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LOS ALAMOS SCIENTIFIC LABORATORY

OF THE UNIVERSITY OF CALIFORNIA ○ LOS ALAMOS NEW MEXICO

BETA-GAMMA RADIOACTIVITY IN ENVIRONMENTAL AIR AT LOS ALAMOS, NEW MEXICO, FOR 1960

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LOS ALAMOS SCIENTIFIC LABORATORY
OF THE UNIVERSITY OF CALIFORNIA LOS ALAMOS NEW MEXICO

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BETA-GAMMA RADIOACTIVITY IN ENVIRONMENTAL AIR AT LOS ALAMOS, NEW MEXICO, FOR 1960

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ABSTRACT

The report is a continuation of work reported in the Los Alamos section of "Radioactive Fallout Data Collected from Eleven Atomic Energy Installations for 1958", and in LAMS-2397. The beta activities measured were not identified. However, since the measurements were made in the same manner, the values are relative to one another.

The monthly average "per day" figures show in general the same peaks reported by other stations, i.e., in the spring months. The values found for 1960 are down by factors of 15 to 20 from those found in 1959, and are approaching the limits of detectability with the system in use.

Introduction

As a part of the environmental monitoring program at Los Alamos, the measurements of air particulate radioactivity, activity in precipitation and gamma background are made periodically. The sampling station is located on the roof of the Administration Building, SM-43. The samplers are on the highest part of the building -- a flat gravel covered surface, 65 feet above ground level.

Gamma Background

Gamma background surveys are made daily. The readings are made at approximately 0900 when the air sampler filter is changed. The measurements are made with a G-M survey meter with the probe held 3 feet above the surface of the roof.

Beta Activity of Particulate Matter in Air

Airborne radioactive particulate matter is collected on 4-inch diameter filters (MSA catalog number CR 17651). The sampling rate is 46 M^3/hr. Air samples are collected for 24-hour intervals during the work week and week-end samples are collected for a 72-hour period. Filters are changed at approximately 0900.

The filter papers are counted for beta activity 7 days after collection in a thin-window gas (methane) flow proportional counter, with an over-all efficiency for Sr^{90} - Y^{90} of 44 percent. Results are reported in terms of microcuries per cubic centimeter of air.

The filters are also counted 10 minutes after removal from the sampler, but these results have not been included in this report.

Beta Activity of Particulate Matter in Rain

Collection is made in an oversized rain collector which delivers one liter of water for each 0.1 inch of precipitation. The collector has a cross section of approximately 0.4 meter. The area is such that the number of d/m collected is approximately equivalent to micromicrocuries per square meter.

Even during relatively dry periods it was found that this arrangement collected activity. So, by the simple expedient of washing down the sides of the collector each day with about 1 liter of distilled water, a suitable sample could be obtained. These "wash" samples as well as any precipitation samples are reduced in volume then dry plated on 1-inch stainless steel planchets. These are then counted in a counter employing an end window Geiger tube with a window thickness of 1.9 mg/cm^2. The counting efficiency was determined by comparison with a Tracerlab standard of radiolead, which emits 1.17 Mev beta particles. Results are reported in $\mu\mu c$ per square meter at time counted.

Samples are taken daily on work days. The activity collected is washed with 1 liter of water for collection of the sample, usually between 0800 and 0900 on the day of collection. When precipitation occurs, the wash is added to the collected precipitation and treated the same way.

Results Reported

The results reported herein continue the measurements reported in LAMS-2397. Average "per day" values for air collection are weighted for sample periods of more than one day. Average "per day" values for the rain gauge collection are the total activity collected during the month divided by the number of days.

JANUARY 1960

Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μc/cc	Beta activity counted 7 days after collection: Rain gauge μμc/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity μμc/M²
Dec. 31 (1959)	Jan. 4	0.03	0.15×10^{-12}	165	0.30	Jan. 4	1553	186
Jan. 4	Jan. 5	0.03	0.19×10^{-12}	30	0	Jan. 4	1148	48
Jan. 5	Jan. 6	0.02	0.18×10^{-12}	36	0	Jan. 6	1135	57
Jan. 6	Jan. 7	0.03	0.12×10^{-12}	48	0	Jan. 7	1227	62
Jan. 7	Jan. 8	0.03	0.14×10^{-12}	35	0	Jan. 8	1130	53
Jan. 8	Jan. 11	0.02	0.13×10^{-12}	22	0	Jan. 11	1113	34
Jan. 11	Jan. 12	0.03	$< 0.08 \times 10^{-12}$	60	0.47	Jan. 12	1331	109
Jan. 12	Jan. 13	0.02	0.11×10^{-12}	22	0.01	Jan. 13	1131	32
Jan. 13	Jan. 14	0.03	0.09×10^{-12}	47	0.07	Jan. 14	1135	132
Jan. 14	Jan. 15	0.03	0.09×10^{-12}	59	trace	Jan. 15	1140	87
Jan. 15	Jan. 18	0.03	0.11×10^{-12}	781	0.26	Jan. 18	1438	951
Jan. 18	Jan. 19	0.03	0.13×10^{-12}	23	0	Jan. 19	1137	52
Jan. 19	Jan. 20	0.02	0.08×10^{-12}	< 22	0	Jan. 20	1140	26
Jan. 20	Jan. 21	0.02	0.25×10^{-12}	< 22	0	Jan. 21	1147	31
Jan. 21	Jan. 22	0.03	0.12×10^{-12}	< 22	0	Jan. 22	1133	22
Jan. 22	Jan. 25	0.02	0.16×10^{-12}	22	0	Jan. 25	1132	32
Jan. 25	Jan. 26	0.04	0.21×10^{-12}	< 22	trace	Jan. 26	1137	40
Jan. 26	Jan. 27	0.03	0.16×10^{-12}	< 22	0	Jan. 27	1120	22
Jan. 27	Jan. 28	0.03	0.18×10^{-12}	< 22	trace	Jan. 28	1125	22
Jan. 28	Jan. 29	0.02	0.19×10^{-12}	< 22	0	Jan. 29	1130	26
Jan. 29	Feb. 1	0.02	0.26×10^{-12}	< 22	0	Feb. 1	1143	63
Average per day		< 0.05	0.16×10^{-12}	< 49 > 43	———			
Total----------					1.11			

