



Job Number: FDH3100
Company: ExL Petroleum
Lease/Well: Comanche A4144 Unit 4146
Location: Martin County, TX
Rig Name: Latshaw 5
RKB: 30.5'
G.L. or M.S.L.: GL

State/Country: Texas, USA
Declination:
Grid: North
File name: C:\WINSERVE\FDH3100.SVY
Date/Time: 12-Aug-16 / 08:50
Curve Name: FDH3100 - 4146

Firethorne Downhole, LLC

WINSERVE SURVEY CALCULATIONS
Minimum Curvature Method
Vertical Section Plane .00
Vertical Section Referenced to Wellhead
Rectangular Coordinates Referenced to Wellhead

<i>Measured Depth FT</i>	<i>Incl Angle Deg</i>	<i>Drift Direction Deg</i>	<i>True Vertical Depth</i>	<i>Subsea TVD FT</i>	<i>N-S FT</i>	<i>E-W FT</i>	<i>Vertical Section FT</i>	<i>C L O S U R E Distance FT</i>	<i>Direction Deg</i>	<i>Dogleg Severity Deg/100</i>
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
200.00	.60	94.20	200.00	-200.00	-.08	1.04	-.08	1.05	94.20	.30
405.00	3.10	105.40	404.87	-404.87	-1.63	7.46	-1.63	7.64	102.31	1.23
469.00	3.00	110.90	468.78	-468.78	-2.68	10.69	-2.68	11.02	104.09	.48
558.00	2.60	124.08	557.68	-557.68	-4.65	14.54	-4.65	15.27	107.72	.85
648.00	2.60	131.30	647.59	-647.59	-7.14	17.76	-7.14	19.15	111.89	.36
740.00	1.30	101.20	739.53	-739.53	-8.72	20.36	-8.72	22.14	113.18	1.75
831.00	1.00	85.40	830.51	-830.51	-8.85	22.16	-8.85	23.86	111.78	.48
925.00	1.00	80.30	924.50	-924.50	-8.65	23.79	-8.65	25.31	109.98	.09
1017.00	.90	74.30	1016.49	-1016.49	-8.32	25.27	-8.32	26.61	108.22	.15
1110.00	.90	72.60	1109.48	-1109.48	-7.90	26.67	-7.90	27.82	106.51	.03
1200.00	.80	67.70	1199.47	-1199.47	-7.45	27.93	-7.45	28.91	104.94	.14
1294.00	.60	57.80	1293.46	-1293.46	-6.94	28.95	-6.94	29.77	103.48	.25
1387.00	.40	59.40	1386.45	-1386.45	-6.52	29.64	-6.52	30.35	102.40	.22
1482.00	.50	53.20	1481.45	-1481.45	-6.10	30.26	-6.10	30.87	101.40	.12
1576.00	.40	56.80	1575.45	-1575.45	-5.68	30.87	-5.68	31.38	100.42	.11
1668.00	.40	67.30	1667.45	-1667.45	-5.38	31.43	-5.38	31.89	99.71	.08
1763.00	.40	78.00	1762.44	-1762.44	-5.18	32.06	-5.18	32.48	99.18	.08
1856.00	.60	95.30	1855.44	-1855.44	-5.16	32.86	-5.16	33.26	98.92	.27
1951.00	1.00	101.80	1950.43	-1950.43	-5.37	34.17	-5.37	34.59	98.93	.43
2044.00	1.10	100.00	2043.42	-2043.42	-5.69	35.84	-5.69	36.29	99.02	.11
2139.00	1.30	92.30	2138.40	-2138.40	-5.89	37.82	-5.89	38.27	98.86	.27
2233.00	1.40	81.40	2232.37	-2232.37	-5.77	40.02	-5.77	40.43	98.20	.29
2328.00	1.20	130.80	2327.35	-2327.35	-6.24	41.92	-6.24	42.38	98.47	1.16
2424.00	1.60	141.70	2423.32	-2423.32	-7.95	43.51	-7.95	44.23	100.36	.50

