

SECRET

CLASSIFIED NOTEBOOK No. 1270-L

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CLASSIFIED NOTEBOOK No. 1270-L

ISSUED TO: A. Vay Shelton
Effects Division - UCRL Livermore

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UCRL Livermore

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RG 326 US ATOMIC ENERGY
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A. Vay Shelton - Effects Division

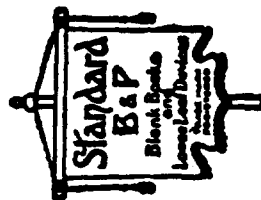
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LC035 0525

John

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Standard Figuring Book

No. 16024

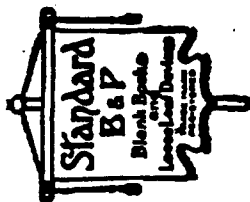
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LLNL

LC735 0520

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Standard Figuring Book

No. 1602½

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In 156 and 300 Pages

Made in U. S. A.

A BOORUN & PEASE PRODUCT

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MAY 20 '59 RRV

LLNL

0900 Meeting

~~SECRET~~

Plumbria
Status as of 26 Sept, 1956

Area 2
Three towers: 20, 25, 40 KT
400, 440, 500, 200 ton capacity

May 1 - July 1

DELETED

DELETED

DELETED

DELETED

Full:

x

↑

4000'

↑

DELETED

x

1300

x

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Area 9
Balloon? 200' taped? May 1 - July 1

≤ 1 KT

0.2 - 10 KT

0.2 - 15 KT

300' taped?

"

"

13.1100W

DELETED

Area 9

DELETED

X

↑
4000'
↓

□

X

< 1 kt

- 0.2-10 kt

- 0.2-15 kt

- 80 kt

Balloon? 2nd tier? May 1- July 1

300' tower

" "

Balloon

Fall: 2-3 small weapons

X Balloon

R

~ 4000'

→

□

X

X

12

□

DELETED

Area 9

□
1300

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2

Fallout for Pilgrims

as of 26 Sept, 1956

40 kt, 500',
25 kt, 400',
20 kt, 300',
0.75 kt, 200',
10 kt, 300',
15 kt, 1500',
80 kt, 1500'

DELETED

M 220 175 170 35 135 135 1
D 745 575 410 4 257 451 0
Z 965 750 590 39 392 506 1
3323 3401 5885 1139

Teagat totals:
W/k
Teagat UCRK totals:

Fallout, MxT/LC

h.min for F₀=0

Fallout, dust, h=60'

Zm = 0.6 T MC
Fm = 0.02 T

T in tons
W in kt

R ₀	W	F ₀	Z ₀	P	h.min for F ₀ =0
217	0.1	1P	600	216	12P
204	0.2	3P	433	283	162
367	0.4	7P	650	366	204
449	0.7	13P	662	449	245
513	1	202	673	P ₂	274
656	2	482	702	347	347
		242	702	438	528

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Fallout, dust, $A = 20'$		km for $F_0 = 0$		Fallout, 1000 ct	
R_z	W	F_0	Z_0	R_z	W
217	0.1	18	.600	128	0.002 T
284	0.2	38	.633	162	0.6 T MC
367	0.4	79	.650	204	
449	0.7	139	.662	245	T in tons
513	1	242	.673	276	W in Kt
656	2	428	.680	342	
836	4	842	.702	438	
1016	7	1488	.709	528	
1148	10	2452	.717	595	
1460	20	4338	.723	750	
1849	40	8782	.732	944	
2235	70	15500	.738	1138	
2622	100	22230	.741	1280	
3185	200	44800	.747	1615	
4030	400	88860	.750	2025	
4860	700	158700	.756	2452	
5480	1000	222600	.759	2760	
6920	2000	458000	.762	3480	
8710	4000	917500	.765	4385	
10520	7000	1613000	.768	5280	
11930	10000	2303000	.768	5950	
14970	20000	4623000	.770	7485	
18810	40000	9282000	.774	9440	
				11380	

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W	R	RF	$\times 10^{-3}$ 9RA	$\times 10^{-3}$ SE	$\times 10^{-3}$ Z	$\times 10^{-3}$ 12RA	$\times 10^{-3}$ Δ	R_2 $\frac{R_2}{15}$	$\sqrt{R_2}$	$\sqrt{R_2}$
0.1	50	85	65	12	77	51	26	153	311	5
4	↓	292	767	↓	779	175	604	775	064	0.052
7		352	1115		1127	211	916	957	046	0.046
10		396	1411	24	1423	238	1185	1089	522	0.522
0.1	70	85	65	↓	89	71	18	182	359	0.254
0.2	↓	107	105		129	91	38	195	267	0.51
0.4		136	166		190	114	76	267	1360	0.51
0.4		500	2250		2274	420	1854	1362	55	0.777
20		85	65	50	115	102	13	152	158	0.633
0.1	100	85	65	↓	155	130	25	288	305	0.321
0.2	↓	107	105		299	196	93	352	366	0.29
0.7		143	239		355	221	134	7697	1690	0.05
1		184	305		3611	755	2856	2073	2075	0.01
40		629	3561		5221	910	4311	145	145	0.8
70		758	5171	84	189	168	21	195	435	0.1
0.2	130	107	105	↓	250	212	37	435	435	0.1
0.4	↓	136	166		568	362	206	435	435	0.1
0.4		232	494		6649	1332	5316	183	183	0.1
2		854	6564		278	245	33	241	241	0.1
100		136	166	112	351	293	58	242	242	0.1
0.4	150	143	239	↓	417	331	86	293	293	0.1
0.7	↓	184	305		879	526	353	594	594	0.1
1		292	767		10,532	1937	8585	293	293	0.1
4		1076	10,420		439	391	48	293	293	0.1
200		163	239	200	684	557	127	35	35	0.1
0.7	200	232	494	↓	1315	845	470	65	65	0.1
2	↓	352	1115		16,750	3254	13,496	36	36	0.1
7		1356	16,550		569	508	61	27	27	0.1
400		230	184	305	264	1093	582	7	7	0.1
1	↓	396	1411		1675	876	203	4	4	0.1
10		292	767		312	1879	4899	19,413	19,413	0.1
4	250	292	767	↓	24312					0.1
700	↓	1633	24,000							0.1

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$\times 10^{-3}$ Z	$\times 10^{-3}$ 12 R _{FA}	$\times 10^{-3}$ Δ	R ₂ $\sqrt{\Delta}$	$\sqrt{R_2}$	$\sqrt{R_2}$	$\sqrt{R_2}$	$\sqrt{R_2}$	① Σ	$\sqrt{h}$	② $\frac{299w}{\sqrt{h}}$	F _D $\pi \phi$
78	51	26	161	.311	.557	.115	1.114	1.438	7.07	5.64	8
779	175	604	775	.064	.253	.011	.506	2.150	↓	226	486
1127	211	916	957	.052	.228	.008	.456	2.203		395	870
1423	238	1185	1089	.046	.214	.007	.428	2.232		564	1259
89	71	18	134	.522	.723	.251	1.446	.970	8.36	4.77	5
129	91	38	182	.359	.599	.143	1.198	1.326	↓	9.55	13
190	114	76	267	.254	.504	.085	1.008	1.574		19.09	30
2274	420	1854	1360	.051	.226	.008	.452	2.207		955	2108
115	102	13	114	.877	.936	.548	1.872	.247	10.00	3.99	1
155	130	25	122	.633	.796	.336	1.592	.739	↓	7.98	16
289	196	93	288	.328	.573	.125	1.146	1.396		27.93	39
355	221	134	305	.273	.523	.095	1.046	1.526		39.9	61
3611	755	2856	352	.059	.243	.009	.486	2.172		1596	3467
5221	910	4311	1687	.048	.219	.007	.438	2.222		2793	6206
189	168	21	2073	.897	.946	.566	1.892	.209	11.40	7	1
250	212	38	64	.667	.816	.363	1.632	.672	↓	14	9
568	362	206	145	.286	.535	.102	1.070	1.495		70	105
6648	1332	5316	435	.056	.237	.009	.474	2.184		3500	7644
278	245	33	2302	.824	.908	.499	1.816	.352	12.24	13.04	5
351	293	58	103	.622	.789	.327	1.578	.762	↓	22.82	17
417	331	86	182	.512	.716	.245	1.432	.990		32.6	32
879	526	353	241	.252	.502	.085	1.004	1.578		130	205
0,532	1937	8595	252	.051	.226	.008	.452	2.207		6520	14,390
439	391	48	575	.913	.955	.582	1.910	.175	14.14	19.75	3
684	557	127	294	.562	.750	.281	1.500	.886	↓	56.4	50
1315	845	470	356	.292	.540	.105	1.080	1.482		198	293 LLNL
6,750	3254	13,496	655	.054	.232	.009	.464	2.194		11,288	24,770
568	508	61	3670	.931	.965	.599	1.930	.138	15.16	26.32	4
1675	1093	582	90	.301	.548	.110	1.096	1.461	↓	263	384
079	876	203	728	.556	.745	.276	1.490	.901	15.80	101	91
4,312	4899	19,413	374	.057	.239	.009	.478	2.180	↓	17,675	38,530
			439P								
			4405								

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W	h	R _F	$\times 10^{-3}$ P R _F ²	$\times 10^{-3}$ 5 h ²	$\times 10^{-3}$ Σ	$\times 10^{-3}$ 12 R _F h	$\times 10^{-3}$ Δ	R _L √Δ	h/R _L	√h/R _L	67 (%)
2	300	232	484	450	934	835	99	314	.955	.977	.6
7	↓	352	1115	↓	1565	1267	298	456	.549	.741	.2
20		500	2250		2700	1800	900	899	.316	.562	.1
1000		1840	30,500		30,950	6624	24,326	4921	.061	.247	.0
4	350	292	767	612	1379	1226	153	174	.895	.946	.56
10	↓	396	1411	↓	2023	1663	360	391	.583	.764	.29
2000		2320	48,400		49,010	9744	39,270	487	.056	.236	.06
7	400	352	1115	800	1915	1690	225	600	.844	.919	.51
40	↓	629	3561	↓	4361	3019	1342	6260	.345	.588	.13
20	450	500	2250	1012	3262	2700	562	254	.600	.775	.31
70	↓	758	5171	↓	6183	4093	2090	1088	.371	.558	.11
4000		2920	76,700		77,710	15,768	61,940	1447	.057	.239	.06
10	500	396	1411	1250	2661	2376	285	7870	.936	.967	.68
100	↓	854	6564	↓	7814	5124	2690	188	.305	.552	.11
7000		3520	111,500		112,800	21,120	91,680	1562	.052	.228	.06
40	550	629	3561	1512	3073	4151	922	1640	.572	.757	.28
20	600	500	2250	1900	4050	3600	450	956	.294	.945	.56
200	↓	1076	10,420	↓	12,220	7747	4473	778	.284	.533	.16
10,000		3960	141,100		142,900	28,512	114,400	301	.056	.236	.06
70	700	758	5171	2450	7621	6367	1254	10,653	.626	.791	.33
20,000	↓	5000	225,000	↓	227,400	42,000	125,400	873	.051	.226	.06
40	750	629	3561	2812	6373	5661	712	13,592	.889	.942	.58
100	800	854	6564	3200	9764	8198	1566	386	.639	.799	.34
400	↓	1356	16,550	↓	19,750	13,018	6732	962	.308	.555	.11
70	900	758	5171	4050	9221	8186	1035	1251	.285	.941	.55
40,000	↓	6290	356,100	↓	360,200	67,930	292,300	2468	.053	.230	.06
100	1000	854	6564	5000	11,560	10,248	1312	474	.873	.934	.54
200	↓	1076	10,420	↓	15,420	12,912	2508	1017	.632	.795	.33
700		1633	24,000		29,000	19,600	9400	1227	.326	.571	.12
								2397			
								3065			

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$\times 10^{-3}$ Z	$\times 10^{-3}$ 12R ₁ A	$\times 10^{-3}$ Δ	R ₁ √Δ	$\sqrt{R_2}$	$\sqrt{R_2}$	$\sqrt{R_2}$	$\sqrt{R_2}$	$\sqrt{R_2}$	$\sqrt{R_2}$	$\sqrt{R_2}$	$\sqrt{R_2}$	$\sqrt{R_2}$	$\sqrt{R_2}$
934	835	99	314	.955	.977	.622	1.954	.091	17.31	46.10	4	.067	
1565	1267	298	456	.549	.741	.271	1.482	.914	↓	161	147	.070	
2700	1800	900	899	.316	.562	.119	1.124	1.424		461	656	.109	
30,950	6624	24,326	4930	.061	.247	.010	.494	2.163		23,050	49,860	.166	
1379	1226	153	391	.895	.946	.565	1.892	.210	18.70	85.4	18	.015	
2023	1663	360	600	.583	.764	.297	1.528	.842	↓	213	179	.060	
49,010	9744	39,270	6270	.056	.236	.009	.472	2.186		42,680	93,298	.155	
1915	1690	225	474	.844	.919	.518	1.838	.311	20.00	140	44	.021	
4361	3019	1342	1159	.345	.588	.135	1.176	1.356	↓	798	1082	.090	
3262	2700	562	750	.600	.775	.310	1.550	.867	21.20	376	303	.051	
6183	4093	2090	1447	.311	.558	.116	1.116	1.435	↓	1317	1890	.090	
17,710	15,768	61,940	7870	.057	.239	.009	.479	2.180		75,280	164,100	.137	
2661	2376	285	534	.936	.967	.604	1.934	.129	22.37	178	23	.008	
7814	5124	2690	1640	.305	.552	.112	1.104	1.451	↓	1794	2599	.026	
12,800	21,120	91,680	9575	.052	.228	.008	.456	2.203		124,900	275,200	.131	
5073	4151	922	961	.572	.757	.389	1.514	.864	23.43	681	588	.041	
4050	3600	450	671	.894	.945	.564	1.890	.213	24.50	326	69	.012	
2,225	7747	4473	2115	.284	.533	.101	1.066	1.500	↓	3256	4884	.081	
42,900	28,512	114,400	10,670	.056	.236	.009	.472	2.186		162,800	355,900	.119	
7621	6367	1254	1119	.626	.791	.330	1.582	.755	26.43	1057	798	.032	
27,400	42,000	125,400	13,610	.051	.226	.008	.452	2.207	↓	302,000	666,500	.111	
6373	5661	712	844	.889	.942	.558	1.884	.225	27.40	582	131	.011	
9764	8198	1566	1251	.639	.799	.341	1.598	.728	28.30	1410	1026	.034	
19,750	13,018	6732	2594	.308	.555	.114	1.110	1.443	↓	5640	8139	.068	
9221	8186	1635	1017	.885	.941	.556	1.882	.229	30.00	931	213	.010	
360,200	67,930	292,300	17,080	.053	.230	.008	.460	2.199	↓	532,000	1,170,000	.098	
11,560	10,248	1312	1145	.873	.934	.544	1.868	.255	31.60	1263	322	.011	
15,420	12,912	2508	1583	.632	.795	.335	1.540	.742	↓	2526	1874	.031	
29,000	19,600	9400	3065	.326	.571	.124	1.142	1.401		8841	12,390	.059	

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1000	1100	1840	30,500	6150	36,550	24,290	1226	2323 3500	314	.560	.117
2,000		7580	517,100	↓	523,200	100,100	42,310	20,520 20,550	.054	.232	.008
200	1200	1356	16,550	7200	23,750	19,530	422	1668 2055	.594	.765	.298
200	1300	1076	10,420	8450	19,870	16,790	207	623 1442	.902	.950	.572
2,000	↓	8540	656,400	↓	664,800	133,200	53,160	23,064 23,100	.056	.236	.009
2000	1400	2320	48,400	9800	58,200	38,980	1922	4150 4380	.320	.566	.121
700	1500	1633	24,000	11,250	35,250	29,390	586	1899 2420	.620	.797	.325
700	1600	1356	16,550	12,900	29,350	26,040	831	868 1820	.879	.937	.550
1000	1700	1840	30,500	14,450	44,950	37,540	741	2123 2720	.625	.791	.329
4000	1800	2920	76,700	16,200	92,900	63,070	2983	5154 5460	.330	.575	.127
700	2000	1633	24,000	20,000	44,000	38,190	481	894 2190	.913	.956	.582
2000	2100	2320	48,400	22,050	70,450	58,460	1199	2750 3460	.607	.779	.315
7000	↓	3520	111,500	↓	133,600	88,200	4490	6364 6700	.313	.560	.117
1000	2200	1840	30,500	24,200	54,700	48,580	612	1133 2475	.889	.943	.559
2,000	2400	3960	141,100	28,800	169,900	114,000	5590	7075 7470	.321	.567	.121
4000	2600	2920	76,700	33,800	110,500	91,100	1940	3561 4410	.590	.768	.302
2000	2800	2320	48,400	32,200	87,600	77,950	965	1341 3105	.902	.950	.572
2,000	3000	5000	225,000	45,000	270,000	180,000	9000	8994 9480	.316	.562	.119
7000	3200	3520	111,500	51,200	162,700	135,200	2750	4148 5240	.611	.782	.319
4000	3500	2920	76,700	61,250	138,000	122,600	1540	1764 3920	.893	.945	.563
4000	3600	3960	141,100	64,800	205,900	171,100	3480	4676 5900	.610	.771	.277
20,000	3800	6290	356,100	72,200	428,300	286,800	14,150	11,255 11,880	.320	.566	.121
7000	4200	3520	111,500	88,200	199,700	177,400	2230	2153 4780	.890	.943	.560
2,000	4500	5000	225,000	101,250	326,200	270,000	5620	6000 7500	.600	.775	.310
2,000	4600	7580	517,100	105,800	622,900	418,400	24,450	13,538 14,300	.322	.567	.122
2,000	4800	3960	141,100	115,200	256,300	228,100	2820	2271 5310	.904	.951	.574
10,000	5000	8540	656,400	125,000	781,400	512,400	26,900	15,618 16,400	.305	.552	.112
2,000	5700	6290	356,100	162,400	518,500	430,200	8830	4477 9400	.606	.778	.314
2,000	6000	5000	225,000	189,000	405,000	360,000	4500	3006 6710	.784	.946	.564
10,000	6800	7580	517,100	231,200	748,300	618,500	12,980	9154 11,400	.596	.722	.307
10,000	7600	6290	356,100	228,800	644,900	573,600	7130	3700 8450	.899	.947	.568
20,000	7700	8540	656,400	296,400	952,800	789,100	16,370	10,195 12,780	.603	.727	.313
70,000	9100	7580	517,100	414,000	931,100	827,700	10,340	4512 10,160	.896	.946	.566
20,000	10,000	8540	656,400	500,000	1,156,000	1,025,000	13,100	5458 11,440	.874	.935	.545

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		x10 ⁻⁴						①	②		
550	28,790	1226	3323	314	560	117	1.120	1.430	33.2	12,020	17.1
3,200	100,100	42,310	20520	054	232	008	.464	2.195	7	841,300	1,241
1,750	19,530	422	2055	584	765	298	1.530	.839	34.6	4613	38
8,870	14,790	208	1442	902	950	572	1.900	.195	36.25	2214	43
4,800	33,200	53,160	23,064	056	286	009	.472	2.186	7	1,107,000	2,42
8,200	38,980	1922	4380	320	566	121	1.132	1.414	37.4	21,340	30.1
250	29,390	586	2420	620	777	325	1.574	.768	38.7	7217	55
1,350	26,040	331	1820	879	937	550	1.874	.243	40	3990	9.
1,850	37,540	741	2780	625	791	329	1.572	.756	41.2	9684	7.3
1,900	63,070	2983	5460	330	575	127	1.150	1.380	42.4	37,640	52.3
4,000	38,190	481	2190	913	956	582	1.912	.173	44.7	6248	102
3,450	58,460	1199	3460	607	779	315	1.558	.794	45.8	17,420	13.2
3,600	88,200	4490	6700	313	560	117	1.120	1.430	7	60,980	87.2
4,780	48,580	612	2475	889	943	559	1.886	.222	46.9	8507	188
8,980	114,000	5590	7470	321	567	121	1.134	1.412	49.0	81,430	115.6
3,500	91,100	1940	4410	590	768	302	1.536	.929	51	31,290	25.9
3,600	77,950	965	3105	902	950	572	1.900	.195	52.9	15,080	294
9,000	180,000	9000	9480	316	562	119	1.124	1.424	54.8	145,600	207.
2,700	135,200	2750	5240	611	782	319	1.564	.784	56.6	49,350	38.1
8,000	122,600	1540	3920	893	945	563	1.890	.214	59.2	26,960	57
15,900	171,100	3480	5900	610	781	277	1.562	.928	60	66,500	55.0
28,300	286,800	14,150	11,880	320	566	121	1.132	1.414	61.6	259,100	366.
9,700	177,400	2230	4780	890	943	560	1.886	.221	64.8	43,100	95.
4,200	270,000	5620	7500	600	785	310	1.550	.807	67.1	117,900	95.
22,900	418,400	24,450	14,300	322	567	122	1.134	1.411	67.9	411,300	500.
16,300	228,100	2820	5310	984	951	574	1.902	.191	69.3	57,580	11.6
81,400	512,400	26,900	16,400	305	552	112	1.104	1.451	70.7	564,400	818.
18,500	430,200	8830	9400	606	788	314	1.556	.797	75.5	211,400	168.
15,000	360,000	4500	6710	884	946	564	1.892	.241	77.5	103,000	21.
18,300	612,500	12,980	11,400	596	782	307	1.544	.716	82.4	339,000	276.
44,900	523,600	7130	2450	899	947	568	1.894	.205	87.1	183,200	37.
52,200	729,100	16,370	12,780	603	787	313	1.554	.800	87.8	454,400	363.
31,100	822,700	10,340	10,460	896	946	566	1.892	.209	95.4	292,200	61.
156,000	1,025,000	13,100	11,440	894	935	545	1.870	.252	100	399,000	100.

~~SECRET~~

68

Probability of Fallout on Wake from a shot on Taongi

From the "time zone" map, Taongi to Wake = 335 statute miles
 = 291 nautical miles
 Bikini to Wake = 495 statute miles
 = 431 nautical miles

Assume, as in Zevi calibration calculation (Flat SL) that intensity falls off as $\frac{1}{R}$ (Helix)

$I_{wake} \propto K R^{-1} = K_{2.5}^{-1}$
 $D_{inf} = 5 I_{surface}^{-1.2}$
 $I_{wake} = I_{surface}^{-1.2}$
 $D_{inf} = 5 I_{wake}^{-1.2}$
 $= 5 K_{2.5}^{-1.2}$
 $= 5 K_{2.5} R^{-1.2}$
 $= K_{4.8} R^{-1.2}$

$D_{inf 291 mi} = \left(\frac{4.31}{291} \right)^{1.2} \times 1.48^{1.2}$
 $D_{inf 431 mi} = \left(\frac{2.91}{431} \right)^{1.2} \times 1.48^{1.2}$

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$\log(\text{ratio } D's) = 1.2 \log 1.48 = 1.2 \times 0.17026 = 0.204312$

ratio $D's = 1.65$ = ratio of dose at Wake from Taongi to dose at Wake from Bikini.

which might be the case for fairly radial winds, and doses at the order of 100R at the distance of Wake from Taongi, and 61R at +60 distance of Wake from Bikini, for 10 MT surface.

$$D_{inf} 29 mi = \left(\frac{431}{291} \right)^{1/2} \cdot 148$$

$$D_{inf} 431 mi$$

$$\log(\text{ratio } D's) = 1.2 \log 1.48 = 1.2 \times 0.17026 = 0.204312$$

ratio $D's = 1.65$ = ratio of dose at Wake from Taongi to dose at Wake from Bikini.

which might be the case for fairly radial winds, and doses of the order of 100R at the distance of Wake from Taongi and 61R at the distance of Wake from Bikini, for 10MT surface.

For cases with more sheer, and lower doses at 300 miles, ~ 20R, decrease verification shows a reduction in dose of 6.5 from 100 to 200 miles. If one takes a factor of 5 per distance change of 2:

$$\text{Ratio } D's = 2.5,$$

so that dose of 20R from 10MT at the distance of Wake from Taongi would be 8R at the distance of Wake from Bikini. This probably is representative of the most common situation which would put Wake in the fallout path.

It is probably reasonable to assume a mean wind of 10 knots in the less severe (and usual) case, which implies a 29 hour fallout arrival time with large space and time variations normally cutting the dose by at least a factor of 5 to 4R infinite and not over 2R biologically effective.

More often than not space and time variations will prevent the fallout from reaching Wake at all.

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Area 1, 4, 3, 7 not available for fall. New area then needed.

LC035 0540

New station ready in fall

New photo station ready in spring, but not agreed

Spring

1 or 2 DELETED Area 2. 3 shots < 10kt in Area 9

DELETED case shot, Area 2 ~ 2kt

DELETED (Area 9)

Have capability of 3 shots, area 2.

DELETED 25-35kt

Fall:

DELETED (not in spring because of primary difficulties)

Sandia will do bomb vulnerability studies, yield > 10kt
will have bombs on tower, have probe running up tower center

Area 2 3 rad'

Site 1	will tolerate	50kt	Overpressure
2	"	25	miss on
3	"	25	Yewers

200 ton Yewers	100 tons in cab
	100 tons distributed

3-300

DELETED

4000'

Site 1 to be fired last

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Meeting Monday, Oct 1, 1960

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T.D. → UCRL for Pilgrim

UCRL LASL CFTG DOD SANDA

S1

Staff, headed by lab
man, trained by Reynolds,
H.W., etc. Harsing, etc

Timing

Balloons
Work

Arming

etc etc

S6

Staff Eng.

Areas 1, 4, 3, 7 not available for fall. New area thus needed.

New station ready in fall
New Plate station ready in spring, but not urgent.

Spring:

Per 2. DELETED Area 2. 3 shots < 10kt in Area 9

DELETED case shot, Area 2. ~ 2kt

DELETED (Area 9)

Have capability of 3 shots, area 2.

DELETED - 25-35kt.

Fall:

DELETED

(not in spring because of primary difficulties)

both vulnerability studies would > 10kt

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Area 9

Bellman

900'

b
x 300'
②

9-300

c
x 300'

-500'

③ x 200'

Pit excavation

Might have a shot ready by April 15 -

" " " large shot ready by April 15 -

Photography can probably be done in daylight
 [REDACTED] exp. can probably not be done in daylight

DELETED

Fallout as of Oct. 1, 1956, P. 1/prim

20kt, 900' tower	at 25 tons/foot	420	D	2.4T
" "	" "	420	M	180
30kt, 500' "	" "	430		180
80kt, 1500' Bellman		0		225
0.4kt, 300' tower	35 tons/foot	0		1
0.3kt, 200' tower	" "	0		28
1kt, 300' "	" "	0		26
	" "	255		63
	" "	1525		704

DELETED

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Fallout operation

Fallnet as of Oct. 1, 1956, P. 1956m

20kt, 700' tower	at 75 tons/foot	420	180	600
" "	" "	420	180	600
30kt, 500'	" "	430	225	655
60kt, 1500' Ballast		0	1	1
0.4kt, 300' tower	" 35 tons/foot	0	25	25
0.3kt, 200' tower	" "	0	25	25
10kt, 300'	" "	855	63	318
		1525	704	2229

DELETED

Fall Operation

DELETED	40kt, 500' tower	at 75 tons/foot	720	225	945
8 kt, 300'	300' towers	at 35 tons/foot	7823	6223	14046
			954	414	1368

Totals for year:

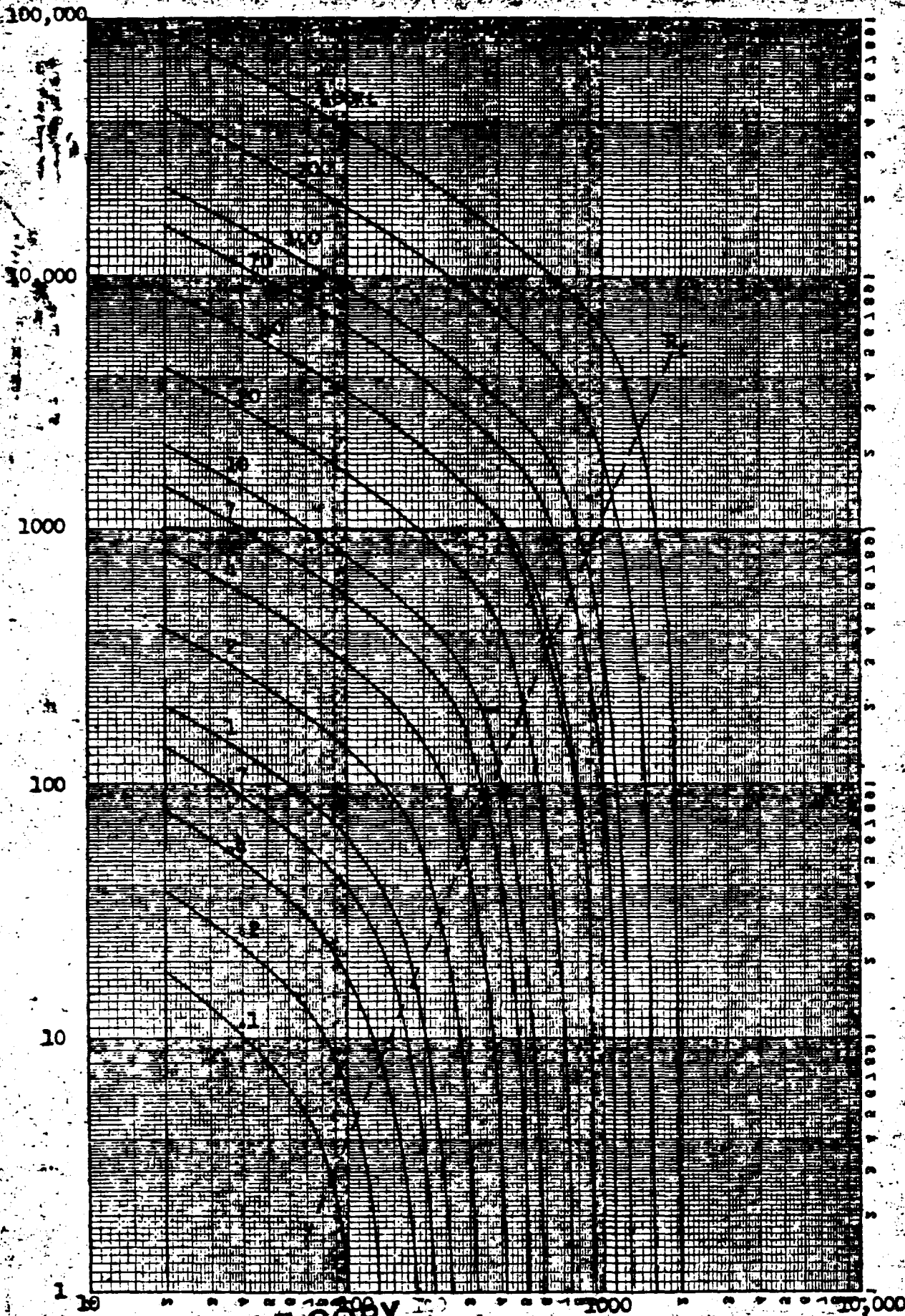
2409 1119

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Megatons at 1 Hour



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Burst Height, feet

~~SECRET~~

REF ID: A66666
FOIA b7
FOIA b7C
FOIA b7D
FOIA b7E
FOIA b7F
FOIA b7G
FOIA b7H
FOIA b7I
FOIA b7J
FOIA b7K
FOIA b7L
FOIA b7M
FOIA b7N
FOIA b7O
FOIA b7P
FOIA b7Q
FOIA b7R
FOIA b7S
FOIA b7T
FOIA b7U
FOIA b7V
FOIA b7W
FOIA b7X
FOIA b7Y
FOIA b7Z

100-1520

20

SECRET

100,000,000

10,000,000

1,000,000

100,000

10,000

1,000

Megacoupling, At 1 Hour



Burst Height, feet

SECRET

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LC135 0547

10

1. Pad calculations for a DELETED 20 Kt, 400 Toner

$$R_0 = (9R_1^2 - 12R_1A + 5A^2)^{1/2}$$

$$9R_1^2 = 2,250,000$$

$$5A^2 = 200,000$$

$$12R_1A = 2,400,000$$

$$(\quad) = 450,000$$

$$R_1 = 806$$

$$Z = 1.33 \left[2 \left(\frac{1}{R_1} - \frac{1}{\sqrt{500}} \right) + 0.67 \times 100 \left(\frac{1}{R_1} \right)^{1.5} \right]$$

$$= 1.33 \left[2 \left(\frac{1}{806} - 0.035 \right) + 2.67 \left(\frac{1}{806} \right)^{1.5} \right]$$

$$F_0 = [2,130,000 + 16,000R_1 - 654(R_1)^{1.5}] / (R_1)^{1.5} = 1.33 \left[\frac{2}{R_1} - 0.07 + \frac{2.67}{(R_1)^{1.5}} - 0.13 \right]$$

$$F_0 = 1.00$$

$$= 1.33 \left(\frac{2}{R_1} - 0.07 + \frac{2.67}{(R_1)^{1.5}} \right)$$

$$= \frac{3.55}{(R_1)^{1.5}} + \frac{2.67}{R_1} - 0.109$$

$$P \quad R_1 \quad F_0 \quad (R_1)^{1.5} \quad 654(R_1)^{1.5} \quad \div (R_1)^{1.5} = F_D \quad Z_0$$

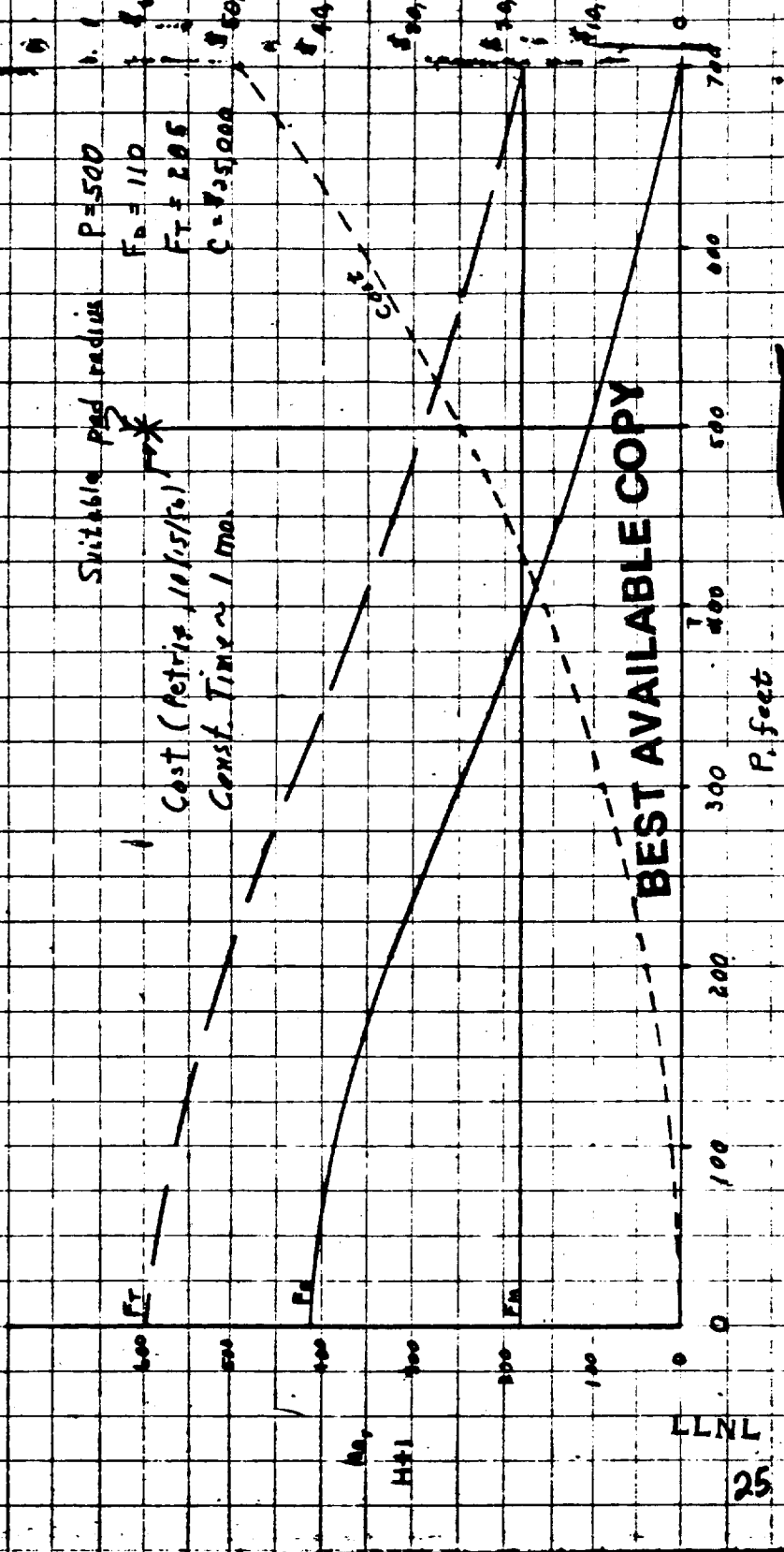
0	400	20	8000	4,400,000	5,232,000	3,235,000	412	.069
300	500	22.4	11,200	7,000,000	7,325,100	2,805,000	250	.043
400	600	24.5	14,700	9,600,000	8,614,200	2,116,000	144	.024
500	700	26.4	18,400	11,200,000	12,426,000	1,244,000	67	.011
600	800	27.3	22,640	12,800,000	14,710,000	120,000	5	.001
700	900	28.2	27,270	14,400,000	17,239,000	3,091,000	324	.054

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1-5-62

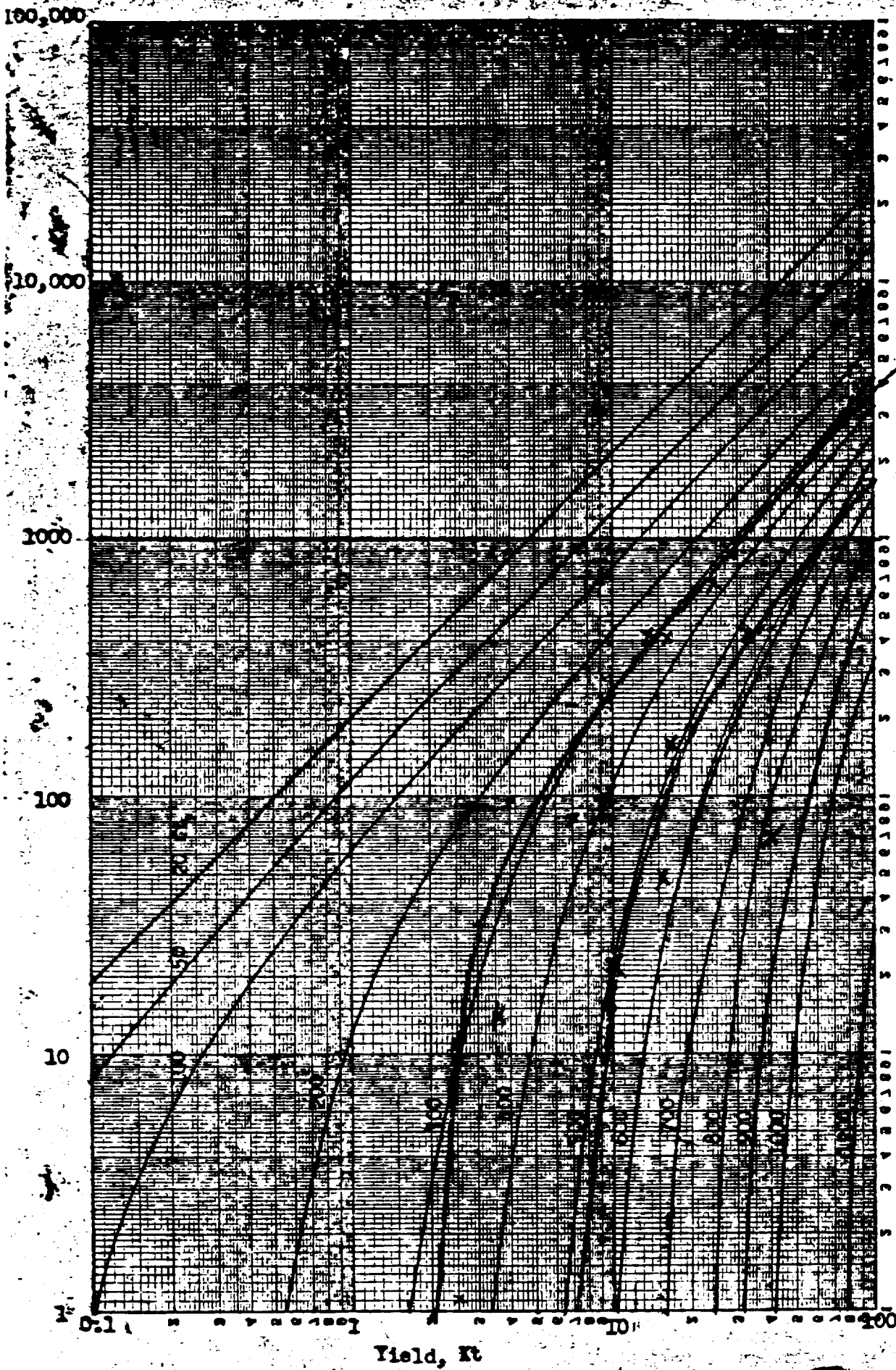
5

P	R	TR	(R) ^{1.5}	659(R) ^{1.5}	$\frac{3.55}{(R)^{1.5}} + \frac{3.6}{\sqrt{R}} - 0.109$	$\frac{21.3 \times 10^6 \times 16,000 R_1}{654(R)^{1.5}} = F_0$	Z
0	400	20	8000	5,232,000	912	9,298,000	0.69
300	500	22.4	11,200	7,325,000	250	2,805,000	0.42
447	600	24.5	14,700	9,644,000	144	2,116,000	0.24
574	700	26.1	18,480	11,249,000	67	1,244,000	0.11
693	800	27.3	22,640	12,800,000	5	120,000	0.01
806	950	31.2	9540	6,239,000	324	3,091,000	0.54
700	806						



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P 120 B

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K-3
 2 X 8 CAGES
 KENNEDY KODER CO.
 2201 1900
 DALLAS, TEXAS

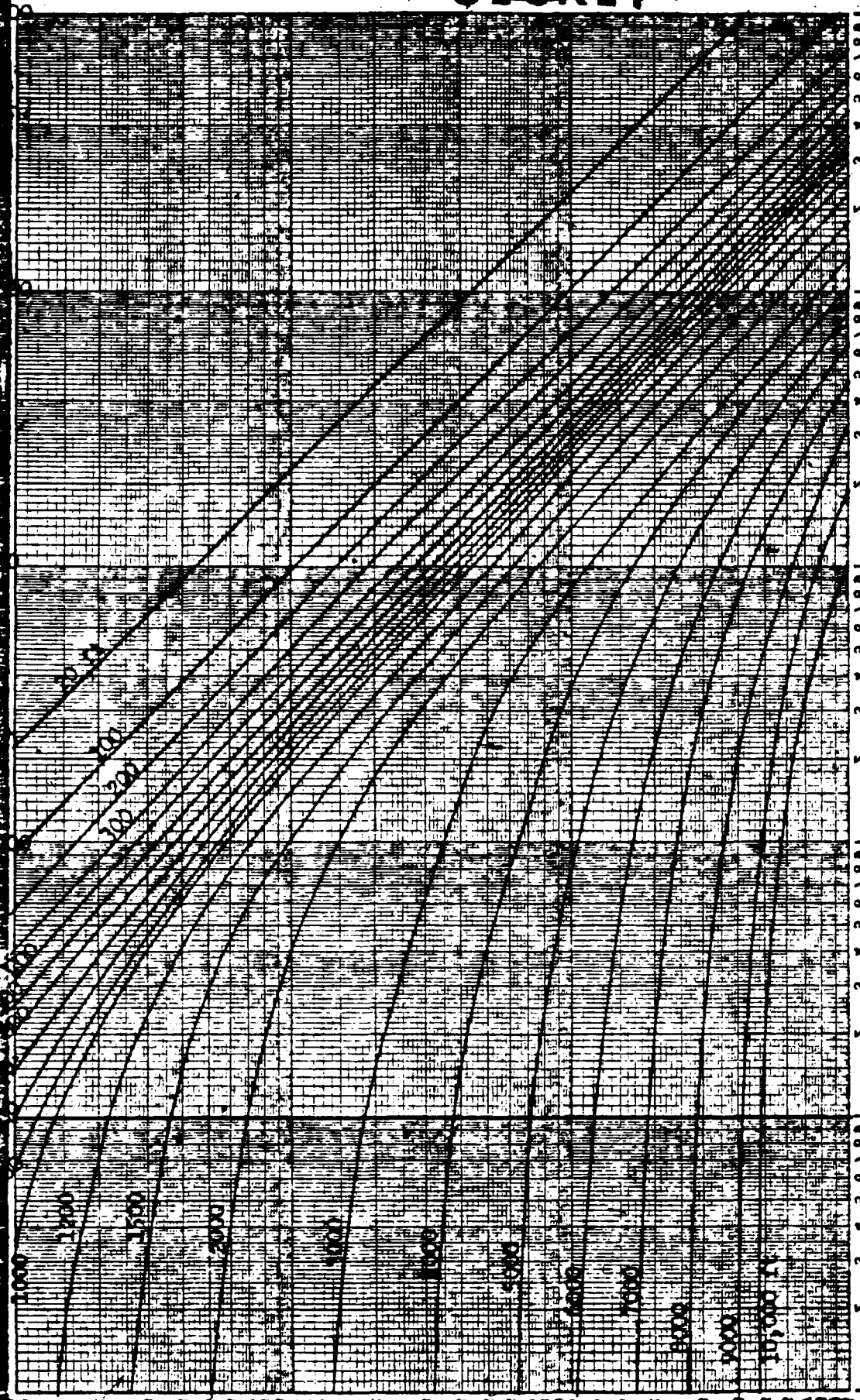
LLNL

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LC635 ~~0550~~

SECRET

Negacurles at 1 Hour



Yield, Kt

SECRET

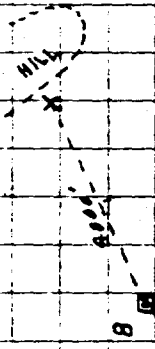
DELETED

DELETED

Pilgrimage Meeting @ October, 1956

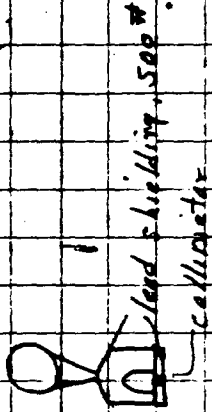
Area 12 is now called area 8.

"Hill and Dale" shot might be possible in area 8. There is a spur nearby, to the east.



Lack of funds may prohibit Hill & Dale exp. anyway

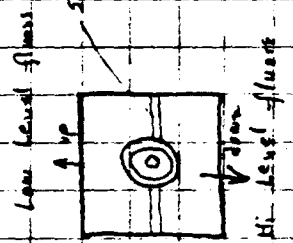
DELETED diagnostics



Looking for secondary

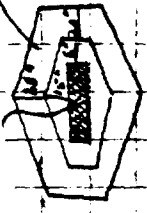
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Area 3 - Masters



DELETED

paraffin, density 5g/cm³
cylindrical symmetry



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DELETED

Looking for secondary

lead shielding, see #

collimator

detector

Area 2 - Waters

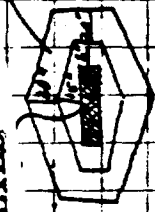
Low level flux

fire shield

DELETED

paraffin, density spl

cylindrical symmetry



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DELETED

New photo bunker near the station

Floors will be about 5' apart on towers

Such a bunker may not be procurable before 1 July.

photo bunker
36" diameter

14

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Rad effect curves

$$Z = 4.33 \left[2 \left(\frac{1}{R_1} - \frac{1}{R_2} \right) + 0.67h \left(\frac{1}{R_1} - \frac{1}{R_2} \right) \right]$$

$$R_1 = (P^2 + h^2)^{1/2}$$

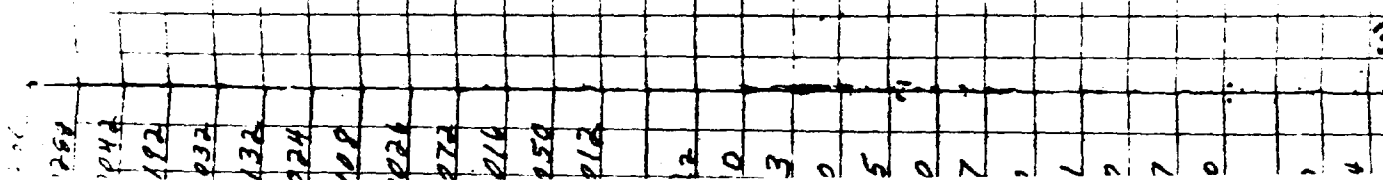
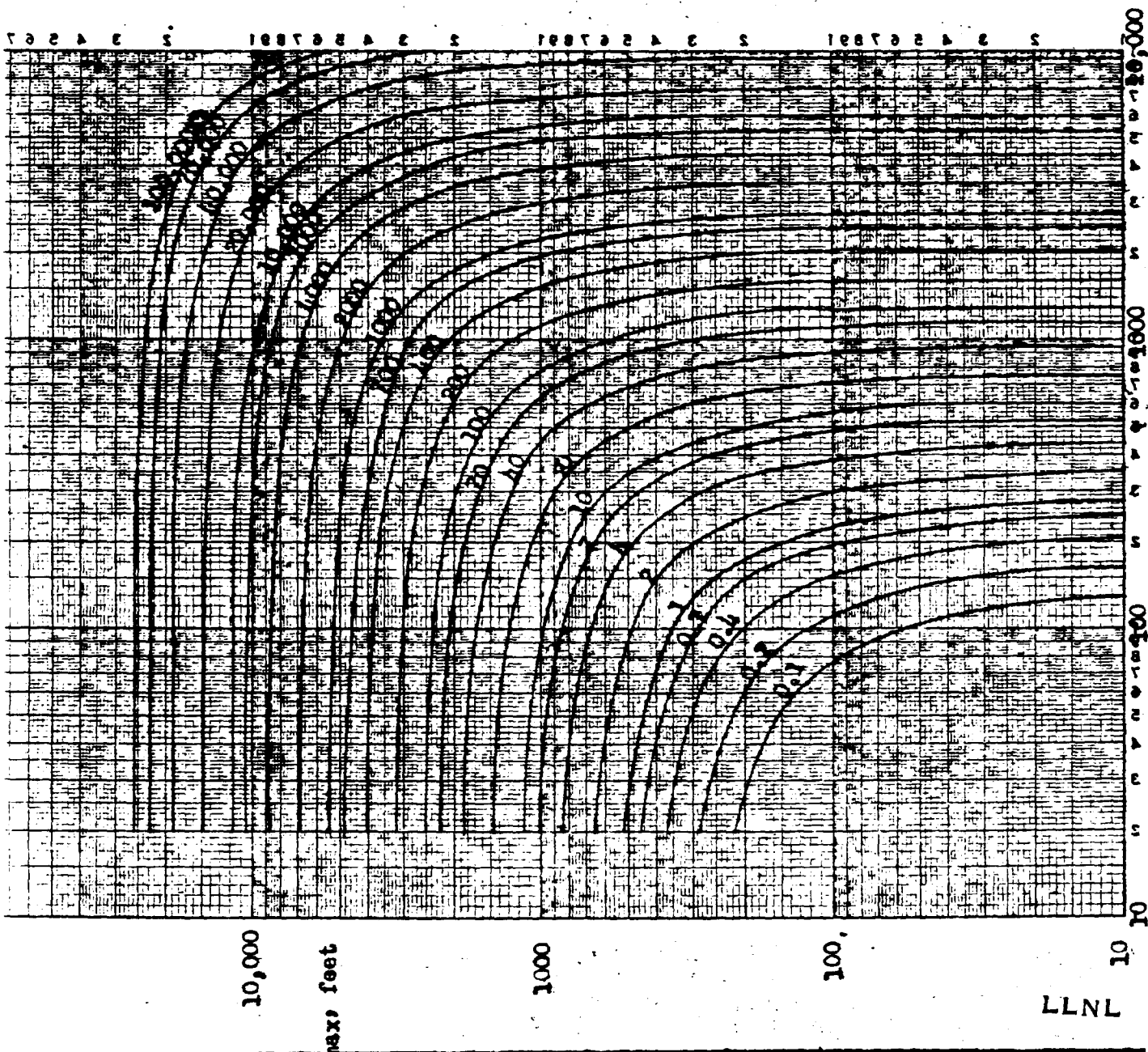
$$R_2 = (P_{max}^2 + h^2)^{1/2}$$

W	h	P/P _m	P _m	P	R ₁	R ₂	$\sqrt{R_1}$	$\sqrt{R_2}$	$\sqrt{R_1}$	$\sqrt{R_2}$	$\frac{R_1}{R_2}$	$\frac{R_1}{R_2}$
4	20	25	836	209	210	836	14.5	27.9	0.697	0.366	0.708	0.708
4	350	↓	174	44	353	391	18.8	19.8	0.538	0.505	0.854	0.854
40	20	↓	1849	462	462	1849	21.5	43.0	0.465	0.233	0.464	0.464
4	750	↓	376	96	755	844	27.5	29.1	0.364	0.344	0.840	0.840
400	20	↓	4030	1009	1009	4030	31.7	63.5	0.315	0.157	0.316	0.316
4	1600	↓	867	217	1614	1820	40.2	42.7	0.249	0.234	0.830	0.830
4	20	50	836	418	418	736	20.4	27.9	0.490	0.346	0.288	0.288
4	350	↓	174	87	360	391	19.0	19.8	0.526	0.505	0.842	0.842
40	20	↓	1849	924	924	1849	30.4	43.0	0.329	0.233	0.192	0.192
4	750	↓	376	193	774	844	27.8	29.1	0.360	0.344	0.832	0.832
400	20	↓	4030	2015	2015	4030	44.8	63.5	0.223	0.157	0.132	0.132
4	1600	↓	867	434	1658	1820	40.7	42.7	0.246	0.234	0.824	0.824
4	20	75	836	627	627	836	25.0	27.9	0.400	0.346	0.108	0.108
4	350	↓	174	130	373	391	19.3	19.8	0.518	0.505	0.826	0.826
40	20	↓	1849	1387	1387	1849	32.2	43.0	0.269	0.233	0.872	0.872
4	750	↓	376	290	804	844	28.4	29.1	0.352	0.344	0.816	0.816
400	20	↓	4030	3022	3022	4030	55.0	63.5	0.182	0.157	0.850	0.850
4	1600	↓	867	651	1728	1820	41.6	42.7	0.240	0.234	0.812	0.812

Z	$\frac{1}{R_1}$	$\frac{1}{R_2}$	$\frac{Z}{R_1}$	$\frac{Z}{R_2}$	$\frac{R_1}{R_2}$
250	0.00328	0.00041	0.00287	0.00041	0.874
350	0.0051	0.00127	0.0041	0.00127	0.840
400	0.00612	0.0013	0.00533	0.0013	0.866

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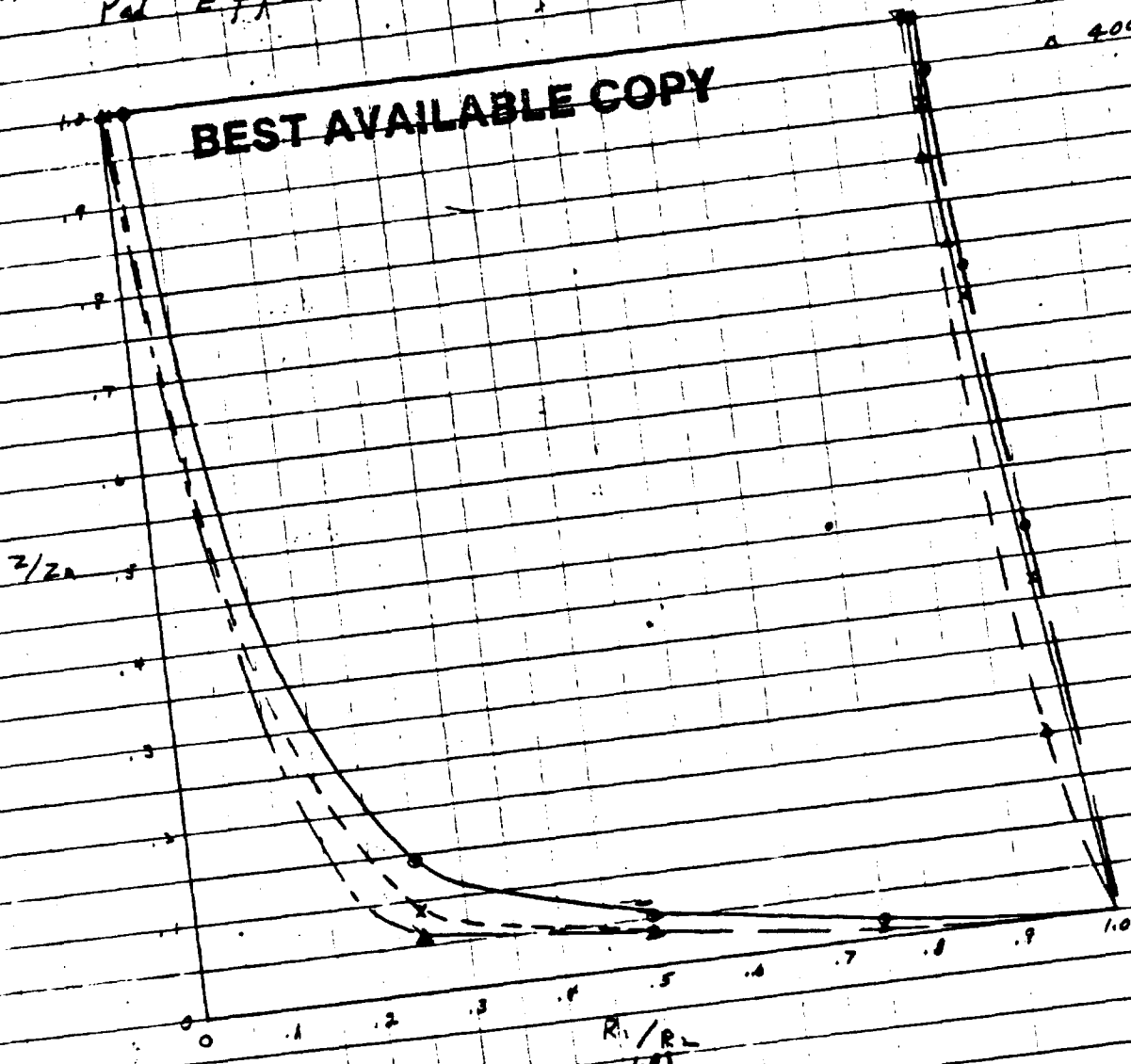
4	20	50	174	418	418	360	391	192	188	28.9	2410	0346	0223
3	350	↓	174	87	924	360	391	192	188	28.9	2410	0346	0223
40	20		1849	924	924	924	1849	80.4	430	430	0329	0233	0192
3	750		386	193	774	774	844	27.8	28.1	28.1	0360	0384	0032
400	20		4030	2015	2015	4030	4030	44.8	63.5	63.5	0223	0157	0132
3	1600		868	434	1658	1658	1820	40.7	42.7	42.7	0246	0234	0024
4	20	75	836	627	627	836	836	25.0	28.9	28.9	0400	0346	0108
3	350	↓	174	130	373	391	391	19.3	19.8	19.8	0518	0505	0026
40	20		1849	1387	1387	1849	1849	52.2	43.0	43.0	0269	0233	0072
3	750		386	290	804	844	844	28.4	28.1	28.1	0352	0384	0014
400	20		4030	3022	3022	4030	4030	55.0	63.5	63.5	0182	0157	0050
3	1600		868	651	1728	1820	1820	41.4	42.7	42.7	0240	0234	0012
4	20		174	1/1.5	1/1.5	1/1.5	1/1.5	1/1.5	1/1.5	1/1.5	1/1.5	1/1.5	1/1.5
3	350	↓	000328	000041	000041	0038	0038	0984	702	702	140	250	250
40	20		000151	000128	000128	0052	0052	0141	015	015	940	903	903
3	750		000101	000013	000013	0012	0012	0633	732	732	086	250	250
400	20		000048	000041	000041	0035	0035	0010	011	011	909	895	895
3	1600		000031	000004	000004	0004	0004	0426	750	750	057	250	250
4	20		000015	000013	000013	0021	0021	0068	004	004	950	887	887
3	350	↓	000117	000041	000041	0010	0010	0396	702	702	056	500	500
40	20		000146	000129	000129	0040	0040	0109	015	015	727	921	921
3	750		000036	000013	000013	0003	0003	0259	732	732	035	500	500
400	20		000046	000041	000041	0025	0025	0076	011	011	691	917	917
3	1600		000011	000004	000004	0001	0001	0257	750	750	034	500	500
4	20		000015	000013	000013	0021	0021	0060	008	008	750	911	911



Pal Effect Curves (Data page 14)

O 4KE, 20' 0.3
 X 40KE, 20' X.7
 A 400KE, 20' A.1

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W	h	$\frac{R_1-h}{R_2}$	$\frac{R_1-h}{R_2-h}$	$\frac{z}{z_m}$
4	20	.227	.220	.140
↓	↓	.476		.056
		.726		.021
	350	.00767		.940
	↓	.0256		.727
		.059		.433
40	20	.239		.057
↓	↓	.499		.035
		.739		.013
	750	.0059		.909
	↓	.028		.691
		.064		.373
400	20	.245		.057
				.034

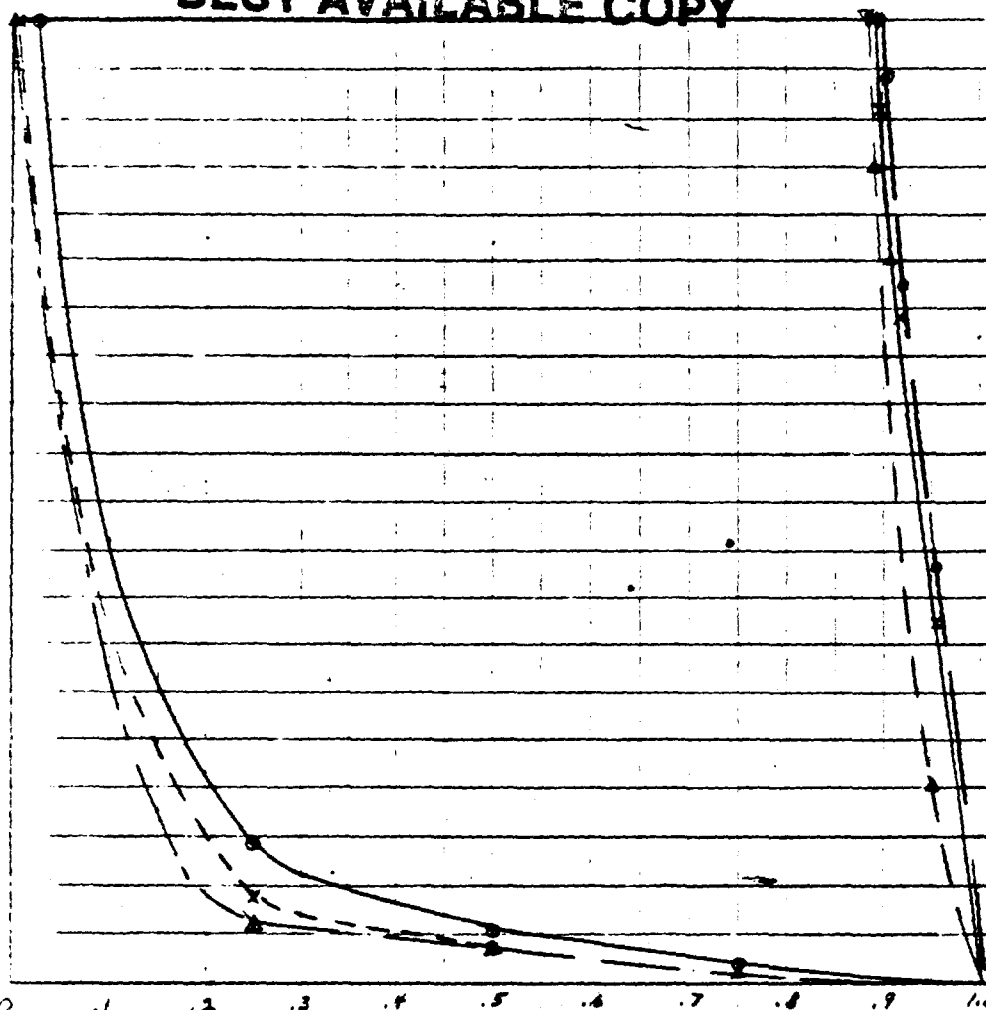
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Pad Effect Curves (Data page 14)

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○ 4kt, 20' ○ 3
x 40kt, 20' x 7
△ 400kt, 20' △ 1



	$\frac{R_1 - h}{R_2}$	$\frac{R_1 - h}{R_2 - h}$	$\frac{z}{2m}$	R_1/R_2
○	.227	.220	.140	1.0
○	.476		.056	.9
○	.726		.021	.8
○	.00767		.940	.7
○	.0256		.727	.6
○	.059		.433	.5
○	.239		.057	.4
○	.499		.035	.3
○	.739		.013	.2
○	.0059		.909	.1
○	.028		.691	.0
○	.064		.373	
○	.245		.057	

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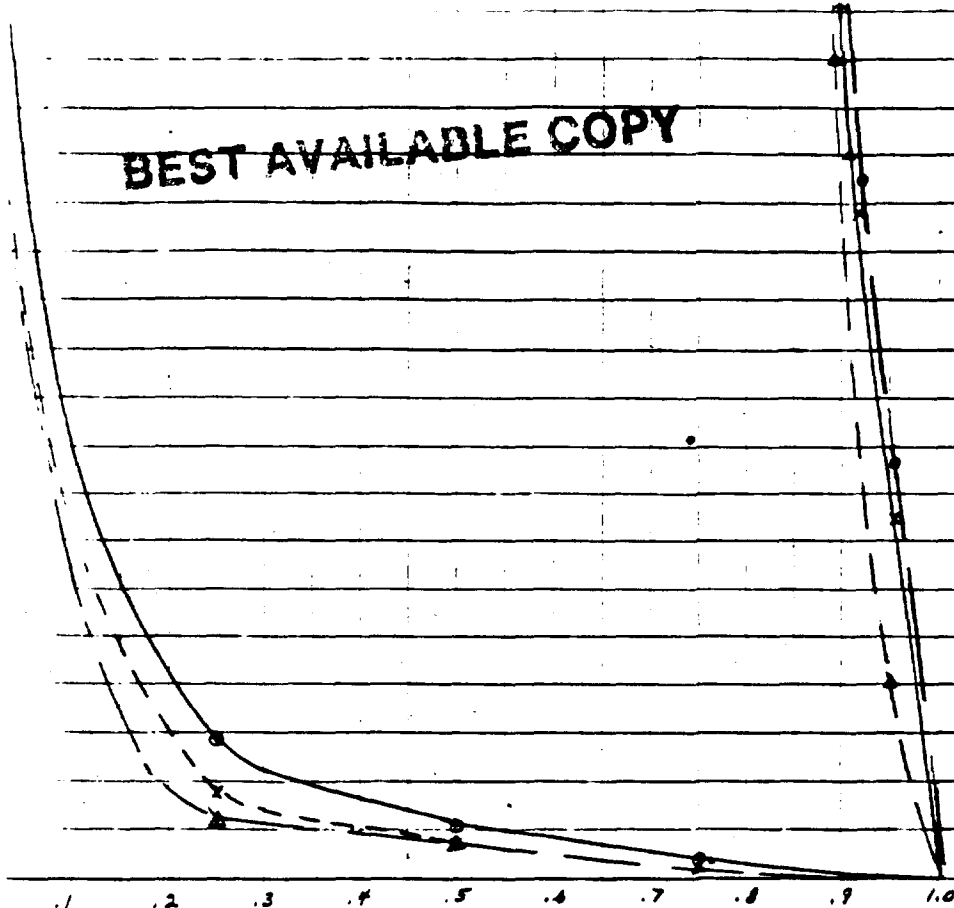
z/z_m

0 .1 .2 .3 .4 .5 .6 .7 .8 .9

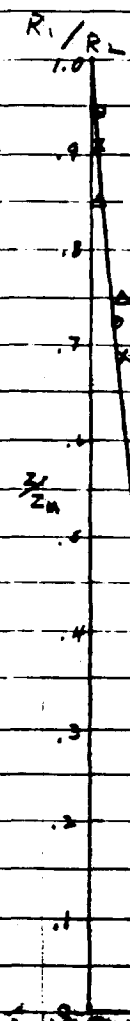
R_1/R_L
1.0

W	h	$\frac{R_1-h}{R_2}$	$\frac{R_1-h}{R_2-h}$	z/z_m
4	20	.227	.220	.140
↓	↓	.476		.056
		.726		.021
	350	.00767		.940
	↓	.0256		.727
		.059		.433
40	20	.239		.057
	↓	.499		.035
		.739		.013
	750	.0059		.909
	↓	.028		.691
		.064		.373
400	20	.245		.057
	↓	.495		.034
		.745		.009
	1600	.0077		.950
	↓	.0319		.750
		.0703		.200

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$\frac{R_1 - h}{R_2}$	$\frac{R_1 - h}{R_2 - h}$	$\frac{z}{z_m}$
.227	.320	.140
.476		.056
.726		.021
.00767		.940
.0256		.727
.059		.433
.239		.057
.489		.035
.739		.013
.0059		.909
.028		.691
.064		.373
.245		.057
.495		.034
.745		.009
.0077		.850
.0319		.750
.0703		.200



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Rad effects, cont.