FEBRUARY 1960

in gauge Beta activity μμc/M²	Collection Date Start	Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μc/cc	Rain gauge μμc/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Time of count	Beta activity μμc/M²
186	Feb. 1	Feb. 2	0.02	0.20×10^{-12}	57	0.15	Feb. 2	1148	785
48	Feb. 2	Feb. 3	0.04	motor off	57	0.18	Feb. 3	1250	133
57	Feb. 3	Feb. 4	0.03	$< 0.08 \times 10^{-12}$	32	0	Feb. 4	1128	34
62	Feb. 4	Feb. 5	0.03	0.16×10^{-12}	< 22	0	Feb. 5	1126	63
53	Feb. 5	Feb. 8	0.02	0.22×10^{-12}	< 22	0	Feb. 8	1117	22
34									
	Feb. 8	Feb. 9	0.03	$< 0.08 \times 10^{-12}$	lost sample	0.01	- - -	- - -	- -
109	Feb. 9	Feb. 10	0.03	$< 0.08 \times 10^{-12}$	61	0.04	Feb. 10	1021	152
32	Feb. 10	Feb. 11	0.03	$< 0.08 \times 10^{-12}$	29	trace	Feb. 11	1054	56
132	Feb. 11	Feb. 12	< 0.05	0.15×10^{-12}	48	0.05	Feb. 12	1258	102
87	Feb. 12	Feb. 15	< 0.05	0.28×10^{-12}	< 22	trace	Feb. 15	1210	33
951									
	Feb. 15	Feb. 16	0.03	0.13×10^{-12}	< 22	0	Feb. 16	1156	36
52	Feb. 16	Feb. 17	0.03	$< 0.08 \times 10^{-12}$	< 22	trace	Feb. 17	1137	33
26	Feb. 17	Feb. 18	< 0.05	$< 0.08 \times 10^{-12}$	55	0.09	Feb. 18	1403	83
31	Feb. 18	Feb. 19	< 0.05	0.11×10^{-12}	< 22	0	Feb. 19	1227	22
22	Feb. 19	Feb. 23	< 0.05	0.22×10^{-12}	66	trace	Feb. 23	1144	159
32									
	Feb. 23	Feb. 24	< 0.05)	0.24×10^{-12}	62	0.01	Feb. 24	1120	166
40	Feb. 24	Feb. 25	< 0.05)		51	0.04	Feb. 25	1327	119
22	Feb. 25	Feb. 26	< 0.05	0.45×10^{-12}	285	0.02	Feb. 26	1156	550
22	Feb. 26	Feb. 29	0.03	0.45×10^{-12}	117	0.09	Feb. 29	1117	1500
26									
63	Feb. 29	Mar. 1	< 0.05	0.12×10^{-12}	308	0.24	Mar. 1	1303	723
	Average per day		< 0.05	$< 0.21 \times 10^{-12}$ > 0.19	< 49 > 44	——			
	Total----------					0.92			

MARCH 1960

Collection Date Start	Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μc/cc	Rain gauge μμc/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Time of count	Beta activity μμc/M²
Mar. 1	Mar. 2	0.03	0.13×10^{-12}	155	0.21	Mar. 2	1412	232
Mar. 2	Mar. 3	< 0.05	0.27×10^{-12}	24	trace	Mar. 3	1112	79
Mar. 3	Mar. 4	0.03	0.37×10^{-12}	29	0	Mar. 4	1132	63
Mar. 4	Mar. 7	0.03	0.56×10^{-12}	43	0	Mar. 7	1126	99
Mar. 7	Mar. 8	0.03	0.76×10^{-12}	22	0	Mar. 8	1124	61
Mar. 8	Mar. 9	0.03	0.56×10^{-12}	67*	0	Mar. 9	1120	60*
Mar. 9	Mar. 10	0.04	0.72×10^{-12}	22	0	Mar. 10	1126	30
Mar. 10	Mar. 11	0.02	0.46×10^{-12}	27	0	Mar. 11	1123	30
Mar. 11	Mar. 14	0.04	0.34×10^{-12}	461	0.18	Mar. 14	1215	650
Mar. 14	Mar. 15	0.03	0.23×10^{-12}	88	trace	Mar. 15	1108	169
Mar. 15	Mar. 16	0.03	0.28×10^{-12}	34	0	Mar. 16	1131	80
Mar. 16	Mar. 17	0.03	0.15×10^{-12}	83	0.02	Mar. 17	1127	268
Mar. 17	Mar. 18	0.02	0.27×10^{-12}	126	trace	Mar. 18	1128	135
Mar. 18	Mar. 21	0.04	0.21×10^{-12}	44	0	Mar. 21	1132	60
Mar. 21	Mar. 22	0.03	0.22×10^{-12}	22	0	Mar. 22	1129	48
Mar. 22	Mar. 23	0.03	0.30×10^{-12}	< 22	0	Mar. 23	1124	30
Mar. 23	Mar. 24	< 0.05	0.25×10^{-12}	234	0.16	Mar. 24	1333	393
Mar. 24	Mar. 25	< 0.05	0.08×10^{-12}	98	0.19	Mar. 25	1220	261
Mar. 25	Mar. 28	< 0.04	0.23×10^{-12}	52	0	Mar. 28	1153	68
Mar. 28	Mar. 29	< 0.05	0.29×10^{-12}	187	0.03	Mar. 29	1108	427
Mar. 29	Mar. 30	0.03	0.13×10^{-12}	63	0	Mar. 30	1131	84
Mar. 30	Mar. 31	< 0.05	0.23×10^{-12}	103	trace	Mar. 31	1133	879
Mar. 31	Apr. 1	0.04	0.31×10^{-12}	37*	0	Apr. 1	1203	22*
Average per day		< 0.05	0.32×10^{-12}	66				
Total----------					0.79			