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Subsea TVD FT	N-S FT	E-W FT	Vertical Section FT	C L O S U R E Distance FT	Direction Deg	Dogleg Severity Deg/100
2518.00	.40	195.80	2517.30	-2517.30	-9.30	44.23	-9.30	45.20	101.87	1.49
2613.00	.70	281.60	2612.30	-2612.30	-9.50	43.58	-9.50	44.60	102.30	.82
2706.00	1.10	297.80	2705.29	-2705.29	-8.97	42.23	-8.97	43.17	101.99	.51
2800.00	1.20	310.20	2799.27	-2799.27	-7.91	40.68	-7.91	41.44	101.01	.28
2894.00	1.30	313.90	2893.25	-2893.25	-6.54	39.16	-6.54	39.70	99.48	.14
2988.00	1.10	325.50	2987.23	-2987.23	-5.05	37.88	-5.05	38.22	97.60	.33
3083.00	1.10	322.20	3082.21	-3082.21	-3.58	36.81	-3.58	36.98	95.56	.07
3178.00	.80	337.10	3177.20	-3177.20	-2.25	35.99	-2.25	36.06	93.58	.41
3274.00	.80	5.60	3273.19	-3273.19	-.97	35.79	-.97	35.81	91.55	.41
3368.00	.80	349.10	3367.18	-3367.18	.33	35.73	.33	35.73	89.47	.24
3463.00	.90	345.40	3462.17	-3462.17	1.70	35.42	1.70	35.46	87.25	.12
3557.00	1.10	341.20	3556.15	-3556.15	3.27	34.94	3.27	35.10	84.65	.23
3652.00	1.10	342.10	3651.14	-3651.14	5.00	34.37	5.00	34.73	81.72	.02
3746.00	1.00	336.40	3745.12	-3745.12	6.61	33.76	6.61	34.40	78.92	.15
3842.00	1.10	332.20	3841.10	-3841.10	8.20	33.00	8.20	34.00	76.05	.13
3937.00	1.10	326.90	3936.09	-3936.09	9.77	32.07	9.77	33.53	73.06	.11
4032.00	.80	299.00	4031.07	-4031.07	10.85	31.00	10.85	32.84	70.70	.57
4127.00	.80	299.20	4126.07	-4126.07	11.50	29.84	11.50	31.98	68.93	.00
4220.00	.60	308.00	4219.06	-4219.06	12.11	28.89	12.11	31.32	67.25	.24
4315.00	.40	319.00	4314.05	-4314.05	12.67	28.28	12.67	30.99	65.86	.23
4408.00	.50	325.00	4407.05	-4407.05	13.25	27.83	13.25	30.82	64.54	.12
4502.00	.70	284.00	4501.05	-4501.05	13.72	27.04	13.72	30.32	63.09	.49
4596.00	.10	297.20	4595.04	-4595.04	13.90	26.41	13.90	29.84	62.24	.64
4690.00	.90	241.70	4689.04	-4689.04	13.59	25.69	13.59	29.06	62.12	.90
4783.00	1.10	236.60	4782.03	-4782.03	12.75	24.30	12.75	27.44	62.31	.24
4877.00	1.10	241.20	4876.01	-4876.01	11.82	22.75	11.82	25.64	62.55	.09
4972.00	.90	234.70	4970.99	-4970.99	10.95	21.35	10.95	23.99	62.85	.24
5066.00	1.00	229.00	5064.98	-5064.98	9.98	20.12	9.98	22.46	63.62	.15
5160.00	.80	222.00	5158.97	-5158.97	8.96	19.07	8.96	21.07	64.84	.24
5253.00	.80	212.90	5251.96	-5251.96	7.93	18.28	7.93	19.92	66.55	.14
5347.00	1.00	217.40	5345.95	-5345.95	6.73	17.42	6.73	18.68	68.89	.23
5443.00	.80	214.40	5441.94	-5441.94	5.51	16.54	5.51	17.43	71.58	.21
5537.00	.90	215.80	5535.93	-5535.93	4.37	15.73	4.37	16.33	74.48	.11
5631.00	.90	211.30	5629.92	-5629.92	3.14	14.92	3.14	15.25	78.12	.08
5727.00	1.10	208.60	5725.90	-5725.90	1.69	14.09	1.69	14.19	83.18	.21
5820.00	1.10	207.10	5818.88	-5818.88	.11	13.25	.11	13.25	89.54	.03
5915.00	1.10	207.20	5913.87	-5913.87	-1.52	12.42	-1.52	12.51	96.96	.00
6010.00	1.10	208.10	6008.85	-6008.85	-3.13	11.57	-3.13	11.99	105.14	.02
6105.00	1.10	209.30	6103.83	-6103.83	-4.73	10.70	-4.73	11.70	113.86	.02
6199.00	1.20	211.60	6197.81	-6197.81	-6.36	9.74	-6.36	11.63	123.13	.12
6294.00	1.10	208.30	6292.79	-6292.79	-8.01	8.79	-8.01	11.89	132.34	.13
6388.00	1.00	206.70	6386.78	-6386.78	-9.53	7.99	-9.53	12.44	140.03	.11
6482.00	.90	212.70	6480.76	-6480.76	-10.89	7.22	-10.89	13.07	146.44	.15
6577.00	.70	191.80	6575.76	-6575.76	-12.08	6.70	-12.08	13.82	150.99	.37
6671.00	.50	189.10	6669.75	-6669.75	-13.05	6.52	-13.05	14.59	153.46	.21

