.01	1.69	-1.20	-61.96
4,400.00	1.10	27.41	4,399.52	7.64	32.00	-7.40	0.60	0.52	-16.72
4,425.00	0.64	43.27	4,424.52	7.96	32.20	-7.71	2.06	-1.84	63.44
4,450.00	0.69	11.28	4,449.51	8.21	32.33	-7.96	1.48	0.20	-127.96
4,475.00	0.80	28.76	4,474.51	8.51	32.44	-8.26	1.00	0.44	69.92
4,500.00	0.30	9.18	4,499.51	8.73	32.54	-8.48	2.11	-2.00	-78.32
4,525.00	0.45	347.43	4,524.51	8.89	32.53	-8.64	0.82	0.60	-87.00
4,550.00	0.21	341.50	4,549.51	9.03	32.49	-8.78	0.97	-0.96	-23.72
4,575.00	0.37	264.48	4,574.51	9.06	32.40	-8.81	1.53	0.64	-308.08
4,600.00	0.37	274.86	4,599.51	9.06	32.23	-8.81	0.27	0.00	41.52
4,625.00	0.51	262.76	4,624.51	9.05	32.04	-8.81	0.67	0.56	-48.40



Integrity Directional Services, LLC
Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 2H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Site:	Sec. 12, T 21 S. , R 33 E	MD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Well:	Bobwhite 12 State Com 2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

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	0.67	269.15	4,649.51	9.04	31.79	-8.79	0.69	0.64	25.56
4,675.00	0.33	194.96	4,674.51	8.97	31.62	-8.72	2.65	-1.36	-296.76
4,700.00	0.48	251.04	4,699.51	8.86	31.50	-8.62	1.61	0.60	224.32
4,725.00	0.15	329.01	4,724.51	8.86	31.39	-8.61	1.89	-1.32	311.88
4,750.00	0.29	269.02	4,749.51	8.88	31.31	-8.64	1.00	0.56	-239.96
4,775.00	0.33	307.62	4,774.51	8.93	31.19	-8.69	0.83	0.16	154.40
4,800.00	0.13	334.52	4,799.51	9.00	31.12	-8.76	0.89	-0.80	107.60
4,825.00	0.36	294.58	4,824.51	9.05	31.04	-8.82	1.09	0.92	-159.76
4,850.00	0.24	302.00	4,849.50	9.11	30.92	-8.88	0.50	-0.48	29.68
4,875.00	0.10	247.11	4,874.50	9.13	30.86	-8.90	0.80	-0.56	-219.56
4,900.00	0.51	214.80	4,899.50	9.03	30.77	-8.80	1.72	1.64	-129.24
4,925.00	0.20	154.85	4,924.50	8.90	30.73	-8.67	1.78	-1.24	-239.80
4,950.00	0.38	336.27	4,949.50	8.94	30.71	-8.70	2.32	0.72	-714.32
4,975.00	0.50	223.39	4,974.50	8.94	30.60	-8.70	2.95	0.48	-451.52