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	W	h	$\frac{R_1-h}{R_2-h}$	R_1	R_2	$\sqrt{R_1}$	$\sqrt{R_2}$	$\sqrt{R_1}$	$\sqrt{R_2}$
	4	150	.02	159	594	12.6	24.4	.0794	.0410
	↓	↓	.05	172	↓	13.1	↓	.0763	↓
			.10	194		13.9		.0719	
			.20	239		15.5		.0645	
			.50	372		19.3		.0518	
	20	400	.02	408	806	20.2	29.4	.0495	.0352
			.05	420	↓	20.5	↓	.0488	↓
			.10	441		21.0		.0476	
			.20	481		21.9		.0457	
			.50	603		24.6		.0406	
	40	550	.02	558	961	23.6	31.0	.0424	.0323
			.05	571	↓	23.9	↓	.0418	
			.10	591		24.3		.0412	
			.20	632		25.2		.0397	
			.50	756		27.5		.0364	

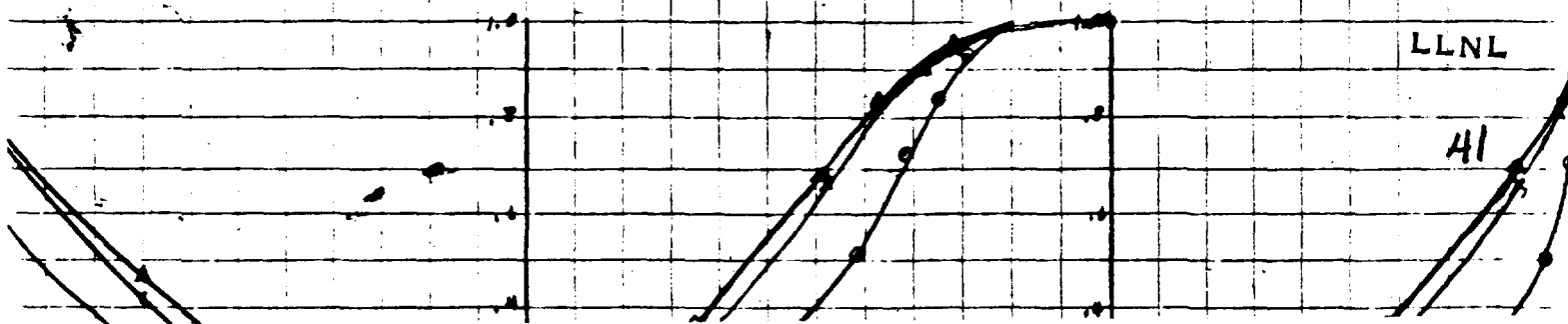
BEST AVAILABLE COPY

$\frac{P_n-P}{PP_n}$	W	h	$\frac{R_1-h}{R_2-h}$	$\sqrt{R_1}$	$\sqrt{R_2}$	$\sqrt{R_1}$	$\sqrt{R_2}$	Z	Z_n
.0172	4	150	.02	.000499	.000069	.676A	1.33	.159	.171
.0102	↓	↓	.05	.000444	↓	.0430	↓	.144	↓
.0064			.10	.000371		.0375		.122	
.00364			.20	.000270		.0302		.099	
.0012			.50	.000139		.0201		.038	
.0110	20	400	.02	.000121	.000044	.0206	1.33	.065	.069
.0064	↓	↓	.05	.000116	↓	.0192	↓	.062	↓
.00395			.10	.000103		.0171		.056	
.00232			.20	.000095		.0136		.046	
.00079			.50	.000067		.0061		.022	
	40	550	.02	.000076	.000034	.0154	1.33	.047	.04
	↓	↓	.05	.000073	↓	.0143	↓	.044	↓
			.10	.000070		.0132		.041	
			.20	.000063		.0106		.034	
			.50	.000048		.0051		.018	

h	$\frac{R-h}{R+h}$	R_1	R_2	$\sqrt{R_1}$	$\sqrt{R_2}$	$\sqrt{R_1}$	$\sqrt{R_2}$	$\frac{D}{2A}$
150	.02	159	594	12.6	24.4	.0794	.0410	.0768
↓	.05	172	↓	13.1	↓	.0763	↓	.0706
↓	.10	194		13.9		.0719		.0618
↓	.20	239		15.5		.0645		.0470
↓	.50	372		19.3		.0518		.0216
400	.02	408	806	20.2	28.4	.0495	.0352	.0286
↓	.05	420	↓	20.5	↓	.0488	↓	.0272
↓	.10	441		21.0		.0476		.0248
↓	.20	481		21.9		.0457		.0210
↓	.50	603		24.6		.0406		.0108
550	.02	559	961	23.6	31.0	.0424	.0323	.0202
↓	.05	571	↓	23.9	↓	.0418		.0190
↓	.10	591		24.3		.0412		.0178
↓	.20	632		25.2		.0397		.0148
↓	.50	756		27.5		.0364		.0082

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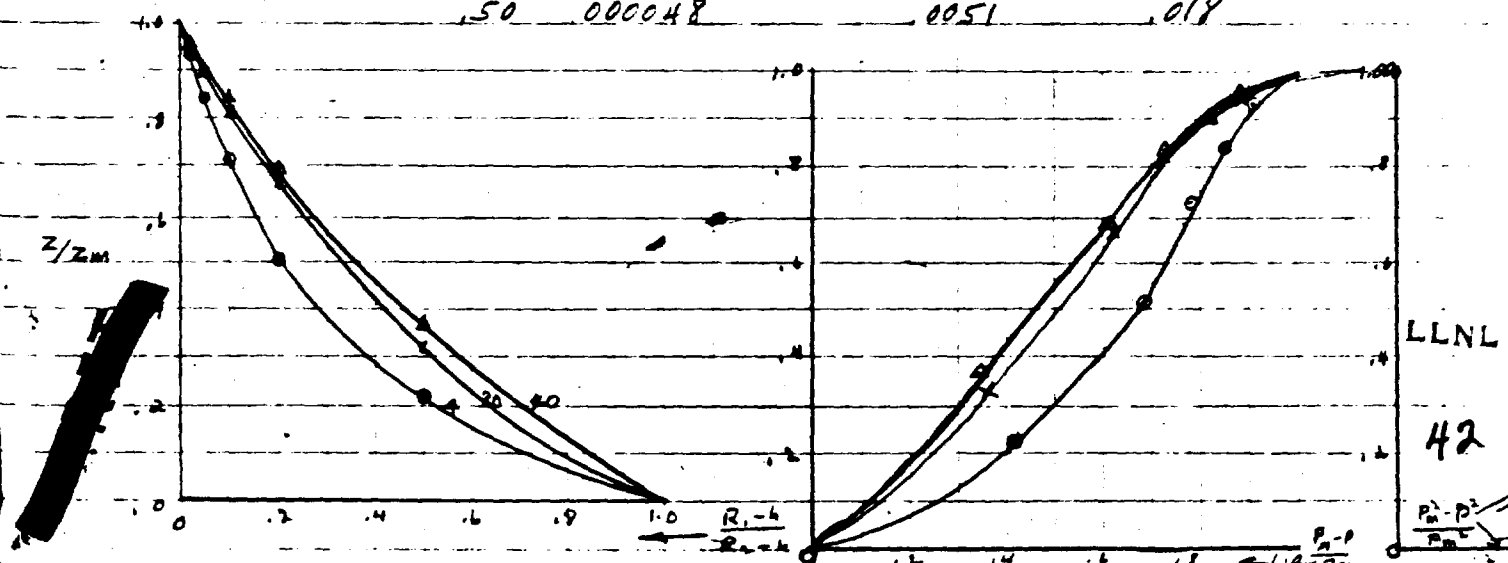
h	$\frac{R-h}{R+h}$	$\sqrt{R_1}$	$\sqrt{R_2}$	$\frac{Z}{2M}$	$\frac{Z}{2M}$	$\frac{Z}{2M}$	$\frac{Z}{2M}$	$\frac{P_0-P}{P_0}$	$\frac{P_0^2-P^2}{P_0^2}$
150	.02	.000499	.000069	.0430	.159	.171	.930	.908	.992
↓	.05	.000444	↓	.0375	.144	↓	.842	.854	.979
↓	.10	.000371		.0302	.122		.713	.786	.954
↓	.20	.000270		.0201	.089		.503	.677	.895
↓	.50	.000139		.0070	.039		.215	.409	.650
400	.02	.000121	.000044	.0206	.065	.069	.942	.986	.987
↓	.05	.000116	↓	.0192	.062	↓	.899	.917	.967
↓	.10	.000108		.0171	.056		.812	.734	.929
↓	.20	.000095		.0136	.046		.667	.619	.854
↓	.50	.000067		.0061	.022		.319	.356	.585
550	.02	.000076	.000034	.0154	.047	.049	.959	.881	.966
↓	.05	.000073	↓	.0143	.044	↓	.898	.906	.96
↓	.10	.000070		.0132	.041		.837	.726	.925
↓	.20	.000063		.0106	.034		.694	.605	.844
↓	.50	.000048		.0051	.018		.367	.341	.56



		.10	1.14				
		.20	239		15.5		0645
		.50	372		19.3		0518
20	400	.02	406	806	20.2	29.4	0495 0352
		.05	420	↓	20.5	↓	0488 ↓
		.10	441		21.0		0476
		.20	481		21.9		0457
		.50	603		24.6		0406
40	550	.02	558	961	23.6	31.0	0424 0323
		.05	571	↓	23.9	↓	0418
		.10	591		24.3		0412
		.20	632		25.2		0397
		.50	756		27.5		0364 ↓

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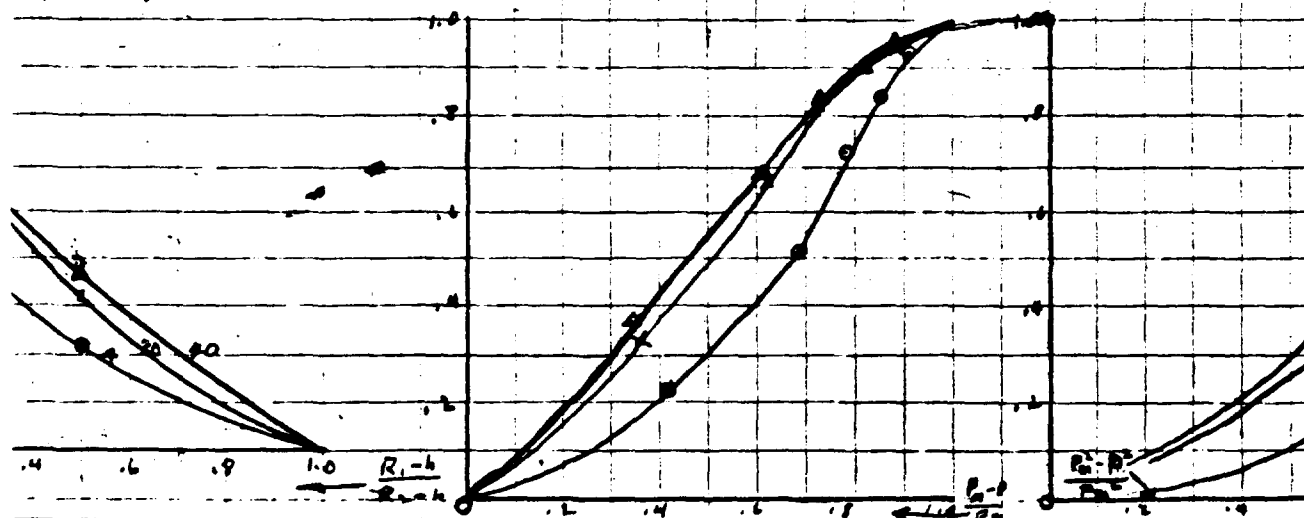
$\frac{P_n - P}{P_n}$	W	h	$\frac{R_1 - h}{R_1 - h}$	$\frac{1}{R_1^{1.5}}$	$\frac{1}{R_2^{1.5}}$	$\frac{1}{R_1^{1.5}}$	$\frac{1}{R_2^{1.5}}$	$\frac{1}{R_1^{1.5}}$	$\frac{1}{R_2^{1.5}}$
.0172	4	150	.02	.000499	.000069	.0430	.159	.171	.93
.0102	↓	↓	.05	.000444	↓	.0375	.144	↓	.84
.0064			.10	.000371		.0302	.122		.71
.00364			.20	.000270		.0201	.099		.54
.0012			.50	.000139		.0070	.038		.21
.0110	20	400	.02	.000121	.000044	.0206	.065	.069	.94
.0064	↓	↓	.05	.000116	↓	.0192	.062	↓	.84
.00395			.10	.000102		.0171	.056		.71
.00232			.20	.000095		.0136	.046		.54
.00079			.50	.000067		.0061	.022		.21
	40	550	.02	.000076	.000034	.0154	.047	.049	.94
	↓	↓	.05	.000073	↓	.0143	.044	↓	.84
			.10	.000070		.0132	.041		.71
			.20	.000063		.0106	.034		.54
			.50	.000048		.0051	.018		.21



.10	1.14		13.9		.0117		.0618
.20	239		15.5		.0645		.0470
.50	372		19.3		.0518		.0216
.02	408	806	20.2	28.4	.0495	.0352	.0286
.05	420	↓	20.5	↓	.0488	↓	.0272
.10	441		21.0		.0476		.0248
.20	481		21.9		.0457		.0210
.50	603		24.6		.0406		.0108
.02	558	961	23.6	31.0	.0424	.0323	.0202
.05	571	↓	23.9	↓	.0418		.0190
.10	591		24.3		.0412		.0178
.20	632		25.2		.0397		.0148
.50	756		27.5		.0364		.0082

BEST AVAILABLE COPY

	$\frac{R_1-h}{R_2-h}$	$\frac{1}{R_1.5}$	$\frac{1}{R_2.5}$	$\frac{1}{R_1.5}$	$\frac{1}{R_2.5}$	$\frac{1}{R_1.5}$	$\frac{1}{R_2.5}$	$\frac{1}{R_1.5}$
				.6711	1.33			
0	.02	.00499	.00069	.0430	.159	.171	.930	9
	.05	.00444	↓	.0375	.144	↓	.842	8
	.10	.00371		.0302	.122		.713	7
	.20	.00270		.0201	.089		.503	6
	.50	.00189		.0070	.038		.215	4
10	.02	.00121	.00044	.0206	.065	.069	.942	1
	.05	.00116	↓	.0192	.062	↓	.899	
	.10	.00108		.0171	.056		.812	
	.20	.00095		.0136	.046		.667	
	.50	.00067		.0061	.022		.319	
0	.02	.00076	.00034	.0154	.047	.049	.959	
↓	.05	.00073	↓	.0143	.044	↓	.898	
	.10	.00070		.0132	.041		.837	
	.20	.00063		.0106	.034		.694	
	.50	.00048		.0051	.018		.367	



n	h	$(\frac{R_2 - R_1}{R_2 - h}) \frac{1}{R_1}$	$\frac{z}{2m}$
4	150	.924	.930
↓	↓	.828	.842
		.696	.713
		.502	.503
		.202	.215
20	400	.960	.942
↓	↓	.905	.899
		.816	.812
		.666	.667
		.332	.319
40	550	.966	.959
↓	↓	.914	.898
		.838	.837
		.697	.694
		.363	.367
4	20	.273	.140
↓	↓	.010	.056
		.006	.021
4	350	.922	.940
↓	↓	.734	.727
		.410	.433
40	20	.033	.036
↓	↓	.011	.035
		.004	.013
40	750	.942	.909
↓	↓	.721	.691
		.397	.373
425	20	.015	.057
↓	↓	.005	.034
		.002	.009
400	1600	.931	.850
↓	↓	.711	.750
		.387	.200

 $\frac{z}{2m}$

$$\beta = \frac{h}{R_2 - h} \left(\frac{R_2 - R_1}{R_1} \right) = \frac{h}{R_1}$$

$$\frac{1}{R_1} = \frac{1 - \beta}{R_2} + \frac{\beta}{h}$$

$$R_1 = \frac{h R_2}{h(1 - \beta) + \beta R_2}$$

Apple II Pad radius

BEST AVAILABLE COPY

LLNL

44

Pad Effects

~~SECRET~~

h	$\left(\frac{R_2 - R_1}{R_2 - h}\right) \frac{h}{R_1}$	z/z_m
150	.924	.930
↓	.828	.842
	.696	.713
	.502	.503
	.202	.215
400	.960	.942
↓	.905	.899
	.816	.812
	.666	.667
	.332	.319
550	.966	.959
↓	.914	.898
	.838	.837
	.697	.694
	.363	.367
20	.373	.140
↓	.010	.056
	.006	.021
30	.722	.240
↓	.734	.727
	.410	.433
20	.033	.036
↓	.011	.035
	.004	.013
700	.942	.909
↓	.721	.691
	.397	.373
50	.015	.057
↓	.005	.034
	.002	.009
1600	.931	.850
↓	.714	.750
	.387	.200

$$\beta = \frac{h}{R_2 - h} \left(\frac{R_2 - R_1}{R_1} \right) = \frac{h}{R_1} \left(\frac{R_2 - R_1}{R_2 - h} \right)$$

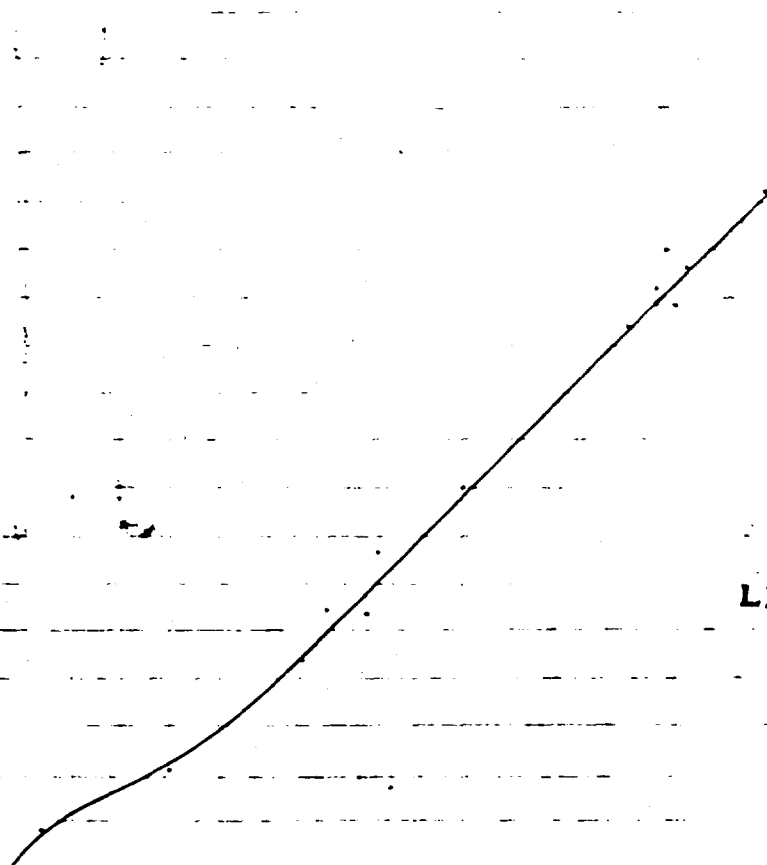
$$\frac{1}{R_1} = \frac{1 - \beta}{R_2} + \frac{\beta}{h}$$

$$R_1 = \frac{h R_2}{h(1 - \beta) + \beta R_2}$$

Apple II Pad radius: 600

BEST AVAILABLE COPY

z/z_m



	.502	.503
	.202	.215
400	.960	.942
↓	.905	.899
	.816	.812
	.666	.667
350	.332	.319
↓	.966	.959
	.914	.898
	.838	.837
	.697	.694
	.363	.367
20	.373	.140
↓	.010	.056
	.006	.021
300	.722	.740
↓	.734	.727
	.410	.433
20	.033	.036
↓	.011	.035
	.004	.013
750	.742	.709
↓	.721	.691
	.397	.373
20	.015	.057
↓	.005	.034
	.002	.009
1600	.931	.850
	.74	.750
	.387	.200

$$R_1 = \frac{h(1-\beta) + \beta R_2}{\beta}$$

Apple II Pad radius: 650'

BEST AVAILABLE COPY

$z/z_{M,3}$

LLNL

$$\frac{h}{R_2 - h} \left(\frac{R_2 - R_1}{R_1} \right) = \beta$$

		.696	.713
		.502	.503
		.202	.215
20	400	.960	.942
↓	↓	.905	.899
		.816	.812
		.666	.667
		.332	.319
40	550	.966	.959
↓	↓	.914	.898
		.838	.837
		.697	.694
		.363	.367
4	20	.073	.140
↓	↓	.010	.056
		.008	.021
4	50	.922	.940
↓	↓	.734	.727
		.410	.433
40	20	.033	.086
↓	↓	.015	.035
		.004	.013
40	750	.942	.909
↓	↓	.721	.691
		.397	.373
400	20	.015	.057
↓	↓	.005	.034
		.008	.009
400	1300	.938	.850
↓	↓	.714	.750
		.387	.200

$$R_1 = \frac{hR}{h(1-\rho) + R}$$

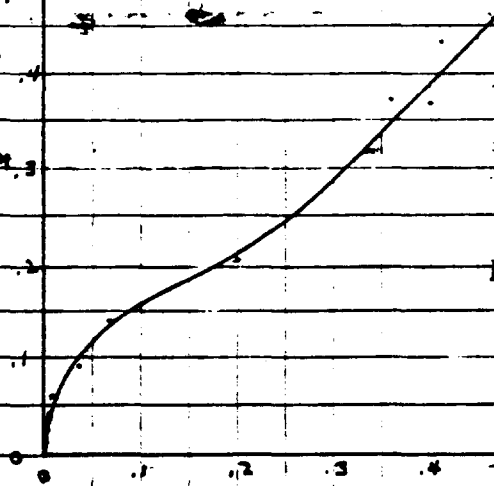
Apple II P2

BEST AVAILABLE C

$\frac{z}{2M_3}$

~~SECRET~~

$\frac{h}{R_1 - h}$



$$R = \sqrt{P^2 + h^2}$$

$$P = \sqrt{R^2 - h^2}$$

BEST AVAILABLE C

h	R	P	h	R	P
100	141	100	700	707	100
↓	510	500	↓	728	100
	1010	1000		860	500
	224	200		1240	1000
	2000	2000			
200	224	100			
↓	283	200			
	538	500	800	806	100
	1020	1000	↓	825	100
	2010	2000		943	500
	5000	5000		1280	1000
300	316	100		2155	200
↓	360	200		5060	500
	583	500		10,030	1000
	1043	1000	900	905	100
	2020	2000	↓	922	200
	5010	5000		1030	500
	10,000	10,000		1345	1000
400	412	100		2194	200
↓	447	200		5080	500
	640	500		10,040	1000
	1077	1000	1000	1004	100
	2040	2000	↓	1020	200
	5010	5000		1118	500
	10,000	10,000		1414	1000
500	510	100		2235	200
↓	538	200		5100	500
	707	500		10,040	1000
	1118	1000	1200	1200	100
	2060	2000	↓	1210	200
	5020	5000			
	10,000	10,000			
600	608	100			
↓	632	200			
	781	500			
	1166	1000	1500	1503	100
	2086	2000	↓	1513	200

$$P = \sqrt{R^2 - h^2}$$

P	h	R	P
100	700	707	100
500	↓	728	500
1000		860	500
200		1240	1000

BEST AVAILABLE COPY

2000			
100			
200			
500	800	806	
1000	↓	825	
2000		943	500
5000		1280	1000
100		2155	2000
200		5060	5000
500		10,030	10,000
1000	900	905	1000
2000	↓	922	2000
5000		1030	5000
10,000		1345	10,000
100		2194	2000
200		5080	5000
500		10,040	10,000
1000	1000	1004	1000
2000	↓	1020	2000
5000		1118	5000
10,000		1414	10,000
100		2235	2000
200		5100	5000
500		10,040	10,000
1000	1200	1200	1000
2000	↓	1200	2000
5000			5000
10,000			10,000
100			2000
200		5110	5000
500		10,060	10,000
1000	1500	1503	1000
2000	↓	1513	2000
5000		1580	5000
10,000		1802	10,000

LLNL

↓ 510 500
1010 1000
224 200
2000 2000

200 224 100

↓ 283 200

538 500

1020 1000

2010 2000

5000 5000

300 316 100

↓ 360 200

583 500

1043 1000

2020 2000

5010 5000

10,000 10,000

400 412 100

↓ 447 200

640 500

1077 1000

2040 2000

5010 5000

10,000 10,000

500 510 100

↓ 538 200

707 500

1118 1000

2060 2000

5020 5000

10,000 10,000

600 608 100

↓ 632 200

781 500

1166 1000

2086 2000

5040 5000

10,020 10,000

↓ 728 200

860 500

1240 1000

800 806

↓ 825

943

1280

2455

5060

10,030

900 905

↓ 922

1030

1345

2194

5080

10,040

1000 1004

↓ 1020

1118

1414

2235

5100

10,040

1200 1200

↓ 1200

1200

1200

1200

1200

1200

1200

1200

1200

1200

1200

1200

1200

1200

BEST AVAILABLE

BEST AVAILABLE COPY

110	1000		860	500
24	200		1240	1000
100	2000			
24	100			
83	200			
282	500	800	806	500
820	1000	↓	825	
810	2000		943	500
0004	5000		1280	1000
116	100		2155	200
160	200		5060	500
183	500		10,030	1000
243	1000	900	905	1000
020	2000	↓	922	200
5010	5000		1030	500
0,000	10,000		1345	1000
412	100		2194	200
447	200		5080	500
640	500		10,040	1000
1077	1000	1000	1004	
2040	2000	↓	1020	
5010	5000		1118	
10,000	10,000		1414	
510	100		2235	
538	200		5100	
707	500		10,040	
1118	1000	1200	1200	
2040	2000	↓	12	
5020	5000			
10,000	10,000			
608	100			
632	200		5140	5000
781	500		10,060	10,000
1166	1000	1500	1503	100
2086	2000	↓	1513	200
5040	5000		1580	500
10,020	10,000		1802	1000
			2500	2000
			5220	5000
			10,120	10,000

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54

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Relation between magnitude & energy of earthquakes

Markus Bath, Trans. Am. Geophys. Un. 36 No. 5, Oct. 1

Earthquake magnitude depends only upon the total seismic waves. (Mag. M as defined by Richter +

$$\log E = (7.2 \pm 0.5) + (2.0 \pm 0.07) M +$$

E = total energy in ergs

M = Richter magnitude.

x = ratio of total energy to energy

x taken as 2 for shallow foci

This is an empirical relationship: depends upon wave forms, and may not apply precisely to shocks.

If shocks cause waves of higher frequency, the ratio in the earth may be considerably higher than the generated waves. -

$$M = A + \log(w/t) + K(M-7) \quad : \text{Gutenberg}$$

A = energy parameter, a function of wave type
Values listed by Gutenberg, 1945.

w = observed ground amplitude, microns

t = wave period, seconds.

K = factor to correct for slight dependence

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LC035 (110)

56

n between magnitude & energy of earthquakes

us Bath, Trans. Am. Geophys. Un. 36 No. 5, Oct. 1955

earthquake magnitude depends only upon the total energy of seismic waves. (Mag. M as defined by Richter & Gutenberg)

$$\log E = (7.2 \pm 0.5) + (2.0 \pm 0.07) M + \log x/2$$

E = total energy in ergs

M = Richter magnitude.

x = ratio of total energy to energy of Rayleigh waves.

x taken as 2 for shallow foci

is an empirical relationship: depends upon seismic waves, and may not apply precisely to "shot" earthquakes.

to cause waves of higher frequency, the rate of absorption in earth may be considerably higher than that for earthquake waves.

BEST AVAILABLE COPY

$$M = A + \log(w/t) + K(M-7) \quad : \text{Gutenberg, 1945}$$

A = energy parameter, a function of wave type & distance.
Values listed by Gutenberg, 1945.

w = observed ground amplitude, microns
t = wave period, seconds.

K = factor to correct for slight dependence of A on M.

LLNL

57

Earthquake magnitude depends only upon the
the seismic waves. (Mag. M as defined by Richter

$$\log E = (7.2 \pm 0.5) + (2.0 \pm 0.07) M$$

E = total energy in ergs

M = Richter magnitude.

x = ratio of total energy to energy

x taken as 2 for shallow foci

This is an empirical relationship: depends
wave forms, and may not apply precisely to S

If shots cause waves of higher frequency, the
in the earth may be considerably higher than
generated waves.

$$M = A + \log(w/t) + K(M-7) \quad \text{Gutenberg}$$

A = energy parameter, a function of wave.
Values listed by Gutenberg, 1945.

w = observed ground amplitude, microns
 t = wave period, seconds.

K = factor to correct for slight d

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LLN

508

Earthquake magnitude depends only upon the total energy of seismic waves. (Mag. M as defined by Richter + Gutenberg)

$$\log E = (7.2 \pm 0.5) + (2.0 \pm 0.07) M + \log x/2$$

E = total energy in ergs

M = Richter magnitude.

x = ratio of total energy to energy of Rayleigh waves.

x taken as 2 for shallow foci.

This is an empirical relationship: depends upon seismic forms, and may not apply precisely to "shot" earthquakes.

shots cause waves of higher frequency, the rate of absorption the earth may be considerably higher than that for earthquake generated waves.

$$M = A + \log(w/t) + K(M-7) \quad : \text{Gutenberg, 1945}$$

A = energy parameter, a function of wave type + distance.

Values listed by Gutenberg, 1945.

w = observed ground amplitude, microns

t = wave period, seconds.

K = factor to correct for slight dependence of A on M.

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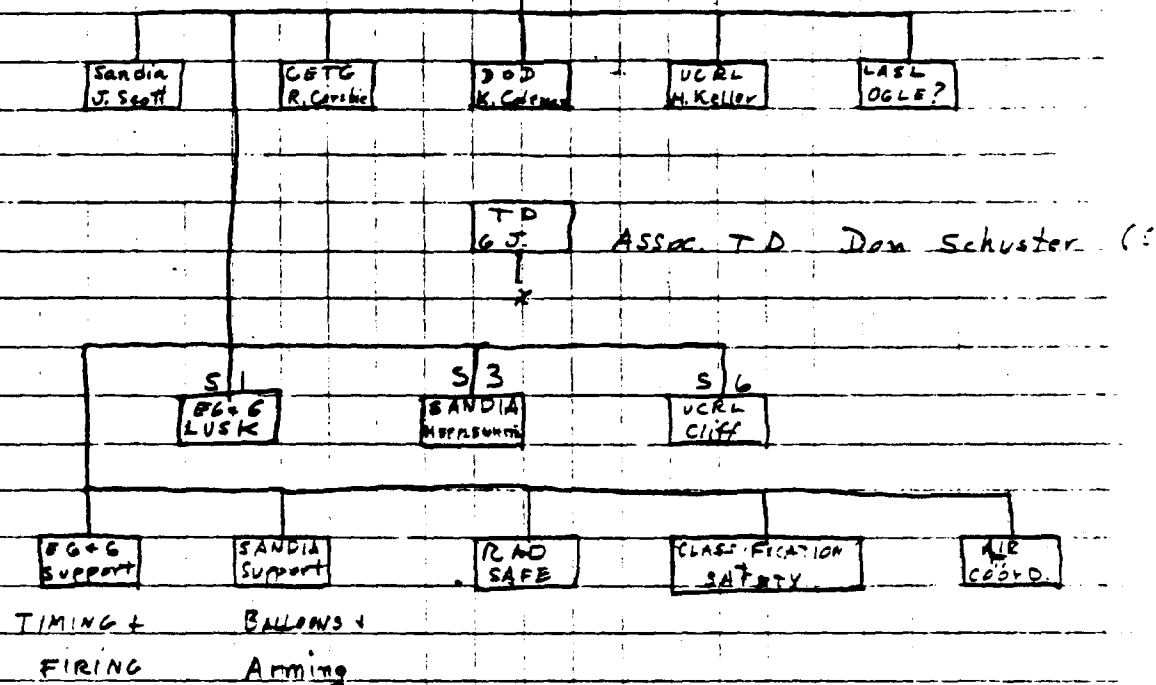
59

LC(37) (S)

Pilgrim meeting 0900 Mon, Oct. 22, 1957

Organization

Hdtrs here - to Merc. in Feb. - Las Vegas



Operation should start ~ May 1 No SACNER.

LASL Area 4 500' tower 10-15KT
 1 500' tower 10-15KT
 3 Three + towers, 300', 2-5KT
 7 Balloon system + 1 tower
 300' towers out if balloons work.

Total: 7-8 shots. **BEST AVAILABLE COPY**

Underground hole existence not classified. Hole

Continuous operation probably out. Starbird o

Pilgrim split between spring + fall - essentially continuous.

Tower orders 1-500' } CLEAN

2-300' }

6-500' } a March?

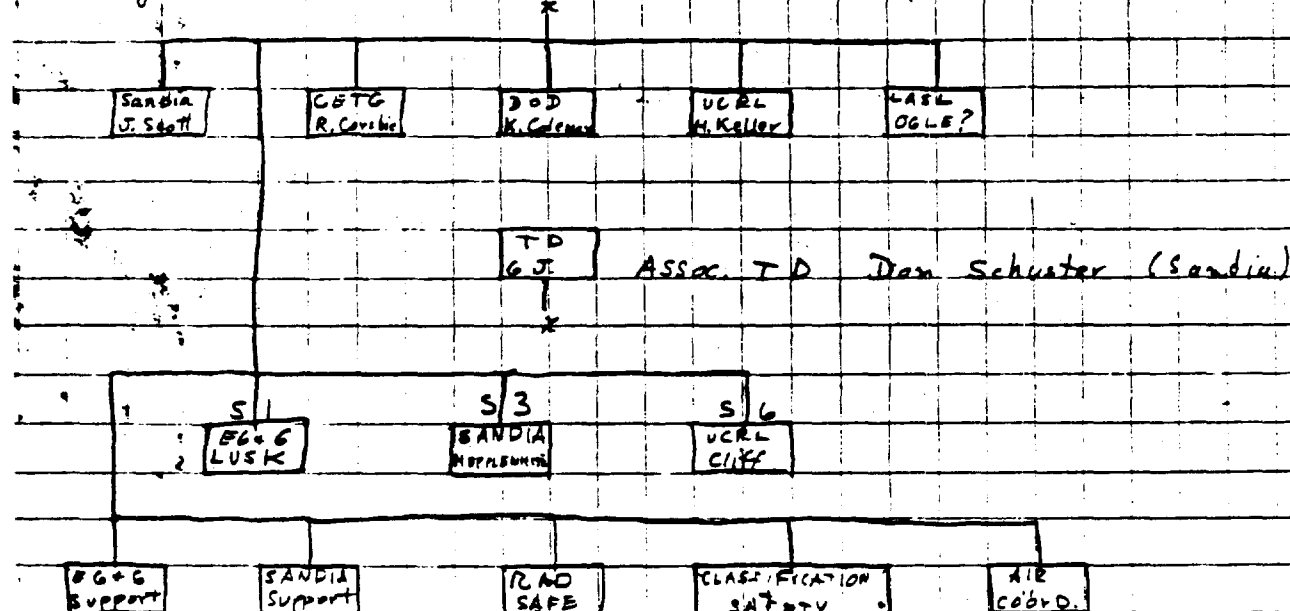
LLNL

60

union meeting 0900 Mon, Oct. 22, 1951

Organization

Hqtrs here - to move in Feb - Las Vegas



Operation should start ~ May 1 No sooner.

ASL Area 4 500' tower 10-15 KT
1 500' tower 10-15 KT
3 Three + towers, 300', 2-5 KT
7 Balloon system + 1 tower
300' towers out if balloons work.

also 7-8 shots.

BEST AVAILABLE COPY

Underground hole existence not classified. Hole to be in May 1.

Continuous operation probably not. Starbird against.

Pilgrim split between spring + fall - essentially could be continuous.

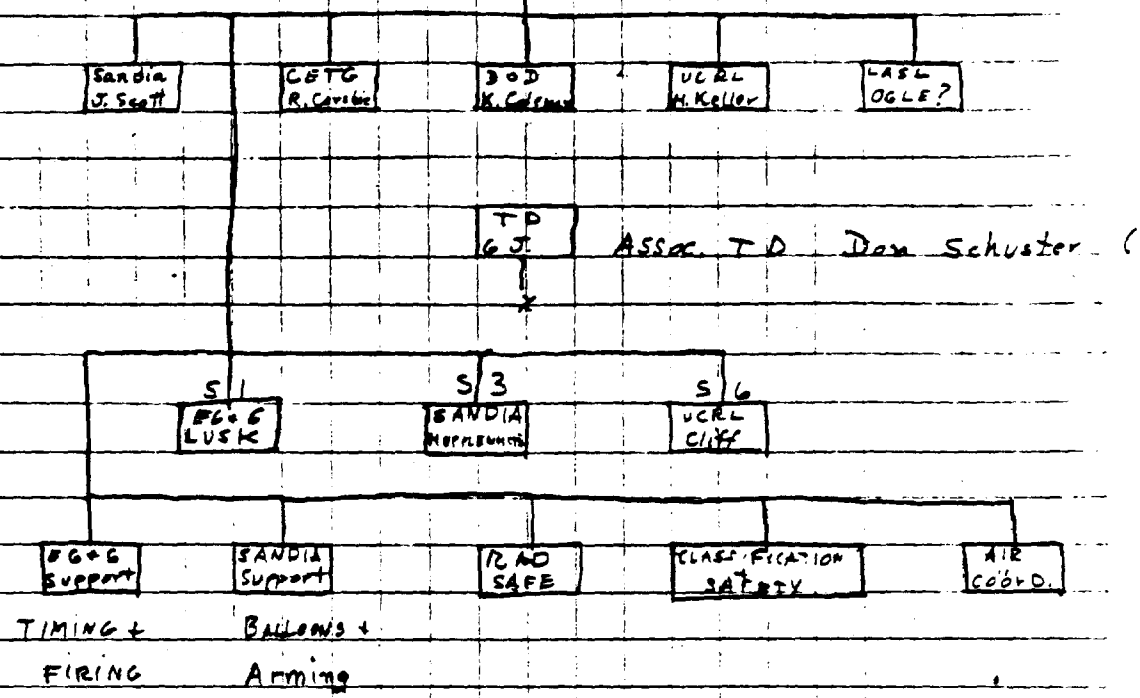
Tower orders 1-500' } 1 JAN
2-300' }

6-500' } ~ March?

LLNL

61

March in Feb. - Las Vegas



Operation should start ~ May 1 No sooner.

LASL Area 4 500' tower 10-15KT
 1 500' tower 10-15KT
 3 Threest towers, 300', 2-5KT
 7 Balloon system + 1 tower
 300' towers out if balloons work.

Total: 7-8 shots. **BEST AVAILABLE COPY**

Underground hole existence not classified. Hole

Continuous operation probably out. Starbird

Pilgrim split between spring + fall - essentially continuous.

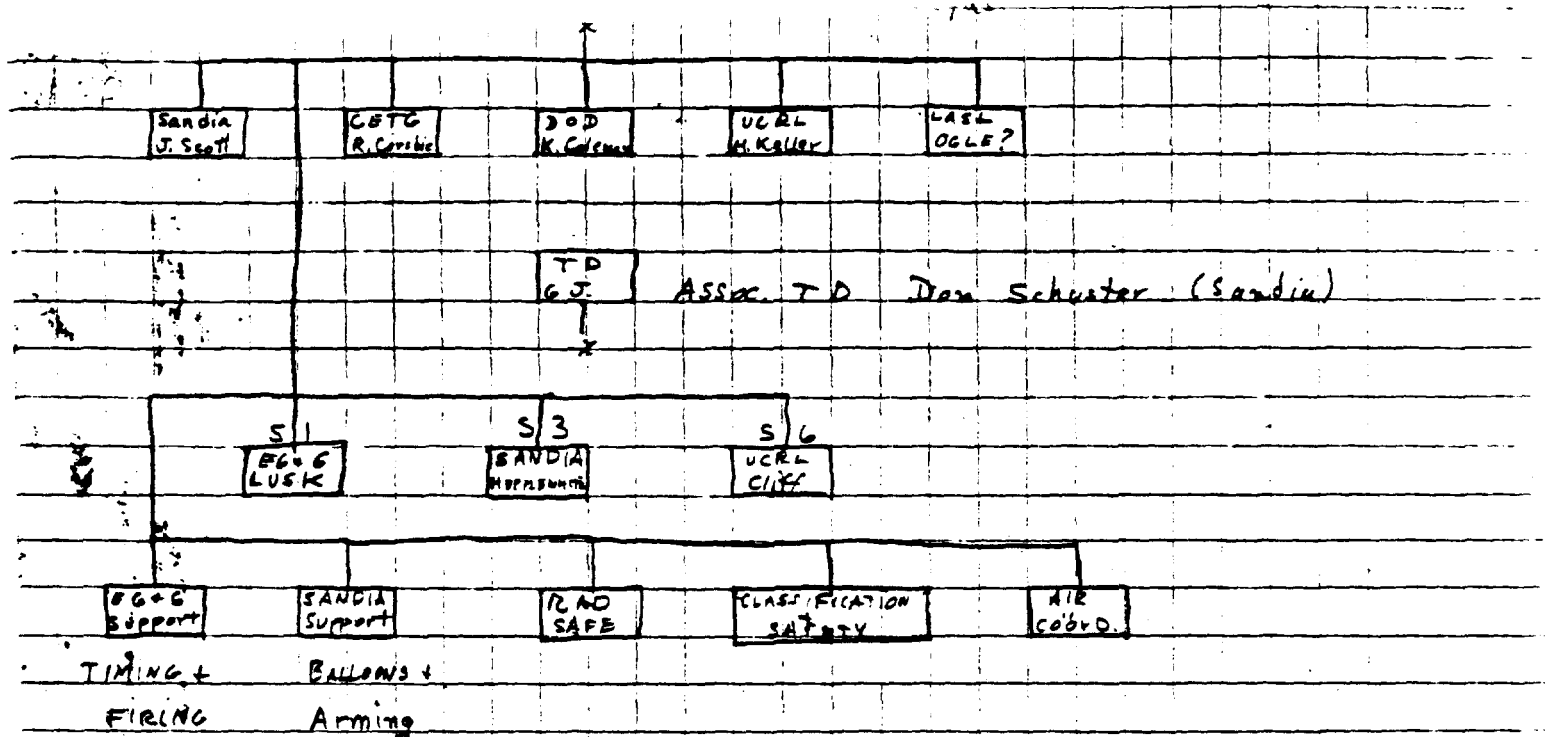
Tower orders 1-500' } 1 JAN
 2-300' }

6-500' } ~ March? LLNL
 2-300' }

3-500' ~ March? or Jan?

Erection not less than 45 days.

62



Operation should start ~ May 1 No sooner.

LASL Area 4 500' tower 10-15 KT
 1 500' tower 10-15 KT
 3 Three + towers, 300', 2-5 KT
 7 Balloon system + 1 tower
 300' towers out if balloons work.

tal: 7-8 shots. **BEST AVAILABLE COPY**

Underground hole existence not classified. Hole to be in May 1.

Continuous operation probably not. Starbird against.

Pilgrim split between spring + fall - essentially could be continuous.

Tower orders 1-500' } 1 JAN
 2-300' }

6-500' } ~ March?
 2-300' }

3-500' ~ March? or Jan.?

Erection not less than 45 days.

LLNL

~~SECRET~~

63

10035 0507

CETG

3 Concrete Domes



Tm 75 - 10 PSI

Thickness 6" to 1 foot (at top)

Family shelters

Underground garage 80x90'

2 Japanese dwellings

Mostly in Frenchman's Elms - DELETED Another sheet 5

D&D

3 Concrete Domes - no thickness variation

Balls on catenary cable

1200 pigs. Trialing mass casualty experiment
Uniform

Around FF ground zone from 10 PSI out.
Complete field hospital. Beds!

Pigs use 30,000 gal/day - 1/2 peak Mercury
150-200 keepers

BEST AVAILABLE COPY

Pigs 60-80 # Out of season!

In pens 8-20 pigs per pen

Pigs stored by well SB in Frenchman's
Sandia

Totem poles - Free standing

8 Balloon rigs ordered. (Permits 8 balloon sh)

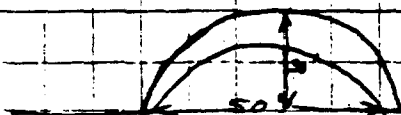
LLNL

64

~~64~~

CETG

Concrete Domes



In 75 - 10 PSI range.

Thickness 6" to 1 foot (at top)

Family shelters

underground garage 80x90'

Japanese dwellings.

by in Frenchman's Field - DELETED Another shot 500' tower

D&D

3 Concrete Domes - no thickness variation

Balls on catenary cable.

1200 pigs. Treating mass casualty experiment
Uniform

Around FF ground zero from 10 PSI out.

Complete field hospital. Beds!

Pigs use 30,000 gal/day - 1/2 peak Mercury consumption
150-200 keepers**BEST AVAILABLE COPY**

Pigs 60-80 # Out of season!

In pens 8-20 pigs per pen

Pigs stored by well 5B in Frenchman's

Sandia.

temples - Free standing

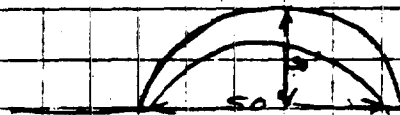
LLNL

Balloon rigs ordered. (Permits 8 balloon shots)

069

to have completed L-500 D/L-100

~~SECRET~~



Thickness 6" to 1 foot (at top)

BEST AVAILABLE COPY

Family shelters

Underground garage 80x90'

2 Japanese dwellings.

Mostly in Frenchman's Flat - **DELETED** Another shelter

DOD

3 Concrete Domes - no thickness variation

Balls on catenary cable

1200 pigs. Trialing mass casualty experiment!
Uniform.

Around FF ground zone from 10 PSI out.
Complete field hospital. Beds!

Pigs use 30,000 gal/day - 1/2 peak Mexico
150-200 keepers

Pigs 60-80 # Out of season!
In pens 8-20 pigs per pen.

Pigs stored by well 5B in Frenchman's

Sandia

Totem poles - Free standing

8 Balloon rigs ordered. (Permits 8 balloon

LLNL

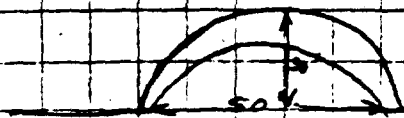
Area B: hope to have completed before Pilgrim.

46b

DELETED

DELETED

Paraffin-lead coffin



In 75 - 10 PSI range.

Thickness 6" to 1 foot (at top)

Family shelters

1. Underground garage 80x90'

2. Japanese dwellings

3. In Frenchman's Field - DELETE. Another shot 500' tower.

Dod

3 Concrete Domes - no thickness variation.

Balls on catenary cable.

1200 pigs. Treating mass casualty experiment

Uniform

Around FF ground zone from 10 PSI out.

Complete field hospital. Beds!

Pigs: use 30,000 gal/day - 1/2 peak Mercury consumption.
150-200 keepers

BEST AVAILABLE COPY

Pigs 60-80 # Out of season!

In pens 8-20 pigs per pen.

Pigs stored by well 5B in Frenchman's

Sandia.

item poles - Free standing

Balloon rigs ordered. (Permits 8 - balloon shots)

LLNI

hope to have completed before Pilgrimage

DELETED

67

DELETED

~~SECRET~~

~~SECRET~~
~~SECRET~~
~~SECRET~~

4 hot spot pipes (Keller)

2 " " " "

15 pipe for various uses on two tiers for pipe end-signal reception.

Keller has no gear in cab for
will study time interval + spectral distribution
fireball.

DELETED

Total fallout for Pilgrim as of 22 Oct, 1956.

(See pg 8)	Spring	UCRL	D 1525	M 704

LASL:

15kt, 500' tower	75T/100'	96	202
" " "	" "	96	202
5kt, 300'	35T/100'	78	63
" " "	" "	78	63
" " "	" "	78	63
" " "	" "	78	63
		504	656

DOD:

40kt, 500' 40T/1 720 120

Fall	UCRL	1954	414

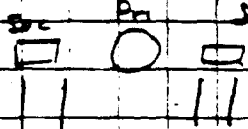
Grand totals:	3633	1894

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683

DELETED



4 hot spot pipes (Keller)

2 " " " "

15 pipes for various uses on

two tiers for pipe end-signal reception.

DELETED

tower has

Keller has no gear in cab for

DELETED

will study from interval + spectral distribution in early fireball.

Total fallout for Pilgrim as of 22 Oct, 1956.

		D	M	T
Spring	VCRL	1525	704	2229

LA SL:

15kt, 500' tower	75T/100'	96	202	298
" " "	" "	96	202	298
5kt, 300'	" 35T/100'	78	63	141
" " "	" "	78	63	141
" " "	" "	78	63	141
" " "	" "	78	63	141
		504	656	1160

D.O.D.:

40kt, 500'	40T/1'	720	120	840

all	VCRL	954	414	1367

Grand Totals:		3633	1894	5597

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69

15 pipes 4 Kt. per 2
2 " " " "

DELETED

15 pipes for various uses on
two tiers for pipe end-signal reception.

Keller has no gear in cab for DELETED
will study from internal & spectral distribution
fireball.

Total fallout for Pilgrim as of 22 Oct, 1956.

(See pg 8) Spring VCRL 1525 704

EASL

15kt	500' tower	75T/100'	96	202
"	"	"	96	202
5kt	300'	35T/100'	78	63
"	"	"	78	63
"	"	"	78	63
"	"	"	78	63
			504	656

DOD:

40kt, 500' 40T/1' 720 170

Fall VCRL 954 414

Grand Totals: 3633 1894

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70

LC 025 05 54

4 hot spot pipes (Keller)

2 " " " "

15 pipes for various uses on

two tiers for pipe end-signal reception.

DELETED

has

Keller has no gear in cab for

DELETED

will study time interval & spectral distribution in early fireball.

Total fallout for Pilgrim as of 22 Oct, 1956.

		D	M	T
Spring	UCRL	1525	704	2229

LASL:

15kt	500' tower	75T/100'	96	202	298
"	"	"	96	202	298
5kt	300'	" 35T/100'	78	63	141
"	"	"	78	63	141
"	"	"	78	63	141
"	"	"	78	63	141
			504	656	1160

DOD:

40kt	500' 40T/1'	720	120	840

all	UCRL	954	414	1367

Grand Totals:		3633	1894	5597

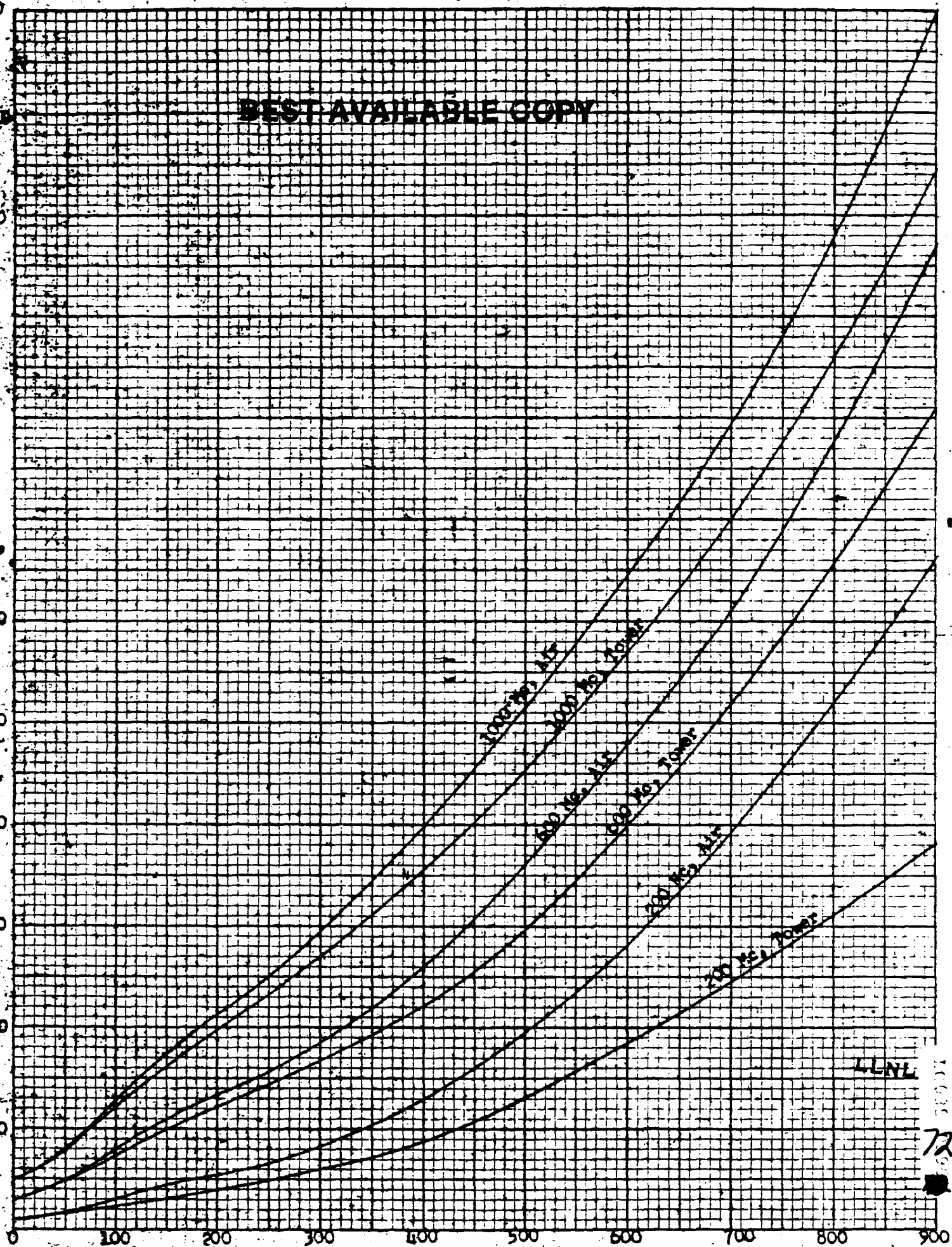
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71

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Burst height vs yield for $E_T = 1000$, with 1 wither ~~1000~~
 No tower 0.4T Tower at 50 tons/10

h	W	h	F_{max}	F_0	W	W max 200
0	4.8	0	0	1000	4.8	-
50	8.0	50	75	985	7.7	-
100	12.8	100	30	970	12.3	-
200	21.3	200	60	940	19.8	-
300	29.6	300	90	910	27.0	-
400	38.0	400	120	880	34.0	-
500	51.5	500	150	850	45.5	✓
600	65.0	600	180	820	57.0	✓
700	80.0	700	210	790	70.0	✓
800	97.0	800	240	760	86.0	✓
900	126.0	900	~~270~~	~~730~~	~~103.0~~	~~105.0~~
1000	142.0	1000	~~300~~	~~700~~	~~122.0~~	
1200	220.0	1200	~~360~~	~~640~~	~~194.0~~	
1500	365.0	1500	~~450~~	~~550~~	~~320.0~~	
2000	700.0	2000	~~600~~	~~400~~	~~600.0~~	

For $E_T = 200$

No Tower		Tower			
h	W	h	F_{max}	F_0	W
0	1.0	0	0	200	1.0
50	1.7	50	15	185	1.5
100	2.8	100	30	170	2.4
200	5.2	200	60	140	4.0
300	8.5	300	80	110	6.0
400	13.1	400	~~120~~	~~80~~	~~8.6~~
500	20.0	500	~~150~~	~~50~~	~~12.3~~
600	27.0	600	~~180~~	~~30~~	~~14.7~~
700	41.0	~~667~~ 700	~~200~~	~~0~~	~~14.0~~
800	51.0	~~800~~			
900	67.0	~~900~~			
1000	83.0	~~1000~~			
1200	152.0	~~1200~~			
1500	280.0	~~1500~~			
2000	520.0	~~2000~~			

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weight vs yield for $F_T = 1000$, with & without towers
 0.6T Tower at 50 tons/100'

W	h	F_{max}	F_D	W	W Maximized
4.8	0	0	1000	4.8	-
8.0	50	75	985	7.7	-
12.8	100	30	970	12.3	-
22.3	200	60	940	19.8	-
29.6	300	90	910	27.0	-
38.0	400	120	880	34.0	-
51.5	500	150	850	45.5	✓
65.0	600	180	820	57.0	✓
80.0	700	210	790	70.0	✓
97.0	800	240	760	86.0	✓
121.0	900	270	730	103.0	105.0
142.0	1000	300	700	122.0	-
220.0	1200	360	640	184.0	-
365.0	1500	450	550	320.0	-
700.0	2000	600	400	600.0	-

For $F_T = 200$ BEST AVAILABLE COPY

Tower W	h	F_{max}	F_D	W	W Maximized
1.0	0	0	200	1.0	-
1.7	50	15	185	1.5	✓
2.8	100	30	170	2.4	✓
5.2	200	60	140	4.0	✓
8.5	300	80	110	6.0	✓
13.1	400	120	80	8.6	8.9
20.0	500	150	50	12.3	13.4
27.0	600	180	20	14.8	18.5
41.0	800	200	0	14.0	25.3
51.0	900				31.0
67.0	1000				38.3
83.0	1200				47.6
152.0	1500				
280.0	2000				
520.0					

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74
22

0	4.8	0	0	1000	4.8	-
50	8.0	50	75	985	7.7	-
100	12.8	100	30	970	12.3	-
200	21.3	200	60	940	19.8	-
300	29.6	300	90	910	27.0	-
400	38.0	400	120	880	34.0	-
500	51.5	500	150	850	45.5	✓
600	65.0	600	180	820	57.0	✓
700	80.0	700	210	790	70.0	✓
800	97.0	800	240	760	86.0	✓
900	121.0	900	270	730	103.0	105.0
1000	140.0	1000	300	700	122.0	
1200	220.0	1200	360	640	194.0	
1500	365.0	1500	450	550	320.0	
2000	700.0	2000	620	420	602.0	

For $E_T = 200$

No Tower		Tower			
h	w	h	F_h	F_D	w
0	1.0	0	0	200	1.0
50	1.7	50	15	185	1.5
100	2.8	100	30	170	2.4
200	5.2	200	60	140	4.0
300	8.5	300	80	110	6.0
400	13.1	400	120	80	8.6
500	20.0	500	150	50	12.3
600	27.0	600	180	20	14.8
700	41.0	667	200	0	14.0
800	51.0	700			
900	67.0	800	BEST AVAILABLE COPY		
1000	83.0	900			
1200	152.0	1000			
1500	280.0	1200			
2000	520.0	1500			
		2000			

LENL

750

SIX

20075 0509

9.8	0	0	1000	46.8	-
8.0	50	75	985	7.7	-
12.8	100	30	970	12.3	-
21.3	200	60	940	19.8	-
29.6	300	90	910	27.0	-
38.0	400	120	880	34.0	-
46.5	500	150	850	45.5	-
65.0	600	180	820	57.0	✓
80.0	700	210	790	70.0	✓
97.0	800	240	760	86.0	✓
124.0	900	270	730	103.0	105.0
140.0	1000	300	700	122.0	
1220.0	1200	360	640	134.0	
365.0	1500	450	550	320.0	
700.0	2000	600	400	600.0	

For $F_T = 200$

Tower		Tower			
W	h	F_h	F_d	W	Maximized
1.0	0	0	200	1.0	-
1.7	50	15	185	1.5	✓
2.8	100	30	170	2.4	✓
5.2	200	60	140	4.0	✓
8.5	300	90	110	6.0	✓
13.1	400	120	80	8.6	8.9
20.0	500	150	50	12.3	13.4
27.0	600	180	20	14.8	18.5
41.0	667	200	0	17.0	
51.0	700				25.3
67.0	800				31.0
83.0	900				38.3
100	1000				47.6
152.0	1200				
280.0	1500				
520.0	2000				

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76

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NTS Board Meeting, Las Vegas, 26 Oct, 1956

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atives, Sub-Committee on Fallout:

1. How serious is the predicted fallout for Pilgrim?
2. How can the hazard be reduced?
3. Should the hazard be reduced?
4. What should NTS testing criteria be?
5. Organization, operation, & functions of a FOPU.

Membership: Shelton
Nagler
Machta
Merritt
Cowan
Stopinski
Sherman
Israel
Kennedy
Gocke

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Special assignments:

Pilgrim predictions, total MC: UCRL

Methods of computing: USWB, SANDIA

Correlation of delay with hazard on total MC: LASL, ICE

The sub-committee will meet for two days prior to next board meeting at Albuquerque.

Pilgrim, LASL

Spring:	1.8 kt	20,000'
	11 kt	500'
	11 kt	500'
	2 kt	Bullhorn
	11-35 kt	500'
	~ 3@5 kt	300' tentative

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Fall:
8 kt
2 kt

77

Objectives, Sub-Committee on Fallout:

1. How serious is the predicted fallout for Pilgrim?
2. How can the hazard be reduced?
3. Should the hazard be reduced?
4. What should NTS testing criteria be?
5. Organization, operation, & functions of a FCI

Membership:

Shelton

Naylor

Machta

Merritt

Cowan

Stopinski

Sherman

Israel

Kennedy

Gocke

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Special assignments:

Pilgrim predictions, total MC: UCRL

Methods of computing: USWB, SANDIA

Correlation of delay with hazard on to

The sub-committee will meet for two days
the next board meeting at Albuquerque.

Pilgrim, LASL

Spring: 1.8 kt 20,000'

11 kt 500'

11 kt 500'

2 kt Bullhorn

11-35 kt 500'

~ 30.5 kt 300' tentative

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78

Fall: 8 kt

2 kt

1. How serious is the predicted fallout for Pilgrim?
2. How can the hazard be reduced?
3. Should the hazard be reduced?
4. What should NTS testing criteria be?
5. Organization, operation, & functions of a FO

Membership: Shelton
Nagler
Machta
Merritt
Cowan
Stopinski
Sherman
Israel
Kennedy
Goetze

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Special assignments:

Pilgrim predictions, total MC: UCRL
Methods of computing: USWB, SANDIA
Correlation of delay with hazard on tot

The sub-committee will meet for two days
the next board meeting at Albuquerque.

Pilgrim, LASL

Spring:	1.8 kt	20,000'
	11 kt	500'
	11 kt	500'
	2 kt	Bullhorn
	11-35 kt	500'
	~ 3@ 5 kt	300' tentative

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Fall: 8 kt
2 kt
+ 2 others

Fall UCRL: 10 kt - 700'
30 kt - 500'
~ 3@ 10 kt 300'

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1. How serious is the predicted fallout for Pilgrim?
2. How can the hazard be reduced?
3. Should the hazard be reduced?
4. What should NTS testing criteria be?
5. Organization, operation, & functions of a FOPU

membership:

- Shelton
- Nagler
- Machta
- Merritt
- Cowan
- Stopinski
- Sherman
- Israel
- Kennedy
- Goeke

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special assignments:

Pilgrim predictions, total Mc: UCRL

Methods of computing: USWB, SANDIA

Correlation of delay with hazard on total Mc: LASL, UCRL

The sub-committee will meet for two days prior to next board meeting at Albuquerque.

Pilgrim, LASL

Spring:	1.8 kt	70,000'
	11 kt	500'
	11 kt	500'
	2 kt	Bellarm
	11-35 kt	500'
	~ 3@5 kt	300' tentative

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Fall:

- 8 kt
- 2 kt
- + 2 others

UCRL:

- 10 kt - 700'
- 30 kt - 500'
- ~ 3@10 kt 300'

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7B

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Clarks Station, Nevada	(5)	800
Crestline, Nevada	(25)	700
Crystal, Nevada	7	4000
Crystal Springs, Nevada	(0)	1000
Currant, Nevada	(5)	500
Desert Rock, Nevada	--	50
Dry Lake, Nevada	(10)	1000
Duckwater, Nevada	(100)	800
East Ely, Nevada	1200	600
Eden Creek Ranch, Nevada	(5)	700
Elgin, Nevada	(25)	3500
Ely, Nevada	3558	600
Enterprise, Utah	790	700
Eureka, Nevada	575	200
Fallini Ranch, Nevada	(15)	800
Furnance Creek, California	(50)	0
Garrison, Utah	(25)	700
Glendale, Nevada	50	700
Glendale, Utah	226	1200
Goldfield, Nevada	336	0
Grocm, Nevada	(0)	2000
Gunlock, Utah	127	2600
Hamilton Fort, Utah	26	600
Henderson, Nevada	3643	20
Hiko, Nevada	55	1000

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Hoover, Dam, Nevada	(30)	50
Hurricane, Utah	1271	4200
Indian Springs, Nevada	(500)	50
Johnnie, Nevada	(5)	0
Kanab, Utah	1287	1600
Kanarraville, Utah	263	1200
Kimberley, Nevada	507	500
Kingman, Arizona	(5000)	30
Lake Meade Resort, Nevada	(5)	50
Las Vegas, Nevada	50,000	200
Lathrop Wells, Nevada	9	50
Leeds, Utah	215	3000
Lincoln Mine, Nevada	500	4000
Littlefield, Arizona	(25)	1600
Lockes Ranch, Nevada	(5)	1300
Logandale, Nevada	300	400
Long Valley, Utah	(100)	800
Lund, Nevada	200	800
Lund, Utah	75	500
Mercury, Nevada	—	100
Mesquite, Nevada	580	1800
McGill, Nevada	2297	400
Milford, Utah	1673	100
Minersville, Utah	593	200
Moapa, Nevada	22	800

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Modena, Utah	84	500
Mount Carmel, Utah	125	850
Mount Trumbull, Arizona	(5)	160
Nellis AFB, Nevada	(1000)	50
New Castle, Utah	115	600
New Harmony, Utah	126	1200
North Las Vegas, Nevada	(8000)	200
Nyala, Nevada	(5)	1700
Orderville, Utah	321	1500
Overton, Nevada	527	350
Pahrump, Nevada	(100)	200
Panaca, Nevada	500	650
Panguitch, Utah	1501	200
Paragonah, Utah	404	400
Parowan, Utah	1455	400
Peach Springs, Arizona	(150)	0
Pintura, Utah	219	1200
Pioche, Nevada	~~1202~~ 392	700
Preston, Nevada	37	700
Reed, Nevada	(0)	4000
Riverside, Nevada	(15)	7800
Rockville, Utah	266	3000
Round Mt., Nevada	300	50
Rox, Nevada	(10)	3000
Ruth, Nevada	1244	500
Saint George, Utah	4562	3000

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Santa Clara, Utah	319	3500
Sharp's (Adaven), Nevada	25	1200
Shivwits, Utah	95	2800
Short Creek, Arizona	(300)	1600
Shoshone, Nevada	(10)	700
Springdale, Nevada	(5)	20
Springdale, Utah	209	2600
Sunnyside, Nevada	25	1200
Toquerville, Utah	219	2000
Tonopah, Nevada	1375	0
Ursine, Nevada	(25)	600
Veyo, Utah	100	2000
Virgin, Utah	147	1500
Warm Springs, Nevada	(5)	500
Warm Springs Ranch, Nevada	(15)	1000
Washington, Utah	435	3000
Whitney, Nevada	(1000)	0
Wolf Hole, Arizona	(5)	1300
Zahe, Utah	25	300

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Dunning's proposed pay system: (1951-1961), (1961-1971), etc.

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~~SECRET~~

Pilgrim Mc as of 29 Oct, 1956

UCRL:					
Spring	{	20 kt	400' tower (75tm/100')	420	180
		20 kt	400' tower "	420	180
		80 kt	1500' Balloon	0	1
		30 kt	500' tower (75tm/100')	440	225
		0.4 kt	300' tower (35tm/100')	0	28
		0.3 kt	200' tower "	0	26
		10 kt	300' tower "	255	63
				1535	704

Fall	{	40 kt	700' tower (50tm/100')	250	210
		30 kt	500' tower (75tm/100')	440	225
		3 at ~10 kt	300' tower (35tm/100')	3x255	3x63
				1455	624

Totals: 2990 1328

LASL:					
Spring	{	1.8 kt	20,000' air	0	1
		11 kt	500' tower (75tm/100')	34	184
		11 kt	500' " "	34	184
		2 kt	Balloon	0	1
		35 kt	500' tower (75tm/100')	560	225
		3 at ~5 kt	300' " (35tm/100')	3x80	3x63
				868	784

Fall	{	7 kt	300' tower (35tm/100')	190	63
		2 kt	" " "	3	49
		2 at 5 kt	" " "	2x80	2x63
				353	238

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Totals: 1221 1022

DOD:	40 kt	500' tower (40tm/100')	720	17
(Spring)				

Grand totals, Spring:		3123	1608
" " Fall:		1808	262
Grand totals, 1957:		4931	2470

Pilgrim Me as of 29 Oct, 1954

			D	M	T
CRL:	20 kt	400' tower (75tn/100')	420	180	600
	20 kt	400' tower "	420	180	600
Spring	80 kt	1500' Balloon	0	1	1
	30 kt	500' tower (75tn/100')	440	225	665
	0.4 kt	300' tower (35tn/100')	0	28	29
	0.3 kt	200' tower "	0	26	26
	10 kt	300' tower "	255	63	318
			1535	704	2239

211	40 kt	700' tower (50tn/100')	250	210	460
	30 kt	500' tower (75tn/100')	440	225	665
	3 at ~10 kt	300' tower (35tn/100')	3X255	3X63	3X318
			1455	624	2079

Totals: 2990 1328 4318

SL:	1.8 kt	20,000' air	0	1	1
ring	11 kt	500' tower (75tn/100')	34	184	218
	11 kt	500' " "	34	184	218
	2 kt	Balloons	0	1	1
	35 kt	500' tower (75tn/100')	560	225	785
	3 at ~5 kt	300' " (35tn/100')	3X80	3X63	3X143
			868	784	1652

1	7 kt	300' tower (35tn/100')	190	63	253
	2 kt	" " "	3	49	52
	2 at 5 kt	" " "	2X80	2X63	2X143
			353	238	591

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Totals: 1221 1022 2243

2:	40 kt	500' tower (40tn/100')	720	122	840

ng)					LLNL
	Grand totals, Spring		3123	1608	4731
	" " Fall		1808	862	2670

Grand totals, 1957: 4931 2470 7401 89

Spring	20 KT	1500' Balloon	0
	30 KT	500' tower (75tm/100')	440
	0.4 KT	300' tower (35tm/100')	0
	0.3 KT	200' tower "	0
	10 KT	300' tower "	255
			1535

Fall	40 KT	700' tower (50tm/100')	250
	30 KT	500' tower (75tm/100')	440
	3 at ~10 KT	300' tower (35tm/100')	3x25
			1455

Totals: 2990

LASL:	1.8 KT	20,000' air	0
Spring	11 KT	500' tower (75tm/100')	34
	11 KT	500' " "	34
	2 KT	Balloons	0
	35 KT	500' tower (75tm/100')	560
	3 at ~5 KT	300' " (35tm/100')	3x80
			868

Fall	2 KT	300' tower (35tm/100')	190
	2 KT	" " "	3
	2 at 5 KT	" " "	2x90
			353

Totals: 1221

DOD: 40 KT 500' tower (40tm/100') 720
(Spring)

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Grand totals, Spring: 3123
" " , Fall: 1808

Grand totals, 1957: 4931

	0-200M	200-400	400-600	600-800	800-1000	1000-1200
UK:	6	0	1	0	1	1
T:	8	2	1	2	1	0

		420	180	600
Spring	80 KT	1500' Balloon	0	1
	30 KT	500' tower (75 ton/100')	440	225
	0.4 KT	300' tower (35 ton/100')	0	28
	0.3 KT	200' tower "	0	26
	10 KT	300' tower "	255	63
		1535	704	2231

Fall	40 KT	700' tower (50 ton/100')	250	210	460
	30 KT	500' tower (75 ton/100')	440	225	665
	3 at ~10 KT	300' tower (35 ton/100')	3x255	3x63	3x318
		1455	624	2079	

Totals: 2990 1328 4318

Spring	1.8 KT	20,000' air	0	1	1
	11 KT	500' tower (75 ton/100')	34	184	218
	11 KT	500' " "	34	184	218
	2 KT	Balloons	0	1	1
	35 KT	500' tower (75 ton/100')	560	225	785
3 at ~5 KT		300' " (35 ton/100')	3x80	3x63	3x143
		868	784	1652	

Fall	7 KT	300' tower (35 ton/100')	190	63	253
	2 KT	" " "	3	49	52
	2 at 5 KT	" " "	2x80	2x63	2x143
		353	238	591	

Totals: 1221 1022 2243

JD:	40 KT	500' tower (40 ton/100')	720	126	846

pring)

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Grand totals, Spring :	3123	1608	4731
" " , Fall :	1808	862	2670

Grand totals, 1957 :	4931	2470	7401

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200-400	400-600	600-800	800-1000	1000-1200	1200-1400	2000-2200
6	0	1	0	1	1	1
3	2	1	2	1	0	0

1 Shot schedule for Pilgrim, spring, (I) as of 31 Oct, 195

UCRL 2 @ 20 kt, 400' T Area 2 5-
 1 @ 30 kt, 500' T 2 6-
 1 @ 20 kt, 1500' B 9
 * 1 @ 2-5 kt, 300' T 9
 * 1 @ 0.2-0.7 kt, 300' T 9
 * 1 @ 2-10 kt, 300' T 9
 * 1 @ 0.4 kt, 300' T

LASL 3 @ 11 kt, 500' T 4, 7, 3 Area 4:
 1 @ 2 kt, 500' B 7
 1 @ 35 kt, 500' T 1
 * 1 @ 2-10 kt, 300' T 3
 * 2 @ 5-3 kt 200', 300' T 3

DOD 1 @ 40 kt 500' T F 6-1-5
 1 @ 1.8 kt 20,000 R

	D	M	T
0.7 kt, 300' T	0	34	34
0.9 kt, 300' T	0	36	36
3 kt, 200' T	96	42	138
3 kt 300' T	19	56	75

BEST AVAILABLE COPY
 600 MG.

No tower		Tower @ 50 tons/100'				
h	W	h	F _{max}	F _D	W	W _{maximized}
0	2.9	0	0	600	2.9	✓
50	4.9	50	15	585	4.8	✓
100	7.9	100	30	570	7.4	✓
200	13.3	200	60	540	12.2	✓
300	19.2	300	90	510	17.0	✓
400	25.6	400	120	480	21.8	✓
500	36.3	500	150	450	30.5	✓
600	48	600	180	420	39.5	✓
700	61	700	~~210~~	~~390~~	~~51.0~~	52
800	78	800	~~240~~	~~360~~	~~63~~	65
900	97	900	~~270~~	~~330~~	~~78~~	81
1000	116	1000	~~300~~	~~300~~	~~95~~	92

LLNL

92

date for Pilgrim, spring, (T) as of 31 Oct, 1956.

29

~~SECRET~~

2 @ 20 kt, 400' T	Area 2	5-15-56, 5-25-56
1 @ 30 kt, 500' T	2	6-15-57
1 @ 20 kt, 1500' B	9	
1 @ 2-5 kt, 300' T	9	
1 @ 0.2-0.7 kt, 300' T	9	
1 @ 2-10 kt, 300' T	9	5-1-56
2 @ 0.4 kt, 300' T		
3 @ 11 kt, 500' T	4, 7, 3	Area 4: 5-1-56
1 @ 2 kt, 500' B	7	
1 @ 35 kt, 500' T	1	
1 @ 2-8 kt, 300' T	3	
2 @ 1.5-3 kt, 200' T, 300' T	3	

1 @ 40 kt, 500' T	F	6-1-56
1 @ 1.0 kt, 20,000 R		

	D	M	T
300' T	0	34	34
300' T	0	36	36
200' T	96	42	138
300' T	19	56	75

BEST AVAILABLE COPY

600 Mci

Tower @ 50 tons/100'

h	F _{max}	F _D	W	W _{maximized}
0	0	600	2.9	✓
50	15	585	4.8	✓
100	30	570	7.4	✓
200	60	540	12.2	✓
300	90	510	17.0	✓
400	120	480	21.8	✓
500	150	450	30.5	✓
600	180	420	39.5	✓
700	~~210~~	~~390~~	~~51.0~~	52
800	~~240~~	~~360~~	~~63~~	65
900	~~270~~	~~330~~	~~78~~	81
1000	~~300~~	~~300~~	~~95~~	

LLNL

43

LC035 0617

	A	D	m	Fallout	Totals	Pipin.	D	B	m	T	
UCRL	500' T @ 75'	440	225	645	2542	500'	310	225	535	15	400'
30 Kt	400' T	420	180	600	20	500'	200	225	425	260	
20 Kt	400' T	420	180	600	20	500'	200	225	425		
5 Kt	300' T @ 35'	80	63	143	5	300'			143		
10 Kt	300' T	255	63	318	10	300'			318		
7 Kt	300' T	0	34	34	7	200'	3	34	32		
ASL		1615	745	2360			1048	835	1883		

35 Kt	500' T @ 75'	560	225	785	29	500'	310	225	535		
11 Kt	500' T	34	184	218							
11 Kt	500' T	34	184	218							
2.8 Kt	300' T @ 35'	0	36	36							
3 Kt	300' T	19	56	75							
8 Kt	200' T	96	42	138							
1 Kt	500' T @ 75'	34	124	218							
		777	911	1688			527	911	1438		
		2392	1656	4048			1575	1746	3321		

					UCRL } A						
					LASL }		1280	585	1865		
							358	819	1577		
							2038	1444	3482		
								675	1395		

BEST AVAILABLE COPY

If started shots on balloons:

29 Nov, 1956

Teapot, Max Mc (used in predictions) vs actual Mc.

Shot	Yield	Mc		Fest, actual w. 35, 59, 757/100
	Act.	Prod	Act.	
Matth	2.5	143	41	72
Matth	7	323	200	213
Tesla	40	1205	888	985
Turk	3.6	143	99	97
Harnet	15.5	1205	256	317 230
Apple	7	323	69	159
Bee	1.8	63	51	49
Post	24	1200	619	670
Mat	31.5	-	737	675
Apple II	32.5	1205	441	475
Zucchini		5810	3401	3652

$$3401 = \sim 60\% \text{ of } 5810$$

Pilgrim, 6 mo in advance, appears to be 36% greater
Teapot, 6 mo in advance.

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LLNL

50035 (101)

97

Max Mc (used in predictions) vs actual Mc (calculated)

Yield	Mc		Fest, actual w. 35, 50, 75, 100
Act	Prod	Act	
2.9	143	41	72
7	323	260	213
40	1205	888	905
3.6	143	99	97
15.5	1205	256	317 230
7	323	69	159
1.8	63	51	49
24	1200	619	670
51.5	-	737	675
32.5	1205	441	475
	5810	3401	3652

21 = ~ 60% of 5810

6 me in advance, appears to be 30% greater than
6 me in advance.