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	Subsea TVD FT	N-S FT	E-W FT	Vertical Section FT	C L O S U R E Distance FT	Direction Deg	Dogleg Severity Deg/100
6765.00	.40	159.40	6763.75	-6763.75	-13.76	6.57	-13.76	15.25	154.48	.27
6859.00	.00	28.30	6857.75	-6857.75	-14.07	6.69	-14.07	15.58	154.59	.43
6954.00	.50	83.70	6952.75	-6952.75	-14.02	7.10	-14.02	15.72	153.16	.53
7049.00	.60	58.90	7047.74	-7047.74	-13.72	7.94	-13.72	15.85	149.96	.27
7143.00	.50	32.90	7141.74	-7141.74	-13.12	8.58	-13.12	15.68	146.83	.28
7238.00	.40	16.30	7236.73	-7236.73	-12.46	8.90	-12.46	15.31	144.46	.17
7332.00	.60	48.80	7330.73	-7330.73	-11.82	9.36	-11.82	15.08	141.62	.36
7426.00	.50	37.80	7424.73	-7424.73	-11.17	9.98	-11.17	14.98	138.21	.15
7521.00	.40	19.30	7519.72	-7519.72	-10.53	10.35	-10.53	14.76	135.50	.18
7615.00	.70	1.70	7613.72	-7613.72	-9.65	10.47	-9.65	14.24	132.65	.36
7709.00	.60	45.70	7707.71	-7707.71	-8.73	10.84	-8.73	13.92	128.84	.53
7801.00	.80	130.90	7799.71	-7799.71	-8.81	11.67	-8.81	14.62	127.06	1.04
7895.00	1.00	124.10	7893.70	-7893.70	-9.70	12.85	-9.70	16.10	127.06	.24
7968.00	.50	141.30	7966.69	-7966.69	-10.31	13.57	-10.31	17.04	127.21	.74
8095.00	.50	156.10	8093.69	-8093.69	-11.25	14.14	-11.25	18.07	128.49	.10
8190.00	.50	142.70	8188.68	-8188.68	-11.95	14.56	-11.95	18.84	129.38	.12
8283.00	.40	166.60	8281.68	-8281.68	-12.59	14.88	-12.59	19.50	130.24	.23
8378.00	.70	195.10	8376.67	-8376.67	-13.48	14.81	-13.48	20.02	132.30	.42
8473.00	.40	209.20	8471.67	-8471.67	-14.33	14.50	-14.33	20.38	134.66	.34
8568.00	.30	195.30	8566.67	-8566.67	-14.86	14.27	-14.86	20.60	136.15	.14
8664.00	.30	160.30	8662.67	-8662.67	-15.33	14.29	-15.33	20.96	137.02	.19
8759.00	.30	61.50	8757.67	-8757.67	-15.45	14.59	-15.45	21.25	136.64	.48
8853.00	.40	103.20	8851.67	-8851.67	-15.41	15.13	-15.41	21.59	135.53	.28
8948.00	.40	166.80	8946.66	-8946.66	-15.81	15.52	-15.81	22.15	135.52	.44
9043.00	.40	299.90	9041.66	-9041.66	-15.96	15.31	-15.96	22.12	136.19	.77
9138.00	1.00	318.70	9136.65	-9136.65	-15.18	14.48	-15.18	20.97	136.35	.67
9234.00	1.60	337.70	9232.63	-9232.63	-13.31	13.42	-13.31	18.90	134.76	.76
9329.00	1.10	24.60	9327.61	-9327.61	-11.25	13.29	-11.25	17.41	130.24	1.23
9422.00	1.40	61.20	9420.59	-9420.59	-9.89	14.66	-9.89	17.68	124.01	.90
9516.00	.70	31.60	9514.57	-9514.57	-8.85	15.97	-8.85	18.25	118.99	.92
9611.00	1.00	17.00	9609.56	-9609.56	-7.56	16.51	-7.56	18.16	114.60	.39
9706.00	1.10	14.60	9704.54	-9704.54	-5.89	16.99	-5.89	17.98	109.11	.11
9801.00	1.80	358.60	9799.51	-9799.51	-3.51	17.18	-3.51	17.53	101.55	.84
9894.00	1.60	350.10	9892.47	-9892.47	-.77	16.92	-.77	16.94	92.62	.35
9987.00	1.40	342.60	9985.44	-9985.44	1.59	16.36	1.59	16.43	84.45	.30

Projection to Bit - Pilot Hole TD

10038.00	1.40	342.60	10036.42	-10036.42	2.78	15.98	2.78	16.22	80.14	.00
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