



Job Number: OK-121550
 Company: Nemaha Oil & Gas
 Lease/Well: Massey 1A-18-34-9H
 Location: Cedar Vale, KS
 Rig Name: Nomac 23
 RKB:
 G.L. or M.S.L.:

State/Country: Kansas
 Declination:
 Grid:
 File name: C:\WINSERVE\MASS.SVY
 Date/Time: 15-Jan-13 / 22:12
 Curve Name: Work Curve

Leam Drilling Systems, Inc.

WINSERVE SURVEY CALCULATIONS
Minimum Curvature Method
Vertical Section Plane 179.63
Vertical Section Referenced to Wellhead
Rectangular Coordinates Referenced to Wellhead

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	N-S FT	E-W FT	Vertical Section FT	CLOSURE Distance FT	Direction Deg	BUILD RATE Deg/100	WALK RATE Deg/100	Dogleg Severity Deg/100
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
TIE IN											
691.00	1.30	140.90	690.94	-6.08	4.94	6.12	7.84	140.90	.19	20.39	.19
754.00	1.50	134.90	753.92	-7.22	5.98	7.26	9.37	140.37	.32	-9.52	.39
818.00	1.70	138.80	817.90	-8.53	7.20	8.57	11.16	139.83	.31	6.09	.36
849.00	2.00	129.40	848.88	-9.21	7.92	9.27	12.15	139.33	.97	-30.32	1.37
881.00	2.10	135.20	880.86	-9.99	8.76	10.04	13.28	138.73	.31	18.13	.72
913.00	1.90	135.70	912.84	-10.78	9.55	10.84	14.40	138.48	-.63	1.56	.63
944.00	2.20	131.40	943.82	-11.54	10.35	11.61	15.50	138.11	.97	-13.87	1.09
976.00	2.10	132.30	975.80	-12.34	11.25	12.42	16.70	137.66	-.31	2.81	.33
1008.00	2.00	136.20	1007.78	-13.14	12.07	13.22	17.84	137.44	-.31	12.19	.54
1071.00	2.20	140.50	1070.74	-14.87	13.60	14.95	20.15	137.56	.32	6.83	.40
1134.00	2.60	141.90	1133.68	-16.92	15.25	17.02	22.78	137.99	.63	2.22	.64
1198.00	2.60	149.50	1197.61	-19.32	16.88	19.43	25.65	138.85	.00	11.88	.54
1261.00	2.70	148.00	1260.55	-21.81	18.39	21.93	28.53	139.86	.16	-2.38	.19
1324.00	2.60	148.00	1323.48	-24.28	19.93	24.41	31.41	140.61	-.16	.00	.16
1387.00	2.90	151.60	1386.41	-26.89	21.45	27.03	34.40	141.42	.48	5.71	.55
1450.00	2.90	148.70	1449.33	-29.65	23.04	29.80	37.55	142.16	.00	-4.60	.23
1514.00	3.10	153.90	1513.24	-32.59	24.64	32.75	40.86	142.91	.31	8.12	.53
1577.00	3.20	151.20	1576.14	-35.66	26.23	35.83	44.27	143.66	.16	-4.29	.28
1639.00	3.30	151.90	1638.04	-38.75	27.91	38.93	47.76	144.24	.16	1.13	.17
1703.00	3.20	150.00	1701.94	-41.93	29.67	42.12	51.36	144.71	-.16	-2.97	.23
1735.00	3.10	150.10	1733.89	-43.45	30.55	43.65	53.11	144.89	-.31	.31	.31
1767.00	3.50	160.80	1765.84	-45.12	31.30	45.32	54.91	145.25	1.25	33.44	2.29
1798.00	4.60	167.90	1796.76	-47.23	31.87	47.44	56.98	145.99	3.55	22.90	3.89
1830.00	6.10	170.90	1828.62	-50.16	32.41	50.37	59.72	147.13	4.69	9.38	4.77

