



COG Operating LLC

Lea County, NM (NAD27 NME)

BC Federal #35

BC Federal #35

OH

Design: Actual

Standard Survey Report

07 May, 2009

SUR: E-19-17s-32e, 2510/N & 330/W
BHL: E-19-17s-32e, 2254/N & 379/W
API # 30-025-39021

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Scientific Drilling



Scientific Drilling
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Site BC Federal #35
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	Ground Elev @ 3932 00ft (Rig ?)
Site:	BC Federal #35	MD Reference:	Ground Elev @ 3932 00ft (Rig ?)
Well:	BC Federal #35	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 5000 1 Single 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	BC Federal #35				
Site Position:		Northing:	662,571 20 ft	Latitude:	32° 49' 13 490 N
From:	Map	Easting:	659,878 00 ft	Longitude:	103° 48' 46 458 W
Position Uncertainty:	0 00 ft	Slot Radius:	0 "	Grid Convergence:	0 28 °

Well	BC Federal #35					
Well Position	+N/-S	0 00 ft	Northing:	662,571 20 ft	Latitude:	32° 49' 13 490 N
	+E/-W	0 00 ft	Easting:	659,878 00 ft	Longitude:	103° 48' 46 458 W
Position Uncertainty		0 00 ft	Wellhead Elevation:	ft	Ground Level:	3,932 00 ft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	2009/05/07	7 98	60 77	49,185

Design	Actual				
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	14 40	

Survey Program	Date	2009/05/07			
From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description	
100 00	2,062 00	Gyro (OH)	Keeper	Standard Wireline Keeper ver 1 0 2	
2,174 00	5,229 00	MWD (OH)	MWD	MWD - Standard	

Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	0 00	
100 00	0 48	332 62	100 00	0 37	-0 19	0 31	0 48	0 48	0 00	
200 00	0 44	325 32	200 00	1 06	-0 60	0 88	0 07	-0 04	-7 30	
300 00	0 33	316 55	299 99	1 58	-1 02	1 28	0 12	-0 11	-8 77	
400 00	0 36	33 62	399 99	2 06	-1 04	1 73	0 43	0 03	77 07	
500 00	0 39	25 71	499 99	2 62	-0 72	2 36	0 06	0 03	-7 91	
600 00	0 41	19 54	599 99	3 27	-0 46	3 05	0 05	0 02	-6 17	
700 00	0 32	31 88	699 99	3 84	-0 19	3 67	0 12	-0 09	12 34	
800 00	0 40	36 15	799 98	4 36	0 17	4 26	0 08	0 08	4 27	
900 00	0 44	37 19	899 98	4 95	0 60	4 94	0 04	0 04	1 04	



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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM 5000 1 Single User Db

