

Results of Directional Survey

DD

API number:	30-025-40097		
OGRID:		Operator:	COG OPERATING LLC
		Property:	BC FEDERAL # 60

surface	ULSTR:	D	20	T 17S	R 32E
				1305 FNL	915 FWL

BH Loc	ULSTR:	E	20	T 17S	R 32E
7153 MD		7129.0 TVD		1673 FNL	973 FWL

Top Perf/OH	ULSTR:	D	20	T 17S	R 32E
5300 MD		5276.3 TVD		1654 FNL	981 FWL

Bot Perf/OH	ULSTR:	E	20	T 17S	R 32E
6740 MD		6716.0 TVD		1671 FNL	976 FWL

	MD	N/S	E/W	VD
	5254	-345.80	65.80	5230.4
TOP PERFS/OH	5300	-349.45	65.65	5276.25
	5317	-350.80	65.60	5293.20
	5704	-359.80	67.00	5680.00
BOT PERFS/OH	6740	-365.89	60.91	6716.00
	5755	-360.10	66.70	5731.00

NEXT TO LAST	5704	-359.80	67.00	5680.00
LAST READING	5755	-360.10	66.70	5731.00
TD	7153	-368.32	58.48	7129.00

Surface Location	1305 FN	915 FW
Projected BHL	1673 FN	973 FW
Location of		
Top Perfs/OH	1654 FN	981 FW
Bottom Perfs/OH	1671 FN	976 FW

SUMMARY of Subsurface Locations

Surface Location	D-20-17S-32E	1305 FN	915 FW	Vert. Depth
Top Perfs/OH	D-20-17S-32E	1654 FN	981 FW	5276.25
Bottom Perfs/OH	E-20-17S-32E	1671 FN	976 FW	6716.00
Projected TD	E-20-17S-32E	1673 FN	973 FW	7129.00

AUG 31 2011



PO Box 1370
Artesia, NM 88211-1370
(575) 748-1288

HOBBS OCD

AUG 17 2011

RECEIVED

July 6, 2011.

COG, LLC
Fasken Center, Tower II
550 West Texas Ave, Suite 1300
Midland, TX 79701

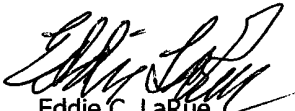
RE: BC Federal #60
1305' FNL & 915' FWL
Sec. 20, T17S, R32E
Lea County, New Mexico

SUR: D-20-17s-32e, 1305/N & 915/W
BHL: E-20-17s-32e, 1673/N & 973/W
API # 30-025-40097

Dear Sir,

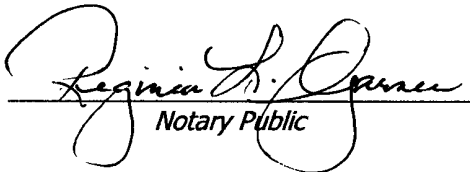
The attached is the Deviation Survey for the above captioned well.

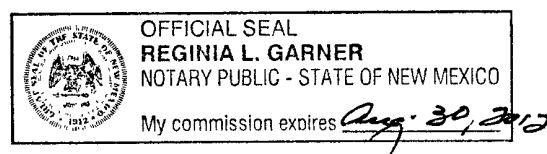
Very truly yours,


Eddie C. LaRue
Operations Manager

State of New Mexico }
County of Eddy }

The foregoing was acknowledged before me this 6th day of July, 2011.


