



HOBBS OCD

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C.O.G. Operating LLC

Lea County (NAD27)

Ranger Lake 1 State

#1H

OH

Survey: MWD #1

Leam X&Y Report

20 August, 2011



30-025-4876

DEC 07 2011



Leam Drilling Systems
Leam X&Y Report



Company:	C.O.G. Operating LLC	Local Co-ordinate Reference:	Site Ranger Lake 1 State
Project:	Lea County (NAD27)	TVD Reference:	WELL @ 4138.0usft (Silver Oak #12)
Site:	Ranger Lake 1 State	MD Reference:	WELL @ 4138.0usft (Silver Oak #12)
Well:	#1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	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	Ranger Lake 1 State				
Site Position:		Northing:	809,504.50 usft	Latitude:	33° 13' 20 177 N
From:	Map	Easting:	768,198.10 usft	Longitude:	103° 27' 22.841 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.48 °

Well	#1H					
Well Position	+N/-S	0.0 usft	Northing:	809,504.50 usft	Latitude:	33° 13' 20 177 N
	+E/-W	0.0 usft	Easting:	768,198.10 usft	Longitude:	103° 27' 22.841 W
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,120.0 usft	

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	07/11/11	7.58	61.15	49,251

Design	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	269.97	



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Survey Program		Date	08/20/11		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
100.0	8,600.0	Gyro (OH)	MWD	MWD - Standard	
8,633.0	13,654.0	MWD #1 (OH)	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)
8,600.0	4.52	92.62	8,598.3	-88.2	0.00	-6.7	88.2	809,497.81	768,286.30
8,633.0	4.70	93.60	8,631.2	-90.8	0.60	-6.8	90.8	809,497.67	768,288.95
KOP - 8633.0'MD, 4.70"INC, 93.60"AZI, 8631.2'TVD									
8,664.0	4.13	101.32	8,662.1	-93.2	2.65	-7.1	93.2	809,497.37	768,291.31
8,696.0	2.90	153.70	8,694.1	-94.7	10.29	-8.1	94.7	809,496.42	768,292.80
8,728.0	4.84	200.11	8,726.0	-94.6	11.04	-10.1	94.6	809,494.43	768,292.69
8,760.0	8.44	219.80	8,757.8	-92.6	13.15	-13.1	92.6	809,491.35	768,290.73
8,792.0	11.52	230.52	8,789.3	-88.6	11.20	-17.0	88.7	809,487.51	768,286.76
8,823.0	14.42	234.91	8,819.5	-83.1	9.87	-21.2	83.1	809,483.33	768,281.21
8,855.0	16.88	233.15	8,850.3	-76.1	7.83	-26.3	76.1	809,478.25	768,274.23
8,887.0	19.43	231.75	8,880.7	-68.2	8.08	-32.3	68.2	809,472.17	768,266.33
8,919.0	21.63	231.57	8,910.7	-59.4	6.88	-39.3	59.4	809,465.21	768,257.53
8,950.0	24.01	233.33	8,939.3	-49.9	7.99	-46.6	49.9	809,457.89	768,247.99
8,982.0	26.91	238.78	8,968.1	-38.4	11.64	-54.3	38.5	809,450.24	768,236.57
9,014.0	30.34	244.23	8,996.2	-25.0	13.46	-61.5	25.0	809,442.97	768,223.10
9,045.0	33.59	247.92	9,022.5	-10.0	12.23	-68.2	10.0	809,436.34	768,208.09
9,077.0	36.84	251.61	9,048.7	7.4	12.14	-74.5	-7.3	809,429.99	768,190.78
9,109.0	39.75	254.95	9,073.8	26.4	11.16	-80.2	-26.3	809,424.30	768,171.79
9,141.0	42.38	256.53	9,097.9	46.7	8.84	-85.4	-46.7	809,419.13	768,151.42
9,173.0	46.25	257.76	9,120.8	68.5	12.39	-90.3	-68.5	809,414.17	768,129.63
9,205.0	50.65	258.12	9,142.0	91.9	13.78	-95.3	-91.9	809,409.17	768,106.21



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Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Midland(Perman Basin) Database

Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	DLeg (°/100usft)	N/S (usft)	E/W (usft)	Northing (usft)	Easting (usft)	
9,236.0	54.96	257.24	9,160.8	116.1	14.09	-100.6	-116.0	809,403.89	768,082.09	
9,268.0	59.71	256.71	9,178.0	142.3	14.91	-106.7	-142.2	809,397.82	768,055.86	
9,300.0	63.84	257.59	9,193.2	169.8	13.13	-112.9	-169.7	809,391.56	768,028.37	
9,332.0	67.36	257.59	9,206.4	198.2	11.00	-119.2	-198.2	809,385.29	767,999.92	
9,363.0	70.43	257.59	9,217.5	226.5	9.90	-125.4	-226.4	809,379.08	767,971.67	
9,395.0	73.78	257.94	9,227.4	256.3	10.52	-131.9	-256.2	809,372.63	767,941.92	
9,427.0	76.94	259.17	9,235.5	286.6	10.55	-138.0	-286.5	809,366.49	767,911.58	
9,459.0	80.46	259.87	9,241.7	317.4	11.21	-143.7	-317.4	809,360.78	767,880.73	
9,491.0	82.92	260.75	9,246.4	348.7	8.15	-149.0	-348.6	809,355.45	767,849.52	
9,522.0	84.94	261.98	9,249.6	379.1	7.62	-153.7	-379.1	809,350.83	767,819.04	
9,586.0	90.22	264.27	9,252.3	442.6	8.99	-161.3	-442.5	809,343.18	767,755.58	
EOC - 9586.0°MD, 90.22°INC, 264.27°AZI, 9252.3°TVD, -161.3°N, -442.5°E										
9,618.0	90.66	264.62	9,252.1	474.4	1.76	-164.4	-474.4	809,340.08	767,723.74	
9,682.0	90.48	264.97	9,251.5	538.2	0.61	-170.2	-538.1	809,334.27	767,660.00	
9,714.0	90.48	265.67	9,251.2	570.1	2.19	-172.8	-570.0	809,331.66	767,628.11	
9,746.0	90.13	266.20	9,251.0	602.0	1.98	-175.1	-601.9	809,329.39	767,596.19	
9,841.0	90.04	268.31	9,250.9	696.9	2.22	-179.7	-696.8	809,324.85	767,501.31	
9,937.0	90.22	269.72	9,250.7	792.9	1.48	-181.3	-792.8	809,323.20	767,405.32	
10,033.0	89.96	272.18	9,250.5	888.8	2.58	-179.7	-888.8	809,324.79	767,309.34	
10,128.0	89.60	273.94	9,250.9	983.7	1.89	-174.6	-983.6	809,329.86	767,214.48	
10,224.0	89.52	275.69	9,251.6	1,079.4	1.82	-166.6	-1,079.3	809,337.92	767,118.83	
10,288.0	90.66	275.34	9,251.5	1,143.1	1.86	-160.4	-1,143.0	809,344.07	767,055.13	
10,352.0	91.54	276.92	9,250.3	1,206.7	2.83	-153.6	-1,206.6	809,350.90	766,991.51	
10,447.0	89.52	275.34	9,249.4	1,301.1	2.70	-143.5	-1,301.0	809,361.04	766,897.06	
10,542.0	89.78	274.29	9,250.0	1,395.8	1.14	-135.5	-1,395.7	809,369.02	766,802.40	
10,637.0	90.57	273.23	9,249.7	1,490.6	1.39	-129.3	-1,490.5	809,375.25	766,707.61	
10,733.0	90.92	270.77	9,248.4	1,586.5	2.59	-125.9	-1,586.4	809,378.60	766,611.68	