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	N-S FT	E-W FT	Vertical Section FT	C L O S U R E Distance FT Direction Deg		BUILD RATE Deg/100	WALK RATE Deg/100	Dogleg Severity Deg/100
1862.00	8.30	173.70	1860.37	-54.14	32.93	54.35	63.37	148.69	6.88	8.75	6.96
1893.00	10.30	179.60	1890.96	-59.14	33.20	59.35	67.82	150.69	6.45	19.03	7.14
1925.00	12.40	181.60	1922.33	-65.43	33.12	65.64	73.34	153.15	6.56	6.25	6.68
1957.00	13.80	185.30	1953.50	-72.67	32.67	72.88	79.67	155.79	4.38	11.56	5.10
1988.00	16.20	186.50	1983.44	-80.65	31.84	80.85	86.70	158.45	7.74	3.87	7.81
2020.00	18.60	188.70	2013.97	-90.13	30.56	90.32	95.17	161.27	7.50	6.87	7.78
2052.00	21.20	191.10	2044.06	-100.85	28.68	101.03	104.85	164.13	8.12	7.50	8.51
2083.00	23.50	191.20	2072.73	-112.42	26.40	112.58	115.47	166.79	7.42	.32	7.42
2115.00	25.80	190.10	2101.81	-125.53	23.94	125.68	127.79	169.20	7.19	-3.44	7.33
2147.00	28.90	188.70	2130.23	-140.04	21.55	140.17	141.68	171.25	9.69	-4.38	9.89
2179.00	32.20	188.90	2157.79	-156.11	19.06	156.23	157.27	173.04	10.31	.62	10.32
2210.00	35.40	189.10	2183.54	-173.14	16.36	173.24	173.91	174.60	10.32	.65	10.33
2242.00	38.40	190.10	2209.13	-192.08	13.15	192.16	192.53	176.08	9.38	3.13	9.56
2274.00	41.50	189.70	2233.66	-212.32	9.62	212.38	212.54	177.41	9.69	-1.25	9.72
2305.00	44.80	188.90	2256.27	-233.24	6.20	233.27	233.32	178.48	10.65	-2.58	10.79
2337.00	48.00	189.60	2278.34	-256.11	2.47	256.12	256.12	179.45	10.00	2.19	10.12
2369.00	51.50	189.30	2299.01	-280.19	-1.54	280.18	280.20	180.31	10.94	-.94	10.96
2401.00	54.90	187.60	2318.18	-305.54	-5.30	305.49	305.58	180.99	10.63	-5.31	11.44
2432.00	58.50	187.20	2335.20	-331.23	-8.63	331.16	331.34	181.49	11.61	-1.29	11.66
2464.00	61.50	185.80	2351.19	-358.76	-11.76	358.67	358.95	181.88	9.38	-4.37	10.11
2496.00	64.70	183.00	2365.67	-387.20	-13.94	387.11	387.45	182.06	10.00	-8.75	12.68
2528.00	67.90	181.40	2378.53	-416.48	-15.06	416.37	416.75	182.07	10.00	-5.00	11.00
2559.00	72.00	180.40	2389.16	-445.59	-15.51	445.48	445.86	181.99	13.23	-3.23	13.57
2591.00	74.60	181.00	2398.35	-476.23	-15.89	476.12	476.50	181.91	8.12	1.88	8.32
2622.00	76.50	181.00	2406.09	-506.25	-16.41	506.13	506.51	181.86	6.13	.00	6.13
2654.00	78.40	181.30	2413.04	-537.48	-17.04	537.35	537.75	181.82	5.94	.94	6.01
2686.00	79.00	181.60	2419.31	-568.84	-17.83	568.72	569.12	181.80	1.87	.94	2.09
2717.00	79.00	181.70	2425.23	-599.26	-18.71	599.13	599.55	181.79	.00	.32	.32
2749.00	79.30	181.60	2431.25	-630.68	-19.62	630.54	630.98	181.78	.94	-.31	.99
2781.00	79.50	181.80	2437.14	-662.12	-20.55	661.97	662.44	181.78	.63	.62	.88
2812.00	79.90	181.90	2442.68	-692.60	-21.53	692.45	692.94	181.78	1.29	.32	1.33
2844.00	81.00	181.90	2447.99	-724.14	-22.58	723.98	724.49	181.79	3.44	.00	3.44
2876.00	84.70	181.90	2451.97	-755.87	-23.63	755.70	756.24	181.79	11.56	.00	11.56
2907.00	86.70	181.60	2454.30	-786.77	-24.58	786.59	787.15	181.79	6.45	-.97	6.52
2939.00	89.60	182.40	2455.33	-818.73	-25.69	818.54	819.13	181.80	9.06	2.50	9.40
2971.00	90.60	182.30	2455.27	-850.70	-27.00	850.51	851.13	181.82	3.13	-.31	3.14
3002.00	92.50	182.00	2454.44	-881.66	-28.17	881.46	882.11	181.83	6.13	-.97	6.20
3034.00	93.20	181.80	2452.84	-913.61	-29.23	913.40	914.07	181.83	2.19	-.62	2.27
3066.00	93.80	181.80	2450.89	-945.53	-30.23	945.32	946.01	181.83	1.87	.00	1.88
3098.00	94.10	181.80	2448.69	-977.44	-31.23	977.22	977.94	181.83	.94	.00	.94
3129.00	94.00	181.30	2446.50	-1008.35	-32.07	1008.12	1008.86	181.82	-.32	-1.61	1.64
3161.00	94.40	181.30	2444.15	-1040.26	-32.79	1040.02	1040.77	181.81	1.25	.00	1.25
3193.00	94.30	181.60	2441.73	-1072.15	-33.60	1071.91	1072.68	181.80	-.31	.94	.99
3225.00	94.70	181.60	2439.22	-1104.04	-34.49	1103.80	1104.58	181.79	1.25	.00	1.25
3256.00	94.80	181.60	2436.65	-1134.92	-35.35	1134.67	1135.47	181.78	.32	.00	.32