*Statistics of sample counting are such that the apparent growth is probably not real.

APRIL 1960

in gauge Beta activity μμc/M²	Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μc/cc	Beta activity counted 7 days after collection: Rain gauge μμc/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity μμc/M²
232	Apr. 1	Apr. 4	0.04	0.65×10^{-12}	40	0.02	Apr. 5	1521	61
79	Apr. 4	Apr. 5	0.03	0.16×10^{-12}	24	trace	Apr. 5	1532	37
63	Apr. 5	Apr. 6	0.03	0.25×10^{-12}	< 22	0	Apr. 6	1110	38
99	Apr. 6	Apr. 7	0.03	0.16×10^{-12}	< 22	0	Apr. 7	1115	42
	Apr. 7	Apr. 8	0.03	0.20×10^{-12}	27	0	Apr. 8	1111	129
61	Apr. 8	Apr. 11	0.04	0.33×10^{-12}	33	0	Apr. 11	1127	58
60*									
30	Apr. 11	Apr. 12	0.03	0.19×10^{-12}	93	trace	Apr. 12	1512	222
30	Apr. 12	Apr. 13	< 0.05	0.33×10^{-12}	120	0.01	Apr. 13	1118	167
650	Apr. 13	Apr. 14	0.03	0.19×10^{-12}	37	trace	Apr. 14	1140	90
	Apr. 14	Apr. 15	0.03	0.41×10^{-12}	< 22	0	Apr. 15	1131	47
169	Apr. 15	Apr. 18	0.04	0.42×10^{-12}	43	0	Apr. 18	1119	63
80									
268	Apr. 18	Apr. 19	0.03	0.25×10^{-12}	22	0	Apr. 19	1101	74
135	Apr. 19	Apr. 20	0.04	0.38×10^{-12}	< 22	0	Apr. 20	1125	57
60	Apr. 20	Apr. 21	< 0.05	0.34×10^{-12}	< 22	0	Apr. 21	1100	22
	Apr. 21	Apr. 22	0.03	0.20×10^{-12}	53	0	Apr. 22	1145	92
48	Apr. 22	Apr. 25	0.03	0.25×10^{-12}	28	0	Apr. 25	1135	51
30									
393	Apr. 25	Apr. 26	0.03	0.44×10^{-12}	< 22	0	Apr. 26	1120	66
261	Apr. 26	Apr. 27	< 0.05	0.39×10^{-12}	< 22	0	Apr. 27	1139	60
68	Apr. 27	Apr. 28	0.03	0.16×10^{-12}	22	trace	Apr. 28	1127	73
	Apr. 28	Apr. 29	< 0.05	0.23×10^{-12}	31	trace	Apr. 29	1106	38
427									
84	Average per day		< 0.05	0.33×10^{-12}	< 24 > 20	——			
879	Total----------					0.03			
22*									

MAY 1960

Collection Date Start	Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μc/cc	Rain gauge μμc/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Time of count	Beta activity μμc/M²
Apr. 29	May 2	0.02	0.16×10^{-12}	210	0.14	May 2	1213	270
May 2	May 3	0.03	0.78×10^{-12}	58	trace	May 3	1110	203
May 3	May 4	0.02	0.18×10^{-12}	52	trace	May 4	1125	110
May 4	May 5	0.04	0.09×10^{-12}	144	0.12	May 5	1432	203
May 5	May 6	0.03	no sample	98	0.14	May 6	1410	150
May 6	May 9	0.04	no sample	51	trace	May 9	1128	112
May 9	May 10	< 0.05	0.15×10^{-12}	30	trace	May 10	1148	146
May 10	May 11	0.03	0.19×10^{-12}	< 22	0	May 11	1107	46
May 11	May 12	0.04	0.13×10^{-12}	33	0	May 12	1109	70
May 12	May 13	0.03	0.12×10^{-12}	38	0	May 13	1104	47
May 13	May 16	0.05	0.12×10^{-12}	33	0	May 16	1137	82
May 16	May 17	0.03	0.28×10^{-12}	< 22	trace	May 17	1104	51
May 17	May 18	0.04	0.10×10^{-12}	< 22	0	May 18	1122	29
May 18	May 19	0.05	0.15×10^{-12}	< 22	trace	May 19	1040	62
May 19	May 20	0.04	0.32×10^{-12}	26	trace	May 20	1148	46
May 20	May 23	0.04	0.23×10^{-12}	23	0	May 23	1117	41
May 23	May 24	0.04	0.09×10^{-12}	23	0	May 24	1126	37
May 24	May 25	0.04	0.33×10^{-12}	23	0	May 25	1111	61
May 25	May 26	0.04	0.42×10^{-12}	< 22	0	May 26	1130	28
May 26	May 27	0.04	0.33×10^{-12}	< 22	0	May 27	1139	34
May 27	May 31	0.05	0.21×10^{-12}	46	trace	May 31	1121	89
Average per day		< 0.05	0.22×10^{-12}	< 32 < 28	——			
Total----------					0.40			