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Survey										
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	DLeg (°/100usft)	N/S (usft)	E/W (usft)	Northing (usft)	Easting (usft)	
10,828.0	90.31	273.76	9,247.4	1,681.4	3.21	-122.2	-1,681.3	809,382.35	766,516.77	
10,923.0	90.13	275.17	9,247.1	1,776.1	1.50	-114.8	-1,776.0	809,389.74	766,422.06	
11,018.0	90.04	274.46	9,246.9	1,870.8	0.75	-106.8	-1,870.7	809,397.72	766,327.40	
11,114.0	90.13	273.76	9,246.8	1,966.5	0.74	-99.9	-1,966.5	809,404.60	766,231.65	
11,209.0	88.99	272.88	9,247.5	2,061.3	1.52	-94.4	-2,061.3	809,410.10	766,136.81	
11,304.0	87.58	271.30	9,250.3	2,156.2	2.23	-90.9	-2,156.2	809,413.56	766,041.92	
11,399.0	88.37	269.72	9,253.7	2,251.2	1.86	-90.1	-2,251.1	809,414.41	765,946.99	
11,495.0	89.96	271.12	9,255.1	2,347.1	2.21	-89.4	-2,347.1	809,415.11	765,851.01	
11,591.0	89.34	272.18	9,255.7	2,443.1	1.28	-86.6	-2,443.0	809,417.88	765,755.05	
11,687.0	90.13	272.00	9,256.1	2,539.0	0.84	-83.1	-2,539.0	809,421.38	765,659.12	
11,782.0	91.89	271.20	9,254.5	2,634.0	2.03	-80.5	-2,633.9	809,424.03	765,564.17	
11,877.0	91.54	272.88	9,251.6	2,728.9	1.81	-77.1	-2,728.8	809,427.41	765,469.28	
11,972.0	91.36	273.06	9,249.2	2,823.7	0.27	-72.2	-2,823.7	809,432.33	765,374.44	
12,067.0	91.98	270.42	9,246.4	2,918.6	2.85	-69.3	-2,918.6	809,435.21	765,279.53	
12,163.0	91.19	269.37	9,243.8	3,014.6	1.37	-69.5	-3,014.5	809,435.04	765,183.57	
12,257.0	91.63	270.77	9,241.5	3,108.5	1.56	-69.3	-3,108.5	809,435.15	765,089.60	
12,353.0	92.42	272.35	9,238.1	3,204.4	1.84	-66.7	-3,204.4	809,437.76	764,993.70	
12,447.0	92.51	273.06	9,234.0	3,298.2	0.76	-62.3	-3,298.2	809,442.20	764,899.89	
12,543.0	91.89	271.83	9,230.4	3,394.1	1.43	-58.2	-3,394.0	809,446.29	764,804.05	
12,638.0	90.40	272.35	9,228.5	3,489.0	1.66	-54.7	-3,489.0	809,449.75	764,709.14	
12,733.0	89.60	271.83	9,228.5	3,583.9	1.00	-51.3	-3,583.9	809,453.22	764,614.20	
12,829.0	90.57	272.88	9,228.3	3,679.8	1.49	-47.3	-3,679.8	809,457.16	764,518.29	
12,923.0	90.48	273.41	9,227.4	3,773.7	0.57	-42.2	-3,773.7	809,462.32	764,424.43	
13,019.0	91.01	275.69	9,226.2	3,869.4	2.44	-34.6	-3,869.3	809,469.93	764,328.75	
13,113.0	91.71	275.87	9,224.0	3,962.9	0.77	-25.1	-3,962.8	809,479.40	764,235.26	
13,208.0	91.54	273.76	9,221.3	4,057.5	2.23	-17.1	-4,057.5	809,487.37	764,140.63	
13,304.0	90.84	271.30	9,219.3	4,153.3	2.66	-12.9	-4,153.3	809,491.60	764,044.76	



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Site:	Ranger Lake 1 State	MD Reference:	WELL @ 4138 0usft (Silver Oak #12)
Well:	#1H	North Reference:	Grid
Wellbore:	OH	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	Midland(Permian Basin) Database

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	V. Sec (usft)	DLeg (°/100usft)	N/S (usft)	E/W (usft)	Northing (usft)	Easting (usft)
13,398.0	90.57	270.07	9,218.1	4,247.3	1.34	-11.8	-4,247.3	809,492.73	763,950.77
13,495.0	91.54	272.18	9,216.3	4,344.3	2.39	-9.9	-4,344.3	809,494.63	763,853.81
13,585.0	92.15	272.88	9,213.4	4,434.2	1.03	-5.9	-4,434.2	809,498.60	763,763.95
13,654.0	92.15	272.88	9,210.9	4,503.0	0.00	-2.4	-4,503.0	809,502.07	763,695.08
BHL - 13654.0°MD, 92.15°INC, 272.88°AZI, 9210.9°TVD, -2.4°N, -4503.0°E									

Survey Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
8,633.0	8,631.2	-6.8	90.8	KOP - 8633.0°MD, 4 70°INC, 93 60°AZI, 8631.2°TVD
9,586.0	9,252.3	-161.3	-442.5	EOC - 9586.0°MD, 90 22°INC, 264 27°AZI, 9252.3°TVD, -161 3°N, -442 5°E
13,654.0	9,210.9	-2.4	-4,503.0	BHL - 13654.0°MD, 92.15°INC, 272.88°AZI, 9210.9°TVD, -2.4°N, -4503.0°E

Checked By: _____ Approved By: _____ Date: _____

C.O.G. Operating LLC

Project: Lea County (NAD27)