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	N-S FT	E-W FT	Vertical Section FT	C L O S U R E Distance FT Direction Deg		BUILD RATE Deg/100	WALK RATE Deg/100	Dogleg Severity Deg/100
3288.00	93.90	180.80	2434.22	-1166.82	-36.02	1166.57	1167.38	181.77	-2.81	-2.50	3.76
3320.00	94.00	180.70	2432.02	-1198.75	-36.44	1198.48	1199.30	181.74	.31	-.31	.44
3351.00	94.20	180.30	2429.80	-1229.66	-36.71	1229.40	1230.21	181.71	.65	-1.29	1.44
3383.00	94.70	180.50	2427.32	-1261.57	-36.93	1261.30	1262.11	181.68	1.56	.62	1.68
3414.00	95.20	180.20	2424.64	-1292.45	-37.12	1292.18	1292.98	181.65	1.61	-.97	1.88
3446.00	93.70	180.00	2422.16	-1324.35	-37.18	1324.09	1324.88	181.61	-4.69	-.62	4.73
3478.00	94.00	179.60	2420.01	-1356.28	-37.07	1356.01	1356.79	181.57	.94	-1.25	1.56
3510.00	94.40	179.60	2417.67	-1388.19	-36.84	1387.93	1388.68	181.52	1.25	.00	1.25
3542.00	92.90	179.20	2415.63	-1420.13	-36.51	1419.86	1420.60	181.47	-4.69	-1.25	4.85
3573.00	92.30	179.00	2414.22	-1451.09	-36.02	1450.83	1451.54	181.42	-1.94	-.65	2.04
3605.00	91.70	178.70	2413.11	-1483.06	-35.38	1482.81	1483.49	181.37	-1.87	-.94	2.10
3623.00	91.70	178.70	2412.57	-1501.05	-34.97	1500.79	1501.46	181.33	.00	.00	.00
3655.00	91.20	178.90	2411.76	-1533.03	-34.30	1532.78	1533.42	181.28	-1.56	.62	1.68
3687.00	91.10	179.00	2411.12	-1565.02	-33.72	1564.77	1565.39	181.23	-.31	.31	.44
3718.00	90.80	178.70	2410.61	-1596.01	-33.09	1595.77	1596.36	181.19	-.97	-.97	1.37
3750.00	91.00	178.70	2410.10	-1628.00	-32.37	1627.76	1628.32	181.14	.63	.00	.62
3782.00	90.90	179.00	2409.57	-1659.99	-31.73	1659.75	1660.29	181.09	-.31	.94	.99
3813.00	90.90	179.00	2409.09	-1690.98	-31.18	1690.74	1691.27	181.06	.00	.00	.00
3845.00	91.40	178.90	2408.44	-1722.97	-30.60	1722.74	1723.24	181.02	1.56	-.31	1.59
3877.00	92.10	179.10	2407.47	-1754.95	-30.04	1754.72	1755.21	180.98	2.19	.63	2.27
3909.00	90.80	178.60	2406.66	-1786.93	-29.40	1786.70	1787.17	180.94	-4.06	-1.56	4.35
3940.00	91.20	178.90	2406.12	-1817.92	-28.72	1817.70	1818.15	180.91	1.29	.97	1.61
3972.00	91.40	179.30	2405.39	-1849.91	-28.22	1849.69	1850.12	180.87	.63	1.25	1.40
4003.00	90.80	178.70	2404.80	-1880.90	-27.68	1880.68	1881.10	180.84	-1.94	-1.94	2.74
4035.00	91.90	178.80	2404.04	-1912.88	-26.98	1912.66	1913.07	180.81	3.44	.31	3.45
4067.00	92.70	179.40	2402.76	-1944.85	-26.48	1944.64	1945.03	180.78	2.50	1.87	3.12
4098.00	92.20	178.20	2401.43	-1975.81	-25.83	1975.60	1975.98	180.75	-1.61	-3.87	4.19
4130.00	92.90	177.70	2400.01	-2007.76	-24.69	2007.56	2007.91	180.70	2.19	-1.56	2.69
4161.00	93.30	177.40	2398.33	-2038.69	-23.36	2038.49	2038.82	180.66	1.29	-.97	1.61
4193.00	93.40	177.30	2396.46	-2070.60	-21.89	2070.41	2070.71	180.61	.31	-.31	.44
4225.00	93.60	177.30	2394.51	-2102.50	-20.38	2102.33	2102.60	180.56	.62	.00	.63
4256.00	91.50	177.70	2393.13	-2133.44	-19.03	2133.27	2133.53	180.51	-6.77	1.29	6.90
4288.00	91.70	177.60	2392.24	-2165.40	-17.72	2165.24	2165.47	180.47	.63	-.31	.70
4320.00	92.20	177.70	2391.15	-2197.36	-16.41	2197.20	2197.42	180.43	1.56	.31	1.59
4352.00	91.10	177.10	2390.23	-2229.31	-14.96	2229.17	2229.36	180.38	-3.44	-1.87	3.92
4383.00	89.00	176.60	2390.20	-2260.26	-13.25	2260.13	2260.30	180.34	-6.77	-1.61	6.96
4415.00	88.70	176.90	2390.84	-2292.20	-11.44	2292.08	2292.23	180.29	-.94	.94	1.33
4447.00	89.20	176.70	2391.43	-2324.15	-9.65	2324.04	2324.17	180.24	1.56	-.62	1.68
4478.00	89.00	176.90	2391.91	-2355.09	-7.92	2354.99	2355.11	180.19	-.65	.65	.91
4510.00	88.80	176.70	2392.53	-2387.04	-6.14	2386.95	2387.05	180.15	-.63	-.62	.88
4542.00	87.60	176.50	2393.53	-2418.97	-4.24	2418.89	2418.97	180.10	-3.75	-.62	3.80
4605.00	86.00	175.40	2397.05	-2481.71	.20	2481.66	2481.71	180.00	-2.54	-1.75	3.08
4668.00	86.40	177.00	2401.23	-2544.43	4.37	2544.40	2544.43	179.90	.63	2.54	2.61
4731.00	87.50	177.20	2404.58	-2607.26	7.55	2607.25	2607.27	179.83	1.75	.32	1.77
4794.00	89.50	178.20	2406.23	-2670.18	10.08	2670.19	2670.20	179.78	3.17	1.59	3.55