Survey									
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
1,000 00	0 37	35 01	999 98	5 52	1 02	5 60	0 07	-0 07	-2 18
1,100 00	0 44	35 28	1,099 98	6 10	1 43	6 26	0 07	0 07	0 27
1,200 00	0 52	48 77	1,199 97	6 71	1 99	6 99	0 14	0 08	13 49
1,300 00	0 58	46 72	1,299 97	7 36	2 70	7 80	0 06	0 06	-2 05
1,400 00	0 77	54 18	1,399 96	8 10	3 61	8 74	0 21	0 19	7 46
1,500 00	0 96	47 11	1,499 95	9 06	4 77	9 96	0 22	0 19	-7 07
1,600 00	1 14	54 19	1,599 93	10 21	6 19	11 43	0 22	0 18	7 08
1,700 00	1 34	52 27	1,699 91	11 51	7 92	13 12	0 20	0 20	-1 92
1,800 00	1 38	52 20	1,799 88	12 96	9 80	14 99	0 04	0 04	-0 07
1,900 00	1 33	61 56	1,899 85	14 25	11 77	16 73	0 23	-0 05	9 36
2,000 00	1 25	62 81	1,999 83	15 30	13 76	18 25	0 08	-0 08	1 25
2,062 00	1 15	57 58	2,061 81	15 95	14 89	19 15	0 24	-0 16	-8 44
Gyro Tie-in									
2,174 00	1 00	65 05	2,173 79	16 96	16 72	20 59	0 18	-0 13	6 67
2,268 00	2 26	31 89	2,267 76	18 88	18 45	22 88	1 62	1 34	-35 28
2,363 00	3 15	11 50	2,362 65	23 03	19 96	27 27	1 37	0 94	-21 46
2,458 00	2 88	8 75	2,457 52	27 95	20 84	32 25	0 32	-0 28	-2 89
2,554 00	3 06	11 23	2,553 39	32 84	21 71	37 21	0 23	0 19	2 58
2,649 00	3 58	9 42	2,648 23	38 26	22 69	42 70	0 56	0 55	-1 91
2,744 00	3 32	11 53	2,743 06	43 88	23 72	48 40	0 30	-0 27	2 22
2,839 00	2 70	1 23	2,837 93	48 81	24 32	53 32	0 86	-0 65	-10 84
2,933 00	3 69	1 30	2,931 78	54 05	24 44	58 43	1 05	1 05	0 07
2,965 00	3 67	5 38	2,963 72	56 10	24 55	60 44	0 82	-0 06	12 75
3,060 00	3 88	18 06	3,058 51	62 18	25 84	66 65	0 90	0 22	13 35
3,155 00	2 96	19 34	3,153 34	67 55	27 65	72 30	0 97	-0 97	1 35
3,250 00	4 40	14 89	3,248 14	73 39	29 39	78 39	1 54	1 52	-4 68
3,346 00	3 73	15 76	3,343 90	79 95	31 19	85 20	0 70	-0 70	0 91
3,441 00	3 45	20 15	3,438 71	85 61	33 01	91 13	0 41	-0 29	4 62
3,536 00	4 93	8 56	3,533 46	92 33	34 60	98 03	1 79	1 56	-12 20
3,631 00	4 76	10 36	3,628 12	100 24	35 92	106 03	0 24	-0 18	1 89
3,726 00	4 78	11 45	3,722 79	108 00	37 42	113 91	0 10	0 02	1 15
3,821 00	4 51	13 64	3,817 48	115 51	39 08	121 60	0 34	-0 28	2 31
3,917 00	4 28	358 24	3,913 20	122 76	39 86	128 81	1 25	-0 24	-16 04
4,011 00	3 90	352 79	4,006 96	129 43	39 35	135 16	0 58	-0 40	-5 80
4,106 00	4 49	7 84	4,101 71	136 32	39 46	141 85	1 31	0 62	15 84
4,201 00	4 19	9 38	4,196 44	143 43	40 53	149 00	0 34	-0 32	1 62
4,233 00	4 14	7 40	4,228 35	145 73	40 87	151 32	0 48	-0 16	-6 19
4,328 00	5 24	0 88	4,323 03	153 47	41 38	158 94	1 28	1 16	-6 86
4,423 00	5 05	354 79	4,417 65	161 97	41 06	167 09	0 61	-0 20	-6 41
4,518 00	4 43	13 35	4,512 33	169 71	41 53	174 70	1 73	-0 65	19 54
4,581 00	4 68	13 11	4,575 13	174 58	42 68	179 70	0 40	0 40	-0 38
4,676 00	4 59	13 67	4,669 82	182 04	44 45	187 38	0 11	-0 09	0 59
4,772 00	4 04	9 48	4,765 55	189 11	45 92	194 59	0 66	-0 57	-4 36



