



C.O.G. Operating LLC

Lea County (NAD27)

GC Federal

#36(SHL = 2012' FSL & 2240' FEL)

S-WELL(BHL = 1660' FSL & 2300' FEL)

Survey: MWD #2

Leam X&Y Report

21 July, 2011

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OCT 05 2011

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30-025-40150

C.O.G. Operating LLC

Project: Lea County (NAD27)

Site: GC Federal

Well: #36(SHL = 2012' FSL & 2240' FEL)

Wellore: S-WELL(BHL = 1660' FSL & 2300' FEL)

Azimuths to Grid North
True North: -0.30°
Magnetic North: 7.41°Magnetic Field
Strength: 48976.1snT
Dip Angle: 60.72°
Date: 07/07/2011
Model: IGRF200510PROJECT DETAILS: Lea County (NAD27)
Geodetic System: US State Plane 1927 (Exact solution)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: New Mexico East 3001
System Datum: Mean Sea Level
Local North: Grid**SECTION DETAILS**

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect
1912.0	0.99	42.94	1911.9	3.5	-3.9	0.00	0.00	-2.9
2153.0	0.99	42.94	2152.9	6.6	-1.1	0.00	0.00	-6.3
2561.6	7.35	188.77	2560.5	-16.7	-2.7	2.00	149.70	16.9
5030.0	7.35	188.77	5008.6	-328.8	-50.8	0.00	0.00	332.7
5397.0	0.00	0.00	5374.6	-352.0	-54.4	2.00	180.00	356.2
7121.6	0.00	0.00	7099.2	-352.0	-54.4	0.00	0.00	356.2

WELL DETAILS: #36(SHL = 2012' FSL & 2240' FEL)