Regina L. Garner
Notary Public



Pason DataHub Deviation Survey
Well Dossier 1308954464 - BC FED 60

# Date	Depth	Deviation	Direction
6/24/2011	117	0.70	0.00
6/25/2011	206	0.40	0.00
6/25/2011	295	0.60	0.00
6/25/2011	382	0.70	0.00
6/25/2011	470	0.80	0.00
6/25/2011	560	1.20	0.00
6/25/2011	648	1.80	0.00
6/25/2011	682	1.00	0.00
6/27/2011	926	1.30	0.00
6/27/2011	1400	0.30	0.00
6/27/2011	1874	3.40	0.00
6/27/2011	1905	2.10	0.00
6/27/2011	1968	2.60	0.00
6/28/2011	2097	1.60	0.00
6/29/2011	2319	1.32	96.91
6/29/2011	2414	1.67	128.20
6/29/2011	2506	2.90	154.04
6/29/2011	2568	3.52	172.32
6/29/2011	2631	4.48	176.37
6/29/2011	2694	5.19	175.66
6/29/2011	2757	5.98	176.37
6/29/2011	2819	6.80	174.80
6/29/2011	2883	7.50	171.80
6/29/2011	2977	7.50	169.50
6/29/2011	3040	7.90	166.00
6/29/2011	3103	8.50	164.90
6/29/2011	3167	8.40	165.60
6/30/2011	3230	7.90	164.10
6/30/2011	3292	8.30	165.30
6/30/2011	3356	9.00	165.50
6/30/2011	3419	9.00	164.80
6/30/2011	3482	9.10	164.90
6/30/2011	3608	8.62	171.27
6/30/2011	3671	8.53	172.85
6/30/2011	3735	8.44	171.27
6/30/2011	3861	8.71	170.92
6/30/2011	3924	8.90	170.00
6/30/2011	3986	8.30	172.00
6/30/2011	4049	7.60	172.00
6/30/2011	4112	7.10	175.70
6/30/2011	4176	7.20	174.60
6/30/2011	4239	7.20	175.00
6/30/2011	4302	7.00	177.40
7/1/2011	4371	7.00	175.30
7/1/2011	4435	6.90	176.70
7/1/2011	4498	6.90	175.30
7/1/2011	4560	6.90	176.20
7/1/2011	4623	6.90	176.20
7/1/2011	4686	6.90	177.80
7/1/2011	4749	7.30	176.72

Well Dossier 1308954464 - BC FED 60

#	Date	Depth	Deviation	Direction
	7/1/2011	4812	7.47	175.49
	7/1/2011	4874	7.30	177.24
	7/1/2011	4937	7.30	176.37
	7/1/2011	5000	7.12	177.07
	7/1/2011	5064	6.07	177.60
	7/1/2011	5127	5.63	174.96
	7/1/2011	5191	5.50	173.90
	7/1/2011	5254	4.80	183.60
	7/1/2011	5317	3.90	180.60
	7/1/2011	5379	2.50	179.40
	7/2/2011	5443	1.80	169.00
	7/2/2011	5507	1.30	139.30
	7/2/2011	5569	1.00	150.40
	7/2/2011	5632	0.40	211.50
	7/2/2011	5704	0.44	234.73
	7/3/2011	6193	0.00	0.00
	7/3/2011	6665	0.70	0.00
	7/3/2011	7083	0.60	0.00

EOF



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AUG 17 2011

RECEIVED

C.O.G. Operating LLC

Lea County (NAD27)

BC Federal

#60(SHL1305' FNL, 915' FWL, Sec 20, T17S, R32E)

OH(Top of Paddock @ 5375'TVD -354.5'S,66.9' E of SHL)

Survey: MWD #1

Leam X&Y Report

02 July, 2011



SUR: D-20-17s-32e, 1305/N & 915/W
BHL: E-20-17s-32e, 1673/N & 973/W
API # 30-025-40097



Leam Drilling Systems
Leam X&Y Report



Company:	C.O.G. Operating LLC	Local Co-ordinate Reference:	Site BC Federal
Project:	Lea County (NAD27)	TVD Reference:	WELL2 @ 3985.0usft
Site:	BC Federal	MD Reference:	WELL2 @ 3985.0usft
Well:	#60(SHL1305' FNL, 915' FWL, Sec 20, T17S,	North Reference:	Grid
Wellbore:	OH(Top of Paddock @ 5375'TVD -354 5'S,66 9' E of SHL)	Survey Calculation Method:	Minimum Curvature
Design:	OH(Top of Paddock @ 5375'TVD -354 5'S,66 9' E of SHL)	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	BC Federal		
Site Position:		Northing:	663,798 90 usft
From:	Map	Easting:	665,766 40 usft
Position Uncertainty:	0 0 usft	Slot Radius:	13-3/16 "
		Latitude:	32° 49' 25 346 N
		Longitude:	103° 47' 37.383 W
		Grid Convergence:	0 29 °

