

30.025-40048

WELL NAME AND NUMBER BC Federal No. 62 Unit C
 LOCATION Section 20, T17S, R32E, 1105 FNL, 2015 FWL, Lea County
 OPERATOR COG Operating LLC
 DRILLING CONTRACTOR United Drilling, Inc.

The undersigned hereby certifies that he is an authorized representative of the drilling contractor who drilled the above described well and had conducted deviation test and obtained the following results:

Degrees @ Depth	Degrees @ Depth	Degrees @ Depth
.20° @ 150'		
.56° @ 305'		
.34° @ 427'		
.61° @ 547'		
2.30° @ 643'		
5.47° @ 760'		
4.46° @ 854'		
3.77° @ 948'		
1.72° @ 1392'		
1.86° @ 1867'		

HOBBS OCD

SEP 19 2011

RECEIVED

Drilling Contractor- UNITED DRILLING, INC.

By: Luisa Noriega
 (Luisa Noriega)

Title: Asst. Office Manager

Subscribed and sworn to before me this 15th day of July, 2011.

Carlue Martin
 Notary Public

Chaves New Mexico
 County State

My Commission Expires: 10/8/12

DEC 12 2011

Results of Directional Survey

DD

API number:	30-025-40098			
OGRID:		Operator:	COG OPERATING LLC	
		Property:	BC FEDERAL	# 62

surface	ULSTR:	C	20	T 17S	R 32E
				1105 FNL	2015 FWL

BH Loc	ULSTR:	F	20	T 17S	R 32E
7168	MD	7125.8	TVD	1678 FNL	2262 FWL

Top Perf/OH	ULSTR:	C	20	T 17S	R 32E
5390	MD	5363.8	TVD	1451 FNL	2195 FWL

Bot Perf/OH	ULSTR:	F	20	T 17S	R 32E
6750	MD	6711.2	TVD	1627 FNL	2247 FWL

	MD	N/S	E/W	VD
	5342	-339.48	178.34	5316.2
TOP PERFS/OH	5390	-345.83	180.02	5363.75
	5437	-352.04	181.67	5410.30
	6662	-510.46	228.79	6624.04
BOT PERFS/OH	6750	-521.74	232.32	6711.24
	6757	-522.64	232.60	6718.18

NEXT TO LAST	6979	-550.17	240.92	6938.31
LAST READING	7117	-566.89	245.13	7075.22
TD	7168	-573.07	246.69	7125.82

Surface Location	1105	FN	2015	FW
Projected BHL	1678	FN	2262	FW
Location of				
Top Perfs/OH	1451	FN	2195	FW
Bottom Perfs/OH	1627	FN	2247	FW

SUMMARY of Subsurface Locations

Surface Location	C-20-17S-32E	1105	FN	2015	FW	Vert. Depth
Top Perfs/OH	C-20-17S-32E	1451	FN	2195	FW	5363.75
Bottom Perfs/OH	F-20-17S-32E	1627	FN	2247	FW	6711.24
Projected TD	F-20-17S-32E	1678	FN	2262	FW	7125.82



COG Operating LLC

Lea County, NM (NAD27 NME)

BC Federal #62

BC Federal #62

OH

HOBBS OCD

SEP 19 2011

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Design: Actual

Standard Survey Report

14 July, 2011

SUR: C-20-17s-32e, 1105/N & 2015/W
BHL: F-20-17s-32e, 1678/N & 2262/W
API# 30-025-40098





Scientific Drilling Survey Report



Company: COG Operating LLC
Project: Lea County, NM (NAD27 NME)
Site: BC Federal #62
Well: BC Federal #62
Wellbore: OH
Design: Actual

Local Co-ordinate Reference: Well BC Federal #62
TVD Reference: KB Elev (20') @ 4008 00usft (UDI #42)
MD Reference: KB Elev (20') @ 4008 00usft (UDI #42)
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM-Julio

Project Lea County, NM (NAD27 NME)

Map System: US State Plane 1927 (Exact solution)
Geo Datum: NAD 1927 (NADCON CONUS)
Map Zone: New Mexico East 3001

System Datum: Mean Sea Level

Site BC Federal #62

Site Position: Northing: 664,003.60 usft Latitude: 32° 49' 27.316 N
From: Map Easting: 666,865 00 usft Longitude: 103° 47' 24.497 W
Position Uncertainty: 0 00 usft Slot Radius: 13-3/16 " Grid Convergence: 0 29 °

Well BC Federal #62

Well Position +N/-S 0 00 usft Northing: 664,003 60 usft Latitude: 32° 49' 27.316 N
+E/-W 0 00 usft Easting: 666,865 00 usft Longitude: 103° 47' 24.497 W
Position Uncertainty 0 00 usft Wellhead Elevation: usft Ground Level: 3,988 00 usft

Wellbore OH

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	2011/07/08	7 72	60 70	48,944

Design Actual

Audit Notes:

Version: 1 0 Phase: ACTUAL Tie On Depth: 0 00

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0 00	0 00	0 00	155 88

Survey Program Date 2011/07/14

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100 00	2,070.00	Gyro Survey (OH)	Keeper	Standard Wireline Keeper ver 1 0 2
2,169 00	7,168 00	MWD Survey (OH)	MWD	MWD - Standard

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build 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 19	159 75	100 00	-0 16	0 06	0 17	0 19	0 19	0 00
200 00	0 40	163 64	200 00	-0 65	0 21	0.68	0 21	0.21	3.89
300 00	0 21	114 44	300 00	-1 06	0.48	1 16	0 31	-0.19	-49 20
400 00	0 31	309 66	400 00	-0 96	0 44	1 05	0 52	0 10	-164 78
500 00	0 50	44 86	500 00	-0 48	0.54	0 66	0.61	0 19	95 20
600 00	2 67	72 29	599 95	0 54	3 06	0 76	2 24	2 17	27 43
700 00	5 71	82.23	699 67	1 92	10 21	2 42	3 11	3.04	9 94
800 00	5 16	84 01	799 22	3 06	19 61	5 22	0.58	-0 55	1 78
900 00	4 04	91 08	898.90	3 47	27 61	8 12	1 25	-1 12	7.07



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North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: EDM-Julio

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
1,000.00	3.56	88.98	998.68	3.45	34.24	10.84	0.50	-0.48	-2.10
1,100.00	3.11	88.95	1,098.51	3.56	40.05	13.12	0.45	-0.45	-0.03
1,200.00	2.63	87.92	1,198.39	3.69	45.06	15.04	0.48	-0.48	-1.03
1,300.00	2.33	84.24	1,298.29	3.98	49.37	16.54	0.34	-0.30	-3.68
1,400.00	1.87	84.58	1,398.22	4.34	53.02	17.71	0.46	-0.46	0.34
1,500.00	1.93	81.94	1,498.17	4.73	56.31	18.70	0.11	0.06	-2.64
1,600.00	2.16	71.44	1,598.11	5.56	59.76	19.34	0.44	0.23	-10.50
1,700.00	2.31	63.44	1,698.03	7.07	63.35	19.44	0.35	0.15	-8.00
1,800.00	2.10	49.68	1,797.96	9.15	66.55	18.84	0.57	-0.21	-13.76
1,900.00	1.75	60.45	1,897.90	11.09	69.28	18.19	0.50	-0.35	10.77
2,000.00	1.50	50.43	1,997.86	12.68	71.62	17.69	0.38	-0.25	-10.02
2,070.00	1.31	49.91	2,067.84	13.78	72.93	17.23	0.27	-0.27	-0.74
Gyro Tie-in									
2,169.00	1.23	70.30	2,166.82	14.86	74.80	17.00	0.46	-0.08	20.60
2,232.00	1.89	83.34	2,229.79	15.21	76.47	17.36	1.18	1.05	20.70
2,296.00	2.36	100.86	2,293.75	15.09	78.81	18.44	1.24	0.73	27.38
2,359.00	2.77	127.49	2,356.69	13.92	81.29	20.52	1.98	0.65	42.27
2,422.00	3.25	145.33	2,419.60	11.52	83.52	23.61	1.66	0.76	28.32
2,485.00	3.90	147.75	2,482.48	8.24	85.68	27.49	1.06	1.03	3.84
2,549.00	4.81	149.03	2,546.29	4.10	88.22	32.31	1.43	1.42	2.00
2,612.00	5.36	157.39	2,609.05	-0.88	90.71	37.87	1.46	0.87	13.27
2,675.00	5.67	157.86	2,671.75	-6.48	93.01	43.93	0.50	0.49	0.75
2,739.00	6.25	164.06	2,735.41	-12.76	95.16	50.53	1.35	0.91	9.69
2,802.00	6.95	161.67	2,797.99	-19.68	97.30	57.72	1.19	1.11	-3.79
2,866.00	7.28	161.26	2,861.50	-27.19	99.82	65.61	0.52	0.52	-0.64
2,961.00	6.17	160.03	2,955.84	-37.69	103.50	76.70	1.18	-1.17	-1.29
3,055.00	6.29	162.63	3,049.29	-47.35	106.76	86.85	0.33	0.13	2.77
3,150.00	6.29	158.90	3,143.72	-57.18	110.19	97.21	0.43	0.00	-3.93
3,245.00	7.01	158.20	3,238.08	-67.41	114.22	108.20	0.76	0.76	-0.74
3,308.00	6.72	159.26	3,300.63	-74.43	116.95	115.72	0.50	-0.46	1.68
3,371.00	6.48	155.39	3,363.21	-81.11	119.73	122.96	0.80	-0.38	-6.14
3,435.00	6.91	161.88	3,426.77	-88.05	122.44	130.40	1.36	0.67	10.14
3,530.00	7.93	170.10	3,520.98	-99.94	125.34	142.43	1.55	1.07	8.65
3,633.00	7.74	166.81	3,623.02	-113.69	128.14	156.13	0.47	-0.18	-3.19
3,727.00	7.95	166.06	3,716.14	-126.16	131.15	168.74	0.25	0.22	-0.80
3,822.00	7.89	163.16	3,810.23	-138.78	134.63	181.68	0.43	-0.06	-3.05
3,917.00	7.67	161.87	3,904.36	-151.05	138.49	194.45	0.30	-0.23	-1.36
4,012.00	8.60	167.39	3,998.40	-164.00	142.01	207.72	1.28	0.98	5.81
4,107.00	8.33	170.59	4,092.37	-177.72	144.69	221.33	0.57	-0.28	3.37
4,202.00	8.16	171.02	4,186.39	-191.17	146.86	234.50	0.19	-0.18	0.45
4,297.00	8.19	172.38	4,280.42	-204.54	148.81	247.49	0.21	0.03	1.43
4,392.00	8.10	171.26	4,374.46	-217.86	150.73	260.43	0.19	-0.09	-1.18
4,487.00	7.83	167.63	4,468.55	-230.80	153.13	273.22	0.60	-0.28	-3.82