5,000.00	0.47	261.95	4,999.50	8.84	30.43	-8.61	1.29	-0.12	154.24
5,025.00	0.66	223.59	5,024.50	8.72	30.23	-8.49	1.65	0.76	-153.44
5,050.00	0.48	245.89	5,049.50	8.58	30.03	-8.35	1.13	-0.72	89.20
5,075.00	0.76	233.93	5,074.50	8.44	29.80	-8.21	1.23	1.12	-47.84
5,100.00	0.52	259.42	5,099.50	8.32	29.56	-8.09	1.47	-0.96	101.96
5,125.00	0.82	240.13	5,124.50	8.21	29.29	-7.98	1.49	1.20	-77.16
5,150.00	0.57	266.95	5,149.49	8.11	29.01	-7.89	1.62	-1.00	107.28
5,175.00	0.77	245.03	5,174.49	8.03	28.73	-7.81	1.29	0.80	-87.68
5,200.00	0.60	271.86	5,199.49	7.97	28.45	-7.75	1.43	-0.68	107.32
5,225.00	0.74	242.78	5,224.49	7.90	28.18	-7.68	1.45	0.56	-116.32
5,250.00	0.49	257.60	5,249.49	7.80	27.93	-7.59	1.18	-1.00	59.28
5,275.00	0.75	273.08	5,274.49	7.79	27.66	-7.57	1.23	1.04	61.92
5,300.00	0.67	269.95	5,299.48	7.80	27.35	-7.59	0.36	-0.32	-12.52
5,325.00	0.53	240.26	5,324.48	7.74	27.10	-7.53	1.34	-0.56	-118.76
5,350.00	0.41	279.38	5,349.48	7.70	26.92	-7.49	1.34	-0.48	156.48
5,375.00	0.66	277.84	5,374.48	7.73	26.69	-7.52	1.00	1.00	-6.16
5,400.00	0.58	260.50	5,399.48	7.73	26.42	-7.53	0.81	-0.32	-69.36
5,425.00	0.20	322.32	5,424.48	7.74	26.27	-7.54	2.07	-1.52	247.28
5,450.00	0.70	271.80	5,449.48	7.78	26.09	-7.58	2.37	2.00	-202.08
5,475.00	0.74	309.54	5,474.48	7.89	25.81	-7.69	1.87	0.16	150.96
5,500.00	0.60	276.24	5,499.47	8.01	25.56	-7.81	1.63	-0.56	-133.20
5,525.00	0.26	213.25	5,524.47	7.97	25.39	-7.78	2.14	-1.36	-251.96
5,550.00	0.53	245.74	5,549.47	7.88	25.26	-7.68	1.36	1.08	129.96
5,575.00	0.18	288.00	5,574.47	7.84	25.11	-7.65	1.66	-1.40	169.04
5,600.00	0.52	230.92	5,599.47	7.78	24.99	-7.59	1.79	1.36	-228.32
5,625.00	0.13	204.63	5,624.47	7.69	24.89	-7.49	1.63	-1.56	-105.16
5,650.00	0.62	202.76	5,649.47	7.54	24.83	-7.34	1.96	1.96	-7.48
5,675.00	0.32	232.31	5,674.47	7.37	24.72	-7.18	1.51	-1.20	118.20
5,700.00	0.32	145.42	5,699.47	7.27	24.70	-7.08	1.76	0.00	-347.56