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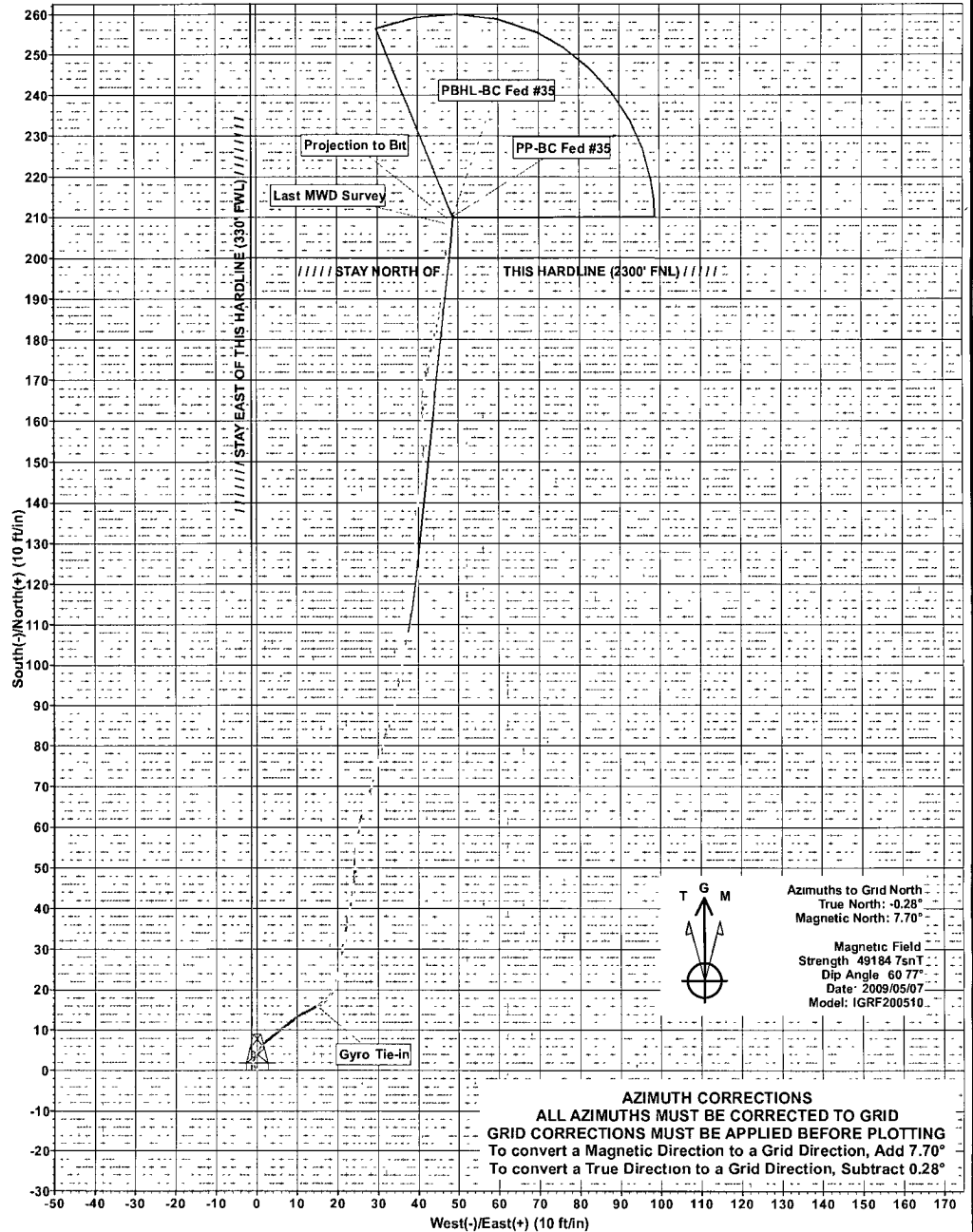
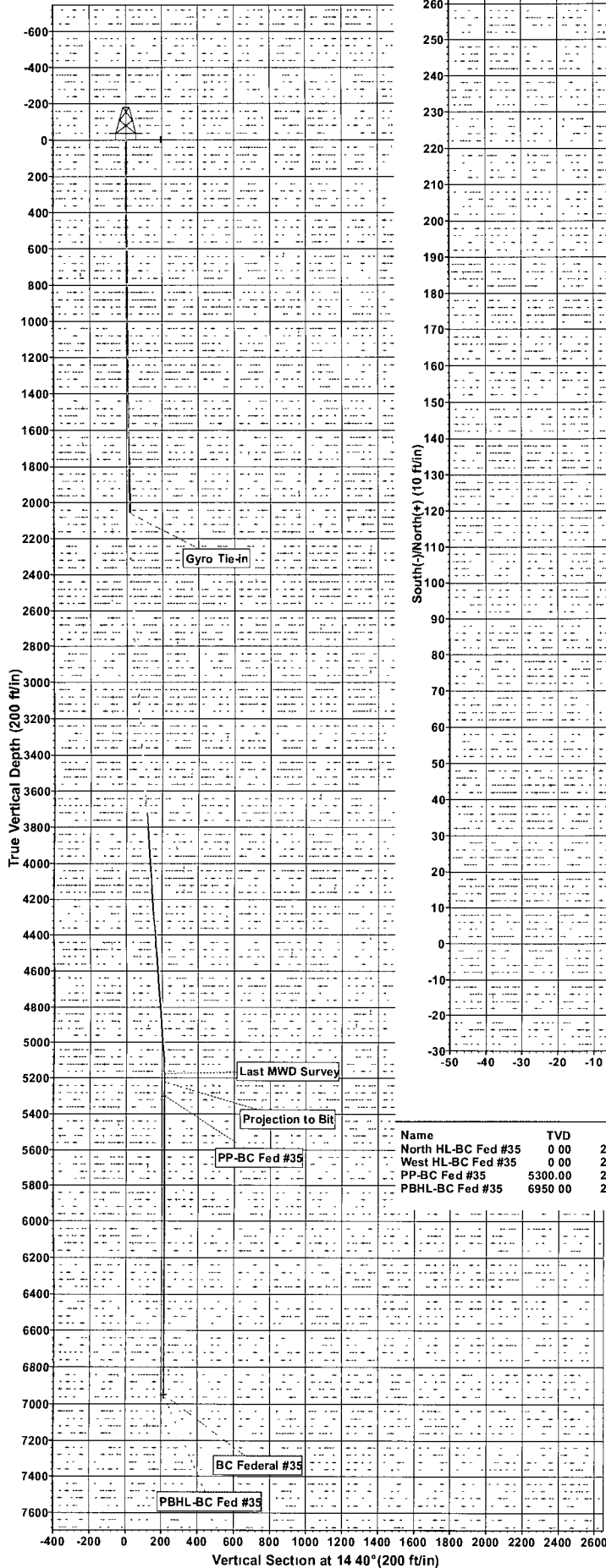
Survey										
Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)	
4,867 00	3 61	3 91	4,860 34	195 40	46 67	200 86	0 60	-0 45	-5 86	
4,962 00	2 84	4 30	4,955 19	200 73	47 05	206 12	0 81	-0 81	0 41	
5,057 00	1 91	8 40	5,050 10	204 64	47 46	210 01	0 99	-0 98	4 32	
5,152 00	1 39	353 78	5,145 06	207 35	47 57	212 67	0 70	-0 55	-15 39	
5,184 00	1 67	1 75	5,177 05	208 20	47 54	213 49	1 10	0 88	24 91	
Last MWD Survey										
5,229 00	1 67	1 75	5,222 03	209 51	47 58	214 77	0 00	0 00	0 00	
Projection to Bit										