BEST AVAILABLE COPY

LLNL

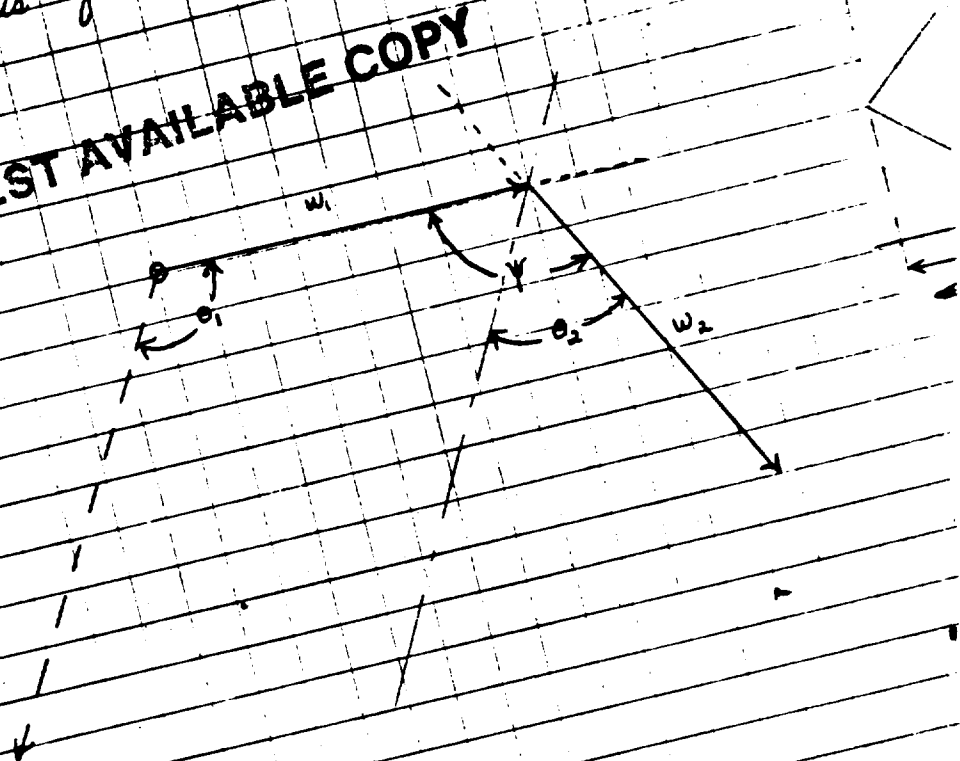
98

LC035 0022

32

Analysis for Site 300: most critical bearing

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$$C_1 = W_1 \cos \theta_1$$

$$C_2 = W_2 \cos \theta_2$$

$$\psi = \theta_2 + \pi - \theta_1$$

$$\Delta C = C_1 - C_2 = W_1 \cos \theta_1 - W_2 \cos \theta_2$$

$$= W_1 \cos \theta_1 - W_2 \cos (\psi + \theta_1)$$

$$= W_1 \cos \theta_1 + W_2 \cos \psi \cos \theta_1 -$$

$$\Delta C = W_1 \cos \theta_1 + W_2 (\cos \psi \cos \theta_1 -$$

$$\frac{d(\Delta C)}{d\theta_1} = -W_1 \sin \theta_1 + W_2 (-\cos \psi \sin \theta_1)$$

$$\text{Set } \frac{d(\Delta C)}{d\theta_1} = 0 = -W_1 \sin \theta_1 + W_2 \cos \psi \sin \theta_1$$

$$= -W_1 + W_2 \cos \psi$$

$$W_2 \sin \psi \tan \theta_1 = -W_1 - W_2$$

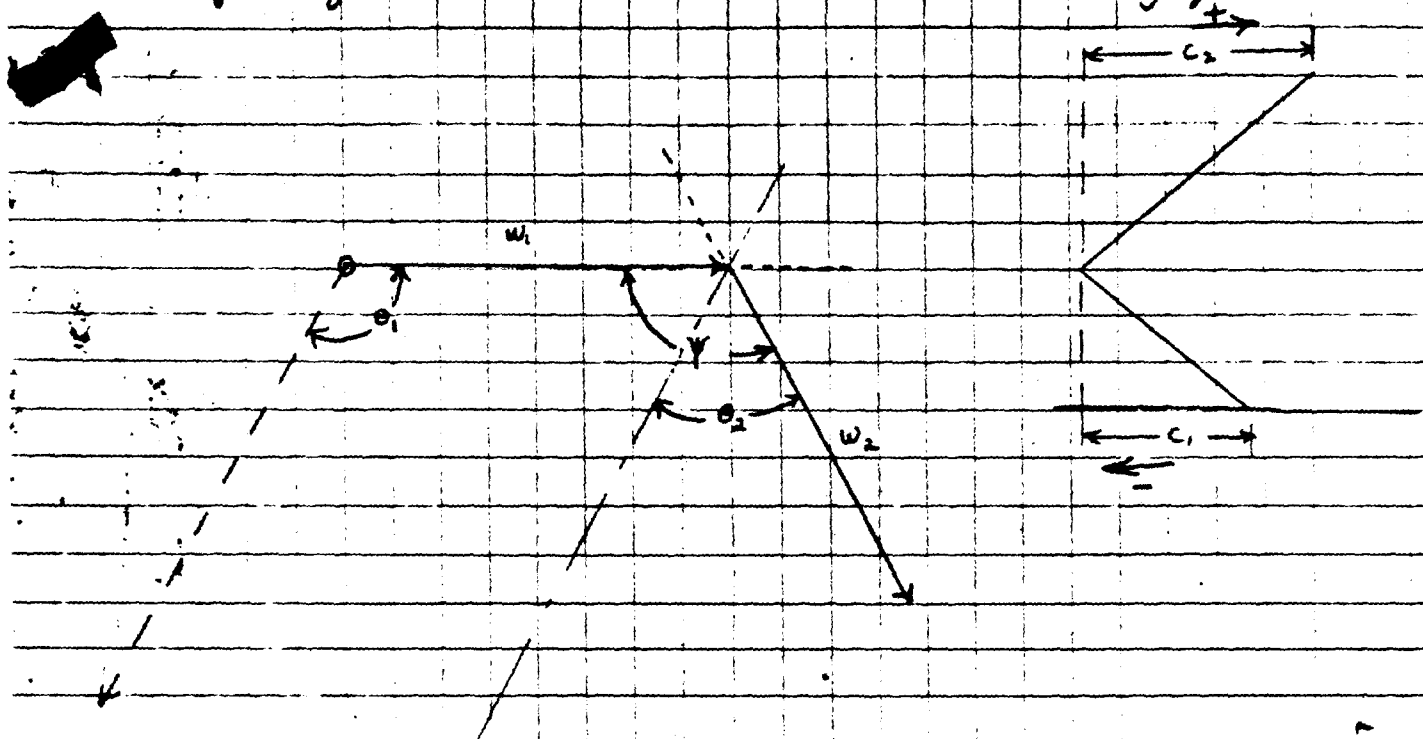
$$W_2 \tan \theta_1 = \frac{-W_1 - W_2}{\sin \psi}$$

$$\tan \theta_1 = \frac{-W_1 - W_2}{W_2 \sin \psi}$$

$$\tan \theta_1 = \frac{-W_1 - W_2}{W_2 \sin \psi}$$

$$\theta_1 = \tan^{-1} \left(\frac{-W_1 - W_2}{W_2 \sin \psi} \right)$$

Analysis for Site 300: most critical bearing from wind sounds



$$C_1 = W_1 \cos \theta_1$$

$$C_2 = W_2 \cos \theta_2$$

$$\theta_2 = \theta_1 + \pi - \Psi$$

$$C = C_1 - C_2 = W_1 \cos \theta_1 - W_2 \cos \theta_2$$

$$= W_1 \cos \theta_1 - W_2 \cos (\Psi + \theta_1 - \pi)$$

$$= W_1 \cos \theta_1 + W_2 \cos (\Psi + \theta_1)$$

$$C = W_1 \cos \theta_1 + W_2 (\cos \Psi \cos \theta_1 - \sin \Psi \sin \theta_1)$$

$$\frac{d(C)}{d\theta_1} = -W_1 \sin \theta_1 + W_2 (-\cos \Psi \sin \theta_1 - \sin \Psi \cos \theta_1)$$

$$\text{Set } \frac{d(C)}{d\theta_1} = 0 = -W_1 \sin \theta_1 + W_2 \cos \Psi \sin \theta_1 + W_2 \sin \Psi \cos \theta_1$$

$$= -W_1 + W_2 \cos \Psi + W_2 \sin \Psi \cot \theta_1$$

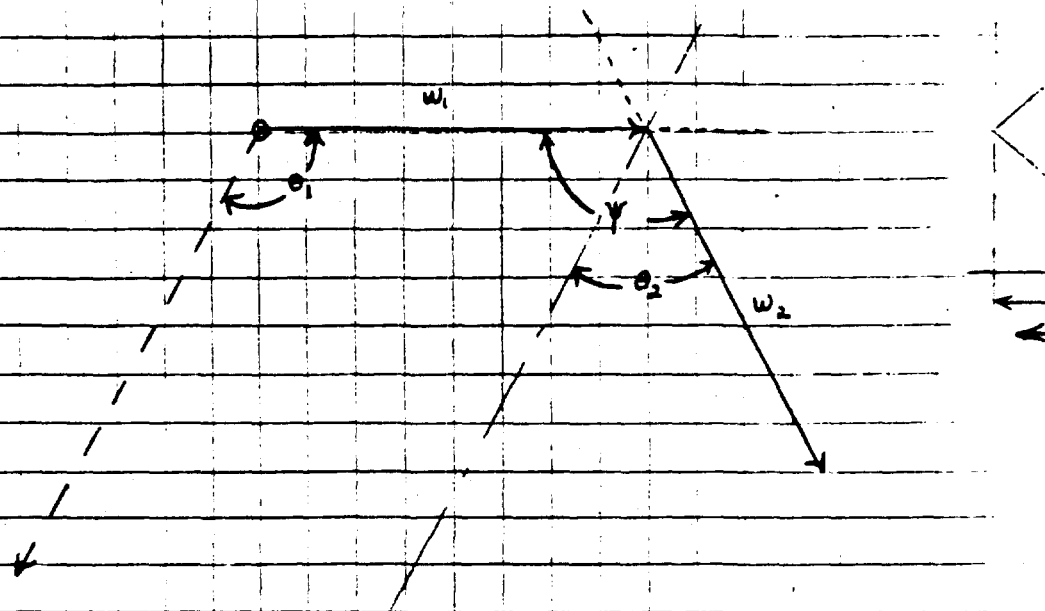
$$W_2 \sin \Psi \cot \theta_1 = -W_1 - W_2 \cos \Psi$$

$$W_2 \cot \theta_1 = \frac{-W_1}{\sin \Psi} - W_2 \cot \Psi$$

$$\cot \theta_1 = \frac{-W_1}{W_2 \sin \Psi} - \cot \Psi \quad (1)$$

$$\tan \theta_1 = \frac{W_2 \sin \Psi}{W_1 + W_2 \cos \Psi}$$

$$\theta_1 = \tan^{-1} \left(\frac{W_2 \sin \Psi}{W_1 + W_2 \cos \Psi} \right) \quad (2)$$



$$C_1 = W_1 \cos \theta_1$$

$$C_2 = W_2 \cos \theta_2$$

$$\Psi = \theta_2 + \pi - \theta_1$$

$$\begin{aligned} \Delta C &= C_1 - C_2 = W_1 \cos \theta_1 - W_2 \cos \theta_2 \\ &= W_1 \cos \theta_1 - W_2 \cos (\Psi + \theta_1 - \pi) \\ &= W_1 \cos \theta_1 + W_2 \cos (\Psi + \theta_1) \\ \Delta C &= W_1 \cos \theta_1 + W_2 (\cos \Psi \cos \theta_1 - \sin \Psi \sin \theta_1) \end{aligned}$$

$$\frac{d(\Delta C)}{d\theta_1} = -W_1 \sin \theta_1 + W_2 (-\cos \Psi \sin \theta_1 - \sin \Psi \cos \theta_1)$$

$$\begin{aligned} \text{Set } \frac{d(\Delta C)}{d\theta_1} = 0 &= -W_1 \sin \theta_1 + W_2 \cos \Psi \sin \theta_1 + W_2 \sin \Psi \cos \theta_1 \\ &= W_1 + W_2 \cos \Psi + W_2 \sin \Psi \cot \theta_1 \end{aligned}$$

$$\begin{aligned} W_2 \sin \Psi \cot \theta_1 &= -W_1 - W_2 \cos \Psi \\ W_2 \cot \theta_1 &= \frac{-W_1}{\sin \Psi} - W_2 \cot \Psi \end{aligned}$$

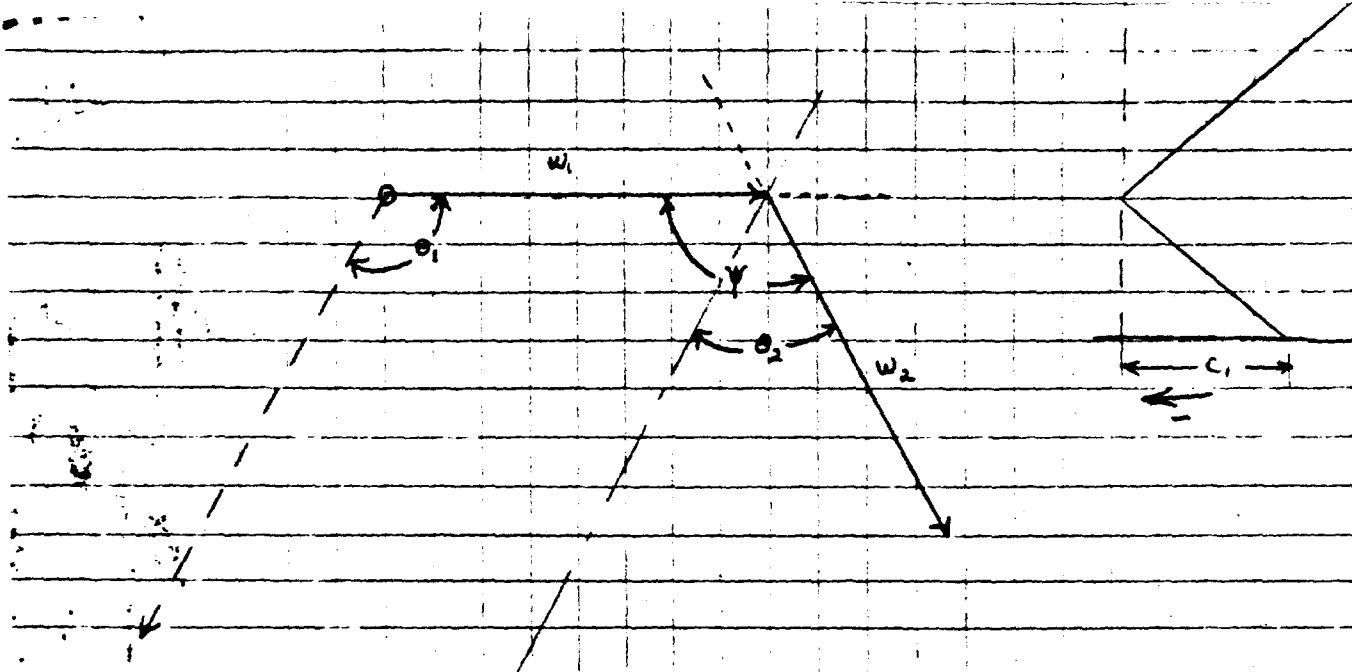
$$\cot \theta_1 = \frac{-W_1}{W_2 \sin \Psi} - \cot \Psi$$

BEST AVAILABLE COPY

$$\tan \theta_1 = \frac{W_2 \sin \Psi}{W_1 + W_2 \cos \Psi} \quad \text{LLNL}$$

$$\text{For } C_1 + C_2 \text{ max: } \cot \theta_1 = \frac{W_1}{W_2 \sin \Psi} - \cot \Psi \quad 101$$

~~SECRET~~



$$C_1 = w_1 \cos \theta_1$$

$$C_2 = w_2 \cos \theta_2$$

$$\psi = \theta_2 + \pi - \theta_1$$

$$C = C_1 - C_2 = w_1 \cos \theta_1 - w_2 \cos \theta_2$$

$$= w_1 \cos \theta_1 - w_2 \cos (\psi + \theta_1 - \pi)$$

$$= w_1 \cos \theta_1 + w_2 \cos (\psi + \theta_1)$$

$$\Delta C = w_1 \cos \theta_1 + w_2 (\cos \psi \cos \theta_1 - \sin \psi \sin \theta_1)$$

$$\frac{d(\Delta C)}{d\theta_1} = -w_1 \sin \theta_1 + w_2 (-\cos \psi \sin \theta_1 - \sin \psi \cos \theta_1)$$

$$\text{Set } \frac{d(\Delta C)}{d\theta_1} = 0 = -w_1 \sin \theta_1 + w_2 \cos \psi \sin \theta_1 + w_2 \sin \psi \cos \theta_1$$

$$= -w_1 + w_2 \cos \psi + w_2 \sin \psi \cot \theta_1$$

$$w_2 \sin \psi \cot \theta_1 = -w_1 - w_2 \cos \psi$$

$$w_2 \cot \theta_1 = \frac{-w_1}{\sin \psi} - w_2 \cot \psi$$

$$\cot \theta_1 = \frac{-w_1}{w_2 \sin \psi} - \cot \psi$$

$$\tan \theta_1 = \frac{w_2 \sin \psi}{w_1 + w_2 \cos \psi}$$

$$\text{For } C_1 + C_2 \text{ max: } \cot \theta_1 = \frac{w_1}{w_2 \sin \psi} - \cot \psi$$

RECORDED

Site 200: Critical Beam, check against data. SE

Date	w_1	w_2	ψ	w/w_2	$\frac{w_1}{w_2 \sin \psi}$	$\cos \psi$	$\cos \theta$
11-30-56	30	26	81°	1.15	1.16	.141	-1.301

Eg. ②

11-30-56	"	"	"	"	"	"	1.019

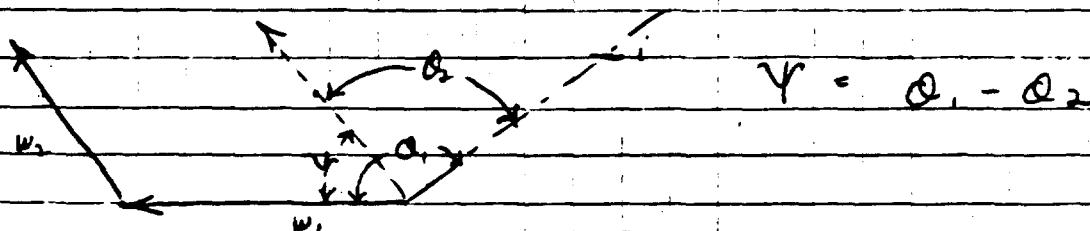
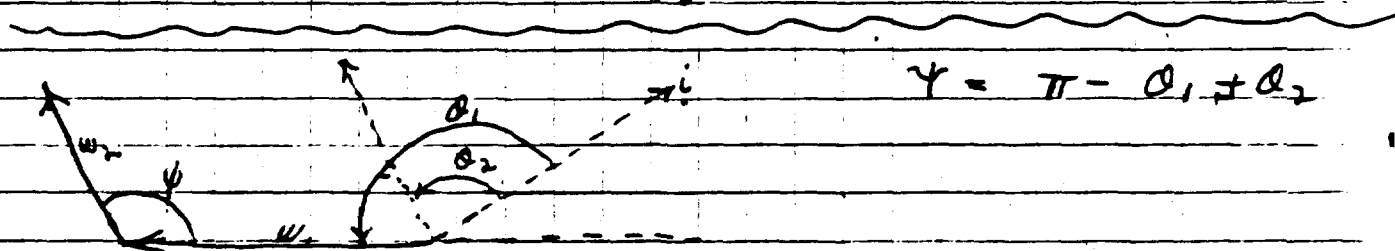
11-21-56	72	38	44°	1.89	2.72	1.036	1.684

Eg. ③

11-21-56							3.76
							3.76

$$C_1 + C_2 = 72 - 7.19 = 38$$

$$= 72 \times$$



BEST AVAILABLE COPY

$$C_1 = w_1 \cos \theta_1$$

$$C_2 = w_2 \cos \theta_2 = w_2 \cos (\theta_1 - \psi)$$

$$C_1 + C_2 = w_1 \cos \theta_1 + w_2 \cos (\theta_1 - \psi)$$

$$\Delta C = w_1 \cos \theta_1 - w_2 (\cos \theta_1 \cos \psi + \sin \theta_1 \sin \psi)$$

$$\frac{d \Delta C}{d \theta_1} = -w_1 \sin \theta_1 - w_2 (-\sin \theta_1 \cos \psi + \cos \theta_1 \sin \psi)$$

$$w_1 \sin \theta_1 = w_2 \sin \theta_1 \cos \psi - w_2 \cos \theta_1 \sin \psi$$

$$\frac{w_1 \sin \theta_1}{w_2 \sin \theta_1} = \cos \psi - \frac{w_2 \cos \theta_1 \sin \psi}{w_2 \sin \theta_1}$$

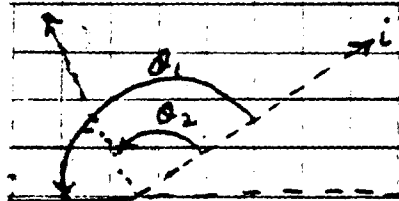
LLNL

103

100: Critical Drilling, check against curve.

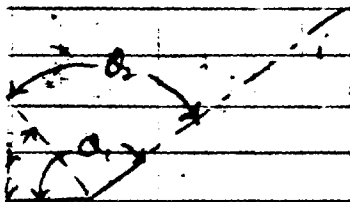
w_2	ψ	w_1/w_2	$w_1 \sin \psi$	$\sin \psi$	$E_8 \text{ @}$ $\sin \theta_1$	Bearing	Actual
26	81°	1.15	1.16	.141	-1.301	130°	130°
Eg ②							
"	"	"	"	"	1.019	~~48°~~ 228°	228°
38	44°	1.89	2.72	1.036	1.684	~~44°~~ 108° 284°	
Eg ③							
					3.76	~~89°~~ 59°	50-70
					3.76	59°	50°-70°

$$C_1 + C_2 = 72 - 71.9 = 38$$



$$\psi = \pi - \theta_1 + \theta_2$$

BEST AVAILABLE COPY



$$\psi = \theta_1 - \theta_2$$

$$= w_1 \cos \theta_1$$

$$= w_2 \cos \theta_2 = w_2 \cos (\theta_1 - \psi)$$

$$C_2 = w_1 \cos \theta_1 \mp w_2 \cos (\theta_1 - \psi) \quad \text{use } -$$

$$C = w_1 \cos \theta_1 - w_2 (\cos \theta_1 \cos \psi + \sin \theta_1 \sin \psi)$$

$$\frac{C}{\sin \theta_1} = -w_1 \sin \theta_1 - w_2 (-\sin \theta_1 \cos \psi + \cos \theta_1 \sin \psi) = 0$$

$$w_1 \sin \theta_1 = w_2 \sin \theta_1 \cos \psi - w_2 \cos \theta_1 \sin \psi$$

LLNL

$$\frac{w_1 \sin \theta_1}{w_2 \sin \theta_1} = \cos \psi - \frac{w_2 \cos \theta_1 \sin \psi}{w_2 \sin \theta_1}$$

104

11-30-56

72

38

44°

1.89

2.72

1.036

1.024

11-21-56

Eg ①

3.76

3.76

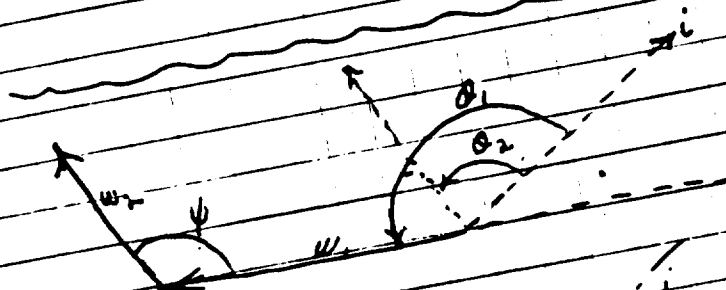
Eg ②

1.019

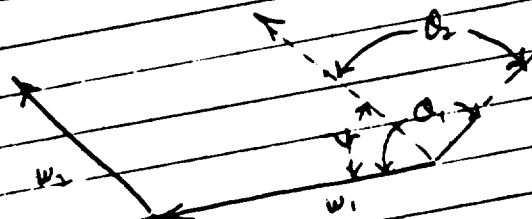
11-21-56

$$C_1 + C_2 = 72 + 71.9 = 143.9$$

$$\psi = \pi - \theta_1 + \theta_2$$



$$\psi = \theta_1 - \theta_2$$



BEST AVAILABLE COPY

$$C_1 = w_1 \cos \theta_1$$

$$C_2 = w_2 \cos \theta_2 = w_2 \cos (\theta_1 - \psi)$$

$$C_1 \mp C_2 = w_1 \cos \theta_1 \mp w_2 \cos (\theta_1 - \psi)$$

$$\Delta C = w_1 \cos \theta_1 - w_2 (\cos \theta_1 \cos \psi + \sin \theta_1 \sin \psi)$$

$$\frac{d \Delta C}{d \theta_1} = -w_1 \sin \theta_1 - w_2 (-\sin \theta_1 \cos \psi + \cos \theta_1 \sin \psi)$$

$$w_1 \sin \theta_1 = w_2 \sin \theta_1 \cos \psi - w_2 \cos \theta_1 \sin \psi$$

$$\frac{w_1 \sin \theta_1}{w_2 \sin \theta_1} = \cos \psi - \frac{w_2 \cos \theta_1 \sin \psi}{w_2 \sin \theta_1}$$

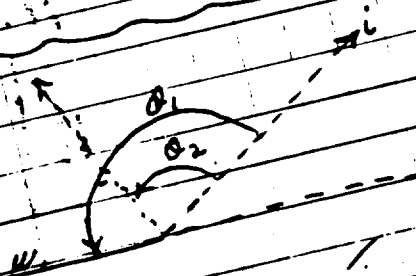
$$w_1/w_2 = \cos \psi - \sin \psi \cot \theta_1$$

$$\tan \theta_1 = \frac{\sin \psi}{\cos \psi - w_1/w_2}$$

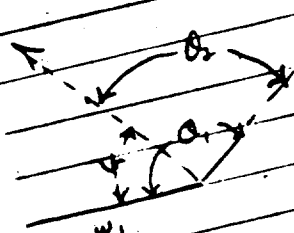
		Eg	(2)	"	"	"	→ 70° 294°		
		"	"	"	"	1.684			
		"	"	"	"	1.036			
		"	"	"	"	2.72			
		"	"	"	"	1.89			
		"	"	"	"	44°			
		"	"	"	"	38			
		"	"	"	"	72			
		Eg	(1)			3.76	89° ~~#9~~ °	50-70	
						3.76	59°	50°-70	

$$C_1 + C_2 = 72 \times 719 = 38$$

$$\psi = \pi - \alpha_1 + \alpha_2$$



$$Y = Q_1 - Q_2$$



BEST AVAILABLE COPY

$$C_1 = W_1 \cos \theta_1 = W_2 \cos (\theta_1 - \psi)$$

$$C_1 = W_1 \cos \theta_1 = W_2 \cos \theta_2$$

$$C_2 = W_2 \cos \theta_2 = W_1 \cos \theta_1 + W_2 \cos (\theta_1 - \psi)$$

$$W_1 \cos \theta_1 + W_2 \cos \psi + \sin \theta_1 \sin \psi$$

$$\Delta C = w_1 \cos \theta_1 - w_2 (\cos \theta_1 \cos \psi + \sin \theta_1 \sin \psi)$$

$$\frac{d \Delta C}{d Q_1} = -w_1 \sin Q_1 \cos \psi - w_2 \cos Q_1 \sin \psi$$

$$W_1 \sin \theta_1 = W_2 \sin \theta_1 \cos \psi$$

$$\frac{W_1 \sin \alpha_1}{W_2 \sin \alpha_2} = \frac{\cos \psi - \sin \psi \tan \alpha_2}{\cos \psi - \sin \psi \tan \alpha_1}$$

$$\frac{w_1}{w_2} = \cos \psi - \sin \psi \tanh \alpha_1$$

~~SECRET~~

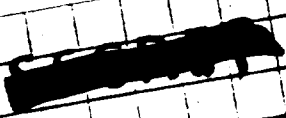
UI

$$\sin \theta = \sin \gamma - \frac{w_1}{w_2} \sin \gamma$$

Date	w_1	w_2	γ	w_1/w_2	$\frac{w_1}{w_2 \sin \gamma}$	$\sin \gamma$	$\sin$
12-3-56	14	56	49°	.3035	.4021	.8693	.467
12-3-56	8	8	49°	1	1.325	"	.455
11-28-56	18	5.3	55°	3.396	4.146	.7002	-3.446
11-26-56	11	27	44°	1.571	2.24	1.035	-1.20
12-4-56	17	28	30°	.68	1.36	1.732	.372

BEST AVAILABLE COPY

File 2



$$\text{ctn } \theta_1 = \text{ctn } \gamma - \frac{w_1}{w_2 \sin \gamma}$$

w_2	γ	w_1/w_2	$\frac{w_1}{w_2 \sin \gamma}$
56	49°	3.035	4.021
8	49°	1	1.325
5.3	55°	3.396	4.146
7	44°	1.571	2.24
38	30°	1.68	1.36

ctn γ	ctn θ_1	Bearing	W. of Actual
8683	4672	35°	Wrong
"	4557	170°	
7002	-3.446	43°	30°
1.035	-1.205	104	90°
1.732	.372	40°	70°

BEST AVAILABLE COPY

Shot Schedule as of 5 December 1956

Date	Device	Lab	Area-Method
May 15		LASL	7 Tower 500'
May 22		LASL	3 Tower 200'
May 27		LASL	7 Balloon
June 1		UCRL	4 Tower 500'
June 1		LASL	9 Balloon
June 4		DGD	7 Balloon
June 7		UCRL	F Tower 600'?
June 10		LASL	9 Balloon
June 12		UCRL	7 Balloon
June 20		UCRL	9 Balloon
June 25		LASL	2 Tower 500'
June 28		UCRL	7 Balloon
June 30		UCRL	9 Balloon
July 9		LASL	2 Tower 500'
July 9		LASL	7 Balloon
August 1		LASL	1 Tower 500'
August 6		UCRL	3 Tower
August 6		UCRL	2 Tower 500'
August 12		LASL	9 Balloon
August 15		UCRL	7 Balloon
August 25		UCRL	9 Balloon
Sept. 1		UCRL	8 Tower 700'
Sept. 4		UCRL	9 Balloon
Sept. 15		UCRL	Underground

DELETED

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Shot Schedule as of 5 December 1956

Device	Lab.	Area-Method	Yield
LASL		7 Tower 500'	11 kt
LASL		3 Tower 200'	20 t
LASL		7 Balloon	2 kt
LASL		4 Tower 500'	11 kt
UCRL		9 Balloon	10 kt
LASL		7 Balloon	1.7 kt
DGD		F Tower 600'?	40 kt
UCRL		9 Balloon	0.5 kt
LASL		7 Balloon	40 kt
UCRL		9 Balloon	5 kt
UCRL		2 Tower 500'	15 kt
LASL		7 Balloon	Long
UCRL		9 Balloon	80 kt
UCRL		2 Tower 500'	15 kt
LASL		7 Balloon	?
LASL		1 Tower 500'	11 kt
LASL		3 Tower	8 kt
UCRL		2 Tower 500'	25 kt
UCRL		9 Balloon	<10
LASL		7 Balloon	50 kt
UCRL		9 Balloon	<10
UCRL		8 Tower 700'	50 kt
UCRL		9 Balloon	<10
UCRL		Underground	1.8

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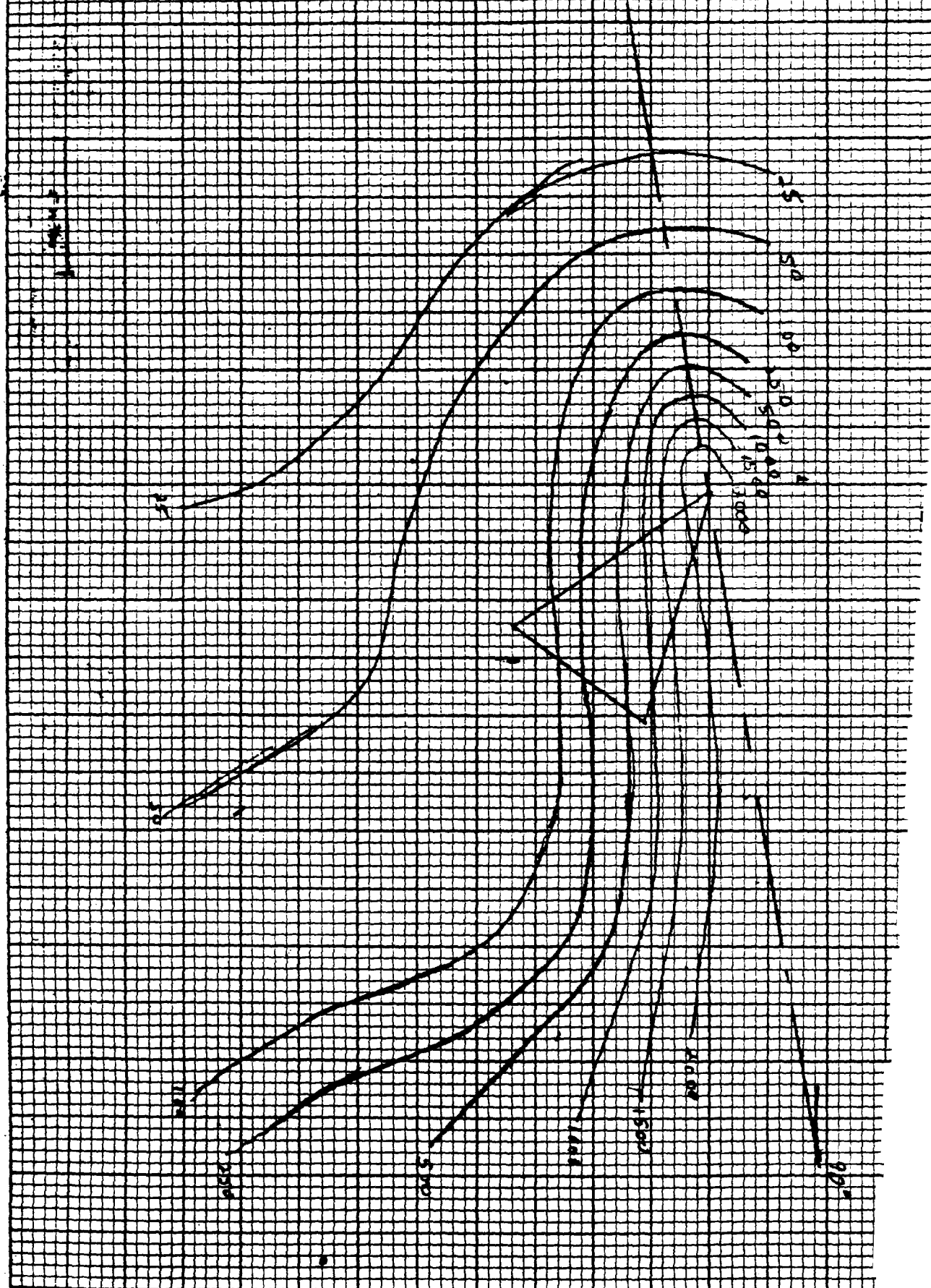
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Tearpot Weather Delay Date

Shot	Ready	Fined	Δ	Yield
Tunk	15 Feb	7 Mar	2019	43 ± 2
Tesla	28 Feb	1 Mar	0	6.9 ± 0.2
Apple I	9 Mar	29 Mar	18	15 ± 2
Wasp		18 Feb	0	1.2 ± 0.1
Moth		22 Feb	0	2.4 ± 0.2
HADR		25 Mar	0	—
Met		15 April	7	23 ± 1.5
Past		9 April	1	1.5 ± 0.1
HA		6 April	0	3.2 ± 0.2
Hornet		12 March	3	3.6 ± 0.2
Ess		23 March	1	8.1 ± 0.3
Bee		22 March	0	3.2 ± 0.2
Wasp I		29 March	0	30 ± 3
Apple II		5 May	9	29 ± 2
Zucchini		15 May	7	

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Estimate of Taongi Lagoon Fallout from Bravo

R/hr H+1	$\frac{1}{mi^2}$	R/hr ave	Mc/mi ² ave	(nmi) ²
72000	6	2500	750	1.11
32000-1800	16	1700	510	2.96
1800-1000	15	1250	375	2.78
1000-500	33	750	225	6.10
500-250	37	375	110	6.84
250-100	14	175	50	2.59
100-80	10	95	30	1.85
				24.23

$$\frac{19kt}{10,000kt} = .0019$$

10MT: Dose Rate on Southern Islands: Min
Max

Mc in lagoon: min ~ 6000
Max ~ 6000

1 MT Dose Rates 10 R/hr → 100 R/hr.

Mc in lagoon ~ 1000 or 0.33 pc

Intensities 3' above lagoon at 1 hr

At southern end 500 mr/hr
at Northern end 100 R/hr

Lagoon interstitial decay ~ t

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10075 0033

Estimate of Taongi Lagoon Fallout from Bravo Pattern.

$\frac{1}{4}$ in ²	R/hr ave	Mt/mi ² ave	(nmi) ²	MC
6	2500	750	1.11	832
16	1700	510	2.96	1510
15	1250	375	2.78	1042
33	750	225	6.10	1372
37	375	110	6.84	752
14	175	50	2.59	130
10	95	30	1.85	56
			24.23	5694 MC
				= 19 kt

$$\frac{19 \text{ kt}}{10,000 \text{ kt}} = .0019$$

Dose Rate on Southern Islands: Min 90 R/hr at 1 hr
Max ~ 500 R/hr at 1 hr

Mc in lagoon: min ~ 6000
Max ~ 6000

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1T Dose Rates 10 R/hr → 100 R/hr. South to North

Mc in lagoon ~ 1000 or 0.33 percent.

Intensities 3' above lagoon at 1 hr: (÷ 20)

at southern end 500 mr/hr at 1 hr
at northern end 100 R/hr at 1 hr

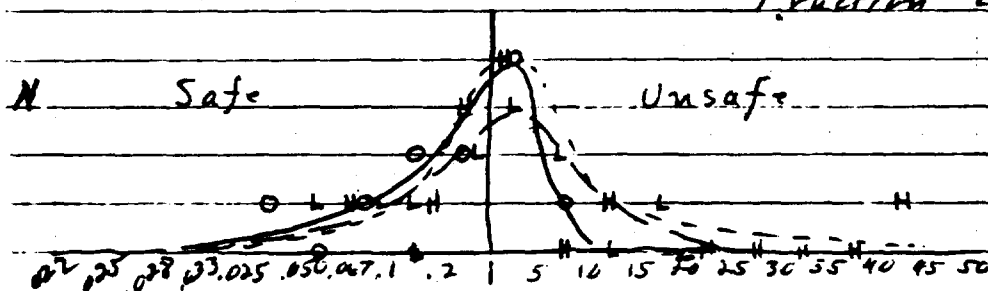
Lagoon interstitial decay ~ $t^{-1.2}$

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	Feet				Deviation, lbs.			Fraction	
	H	O	L	T	H	O	L	H	
1	500	50	90	500	0	-450	-410	1	0
2	350	65	45	8	+342	+57	+37	43.8	
3	300	60	500	25	+275	+35	+475	12.0	
4	35	160	330	65	-30	+95	+265	0.54	2
5	500	45	45	500	0	-455	-455	1	0
6	35	9	360	200	-165	-191	+160	0.18	0
7	70	170	8	140	-70	+30	-132	0.5	1
8	500	70	110	360	+140	-290	-250	1.4	0
9	6	10	28	17	-11	-7	+11	0.35	
10	500	360	220	500	0	-140	-280	1	
11	35	500	500	500	-465	0	0	0.07	
Ave	257	136	203	256				Ave 5.62	

Fraction of T curves

0 ———
 L ———
 H ———

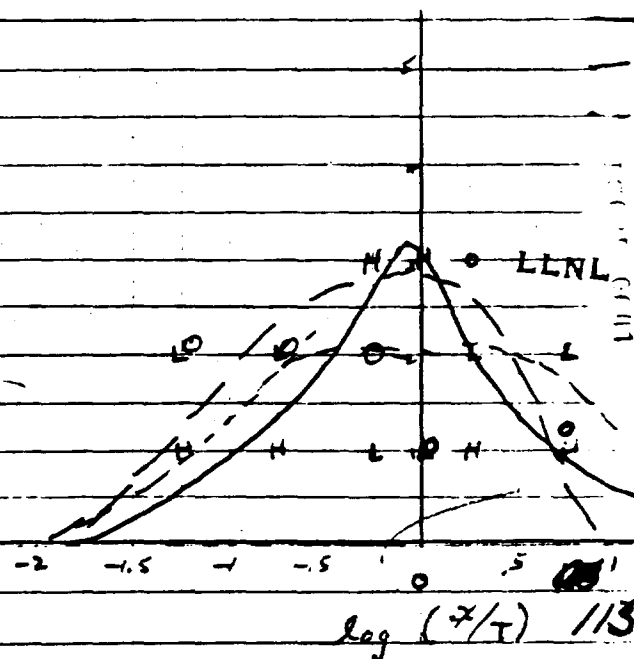


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which corresponds to a probable error in # of 1/8,

Log (x/T)

H	O	L	
0	-1.000	-.745	
1.641	.908	.748	
1.079	.380	1.301	
-.268	.398	.708	
0	-1.046	-1.046	
-.745	-1.398	.255	
-.301	.079	-1.222	
.146	-.721	-.509	
-.456	-.229	.204	
0	-.143	-.357	
-1.155	0	0	
Σ	-0.059	-2.772	-0.663

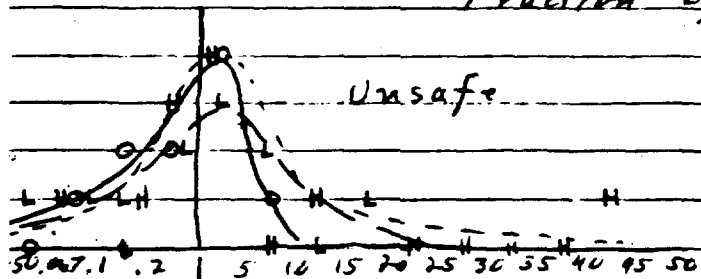


Relative mean, H 0

300 Blast Test Verifications with Tracy run.

Facts			Deviation, lbs.			Fraction of T ($\frac{x}{T}$)		
O	L	T	H	O	L	H	O	L
50	90	500	0	-450	-410	1	0.1	0.18
45	45	2	+342	+57	+37	43.8	8.1	5.6
60	500	25	+275	+35	+475	12.0	2.4	20.0
60	330	65	-30	+95	+265	0.54	2.5	5.1
45	45	500	0	-455	-455	1	0.09	0.09
9	360	200	-165	-191	+160	0.18	0.04	1.8
170	8	140	-70	+30	-132	0.5	1.2	0.06
70	110	360	+140	-290	-250	1.4	0.19	0.31
10	28	17	-11	-7	+11	0.35	0.59	1.6
360	220	500	0	-140	-280	1	0.72	0.44
500	500	500	-465	0	0	0.07	1	1
136	203	256				5.62	1.54	3.29

Fraction of T curves

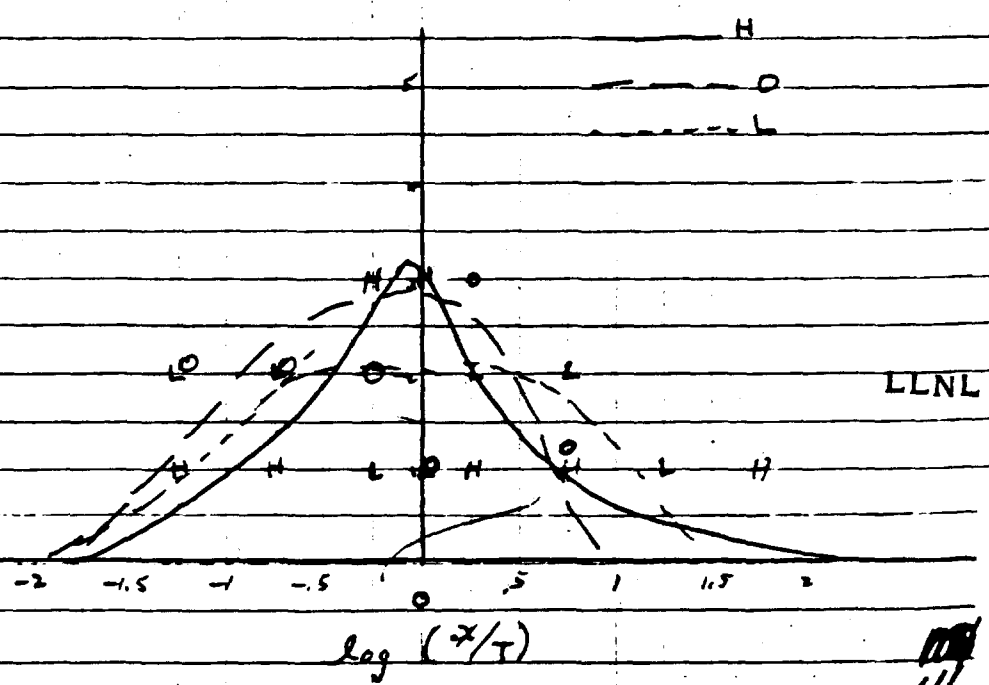


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corresponds to a probable error in # of ~ 48 , $\mu_b \sim 42$.

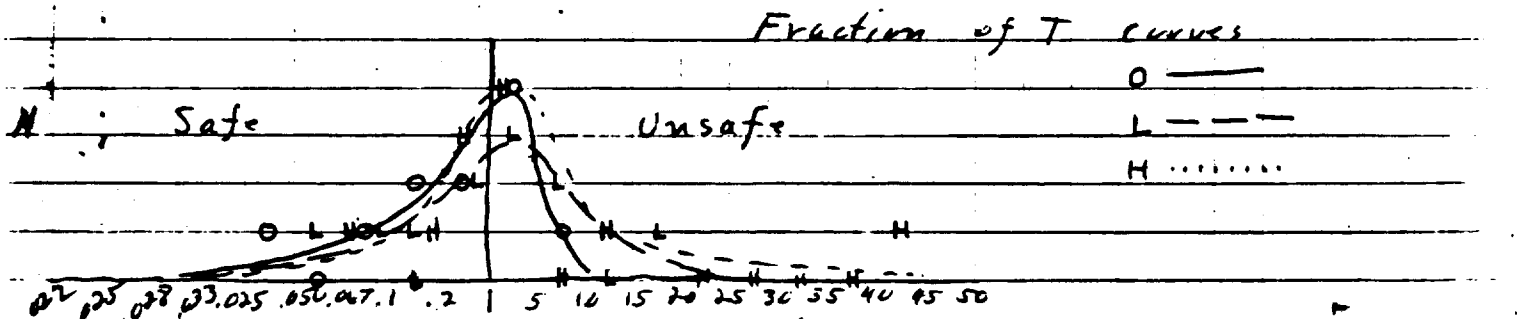
Log ($\frac{x}{T}$)

O	L
-1.000	-.745
.908	.748
.380	1.301
.398	.708
-1.046	-1.046
-1.398	.755
.079	-1.222
-.721	-.509
-.229	.204
-.143	-.357
0	0
-2.772	-0.663

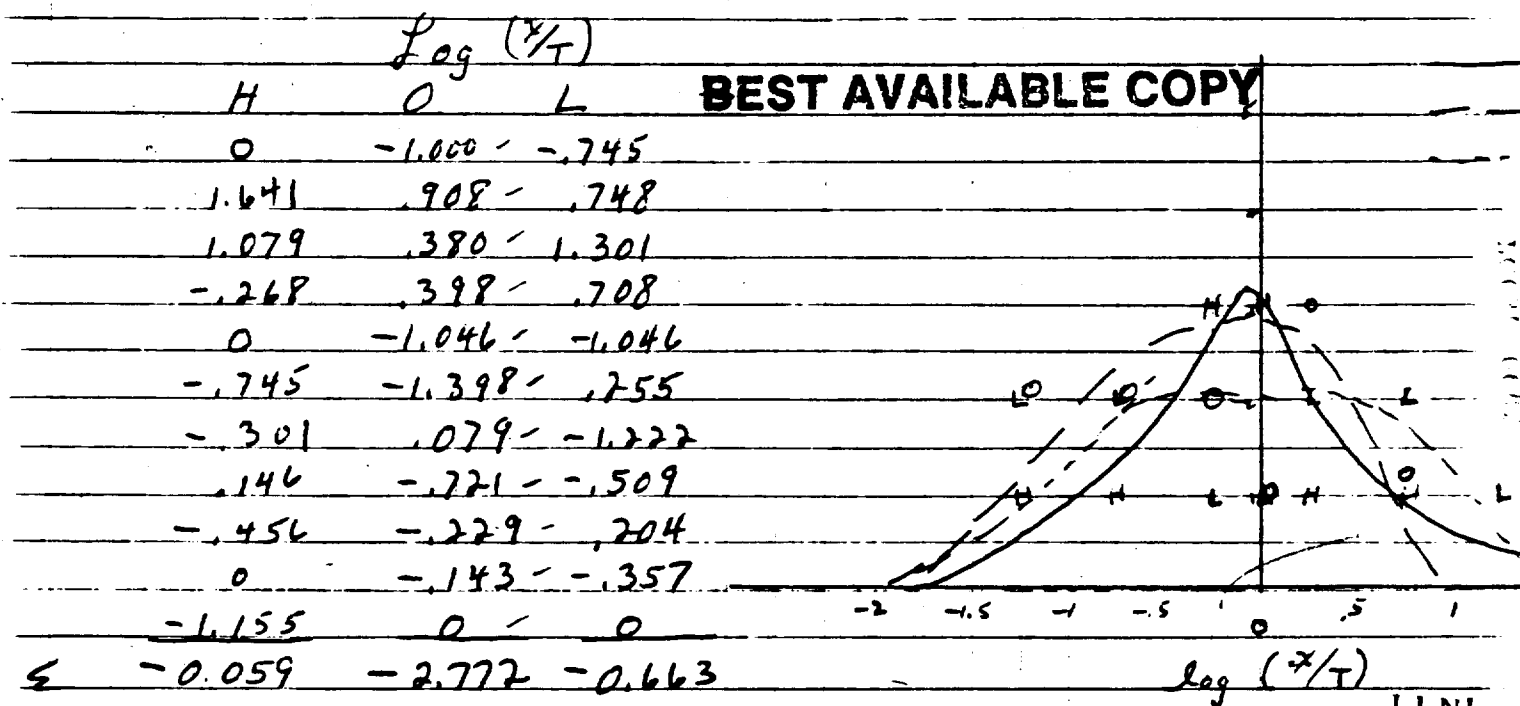


Relative error, H O L

1	350	65	45	8	+342	+57	+37	43.8	8
2	300	60	500	25	+275	+35	+475	12.0	2
4	35	160	330	65	-30	+95	+265	0.54	2.
5	500	45	45	500	0	-455	-455	1	0.0
6	35	9	360	200	-165	-191	+160	0.18	0.
7	70	170	8	140	-70	+30	-132	0.5	1.
8	500	70	110	360	+140	-290	-250	1.4	0.
9	6	10	28	17	-11	-7	+11	0.35	0.
10	500	360	220	500	0	-140	-280	1	0.
11	35	500	500	500	-465	0	0	0.07	
Ave	257	136	203	256				Ave 5.62	1.



which corresponds to a probable error in # of ~48,



Relative error H 0

Probable max log(x/T) 0.456 .721

x/T ~3 ~5

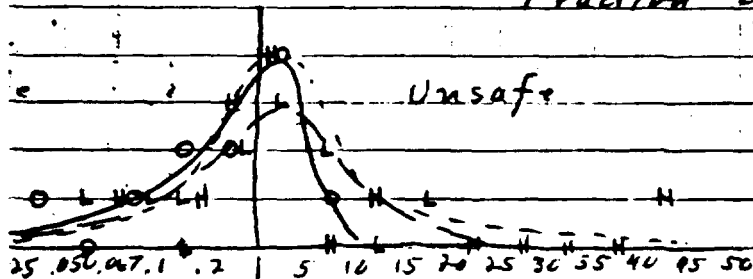
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more page 40

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30	70	200	0	720	710	1	0.1	0.18
65	45	8	+342	+57	+37	43.8	8.1	5.6
60	500	25	+275	+35	+475	12.0	2.4	20.0
160	330	65	-30	+95	+265	0.54	2.5	5.1
45	45	500	0	-455	-455	1	0.09	0.09
9	360	200	-165	-191	+160	0.18	0.04	1.8
70	8	140	-70	+30	-132	0.5	1.2	0.06
70	110	360	+140	-290	-250	1.4	0.19	0.31
10	28	17	-11	-7	+11	0.35	0.59	1.6
160	220	500	0	-140	-280	1	0.72	0.44
500	500	500	-465	0	0	0.07	1	1
136	203	256				5.62	1.54	3.29

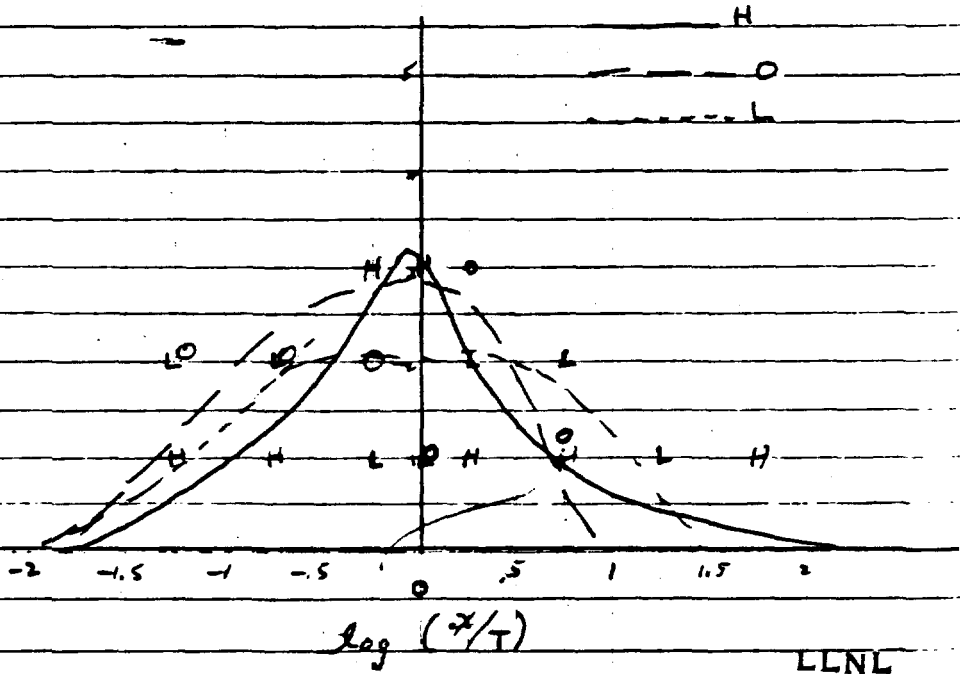
Fraction of T curves



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corresponds to a probable error in # of ~ 48 , $\mu \sim 42$.

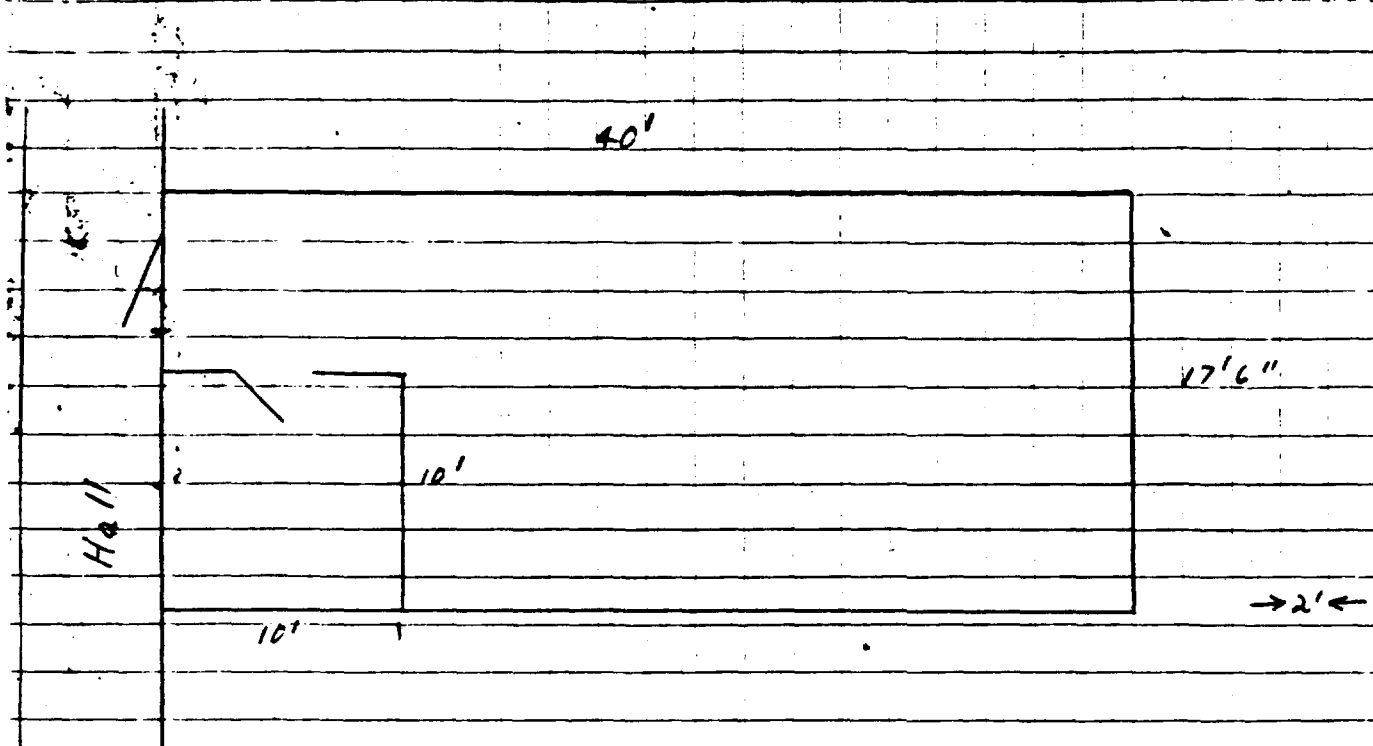
	$\log (x/T)$	
43	0	L
2	-1.000	-0.745
641	.908	.748
079	.380	1.301
268	.398	.708
2	-1.046	-1.046
745	-1.398	.755
301	.079	-1.222
146	-.721	-.509
456	-.229	.204
2	-.143	-.357
155	0	0
159	-2.772	-0.663



Relative error	H	O	L
Probable max $\log (x/T)$	0.456	.721	.745
x/T	~ 3	~ 5	~ 5

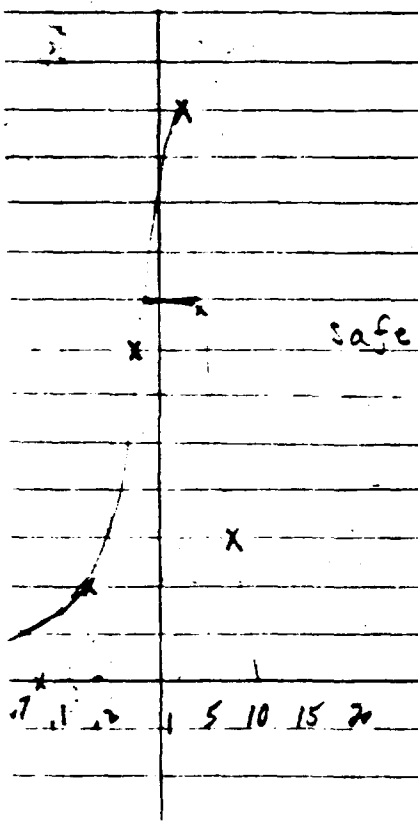
more page 40

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X4 safe

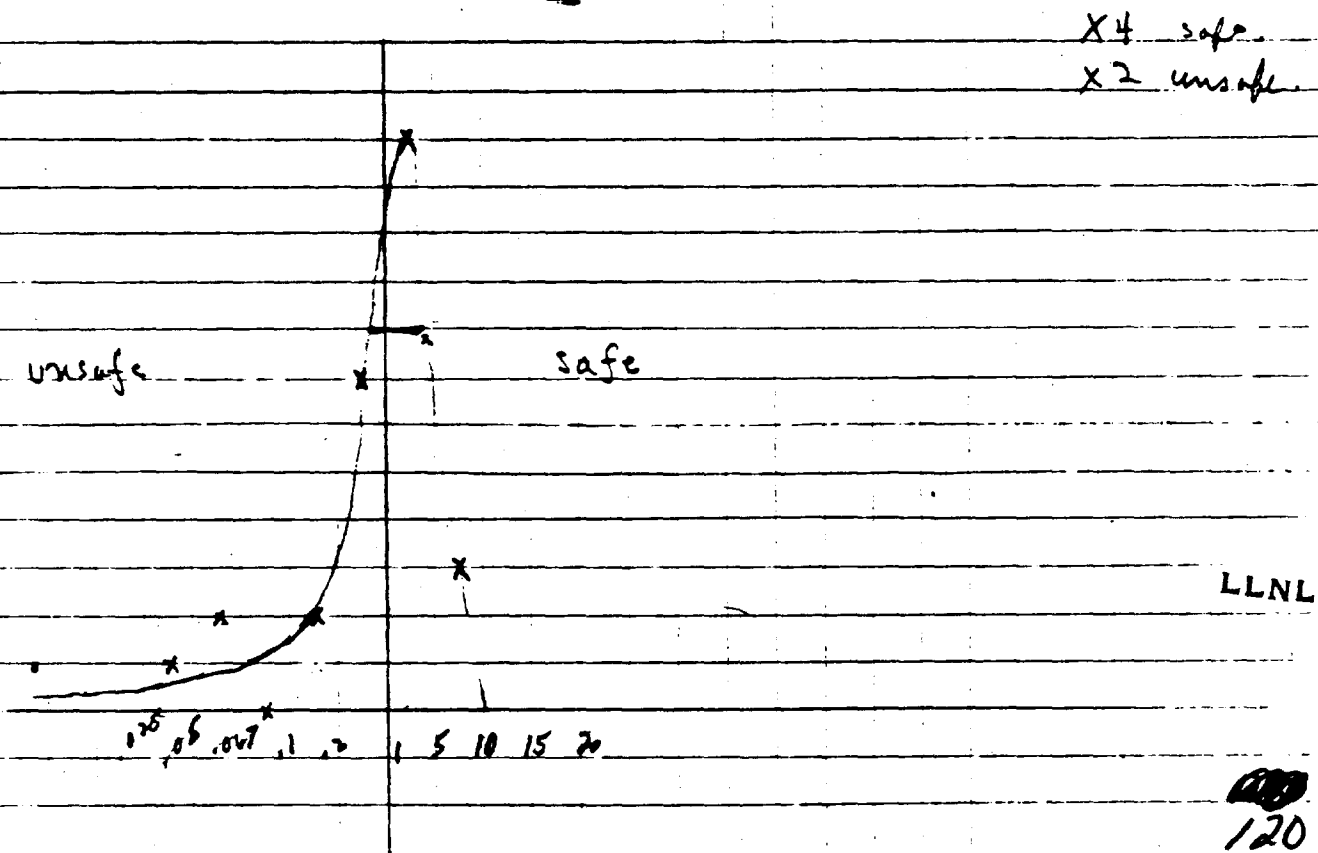
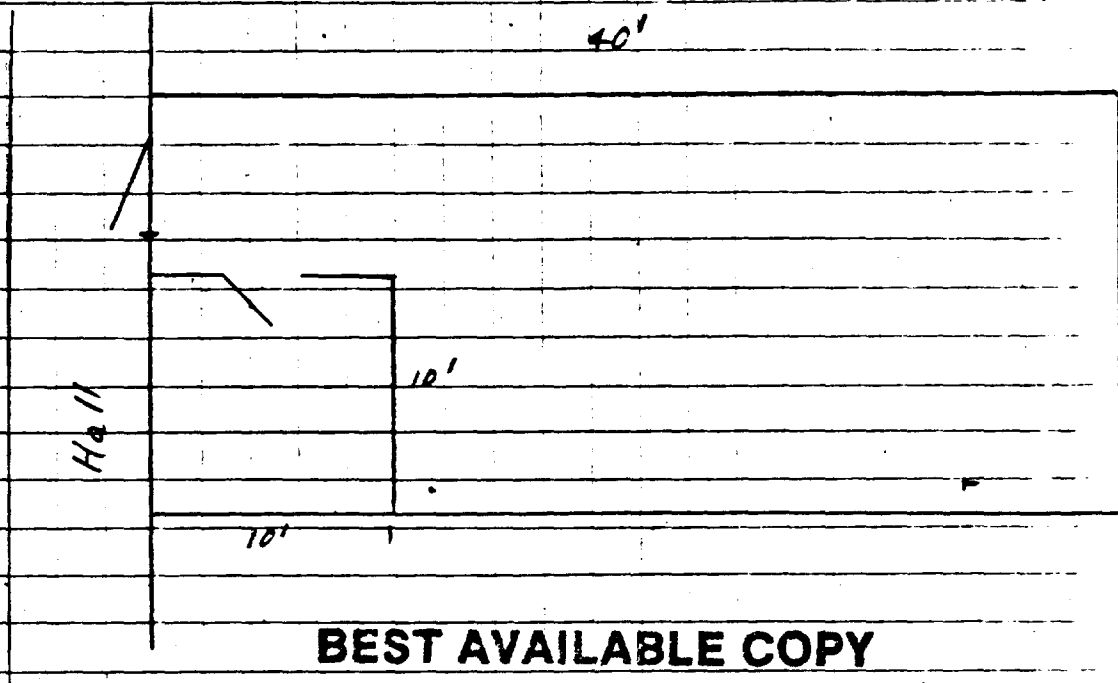
X2 unsafe

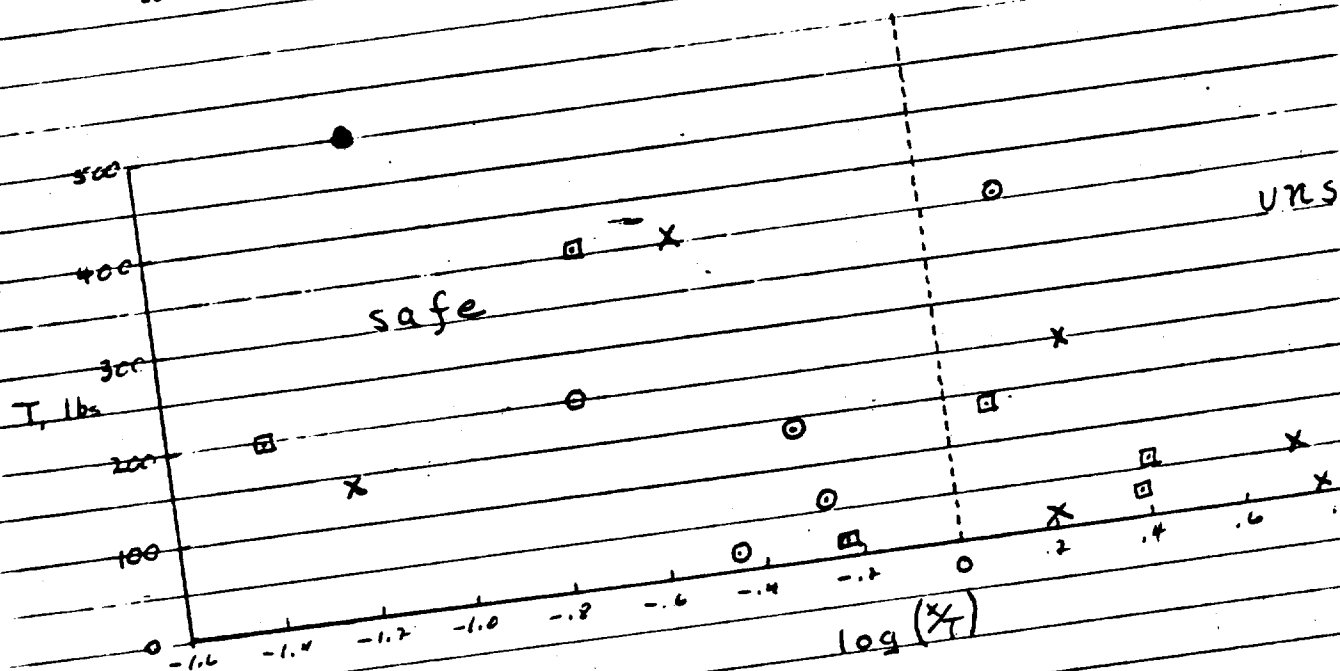
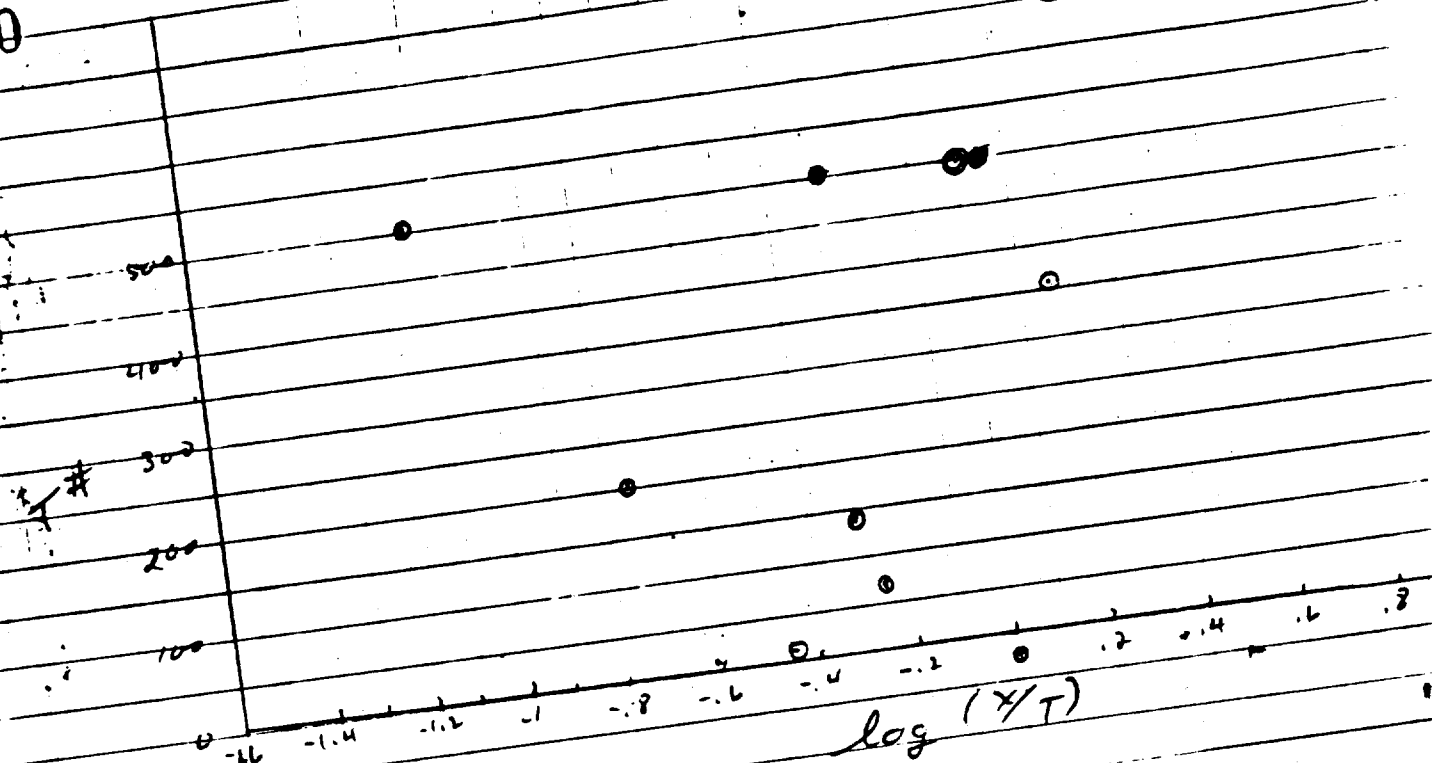


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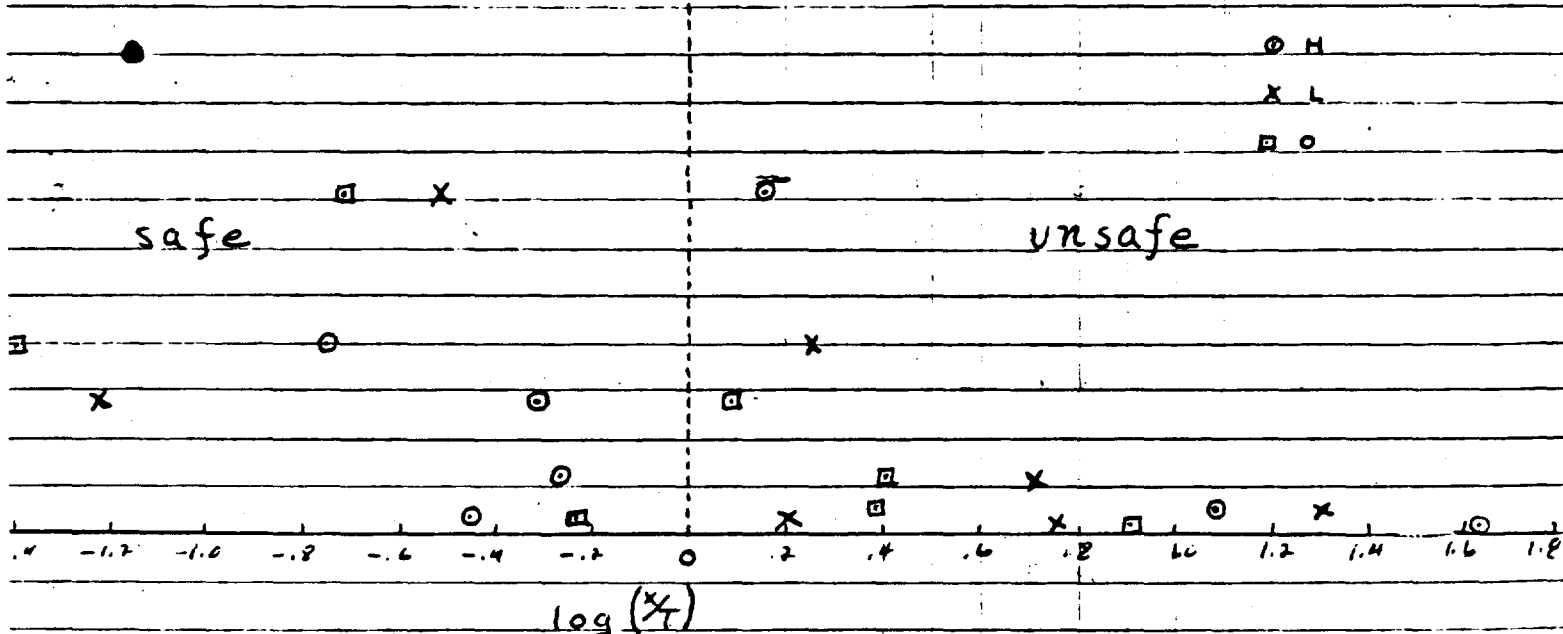
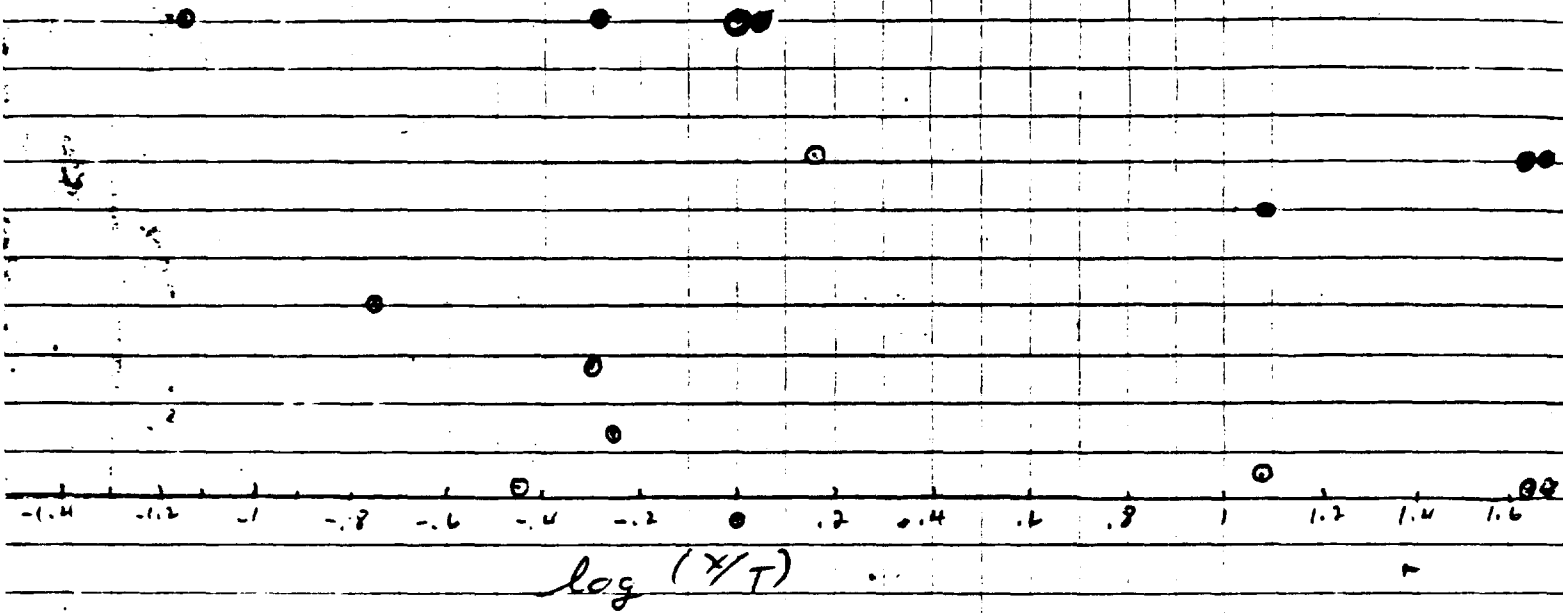
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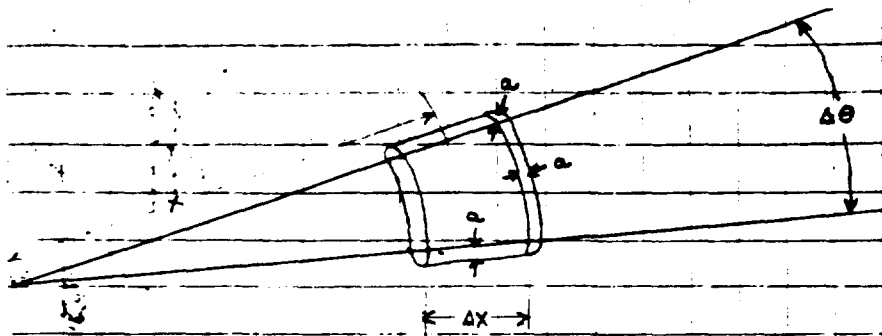
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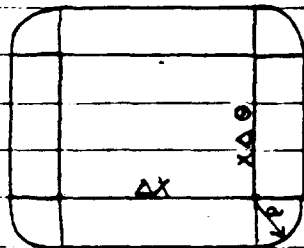
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$\Delta\theta$ is determined by the layer thickness; center level of consideration i , as determined by the weighted space-time hodograph.

Approximate the area of interest:



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$$\begin{aligned} \text{Total area } A &= \Delta X \cdot x \Delta \theta + 2a x \Delta \theta + 2a \Delta X + \pi a^2 \\ &= x \Delta \theta (\Delta X + 2a) + 2a \Delta X + \pi a^2 \end{aligned}$$

M = total number of megacuries, at one hour, in the layer Δh , contained on particles which fall between x and $x + \Delta x$.

Activity on ground in the Total area = $M t^{-1.2}$

where t = the time of fall from level i to the surface at distance x .

Intensity on ground at time of fall I_t :

$$I_t = \frac{3.34 M t^{-1.2}}{x \Delta \theta (\Delta X + 2a) + 2a \Delta X + \pi a^2} \quad \frac{\text{Rvrms}^2}{\text{hr Mc}} \frac{\text{Mc}}{\text{mi}^2}$$

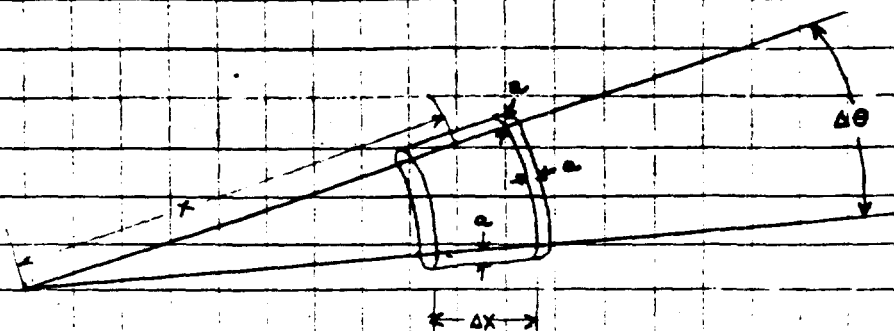
LLNL

$$D_{inf} = 5 I_t t = \frac{16.7 M t^{-1.2}}{x \Delta \theta (\Delta X + 2a) + 2a \Delta X + \pi a^2}$$

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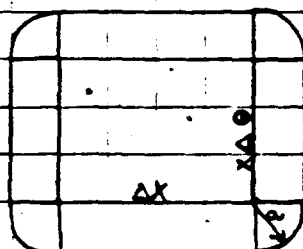
Fallout Forecasting

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$\Delta\theta$ is determined by the layer thickness; center level a as determined by the weighted space-time hodosgraph.

Approximate the area of interest:



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$$\begin{aligned} \text{Total area } A &= \Delta x \cdot x \Delta\theta + 2a \cdot x \Delta\theta + 2a \Delta x \\ &= x \Delta\theta (\Delta x + 2a) + 2a \Delta x + \pi a^2 \end{aligned}$$

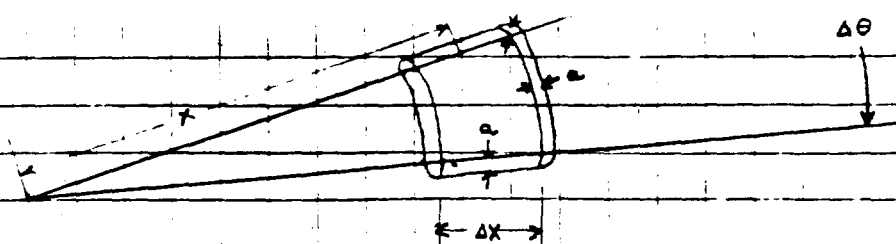
M = total number of megacuries, at one hour, contained on particles which fall between x and

Activity on ground in the Total area = $M t^{-1}$
where t = the time of fall from level i to distance x

Intensity on ground at time of fall I_t :

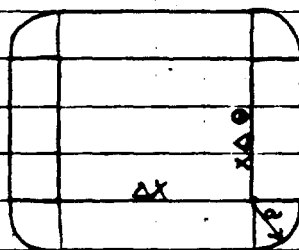
$$I_t = \frac{3.34 M t^{-1.2}}{x \Delta\theta (\Delta x + 2a) + 2a \Delta x + \pi a^2} \quad \begin{matrix} \text{R von} \\ \text{hr Mc} \\ \text{LLNL} \end{matrix}$$

$$D_{inf} = 5 I_t t = \frac{16.7 M t^{-0.2}}{x \Delta\theta (\Delta x + 2a) + 2a \Delta x + \pi a^2} \quad \begin{matrix} 124 \\ 100 \end{matrix}$$



$\Delta\theta$ is determined by the layer thickness; center level as determined by the weighted space-time hodoscope.

Approximate the area of interest:



$$\begin{aligned} \text{Total area } A &= \Delta X \cdot \Delta\theta + 2a \cdot \Delta\theta + 2a \cdot \Delta X \\ &= \Delta\theta(\Delta X + 2a) + 2a\Delta X + \pi a^2 \end{aligned}$$

M = total number of megacuries, at one hour, contained on particles which fall between X and

Activity on ground in the Total area = Mt
where t = the time of fall from level i to distance X .

Intensity on ground at time of fall I_t :

$$I_t = \frac{3.34 M t^{-1.2}}{\Delta\theta(\Delta X + 2a) + 2a\Delta X + \pi a^2} \quad \frac{\text{R/hr}}{\text{hr Mc}}$$

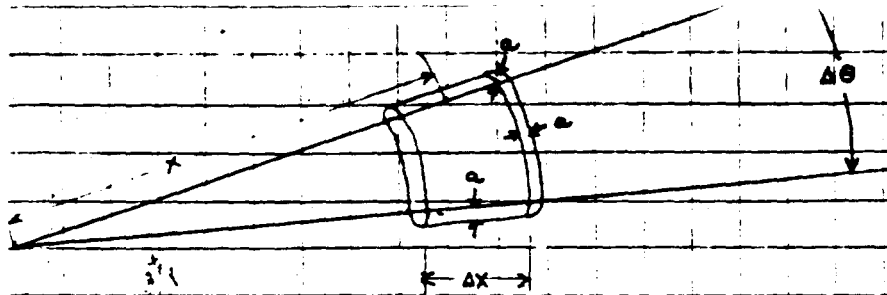
$$D_{inf} = 5 I_t t = \frac{16.7 M t^{-0.2}}{\Delta\theta(\Delta X + 2a) + 2a\Delta X + \pi a^2}$$

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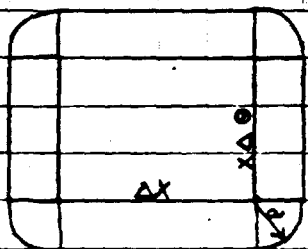
continued page 43

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$\Delta\theta$ is determined by the layer thickness; center level of consideration i , as determined by the weighted space-time hodograph.

Approximate the area of interest:



$$\begin{aligned} \text{Total area } A &= \Delta X \cdot X \Delta\theta + 2a \cdot X \Delta\theta + 2a \cdot \Delta X + \pi a^2 \\ &= X \Delta\theta (\Delta X + 2a) + 2a \Delta X + \pi a^2 \end{aligned}$$

M = total number of megacuries, at one hour, in the layer Δh , contained on particles which fall between x and $x + \Delta x$.

Activity on ground in the Total area = $M t^{-1.2}$

where t = the time of fall from level i to the surface at distance x .