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 2H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Site:	Sec. 12, T 21 S. , R 33 E	MD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Well:	Bobwhite 12 State Com 2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

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)
5,725.00	0.43	223.76	5,724.47	7.14	24.68	-6.95	1.93	0.44	313.36
5,750.00	0.17	211.13	5,749.47	7.04	24.59	-6.85	1.07	-1.04	-50.52
5,775.00	0.61	221.04	5,774.47	6.91	24.49	-6.72	1.77	1.76	39.64
5,800.00	0.21	226.08	5,799.47	6.78	24.37	-6.59	1.60	-1.60	20.16
5,825.00	0.49	214.36	5,824.47	6.66	24.27	-6.47	1.15	1.12	-46.88
5,850.00	0.42	266.00	5,849.47	6.56	24.12	-6.38	1.61	-0.28	206.56
5,875.00	0.33	134.24	5,874.47	6.51	24.08	-6.32	2.74	-0.36	-527.04
5,900.00	0.73	259.17	5,899.47	6.43	23.98	-6.24	3.83	1.60	499.72
5,925.00	0.68	235.82	5,924.46	6.31	23.70	-6.13	1.16	-0.20	-93.40
5,950.00	0.44	257.65	5,949.46	6.21	23.48	-6.03	1.27	-0.96	87.32
5,975.00	0.84	245.93	5,974.46	6.11	23.22	-5.94	1.68	1.60	-46.88
6,000.00	0.82	263.39	5,999.46	6.02	22.87	-5.84	1.01	-0.08	69.84
6,025.00	0.53	258.62	6,024.46	5.98	22.58	-5.80	1.18	-1.16	-19.08
6,050.00	0.98	264.29	6,049.45	5.93	22.26	-5.76	1.82	1.80	22.68
6,075.00	0.62	219.76	6,074.45	5.81	21.96	-5.64	2.77	-1.44	-178.12
6,100.00	0.59	270.23	6,099.45	5.70	21.74	-5.54	2.07	-0.12	201.88
6,125.00	0.66	251.62	6,124.45	5.66	21.48	-5.49	0.85	0.28	-74.44
6,150.00	0.61	231.74	6,149.45	5.53	21.24	-5.37	0.90	-0.20	-79.52
6,175.00	0.71	270.82	6,174.45	5.45	20.98	-5.29	1.81	0.40	156.32
6,200.00	0.91	240.52	6,199.44	5.35	20.65	-5.20	1.86	0.80	-121.20
6,225.00	0.70	261.99	6,224.44	5.24	20.33	-5.08	1.46	-0.84	85.88
6,250.00	0.97	249.11	6,249.44	5.14	19.98	-4.99	1.31	1.08	-51.52
6,275.00	0.53	254.50	6,274.44	5.03	19.67	-4.88	1.78	-1.76	21.56
6,300.00	0.95	263.19	6,299.43	4.98	19.35	-4.83	1.73	1.68	34.76
6,325.00	0.69	216.35	6,324.43	4.83	19.05	-4.69	2.78	-1.04	-187.36
6,350.00	0.54	257.18	6,349.43	4.68	18.85	-4.54	1.81	-0.60	163.32
6,375.00	0.97	250.42	6,374.43	4.59	18.54	-4.44	1.75	1.72	-27.04
6,400.00	0.39	249.21	6,399.43	4.49	18.26	-4.35	2.32	-2.32	-4.84
6,425.00	0.70	276.84	6,424.43	4.47	18.03	-4.34	1.59	1.24	110.52
6,450.00	0.86	242.58	6,449.42	4.41	17.71	-4.27	1.94	0.64	-137.04
6,475.00	0.47	255.93	6,474.42	4.29	17.44	-4.16	1.67	-1.56	53.40
6,500.00	0.82	260.58	6,499.42	4.24	17.17	-4.11	1.41	1.40	18.60
6,525.00	0.65	220.26	6,524.42	4.10	16.90	-3.97	2.12	-0.68	-161.28
6,550.00	0.72	264.48	6,549.42	3.98	16.65	-3.85	2.08	0.28	176.88
6,575.00	1.27	244.91	6,574.41	3.85	16.24	-3.72	2.56	2.20	-78.28
6,600.00	0.72	244.00	6,599.41	3.66	15.85	-3.54	2.20	-2.20	-3.64
6,625.00	0.73	248.68	6,624.41	3.53	15.56	-3.41	0.24	0.04	18.72
6,650.00	0.96	241.00	6,649.40	3.37	15.23	-3.26	1.02	0.92	-30.72
6,675.00	0.62	239.19	6,674.40	3.20	14.93	-3.09	1.36	-1.36	-7.24
6,700.00	1.28	254.73	6,699.40	3.06	14.54	-2.95	2.81	2.64	62.16
6,725.00	0.75	225.37	6,724.39	2.87	14.16	-2.76	2.91	-2.12	-117.44
6,750.00	0.74	254.25	6,749.39	2.71	13.89	-2.61	1.49	-0.04	115.52
6,775.00	0.76	242.62	6,774.39	2.59	13.58	-2.49	0.61	0.08	-46.52
6,800.00	0.97	233.10	6,799.39	2.39	13.27	-2.29	1.02	0.84	-38.08



