



SURVEY CALCULATION PROGRAM

30.015-43278

NM OIL CONSERVATION

1.00

File:

ARTESIA DISTRICT

2.00

OPERATOR: Lime Rock Resources

WELL: Hawk 9B Federal #18

LOCATION: Eddy Co. NM

RIG: United Rig #33

JOB NUMBER: TX-17-007

SURVEY COMPANY

Kingsley Directional

Directional Drillers

Allen Hightower

RECEIVED

DIRECTIONAL COMPANY

Accel Directional

COORDINATORS

Chris Shipp

Current Target Information

TARGET KBTVD: 5200.00

TARGET INCL: 16.88

TARGET AZM: 293.57

VS Referenced to Offset from Surface

NORTH/SOUTH: 91.27

EAST/WEST: -209.16

(Enter 0° N and 0° E for Surface)

PROPOSED DIRECTION: 293.57

COMMENTS:

Dec / Total Corr. (+/-): 7.36

Lime Rock Resources

Hawk 9B Federal #18

Target Calculations

SVY	MD	INC	AZM	TEMP °F	API Gamma	Course Length	TVD	N-S	E-W	Surface Vert Sect	CLOSURE DIST	DIR	DLS/ 100	BUR/ 100'	TVD AT 0'	ABOVE (+) BELOW (-)	RIGHT(+) LEFT(-)
TIE IN	0	0.0	0.0			N/A	0.00	0.00	0.00		0.00	0.00	N/A	N/A			
1	476	0.7	209.7			476	475.99	-2.53	-1.44	0.31	2.91	209.70	0.15	0.15	474.96	4725.04	-2.91
2	508	0.9	236.1			32	507.99	-2.84	-1.75	0.47	3.33	211.62	1.29	0.63	506.45	4693.55	-3.32
3	540	2.6	285.7			32	539.97	-2.78	-2.65	1.32	3.84	223.67	6.66	5.31	535.62	4664.38	-3.63
4	572	3.8	284.9			32	571.92	-2.31	-4.38	3.09	4.95	242.17	3.75	3.75	561.74	4638.26	-3.89
5	603	5.5	285.6			31	602.82	-1.65	-6.80	5.57	7.00	256.39	5.49	5.48	584.44	4615.56	-4.25
6	635	6.5	288.9			32	634.64	-0.65	-9.99	8.90	10.01	266.29	3.30	3.13	605.31	4594.69	-4.61
7	667	6.7	285.4			32	666.43	0.43	-13.50	12.55	13.51	271.84	1.40	0.63	625.06	4574.94	-5.02
8	699	6.6	286.2			32	698.21	1.44	-17.07	16.22	17.13	274.83	0.43	-0.31	644.75	4555.25	-5.52
9	730	6.6	289.1			31	729.01	2.52	-20.46	19.77	20.62	277.03	1.08	0.00	663.87	4536.13	-5.89
10	763	6.9	296.2			33	761.78	4.02	-24.04	23.64	24.37	279.49	2.69	0.91	683.88	4516.12	-5.95
11	795	6.7	298.0			32	793.56	5.74	-27.41	27.42	28.00	281.84	0.91	-0.63	703.20	4496.80	-5.71
12	826	7.0	297.4			31	824.33	7.46	-30.68	31.11	31.58	283.67	0.99	0.97	721.82	4478.18	-5.45
13	859	8.2	294.9			33	857.04	9.38	-34.60	35.47	35.85	285.17	3.77	3.64	740.16	4459.84	-5.26