Well	#60(SHL1305' FNL, 915' FWL, Sec 20, T17S, R32E)		
Well Position	+N/-S	0 0 usft	Northing:
	+E/-W	0 0 usft	Easting:
Position Uncertainty	0 0 usft	Wellhead Elevation:	0 0 usft
		Latitude:	32° 49' 25.346 N
		Longitude:	103° 47' 37 383 W
		Ground Level:	3,968 0 usft

Wellbore	OH(Top of Paddock @ 5375'TVD -354 5'S,66 9' E of SHL)				
Magnetics	Model Name	Sample Date	Declination	Dip Angle	Field Strength
			(°)	(°)	(nT)
	IGRF2010	06/20/11	7.73	60 70	48,948

Design	OH(Top of Paddock @ 5375'TVD -354 5'S,66 9' E of SHL)			
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	169 32

Survey Program	Date	07/02/11		
From	To	Survey (Wellbore)	Tool Name	Description
(usft)	(usft)			
100 0	5,755 0	MWD #1 (OH(Top of Paddock @ 5375'TV	MWD	MWD - Standard



Leam Drilling Systems
Leam X&Y Report



Company: C.O.G. Operating LLC
Project: Lea County (NAD27)
Site: BC Federal
Well: #60(SHL1305' FNL, 915' FWL, Sec 20, T17S,
Wellbore: BPE Top of Paddock @ 5375'TVD -354 5'S,66 9' E of SI
Design: OH(Top of Paddock @ 5375'TVD -354 5'S,66 9' E of SI

Local Co-ordinate Reference: Site BC Federal
TVD Reference: WELL2 @ 3985.0usft
MD Reference: WELL2 @ 3985.0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland(Permian 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)
0 0	0.00	0.00	0 0	0 0	0 00	0 0	0.0	663,798 90	665,766 40
100 0	0.37	204 71	100 0	0 3	0 37	-0 3	-0.1	663,798 61	665,766 27
200 0	0.45	184 12	200 0	0 9	0 17	-1 0	-0.3	663,797 92	665,766 10
300 0	0.56	180 06	300 0	1 8	0 12	-1 9	-0.3	663,797 04	665,766 07
400 0	0 66	174.12	400 0	2 8	0 12	-2 9	-0.3	663,795 98	665,766 13
500.0	0 82	182 87	500.0	4 1	0 20	-4 2	-0.2	663,794 69	665,766 15
600.0	1 22	204 41	600 0	5 7	0 55	-5.9	-0.7	663,793.01	665,765 68
700 0	1 45	212 23	699 9	7 5	0.29	-7 9	-1.8	663,790 97	665,764 56
800 0	1.25	220 97	799.9	9.1	0.29	-9 8	-3.2	663,789 07	665,763 17
900 0	1 35	222.51	899.9	10 4	0 11	-11 5	-4.7	663,787 38	665,761 66
1,000 0	1 14	218 00	999.9	11 8	0.23	-13.2	-6.1	663,785 73	665,760 25
1,100.0	0 99	217 98	1,099 8	13 0	0 15	-14.6	-7.3	663,784 27	665,759 11
1,200.0	0 50	203 25	1,199 8	14 0	0.52	-15.7	-8.0	663,783 18	665,758 41
1,300 0	0 12	31 30	1,299 8	14.2	0.62	-16 0	-8.1	663,782 87	665,758 29
1,400 0	0 47	34 80	1,399 8	13 9	0.35	-15 6	-7.8	663,783 30	665,758 58
1,500 0	1 06	42 52	1,499 8	13.0	0.60	-14.6	-7.0	663,784.32	665,759 44
1,600 0	1 75	47 80	1,599 8	11 7	0.70	-12.9	-5.2	663,786 02	665,761 19
1,700 0	2.17	47 67	1,699.7	9 9	0.42	-10.6	-2.7	663,788 33	665,763 72
1,800 0	2 55	48 06	1,799 6	7.7	0.38	-7 8	0.4	663,791.09	665,766.78
1,900 0	2 50	51 76	1,899 5	5 6	0 17	-5 0	3.7	663,793 92	665,770.15
2,000 0	1.88	55.50	1,999 5	3 9	0.64	-2 7	6.8	663,796 20	665,773 21
2,100 0	1 65	47 44	2,099 4	2.5	0.34	-0 8	9.2	663,798 11	665,775 62
2,106 0	1 58	43 27	2,105.4	2 4	2.28	-0 7	9.3	663,798 22	665,775 74
2,256 0	1 30	66.20	2,255.4	0 8	0.42	1.5	12.3	663,800 42	665,778 72
2,319.0	1.32	96 91	2,318 4	0 8	1 10	1.7	13.7	663,800.62	665,780 09
2,414 0	1 67	128 20	2,413 3	2 2	0.92	0 7	15.9	663,799.63	665,782 27
2,506 0	2 90	154 04	2,505 3	5 5	1 71	-2 2	17.9	663,796 71	665,784 34



