

RADIATION LABORATORY  
BERKELEY 4, CALIFORNIA

November 19, 1958  
MDT-611-58

Dr. Gordon M. Dunning, Chief  
Radiation Effects of Weapons Branch  
Division of Biology and Medicine  
U.S. Atomic Energy Commission  
Washington 25, D.C.

Ref: BMREW:GMD of 11/10/58

Dear Dr. Dunning:

Responding to your request of November 10, we have gathered together material covering air samples taken outdoors at a number of locations as follows:

UCRL-Berkeley	Oct. 15-Nov. 10, inc.	"Daily",	one station
UCRL-Livermore	" "	" " "Daily",	one station
" "	environs (off-site)	"Weekly",	eleven stations
General Electric	Vallecitos Lab.	4 on-site	locations
California State Dept. of Public Health,	Berkeley,	one station	
" "	" "	" "	Los Angeles, one station

We also submit data on rain water samples from two sites, viz;

UCRL-Berkeley  
General Electric-Vallecitos

Factors for conversion of counting information from counts per minute to microcuries per cc (or whatever) are not critically examined herein but all air sample data has been expressed in  $\mu\text{c}/\text{m}^3$  with the exception of General Electric's counts per minute data taken daily on an integrated basis from samples remaining on stream for one week.

The most extensive data and comparisons exist between our Berkeley and Livermore collections. The basic records are tabulated in extenso. We have constructed smoothed decay curves for each "daily" sample and extracted the 5, 75, 150 and 300 hour values therefrom for tabulation and graphical presentation below. We call your attention however to the fact that certain UCRL off-site "weekly" samples (of actually much less than 1 week's duration) showed considerably higher activity than any other. These are tabulated but not graphed.

For your convenience we are including in the original (not in the copies) a road map and a topographical map assembly, the latter indicating locations of UCRL off-site samplers about the Livermore project.

11/19/58

It is entirely possible, in the rush to get these facts off to you promptly, that I have elided some details necessary to complete understanding. We will be happy to attempt to answer quickly any questions you may ask.

Very truly yours,

M. D. Thaxter  
Health Chemistry

MDT/cg  
Attachment

University of California Ernest O. Lawrence Radiation Laboratory -  
Berkeley, California

Air samples taken daily M, T, W, Th, F and F - M at 4 CFM thru 4" x 9" HV-70 paper at Building 70 air intake. Beta-gamma activity estimated periodically thereafter by disposing collections about Geiger tube in 1" thick lead pig. Conversion to  $\mu\text{mc}/\text{m}^3$  is obtained by the expression

$$\frac{\text{counts/min} \times 15.9}{\text{m}^3}, \text{ employing an average of}$$

6 counting determinations for 1 minute for each entry. The instrument is standardized daily to a  $\text{U}^{238}$  foil cylinder sealed in epoxy resin. Background is 20 counts per minute.

Alpha activity is determined on a proportional chamber gas-flow counter standardized daily to  $\text{Pu}^{239}$ . Background is 1 count/min.

University of California Ernest O. Lawrence Radiation Laboratory -  
Livermore, California

Air samples are taken daily on site and counted as described for UCRL-Berkeley (above) with the exception of a slightly different conversion factor, viz:

$$\frac{\text{counts/min} \times 17.9}{\text{m}^3}. \text{ Their Building 125 intake is the sampling location.}$$

"Weekly" samples are taken using identical equipment and rates at 11 stations beyond the site (see topo map) and counted as above.

During the Oct. 31 - Nov. 1 period sampling was intercepted prematurely to gain prompt data concerning the substantially higher fallout experienced.

A. AIR SAMPLES (atmospheric aerosols collected on HV-70 filters)

1. Data from UCRL-Berkeley, 1958

Sampling Times (PST) & Dates	Volume cubic meters	Net counts per minute after sampling terminated (Figures in parentheses are hours and minutes decay)	
		Combined Beta-gamma	Alpha
0803, 10/14 0820, 10/15	165.0	85(0,37); 11(26,21)	209(0,28); 3(26,12)
0820, 10/15 0817, 10/16	162.8	141(0,35); 20(98,39)	374(0,25); 0(98,30)
0817, 10/16 0759, 10/17	161.1	363(0,54); 46(75,24); 23(635,59)	1157(0,42); 1(75,7)
0759, 10/17 0833, 10/20	493.0	341(0,36); 229(55,54); 187(98,4); 173(169,58); 122(563,31)	431(0,27); 3(55,44); 2(563,33)
0833, 10/20 0816, 10/21	161.3	436(0,34); 298(51,5); 286(80,30); 242(146,3); 167(539,51)	461(0,24); 7(51,2); 3(197,30)
0816, 10/21 0805, 10/22	162.1	664(0,40); 468(8,33); 435(23,24); 370(50,51); 376(55,55); 329(122,50); 203(516,11)	701(0,32); 8(51,22); 0(516,15)
0805, 10/22 0815, 10/23	164.2	253(1,29); 204(27,5); 191(32,8); 152(98,52); 96(492,7)	104(1,20); 0(99,2)
0815, 10/23 0805, 10/24	162.1	287(0,49); 214(8,18); 170(75,44); 120(468,21)	246(0,40); 2(75,33)
0805, 10/24 0824, 10/27	491.6	586(0,35); 551(4,44); 421(53,44); 297(396,9)	417(0,27); 6(53,32); 0(396,4)
0824, 10/27 0805, 10/28	161.0	298(0,41); 142(29,23); 125(51,12); 89(372,31)	512(0,33); 8(51,1); 1(372,25)
0805, 10/28 0740, 10/29	161.0	469(3,13); 283(27,49); 245(49,38); 125(348,59)	651(3,3); 11(49,25); 4(349,3)
0740, 10/29 0827, 10/30	168.2	579(0,53); 384(7,4); 257(98,18); 128(324,14)	767(0,43); 4(98,5); 4(324,19)
0827, 10/30 0756, 10/31	159.7	462(0,40); 267(77,22); 179(300,51)	248(0,32); 6(75,0); 8(300,54)
0756, 10/31 0829, 11/3	497.9	1313(0,33); 962(25,5); 873(50,5); 857(77,34); 666(228,23)	632(0,24); 20(49,20); 17(77,20); 18(193,1)
0829, 11/3 0800, 11/4	159.9	93(0,43); 33(54,35)	213(0,34); 2(54,24)
0800, 11/4 0806, 11/5	163.6	196(0,50); 91(55,27); 78(180,50)	296(0,41); 4(55,22); 0(180,56)
0806, 11/5 0736, 11/6	159.8	161(0,43); 44(99,38)	358(0,34); 0(99,22)

A. 1. Data from UCRL-Berkeley, 1958 (continued)

Sampling Times (PST) & Dates	Volume cubic meters	Net counts per minute after reading terminated (Figures in parentheses are hours and minutes decay)	
		Combined Beta-gamma	Alpha
0736, 11/6 0830, 11/7	169.0	134(1,3); 20(75,8)	261(0,54); 0(74,58)
0834, 11/7 0836, 11/10	489.3	148(1,27); 93(48,42); 91(60,24)	153(1,17); 5(48,32); 4(60,22)