Integrity Directional Services, LLC
Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 2H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Site:	Sec. 12, T 21 S., R 33 E	MD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Well:	Bobwhite 12 State Com 2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

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	0.77	253.97	6,824.38	2.22	12.94	-2.12	1.49	-0.80	83.48
6,850.00	1.19	230.02	6,849.38	2.00	12.58	-1.91	2.31	1.68	-95.80
6,875.00	0.84	247.69	6,874.38	1.77	12.21	-1.67	1.86	-1.40	70.68
6,900.00	1.07	227.73	6,899.37	1.54	11.87	-1.45	1.60	0.92	-79.84
6,925.00	1.16	249.50	6,924.37	1.29	11.46	-1.21	1.72	0.36	87.08
6,950.00	0.93	236.74	6,949.37	1.09	11.05	-1.01	1.30	-0.92	-51.04
6,975.00	1.25	240.07	6,974.36	0.85	10.64	-0.77	1.30	1.28	13.32
7,000.00	0.92	236.53	6,999.36	0.60	10.24	-0.52	1.35	-1.32	-14.16
7,025.00	1.10	232.26	7,024.35	0.34	9.88	-0.27	0.78	0.72	-17.08
7,050.00	1.08	239.32	7,049.35	0.08	9.49	0.00	0.54	-0.08	28.24
7,075.00	0.98	238.10	7,074.34	-0.16	9.11	0.23	0.41	-0.40	-4.88
7,100.00	1.35	237.58	7,099.34	-0.43	8.68	0.49	1.48	1.48	-2.08
7,125.00	1.09	237.43	7,124.33	-0.71	8.23	0.78	1.04	-1.04	-0.60
7,150.00	1.13	227.81	7,149.33	-1.01	7.84	1.07	0.76	0.16	-38.48
7,175.00	1.13	245.17	7,174.32	-1.28	7.44	1.33	1.36	0.00	69.44
7,200.00	0.94	225.96	7,199.32	-1.52	7.07	1.58	1.57	-0.76	-76.84
7,225.00	1.40	231.72	7,224.31	-1.85	6.68	1.91	1.90	1.84	23.04
7,250.00	1.13	234.79	7,249.31	-2.19	6.24	2.23	1.11	-1.08	12.28
7,275.00	1.39	216.82	7,274.30	-2.57	5.86	2.62	1.88	1.04	-71.88
7,300.00	1.35	239.64	7,299.29	-2.96	5.42	3.00	2.17	-0.16	91.28
7,325.00	1.10	217.20	7,324.29	-3.30	5.02	3.34	2.14	-1.00	-89.76
7,350.00	1.38	227.57	7,349.28	-3.70	4.65	3.73	1.43	1.12	41.48
7,375.00	1.04	230.47	7,374.28	-4.04	4.26	4.08	1.38	-1.36	11.60
7,400.00	1.39	222.58	7,399.27	-4.41	3.88	4.44	1.55	1.40	-31.56
7,425.00	1.20	219.73	7,424.27	-4.84	3.50	4.86	0.80	-0.76	-11.40
7,450.00	1.48	223.93	7,449.26	-5.27	3.11	5.29	1.19	1.12	16.80
7,475.00	1.17	234.55	7,474.25	-5.65	2.68	5.67	1.58	-1.24	42.48
7,500.00	1.37	216.39	7,499.25	-6.04	2.29	6.06	1.79	0.80	-72.64
7,525.00	1.08	232.54	7,524.24	-6.42	1.93	6.44	1.79	-1.16	64.60
7,550.00	1.48	220.62	7,549.23	-6.81	1.53	6.82	1.91	1.60	-47.68
7,575.00	1.21	225.19	7,574.23	-7.24	1.14	7.25	1.16	-1.08	18.28
7,600.00	1.55	216.27	7,599.22	-7.70	0.75	7.71	1.60	1.36	-35.68
7,625.00	1.28	226.31	7,624.21	-8.17	0.35	8.17	1.46	-1.08	40.16
7,650.00	1.47	217.76	7,649.21	-8.61	-0.05	8.61	1.12	0.76	-34.20
7,675.00	1.22	226.27	7,674.20	-9.05	-0.44	9.05	1.28	-1.00	34.04
7,700.00	1.55	216.37	7,699.19	-9.51	-0.83	9.50	1.63	1.32	-39.60
7,725.00	1.22	220.86	7,724.18	-9.98	-1.21	9.97	1.39	-1.32	17.96
7,750.00	0.43	264.99	7,749.18	-10.19	-1.48	10.18	3.84	-3.16	176.52
7,775.00	0.61	276.80	7,774.18	-10.18	-1.70	10.17	0.83	0.72	47.24
7,800.00	0.46	223.78	7,799.18	-10.24	-1.90	10.22	1.98	-0.60	-212.08
7,825.00	0.38	278.76	7,824.18	-10.30	-2.05	10.28	1.58	-0.32	219.92
7,850.00	0.70	257.54	7,849.18	-10.32	-2.28	10.30	1.49	1.28	-84.88
7,875.00	0.33	277.09	7,874.18	-10.34	-2.51	10.32	1.62	-1.48	78.20