14	891	9.2	294.0			32	888.67	11.38	-39.01	40.31	40.64	286.26	3.15	3.13	755.85	4444.15	-5.19
15	923	10.6	292.0			32	920.20	13.52	-44.08	45.81	46.10	287.06	4.50	4.38	769.24	4430.76	-5.25
16	954	12.3	289.1			31	950.58	15.67	-49.84	51.95	52.25	287.46	5.79	5.48	779.38	4420.62	-5.58
17	986	14.2	288.5			32	981.73	18.03	-56.78	59.26	59.58	287.62	5.95	5.94	786.44	4413.56	-6.20
18	1,018	16.5	289.8			32	1012.58	20.82	-64.78	67.70	68.04	287.82	7.27	7.19	789.47	4410.53	-6.84
19	1,050	17.4	289.3			32	1043.19	23.94	-73.57	77.01	77.37	288.02	2.85	2.81	789.41	4410.59	-7.50
20	1,082	17.5	289.5			32	1073.72	27.13	-82.62	86.58	86.96	288.18	0.36	0.31	788.40	4411.60	-8.19
21	1,114	18.0	292.6			32	1104.20	30.63	-91.72	96.32	96.70	288.47	3.34	1.56	786.77	4413.23	-8.62
22	1,146	17.5	292.7			32	1134.67	34.39	-100.73	106.08	106.44	288.85	1.57	-1.56	785.10	4414.90	-8.78
23	1,177	17.7	292.2			31	1164.22	37.97	-109.39	115.45	115.79	289.14	0.81	0.65	783.76	4416.24	-8.96
24	1,209	17.6	293.1			32	1194.72	41.70	-118.35	125.15	125.48	289.41	0.91	-0.31	782.29	4417.71	-9.12
25	1,241	17.5	292.3			32	1225.23	45.43	-127.25	134.80	135.11	289.65	0.82	-0.31	781.00	4419.00	-9.26
26	1,273	17.7	292.1			32	1255.73	49.08	-136.21	144.47	144.78	289.82	0.65	0.62	779.63	4420.37	-9.49
27	1,306	17.2	297.5			33	1287.21	53.23	-145.18	154.35	154.63	290.13	5.13	-1.52	778.54	4421.46	-9.29
28	1,338	17.0	298.2			32	1317.80	57.62	-153.50	163.74	163.96	290.57	0.90	-0.62	778.20	4421.80	-8.59
29	1,369	16.8	296.8			31	1347.46	61.78	-161.49	172.73	172.91	290.94	1.46	-0.65	778.24	4421.76	-7.97
30	1,402	17.0	297.2			33	1379.03	66.14	-170.04	182.30	182.45	291.25	0.70	0.61	778.26	4421.74	-7.39
31	1,434	17.0	296.9			32	1409.64	70.39	-178.37	191.64	191.76	291.54	0.27	0.00	778.08	4421.92	-6.83
32	1,466	16.7	295.7			32	1440.26	74.50	-186.69	200.90	201.01	291.76	1.44	-0.94	778.18	4421.82	-6.38
33	1,498	16.9	295.9			32	1470.90	78.53	-195.02	210.15	210.23	291.93	0.65	0.62	778.35	4421.65	-6.02
34	1,530	16.8	295.2			32	1501.52	82.53	-203.38	219.42	219.49	292.09	0.71	-0.31	778.43	4421.57	-5.70
35	1,562	16.6	295.2			32	1532.17	86.44	-211.70	228.61	228.67	292.21	0.63	-0.62	778.79	4421.21	-5.44