2. Data from UCRL-Livermore, 1958

(a) Samples on-site; location Building 125 intake

0830, 10/14 0830, 10/15	163.1	508(0,6); 23(48,0); 10(>630,0)	1262(0,4); 24(48,0); 0(>630,0)
0830, 10/15 0830, 10/16	163.1	544(0,6); 29(48,0); 34(>630,0)	1249(0,4); 34(48,0); 0(>630,0)
0830, 10/16 0830, 10/17	163.1	1349(0,6); 46(72,0); 30(>630,0)	3765(0,4); 12(72,0); 0(>630,0)
0830, 10/17 0830, 10/18	163.1	342(0,6); 37(48,0); 36(630,7)	873(0,4); 17(48,0); 0(630,14)
0830, 10/18 0830, 10/20	326.2	566(0,6); 276(48,0); 126(582,9)	757(0,4); 24(48,0); 0(582,11)
0830, 10/20 0830, 10/21	163.1	583(0,6); 288(48,0); 149(558,4)	1137(0,4); 30(48,0); 0(558,6)
0830, 10/21 0930, 10/22	169.8	1174(0,6); 275(48,0); 168(534,0)	3465(0,4); 63(48,0); 0(534,2)
0930, 10/22 0830, 10/23	156.3	377(0,26); 55(98,0)	665(0,24); 6(98,0)
0830, 10/23 0830, 10/24	163.1	956(0,6); 59(72,0)	3255(0,4); 2(72,0) 0(509,56)
0830, 10/24 0830, 10/25	163.1	886(0,6); 154(48,0); 80(461,52)	2665(0,4); 35(48,0); 6(461,53)
0830, 10/25 0830, 10/27	326.2	1312(0,6); 273(48,0); 170(413,46)	3548(0,4); 65(48,0); 0(413,47)
0830, 10/27 0830, 10/28	163.1	935(0,6); 96(48,0); 40(389,41)	2658(0,4); 42(48,0); 0(389,42)
0830, 10/28 0830, 10/29	163.1	1553(0,6); 286(48,0); 80(365,37)	5096(0,4); 75(48,0); 0(365,35)
0830, 10/29 0830, 10/30	163.1	1494(0,6); 235(104,0); 154(341,28)	4147(0,4); 0(104,0)

A. 2. (a) Samples on-site; location Building 125 intake (continued)

Sampling Times (PST) & Dates	Volume cubic meters	Net counts per minute after sampling terminated (Figures in parentheses are hours and minutes decay)	
		Combined Beta-gamma	Alpha
0830, 10/30 0830, 10/31	163.1	15,722(0,6); 11,359(6,36); 6658(24,0); 6418(31,30); 3383(72,0); 2787(79,0); 2767(81,22); 3113(99,0); 2005(151,0); 1133(240,0)	3565(0,4); 257(24,0); 168(31,0); 31(72,0); 28(79,0); 26(81,22); 25(99,0); 20(151,0); 11(240,0)
0830, 10/31 0830, 11/1	163.1	3060(0,6); 1096(48,0); 1051(55,30); 1123(75,30); 1121(104,20); 671(127,30); 452(294,43)	54(48,0); 20(55,30); 23(75,30); 10(104,20); 9(127,30); 15(294,45)
0830, 11/1 0830, 11/3	326.2	1694(0,6); 1032(5,0); 618(49,0); 370(246,37)	3712(0,4); 73(49,0); 2(246,38)
0830, 11/3 0940, 11/4	171.0	395(0,7); 81(47,0); 60(222,27)	921(0,5); 28(47,0); 0(222,28)
0940, 11/4 0824, 11/5	159.0	536(0,6); 68(48,0); 30(198,26)	1308(0,4); 27(48,0); 5(198,27)
0823, 11/5 0830, 11/6	163.9	1124(0,6); 56(96,0); 44(173,12)	3265(0,4); 2(96,0); 0(173,10)
0830, 11/6 0830, 11/7	163.1	914(0,6); 32(72,0); 3(149,23)	3046(0,4); 11(72,0); 0(149,21)
0830, 11/7 0830, 11/10	489.3	173(0,6); 66(48,0); 78(77,18)	342(0,4); 9(48,0); 6(77,16)

A. 2. (b) Samples off-site

(1) Location: Water Tank

1300, 9/9 1320, 10/14	817.8	999(48)	27(48)
1320, 10/14 1240, 10/21	1137.2	815(50)	24(50)
1240, 10/21 1315, 10/28	1137.7	1034(50)	27(50)
1315, 10/28 1415, 10/31	496.1	19896(0,41); 9738(24,17); 1639(sic)(73); 5420(93); 3417(122,37); 3163(145,27)	1008(0,39); 173(24,15); 72(73); 36(93); 26(122,37); 12(145,27)
1415, 10/31 1010, 11/1	135.3	1270(4); 639(53,26); 1720(73,9); 555(102,48); 383(125,38)	504(4); 12(53,24); 19(73,7); 18(102,46); 3(125,36)

A. 2. (b) (2) Location: Patterson Pass-Upper

Sampling Times (FST) & Dates	Volume cubic meters	Net counts per minute after sampling terminated (Figures in parentheses are hours and minutes decay)	
		Combined Beta-gamma	Alpha
1330, 10/7 1335, 10/14	1142.2	226(48)	25(48)
1335, 10/14 1300, 10/21	1138.9	751(50)	33(50)
1300, 10/21 1330, 10/28	1145.1	1265(50)	29(50)
1330, 10/28 1130, 11/1	638.8	33,377(3); 21,098(52); 17,581(72); 12,449(101,26); 9,738(124,14)	790(3); 102(52); 58(72); 42(101,28); 55(124,16)

(3) Location: Patterson Pass-Lower

1340, 10/7 1345, 10/14	1142.2	145(48)	18(48)
1345, 10/14 1310, 10/21	1137.7	652(50)	19(50)
1310, 10/21 1340, 10/28	1145.1	949(50)	24(50)
1340, 10/28 1140, 11/1	638.8	7302(3); 698(sic)(52); 4419(72); 2805(101,22); 2341(124,12)	882(3); 79(52); 41(72); 28(101,20); 16(124,10)

(4) Location: Altamont Pass

1350, 10/7 1400, 10/14	1142.8	325(48)	20(48)
1400, 10/14 1330, 10/21	1138.3	126(49)	0(49)
1330, 10/21 1355, 10/28	1144.5	2(50)	0(50)

(5) Location: Vasco Road

1410, 10/7 1410, 10/14	1141.7	268(47)	42(47)
1410, 10/14 1350, 10/21	1137.7	835(49)	38(49)
1350, 10/21 1410, 10/28	1144.0	1229(50)	45(50)
1410, 10/28 1210, 11/1	638.8	7685(3); 3704(52); 4463(71); 3057(100,56); 2621(126,44)	1000(3); 108(52); 74(71); 34(100,54); 31(126,46)