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4,582 00	7 67	170 05	4,562 68	-243 36	155 61	285 71	0 38	-0 17	2 55
4,676 00	7 60	171 56	4,655 85	-255 69	157 61	297 77	0 23	-0 07	1 61
4,771 00	7 42	170 55	4,750 03	-267 95	159 54	309 76	0 23	-0 19	-1 06
4,866 00	7 17	169 72	4,844 26	-279 84	161 60	321 45	0 29	-0 26	-0 87
4,961 00	7 15	168 20	4,938 52	-291 46	163 87	332 98	0 20	-0 02	-1 60
5,056 00	8 03	161 47	5,032 69	-303 54	167 19	345 36	1 32	0 93	-7 08
5,151 00	7 61	163 92	5,126 81	-315 87	171 04	358 19	0 56	-0 44	2 58
5,247 00	7 51	161 74	5,221 97	-327 94	174 77	370 73	0 32	-0 10	-2 27
5,342 00	7 10	163 89	5,316 20	-339 48	178 34	382 72	0 52	-0 43	2 26
5,437 00	8 63	166 17	5,410 30	-352 04	181 67	395 54	1 64	1 61	2 40
5,532 00	8 58	167 36	5,504 23	-365 87	184 93	409 50	0 19	-0 05	1 25
5,619 00	8 48	167 73	5,590 27	-378 48	187 71	422 14	0 13	-0 11	0 43
5,714 00	8 36	164 81	5,684 25	-391 98	191 01	435 82	0 47	-0 13	-3 07
5,809 00	7 28	164 20	5,778 36	-404 44	194 46	448 60	1 14	-1 14	-0 64
5,904 00	7 37	163 80	5,872 59	-416 08	197 80	460 59	0 11	0 09	-0 42
5,998 00	7 30	162 32	5,965 82	-427 56	201 29	472 49	0 21	-0 07	-1 57
6,093 00	7 35	162 25	6,060 04	-439 10	204 98	484 53	0 05	0 05	-0 07
6,188 00	7 26	164 01	6,154 27	-450 66	208 48	496 51	0 25	-0 09	1 85
6,283 00	7 27	160 80	6,248 51	-462 11	212 11	508 44	0 43	0 01	-3 38
6,378 00	7 56	159 81	6,342 72	-473 65	216 25	520 66	0 33	0 31	-1 04
6,473 00	7 95	160 67	6,436 85	-485 71	220 58	533 45	0 43	0 41	0 91
6,568 00	8 04	160 95	6,530 92	-498 19	224 92	546 61	0 10	0 09	0 29
6,662 00	7 70	164 14	6,624 04	-510 46	228 79	559 39	0 59	-0 36	3 39
6,757 00	7 74	161 11	6,718 18	-522 64	232 60	572 06	0 43	0 04	-3 19
6,852 00	7 58	163 59	6,812 33	-534 70	236 44	584 64	0 39	-0 17	2 61
6,979 00	6 99	164 14	6,938 31	-550 17	240 92	600 59	0 47	-0 46	0 43
7,117 00	7 37	167 50	7,075 22	-566 89	245 13	617 57	0 41	0 28	2 43
Last MWD Survey									
7,168 00	7 37	167 50	7,125 80	-573 28	246 55	623 98	0 00	0 00	0 00
Projection to Bit									

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	+E/-W (usft)	Comment
2,070 00	2,067 84	13 78	72 93	Gyro Tie-in
7,117 00	7,075 22	-566 89	245 13	Last MWD Survey
7,168 00	7,125 80	-573 28	246 55	Projection to Bit

Checked By: _____

Approved By: _____

Date: _____