36	1,593	16.0	295.6			31	1561.93	90.18	-219.56	237.30	237.36	292.33	1.97	-1.94	779.88	4420.12	-5.16
37	1,625	15.2	296.7			32	1592.75	93.97	-227.29	245.90	245.95	292.46	2.67	-2.50	782.38	4417.62	-4.78
38	1,658	13.6	294.4			33	1624.71	97.51	-234.69	254.10	254.14	292.56	5.15	-4.85	787.32	4412.68	-4.49
39	1,690	13.3	295.6			32	1655.83	100.66	-241.43	261.54	261.58	292.63	1.28	-0.94	793.92	4406.08	-4.30
40	1,722	11.8	297.1			32	1687.07	103.74	-247.67	268.49	268.51	292.73	4.80	-4.69	802.27	4397.73	-3.97
41	1,754	11.7	298.8			32	1718.40	106.79	-253.42	274.98	275.00	292.85	1.13	-0.31	812.19	4387.81	-3.47
42	1,785	10.8	297.8			31	1748.80	109.66	-258.75	281.01	281.02	292.97	2.97	-2.90	822.73	4377.27	-2.97
43	1,818	10.6	297.2			33	1781.23	112.49	-264.18	287.12	287.13	293.06	0.69	-0.61	835.01	4364.99	-2.55
44	1,850	9.3	299.4			32	1812.74	115.11	-269.05	292.63	292.64	293.16	4.23	-4.06	848.37	4351.63	-2.10
45	1,882	8.8	299.2			32	1844.35	117.57	-273.44	297.64	297.64	293.27	1.57	-1.56	863.47	4336.53	-1.60
46	1,914	7.1	292.8			32	1876.04	119.53	-277.40	302.05	302.06	293.31	5.98	-5.31	880.61	4319.39	-1.39
47	1,945	6.2	292.7			31	1906.83	120.92	-280.71	305.64	305.65	293.30	2.90	-2.90	899.57	4300.43	-1.44
48	1,977	4.6	288.6			32	1938.69	121.99	-283.52	308.65	308.65	293.28	5.14	-5.00	921.52	4278.48	-1.57
49	2,009	4.0	285.8			32	1970.60	122.71	-285.81	311.03	311.04	293.24	1.99	-1.88	945.58	4254.42	-1.84
50	2,041	3.6	289.7			32	2002.53	123.35	-287.83	313.14	313.15	293.20	1.49	-1.25	970.56	4229.44	-2.05
51	2,073	2.3	302.6			32	2034.48	124.03	-289.32	314.78	314.79	293.21	4.54	-4.06	997.12	4202.88	-2.02
52	2,105	2.2	294.1			32	2066.46	124.63	-290.42	316.03	316.03	293.23	1.09	-0.31	1024.98	4175.02	-1.92
53	2,136	1.5	266.9			31	2097.44	124.85	-291.37	316.98	316.99	293.20	3.56	-2.26	1052.81	4147.19	-2.09
54	2,168	2.0	236.9			32	2129.43	124.52	-292.25	317.67	317.68	293.08	3.21	1.56	1082.55	4117.45	-2.75
55	2,200	1.1	220.2			32	2161.42	123.98	-292.92	318.06	318.08	292.94	3.12	-2.81	1113.24	4086.76	-3.51
56	2,232	0.8	223.7			32	2193.41	123.59	-293.27	318.23	318.25	292.85	0.95	-0.94	1144.69	4055.31	-4.01