Measured Depth FT	Incl Angle Deg	Drift Direction Deg	True Vertical Depth	N-S FT	E-W FT	Vertical Section FT	C L O S U R E Distance FT		Direction Deg	BUILD RATE Deg/100	WALK RATE Deg/100	Dogleg Severity Deg/100
4858.00	91.90	179.30	2405.45	-2734.16	11.47	2734.17	2734.18	179.76	3.75	1.72	4.13	
4921.00	92.70	178.50	2402.92	-2797.09	12.68	2797.12	2797.12	179.74	1.27	-1.27	1.80	
4984.00	91.50	179.20	2400.61	-2860.04	13.95	2860.07	2860.07	179.72	-1.90	1.11	2.20	
5048.00	92.30	178.80	2398.49	-2923.99	15.06	2924.03	2924.03	179.70	1.25	-.62	1.40	
5111.00	91.10	177.80	2396.62	-2986.93	16.93	2986.98	2986.98	179.68	-1.90	-1.59	2.48	
5174.00	89.20	176.80	2396.45	-3049.86	19.90	3049.92	3049.92	179.63	-3.02	-1.59	3.41	
5237.00	89.90	176.70	2396.95	-3112.76	23.47	3112.84	3112.84	179.57	1.11	-.16	1.12	
5301.00	89.80	176.70	2397.12	-3176.65	27.15	3176.76	3176.77	179.51	-.16	.00	.16	
5364.00	90.10	177.40	2397.17	-3239.57	30.39	3239.69	3239.71	179.46	.48	1.11	1.21	
5428.00	89.80	177.40	2397.23	-3303.50	33.30	3303.65	3303.67	179.42	-.47	.00	.47	
5468.00	88.70	176.30	2397.75	-3343.43	35.50	3343.59	3343.62	179.39	-2.75	-2.75	3.89	
5531.00	87.10	176.70	2400.06	-3406.27	39.34	3406.46	3406.50	179.34	-2.54	.63	2.62	
5594.00	86.70	175.70	2403.46	-3469.04	43.51	3469.25	3469.31	179.28	-.63	-1.59	1.71	
5658.00	86.40	176.00	2407.32	-3532.76	48.13	3532.99	3533.09	179.22	-.47	.47	.66	
5721.00	86.40	176.80	2411.27	-3595.51	52.08	3595.77	3595.89	179.17	.00	1.27	1.27	
5728.00	86.50	176.60	2411.71	-3602.48	52.48	3602.75	3602.87	179.17	1.43	-2.86	3.19	
Projection To Bit												
5783.00	86.50	176.60	2415.06	-3657.28	55.74	3657.57	3657.71	179.13	.00	.00	.00	