

Results of Directional Survey

DD

API number:	30-025-40237		
OGRID:		Operator:	COG OPERATING LLC
		Property:	GC FEDERAL # 44

surface	ULSTR:	O	20	T 17S	R 32E
				753 FSL	2206 FEL

BH Loc	ULSTR:	O	20	T 17S	R 32E
7150	MD	7122.3	TVD	393 FSL	2261 FEL

Top Perf/OH	ULSTR:	O	20	T 17S	R 32E
5435	MD	5407.5	TVD	395 FSL	2278 FEL

Bot Perf/OH	ULSTR:	O	20	T 17S	R 32E
6830	MD	6802.4	TVD	393 FSL	2264 FEL

	MD	N/S	E/W	VD
	5401	-358.11	-72.57	5373.51
TOP PERFS/OH	5435	-358.49	-72.42	5407.51
	5463	-358.81	-72.29	5435.51
	5463	-358.81	-72.29	5435.51
BOT PERFS/OH	6830	-359.67	-58.04	6802.37
	5558	-358.87	-71.30	5530.50

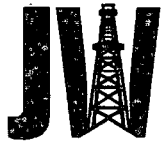
NEXT TO LAST	5463	-358.81	-72.29	5435.51
LAST READING	5558	-358.87	-71.30	5530.50
TD	7150	-359.88	-54.71	7122.33

Surface Location	753	FS	2206	FE
Projected BHL	393	FS	2261	FE
Location of				
Top Perfs/OH	395	FS	2278	FE
Bottom Perfs/OH	393	FS	2264	FE

SUMMARY of Subsurface Locations

Surface Location	O-20-17S-32E	753	FS	2206	FE	Vert. Depth
Top Perfs/OH	O-20-17S-32E	395	FS	2278	FE	5407.51
Bottom Perfs/OH	O-20-17S-32E	393	FS	2264	FE	6802.37
Projected TD	O-20-17S-32E	393	FS	2261	FE	7122.33

MAR 22 2012



DRILLING INC. Oil Well Drilling Contractor

Post Office Box 160 Artesia, New Mexico 88211-0160 Office (575) 748-8704 Fax (575) 748-8719

November 17, 2011

HOBBS OCD

JAN 12 2012

COG Operating, LLC
550 W. Texas
Midland, Texas 79701

RECEIVED

Re: GC Federal # 44
Sec. 20, T-17-S, R-32-E
Lea County, New Mexico

Attn: John Coffman

The following is a Deviation Survey on the referenced well in Lea County, New Mexico:

440' - 0.5°
628' - 0.75°
1102' - 1°
1602' - 0.75°
2148' - 1.25°

Sincerely,

Gary W. Chappell
Contracts Manager

STATE OF NEW MEXICO)
COUNTY OF EDDY)

The foregoing was acknowledged before me this 17th day of November, 2011 by Gary W. Chappell.

NOTARY PUBLIC

OFFICIAL SEAL
April Carrasco
NOTARY PUBLIC-STATE OF NEW MEXICO
My commission expires 9/30/15



COG Operating LLC

Lea County, NM (NAD27 NME)

GC Federal #44

GC Federal #44

OH

Design: Actual

Standard Survey Report

18 November, 2011

HOBBS OCD

JAN 12 2012

RECEIVED



Scientific Drilling
Directional Drilling Operations



Scientific Drilling
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well GC Federal #44
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB Elev (13') @ 3990 00usft (JW #4)
Site:	GC Federal #44	MD Reference:	KB Elev (13') @ 3990 00usft (JW #4)
Well:	GC Federal #44	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Julio

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	GC Federal #44		
Site Position:		Northing:	660,587 70 usft
From:	Map	Easting:	667,940 30 usft
Position Uncertainty:	0 00 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 48' 53 460 N
		Longitude:	103° 47' 12 103 W
		Grid Convergence:	0 30 °