A. 2. (b) (6) Locations: FCC

Sampling Times (PST) & Dates	Volume cubic meters	Net counts per minute after sampling terminated (Figures in parentheses are hours and minute decay)	
		Combined Beta-gamma	Alpha
1420, 10/7 1425, 10/14	1142.2	445(47)	219(47)
1425, 10/14 1405, 10/21	1139.4	937(49)	71(49)
1405, 10/21 1420, 10/28	1143.3	1261(49)	295(49)
1420, 10/28 1220, 11/1	638.8	7396(2); 6888(3); 3519(51); 3701(71); 2745(100,44); 2033(123,30)	4217(2); 3807(3); 218(51); 111(71); 62(100,46); 15(123,32)

(7) Locations: Livermore City Hall Roof

1435, 10/7 1440, 10/14	1141.2	113(47)	17(47)
1440, 10/14 1430, 10/21	1140.6	719(48)	31(48)
1430, 10/21 1440, 10/28	1142.8	1096(49)	41(49)
1440, 10/28 1430, 10/31	488.1	1981(0,24); 5449(sic)(73); 6506(93); 4433(122,22); 3218(145,12)	1196(0,26); 56(73); 32(93); 18(122,24); 11(145,10)
1430, 10/31 1240, 11/1	640	1437(2); 746(51); 734(71); 697(100,30); 493(123,16)	632(2); 34(51); 19(71); 0(100,28); 7(123,14)

(8) Location: Livermore Vet's Hospital

1500, 10/7 1505, 10/14	1142.2	6(47)	2(47)
1505, 10/14 1455, 10/21	1140.6	37(48)	0(48)
1455, 10/21 1500, 10/28	1142.3	40(49)	0(49)
1500, 10/28 1300, 11/1	638.8	1102(2); 526(51); 548(71); 317(100,12); 187(122,58)	17(2); 3(51); 3(71); 2(100,10); 0(122,56)

(9) Locations: Mines Road

1610, 10/7 1600, 10/14	1140.6	384(46)	16(46)
1600, 10/14 1555, 10/21	1141.0	817(47)	18(47)

A. 2. (b) (9) Location: Mines Road (continued)

Sampling Times (PST) & Dates	Volume cubic meters	Net counts per minute after sampling terminated (Figures in parentheses are hours and minutes decay)	
		Combined Beta gamma	Alpha
1555, 10/21 1555, 10/28	1141.7	1152(48)	17(48)
1555, 10/28 1345, 11/1	637.6	24707(1); 12745(50); 13724(69,53); 9873(99,29); 7733(122,11)	313(1); 65(50); 50(69,51); 46(99,27); 23(122,13)

(10) Location: Site 300, C.P.

1030, 9/30 1330, 10/7	1162.1	193(49)	21(49)
1330, 10/7 1315, 10/27	3260.1	1860(50)	0(50)
1315, 10/25 1040, 11/1	1124.1	20007(4,0); 1723(stc)(53); 10032(72,27); 7197(102,22); 5812(125,4)	320(4,0); 64(53); 51(72,25); 26(102,24); 21(125,4)

(11) Location: Site 300, Butte Field

0945, 10/6 1215, 10/7	180.1	33(50)	9(50)
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Counting System Calibration  
 Specific Combined Beta gamma Activity<sup>(1)</sup> at 5, 75, 150  
 and 300 hour decay

Date- end of sampling	Vol. m <sup>3</sup>	10.13 hr half-life					5.49 hr half-life				
		5	75	150	300	600	5	75	150	300	
10/15	169.0	ND**	±1.1	±1.3	±1.4	163.1	59.8	±2.5	±2.5	±2.5	
16	162.8	ND	ND	±2.0	±2.0	"	ND	3.4	3.4	3.4	
17	161.1	31.4	4.4	3.1	2.4	"	ND	±9.1	±5.1	±5.1	
18	X					"	ND	4.1	4.5	4.0	
19	X					X					
20	493.0	10.2	6.8	5.8	4.1	326.2	36.2	14.4	12.5	9.9	
21	161.3	37.2	27.9	24.4	19.7	163.1	72.4	30.7	27.4	22.9	
22	162.1	50.5	34.5	27.9	23.3	169.8	69.6	28.4	27.1	21.9	
23	164.2	22.3	15.7	13.1	10.7	155.3	ND	±6.3	±6.3	±6.3	
24	162.1	"	16.5	14.0	12.1	163.1	ND	6.8	±6.4	±6.4	
25	X					"	ND	16.4	15.3	12.7	
26	X					X					
27	491.6	17.1	12.9	10.9	9.7	326.2	36.2	13.7	11.7	10.1	
28	161.0	22.7	11.1	9.7	9.1	163.1	ND	6.8	6.8	6.8	
29	161.0	37.5	21.2	16.5	12.8	"	72.4	27.0	19.8	15.2	
30	168.2	42.5	26.3	19.7	12.9	"	72.4	26.3	23.4	18.1	
31	159.7	41.8	26.4	21.3	17.8	"	1262.1	362.2	200.8	130.5	
11/1	X					"	296.3	114.1	75.5	49.9	
2	X					X					
3	492.9	38.7	27.7	24.2	18.7	326.2	57.6	28.5	23.1	<19.8*	
4	159.9	±3.3	±3.3	±3.3	±3.3	171.0	ND	7.3	7.3	±7.3*	
5	163.6	13.6	8.4	7.8	ND	159.0	ND	5.7	5.7	±3.6	
6	159.8	ND	ND	±4.4	±4.4	163.9	25.1	6.8	6.9	±4.9	
7	169.0	±1.9	±1.9	±1.9	±1.9	163.1	ND	3.7	0.4	±0.4*	
8	X					X					
9	X					X					
10	489.3	±3.0	ND	ND	ND	489.3	ND	2.8	±2.8	±2.8	

(Note: 5 and 75 hour decay data from above are plotted below.)

(1) Tabular data herein was derived from smoothed curves constructed from "counts per minute" tables, corrected for sampling volume, geometry and counter efficiency.

\* ND: No data.  
 \*\*\* Extrapolated.

Handwritten notes at the top of the page, possibly including a date and location.