Intensity on ground at time of fall I_t :

$$I_t = \frac{3.34 M t^{-1.2}}{X \Delta\theta (\Delta X + 2a) + 2a \Delta X + \pi a^2} \cdot \frac{R \text{ rons}^2}{\text{hr } M_c} \cdot \frac{M_c}{\text{mm}^2}$$

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$$D_{inf} = 5 I_t t = \frac{16.7 M t^{-1.2}}{X \Delta\theta (\Delta X + 2a) + 2a \Delta X + \pi a^2}$$

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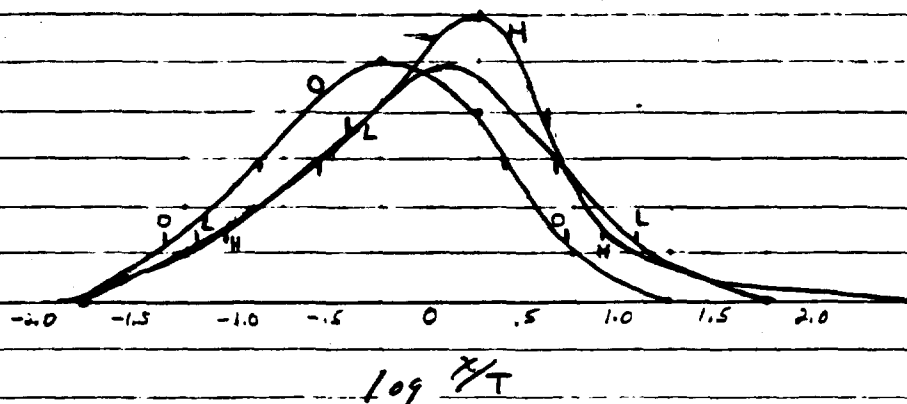
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LC035 0655

	# Fcst.				$\log x/T$			
	T	H	O	L	X	H	O	L
1	500	500	50	90	OUT	0	-1	-.745
2	9	350	65	45		1.641	.908	.748
3	25	300	60	(500)		1.079	.390	1.301
4	65	35	160	330		-.268	.398	.708
5	500	500	45	45	OUT	0	-1.081	-1.041
6	200	35	9	360		-.745	-1.398	.255
7	140	70	170	8		-.301	.079	-1.222
8	360	(500)	70	110		.146	-.721	-.509
9	17	(6)	10	28		-.456	-.229	.204
10	500	500	360	220	OUT	0	-.143	-.357
11	500	35	500	500	OUT	-1.155	0	0
12	53	(6)	32	(6)		-.947	-.219	-.947
13	6	6	-	17	OUT	0	-	.452
14	70	18	(6)	9		-.590	-1.067	-.889
15	14	17	(6)	(6)		.083	-.368	-.368
16	14	90	(6)	40		.808	-.368	.456

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Probable error



L +0.65, -0.6

O +0.40, -0.4

H +0.60, -0.6

L +4.5, -

O +2.5, -

H +4.0, -

L +1.9, -1

O +1.5, -2

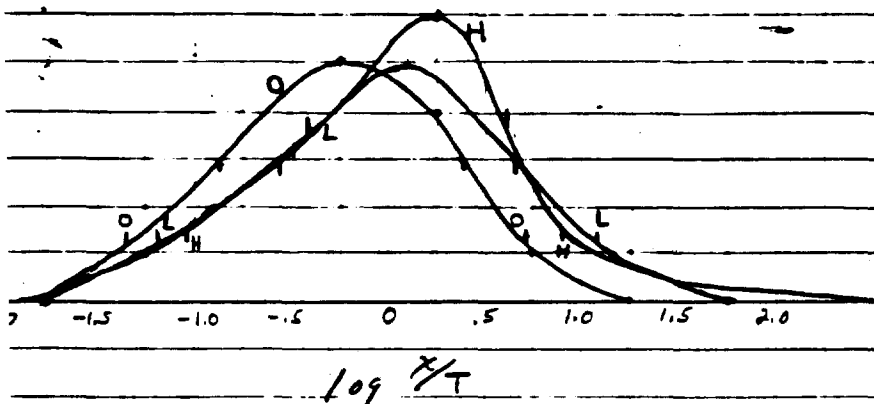
H +1.8, -1

LLNL

Blast Forecast Verifications.

# Fest.	O	L	X	H	O	L
0	50	90	out	0	-1	-.745
0	65	45		1.641	.908	.748
10	60	(500)		1.079	.380	1.301
5	160	330		-.268	.388	.708
0	45	45	out	0	-1.066	-1.046
0	9	360		-.745	-1.398	.255
0	170	8		-.301	.079	-1.222
20	70	110		.146	-.721	-.509
2	10	28		-.456	-.229	.204
10	360	220	out	0	-.143	-.357
-	500	500	out	-1.155	0	0
0	32	(6)		-.947	-.219	-.947
-	-	17	out	0	-	.452
P	(6)	9		-.590	-1.067	-.889
7	(6)	(6)		.083	-.368	-.368
0	(6)	40		.808	-.368	.456

Probable errors



$L +0.65, -0.60$
 $O +0.40, -0.75$
 $H +0.60, -0.40$

$\log x/T$

$L +4.5, -4.0$
 $O +2.5, -7.0$
 $H +4.0, -2.5$

x/T

$L +1.9, -1.8$
 $O +1.5, -2.4$
 $H +1.8, -1.5$

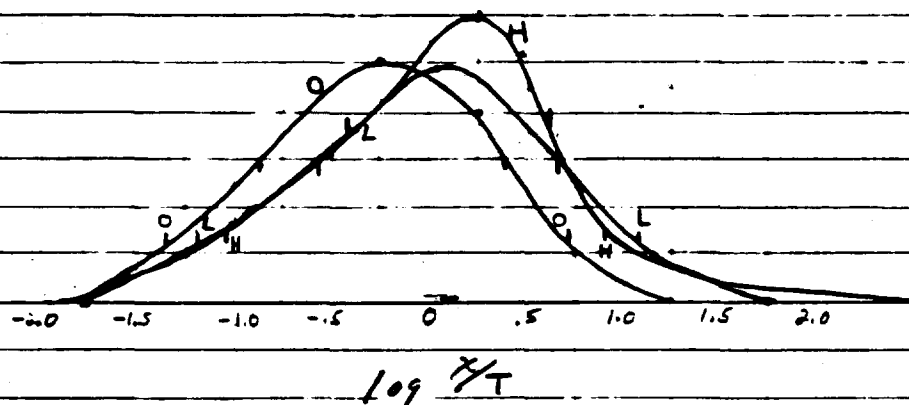
P_x/P_T

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3	25	300	60	(500)	1.079	.380	1.301
4	65	35	160	330	-.268	.398	.708
5	500	500	45	45 out	0	-1.086	-1.046
6	200	35	9	360	-.745	-1.398	.255
7	140	70	170	8	-.301	.079	-1.222
8	360	(500)	70	110	.146	-.721	-.509
9	17	(6)	10	28	-.456	-.229	.204
10	500	500	360	220 out	0	-.143	-.357
11	500	35	500	500 out	-1.155	0	0
12	53	(6)	32	(6)	-.947	-.219	-.947
13	6	6	-	17 out	0	-	.452
14	70	18	(6)	9	-.590	-1.067	-.889
15	14	17	(6)	(6)	.083	-.368	-.368
16	14	90	(6)	40	.808	-.368	.456

Probable error



L +0.65, -0.6
O +0.40, -0.8
H +0.60, -0.4

L +4.5, -
O +2.5, -
H +4.0, -2

L +1.9, -1.
O +1.5, -2.
H +1.8, -1..

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LLNL

129

* indicates 6 or 500 # Fests.

$$t = \frac{X}{\bar{V}}$$

$$X = \bar{V} t$$

$$D_{inf} = \frac{16.7 M t^{-0.2}}{X \Delta \theta (\Delta X + 2a) + 2a \Delta X + \pi a^2}$$

$$= \frac{16.7 M t^{-0.2}}{\bar{V} t \Delta \theta (\Delta X + 2a) + 2a \Delta X + \pi a^2} \quad \Delta \theta \text{ in } ^\circ$$

$$= \frac{957 M t^{-0.2}}{\bar{V} t \Delta \theta (\Delta X + 2a) + 2a \Delta X + \pi a^2} \quad \Delta \theta \text{ in } ^\circ$$

$$= \frac{957 M}{\bar{V} t^{1.2} \Delta \theta (\Delta X + 2a) + t^{0.2} [2a \Delta X + \pi a^2]}$$

For $\Delta \theta$ small, $\rightarrow 0$: (how small depends on)

$$D_{inf} = \frac{957 M}{t^{0.2} [2a \Delta X + \pi a^2]}$$

For $\Delta \theta$ large: ($X \Delta \theta \gg a$)

$$D_{inf} = \frac{957 M}{\bar{V} t^{1.2} \Delta \theta (\Delta X + 2a)} \quad \begin{array}{l} a \text{ \& } \Delta X \text{ in sec} \\ \bar{V} \text{ in knots,} \\ t \text{ in hours} \\ \Delta \theta \text{ in degrees} \end{array}$$

BEST AVAILABLE COPY

Express ① in terms of t and Δt :

$$D_{inf} = \frac{957 M}{\bar{V} t^{1.2} \Delta \theta (\bar{V} \Delta t + 2a) + t^{0.2} [2a \bar{V} \Delta t + \pi a^2]}$$

Continue on page 73

LLNL

~~SECRET~~

$$= \frac{x}{\bar{v}} \quad x = \bar{v}t$$

$$D_{inf} = \frac{16.7 M t^{-1.2}}{x \Delta \theta (\Delta x + 2a) + 2a \Delta x + \pi a^2}$$

$$= \frac{16.7 M t^{-1.2}}{\bar{v} t \Delta \theta (\Delta x + 2a) + 2a \Delta x + \pi a^2} \quad \Delta \theta \text{ in radians}$$

$$= \frac{957 M t^{-1.2}}{\bar{v} t \Delta \theta (\Delta x + 2a) + 2a \Delta x + \pi a^2} \quad \Delta \theta \text{ in degrees}$$

$$= \frac{957 M}{\bar{v} t^{0.2} \Delta \theta (\Delta x + 2a) + t^{0.2} [2a \Delta x + \pi a^2]} \quad \textcircled{1}$$

or $\Delta \theta$ small, $\rightarrow 0$: (how small depends upon a and x)

$$D_{inf} = \frac{957 M}{t^{0.2} [2a \Delta x + \pi a^2]}$$

or $\Delta \theta$ large: ($x \Delta \theta \gg a$)

$$D_{inf} = \frac{957 M}{\bar{v} t^{0.2} \Delta \theta (\Delta x + 2a)}$$

$a + \Delta x$ in sea miles
 $\bar{v}$ in knots, mean speed to layer
 t in hours
 $\Delta \theta$ in degrees

① in terms of t and Δt :

BEST AVAILABLE COPY

$$inf = \frac{957 M}{\bar{v} t^{0.2} \Delta \theta (\bar{v} \Delta t + 2a) + t^{0.2} [2a \bar{v} \Delta t + \pi a^2]}$$

Continue on page 73

LLNL

~~SECRET~~

Cab weight: 36 tons

300' tower + guys (no cab) = 48 tons

500' tower + guys (no cab) = 300 tons

200' tower + guys (no cab) = 465 tons

Balloon pay + cab: 1 ton

Take uniform 10 tons for device + shields etc in towers

Balloon cables: $\frac{1}{2}$ " #/ft. Four each balloon

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LLNL

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cab weight: 36 tons

300' tower + guys (no cab) = 48 tons

500' tower + guys (no cab) = 300 tons

200' tower + guys (no cab) = 465 tons

pay + cab : 1 ton

are uniform 10 tons for device + shields etc in tower cabs.

cables : 1/2" # / ft. Four each balloons

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* 25 January Schedule

Fallout for Plumbbob Data sent to Reeves wk of Jan.

	Shot	Yield	Height	weight of Metals in Fireball	Metal Fallout	Dust Fallout
1	Baltzman 15 May		500' tower	292 tons	175 Mc	33
3	Wilson 8 June		500' balloon	1	1	23
8	Lassen 2 June		300' balloon	1	1	0
15	Franklin 15 May		300' tower 500' balloon	1	1	0
20	Priscilla 15 June		700' balloon	2	1	190
24	La Place July		750' balloon 300' tower	81	49	1
25	Diablo		500' tower	319	191	96
28	Hood 27 June July		1500' balloon	2	1	0
4	Owens 5 July		400' balloon	1	1	12
9	Shasta		500' tower	319	191	96
15	Kepler		500' tower	292	175	33
19	Huygens 1 Aug		sfc	2	1	4
19	John		20,000 18,000' rocket	0	0	0
22	Doppler Oct Aug		700' balloon	1	1	0
1	Newton 25 July 70		1500' balloon	2	1	0
8	Whitney		500' tower	319	191	96
19	Smoky		700' tower	497	298	134 3;
26	Everest Sept		500' balloon 800' balloon	1	1	7

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LLNL

Fallout for Plumbbob (Data sent to Reeves wk of Jan. 21, 1957)

Yield	Height	Weight of Metals in Fireball	Metal Fallout	Dust Fallout	Total Fallout
500' tower		292 tons	175 Mc	33 Mc	208 Mc
500' balloon		1	1	23	24
300' balloon		1	1	0	1
300' tower					
500' balloon		1	1	0	1
700' balloon		2	1	190	191
750' balloon					
300' tower		81	49	1	50
500' tower		319	191	96	287
1500' balloon		2	1	0	1
400' balloon		1	1	12	13
500' tower		319	191	96	287
500' tower		292	175	33	208
5 fc		2	1	4	5
20,000					
18,000' rocket		0	0	0	0
BEST AVAILABLE COPY					
700' balloon		1	1	0	1
1500' balloon		2	1	0	1
500' tower		319	191	96	287
700' tower		497	298	370	668
500' balloon					
00' balloon		1	1	78	79
500' tower		292	175	33	208

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LLNL

10035 0067

Loc	Time	Height	in Fireball	Fallout	Fe. c
1 Baltzman	15 May	500' tower	292	175	3
2 Wilson	8 June	500' balloon	1	1	2
8 Lassen	2 June	300' balloon	1	1	
15 Franklin	15 May	500' tower 500' balloon	1	1	
20 Priscilla	15 June	700' balloon	2	1	1
24 La Place	July 1	750' balloon 300' tower	81	49	
25 Diablo		500' tower	319	191	9
28 Hood	27 June	1500' balloon	2	1	
July					
4 Owens	5 July	400' balloon	1	1	
9 Shasta		500' tower	319	191	
15 Kepler		500' tower	292	175	
19 Huygens	1 Aug	sfc	2	1	
19 John		20,000 18,000' rocket	0	0	
22 Doppler	Oct	700' balloon	1	1	
Aug					
1 Newton	25 July 70	1500' balloon	2	1	
8 Whitney		500' tower	319	191	9
19 Smoky		700' tower	497	298	
26 Everest		500' balloon 500' balloon	1	1	
Sept					
1 Galileo	1	500' tower	292	175	
8 Fizeau		500' tower	268	161	
10 Morgan		500' balloon	1	1	

DELETED

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LLNL

136

May	500' tower	292	175	33	200
me	500' balloon	1	1	23	24
me	300' balloon	1	1	0	1
May	300' tower				
	500' balloon	1	1	0	1
me	700' balloon	2	1	190	191
by	750' balloon				
	300' tower	81	49	1	50
	500' tower	319	191	96	287
me	500' balloon	2	1	0	1
by	00' balloon	1	1	12	13
	00' tower	319	191	96	287
	500' tower	292	175	33	208
ny	5 ft	2	1	4	5
	20,000				
	18,000' rocket	0	0	0	0
F	700' balloon	1	1	0	1

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July	1500' balloon	2		0	1
	500' tower	319	191	96	287
	700' tower	497	298	370	668
	500' balloon				
	300' balloon	1	1	78	79
	500' tower	292	175	33	208
	500' tower	268	161	7	168
	500' balloon	1	1	0	1

LLNL

137

18689

W: 50 Kt

Standard Towers & Cabs: Device & Shielding

h	Weight of metals in fireball	Metal Fallout	Dust Fallout	Total Fallout
300	94 tons 110 (built up 300')	56 Mc 66	1860 Mc	1916 1486
400	286 (cut down 500')	172	1420	1592
500	346	208	960	1168
600	396	238	650	888
700	497	298	370	668
800	↓	↓	190	488
900			60	358
1000			13	311
1100			0	298

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LLNL

138

t

Standard Towers + Cabs: Device + Shielding, etc, 10 tons.

Weight of metals in fireball	Metal Fallout	Dust Fallout	Total Fallout
94 tons	56 Mc	1860 Mc	1916
110 (built up 300')	66		1486
286 (eat down 500')	172	1420	1592
346	208	960	1168
396	238	650	888
497	298	370	668
↓	↓	190	488
		60	358
		13	311
		0	298

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LLNL

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-3 1-1 1-1 1/2 1 1/2-2 2-2 1/2 2 1/2-3 3-3 1/2 3 1/2-4 4-4 1/2

0

20

17 590

17 55

5 505

5 5

8 246 435 25

25 0 500

0 0 0 0 0 0 7

0 580 0 0 0 0 200

864 342 2298 570 5960 32

0 400

25 0 0 0 25

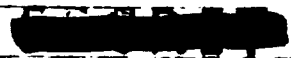
10

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LLNL

140

LC625 0672



Shot	1/2-1	1-1 1/2	1 1/2-2	2-2 1/2	2 1/2-3	3-3 1/2	3
Jangle Sfc	0						
U	500						
TS-5	357	500					
-6	1917	55					
-7	105	505					
-8	0	5					
UK-1	5938	266	435	25			
-2	95	25	0	500			
-3	0						
-5	0						
-6	0	0	0	0	0	0	0
-7	15	0	580	0	0	0	0
-9	7816	864	342	2298	570	5960	32
-10	0						
-11	0						
T -Moth	0						
-Tesla	0						
-Turk	50						
-Hornet	10						
-Bee	0						
-Ess	0						
-Apple	5	0	400				
-Post	0						
-Met	1900	25	0	0	0	25	
-Apple II	362	10					
-Zucchini	397						

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LLNL

31 Jan 50# Completely covered barrel (oil drum)

Earth Overburden, ft Pressure at Saddle, psf

0 240

1 180 $P_0 = 222$

3 60 $P_0 = 185$

0 180

142 10# Completely covered barrel.

Overburden ub

0 80

2 20 $P_0 = 94$

3 30 $P_0 = 90$

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0 90

W	Overburden ft	$\frac{P_{earth}}{P_{atm}}$	5 Feb.	25#	closed -
50#	1 c	0.81		Overburden	ub
↓	3 c	0.32		0	200
10#	2 c	0.24			
↓	3 c	0.33		2	80 P_0
25#	2 c	0.47			
75#	2 c	0.25	75#	2	LLNL 60 F
25#	1090°	0.87			
↓	2090°	0.83	25#	0	140
	3090°	0.48			
	1090°	0.67		± 6 inches	142
10#	2090°	0.50			
↓	200°	1.00			

Site 300 Containment Tests

~~SECRET~~

cross, overburden $\pm 1/2$
ub -0 +10%

Item 50# Completely covered barrel (oil drum)

South Overburden, ft	Pressure at Saddle, ub	Δt
0	240	30 min
1	180 $P_0 = 222$	60 min
3	60 $P_0 = 185$	8 min
0	180	

Completely covered barrel.

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Overburden	ub	Δt
0	80	23 min
2	20 $P_0 = 84$	30 min
3	30 $P_0 = 90$	4 min
0	90	

Overburden ft.	$P_{0,th} / P_{0,th}$	5 Feb.	25#	closed barrel
1 c	0.81	Overburden	ub	ot
3 c	0.32	0	200	30 min
2 c	0.24			
3 c	0.33	2	80 $P_0 = 169$	18 min
2 c	0.47			
2 c	0.25	75#	2	60 $P_0 = 242$ (exp. 43)
1090°	0.87			9 min
2090°	0.83	25#	0	140 LLNL
3090°	0.48			
1090°	0.67	± 6 inches		143
2090°	0.50			
200°	1.00			

100-01-0075

Meeting Jan 4-17 Albuquerque

~~SECRET~~

Assigned space: Barracks Y WX 45

FOPU 5

BPU 4

54

Max capacity 63

Q WX 1 Mac

FOPU 1 S

BPU 1 Reed

What will be done on cloud dimension measuring? Long

Sherman will: write up techniques for space-time calculus

Program 37.2A

Max of 7 arcs, routinely to 300 miles.
— special to Miss. river.

1 team	25 stations	at 1 mi intervals	12 ~ 20
1	25		50
2	30		80-100
2	40		120
2	40		150
2	40		200
3	65		275-300

BEST AVAILABLE COPY

Communications phone + radio (aircraft relay)

Need to know:

D-2	2100 hrs	Est hot line	LLNL 144
D-1	0930	" "	people 51
	H-6 1/2	plane goes up with Kern	
		Set up 30 50 20 mi	
	H-4	" "	120 150
	H-0	" "	200 300

Time Jan 14-17 Albuquerque

space: Barracks Y WX 45

FOPU 5

BPU 4

54

Max capacity 63

Q WX 1 Mac

FOPU 1 S

BPU 1 Reed

ill be done on cloud dimension measuring? long range trajectories?

will: write up techniques for space-time calculation.

m 37.2A

BEST AVAILABLE COPY

Max of 7 arcs, routinely to 300 miles.
special to Miss. river.

arc	25 stations at 1 mi intervals, 12 ~ 20	arc length 25 mi
25	56	50
30	80-100	80
40	120	80
40	150	120
40	200	120
65	275-300	195

Communications phone + radio (aircraft relay)

red to know:

LLNL

D-2 2100 hrs Est hot line

D-1 0930 " " people start to move 145

H-6 1/2 plane goes up with Kermit

Set up 20, 50, 20 mi R arcs

H-4 " " 120, 150 " " "

H-0 " " 200, 300 " " "

FOPU 5

BPU 4

54

Max capacity 63

Q Wx 1 Max

FOPU 1 3

BPU 1 2

What will be done on cloud dimension measuring

Sherman will: write up techniques for spec-time

Program 37.2A

Max of 7 arcs, routinely to 300 miles
special to Miss. river

1 team 25 stations at 1 mi intervals

1 25

2 30

2 40

2 40

2 40

3 65

BEST AVAILABLE COPY

Communications phone + radio (aircraft relay)

Need to know:

D-2 2100 hrs Est hot line

D-1 0930

H-6 1/2

plane goes up with 300

Set up 20 50 20

H-4

" " 120 150

H-0

" " 200 300

H+4

Pattern as known for

D-0 Evening

" " LINE

Aircraft Summary D+1 morning

So. + M. river D 0 MA MA 1 1

FOPU 5

BPU 4

54

Max capacity 63

Q Wx 1 Mac

FOPU 1 5

BPU 1 Recd.

will be done in cloud dimension measuring? long range trajectory

man will: write up techniques for space-time calculation.

gram 37.2A

Max of 7 arcs, routinely to 300 miles.
special to Miss. river.

Team	25 stations at 1 mi intervals	12 ~ 20	arc length
25		50	50
30		80-100	100
40		120	150
40	BEST AVAILABLE COPY	150	200
40		200	250
65		275-300	350

Communications phone + radio (aircraft relay)

Need to know:

D-2 2100 hrs Est hot line LLNL

D-1 0930 " " people start to move

H-6 1/2 plane goes up with Kermit

Set up 20 50 20 mi R arcs

H-4 " " 120 150 " "

H-0 " " 200 300 " "

H+4 Pattern as known & fast (shot time)

D-0 Evening " " " " to 7200

Aircraft Summary D+1 morning

Santa Monica: Del Mar Motel

~~SECRET~~

Plan to cover 8 tower shots + high yield balloon
10-12 total

MAPS

Scales	1:500,000	1000' ca	Long 119° to 112.5°
	1:1,000,000	5000'	Long " " "
	1:3,000,000	1500' with contours 4000' without "	" 125° to 90°

2000' contours
 < 4000' white
 4-8000' light shading
 7-8000' less light shading

Lambert Conformal, Yucca long N-S s

1/2° grid on 1:500,000
 " internal " 1:1,000,000
 " " 1:3,000,000

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LLNL

37.2A (cont)

S

on to cover 8 tower shots + high yield bellows
10-12 total

MAPS

cales 1:500,000
1:1,000,000
1:3,000,000

1000 ea
5000 "
1500 with contours
4000 without "

long 119° to 112.5° Lat 35°-40°
long " " " " "
" 125° to 90° 49°-31°

2000' contours
4000' white
4-8000' light shading
7-8000' less light shading

Lambert Conformal, Yucca long N-S straight
1/2° grid on 1:500,000
" internal " 1:1,000,000
1:3,000,000

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Peaceful Use of Atomic Explosives.

~~SECRET~~

"Contamination Problems"

Fallout from 100 Kt/sat many sectioned linear series

100kt

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~~23 sec~~

Width 500 R/hr H+1 hr. ^{1.6}
~~2.3 miles~~
 Length " " " " ^{5.8}
~~+ 5.8 miles~~
~~- 0.4 miles~~

250 R/hr
 Width ^{2.9}
~~4.3 miles~~
 Length ^{8.3}
~~+ 8.3 miles~~
~~- 1.6 miles~~

100 R/hr
 Width ^{5.6}
~~7.3 miles~~
 Length ^{13.6}
~~+ 13.6 miles~~
~~- 2.5 miles~~

50 R/hr
 Width ^{9.2}
~~12 miles at 70~~
 Length ¹⁷
~~- 3 miles~~

10 R/hr width ¹⁷
~~25 miles at~~
 length ^{3.7}
~~- 4 miles~~

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1 R/hr width ²⁴
~~35 miles~~
 length ¹⁵
~~- 4 miles~~

Scaling from Tewa:

LLNL

10 R/hr H+1 to 100 miles.

50 R/hr. to 50 miles.

1 R/hr to 200 miles, ¹⁵⁰

~~SECRET~~

"atomization Problems"

from 100 Kt/sd many sectioned linear series 100 m spacing

+ DELETED ~~23 sec~~

Width 500 R/hr H+1 hr. ^{1.6}
Length " " " ^{2.3} miles
+ ^{2.3} miles
- ^{0.4} miles

250 R/hr
Width ^{2.3} miles
Length + ^{2.3} miles
- ^{1.0} miles

100 R/hr
Width ^{5.6}
Length ^{2.3} miles
+ ^{2.3} miles
- ^{2.3} miles

50 R/hr
Width ^{9.2}
Length ^{2.3} miles at 20 miles
- ^{2.3} miles

10 R/hr width ¹⁷ miles at 20 miles
length - ^{2.7} miles

1 R/hr width ²⁴ miles at 20 miles
length - ⁴ miles

Scaling from Tewa:

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LLNL

10 R/hr H+1 to 100 miles.

50 R/hr to 50 miles.

1 R/hr to 200 miles.

14

Jan 21

Open barrel end 90° to recorder
25 #

Overburden	ub	Δt	Open end Overburden
Test 2			
(0) 0	(180) 144		0
		(4) 5 min	
(1) 1	$p_o = 180$ (120) 126 $p_o = 145$		2
		5 min	
2	120 $p_o = 147$		2 open end
		5 min	
3	72 $p_o = 149$		0
		5 min	
0	150		

Week of March 18

BEST AVAILABLE COPY

Open	25 #	90 ub	3:10 PM	
Bare Cone with				
2 Sand bags on top	75 #	100 ub	3:25	Bare Cone
Covered (3') barrel	75 #	90 ub	4:40	"
Open	25 #	80 ub	4:50	

If: 75# covered gives 90 ub
and 75# bare gives 270 ub
and 75# bare gives 81 ub

then:

$$P = KW^2$$

$$81 = K 25^2$$

$$270 = K 75^2$$

$$\frac{81}{270} = \left(\frac{25}{75}\right)^2$$

$$0.300 = 0.333^2$$

$$9.477 - 10 = \alpha (9.522 - 10)$$

$$0.523 = 0.478 \alpha$$

$$\alpha = 1.094$$

$$\frac{81}{180} = \left(\frac{25}{75}\right)^2$$

$$0.45 = 0.333$$

$$9.653 - 10 = -0.47$$

$$\alpha = 0.726$$

$$\text{and } \alpha = 0.43$$

LLNI

$$\frac{81}{x} = 0.333$$

$$x = \frac{81}{0}$$

$$\frac{75}{x} = \left(\frac{90}{130}\right)^{0.43} = 0.622^{0.43}$$

300 Containment Tests

21 Open barrel end 90° to recorder.
25 #

			Open end at 90° 10 #		
ent burden	μb	Δt	ent burden	μb	Δt
0	(180) 144		0	120	
1	$p = 180$ (120) 126 $p = 145$	(4) 5 min	2	60 $p = 120$	8 min
2	120 $p = 147$	5 min	2	open end at 0° 120 $p = 120$	11 min
3	72 $p = 149$	5 min	0	120	13 min
0	150	5 min			

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of March 18

25 # 90 μb 3:10 PM

is with

base on top	75 #	100 μb	3:25	Base background	89 μb
1 barrel	75 #	90 μb	4:40	"	81 μb
	25 #	80 μb	4:50		

75 # covered gives 90 μb
and 75 # bare gives 270 μb
and 25 # bare gives 81 μb

and 75 # bare gives 180 μb

$$P = KW^x$$

$$81 = K 25^x$$

$$270 = K 75^x$$

$$81/270 = (25/75)^x$$

$$0.300 = 0.333^x$$

$$472 - 10 = x(9.522 - 10)$$

$$0.523 = 0.478x$$

$$x = 1.094$$

$$81/180 = (25/75)^x$$

$$0.45 = 0.333^x$$

$$9.653 - 10 = -0.478x = 0.347$$

$$x = 0.726$$

LLNL

$$\text{and } x = 0.43$$

$$81/x = 0.333^{0.43}$$

153

$$15/x = (90/130)^{0.43} = 0.682^{0.43}$$

$$x = 81/0.333^{0.43} = 81/0.623$$

$$= 130.1$$

Overburden	ab	st	Overburden	st
Free 2	1			
(0) 0	(180) 144		0	12
		(4) 5 min		
(1) 1	$p_{0.18} = 120$ 126 $p_{0.145}$		2	60
		5 min		
2	120 $p_{0.147}$		2	open at 12
		5 min		
3	72 $p_{0.149}$		0	12
		5 min		
0	150			

Week of March 15 BEST AVAILABLE COPY

Open	25 #	90 ab	3:10 PM	
Bare Cone with				
2 Sand bags on top	75 #	100 ab	3:25	Bare Cone with
Covered (3') barrel	75 #	90 ab	4:40	" "
Open	25 #	80 ab	4:50	

If: 75# covered gives 90 ab
and 75# bare gives 270 ab
and 25# bare gives 81 ab

then:

$$P = KW^x$$

$$81 = K 25^x$$

$$270 = K 75^x$$

$$\frac{81}{270} = \left(\frac{25}{75}\right)^x$$

$$0.300 = 0.333^x$$

$$9.477 - 10 = x(9.522 - 10)$$

$$0.523 = 0.478x$$

$$x = 1.094$$

$$\frac{81}{180} = \left(\frac{25}{75}\right)^x$$

$$0.45 = 0.333^x$$

$$9.653 - 10 = -0.478x =$$

$$x = 0.726$$

$$\text{and } x = 0.43:$$

$$\frac{81}{x} = 0.333^{0.43}$$

$$x = \frac{81}{0.333^{0.43}}$$

LLNL

$$= 130 \text{ ab}$$

$$\frac{180}{90} = 1.44$$

154

$$\frac{90}{130} = \left(\frac{75}{x}\right)^{0.43}$$

$$-0.1599 = 0.43[1.8751 - \log x]$$

$$3.09x = 2.2465 \quad x = 176 \#$$

$$\frac{176}{75} = 2.34$$

			Open end at 90° 10#		
Turndown	ub	Δt	Open end	ub	Δt
1					
2	(180) 144.		0	120	
		(4) 5 min			8 min
	p=81 (120) 126 p=145		2	60 p=120	
		5 min			11 min
	120 p=147		2	open end at 0°	
		5 min		120 p=120	
	72 p=149		0		13 min
		5 min		120	
	150				

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March 18

with	25 #	90 ub	3:10 PM		
on top	75 #	100 ub	3:25	Bare background	89 ub
side	75 #	90 ub	4:40	"	81 ub
	25 #	80 ub	4:50		

75# covered gives 90 ub
 75# bare gives 270 ub
 25# bare gives 81 ub

and 75# bare gives 180 ub

$$\begin{aligned}
 P &= KW \\
 81 &= K 25 \\
 -70 &= K 75 \\
 81/270 &= (25/75) \\
 0.300 &= 0.333 \\
 -10 &= \alpha (9.522 - 10) \quad \text{and } \alpha = 0.43 \\
 .523 &= 0.478 \alpha \\
 \alpha &= 1.094
 \end{aligned}$$

$$\begin{aligned}
 81/180 &= (25/75) \\
 0.45 &= 0.333 \\
 9.653 - 10 &= -0.478 \alpha = 0.347 \\
 \alpha &= 0.726
 \end{aligned}$$

$$\begin{aligned}
 &= (90/130)^{.43} = 0.682^{.43} \\
 &= 0.854 \\
 75/0.854 &= 88
 \end{aligned}$$

$$\begin{aligned}
 81/\alpha &= 0.333^{0.43} \\
 \alpha &= \frac{81}{0.333^{0.43}} = 162.3 \\
 &= 130 \text{ ub}
 \end{aligned}$$

$$\begin{aligned}
 (75/\alpha)^{.43} \\
 9.65 &= 0.43 [1.8751 - \log \alpha] \\
 176 &= \alpha
 \end{aligned}$$

176/75 = 2.34

LLNL
155

10035 0103

TD's effects Curves

~~SECRET~~

Yield	Height	W
11	500'	.02
15	500'	0.6
2	300'	1.7
1.7	750'	2
0.6	300'	3.5
3.5	400' 500'	3.5
50	700'	8
70	1500'	11
8	500'	15
40	700'	40
.02	20	50
		70

Peak Overpressures 1, 5, 10, 30, 50, 100 psi
 $\frac{W}{W_0}$ d_{kt}

$\Delta P, \text{psi}$	$\Delta P = 1 \text{ psi}$	W	W	$h(1kt)$	
1		.02	20	74	1500 yds
2		0.6	300	356	1625 yds
		1.7	750	627	1730 yds
		2.0	300	238	1580
		3.5	400	263	1600
		3.5	500	329	1620
		8	500	250	1590
		11	500	226	1580
		15	500	203	1575
		40	700	204	1575
		50	700	190	1570
		70	1500	364	1630

BEST AVAILABLE COPY

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156

s effects Curves

~~SECRET~~

Height	W	h
500'	.02	20
500'	0.6	300
300'	1.7	750
750'	2	300
300'	3.5	400
400' 600'	3.5	500
700'	8	500
1500'	11	500
500'	15	500
700'	40	700
70	50	700
	70	1500

Back Over pressures 1, 5, 10, 30, 50, 100 psi distances

$\frac{W}{W^{1/2}}$	d_{100}	$d_{100} \times W^{1/2}$		
≥ 1 psi:	W	h	h(1kt)	= d ₁₀₀
.02	20	74	1500 yds	405 yds
0.6	300	356	1625 yds	1370 yds
1.7	750	627	1730 yds	2070 yds *
2.0	300	238	1580	1990
3.5	400	263	1600	2430
3.5	500	329	1620	2460
8	500	250	1590	3180
11	500	226	1580	3510
15	500	203	1575	3820
40	700	204	1575	5380
50	700	190	1570	5790
70	1500	364	1630	6720

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100-0000

15	500'	0.6
2	300'	1.7
1.7	750'	2
0.6	300'	3.5
3.5	400' 600'	3.5
50	700'	8
70	1500'	11
8	500'	15
40	700'	40
0.2	20	50
		70

$\Delta P, \text{psi}$	Peak Overpressures 1, 5, 10, 30, 50, 100 psi				Dist
	$\Delta P = 1 \text{ psi}$	W	h	$h(1 \text{ kt})$	
1		0.2	20	74	1500 yds
2		0.6	300	356	1625 yds
		1.7	750	627	1730 yds
		2.0	300	238	1580
		3.5	400	263	1600
		3.5	500	329	1620
		8	500	250	1590
		11	500	226	1580
		15	500	203	1575
		40	700	204	1575
		50	700	190	1570
		70	1500	364	1630

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158

* Off 23-200 ennes

~~SECRET~~

LLNI

159

Tentative Shots, Large, Hardback.

DELETED

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160

ire Shots, large, Hardhat.

~~SECRET~~

DELETED

LLNL

161



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LAST SHOT HUYGENS:

AREA

DELETED

Paul Tompkins request for Corbis's program.

Needs shot which puts $\geq 1R/hr$ @ 1hr at ~ region.

Shot	Extent	1 R/hr line	width at 1psi dis
43 ^{kt} Smoky, $250d + 278m = 528Mc$	> 7000 yds	~ 1000 yds.	
Bee 8kt 500' r	2500 yds		
Apple 15kt 500' r	> 6000 yds	10 R/hr to 4000 yds	2000 yds
DELETED 7 10kt + 500' r	~ 4500 yds		< 1000 yds

Zucchini 28kt + 500' 10 R/hr to > 5000 yds.

Marginal:

Area		Boltzman	11 kt	at	500' T
2	Diablo	12 "	"	"	"
2	Shasta	"	"	"	"
4	Kepler	11 "	"	"	"
2	Whitney	12 "	"	"	"
1	Galileo	11 "	"	"	"

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~~SECRET~~
LAST SHOT HUYGENS:

AREA 3 sfc

57

DELETED

Tampkins request for Corbic's program.

Needs shot which puts $\geq 1R/hr$ @ 1hr at or beyond 1psi
in.

Extent 1 R/hr line width at 1psi distance

77m
McT > 7000 yds. ~ 1000 yds. 1psi to 5000 yds.

500' T 2500 yds
T 500' > 6000 yds 10R/hr to 4000 yds 2000 yds 1psi to 3300 yds.

500' ~ 4500 yds. < 1000 yds with Apple winds
1psi to 3000 yds.

at 500' 10R/hr to > 5000 yds. 1psi to 4000 yds.

Li:

Boltzman 11 kt at 500' T

Diablo 12 " " " "

hesta " " " " "

epier 11 " " " "

hitney 12 " " " "

lileo 11 " " " "

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1164

LC035 0703

Frequency of Shooting Days Sr. B
May - July 1955

#584

May — total days (4) (one 2½ day period)

1500Z - 2100Z 4 May } ¼ day

2100Z - 19 May } 2½ days Cherokee fired 1751 20 May
thru 0300Z 22 May

2100Z 26 May } ½ day
thru 0600Z 27 May

1600Z 27 May } ¾ day Zuni fired 1756 27 May.
thru 0900Z 28 May

June — total days (3) (no period longer than 1 day)

0900Z 3 June } 1 day
thru 0900Z 4 June

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2100Z 5 June } ¾ day
thru 1500Z 6 June

LLNL

1400Z 11 June } ¼ day Flathead fired 1826 11 June
thru 2000Z 11 June 165

2100Z 16 June } 1 day
thru 1900Z 17 June

LC035 0706

June (Cont'd)

#58B

0600Z 21 June } 1/2 day
thru 1600Z 21 June }

1000Z 25 June } 1 day Dakota fired 1906Z 25 June
thru 1200Z 26 June }

0900Z 30 June } 2 1/2 days } 3/2 day in June
thru 2100Z 2 July } 2 days in July

July - total days

9 1/4

one 3 1/4 day period
one 2 day period
two 1 1/2 day periods

1600Z 3 July } 3 1/4 days
thru 2100Z 6 July }

1200Z 7 July } 1 1/2 days
thru 2100Z 8 July }

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1800Z 9 July } 1 day
thru 1600Z 10 July }

Navajo fired 1856Z 9 July

1200Z 19 July } 1 1/2 days
thru 0300Z 21 July }

LLNL

1166

10005 0707

Level	f_0	$h = 44,000' \text{ MSL}$ $b = 4000' \text{ MSL}$ d, μ	Level	f_0	$h = 44,000 \text{ MSL}$ $b = 4000 \text{ MSL}$ d, μ	$h, \text{Kf+}$	σ
1	12.6	~~904~~	1	12.2	688	6	1.00
2	11.3	~~944~~	2	9.4	620	10	1.07
3	10.0	~~624~~	3	7.3	478	14	1.14
4	8.9	~~550~~	4	5.3	324	18	1.22
5	7.7	~~547~~	5	3.75	246	22	1.31
6	6.7	~~387~~	6	2.62	175	26	1.40
7	5.7		7	1.80	134	30	1.50
8	4.9		8	1.17	98	34	1.60
9	4.1		9	0.75	73	38	1.72
10	3.43		10	0.45	55	42	1.84
11	2.87						
12	2.38						
13	1.96						
14	1.63						
15	1.30						
16	1.05						
17	0.83						
18	0.65						
19	0.51						
20	0.39						

calc. for aerodynamic fall time
correlated to Redwing f_0 's

From page 15:

$$I_{mf} = \frac{1}{2.89 \times 10^4} [25(4.75)^{1.2} \times 5(0.204 \times 25 + 6) + 4.72^6]$$

$$= \quad [25 \times 5 \times 6.53 \times 11.1 + 1.37 \times 59]$$

$$= \quad \times 9141$$

$$D_{mf} = \frac{18.9 \times 10^3}{9.14 \times 10^3} = 2.07 \times 10^0 = 2.07$$

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LLNL

202
100000 (751)

Model ~~SECRET~~

h = 44,000' MSL
b = 4000' MSL
d, μ

h = 44,000 MSL
b = 4000 MSL MSL

	f ₀ Level		d, μ	h, kf +	σ	C fraction
~~904~~	1	12.2	688	6	1.00	0.032
~~944~~	2	9.4	620	10	1.07	0.032
~~624~~	3	7.3	478	14	1.14	0.032
~~550~~	4	5.3	324	18	1.22	0.032
~~547~~	5	3.75	246	22	1.31	0.032
~~389~~	6	2.62	175	26	1.40	0.093
	7	1.80	134	30	1.50	0.195
	8	1.17	98	34	1.60	0.258
	9	0.75	73	38	1.72	0.199
	10	0.45	55	42	1.84	0.095

f₁ =
f₂ =

calc. for aerodynamic fall times
correlated to Redwing fu's

From page 75:

$$I_{w_j} = \frac{1}{7.89 \times 10^4} [25(4.75)^{1.2} \times 5(0.204 \times 25 + 6) + 4.72^{0.2} (150 \times 20 + 9\pi)]$$

$$= \quad \quad [25 \times 5 \times 6.53 \times 11.1 + 1.37 \times 59]$$

$$= \quad \quad \times 9141$$

$$D_{inj} = \frac{18.9 \times 10^3}{9.14 \times 10^3} = 2.07 \times 10^0 = 2.07 R$$

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203

Determination of M_{ij} vs f_{ij}

Take layer 8

$$f_0 = 1.17 ; \sigma = 1.60 ; M_i = 0.258 \text{ YZ}$$

$$\text{Set } \Delta f_{ij} = 0.05$$

$$\log f_0 = 0.06819$$

$$f_1 = f_0 - 0.025 = 1.145$$

$$\log f_1 = 0.05881$$

$$f_2 = f_0 + 0.025 = 1.195$$

$$\log f_2 = 0.07737$$

$$\text{area 1} = 0.0147$$

$$M_{81} = \frac{0.034}{1} \times 0.258 \text{ YZ}$$

$$\text{area 2} = 0.0193$$

$$= 0.00877 \text{ YZ}$$

$$\Sigma = 0.0340$$

Test: set $\Delta \theta = 5^\circ$, $\bar{v} = 25 \text{ knots}$ $h =$

$$h_i = 34,000' = 5.54 \text{ nm}$$

$$f_{ij} = 1.17 \quad f_{ij}^2 = 1.369$$

$$\Delta f_{ij} = 0.05$$

$$M_{ij} = 0.00877 \text{ YZ}$$

$$Y = 50$$

$$\text{Then } D_{inj} = \frac{1}{957 \times 0.00877 \times 50 \times 15} \left[25 (29,060)^{1.2} \right] \left[(1242 + 9\pi) \right]$$

$$\left[2 \times 3 \times 25 \times 1242 + 9\pi \right]$$

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$$= \frac{1}{6300} \left[227,100 \times 125 (31,056) + 7.81 (18) \right]$$

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$$= \frac{1}{6300} (881,214,000,000 + 1,455,7)$$

$$= \frac{881,214,000,000}{6300} = 140,000 \frac{204}{204}$$

$$D_{inj} = 7 \times 10^{-9} \text{ R} \times 3 \times 10^2 = 2.1$$

layer 8

$$f_0 = 1.17; \sigma = 1.60; M_i = 0.258 YZ$$

$$f_{ij} = 0.05$$

$$\log f_0 = 0.06819$$

$$0.25 = 1.145$$

$$\log f_1 = 0.05881$$

$$t_1 = 0.03676$$

$$0.25 = 1.195$$

$$\log f_2 = 0.07737$$

$$t_2 = 0.04836$$

$$0.0147$$

$$M_{81} = \frac{0.034}{1} \times 0.258 YZ$$

$$= 0.00877 YZ$$

$$0.0193$$

$$0.0340$$

$$\text{set } \Delta\theta = 5^\circ, \bar{v} = 25 \text{ knots} \quad h = 44,000' \text{ MSL}$$

$$= 40,000' \text{ AG}$$

$$h_i = 34,000' = 5.54 \text{ nm}$$

$$f_{ij} = 1.17$$

$$f_{ij}^2 = 1.369$$

$$a = 3$$

$$\Delta f_{ij} = 0.05$$

$$M_{ij} = 0.00877 YZ$$

$$Y = 50$$

$$Z = 0.15$$

$$D_{inj} = \frac{1}{957 \times 0.00877 \times 50 \times 15} \left[25 \left(29,060 \right)^{1.2} \times 5 \left[\left(1242 \times 25 + 6 \right) \right] + 29,060^{0.2} \right]$$

$$\left[2 \times 3 \times 25 \times 1242 + 9\pi \right]$$

BEST AVAILABLE COPY

$$= \frac{1}{6300} \left[227,100 \times 125 \left(31,056 \right) + 7.81 \left(186,328 \right) \right]$$

$$= \frac{1}{6300} \left(881,214,000,000 + 1,455,721 \right)$$

LLNL

$$= \frac{881,214,000,000}{6,300} = 140,000,000 = 1.4 \times 10^8$$

$$D_{inj} = 7 \times 10^{-9} R \times 3 \times 10^2 = 2.1 \times 10^{-7}$$

205

Error: h_i must be in nautical miles

~~SECRET~~

$\Delta f_{ij} = 0.05$	f_{ij}	f_{j+1}	$\log f_j$	$\log f_{j+1}$	$t = \frac{\log f_j}{f_j}$	t_{j+1}	Area f_{j+1}	$\frac{H}{VZ} \cdot M$ Argument	Area
1.17	1.145	1.195	.05881	.07737	.07737	.03676	.034	.00877	.0193
1.22	1.195	1.245	.07737	.09517	.09517	.04836	.0044		.0237

f_{ij}	f_{j+1}	$\log f_j$	$\log f_{j+1}$

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0660 5500

206

Layer	Δf_{ij}	f_i	f_{j+1}	$\log f_i$	$\log f_{j+1}$	$t = \frac{\log f_i}{f_i}$	t_{j+1}	Area f_{j+1}	$\frac{M-M'}{N}$	A_{j+1}
0	1.17	1.145	1.195	.05881	.07737	.03676	.04834	.834	.00877	.019
2	1.22	1.195	1.245	.07737	.09517	.04836	.05948	.0044		.023

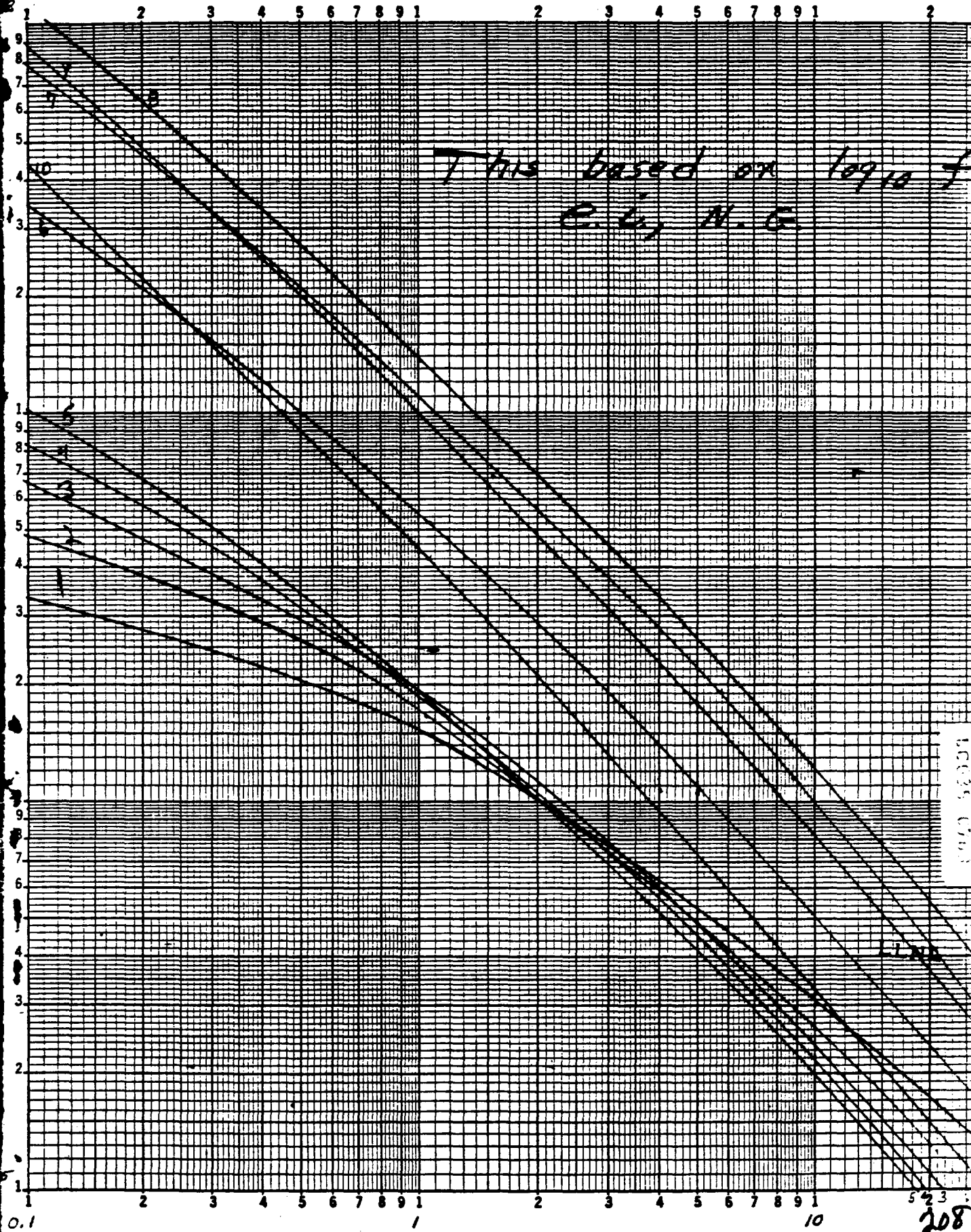
Layer	f_{ij}	f_{j+1}	$\log f_i$	$\log f_{j+1}$

BEST AVAILABLE COPY

~~SECRET~~

LLNL

~~SECRET~~

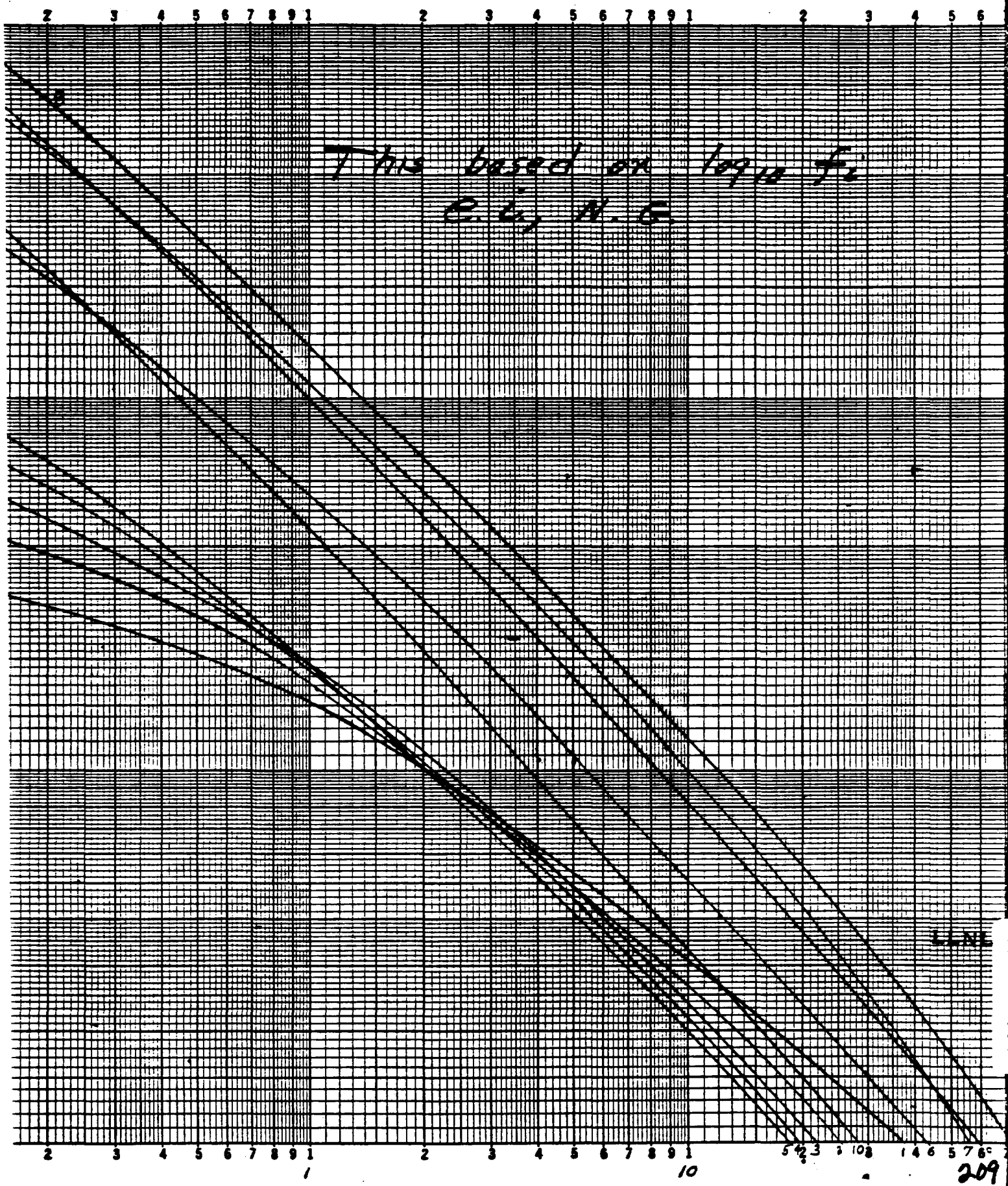


10025 000

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~~SECRET~~

#77A



~~SECRET~~

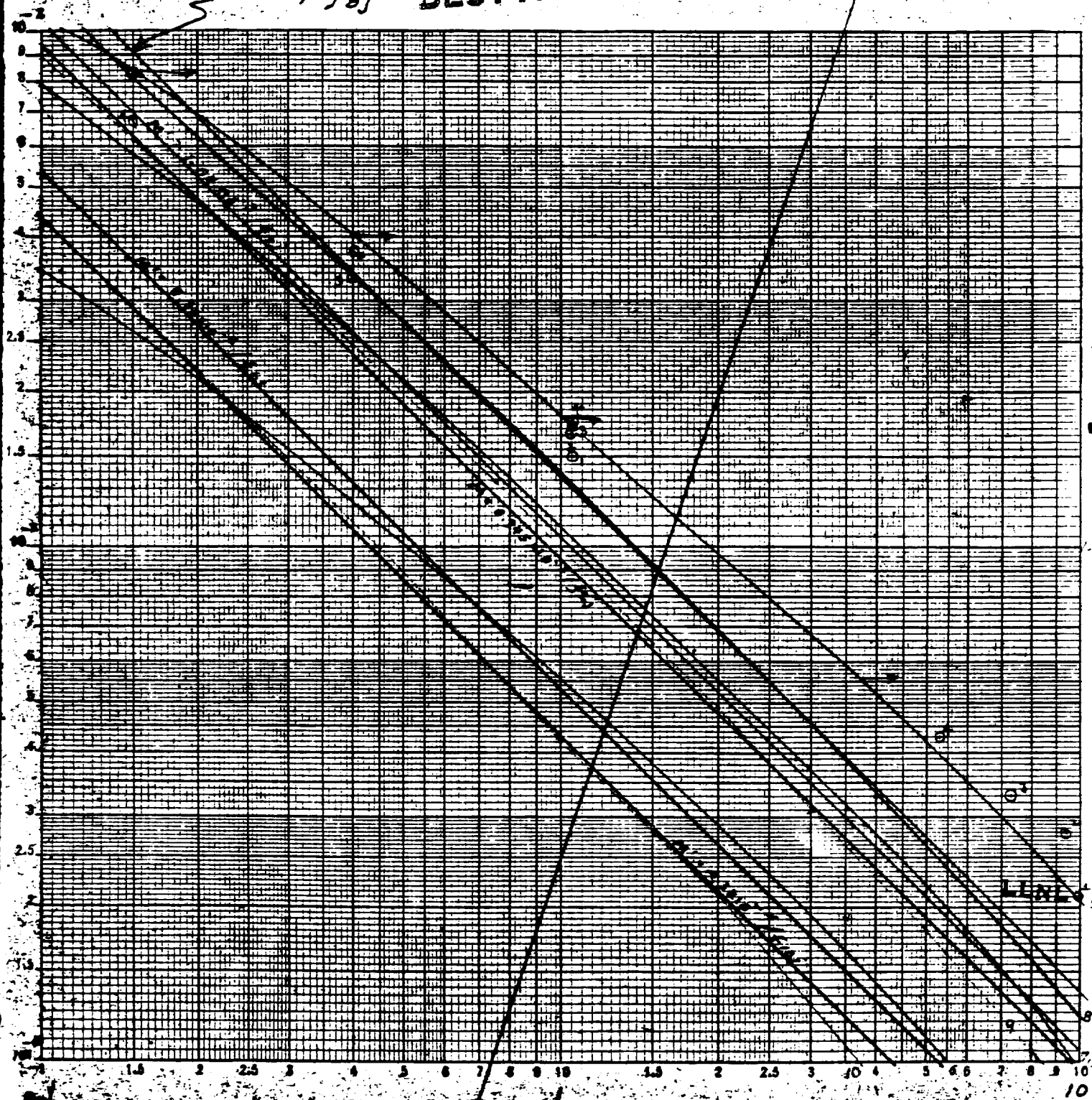
10035 0764

77B

~~SECRET~~

$M' = 1.365 \times 10^{-3} / f_{0j}$

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f_{0j} , knots
 $\Delta f_{0j} = 0.05$ knots

210

~~SECRET~~

100-5 0765

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$\Delta f_i = 0.05$

$t = \frac{\log f_0 - \log f_i}{\Delta f_i}$

10035 0766

f_i	f_{i+1}	$\log f_0$	$\log f_i$	$\log f_{i+1}$	t_i	t_{i+1}	A_{i+1}	A_i
1.17	1.145	1.195	.06819	.05881	.07737	.00586	.00574	.00230
1.22	1.195	1.245		.07737	.09517	.00574	.01686	.00674
1.27	1.245	1.295		.09517	.11227	.01686	.02755	.01102
1.32	1.295	1.345		.11227	.12872	.02755	.03783	.01513
1.37	1.345	1.395		.12872	.14457	.03783	.04774	.01902
1.42		1.445			.15987		.05730	.02282
1.47		1.495			.17464		.06653	.02651
1.52		1.545			.18893		.07546	.03008
1.57		1.595			.20276		.08411	.03354
1.62		1.645			.21617		.09249	.03687
1.67		1.695			.22917		.10061	.04004
1.72		1.745			.24180		.10851	.04320
1.77		1.795			.25406		.11617	.04627
1.82		1.845			.26600		.12363	.04922
1.87		1.895			.27761		.13089	.05206
1.92		1.945			.28892		.13796	.05478
1.97		1.995			.29994		.14484	.05759
2.02		2.045			.31069		.15156	.06022
2.07		2.095			.32118		.15812	.06285
2.12		2.145			.33143		.16452	.06536
2.17		2.195			.34143		.17078	.06780
2.22		2.245			.35122		.17689	.07019
2.27		2.295			.36078		.18287	.07255
2.32		2.345			.37014		.18872	.07488
2.37		2.395			.37931		.19445	.07714
2.42		2.445			.38828		.20006	.07932
2.47		2.495			.39707		.20555	.08146
2.52		2.545			.40569		.21094	.08357
2.57		2.595			.41414		.21622	.08563
2.62		2.645			.42243		.22140	.08765
2.67		2.695			.43056	LLNL	.22648	.08963
2.72		2.745			.43854		.23147	.09156
2.77		2.795			.44638		.23637	.09342
2.82		2.845			.45408		.24118	.09526
2.87		2.895			.46165		.24591	.09710
2.92		2.945			.46909		.25056	.09892
2.97		2.995			.47640		.25513	.10070
3.02		3.045			.48359		.25962	.10245
3.07		3.095			.49066		.26404	.10413
3.12		3.145			.49762		.26839	.10579

$\Delta f_{ij} = 0.05$	$\log f_0$	$\log f_i$	$\log f_{i+1}$	t_j	t_{j+1}	A_{j+1}	$A_i - A_{i+1} = \Delta A_i$	M_i
1.195	.06819	.05881	.07737	.00586	.00594	.00230	.00464	.00180
1.245	↓	.07737	.09517	.00574	.01676	.00674	.00444	.00115
1.295		.09517	.11227	.01686	.02755	.01102	.00428	.00110
1.345		.11227	.12872	.02755	.03783	.01513	.00411	.00106
1.395		.12872	.14457	.03783	.04774	.01902	.00389	.00100
1.445			.15987		.05730	.02282	.00380	.00098
1.495			.17464		.06653	.02651	.00369	.00095
1.545			.18893		.07546	.03008	.00357	.00092
1.595			.20276		.08411	.03354	.00346	.00089
1.645			.21617		.09249	.03687	.00333	.00086
1.695			.22917		.10061	.04004	.00317	.00082
1.745			.24180		.10851	.04320	.00316	.00082
1.795			.25406		.11617	.04627	.00307	.00079
1.845			.26600		.12363	.04922	.00295	.00076
1.895			.27761		.13089	.05206	.00284	.00073
1.945			.28892		.13796	.05488	.00282	.00073
1.995			.29994		.14484	.05759	.00271	.00070
2.045			.31069		.15156	.06022	.00263	.00068
2.095			.32118		.15812	.06285	.00263	.00068
2.145			.33143		.16452	.06536	.00251	.00065
2.195			.34143		.17078	.06780	.00244	.00063
2.245			.35122		.17689	.07019	.00239	.00062
2.295			.36078		.18287	.07255	.00236	.00061
2.345			.37014		.18872	.07488	.00233	.00060
2.395			.37931		.19445	.07714	.00226	.00058
2.445			.38828		.20006	.07932	.00218	.00056
2.495			.39707		.20555	.08146	.00214	.00055
2.545			.40569		.21094	.08357	.00211	.00054
2.595			.41414		.21622	.08563	.00206	.00053
2.645			.42243		.22140	.08765	.00202	.00052
2.695			.43056		.22648	.08963	.00198	.00051
2.745			.43854		.23147	.09156	.00193	.00050
2.795			.44638		.23637	.09342	.00186	.00048
2.845			.45408		.24118	.09526	.00184	.00047
2.895			.46165		.24591	.09710	.00184	.00047
2.945			.46909		.25056	.09892	.00182	.00047
2.995			.47640		.25513	.10070	.00178	.00046
3.045			.48359		.25962	.10245	.00175	.00045
3.095			.49066		.26404	.10413	.00168	.00043
3.145			.49762		.26839	.10579	.00166	.00043

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10035 0767

1.32	1.295	1.345	11227	12872	02255	03783	01513	00411
1.37	1.345	1.395	12872	14457	03783	04774	01902	0038
1.42		1.445		15987		05730	02282	0038
1.47		1.495		17464		06653	02651	0036
1.52		1.545		18893		07546	03108	0035
1.57		1.595		20276		08411	03354	0034
1.62		1.645		21617		09249	03687	0033
1.67		1.695		22917		10061	04004	0031
1.72		1.745		24180		10851	04320	0031
1.77		1.795		25406		11617	04627	0030
1.82		1.845		26600		12363	04922	0029
1.87		1.895		27761		13089	05206	0028
1.92		1.945		28892		13796	05488	0028
1.97		1.995		29994		14484	05759	0027
2.02		2.045		31069		15156	06022	0026
2.07		2.095		32118		15812	06285	0026
2.12		2.145		33143		16452	06536	0025
2.17		2.195		34143		17078	06780	0024
2.22		2.245		35122		17689	07019	0023
2.27		2.295		36078		18287	07255	0023
2.32		2.345		37014		18872	07488	0023
2.37		2.395		37931		19445	07714	0022
2.42		2.445		38828		20006	07932	0021
2.47		2.495		39707		20555	08146	0021
2.52		2.545		40569		21094	08357	002
2.57		2.595		41414		21622	08563	0020
2.62		2.645		42243		22140	08765	0020
2.67		2.695		43056		22648	08963	0019
2.72		2.745		43854		23147	09156	0019
2.77		2.795		44638		23637	09342	0018
2.82		2.845		45408		24118	09526	0018
2.87		2.895		46165		24591	09710	0018
2.92		2.945		46909	LLNL	25056	09892	001
2.97		2.995		47640		25513	10070	001
3.02		3.045		48359		25962	10245	001
3.07		3.095		49066		26404	10413	0016
3.12		3.145		49762		26839	10579	001
3.17		3.195		50447		27268	10745	001
3.22		3.245		51121		27689	10909	001
3.27		3.295		51786		28104	11070	001
3.32		3.345		52440		28513	11225	001
3.37		3.395		53084		28916	11378	001

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1.275	.04511	.11227	.01686	.02755	.01104	.00428	.00110
1.345	.11227	.12872	.02255	.03783	.01513	.00411	.00106
1.395	.12872	.14457	.03283	.04774	.01902	.00389	.00100
1.445		.15987		.05730	.02282	.00380	.00098
1.495		.17464		.06653	.02651	.00369	.00095
1.545		.18893		.07546	.03008	.00357	.00092
1.595		.20276		.08411	.03354	.00346	.00089
1.645		.21617		.09249	.03687	.00333	.00086
1.695		.22917		.10061	.04004	.00317	.00082
1.745		.24180		.10851	.04320	.00316	.00082
1.795		.25406		.11617	.04627	.00307	.00079
1.845		.26600		.12363	.04922	.00295	.00076
1.895		.27761		.13089	.05206	.00284	.00073
1.945		.28892		.13796	.05488	.00282	.00073
1.995		.29994		.14484	.05759	.00271	.00070
2.045		.31069		.15156	.06022	.00263	.00068
2.095		.32118		.15812	.06285	.00263	.00068
2.145		.33143		.16452	.06536	.00251	.00065
2.195		.34143		.17078	.06780	.00244	.00063
2.245		.35122		.17689	.07019	.00239	.00062
2.295		.36078		.18287	.07255	.00236	.00061
2.345		.37014		.18872	.07488	.00233	.00060
2.395		.37931		.19445	.07714	.00226	.00058
2.445		.38828		.20006	.07932	.00219	.00056
2.495		.39707		.20555	.08146	.00214	.00055
2.545		.40569		.21094	.08357	.00211	.00054
2.595		.41414		.21622	.08563	.00206	.00053
2.645		.42243		.22140	.08765	.00202	.00052
2.695		.43056		.22648	.08963	.00198	.00051
2.745		.43854		.23147	.09156	.00193	.00050
2.795		.44638		.23637	.09342	.00186	.00048
2.845		.45408		.24118	.09526	.00184	.00047
2.895		.46165		.24591	.09710	.00184	.00047
2.945		.46909		.25056	.09892	.00182	.00047
2.995		.47640		.25513	.10070	.00178	.00046
3.045		.48359		.25962	.10245	.00175	.00045
3.095		.49066		.26404	.10413	.00168	.00043
3.145		.49762		.26839	.10579	.00166	.00043
3.195		.50447		.27268	.10745	.00166	.00043
3.245		.51121		.27689	.10909	.00164	.00042
3.295		.51786		.28104	.11070	.00161	.00042
3.345		.52440		.28513	.11225	.00155	.00040
3.395		.53084		.28916	.11378	.00153	.00039

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	f_{i+1}	$\log f_0$	$\log f_i$	$\log f_{i+1}$	t_i	t_{i+1}	A_i	DA	M'
95	3.445	06819	53084	53719	28916	29312	11529	00151	00039
	3.495			54345		29704	11677	00148	00038
	3.545			54962		30089	11824	00147	00038
	3.595			55570		30469	11968	00144	00037
	3.645			56170		30844	12111	00143	00037
	3.695			56761		31214	12251	00140	00036
	3.745			57345		31579	12390	00139	00036
	3.795			57921		31939	12527	00137	00035
	3.845			58490		32294	12662	00135	00035
	3.895			59051		32645	12795	00133	00034
	3.945			59605		32991	12927	00132	00034
	3.995			60152		33333	13057	00130	00034
	4.045			60692		33671	13185	00128	00033
	4.095			61225		34004	13311	00126	00033
	4.145			61752		34333	13433	00122	00031
	4.195			62273		34659	13554	00121	00031
	4.245			62788		34981	13673	00119	00031
	4.295			63296		35298	13793	00120	00031
	4.345			63799		35612	13913	00120	00031
	4.395			64296		35923	14031	00118	00030
	4.445			64787		36230	14145	00114	00029
	4.495			65273		36534	14258	00113	00029
5	5.495		73600	73997	41738	41986	16275	00092	00024
15	7.495		87186	87477	50229	50411	19294	00064	00017
15	9.495		97520	97749	56688	56831	21513	00049	00013
25	1.145		03941	05881	01799	00586	00720	00486	00125
15	1.095		01912	03941	03067	01799	01227	00507	00131
15	1.045		-00218	01912	04398	03067	01755	00528	00136
45	.995		-02457	-00218	05798	04398	02309	00554	00143
75	.945		-04818	-02457	07273	05798	02899	00590	00152
15	.845		-09863	-07299	10489	08818	04176	00659	00170
5	.745		-15802	-12784	14138	12252	05624	00746	00192
15	.645		-22548	-19044	18354	16164	07282	00858	00221
75	.545		-30539	-26360	23349	20737	09236	01026	00265
15	.445		-40340	-35164	29474	26239	11595	01244	00321
5	.345		-53018	-46218	37398	33148	14577	01591	00410
5	.245		-70997	-61083	48635	42439	18662	02224	00574
5	.145		-1.02228	-83863	68154	56676	25228	03768	00972
5	.9425	.97313	.97197	.97428	.00108	.00107	.00043	.00043	.00086
			.14767	.14767					

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level	f_i	f_i	f_{i+1}	$\log f_0$	$\log f_i$	$\log f_{i+1}$	t_i	t_{i+1}	A_i	L
8	3.42	3.395	3.445	.06919	.53084	.53719	.28916	.29312	.11529	.0
7	3.47		3.495			.54345		.29704	.11677	.0
	3.52		3.545			.54962		.30089	.11824	.0
	3.57		3.595			.55570		.30469	.11968	.0
	3.62		3.645			.56170		.30844	.12111	.0
	3.67		3.695			.56761		.31214	.12251	.0
	3.72		3.745			.57345		.31579	.12390	.0
	3.77		3.795			.57921		.31939	.12527	.0
	3.82		3.845			.58490		.32294	.12662	.0
	3.87		3.895			.59051		.32645	.12795	.0
	3.92		3.945			.59605		.32991	.12927	.0
	3.97		3.995			.60152		.33333	.13057	.0
	4.02		4.045			.60692		.33671	.13185	.0
	4.07		4.095			.61225		.34004	.13311	.0
	4.12		4.145			.61752		.34333	.13433	.0
	4.17		4.195			.62273		.34659	.13554	.0
	4.22		4.245			.62788		.34981	.13673	.0
	4.27		4.295			.63296		.35298	.13793	.0
	4.32		4.345			.63799		.35612	.13913	.0
	4.37		4.395			.64296		.35923	.14031	.0
	4.42		4.445			.64787	LLNL	.36230	.14145	.0
	4.47		4.495			.65273		.36534	.14258	.0
	5.47	5.445	5.495		.73600	.73997	.41738	.41986	.16275	.0
	7.47	7.445	7.495		.87186	.87477	.50229	.50411	.18294	.0
	9.47	9.445	9.495		.97520	.97749	.56688	.56831	.21513	.0
	1.12	1.095	1.145		.03941	.05881	.01799	.02586	.00720	.0
	1.07	1.045	1.095		.01912	.03941	.03067	.01799	.01227	.0
	1.02	.995	1.045		-.00218	.01912	.04398	.03067	.01755	.0
	.97	.945	.995		-.02457	-.00218	.05798	.04398	.02309	.0
	.92	.895	.945		-.04818	-.02457	.07273	.05798	.02899	.0
	.87	.845	.895		-.09863	-.07289	.10489	.08818	.04176	.0
	.82	.795	.845		-.15802	-.12784	.14138	.12252	.05624	.0
	.77	.745	.795		-.22548	-.19044	.18354	.16164	.07282	.0
	.72	.695	.745		-.30539	-.26360	.23349	.20737	.09236	.0
	.67	.645	.695		-.40340	-.35164	.29474	.26239	.11595	.0
	.62	.595	.645		-.53018	-.46248	.38388	.33148	.14577	.0
	.57	.545	.595		-.70997	-.61083	.48635	.42439	.18662	.0
	.52	.495	.545		-.82228	-.73863	.68154	.56676	.25228	.0
	.47	.445	.495		1.47676	1.47748	.47119	.47121	.16111	.0
2	9.40	9.375	9.425	.97313	.97197	.97428	.00108	.00107	.00043	.0
1	30.00									.0

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50035 0703

Bikini

At Enongi 2 days -

At Bikini 5 days

— shot --- time lapse

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	Taongi	Bikini	At Taongi	At Bikini
	-	-	2d	5d
	-	-	shot	-
	-	-		
	-	-		
	-	-		
	o	-		
April	+ -	+		
	+	+ -		
	+	-		
	+	-		
	+	-		
	o	-		
	o	-		
	-	-		
	o	-		
	+ -	-		
	o	+		
	-	-		
	-	-		
	o	-		
	+	-		
June	+	-		
	o	-		
	+ -	-		
	+	-		
	+	-		
	o	-		
	+	-		
	-	→		
	+ -	+ -		
	+ -	-		
	+	-		
	+	→		
	+	+		
	+	+ -		
	+	-		
	+	-		
	+	-		
July	o	-		
	+ -	-		
	-	-		
	+	-		

BEST AVAILABLE COPY

LLNL

April

-	-
-	-
-	-
o	-
+ -	+
+	+ -
+	-
+	-
+	-
o	-
o	-
-	-
o	-

2 weeks

June

+ -	-
o	+ -
-	-
-	-
o	-
+	-
+	-
o	-
+	-
-	+

BEST AVAILABLE COPY

2 weeks

+ -	+ -
+	-
+	-
+	+
+	+
+	+
+	+ -
+	-

LLNL

July

o	-
+ -	-
-	-
+	-
+	+
+	+ -
+	-

W	AP	d, 1 kt	$\frac{K W^{1/2}}{d}$ d, 0 kt, yds
5	1	1500 yds	2560
	4	560 yds.	958
20	1	etc	4070
	4	etc	1520
10	1	↓	3230
10	4		1205
15	1		3700
	4		1380
30	1		4660
	4		1740
40	1		5130
	4		1916
70	1		6180
	4		2310
100	1		6970
	4		2600
150	1		7970
	4		2970
200	1		8780
	4		3270
250	1		9440
	4		3530
300	1		10,030
	4		3750

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LMC 0713

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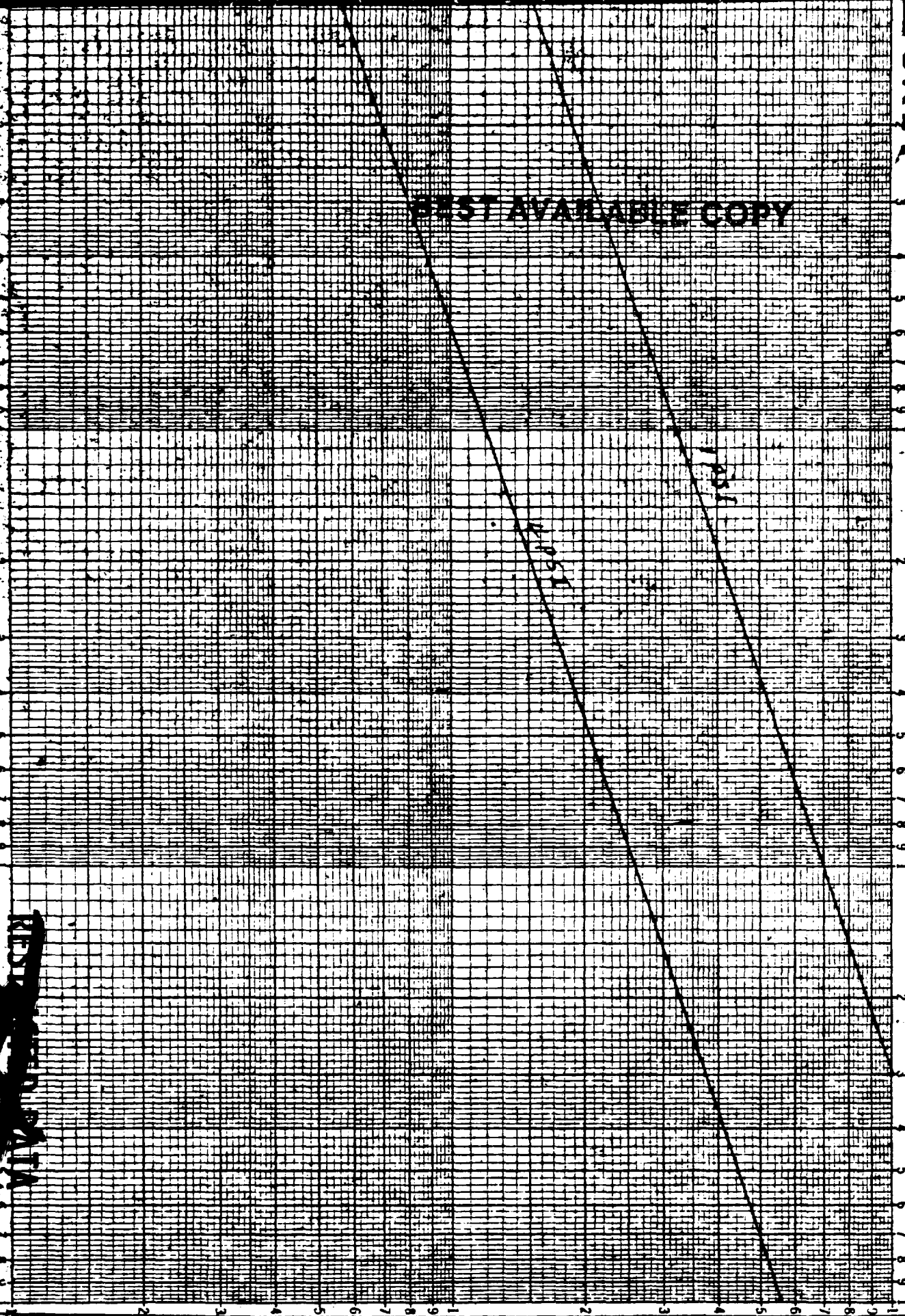
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1000000 (719



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Distances Tare Complex

Site	Location	Yield	Distance	To
1	300' tower - Regov	5	9050'	OBCE camp
	↓	↓	1650	2200 Sta
			4550	2300 "
			3625	Site #2 300'
2	300' tower Sugar	5	12,700	OBCE
	↓	↓	2000	2200
			2200	2300
			3625	Site #1
3	Range on ground	20	16800	OBCE
	↓	↓	4250	Site #2
		40	16,800	OBCE
			4250	Site #2
4		300	28,000	OBCE
5	Range off dog	2M	62,000	"
		7M	↓	"
6	" " Baker	500K	85,000	"
		12M		

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Site	W	h, kt	d, yds	d, kt	DP psi	Location
1	5	175	3017	1762	0.86	Obce
			550	322	12	sta 2200
			1517	887	2.2	sta 2300
			1225	717	3.0	site #2
2			4233	2472	0.53	Obce
			667	390	8.2	sta 2200
			27339			
			8200 yds	1595	0.98	sta 2300
					3.0	site #1
3	20	0	5600	2062	0.68	Obce
			1417	522	4.6	site #2
40			5600	1636	0.94	Obce
			1417	415	6.6	site #2
4	300	0	9223	1391	1.2	Obce
5	5000	0	26,667	1208	1.4	Obce
	7000	0	"	1080	1.7	Obce
6	500	0	26,823	3570	0.32	Obce
	12,000	0	"	1295	1.4	Obce

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10025 0715

res Tare Complex

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location	Yield	Distance	To	DP
to - Regov	5	9050'	OBCE camp	
↓	↓	1650	2200 sta	
		4550	2300 "	
		3625	Site #2 300'	
to - Regov	5	12,200	OBCE	
↓	↓	2000	2200	
		2200	2300	
		3625	Site #1	
to - ground	20	16800	OBCE	
↓	↓	4250	Site #2	
	40	16,800	OBCE	
		4250	Site #2	
	300	28,000	OBCE	
off log	2M	62,000	"	
	7M	"	"	
" Baker	500K	85,000	"	
	12M			

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d, yds	d, lbs	DP psi	Location
3017	1762	0.86	Obce
550	322	12	sta 2200
1517	887	2.2	sta 2300
1225	717	3.0	Site #2
4233	2472	0.53	Obce
667	390	8.2	sta 2200
2733			
8200 yds	1595	0.98	sta 2300
		3.0	Site #1
5600	2062	0.68	Obce
1417	522	4.6	Site #2
5600	1636	0.94	Obce
1417	415	6.6	Site #2
9333	1391	1.2	Obce
26,667	1208	1.4	Obce
"	1080	1.7	Obce
26,333	3570	0.32	Obce
"	1295	1.4	Obce

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LC 6719

Close in fallout intensities

Dose rates for H +
Reduce a factor of 10 +

W	h	Extents $10^2/\text{hr}$	$1^2/\text{hr}$	$0.1^2/\text{hr}$	$0.01^2/\text{hr}$
20X	300'	350 yds	600 yds	850 yds	1100 yds

5 26 " 200 400 600 800

40 " 700 1100 1500 1900
~~1000~~ ~~1300~~ ~~1600~~

150 ~~7000~~ ~~10,000~~ ~~7,000~~ ~~10,000~~
~~3000~~ ~~2000~~ ~~4000~~ ~~12,000~~

1,000 2,000 10,000 22,000 yds

1500 3300 5000 ~~7000~~ yds
(7000)

300 1000 ~~2150~~ ~~7000~~ yds
2000 4300

6500 (9000)

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e in fallout intensities

Dose rates for H+24 hours.
Reduce a factor of 10 to H+8 days

10 R/hr	Extents 1 R/hr	0.1 R/hr	0.01 R/hr
350 yds	600 yds	850 yds	1100 yds

200	400	600	800
700	1100	1500	1900
	~~1000~~	~~1300~~	~~1600~~

~~8000~~	~~7,000~~		
~~10,000~~	~~10,000~~	~~13,000~~	
~~2000~~			
~~4000~~			

1,000 2,000 10,000 22,000 yds.