Ground Elevation: 3991.0

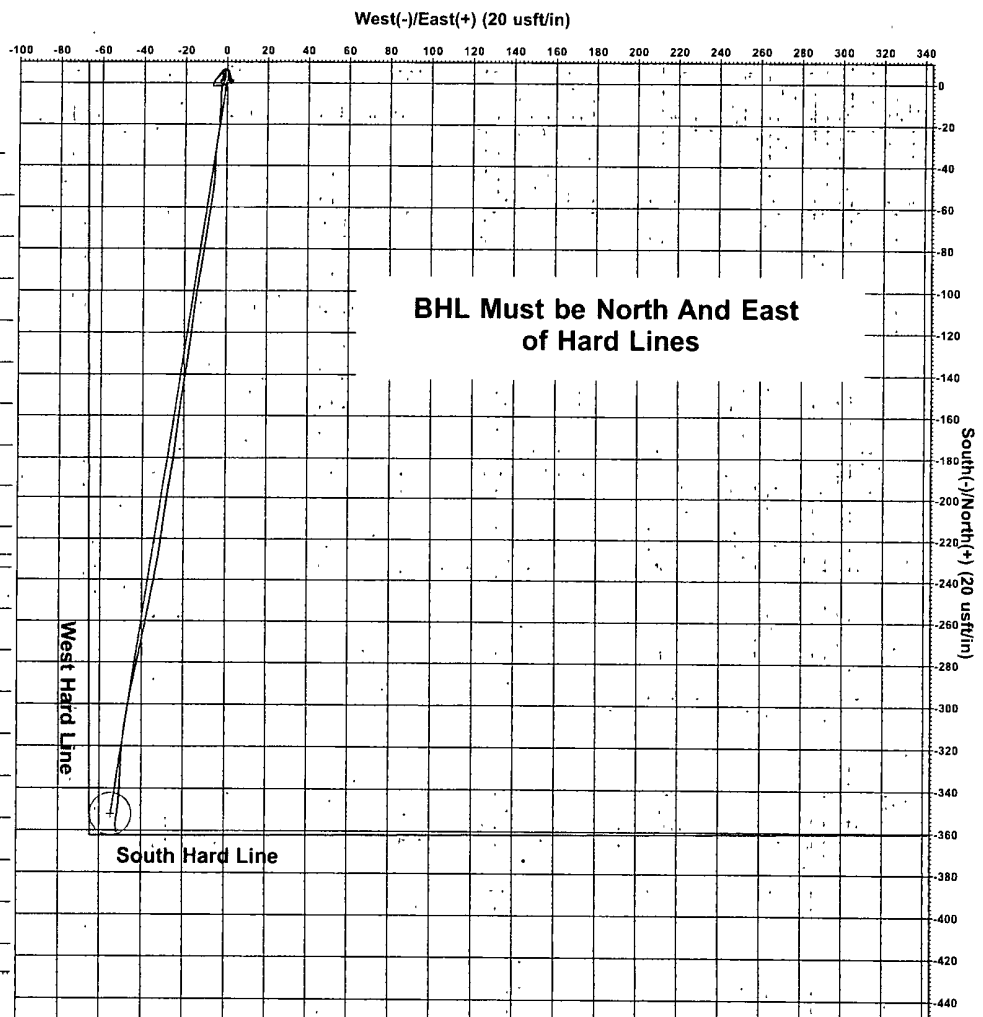
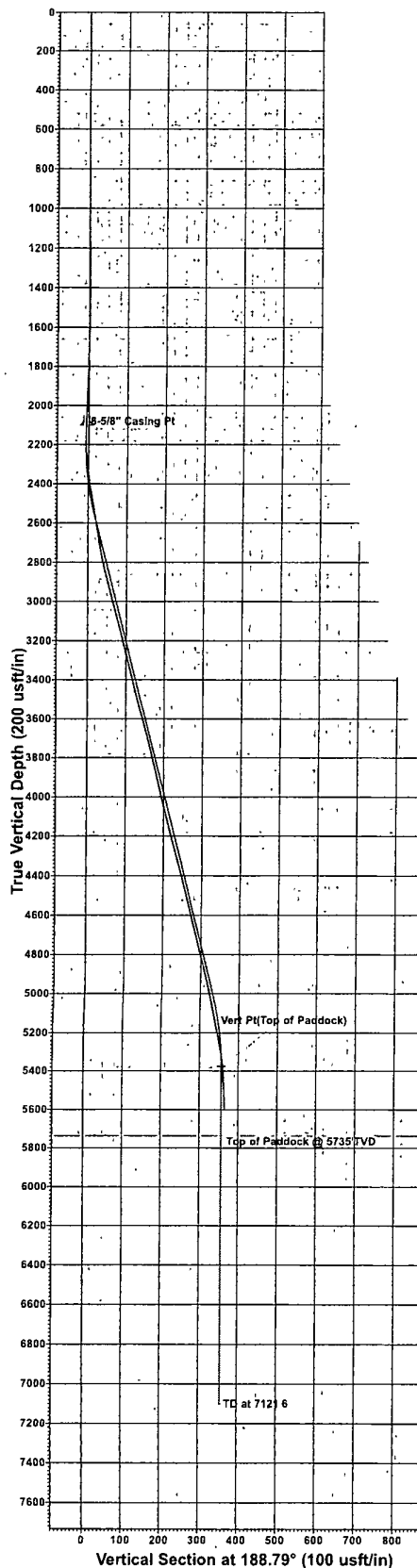
RKB Elevation: WELL @ 4008.0usft (17'KB-SO#8)

Rig Name: 17'KB-SO#8

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	661846.20	667897.90	32° 49' 5.915 N	103° 47' 12.523 W

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
Vert Pt(Top of Paddock)	5375.0	-352.3	-54.5	661493.90	667843.40	Circle (Radius: 10.0)

LEAM DRILLING SYSTEMS, INC.
4906 West Highway 80 Midland, Texas 79707
Phone: 432-697-1490

Created By Nate Bingham Date: 10.28, July 21 2011



Learn Drilling Systems

Learn X&Y Report



Company: C O.G. Operating LLC		Local Co-ordinate Reference:		Site GC Federal	
Project: Lea County (NAD27)		TVD Reference:		WELL @ 4008.0usft (17'KB-SO#8)	
Site: GC Federal		MD Reference:		WELL @ 4008.0usft (17'KB-SO#8)	
Well: #36(SHL = 2012' FSL & 2240' FEL)		North Reference:		Grid	
Wellbore: S-WELL(BHL = 1660' FSL & 2300' FEL)		Survey Calculation Method:		Minimum Curvature	
Design: S-WELL(BHL = 1660' FSL & 2300' FEL)		Database:		Midland(Permian Basin) Database	