CONCHO

Integrity Directional Services, LLC

Survey Report



Company:	COG Operating L.L.C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 2H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Site:	Sec. 12, T 21 S., R 33 E	MD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Well:	Bobwhite 12 State Com 2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

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	0.55	266.75	7,899.18	-10.34	-2.70	10.32	0.93	0.88	-41.36
7,925.00	0.58	210.45	7,924.17	-10.46	-2.88	10.43	2.14	0.12	-225.20
7,950.00	0.50	274.10	7,949.17	-10.56	-3.05	10.53	2.29	-0.32	254.60
7,975.00	0.72	245.36	7,974.17	-10.62	-3.31	10.59	1.48	0.88	-114.96
8,000.00	0.44	283.77	7,999.17	-10.66	-3.54	10.63	1.86	-1.12	153.64
8,025.00	0.64	245.39	8,024.17	-10.69	-3.76	10.66	1.61	0.80	-153.52
8,050.00	0.50	283.46	8,049.17	-10.73	-3.99	10.70	1.58	-0.56	152.28
8,075.00	0.74	245.39	8,074.17	-10.77	-4.25	10.74	1.85	0.96	-152.28
8,100.00	0.36	286.75	8,099.17	-10.81	-4.47	10.78	2.11	-1.52	165.44
8,125.00	0.64	298.59	8,124.17	-10.72	-4.67	10.69	1.19	1.12	47.36
8,150.00	0.29	206.54	8,149.16	-10.71	-4.82	10.68	2.85	-1.40	-368.20
8,175.00	0.73	273.03	8,174.16	-10.76	-5.01	10.72	2.68	1.76	265.96
8,200.00	0.38	229.36	8,199.16	-10.81	-5.23	10.77	2.10	-1.40	-174.68
8,225.00	0.48	252.96	8,224.16	-10.89	-5.39	10.85	0.81	0.40	94.40
8,250.00	0.55	236.07	8,249.16	-10.99	-5.59	10.95	0.67	0.28	-67.56
8,275.00	0.50	267.35	8,274.16	-11.06	-5.80	11.02	1.15	-0.20	125.12
8,300.00	0.48	86.52	8,299.16	-11.06	-5.80	11.02	3.92	-0.08	716.68
8,325.00	0.62	252.41	8,324.16	-11.09	-5.83	11.05	4.37	0.56	663.56
8,350.00	0.37	239.99	8,349.16	-11.18	-6.03	11.13	1.08	-1.00	-49.68
8,375.00	0.67	240.10	8,374.16	-11.29	-6.22	11.24	1.20	1.20	0.44
8,400.00	0.52	262.13	8,399.16	-11.38	-6.46	11.33	1.08	-0.60	88.12
8,425.00	0.56	234.47	8,424.16	-11.46	-6.67	11.41	1.04	0.16	-110.64
8,450.00	0.68	261.24	8,449.15	-11.56	-6.92	11.50	1.24	0.48	107.08
8,475.00	0.40	188.55	8,474.15	-11.67	-7.08	11.61	2.71	-1.12	-290.76
8,500.00	0.71	250.72	8,499.15	-11.80	-7.24	11.75	2.53	1.24	248.68
8,525.00	0.79	236.31	8,524.15	-11.95	-7.53	11.89	0.82	0.32	-57.64
8,550.00	0.43	246.55	8,549.15	-12.08	-7.76	12.02	1.50	-1.44	40.96
8,575.00	0.55	264.70	8,574.15	-12.13	-7.96	12.07	0.78	0.48	72.60
8,600.00	0.73	239.77	8,599.15	-12.22	-8.22	12.16	1.31	0.72	-99.72
8,625.00	0.34	254.67	8,624.14	-12.32	-8.43	12.26	1.64	-1.56	59.60
8,650.00	0.88	243.68	8,649.14	-12.43	-8.67	12.36	2.20	2.16	-43.96
8,675.00	0.41	355.53	8,674.14	-12.42	-8.85	12.36	4.40	-1.88	447.40
8,700.00	0.74	242.46	8,699.14	-12.41	-9.00	12.34	3.91	1.32	-452.28
8,725.00	0.62	274.54	8,724.14	-12.47	-9.28	12.40	1.57	-0.48	128.32
8,750.00	0.62	234.00	8,749.14	-12.54	-9.52	12.47	1.72	0.00	-162.16
8,775.00	0.84	265.21	8,774.14	-12.64	-9.82	12.56	1.79	0.88	124.84
8,800.00	0.48	248.93	8,799.13	-12.69	-10.10	12.61	1.61	-1.44	-65.12
8,825.00	0.82	249.11	8,824.13	-12.79	-10.36	12.71	1.36	1.36	0.72
8,850.00	0.67	279.22	8,849.13	-12.83	-10.67	12.75	1.65	-0.60	120.44
8,875.00	0.78	254.86	8,874.13	-12.85	-10.98	12.77	1.30	0.44	-97.44
8,900.00	0.69	283.93	8,899.13	-12.86	-11.29	12.77	1.52	-0.36	116.28
8,925.00	1.24	278.96	8,924.12	-12.78	-11.71	12.69	2.22	2.20	-19.88
8,950.00	1.21	263.54	8,949.12	-12.77	-12.23	12.68	1.32	-0.12	-61.68

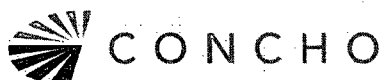


Integrity Directional Services, LLC
Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 2H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Site:	Sec. 12, T 21 S., R 33 E	MD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Well:	Bobwhite 12 State Com 2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