SURVEY CALCULATION PROGRAM

02.01

OIL CONSERVATION

1.00

File:

2.00

OPERATOR: Lime Rock Resources

WELL: Hawk 9B Federal #18

LOCATION: Eddy Co. NM

RIG: United Rig #33

JOB NUMBER: TX-17-007

SURVEY COMPANY

Kingsley Directional

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ARTESIA DISTRICT

MAY 04 2017

RECEIVED DIRECTIONAL COMPANY

Accel Directional

COORDINATORS

Chris Shipp

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TARGET INCL: 16.88

TARGET AZM: 293.57

VS Referenced to Offset from Surface

NORTH/SOUTH: 91.27

EAST/WEST: -209.16

(Enter 0' N and 0' E for Surface)

PROPOSED DIRECTION: 293.57

COMMENTS:

Dec / Total Corr (+/-): 7.36

Lime Rock Resources

Hawk 9B Federal #18

Target Calculations

SVY	MD	INC	TRUE	TEMP	API	Course				Surface	CLOSURE		DLS/	BUR/	TVD AT 0'	ABOVE (+)	RIGHT(+)
			AZM	°F	Gamma	Length	TVD	N-S	E-W	Vert Sect	DIST	DIR	100'	100'	V. SEC.	BELOW (-)	LEFT(-)
57	2,264	0.9	247.8			32	2225.41	123.33	-293.66	318.48	318.51	292.78	1.15	0.31	1175.86	4024.14	-4.40
58	2,295	0.2	146.4			31	2256.41	123.20	-293.86	318.60	318.63	292.75	3.10	-2.26	1206.45	3993.55	-4.61
59	2,327	0.5	91.9			32	2288.41	123.14	-293.69	318.43	318.46	292.75	1.30	0.94	1239.03	3960.97	-4.58
60	2,359	1.3	93.1			32	2320.40	123.12	-293.18	317.96	317.99	292.78	2.50	2.50	1272.57	3927.43	-4.41
61	2,391	1.8	90.7			32	2352.39	123.09	-292.32	317.15	317.18	292.84	1.58	1.56	1307.21	3892.79	-4.08
62	2,423	2.2	93.8			32	2384.37	123.05	-291.20	316.11	316.13	292.91	1.29	1.25	1342.62	3857.38	-3.68
63	2,455	1.7	99.5			32	2416.35	122.93	-290.12	315.07	315.09	292.96	1.67	-1.56	1378.02	3821.98	-3.36
64	2,487	0.6	83.5			32	2448.35	122.87	-289.49	314.47	314.48	293.00	3.55	-3.44	1412.01	3787.99	-3.16
65	2,519	0.6	78.8			32	2480.34	122.92	-289.16	314.18	314.20	293.03	0.15	0.00	1444.94	3755.06	-2.98
66	2,551	0.5	57.5			32	2512.34	123.03	-288.87	313.97	313.98	293.07	0.71	-0.31	1477.65	3722.35	-2.77
67	2,581	0.4	51.3			30	2542.34	123.16	-288.68	313.85	313.86	293.11	0.37	-0.33	1508.05	3691.95	-2.57
68	2,615	0.4	35.5			34	2576.34	123.33	-288.52	313.77	313.78	293.15	0.32	0.00	1542.31	3657.69	-2.34
69	2,647	0.4	75.1			32	2608.34	123.45	-288.35	313.66	313.66	293.18	0.85	0.00	1574.68	3625.32	-2.17
70	2,680	0.7	57.7			33	2641.34	123.59	-288.07	313.45	313.46	293.22	1.03	0.91	1608.35	3591.65	-1.93
71	2,712	0.5	42.7			32	2673.34	123.80	-287.81	313.30	313.30	293.27	0.79	-0.63	1640.86	3559.14	-1.63
72	2,744	0.6	56.8			32	2705.34	123.99	-287.57	313.16	313.16	293.32	0.52	0.31	1673.31	3526.69	-1.36
73	2,808	0.4	29.0			64	2769.33	124.37	-287.18	312.96	312.96	293.42	0.48	-0.31	1737.98	3462.02	-0.86
74	2,872	0.7	37.1			64	2833.33	124.88	-286.84	312.84	312.84	293.53	0.48	0.47	1802.35	3397.65	-0.26
75	2,936	0.7	42.8			64	2897.33	125.48	-286.34	312.62	312.62	293.66	0.11	0.00	1867.07	3332.93	0.49
76	2,968	0.5	55.4			32	2929.32	125.70	-286.09	312.49	312.49	293.72	0.75	-0.63	1899.52	3300.48	0.80
77	3,028	0.8	45.5			60	2989.32	126.14	-285.57	312.19	312.19	293.83	0.53	0.50	1960.49	3239.51	1.41
78	3,061	0.6	28.0			33	3022.32	126.46	-285.33	312.09	312.10	293.90	0.88	-0.61	1993.81	3206.19	1.79