Project Lea County (NAD27)			
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					
Site Position:		Northing: 661,846.20 usft		Latitude: 32° 49' 5.915 N	
From: Map		Easting: 667,897.90 usft		Longitude: 103° 47' 12.523 W	
Position Uncertainty: 0.0 usft		Slot Radius: 13-3/16 "		Grid Convergence: 0.30 °	

Well #36(SHL = 2012' FSL & 2240' FEL)					
Well Position		Northing: 661,846.20 usft		Latitude: 32° 49' 5.915 N	
+N/-S 0.0 usft		Easting: 667,897.90 usft		Longitude: 103° 47' 12.523 W	
+E/-W 0.0 usft		Wellhead Elevation: usft		Ground Level: 3,991.0 usft	
Position Uncertainty 0.0 usft					

Wellbore S-WELL(BHL = 1660' FSL & 2300' FEL)					
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF200510	07/07/11	7.71	60.72	48,976

Design S-WELL(BHL = 1660' FSL & 2300' FEL)					
Audit Notes:					
Version: 1.0		Phase: ACTUAL		Tie On Depth: 0.0	
Vertical Section:		Depth From (TVD)	+N/-S	+E/-W	Direction
		(usft)	(usft)	(usft)	(°)
		0.0	0.0	0.0	188.77



Leam Drilling Systems

Leam X&Y Report



Company:	C.O.G. Operating LLC	Local Co-ordinate Reference:	Site GC Federal
Project:	Lea County (NAD27)	TVD Reference:	WELL @ 4008.0usft (17'KB-SO#8)
Site:	GC Federal	MD Reference:	WELL @ 4008.0usft (17'KB-SO#8)
Well:	#36(SHL = 2012' FSL & 2240' FEL)	North Reference:	Grid:
Wellbore:	S-WELL(BHL = 1660' FSL & 2300' FEL)	Survey Calculation Method:	Minimum Curvature
Design:	S-WELL(BHL = 1660' FSL & 2300' FEL)	Database:	Midland(Permian Basin) Database

Survey Program		Date	07/21/11		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	1,912.0	GYRO (S-WELL(BHL = 1660' FSL & 2300	MWD	MWD - Standard	
2,059.0	2,593.0	MWD #1 (S-WELL(BHL = 1660' FSL & 230	MWD	MWD - Standard	

MD (usft)	Inc (")	Azi (azimuth) (")	TVD (usft)	V. Sec (usft)	DLeg (*/100usft)	N/S (usft)	E/W (usft)	Northing (usft)	Easting (usft)
1,912.0	0.99	42.94	1,911.9	-2.9	0.00	3.5	-3.9	661,849.71	667,893.96
2,098.0	1.06	31.97	2,097.9	-5.8	0.11	6.2	-1.9	661,852.35	667,895.97
2,200.0	0.88	190.70	2,199.9	-5.9	1.87	6.2	-1.6	661,852.38	667,896.32
2,278.0	2.02	186.66	2,277.9	-3.9	1.47	4.2	-1.8	661,850.43	667,896.05
2,403.0	5.10	185.95	2,402.6	3.9	2.46	-3.5	-2.7	661,842.71	667,895.22
2,498.0	5.28	178.59	2,497.2	12.4	0.73	-12.1	-3.0	661,834.14	667,894.89
2,591.0	5.01	186.66	2,589.8	20.6	0.83	-20.4	-3.4	661,825.83	667,894.52
2,693.0	4.31	189.64	2,691.5	28.9	0.73	-28.6	-4.5	661,817.63	667,893.36
2,788.0	6.33	182.09	2,786.1	37.7	2.25	-37.3	-5.3	661,808.87	667,892.58
2,883.0	7.65	184.55	2,880.4	49.2	1.42	-48.9	-6.0	661,797.34	667,891.88
2,977.0	7.21	191.23	2,973.6	61.3	1.03	-60.9	-7.7	661,785.31	667,890.24
3,071.0	8.00	187.53	3,066.8	73.8	0.99	-73.2	-9.7	661,773.04	667,888.23
3,166.0	7.56	189.47	3,160.9	86.6	0.54	-85.9	-11.6	661,760.32	667,886.34
3,261.0	7.39	189.82	3,255.1	99.0	0.19	-98.1	-13.6	661,748.14	667,884.27
3,356.0	7.30	187.01	3,349.3	111.1	0.39	-110.1	-15.4	661,736.13	667,882.49
3,451.0	6.95	187.89	3,443.6	122.9	0.39	-121.8	-16.9	661,724.45	667,880.96
3,546.0	7.83	188.41	3,537.8	135.1	0.93	-133.8	-18.7	661,712.35	667,879.23
3,641.0	8.09	188.74	3,631.9	148.3	0.28	-146.9	-20.6	661,699.34	667,877.27
3,736.0	6.95	187.89	3,726.0	160.7	1.21	-159.2	-22.4	661,687.04	667,875.46
3,830.0	6.95	187.53	3,819.4	172.1	0.05	-170.4	-24.0	661,675.77	667,873.93
3,928.0	6.60	187.71	3,916.7	183.6	0.36	-181.9	-25.5	661,664.31	667,872.40