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	0.93	268.55	8,974.11	-12.80	-12.70	12.71	1.18	-1.12	20.04
9,000.00	1.21	277.08	8,999.11	-12.78	-13.16	12.68	1.29	1.12	34.12
9,025.00	1.35	278.17	9,024.10	-12.70	-13.72	12.60	0.57	0.56	4.36
9,050.00	1.41	273.20	9,049.10	-12.64	-14.32	12.53	0.54	0.24	-19.88
9,075.00	1.36	269.43	9,074.09	-12.63	-14.92	12.51	0.42	-0.20	-15.08
9,100.00	1.38	262.97	9,099.08	-12.67	-15.52	12.55	0.62	0.08	-25.84
9,125.00	1.55	255.08	9,124.07	-12.79	-16.14	12.67	1.05	0.68	-31.56
9,150.00	1.53	255.78	9,149.06	-12.96	-16.79	12.83	0.11	-0.08	2.80
9,175.00	1.57	253.97	9,174.05	-13.14	-17.44	13.00	0.25	0.16	-7.24
9,200.00	1.43	269.61	9,199.05	-13.24	-18.09	13.10	1.72	-0.56	62.56
9,225.00	1.62	264.75	9,224.04	-13.27	-18.75	13.13	0.92	0.76	-19.44
9,250.00	1.75	265.62	9,249.03	-13.33	-19.48	13.18	0.53	0.52	3.48
9,275.00	1.78	267.90	9,274.01	-13.37	-20.25	13.22	0.31	0.12	9.12
9,300.00	1.72	262.97	9,299.00	-13.44	-21.01	13.27	0.65	-0.24	-19.72
9,325.00	1.72	257.01	9,323.99	-13.57	-21.75	13.40	0.72	0.00	-23.84
9,350.00	1.69	257.00	9,348.98	-13.73	-22.47	13.56	0.12	-0.12	-0.04
9,375.00	1.62	251.95	9,373.97	-13.93	-23.17	13.75	0.65	-0.28	-20.20
9,400.00	1.60	257.49	9,398.96	-14.11	-23.85	13.93	0.63	-0.08	22.16
9,425.00	1.24	248.56	9,423.95	-14.28	-24.44	14.10	1.69	-1.44	-35.72
9,450.00	0.67	228.19	9,448.95	-14.48	-24.80	14.29	2.62	-2.28	-81.48
9,475.00	0.80	206.97	9,473.95	-14.73	-24.99	14.54	1.20	0.52	-84.88
9,500.00	0.65	223.71	9,498.95	-14.99	-25.16	14.80	1.03	-0.60	66.96
9,525.00	0.71	212.68	9,523.94	-15.22	-25.35	15.03	0.57	0.24	-44.12
9,550.00	0.55	190.59	9,548.94	-15.47	-25.45	15.28	1.15	-0.64	-88.36
9,575.00	0.75	235.56	9,573.94	-15.68	-25.61	15.49	2.12	0.80	179.88
9,600.00	0.99	239.79	9,598.94	-15.88	-25.93	15.69	0.99	0.96	16.92
9,625.00	0.71	195.63	9,623.94	-16.14	-26.16	15.94	2.76	-1.12	-176.64
9,650.00	0.97	203.47	9,648.93	-16.49	-26.28	16.28	1.13	1.04	31.36
9,675.00	0.90	177.15	9,673.93	-16.88	-26.36	16.67	1.72	-0.28	-105.28
9,700.00	0.71	168.75	9,698.93	-17.22	-26.32	17.02	0.89	-0.76	-33.60
9,725.00	0.70	174.20	9,723.93	-17.53	-26.27	17.33	0.27	-0.04	21.80
9,750.00	0.81	184.74	9,748.92	-17.86	-26.27	17.65	0.71	0.44	42.16
9,775.00	0.76	189.75	9,773.92	-18.20	-26.31	17.99	0.34	-0.20	20.04
9,800.00	0.93	192.32	9,798.92	-18.56	-26.39	18.35	0.70	0.68	10.28
9,825.00	1.24	170.87	9,823.91	-19.02	-26.39	18.82	2.02	1.24	-85.80
9,850.00	1.21	168.25	9,848.91	-19.55	-26.29	19.35	0.25	-0.12	-10.48
9,875.00	1.22	164.14	9,873.90	-20.06	-26.16	19.86	0.35	0.04	-16.44
9,900.00	1.28	163.78	9,898.90	-20.59	-26.01	20.39	0.24	0.24	-1.44
9,925.00	1.11	169.70	9,923.89	-21.09	-25.89	20.89	0.84	-0.68	23.68
9,950.00	1.06	175.76	9,948.89	-21.56	-25.83	21.36	0.50	-0.20	24.24
9,975.00	1.32	180.42	9,973.88	-22.08	-25.82	21.88	1.11	1.04	18.64
10,000.00	1.30	164.43	9,998.87	-22.64	-25.74	22.44	1.46	-0.08	-63.96
10,025.00	1.18	186.89	10,023.87	-23.17	-25.70	22.97	1.99	-0.48	89.84
10,050.00	1.17	175.39	10,048.86	-23.68	-25.71	23.48	0.94	-0.04	-46.00



Integrity Directional Services, LLC

Survey Report



Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 2H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Site:	Sec. 12, T 21 S., R 33 E	MD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Well:	Bobwhite 12 State Com 2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