Leam Drilling Systems

Leam X&Y Report



Company: C O G Operating LLC
Project: Lea County (NAD27)
Site: BC Federal
Well: #60(SHL1305' FNL, 915' FWL, Sec 20, T17S,
Wellbore: 5375' TVD -354.5'S, 66.9' E of SI
Design: OH(Top of Paddock @ 5375'TVD -354.5'S, 66.9' E of SI

Local Co-ordinate Reference: Site BC Federal
TVD Reference: WELL2 @ 3985 0usft
MD Reference: WELL2 @ 3985 0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland(Permian 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)
2,568.0	3.52	172.32	2,567.2	8.9	1.92	-5.5	18.9	663,793.41	665,785.28
2,631.0	4.48	176.37	2,630.0	13.3	1.59	-9.9	19.3	663,789.04	665,785.69
2,694.0	5.19	175.66	2,692.8	18.5	1.13	-15.2	19.7	663,783.74	665,786.07
2,757.0	5.98	176.37	2,755.5	24.6	1.26	-21.3	20.1	663,777.63	665,786.49
2,819.0	6.77	174.78	2,817.1	31.5	1.31	-28.1	20.6	663,770.76	665,787.03
2,883.0	7.47	171.80	2,880.6	39.4	1.24	-36.0	21.6	663,762.89	665,787.96
2,978.0	7.47	169.51	2,974.8	51.7	0.31	-48.2	23.6	663,750.70	665,789.97
3,040.0	7.91	165.99	3,036.2	60.0	1.04	-56.3	25.3	663,742.60	665,791.73
3,103.0	8.50	164.90	3,098.6	69.0	0.97	-65.0	27.6	663,733.90	665,794.00
3,167.0	8.35	165.64	3,161.9	78.3	0.29	-74.1	30.0	663,724.83	665,796.38
3,230.0	7.91	164.06	3,224.3	87.2	0.78	-82.7	32.3	663,716.23	665,798.71
3,292.0	8.27	165.29	3,285.7	95.9	0.64	-91.1	34.6	663,707.82	665,801.01
3,356.0	8.97	165.47	3,348.9	105.5	1.09	-100.4	37.0	663,698.54	665,803.43
3,419.0	8.97	164.76	3,411.2	115.3	0.18	-109.9	39.6	663,689.04	665,805.95
3,482.0	9.06	164.94	3,473.4	125.1	0.15	-119.4	42.1	663,679.51	665,808.53
3,545.0	8.79	168.63	3,535.6	134.9	1.00	-128.9	44.4	663,670.01	665,810.77
3,608.0	8.62	171.27	3,597.9	144.4	0.69	-138.3	46.0	663,660.62	665,812.44
3,671.0	8.53	172.85	3,660.2	153.8	0.40	-147.6	47.3	663,651.32	665,813.73
3,735.0	8.44	171.27	3,723.5	163.2	0.39	-156.9	48.6	663,641.97	665,815.04
3,798.0	8.62	170.39	3,785.8	172.6	0.35	-166.2	50.1	663,632.74	665,816.53
3,861.0	8.71	170.92	3,848.1	182.1	0.19	-175.5	51.7	663,623.37	665,818.07
3,924.0	8.88	170.04	3,910.3	191.7	0.34	-185.0	53.3	663,613.88	665,819.66
3,986.0	8.27	171.97	3,971.6	200.9	1.09	-194.2	54.7	663,604.75	665,821.11
4,049.0	7.56	171.97	4,034.0	209.6	1.13	-202.7	55.9	663,596.16	665,822.33
4,112.0	7.12	175.66	4,096.5	217.6	1.02	-210.7	56.8	663,588.16	665,823.20
4,176.0	7.21	174.61	4,160.0	225.6	0.25	-218.7	57.5	663,580.21	665,823.88
4,239.0	7.21	174.96	4,222.5	233.4	0.07	-226.6	58.2	663,572.33	665,824.60