5 Hours Decay, by Data  
 From first Simulated Curves  
 (See text)

$\mu C/m^3$   
 1000

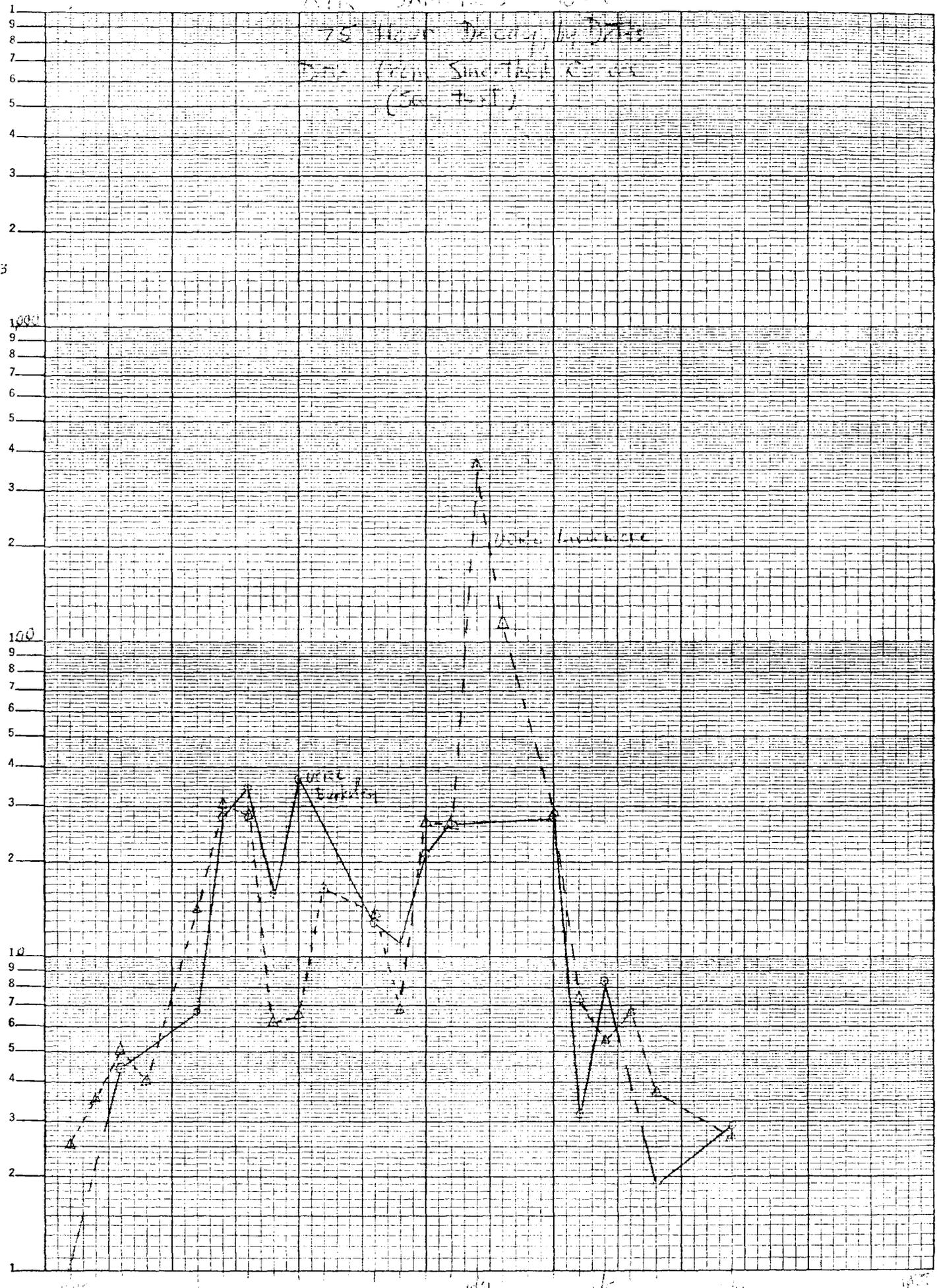
SEMI-LOGARITHMIC 359-81G  
 KEUFFEL & ESSER CO. MADE IN U.S.A.  
 4 CYCLES X 70 DIVISIONS



ALL SAMPLES B-58

75 Hour Decay, by 1/24  
 Data from Sim-Talk Center  
 (See Test)

4000/1000



KE SEMI-LOGARITHMIC 359-81G  
 KEUFFEL & ESSER CO. MADE IN U.S.A.  
 4 CYCLES X 70 DIVISIONS

General Electric Laboratory at Vallesites  
(about 10 miles west of UCRL-Livermore site)

10 CFM air samples drawn thru 7" x 7" HV-70 paper, 5 ft. above ground, at 4 on-site locations. Average Beta-gamma determinations taken continuously per Geiger tube axially located in filter cylinders. At end of week, filter is removed, stored and lab-counted at 24 and 48 hours decay. Thus two types of data: (a) integrated, showing build-up, and (b) total for week's sample vs. decay.

(a) Daily integrated readings (counts per minute) among 4 samplers

10/15	175-200 ("normal")	10/29	500-700 (new sample)
16	500-700	30	700-1000
17	600-750	31	750-900
20	200-300	11/1	1000-1850
		3	1000-1300
21	250-350 (new sample)	5	200-250 (new sample)
22	900	6	350-600
23	500	7	300-850
24	600-900	10	175-225
27	500-800		

(b) Weekly samples - Beta-gamma  $\mu\text{c}/\text{m}^3$  - Data rounded to nearest integer

(In all cases, the volume sampled was 407.7  $\text{m}^3$ )

<u>Date</u>	<u>Decay Time</u>	<u>Site 1</u>	<u>Site 2</u>	<u>Site 3</u>	<u>Site 4</u>
10/6-	24 hours	6	6	5	5
10/13	48 "	5	4	6	4
10/13--	24 "	20	10	3	8
10/20	48 "	10	7	3	6
10/20-	24 "	50	30	20	30
10/27	48 "	40	30	20	20
10/27-	24 "	70	50	70	50
11/3	48 "	50	40	60	40
11/3-	24 "	6	10	10	9
11/10	48 "	6	10	10	9

State of California Department of Public Health

Air samples were taken and measured by methods set forth by the USPHS.  
(Field estimate gives 5 hr decay; USPHS assay is back extrapolated to 5 hrs  
decay. All data expressed in  $\mu\text{pc}/\text{m}^3$ .)

RADIATION FALLOUT DATA  
October 1 to October 31, 1958, Inclusive

Sample Number	Berkeley		Los Angeles	
	Field Estimate µpc/M <sup>3</sup>	USPHS Assay µpc/M <sup>3</sup>	Field Estimate µpc/M <sup>3</sup>	USPHS Assay µpc/M <sup>3</sup>
1001	.38	0.19	7.30	0.42
1002	.73	0.84	2.40	1.60
1003	.75	0.19	4.00	2.81
1004	.25	0.37	4.90	3.91
1005	1.10	0.91	2.20	1.75
1006	4.80	4.88	2.00	1.86
1007	1.20	1.77	1.40	2.36
1008	0.70	0.81	2.10	1.94
1009	0.53	0.71	2.40	1.92
1010	0.74	0.56	2.00	1.34
1011	0.33	0.47	2.30	1.61
1012	0.36	0.54	1.10	1.05
1013	0.74	0.88	2.10	1.03
1014	0.74	1.20	1.90	1.51
1015	0.35	0.48	2.70	1.23
1016	0.74	0.58	2.70	2.21
1017	1.40	0.57	1.94	2.45
1018	3.30	5.05	3.70	2.93
1019	0.59	0.87	2.80	2.34
1020	2.10	2.87	3.40	3.06
1021	10.30	11.51	8.60	7.37
1022	12.20	13.61	17.30	19.82
1023	3.40	6.79	25.50	28.39
1024	5.60	6.28	23.40	21.70
1025	Motor failure		12.20	
1026	8.0	9.17	8.20	6.58
1027	4.5	6.41	6.90	5.08
1028	4.0	4.63	137.0	37.58
1029	4.4	5.75	44.2	32.56
1030	3.1	8.40	453.0	125.6
1031	18.0	13.80	129.0	57.12