Collection Start
May 31
June 1
June 2
June 3
June 6
June 7
June 8
June 9
June 10
June 13
June 14
June 15
June 16
June 17
June 20
June 21
June 22
June 23
June 24
June 27
June 28
June 29
Average pe
Total-----

JUNE 1960

ain gauge f Beta activity $\mu\mu c/M^2$	Collection Date Start	Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne $\mu c/cc$	Rain gauge $\mu\mu c/M^2$	Precipitation (inches)	Early count - Rain gauge: Date of count	Time of count	Beta activity $\mu\mu c/M^2$
270	May 31	June 1	0.05	0.18×10^{-12}	160	0.03	June 1	1210	249
203	June 1	June 2	0.05	0.24×10^{-12}	44	0	June 2	1058	127
110	June 2	June 3	0.04	no sample	622	0.49	June 3	1624	916
203	June 3	June 6	0.05	0.46×10^{-12}	847	0.63	June 6	1636	1252
150									
112	June 6	June 7	0.05	0.19×10^{-12}	538	0.54	June 7	1555	1076
	June 7	June 8	0.04	0.12×10^{-12}	605	0.72	June 9	1043	701
146	June 8	June 9	0.04	0.12×10^{-12}	66	0.44	June 9	1100	127
46	June 9	June 10	0.04	$< 0.08 \times 10^{-12}$	265	0.34	June 10	1414	434
70	June 10	June 13	0.05	0.14×10^{-12}	280	0.18	June 13	1427	287
47									
82	June 13	June 14	0.04	0.18×10^{-12}	23	0	June 14	1120	65
	June 14	June 15	0.04	0.08×10^{-12}	41	0	June 15	1108	96
51	June 15	June 16	0.05	0.08×10^{-12}	< 22	0	June 16	1055	40
29	June 16	June 17	0.04	$< 0.08 \times 10^{-12}$	30	0	June 17	1119	30
62	June 17	June 20	< 0.05	0.20×10^{-12}	49	0	June 20	1152	120
46									
41	June 20	June 21	< 0.05	0.11×10^{-12}	39	0	June 21	1400	62
	June 21	June 22	< 0.05	0.10×10^{-12}	35	0	June 22	1158	73
37	June 22	June 23	< 0.05	$< 0.08 \times 10^{-12}$	37	trace	June 23	1152	133
61	June 23	June 24	< 0.05	0.12×10^{-12}	134	trace	June 24	1130	308
28	June 24	June 27	< 0.05	0.11×10^{-12}	140	0.03	June 27	1150	164
34									
89	June 27	June 28	0.03	$< 0.08 \times 10^{-12}$	30	0	June 28	1105	61
	June 28	June 29	0.03	$< 0.08 \times 10^{-12}$	< 22	0	June 29	1249	< 22
	June 29	June 30	0.04	$< 0.08 \times 10^{-12}$	< 22	0	June 30	1302	< 22
	Average per day		< 0.05	< 0.16 $> 0.15 \times 10^{-12}$	< 135 > 133	——			
	Total----------					3.40			

JULY 1960

Collection Date Start	Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μc/cc	Rain gauge μμc/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Time of count	Beta activity μμc/M²
June 30	July 1	< 0.04	0.15×10^{-12}	< 22	0	July 1	1113	51
July 1	July 5	< 0.04	$< 0.08 \times 10^{-12}$	169	0	July 5	1255	245
July 5	July 6	< 0.05	$< 0.08 \times 10^{-12}$	248	0.83	July 6	1622	500
July 6	July 7	0.03	$< 0.08 \times 10^{-12}$	42	0.09	July 7	1209	101
July 7	July 8	< 0.05	$< 0.08 \times 10^{-12}$	75	0.04	July 8	1216	88
July 8	July 11	< 0.04	$< 0.08 \times 10^{-12}$	267	0.61	July 11	1620	659
July 11	July 12	< 0.05	$< 0.08 \times 10^{-12}$	< 22	0	July 12	1125	55
July 12	July 15	0.03	$< 0.08 \times 10^{-12}$	< 22	0	July 13	1052	57
July 13	July 14	0.03	0.10×10^{-12}	< 22	0.01	July 14	1054	88
July 14	July 15	0.02	no sample	102	0.12	July 15	1150	206
July 15	July 18	0.04	0.10×10^{-12}	99	0.17	July 18	1146	123
July 18	July 19	0.04	0.18×10^{-12}	< 22	trace	July 19	1125	69
July 19	July 20	0.04	0.23×10^{-12}	< 22	0	July 20	1110	47
July 20	July 21	0.02	0.12×10^{-12}	< 22	0	July 21	1105	58
July 21	July 22	0.03	0.19×10^{-12}	37	trace	July 22	1129	130
July 22	July 25	0.03	$< 0.08 \times 10^{-12}$	100	trace	July 25	1053	169
July 25	July 26	0.03	$< 0.08 \times 10^{-12}$	< 22	0	July 26	1115	58
July 26	July 27	0.03	0.13×10^{-12}	26	trace	July 27	1100	72
July 27	July 28	0.03	0.10×10^{-12}	< 22	0	July 28	1114	81
July 28	July 29	0.03	$< 0.08 \times 10^{-12}$	29	0	July 29	1110	73
July 29	Aug. 1	0.02	$< 0.08 \times 10^{-12}$	121	0.32	Aug. 1	1320	151
Average per day		< 0.05	< 0.10 $> 0.05 \times 10^{-12}$	< 47 > 41	——			
Total----------					2.19			