Leam Drilling Systems
Leam X&Y Report



Company: C O G Operating LLC
Project: Lea County (NAD27)
Site: BC Federal
Well: #60(SHL1305' FNL, 915' FWL, Sec 20, T17S,
SRR)Top of Paddock @ 5375'TVD -354.5'S,66 9' E of SL
Wellbore: OH(Top of Paddock @ 5375'TVD -354 5'S,66 9' E of SL
Design:

Local Co-ordinate Reference: Site BC Federal
TVD Reference: WELL2 @ 3985 0usft
MD Reference: WELL2 @ 3985 0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland(Permian 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)
4,301.0	7.03	177.42	4,284.1	241.1	0.57	-234.2	58.7	663,564.67	665,825.11
4,371.0	7.03	175.30	4,353.5	249.6	0.37	-242.8	59.3	663,556.12	665,825.65
4,435.0	6.95	176.72	4,417.1	257.3	0.30	-250.6	59.8	663,548.35	665,826.19
4,498.0	6.95	175.31	4,479.6	264.9	0.27	-258.2	60.3	663,540.74	665,826.72
4,560.0	6.86	176.19	4,541.1	272.3	0.22	-265.6	60.9	663,533.31	665,827.28
4,623.0	6.86	176.19	4,603.7	279.7	0.00	-273.1	61.4	663,525.80	665,827.78
4,686.0	6.86	176.37	4,666.2	287.2	0.03	-280.6	61.9	663,518.29	665,828.27
4,749.0	7.30	176.72	4,728.8	294.9	0.70	-288.4	62.3	663,510.54	665,828.73
4,812.0	7.47	175.49	4,791.2	303.0	0.37	-296.4	62.9	663,502.46	665,829.28
4,874.0	7.30	177.24	4,852.7	310.9	0.45	-304.4	63.4	663,494.51	665,829.79
4,937.0	7.30	176.37	4,915.2	318.8	0.18	-312.4	63.8	663,486.52	665,830.24
5,000.0	7.12	177.07	4,977.7	326.6	0.32	-320.3	64.3	663,478.63	665,830.69
5,064.0	6.07	177.60	5,041.3	333.9	1.64	-327.6	64.6	663,471.28	665,831.03
5,127.0	5.63	174.96	5,104.0	340.3	0.82	-334.0	65.0	663,464.88	665,831.45
5,191.0	5.45	173.90	5,167.7	346.4	0.32	-340.2	65.6	663,458.73	665,832.04
5,254.0	4.84	183.57	5,230.4	352.0	1.68	-345.8	65.8	663,453.10	665,832.20
5,317.0	3.87	180.58	5,293.2	356.7	1.58	-350.6	65.6	663,448.32	665,832.01
5,379.0	2.46	179.35	5,355.1	360.0	2.28	-354.0	65.6	663,444.90	665,832.00
5,443.0	1.76	168.98	5,419.1	362.4	1.24	-356.3	65.8	663,442.56	665,832.21
5,507.0	1.32	139.98	5,483.1	364.0	1.38	-357.9	66.5	663,441.03	665,832.87
5,569.0	0.97	150.40	5,545.0	365.1	0.65	-358.9	67.2	663,440.03	665,833.59
5,632.0	0.35	211.52	5,608.0	365.8	1.36	-359.5	67.3	663,439.40	665,833.75
5,704.0	0.44	234.73	5,680.0	366.0	0.25	-359.8	67.0	663,439.05	665,833.41
5,755.0	0.44	234.73	5,731.0	366.2	0.00	-360.1	66.7	663,438.83	665,833.09