→ 1500	3300	5000	~~5000~~ yds. (7000)	10:20 Wed
1000	~~2750~~		~~5000~~ yds.	
2000	4300			
		6500	(9000)	

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Scaling from UK-10:

Diablo
5000 ft
Whiting
Nagay
Wilson
500'

15 Kt	d, yds	d, 11 Kt, yds	12 Kt	10 Kt	14 Kt	d, = $(\frac{W_1}{W_2})^{1/3}$
1	3433	3066	1071	8973	1337	
2	1167	1042	3150	1011	1131	
2.50	1917	1712	1958	1660	1858	
5	1283	1146	1178	1111	1243	
8	2700	2411	2476	2338	2616	
10	980	804	825	779	872	Assume h
10	650	580	596	563	630	
10	583	521	535	505	565	$(W_1/W_2)^{1/3} = (15)$
15	517	462	474	448	501	
20	477	426	437	413	462	$d_2 = \frac{d_1}{1.11}$
30	420	375	385	364	407	
50	353	315	324	306	342	
100	267	238	245	231	259	
200	190	170	170	165	184	

B': Smokey: 45 Kt, 700' to

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Scale from Priscilla:

Assume same scaled height

$$\frac{d_1}{d_2} = \left(\frac{W_1}{W_2}\right)^{1/3} = \left(\frac{39.5}{45}\right)^{1/3} = 0.878^{1/3} = 0.958$$

$$d_{prisc} = 0.958 d_{a'}$$

$$d_{a'} = 1.044 d_{prisc}$$

Newton: 70 Kt at 1500
Scale from Smokey: add
scaled height. Add 1% for
for higher scaled height.

 $\Delta P, psi$ $d_{a'} yds$

1	4872
2	3306
3	2561
5	~~1851~~ 1400
6	1653
8	1368
9	~~1229~~ 1100
2.5	1034
2.3	1078 → 1287
10	950
15	793
20	707
30	~~598~~ 598
40	629

 ΔP $1.16 D_{a'} = D_{n'}^*$ $X D_{n'}^* = D_{n'}$

1	5652	5833
2	3835	4027
3	2971	3182
5	2147	2319
6	1917	2070
8	1587	1657
9	1159	1217
2.5	1198	1259
2.3	1250 → 1483	1312 → 1568
10	1102	1165
15	920	950
20	820	853
20	1.94	1.00

ing from UK-10:

4KT	d, yds	d, 11KT, yds	12KT	10KT	14KT	d, 1
3433	3066	1071	8973	8423	2327	
1167	1642	3150	1011	1131	52	
1917	1712	1758	1660	1858		
1283	1146	1190	1111	1243		
2700	2411	2476	2338	2616		
980	804	825	779	872		
650	580	596	563	630		
583	521	535	505	565		
517	462	474	448	501		
477	426	437	413	462		
420	375	385	364	407		
353	315	324	306	342		
267	238	245	231	259		
190	170	170	165	184		

$$\left(\frac{w_1}{w_2}\right)^{1/3} = \frac{h_1}{h_2}$$

Assume $h_1 = h_2$

$$\left(\frac{w_1}{w_2}\right)^{1/3} = \left(\frac{15.4}{11}\right)^{1/3} = 1.12$$

$$d_2 = \frac{d_1}{1.12} = 0.893 d_1$$

B: Smokey: 45 KT, 700' tower

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from Priscilla: Assume same scaled height.

$$\frac{d_1}{d_2} = \left(\frac{w_1}{w_2}\right)^{1/3} = \left(\frac{39.5}{45}\right)^{1/3} = 0.878^{1/3} = 0.958$$

$$d_{prisc} = 0.958 d_{B'}$$

$$d_{B'} = 1.044 d_{prisc}$$

Newton: 70KT at 1500'

Scale from Smokey: add 10% for higher scaled height. Add 8% from TN 43-200 for higher scaled height. (to d height)

Hood: 60KT 1500'

4KT	d, yds	ΔP	1.16 D _{B'} = D _N *	X D _N * = D _N	
4872					
3306		1	5652	5833	5541
2561		2	3835	4027	3826
1851		3	2971	3182	3023
1460		5	2147	2319	2203
1653		6	1917	2070	1967
1368		8	1587	1657	1574
889		9	1159	1217	LLN 1156
1034		8.5	1198	1259	1196
1078 → 1287		8.3	1250 → 1483	1312 → 1568	1246 → 1490
950		10	1102	1165	1107
793		15	920	950	902
707		20	820	853	810
598		30	694	694	659
529					
438					

1	1283	1146	1190	1111	1243
7.5	2700	2471	2476	2338	2616
9	980	804	825	779	872
10	650	580	596	563	630
15	583	521	535	505	565
20	517	462	474	448	501
30	477	426	437	413	462
50	420	375	385	364	407
100	353	315	324	302	342
200	267	238	245	231	259
	190	170	170	165	184

Assume

$$(W_1/W_2)^{1/3} = 1$$

$$d_2 = d_1$$

B' : Smokey : 45 Kt, 700' -

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Scale from Priscilla:

Assume same scaled height

$$\frac{d_1}{d_2} = \left(\frac{W_1}{W_2}\right)^{1/3} = \left(\frac{39.5}{45}\right)^{1/3} = 0.878^{1/3} = 0.958$$

$$d_{prisc} = 0.958 d_{B'}$$

$$d_{B'} = 1.044 d_{prisc}$$

Newton: 70 Kt at 150'

Scale from Smokey: as scaled height. Add 1% for higher scaled height.

ΔP_{prisc}	$d_{B'} \text{ yds}$	ΔP	$1.16 D_{B'} = D_N^*$	$X D_N^* = D_N$
1	4872	1	5652	5833
2	3306	2	3835	4027
3	2561	3	2971	3182
5	~~1851~~ 1851	5	2147	2319
6	1653	6	1917	2070
8	1368	8	1587	1657
9	~~889~~ 889	9	1159	1217
8.5	1034	8.5	1198	1259
8.3	1078 → 1287	8.3	1250 → 1493	1312 → 1568
10	950	10	1102	1165
15	793	15	920	950
20	707	20	820	LLNL 853
30	~~598~~ 598	30	694	694
40	529	40	614	614
60	438	60	508	457 RD
100	362	100	420	357
200	300	200	348	296
300	268	300	311	[264] P

PILOT

[264] P

1283	1146	1190	1111	1243
2700	2411	2476	2338	2616
960	864	925	779	872
650	580	596	563	630
583	521	535	505	565
517	462	474	448	501
477	426	437	413	462
420	375	385	364	407
353	315	324	306	342
267	238	245	231	259
180	170	165	184	

Assume $h_1 = h_2$

$$(W_1/W_2)^{1/3} = (15.4/11)^{1/3} = 1.12$$

$$d_2 = d_1 / 1.12 = 0.893 d_1$$

B': Smokey: 45 kt, 700' tower

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from Priscilla:

Assume same scaled height.

$$\pm = \left(\frac{W_1}{W_2} \right)^{1/3} = \left(\frac{39.5}{45} \right)^{1/3} = 0.878^{1/3} = 0.958$$

$$prisc = 0.958 d_0'$$

$$d_0' = 1.044 d_{prisc}$$

Newton: 70 kt at 1500'

Scale from Smokey: add 10% for higher scaled height. Add 8% from 1400 to 1500 for higher scaled height. (to d_{Newton})

Head: 60 kt 1500'

d_0' yds	ΔP	$1.16 \bar{D}_0' = D_n^*$	$X D_n^* = D_m$	
4872				
3306	1	5652	5833	5541
2561	2	3835	4027	3826
~~1851~~	3	2971	3182	3023
1653	5	2147	2319	2203
1368	6	1917	2070	1967
~~886~~	8	1587	1657	1574
1034	9	1159	1217	1156
1078 → 1287	8.5	1198	1259	1196
950	8.3	1250 → 1483	1312 → 1568	1246 → 1490
793	10	1102	1165	1107
707	15	920	950	902
~~598~~	20	820	853	LLNL 810
529	30	694	694	659
438	40	614	614	583
362	60	508	457	434
300	100	420	357	339
268	200	348	296	281
	300	311	264	251

100000 0725

Device:

Yield: DELETED

Height: 500' (Tow)
d: ground range

DELETED

1 - 8 PSI: Ideal Curves, Overpressure, TM-23-200

d = h

Scaled height 1 kt = 225'

With altitude correction

Pressure factor: .86 Distance

ΔP , psi	d, 1 kt, yds	d, 11 kt, yds	ΔP	d, 1 kt, yds	d, 11 kt, yds
1	1585	3519	0.86	1	3632
3	730	1621	2.58	3	752
6	455		5.16	6	469
5	515	1010	6.98	8	402
8	390	866			

Working: $\Delta P = 1$ back according to TM-23-200 method

$$d, 1 \text{ kt} = \frac{3632}{1.03(11)^2} = 1584$$

$$p, 1 \text{ kt} = 1 \text{ psi} \quad p, 4000' = 0.86$$

UK-10: Yield = 15.4 kt h = 524'

 ΔP 13.6 PSI 10 PSI

d 533 yds 587 yds

From 23-200 curves for poor sfc conditions:

Scaled 1 kt h = 210'

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$$d, 1 \text{ kt} = \frac{533}{1.03(11)^2} = 208 \text{ yds}$$

$$p, 1 \text{ kt} = 14.2 \times 0.86 = 12.2 \quad \text{curve hard to read.}$$

$$t_0 \quad 15.0 \times 0.86 = 12.9$$

$$d, 1 \text{ kt} = \frac{587}{1.03(11)^2} = 229 \text{ yds}$$

$$p, 1 \text{ kt} = 12 \times 0.86 = 10.3 \text{ PSI}$$

LLNL

ΔP_0	ΔP	d, 1 kt, yds	d, 11 kt, yds
10.3	12	332	737
14.6	17	285	633
19.8	23	240	533
24.9	29	210	466
30.1	35	180	400

This data does not show proper

182

DELETED

Yield : DELETED Height : 500' (Tower)

d : ground range

Ideal Curves, over pressure, TM-23-200

d = horizontal range

height 1 kt = 225'

With altitude correction:

Pressure factor: 0.86 Distance factor: 1.03

1 kt, yds d, 11 kt, yds

585 3519

730 1621

155 1010

90 866

AP

0.86

1

d, 1 kt, yds

1632

2.58

3

752

5.16

6

469

6.88

8

402

d, 11 kt, yds

3623

1669

1041

892

P=1 back according to TM 23-200 method:

$$\frac{3623}{1.03(11)^2} = 1584$$

$$1 \text{ psi } P_{4000'} = 0.86$$

Yield = 15.4 kt h = 524'

13.6 PSI 10 PSI

533 yds 587 yds

23-200 curves for poor sfc conditions:

d 1 kt h = 210'

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$$1 \text{ kt} = \frac{533}{1.03(11)^2} = 208 \text{ yds}$$

$$1 \text{ kt} = 14.2 \times 0.86 = 12.2 \text{ } \left. \begin{array}{l} \text{curve hard to read.} \\ t_0 \end{array} \right\}$$

$$t_0 \quad 15.0 \times 0.86 = 12.9$$

$$1 \text{ kt} = \frac{587}{1.03(11)^2} = 229 \text{ yds}$$

$$1 \text{ kt} = 12 \times 0.86 = 10.3 \text{ PSI}$$

LLNL

d, 11 kt, yds

737

633

533

466

422

This data does not show proper 'precursor' shape

DELETER

1-8 PSI: Ideal Curves, Overpressure, TM-23-200

d =

Scaled height 1kt = 225'

With altitude curve

Pressure factor: 0.86 Distance

$\Delta P, \text{psi}$	d, 1kt, yds	d, 11kt, yds
1	1585	3519
3	730	1621
6	455	
5	515	1010
8	390	866

ΔP	d, 1kt, yds	d, 11kt, yds
0.86 1	1632	3
2.58 3	752	1
5.16 6	469	1
6.88 8	402	

Working OP=1 back according to TM 23-200 method:

$$d, 1kt = \frac{3623}{1.03(11)^{1/2}} = 1584$$

$$p, 1kt = 1 \text{ psi} \quad P, 4000' = 0.86$$

UK-10: Yield = 15.4kt h = 524'

ΔP 13.6 PSI 10 PSI

d 533 yds 587 yds

From 23-200 curves for peer c/c conditions:

Scaled 1kt h = 210'

$$d, 1kt = \frac{533}{1.03(11)^{1/2}} = 208 \text{ yds}$$

$$p, 1kt = 14.2 \times 0.86 = 12.2 \quad \text{curve hard to read.}$$

$$t, 15.0 \times 0.86 = 12.9$$

$$d, 1kt = \frac{587}{1.03(11)^{1/2}} = 229 \text{ yds}$$

$$p, 1kt = 12 \times 0.86 = 10.3 \text{ PSI}$$

ΔP_c	ΔP_i	d, 1kt, yds	d, 11kt, yds
10.3	12	332	737
14.6	17	285	633
19.8	23	240	533
24.9	29	210	466
30.1	35	190	422
39.6	46	170	377
49.9	58	147	326
99.8	116		
149.6	174		

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LLNL

This data does not show proper

184

~~SECRET~~

66

~~SECRET~~

10

0

100%

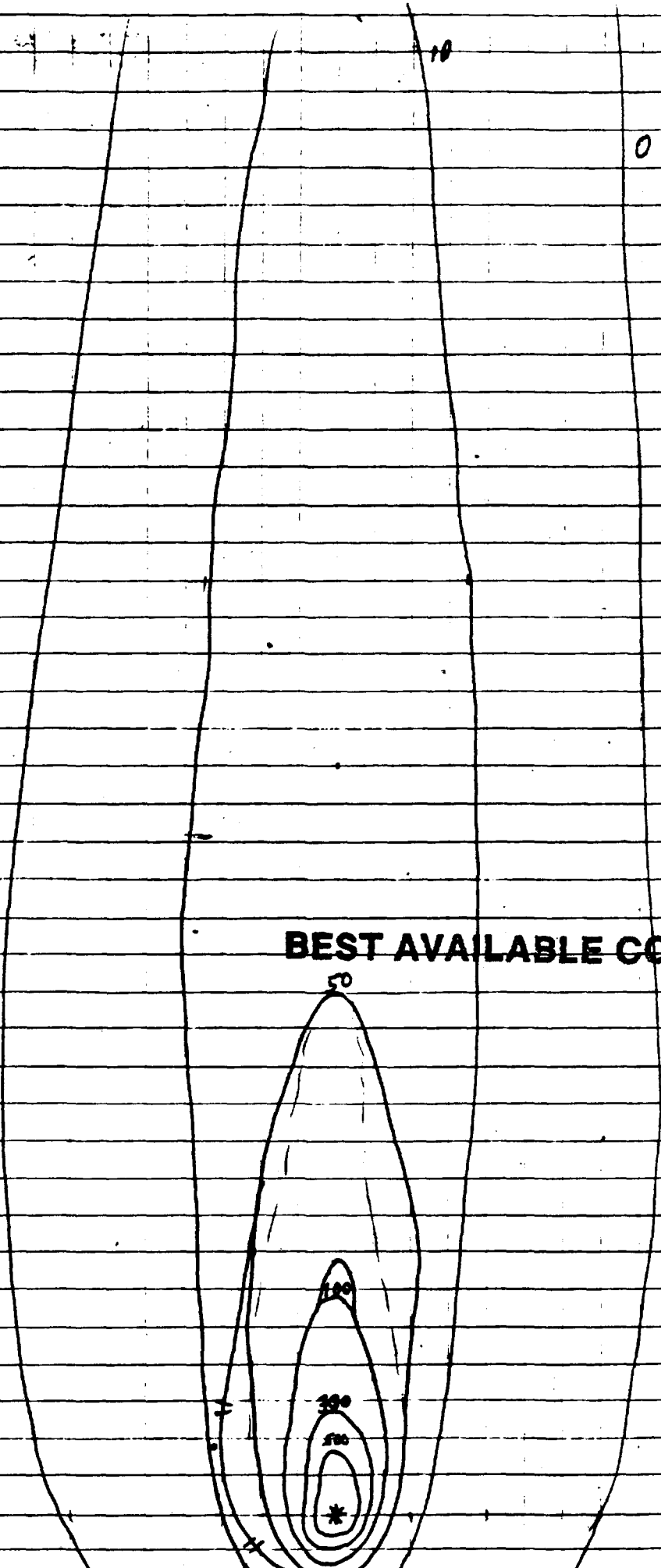
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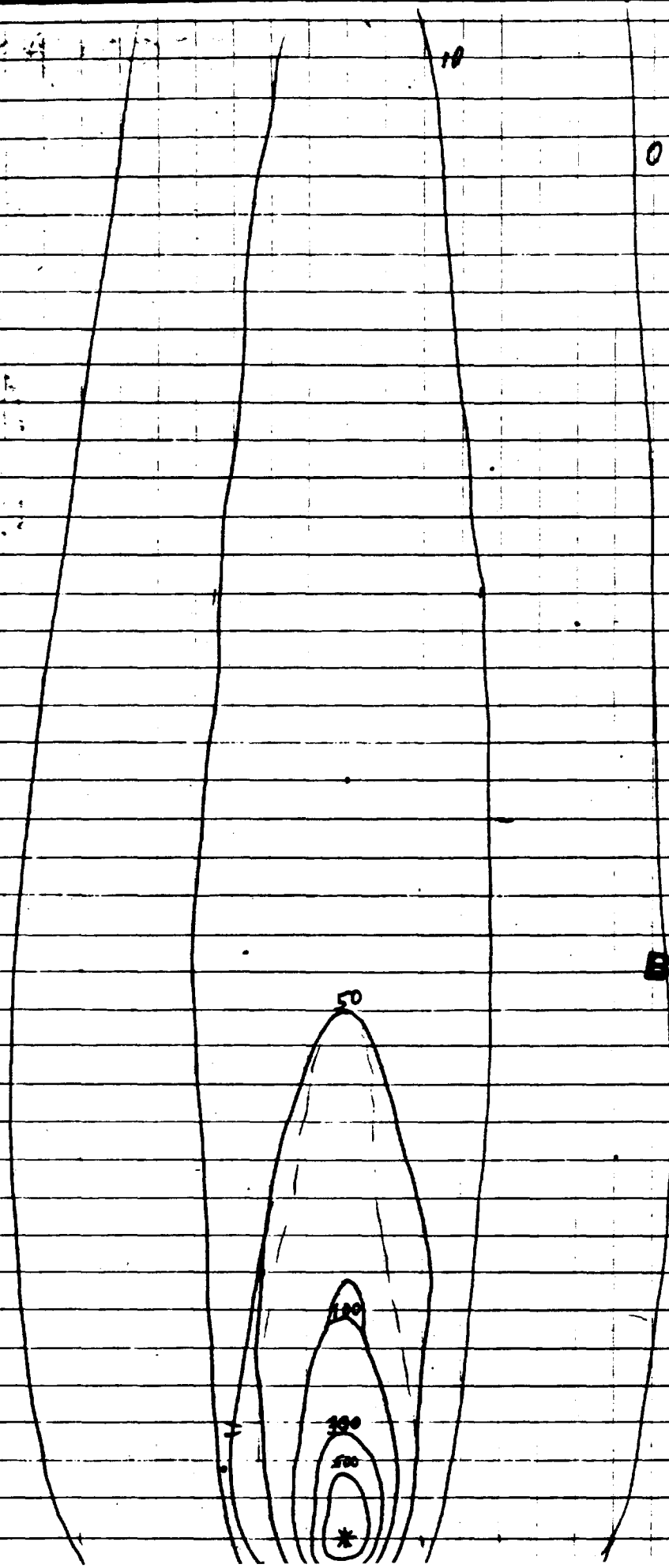
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185

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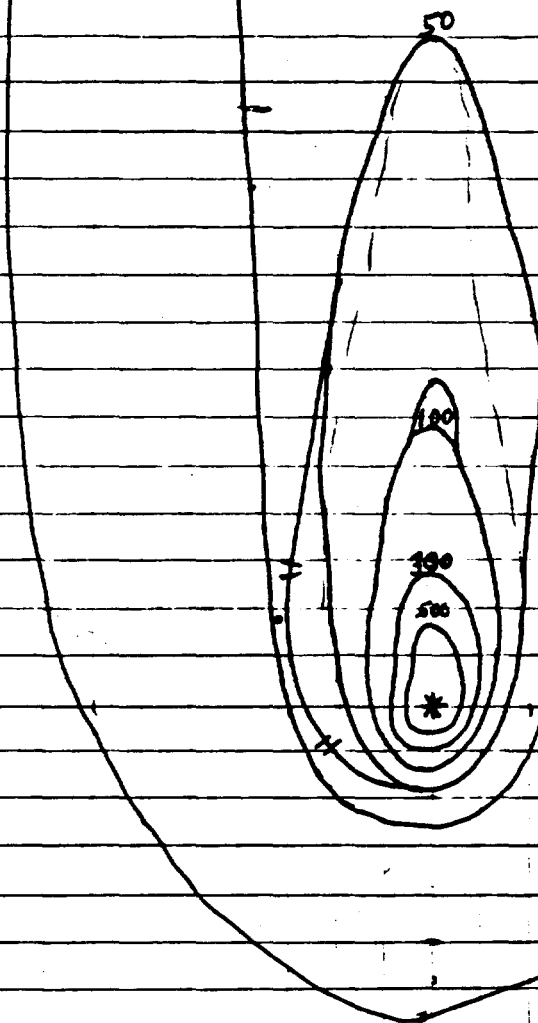
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Dose
at

LLNL

182

Development of DELETED Fallout Pattern.

Yield 0.02 kt

Puff radius: 0.22 miles = 1162' or 327 yds

Stem radius: 0.055 miles = 290' or 97 yds

Cloud heights 3000' sfc burst

6000' tower burst

Stem to puff thickness ratio: 1 ~~to~~ : 1 to 1

angle surface: 1.2 kt

distance:	R/hr @ 1 hr	width
600 yds	500	300 yds at 300 yds
2200 "	300	500 yds at 500 yds; 200
	100	500 yds at 2000 yds
	50	1000 yds at 2000 yds
	10	1500 yds at 3000 yds
	1	2000 yds at 3000 yds

angle surface from TM-23-200 predictions: (15 hr + win

1000 yds	500 R/hr
1500 yds	300
3300 yds	100
7000 yds	50

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DELETED

prediction from TM-23-200

85 yds	500 R/hr	Crosswind extent ~ 350 yds.
130 yds	300	
340	100	
700	50	
2400	10	

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Scaling width ~~as~~ w's (factor of 60):

500 R/hr	75 yds	188
300	175 yds	
100		
1	325 yds at zero	
	500 yds at 1000 yds.	

Development of DELETED Fallout Pattern.

22 kt

∴ 0.22 miles = 1162' or 327 yds

∴ 0.055 miles = 290' or 97 yds

641 3000' sfc burst

6000' tower burst

uff. thickness ratio: 1 ~~100~~ : 1 to 1

acc: 1.2 kt

R/hr @ 1 hr	width
500	300 yds at 300 yds
300	500 yds at 500 yds; 200 yds at 1000 yds
100	500 yds at 2000 yds
50	1000 yds at 2000 yds
10	1500 yds at 3000 yds
1	2000 yds at 3000 yds.

re from TM-23-200 predictions: (15 hr + wind)

500 R/hr
300
~~1000~~
100
50

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prediction from TM-23-200

500 R/hr crosswind extent ~ 350 yds.
300
100
50
10

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widths as w's (factor of 60) :

500 R/hr 75 yds
300 125 yds
~~100~~
1 325 yds at zero
500 yds at 1000 yds.

10035 0735

189

1000' radius: U.S. miles = 1162' or 327 yds

Stem radius: 0.055 miles = 290' or 97 yds

Cloud heights: 3000' sfc burst

6000' tower burst

Stem to puff thickness ratio: 1 ~~100~~ : 1 to 1

gangle surface: 1.2 kt

distance:

R/hr @ 1 hr

width

600 yds

500

300 yds at 300 yds

2200 "

300

500 yds at 500 yds; 200

100

500 yds at 2000 yds

50

1000 yds at 2000 yds

10

1500 yds at 3000 yds

1

2000 yds at 3000 yds

gangle surface from TM-23-200 predictions: (15 knot wind)

1000 yds

500 R/hr

1500 yds

~~1000~~
300

3300 yds

100

7000 yds

50

DELETED

prediction from TM-23-200

85

~~100~~ yds

500 R/hr

Crosswind extent ~ 350 yds.

130 yds

300

340

100

700

50

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2400

10

Scaling widths at 23 w's (factor of 60):

500 R/hr

~~75~~
750 yds

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300

175 yds

~~100~~

1

325 yds at zero

500 yds at 1000 yds.

100

225 yds at 175 yds

50

250 yds at 325 yds

190

10

375 yds at 1000 yds

Max width in radial winds: 400 yds

Desert Line

From UK-10, neglect

Ground Range, yds

ΔP, psi

433

14.4

422

550

10.85

462

667

11.7

449

433

21.8

550

13.8

667

12.4

433

28.5

550

-

667

3.25

$$d_1 = \left(\frac{8.1}{15.4} \right)^{1/3} = 0.526^{1/3} = 0.807$$

$$d_1 = 0.807 d_2$$

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Shot Fizeau: 8 kt at 500'

Scaling from Boltzmann:

$$\frac{dB}{dF} = \left(\frac{11}{8} \right)^{1/3}$$

$$dF = 0.9 dA$$

ΔP, psi	d _F , yds	d _{max} ΔP	d _F and d _F	For Owen
1	2759		2759	2814
2.56	1541		1541	1572
1.5	2170		2170	2213
5	1031		1031	1054
6	938		938	959
8	724		800	823
9	522		700	720
10	469	550 10.85	540	555
15	416	433 14.4	430	430
20	383	667 11.7	383	383
30	338		338	338
50	284		284	284
100	214		214	214
200	153		153	153

PIOT

PIOT



$$W = g_1 \pm g_2 k \pm$$

$$h = 500$$

Liase

Frame UK-10, neglecting scaled h difference

nd Range, yds	ΔP , psi		
433	14.4	} 0 level	422
550	10.85		462
667	11.7		449
433	21.8	} 10' level	
550	13.8		
667	12.4		
433	28.5	} dynamic	
550	-		
667	3.25		

$$\frac{(8.1)^{1/3}}{15.4} = 0.526^{1/3} = 0.807$$

0.807 d.

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Fizeau : 8 kt at 500'

ng from Boltzmann:

$$\frac{dB}{dF} = \left(\frac{11}{8}\right)^{1/3} = 1.375^{1/3} = 1.112$$

$$d_F = 0.9 d_A$$

psi	d m yds	d bar & P	Bar out of	For Owens: 8kt at 400'
2759			2759	2814
1541			1541	1572
2170			2170	2213
1031			1031	1054
938			938	959
724			800	823
522			700	720
469	550 10.65		540	555
	433 14.4			
416	667 11.7		430	430
383			383	383
338			338	338
284			284	284
214			214	214
153			153	153

~~LLNL~~

192

22-1-13

PLAT

01 03

Overpressures: Franklin: 2 Kt at 300' 5.

Alt. corrections: Distance: 1.04; ΔP : 0

Directly from TM-23-200: "average" surface conditions.

ΔP	$\Delta P_{5000'}$	$d_{ikt} \times \frac{1}{1.04} \times 1.26 = d_{FRANKLIN}, yds$	Franklin x 0.66 Lassen
1	0.85	1920	1283
1.18	1.00	1736	1160
2	1.70	1192	796
3	2.55	886	592
5	4.25	623	416
10	8.50	399	267
15	12.75	302	202
20	17.00	254	170
30	25.50	206	138
50	42.50	157	105
70	59.50		
100	85.00	115	
200	170.0		

PLOT

Laplace: 1.7 Kt at 750'

Altitude corrections: Distance 1.04; ΔP :

Scaled height: 628' Data as of Fran

ΔP	$\Delta P_{5000'}$	$d_{ikt} \times \frac{1}{1.04} \times 1.193 = d_{LAP}, yds$
1	0.83	1984
2	1.66	1357
3	2.49	1052
5	4.15	759
10	8.3	477
15	12.45	298
20	16.6	190
30	24.9	115
50	41.5	-
70	59.1	-
100	83	-

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0030 0701

Overpressures: Franklin: 2 Kt at 300' scaled h = 230'

Alt. corrections: Distance: 1.04; ΔP : 0.85

from TM-23-200: "average" surface conditions. (Checks Uk-3 to 4ps)

$\Delta P_{\text{at 300'}}$	dist $\times \frac{1}{1.04} \times 1.26 = \text{Franklin, yds}$	Franklin $\times 0.668$ Lassen	$W = 0.6 \text{ at } 300'$ Corrected for Scaled h
0.85	1920	1283	1311
1.00	1736	1160	1185
1.70	1192	796	819
2.55	886	592	607
4.25	623	416	426
8.50	399	267	275
12.75	302	202	202
17.00	254	170	163
25.50	206	138	115
42.50	157	105	95
59.50			PLOT
85.00	115		
170.0			

PLOT

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Laplace: 1.7 Kt at 750'

Altitude corrections: Distance 1.04; ΔP : 0.83

Scaled height: 628' Data as of Franklin above.

$\Delta P_{\text{at 750'}}$	dist $\times \frac{1}{1.04} \times 1.193 = \text{dist, yds}$
0.83	1984
1.66	1357
2.49	1052
4.15	759
8.3	477
12.45	298
16.6	190
24.9	115
41.5	-
58.1	-
83	-

LLNL

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Overpressures: Huygens: 0.02 kt, sfc.

Altitude corrections: Distance 1.24; AP

Using TM 23-200:

ΔP	ΔP_{seal}	$d_{\text{int}} = \frac{1}{1.24} \times 0.272 = d_{\text{HUYGENS}}$	Scalar
0.1	0.086	$* 4300 \div 1.04 = 4134$	(+)
0.4	0.344	$* 830 \div 1.04 = 798$	
0.5	0.43		
1	0.86	391	
3	2.58	180	
5	4.30	130	
10	8.60	85	
20	17.20	62	
30	25.80	49	
50	43.00	42	

PLOT

* Taken from COL 4340

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Overpressures: Huygens: 0.02 kt, sfc

Altitude correction: Distance 1.04; AP 0.86

Using TM 23-200:

P	ΔP_{sooo}	$d_{\text{kt}} \times \frac{1}{1.04} \times 0.272 = d_{\text{HUYGENS}}$	Scaling from H.E: ($\div 1.04, W = 20,000\#$)
1	0.086	$* 4300 \div 1.04 = 4134$	
4	0.344	$* 830 \div 1.04 = 798$	
5	0.43		
	0.86	391	375
	2.58	180	153
	4.30	130	108
2	8.60	85	73
0	17.20	62	52
0	25.80	49	44
0	43.00	42	34

PLOT

* Taken from COL 4340

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~~SECRET~~

Prompt Gamma Intensities: Plumbbob. (Carbie's curves)

$$\begin{aligned}\text{Relative air density} &= R = 0.27 \frac{P}{T} \\ &= 0.27 \times \frac{860}{286} \\ &= 0.81\end{aligned}$$

Plot γ -yield scaling factor vs yield for $R = 0.81$ }
" γ dose vs slant range for 1 kt

$\frac{1}{4}$ PSI distance

Newton	70 kt	1500'	:	21,700 yds	area 7
Houd	60 kt	1500'	:	20,200 yds	area 9
Franklin	2 kt	300'	:	6400 yds	" 3

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mp Gamma Intensities: Plumbbob (Carbie's record)

$$\text{relative air density} = R = 0.27 \text{ P/T}$$

$$= 0.27 \times \frac{860}{296}$$

$$= 0.81$$

at γ -yield scaling factor vs yield for $R = 0.81$ } From
" γ dose vs slant range for 1 kt } TM 23-200

PST distance

Newton	70 kt	1500'	:	21,700 yds	area 7
Hood	60 kt	1500'	:	20,700 yds	area 8
Franklin	2 kt	300'	:	6400 yds	" 3

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1700 30 6707

Corstie's request for Project 39.5

Shot	Shape	Boasted	Stages
Franklin		Yes?	1
Wilson		Yes	1
Hard -		Yes	2
Laplace -		No?	1
Newton -		Yes	2
Smoky -		Yes	2
Galileo		Yes	1
Fizeau		Yes?	1

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$$D_{inf} = \frac{957 M}{\bar{v} t^{1.2} \Delta \theta (\bar{v} \Delta t + 2a) + t^{0.2} (2a \bar{v} \Delta t + \pi a^2)}$$

where

M = mc at 1 hour in layer Δh ("width" Δh)
 $\bar{v}$ = mean wind speed to height h , knots
 t = fall time from height h , hours.
 Δt = " " interval from Δh interval, hours
 a = cloud radius at height h , nautical miles
 $\Delta \theta$ in degrees

$$D_{inf} = \frac{957 M_{ij}}{\bar{v} \left(\frac{h_i}{f_{ij}} \right)^{1.2} \Delta \theta \left[\frac{h_i \Delta f_{ij}}{f_j f_{j-1}} \bar{v} + 2a \right] + \left(\frac{h_i}{f_{ij}} \right)^{0.2} \left(2a \bar{v} \frac{h_i \Delta f_{ij}}{f_j f_{j-1}} + \pi a^2 \right)}$$

Set $f_j f_{j-1} \approx f_{ij}^2$

Then $D_{inf}^{-1} = \frac{1}{957 M_{ij}} \left\{ \bar{v} \left(\frac{h_i}{f_{ij}} \right)^{1.2} \Delta \theta \left(\left[\frac{h_i \Delta f_{ij}}{f_{ij}^2} \right] \bar{v} + 2a \right) + \left(\frac{h_i}{f_{ij}} \right)^{0.2} \left(2a \bar{v} \frac{h_i \Delta f_{ij}}{f_{ij}^2} + \pi a^2 \right) \right\}$

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$$f = \frac{957 M}{\bar{v} t^{1.2} \Delta \theta (\bar{v} \Delta t + 2a) + t^{0.2} (2a \bar{v} \Delta t + \pi a^2)}$$

here

M = mc at 1 hour in layer Δh (width $\Delta \theta$)

$\bar{v}$ = mean wind speed to height h , knots

t = fall time from height h , hours.

Δt = " " interval from Δh interval, hours

a = cloud radius at height h , nautical miles.

$\Delta \theta$ in degrees

$$inf = \frac{957 M_{ij}}{\bar{v} \left(\frac{h_i}{f_{ij}} \right)^{1.2} \Delta \theta \left[\frac{h_i}{f_{ij}} \bar{v} + 2a \right] + \left(\frac{h_i}{f_{ij}} \right)^{0.2} (2a \bar{v} \frac{h_i}{f_{ij}} + \pi a^2)}$$

$$\frac{h_i \Delta f_{ij}}{f_{ij} f_{j-1}} \quad \frac{h_i \Delta f_{ij}}{f_{ij} f_{j-1}}$$

$$+ f_{ij} f_{j-1} \approx f_{ij}^2$$

$$D_{inf}^{-1} = \frac{1}{957 M_{ij}} \left[\bar{v} \left(\frac{h_i}{f_{ij}} \right)^{1.2} \Delta \theta \left(\left[\frac{h_i \Delta f_{ij}}{f_{ij}^2} \right] \bar{v} + 2a \right) + \left(\frac{h_i}{f_{ij}} \right)^{0.2} \left[\frac{2a \bar{v} h_i \Delta f_{ij}}{f_{ij}} + \pi a^2 \right] \right]$$

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LC-31 0750

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3.52		3.545			54962		30089	11824	001
3.57		3.595			55570		30469	11968	001
3.62		3.645			56170		30844	12111	001
3.67		3.695			56761		31214	12251	001
3.72		3.745			57345		31579	12390	001
3.77		3.795			57921		31939	12527	001
3.82		3.845			58490		32294	12662	001
3.87		3.895			59051		32645	12795	001
3.92		3.945			59605		32991	12927	001
3.97		3.995			60152		33333	13057	001
4.02		4.045			60692		33671	13185	001
4.07		4.095			61225		34004	13311	001
4.12		4.145			61752		34333	13433	001
4.17		4.195			62273		34659	13554	001
4.22		4.245			62788		34981	13673	001
4.27		4.295			63296		35298	13793	001
4.32		4.345			63799		35612	13913	001
4.37		4.395			64296	LLNL	35923	14031	001
4.42		4.445			64787		36230	14145	001
4.47		4.495			65273		36534	14258	001
5.47	5.445	5.495			73600	73997	41738	41986	16275
7.47	7.445	7.495			87186	87477	50229	50411	19294
9.47	9.445	9.495			97520	97749	56688	56831	21513
1.12	1.095	1.145			03941	05881	01799	00586	00720
1.07	1.045	1.095			01912	03941	03067	01799	01227
1.02	.995	1.045			-00218	01912	04398	03067	01755
.97	.945	.995			-02457	-00218	05798	04398	02309
.92	.895	.945			-04818	-02457	07273	05798	02899
.87	.795	.845			-09863	-07289	10489	08818	04176
.77	.695	.745			-15802	-12784	14138	12252	05624
.67	.595	.645			-22548	-19044	18354	16164	07282
.57	.495	.545			-30539	-26360	23349	20737	09236
.47	.395	.445			-40340	-35164	29474	26239	11595
.37	.295	.345			-53018	-46218	37398	33148	14577
.27	.195	.245			-70997	-61083	48635	42439	18662
.17	.095	.145			-102228	-83863	68154	56676	25228
2	9.40	9.375	9.425	97313	97197	97428	00108	00107	00043
2	30.00				1.47676	1.47748	47068	47136	18104
	0.15				-90309	-75696	136348	126591	46021
	1.05				01072	03141	89945	89011	31576
1	12.20	12.175	12.225	1.08636	1.08549	1.08745	10089	100109	00036
2	30.00				1.47676	1.47748	39040	39112	15185
	0.15				-90309	-75696	136348	126591	46021
	1.05				01072	03141	89945	89011	31576
8	40.02	39.995	40.045	1.1810	1.1802	1.1821	05012	05007	22114

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3.545				54962		30089	11824	00147	00038
3.595				55570		30469	11968	00144	00037
3.645				56170		30844	12111	00143	00037
3.695				56761		31214	12251	00140	00036
3.745				57345		31579	12390	00139	00036
3.795				57921		31939	12527	00137	00035
3.845				58490		32294	12662	00135	00035
3.895				59051		32645	12795	00133	00034
3.945				59605		32991	12927	00132	00034
3.995				60152		33333	13057	00130	00034
4.045				60692		33671	13185	00128	00033
4.095				61225		34004	13311	00126	00033
4.145				61752		34333	13433	00122	00031
4.195				62273		34659	13554	00121	00031
4.245				62788		34981	13673	00119	00031
4.295				63296		35298	13793	00120	00031
4.345				63799		35612	13913	00120	00031
4.395				64296		35923	14031	00118	00030
4.445				64787		36230	14145	00114	00029
4.495				65273		36534	14258	00113	00029
5.445	5.495		73600	73997	41738	41986	16275	00092	00024
7.445	7.495		87186	87477	50229	50411	18294	00064	00017
9.445	9.495		97520	97749	56688	56831	21513	00049	00013
1.095	1.145		03941	05881	01799	00586	00720	00486	00125
1.045	1.095		01912	03941	03067	01799	01227	00507	00131
1.995	1.045		-00218	01912	04398	03067	01755	00528	00136
1.945	1.995		-02457	-00218	05798	04398	02309	00554	00143
1.895	1.945		-04818	-02457	07273	05798	02899	00590	00152
1.795	1.845		-09863	-07289	10489	08818	04176	00659	00170
1.695	1.745		-15802	-12784	14138	12252	05624	00746	00192
1.595	1.645		-22548	-19044	18354	16164	07282	00858	00221
1.495	1.545		-30539	-26360	23349	20737	09236	01026	00265
1.395	1.445		-40340	-35164	29424	26239	11595	01244	00321
1.295	1.345		-53018	-46218	37398	33148	14577	01591	00410
1.195	1.245		-70997	-61083	48635	42439	18662	02224	00574
1.095	1.145		-1.02228	-83863	68154	56676	25228	03768	00972
9.375	9.425	97313	97197	97428	00108	00107	00043	00043	00086
		↓	1.47676	1.47748	42068	47136	18104	18129	00025
			-90309	-75696	1.98348	1.61691	22021	44705	01315
			01072	03141	89945	88011	31576	31063	00513
2.175	12.225	1.08636	1.08547	1.08745	1.00889	00109	00036	00044	00080
		↓	1.47676	1.47748	39040	39112	15185	15211	00036
			-90309	-75696	1.98348	1.61691	22021	44705	01315
			01072	03141	89945	88011	31576	31063	00513
9.995	40.045	1.06819	1.60209	1.60254	95063	95897	33118	33123	00009

LLN

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F ₁₀₁	log f ₀	log f ₁	log f ₂	log f ₃	log f ₄	A ₁	A ₂	A ₃	M ⁷⁹
1.825	0.25527	.24920	.26126	.20485	.00399	.00162	.00160	.00322	.00063
2.825	↓	.44326	.45102	.12533	.13050	.04988	.05190	.00202	.00039
3.825		.57692	.58263	.21443	.21824	.08493	.08641	.00148	.00029
5.825		.76155	.76530	.33752	.34002	.13216	.13311	.00095	.00019
8.825		.94325	.94571	.45265	.46029	.17671	.17730	.00059	.00015
0.825		-.11070	-.08355	.24398	.22588	.09635	.08939	.00696	.00136
0.525		-.32331	-.27984	.38572	.35674	.15012	.13936	.01076	.00210
0.325		-.56067	-.48212	.54396	.49559	.20675	.18991	.01684	.00328
2.175		.147676	.147748	.81433	.81481	.39226	.39239	.00012	.00005
2.175		-.90309	-.75696	.77224	.67482	.28005	.25014	.02891	.00583
0.775	-.12494	-.13966	-.11070	.00856	.00828	.00342	.00331	.00673	.00134
1.525	↓	.16879	.18327	.17077	.17919	.06780	.07108	.00328	.00065
3.025		.47349	.48073	.34792	.35213	.13603	.13761	.00158	.00031
5.025		.69679	.70114	.47775	.48028	.18359	.18450	.00091	.00018
2.025		.29557	.30643	.24448	.25090	.09655	.09901	.00246	.00049
1.075		.48073	.48785	.35213	.35627	.13761	.13918	.00157	.00031
8.025		.90173	.90445	.59690	.59848	.22475	.22528	.00053	.000105
2.425		-.42597	-.37161	.12502	.14341	.06946	.05703	.01243	.00247
2.175		-.90309	-.75696	.45241	.36745	.17447	.14336	.03111	.00619
2.475	-.34679	-.37161	-.32331	.01349	.01276	.00540	.00510	.01050	.00100
1.075	↓	.01072	.03141	.19430	.20554	.07708	.08146	.00438	.00042
2.025		.29557	.30643	.34911	.35501	.13647	.13870	.00223	.00021
3.025		.47349	.48073	.44580	.44974	.17209	.17351	.00142	.00013
0.225		-.75696	-.64782	.22292	.16360	.08824	.06500	.02324	.00221
0.125		-.112494	-.90309	.42291	.30234	.16385	.11279	.04506	.00428
2.645	.41830	.41414	.42243	.00297	.00295	.00119	.00118	.00237	.00022
5.045	↓	.69854	.70286	.20017	.20326	.07937	.08057	.00120	.00011
1.095		.01912	.03941	.28513	.27064	.11225	.10665	.00560	.00052
0.445		-.40340	-.35164	.58693	.54996	.22136	.20879	.01257	.00117
0.145		.147676	.147748	.75604	.75656	.39524	.37537	.00016	.000015
2.775	.57403	.57113	.57692	.00221	.00221	.00088	.00088	.00176	.00056
1.025	↓	.99891	.100108	.32434	.32599	.12715	.12778	.00063	.000020
1.075		.01072	.03141	.43001	.41421	.16640	.16066	.00574	.00018
20.025		.130049	.130147	.55855	.55530	.21039	.21066	.00027	.000009
4.25		-.42597	-.37161	.76336	.72186	.27741	.26478	.01263	.000404
0.175		-.90309	-.75696	.112757	.101602	.37027	.34518	.02509	.00803
5.325	72428	.72222	.72632	.00169	.00167	.00068	.00067	.00135	.00043
1.075	↓	.01072	.03141	.58488	.56793	.22066	.21500	.00566	.000181
9.985		.99673	.99891	.22332	.22511	.08839	.08909	.00070	.000022
4.25		-.42597	-.37161	.94283	.89827	.32711	.31545	.01166	.000373
0.025		.147676	.147748	.61679	.61738	.23134	.23154	.00020	.00006
2.175		-.90309	-.75696	.133391	.121413	.40886	.38768	.02117	.000678
7.225	86232	81.182	86401	.00121	.00121	.00053	.00053	.00106	.00003

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Level	f_{i-1}	f_i	f_{i+1}	$\log f_i$	$\log f_{i-1}$	$\log f_{i+1}$	t_i	t_{i-1}	A_i	A_{i-1}
9	1.80	1.775	1.825	0.25527	24920	26126	00405	00399	00162	0
7	2.80	2.775	2.825	↓	44326	45102	12533	13050	04988	0517
↓	3.80	3.775	3.825		57692	58263	24443	21824	08493	0800
	5.80	5.775	5.825		76155	76530	33752	34002	13216	1230
	8.80	8.775	8.825		94325	94571	45865	46029	17671	1773
	0.80	0.775	0.825		-11070	-08355	24398	22589	09635	0879
	0.50	0.475	0.525		-32331	-27984	38572	35674	15012	1390
	0.30	0.275	0.325		-56067	-48212	54396	49559	20675	1890
30.00					1.47676	1.47748	81433	81481	39226	3720
0.15	0.125	0.175			-90309	-75696	77224	67482	28005	2500
9	0.75	0.725	0.775	-12494	-13966	-11070	00856	00828	00342	0030
7	1.50	1.475	1.525	↓	16879	18327	17077	17919	06780	0710
↓	3.00	2.975	3.025		47349	48073	34792	35213	13603	1376
	5.00	4.975	5.025		69679	70114	47775	48028	18359	1925
	2.00	1.975	2.025		29557	30643	24448	25080	09655	0990
	3.05	2.025	3.075		48073	48785	35213	35627	13761	1391
	8.00	7.975	8.025		90173	90445	59690	59848	22475	2250
	0.40	0.375	0.425		-42597	-37161	17502	14341	08946	0570
	0.15	0.125	0.175		-90309	-75696	45241	36745	17447	1430
10	0.45	0.425	0.475	-34679	-37161	-32331	01349	01276	00540	0050
↓	1.05	1.025	1.075	↓	01072	03141	19430	20554	07708	0710
	2.00	1.975	2.025		29557	30643	34911	35501	13647	1380
	3.00	2.975	3.025		47349	48073	44580	44974	17209	1720
	0.20	0.175	0.225		-75696	-64782	22292	16360	08224	0650
30.00					1.47676	1.47748	81433	81481	39226	3720
0.10	0.075	0.125			-112494	-90309	42291	30234	16385	1120
6	2.62	2.595	2.645	41830	41414	42243	00297	00295	00119	0011
↓	5.02	4.995	5.045	↓	69854	70286	20017	20326	07937	0800
	1.07	1.045	1.095		01912	03941	28513	27064	11225	1000
	0.42	0.395	0.445		-40340	-35164	58693	54996	22136	2050
30.00					1.47676	1.47748	81433	81481	39226	3720
0.12	0.095	0.145			-102228	-83863	102899	89781	34826	3150
5	3.75	3.725	3.775	57403	57113	57692	00221	00221	00078	0000
↓	10.00	9.975	10.025	↓	99891	1.00108	32434	32599	12715	1277
	1.05	1.025	1.075		01072	03141	43001	41421	16640	1600
	20.00	19.975	20.025	LLNL	130049	130147	55855	55530	21039	2100
	0.40	.375	.425		-42597	-37161	76336	72186	27741	2640
	0.15	0.125	0.175		-90309	-75696	112757	101602	37027	3450
4	5.30	5.275	5.325	72428	72222	72632	00169	00167	00068	0000
↓	1.05	1.025	1.075	↓	01072	03141	58488	56793	22066	2100
	9.95	9.925	9.995		99673	99791	22332	22511	08839	0800
	0.40	.375	.425		-42597	-37161	94283	89827	32711	3100
	30.00	29.975	30.025		1.47676	1.47748	61679	61738	23134	2300
	0.15	0.125	0.175		-90309	-75696	1.33891	1.21413	40886	3300

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	2.80	2.775	2.825		1.6152	1.6250	1.2715	1.2762	1.2719	1.27
	8.80	8.775	8.825		.94325	.94571	.45265	.46029	.17671	.177
	0.80	0.775	0.825		-.11070	-.08355	.24398	.22529	.09635	.089
	0.50	0.475	0.525		-.32331	-.27984	.38572	.35674	.15012	.139
	0.30	0.275	0.325		-.56067	-.48212	.54396	.49559	.20675	.199
	30.00				1.47676	1.47748	.81433	.81481	.29226	.292
	0.15	0.125	0.175		-.90309	-.75696	.77224	.67482	.28005	.250
9	0.75	0.725	0.775	-.12494	-.13966	-.11070	.00856	.00828	.00342	.003
7	1.50	1.475	1.525	↓	.16879	.12327	.17077	.17919	.06780	.071
	3.00	2.975	3.025		.47349	.48073	.34792	.35213	.13603	.1376
	5.00	4.975	5.025		.69679	.70114	.47775	.48028	.18359	.182
	2.00	1.975	2.025		.29557	.30643	.24448	.25080	.09655	.099
	3.05	3.025	3.075		.48073	.48785	.35213	.35627	.13761	.139
	8.00	7.975	8.025		.90173	.90445	.59690	.59848	.22475	.225
	0.40	0.375	0.425		-.42597	-.37161	.12502	.14341	.06946	.057
	0.15	0.125	0.175		-.90309	-.75696	.45241	.36745	.17447	.143
10	0.45	0.425	0.475	-.34679	-.37161	-.32331	.01349	.01276	.00540	.005
↓	1.05	1.025	1.075	↓	.01072	.03141	.19430	.20554	.07708	.071
	2.00	1.975	2.025		.29557	.30643	.34911	.35501	.13647	.138
	3.00	2.975	3.025		.47349	.48073	.44580	.44974	.17209	.173
	0.20	0.175	0.225		-.75696	-.64782	.22292	.16360	.08824	.065
	30.00				1.47676	1.47748	.99106	.99145	.33915	.339
	0.10	0.075	0.125		-.112494	-.90309	.42291	.30234	.16385	.112
6	2.62	2.595	2.645	.41830	.41414	.42243	.00297	.00295	.00119	.001
↓	5.02	4.995	5.045	↓	.69854	.70286	.20017	.20326	.07937	.080
	1.07	1.045	1.095		-.01912	.03941	.28513	.27064	.11225	.106
	0.42	0.395	0.445		-.40340	-.35164	.58693	.54996	.22136	.205
	30.00				1.47676	1.47748	.75604	.75656	.33915	.339
	0.12	0.095	0.145		-.102228	-.93863	.102899	.89781	.34826	.315
5	3.75	3.725	3.775	.57403	.57113	.57692	.00221	.00221	.00088	.000
↓	10.00	9.975	10.025	↓	.99891	1.00108	.32434	.32599	.12715	.1277
	1.05	1.025	1.075		.01072	.03141	.43001	.41421	.16640	.160
	20.00	19.975	20.025		.130049	.130147	.55855	.55530	.21039	.210
	0.40	.375	.425		-.42597	-.37161	.76336	.72186	.27741	.264
	0.15	0.125	0.175		-.90309	-.75696	.112757	.101602	.37027	.345
4	5.30	5.275	5.325	.72428	.72222	.72632	.00169	.00167	.00068	.000
↓	1.05	1.025	1.075	↓	.01072	.03141	.58488	.56793	.22066	.215
	9.95	9.925	9.975		.99673	.99791	.22332	.22511	.08839	.089
	0.40	.375	.425		-.42597	-.37161	.94283	.89827	.32711	.315
	30.00	29.975	30.025	LLNL	1.47676	1.47748	.61679	.61738	.23134	.23
	0.15	0.125	0.175		-.90309	-.75696	.1.33391	.1.21413	.40886	.38
3	7.30	7.275	7.325	.86332	.86183	.86481	.00131	.00131	.00052	.000
↓	0.15			↓	-.90309	-.75696	.1.54148	.1.42130	.43934	.4
	1.05				.01072	.03141	.74789	.72974	.27269	.2
	30.00				1.47676	1.47748	.53811	.53874	.20474	.2
	0.40				-.42597	-.37161	.1.13096	.1.08327	.37100	.3
9	40.00	39.975	40.025	-.12494	1.60178	1.60233	1.00391	1.00423	.34228	.34

0.825		94325	94571	45865	46029	17671	17730	00059	000175
0.925		-11070	-08355	24398	22528	09635	08939	00696	00136
0.525		-32331	-27924	38572	35674	15012	13936	01076	00210
0.325		-56067	-48212	54396	49559	20675	18991	01684	00328
0.175		-90309	-75696	77224	67482	28005	25014	02991	00583
0.775	-12494	-13966	-11070	00856	00828	00342	00331	00673	00134
1.525	↓	16879	18327	17077	17919	06780	07108	00328	00065
3.025		47349	48073	34792	35213	13603	13761	00158	00031
5.025		69679	70114	47775	48028	18359	18450	00091	00018
2.025		29557	30643	24448	25090	09655	09901	00246	00049
3.075		48073	48785	35213	35627	13761	13918	00157	00031
8.025		90173	90445	59690	59848	22475	22528	00053	000105
0.425		-42597	-37161	12502	14341	06946	05703	01243	00247
0.175		-90309	-75696	45241	36745	17447	14336	03111	00619
0.475	-34679	-37161	-32331	01349	01276	00540	00510	01050	00100
1.075	↓	01072	03141	18430	20554	07708	08146	00438	00042
2.025		29557	30643	34911	35501	13647	13870	00223	00021
3.025		47349	48073	44580	44974	17209	17351	00142	00018
0.225		-75696	-64782	22792	16360	08824	06500	02324	00221
0.125		-112494	-90309	42291	30234	16385	11879	04506	00428
2.645	41830	41414	42243	00297	00295	00119	00118	00237	00022
5.045	↓	69854	70286	20017	20326	07937	08057	00120	00011
1.095		01912	03941	28513	27064	11225	10665	00560	00052
0.445		-40340	-35164	58693	54996	22136	20279	01257	00117
0.145		-102228	-83863	102899	89781	34826	31533	03293	00306
3.775	57403	57113	57692	00221	00221	00088	00088	00176	000056
10.025	↓	99891	100108	32434	32599	12715	12778	00063	000070
1.075		01072	03141	43001	41421	16640	16066	00574	00018
20.025		130049	130147	55855	55530	21039	21066	00027	000009
.425		-42597	-37161	76336	72186	27741	26478	01263	000404
0.175		-90309	-75696	112757	101602	37027	34518	02509	000803
5.325	72428	72222	72632	00169	00167	00068	00067	00135	000043
1.075	↓	01072	03141	58488	56793	22066	21500	00566	000181
9.915		99673	99891	22332	22511	08839	08909	00070	000022
.425		-42597	-37161	94283	89827	32711	31545	01166	000373
30.025		147676	147748	61679	61738	23134	23154	00020	000006
0.175		-90309	-75696	133391	121413	40886	38768	02117	000678
7.325	96332	86183	86481	00131	00131	00052	00052	00104	000035
	↓	-90309	-75696	154148	142130	43934	42838	01696	000054
		01072	03141	74789	72974	27269	26722	00547	000175
		147676	147748	53811	53874	20474	20496	00022	000007
		-42597	-37161	113096	108327	37100	36062	01038	000332
40.025	-12494	160178	160233	100391	100423	34228	34236	00008	000016

BEST AVAILABLE COPY

LLNL

10035 0777

$h_r = 40$

$h_0 = 4.44$

$\frac{h_0}{f_{0j}} = 1.59$

$f_{0j} = 2.79$

$\Delta \theta_0 =$

$d = 50 \text{ miles}$

$\bar{v}_0 = 31.4$

$C_{0j} = .000340$

$f_{0j}^2 = 7.78$

$\frac{1}{f_{0j}} =$

$$D_{inf} = \frac{6 \times 10^6}{4.76} \{ 31.4 \times 4.2 \times 1.59^{1.2} [31.4 \times .57 + 40] + 1.59^{0.2} [2 \times 31.4 \times .57 + 63] \}^{-1}$$

$$= \frac{6 \times 10^6}{4.76} \{ 230 \times 57.9 + 1.097 [98.8] \}^{-1}$$

$$= \frac{6 \times 10^6}{4.76} (13317 + 108) = \frac{6 \times 10^6}{4.76} \times 13425 = 9.54 \times 10^{-4}$$

$h_r = 3.85$

$\frac{h_r}{f_{rj}} = 1.69$

$f_{rj} = 2.28$

$f_{rj}^2 = 5.20$

$\frac{1}{f_{rj}} = 0.71$

$\bar{v}_r = 29.5$

$C_{rj} = .000494$

$$D_{inf} = 6 \times 10^6 \times 4.94 \times 10^{-4} (29.5 \times 5.4 \times 1.87 [29.5 \times .74 + 40] + 1.1 [2 \times 29.5 \times .74 + 63])^{-1}$$

$$= 2.96 \times 10^3 (298 \times 62 + 1.11 \times 107)^{-1} = 2.96 \times 10^3 \div 1.86 \times 10^4$$

BEST AVAILABLE COPY

Met: using WBP MODEL

$h_r = 38,000 \text{ AG}$

$h_r = 24,760' = 4.06 \text{ n.mi.}$

$\frac{h_r}{f_{rj}} = 2.12$

$f_{rj} =$

$d = 50 \text{ miles}$

$\bar{v}_r = 23.6$

$C_{rj} = .00201$

$f_{rj}^2 = 3.69$

$\frac{1}{f_{rj}} = 1.10$

$w = 3$

$a = 2.2$

$\Delta \theta_r = 1.1$

$$D_{inf} = 6 \times 10^6 \times 3 \times 2.01 \times 10^{-3} \{ 23.6 \times 1.1 \times 2.46 [23.6 \times 1.1 + 40 \times 2.2] + 1.16 [2 \times 23.6 \times 1.1 + 63] \}^{-1}$$

$$= 3.62 \times 10^4 \{ 63.9 [114] + 1.16 [417] \}^{-1}$$

$$= 3.62 \times 10^4 (7225 + 484)^{-1} = \frac{3.62 \times 10^4}{7.77 \times 10^3} = 0.4$$

$h_0 = 4.69$

$\frac{h_0}{f_{0j}} = 1.48$

$f_{0j} = 3.17$

$C_{0j} = .00125$

LLNL

$\bar{v}_0 = 33.8$

$$D_{inf} = 6 \times 10^6 \times 3 \times 1.25 \times 10^{-3} \{ 33.8 \times 4.6 \times 1.6 [33.8 \times 0.4 + 88] + 1.1 [4.4 + 63] \}^{-1}$$

$$= 2.25 \times 10^4 [32.4 (101.5) + 1.1 \times 361]^{-1}$$

$$= 2.25 \times 10^4 (2681 \times 10^3)^{-1}$$

Test calculation (from EOPV manual)

~~SECRET~~

$$h_0 = 4.44$$

$$\frac{h_0}{f_{0j}} = 1.59$$

$$f_{0j} = 2.79$$

$$\Delta \theta_0 = 4.2$$

$$a_0 = 1$$

$$\bar{v}_0 = 31.4$$

$$C_{0j} = .000340$$

$$f_{0j}^2 = 7.78$$

$$\frac{1}{f_{0j}} = 0.57$$

$$w = 1$$

$$31.4 \times 4.2 \times 1.59^{1.2} [31.4 \times .57 + 40] + 1.59^{0.2} [2 \times 31.4 \times .57 + 63] \}^{-1} \\ \{ 230 \times 57.9 + 1.097 [98.8] \}^{-1} \\ (13317 + 108)^{-1} = \frac{240}{4.76} \times 13425^{-1} = 9.51 \times 10^{-4} \quad 0.152 \quad 0.219$$

$$5 \quad \frac{h_1}{f_{1j}} = 1.69 \quad f_{1j} = 2.28 \quad f_{1j}^2 = 5.20 \quad \frac{1}{f_{1j}} = 0.74 \quad \Delta \theta = 5.4 \\ C_{1j} = .000494$$

$$4.94 \times 10^{-4} (29.5 \times 5.4 \times 1.87 [29.5 \times .74 + 40] + 1.11 [2 \times 29.5 \times .74 + 63])^{-1} \\ \times 10^3 (298 \times 62 + 1.11 \times 107)^{-1} = 2.96 \times 10^3 \div 1.86 \times 10^4 = 0.159$$

BEST AVAILABLE COPY

WBP MODEL

$$8,000 \text{ AG miles} \quad h_1 = 24,700' = 4.06 \text{ n.m.} \quad \frac{h_1}{f_{1j}} = 2.12 \quad f_{1j} = 1.92 \\ \bar{v}_1 = 23.6 \quad C_{1j} = .00201 \quad f_{1j}^2 = 3.69$$

$$1.10 \quad w = 3 \quad a = 2.2 \quad \Delta \theta_1 = 1.1$$

$$10^6 \times 3 \times 2.01 \times 10^{-3} \{ 23.6 \times 1.1 \times 2.46 [23.6 \times 1.1 + 40 \times 2.2] + 1.16 [2 \times 2.2 \times 23.6 \times 1.1 + 63 \times 4.6] \}^{-1} \\ 3.62 \times 10^4 \{ 63.9 [114] + 1.16 [417] \}^{-1} \\ 3.62 \times 10^4 (7285 + 484)^{-1} = \frac{3.62 \times 10^4}{7.77 \times 10^3} = 0.47 \times 10^1 = 4.7$$

LLNL

$$9 \quad \frac{h_2}{f_{2j}} = 1.48 \quad f_{2j} = 3.17 \quad C_{2j} = .00125 \quad \Delta \theta = 0.6$$

$$6 \times 10^6 \times 3 \times 1.25 \times 10^{-3} \{ 33.8 \times 0.6 \times 1.6 [33.8 \times 0.4 + 88] + 1.1 [4.4 + 33.8 \times 0.4 + 302] \}^{-1} \\ 2.25 \times 10^4 [32.4 (101.5) + 1.1 \times 361]^{-1} \\ 2.25 \times 10^4 (3.686 \times 10^3)^{-1}$$

$$D_{inf} = \frac{2940}{4.76} \{ 31.4 \times 4.2 \times 1.59^{0.2} [31.4 \times .57 + 40] + 1.59^{0.2} [2 \times 31.4 \times .57 + 63] \}^{-1}$$

$$= \frac{2940}{4.76} \{ 230 \times 57.9 + 1.097 [98.8] \}^{-1}$$

$$= \frac{2940}{4.76} (13317 + 108)^{-1} = \frac{2940}{4.76} \times 1.3425^{-1} = 5.54 \times 10^{-4}$$

$$h_7 = 3.85 \quad \frac{h_7}{f_{7j}} = 1.69 \quad f_{7j} = 2.28 \quad f_{7j}^2 = 5.20 \quad \frac{h_7}{f_{7j}} = 0.7$$

$$\bar{v}_7 = 29.5 \quad C_{7j} = .000494$$

$$D_{inf} = 6 \times 10^6 \times 4.94 \times 10^{-4} (29.5 \times 5.4 \times 1.87 [29.5 \times .74 + 40] + 1.1 [2 \times 29.5 \times .74 + 63])^{-1}$$

$$= 2.96 \times 10^3 (298 \times 62 + 1.11 \times 107)^{-1} = 2.96 \times 10^3 \div 1.86 \times 10^4$$

Met: using WBP MODEL **BEST AVAILABLE COPY**

$$h_T = 38,000 \text{ AG} \quad h_7 = 24,700' = 4.06 \text{ n.m.} \quad \frac{h_7}{f_{7j}} = 2.12 \quad f_{7j} = 2.12$$

$$d = 50 \text{ miles} \quad \bar{v}_7 = 23.6 \quad C_{7j} = .00201 \quad f_{7j}^2 = 3.6$$

$$\frac{h_7}{f_{7j}} = 1.10 \quad w = 3 \quad a = 2.2 \quad \Delta \theta_7 = 1.1$$

$$D_{inf} = 6 \times 10^6 \times 3 \times 2.01 \times 10^{-3} \{ 23.6 \times 1.1 \times 2.46 [23.6 \times 1.1 + 40 \times 2.2] + 1.16 [2 \times 23.6 \times 1.1 + 63] \}^{-1}$$

$$= 3.62 \times 10^4 \{ 63.9 [114] + 1.16 [417] \}^{-1}$$

$$= 3.62 \times 10^4 (7225 + 484)^{-1} = \frac{3.62 \times 10^4}{7.77 \times 10^3} = 0.4$$

$$h_8 = 4.69 \quad \frac{h_8}{f_{8j}} = 1.48 \quad f_{8j} = 3.17 \quad C_{8j} = .00125$$

$$\bar{v}_8 = 33.8$$

$$D_{inf} = 6 \times 10^6 \times 3 \times 1.25 \times 10^{-3} \{ 33.8 \times 0.6 \times 1.6 [33.8 \times 0.4 + 88] + 1.1 [4.4 + 63] \}^{-1}$$

$$= 2.25 \times 10^4 [32.4 (101.5) + 1.1 \times 361]^{-1}$$

$$= 2.25 \times 10^4 (3.686 \times 10^3)^{-1}$$

$$= 6.1$$

$$\Sigma 7 \text{ and } 8 = 10.8 R$$

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$$D_{inj} = 957 M_{ij} \left\{ \bar{v} \left(\frac{h_i}{f_{ij}} \right)^{1.2} \Delta \theta \left[\left(\frac{h_i \Delta f_{ij}}{f_{ij}^2} \right) \bar{v} + 2a_i \right] + \left(\frac{h_i}{f_{ij}} \right)^{0.2} \left[\left(\frac{h_i \Delta f_{ij}}{f_{ij}^2} \right) 2a_i \right] \right\}$$

M_{ij} = mc at 1 hour in layer Δh_i , center

$\bar{v}_i$ = mean wind speed to height h_i , knots

f_{ij} = fall rate, knots, mean, interval Δf_{ij}

a_i = cloud radius at h_i , nautical miles.

h_i = height of level i , nautical miles.