Well	GC Federal #44		
Well Position	+N/-S	0 00 usft	Northing:
	+E/-W	0 00 usft	Easting:
Position Uncertainty	0 00 usft	Wellhead Elevation:	usft
		Latitude:	32° 48' 53 460 N
		Longitude:	103° 47' 12 103 W
		Ground Level:	3,977 00 usft

Wellbore	OH		
Magnetics	Model Name	Sample Date	Declination
			(°)
	IGRF2010	2011/11/14	7 68
			Dip Angle
			(°)
			60 69
			Field Strength
			(nT)
			48,903

Design	Actual		
Audit Notes:			
Version:	1 0	Phase:	ACTUAL
		Tie On Depth:	0 00
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W
	(usft)	(usft)	(usft)
	0 00	0 00	0 00
			Direction
			(°)
			193 71

Survey Program	Date 2011/11/18		
From	To	Survey (Wellbore)	Tool Name
(usft)	(usft)		
100 00	2,067 00	Gyro Survey (OH)	Keeper
2,221 00	5,605 00	MWD Survey (OH)	MWD
			Description
			Standard Wireline Keeper ver 1 0 2
			MWD - Standard

Survey									
Measured	Inclination	Azimuth	Vertical	+N/-S	+E/-W	Vertical	Dogleg	Build	Turn
Depth	(°)	(°)	Depth	(usft)	(usft)	Section	Rate	Rate	Rate
(usft)			(usft)			(usft)	(°/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 27	185 66	100 00	-0 23	-0 02	0 23	0 27	0 27	0 00
200 00	0 22	190 45	200 00	-0 66	-0 08	0 66	0 05	-0 05	4 79
300 00	0 14	243 50	300 00	-0 90	-0 23	0 93	0 18	-0 08	53 05
400 00	0 20	174 62	400 00	-1 13	-0 32	1 17	0 20	0 06	-68 88
500 00	0 11	225 18	500 00	-1 37	-0 37	1 42	0 16	-0 09	50 56
600 00	0 29	244 63	600 00	-1 55	-0 67	1 66	0 19	0 18	19 45
700 00	0 58	261 00	699 99	-1 73	-1 40	2 02	0 31	0 29	16 37
800 00	0 55	268 94	799 99	-1 82	-2 38	2 33	0 08	-0 03	7 94
900 00	0 72	269 55	899 98	-1 84	-3 48	2 61	0 17	0 17	0 61