AUGUST 1960

Rain gauge Beta activity μμc/M²	Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μc/cc	Beta activity counted 7 days after collection: Rain gauge μμc/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity μμc/M²
51	Aug. 1	Aug. 2	0.02	$< 0.08 \times 10^{-12}$	< 22	trace	Aug. 2	1109	101
245	Aug. 2	Aug. 3	0.03	0.09×10^{-12}	< 22	trace	Aug. 3	1125	248
	Aug. 3	Aug. 4	0.03	0.09×10^{-12}	< 22	0	Aug. 4	1100	75
500	Aug. 4	Aug. 5	0.03	$< 0.08 \times 10^{-12}$	44	0.01	Aug. 5	1153	86
101	Aug. 5	Aug. 8	0.02	$< 0.08 \times 10^{-12}$	46	trace	Aug. 8	1116	113
88									
659	Aug. 8	Aug. 9	0.02	0.10×10^{-12}	437	0.98	Aug. 10	1106	637
	Aug. 9	Aug. 10	< 0.05	$< 0.08 \times 10^{-12}$	136	0.19	Aug. 10	1227	361
55	Aug. 10	Aug. 11	0.03	$< 0.08 \times 10^{-12}$	123	0.22	Aug. 11	1138	189
57	Aug. 11	Aug. 12	0.03	0.14×10^{-12}	< 22	0.05	Aug. 12	1115	42
88	Aug. 12	Aug. 15	< 0.05	0.08×10^{-12}	243	0.43	Aug. 15	1503	459
206									
123	Aug. 15	Aug. 16	0.03	$< 0.08 \times 10^{-12}$	26	0.10	Aug. 16	1117	460
	Aug. 16	Aug. 17	0.03	$< 0.08 \times 10^{-12}$	57	0.08	Aug. 17	1128	99
69	Aug. 17	Aug. 18	0.03	0.32×10^{-12}	< 22	0	Aug. 18	1130	41
47	Aug. 18	Aug. 19	0.03	0.16×10^{-12}	33	0	Aug. 19	1136	41
58	Aug. 19	Aug. 22	0.04	0.11×10^{-12}	50	0	Aug. 22	1110	112
130									
169	Aug. 22	Aug. 23	0.03	$< 0.08 \times 10^{-12}$	< 22	trace	Aug. 23	1026	22
	Aug. 23	Aug. 24	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Aug. 24	1100	46
58	Aug. 24	Aug. 25	0.02	$< 0.08 \times 10^{-12}$	< 22	0	Aug. 25	1110	25
72	Aug. 25	Aug. 26	0.03	0.10×10^{-12}	33	0	Aug. 26	1124	49
81	Aug. 26	Aug. 29	0.04	$< 0.08 \times 10^{-12}$	< 22	0	Aug. 29	1120	69
73									
151	Aug. 29	Aug. 30	0.03	0.12×10^{-12}	< 22	0	Aug. 30	1102	71
	Aug. 30	Aug. 31	0.03	$< 0.08 \times 10^{-12}$	26	0.02	Aug. 31	1655	32
	Aug. 31	Sept. 1	0.04	0.12×10^{-12}	< 22	0	Sept. 1	1114	61
	Average per day		< 0.05	< 0.11 $> 0.05 \times 10^{-12}$	< 48 > 40	——			
	Total----------					2.08			