BHL - 5755.0'MD, 0.44°INC, 234.73°AZI, 5731.0'TVD, -360.1°N, 66.7°E



Leam Drilling Systems
Leam X&Y Report



Company: C O.G. Operating LLC
Project: Lea County (NAD27)
Site: BC Federal
Well: #60(SHL1305' FNL, 915' FWL, Sec 20, T17S,
R9E)
Wellbore: BPP Top of Paddock @ 5375'TVD -354 5'S,66 9' E of SI
Design: OH(Top of Paddock @ 5375'TVD -354 5'S,66 9' E of SI

Local Co-ordinate Reference: Site BC Federal
TVD Reference: WELL2 @ 3985 0usft
MD Reference: WELL2 @ 3985 0usft
North Reference: Grid
Survey Calculation Method: Minimum Curvature
Database: Midland(Permian Basin) Database

Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
5,755 0	5,731 0	-360 1	66 7	BHL - 5755 0'MD, 0 44°INC, 234.73°AZI, 5731 0'TVD,-360 1'N,66 7'E

Checked By: _____ Approved By: _____ Date: _____

C.O.G. Operating LLC

Project: Lea County (NAD27)

Site: BC Federal

Well: #60(SHL1305' FNL, 915' FWL, Sec 20, T17S, R32E)

Wellore: OH(Top of Paddock @ 5375'TVD -354.5'S,66.9' E of SHL)

Azimuths to Grid North
True North: -0.29°
Magnetic North: 7.44°Magnetic Field
Strength: 48948.0nT
Dip Angle: 60.70°
Date: 06/20/2011
Model: IGRF2010PROJECT 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	VSec
2106.0	1.58	43.27	2105.4	-0.7	9.3	0.00	0.00	2.4
2200.0	1.58	43.27	2199.4	1.2	11.1	0.00	0.00	0.9
2627.2	7.47	171.83	2625.5	-22.0	19.1	2.00	136.82	25.2
5025.5	7.47	171.83	5003.4	-330.7	63.4	0.00	0.00	336.7
5398.1	0.00	0.00	5375.0	-354.7	66.9	2.00	180.00	360.9
7123.1	0.00	0.00	7100.0	-354.7	66.9	0.00	0.00	360.9

WELL DETAILS: #60(SHL1305' FNL, 915' FWL, Sec 20, T17S, R32E)