RADIATION FALLOUT DATA  
November 1-12, 1958

Sample Number	Berkeley		Los Angeles	
	Field Estimate $\mu\text{c}/\text{M}^3$	USPHS ASSAY $\mu\text{c}/\text{M}^3$	Field Estimate $\mu\text{c}/\text{M}^3$	USPHS Assay $\mu\text{c}/\text{M}^3$
1101	21.5	15.15	20	17.67
1102	26.1	13.08	33	31.64
1103	8.3	6.8	198	
1104	4.95		145	
1105	Power failure		113	
1106	3.3		89	
1107	1.6		38	
1108	1.21		31	
1109	1.26		23	
1110	3.70		18	
1112	3.46			

Data on beta-gamma

(a) UCL-Berkeley, 1958

<u>Sampling dates</u>	<u>Beta-gamma cp/d</u>	<u>Remarks</u>
9/23 10/18	$2.0 \times 10^{-6}$	decayed 4 days
10/18 11/10	$1.0 \times 10^{-6}$	no decay
10/21 11/10	$7.5 \times 10^{-6}$	no decay

(b) G.L.-Tullahoma Lab, 1958

11/9 11/10	$107 \times 10^{-6}$ $115 \times 10^{-6}$	no decay
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MDT

UNIVERSITY OF CALIFORNIA

RADIATION LABORATORY  
BERKELEY 4, CALIFORNIA

November 19, 1958  
MDT-611-58

Dr. Gordon M. Dunning, Chief  
Radiation Effects of Weapons Branch  
Division of Biology and Medicine  
U.S. Atomic Energy Commission  
Washington 25, D.C.

Ref: EMREW:CMD of 11/10/58

Dear Dr. Dunning:

Responding to your request of November 10, we have gathered together material covering air samples taken outdoors at a number of locations as follows:

UCRL-Berkeley	Oct. 15-Nov. 10, inc.	"Daily"	one station
UCRL-Livermore	" "	" " " " " " " " " "	"Daily", one station
" "	environs (off-site)	"Weekly"	eleven stations
General Electric	Vallecitos Lab.		4 on-site locations
California State Dept. of Public Health,	Berkeley,		one station
" " " " " "	Los Angeles,		one station

We also submit data on rain water samples from two sites, viz;

UCRL-Berkeley  
General Electric-Vallecitos

Factors for conversion of counting information from counts per minute to microcuries per cc (or whatever) are not critically examined herein but all air sample data has been expressed in  $\mu\text{mc}/\text{m}^3$  with the exception of General Electric's counts per minute data taken daily on an integrated basis from samples remaining on stream for one week.

The most extensive data and comparisons exist between our Berkeley and Livermore collections. The basic records are tabulated in extenso. We have constructed smoothed decay curves for each "daily" sample and extracted the 5, 75, 150 and 300 hour values therefrom for tabulation and graphical presentation below. We call your attention however to the fact that certain UCRL off-site "weekly" samples (of actually much less than 1 week's duration) showed considerably higher activity than any other. These are tabulated but not graphed.

For your convenience we are including in the original (not in the copies) a road map and a topographical map assembly, the latter indicating locations of UCRL off-site samplers about the Livermore project.

11/19/58

It is entirely possible, in the rush to get these facts off to you promptly, that I have elided some details necessary to complete understanding. We will be happy to attempt to answer quickly any questions you may ask.

Very truly yours,

M. D. Thaxter  
Health Chemistry

MDT/cg  
Attachment

✓ Bcc: MDT

A. 2. (a) Samples on-site; location Building 125 intake (continued)

Sampling Times (PST) & Dates	Volume cubic meters	Net counts per minute after sampling terminated (Figures in parentheses are hours and minutes decay)	
		Combined Beta-gamma	Alpha
0830, 10/30	163.1	15,722(0,6); 11,359(6,36); 6658(24,0); 6418(31,30);	3565(0,4); 257(24,0);
0830, 10/31	329.77	3383(72,0); 2767(79,0); 2767(81,22); 3113(99,0); 2005(151,0); 1133(240,0)	168(31,0); 31(72,0); 28(79,0); 26(81,22); 25(99,0); 20(151,0); 11(240,0)
	195.45	269.73	269.73 303.46
0830, 10/31	163.1	106.44 102.45 109.47	54(48,0); 20(55,30);
0830, 11/1		3060(0,6); 1096(48,0); 1051(55,30); 1123(75,30); 1121(104,20); 671(127,30); 452(294,43)	23(75,30); 10(104,20); 9(127,30); 15(294,45)
		109.28 65.41 44.06	
0830, 11/1	326.2	1694(0,6); 1032(5,0); 618(49,0); 370(246,37)	3712(0,4); 73(49,0);
0830, 11/3		50.30 20.12 13.03	2(246,38)
0830, 11/3	171.0	395(0,7); 81(47,0); 60(222,27)	921(0,5); 28(47,0);
0940, 11/4		7.53 5.55	0(222,28)
0940, 11/4	159.0	536(0,6); 68(48,0); 30(198,26)	1308(0,4); 27(48,0);
0824, 11/5		6.80 3.00	5(198,27)
0823, 11/5	163.9	1124(0,6); 56(96,0); 44(173,12)	3265(0,4); 2(96,0);
0830, 11/6		5.45 6.95	0(173,10)
0830, 11/6	163.1	914(0,6); 32(72,0); 3(149,23)	3046(0,4); 11(72,0);
0830, 11/7		3.12 0.29	0(149,21)
0830, 11/7	489.3	173(0,6); 66(48,0); 78(77,18)	342(0,4); 9(48,0);
0830, 11/10		3.49 2.53	6(77,16)
		2.14	

A. 2. (b) Samples off-site

(1) Location: Water Tank

1300, 9/9	817.8	999(48)	19.42	27(48)
1320, 10/14		7.94		
1320, 10/14	1137.2	815(50)	11.40	24(50)
1240, 10/21				
1240, 10/21	1137.7	1034(50)	14.45	27(50)
1315, 10/28				
1315, 10/28	496.1	19896(0,41); 9738(24,17); 1639(sic)(73);	21.21 52.53	1008(0,39); 173(24,15);
1415, 10/31		5420(93); 3417(122,37); 3163(145,27)	17.37 10.95 10.14	72(73); 36(93); 26(122,37); 12(145,27)
1415, 10/31	135.3	1270(4); 639(53,26); 1720(73,9); 555(102,48);		504(4); 12(53,24);
1010, 11/1		383(125,33)	75.09 702.1 65.21	19(73,7); 18(102,46); 3(125,36)
		45.00		

A. 2. (b) (2) Location: Patterson Pass-Upper

Sampling Times (PST) & Dates	Volume cubic meters	Net counts per minute after sampling terminated (Figures in parentheses are hours and minutes decay)		
		Combined Beta-gamma	Alpha	
1330, 10/7 1335, 10/14	1142.2	226(48)	3.15	25(48)
1335, 10/14 1300, 10/21	1138.9	751(50)	10.48	33(50)
1300, 10/21 1330, 10/28	1145.1	1265(50)	17.56	29(50)
1330, 10/28 1130, 11/1	638.8	33,377(3); 21,098(52); 17,581(72); 12,449(101,26); 9,738(124,14)	525.14 437.59 309.86 242.34	790(3); 102(52); 58(72); 42(101,28); 55(124,16)