SEPTEMBER 1960

Collection Date Start	Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne $\mu c/cc$	Rain gauge $\mu\mu c/M^2$	Precipitation (inches)	Early count - Rain gauge: Date of count	Time of count	Beta activity $\mu\mu c/M^2$
Sept. 1	Sept. 2	0.04	$< 0.08 \times 10^{-12}$	< 22	0	Sept. 2	1117	49
Sept. 2	Sept. 6	0.03	$< 0.08 \times 10^{-12}$	38	0	Sept. 6	1143	89
Sept. 6	Sept. 7	0.03	$< 0.08 \times 10^{-12}$	60	0.01	Sept. 7	1119	90
Sept. 7	Sept. 8	0.03	$< 0.08 \times 10^{-12}$	< 22	0.04	Sept. 8	1214	62
Sept. 8	Sept. 9	0.03	$< 0.08 \times 10^{-12}$	36	0.02	Sept. 9	1116	64
Sept. 9	Sept. 2	0.03	$< 0.08 \times 10^{-12}$	46	0.63	Sept. 12	1441	70
Sept. 12	Sept. 13	0.03	0.09×10^{-12}	< 22	trace	Sept. 13	1110	77
Sept. 13	Sept. 14	0.03	$< 0.08 \times 10^{-12}$	< 22	trace	Sept. 14	1110	86
Sept. 14	Sept. 15	< 0.05	0.10×10^{-12}	85	0.20	Sept. 15	1150	265
Sept. 15	Sept. 16	0.03	$< 0.08 \times 10^{-12}$	23	0.03	Sept. 16	1203	83
Sept. 16	Sept. 19	0.02	$< 0.08 \times 10^{-12}$	24	0.04	Sept. 19	1127	163
Sept. 19	Sept. 20	0.03	$< 0.08 \times 10^{-12}$	32	0.09	Sept. 20	1126	88
Sept. 20	Sept. 21	0.03	0.15×10^{-12}	25	trace	Sept. 21	1105	44
Sept. 21	Sept. 22	0.02	$< 0.08 \times 10^{-12}$	30	0.02	Sept. 22	1133	266
Sept. 22	Sept. 23	0.03	0.09×10^{-12}	61	0.06	Sept. 23	1216	62
Sept. 23	Sept. 26	0.03	$< 0.08 \times 10^{-12}$	25	trace	Sept. 26	1101	42
Sept. 26	Sept. 27	0.03	$< 0.08 \times 10^{-12}$	< 22	trace	Sept. 27	1054	52
Sept. 27	Sept. 28	< 0.05	0.09×10^{-12}	55	0.06	Sept. 28	1155	121
Sept. 28	Sept. 29	< 0.05	$< 0.08 \times 10^{-12}$	51	0.10	Sept. 29	1150	172
Sept. 29	Sept. 30	0.03	0.11×10^{-12}	22	0	Sept. 30	1115	101
Average per day		< 0.05	< 0.09 > 0.02×10^{-12}	< 25 > 21	——			
Total----------					1.30			

OCTOBER 1960

Rain gauge Beta activity $\mu\mu c/M^2$	Collection Date Start	Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne $\mu c/cc$	Rain Gauge $\mu\mu c/M^2$	Precipitation (inches)	Early count - Rain Gauge: Date of count	Time of count	Beta activity $\mu\mu c/M^2$
49	Sept. 30	Oct. 3	0.03	$< 0.08 \times 10^{-12}$	56	0.09	Oct. 3	1129	72
89	Oct. 3	Oct. 4	0.02	0.12×10^{-12}	37	0	Oct. 4	1057	97
90	Oct. 4	Oct. 5	0.03	0.08×10^{-12}	24	0	Oct. 5	1055	30
62	Oct. 5	Oct. 6	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Oct. 6	1055	49
64	Oct. 6	Oct. 7	0.03	0.11×10^{-12}	22	0	Oct. 7	1126	46
70	Oct. 7	Oct. 10	0.02	0.22×10^{-12}	43	0.10	Oct. 10	1100	57
77	Oct. 10	Oct. 11	0.03	$< 0.08 \times 10^{-12}$	< 22	trace	Oct. 11	1118	58
86	Oct. 11	Oct. 12	< 0.05	$< 0.08 \times 10^{-12}$	31	0.04	Oct. 12	1200	66
265	Oct. 12	Oct. 13	< 0.05	0.11×10^{-12}	< 22	0	Oct. 13	1107	28
83	Oct. 13	Oct. 14	< 0.05	0.13×10^{-12}	38*	0	Oct. 14	1136	27*
163	Oct. 14	Oct. 17	< 0.05	$< 0.08 \times 10^{-12}$	144	1.42	Oct. 17	1539	195
88	Oct. 17	Oct. 18	< 0.05	$< 0.08 \times 10^{-12}$	90	1.94	Oct. 18	1315	141
44	Oct. 18	Oct. 19	< 0.05	0.09×10^{-12}	54	0.07	Oct. 19	1110	54
266	Oct. 19	Oct. 20	< 0.05	$< 0.08 \times 10^{-12}$	< 22	0	Oct. 20	1137	66
62	Oct. 20	Oct. 21	< 0.05	0.14×10^{-12}	< 22	0	Oct. 21	1243	< 22
42	Oct. 21	Oct. 24	0.03	0.15×10^{-12}	< 22	0	Oct. 24	1055	54
52	Oct. 24	Oct. 25	0.03	0.14×10^{-12}	< 22	0	Oct. 25	1052	47
121	Oct. 25	Oct. 26	0.03	0.14×10^{-12}	< 22	0	Oct. 26	1102	47
172	Oct. 26	Oct. 27	0.03	0.08×10^{-12}	< 22	0	Oct. 27	1126	25
101	Oct. 27	Oct. 28	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Oct. 28	1136	48
	Oct. 28	Oct. 31	< 0.05	0.12×10^{-12}	98	0	Oct. 31	1153	131
	Average per day		< 0.05	< 0.12 $> 0.08 \times 10^{-12}$	< 28 > 20				
	Total					3.66			

*Statistics of sample counting are such that the apparent growth is probably not real.