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	1.03	183.91	10,073.86	-24.16	-25.70	23.96	0.86	-0.56	34.08
10,100.00	1.19	176.71	10,098.85	-24.64	-25.70	24.44	0.85	0.64	-28.80
10,303.00	0.70	178.50	10,301.83	-27.99	-25.55	27.79	0.24	-0.24	0.88
First IDS MWD Survey									
10,335.00	1.10	172.40	10,333.82	-28.49	-25.50	28.29	1.28	1.25	-19.06
10,366.00	4.10	187.70	10,364.79	-29.88	-25.61	29.68	9.85	9.68	49.35
10,398.00	8.40	175.40	10,396.59	-33.34	-25.58	33.15	14.00	13.44	-38.44
10,430.00	12.00	172.80	10,428.08	-38.98	-24.97	38.78	11.34	11.25	-8.13
10,462.00	15.60	178.20	10,459.15	-46.58	-24.42	46.39	11.94	11.25	16.88
10,493.00	17.70	182.70	10,488.85	-55.46	-24.51	55.27	7.94	6.77	14.52
10,525.00	20.50	185.10	10,519.09	-65.90	-25.24	65.70	9.09	8.75	7.50
10,557.00	24.10	180.10	10,548.69	-78.02	-25.75	77.82	12.71	11.25	-15.63
10,588.00	27.30	179.80	10,576.62	-91.46	-25.74	91.26	10.33	10.32	-0.97
10,619.00	28.10	179.70	10,604.07	-105.87	-25.67	105.67	2.59	2.58	-0.32
10,651.00	31.10	176.60	10,631.89	-121.66	-25.14	121.46	10.52	9.38	-9.69
10,681.00	35.00	176.00	10,657.03	-137.98	-24.08	137.79	13.05	13.00	-2.00
10,684.85	35.47	176.05	10,660.18	-140.20	-23.93	140.01	12.21	12.19	1.35
North 330 Hardline Crossing									
10,713.00	38.90	176.40	10,682.60	-157.17	-22.81	156.99	12.21	12.19	1.24
10,744.00	43.60	176.90	10,705.90	-177.57	-21.62	177.40	15.20	15.16	1.61
10,775.00	48.70	176.90	10,727.37	-199.89	-20.41	199.73	16.45	16.45	0.00
10,807.00	52.90	178.30	10,747.59	-224.66	-19.38	224.50	13.56	13.13	4.38
10,838.00	56.80	179.30	10,765.44	-249.99	-18.86	249.84	12.85	12.58	3.23
10,869.00	60.60	180.00	10,781.54	-276.48	-18.70	276.33	12.41	12.26	2.26
10,901.00	63.70	180.80	10,796.48	-304.77	-18.90	304.61	9.94	9.69	2.50
10,931.00	66.70	180.90	10,809.07	-331.99	-19.30	331.84	10.00	10.00	0.33
10,963.00	69.90	180.60	10,820.90	-361.72	-19.69	361.56	10.04	10.00	-0.94
10,994.00	73.30	180.00	10,830.68	-391.13	-19.85	390.97	11.12	10.97	-1.94
11,025.00	76.10	179.80	10,838.86	-421.03	-19.79	420.86	9.05	9.03	-0.65
11,055.00	78.50	179.80	10,845.46	-450.29	-19.69	450.13	8.00	8.00	0.00
11,086.00	80.90	180.90	10,851.00	-480.79	-19.88	480.62	8.49	7.74	3.55
11,118.00	84.00	180.60	10,855.20	-512.50	-20.29	512.33	9.73	9.69	-0.94
11,149.00	87.00	180.90	10,857.63	-543.40	-20.70	543.23	9.73	9.68	0.97
11,179.00	88.10	181.40	10,858.92	-573.37	-21.30	573.19	4.03	3.67	1.67
11,273.00	89.00	182.10	10,861.30	-667.29	-24.17	667.09	1.21	0.96	0.74
11,368.00	88.90	181.20	10,863.04	-762.24	-26.90	762.01	0.95	-0.11	-0.95
11,461.00	89.30	180.90	10,864.50	-855.21	-28.61	854.96	0.54	0.43	-0.32
11,554.00	88.60	180.80	10,866.20	-948.18	-29.99	947.92	0.76	-0.75	-0.11
11,649.00	88.50	180.20	10,868.60	-1,043.15	-30.82	1,042.88	0.64	-0.11	-0.63
11,744.00	89.20	180.20	10,870.51	-1,138.13	-31.15	1,137.86	0.74	0.74	0.00
11,836.00	88.30	179.70	10,872.52	-1,230.10	-31.07	1,229.83	1.12	-0.98	-0.54
11,930.00	89.10	180.30	10,874.65	-1,324.08	-31.07	1,323.80	1.06	0.85	0.64
12,025.00	89.20	179.30	10,876.06	-1,419.07	-30.74	1,418.79	1.06	0.11	-1.05

Company:	COG Operating L L C	Local Co-ordinate Reference:	Well Bobwhite 12 State Com 2H
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Site:	Sec. 12, T 21 S., R 33 E	MD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Well:	Bobwhite 12 State Com 2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