(3) Location: Patterson Pass-Lower

1340, 10/7 1345, 10/14	1142.2	145(48)	2.02	18(48)
1345, 10/14 1310, 10/21	1137.7	652(50)	9.11	19(50)
1310, 10/21 1340, 10/28	1145.1	949(50)	13.18	24(50)
1340, 10/28 1140, 11/1	638.8	7302(3); 698(sic)(52); 4419(72); 2805(101,22); 2341(124,12)	17.37 <del>4.10</del> 109.99 69.82 58.27	882(3); 79(52); 41(72); 28(101,20); 16(124,10)

(4) Location: Altamont Pass

1350, 10/7 1400, 10/14	1142.8	325(48)	4.52	20(48)
1400, 10/14 1330, 10/21	1138.3	126(49)	1.76	0(49)
1330, 10/21 1355, 10/28	1144.5	2(50)	0.03	0(50)

(5) Location: Vasco Road

1410, 10/7 1410, 10/14	1141.7	268(47)	3.73	42(47)
1410, 10/14 1350, 10/21	1137.7	835(49)	11.67	38(49)
1350, 10/21 1410, 10/28	1144.0	1229(50)	17.08	45(50)
1410, 10/28 1210, 11/1	638.8	7685(3); 3704(52); 4463(71); 3057(100,56); 2621(126,44)	92.19 111.03 76.07 65.24	1000(3); 108(52); 74(71); 34(100,54); 31(126,46)

A. 2. (b) (6) Location: FCC

Sampling Times (PST) & Dates	Volume cubic meters	Net counts per minute after sampling terminated (Figures in parentheses are hours and minutes decay)		
		Combined Beta-gamma	Alpha	
1420, 10/7 1425, 10/14	1142.2	445(47)	0.65	219(47)
1425, 10/14 1405, 10/21	1139.4	937(49)	13.08	71(49)
1405, 10/21 1420, 10/28	1143.3	1261(49)	17.54	295(49)
1420, 10/28 1220, 11/1	638.8	7396(2); 6888(3); 3519(51); 2745(100,44); 2033(123,30) 6.83 5.06	8.76 9.21	4217(2); 3807(3); 218(51); 111(71); 62(100,46); 15(123,32)

(7) Location: Livermore City Hall Roof

1435, 10/7 1440, 10/14	1141.2	113(47)	1.57	17(47)
1440, 10/14 1430, 10/21	1140.6	729(48)	17.02	31(48)
1430, 10/21 1440, 10/28	1142.8	1096(49)	15.25	41(49)
1440, 10/28 1430, 10/31	488.1	19814(0,24); 5449(sic)(73); 6506(93); 4413(122,22); 3218(145,12) 144.34 124.83	177.50 211.93	1196(0,26); 56(73); 32(93); 18(122,24); 11(145,10)
1430, 10/31 1240, 11/1	640	1437(2); 746(51); 734(71); 697(100,30); 493(123,16) 12.25	12.53 13.24 17.32	632(2); 34(51); 19(71); 0(100,28); 7(123,14)

(8) Location: Livermore Vet's Hospital

1500, 10/7 1505, 10/14	1142.2	6(47)	0.08	2(47)
1505, 10/14 1455, 10/21	1140.6	37(48)	0.52	0(48)
1455, 10/21 1500, 10/28	1142.3	40(49)	0.56	0(49)
1500, 10/28 1300, 11/1	638.8	1102(2); 526(51); 548(71); 317(100,12); 187(122,58) 4.65	13.09 13.64 7.39	17(2); 3(51); 3(71); 2(100,10); 0(122,56)

(9) Location: Mines Road

1610, 10/7 1600, 10/14	1140.6	384(46)	5.35	16(46)
1600, 10/14 1555, 10/21	1141.0	817(47)	1.39	18(47)

A. 2. (b) (9) Location: Mines Road (continued)

Sampling Times (PST) & Dates	Volume cubic meters	Net counts per minute after sampling terminated (Figures in parentheses are hours and minutes decay)		
		Combined Beta-gamma	Alpha	
1555, 10/21 1555, 10/28	1141.7	1152(48)	16.04	17(48)
			317.83 342.24	
1555, 10/28 1345, 11/1	637.6	24707(1); 12745(50); 13724(69,53); 9873(99,29); 7733(122,11)		313(1); 65(50); 50(69,51); 46(99,27); 23(122,13)
		246.20 192.84		

(10) Location: Site 300, C.P.

1030, 9/30 1330, 10/7	1162.1	193(49)	2.64	21(49)
1330, 10/7 1315, 10/27	3260.1	1860(50)	9.07	0(50)
1315, 10/25 1040, 11/1	1124.1	20007(4,0); 1723(sic)(53); 10032(72,27); 7197(102,22); 5812(125,4)	24.37 141.89	320(4,0); 64(53); 51(72,25); 26(102,24); 21(125,4)
		101.79 82.20		

(11) Location: Site 300, Butte Field

0945, 10/6 1215, 10/7	180.1	33(50)	2.91	9(50)
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UCRL "Daily" AIR SAMPLES  
 $\mu\text{C}/\text{m}^3$  Combined Beta-gamma Activity<sup>(1)</sup> at 5, 75, 150  
 and 300 hrs decay

Date- end of sampling	UCRL-Berkeley					UCRL-Livermore				
	Vol. $\text{m}^3$	5	75	150	300	Vol. $\text{m}^3$	5	75	150	300
10/15	165.0	ND*	$\neq 1.1$	$\neq 1.1$	$\neq 1.1$	163.1	43.8	$\neq 2.5$	$\neq 2.5$	$\neq 2.5$
16	162.8	ND	ND	$\neq 2.0$	$\neq 2.0$	"	ND	3.4	3.4	3.4
17	161.1	31.4	4.4	3.1	2.4	"	ND	$\neq 5.1$	$\neq 5.1$	$\neq 5.1$
18	X					"	ND	4.1	4.1	4.0
19	X					X				
20	493.0	10.2	6.8	5.8	4.8	326.2	36.2	14.4	12.5	9.9
21	161.3	37.2	27.9	24.4	19.7	163.1	72.4	30.7	27.4	22.3
22	162.1	50.5	34.5	27.9	23.3	169.8	69.6	28.4	27.1	21.9
23	164.2	22.3	15.7	13.1	10.7	156.3	ND	$\neq 6.3$	$\neq 6.3$	$\neq 6.3$
24	162.1	"	16.5	14.0	12.6	163.1	ND	6.5	$\neq 6.4$	$\neq 6.4$
25	X					"	ND	16.4	14.3	11.3
26	X					X				
27	491.6	17.1	12.9	10.9	9.7	326.2	36.2	13.5	11.7	10.1
28	161.0	22.7	11.1	9.9	9.1	163.1	ND	6.8	6.8	6.8
29	161.0	37.5	21.2	16.5	12.8	"	72.4	27.0	19.8	11.2
30	168.2	42.5	26.3	19.7	12.9	"	72.4	26.3	23.4	18.1
31	159.7	41.8	26.4	21.3	17.8	"	1262.1	362.2	200.8	100.9
11/1	X					"	296.3	114.1	75.5	49.9
2	X					X				
3	492.9	38.7	27.7	24.2	18.7	326.2	57.6	28.5	23.1	< 19.8**
4	159.9	$\neq 3.3$	$\neq 3.3$	$\neq 3.3$	$\neq 3.3$	171.0	ND	7.3	7.3	$\neq 7.3$ **
5	163.6	13.6	8.4	7.8	ND	159.0	ND	5.7	5.7	$\neq 3.4$
6	159.8	ND	ND	$\neq 4.4$	$\neq 4.4$	163.9	25.1	6.8	4.9	$\neq 4.9$
7	169.0	$\neq 1.9$	$\neq 1.9$	$\neq 1.9$	$\neq 1.9$	163.1	ND	3.7	0.4	$\neq 0.4$ **
8	X					X				
9	X					X				
10	489.3	$\neq 3.0$	ND	ND	ND	489.3	ND	2.8	$\neq 2.8$	$\neq 2.8$

(Note: 5 and 75 hour decay data from above are plotted below.)