NOVEMBER 1960

Collection Date Start	Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μc/cc	Rain gauge μμc/M²	Precipitation (inches)	Early count - Rain Gauge: Date of count	Time of count	Beta activity μμc/M²
Oct. 31	Nov. 1	0.03	0.19×10^{-12}	< 22	0	Nov. 1	1329	118
Nov. 1	Nov. 2	0.04	$< 0.08 \times 10^{-12}$	< 22	0	Nov. 2	1124	37
Nov. 2	Nov. 3	< 0.05	$< 0.08 \times 10^{-12}$	< 22	0	Nov. 3	1125	39
Nov. 3	Nov. 4	0.04	0.09×10^{-12}	< 22	0	Nov. 4	1216	36
Nov. 4	Nov. 7	0.03	$< 0.08 \times 10^{-12}$	52	0.16	Nov. 7	1150	233
Nov. 7	Nov. 8	0.03	$< 0.08 \times 10^{-12}$	26	0.30	Nov. 8	1201	47
Nov. 8	Nov. 9	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Nov. 9	1102	< 22
Nov. 9	Nov. 10	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Nov. 10	1138	23
Nov. 10	Nov. 14	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Nov. 14	1110	23
Nov. 14	Nov. 15	0.03	0.13×10^{-12}	23	trace	Nov. 15	1100	396
Nov. 15	Nov. 16	0.02	$< 0.08 \times 10^{-12}$	67	trace	Nov. 16	1104	68
Nov. 16	Nov. 17	0.02	0.08×10^{-12}	< 22	0	Nov. 17	1102	37
Nov. 17	Nov. 18	0.03	$< 0.08 \times 10^{-12}$	26	0	Nov. 18	1125	54
Nov. 18	Nov. 21	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Nov. 21	1118	24
Nov. 21	Nov. 22	0.05	0.11×10^{-12}	< 22	0	Nov. 22	1129	42
Nov. 22	Nov. 23	< 0.05	$< 0.08 \times 10^{-12}$	< 22	0	Nov. 23	1115	38
Nov. 23	Nov. 25	0.03	$< 0.08 \times 10^{-12}$	26	0	Nov. 25	1150	65
Nov. 25	Nov. 28	0.03	$< 0.08 \times 10^{-12}$	29	trace	Nov. 28	1110	87
Nov. 28	Nov. 29	0.03	no sample	< 22	0	Nov. 29	1145	39
Nov. 29	Nov. 30	< 0.05	$< 0.08 \times 10^{-12}$	< 22	0	Nov. 30	1118	32
Average per day		< 0.05	< 0.09 $> 0.02 \times 10^{-12}$	< 18 > 8				
Total ----------					0.46			

Collection Start

Nov. 30
Dec. 1
Dec. 2
Dec. 5
Dec. 6
Dec. 7
Dec. 8
Dec. 9
Dec. 12
Dec. 13
Dec. 14
Dec. 15
Dec. 16
Dec. 19
Dec. 20
Dec. 21
Dec. 22
Dec. 23
Dec. 27
Dec. 28
Dec. 29

Average pe

Total - -

DECEMBER 1960

Rain Gauge of Beta activity μμc/M²	Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μc/cc	Beta activity counted 7 days after collection: Rain gauge μμc/M²	Precipitation (inches)	Early count - Rain Gauge: Date of count	Early count - Rain Gauge: Time of count	Early count - Rain Gauge: Beta activity μμc/M²
118	Nov. 30	Dec. 1	0.04	0.08×10^{-12}	< 22	0	Dec. 1	1115	29
37	Dec. 1	Dec. 2	0.03	0.12×10^{-12}	< 22	0	Dec. 2	1142	44
39	Dec. 2	Dec. 5	0.04	$< 0.08 \times 10^{-12}$	102	0.45	Dec. 5	1400	292
36									
233	Dec. 5	Dec. 6	0.03	0.11×10^{-12}	48	0.25	Dec. 6	1130	372
	Dec. 6	Dec. 7	0.02	$< 0.08 \times 10^{-12}$	118	0.05	Dec. 7	1337	211
47	Dec. 7	Dec. 8	< 0.05	$< 0.08 \times 10^{-12}$	< 22	0.10	Dec. 8	1343	72
< 22	Dec. 8	Dec. 9	0.03	$< 0.08 \times 10^{-12}$	48	0.65	Dec. 9	1449	76
23	Dec. 9	Dec. 12	0.03	$< 0.08 \times 10^{-12}$	< 22	0.06	Dec. 12	1220	31
23									
	Dec. 12	Dec. 13	< 0.05	$< 0.08 \times 10^{-12}$	< 22	0.01	Dec. 13	1155	244
396	Dec. 13	Dec. 14	0.03	$< 0.08 \times 10^{-12}$	26	0.19	Dec. 14	1122	28
68	Dec. 14	Dec. 15	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Dec. 15	1123	< 22
37	Dec. 15	Dec. 16	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Dec. 16	1158	32
54	Dec. 16	Dec. 19	0.04	$< 0.08 \times 10^{-12}$	24	0	Dec. 19	1123	29
24									
	Dec. 19	Dec. 20	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Dec. 20	1026	< 22
42	Dec. 20	Dec. 21	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Dec. 21	1119	< 22
38	Dec. 21	Dec. 22	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Dec. 22	1101	25
65	Dec. 22	Dec. 23	0.02	$< 0.08 \times 10^{-12}$	< 22	0	Dec. 23	1218	< 22
87	Dec. 23	Dec. 27	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Dec. 27	1142	26
39	Dec. 27	Dec. 28	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Dec. 28	1132	< 22
32	Dec. 28	Dec. 29	< 0.05	$< 0.08 \times 10^{-12}$	< 22	trace	Dec. 29	1148	< 22
	Dec. 29	Dec. 30	0.03	$< 0.08 \times 10^{-12}$	< 22	0	Dec. 30	1255	< 22
	Average per day		< 0.05	< 0.09 $> 0.01 \times 10^{-12}$	< 24 > 12				
	Total					1.76			