$\Delta \theta_i$ = sector width, degrees, covered by

Set $\Delta f_{ij} = 0.05$ knots

$M_{ij} = 300 W' C_f$, w in Kt, fallout yield

Then:

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$$D_{inj} = 3 \times 10^5 C_f \left\{ \bar{v}_i \Delta \theta \left(\frac{h_i}{f_{ij}} \right)^{1.2} \left[0.05 \bar{v}_i \left(\frac{h_i}{f_{ij}} \right) + 2a_i \right] + \left(\frac{h_i}{f_{ij}} \right)^{0.2} \left[0.05 \times 2 a_i \bar{v}_i \left(\frac{h_i}{f_{ij}} \right) \right] \right\}$$

$$= \frac{6 \times 10^6}{1.4 \times 10^6} W' C_f \left\{ \bar{v}_i \Delta \theta \left(\frac{h_i}{f_{ij}} \right)^{1.2} \left[\bar{v}_i \left(\frac{h_i}{f_{ij}} \right) + 40a_i \right] + \left(\frac{h_i}{f_{ij}} \right)^{0.2} \left[2a_i \bar{v}_i \left(\frac{h_i}{f_{ij}} \right) \right] \right\}$$

$$6 \times 10^6 W' C_f \left(\frac{h_i}{f_{ij}} \right)^{1.2} \left\{ \bar{v}_i \Delta \theta \left[\bar{v}_i \left(\frac{h_i}{f_{ij}} \right) + 40a_i \right] + \left(\frac{h_i}{f_{ij}} \right)^{0.2} \left[2a_i \bar{v}_i \left(\frac{h_i}{f_{ij}} \right) \right] \right\}$$

$$6 \times 10^6 W' C_f \left(\frac{h_i}{f_{ij}} \right)^{1.2} \left\{ \frac{\bar{v}_i^2 h_i \Delta \theta}{f_{ij}^2} + 40 \bar{v}_i \Delta \theta a_i + 2 a_i \bar{v}_i / f_{ij} \right\}$$

$$h_i / f_{ij} = \frac{R}{\bar{v}_i} \quad f = \frac{h_i \bar{v}_i}{R}$$

$$\bar{v}_i = \frac{R f}{h_i}$$

$$6 \times 10^6 W' C_f \left(\frac{h_i}{f_{ij}} \right)^{1.2} \left\{ \frac{R^2 f^2}{h^2} \frac{h \Delta \theta}{f^2} + \frac{40 R f \Delta \theta a_i}{h} + \frac{2 a_i \bar{v}_i}{f_{ij}} \right\}$$

LLNL

$$6 \times 10^6 W' C_f \left(\frac{h_i}{f_{ij}} \right)^{1.2} \left\{ \frac{R^2 \Delta \theta}{h} + \frac{40 R f \Delta \theta a_i}{h} + \frac{63 a_i^2 f}{h^3} \right\}$$

$$\frac{6 \times 10^6 W' C_f \left(\frac{h_i}{f} \right)^{1.2}}{h^{-1}} \left(R^2 \Delta \theta + 40 R f \Delta \theta a_i + 63 a_i^2 f + \dots \right)$$

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$$\left\{ \bar{v} \left(\frac{h_i}{f_{ij}} \right)^{1.2} \Delta \theta \left[\left(\frac{h_i \Delta f_{ij}}{f_{ij}^2} \right) \bar{v} + 2a_i \right] + \left(\frac{h_i}{f_{ij}} \right)^{0.2} \left[\left(\frac{h_i \Delta f_{ij}}{f_{ij}^2} \right) 2a_i \bar{v} + \pi a_i^2 \right] \right\}^{-1}$$

M_i = mc at 1 hour in layer Δh_i , center h_i

$\bar{v}_i$ = mean wind speed to height h_i , knots

f_{ij} = fall rate, knots, mean, interval Δf_{ij}

a_i = cloud radius at h_i , nautical miles

h_i = height of level i , nautical miles

$\Delta \theta_i$ = sector width, degrees, covered by Δh_i

= 0.05 knots

300 W' C_f, W in kt, fallout yield

$$\left\{ \bar{v}_i \Delta \theta \left(\frac{h_i}{f_{ij}} \right)^{1.2} \left[0.05 \bar{v}_i \left(\frac{h_i}{f_{ij}^2} \right) + 2a_i \right] + \left(\frac{h_i}{f_{ij}} \right)^{0.2} \left[0.05 \times 2 a_i \bar{v}_i \left(\frac{h_i}{f_{ij}^2} \right) + \pi a_i^2 \right] \right\}^{-1}$$

$$\sum_i \left\{ \bar{v}_i \Delta \theta \left(\frac{h_i}{f_{ij}} \right)^{1.2} \left[\bar{v}_i \left(\frac{h_i}{f_{ij}^2} \right) + 40a_i \right] + \left(\frac{h_i}{f_{ij}} \right)^{0.2} \left[2a_i \bar{v}_i \left(\frac{h_i}{f_{ij}^2} \right) + 63a_i^2 \right] \right\}^{-1}$$

$$C_f \left(\frac{h_i}{f_{ij}} \right)^{1.2} \left\{ \bar{v}_i \Delta \theta \left(\bar{v}_i \left(\frac{h_i}{f_{ij}^2} \right) + 40a_i \right) + \left(\frac{h_i}{f_{ij}} \right)^{0.2} \left(2a_i \bar{v}_i \left(\frac{h_i}{f_{ij}^2} \right) + 63a_i^2 \right) \right\}^{-1}$$

$$W' C_f \left(\frac{h_i}{f_{ij}} \right)^{1.2} \left\{ \frac{\bar{v}_i^2 h_i \Delta \theta}{f_{ij}^2} + 40 \bar{v}_i \Delta \theta a_i + 2a_i \bar{v}_i / f_{ij} + \frac{63a_i^2 f_{ij}}{h_i} \right\}$$

$$h_i / f_{ij} = R / \bar{v}_i$$

$$f = \frac{h \bar{v}}{R}$$

$$\bar{v}_i = \frac{R f_{ij}}{h_i}$$

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$$W' C_f \left(\frac{h_i}{f_{ij}} \right)^{1.2} \left\{ \frac{R^2 f_{ij}^2}{h_i^2} h_i \Delta \theta + \frac{40 R f_{ij} \Delta \theta a_i}{h_i} + \frac{2 a_i R f_{ij}}{h_i} + \frac{63 a_i^2 f_{ij}}{h_i} \right\}$$

$$W' C_f \left(\frac{h_i}{f_{ij}} \right)^{1.2} \left\{ \frac{R^2 \Delta \theta}{h_i} + \frac{40 R f_{ij} \Delta \theta a_i}{h_i} + \frac{63 a_i^2 f_{ij}}{h_i} + \frac{2 a_i R f_{ij}}{h_i} \right\}$$

$$W' C_f \left(\frac{h_i}{f_{ij}} \right)^{1.2} \left(R^2 \Delta \theta + 40 R f_{ij} \Delta \theta a_i + 63 a_i^2 f_{ij} + 2 a_i R f_{ij} \right)$$

LLNL-1

W.B. Plumbhak Model

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Layer	C_s	f_0	σ
Base 1	0.032	12.4	1.89
2	0.034	9.8	1.82
3	0.042	7.7	1.68
4	0.052	5.9	1.42
5	0.075	4.4	1.23
6	0.121	3.2	1.10
7	0.174	2.3	1.03
8	0.226	1.8	0.98
9	0.161	1.4	0.94
Tap 10	0.083	1.3	0.92

10035 0710

Level	f_j	f_j	f_{j+1}	$\log f_0$	$\log f_j$	$\log f_{j+1}$	t_j	t_{j+1}	A_j
7	.125			.09791			3.04457	2.65040	.49885
↓	.425			↓			1.69797	1.50430	.45522
	1.025						.90865	.76128	.29061
	4.025						.53726	.54933	.20372
	10.025						1.42609	1.43171	.42316
	40.025						2.72279	2.77398	.49723
8	.125			.50779			2.94979	2.53550	.49845
↓	.425			↓			1.53448	1.41509	.43754
	1.025						.59979	.55000	.22573
	4.025						.81480	.82748	.29239
	10.025						1.74980	1.75488	.45988
	40.025						3.16438	3.16563	.49926
9	.125			.33647			2.80795	2.37603	.49748
↓	.425			↓			1.33241	1.20795	.40860
	1.025						.35795	.30604	.13982
	4.025						1.11693	1.13005	.36793
	10.025						2.09162	2.09691	.48176
10	.125			.26236			2.78843	2.34713	.49738
↓	.425			↓			1.28083	1.15365	.39985
	1.025						.28517	.23214	.11226
	4.025						1.22166	1.23517	.38928
	10.025						2.21764	2.22305	.48673

LLNL 228

W.B. Plumbhead Model

~~SECRET~~

C _f	f ₀	σ
0.032	12.4	1.89
0.034	9.8	1.82
0.042	7.7	1.62
0.052	5.9	1.42
0.075	4.4	1.23
0.121	3.2	1.10
0.174	2.3	1.03
0.226	1.8	0.92
0.161	1.4	0.94
0.083	1.3	0.92

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f _j	f _{j+1}	log f ₀	log f _j	log f _{j+1}	t _j	t _{j+1}	A _j	A _{j+1}	ΔA	M'
.89291					3.04457	2.65040	.49885	.49600	.00285	.000496
↓					1.69797	1.50438	.45522	.44348	.01174	.002043
					.90765	.76128	.29061	.27678	.01383	.002406
					.53726	.54933	.20372	.20057	.00485	.000844
					1.42609	1.43171	.42316	.42386	.00070	.000122
					2.77229	2.77398	.49723	.49724	.00001	.000002
.58779					2.94979	2.53550	.49845	.49441	.00404	.000913
↓					1.53448	1.41509	.43754	.42146	.01608	.003624
					.59979	.55000	.22573	.20880	.01693	.003826
					.91480	.82748	.29239	.29599	.00360	.000814
					1.74980	1.75488	.45988	.46034	.00046	.000104
					3.16438	3.16563	.49926	.49927	.00001	.000002
.33647					2.80795	2.37603	.49748	.49122	.00626	.001088
↓					1.33241	1.20795	.40860	.38649	.02211	.013560
					.35795	.30604	.13982	.12020	.01962	.003159
					1.11693	1.113005	.36793	.37001	.00288	.000464
					2.09162	2.09691	.48176	.48198	.00022	.000035
.26236					2.78843	2.34713	.49738	.49054	.00684	.000568
↓					1.29083	1.15365	.39985	.37567	.02418	.002007
					.28517	.23214	.11226	.09181	.02045	.001697
					1.22166	1.23517	.38928	.39161	.00233	.000193
					2.21764	2.22305	.48673	.48689	.00016	.000013

LN L

ΔA vs S_0 0.01 = Δf

X

#83A

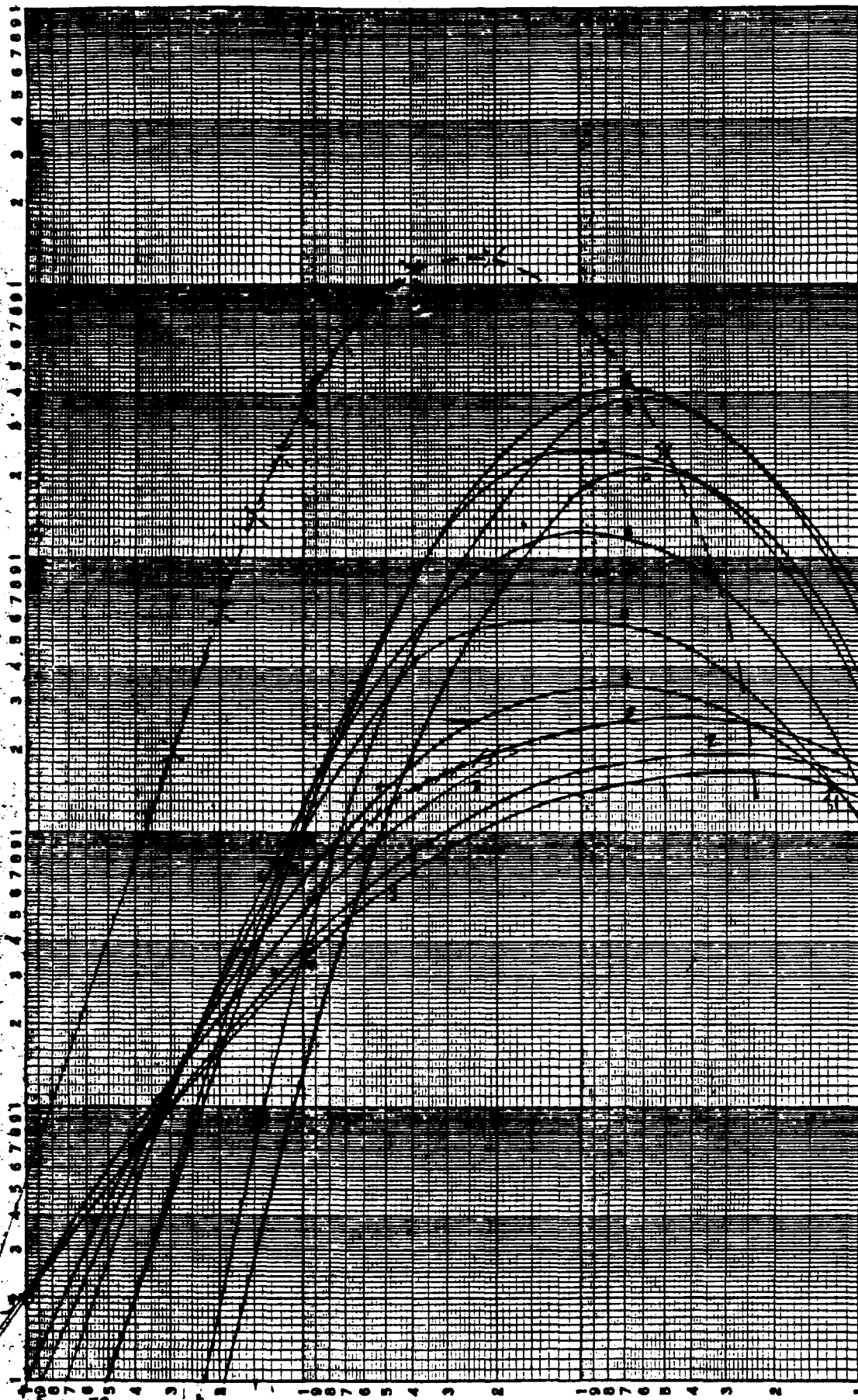
10^1

10^0

~~SECRET~~

10^{-2}

BEST AVAILABLE COPY



LLNL

0.05 = Δf

230

EC625 07/79

	f_i	f_{in}	$\log f_i$	$\log f_{in}$	$\log f_{in}$	f_j		A_j
1	0.1	0.15	2.51770	-2.303	-1.097	2.55063	2.33582	49461
2	0.425	0.45		-0.915	-0.799	1.81677	1.75486	46544
3	1.025	1.05		0	0.0079	1.33212	1.30630	40056
4	4.025	4.05		1.37629	1.39772	59863	59205	22533
5	10.025	10.05		2.30259	2.30757	11381	11118	04532
6	40.025	40.05		3.68888	3.69011	61967	62032	23229
7	100.025	100.05		4.60517	4.60567	1.10448	1.10475	36529
8	125		2.28238			2.51944	2.29636	49409
9	425					1.75735	1.69307	46056
10	1025					1.25405	1.22725	39513
11	4025					49236	40553	18875
12	10025					01110	01384	00444
13	40025					77280	77348	28021
14	100025					1.27626	1.27653	39906
15	125		2.04122			2.58584	2.34418	49516
16	425					1.76025	1.69061	46082
17	1025					1.21501	1.18597	38785
18	4025					38994	38244	15164
19	10025					15558	15854	06183
20	40025					98075	98148	33668
21	100025					1.52616	1.52646	43650
22	125		1.77495			2.87179	2.58588	49801
23	425					1.89504	1.81264	47095
24	1025					1.24996	1.21561	39439
25	4025					27370	26495	10704
26	10025					37158	37508	14488
27	40025					1.34784	1.34870	41115
28	100025					1.99311	1.99346	47699
29	125		1.48160			3.07691	2.74683	49897
30	425					1.94927	1.85415	47436
31	1025					1.24455	1.16489	38581
32	4025					08107	06738	03233
33	10025					66747	67152	24779
34	40025					1.79454	1.79554	46366
35	100025					2.53949	2.53999	49449
36	125		1.16315			3.15105	2.78195	49921
37	425					1.89014	1.78377	47061
38	1025					1.05741	1.01305	35480
39	4025					20285	21415	08041
40	10025					1.03585	1.04038	34985

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LLNL

	10.025	10.0	10.05	2.302592	2.30757	11381	11118	04532	0442
	40.025	40.0	40.05	3.687883	3.69011	61967	62032	23229	232
	100.025	100.0	100.05	4.60517	4.60567	1.10448	1.10475	36529	3653
2	1.125			2.28238		2.51944	2.29636	49409	4891
2	4.25			↓		1.75735	1.69307	46056	45470
	1.025					1.25405	1.22725	39513	3901
	4.025					49236	48553	18775	1863
	10.025					01110	01374	10444	1055
	40.025					77280	77348	28071	2804
	100.025					1.27626	1.27653	39906	3991
3	1.125			2.04122		2.58584	2.34418	49516	4904
96	4.25			↓		1.76025	1.69061	46082	4545
43	1.025					1.21501	1.18597	38785	387
46	4.025					38984	38244	15164	14890
44	10.025					15558	15854	06183	0630
22	40.025					98075	98148	33668	3368
22	100.025					1.52616	1.52646	43650	43654
13	1.125			1.77495		2.87179	2.58588	48801	48516
134	4.25			↓		1.89504	1.81264	47095	4658
126	1.025					1.24996	1.21561	39439	3879
914	4.025					27370	26495	10784	1044
04	10.025					37158	37508	14488	14618
02	40.025					1.34784	1.34870	41115	41129
08	100.025					1.99311	1.99346	47699	4769
60	5 1.125			1.48160		2.07691	2.74683	49897	4969
57	4.25			↓		1.94927	1.85415	47436	4681
64	1.025					1.20455	1.16489	39581	3779
35	4.025					08107	06738	03233	0268
568	10.025					66747	67152	24779	2490
07	40.025					1.79454	1.79554	46366	4637
97	100.025					2.53949	2.53989	49449	4945
93	6 1.125			1.16315		3.15105	2.78195	49921	4973
13	4.25			↓		1.89014	1.78377	47061	462
	1.025					1.05741	1.01385	35480	3445
	4.025					20285	21415	08041	084
	10.025					1.03585	1.04038	34985	350
	40.025					2.29612	2.29724	48918	4891
	100.025					3.12911	3.12956	49915	4991

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LLNL

4.05	1.28627	1.39872	39862	21009	22222	22310	00222	000071
10.05	2.30259	2.30757	11381	11118	04532	04427	00105	000034
40.05	3.68888	3.69011	61967	62022	23229	23251	00022	000007
100.05	4.60517	4.60567	1.10448	1.10475	36529	36534	00005	000002
2.28238			2.51944	2.29636	49409	48919	00490	000167
↓			1.75735	1.69307	46056	45478	00570	000197
			1.25405	1.22725	39513	39018	00495	000168
			49236	48553	18975	18634	00241	000082
			01110	01384	00444	00554	00110	000037
			77280	77348	28021	28041	00020	000007
			1.27626	1.27653	39906	39911	00005	000002
2.04122			2.58584	2.34418	49516	49048	00468	000197
↓			1.76025	1.69061	46082	45455	00627	000263
			1.21501	1.18597	38785	38719	00566	000238
			38994	38244	15164	14990	00274	000115
			15558	15854	06183	06302	00119	000050
			98075	98148	33668	33696	00018	000008
			1.52616	1.52646	43650	43654	00004	000002
1.77495			2.87179	2.58588	49801	49516	00285	000148
↓			1.89504	1.81264	47095	46508	00587	000305
			1.24996	1.21561	39439	38797	00642	000334
			27370	26495	10784	10448	00336	000175
			37158	37508	14488	14618	00130	000068
			1.34784	1.34870	41115	41129	00014	000007
			1.99311	1.99346	47689	47691	00002	000001
1.48160			3.07691	2.74683	49897	49697	00200	000150
↓			1.94927	1.85415	47436	46813	00623	000467
			1.20455	1.16489	39521	37798	00783	000587
			08107	06738	03233	02685	00548	000411
			66747	67152	24779	24909	00130	000098
			1.79454	1.79554	46366	46374	00008	000006
			2.53949	2.53989	49449	49450	00001	000001
1.16315			3.15105	2.78195	49921	49732	00189	000229
↓			1.89014	1.78377	47061	46280	00781	000945
			1.05741	1.01305	35480	34450	01030	001246
			20285	21415	08041	08482	00941	000534
			1.03585	1.04038	34985	35089	00104	000124
			2.29612	2.29724	48918	48922	00004	000005
			3.12911	3.12956	49915	49915	00000	000000
								LLNL

4.05	1.37627	1.39772	59863	59205	22533	22310	00223	000071
10.05	2.30259	2.30757	11381	11118	08532	04427	00105	000034
40.05	3.68888	3.69011	01967	62082	23229	23251	00022	000007
100.05	4.60517	4.60567	1.10448	1.10475	36529	36534	00005	000002
2.28238			2.51944	2.29636	49409	48919	00490	000167
↓			1.75735	1.69307	46056	45478	00578	000197
			1.25405	1.22725	39513	39018	00495	000168
			49236	40553	18975	18634	00241	000082
			01110	01384	00444	00554	00110	000037
			77280	77348	28021	28041	00020	000007
			1.27626	1.27653	39906	39911	00005	000002
2.04122			2.58584	2.34418	49516	49048	00468	000197
↓			1.76025	1.69061	46082	45455	00627	000263
			1.21501	1.19597	38785	38719	00566	000238
			38994	38244	15164	14990	00274	000115
			15558	15854	06183	06302	00119	000050
			98075	98148	33668	33696	00018	000008
			1.52616	1.52646	43650	43654	00004	000002
1.77495			2.87179	2.58588	49801	49516	00285	000148
↓			1.89504	1.81264	47095	46508	00587	000305
			1.24996	1.21561	39439	38797	00642	000334
			27370	26495	10784	10448	00336	000175
			37158	37508	14488	14618	00130	000068
			1.34784	1.34870	41115	41129	00014	000007
			1.99311	1.99346	47699	47691	00002	000001
1.48160			2.07691	2.74683	49897	49697	00200	000150
↓			1.94927	1.85415	47436	46913	00623	000467
			1.70455	1.16489	39521	37798	00783	000587
			00107	06738	03233	02685	00548	000411
			66747	67152	24779	24909	00130	000098
			1.79454	1.79554	46366	46374	00008	000006
			2.53949	2.53989	49449	49450	00001	000001
1.16315			3.15105	2.78195	49921	49732	00189	000229
↓			1.89014	1.78377	47061	46280	00781	000945
			1.05741	1.01305	35480	34450	01030	001246
			20285	21415	08041	07482	00441	000534
			1.03585	1.04038	34985	35089	00104	000124
			2.29612	2.29724	48918	48922	00004	000005
			3.12911	3.12956	49915	49915	00000	000000

LLNL

Change of $T = 1.00$

Eliminate terms relating to ratio of cloud radius and pattern c.

Then:

$$D_{inf} = 6 \times 10^6 w' c_f h \left(\frac{R}{r} \right)^{-1.2} [30 R^2 \Delta \theta + 40 a]$$

$$= 1.2 \times 10^7 w' c_f h \left(\frac{R}{r} \right)^{-1.2} (R^2 \Delta \theta + 20 a)$$

WB Ballson (Air Burst) Model

$$f_0 = 0.51, \text{ all layers.}$$

$$\sigma = 0.863,$$

	L	Cf
Top	10	0.086
	9	0.225
	8	0.291
	7	0.247
	6	0.128
	5	0.023
	4	0
	3	0
	2	0
Bottom	1	0

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LLNL

~~SECRET~~
Change Δf to 1.00

Eliminate terms relating to radial addition
of cloud radius and pattern corner (πa^2)

Then:

$$\begin{aligned} D_{inf} &= 6 \times 10^6 w' c_f h \left(\frac{R}{r} \right)^{-1.2} [20 R^2 \Delta \theta + 40 a R] \\ &= 1.2 \times 10^7 w' c_f h \left(\frac{R}{r} \right)^{-1.2} (R^2 \Delta \theta + 2 R a) \end{aligned}$$

WB Balloon (an Burst) Model.

$f_0 = 0.51$, all layers.
 $\sigma = 0.863$, "

	i	C_f
Top	10	0.086
	9	0.225
	8	0.291
	7	0.247
	6	0.128
	5	0.023
	4	0
	3	0
	2	0
Bottom	1	0

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LLNL

Then:

$$\begin{aligned} D_{inf} &= 6 \times 10^6 w' c_f h \left(\frac{R}{\bar{r}} \right)^{-1.2} [20 R^2 \Delta \theta + 40 a] \\ &= 1.2 \times 10^7 w' c_f h \left(\frac{R}{\bar{r}} \right)^{-1.2} (R^2 \Delta \theta + 2a) \end{aligned}$$

WB Balloon (air burst) Model.

$$f_0 = 0.51, \text{ all layers}$$
$$\sigma = 0.263, \text{ " "}$$

	i	Cf
③ 634.2 f.i.	Top 10	0.086
51.	9	0.225
	8	0.291
	7	0.247
② 400 a.i. 08 i	6	0.128
10,080	5	0.023
	4	0
	3	0
① 220, 1	2	0
15,000	Bottom 1	0

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LLNL

Shot
Inca
Flat 5"
Tare
 $h = 5.76$
 $a_p = .84$
 $W' = .75$

CHICKEN

236

1967

Shot Baltzmann :
Ready 16 MAY 1957

DELETED

Design yield
Aircraft yield
Fallout yield

DELETED

12.5 KT

12.5 KT

Tower weights:

Cumulative	{	Top	Cumulative		
			0-50'	88,900 #	
			50-100'	115,280	
			100-300'	226,110	
			300-500'	356,740	
					Cab: 12 +
					Sand: 9 +
					Paraffin: 15 +

Metals weight in fireball as $\frac{477}{500} \times \frac{178}{100} \times 100 = 847$

Fallout Mc:

Tower materials:

Dust:

Total 3

WB estimate: 340 MC

Fired 0455 PDT, 28 MAY, 1957

Yield 12 KT -

Cloud height 33,000' MSL

Radius, visual estimate, crude, 1 mi

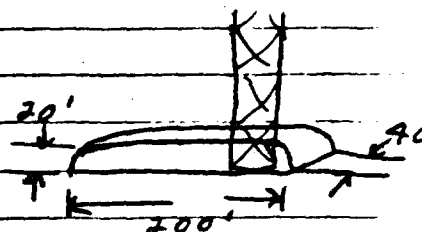
-- Yucca winds 0500 PDT 28 MAY

BEST AVAILABLE COPY

Sfc → 7,000' calm

Fire earth over tower:

8	20/10
9	19/11
10	15/13
12	14/16
14	13/18
16	14/27
18	14/27
20	15/24
23	17/20
25	17/18
30	17/21
35	19/23



Calc. fallout parameters for 12 KT:

$a = 1.8$

$a' = .44$

Dust Mc: 48

Metals Mc: 97

Total: 145

239

~~SECRET~~

85

tz more :

DELETED

Design yield

DELETED

AY 1957

Aircraft yield

12.5 KT

Fallout yield

12.5 KT

lbs:

Cumulative

0-50'

88,900 #

Cap: 12 tons

50-100'

115,280

Sand: 9 tons

100-300'

226,110

Paraffin: 15 tons

300-500'

356,740

ls weight in fireball as

$$\frac{427}{500} \times \frac{178}{100} \times \frac{104}{100} = 738 \text{ tons}$$

Fallout Mc:

Tower materials: 263 22 98

Dust: 55

Total 318 737 153

WB estimate: 340 MC

455 PDT, 28 May, 1957

old 12 KT

BEST AVAILABLE COPY

loud height 33,000' MSL

radius, visual estimate, crude, 1 mi.

inds 0500 PDT 28 May

2 sec' calm

Five earth cover at base of tower:

20/10

19/11

15/13

14/16

13/18

14/27

14/27

15/24

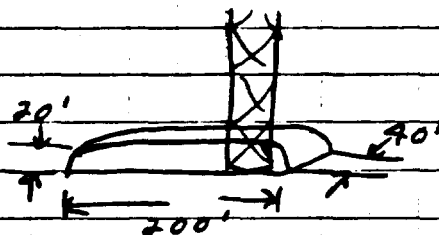
17/20

17/18

17/21

19/23

12/47



LLNL

Calc. fallout parameters for 12 KT:

a = 1.8

Dust Mc: 48

a' = .44

Metals Mc: 97

Total : 145

238

0030 50001

Tower weights:

Cumulative	Top	0 → 50'	Cumulative	88,900 #	Cab: 12
		50-100'		115,280	Sand: 9
		100-300'		226,110	Paraffin: 15
		300-500'		356,740	

Metals weight in fireball as $\frac{447}{500} \times \frac{178}{100} \times 12 = 137$

Fallout Mc:

Tower materials:

Dust:

Total

WB estimate: 340 MC

Fired 0455 PDT, 28 MAY, 1957

Yield 12 KT

Cloud height 33,000' MSL

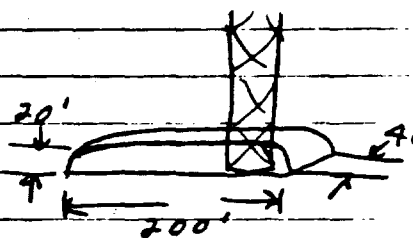
Radius, visual estimate, crude, 1 mi

Yucca winds 0600 PDT 28 MAY

Sfc → 7,000' calm

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Fire earth cover tower:



8	20/10
9	19/11
10	15/13
12	14/16
14	13/18
16	14/27
18	14/27
20	15/24
23	17/20
25	17/18
30	17/21
35	19/23
40	22/47
45	23/45
50	23/25

Calc. fallout parameters for 12 KT:

$a = 1.8$ $a' = .44$ $LLNL$
Dust Mc: 48
Metals Mc: 97
Total: 145

Amount used in predictions

~~SECRET~~

239

etc:

Cumulative

0-50'	88,900 #
50-100'	115,280
100-300'	226,110
300-500'	356,740

Cab: 12 tons
 Sand: 9 tons } in cab
 Paraffin: 15 tons

ls weight in fireball as $\frac{437}{500} \times \frac{178}{100} \times \frac{164}{100} = 164$ tons

Fallout Mc:

Tower materials: ~~263~~ 28 98
 Dust: 55
 Total ~~318~~ 153

WB estimate: 340 MC

1455 PDT, 28 MAY, 1957

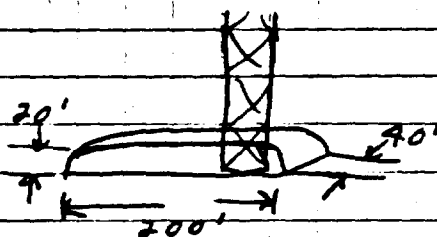
ield 12 KT

BEST AVAILABLE COPY

loud height 33,000' MSL
 radius, visual estimate, crude, 1 mi.
 winds 0500 PDT 28 MAY

7,000' calm

Five earth cover at base of tower:



Calc. fallout parameters for 12KT:

- 20/10
- 19/11
- 15/13
- 14/16
- 13/18
- 14/27
- 14/27
- 15/24
- 17/20
- 17/18
- 17/21
- 19/23
- 22/47
- 23/45
- 23/25

a = 1.8 Dust Mc: 48
 a' = .44 Metals Mc: 97
 Total: 145

LLNL

Amount used in prediction: 300, based on Apple, and 12.5KT

240

86

 $\sigma = 0.963$

WB Balloon Model

0.01 Knot

BEST AVAILABLE COPY

Time	f_j	f_j	f_{j+1}	$h f_j$	$h f_j$	$h f_{j+1}$	t_j	t_{j+1}	A_j
10	0.02	.015	.025	-0.673	-4.2585	-3.7895	4.1546	3.5185	-
	0.05	.045	.055		-3.1075	-2.9045	2.8210	2.5857	.47
	0.1	.095	.105		-2.3555	-2.2550	1.9496	1.8331	.474
	0.2	.195	.205		-1.6350	-1.5850	1.1147	1.0568	.367
	0.4	.395	.405		-0.9290	-0.9040	0.2966	0.2677	.11
	0.7	.695	.705		-0.3640	-0.3495	0.3580	0.3748	.13
	1.0	.995	1.005		-0.0050	-0.00497	0.7740	0.7856	.28
	1.2	1.195	1.205		0.17813	0.18647	0.9762	0.9959	.37
	1.5	1.495	1.505		0.40212	0.40879	1.2458	1.2535	.39
	2.0	1.995	2.005		0.69064	0.69564	1.5801	1.5859	.40
	3.0	2.995	3.005		1.09694	1.10027	2.0509	2.0548	.47
f_i	i	i	i	i	i	i	i	i	i
.03	.00005	.00014	.00017	.00014	.00007	.00001			
.04	.00013	.00034	.00044	.00037	.00019	.00003			
.05	.00022	.00057	.00074	.00063	.00033	.00006			
.06	.00032	.00093	.00108	.00092	.00048	.00009			
.07	.00041	.00107	.00139	.00118	.00061	.00011			
.08	.00050	.00131	.00169	.00144	.00074	.00013			
.09	.00058	.00152	.00196	.00166	.00086	.00015			
.10	.00066	.00173	.00223	.00189	.00098	.00018			
.20	.00110	.00288	.00372	.00316	.00164	.00029			
.30	.00107	.00280	.00362	.00307	.00159	.00028			
.40	.00096	.00252	.00325	.00276	.00143	.00026			
.50	.00083	.00217	.00281	.00238	.00124	.00022			
.60	.00067	.00176	.00227	.00192	.00100	.00013			
.70	.00054	.00141	.00183	.00155	.00080	.00012			
.80	.00045	.00118	.00152	.00129	.00067	.00012			
.90	.00037	.00097	.00125	.00106	.00055	.00010			
1.00	.00029	.00076	.00098	.00083	.00043	.00008			
1.10	.00025	.00066	.00095	.00072	.00037	.00007			
1.20	.00020	.00052	.00068	.00057	.00030	.00005			
1.30	.00018	.00047	.00061	.00052	.00027	.00005			
1.40	.00015	.00039	.00051	.00043	.00022	.00004			
1.50	.00012	.00031	.00041	.00034	.00018	.00003			
1.60	.00011	.00029	.00037	.00032	.00016	.00003			
1.80	.00008	.00021	.00027	.00023	.00012	.00002			
2.00	.00006	.00016	.00020	.00017	.00009	.00002			
2.20	.00004	.00010	.00014	.00011	.00006	.00001			

963 WB Balloon Model Per 0.01 Knot interval

~~SECRET~~

fj	fj+1	h fj	h fj	h fj+1	tj	tj+1	Aj	Aj+1	ΔA
.015	.025	-0.673	-4.2585	-3.7185	4.1546	3.5165	-	-	-
.045	.055	J	-3.1075	-2.9045	2.8210	2.5857	.49761	.49516	.00245
.095	.105		-2.3555	-2.2550	1.9496	1.8331	.47430	.46662	.00768
.195	.205		-1.6350	-1.5850	1.1147	1.0568	.36749	.35466	.01283
.395	.405		-0.9290	-0.9040	0.2966	0.2677	.11661	.10553	.01108
.695	.705		-0.3640	-0.3495	0.8580	0.3748	.13984	.14608	.00624
.995	1.005		-0.0050	+0.00497	0.7740	0.7856	.28056	.28392	.00336
1.195	1.205		0.17813	0.18647	0.9762	0.9959	.33799	.34038	.00239
1.495	1.505		0.40212	0.40879	1.2458	1.2535	.39360	.39503	.00143
1.995	2.005		0.69064	0.69564	1.5801	1.5859	.44301	.44365	.00064
2.995	3.005		1.09694	1.10027	2.0509	2.0548	.47984	.48004	.00020

10 9 8 7 6 5 ← level

.00005	.00014	.00017	.00014	.00007	.00001
.00013	.00034	.00044	.00037	.00019	.00003
.00022	.00057	.00074	.00063	.00033	.00006
.00032	.00083	.00108	.00092	.00048	.00009
.00041	.00107	.00139	.00118	.00061	.00011
.00050	.00131	.00169	.00144	.00074	.00013
.00058	.00152	.00196	.00166	.00086	.00015
.00066	.00173	.00223	.00189	.00098	.00018
.00110	.00288	.00372	.00316	.00164	.00029
.00107	.00280	.00362	.00307	.00159	.00028
.00096	.00252	.00325	.00276	.00143	.00026
.00083	.00217	.00281	.00238	.00124	.00022
.00067	.00176	.00227	.00192	.00100	.00018
.00054	.00141	.00183	.00155	.00080	.00014
.00045	.00118	.00152	.00129	.00067	.00012
.00037	.00097	.00125	.00106	.00055	.00010
.00029	.00076	.00098	.00083	.00043	.00008
.00025	.00066	.00085	.00072	.00037	.00007
.00020	.00052	.00068	.00057	.00030	.00005
.00018	.00047	.00061	.00052	.00027	.00005
.00015	.00039	.00051	.00043	.00022	.00004
.00012	.00031	.00041	.00034	.00018	.00003
.00011	.00029	.00037	.00032	.00016	.00003
.00008	.00021	.00027	.00023	.00012	.00002
.00006	.00016	.00020	.00017	.00009	.00002
.00004	.00010	.00014	.00011	.00006	.00001
.00003	.00008	.00010	.00009	.00004	.00001

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Table 9 of 9

0.1	.095	.105	-2.3555	-2.2550	1.9496	1.8331	.47
0.2	.195	.205	-1.6350	-1.5850	1.1147	1.0568	.30
0.4	.395	.405	-0.9290	-0.9040	0.2966	0.2677	.11
0.7	.695	.705	-0.3640	-0.3495	0.3580	0.3748	.15
1.0	.995	1.005	-0.0050	+0.00497	0.7740	0.9556	.2
1.2	1.195	1.205	0.17813	0.18647	0.9862	0.9959	.33
1.5	1.495	1.505	0.40212	0.40279	1.2458	1.2535	.34
2.0	1.995	2.005	0.69064	0.69564	1.5801	1.5859	.42
3.0	2.995	3.005	1.09694	1.110027	2.0509	2.0542	.45

f_i	$i = 10$	9	8	7	6	5
.03	.00005	.00014	.00017	.00014	.00007	.00001
.04	.00013	.00034	.00044	.00037	.00019	.00002
.05	.00022	.00057	.00074	.00063	.00033	.00006
.06	.00032	.00083	.00108	.00092	.00048	.00009
.07	.00041	.00107	.00139	.00118	.00061	.00011
.08	.00050	.00131	.00169	.00144	.00074	.00013
.09	.00058	.00152	.00196	.00166	.00086	.00015
.10	.00066	.00173	.00223	.00189	.00098	.00018
.20	.00110	.00288	.00372	.00316	.00164	.00029
.30	.00107	.00280	.00362	.00307	.00159	.00028
.40	.00096	.00252	.00325	.00276	.00143	.00024
.50	.00083	.00217	.00281	.00238	.00124	.0002
.60	.00067	.00176	.00227	.00192	.00100	.00015
.70	.00054	.00141	.00183	.00155	.00080	.00014
.80	.00045	.00118	.00152	.00129	.00067	.00012
.90	.00037	.00097	.00125	.00106	.00055	.00010
1.00	.00029	.00076	.00098	.00083	.00043	.00008
1.10	.00025	.00066	.00085	.00072	.00037	.00007
1.20	.00020	.00052	.00068	.00057	.00030	.00005
1.30	.00018	.00047	.00061	.00052	.00027	.00005
1.40	.00015	.00039	.00051	.00043	.00022	.00004
1.50	.00012	.00031	.00041	.00034	.00018	.00003
1.60	.00011	.00029	.00037	.00032	.00016	.00003
1.80	.00008	.00021	.00027	.00023	.00012	.00002
2.00	.00006	.00016	.00020	.00017	.00009	.00002
2.20	.00004	.00010	.00014	.00011	.00006	.00001
2.40	.00003	.00008	.00010	.00009	.00004	.00001
2.70	.00002	.00006	.00007	.00006	.00003	.00000
3.00	.00002	.00005	.00005	.00005	.00003	0
3.30	.00001	.00003	.00003	.00003	.00002	
3.60	.00001	.00003	.00003	.00003	.00001	
4.00	.00001	.00003	.00003	.00003	.00001	

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TNT

DELETED

4KT Aircraft. + fallout.

87

00' WT 125 Tons (12 tons cab included)

$$M_c = \frac{75 \times \frac{R_f}{500}}{113 \frac{R_f}{300} + 12} = 73$$

$$M_c = 46$$

$$\text{ad } M_c, 4kt = 119 = 0.40 \text{ KT}$$

$$M_c = 112 \times 0.6 = 67$$

$$M_c = 20$$

$$M_c, 3kt = 87 = 0.29 \text{ KT}$$

$$M_c = 99 \times 0.6 = 59$$

$$\text{ad } M_c = 4$$

$$\text{total } M_c, 2KT = 63 = 0.21 \text{ KT}$$

1455 PDT 2 June 1957

height 15.5 kft MSL

0.15 KT

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dir, visual estimate, 0.5 mi.

Cloud showed no stem, considerable amount of h_c from tower.

LLNL

1003

Franklin

DELETED

4KT Aircraft. + fo

Tower 300' WT 125 Tons (12 tons calc mi

$$\begin{aligned} \underline{4KT} \quad \text{Tower } Mc &= \frac{75 \times \frac{R_f}{500}}{100} = (113 \frac{R_f}{300} + 12) 0.6 = \\ \text{Dust } Mc &= 46 \end{aligned}$$

$$\text{Total } Mc, 4kt = 119 = 0.40 KT$$

$$\begin{aligned} \underline{3KT} \quad \text{Tower } Mc &= 112 \times 0.6 = 67 \\ \text{Dust } Mc &= 20 \end{aligned}$$

$$\text{Total } Mc, 3kt = 87 = 0.29 KT$$

$$\begin{aligned} \underline{2KT} \quad \text{Tower } Mc &= 99 \times 0.6 = 59 \\ \text{Dust } Mc &= 4 \end{aligned}$$

$$\text{Total } Mc, 2KT = 63 = 0.21 KT$$

Fired 0455 PDT 2 June 1957

Cloud height 15.5 kft MSL

Yield 0.15 KT

Radius, visual estimate, 0.5 mi.

Cloud showed no stem, considerable amount
sparks from tower.

BEST AVAILABLE COPY

LLNL

Area Elevations

~~SECRET~~

T 1	4235' MSL
T 2	4486
T 2a	4382
T 2b	4469
T 2c	4479
T 3	4025
T 3b	3997
T 4	4307
T 7c	4243
B 7b	4186
B 9a	4214
B fa	3076

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LLNL

Wilson

DELETED

500' balloon, area

15 kt used for fallout.

Assumed Me : 90

" Cloud height : 36

" Radius $1\frac{1}{2}$ miles

Cloud model: balloon

Fired 0445 PDT 18 June

First yield 10 kt

Cloud height 35,000'

Radius 1 mi.

Puff clean of dirt - NO_2 color.

Stem dark + thick.

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LLNL

247

LC035 212

90

Priscilla

DELETED

700' b

F

Fallout Prod: max yield

Fallout yield 0.8 KT $\approx$ 240 MC

Cloud height feet trop + 2000'

Radius feet 2 1/2 miles

Fired 0600 PDT 24 June

Prelim yield 39 KT

Dim. Radius 2-2.5 miles at 4 minutes
~ 10 miles at 1 hour

Height 40,000'

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LLNL

248

10035 0119

2. miscilla

DELETED

700' balloon
FF

Fallout Prod: max yield

Fallout yield 0.8 KT 2240 MC

Cloud height feet trop. + 2000'

Radius feet 2 1/2 miles

Fired 0630 PDT 24 June

Prelim. yield 38KT

m. Radius 3-2.5 miles at 4 minutes
~ 10 miles at 1 hour

Height 40,000'

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LLNL

Diablo.

500' Tower
Area 2.6

Design yield:

DELETED

Yield for fallout calc.: 15 kT

Cloud height feet 36,000'

Metal etc weights:

Total steel: 755,920 # = 378 tons

Tower 200' steel: 227,160 # = 114 tons

In cab:

Al: 14,270 # = 7 tons

Lead-powderr: 136,000 # = 58 tons P

10 tons pa

Powderr: 40,000 # = 20 tons

In tower above 200':

Cu: 1116 # = 0.5 tons

Powderr: 16,280 # = 8 tons

Lead: 55,440 # = 28 tons

At 15 kT, amount of tower not in fireball:

Total steel in fb: 350 tons

" Lead " " 86 tons

" Al " " 7 tons

Total metal: 443 tons

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Mc calculation:

Total Boltzmann: 560 mc

Fraction less than 40 μ : 214 mc

Difference: 346 mc

LLNL

Assume the 214 mc brought down by rain, (or dust)

Assume dust contribution fits theory: Witness Priscil

Dust on Boltzmann: (at 100 kT): 45 mc

Metal on Boltzmann: 301 mc

Metal calc on " : 100 mc

Error in 0.6 T theory a factor of 3. 250

Using 1.8 T on Diablo: Metals = 1.8 x 443 =

500' Tower

Design yield:

DELETED

91

Area 2 b

Yield for fallout calc: 15 KT

Cloud height feet 36,000'

~~SECRET~~

etc weights:

Total steel: 755,920 # = 378 tons

Tower 200' steel: 227,160 # = 114 tons

On cab:

Al: 14,270 # = 7 tons

Lead-paraffin: 136,000 # = 58 tons Pb

10 tons paraffin

Paraffin: 40,000 # = 20 tons "

Tower above 200':

Cu: 1116 # = 0.5 tons

Paraffin: 16,280 # = 8 tons

Lead: 55,440 # = 28 tons

KT, amount of tower not in fireball: 28 tons

Total steel in fb: 350 tons

" Lead " " 86 tons

" Al " " 7 tons

Total metal: 443 tons

re:

BEST AVAILABLE COPY

Total Boltzmann: 560 mc

tion less than 40 μ : 214 mc

Difference: 346 mc

LLNL

214 mc brought down by rain. (or dust under tower)
best contribution fits theory: witness Priscilla.

Boltzmann: (at 100KT): 4.5 MC

Boltzmann: 301 mc

on " : 100 mc

251

in 0.6T theory a factor of 3.

PT on Diablo: Metals = $1.8 \times 443 = 797$ mc

LCC35 0817

Metal etc weights:

Total steel: 755,920 # = 378 tons
Lower 200' steel: 227,160 # = 114 tons
In cab:
Al: 14,270 # = 7 tons
Lead-powd effr: 136,000 # = 58 tons
Paraffin: 40,000 # = 20 tons

In tower above 200':

Cu: 1116 # = 0.5 tons
Paraffin: 16,280 # = 8 tons
Lead: 55,440 # = 28 tons

At 15 kT, amount of tower not in fireball:

Total steel in fb: 350 tons
" Lead " " : 86 tons
" AL " " : 7 tons

Total metal: 443 tons

Mc calculation:

Total Boltzmann: 560 mc
Fraction less than 40 μ : 214 mc
Difference: 346 mc

BEST AVAILABLE COPY

Assume the 214 mc brought down by rain, (or dust)

Assume dust contribution fits theory: Witness Prisci

Dust on Boltzmann: (at 100 kT): 4.5 mc

Metal on Boltzmann: 301 mc

Metal calc on " : 100 mc

LLNL

Error in 0.6 T theory a factor of 3.

Using 1.8 T on Diablo: Metals = $1.8 \times 443 =$

Dust =

Total = 252

~~SECRET~~

etc weights:

Total steel: 755,920# = 378 tons
 Lower 200' steel: 227,160# = 114 tons
 On cab:
 Al: 14,270# = 7 tons
 Lead-paraffin: 136,000# = 58 tons Pb
 10 tons paraffin
 Paraffin: 40,000# = 20 tons "

tones above 200':

Cu: 1116# = 0.5 tons
 Paraffin: 16,280# = 8 tons
 Lead: 55,440# = 28 tons

5kT, amount of tones not in fireball: 28 tons

Total steel in fb: 350 tons
 " Lead " " : 86 tons
 " AL " " : 7 tons

Total metals: 443 tons

time:

BEST AVAILABLE COPY

Total Boltzmann: 560 mc
 action less than 40μ: 214 mc
 Difference: 346 mc

the 214 mc brought down by rain, (or dust and/or tower)
 dust contribution fits theory: witness Priscilla.
 on Boltzmann: (at 100kT) : 45 mc
 on Boltzmann: 301 mc
 all on " : 100 mc
 in 0.6T theory a factor of 3.

LENL

1.8 T on Diablo: Metals = $1.8 \times 443 = 797$ mc
 Dust = 100 mc
 Total = 897 mc

253

~~SECRET~~

Mc on Apple: 250 total.
 Dust cont: 105
 Metals: 145

Metals wt. in fireball: 223 tons.

α in $KT = MC$: 0.65

Calc ~~Baltzman~~ Diablo:

$$0.65T = 0.65 \times 443 = 288 \text{ mc}$$

$$\text{Dust} = 100 \text{ mc}$$

$$\text{Total} = 388 \text{ mc}$$

Average between Baltzman + Apple calibrations

$$\underline{\underline{642 \text{ MC}}}$$

$$= 14\%$$

$$\approx 2.1 \text{ KT}$$

Diablo initial measurements:

High 900 mc

Low 1700mc (60% within 5 miles)

Calculated using 1.8T and measured yield

951 mc

LLNL

BEST AVAILABLE COPY

Mc on Apple: 250 total.
Dust cont: 105
Metals: 145

~~SECRET~~

wt. in fireball: 223 tons.

α in $2T = mc$: 0.65

~~Baltzman~~ Diablo;

$$0.65T = 0.65 \times 443 = 288 \text{ mc}$$

$$\text{Dust} = 100 \text{ mc}$$

$$\text{Total} = 388 \text{ mc}$$

between Baltzman + Apple calibration for Diablo:

$$\underline{\underline{642 \text{ MC}}}$$

$$= 14\%$$

$$= 2.1 \text{ KT}$$

initial measurements: **BEST AVAILABLE COPY**

High 900 mc

Low 1700mc (60% within 5 miles)

Calculated using 1.8T and measured yield:

$$951 \text{ mc}$$

LLNL

Calculations for surface bursts of small "clean"

Total Yield	Fission Yield	Extent of: (t =	
		400 R	25 R
5		1 mi	4 mi
		1/2 mi	2 mi
50		2.5 mi	12 mi
		1.5 mi	5 mi
150		5 mi	21 mi
		2 mi	9 mi

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For dirty bombs, sfc bursts,

Yield 10KT		20		50		150	
Stat. miles	5 hour Dose	D _i	D _o	D _i	D _o	D _i	D _o
5	440	5	730	5	1700	5	5000
10	90	10	180	10	430	10	1400
15	40	15	72	15	155	15	535
30	8.3	30	17	30	33	30	80
60	2.4	60	3	60	7	60	17

Zuni: 91 R/hr, H+1 hrs, 13.6 stat miles.
150 R/hr, H+1 hrs, ~70 stat miles

Lacrosse: 180-400 R/hr at H+1 hrs, 14.5 stat miles

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256

10035 0004

laterals for surface bursts of small "clean" bombs.

Extent of: ($t = 5$ hrs exp.)

Fission Yield	400 R	25 R	1 R
	1 mi	4 mi	17 mi
	$\frac{1}{2}$ mi	2 mi	10 mi
	2.5 mi	12 mi	45 mi
	1.5 mi	5 mi	25 mi
	5 mi	21 mi	70 mi
	2 mi	9 mi	40 mi

For dirty bombs, sfc bursts 15 knot wind.

20 50 150 1500

D_i	D_o	D_i	D_o	D_i	D_o	D_i	D_o
5	730	5	1700	5	5000	5	~~7000.0~~
10	180	10	430	10	1400	10	5200
15	72	15	155	15	535	15	3600
30	17	30	33	30	80	30	1300
60	3	60	7	60	17	60	210

91 R/hr, H+1 hrs, 13.6 stat miles.

50 R/hr, H+1 hrs, ~70 stat miles

80-400 R/hr at H+1 hrs, 14.5 stat miles.

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94 ~~SECRET~~

	Dust	Metal. #100	Total	Mean	
TS-7	406	114 91	520 497	513	4
Uk-1	509	115 92	624 601	511	5
Uk-2	836	258 206	1094 1042	859	2
Uk-5	12	8 6	20 18	~10	
Uk-6	980	150 120	1130 1100	1010	1
Uk-7	2061	368 294	2429 2355	1830	2
Uk-9	1179	123 98	1302 1277	3205	1
Uk-10	73	.6 .5	74 74	~100	

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Wasp	0	.65 .5	.65 .5	~1	
Moth	12	38 30	50 42	67	
Tesla	147	116 93	263 240	198	2
Turk	732	822 658	1554 1390	~1000	
Hornet	38	97 78	135 116	106	
Apple	111	477 382	588 493 (400)	153 ?	
Bee	1	162 130	163 131	~100	
Post	2	55 44	57 46	~20	
Met	535	343 274	878 809	933	
Apple II	0	1089 871	1089 871	898	
Zucchini	361	379 303	~~420~~ 664	~700	
Baltzman	48	269 215	317 263	346	

	5000X E8	Dust	Paint	Meas	P 109	Dust	new	System (A)	1/3 WKT	Totals	Mean	Err.
TS-7	437	330	406	470	76	482	513	- .06				
Uk-1	434	390	509	560	77	586	511	+ .15				
Uk-2	687	575	836	850	172	1008	859	+ .17				
Uk-6	910	660	980	970	100	1080	1010	+ .07				
Uk-7	1585	1250	2061	1900	245	2306	1830	+ .20				
Moth	42	53	12	66	25	37	67	- .45				
Tesla	121	160	147	223	77	224	198	+ .13				
Turk	452	575	732	1010	548	1280	~1000	~ + .2				
Hornet	41	79	38	103	65	103	106	- .05				
Apple	82	200	111	340	318	429	~400	~ + .07				
Met			535	700	229	764	933	- .18				
Apple II			70		726	7726	898	- .19				
Boltz.			48	222	179	277	346?	~ - .34				
Diablo 15KT			100	510	586	686	(258)	LLNL				
Bee	0	93	1	120	108	109	~100	~ + .09				
Post			2	43	37	39	~20	~ + .95				
Zucchini			361	770	253	614	~700	- .12				

T	Dust	Metals	Total	Mean	Std Cal	New Old
406	114 91	520 497	513	443	+0.14	-0.14
509	115 92	624 601	511	543	+0.24	+0.03
836	258 206	1094 1042	859	897	+0.37	+0.44
12	8 6	20 18	~10	30	+1.0	+2.0
980	150 120	1130 1100	1010	1014	+0.29	+0.04
2061	368 294	2429 2355	1830	2122	+0.33	+0.16
1179	123 98	1302 1277	3205	1205		
73	6 5	74 74	~100	74		

0	65 5	65 5	~1	.7		
12	38 30	50 42	67	41	-0.25	-0.39
147	116 93	263 240	198	200	+0.33	+0.01
732	822 658	1554 1390	~1000	888	+0.35	-0.11
38	97 78	135 116	106	99	+0.27	-0.06
111	477 382	588 493 (400)	153	252	+0.47	-0.31
1	162 130	163 131	~100	69		
2	55 44	57 46	~20	51		
535	343 274	878 809	933	619	-0.59	-0.34
0	1089 871	1089 871	898	737	+0.23	-0.17
361	379 303	424 364	~700	441		
48	269 215	317 263	346	145		

DOXE 8	Dust	Metals	Total	Mean	Error	New Old
P 109	Dust System (A)	1/3 W 1/2 T	Totals	Mean	Error	New Old
7 330	406 470	76	482	513	-0.06	-0.071
34 390	509 560	77	586	511	+0.15	+0.17
87 575	836 850	172	1008	859	+0.17	+0.22
10 660	980 970	100	1080	1010	+0.07	+0.08
185 1250	2061 1900	245	2306	1830	+0.26	+0.30
12 53	12 66	25	137	67	-0.45	-0.71
21 160	147 223	77	224	198	+0.13	+0.21
52 575	732 1010	548	1280	~1000	+0.28	-
41 79	38 103	65	103	106	-0.03	-0.07
32 200	111 340	318	429	~400	+0.07	
535 700	229	764	933	-0.18	-0.24	
70	726	7726	898	-0.19	+1 ?	Prindle
48 222	179	227	346	~0.34	+1 ?	Wilson
100 510	586	686				
93 1	120 108	109	~100	+0.09		259
2 43	37	39	~20	+0.95		
361 770	253	614	~700	-0.12		

	10	0	6	20	18	~10
Uk-6	980	150	120	1130	1100	1010
Uk-7	2061	368	294	2429	2355	1830
Uk-9	1179	123	98	1302	1277	3205
Uk-10	73	.6	.5	74	74	~100

Wasp	0	.65	.5	.65	.5	~1
Moth	12	38	30	50	42	67
Tesla	147	116	93	263	240	198
Turk	732	822	658	1554	1390	~1000
Hornet	38	97	78	135	116	106
Apple	111	477	382	588	493 (400)	153?
Bee	1	162	130	163	131	~100
Post	2	55	44	57	46	~20
Met	535	343	274	878	809	933
Apple II	0	1089	871	1089	871	898
Zucchini	361	379	303	~~250~~ 664		~700
Baltzman	48	269	215	317	263	346

	5000XES ^① / ₁₀₀		Dust ^{new} System ^① / ₃ WKT		Totals	Mean	
	P	109	Dust	new			
TS-7	437	330	406	470	76	482	513 -
Uk-1	434	390	509	560	77	586	511 +
Uk-2	687	575	836	850	172	1008	859 +
Uk-6	910	660	980	970	100	1080	1010 +
Uk-7	1585	1250	2061	1900	245	2306	1830 +
Moth	42	53	12	66	25	37	67 -
Tesla	121	160	147	223	77	224	198 +
Turk	452	575	732	1010	548	1280	~1000 ~+
Hornet	41	79	38	103	65	103	106 -
Apple	82	200	111	340	318	429	~400 ~+
Met			535	700	229	764	933 -
Apple II			70		726	726	898 -
Boltz			48	222	179	227	346? ~-
Diablo 15KT			100	510	586	686	
Bee 0	93		1	120	108	109	~100 ~+
Post			2	43	37	39	~20 ~+
Zucchini			361	770	253	614	~700 ~-
Uk-5			12	17	5	17	~10 ~+

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LLNL

Ave + 0.0
260

Hood	0	140	4.4	4.4	1.7

12	8	6	20	18	~10	30	+1.0	+2.0
980	150	120	1130	1100	1010	1014	+1.29	+1.04
2061	368	294	2429	2355	1830	2122	+1.33	+1.16
1179	123	98	1302	1277	3205	1205		
73	.6	.5	74	74	~100	74		

0	.65	.5	.65	.5	~1	.7		
12	38	30	50	42	67	41	= .25	-.39
147	116	93	263	240	198	200	+1.33	+1.01
732	822	658	1554	1390	~1000	888	+1.35	-.11
38	97	78	135	116	106	99	+1.24	-.16
111	477	382	588	493	(400) 153 ?	256	+1.47	-.31
1	162	130	163	131	~100	69		
2	55	44	57	46	~20	51		
535	343	274	878	809	933	619	= .13	-.34
0	1089	871	1089	871	898	737	+1.21	-.17
361	379	303	664	664	~700	441		
48	269	215	317	263	346	145		

EXES ①	P 109	Dust	Dust ^{new} System (A)	1/3 W ^{1/2} T	Totals	Mean	Error	Ave +206 -11
330	406	470	76	482	513	-.06	-.071	
4 390	509	560	77	586	511	+1.15	+1.17	
12 575	836	850	172	1008	859	+1.17	+1.22	
0 660	980	970	100	1080	1010	+1.07	+1.08	
35 1250	2061	1900	245	2306	1830	+1.26	+1.30	
2 53	12	66	25	37	67	-.45	-.71	
1 160	147	223	77	224	198	+1.13	+1.21	
2 575	732	1010	548	1280	~1000	~+.28	-	
1 79	38	103	65	103	106	-.03	-.07	
2 200	111	340	318	429	~400	~+.07		
535	700	229	764	933	-.18	-.24		
70	726	726	898	4-.19	+1 ?	Principle		
48	222	179	227	346? ~	-.34 ?	+1 ?	Wilson	
100	510	586	686					
93	1	120	108	109	~100	~+.09		
2	43	37	39	~20	~+.95		LLNL	
361	770	253	614	~700	4-.12			
17	17	5	17	~10	~+.7			

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Ave + 0.02

261

0 140

4.4

4.4

17

~~SECRET~~

New metals scaling

~~SECRET~~

$$M_{c \text{ met}} = K T W^{\frac{1}{2}}$$

for $W = 24$, $T = 140$, $M_c = 398$

$$M_{c \text{ et}} \quad K = \frac{398}{140 \times 4.9} = 0.58$$

$$\text{Zucch.} \quad K_p = \frac{339}{133 \times 5.7} = 0.45$$

With Pad Apple II ~~K~~ $K = \frac{898}{388 \times 5.61} = 0.41$

$$\text{Tesla.} \quad K = \frac{51}{88 \times 2.64} = 0.22$$

$M_c = 400$
Apple $K = \frac{289}{242 \times 3.93} = 0.30$

$$\text{Moth} \quad K = \frac{55}{48 \times 1.57} = 0.73$$

$$\text{Boltz.} \quad K = \frac{505}{164 \times 3.32} = 0.93$$

Or, figuring average or whatever!

LLNL

$$K = \frac{291}{164 \times 3.32} = 0.53$$

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Average: $\sim \frac{1}{2}$

262

262

$$c = KTW^{1/2}$$

$$= 24, T = 140, M_c = 398$$

$$= \frac{398}{140 \times 4.9} = 0.58$$

$$= \frac{339}{133 \times 5.7} = 0.45$$

$$K = \frac{898}{388 \times 5.61} = 0.41$$

$$= \frac{51}{88 \times 2.64} = 0.22$$

$$= \frac{289}{242 \times 3.93} = 0.30$$

$$= \frac{55}{48 \times 1.57} = 0.73$$

$$= \frac{505}{164 \times 3.32} = 0.93$$

or, figuring using exponents!

LLNL

$$= \frac{291}{164 \times 3.32} = 0.53$$

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~ 1/2

269

for $W = 24$, $T = 140$, $M_c = 398$

$$Met \quad k = \frac{398}{140 \times 4.9} = 0.58$$

$$Zucch. \quad k = \frac{339}{133 \times 5.7} = 0.45$$

With ~~the~~ Pad Apple II $k = \frac{898}{388 \times 5.61} = 0.41$

$$Tesla \quad k = \frac{51}{88 \times 2.64} = 0.22$$

$M_c = 400$
Apple $k = \frac{289}{242 \times 3.93} = 0.30$

$$Moth \quad k = \frac{55}{48 \times 1.52} = 0.73$$

$$Boltz. \quad k = \frac{505}{164 \times 3.32} = 0.93$$

Or, figuring W is whatever!

$$k = \frac{291}{164 \times 3.32} = 0.53$$

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LLNL

Average: $\sim \frac{1}{2}$

then $M_{c \text{ metals}} = \frac{1}{2} W^{\frac{1}{2}} T$

Diablo calculates: $857 \text{ Mc metal} + 100$
 $= 754 \text{ total for } 10k = 957 \text{ Mc}$

$$= \frac{398}{140 \times 4.9} = 0.58$$

$$= \frac{339}{133 \times 5.7} = 0.45$$

$$K = \frac{898}{388 \times 5.61} = 0.41$$

$$C = \frac{51}{88 \times 2.64} = 0.22$$

$$K = \frac{289}{242 \times 3.93} = 0.30$$

$$K = \frac{55}{48 \times 1.57} = 0.73$$

$$K = \frac{505}{164 \times 3.32} = 0.93$$

or, figuring wings or whatever!

$$K = \frac{291}{164 \times 3.32} = 0.53$$

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LLNL

: ~ 1/2

$$M_{\text{c metals}} = \frac{1}{2} W^{1/2} T$$

blo calculates: 857 mc metal + 100 dust

$$\text{total for 10KT} = 957 \text{ MC at 15KT}$$

265

10035 0135

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[illegible]

50	10,000	8965	31,720	3,660	.0004	.024	.0000	.05	.02	2.62	67,11
↓	0.1		680	530	.0094	.306	.029	.61		2.04	42
	0.3	123	984	834	.060	.245	.015	.49	.01	2.17	12,1
	1		1472	1322	.038	.195	.007	.39		2.28	42,1
	10		3176	3026	.017	.130	-	.26		2.41	42
	100		6832	4682	.0075	.046	-	.17		2.50	424
	1000		14,720	14,570	.0034	.058	-	.12		2.55	424
	10,000		31,720	31,570	.0016	.040	-	.08		2.59	424,3
100	0.1		680	380	.263	.512	.135	1.02	.09	1.56	3
↓	0.2	108	864	564	.177	.420	.074	.84	.05	1.78	6
	0.4	136	1098	788	.127	.356	.045	.71	.03	1.93	12
	1		1472	1172	.085	.292	.025	.58	.02	2.07	30
	10		3176	2876	.035	.187	.007	.37		2.30	300
	100		6832	4532	.015	.122	.002	.24		2.43	300
	1000		14,720	14,420	.007	.084	-	.17		2.50	300
	10,000		31,720	31,420	.003	.055	-	.11		2.56	300,0
200	.2		864	244	.758	.870	.659	1.74	.44	.49	42
	.5	146	1168	568	.352	.594	.209	1.19	.14	1.34	10,4
	1		1472	872	.229	.478	.109	.96	.07	1.64	21,1
	10		3176	2576	.078	.279	.022	.56	.01	2.10	21,2
	100		6832	6232	.032	.179	.006	.36		2.31	21,2
	1000		14,720	14,120	.014	.118	.002	.24		2.43	21,2
	10,000		31,720	31,120	.006	.078	-	.16		2.51	21,3
300	1		1472	572	.524	.724	.379	1.45	.25	.97	17,3
	2	232	1856	956	.314	.560	.176	1.12	.12	1.43	34,1
	4	292	2336	1436	.209	.457	.096	.91	.06	1.70	69,1
	10		3176	2276	.132	.363	.048	.73	.03	1.91	173
	100		6832	5932	.051	.226	.012	.45	.01	2.21	173
	1000		14,720	13,820	.022	.148	.003	.30		2.37	173
	10,000		31,720	30,820	.010	.100	-	.20		2.47	173,0
	.6	155	1240	340	.988	.939	.826	1.88	.55	1.24	10,4

000	3965	31,720	31,660	.0004	.024	.0000	.05
1	123	680	530	.094	.306	.029	.02
3		984	834	.060	.245	.015	.01
1		1472	1322	.038	.795	.007	-
0		3176	3026	.017	.130	-	-
00		6832	4682	.0075	.086	-	-
00		14,720	14,570	.0034	.058	-	-
000		31,720	31,570	.0016	.040	-	-
1		680	380	.263	.512	.135	.09
2	108	864	564	.177	.420	.074	.05
4	136	1088	788	.127	.356	.045	.03
0		3176	1172	.085	.292	.025	.02
0		6832	6532	.035	.187	.007	-
00		14,720	14,420	.015	.122	.002	-
00		31,720	31,420	.007	.084	-	-
0		864	244	.003	.055	-	-
5	146	1168	568	.758	.870	.659	.44
1		1472	872	.352	.594	.209	.14
0		3176	2576	.229	.478	.109	.07
0		6832	6232	.078	.279	.022	.01
0		14,720	14,120	.032	.179	.006	-
0		31,720	31,120	.014	.118	.002	-
0		1472	572	.006	.078	-	-
0		1856	956	.524	.724	.379	.25
0		2236	1436	.314	.560	.196	.12
0		3176	2276	.209	.457	.096	.06
0		6832	5932	.132	.363	.048	.03
0		14,720	13,820	.051	.226	.012	.01
0		31,720	30,820	.022	.148	.003	-
0		1240	340	.010	.100	-	-
0				.002	.039	.006	.05

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000	2.62	67,108	1768,00
1	2.04	4,24	8.6
3	2.17	12.7	27.6
1	2.28	42.4	97
0	2.41	424	1022
00	2.50	4243	19616
00	2.55	42430	107,300
000	2.59	424,300	1,079,000
1	1.56	8	4.7
2	1.78	6	10.7
4	1.93	12	23.2
0	2.07	30	62
0	2.30	300	690
00	2.43	3000	7290
00	2.50	30000	75000
0	2.56	300,000	768,000
0	4.9	42.5	2.08
5	1.34	10.6	14.8
1	1.64	21.2	34.8
0	2.10	21.2	44.5
0	2.31	2123	4904
0	2.43	21,280	61,590
0	2.51	219,300	539,900
0	97	17.3	16.8
0	1.43	34.6	49.5
0	1.70	69.2	118
0	1.91	173	330
0	2.21	1730	3823
0	2.37	17300	41,000
0	2.47	173,000	427,300
0	2.4	10.4	2.5

~~SECRET~~

Correction: Increase speed of dust rise to cloud;
decrease overall dust effect by lowering constant.

① ... enters the fireball at three times the

② ... if it enters after the center of the circle more than four radii above the surface

For ① - r

$$R_1 = 6R'$$

$$w_0 = 0 \text{ ct}$$

$$\frac{4R_f - k}{V_f} = \frac{R_2 + 4R_f}{2V_f}$$

$$3(4R_f - h) = R_2 + 4R_f$$

~~BEST AVAILABLE COPY~~ $12R_f - 3h = 12z + 4R_f$

$$R_2 = 12R_f - 3L - 4R_f$$

$$R_2 = 8 R_f - 36$$

$$W_D = 0 \text{ at } h = 2R_f \quad (h = R_2)$$

For

$$R_2 = 4 \Omega$$

Try:

$$W_D (mc) = \frac{300W}{\sqrt{h}} \left[2.67 - 2 \left(\frac{h}{R_2} \right)^{1/2} - 0.67 \left(\frac{h}{R_2} \right)^{LLNL} \right]$$

errors are: underestimate of dust effect for high heights, overestimate of low scaled burst heights.

∴ Increase speed of dust rise to cloud; possibly overall dust effect by lowering constant.

60: page 6, assumption (3): change to:

... enters the fireball at three times the speed ...

... if it enters after the center of the fireball is more than four radii above the surface.

tion of R_2 :

For ① only:

$$t_f = \frac{4R_f - h}{v_f}$$

$$\max t_D = \frac{R_2 + 4R_f}{3v_f}$$

$$R_2 = 6R_f - h$$

$$W_D = 0 \text{ at } h = 3R_f$$

$$= t_D \quad \frac{4R_f - h}{v_f} = \frac{R_2 + 4R_f}{3v_f}$$

$$3(4R_f - h) = R_2 + 4R_f$$

$$12R_f - 3h = R_2 + 4R_f$$

$$R_2 = 12R_f - 3h - 4R_f$$

$$R_2 = 8R_f - 3h$$

$$W_D = 0 \text{ at } h = 2R_f \quad (h = R_2)$$

For ② only, not ①:

$$R_2 = 4R_f - 2h \\ = 2(2R_f - h)$$

LLNL

$$(MC) = \frac{3CCW}{\sqrt{h}} \left[2.67 - 2 \left(\frac{h}{R_2} \right)^{1/2} - 0.67 \left(\frac{h}{R_2} \right)^{1/2} \right]$$

BEST AVAILABLE COPY

BEST AVAILABLE COPY														
h	w	Rf	Bf	Bh	R ₂	1/2	(1/2)	(1/2)	2(1/2)	67(1/2)	LLNL	2.67	252	300
400	1.5	211	1688	1200	488	.820	.905	.742	1.81	.50	.36	.36	22.5	22.5
	3	265	2120	↓	920	.435	.659	.287	1.32	.19	.114	1.59	45	45
	7	352	2816	↓	1614	.248	.499	.124	1.08	.08	1.59	1.77	105	105
	10		3176		1976	.202	.449	.091	.90	.06	1.77	1.91	150	150
	20	500	4000		2800	.143	.378	.054	.76	.04	1.91	2.13	300	300
	100		6882		5632	.071	.266	.019	.53	.01	2.13	2.32	1500	1500
	1000		14,720		13,520	.030	.173	.005	.35	—	2.32	2.44	15,000	15,000
	10,000		31,720		30,520	.013	.114	—	.23	—	2.44	40	40.2	40.2
500	3		2120	1500	620	.806	.896	.722	1.79	.48	40	40	40.2	40.2
	5	315	2520	↓	1020	.480	.700	.343	1.40	.23	1.04	1.28	67.0	67.0
	7		2816		1316	.380	.616	.234	1.23	.16	1.28	1.47	93.7	93.7
	10		3176		1676	.298	.546	.163	1.09	.11	1.47	1.61	134	134
	100		6882		5332	.094	.306	.029	.61	.02	1.61	2.04	1339	1339
	1000		14,720		13,220	.038	.195	.007	.39	—	2.04	2.28	13,390	13,390
	10,000		31,720		30,220	.017	.130	.002	.26	—	2.28	2.41	13,390	13,390
600	4.5	304	2432	1800	632	.949	.923	.923	1.95	.62	10	10	55.1	55.1
	7		2816	↓	1016	.591	.769	.454	1.54	.30	.83	.83	85.7	85.7
	10		3176		1576	.436	.660	.288	1.32	.19	1.16	1.16	122	122
	20		4000		2200	.273	.522	.143	1.04	.10	1.53	1.53	245	245
	100		6882		5032	.149	.345	.041	.69	.03	1.95	1.95	1224	1224
	1000		14,720		12,920	.046	.214	.010	.43	.01	2.23	2.39	1234	1234
	10,000		31,720		29,920	.020	.141	.003	.28	—	2.39	2.44	1234	1234
700	7		2816	2100	716	.978	.989	.967	1.98	.65	.44	.44	79.5	79.5
	10		3176	↓	1076	.651	.807	.525	1.61	.35	.71	.71	114	114
	30	571	4568		2468	.284	.533	.151	1.07	.10	1.50	1.50	341	341
	60	720	5760		3660	.191	.437	.083	.87	.06	1.74	1.74	682	682
	100		6832		4732	.148	.384	.057	.77	.04	1.86	1.86	1136	1136
	1000		14,720		12,620	.055	.234	.013	.47	.01	2.19	2.19	1136	1136
	10,000		31,720		29,620	.024	.155	.004	.31	—	2.36	2.36	1136	1136

RF	BAC	BH	R2	1/2	(1/2)	(1/2)	2(1/2)	67(1/2)	2.67	300	11
211	1688	1200	488	.820	.925	.742	1.81	.50	.36	22.5	8.1
265	2120	920	920	.435	.659	.287	1.32	.19	1.16	45.7	52.2
352	2816	1616	1616	.248	.499	.124	1.00	.08	1.59	105.7	167
	3176	1976	1976	.202	.449	.091	.90	.06	1.77	150	266
500	4000	2800	2800	.143	.378	.054	.76	.04	1.91	300	573
	6882	5632	5632	.071	.266	.019	.53	.01	2.13	1500	3195
	14720	13520	13520	.030	.173	.005	.35	-	2.32	15000	34800
	31720	30520	30520	.013	.114	-	.23	-	2.44	150000	346000
315	2120	1508	620	.806	.896	.722	1.79	.48	4.0	40.1	16.1
	2520	1020	1020	.490	.700	.343	1.40	.23	1.04	67.0	70
	2816	1316	1316	.380	.616	.234	1.23	.16	1.28	93.7	120
	3176	1676	1676	.298	.546	.163	1.09	.11	1.47	134	197
	6832	5332	5332	.094	.306	.029	.61	.02	1.04	1339	2732
	14720	13220	13220	.038	.195	.007	.39	-	2.04	13390	30530
	31720	30220	30220	.017	.130	.002	.26	-	2.28	133900	323700
304	2432	1800	632	.949	.923	.923	1.95	.62	1.10	55.1	5.5
	2816	1016	1016	.591	.769	.454	1.54	.30	.83	85.7	71.1
	3176	1576	1576	.436	.660	.288	1.32	.19	1.16	122	142
	4000	2200	2200	.273	.522	.143	1.04	.10	1.53	245	375
	6882	5032	5032	.119	.345	.041	.69	.03	1.95	1224	2387
	14720	13220	13220	.046	.244	.010	.43	.01	2.23	12240	23300
	31720	29220	29220	.020	.141	.003	.28	-	2.39	123400	293500
	2816	2100	716	.978	.989	.967	1.98	.65	.04	79.5	3.2
	3176	1076	1076	.651	.807	.525	1.61	.35	.71	114	81
571	4568	2468	2468	.284	.533	.151	1.07	.10	1.50	341	512
720	5760	3660	3660	.191	.437	.083	.87	.06	1.74	682	1187
	6832	4732	4732	.148	.384	.057	.77	.04	1.86	1136	2113
	14720	13620	13620	.055	.234	.013	.47	.01	2.19	11360	24880
	31720	29620	29620	.024	.155	.004	.31	-	2.36	113600	262100

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2.67	300	11
.36	22.5	8.1
1.16	45.7	52.2
1.59	105.7	167
1.77	150	266
1.91	300	573
2.13	1500	3195
2.32	15000	34800
2.44	150000	346000
4.0	40.1	16.1
1.04	67.0	70
1.28	93.7	120
1.47	134	197
2.04	1339	2732
2.28	13390	30530
2.41	133900	323700
1.10	55.1	5.5
.83	85.7	71.1
1.16	122	142
1.53	245	375
1.95	1224	2387
2.23	12240	23300
2.39	123400	293500
.04	79.5	3.2
.71	114	81
1.50	341	512
1.74	682	1187
1.86	1136	2113
2.19	11360	24880
2.36	113600	262100

h	u	R ₁	8 R ₁	3L	R ₂	1/R ₂	(1/R ₂) ^{1/2}	(1/R ₂) ^{1/4}	2(1/R ₂) ^{1/4}	.67(1/R ₂) ^{1/4}	LN L	E	E ₀
4600	1400	2060	16,480	13,000	4480	.993	.945	.844	1.89	.57		.21	6450
2	3000	2660	21,280	↓	9280	.431	.656	.283	1.31	.19		1.17	14,250
	5000	3140	25,120		13,120	.305	.552	.168	1.10	.11		1.46	23,750
	10,000		31,720		19,720	.203	.450	.091	1.90	.06		1.71	47,500
	20,000	5000	40,000		28,000	.143	.378	.054	.76	.05		1.86	95,000
	100,000		68,320		56,320	.071	.266	.019	.53	.01		2.13	475,000
5000	2600	2530	29,340	15,000	5240	.954	.976	.93	1.95	.62		.10	14,050
	3000		21,280	↓	6280	.796	.892	.710	1.78	.48		.41	12,750
	5000		25,120		10,120	.494	.703	.347	1.44	.23		1.03	21,250
	10,000		31,720		16,720	.299	.547	.164	1.09	.11		1.47	43,500
	20,000		40,000		25,000	.200	.447	.089	.89	.06		1.72	85,000
	100,000		68,320		53,320	.094	.306	.029	.61	.02		2.04	425,000
6000	4400	3010	24,080	18,000	6080	.987	.993	.980	1.99	.66		.02	12,072
	5000		25,120	↓	7120	.843	.918	.774	1.84	.52		.31	19,400
	10,000		31,720		10,160	.591	.769	.454	1.54	.30		.83	27,160
	20,000		40,000		13,720	.487	.661	.289	1.32	.19		1.16	38,800
	50,000		54,040		23,000	.273	.522	.143	1.04	.10		1.53	72,600
	100,000		68,320		36,240	.166	.407	.068	.81	.05		1.81	194,000
2000	1000	6780	8,320		50,320	.119	.345	.041	.69	.03		1.95	389,000
	2000		21,000	↓	7160	.978	.988	.966	1.98	.65		.04	25,130
	10,000		31,720		10,720	.653	.808	.528	1.62	.35		.70	35,900
	20,000		40,000		19,000	.368	.606	.223	1.21	.15		1.31	71,800
	50,000		54,240		33,240	.211	.458	.097	.92	.09		1.66	179,500
	100,000		68,320		47,320	.148	.384	.057	.77	.04		1.86	359,000
3000	18300	4010	32,080	24,000	8680	.990	.995	.985	1.99	.66		.02	34,610
	20,000		40,000	↓	16,000	.500	.707	.354	1.41	.24		1.02	67,200
	50,000		54,240		30,240	.205	.514	.136	1.03	.09		1.55	168,000
	100,000		68,320		44,320	.181	.405	.077	.85	.05		1.67	235,200
4000	15,000	4530	36,240	28,000	9240	.974	.987	.961	1.97	.64		1.77	336,000
	20,000		45,680	↓	18,000	.912	.94	.935	1.94	.64		1.77	336,000

R ₁	S ₁	3L	R ₂	A/R ₂	(1/R ₂) ^{1/2}	(1/R ₂) ^{1/4}	2(1/R ₂) ^{1/2}	67(1/R ₂) ^{1/4}	1/R ₂	E	E ²	Σ	T
2060	16,480	13,000	4480	.893	.945	.844	1.89	.57	.21	6450	1396	1396	1396
2460	21,280	9280		.431	.656	.283	1.31	.19	1.17	14,250	14,740	14,740	14,740
3140	25,120	13,120		.305	.552	.168	1.10	.11	1.46	23,750	34,700	34,700	34,700
5000	31,720	19,720		.203	.450	.091	.90	.06	1.71	47,500	81,200	81,200	81,200
2530	40,000	28,000		.143	.378	.054	.76	.05	1.86	95,000	126,700	126,700	126,700
	68,380	56,320		.071	.246	.019	.53	.01	2.13	475,000	1013,000	1013,000	1013,000
	29,240	15,000		.754	.976	.931	1.95	.62	.10	11,050	11,050	11,050	11,050
	21,280	6280		.796	.892	.710	1.78	.48	.41	18,750	5230	5230	5230
	25,120	10,120		.494	.703	.347	1.44	.23	1.03	21,250	21,900	21,900	21,900
	31,720	16,720		.299	.547	.164	1.09	.11	1.47	43,500	63,500	63,500	63,500
	49,000	25,000		.200	.447	.089	.89	.06	1.72	85,000	146,200	146,200	146,200
	68,320	53,320		.094	.306	.029	.61	.02	2.04	425,000	867,000	867,000	867,000
3010	24,080	18,000		.987	.993	.980	1.99	.66	.02	17,072	341	341	341
	25,120	7120		.843	.918	.774	1.84	.52	.31	19,428	6014	6014	6014
3520	28,160	10,160		.591	.769	.454	1.54	.30	.83	27,160	23,500	23,500	23,500
	31,720	13,720		.487	.661	.289	1.32	.19	1.16	38,800	45,000	45,000	45,000
	49,000	23,000		.273	.522	.143	1.04	.10	1.53	72,600	119,000	119,000	119,000
6780	54,240	36,240		.166	.407	.068	.81	.05	1.81	194,000	351,000	351,000	351,000
	68,320	50,320		.119	.345	.041	.69	.03	1.95	388,000	757,000	757,000	757,000
	28,160	21,000		.978	.988	.966	1.98	.65	.04	25,130	1045	1045	1045
	31,720	10,720		.653	.808	.528	1.62	.35	.70	35,900	25,130	25,130	25,130
	49,000	19,000		.368	.606	.223	1.21	.15	1.31	71,800	94,460	94,460	94,460
	54,240	33,240		.211	.458	.097	.92	.09	1.66	179,500	298,000	298,000	298,000
4010	68,320	47,320		.148	.384	.057	.77	.04	1.86	358,000	668,000	668,000	668,000
	32,080	24,000		.990	.995	.985	1.99	.66	.02	34,610	692	692	692
	40,000	16,000		.500	.707	.354	1.41	.24	1.02	67,200	68,500	68,500	68,500
	54,240	30,240		.265	.514	.136	1.03	.09	1.55	168,000	260,400	260,400	260,400
2580	60,640	36,640		.218	.467	.102	.93	.07	1.47	235,200	393,000	393,000	393,000
	68,320	44,320		.181	.425	.077	.85	.05	1.77	336,000	595,000	595,000	595,000
1530	76,240	27,000		.974	.987	.961	1.97	.64	.06	47,400	2844	2844	2844