Site: Ranger Lake 1 State

Well: #1H

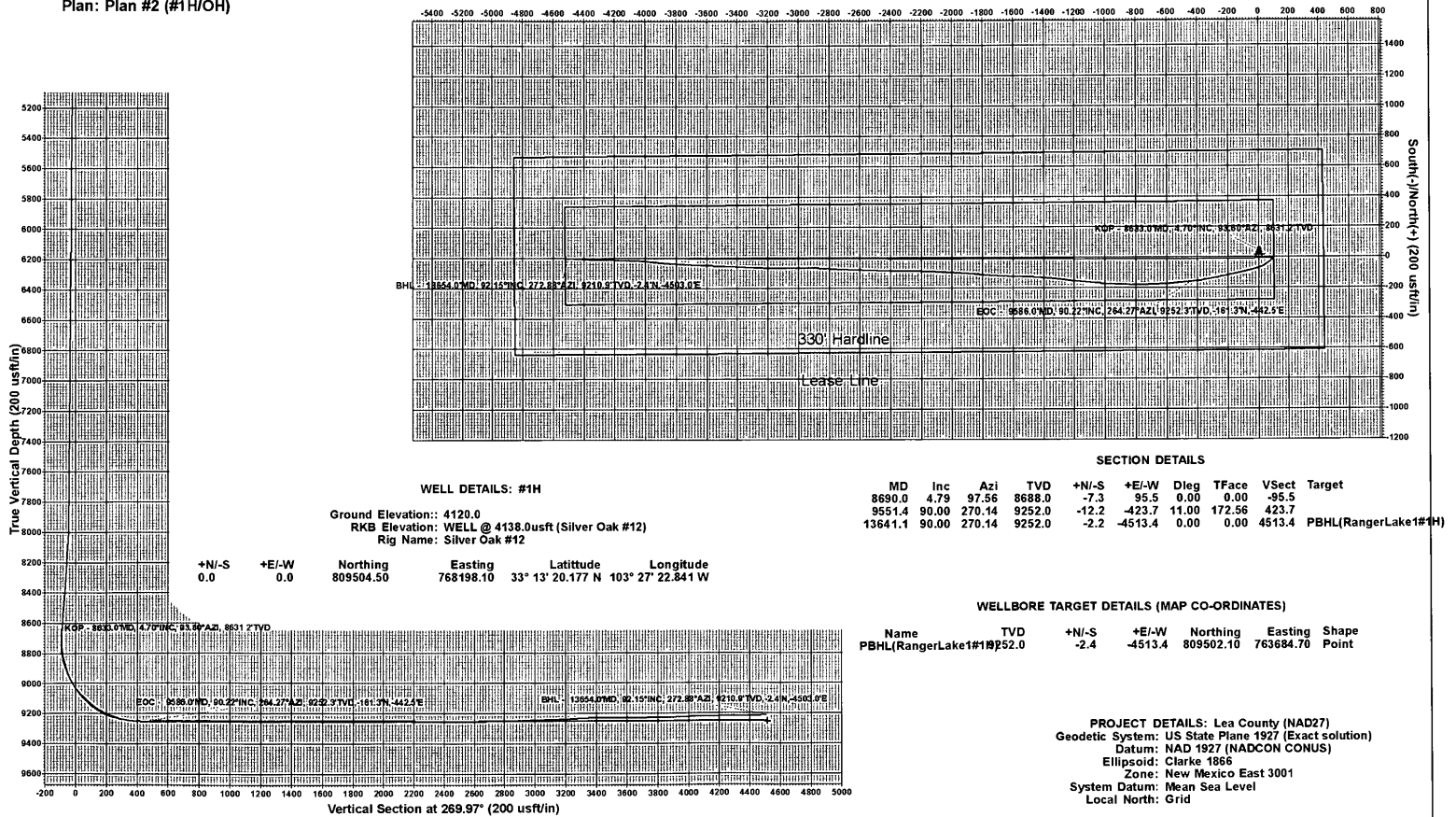
Wellbore: OH

Plan: Plan #2 (#1H/OH)



Azimuths to Grid North
True North: -0.48°
Magnetic North: 7.10°

Magnetic Field
Strength: 49251.1nT
Dip Angle: 61.15°
Date: 07/11/2011
Model: IGRF200510



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

Plan Plan #2 (#1H/OH)
Created By Nate Bingham Date: 13:44, August 20 2011