Design Annotations					
Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates			
		+N/-S (ft)	+E/-W (ft)	Comment	
2,062 00	2,061 81	15 95	14 89	Gyro Tie-in	
5,184 00	5,177 05	208 20	47 54	Last MWD Survey	
5,229 00	5,222 03	209 51	47 58	Projection to Bit	

Checked By _____ Approved By. _____ Date _____



Scientific Drilling for COG Operating LLC
Site: Lea County, NM (NAD27 NME)
Well: BC Federal #35
Wellbore: OH
Design: Plan #4 vs Actual - 7 7/8" Hole



Azimuths to Grid North
True North: -0.28°
Magnetic North: 7.70°

Magnetic Field
Strength 49184.75nT
Dip Angle 60.77°
Date: 2009/05/07
Model: IGRF200510

AZIMUTH CORRECTIONS
ALL AZIMUTHS MUST BE CORRECTED TO GRID
GRID CORRECTIONS MUST BE APPLIED BEFORE PLOTTING
To convert a Magnetic Direction to a Grid Direction, Add 7.70°
To convert a True Direction to a Grid Direction, Subtract 0.28°

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
North HL-BC Fed #35	0 00	200 00	-1 20	662771.20	659876 80	32°49' 15 469 N	103°48' 46.460 W	Rectangle (Sides. L0.00 W100.00)
West HL-BC Fed #35	0 00	200 00	-1 20	662771.20	659876 80	32°49' 15 469 N	103°48' 46.460 W	Rectangle (Sides. L300.00 W0.00)
PP-BC Fed #35	5300.00	210.00	48 80	662781 20	659926 80	32°49' 15 565 N	103°48' 45 874 W	Point
PBHL-BC Fed #35	6950 00	210 00	48 80	662781 20	659926 80	32°49' 15.565 N	103°48' 45 874 W	Point

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSec	Target
1	3726 00	4.78	11 45	3722 79	108.00	37.42	0.00	0 00	113 91	
2	3898 67	4 02	5 99	3894 95	121.08	39.48	0.50	-153 67	127.09	
3	5038 46	4 02	5 99	5031.93	200 63	47.82	0.00	0 00	206.22	
4	5306.75	0.00	0 00	5300.00	210.00	48 80	1.50	180 00	215.54	PP-BC Fed #35
5	6956 75	0 00	0 00	6950.00	210 00	48.80	0.00	0 00	215.54	PBHL-BC Fed #35

WELL DETAILS: BC Federal #35

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0 00	0.00	662571 20	659878.00	32°49' 13 490 N	103°48' 46 458 W	

PROJECT DETAILS: Lea County, NM (NAD27 NME)

Plan. Plan #4 - 7 7/8" Hole (BC Federal #35/OH)

Geodetic System: US State Plane 1927 (Exact solution)	Created By: Julio Pina	Date: 07-May-09
Datum: NAD 1927 (NADCON CONUS)		
Ellipsoid: Clarke 1866	Checked: _____	Date: _____
Zone: New Mexico East 3001	Reviewed: _____	Date: _____
System Datum: Mean Sea Level	Approved: _____	Date: _____