5000	140,000	2600	2530	29,240	15,000	5240	701	240	011	53	01	415,000	10	415,000	10
	3400	21,280		21,280	↓	6280	796	892	710	1178	48	10	41	10,750	1
	5000	25,120		25,120		10,120	494	703	347	144	23	103	26,250	2	2
	10,000	31,720		31,720		16,720	299	547	164	109	11	147	43,500	6	6
	20,000	41,000		41,000		25,000	200	447	089	89	46	85,000	14	85,000	14
	100,000	68,320		68,320		53,320	094	306	029	61	02	425,000	8	425,000	8
6000	4400	3010		44,080	18,000	6080	987	993	980	199	66	17,072		17,072	
	5000	3530		25,120	↓	7120	843	918	774	184	52	19,408		19,408	
	10,000	31,720		13,720		13,720	487	769	454	154	30	27,160		27,160	
	19,000	40,000		22,000		36,240	273	522	143	104	19	38,800		38,800	
	53,000	54,240		36,240		50,320	146	407	068	81	04	194,000		194,000	
	100,000	68,320		50,320		7160	119	345	041	69	00	308,000		308,000	
1000	7000	21,000		88160	↓	10,720	978	988	966	198	66	25,130		25,130	
	10,000	31,720		19,000		33,240	653	808	528	162	30	35,900		35,900	
	20,000	49,000		53,240		47,320	368	696	225	121	15	71,840		71,840	
	50,000	54,240		47,320		148	211	458	097	92	09	179,500		179,500	
	100,000	68,320		47,320		148	148	384	057	77	04	358,000		358,000	
1000	12,340	4010		32,080	24,000	8880	990	995	985	199	66	34,610		34,610	
	20,000	40,000		16,000	↓	30,240	500	707	354	141	24	67,200		67,200	
	50,000	54,240		30,240		36,440	265	514	136	103	09	68,000		68,000	
	70,000	7580		60,640		44,320	218	467	102	93	07	235,200		235,200	
	100,000	68,320		44,320		9240	181	425	077	85	05	334,000		334,000	
1000	15,000	4530		36,240	28,000	9240	974	987	961	197	64	47,400		47,400	
	30,000	5710		45,680	↓	18,680	482	604	335	139	22	94,800		94,800	
	50,000	54,240		27,240		33,640	330	574	189	115	13	158,000		158,000	
	70,000	60,640		41,820		41,820	268	517	139	103	09	221,200		221,200	
	100,000	68,320		10,320		10,320	218	467	102	93	07	316,000		316,000	
0000	20,500	5040		49,820	34,000	10,320	969	983	953	147	06	61,500		61,500	
	30,000	45,680		15,680	↓	15,680	638	799	510	140	34	90,000		90,000	
	50,000	54,240		24,240		24,240	413	442	265	128	18	150,000		150,000	

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LLNL

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2530	29340	15000	5340	1.754	.976	.93	1.95	.62	.10	1.050	1.05
	31,290	2	6290	.796	.892	.710	1.78	.48	.41	1.8750	5230
	25,120		10,120	.494	.703	.347	1.44	.23	1.03	21,250	21,900
	31,720		16,720	.299	.547	.164	1.09	.11	1.47	43,500	64,500
	49,000		25,000	.200	.447	.089	.89	.46	1.72	85,400	146,200
	68,320		53,320	.094	.306	.029	.61	.02	2.04	425,100	867,000
3010	24,080	18,000	6080	.987	.993	.980	1.99	.66	.02	17,072	341
	25,120	2	7120	.843	.918	.774	1.84	.52	.31	19,448	6014
	31,720		13,720	.487	.661	.289	1.32	.19	.83	27,160	23,500
	49,000		22,000	.273	.522	.143	1.04	.10	1.53	38,800	45,000
	68,320		36,240	.166	.407	.068	.81	.05	1.88	194,400	351,000
6780	54,240		30,320	.119	.345	.041	.69	.03	1.92	389,000	757,000
	28,160	21,000	7160	.978	.988	.966	1.98	.65	.04	25,130	1005
	31,720	2	19,720	.653	.808	.528	1.62	.35	.70	35,900	25,130
	49,000		19,000	.368	.606	.223	1.21	.15	1.31	71,800	94,460
	54,240		33,240	.211	.458	.097	.92	.09	1.66	179,500	298,000
	68,320		47,320	.148	.384	.057	.77	.04	1.86	358,000	648,000
4010	32,080	24,000	8080	.990	.995	.985	1.99	.66	.02	34,610	692
	49,000	2	16,000	.500	.707	.354	1.41	.24	1.02	67,200	68,500
	54,240		30,240	.265	.514	.136	1.03	.09	1.58	168,000	260,400
	60,640		36,640	.218	.467	.102	.93	.07	1.67	235,200	393,000
	68,320		44,320	.181	.425	.077	.85	.05	1.77	336,000	585,000
7580	60,640		36,640	.218	.467	.102	.93	.07	1.67	235,200	393,000
	68,320		44,320	.181	.425	.077	.85	.05	1.77	336,000	585,000
4530	36,240	22,000	9240	.974	.987	.961	1.97	.64	.06	42,400	2844
	45,680	2	18,680	.482	.694	.335	1.39	.22	1.06	94,800	104,500
	54,240		27,240	.330	.574	.189	1.15	.13	1.39	158,000	229,000
	60,640		33,640	.268	.517	.139	1.03	.09	1.55	221,200	343,000
	68,320		41,320	.218	.467	.102	.93	.07	1.67	316,000	528,000
5040	49,220	39,000	10,220	.969	.983	.953	1.97	.64	.06	61,500	3490
	45,680	2	15,680	.638	.799	.510	1.40	.34	.73	90,000	65700
	54,240		24,240	.413	.642	.265	1.28	.18	1.21	159,000	191,500

BEST AVAILABLE COPY

LN7

Try pressure goes as $\frac{1}{R^3}$

$$W_3 = k_1 \int_{\phi=0}^{2\pi} \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{k_2 W (1 + \cos \theta) (R^2 - h^2)^{1/2}}{R^3 \cos \theta} R d\theta d\phi$$

$$= \left[\right] \frac{k_2 W (1 + \cos \theta) (R^2 - h^2)^{1/2}}{R^2 \cos \theta} d\theta$$

$$= k_2 W \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{(1 + \cos \theta) (R^2 - h^2)^{1/2}}{\cos \theta R^4} d\theta d\phi$$

$$= k_2 W \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{(1 + \sec \theta) (1 - \cos^2 \theta)^{1/2}}{R} d\theta$$

$$= k_2 W \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{(1 + \sec \theta) \cos \theta (1 - \cos^2 \theta)^{1/2}}{h} d\theta$$

$$= k_2 W \left[\int \left(\frac{\cos \theta}{h} + \frac{1}{h} \right) \sin \theta d\theta \right]$$

BEST AVAILABLE COPY

$$\cos \theta = \frac{h}{R} \quad -\sin \theta d\theta = -\frac{h}{R^2} dR$$

$$\theta = \cos^{-1} \frac{h}{R}$$

$$= k_2 W \int_h^{R_2} \left(\frac{1}{R} + \frac{1}{h} \right) \frac{h}{R^2} dR$$

$$= \frac{k_2 W h}{h} \int_h^{R_2} \frac{1}{R^3} dR + k_2 W \int_h^{R_2} \frac{1}{R^2} dR$$

$$= \frac{k_2 W h}{2} \left[\frac{1}{R^2} \right]_h^{R_2} + k_2 W \left[-\frac{1}{R} \right]_h^{R_2}$$

Try pressure goes as $\frac{1}{R^3}$.

$$W_3 = k_3 \int_{\phi=0}^{2\pi} \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{k_3 W (1 + \cos \theta) (R^2 - h^2)^{1/2}}{R^3 \cos \theta} R d\theta d\phi$$

$$= \left[\right] \frac{k_3 W (1 + \cos \theta) (R^2 - h^2)^{1/2}}{R^2 \cos \theta} d\theta d\phi$$

$$= k_3 W \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{(1 + \cos \theta)}{\cos \theta} \left(\frac{R^2 - h^2}{R^4} \right)^{1/2} d\theta d\phi$$

$$= k_3 W \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{(1 + \sec \theta)}{R} (1 - \cos^2 \theta)^{1/2} d\theta$$

$$= k_3 W \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{(1 + \sec \theta) \cos \theta}{h} (1 - \cos^2 \theta)^{1/2} d\theta$$

BEST AVAILABLE COPY

$$= k_3 W \left[\int \left(\frac{\cos \theta}{h} + \frac{1}{h} \right) \sin \theta d\theta \right]$$

$$\cos \theta = \frac{h}{R} \quad -\sin \theta d\theta = -\frac{h}{R^2} dR$$

$$\theta = \cos^{-1} \frac{h}{R}$$

$$= k_3 W \int_h^{R_2} \left(\frac{1}{R} + \frac{1}{h} \right) \frac{h}{R^2} dR$$

$$= \frac{k_3 W h}{h} \int_h^{R_2} \frac{1}{R^3} dR + k_3 W \int_h^{R_2} \frac{1}{R^2} dR$$

$$= \frac{k_3 W h}{2} \left[-\frac{1}{R^2} \right]_h^{R_2} + k_3 W \left[-\frac{1}{R} \right]_h^{R_2}$$

LLNL

$$R^2 \cos \theta$$

$$= \left[\frac{K_3 W (1 + \cos \theta) (R^2 - h^2)^{1/2}}{R^2 \cos \theta} \right] d\theta$$

$$= K_3 W \int_0^{\cos^{-1} \frac{h}{R_2}} \frac{(1 + \cos \theta)}{\cos \theta} \left(\frac{R^2 - h^2}{R^4} \right)^{1/2} d\theta d\theta$$

$$= K_3 W \int_0^{\cos^{-1} \frac{h}{R_2}} \frac{(1 + \sec \theta)}{R} (1 - \cos^2 \theta)^{1/2} d\theta$$

$$= K_3 W \int_0^{\cos^{-1} \frac{h}{R_2}} (1 + \sec \theta) \cos \theta (1 - \cos^2 \theta)^{1/2} d\theta$$

$$= K_3 W \left[\int \left(\frac{\cos \theta}{h} + \frac{1}{h} \right) \sin \theta d\theta \right]$$

$$\cos \theta = \frac{h}{R} \quad -\sin \theta d\theta = -\frac{h}{R^2} dR$$

$$\theta = \cos^{-1} \frac{h}{R}$$

BEST AVAILABLE COPY

$$= K_3 W \int_h^{R_2} \left(\frac{1}{R} + \frac{1}{h} \right) \frac{h}{R^2} dR$$

$$= \frac{K_3 W h}{h} \int_h^{R_2} \frac{1}{R^3} dR + K_3 W \int_h^{R_2} \frac{1}{R^2} dR$$

LLNL

$$= \frac{K_3 W h}{2} \left[\frac{1}{R^2} \right]_h^{R_2} + K_3 W \left[-\frac{1}{R} \right]_h^{R_2}$$

$$= h K_3 W \left[\frac{1}{h^2} - \frac{1}{R_2^2} \right] + K_3 W \left[\frac{1}{h} - \frac{1}{R_2} \right]$$

55
282

$$q=0 \quad \theta=0 \quad R^2 \cos \theta$$

$$= \left[\frac{k_3 W (1 + \cos \theta) (R^2 - h^2)^{1/2}}{R^2 \cos \theta} d\theta dR \right]$$

$$= k_3 W \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{(1 + \cos \theta)}{\cos \theta} \left(\frac{R^2 - h^2}{R^4} \right)^{1/2} d\theta dR$$

$$= k_3 W \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{(1 + \sec \theta)}{R} (1 - \cos^2 \theta)^{1/2} d\theta$$

$$= k_3 W \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{(1 + \sec \theta) \cos \theta}{h} (1 - \cos^2 \theta)^{1/2} d\theta$$

$$= k_3 W \left[\int \left(\frac{\cos \theta}{h} + \frac{1}{h} \right) \sin \theta d\theta \right]$$

$$\cos \theta = \frac{h}{R} \quad -\sin \theta d\theta = -\frac{h}{R^2} dR$$

$$\theta = \cos^{-1} \frac{h}{R}$$

$$= k_3 W \int_h^{R_2} \left(\frac{1}{R} + \frac{1}{h} \right) \frac{h}{R^2} dR$$

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$$= \frac{k_3 W h}{h} \int_h^{R_2} \frac{1}{R^3} dR + k_3 W \int_h^{R_2} \frac{1}{R^2} dR$$

$$= \frac{k_3 W h}{2} \left[\frac{1}{R^2} \right]_h^{R_2} + k_3 W \left[-\frac{1}{R} \right]_h^{R_2}$$

LLNL

$$= h k_3 W \left[\frac{1}{h^2} - \frac{1}{R_2^2} \right] + k_3 W \left[\frac{1}{h} - \frac{1}{R_2} \right]$$

$$W_D = K_3 W \left(\frac{1}{h} - \frac{h}{R_2^2} + \frac{1}{h} - \frac{1}{R_2} \right)$$

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$$= K_3 W \left(\frac{2}{h} - \frac{h}{R_2^2} - \frac{1}{R_2} \right)$$

$$R_2 = 8R_f - 3h$$

$$W_D = K_3 W \left[\frac{2}{h} - \frac{h}{64R_f^2 - 48R_f h + 9h^2} - \frac{1}{8R_f - 3h} \right]$$

$$= K_3 W \left(\frac{2R_2^2 - h^2 - hR_2}{hR_2^2} \right)$$

$$= K_3 W \left(\frac{2R_2^2 - hR_2 - h^2}{hR_2^2} \right)$$

$$= \frac{K_3 W}{h} \left(2 - \left(\frac{h}{R_2} \right)^2 - \frac{h}{R_2} \right)$$

For

$$R_2 = 4R_f - 2h$$

$$W_D = 0: R_2 = h:$$

$$h = 4R_f - 2h$$

$$3h = 4R_f$$

$$R_f = \frac{3}{4}h$$

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L	W	R _s	$\frac{h}{R_s}$	$(\frac{h}{R_s})^2$	2-ε	$\frac{w}{h}$	π	mc
500	3	620	.806	.650	.544	.006	.003	15
	5	1020	.490	.240	1.270	.010	.013	65
	7	1316	.380	.144	1.476	.014	.021	105
	10	1676	.298	.089	1.610	.020	.032	160
	30	3076	.163	.027	1.810	.060	.109	545
	100	5332	.094	.009	1.897	.200	.379	1895

b	W	$\frac{h}{R_s}$	$(\frac{h}{R_s})^2$	2-ε	$5 \frac{W}{h} \times 10^3 = \frac{mc}{h}$	
300	1	.524	.275	1.20	16.7	20
↓	2	.314	.099	1.59	33.3	53
	4	.209	.044	1.75	66.7	117
	10	.132	.017	1.85	167	309
	100	.051	.003	1.95	1670	3256
	.6	.880	.774	.35	10	3.5

For $R_e = 4R_s - 2h$:

h
500

9

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Assume that the effectiveness of the dust is dependent upon of entry into the fireball and the time-temperature history of fireball:

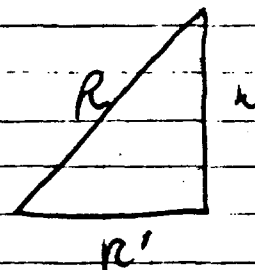
time to fireball $t = \frac{R' + h}{3 v_f} + x$ where $x = \frac{v_f}{\text{fireball same to}}$

$$\frac{R' + h + v_f t}{3 v_f} = t$$

$$3 v_f t - v_f t = R' + h$$

$$2 v_f t = R' + h$$

$$t = \frac{R' + h}{2 v_f}$$



LLNL

Assume $v_f \sim w^{1/2}$ since rate of rise should proportion temp. history of the fireball: time at a guess roughly as $w^{1/2}$

R_0	$(\frac{1}{R_0})$	$2-\epsilon$	W/h	π	M_c
.806	.650	.544	.006	.003	15
.490	.240	1.270	.010	.013	65
.380	.144	1.476	.014	.021	105
.298	.089	1.610	.020	.032	160
.163	.027	1.810	.060	.109	545
.094	.009	1.897	.200	.379	1895

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$(\frac{1}{R_0})$	$2-\epsilon$	$5 \frac{W}{h} \times 10^3 = \frac{M_c}{\pi}$	
.275	1.20	16.7	20
.099	1.59	33.3	53
.044	1.75	66.7	117
.017	1.85	167	309
.003	1.95	1670	3256
.774	.35	10	3.5

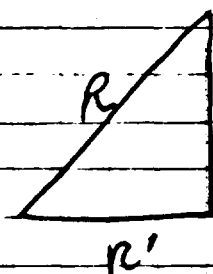
4 Rs - 2h:

the effectiveness of the dust is dependent upon its time the fireball and the time-temperature history of the

fireball $t = \frac{R' + h}{\frac{1}{2} V_f} + x$ where $x = \frac{V_f t}{2}$, the fireball rise in same time.

$$\frac{V_f t}{2} = t$$

$$t = R' + h$$



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$$R' + h$$

$$R' + h$$

$$\frac{R' + h}{2 V_f}$$

286

$\sim W^{1/2}$ since rate of rise should be proportional to the temp. history of the fireball; time at a given Temp goes roughly as $W^{1/2}$

10	1676	.298	.009	1.610	.020	.032	160
30	3076	.163	.027	1.810	.060	.109	545
100	5332	.094	.009	1.897	.200	.379	1895

h	W	$\frac{h}{R_s}$	$()^2$	$2-z$	$5 \frac{W}{h} \times 10^3 = \frac{mc}{h}$
300	1	.524	.275	1.20	16.7 20
↓	2	.314	.099	1.59	33.3 53
	4	.209	.044	1.75	66.7 117
	10	.132	.017	1.85	167 309
	100	.051	.003	1.95	1670 3256
	.6	.880	.774	.35	10 3.5

For $R_s = 4 R_f - 2h$:

h	W
500	9

Assume that the effectiveness of the dust is dependent upon
of entry into the fireball and the time-temperature history of
fireball:

time to fireball $t = \frac{R' + h}{3 v_f} + x$ where $x =$ $\frac{v}{\text{fireball}}$
same t

$$\frac{R' + h + v_f t}{3 v_f} = t$$

$$3 v_f t - v_f t = R' + h$$

$$2 v_f t = R' + h$$

$$t = \frac{R' + h}{2 v_f}$$

BEST AVAILABLE COPY

LLNL

Assume $v_f \sim W^{1/2}$ since rate of rise should proportion
temp. history of the fireball: time at a g
goes roughly as $W^{1/2}$

$$\text{Then } t \sim \frac{1}{2} \frac{R' + h}{W^{1/2}} \sim \frac{R' + h}{W^{1/2}}$$

Assume that $dW_D \sim \frac{\text{Total force (as before)}}{r_R}$

$$\text{Then } W_D = k \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{W}{R^3} \frac{(1+\cos \theta)(R^2-h^2)^{1/2}}{\cos \theta} R \frac{W^{1/2}}{(R+h)}$$

$$d\theta = \frac{h}{R^2 \sin \theta} dR$$

$$= \frac{h}{R^2} \times \frac{R}{(R^2-h^2)^{1/2}}$$

$$\sin \theta = \frac{(1-\cos^2 \theta)^{1/2}}{R} = \frac{(R^2-h^2)^{1/2}}{R}$$

$$= \frac{h}{R(R^2-h^2)^{1/2}}$$

$$R' = (R^2-h^2)^{1/2}$$

Then

$$W_D = k \int_{R=h}^{R_2} \frac{W}{R^3} \frac{(1+\cos \theta)(R^2-h^2)^{1/2}}{\cos \theta} R \frac{W^{1/2}}{R(R^2-h^2)^{1/2}}$$

$$= k W^{3/2} \int_{R=h}^{R_2} \frac{h(1+\cos \theta)}{R^3 \cos \theta (R^2-h^2)^{1/2} + h} dR$$

$$= k W^{3/2} h \int_h^{R_2} \frac{R + \frac{h}{R}}{R^3 (R^2-h^2)^{1/2} + h} dR$$

$$= k W^{3/2} \int_h^{R_2} \frac{R+h}{(R^2-h^2)^{1/2} + h} \frac{dR}{R^3}$$

$$= k W^{3/2} \int_h^{R_2} \frac{R+h}{[R+h)(R-h)]^{1/2} + h} \frac{dR}{R^3} \quad \text{LLNL}$$

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use that $dW_D \sim \frac{\text{Total force (as before)}}{t_R}$

$$W_D = k \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{W}{R^3} \frac{(1+\cos\theta)(R^2-h^2)^{1/2}}{\cos\theta} R \frac{W^{1/2}}{(R+h)} d\theta$$

$$= \frac{k}{R^2} \sin\theta dR \quad \sin\theta = \frac{(1-\cos^2\theta)^{1/2}}{1} = \left(1 - \frac{h^2}{R^2}\right)^{1/2}$$

$$= \frac{k}{R^2} \times \frac{R}{(R^2-h^2)^{1/2}}$$

$$= \frac{(R^2-h^2)^{1/2}}{R}$$

$$= \frac{k}{R(R^2-h^2)^{1/2}}$$

$$R' = (R^2-h^2)^{1/2}$$

$$= k \int_{R=h}^{R_2} \frac{W}{R^3} \frac{(1+\cos\theta)(R^2-h^2)^{1/2}}{\cos\theta} \frac{R W^{1/2} h}{R(R^2-h^2)^{1/2}} dR$$

$$k W^{3/2} \int_{R=h}^{R_2} \frac{h(1+\cos\theta)}{R^3 \cos\theta (R^2-h^2)^{1/2} + h} dR$$

$$= k W^{3/2} h \int_h^{R_2} \frac{\frac{R}{h} + \frac{1}{h}}{R^3 \left(\frac{R+h}{h} \right)} \frac{1}{(R^2-h^2)^{1/2} + h} dR$$

$$= k W^{3/2} \int_h^{R_2} \frac{R+h}{(R^2-h^2)^{1/2} + h} \frac{dR}{R^3}$$

$$= k W^{3/2} \int_h^{R_2} \frac{R+h}{[(R+h)(R-h)]^{1/2} + h} \frac{dR}{R^3}$$

LLNL

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4th

1000 ~~SECRET~~

	Sept.	Area
1 pt	10	3
	15	7
20 kt		3
1 pt	16	3
	20	3
1 pt		3
	24	
1 pt	20	7
50 T		7
	25	7
50 T		7
1 kt	25	7
	20	7
10 kt		7
	25	
10 kt		

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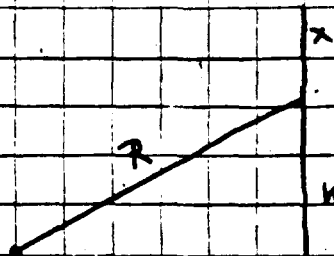
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LLNL

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Try:

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$$t = \frac{R+x}{3v_f} = \frac{R+v_f t}{3v_f}$$

$$3v_f t = R + v_f t$$

$$2v_f t = R$$

$$t = \frac{R}{2v_f}$$

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$$t \sim \frac{R}{2w^{1/2}} \sim \frac{R}{w^{1/2}}$$

Then

$$w_0 = k \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{w}{R^3} \frac{(1+\cos\theta)}{\cos\theta} (R^2 - h^2)^{1/2} \frac{R}{R} w^{1/2} d\theta$$

$$= kW \int_{\theta=0}^{\cos^{-1} \frac{h}{R_2}} \frac{1}{R^3} \frac{R+h}{R} \frac{1}{R} dR$$

$$= kW^{3/2} \int_h^{R_2} \frac{R+h}{R^4} dR = kW^{3/2} \int_h^{R_2} \left(\frac{1}{R^3} + \frac{h}{R^4} \right) dR$$

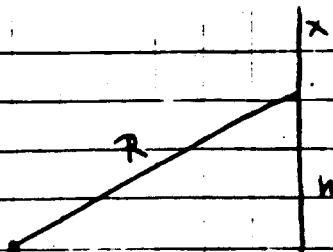
$$= kW^{3/2} \left[-\frac{1}{2R^2} \right]_h^{R_2} + kW^{3/2} h \left[-\frac{1}{3R^3} \right]_h^{R_2}$$

$$= kW^{3/2} \left[-\frac{1}{2R^2} \right]_h^{R_2} + h \left[-\frac{1}{3R^3} \right]_h^{R_2}$$

24:

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100



$$t = \frac{R+x}{3v_f} = \frac{R+u_f t}{3v_f}$$

$$3v_f t = R + u_f t$$

$$2v_f t = R$$

$$t = \frac{R}{2v_f}$$

$$t \sim \frac{R}{2w^{1/2}} \sim \frac{R}{w^{1/2}}$$

$$0 = k \int_{\theta=0}^{\cos^{-1} h/R} \frac{w}{R^3} \frac{(1+\cos\theta)}{\cos\theta} (R^2 - h^2)^{1/2} \frac{R}{R} \frac{h}{(R^2 - h^2)^{1/2}} dR$$

$$\theta=0$$

$$= kW \int_{\theta=0}^{\cos^{-1} h/R} \frac{1}{R^3} \frac{R+h}{h} \frac{1}{R} h dR$$

$$\theta=0$$

$$= kW^{3/2} \int_h^{R_2} \frac{R+h}{R^4} dR = kW^{3/2} \int_h^{R_2} \left(\frac{1}{R^3} + \frac{h}{R^4} \right) dR$$

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$$= kW^{3/2} \int_h^{R_2} \frac{1}{R^3} dR + kW^{3/2} h \int_h^{R_2} \frac{1}{R^4} dR$$

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$$= kW^{3/2} \left[-\frac{1}{2} \frac{1}{R^2} \right]_h^{R_2} + h \left[-\frac{1}{3} \frac{1}{R^3} \right]_h^{R_2}$$

$$t = \frac{R + x}{3v_f} = \frac{R + v_f t}{3v_f}$$

$$3v_f t = R + v_f t$$

$$2v_f t = R$$

$$t = \frac{R}{2v_f}$$

$$t \sim \frac{R}{2w^{1/2}} \sim \frac{R}{w^{1/2}}$$

Then

$$W_0 = k \int_{\theta=0}^{\cos^{-1} \frac{R_2}{h}} \frac{W}{R^3} \frac{(1+\cos\theta)}{\cos\theta} (R^2 - h^2)^{1/2} \frac{1}{R} w^{1/2} h$$

$$= kW \int_{\theta=0}^{\cos^{-1} \frac{R_2}{h}} \frac{1}{R^3} \frac{R+h}{h} \frac{1}{R} h dR$$

$$= kW^{3/2} \int_h^{R_2} \frac{R+h}{R^4} dR = kW^{3/2} \left[\frac{1}{3R^3} + \frac{h}{R^3} \right]_h^{R_2}$$

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$$= kW^{3/2} \int_h^{R_2} \frac{1}{R^3} dR + kW^{3/2} h \int_h^{R_2} \frac{1}{R^4} dR$$

$$= kW^{3/2} \left[-\frac{1}{2R^2} \right]_h^{R_2} + h \left[-\frac{1}{3R^3} \right]_h^{R_2}$$

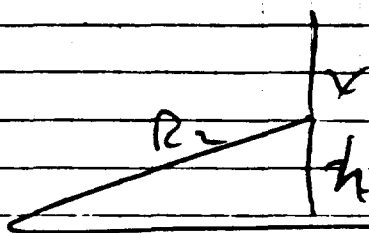
$$= kW^{3/2} \left[\frac{1}{2h^2} - \frac{1}{2R_2^2} \right] + h \left[\frac{1}{3h^3} - \frac{1}{3R_2^3} \right]$$

$$= kW_f^{3/2} \left[\frac{5}{6h^2} - \frac{1}{2R_2^2} - \frac{h}{3R_2^3} \right] \quad \text{[REDACTED]}$$

$$= \frac{kW_f^{3/2}}{h^2} \left[\frac{5}{6} - \frac{1}{2} \left(\frac{h}{R_2} \right)^2 - \frac{1}{3} \left(\frac{h}{R_2} \right)^3 \right]$$

$$R_2 = 6R_f \quad W_0 = 0 \quad \text{at} \quad h = 3x$$

~~Assumption ① page 97~~
~~Assumption ② " " "~~



Using P 97 Assumption

$$t = \frac{R_2 + x}{3W_f} = \frac{x}{W_f}$$

$$x + h = 4R_f$$

$$x = 4R_f - h$$

$$R_2 + x = 3x \quad \text{BEST AVAILABLE COPY}$$

$$R_2 = 2x = 2(4R_f - h) = 8R_f - 2h$$

$$W_0 = 0 \quad \text{at} \quad h = R_2: \quad 3h = 8R_f$$

$$h = \frac{8}{3}R_f$$

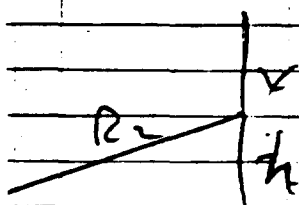
$$\text{Total } Mc = \frac{kW_f W_r^{3/2}}{h^2} \left[\frac{5}{6} - \frac{1}{2} \left(\frac{h}{R_2} \right)^2 - \frac{1}{3} \left(\frac{h}{R_2} \right)^3 \right] \quad \text{LLNL}$$

$$kW^{3/2} \left[\frac{5}{6h^2} - \frac{1}{2R_2} - \frac{h}{3R_2^3} \right] \quad \text{[REDACTED]}$$

$$\frac{kW^2}{h^2} \left[\frac{5}{6} - \frac{1}{2} \left(\frac{h}{R_2} \right)^2 - \frac{1}{3} \left(\frac{h}{R_2} \right)^3 \right] \quad (1)$$

$$R_2 = 6R_f \quad W_0 = 0 \quad \text{at} \quad h = 3R_f$$

Assumptions ① page 97
 And ② " " " "



Using P 97 Assumptions ① and ②

$$\frac{R_2 + x}{3W_f} = \frac{x}{W_f} \quad \Rightarrow \quad x + h = 4R_f$$

$$x = 4R_f - h$$

$$R_2 + x = 3x$$

$$R_2 = 2x = 2(4R_f - h) = 8R_f - 2h$$

BEST AVAILABLE COPY

$$W_0 = 0 \quad \text{at} \quad h = R_2: \quad 3h = 8R_f$$

LLNL

$$h = \frac{8}{3} R_f$$

$$c = \frac{kW_f W_r^{3/2}}{h^2} \left[\frac{5}{6} - \frac{1}{2} \left(\frac{h}{R_2} \right)^2 - \frac{1}{3} \left(\frac{h}{R_2} \right)^3 \right]$$

h	W	8R ₁	2h	R ₁	$\frac{1}{R_2}$	α^2	α^3	$.5\alpha^2$	$.33\alpha^3$	$.93 - \frac{1}{6}$	K
300	6	1240	600	640	.469	.220	.103	.11	.034	.686	1.989
	1	1472	↓	872	.344	.158	.041	.06	.014	.756	8.399
	2	1856		1256	.239	.057	.014	.03	.0046	.795	49.96
	4	2336		1736	.173	.030	.005	.015	.0017	.813	289.06
	10	3176		2576	.113	.013	.002	.0065	.0007	.823	2890
	100	6832		6232	.047	.002	-	.001	-	.829	82,900
1500	75	6208	3000	3208	.468	.219	.102	.110	.034	.686	23

$$Z_0 = K_1 - K_2 e^{-k_2 w_0} \quad \text{or} \quad K_1 (1 - e^{-k_2 w_0})$$

$$M_c = K_1 w (1 - e^{-k_2 w_0})$$

$$\begin{aligned} \text{for } w &= 52 \text{ kt}, & M_c &= 1585 \\ w &= 7 \text{ kt}, & M_c &= 121 \\ w &= 24.5 \text{ kt}, & M_c &= 687 \\ w &= 2.5 \text{ kt}, & M_c &= 42 \end{aligned}$$

$$K_1 = 200$$

$$M_c = 200 w (1 - e^{-K_2 w_0})$$

$$1585 = 200 \times 52 (1 - e^{-K_2 \cdot 200})$$

$$3.20008 = 4.01703 + 700 K_2 \quad \text{LLNL}$$

$$700 K_2 = - .817 \quad \text{BEST AVAILABLE COPY}$$

$$K_2 = - .00117 = - 1.17 \times 10^{-3}$$

$$\begin{aligned} \text{Tesla: } M_c &= 200 \times 7 (1 - e^{-1.17 \times 10^{-3} \times 170}) \\ &= 1400 (1 - e^{-.2}) = 1400 (1 - .8187) = 296 \end{aligned}$$

	ΔE	k_1	k_2	k_3	k_4	k_5	k_6	k_7	k_8	k_9
24	R ₁	$\frac{1}{k_1}$	$\frac{1}{k_2}$	$\frac{1}{k_3}$	$\frac{1}{k_4}$	$\frac{1}{k_5}$	$\frac{1}{k_6}$	$\frac{1}{k_7}$	$\frac{1}{k_8}$	$\frac{1}{k_9}$
300	640	.469	.220	.803	.411	.034	.6186	.6989	3.32	
↓	872	.344	.158	.044	.061	.014	.756	8.389	8.40	
	1256	.239	.057	.014	.03	.0046	.795	49.96	24.98	
	1736	.173	.030	.005	.015	.0017	.813	289.06	74.52	
	2576	.113	.013	.002	.0065	.0007	.823	2890	289.96	
	3232	.047	.002	-	.001	-	.829	82,900	829	
3000	3208	.468	.219	.102	.110	.034	.686	23	46	k_2

$$K_e \frac{w_0}{2} \approx K_1 (1 - e^{-K_2 w_0})$$

$$K_1 w (1 - e^{-K_2 w_0})$$

$$\begin{aligned} &= 52 K_1, & M_c &= 1585 \\ &= 7 K_1, & M_c &= 121 \\ &= 24.5 K_1, & M_c &= 687 \\ &= 2.5 K_1, & M_c &= 42 \end{aligned}$$

$$= 200$$

BEST AVAILABLE COPY

$$\begin{aligned} &200 w (1 - e^{-K_2 w_0}) \\ &200 \times 52 (1 - e^{-K_2 \cdot 200}) \\ &= 4.01703 + 700 K_2 \\ &= .817 \\ &w = .00117 = -1.17 \times 10^{-3} \end{aligned} \quad \left. \begin{array}{l} \text{OK} - 7 \\ \text{LLNL} \end{array} \right\}$$

$$\begin{aligned} 1c &= 200 \times 7 (1 - e^{-1.17 \times 10^{-3} \times 170}) \\ &= 1400 (1 - e^{-.2}) = 1400 (.18) = 252 \end{aligned} \quad 297$$

From page 109 with k_2 of page 106:~~SECRET~~ $\lambda =$

h	W	X_2	λ^2	$.5\lambda^2$	$1.5 - .25\lambda^2$	$+h$	$\sqrt{W}$	$W^{3/2}$	π
300	.6	.469	.220	.11	.92	.00807	.774	.48	.00141
	1	.344	.118	.06	1.10	.00387	1	1	.00367
	2	.239	.057	.03	1.23	.00410	1.41	2.82	.0116
	4	.173	.030	.015	1.32	.00440	2	8	.0352
	10	.114	.013	.006	1.37	.00457	3.16	31.6	.144
	100	.047	.002	.001	1.45	.00483	10	1000	4.23

 $\lambda = 300$

W	W_D	$\frac{W_D}{W_{0.52}}$	$\frac{M_{c, \text{max}}}{M_{c, 52}}$	$\frac{P_{TW}}{W_D}$	$\frac{P_{TW}}{W_D}$	$M_{c, \text{max}}$	$\frac{M_{TW}}{W_D}$
52	0.8	1	1	1	.050	1585	6340
24.5	.57	.312	.433	.464	.116	687	5922
7	.073	.0405	.076	.128	.032	121	3781
2.5	.017	.009	.026	.042	.0106	42	3962

$$M_c = K_1 W (1 - e^{-k_2 W_D})$$

$$\begin{aligned} 1585 &= K_1 52 (1 - e^{-k_2 6000}) \\ 687 &= K_1 24.5 (1 - e^{-k_2 1900}) \end{aligned}$$

$$2.31 = \frac{2.12 (1 - e^{-6000 K_2})}{(1 - e^{-1900 K_2})}$$

BEST AVAILABLE COPY

$$2.31 (1 - e^{-1900 K_2}) = 2.12 (1 - e^{-6000 K_2})$$

$$1.09 - 1.09 e^{-1900 K_2} = 1 - e^{-6000 K_2}$$

$$.09 - 1.09 e^{-1900 K_2} = -e^{-6000 K_2}$$

$$\ln .09 - (\ln 1.09 + 1900 K_2) = -6000 K_2$$

$$+ 2.41 + .086 + 1900 K_2 = +6000 K_2$$

$$4100 K_2 = 2.496$$

$$K_2 = .00061$$

LLNE

298

10035 (179)

am page 109 with R_2 of page 106: ~~SECRET~~ For $P \sim \sqrt{W}$:

L	X_2	L^2	$.5L^2$	$1.5 - L - .5L^2 \div h$	$\sqrt{W}$	$W^{1/2}$	W^p	$W(\frac{1.5 - L - .5L^2}{h})$
	.469	.220	.11	.92	.00507	.774	.46	.00141
	.344	.118	.06	1.10	.00367	1	1	.00367
	.239	.057	.03	1.23	.00410	1.41	2.82	.0116
	.173	.030	.015	1.32	.00449	2	8	.0352
	.116	.013	.006	1.37	.00457	3.16	31.6	.144
	.047	.002	.001	1.45	.00483	10	1000	4.23

W_0	$W_{0.52}$	$\frac{M_{max}}{M_{CS}}$	$\frac{P \sim \sqrt{W}}{W_0}$	$P \sim \sqrt{W}$	M_{CS}	M_{max}	$\frac{M}{W_0}$
1	1	1	.250	1585	6340		
.312	.433	.464	.116	687	5922		
.0405	.076	.128	.032	121	3781		
.009	.026	.042	.0106	42	3962		

$$M_c = K_1 W (1 - e^{-K_2 W_0})$$

$$\begin{aligned} 85 &= K_1 52 (1 - e^{-K_2 6000}) \\ 77 &= K_1 24.5 (1 - e^{-K_2 1900}) \end{aligned}$$

$$31 = \frac{2.12 (1 - e^{-6000 K_2})}{(1 - e^{-1900 K_2})}$$

$$1 - e^{-1900 K_2} = 2.12 (1 - e^{-6000 K_2})$$

$$-1.09 e^{-1900 K_2} = 1 - e^{-6000 K_2} \quad \text{BEST AVAILABLE COPY}$$

$$-1.09 e^{-1900 K_2} = -e^{-6000 K_2}$$

$$09 - (\ln 1.09 + 1900 K_2) = -6000 K_2$$

$$1 + .086 + 1900 K_2 = 6000 K_2$$

$$4100 K_2 = 2.496$$

$$K_2 = .00061$$

LLNL

300	.6	.769	.220	.11	.92	.00807	.774	.48	.00141
	1	.344	.118	.06	1.10	.00387	1	1	.00367
	2	.239	.057	.03	1.23	.00410	1.41	2.82	.0116
	4	.173	.030	.015	1.32	.00440	2	8	.0352
	10	.116	.013	.006	1.37	.00457	3.16	31.6	.144
	100	.047	.002	.001	1.45	.00483	10	1000	4.23

h=300		Mass		P ₂ /P ₁		Mc		m	
W	W ₀	W ₀ /W ₀₅₂	Mc/Mc ₀	W ₀ /W ₀₅₂	W ₀	W ₀	Mc	m	m ₀
52	0.8	1	1	1	.050		1585	6340	
24.5	.157	.317	.433	.464	.116		687	5922	
7	.073	.0405	.076	.128	.032		121	3281	
2.5	.017	.009	.026	.042	.0106		42	3962	

$$M_c = K_1 W (1 - e^{-K_2 W_0})$$

$$\begin{aligned} 1585 &= K_1 52 (1 - e^{-K_2 6000}) \\ 687 &= K_1 24.5 (1 - e^{-K_2 1900}) \end{aligned}$$

$$2.31 = \frac{2.12 (1 - e^{-6000 K_2})}{(1 - e^{-1900 K_2})}$$

$$2.31 (1 - e^{-1900 K_2}) = 2.12 (1 - e^{-6000 K_2})$$

$$1.09 - 1.09 e^{-1900 K_2} = 1 - e^{-6000 K_2}$$

$$.09 - 1.09 e^{-1900 K_2} = -e^{-6000 K_2}$$

$$\ln .09 - (\ln 1.09 + 1900 K_2) = -6000 K_2$$

$$+ 2.41 + .086 + 1900 K_2 = +6000 K_2$$

$$4100 K_2 = 2.496$$

$$K_2 = .00061$$

LLNL

BEST AVAILABLE COPY

360

From page 105, using a pressure dependence of R^{-2} : (vice R^{-3})

~~SECRET~~

$$\begin{aligned}
 W_D &= KW^{3/2} \int_h^{R_2} \frac{R+h}{R^2} dR = KW^{3/2} \int_h^{R_2} \left(\frac{1}{R} + \frac{h}{R^2} \right) dR \\
 &= KW^{3/2} \left[\left. -\frac{1}{R} \right|_h^{R_2} + \left. -\frac{1}{2} \frac{h}{R^2} \right|_h^{R_2} \right] \\
 &= KW^{3/2} \left(\frac{1}{h} - \frac{1}{R_2} + \frac{1}{2} \frac{h}{h^2} - \frac{1}{2} \frac{h}{R_2^2} \right) \\
 &= KW^{3/2} \left(1.5 \frac{1}{h} - \frac{1}{R_2} - .5 \frac{h}{R_2^2} \right) \\
 &= \frac{KW^{3/2}}{h} \left(1.5 - \frac{h}{R_2} - .5 \left(\frac{h}{R_2} \right)^2 \right)
 \end{aligned}$$

h	W	$8R_f$	$2h$	$R_2 = \Delta$	$\frac{1}{R_2}$	$\left(\frac{1}{R_2}\right)^2$	$.5\left(\frac{1}{R_2}\right)^2$	$1.5 - \epsilon$	$\frac{W}{h}$	5000
500	3	2120	1000	1120	.446	.199	.100	.95	.006	23
	5	2520	↓	1520	.329	.108	.054	1.12	.010	5
	7	2816		1816	.275	.076	.038	1.19	.014	8
	10	3176		2176	.230	.053	.026	1.24	.020	12
	100	6832		5832	.086	.007	.004	1.41	.200	14

Should try $Eg \textcircled{D}/W$ using P as $1/R^3$ instead of height scaling dependency.

This is $Eg \textcircled{D} \cdot P$ 106, using $\frac{W}{h^2}$, not

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h	W	$8R_f$	$2h$	R_2	$\frac{1}{R_2}$	$\left(\frac{1}{R_2}\right)^2$	$\left(\frac{1}{R_2}\right)^3$	$\frac{1}{2}\left(\frac{1}{R_2}\right)^2$	$\frac{1}{3}\left(\frac{1}{R_2}\right)^3$	$.93 - \epsilon$	$\frac{W}{h}$	$\frac{W}{h^2}$
300	25	4304	600	3704	.081	.0066	.0033	.1416	.417	.590		
500	25	4304	1000	3304	.151	.0228	.0114	1.338	.250	.334		3pl
h	W				$\frac{1}{R_2}$	$\left(\frac{1}{R_2}\right)^2$	$\left(\frac{1}{R_2}\right)^3$	$\frac{1}{2}\left(\frac{1}{R_2}\right)^2$	$\frac{1}{3}\left(\frac{1}{R_2}\right)^3$	$.93 - \epsilon$		
300	25				.081	.0066	.0005	.0033	.0017	.8265		.00
500	25				.151	.0228	.0034	.114	.0013	.8175		.00

e. 105, using a pressure dependence of R^{-2} : (vice R^{-3})

105

$$\begin{aligned}
 I_D &= KW^{3/2} \int_h^{R_2} \frac{R+1}{R^2} dR = KW^{3/2} \int_h^{R_2} \left(\frac{1}{R} + \frac{1}{R^2} \right) dR \\
 &= KW^{3/2} \left[-\frac{1}{R} + \left[-\frac{1}{2} \frac{1}{R^2} \right]_h^{R_2} \right] \\
 &= KW^{3/2} \left(\frac{1}{h} - \frac{1}{R_2} + \frac{1}{2} \frac{h}{h^2} - \frac{1}{2} \frac{h}{R_2^2} \right) \\
 &= KW^{3/2} \left(1.5 \frac{1}{h} - \frac{1}{R_2} - .5 \frac{h}{R_2^2} \right) \\
 &= \frac{KW^{3/2}}{h} \left(1.5 - \frac{h}{R_2} - .5 \left(\frac{h}{R_2} \right)^2 \right) \quad \textcircled{1}
 \end{aligned}$$

R_2	$2h$	$\frac{R_2}{\Delta}$	$\frac{1}{R_2}$	$(\frac{1}{R_2})^2$	$.5(\frac{1}{R_2})^2$	$1.5 - \epsilon$	$\frac{W}{h}$	$5000 \frac{W}{h} (1.5 - \epsilon)$
20	1000	1120	.446	.199	.100	.95	.006	28.5
30	1520	329	.108	.054	1.12	.010		56.0
16	1816	.275	.076	.038	1.19	.014		83.0
76	2176	.230	.053	.026	1.24	.020		124.0
32	5832	.086	.007	.004	1.41	.200		1410.0

try $Eg \textcircled{1}/W$ using P as $1/R^3$ instead to correct line defocusing.

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is $Eg \textcircled{1}: P. 106$, using $\frac{W}{h^2}$, not $\frac{W^{3/2}}{h^2}$

LLNL

$2h$	R_2	$1/R_2$	$(1/R_2)^2$	$.5(1/R_2)^2$	$1.5 - \epsilon$	$\frac{W}{h}$	$\frac{W}{h^2}$	$\frac{W^{3/2}}{h^2}$
600	3704	.081	.0066	.0033	1.416	.417	.590	
1000	3304	.151	.0228	.0114	1.338	.250	.334	
		$1/R_2$	$(1/R_2)^2$	$(1/R_2)^3$	$1/2(1/R_2)^2$	$1/3(1/R_2)^3$	$.93 - \epsilon$	$\frac{W}{h^2}$
		.081	.0066	.0005	.0033	.0017	.8265	.00139
		.151	.0228	.0034	.0114	.0013	.8175	.00050

110

Try:

Me total = $\frac{1}{3} T W^{\frac{1}{2}}$ for tower T
 $+ 3 T$ for cab T
 $6 T_c$

Shot	W	h	T _F	T _c	# of K ₃	T _F W ^{1/2}	Σ	3 T _c	Σ
TS-7	13.8	300	52	10	47	63	77	30 60	93
UK-1	16.3	300	45	12	45	60	81	36 72	96
UK-2	24.5	300	77	24	95	177	169	72 144	199
UK-6	27.7	300	45	12	59	79	95	36 72	115
UK-7	52.0	300	77	24	139	185	211	72 144	257
Moth	2.5	300	50	10	20	26	50	30 60	56
Tesla	9.0	300	63	20	41	55	101	60 120	115
Hornet	3.6	300	98	10	46	62	76	30 60	92
Apple	15.5	500	222	20	218	291	278	60 120	351
Met	24.0	400	130	10	159	212	189	30 60	242
Apple II	31.5	500	370	20		690		60 120	750
Zucchini	32.5	500	123	10	126	234	206	30 60	264
Diablo	~18	~500	370	73	331	457	400	219 438	726
Presicilla	40	700	0	2		0		6 12	6
Wilson	10	500	0	1		0		3 6	3

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LLNL

303

10035 0156

$$M_{\text{catal}} = \frac{1}{3} T W^{1/2} \text{ for } T_{\text{max}} T$$

$$+ 3 T \text{ for cal } T$$

	T_F	T_c	$\frac{1}{3} T W^{1/2}$	$T_F W^{1/2}$	Σ	$3 T_c$	Σ	ϵ_{TC}	M_{CO}	M_{CO}	$M_{CO}(\epsilon_{TC})$
100	52	10	47	63	77	30	60	93 ¹²³	420	436	390
100	45	12	45	60	81	36	72	96 ¹³²	415	430	379
100	77	24	95	177	169	72	144	199 ²⁷¹	660	692	588
100	45	12	59	79	95	36	72	115 ¹⁵¹	895	915	759
100	77	24	139	185	211	72	144	257 ³²⁹	1573	1619	1501
100	50	10	20	26	50	30	60	56 ⁸⁶	11	17	0
100	63	20	41	55	101	60	120	115 ¹⁷⁵	83	97	23
100	98	10	46	62	76	30	60	92 ¹²²	14	30	0
100	222	20	218	291	278	60	120	351 ⁴¹¹	49	122	0
100	130	10	159	212	189	30	60	242 ²⁷²	691	704	661
100	370	20		690		60	120	750 ⁸¹⁰	148		88
100	123	10	126	234	206	30	60	264 ²⁹⁴	436	494	406
500	370	73	331	~~457~~	~~600~~	219	438	~~672~~ ⁸⁶⁵	~~367~~	300	85
100	0	2		0		6	12	6 ¹²	69		~~63~~
100	0	1		0		3	6	6 ⁶	18		4

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LLNL

	W	h	M _{max}	M _c	M _c	$\frac{1}{2}TW$	$\Delta =$	T
			M _c	W _m	W ₀	W ₀	W ₀	
TS-7	13.8	300	513	76	437	114	399	57
UK-1	16.3	300	511	76	435	114	397	57
UK-2	24.5	300	859	168	691	252	607	102
UK-5	0.3	100	~10	6	~4	~9	~1	30
UK-6	27.7	300	1010	98	984	148	862	57
UK-7	52.0	300	1830	244	1586	366	1464	102
UK-9	32.4	300	3205	82	3123	123	3082	43
UK-10	15.4	524	~100	0.5	~100	.8	~100	0.35
Wasp	1.2	750	~1	~0.2	<1	~.3	~.1	?
Math	2.5	300	67	25	42	38	29	48
Tesla	7.0	300	198	78	120	117	81	98
Turk	40.0	500	~1000	548	~452	822	~178	260
Hornet	3.6	300	106	65	41	98	8	102
Apple	15.5	500	400	318	82	477	~0	242
Bee	7.0	500	~100	100	~0	150	~0	113
Post	1.8	300	~20	36	~0	54	~0	82
Met	24.0	400	933	229	704	344	599	140
Apple II	31.5	500	898	724	174	1086	~0	388
Zucchini	32.5	500	700	253	447	380	320	133
			366		113	avg		
Boltzman	11	500	346	185	161	278	68	160
			560		375	avg		
Wilson	10	500	~10 ²²	1	~9	1+	~9	1
Priscilla	40	700	~75	1	~74	1+	~74	1.5
Hood	75	1500	~17	4	~13	6	~11	1.5
Diable	~12	500	~17 ⁸⁹⁰	511	>389	766	7134	443

BEST AVAILABLE COPY

LLNL

305

200 30 01 50

	Mass	M_c	M_c	$\frac{1}{2}TW$	Δ	T
h	M_c	W_m	W_0	W_m	W_0	h
300	513	76	437	114	399	57
300	511	76	435	114	397	
300	859	168	691	252	607	102
100	~10	6	~4	~9	~1	30
300	1010	98	934	148	862	57
300	1830	244	1586	366	1464	102
300	3205	82	3123	123	3022	43
524	~100	0.5	~100	.8	~100	0.35
750	~1	~0.2	<1	~.3	~.1	?
300	67	25	42	38	29	48
300	198	78	120	117	81	98
500	~1000	548	~452	822	~178	260
300	106	65	41	98	8	102
500	400	318	82	477	~0	242
500	~100	100	~0	150	~0	113
300	~20	36	~0	54	~0	82
400	933	229	704	344	599	140
500	898	724	174	1086	~0	398
500	700	253	447 _{WB}	380	320	133
	366		113 _{AVS}			
500	346	185	161 _{part}	278	68	160
	560		375 _{TOT}			
500	~10 ²²	1	~9	1+	~9	1
700	~75	1	~74	1+	~74	1.5
1500	~17	4	~13	6	~11	1.5
500	7900 ⁸⁹⁰	511	>389	766	7134	443

BEST AVAILABLE COPY

LLNL

$$W_D = K W \frac{h^2}{R_2^2} \left[0.833 - 0.5 \left(\frac{h}{R_2} \right)^2 - 0.333 \left(\frac{h}{R_2} \right)^3 \right]$$

$$R_2 = BR_f - 2h$$

$$W_D = 0 \text{ at } h$$

h	W	R _f	BR _f	2h	R ₂	W _D	W _D /h ²	W _D /h ³	W _D /h ⁴
300	0.3	123	984	600	384	.781	.305	.159	.369
	0.5	146	1170	↓	570	.526	.138	.0486	.646
	0.7	163	1300		700	.429	.092	.0263	.715
	1	184	1470		870	.345	.0595	.0137	.760
	2	232	1860		1260	.238	.0283	.0045	.800
	4	292	2340		1740	.172	.0148	.0017	.817
	7	353	2820		2220	.135	.0091	.0009	.823
	10	396	3170		2570	.117	.0068	.0005	.826
	30	572	4580		3980	.0754	.0028	.0001	.830
	60	721	5770		5170	.0580	.0017	.0001	.832
	100	855	6840		6240	.0481	.0012	—	.832
	200	1080	8640		8040	.0373	.0007	—	.833
	500	1460	11,700		11,100	.0270	.0004	—	.833
W	h	R _f	BR _f					W ^{3/2} /h ²	
20	1300	500	4000	2600	1400	.929	.432	.267	.134
	1000	↓	↓	2000	2000	.500	.125	.0416	.667
	700			1400	2600	.269	.0362	.0065	.791
	500			1000	3000	.167	.0140	.0016	.818
	200			400	3600	.0556	.0015	.0001	.832
	100			200	3900	.0263	.0003	—	.833
	50			100	3900	.0128	.0001	—	.833
75	1500	776	6210	3000	3210	.467	.109	.034	.690
10	500	396	3170	1000	2170	.230	.0264	.0041	.803

If assumption ②, p 197, changed to "... three

Then:

BEST AVAILABLE COPY

LLNL

$$\frac{R_2 + X}{3V_f} = \frac{X}{V_f}$$

$$\frac{R_2 + X}{3} = X$$

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$$R_2 = 2X$$

$$X + h = 3R_f$$

$$X = 3R_f - h$$

From p 106:

$$W_D = K W \frac{h^{3/2}}{R_2^2} \left[0.833 - 0.5 \left(\frac{h}{R_2} \right)^2 - 0.333 \left(\frac{h}{R_2} \right)^3 \right]$$

$$R_2 = 8R_f - 2L$$

$$W_D = 0 \text{ at } h = \frac{8}{3} R_f$$

corrected f

R_f	$8R_f$	$2h$	$\frac{h}{R_2}$	$\frac{h}{R_f}$	$5x^2$	$333x^3$	$933x^4$	$\frac{W_D}{K}$	$\frac{W_D}{K}$	$K = 727500$	M_{co}	Z
123	984	600	384	.781	.305	.159	.369	.000547	.000202	0.490	.005	
146	1170	↓	570	.526	.138	.0486	.646	.00118	.000762	1.85	.012	
163	1300		700	.429	.092	.0263	.715	.00195	.00139	3.37	.016	
184	1470		870	.345	.0595	.0137	.760	.00333	.00253	6.14	.020	
232	1860		1260	.232	.0283	.0045	.800	.00940	.00752	18.2	.032	
292	2340		1740	.172	.0148	.0017	.817	.0267	.0218	52.9	.044	
352	2820		2220	.135	.0081	.0009	.823	.0618	.0509	123	.058	
396	3170		2570	.117	.0068	.0005	.826	.105	.0867	210	.070	
572	4580		3980	.0754	.0028	.0001	.830	.548	.455	1100	.122	
721	5770		5170	.0580	.0017	.0001	.832	1.55	1.29	3130	.172	
855	6840		6240	.0481	.0012	—	.832	3.33	2.77	6720	.221	
1080	8640		8040	.0373	.0007	—	.833	9.42	7.85	19,000	.317	
1460	11,700		11,100	.0270	.0004	—	.833	37.3	31.1	75,400	.50.	
R_f	$8R_f$							$\frac{W_D}{K}$				
500	4000	2600	1400	.929	.432	.267	.134	.0000529	.00000709	5.16	.0008	
↓	↓	2000	2000	.500	.125	.0416	.667	.0000894	.0000596	43.4	.0072	
		1400	2600	.269	.0362	.0065	.791	.000182	.000144	105	.0175	
		1000	3000	.167	.0140	.0016	.818	.000358	.000293	21.3	.0355	
		400	3600	.0556	.0015	.0001	.832	.00224	.00186	1350	.225	
		200	3800	.0263	.0003	—	.833	.00894	.00745	5420	.903	
		100	3900	.0128	.0001	—	.833	.0358	.0298	21,700	.71	
776	6210	3000	3210	.467	.109	.034	.690	.000289	.000199	145		
396	3170	1000	2170	.230	.0264	.0041	.803	.000126	.000101	7.3		

If assumption ②, p 197, changed to "... three radii above ..."

BEST AVAILABLE COPY

LLNL

$$\frac{R_2 + x}{3V_f} = \frac{x}{V_f}$$

$$\frac{R_2 + x}{3} = x$$

$$R_2 = 2x \quad x + h = 3R_f$$

$R_2 = 8R_f - 2h$											$W_0 = 0$ at $h =$	
h	W	R_f	$8R_f$	$2h$	R_2	$\frac{R_2}{R_f}$	$5R_2^2$	$323R_2$	$933-R$	$\frac{W^{3/2}}{h}$	$\frac{W^{3/2}}{h}$	
300	0.3	123	984	600	384	.781	.305	159	369	.000547	.00	
	0.5	146	1170	↓	570	.526	.138	.0486	.646	.00118	.0001	
	0.7	163	1300		700	.429	.092	.0263	.715	.00195	.0001	
	1	184	1470		870	.345	.0595	.0137	.760	.00333	.0002	
	2	232	1860		1260	.238	.0283	.0045	.800	.00940	.0007	
	4	292	2340		1740	.172	.0148	.0017	.817	.0267	.002	
	7	353	2820		2220	.135	.0091	.0009	.823	.0618	.005	
	10	396	3170		2570	.117	.0068	.0005	.826	.105	.01	
	30	572	4580		3980	.0754	.0028	.0001	.830	.548	.45	
	60	721	5770		5170	.0580	.0017	.0001	.832	1.55	1.2	
	100	855	6840		6240	.0481	.0012	—	.832	3.33	2.7	
	200	1080	8640		8040	.0373	.0007	—	.833	9.42	7.7	
	500	1460	11700		11100	.0270	.0004	—	.833	37.3	31.1	
W	h	R_f	$8R_f$							$\frac{W^{3/2}}{h}$		
20	1300	500	4000	2600	1400	.929	.432	.267	.134	.0005529	.00005	
	1000	↓	↓	2000	2000	.500	.125	.0416	.667	.0000894	.00005	
	700			1400	2600	.269	.0362	.0065	.791	.000182	.00014	
	500			1000	3000	.167	.0140	.0016	.818	.000358	.0002	
	200			400	3600	.0556	.0015	.0001	.832	.00224	.0018	
	100			200	3800	.0263	.0003	—	.833	.00894	.0074	
	50			100	3900	.0128	.0001	—	.833	.0358	.029	
75	1500	776	6210	3000	3210	.467	.109	.034	.690	.000289	.00019	
10	500	396	3170	1000	2170	.230	.0264	.0041	.803	.000126	.0001	

If assumption ②, p 197, changed to "three"

Then:

$$\frac{R_2 + X}{3V_f} = \frac{X}{V_f}$$

$$\frac{R_2 + X}{3} = X$$

BEST AVAILABLE COPY

LLNL

$$R_2 = 2X$$

$$X + h = 3R_f$$

$$X = 3R_f - h$$

$$R_2 = 6R_f - 2h$$

$$W_0 = 0, h = R_2,$$

$$3h = 6R_f$$

$$h = 2R_f$$

From new R_2 bottom page 112, $R_2 = 6R_f - 2L$

h	w	$6R_f$	$2L$	$\Delta = R_2$	$\frac{1}{2}R_2$	$5x^2$	$.333x^3$	$\frac{1}{2}x^{3/2}$	$.033-E$	$\frac{w}{k}$
300	0.7	975	600	375	800	.32	.17	.000015	.34	.0000221
	1	1100	↓	500	600	.18	.07	.000111	.58	.0000064
	2	1400		800	375	.07	.02	.0000313	.74	.0000235
	4	1760		1160	.259	.03	.01	.0000890	.79	.0000702
	7	2120		1520	.197	.02	-	.000206	.81	.000167
	10	2380		1720	.174	.02	-	.000350	.81	.000234
	30	3441		2840	.106	.01	-	.00183	.82	.00150
	60	4330		3730	.080	-	-	.00517	.83	.00429
	100	5130		4530	.066	-	-	.0111	↓	.00921
	200	6480		5880	.051	-	-	.0314		.0261
	500	8780		8180	.037	-	-	.124		.103
1500	75	11,240	3000	10,440	.0507	-	-	.351	.83	.291
	75	4660		1660	.904	.408	.246	.000289	.179	.000517
500	10	2380	1000	1380	.362	.066	.016	.000126	.751	.000946
700	40	3770	1400	2370	.295	.043	.009	.000516	.781	.000463
500	40	3774	1000	2774	.180	.016	.002		.815	.00101
900	20	3000	1800	1200	.750	.28	.14	.00011	.41	.000045
700	↓	↓	1400	1600	.438	.10	.03	.00018	.70	.000126
500			1000	2000	.250	.03	.005	.00036	.80	.000228
200			400	2600	.097	.003	-	.00224	.83	.00186
100			200	2800	.036	.0006	-	.00894	.83	.00742
50			100	2900	.017	-	-	.0358	.83	.0297
30			60	2940	.010	-	-	.0993	.83	.0824

From above:

h	wD/w	$600 \frac{wD}{w}$	$1000 \frac{wD}{w}$	$e = \frac{wD}{w}$	β	βKWD	Z
900	.0000225	.00135	.00225	~1		29.1	.004E
700	.0000630	.00378	.00630	.99		80.7	.0134
500	.000144	.00864	.0144	.99		184	.0367
200	.000930	.0558	.0930	.91		1095	.182
100	.00371	.223	.371	.69		3312	.552
50	.0148	.888	1.48	.23		4416	.736
30	.0412	2.47	4.12	.016		853	.142
300	.0000316	.7	.00316	1		1.43	
↓	.00000644	1	.000644	.99		4.13	LLNL
	.0000116	2	.0116	.99		14.8	
	.0000176	4	.0176	.98		44.6	
	.0000739	7	.0239	.98		106	
	.0000284	10	.0284	.97		178	310
	.0000500	30	.0500	.95		922	
			.0715	.93		2585	

BEST AVAILABLE COPY

100-55001

u R₂, bottom page 112, R₂ = 6R₁ - 2L: ~~SECRET~~ 13

2L	$\Delta = R_2$	$\frac{1}{R_2}$	$5x^2$	$333x^3$	$\frac{5x}{2}$	$\frac{2}{1/k}$	$\frac{4x}{k}$	KE 447,000	$\frac{1}{k}$	Z
600	375	.800	.32	.17	.000065	.34	.11	.00000221	1.43	.0068
↓	500	.600	.18	.07	.000111	.58	.00000644	4.17	.0139	
	800	.375	.07	.02	.0000313	.74	.0000232	15.0	.025	
	1160	.259	.03	.01	.0000890	.79	.0000763	45.5	.038	
	1520	.197	.02	-	.000206	.81	.000167	108	.051	
	1720	.174	.02	-	.000350	.81	.000284	174	.061	
	2840	.106	.01	-	.00183	.82	.00150	970	.108	
	3730	.080	-	-	.00517	.83	.01429	2780	.154	
	4530	.066	-	-	.0111	✓	.00921	5960	.199	
	5880	.051	-	-	.0314		.0261	16,900	.282	
	8180	.037	-	-	.124		.103	66,600	.444	
3000	1660	.904	.408	.246	.000289	.83	.000291	33		
1000	1380	.362	.066	.016	.000126	.751	.000946	61		
1400	2370	.295	.063	.009	.000516	.781	.000403	261		
1000	2774	.180	.016	.002		.815	.00101	634		
1800	1200	.750	.28	.14	.00011	.41	.000045	29.1	.0048	
1400	1600	.438	.10	.03	.00018	.70	.000126	81.5	.0136	
1000	2000	.250	.03	.005	.00036	.80	.000298	186	.031	
400	2600	.077	.003	-	.00224	.83	.00186	1203	.200	
200	2800	.036	.006	-	.00894	.83	.00742	4800	.80	
100	2900	.017	-	-	.0358	.83	.0297	19,200	> 1	
60	2940	.010	-	-	.0993	.83	.0824	53,313	> 1	

100 %/10	1000 %/10	$e = \beta$	β KWD	Z
.00135	.00225	~1	29.1	.0048
.00378	.00630	.99	80.7	.0134
.00864	.0144	.99	184	.0307
.0558	.0930	.91	1095	.182 (1.172) (1.186)
.223	.371	.69	3312	.552 (1.312) (1.392)
.888	1.48	.23	4416	.736 (1.384) (1.512)
2.47	4.12	.016	853	.142 (1.355) (1.533)
7	.00316	1	1.43	BEST AVAILABLE COP
1	.00644	.99	4.13	LLNL
2	.0116	.99	14.8	
4	.0176	.98	44.6	
7	.0239	.98	106	
10	.0284	.97	178	
30	.0500	.95	922	
60	.0715	.93	2585	
100	.0921	.91	4414	

1	1100	✓	200	600	.10	.01	.000111	.58	.000066	
2	1400		800	375	.07	.02	.0000313	.74	.000023	
4	1760		1160	.259	.03	.01	.0000890	.79	.000070	
7	2120		1520	.197	.02	-	.000206	.81	.000167	
10	2380		1720	.174	.02	-	.000350	.81	.000234	
30	3441		2840	.106	.01	-	.00183	.82	.00150	
60	4330		3730	.080	-	-	.00517	.83	.00429	
100	5130		4530	.066	-	-	.0111	✓	.00921	
200	6480		5880	.051	-	-	.0314		.0261	
500	8780		8180	.037	-	-	.124		.103	
1500	11,240		10,440	.0307	-	-	.351	.83	.291	
75	4660	3000	1660	.904	.408	.246	.000289	.179	.000517	
500	10	2380	1000	1380	.362	.066	.016	.000126	.751	.000946
700	40	3770	1400	2370	.295	.043	.009	.000516	.781	.000403
500	40	3774	1000	2774	.180	.116	.012		.815	.00101
900	20	3000	1800	1200	.750	.28	.19	.00011	.41	.000045
780	↓	↓	1400	1600	.438	.10	.03	.00018	.70	.000126
500			1000	2000	.250	.03	.005	.00036	.80	.000235
200			400	2600	.077	.003	-	.00224	.83	.00186
100			200	2800	.036	.0006	-	.00894	.83	.00742
50			100	2900	.017	-	-	.0358	.83	.0297
30			60	2940	.010	-	-	.0993	.83	.0824

From above:

BEST AVAILABLE COPY

h	WD/W	600 %	1000 / 10	$\epsilon = \beta$	β KWD	Z
900	.00000225	.00135	.00225	~1	29.1	.004E
700	.00000630	.00378	.00630	.99	80.7	.0134
500	.0000144	.00864	.0144	.99	184	.0307
200	.0000930	.0558	.0930	.91	1095	.182
100	.000371	.223	.371	.69	3312	.552
50	.00148	.888	1.48	.23	4416	.736
30	.00412	2.47	4.12	.016	853	.142
300	.00000316	.7	.00316	1	1.43	
↓	.00000644	1	.00644	.99	4.13	
	.0000116	2	.0116	.99	14.8	
	.0000176	4	.0176	.98	44.6	
	.0000239	7	.0239	.98	126	
	.0000284	10	.0284	.97	178	
	.0000500	30	.0500	.95	922	LLNL
	.0000715	60	.0715	.93	2585	
	.0000921	100	.0921	.91	5424	312
	.000130	200	.130	.88	14,870	.248
	.000206	500	.206	.81	52,900	.359
	.000291	1000	.291	.75	141,225	.471

h	W	$6R_3$	$2L$	$\frac{A}{R_2}$	$\frac{4}{R_2}$	$.5K^2$	$.333K^3$	$.832-E$	$W^{\frac{3}{2}}$	
100	0.1	510	200	310	.325	.052	.011	.770	.0316	
↓	0.2	648	↓	448	.223	.025	.004	.804	.0894	
	0.4	816		616	.162	.013	.001	.819	.253	
	1	1100		900	.111	.006	-	.827	1	
	10	2380		2180	.046	.001	-	.832	31.6	
	100	5120		4920	.020	-	-	.833	1000	
300	1	1100	600	500	.600	.180	.072	.581	1	
↓	2	1390	↓	790	.380	.072	.018	.743	2.83	
	4	1750		1150	.261	.034	.006	.793	8.00	
	10	2380		1780	.169	.014	.002	.817	31.6	
	50	4070		3470	.086	.004	-	.829	354	
	100	5120		4520	.066	.002	-	.831	1000	
500	3	1590	1000	590	.847	.358	.202	.773	5.20	
↓	5	1890	↓	890	.562	.158	.059	.616	11.2	
	7	2110		1110	.450	.101	.030	.702	18.5	
	10	2380		1380	.362	.066	.016	.751	31.6	
	50	4070		3070	.163	.014	.001	.518	354	
	100	5120		4120	.121	.008	-	.725	1000	
700	7	2110	1400	710	.986	.426	.319	.028	15.5	
	10	2380	↓	980	.714	.255	.121	.457	31.6	
	30	3430		2030	.345	.060	.014	.759	164	
	50	4070		2670	.262	.034	.006	.793	354	
	100	5120		3720	.188	.018	.002	.813	1000	
900	1.5	1370	800	470	.851	.362	.205	.266	1.83	
	3	1590	↓	790	.506	.128	.043	.662	5.20	
	7	2110		1310	.305	.046	.009	.778	18.5	
	10	2380		1580	.253	.032	.005	.796	31.6	
	24	3190		2390	.167	.014	.002	.817	112	
	100	5120		4320	.093	.004	-	.829	1000	

BEST AVAILABLE COPY

LLNL

	W	W	W	W	W	W	W	W	W
2	.011	.770	.0316	.00000316	.00000243	1.6	1	1.6	.053
5	.014	.804	.0894	.00000894	.00000719	4.7	1	4.7	.078
3	.001	.819	.253	.0000253	.0000207	13	.99	13	.108
6	-	.827	1	.000100	.0000827	54	.95	51	.170
1	-	.832	31.6	.00316	.00263	1700	.61	1040	.347
-	-	.833	1000	.100	.0833	54,000	.26	14,000	.467
0	.072	.581	1	.0000111	.00000645	4.2	1	4.2	
2	.018	.743	2.83	.0000314	.0000233	15	1	15	
4	.006	.793	8.00	.0000789	.0000705	46	1	46	
4	.002	.817	31.6	.000351	.000287	186	1	186	
8	-	.829	354	.00393	.00326	2109	.98	2070	
2	-	.831	1000	.0111	.00922	6000	.93	5600	
58	.202	.273	5.20	.0000208	.00000560	3.7	1	3.7	
58	.059	.616	11.2	.0000448	.0000276	18	1	18	
01	.030	.702	18.5	.0000740	.0000519	34	1	34	
66	.016	.751	31.6	.000126	.0000946	61	1	61	
4	.001	.817	354	.00142	.00116	750	1	750	
8	-	.825	1000	.00450	.00330	2140	1	2140	
76	.319	.028	18.5	.0000378	.00000106	0.69	1	0.69	
55	.121	.457	31.6	.0000645	.0000295	19	1	19	
60	.014	.759	164	.000335	.000254	164	1	164	
54	.006	.793	354	.000722	.000573	371	1	371	
18	.002	.813	1000	.00204	.00166	1074	1	1074	
62	.205	.266	1.83	.0000114	.00000303	2.0	1	2	
8	.043	.662	5.20	.0000325	.0000215	14	1	14	
16	.009	.778	18.5	.000112	.0000871	56	1	56	
32	.005	.796	31.6	.000198	.000158	102	1	102	
4	.002	.817	118	.000738	.000603	390	1	390	
1	-	.829	1000	.00625	.00518	3350	.99	3320	

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Try: $w_D \sim \left(\frac{w^2}{R}\right)$ (time-temp dependence)

$3V_f = \text{dust speed}$
limiting height for dust entry as bottle

OR: Integrate h to ∞

$$w_D = K w^2 \int_h^\infty \left(\frac{1}{R^4} + \frac{h}{R^5} \right) R R$$

$$= K w^2 \left[\left| -\frac{1}{3} \frac{1}{R^3} \right| + \left| -\frac{1}{4} \frac{h}{R^4} \right| \right]_h^\infty$$

$$= K w^2 \left(\frac{1}{3} \frac{1}{h^3} + \frac{1}{4} \frac{h}{h^4} \right)$$

$$= \frac{K w^2}{h^3} \left(\frac{1}{3} + \frac{1}{4} \right)$$

$$= \frac{K' w^2}{h^3}$$

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$$M_{CD} = \frac{K w^2}{h^3} \left(1 - e^{-\frac{h}{w_D}} \right)$$

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$$= \frac{K w^2}{h^3} \left(1 - e^{-\frac{K' h^3}{w}} \right)$$

$$K w^2 / 1 - e^{-\frac{K' h^3}{w}}$$

$$W_D \sim \left(\frac{W}{R}\right) \quad (\text{time-temp dependence})$$

$3\sqrt{g} = \text{dust speed}$
 limiting height for dust entry as bottom page 112

Integrate h to ∞

$$W_D = K W^2 \int_h^\infty \left(\frac{1}{R^4} + \frac{h}{R^5} \right) R R$$

$$= K W^2 \left[\left| -\frac{1}{3} \frac{1}{R^3} \right| + \left| -\frac{1}{4} \frac{h}{R^4} \right| \right]_h^\infty$$

$$= K W^2 \left(\frac{1}{3} \frac{1}{h^3} + \frac{1}{4} \frac{h}{h^4} \right)$$

$$= \frac{K W^2}{h^3} \left(\frac{1}{3} + \frac{1}{4} \right)$$

$$= \frac{K' W^2}{h^3}$$

BEST AVAILABLE COPY

$$M_{CD} = \frac{K W^2}{h^3} \left(1 - e^{-\frac{K' h^3}{W}} \right)$$

$$= \frac{K W^2}{h^3} \left(1 - e^{-\frac{K' h^3}{W}} \right)$$

$$= \frac{K W^2}{h^3} \left(1 - e^{-\frac{K' h^3}{W}} \right)$$

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10039 (C-1)

OR:

Integrate h to ∞

$$W_0 = KW^2 \int_h^\infty \left(\frac{1}{R^4} + \frac{h}{R^5} \right) R R$$

$$= KW^2 \left[\left| -\frac{1}{3} \frac{1}{R^3} \right| + \left| -\frac{1}{4} \frac{h}{R^4} \right| \right]_h^\infty$$

$$= KW^2 \left(\frac{1}{3} \frac{1}{h^3} + \frac{1}{4} \frac{h}{h^4} \right)$$

$$= \frac{KW^2}{h^3} \left(\frac{1}{3} + \frac{1}{4} \right)$$

$$= \frac{KW^2}{h^3}$$

$$M_{CD} = \frac{KW^2}{h^3} \left(1 - e^{-\frac{3}{4} \frac{h^4}{W^2}} \right)$$

$$= \frac{KW^2}{h^3} \left(1 - e^{-\frac{K^{\frac{1}{2}} h^3}{W^{\frac{1}{2}}}} \right)$$

$$= \frac{KW^2}{h^3} \left(1 - e^{-\frac{K^{\frac{1}{2}} h^3}{W^{\frac{1}{2}}}} \right)$$

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Use $R_2 = 3R_f - h$ ($V_{dust} = 2V_f$),
 $W_D = 0$ at $h = 1.5 R_f$

h	W	$3R_f$	R_2	$\frac{R_2}{R_f}$	$.54^2$	$.333^2$	$.833 - z$	$W^{3/2}$
300	1	550	250					
	2	695	395	.759	.288	.146	.399	2.93
	4	875	575	.522	.136	.047	.650	5.73
	10	1190	890	.337	.057	.013	.763	31.6
	50	2035	1735	.173	.015	.002	.816	354
	100	2560	2260	.133	.009	.001	.823	1000

Try $V_{dust} = 2V_f$, 2.5 radii above prob

which gives $R_2 = 2.5 R_f - h$ $W_D = 0$
 $2.5 R_f$ R_2 $W^{1/2}$ W

300	3	665	365	.822	.338	.185	.310	3.74	.100
	6	838	538	.558	.156	.058	.619	8.59	.004
	→ 10	990	690	.435	.094	.027	.712	15.9	.001
	20	1250	950	.316	.050	.011	.772	36.4	.0001
	50	1695	1395	.215	.023	.003	.807	109	.00001
	100	2138	1838	.163	.014	.001	.818	251	.000001
500	11	1022	522	.958	.459	.293	.081	17.8	.0000001
	20	1250	750	.667	.222	.099	.512	36.4	.00000001
	30	1430	930	.538	.144	.052	.637	59.2	.000000001
	50	1695	1195	.418	.088	.024	.721	109	.0000000001
	100	2138	1638	.305	.046	.009	.778	251	.00000000001

height dependence needs $h^{1/3}$

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($N_{\text{ant}} = 2 V_f$), 3-Radii above gnd assumption

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$.9334^*$	$.833-2$	$w^{3/4}$	$w^{3/4}/h^2$	$\pi = w_0$
.146	.399	2.83	.000314	.000025
.047	.650	8.06	.000879	.0000578
.013	.763	31.6	.000351	.000268
.002	.816	354	.00393	.00321
.001	.823	1000	.0111	.00914

(1)

5 radii above gnd assumption.