(1) Tabular data herein was derived from smoothed curves constructed from "counts per minute" tables, corrected for sampling volume, geometry and counter efficiency.

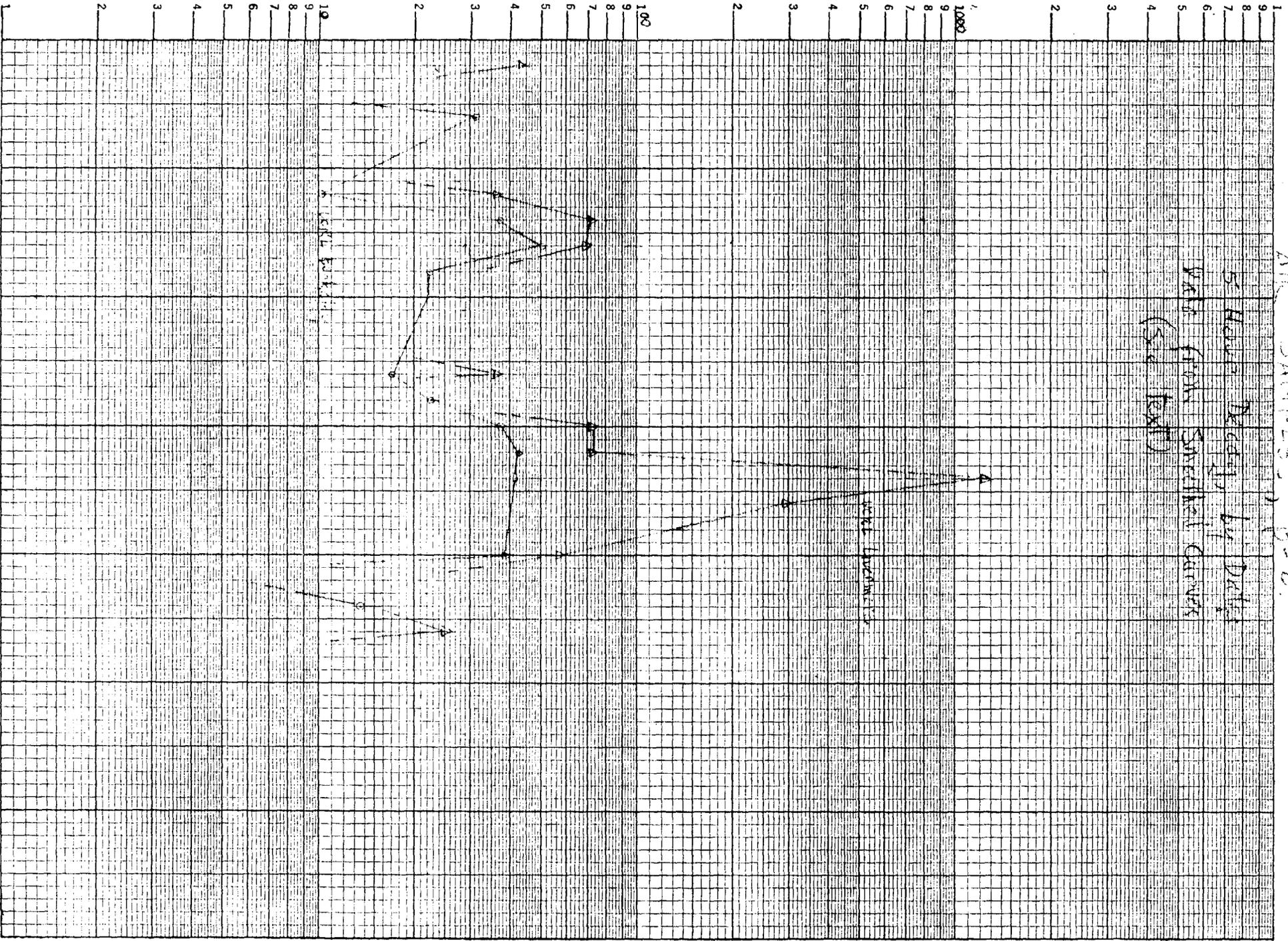
\* ND: No data.

\*\* Extrapolated.

2/11/53  
 27114 M.F. 7  
 1000

AIR SAMPLES, P-2.