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Project:	Lea County (NAD27)	TVD Reference:	WELL @ 4008.0usft (17KB-SO#8)
Site:	GC, Federal	MD Reference:	WELL @ 4008.0usft (17KB-SO#8)
Well:	#36(SHL = 2012° FSL & 2240° FEL)	North Reference:	Grid:
Wellbore:	S-WELL(BHL = 1660° FSL & 2300° FEL)	Survey Calculation Method:	Minimum Curvature
Design:	S-WELL(BHL = 1660° FSL & 2300° FEL)	Database:	Midland(Permian Basin) Database

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	D Leg (°/100usft)	N/S (usft)	E/W (usft)	Northing (usft)	Easting (usft)	
4,020.0	6.68	188.41	4,008.1	194.3	0.12	-192.4	-27.0	661,653.78	667,870.91	
4,113.0	7.47	188.59	4,100.3	205.7	0.85	-203.8	-28.7	661,642.45	667,869.22	
4,207.0	7.74	187.36	4,193.5	218.2	0.34	-216.1	-30.4	661,630.13	667,867.49	
4,302.0	7.74	189.29	4,287.7	231.0	0.27	-228.7	-32.3	661,617.47	667,865.64	
4,396.0	7.74	190.70	4,380.8	243.6	0.20	-241.2	-34.5	661,605.01	667,863.44	
4,491.0	7.65	191.23	4,474.9	256.3	0.12	-253.7	-36.9	661,592.52	667,861.02	
4,586.0	7.39	191.93	4,569.1	268.8	0.29	-265.9	-39.4	661,580.34	667,858.53	
4,681.0	7.21	191.23	4,663.4	280.8	0.21	-277.7	-41.8	661,568.51	667,856.11	
4,775.0	7.21	191.58	4,756.6	292.6	0.05	-289.3	-44.1	661,556.95	667,853.77	
4,869.0	7.21	192.81	4,849.9	304.4	0.16	-300.8	-46.6	661,545.42	667,851.28	
4,963.0	7.30	185.95	4,943.1	316.2	0.93	-312.5	-48.5	661,533.73	667,849.35	
5,059.0	6.16	182.96	5,038.5	327.4	1.24	-323.7	-49.4	661,522.52	667,848.46	
5,153.0	6.16	182.79	5,131.9	337.5	0.02	-333.8	-50.0	661,512.44	667,847.95	
5,247.0	5.98	183.67	5,225.4	347.4	0.22	-343.7	-50.5	661,502.52	667,847.39	
5,342.0	4.31	189.64	5,320.0	355.9	1.84	-352.1	-51.4	661,494.06	667,846.48	
5,436.0	1.76	182.44	5,413.9	360.8	2.74	-357.1	-52.1	661,489.13	667,845.82	
5,530.0	0.97	167.50	5,507.8	363.0	0.91	-359.3	-52.0	661,486.91	667,845.93	
5,616.0	0.97	167.50	5,593.8	364.4	0.00	-360.7	-51.7	661,485.49	667,846.25	
BHL - 5616.0°MD, 0.97°INC, 167.50°AZI, 5593.8°TVD, -360.7°N, -51.7°E										

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/S (usft)	+E/W (usft)	
5,616.0	5,593.8	-360.7	-51.7	BHL - 5616.0°MD, 0.97°INC, 167.50°AZI, 5593.8°TVD, -360.7°N, -51.7°E

Checked By: _____	Approved By: _____	Date: _____
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