Scientific Drilling
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well GC Federal #44
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB Elev (13') @ 3990.00usft (JW #4)
Site:	GC Federal #44	MD Reference:	KB Elev (13') @ 3990.00usft (JW #4)
Well:	GC Federal #44	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	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	0.56	291.95	999.98	-1.66	-4.56	2.69	0.29	-0.16	22.40
1,100.00	0.46	305.58	1,099.97	-1.24	-5.34	2.47	0.16	-0.10	13.63
1,200.00	0.41	355.87	1,199.97	-0.65	-5.70	1.98	0.37	-0.05	50.29
1,300.00	0.60	6.76	1,299.97	0.22	-5.66	1.12	0.21	0.19	10.89
1,400.00	0.69	2.75	1,399.96	1.35	-5.57	0.01	0.10	0.09	-4.01
1,500.00	0.36	56.60	1,499.96	2.12	-5.28	-0.81	0.56	-0.33	53.85
1,600.00	0.62	43.41	1,599.95	2.69	-4.65	-1.51	0.28	0.26	-13.19
1,700.00	1.12	51.21	1,699.94	3.69	-3.51	-2.75	0.51	0.50	7.80
1,800.00	1.72	48.92	1,799.91	5.29	-1.62	-4.76	0.60	0.60	-2.29
1,900.00	1.71	50.16	1,899.86	7.23	0.66	-7.18	0.04	-0.01	1.24
2,000.00	1.81	44.74	1,999.82	9.31	2.92	-9.74	0.19	0.10	-5.42
2,067.00	1.62	37.54	2,066.79	10.81	4.24	-11.51	0.43	-0.28	-10.75
Gyro Tie-in									
2,221.00	1.56	31.82	2,220.73	14.32	6.67	-15.49	0.11	-0.04	-3.71
2,284.00	0.78	26.09	2,283.71	15.43	7.31	-16.73	1.25	-1.24	-9.10
2,346.00	0.43	152.12	2,345.71	15.61	7.60	-16.96	1.76	-0.56	203.27
2,408.00	1.20	231.10	2,407.71	14.99	7.21	-16.27	1.93	1.24	127.39
2,470.00	2.05	202.26	2,469.68	13.56	6.28	-14.66	1.86	1.37	-46.52
2,532.00	3.19	204.83	2,531.62	10.97	5.14	-11.87	1.85	1.84	4.15
2,595.00	4.15	192.78	2,594.49	7.15	3.90	-7.87	1.95	1.52	-19.13
2,657.00	4.81	194.92	2,656.30	2.45	2.73	-3.03	1.10	1.06	3.45
2,720.00	5.71	191.46	2,719.03	-3.17	1.43	2.74	1.51	1.43	-5.49
2,782.00	6.43	187.47	2,780.69	-9.64	0.36	9.27	1.35	1.16	-6.44
2,844.00	7.03	184.93	2,842.26	-16.86	-0.41	16.47	1.08	0.97	-4.10
2,906.00	7.45	183.93	2,903.76	-24.65	-1.01	24.19	0.71	0.68	-1.61
2,970.00	7.16	186.29	2,967.24	-32.75	-1.74	32.23	0.65	-0.45	3.69
3,032.00	7.20	192.02	3,028.76	-40.39	-2.97	39.94	1.16	0.06	9.24
3,094.00	7.88	195.44	3,090.22	-48.29	-4.91	48.08	1.31	1.10	5.52
3,156.00	8.39	198.91	3,151.60	-56.67	-7.51	56.83	1.14	0.82	5.60
3,219.00	9.07	201.45	3,213.87	-65.64	-10.81	66.33	1.24	1.08	4.03
3,313.00	9.01	201.97	3,306.70	-79.36	-16.27	80.95	0.11	-0.06	0.55
3,406.00	8.63	201.78	3,398.60	-92.59	-21.59	95.07	0.41	-0.41	-0.20
3,500.00	8.66	200.18	3,491.53	-105.78	-26.65	109.08	0.26	0.03	-1.70
3,593.00	8.87	199.42	3,583.45	-119.12	-31.45	123.17	0.26	0.23	-0.82
3,687.00	9.00	199.60	3,676.31	-132.88	-36.32	137.70	0.14	0.14	0.19
3,781.00	9.97	196.54	3,769.02	-147.60	-41.10	153.14	1.16	1.03	-3.26
3,874.00	10.16	193.80	3,860.59	-163.29	-45.35	169.38	0.55	0.20	-2.95
3,937.00	9.58	192.50	3,922.66	-173.80	-47.81	180.18	0.99	-0.92	-2.06
4,000.00	9.47	191.80	3,984.79	-183.99	-50.01	190.60	0.25	-0.17	-1.11
4,093.00	9.92	192.01	4,076.46	-199.32	-53.24	206.26	0.49	0.48	0.23
4,155.00	9.51	189.29	4,137.57	-209.60	-55.18	216.70	0.99	-0.66	-4.39
4,217.00	8.66	184.28	4,198.79	-219.31	-56.35	226.41	1.87	-1.37	-8.08
4,310.00	8.59	182.38	4,290.74	-233.23	-57.16	240.13	0.32	-0.08	-2.04



Scientific Drilling
Survey Report



Company:	COG Operating LLC	Local Co-ordinate Reference:	Well GC Federal #44
Project:	Lea County, NM (NAD27 NME)	TVD Reference:	KB Elev (13') @ 3990.00usft (JW #4)
Site:	GC Federal #44	MD Reference:	KB Elev (13') @ 3990.00usft (JW #4)
Well:	GC Federal #44	North Reference:	Grd
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	Actual	Database:	EDM-Julio