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)
12,120.00	87.80	178.50	10,878.55	-1,514.01	-28.91	1,513.75	1.70	-1.47	-0.84
12,215.00	88.30	178.80	10,881.78	-1,608.93	-26.68	1,608.68	0.61	0.53	0.32
12,309.00	88.40	177.80	10,884.49	-1,702.85	-23.89	1,702.62	1.07	0.11	-1.06
12,404.00	88.60	178.50	10,886.97	-1,797.77	-20.82	1,797.56	0.77	0.21	0.74
12,499.00	89.80	177.90	10,888.30	-1,892.71	-17.84	1,892.52	1.41	1.26	-0.63
12,594.00	90.10	176.80	10,888.38	-1,987.61	-13.45	1,987.44	1.20	0.32	-1.16
12,689.00	87.60	177.10	10,890.29	-2,082.45	-8.39	2,082.32	2.65	-2.63	0.32
12,784.00	88.70	177.50	10,893.36	-2,177.29	-3.92	2,177.19	1.23	1.16	0.42
12,879.00	89.50	178.50	10,894.85	-2,272.22	-0.61	2,272.15	1.35	0.84	1.05
12,974.00	90.10	179.70	10,895.18	-2,367.20	0.89	2,367.14	1.41	0.63	1.26
13,070.00	89.80	178.60	10,895.26	-2,463.19	2.31	2,463.14	1.19	-0.31	-1.15
13,165.00	90.50	179.10	10,895.01	-2,558.17	4.22	2,558.13	0.91	0.74	0.53
13,260.00	91.30	178.70	10,893.52	-2,653.14	6.04	2,653.11	0.94	0.84	-0.42
13,354.00	89.90	178.70	10,892.54	-2,747.11	8.17	2,747.09	1.49	-1.49	0.00
13,446.00	88.80	177.30	10,893.58	-2,839.04	11.38	2,839.05	1.94	-1.20	-1.52
13,541.00	88.70	178.10	10,895.65	-2,933.94	15.19	2,933.97	0.85	-0.11	0.84
13,636.00	88.20	178.70	10,898.22	-3,028.87	17.85	3,028.92	0.82	-0.53	0.63
13,731.00	87.10	179.70	10,902.12	-3,123.78	19.17	3,123.83	1.56	-1.16	1.05
13,826.00	87.80	180.40	10,906.35	-3,218.68	19.09	3,218.73	1.04	0.74	0.74
13,920.00	89.40	181.00	10,908.64	-3,312.64	17.94	3,312.68	1.82	1.70	0.64
14,014.00	90.50	180.70	10,908.72	-3,406.63	16.55	3,406.66	1.21	1.17	-0.32
14,108.00	90.40	181.30	10,907.99	-3,500.61	14.91	3,500.63	0.65	-0.11	0.64
14,203.00	91.10	180.50	10,906.74	-3,595.59	13.41	3,595.59	1.12	0.74	-0.84
14,298.00	90.00	179.50	10,905.83	-3,690.59	13.41	3,690.58	1.56	-1.16	-1.05
14,392.00	89.40	178.90	10,906.32	-3,784.58	14.73	3,784.58	0.90	-0.64	-0.64
14,487.00	89.50	178.80	10,907.24	-3,879.55	16.63	3,879.57	0.15	0.11	-0.11
14,581.00	89.40	178.20	10,908.14	-3,973.51	19.09	3,973.54	0.65	-0.11	-0.64
14,676.00	87.60	177.80	10,910.62	-4,068.42	22.41	4,068.47	1.94	-1.89	-0.42
14,770.00	87.50	177.20	10,914.64	-4,162.24	26.50	4,162.33	0.65	-0.11	-0.64
14,865.00	89.30	177.00	10,917.30	-4,257.08	31.31	4,257.20	1.91	1.89	-0.21
14,959.00	90.10	176.60	10,917.79	-4,350.93	36.56	4,351.09	0.95	0.85	-0.43
15,053.00	89.20	176.40	10,918.36	-4,444.76	42.29	4,444.95	0.98	-0.96	-0.21
15,148.00	89.00	175.90	10,919.85	-4,539.53	48.67	4,539.77	0.57	-0.21	-0.53
15,242.00	88.70	176.70	10,921.74	-4,633.31	54.74	4,633.60	0.91	-0.32	0.85
15,338.00	88.60	176.50	10,924.00	-4,729.12	60.43	4,729.44	0.23	-0.10	-0.21
15,367.55	88.92	176.53	10,924.64	-4,758.61	62.22	4,758.94	1.09	1.09	0.10
South 330 Hardline Crossing									
15,439.00	89.70	176.60	10,925.50	-4,829.92	66.51	4,830.29	1.09	1.09	0.10
Final IDS MWD Survey									
15,495.00	89.70	176.60	10,925.79	-4,885.82	69.83	4,886.21	0.00	0.00	0.00
Projection to TD									



Integrity Directional Services, LLC
Survey Report



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Site:	Sec. 12, T 21 S. , R 33 E	MD Reference:	KB=20' @ 3792.50ft (Patriot 2)
Well:	Bobwhite 12 State Com 2H	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Multi User Db

Design Annotations				
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
10,303.00	10,301.83	-27.99	-25.55	First IDS MWD Survey
10,684.85	10,660.18	-140.20	-23.93	North 330 Hardline Crossing
15,367.55	10,924.64	-4,758.61	62.22	Sourth 330 Hardline Crosssing
15,439.00	10,925.50	-4,829.92	66.51	Final IDS MWD Survey
15,495.00	10,925.79	-4,885.82	69.83	Projection to TD

Checked By: _____ Approved By: _____ Date: _____