5 Hours Drifted by Dally  
 with fresh Smeethell Camera  
 (See Text)



1750

100

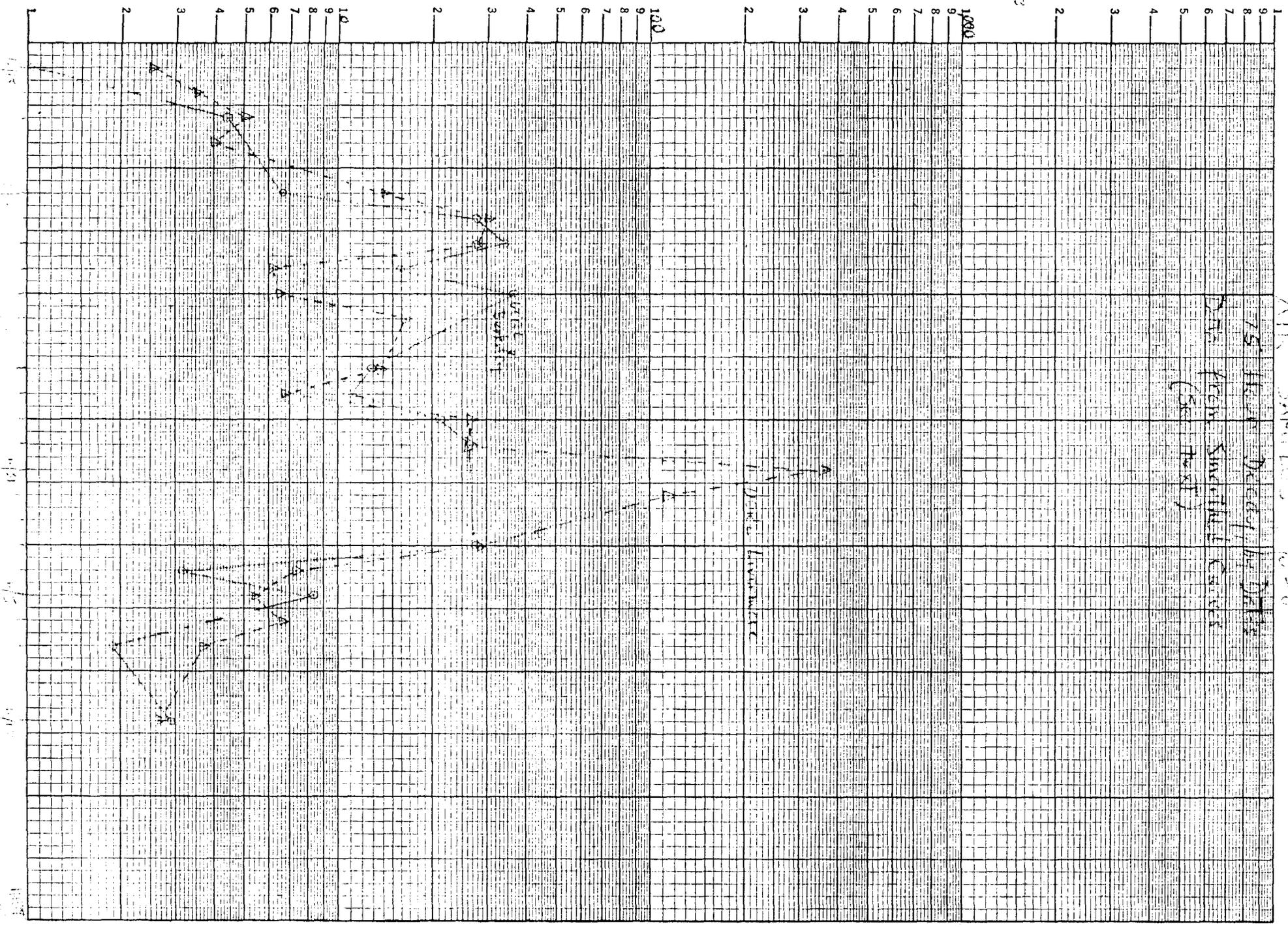
100

1000

*4000 / m<sup>2</sup>*

AIR SAMPLES B-28

75 HOUR Dredge by Dredge  
 ONE FROM SMOKEHOLE CATCHES  
 (SEE LIST)



General Electric Laboratory at Vallecitos  
(about 10 miles west of UCRL-Livermore site)

10 CFM air samples drawn thru 7" x 7" HV-70 paper, 5 ft. above ground, at 4 on-site locations. Average Beta-gamma determinations taken continuously per Geiger tube axially located in filter cylinders. At end of week, filter is removed, stored and lab-counted at 24 and 48 hours decay. Thus two types of data: (a) integrated, showing build-up, and (b) total for week's sample vs. decay.

(a) Daily integrated readings (counts per minute) among 4 samplers

10/15	175-200 ("normal")	10/29	500-700 (new sample)
16	500-700	30	700-1000
17	600-750	31	750-900
20	200-300	11/1	1000-1850
		3	1000-1300
21	250-350 (new sample)	5	200-250 (new sample)
22	900	6	350-600
23	500	7	300-850
24	600-900	10	175-225
27	500-800		

(b) Weekly samples - Beta-gamma  $\mu\text{C}/\text{m}^3$  - Data rounded to nearest integer

(In all cases, the volume sampled was 407.7  $\text{m}^3$ )

<u>Date</u>	<u>Decay</u> <u>Time</u>	<u>Site</u> <u>1</u>	<u>Site</u> <u>2</u>	<u>Site</u> <u>3</u>	<u>Site</u> <u>4</u>
10/6-	24 hours	6	6	5	5
10/13	48 "	5	4	6	4
10/13--	24 "	20	10	5	8
10/20	48 "	10	7	3	6
10/20-	24 "	50	30	20	30
10/27	48 "	40	30	20	20
10/27-	24 "	70	50	70	50
11/3	48 "	50	40	60	40
11/3-	24 "	6	10	10	9
11/10	48 "	6	10	10	9

State of California Department of Public Health

Air samples were taken and measured by methods set forth by the USPHS.  
(Field estimate gives 5 hr decay; USPHS assay is back extrapolated to 5 hrs  
decay. All data expressed in  $\mu\text{c}/\text{m}^3$ .)

RADIATION FALLOUT DATA  
October 1 to October 31, 1958, Inclusive

Sample Number	Berkeley		Los Angeles	
	Field Estimate µuc/M <sup>3</sup>	USPHS Assay µuc/M <sup>3</sup>	Field Estimate µuc/M <sup>3</sup>	USPHS Assay µuc/M <sup>3</sup>
1001	.38	0.19	7.30	0.42
1002	.73	0.84	2.40	1.60
1003	.75	0.19	4.00	2.81
1004	.25	0.37	4.90	3.91
1005	1.10	0.91	2.20	1.75
1006	4.80	4.88	2.00	1.86
1007	1.20	1.77	1.40	2.36
1008	0.70	0.81	2.10	1.94
1009	9.53	0.71	2.40	1.92
1010	0.74	0.56	2.00	1.34
1011	0.33	0.47	2.30	1.61
1012	0.36	0.54	1.10	1.05
1013	0.74	0.88	2.10	1.03
1014	0.74	1.20	1.90	1.51
1015	0.35	0.48	2.70	1.23
1016	0.74	0.58	2.70	2.21
1017	1.40	0.57	1.94	2.45
1018	3.30	5.05	3.70	2.93
1019	0.59	0.87	2.80	2.34
1020	2.10	2.87	3.40	3.06
1021	10.30	11.51	8.60	7.37
1022	12.20	13.61	17.30	19.82
1023	3.40	6.79	25.50	28.39
1024	5.60	6.28	23.40	21.70
1025	Motor failure		12.20	
1026	8.0	9.17	8.20	6.58
1027	4.5	6.41	6.90	5.08
1028	4.0	4.63	137.0	37.58
1029	4.4	5.75	44.2	32.56
1030	3.1	8.40	453.0	125.6
1031	18.0	13.80	129.0	57.12

RADIATION FALLOUT DATA  
November 1-12, 1958

Sample Number	Berkeley		Los Angeles	
	Field Estimate $\mu\text{c}/\text{M}^3$	USPHS ASSAY $\mu\text{c}/\text{M}^3$	Field Estimate $\mu\text{c}/\text{M}^3$	USPHS Assay $\mu\text{c}/\text{M}^3$
1101	21.5	15.15	20	17.67
1102	26.1	13.08	33	31.64
1103	8.3	6.8	198	
1104	4.95		145	
1105	Power failure		113	
1106	3.3		89	
1107	1.6		38	
1108	1.21		31	
1109	1.26		23	
1110	3.70		18	
1112	3.46			

Rain water samples

(a) UCRL-Berkeley, 1958

<u>Sampling dates</u>	<u>Beta-gamma µc/ml</u>	<u>Remarks</u>
<del>9/23</del> 10/18	$2.0 \times 10^{-8}$	decayed 4 days
<del>10/18</del> 11/10	$140 \times 10^{-8}$	no decay
<del>10/31</del> 11/10	$73 \times 10^{-8}$	no decay

(b) G.E.-Vallecitos Lab, 1958

<del>11/9</del> 11/10	$107 \times 10^{-8}$ $135 \times 10^{-8}$	no decay
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