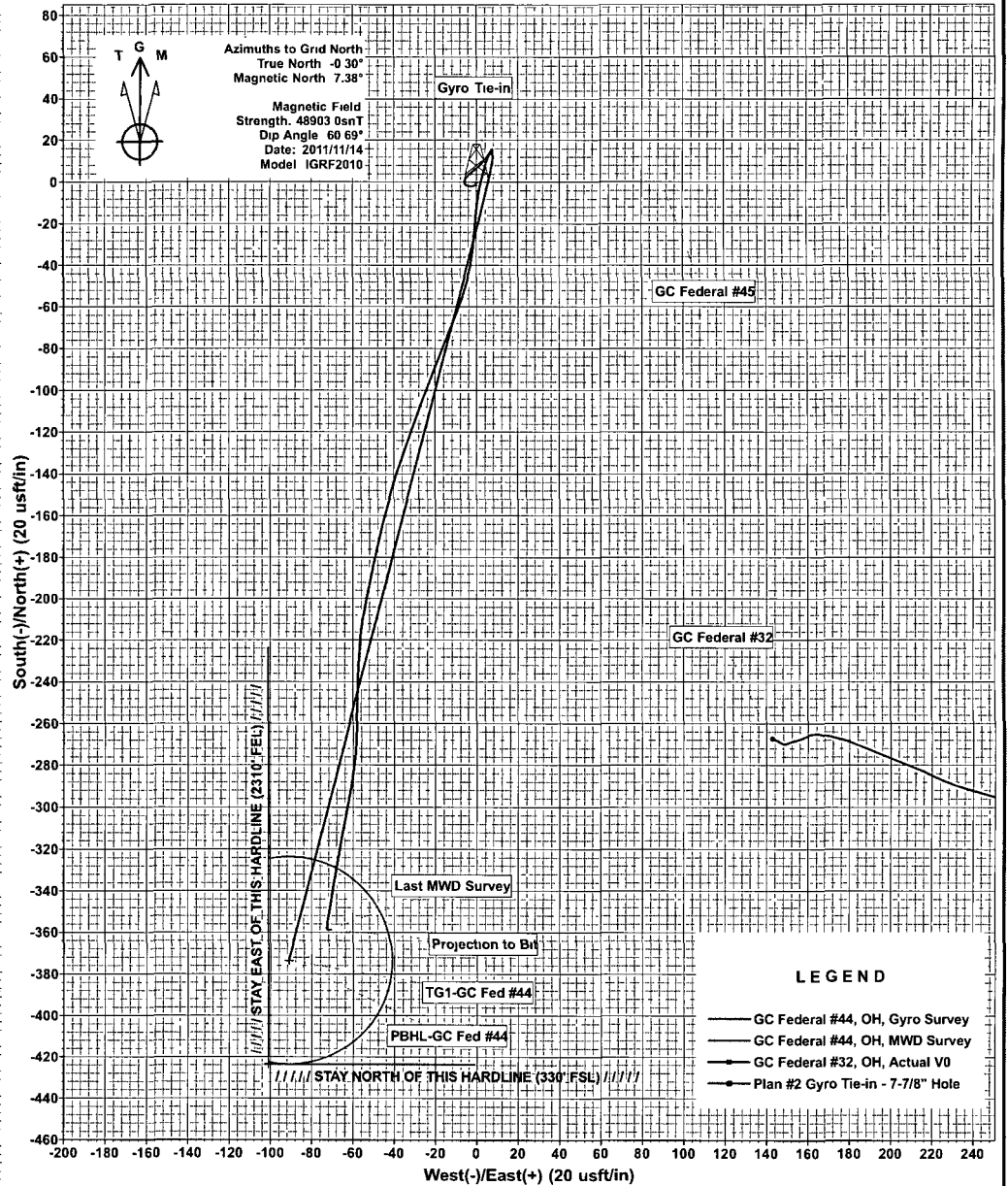
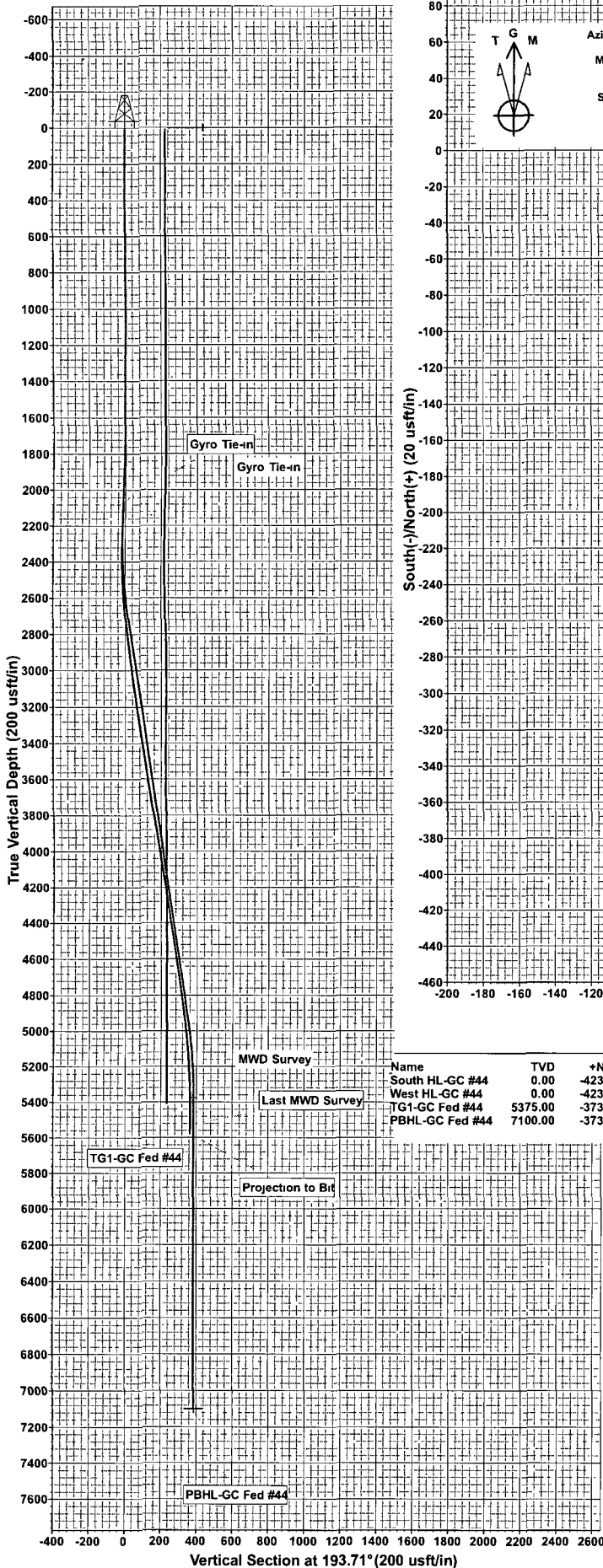
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
4,404.00	8.93	181.99	4,383.65	-247.53	-57.71	254.16	0.37	0.36	-0.41
4,497.00	9.31	181.09	4,475.47	-262.27	-58.10	268.56	0.44	0.41	-0.97
4,590.00	8.36	185.21	4,567.37	-276.52	-58.86	282.59	1.23	-1.02	4.43
4,684.00	7.92	190.88	4,660.42	-289.69	-60.70	295.82	0.97	-0.47	6.03
4,777.00	7.89	190.94	4,752.54	-302.25	-63.12	308.59	0.03	-0.03	0.06
4,871.00	7.78	190.08	4,845.66	-314.84	-65.46	321.39	0.17	-0.12	-0.91
4,965.00	6.95	190.94	4,938.88	-326.69	-67.65	333.42	0.89	-0.88	0.91
5,058.00	6.05	188.17	5,031.28	-337.07	-69.42	343.92	1.02	-0.97	-2.98
5,152.00	4.72	189.18	5,124.87	-345.79	-70.74	352.70	1.42	-1.41	1.07
5,245.00	3.29	189.88	5,217.64	-352.20	-71.81	359.18	1.54	-1.54	0.75
5,338.00	1.98	186.32	5,310.54	-356.42	-72.44	363.44	1.42	-1.41	-3.83
5,401.00	1.11	180.90	5,373.51	-358.11	-72.57	365.11	1.40	-1.38	-8.60
5,463.00	0.57	107.44	5,435.51	-358.81	-72.29	365.72	1.76	-0.87	-118.48
5,558.00	0.65	80.99	5,530.50	-358.87	-71.30	365.54	0.31	0.08	-27.84
Last MWD Survey									
5,605.00	0.65	80.99	5,577.50	-358.78	-70.78	365.33	0.00	0.00	0.00
Projection to Bit									

Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
2,067.00	2,066.79	10.81	4.24	Gyro Tie-in
5,558.00	5,530.50	-358.87	-71.30	Last MWD Survey
5,605.00	5,577.50	-358.78	-70.78	Projection to Bit

Checked By _____ Approved By _____ Date: _____



Scientific Drilling for COG Operating LLC
Site: Lea County, NM (NAD27 NME)
Well: GC Federal #44
Wellbore: OH
Design: Plan #2 Gyro Tie-in - 7-7/8" Hole



Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Shape
South HL-GC #44	0.00	-423.50	-101.10	660164.20	667839.20	32° 48' 49.275 N	103° 47' 13.313 W	Rectangle (Sides: L 0.00 W100.00)
West HL-GC #44	0.00	-423.50	-101.10	660164.20	667839.20	32° 48' 49.275 N	103° 47' 13.313 W	Rectangle (Sides: L 200.00 W0.00)
TG1-GC Fed #44	5375.00	-373.50	-91.10	660214.20	667849.20	32° 48' 49.769 N	103° 47' 13.193 W	Point
PBHL-GC Fed #44	7100.00	-373.50	-91.10	660214.20	667849.20	32° 48' 49.769 N	103° 47' 13.193 W	Circle (Radius: 50.00)

SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VFace	Target
1	2067.00	1.62	37.54	2066.79	10.81	4.24	0.00	0.00	-11.51	
2	2200.00	1.62	37.54	2199.73	13.79	6.53	0.00	0.00	-14.95	
3	2701.41	8.52	194.55	2699.55	-16.60	1.51	2.00	160.60	15.77	
4	4977.67	8.52	194.55	4950.71	-342.92	-83.16	0.00	0.00	352.86	
5	5403.52	0.00	0.00	5375.00	-373.50	-91.10	2.00	180.00	384.45	TG1-GC Fed #44
6	7128.52	0.00	0.00	7100.00	-373.50	-91.10	0.00	0.00	384.45	PBHL-GC Fed #44

WELL DETAILS: GC Federal #44

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.00	0.00	660587.70	667940.30	32° 48' 53.460 N	103° 47' 12.103 W	

PROJECT DETAILS: Lea County, NM (NAD27 NME) Plan: Plan #2 Gyro Tie-in - 7-7/8" Hole (GC Federal #44/OH)

Geodetic System: US State Plane 1927 (Exact solution)	Created By: Julio Pina	Date: 14-Nov-11
Datum: NAD 1927 (NADCON CONUS)		
Ellipsoid: Clarke 1866	Checked: _____	Date: _____
Zone: New Mexico East 3001		
System Datum: Mean Sea Level	Reviewed: _____	Date: _____
	Approved: _____	Date: _____