Ground Elevation: 3968.0

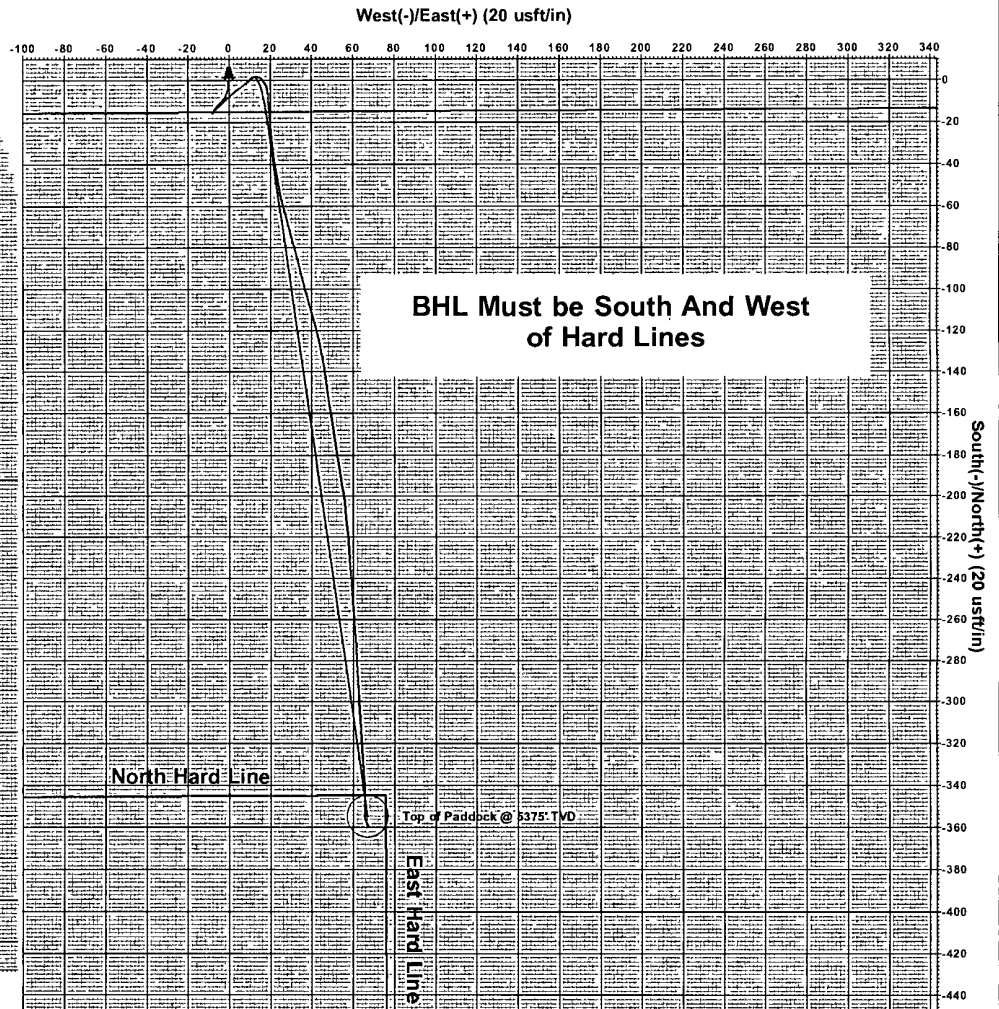
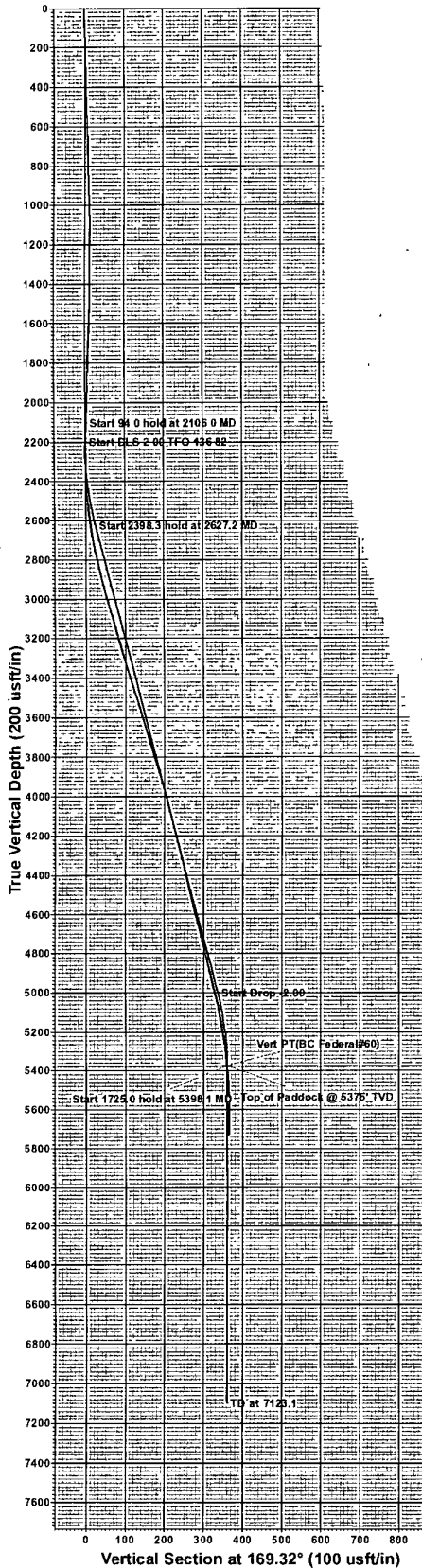
RKB Elevation: WELL2 @ 3985.0usft

Rig Name:

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	663798.90	665766.40	32° 49' 25.346 N	103° 47' 37.383 W

WELLBORE TARGET DETAILS (MAP CO-ORDINATES)

Name	TVD	+N/-S	+E/-W	Northing	Easting	Shape
Vert PT	5375.0	-354.5	66.9	663444.40	665833.30	Circle (Radius: 10.0)

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

Created By: Nate Bingham Date: 7/38, July 02 2011