$5 R_f - h$	$w_0 = 0$	et	$h = 1.25 R_f + [w^{1/2}]$
	$w^{1/2}$	$w^{1/2}/h^2$	$\frac{1}{h^2}$
185	.310	3.74	.0000416
058	.619	8.59	.0000954
027	.712	15.9	.000147
011	.772	36.4	.000404
003	.807	109	.00121
001	.818	251	.00279
293	.081	17.8	.0000712
099	.512	36.4	.000146
152	.637	59.2	.000237
24	.721	109	.000436
09	.778	251	.00100

(2)

needs $h^{1.3}$

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LC030 0004

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$$= u^{1,2} \left[\begin{vmatrix} -\frac{1}{1,3} & \frac{1}{R^{1,3}} \end{vmatrix} + \begin{vmatrix} -\frac{1}{2,3} & \frac{1}{R^{2,3}} \end{vmatrix} \right]$$

$$= \frac{w}{h} \left[\frac{1}{1.3} + \frac{1}{2.3} - \frac{1}{1.3} \left(\frac{1}{R_2} \right) - \frac{1}{2.3} \right]$$

$$R_2 = 2.5 R_f = h$$

$$W_0 = 0 \text{ at } h = 1.25 R$$

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$$W_0 \text{ eff} \sim \left(\frac{1}{z}\right)^{1/3} \sim \left(\frac{W_0}{R}\right)^{1/3} = \frac{W_0}{R^{1/3}} \approx \frac{W_0^{1/2}}{R^{1/3}} \quad 117$$

$$W_0 = W_0^{(1)} \int_h^{R_2} \left(\frac{R+h}{R^{3.3}} \right) dR = W_0^{(1)} \int_h^{R_2} \left(\frac{1}{R^{2.3}} + \frac{h}{R^{3.3}} \right) dR$$

$$= W_0^{(1)} \left[\left| -\frac{1}{1.3} \frac{1}{R^{1.3}} \right|_h^{R_2} + \left| -\frac{1}{2.3} \frac{h}{R^{2.3}} \right|_h^{R_2} \right]$$

$$= W_0^{(1)} \left[\frac{1}{1.3} \frac{1}{h^{1.3}} - \frac{1}{1.3} \frac{1}{R_2^{1.3}} + \frac{1}{2.3} \frac{1}{h^{1.3}} - \frac{1}{2.3} \frac{h}{R_2^{2.3}} \right]$$

$$= \frac{W_0^{(1)}}{h^{1.3}} \left[\frac{1}{1.3} + \frac{1}{2.3} - \frac{1}{1.3} \left(\frac{h}{R_2} \right)^{1.3} - \frac{1}{2.3} \left(\frac{h}{R_2} \right)^{2.3} \right]$$

$$= \frac{W_0^{(1)}}{h^{1.3}} \left[1.204 - .769 \left(\frac{h}{R_2} \right)^{1.3} - .435 \left(\frac{h}{R_2} \right)^{2.3} \right]$$

(1.067) - (.667) - (.400)

$$R_2 = 2.5 R_f - h \quad (P 116)$$

$$W_0 = 0 \text{ at } h = 1.25 R_f$$

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[illegible]

$$M_{cm} = \frac{1}{3} \omega \sqrt{\frac{1}{5}}$$

DATE	DESCRIPTION	AMOUNT	BALANCE
10/1	1000	1000	1000
10/2	1000	1000	1000
10/3	1000	1000	1000
10/4	1000	1000	1000
10/5	1000	1000	1000
10/6	1000	1000	1000
10/7	1000	1000	1000
10/8	1000	1000	1000
10/9	1000	1000	1000
10/10	1000	1000	1000
10/11	1000	1000	1000
10/12	1000	1000	1000
10/13	1000	1000	1000
10/14	1000	1000	1000
10/15	1000	1000	1000
10/16	1000	1000	1000
10/17	1000	1000	1000
10/18	1000	1000	1000
10/19	1000	1000	1000
10/20	1000	1000	1000
10/21	1000	1000	1000
10/22	1000	1000	1000
10/23	1000	1000	1000
10/24	1000	1000	1000
10/25	1000	1000	1000
10/26	1000	1000	1000
10/27	1000	1000	1000
10/28	1000	1000	1000
10/29	1000	1000	1000
10/30	1000	1000	1000
10/31	1000	1000	1000

~~LLNL~~

[illegible]

The above from page 117

check's data turned using

$$M_{\text{core}} = \frac{1}{3} \omega^2 T^2 + 3T^2$$

DATE	DESCRIPTION	AMOUNT	BALANCE
04	488	194	522
03	578	263	363
		109	109
		83.7	83.7
		0218	0218
		0114	0114
		00606	00606
		0167	0167
		155	155
		292	292

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1.1.35.

$w', k^{-1.5}$ $\frac{v}{V_0} = \frac{1}{2}$, Limiting height = $4R_2$, $R_2 = 117 - h$
 $w_D = 0.24$ $h = 2R_2$

$$w_D = \frac{w}{h^{1.5}} \left[1.067 - .667 \left(\frac{1}{R_2} \right)^{1.5} - .400 \left(\frac{1}{R_2} \right)^{2.5} \right]$$

$k = 148,600$

	$R_2 =$	$\frac{1}{R_2}$	$(\frac{1}{R_2})^{1.5}$	$(\frac{1}{R_2})^2$	$(\frac{1}{R_2})^{2.5}$	$.667(\frac{1}{R_2})^{1.5}$	$.41(\frac{1}{R_2})^{2.5}$	$[\frac{w}{R_2^{1.5}}] \times 10^{13}$	M_C
4R ₂	436	.688	.829	.473	.392	.390	.157	.530	.000193 .102 15.2
736	436	.688	.829	.473	.392	.390	.157	.530	.000193 .102 15.2
736	436	.688	.829	.473	.392	.390	.157	.530	.000193 .102 15.2
728	628	.478	.691	.228	.158	.220	.063	.784	.000385 .302 44.9
1064	764	.393	.627	.154	.097	.164	.039	.864	.000578 .499 74.2
1336	1036	.290	.538	.084	.045	.104	.018	.945	.00116 1.10 163
1584	1284	.234	.483	.055	.027	.075	.011	.981	.00193 1.89 281
2000	1700	.176	.418	.031	.013	.049	.005	1.013	.00385 3.90 580
2288	1988	.151	.398	.023	.009	.039	.004	1.024	.00578 5.92 880
2712	2412	.124	.352	.015	.005	.029	.002	1.036	.00963 9.98 1480
3420	3120	.096	.310	.009	.003	.020	.001	1.046	.0193 20.2 3000
3516	3216	.093	.307	.008	.003	.019	.001	1.047	.0216 21.8 3179
836	596	.773	.358	.787	.741	.557	.291	.214	.00268 .057 84.7
1084	461	.679	.213	.313	.145	.209	.058	.800	.00895 .716 106
1500	.333	.576	.111	.192	.064	.128	.026	.913	.00179 1.63 242
1788	.280	.529	.078	.148	.041	.099	.016	.952	.00268 2.55 379
2212	.224	.475	.051	.107	.024	.071	.010	.986	.00447 4.41 655
2920	.171	.413	.029	.071	.012	.047	.005	1.015	.00895 9.08 1350
496	.602	.776	.362	.467	.281	.311	.112	.644	.000578 .372 55
365	.922	.906	.676	.745	.612	.497	.245	.325	.000578 .188 28
312	.962	.980	.925	.943	.916	.629	.362	.076	.000578 .044 6.5
338	.888	.942	.789	.836	.743	.558	.297	.212	.000578 .123 18.3
900	.333	.577	.111	.192	.064	.128	.026	.913	.00268 .057 84.7

9	1822	322	746	803	643	536	.277	.254	.1216 .541 82
1510	810	210	786	804	644	537	.278	.255	.1217 .542 83

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(1000000)

[illegible]

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Try	W	$h = 1.5$	$R_L = 2.6 R_{p-w}$	$W = 0$	$h = 1.3 R_{p-w}$
2.32	2.625	2.625	2.625	2.625	2.625
2.65	2.625	2.625	2.625	2.625	2.625
3.14	2.625	2.625	2.625	2.625	2.625
3.52	2.625	2.625	2.625	2.625	2.625
3.96	2.625	2.625	2.625	2.625	2.625
5.00	2.625	2.625	2.625	2.625	2.625
5.29	2.625	2.625	2.625	2.625	2.625
8.54	2.625	2.625	2.625	2.625	2.625
14.30	2.625	2.625	2.625	2.625	2.625
13.00	2.625	2.625	2.625	2.625	2.625
16.25	2.625	2.625	2.625	2.625	2.625
22.20	2.625	2.625	2.625	2.625	2.625
16.35	2.625	2.625	2.625	2.625	2.625

$\chi = V_f t_r$ where t_r is time to cooling to a certain temp.

$$V_G = K_1 \omega^{1/2}$$

$$E_T = K_2 \omega^{1/2}$$

$$I_f V_f = \frac{1}{2} V_D, \quad x = R_L$$

and $R_2 = K W^{1/4}$

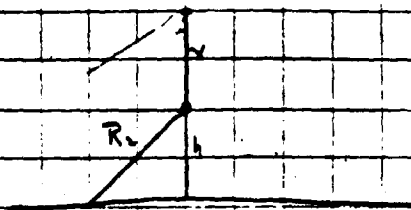
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By as page 120 B with $R_s = 800'$ at $W = 20$, $K = 378$

W	$R_2 = \alpha = \frac{W}{370W}$	$\alpha^{\frac{1}{2}}$	α^2	$\alpha^{\frac{1}{2}}$	$\alpha^{\frac{2}{2}}$	$\alpha^{\frac{1}{2}}$	4α	2α	100α	$\frac{W}{R_2}$	π	$K' = 126$
.84	318	.943	.971	.889	.916	.863	.611	.345	.111	.000090	.000510	1.2
1	378	.794	.891	.630	.707	.561	.472	.224	.371	.000193	.000072	9.0
1.19	450	.667	.815	.445	.574	.363	.363	.145	.559	.000412	.000230	29.0
1.41	533	.563	.750	.317	.422	.238	.281	.095	.691	.000806	.000612	77.2
1.78	673	.446	.668	.199	.298	.133	.199	.053	.815	.00243	.00198	250
2.12	801	.375	.612	.141	.230	.086	.153	.034	.880	.00520	.00458	578
2.52	953	.315	.561	.099	.177	.056	.118	.022	.927	.0111	.0103	1300
3.16	1194	.251	.500	.063	.126	.032	.084	.013	.970	.0306	.0297	3748

$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$	$\frac{R_2}{R_1}$
73	311	965	982	931	948	914	632	366	069	000647	00045	5.2			
	360	833	912	694	760	633	507	253	307	100086	000272	33			
2.16	569	527	724	278	382	201	255	080	732	00243	00178	216			
47	805	373	610	139	228	085	152	034	881	00520	00458	550			
32	1138	264	513	070	135	036	090	014	963	0111	0107	130			
10	1800	167	408	028	068	011	045	004	1.018	0306	0312	379			
	569	979	936	773	823	724	549	290	228	00112	000255	31			
	1138	615	784	378	482	296	321	118	628	00314	00197	239			
2.5	1557	963	981	927	945	809	630	364	073	00200	00014	17.7			
	1011	692	932	479	576	399	384	160	523	00314	00164	20			
	1011	297	545	088	162	048	108	019	940	0112	0105	1302			

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$X = V_f t_T$ where t_T is time to cooling to a c

$$V_f = K_1 W^{1/2}$$

$$t_T = K_2 W^{1/2}$$

If $V_f = \frac{1}{2} V_0$, $X = R_2$

and $R_2 = K W^{1/4}$

Try as page 120 B with $R_2 = 800'$ at $W = 20$, K

$R_2 = 800'$													
h	W	$W^{1/2}$	$370 W^{1/2}$	W/R_2	$W^{1/2}$	W	$W^{1/2}$	W	$W^{1/2}$	W	$W^{1/2}$	W	$W^{1/2}$
300	.5	.84	318	.943	.971	.889	.916	.863	.611	.345	.111	.000090	
	1	1	378	.794	.891	.630	.707	.561	.472	.224	.371	.000193	
	2	1.19	450	.667	.815	.445	.544	.363	.363	.145	.559	.000412	
	4	1.41	533	.563	.750	.317	.422	.238	.281	.095	.691	.000806	
	10	1.78	673	.446	.668	.199	.298	.133	.199	.053	.915	.00243	
	20	2.12	801	.375	.612	.141	.230	.086	.153	.034	.980	.00520	
	40	2.52	953	.315	.561	.099	.177	.056	.118	.022	.927	.0111	
	100	3.16	1194	.251	.500	.063	.126	.032	.084	.013	.970	.0306	

If $R_2 = K W^{1/4}$, $R_2 = 800$ at $W = 20$, $K = 180$

h	W	$W^{1/2}$	R_2	W/R_2	$W^{1/2}$	W	$W^{1/2}$	W	$W^{1/2}$	W	$W^{1/2}$	W	$W^{1/2}$
300	3	1.73	311	.965	.982	.931	.948	.914	.632	.366	.069	.0006	
	4	2	360	.833	.912	.694	.760	.633	.507	.253	.307	.00088	
	10	3.16	569	.527	.724	.278	.382	.201	.255	.080	.732	.0024	
	20	4.47	805	.373	.610	.139	.228	.085	.152	.034	.991	.00520	
	40	6.32	1138	.264	.513	.070	.135	.036	.090	.014	.963	.0111	
	100	10	1800	.167	.408	.028	.068	.011	.045	.004	1.018	.0306	
500	10		569	.979	.936	.773	.823	.724	.549	.290	.228	.00112	
700	40		1138	.415	.784	.378	.482	.296	.321	.118	.628	.00314	
1500	75	8.65	1557	.963	.981	.927	.945	.909	.630	.364	.073	.00200	
K=160.700	40		1011	.692	.832	.479	.576	.399	.384	.160	.523	.00314	
300	40		1011	.297	.545	.088	.162	.048	.108	.019	.940	.0112	

BEST AVAILABLE COPY

LLNL

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LLNL

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~~SECRET~~

Shot	Area	C	Cab	Tower
T-S 5	1		12.28 Fe	44.92 Fe
T-S 6	4		12.28 "	44.92 "
T-S 7	3		14.23 "	50.88 "
T-S 8	2		12.23 "	44.92 "
U-K 1	3		12.28 "	44.92 "
U-K 2	4		23.84 "	76.88 "
			42.56 Conc.	
U-K 6	2		12.28 Fe	44.92 "
U-K 7	1		24.07 "	
			47.70 Conc.	76.88 "
U-K 9	3a		6.68 ← 23.09 Al →	36.25 Al
			← 17.63 Fe →	
			← 2.21 Misc →	
Meth	3		12.3 Fe	45 Fe

LLNL

SECRET

Hand Tack A + B
 $\pm_j = \frac{\ln f_0 - \ln f_j}{\sigma}$

~~SECRET~~

$$M' = \Delta A C_f = \frac{1}{\sigma}$$

$$\Delta f_{ij} = 0.05$$

$$\sigma = 1.3$$

BEST AVAILABLE COPY

LLNL

LC035 0920

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ET

Level i	f_{ij}	f_j	f_{j+1}	$\ln f_0$	$\ln f_j$	$\ln f_{j+1}$	t_j	t_{j+1}
1	0.125	0.100	0.150	2.07944	-2.303	-1.897	3.37110	3.05
	0.425	0.4	.45		-0.916	-0.799	2.30418	2.21
	1.025	1	1.05		0	.04879	1.59956	1.56
	4.025	4	4.05		1.38629	1.39872	.53319	.523
	10.025	10	10.05		2.30259	2.30757	.17165	.1754
	40.025	40	40.05		3.68888	3.69011	1.23803	1.238
	100.025	100	100.05		4.60517	4.60567	1.94286	1.943
	0.0254	0.015	0.065		-4.259	-2.736	4.8754	3.7
6	0.125			0.53063		2.7334	2.17971	1.867
	0.425					1.11279	1.022	
	1.025					.40817	.370	
	4.025					.65820	.6677	
	10.025					1.36304	1.3668	
	40.025					2.42942	2.4303	
	100.025					3.13426	3.1346	
	0.04	0.015	0.065			4.7896	3.266	

Hdk A $f_{ij} = 0.04$

Layer	M
10	53
9	100
8	121
7	108
6	66
5	4
4	3
3	2
2	15 2
1	15 2

BEST AVAILABLE COPY

LLNL

f_j	f_{j+1}	$\ln f_0$	$\ln f_j$	$\ln f_{j+1}$	t_j	t_{j+1}	A_{j+1}	$A_j - A_{j+1}$	MA 1208
0.100	0.150	2.07944	-2.303	-1.097	3.37110	3.05880	.0007		
0.4	.45		-0.916	-0.799	2.30418	2.21418	.0028		
1	1.05		0	.04879	1.59956	1.56203	.0044		
4	4.05		1.38629	1.39872	.53319	.52363	.0043		
10	10.05		2.30259	2.30757	.17165	.17548	.0015		
40	40.05		3.68888	3.69011	1.23803	1.23897	.00017		
100	100.05		4.60517	4.60567	1.94286	1.94325	.00003		
2.015	0.065		-4.259	-2.736	4.8754	3.7038	.500	-.4999 = .0001	3
			4.1997	2.7374	2.17971	1.86740	.01627		
					1.11279	1.02279	.02032		
					.40817	.37064	.01388		
					.65820	.66776	.00306		
					1.36304	1.36687	.00061		
					2.42942	2.43036	.00003		
					3.13421	3.13464	.00001		
					4.7896	3.2666	.0005		

0.53063



2.015 0.065

Hdk A $f_U = 0.04$

M

53

100

121

108

66

4

3

2

15 2

15 2

BEST AVAILABLE COPY

LLNL

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LC075 (92)



	f_{min}	f_0	$\ln f_0$	$\ln f_{min}$	Δ/σ	A	X	
1	0.0274	8	2.07944	-3.8728	4.579	.5000	.0000	1.0
2	0.0222	8		-2.49860	3.522	.4998	.0002	1.0
3	0.1309	8		-1.98778	3.129	.4991	.0009	1.00
4	0.1918	8		-1.65026	2.869	.4980	.0020	1.00
5	0.2465	8		-1.4006	2.677	.4963	.0037	1.00
6	0.3013	1.7	0.53063	-1.17319	1.311	.4049	.0951	1.11
7	0.3562	1.7		-.9326	1.126	.3708	.1292	1.15
8	0.4109	1.7		-.8892	1.092	.3621	.1379	1.16
9	0.4656	1.7		-.7643	0.996	.3413	.1587	1.19
10	0.5205	1.7		-.6529	0.910	.3186	.1814	1.22

If assign M_{mc} to all levels as fallout fraction,
Gaussians add to M

If subtract activity on fall-times > 12 hours:

Hardtack A:

Hardtack B

Layer	% loss of Y2	
10	0.012	0.015
9	0.031	0.026
8	0.033	0.030
7	0.028	0.023
6	0.013	0.012
	<u>0.124</u>	<u>0.104</u>

BEST AVAILABLE COPY

If M₁₂ MC within 12 hours, then for calcu
Y2 = M₁₂ = 1.12 M₁₂ HTK B
Hardtack A, M₁₂ = 1.14 M₁₂ and this
number which should be cranked into calcu

LLNL

for 40,000, 12 hours arrival

$$t = \frac{1}{\sqrt{x}} = 8$$

f_0	$\ln f_0$	$\ln f_{min}$	Δ/σ	A	X	
8	2.07944	-3.8728	4.579	.5000	.0000	1.00
8		-2.49860	3.522	.4998	.0002	1.00
8		-1.98778	3.129	.4991	.0009	1.00
8		-1.65026	2.869	.4980	.0020	1.00
8		-1.4006	2.677	.4963	.0037	1.00
1.7	0.53063	-1.17319	1.311	.4049	.0951	1.11
1.7		-.9326	1.126	.3708	.1292	1.15
1.7		-.8892	1.092	.3621	.1379	1.16
1.7		-.7643	0.996	.3413	.1587	1.19
1.7		-.6529	0.910	.3186	.1814	1.22

assign M_{mc} to all levels as fallout fraction, all
sums add to M

If subtract activity on fall-times > 12 hours:

Handtack A:

% loss of Y2

Handtack B

10	0.019	0.015
9	0.031	0.026
8	0.033	0.030
7	0.028	0.023
6	0.013	0.012
	<u>0.124</u>	<u>0.106</u>

If M_{12} MC within 12 hours, then for calculation:

$$Y2 = M_{12} = 1.12 M_{12} \text{ HTK B}$$

Handtack A, $M_{12} = 1.14 M_{12}$ and this is the
number which should be cranked into calculators

BEST AVAILABLE COPY

LLNL

for 40,000, 12 hours arrived

SECRET

H	t _{mev}	h	f _{min}	f _{max}	f ₀	i	H	t _{mev}
10,000'	3 hr	500	167	.0274	8	1	30,000'	12
		1500	500	.0822	8	2		
		2500	833	.1369	8	3		
		3500	1167	.1918	8	4		
		4500	1500	.2465	8	5		
		5500	1833	.3013	1.7	6		
		6500	2167	.3562	1.7	7		
		7500	2500	.4109	1.7	8		
		8500	2833	.4656	1.7	9		
		9500	3167	.5205	1.7	10		

80,000'	24 hr	4000	167
		12000	
		20,000	
		28,000	
		36,000	
		44,000	
		52,000	
		60,000	
		68,000	
		76,000	3167

BEST AVAILABLE COPY

	f _{min}	f ₀	ln f ₀	ln f _{min}	$\frac{\epsilon}{\sigma}$
1	.0205	8	2.07944	-3.88733	4.58982
2	.0616	8		-2.78709	3.74348
3	.1027	8		-2.27303	3.34805
4	.1438	8		-1.93795	3.09030
5	.1849	8		-1.68740	2.89756
6	.2260	1.7	0.53063	-1.48773	1.55270
7	.2671	1.7		-1.32051	1.42395
8	.3082	1.7		-1.17766	1.31406
9	.3493	1.7		-1.05269	1.21793
10	.3904	1.7		-0.94161	1.13249

LLNL

HDTK-A $M_{\infty} = 1.09 M_{12}$
HDTK-B $M_{\infty} = 1.08 M_{12}$

ft/hr	knots	fo	
fmin	fmax		
167	.0274	8	2
500	.0822	8	3
833	.1369	8	4
1167	.1918	8	5
1500	.2465	8	6
1833	.3013	1.7	7
2167	.3562	1.7	8
2500	.4109	1.7	9
2833	.4656	1.7	10
3167	.5205	1.7	

M	Caev	hi	/hr	Knots
30,000'	12	1500	125	.0205
		4500	375	.0616
		7500	625	.1027
		10,500	875	.1438
		13,500	1125	.1849
		16,500	1375	.2260
		19,500	1625	.2671
		22,500	1875	.3082
		25,500	2125	.3493
		28,500	2375	.3904

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for 30,000' $\leq$ 12 hrs arrival

BEST AVAILABLE COPY

3167

fo	ln fo	ln fmin	$\epsilon = \Delta/\sigma$	A	Loss	Loss in % with A B
8	2.07944	-3.88733	4.58982	1.00	0	0 0
8		-2.78709	3.74348	1.00	0	0 0
8		-2.27303	3.34805	1.00	0	0 0
8		-1.93795	3.09030	1.00	0	0 0
8		-1.68740	2.89756	1.00	0	0 0
1.7	0.53063	-1.48773	1.55270	0.94	.06	.008 .007
1.7		-1.32051	1.42395	0.92	.08	.017 .014
1.7		-1.17766	1.31406	0.91	.09	.022 .020
1.7		-1.05269	1.21793	0.89	.11	.021 .018
1.7		-0.94161	1.13249	0.87	.13	.014 .011
						<u>.082 .070</u>

$$M_{\infty} = 1.09 \quad M_{12}$$

$$M_{\infty} = 1.08 \quad M_{12}$$

LLNL

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~~SECRET~~ A

01	02	03	04	05	06	07	08	09
0	0	80	~~42~~	~~98~~	~~343~~	~~523~~	~~633~~	~~343~~
0	0	0	82	~~17404~~	~~723~~	~~1042~~	~~1341~~	~~6041680~~
0	0	0	110	~~25847~~	~~41093~~	~~51419~~	~~7141855~~	~~8662291~~
0	0	0	90	~~141~~	~~39841~~	~~5141~~	~~2041491~~	~~857841~~
0	0	0	62	~~18365~~	~~300540~~	~~422787~~	~~5401028~~	~~6621269~~
0	0	0	8	~~12313~~	~~210~~	~~3024~~	~~324~~	~~434~~
0	0	0	5	9	13	16	20	234
0	0	0	4	7	10	13	16	19
0	0	0	4	8	9	17	14	16
0	0	0	3	4	6	8	10	12

BEST AVAILABLE COPY

LENL

~~SECRET~~ A

B $f_2 = .04$

04	05	06	07	08	09		
~~42~~	~~98~~	~~723~~	~~523~~	~~633~~	~~343~~	45/.01	42
82	~~196404~~	~~723~~	~~1042~~	~~1351~~	~~6071080~~	192/.01	82
110	~~258547~~	~~410983~~	~~51419~~	~~7141855~~	~~8662291~~	152/.01	110
90	~~4141~~	~~398741~~	~~551141~~	~~201491~~	~~857841~~	153/.01	90
62	~~182305~~	~~300540~~	~~420787~~	~~5401028~~	~~6601269~~	120/.01	62
8	~~12513~~	~~210~~	~~3074~~	~~3129~~	~~434~~	2.6/.01	8
5	9	13	18	20	~~2524~~	2.4/.01	5
4	7	10	13	16	19	2.3/.01	4
4	~~8~~	~~9~~	~~17~~	~~14~~	~~16~~	2.2/.01	4
3	4	6	8	10	12	2.1/.01	3

BEST AVAILABLE COPY

LLNL

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10035 0036

HARDTACK MODEL A, B C-FRACT

BEST AVAILABLE COPY

		Fall Rate					Level				
		0.10	0.11	0.12	0.13	0.14					
Top	10	9223	1163	1323	1372	1412					
	9	704999	80238	163720	2668	2702					
	8	2727	1170	3599	3563	3660					
	7	1018	3163	2891	2412	2481					
	6	1818	1162	1376	1469	1469					
	5	2191	2541	1992	2017	2031					
	4	1510	1751	1920	2031	2031					
	3	2840	44	53	53	53					
	2	28	231	37	37	37					
	1	22	11	13	14	14					
Base	10	.000018	.000021	.000024	.000027	.000030					
	9	.000008	.000009	.000011	.000012	.000013					
	8	.000014	.000017	.000019	.000022	.000024					
	7	.000007	.000008	.000009	.000010	.000012					
	6	0.22	0.24	0.27	0.30	0.33					
	5	1818	1823	1818	1793	1763					
	4	3393	3393	33400	3393	3378					
	3	4209	4331	4512	4534	4992					
	2	2840	3460	3611	3682	3632					
	1	2382	2460	2509	2546	2555					
Top	10	114	126	143	155	173					
	9	61	67	76	84	92					
	8	.000078	.000087	.000099	.000104	.000114					
	7	.000037	.000041	.000046	.000051	.000056					
	6	.000064	.000071	.000080	.000088	.000097					
	5	.000028	.000031	.000035	.000039	.000043					
	4	.000053	.000059	.000067	.000074	.000081					
	3	.000023	.000026	.000030	.000033	.000036					
	2	.000043	.000048	.000054	.000059	.000065					
	1	.000021	.000023	.000026	.000029	.000032					
Base	10	0.50	0.55	0.60	0.65	0.70					
	9	1591	1550	1501	1451	1410					
	8	2037	1984	1922	1858	1806					
	7	.003162	.003081	.002983	.002885	.002784					
	6	.003783	.003686	.003568	.003452	.003354					
	5	.004210	.004101	.003971	.003841	.003732					
	4	.004656	.004536	.004392	.004248	.004128					
	3	.004344	.004345	.004239	.004133	.004044					
	2	.004132	.004026	.003898	.003770	.003664					
	1	.002386	.002325	.002251	.002177	.002116					
Top	10	0.50	0.55	0.60	0.65	0.70					
	9	1591	1550	1501	1451	1410					
	8	2037	1984	1922	1858	1806					
	7	.003162	.003081	.002983	.002885	.002784					
	6	.003783	.003686	.003568	.003452	.003354					
	5	.004210	.004101	.003971	.003841	.003732					
	4	.004656	.004536	.004392	.004248	.004128					
	3	.004344	.004345	.004239	.004133	.004044					
	2	.004132	.004026	.003898	.003770	.003664					
	1	.002386	.002325	.002251	.002177	.002116					
Base	10	0.50	0.55	0.60	0.65	0.70					
	9	1591	1550	1501	1451	1410					
	8	2037	1984	1922	1858	1806					
	7	.003162	.003081	.002983	.002885	.002784					
	6	.003783	.003686	.003568	.003452	.003354					
	5	.004210	.004101	.003971	.003841	.003732					
	4	.004656	.004536	.004392	.004248	.004128					
	3	.004344	.004345	.004239	.004133	.004044					
	2	.004132	.004026	.003898	.003770	.003664					
	1	.002386	.002325	.002251	.002177	.002116					
Top	10	1.00	1.10	1.20	1.30	1.40					
	9	1148	1074	1009	951	886					
	8	1470	1376	1292	1218	1134					
	7	2262	2135	2005	1891	1760					
	6	2730	2554	2398	2262	2106					
	5	3035	2843	2669	2517	2344					
	4	3360	3144	2952	2784	2592					
	3	2478	2319	2177	2053	1912					
	2	2982	2790	2620	2471	2300					
	1	1722	1611	1513	1427	1328					
Base	10	1.00	1.10	1.20	1.30	1.40					
	9	1148	1074	1009	951	886					
	8	1470	1376	1292	1218	1134					
	7	2262	2135	2005	1891	1760					
	6	2730	2554	2398	2262	2106					
	5	3035	2843	2669	2517	2344					
	4	3360	3144	2952	2784	2592					
	3	2478	2319	2177	2053	1912					
	2	2982	2790	2620	2471	2300					
	1	1722	1611	1513	1427	1328					

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HARDTACK MODEL A,B C-FRACTION per 0.05 knots 429

0.10	0.11	0.12	0.13	0.14	0.16	0.18	0.20
1093	1163	1223	1372	1471	1592	1617	175
2727	2727	2727	2727	2727	2727	2727	2727
191	191	191	191	191	191	191	191
1510	1510	1510	1510	1510	1510	1510	1510
40	40	40	40	40	40	40	40
28	28	28	28	28	28	28	28
22	22	22	22	22	22	22	22
08	08	08	08	08	08	08	08
08	08	08	08	08	08	08	08
14	14	14	14	14	14	14	14
27	27	27	27	27	27	27	27
2	2	2	2	2	2	2	2
267	267	267	267	267	267	267	267
4209	4209	4209	4209	4209	4209	4209	4209
3371	3371	3371	3371	3371	3371	3371	3371
30	30	30	30	30	30	30	30
114	114	114	114	114	114	114	114
61	61	61	61	61	61	61	61
78	78	78	78	78	78	78	78
37	37	37	37	37	37	37	37
64	64	64	64	64	64	64	64
28	28	28	28	28	28	28	28
53	53	53	53	53	53	53	53
23	23	23	23	23	23	23	23
43	43	43	43	43	43	43	43
21	21	21	21	21	21	21	21
0.55	0.60	0.65	0.70	0.75	0.80	0.90	
001550	001501	001451	001410	001361	001312	001230	
001984	001922	001858	001806	001743	001680	001575	
003071	002953	002855	002804	002706	002605	002445	
003686	003568	003452	003354	003237	003120	002925	
004101	003971	003841	003732	003602	003472	003255	
004536	004392	004248	004128	003984	003840	003600	
003345	003239	003133	003044	002938	002832	002655	
004026	003898	003770	003664	003536	003408	003195	
002325	002251	002177	002116	002042	001968	001845	
002495	002416	002336	002270	002191	002112	001980	
000256	000267	000279	000290	000295	000308	000323	
000136	000142	000148	000155	000159	000164	000172	
000176	000184	000192	000200	000205	000212	000223	
000083	000087	000090	000094	000097	000100	000105	
000143	000149	000156	000162	000166	000172	000181	
000063	000066	000069	000072	000074	000076	000080	
000120	000125	000130	000136	000139	000144	000151	
000053	000056	000058	000060	000062	000064	000067	
000096	000101	000105	000109	000112	000116	000122	
000046	000049	000051	000053	000054	000056	000059	

BEST AVAILABLE COPY

1.10	1.20	1.30	1.40	1.60	1.80	2.00
1074	1001	951	886	787	697	625
1376	1292	1218	1134	1008	892	800
2135	2025	1891	1760	1565	1386	1242
2554	2398	2262	2106	1872	1658	1486
2643	2669	2517	2344	2083	1844	1654
3144	2952	2784	2592	2304	2040	1829
2319	2177	2053	1912	1694	1504	1349
2790	2620	2471	2300	2045	1810	1623
1611	1513	1427	1328	1181	1046	937
1729	1624	1531	1424	1267	1122	1006
350	357	365	371	382	390	395
186	190	194	198	203	207	210

LLN 25
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BEST AVAILABLE COPY

Base

Top

Base

Top

Base

Top

Base

8	~~1418~~	~~116~~	~~1316~~	~~1469~~	~~1622~~	~~1928~~
7	2191	2541	2939	2987	3083	
6	1510	1751	1992	207	2031	2148
5	~~280~~	~~400~~	~~1020~~	~~1140~~	~~1560~~	~~1500~~
4	~~4838~~	~~44~~	~~53~~	~~54~~	~~8263~~	~~7684~~
3	28	2531	329	37	439	53
2	22	25	28	30	32	25
1	.000018	.000011	.000013	.000014	.000016	.000019
	.000008	.000009	.000011	.000012	.000013	.000016
	.000014	.000017	.000019	.000022	.000024	.000029
	.000007	.000008	.000009	.000010	.000012	.000014

10	0.22	0.24	0.27	0.30	0.33	0.36
9	~~1328~~	~~1823~~	~~1813~~	~~1793~~	~~1763~~	~~1723~~
8	~~4209~~	~~4331~~	~~4512~~	~~4534~~	~~4574~~	~~4617~~
7	~~284~~	~~3460~~	~~3611~~	~~3682~~	~~3652~~	~~3652~~
6	~~2382~~	~~2460~~	~~2509~~	~~2526~~	~~2555~~	~~2546~~
5	~~114~~	~~126~~	~~143~~	~~155~~	~~173~~	~~187~~
4	~~78~~	~~87~~	~~97~~	~~104~~	~~119~~	~~129~~
3	~~37~~	~~41~~	~~46~~	~~51~~	~~56~~	~~61~~
2	~~28~~	~~31~~	~~35~~	~~39~~	~~43~~	~~46~~
1	.000021	.000023	.000026	.000029	.000032	.000034

10	0.50	0.55	0.60	0.65	0.70	0.75
9	~~1591~~	~~1984~~	~~1922~~	~~1858~~	~~1806~~	~~1743~~
8	~~2037~~	~~2368~~	~~2356~~	~~2352~~	~~2354~~	~~2327~~
7	~~003162~~	~~003456~~	~~003392~~	~~004248~~	~~004128~~	~~003984~~
6	~~004210~~	~~004026~~	~~003898~~	~~003770~~	~~003664~~	~~003536~~
5	~~003434~~	~~003325~~	~~003251~~	~~002177~~	~~002116~~	~~002042~~
4	~~004132~~	~~002495~~	~~002416~~	~~002336~~	~~002270~~	~~002191~~
3	~~002356~~	~~002156~~	~~002142~~	~~002179~~	~~002190~~	~~002175~~
2	~~00242~~	~~000136~~	~~000142~~	~~000148~~	~~000155~~	~~000159~~
1	.000129	.000176	.000184	.000192	.000200	.000205

10	1.00	1.10	1.20	1.30	1.40	1.60
9	~~1146~~	~~1074~~	~~1009~~	~~951~~	~~886~~	~~797~~
8	~~1470~~	~~1376~~	~~1292~~	~~1218~~	~~1134~~	~~1008~~
7	~~2252~~	~~2135~~	~~2065~~	~~1891~~	~~1760~~	~~1565~~
6	~~2730~~	~~2554~~	~~2398~~	~~2262~~	~~2106~~	~~1872~~
5	~~3035~~	~~2843~~	~~2669~~	~~2517~~	~~2344~~	~~2093~~
4	~~3360~~	~~3144~~	~~2952~~	~~2784~~	~~2592~~	~~2304~~
3	~~2475~~	~~2319~~	~~2177~~	~~2053~~	~~1912~~	~~1699~~
2	~~2982~~	~~2790~~	~~2620~~	~~2471~~	~~2300~~	~~2045~~
1	~~1722~~	~~1611~~	~~1513~~	~~1427~~	~~1328~~	~~1161~~

11703	1212	1417	1506	1550	2234	2538
1162	2891	2921	2926	2946	2906	3296
2541	1316	2412	1469	1622	2234	2540
1751	1992	2017	2031	2148	3179	3275
1008	1020	1140	1260	1500	2226	2304
40	50	53	54	563	768	102
31	37	39	44	53	589	55
25	28	30	32	25	62	000070
11	13	14	14	000036	29	000033
000009	000011	000012	000013	000016	000019	000022
000017	000019	000022	000024	000029	000036	000042
000008	000009	000010	000012	000014	000016	000019
0.24	0.27	0.30	0.33	0.36	0.40	0.44
1823	1813	1793	1753	1723	1673	1648
952	1048	1143	1238	1333	1428	1523
3393	3400	3393	3378	3358	3335	3312
4331	4342	4354	4374	4394	4417	4440
3460	3460	3460	3460	3460	3460	3460
2460	2460	2460	2460	2460	2460	2460
2460	2460	2460	2460	2460	2460	2460
126	126	126	126	126	126	126
67	67	67	67	67	67	67
000087	000087	000087	000087	000087	000087	000087
000041	000041	000041	000041	000041	000041	000041
000071	000071	000071	000071	000071	000071	000071
000031	000031	000031	000031	000031	000031	000031
000059	000059	000059	000059	000059	000059	000059
000026	000026	000026	000026	000026	000026	000026
000048	000048	000048	000048	000048	000048	000048
000023	000023	000023	000023	000023	000023	000023
0.55	0.60	0.65	0.70	0.75	0.80	0.90
001550	001501	001451	001410	001361	001312	001250
001984	001922	001858	001806	001743	001680	001575
003081	002953	002855	002804	002706	002605	002445
003686	003568	003451	003354	003237	003120	002925
004101	003971	003842	003732	003602	003472	003255
004536	004392	004248	004128	003984	003840	003600
003345	003239	003133	003044	002938	002832	002655
004026	003898	003770	003664	003536	003408	003195
002325	002251	002177	002116	002042	001965	001845
002495	002416	002336	002270	002191	002112	001980
000256	000267	000279	000290	000295	000305	000323
000136	000142	000148	000155	000159	000164	000172
000176	000184	000192	000200	000205	000212	000223
000083	000087	000090	000094	000097	000100	000105
000143	000147	000156	000162	000166	000172	000181
000063	000066	000069	000072	000074	000076	000080
000120	000125	000130	000136	000139	000144	000151
000053	000056	000058	000060	000062	000064	000067
000096	000101	000105	000109	000112	000116	000122
000046	000049	000051	000053	000054	000056	000059
1.10	1.20	1.30	1.40	1.60	1.80	2.00
1074	1001	951	886	787	697	625
1376	1292	1218	1134	1008	892	800
2135	2015	1891	1760	1565	1356	1242
2554	2398	2262	2106	1872	1658	1486
2843	2669	2517	2344	2083	1844	1654
3144	2952	2784	2592	2304	2040	1829
2319	2177	2053	1912	1699	1504	1349
2790	2620	2471	2300	2045	1810	1623
1611	1513	1427	1328	1181	1046	937
1729	1624	1531	1424	1267	1122	1006
350	357	365	371	382	390	395
186	190	194	198	203	207	210
241	245	251	255	263	268	271
114	116	118	120	124	126	128
195	199	204	207	213	218	220
86	88	90	92	94	96	97
163	167	171	174	179	182	184
73	74	76	77	79	80	81
132	134	137	140	144	147	148
64	65	66	67	69	71	72

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2.66	2.7	2.69	2.00	2.30	2.60	4.00	4.40
225	508	439	385	332	297	250	216
225	651	562	494	425	380	320	277
246	1011	872	766	660	570	497	430
246	1209	1043	916	790	706	595	515
256	1345	1161	1020	879	786	662	573
256	1488	1294	1128	972	869	732	634
270	1627	1447	1282	1128	1011	869	732
270	1771	1594	1440	1282	1128	1011	869
270	1920	1748	1594	1440	1282	1128	1011
270	2074	1908	1748	1594	1440	1282	1011
270	2233	2074	1908	1748	1594	1440	1282
270	2397	2244	2074	1908	1748	1594	1440
270	2566	2419	2244	2074	1908	1748	1594
270	2740	2598	2419	2244	2074	1908	1748
270	2919	2781	2598	2419	2244	2074	1908
270	3103	2970	2781	2598	2419	2244	2074
270	3292	3164	2970	2781	2598	2419	2074
270	3486	3363	3164	2970	2781	2598	2074
270	3685	3567	3363	3164	2970	2781	2074
270	3889	3776	3567	3363	3164	2970	2074
270	4098	3990	3776	3567	3363	3164	2074
270	4312	4209	3990	3776	3567	3363	2074
270	4531	4434	4209	3990	3776	3567	2074
270	4755	4664	4434	4209	3990	3776	2074
270	4984	4893	4664	4434	4209	3990	2074
270	5218	5127	4893	4664	4434	4209	2074
270	5457	5366	5127	4893	4664	4434	2074
270	5691	5600	5366	5127	4893	4664	2074
270	5930	5839	5600	5366	5127	4893	2074
270	6174	6083	5839	5600	5366	5127	2074
270	6423	6332	6083	5839	5600	5366	2074
270	6677	6586	6332	6083	5839	5600	2074
270	6936	6845	6586	6332	6083	5839	2074
270	7190	7100	6845	6586	6332	6083	2074
270	7449	7359	7100	6845	6586	6332	2074
270	7713	7623	7359	7100	6845	6586	2074
270	7982	7892	7623	7359	7100	6845	2074
270	8256	8166	7892	7623	7359	7100	2074
270	8535	8445	8166	7892	7623	7359	2074
270	8819	8729	8445	8166	7892	7623	2074
270	9108	9018	8729	8445	8166	7892	2074
270	9392	9302	9018	8729	8445	8166	2074
270	9681	9591	9302	9018	8729	8445	2074
270	9975	9885	9591	9302	9018	8729	2074
270	10274	10184	9885	9591	9302	9018	2074
270	10578	10488	10184	9885	9591	9302	2074
270	10887	10797	10488	10184	9885	9591	2074
270	11191	11101	10797	10488	10184	9885	2074
270	11500	11410	11101	10797	10488	10184	2074
270	11814	11724	11410	11101	10797	10488	2074
270	12133	12043	11724	11410	11101	10797	2074
270	12457	12367	12043	11724	11410	11101	2074
270	12786	12696	12367	12043	11724	11410	2074
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270	13459	13369	13030	12696	12367	12043	2074
270	13803	13713	13369	13030	12696	12367	2074
270	14152	14062	13713	13369	13030	12696	2074
270	14506	14416	14062	13713	13369	13030	2074
270	14865	14775	14416	14062	13713	13369	2074
270	15229	15139	14775	14416	14062	13713	2074
270	15598	15508	15139	14775	14416	14062	2074
270	15972	15882	15508	15139	14775	14416	2074
270	16351	16261	15882	15508	15139	14775	2074
270	16735	16645	16261	15882	15508	15139	2074
270	17124	17034	16645	16261	15882	15508	2074
270	17518	17428	17034	16645	16261	15882	2074
270	17917	17827	17428	17034	16645	16261	2074
270	18321	18231	17827	17428	17034	16645	2074
270	18730	18640	18231	17827	17428	17034	2074
270	19144	19054	18640	18231	17827	17428	2074
270	19563	19473	19054	18640	18231	17827	2074
270	19987	19897	19473	19054	18640	18231	2074
270	20416	20326	19897	19473	19054	18640	2074
270	20850	20760	20326	19897	19473	19054	2074
270	21289	21199	20760	20326	19897	19473	2074
270	21733	21643	21199	20760	20326	19897	2074
270	22182	22092	21643	21199	20760	20326	2074
270	22636	22546	22092	21643	21199	20760	2074
270	23095	23005	22546	22092	21643	21199	2074
270	23559	23469	23005	22546	22092	21643	2074
270	24028	23938	23469	23005	22546	22092	2074
270	24502	24412	23938	23469	23005	22546	2074
270	24981	24891	24412	23938	23469	23005	2074
270	25465	25375	24891	24412	23938	23469	2074
270	25954	25864	25375	24891	24412	23938	2074
270	26448	26358	25864	25375	24891	24412	2074
270	26947	26857	26358	25864	25375	24891	2074
270	27451	27361	26857	26358	25864	25375	2074
270	27960	27870	27361	26857	26358	25864	2074
270	28474	28384	27870	27361	26857	26358	2074
270	28993	28903	28384	27870	27361	26857	2074
270	29517	29427	28903	28384	27870	27361	2074
270	30046	29956	29427	28903	28384	27870	2074
270	30580	30490	29956	29427	28903	28384	2074
270	31119	31029	30490	29956	29427	28903	2074
270	31663	31573	31029	30490	29956	29427	2074
270	32212	32122	31573	31029	30490	29956	2074
270	32766	32676	32122	31573	31029	30490	2074
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270	35611	35521	34942	34368	33799	33235	2074
270	36195	36105	35521	34942	34368	33799	2074
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270	37977	37887	37288	36694	36105	35521	2074
270	38581	38491	37887	37288	36694	36105	2074
270	39190	39100	38491	37887	37288	36694	2074
270	39804	39714	39100	38491	37887	37288	2074
270	40423	40333	39714	39100	38491	37288	2074
270	41047	40957	40333	39714	39100	38491	2074
270	41676	41586	40957	40333	39714	39100	2074
270	42310	42220	41586	40957	40333	39714	2074
270	42949	42859	42220	41586	40957	40333	2074
270	43593	43503	42859	42220	41586	40957	2074
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270	44896	44806	44152	43503	42859	42220	2074
270	45555	45465	44806	44152	43503	42859	2074
270	46219	46129	45465	44806	44152	43503	2074
270	46888	46798	46129	45465	44806	44152	2074
270	47562	47472	46798	46129	45465	44806	2074
270	48241	48151	47472	46798	46129	45465	2074
270	48925	48835	48151	47472	46798	46129	2074
270	49614	49524	48835	48151	47472	46798	2074
270	50308	50218	49524	48835	48151	47472	2074
270	51007	50917	50218	49524	48835	48151	2074
270	51711	51621	50917	50218	49524	48835	2074
270	52420	52330	51621	50917	50218	49524	2074
270	53134	53044	52330	51621	50917	50218	2074
270	53853	53763	53044	52330	51621	50917	2074
270	54577	54487	53763	53044	52330	51621	2074
270	55306	55216	54487	53763	53044	52330	2074
270	56040	55950	55216	54487	53763	53044	2074
270	56779	56689	55950	55216	54487	53763	2074
270	57523	57433	56689	55950	55216	54487	2074
270	58272	58182	57433	56689	55950	55216	2074
270	59026	58936	58182	57433	56689	55950	2074
270	59785	59695	58936	58182	57433	56689	2074
270	60549	60459	59695	58936	58182	57433	2074
270	61318	61228	60459	59695	58936	58182	2074
270	62092	62002	61228	60459	59695	58936	2074
270	62871	62781	62002	61228	60459	59695	2074
270	63655	63565	62781	62002	61228	60459	2074
270	64444	64354	63565	62781	62002	61228	2074
270	65238	65148	64354	63565	62781	62002	2074
270	66037	65947	65148	64354	63565	62781	2074
270	66841	66751	66037	65238	64444	63655	2074
270	67650	67560	66841	66037	65238	64444	2074
270	68464	68374	67650	67650	66841	66037	2074
270	69283	69193	68464	68464	67650	67650	2074
270	70107	70017	69283	69283	684		

Top	10	2.20 566	2.40 506	2.70 439	3.00 385	3.30 332	3.60 297
	9	724	651	562	494	425	380
	8	1625	1011	872	766	660	570
	7	1346	1209	1043	916	790	706
	6	1467	1345	1161	1020	879	786
	5	1656	1488	1294	1128	972	869
	4	1221	1097	947	832	717	641
	3	1470	1321	1140	1001	863	771
	2	849	763	658	578	498	445
	1	911	818	706	620	535	478

Base

Top

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10	5.00 175	5.50 151	6.00 129	6.50 112	7.00 98	7.50 87
9	225	193	165	144	126	111
8	349	300	256	223	196	173
7	417	359	306	267	234	207
6	464	399	341	297	260	230
5	514	442	377	329	288	254
4	379	326	278	242	212	182
3	456	392	278	292	256	226
2	263	226	193	169	148	135
1	282	243	207	181	158	140

10	10.0 50	11.0 41	12.0 35	13.0 30	14.0 26	16.0 20
9	64	53	45	39	33	26
8	99	82	70	60	52	40
7	118	99	84	72	62	48
6	131	110	93	80	69	53
5	145	121	103	88	76	59
4	107	90	76	65	56	44
3	129	108	92	78	67	52
2	74	62	53	45	39	30
1	80	67	57	48	42	32

10	22.0 11	24.0 9	27.0 7	30.0 6	33.0 5	36.0 4
9	14	12	9	8	6	5
8	22	18	15	12	10	8
7	26	22	18	14	12	10
6	32	27	20	16	13	11
5	24	20	16	13	11	9
4	28	24	19	16	13	10
3	16	14	11	9	8	6
2	18	15	12	10	8	7
1	36	31	25	21	18	15

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Base

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6	849	763	658	578	863	771	65
5	911	818	706	620	498	445	37
4	396	396	393	385	535	478	40
3	211	211	209	205	372	357	33
2	272	272	270	265	198	190	17
1	128	128	128	125	256	245	22
	221	221	219	215	121	116	108
	98	98	97	95	208	199	181
	185	185	184	180	92	88	82
	82	82	81	80	174	167	156
	149	149	148	145	77	74	69
	72	72	71	70	140	134	125
					68	65	60
	5.00	5.50	6.00	6.50	7.00	7.50	8.00
10	175	151	129	112	96	87	75
9	225	193	165	144	126	111	97
8	349	300	256	223	196	173	150
7	417	359	306	267	234	207	179
6	464	399	341	297	260	230	200
5	514	442	377	329	288	254	221
4	379	326	278	242	212	188	163
3	456	392	328	292	256	226	196
2	263	226	193	169	148	130	113
1	282	243	207	181	158	140	121
	270	246	223	204	187	171	157
	144	131	119	109	100	91	84
	186	170	145	140	129	118	108
	88	80	72	66	61	56	51
	150	138	125	114	104	95	86
	66	61	55	50	46	42	39
	126	115	104	95	87	80	73
	56	51	46	42	39	36	33
	102	93	84	77	70	64	59
	49	45	41	37	34	31	29
	10.0	11.0	12.0	13.0	14.0	16.0	18.0
10	50	41	35	30	26	20	16
9	64	53	45	39	33	26	21
8	99	82	70	60	52	40	32
7	118	99	84	72	62	48	38
6	131	110	93	80	69	53	43
5	145	121	103	88	76	59	47
4	107	90	76	65	56	44	35
3	129	108	92	78	67	52	42
2	74	62	53	45	39	30	24
1	80	67	57	48	42	32	26
	118	103	92	81	72	59	49
	63	55	49	43	39	31	26
	81	71	63	56	50	41	34
	38	34	30	26	24	19	16
	66	58	51	45	40	33	27
	29	25	23	20	18	15	12
	55	48	43	38	34	28	23
	24	21	19	17	15	12	10
	44	39	35	30	27	22	18
	21	19	17	15	13	11	9
	22.0	24.0	27.0	30.0	33.0	36.0	40.0
10	11	9	7	6	5	4	3
9	14	12	10	9	8	7	6
8	22	22	20	18	16	14	12
7	29	27	24	22	20	18	16
6	32	30	27	25	23	21	19
5	24	24	22	20	18	16	14
4	28	28	26	24	22	20	18
3	16	15	14	13	12	11	10
2	36	31	28	26	24	22	20
1	19	16	14	12	11	10	9
	25	21	18	16	14	12	10
	12	10	9	8	7	6	5
	20	17	15	13	12	10	9
	9	8	7	6	5	4	3
	17	14	12	10	9	8	7
	7	6	5	4	3	2	1

BEST AVAILABLE COPY

LLNL

Hywag-40-1365

5-6-7-8-9-10-11-12-13-14-15-16-17-18-19-20-21-22-23-24-25-26-27-28-29-30-31-32-33-34-35-36-37-38-39-40-41-42-43-44-45-46-47-48-49-50-51-52-53-54-55-56-57-58-59-60-61-62-63-64-65-66-67-68-69-70-71-72-73-74-75-76-77-78-79-80-81-82-83-84-85-86-87-88-89-90-91-92-93-94-95-96-97-98-99-100

818
396
211
272
128
221
98
185
82
149
72

5.50
151
193
300
359
399
442
326
392
226
243
246
131
170
80
138
61
115
51
93
45

11.0
41
53
82
99
110
121
90
108
62
67
103
55
71
34
56
25
48
21
34
19

24.0
9
12
18
22
24
27
20
24
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15
31
16
21
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8
14
6
12
6

706
393
209
270
128
219
97
184
81
146
71

6.00
129
165
256
306
341
377
278
278
193
207
223
119
145
72
125
55
104
46
84
41

12.0
35
45
70
84
93
103
76
92
53
57
92
49
63
30
51
23
43
19
35
17

27.0
7
9
15
18
20
22
16
19
11
12
25
14
17
8
14
12
5
10
5

620
385
205
265
125
215
95
180
80
145
70

6.50
112
144
223
267
297
329
242
292
169
181
204
109
140
66
114
50
95
42
77
37

13.0
30
39
60
72
80
88
65
78
45
48
81
43
56
26
45
20
36
17
30
15

30.0
6
8
12
14
16
18
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10
21
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15
7
12
5
10
4
8
4

535
372
198
256
121
208
92
174
77
140
68

7.00
98
126
196
234
260
288
212
256
148
158
187
100
129
61
104
46
87
39
70
34

14.0
26
33
52
62
69
76
56
67
39
42
72
39
50
24
40
18
34
15
27
13

23.0
5
6
10
12
13
15
11
13
8
10
18
10
12
10
4
8
4
3
2
3

478
357
190
245
116
199
88
167
74
134
65

7.50
87
111
173
207
230
254
188
226
130
140
171
91
118
56
95
42
80
36
64
31

16.0
20
26
40
48
53
59
44
52
30
32
59
31
41
19
33
15
28
12
22
11

36.0
4
5
8
10
11
12
9
11
6
7
15
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11
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4
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3
6
3

403
333
177
229
108
186
82
156
69
125
60

8.00
75
97
150
179
200
221
163
196
113
121
157
84
108
51
88
39
73
33
59
29

18.0
16
21
32
38
43
47
35
42
24
26
49
26
34
16
27
12
23
10
18
9

40.0
3
4
7
10
10
10
10
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10
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10
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10
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10
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10
10

348
308
164
212
100
172
76
144
64
116
56

9.00
61
78
121
144
161
178
131
158
91
98
118
63
81
38
29
55
24
44
21

20.0
13
17
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31
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38
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42
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16
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50.0
2
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6
6

BEST AVAILABLE COPY

LLNL

~~SECRET~~

LLNL

~~SECRET~~

350

~~SECRET~~

Total Yield
Fission Yield
Fallout Yield

DELETED

~~SECRET~~

Cloud Height 70-75 kft

Radii 2, 9 n. mi.

W fallout yield 10x Batzels. ~~2~~

Na etc fallout yield $\frac{1}{2}$ "

BEST AVAILABLE COPY

Dose, 1 hr to 100 days, fission: 9.6

Dose, 1 hr to ∞ " 14

Dose, 1 hr to 100 days, W: 16

" , 1 hr to ∞ , " 16

For (1 hr) arrival, $W = 1.14$ fission Dose
Total Dose = (2.14) x fission inf.

Dose 2 hr to 100 days, fission: 8.4

" " " ∞ " 11

" " " 100 days, W: 15.6

" " " ∞ " W 15.6

For (2 hr) arrival, $W = 1.42$ fission Dose

Total Dose = (2.42) x fission inf.

Dose 3 hr to 100 days, fission: 7.6

" " " ∞ " 10

" 3 hr " 100 days, W: 14.8

" " " ∞ " " "

For (3 hr) arrival, $W = 1.48$ fission ^{LLNL}

Total Dose = (2.48) fission D.

4 hr " " = 2.40

5 " " = 2.49

6 " " = 2.46

7

Total Yield
Fission Yield
Fallout Yield

DELETED

~~SECRET~~

Cloud Height 70-75 kft

Radii 2, 9 n. mi.

W fallout yield 10x Batzel's. ~~1~~

Na etc fallout yield $\frac{1}{2}$

BEST AVAILABLE COPY

Dose, 1 hr to 100 days, fission: 9.6

Dose, 1 hr to ∞ " 14

Dose, 1 hr to 100 days, W: 16

" 1 hr to ∞ " 16

For (1 hr) arrival, $W = 1.14$ fission Dose
Total Dose = (2.14) x fission inf Dose

Dose 2 hr to 100 days, fission: 8.4

" " " ∞ " 11

" " " 100 days, W: 15.6

" " " ∞ " 15.6

For (2 hr) arrival, $W = 1.42$ fission Dose
Total Dose = (2.42) x fission inf. Dose

Dose 3 hr to 100 days, fission: 7.6

" " " ∞ " 10

" 3 hr " 100 days, W: 14.8

" " " ∞ " "

For (3 hr) arrival, $W = 1.48$ fission Dose
Total Dose = (2.48) fission Dose

4 hr " " = 2.40

5 " " = 2.49

6 " " = 2.46

7

8

c

LLNL

Cloud Height 10-15 Kft

Radii 2, 9 n. mi.

W fallout yield 10x Batzel 5. ~~1~~

N etc fallout yield ~~X~~

BEST AVAILABLE COPY

Dose, 1 hr to 100 days, fission: 9.6

Dose, 1 hr to ∞ , " 14

Dose, 1 hr to 100 days, W: 16

" , 1 hr to ∞ , " 16

For (1 hr) annual, $W = 1.14$ fission Dose
Total Dose = (2.14) x fission inf

Dose 2 hr to 100 days, fission: 8.4

" " " ∞ " 11

" " " 100 days, W: 15.6

" " " ∞ " W 15.6

For (2 hr) annual, $W = 1.42$ fission Dose
Total Dose = (2.42) x fission Inf.

Dose 3 hr to 100 days, fission: 7.6

" " " ∞ " 10

" 3 hr " 100 days, W: 14.8

" " " ∞ " " "

For (3 hr) annual, $W = 1.48$ fission T-

Total Dose = (2.48) fission Dose

4 hr " " = 2.40

5 " " = 2.49

6 " " = 2.46

7

8

9

10

11

12

LLNL

FIR

DELETED

K+E SEMI-LOGARITHMIC 359-91
KEUFFEL & ESSER CO. MADE IN U.S.A.
3 CYCLES X 70 DIVISIONS

LLNL

FIR

DELETED

KOE SEMI-LOGARITHMIC 359-91
 KEUFFEL & ESSER CO. MADE IN U.S.A.
 5 CYCLES X 70 DIVISIONS

LLNL

353

DELETED

LLNL

34

Base from 5 m. off

toes

2.6

2.4

2.2

2.0

1.8

16.5

16

15.5

1.4

1.2

1

.8

.6

.4

2.7

2.4

2.0

DELETED

LLNL

357

DELETED

BEST AVAILABLE COPY

$x_{hrs} \rightarrow \infty$	Tungsten Dose $x_{hr} \rightarrow \infty$	Sfc Dose $x_{hr} \rightarrow \infty$	F+W+S	$\beta = \frac{F+W+S}{F}$
F		$x3.75$ for prog 2 data		
12.0	16.3	9.0 2.4	37.3 30.7	2.56 3.11
11.0	15.6	7.9 2.1	34.5 28.7	2.61 3.14
10.5	14.7	7.1 1.9	32.3 27.1	2.58 3.08
10.0	13.9	6.4 1.7	30.3 25.6	2.56 3.03
9.5	13.2	5.6 1.5	28.3 24.2	2.55 2.98
9.0	12.7	5.2 1.4	26.9 23.1	2.57 2.99
8.5	12.1	5.2 1.4	25.8 22.0	2.59 3.04
9.0	11.5	4.5 1.2	25.0 21.7	2.41 2.78
8.5	11.2	4.1 1.1	23.8 20.8	2.45 2.80
8.5	10.8	4.1 1.1	23.4 20.4	2.40 2.75
8.0	10.5	3.8 1.0	22.3 19.5	2.44 2.79
8.0	10.1	3.8 1.0	21.9 19.1	2.39 2.74
7.5	4.1	1.5 0.4	13.1 12.0	1.60 1.75
5.5	1.7	1.1 0.3	8.3 7.5	1.36 1.51

LLNL

Fir.

Fcst

Total Yield

Fission Yield

DELETED

Fallout Yield

Cloud Height

70-75 Kft.

Cloud Radii

2 & 9 mi

Tungsten fallout yield :

Na etc fallout yield :

DELETED

Fission Doses			Tungsten Dose	Sfc Dose	F+W+S	
X hr	X hrs → 100 days	X hrs → ∞	X hr → ∞	X hr → ∞		
↓		F		X 3.75 for prev 2 dates		
1	9.5	12.0	16.3	9.0 2.4	37.3	30.7
2	8.3	11.0	15.6	7.9 2.1	34.5	28.7
3	7.6	10.5	14.7	7.1 1.9	32.3	27.1
4	7.1	10.0	13.9	6.4 1.7	30.3	25.6
5	6.7	9.5	13.2	5.6 1.5	28.3	24.2
6	6.3	9.0	12.7	5.2 1.4	26.9	23.1
7	6.1	8.5	12.1	5.2 1.4	25.8	22.0
8	6.0	9.0	11.5	4.5 1.2	25.0	21.7
9	5.8	8.5	11.2	4.1 1.1	23.8	20.8
10	5.6	8.5	10.8	4.1 1.1	23.4	20.4
11	5.4	8.0	10.5	3.8 1.0	22.3	19.5
12	5.3	8.0	10.1	3.8 1.0	21.9	19.1
50	3.3	7.5	4.1	1.5 0.4	13.1	12.0
100	2.2	5.5	1.7	1.1 0.3	8.3	7.5

BEST AVAILABLE COPY

LLNL

~~SECRET~~

21

21

LLNL

360

1957 1957

Observation Time	Fast Ready	Fallout Ready	Briefing
1200	1900		
500	19 ⁴⁵ ~~00~~	20 ⁴⁵ ~~30~~	21 ³⁰ ~~15~~
800	2300		
1100	0100	0230	0300
400	0400		
200	0330	0500	0530
400	0530		
600	1230	1400	1430

all obs 45 stations

antial obs 9 stat.

intermediate obs 15 stat.

real obs. 4 stations

Eniwetok, Bikini, Uterik, K-usae, (Maybe ships.)

BEST AVAILABLE COPY

LLNL

	Observation Time	Fcst Ready	Fallout Ready
*	1200	1900	
†	1500	19 ⁴⁵ ~~00~~	⁴⁵ 2030
Δ	1800	2300	
‡	2100	0100	0230
*	2400	0400	
⌘	0200	0330	0500
⌘	0400	0530	
Δ	0600	1230	1400

* Full obs 45 stations

† Partial obs 9 stat.

Δ Intermediate obs 15 stat.

⌘ Local obs. 4 stations
Eniwetok, Bikini, Uterik, Kusaie,

BEST AVAILABLE COPY

LLNL

Ready date: 23 April

~~SECRET~~

1	Turned off	1430	22 April	for	23 April
2	"	"	23 April	"	24 "
3	"	2100	24 "	"	25 "
4	"	"	25 "	"	26 "
5	"	2100	26 "	"	27 "
6	"	1430	27 "	"	28 "
7	"	2100	28 "	"	29 "
8	"	2100	29 "	"	30 "
9	"	2100	30 "	"	1 May
10	"	2500	1 May	"	2 May
11	"	~~1430~~	2 "	"	3 May
12	"	~~1430~~	3 "	"	4 May
13	"	2100	4 "	"	5 "
14	"	1430	5 "	"	6 "
15	"	0300	7 "	"	7 "
16	"	2100	7 "	"	8 "
17	"	1430	8 "	"	9 "
18	"	0300	10 "	"	10 "

BEST AVAILABLE COPY

LLNL

75 mi
NE
niwetk

Fir.

1497

Ready date: 23 April

1	Turned off	1430	22 April	f
2	"	"	23 April	"
3	"	"	24 "	"
4	"	"	25 "	"
5	"	"	26 "	"
6	"	"	27 "	"
7	"	"	28 "	"
8	"	"	29 "	"
9	"	"	30 "	"
10	"	"	2500	1 May
11	"	"	~~1430~~	2 "
12	"	"	~~1430~~	3 "
13	"	"	2100	4 "
14	"	"	1430	5 "
15	"	"	0300	7 "
16	"	"	2100	7 "
17	"	"	1430	8 "
18	"	"	0300	10 "

BEST AVAILABLE COPY

LLNL

1000 0000

366

~~SECRET~~

dirgt. 00 - r + secret pool

sec. 2 - 1
faint

2 1 7 1 1

BEST AVAILABLE COPY

LLNL

actus

Fallout yield DELETED
Cloud Ht 30 kft
Ratio 0.5/2

- 1 Turned off 0300/29 Apr 4 for 30 April
- 2 " " 2100/30 " " 1 May ← sent back may
- 3 " " 0600 3 May " 3 May
- 4 " " 0500 4 May " 4 May
- ~~5 " " 2100 4 May " 4 May~~
- 5 " " 2100 4 May " 5 May

BEST AVAILABLE COPY

LLNL

142

Koa

Total yield

Fission "

Fallout "

Cloud height

Radii

DELETED

2:10 mi. n.

BEST AVAILABLE COPY

LLNL

Butter not

Total yield
Fallout "
Cloud height
Radii

DELETED

135-56 Kft

1:4 n mi

Turned off 0300 10 MAY for 0600 10 MAY

BEST AVAILABLE COPY

LLNL



Calc Inf Dose

5.5R if FIR

4.1R if KOA

BEST AVAILABLE COPY

LLNL

Falloot, Parry Island, Court in compound.

5/12/65 7/12/65

5/12

Date
May 13
May 14

Rate $\frac{m}{hr}$

Time

Fir-Butternut + hrs

K

0.02

1530

33.67 34.08

2

12

0800

50.16 50.58

25

12

0815

50.42 50.83

2

13

0830

50.67 51.08

26

13

0845

50.92 51.33

26

14

0900

51.17 51.58

2

14

0915

51.42 51.83

2

15

0930

51.67 52.08

2

15

0945

51.92 52.33

2

16

1000

52.17 52.58

2

15

1015

52.42 52.83

2

17

1030

52.67 53.08

2

15

1045

52.92 53.33

2

15

1100

53.17 53.58

2

15

1115

53.42 53.83

2

17

1135

54.09 54.50

2

18

1215

54.42 54.83

3

18

1230

54.67 55.08

3

19

1245

54.92 55.33

3

17

1300

55.17 55.58

3

19

1345

55.92 56.33

3

18

1430

56.67 57.08

3

18

1530

57.67 58.08

3

14

1630

58.67 59.08

3

18

1945

61.92 62.33

3

17

2140

63.84 64.25

4

15

0715

74.42 74.83

5

15

0830

75.67 76.08

5

15

0940

76.83 77.24

5

14

1055

78.08 78.49

5

14

1135

78.75 79.16

5

13

1335

80.75 81.16

5

11

1405

81.25 81.66

5

12

1440

81.83 82.24

5

11

1500

82.16 82.57

5

11

1530

82.66 83.07

372

12

1630

83.66 84.07

5

1700

84.11 84.57

5

BEST AVAILABLE COPY

May 15

LLNL

372

oot, Yarry Island , Court in Compend.

5/12/0550 7/12/0615

5/13/0630

Rate	hr	Time	Fir-Butternut + hrs		Koa +
3	0.02	1530	33.67	34.08	9.00
4	12	0800	50.16	50.58	25.50
	12	0815	50.42	50.83	25.75
	13	0830	50.67	51.08	26.00
	13	0845	50.92	51.33	26.25
	14	0900	51.17	51.58	26.50
	14	0915	51.42	51.83	26.75
	15	0930	51.67	52.08	27.00
	15	0945	51.92	52.33	27.25
	16	1000	52.17	52.58	27.50
	15	1015	52.42	52.83	27.75
	17	1030	52.67	53.08	28.00
	15	1045	52.92	53.33	28.25
	15	1100	53.17	53.58	28.50
	15	1115	53.42	53.83	28.75
	17	1155	54.09	54.50	29.42
	18	1215	54.42	54.83	29.75
	18	1230	54.67	55.08	30.00
	19	1245	54.92	55.33	30.25
	17	1300	55.17	55.58	30.50
	19	1345	55.92	56.33	31.25
	18	1430	56.67	57.08	32.00
	18	1530	57.67	58.08	33.00
	14	1630	58.67	59.08	34.00
	18	1945	61.92	62.33	37.25
	17	2140	63.84	64.25	39.17
	15	0715	74.42	74.83	49.75
	15	0830	75.67	76.08	51.00
	15	0940	76.83	77.24	52.16
	14	1055	78.08	78.49	53.41
	14	1135	78.75	79.16	54.08
	13	1335	80.75	81.16	56.08
	11	1405	81.25	81.66	56.58
	12	1440	81.83	82.24	57.16
	11	1500	82.16	82.57	57.49
	11	1530	82.66	83.07	57.99
	12	1630	83.66	84.07	58.99
	12	1700	84.16	84.57	59.49
6	9	0755	99.08	99.49	74.41
					75.49

BEST AVAILABLE COPY

LLNL 56.58

373

May 13
May 14

BEST AVAILABLE COPY

May 15

May 16

May 17

12	0800	50.16	50.58
12	0815	50.42	50.83
13	0830	50.67	51.08
13	0845	50.92	51.33
14	0900	51.17	51.58
14	0915	51.42	51.83
15	0930	51.67	52.08
15	0945	51.92	52.33
16	1000	52.17	52.58
15	1015	52.42	52.83
17	1030	52.67	53.08
15	1045	52.92	53.33
15	1100	53.17	53.58
15	1115	53.42	53.83
17	1155	54.09	54.50
18	1215	54.42	54.83
18	1230	54.67	55.08
19	1245	54.92	55.33
17	1300	55.17	55.58
19	1345	55.92	56.33
18	1430	56.67	57.08
18	1530	57.67	58.08
14	1630	58.67	59.08
18	1945	61.92	62.33
17	2140	63.84	64.25
15	0715	74.42	74.83
15	0830	75.67	76.08
15	0940	76.83	77.24
14	1055	78.08	78.49
14	1135	78.75	79.16
13	1335	80.75	81.16
11	1405	81.25	81.66
12	1440	81.83	82.24
11	1500	82.16	82.57
11	1530	82.66	83.07
12	1630	83.66	84.07
12	1700	84.16	84.57
9	0755	99.08	99.49
10	0900	100.16	100.57
8	1210	103.32	103.73
7	0730	122.74	123.15
7	1020	125.58	125.99

LLNL

374

0.02	1530	33.67	54.00	72.00
12	0800	50.16	50.58	25.50
12	0815	50.42	50.83	25.75
13	0830	50.67	51.08	26.00
13	0845	50.92	51.33	26.25
14	0900	51.17	51.58	26.50
14	0915	51.42	51.83	26.75
15	0930	51.67	52.08	27.00
15	0945	51.92	52.33	27.25
16	1000	52.17	52.58	27.50
15	1015	52.42	52.83	27.75
17	1030	52.67	53.08	28.00
15	1045	52.92	53.33	28.25
15	1100	53.17	53.58	28.50
15	1115	53.42	53.83	28.75
17	1135	54.09	54.50	29.42
18	1215	54.42	54.83	29.75
18	1230	54.67	55.08	30.00
19	1245	54.92	55.33	30.25
17	1300	55.17	55.58	30.50
19	1345	55.92	56.33	31.25
18	1430	56.67	57.08	32.00
18	1530	57.67	58.08	33.00
14	1630	58.67	59.08	34.00
18	1945	61.92	62.33	37.25
17	2140	63.84	64.25	39.17
15	0715	74.42	74.83	49.75
15	0830	75.67	76.08	51.00
15	0940	76.83	77.24	52.16
14	1055	78.08	78.49	53.41
14	1135	78.75	79.16	54.08
13	1335	80.75	81.16	56.08
11	1405	81.25	81.66	56.58
12	1440	81.83	82.24	57.16
11	1500	82.16	82.57	57.49
11	1530	82.66	83.07	57.99
12	1630	83.66	84.07	58.99
12	1700	84.16	84.57	59.49
9	0755	99.08	99.49	74.41
10	0900	100.16	100.57	75.49
8	1210	103.32	103.73	78.65
7	0730	122.74	123.15	98.07
7	1020	125.58	125.99	100.91

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375

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Date	Rate	Time	Fir - Butterworth	Koa
May 17	4.3	2015	134.11	110.0
May 18	4.3	0850	147.1	123.4
	3.5	1445	153	128
	3.5	1510	153	128
	3.2	2210	160	135
May 19	3.24.10	0815	170	145
	3.4	0940	172	147
	3.5	1120	173	148

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Fir
 "Dose" ratios

F W Na
 70 : 120 : 70
 1 : 1.5 : .78

Batzel's ratios 1 : .56 : .45

Mult B's curves X: 1 : 2.68 : 1.96

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B: Time, hr	F	W	Na
10	2650	3550	2820
20	1260	2370	1780
50	445	1060	445
100	178	237	31.5
200	75	14.1	2.0
500	25	.57	.18
30	850	1780	1200
70	265	600	133
280	44	2.7	.76

Fir:	F	
	2650	9
	1260	6
	445	2
	178	6
	75	
	25	
	850	4
	265	16
	44	7

LLNL

base ratios F W Na
 70 : 120 : 70
 1 : 1.5 : .78

Age's ratios 1 : .56 : .45

B's curves X: 1 : 2.68 : 1.96

br	F	W	Na
2650	3550	2820	
1260	2370	1780	
445	1060	445	
178	2.37	31.5	
75	14.1	2.0	
25	.57	.18	
850	1780	1200	
265	600	133	
44	2.7	.76	

Fil:	F	W	Na	Σ
2650	9514	5527	17,69	
1260	6352	3489	11,101	
445	2841	872	4158	
178	635	62	875	
75	38	3.9	117	
25	65	.35	27	
850	4770	2352	7972	
265	1608	761	2134	
44	7.2	1.5	53	

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 Δ

N

N✓

Total

ave

$$= 138.92 / 225 = 0.6$$

ave

=

$$18.59 / 34 =$$

0.54

0	8	0
.1-.19	4	2
.2-.29	22	4
.3-.39	27	6
.4-.49	28	5
.5-.59	28	6
.6-.69	24	5
.7-.79	27	0
.8-.89	31	1
.9-.99	9	2
1-1.09	4	0
1.1-1.19	5	0
1.2-1.29	2	2
1.3-1.39	0	0
1.4-1.49	2	1
1.5-1.59	1	0
>1.6	3	0

BEST AVAILABLE COPY

LLNL

BEST AVAILABLE COPY

.35
 .40 ✓
 1.28 ✓
 .80 ✓
 .82
 .56
 .12
 .75
 .57
 .42
 .49 ✓
 .54
 0
 .60
 .74
 .58 ✓
 .76
 .83
 .83
 0
 0
 .65 ✓
 .96
 .44
 .85
 .50 ✓
 .53 ✓
 .56
 .73
 .68
 .88
 .40
 .32
 .50
 .85
 .43
 .83
 .51
 .63
 .12
 .27 ✓
 .72

.67
 .94
 .83
 .92
 .42
 .27 ✓
 .81
 .94 ✓
 .13 ✓
 .28
 .37
 1.48 ✓
 .28 ✓
 .87
 .87
 .32
 .73
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 .60 ✓
 .35
 .72
 .43
 .52
 .95
 0
 .64
 .27
 .44
 .50 ✓
 .60
 1.18
 .38
 1.19
 .89
 .30
 .31 ✓
 .32 ✓
 .80
 .34
 .89
 .62
 1.27 ✓

.40
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 .33 ✓
 .25
 .24
 .29
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 1.04
 .33 ✓
 .33 ✓
 1.18
 .81
 .50
 0
 .28
 .24
 0
 0
 .48 ✓
 .44 ✓
 .56 ✓
 .87
 .24 ✓
 .61
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 .62 ✓
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 .67 ✓
 .36 ✓
 .90 ✓
 .44 ✓
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 .68 ✓
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 .50 ✓
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 2.33
 .78
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.62
 .82
 .51
 .77
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 .64
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 .81
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 .64
 .49
 .74
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 .91
 1.40
 .74
 .51
 .62
 .86
 .77
 .78
 .82
 .90
 .77
 .59
 .56
 .86
 .22
 .82
 .89
 5.11
 .88
 .75
 1.83
 .84
 .55
 .34
 .39
 1.14
 40

LLNL

BEST AVAILABLE COPY

.67	.40		.70
.94	.56		.31
.83	.33 ✓		.37
.92	.25		.46
.42	.74		.96
.27 ✓	.29		.38
.81	.45		.26
.94 ✓	1.04		.60
.13 ✓	.33 ✓		.31
.28	.33 ✓		.30
.37	1.18		.29
1.48 ✓	.81		.34
.28 ✓	.50		.47
.87	0		.60
.87	.28		.44
.32	.24		.56
.73	0		.60
.74	0		.29
.60 ✓	.48 ✓		.25
.35	.44 ✓		0
.72	.56 ✓		.28
1.13	.87		1.02
.52	.24 ✓		.50
.95	.61		.25
0	.56		.43
.64	.62 ✓		1.08
.27	.44		.50
.44	.49		.25
.50 ✓	.62 ✓		.26
.60	.36 ✓		.70
1.18	.90 ✓		.72
.38	.44 ✓		.72
1.19	.72		1.56
.89	.55		.49
.30	.68 ✓		.67
.31 ✓	.30		.63
.32 ✓	.50 ✓		.85
.80	.35		.73
.34	.74		.73
.89	2.33		.33
.62	.78		.82
			0

LLNL

381

.82
.56
.12
.75
.57
.42
.49 ✓
.54
0
.60
.74
.58 ✓
.76
.83
.83
0
0
.65 ✓
.96
.44
.85
.50 ✓
.53 ✓
.56
.73
.68
.88
.40
.32
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.27 ✓
.72
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.42
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.13 ✓
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.28 ✓
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1.27 ✓
1.01
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BEST AVAILABLE COPY

.24
.29
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1.18
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.48 ✓
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1.14
.48
.58
.58

LLNL

382

.42	.14	.22	.76
.27 ✓	.29	.45	.38
.81	.45	.43	.26
.94 ✓	1.04	.64	.60
.13 ✓	.33 ✓	.77	.31
.28	.33 ✓	.52	.30
.37	1.18	.81	.29
1.48 ✓	.81	.49	.34
.28 ✓	.50	.64	.47
.87	0	.49	.60
.87	.28	.74	.44
.32	.24	.25	.56
.73	0	.91	.60
.74	0	1.40	.29
.60 ✓	.48 ✓	.74	.25
.35	.44 ✓	.51	0
.72	.56 ✓	.62	.28
1.13	.87	.86	1.02
.52	.24 ✓	.77	.50
.95	.61	.78	.25
0	.56	.82	.43
.64	.62 ✓	.90	1.08
.27	.44	.77	.50
.44	.49	.59	.25
.50 ✓	.62 ✓	.56	.26
.60	.36 ✓	.86	.70
1.18	.90 ✓	.22	.72
.38	.44 ✓	.82	.72
1.19	.72	.89	1.56
.89	.55	5.11	.49
.30	.68 ✓	.88	.67
.31 ✓	.30	.75	.63
.32 ✓	.50 ✓	1.83	.85
.80	.35	.84	.73
.34	.74	.55	.73
.89	2.33	.34	.33
.62	.78	.39	.82
1.27 ✓	.47	1.14	.85
1.01	.85	.49	.78
.11 ✓	.44	.58	.86
.35	.48	.58	.72

BEST AVAILABLE COPY

LLNL

383

150

304



LLNL

384