79	3,125	0.6	25.4			64	3086.31	127.06	-285.03	312.05	312.06	294.03	0.04	0.00	2057.93	3142.07	2.46
80	3,190	0.9	32.6			65	3151.31	127.79	-284.61	311.96	311.98	294.18	0.48	0.46	2123.23	3076.77	3.31
81	3,254	0.8	42.3			64	3215.30	128.55	-284.04	311.74	311.77	294.35	0.27	-0.16	2187.95	3012.05	4.23
82	3,318	1.1	28.8			64	3279.29	129.42	-283.44	311.54	311.59	294.54	0.58	0.47	2252.60	2947.40	5.26
83	3,382	0.7	97.3			64	3343.29	129.90	-282.76	311.11	311.17	294.68	1.67	-0.63	2318.01	2881.99	5.98
84	3,446	0.9	122.4			64	3407.28	129.59	-281.94	310.24	310.30	294.68	0.62	0.31	2384.88	2815.12	6.01
85	3,510	0.9	133.5			64	3471.27	128.97	-281.15	309.27	309.32	294.64	0.27	0.00	2452.07	2747.93	5.77
86	3,574	0.8	117.3			64	3535.26	128.42	-280.39	308.35	308.40	294.61	0.40	-0.16	2519.09	2680.91	5.57
87	3,639	1.0	118.4			65	3600.26	127.94	-279.49	307.33	307.38	294.60	0.31	0.31	2587.43	2612.57	5.49
88	3,703	1.0	213.3			64	3664.25	127.21	-279.31	306.87	306.91	294.49	2.30	0.00	2652.95	2547.05	4.89
89	3,767	1.2	233.5			64	3728.24	126.34	-280.15	307.30	307.32	294.27	0.68	0.31	2715.53	2484.47	3.76
90	3,831	0.9	231.6			64	3792.23	125.63	-281.08	307.87	307.88	294.08	0.47	-0.47	2777.64	2422.36	2.74
91	3,895	0.4	268.4			64	3856.22	125.31	-281.70	308.31	308.32	293.98	0.98	-0.78	2840.19	2359.81	2.20
92	3,959	0.4	272.6			64	3920.22	125.32	-282.15	308.72	308.73	293.95	0.05	0.00	2902.83	2297.17	2.02
93	4,023	0.2	271.6			64	3984.22	125.33	-282.48	309.03	309.04	293.93	0.31	-0.31	2965.80	2234.20	1.90
94	4,087	0.6	285.3			64	4048.22	125.42	-282.92	309.47	309.47	293.91	0.64	0.63	3028.37	2171.63	1.81
95	4,150	0.7	301.0			63	4111.22	125.71	-283.57	310.17	310.18	293.91	0.32	0.16	3089.03	2110.97	1.81
96	4,213	0.8	310.2			63	4174.21	126.19	-284.23	310.98	310.98	293.94	0.25	0.16	3149.38	2050.62	1.99
97	4,277	1.1	303.6			64	4238.20	126.82	-285.08	312.01	312.02	293.98	0.50	0.47	3209.96	1990.04	2.22
98	4,341	0.9	295.2			64	4302.19	127.37	-286.05	313.12	313.13	294.00	0.39	-0.31	3270.30	1929.70	2.34
99	4,405	1.2	310.7			64	4366.18	128.02	-287.01	314.26	314.27	294.04	0.64	0.47	3330.53	1869.47	2.56
100	4,470	0.5	275.3			65	4431.17	128.49	-287.81	315.18	315.19	294.06	1.30	-1.08	3392.49	1807.51	2.67
101	4,533	0.7	265.7			63	4494.17	128.49	-288.47	315.78	315.79	294.01	0.35	0.32	3453.50	1746.50	2.40
102	4,597	0.2	154.4			64	4558.17	128.36	-288.81	316.04	316.05	293.96	1.24	-0.78	3516.64	1683.36	2.15
103	4,661	1.5	152.8			64	4622.16	127.51	-288.38	315.31	315.31	293.85	2.03	2.03	3583.05	1616.95	1.54
104	4,756	0.5	227.7			95	4717.15	126.13	-288.12	314.52	314.52	293.64	1.53	-1.05	3680.65	1519.35	0.38
105	4,820	0.1	177.7			64	4781.15	125.89	-288.32	314.61	314.61	293.59	0.69	-0.63	3744.36	1455.64	0.07
106	4,884	0.5	203.8			64	4845.15	125.57	-288.43	314.58	314.58	293.53	0.64	0.63	3808.43	1391.57	-0.26
107	4,948	0.6	203.6			64	4909.14	125.01	-288.68	314.58	314.58	293.41	0.16	0.16	3872.42	1327.58	-0.87
PTB	4,990	0.6	203.6			42	4951.14	124.61	-288.86	314.58	314.59	293.33	0.00	0.00	3914.42	1285.58	-1.31

Allen Hightower 3-2-17
 Ruthen Christ 3-2-17