SUMMARY 1960

Month	Average "per day" activities: Airborne μc/cc		Rain gauge μμc/M^2		Total inches precipitation
January		0.16×10^{-12}	< 49	> 43	1.11
February	< 0.21	$>0.19 \times 10^{-12}$	< 49	> 44	0.92
March		0.32×10^{-12}	66		0.79
April		0.33×10^{-12}	< 24	> 20	0.03
May		0.22×10^{-12}	< 32	> 28	0.40
June	< 0.16	$>0.15 \times 10^{-12}$	<135	>133	3.40
July	< 0.10	$>0.05 \times 10^{-12}$	< 47	> 41	2.19
August	< 0.11	$>0.05 \times 10^{-12}$	< 48	> 40	2.08
September	< 0.09	$>0.02 \times 10^{-12}$	< 25	> 21	1.30
October	< 0.12	$>0.08 \times 10^{-12}$	< 28	> 20	3.66
November	< 0.09	$>0.02 \times 10^{-12}$	< 18	> 8	0.46
December	< 0.09	$>0.01 \times 10^{-12}$	< 24	> 12	1.76

INCHES PRECIPITATION

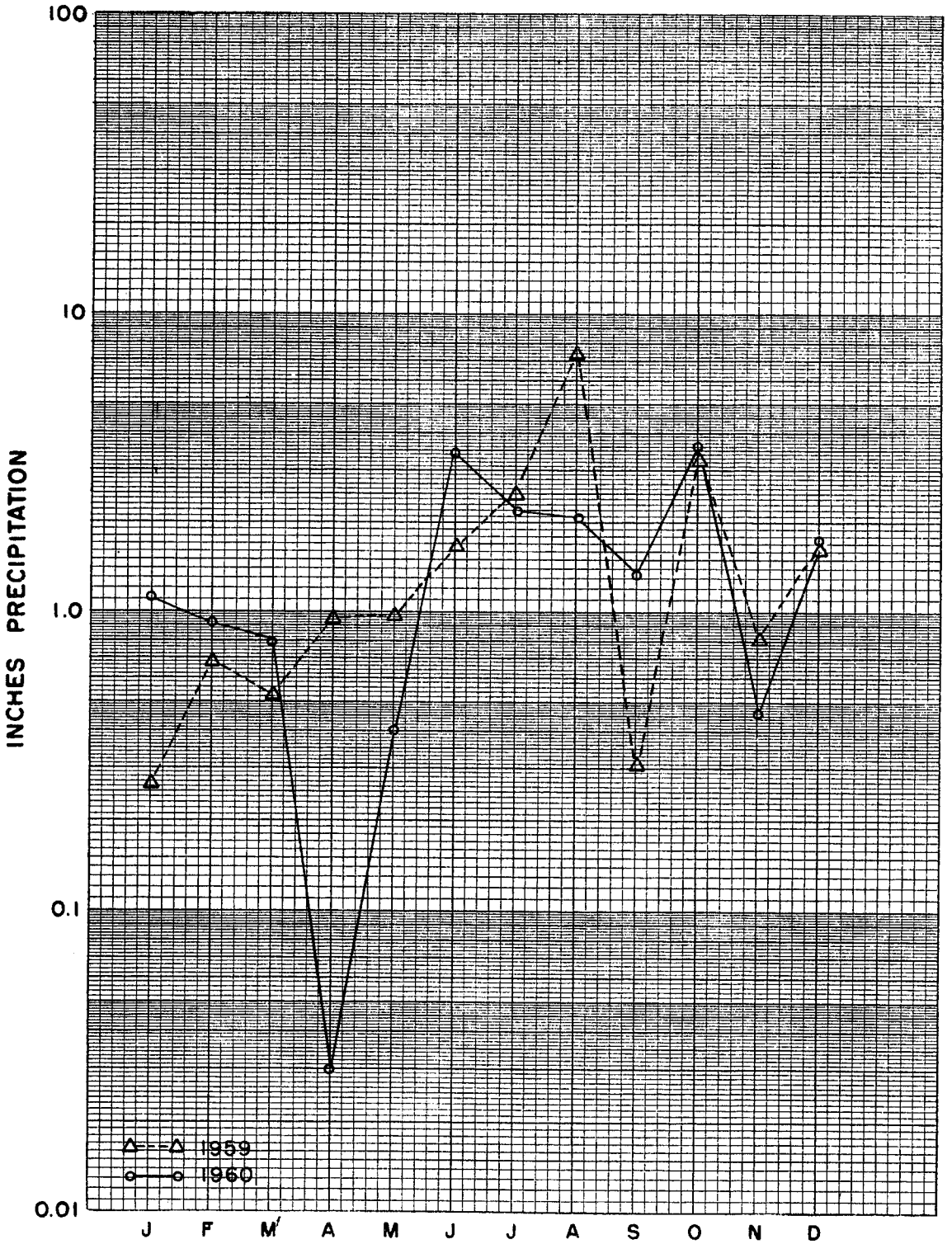

Fig. 1 Total Monthly Precipitation

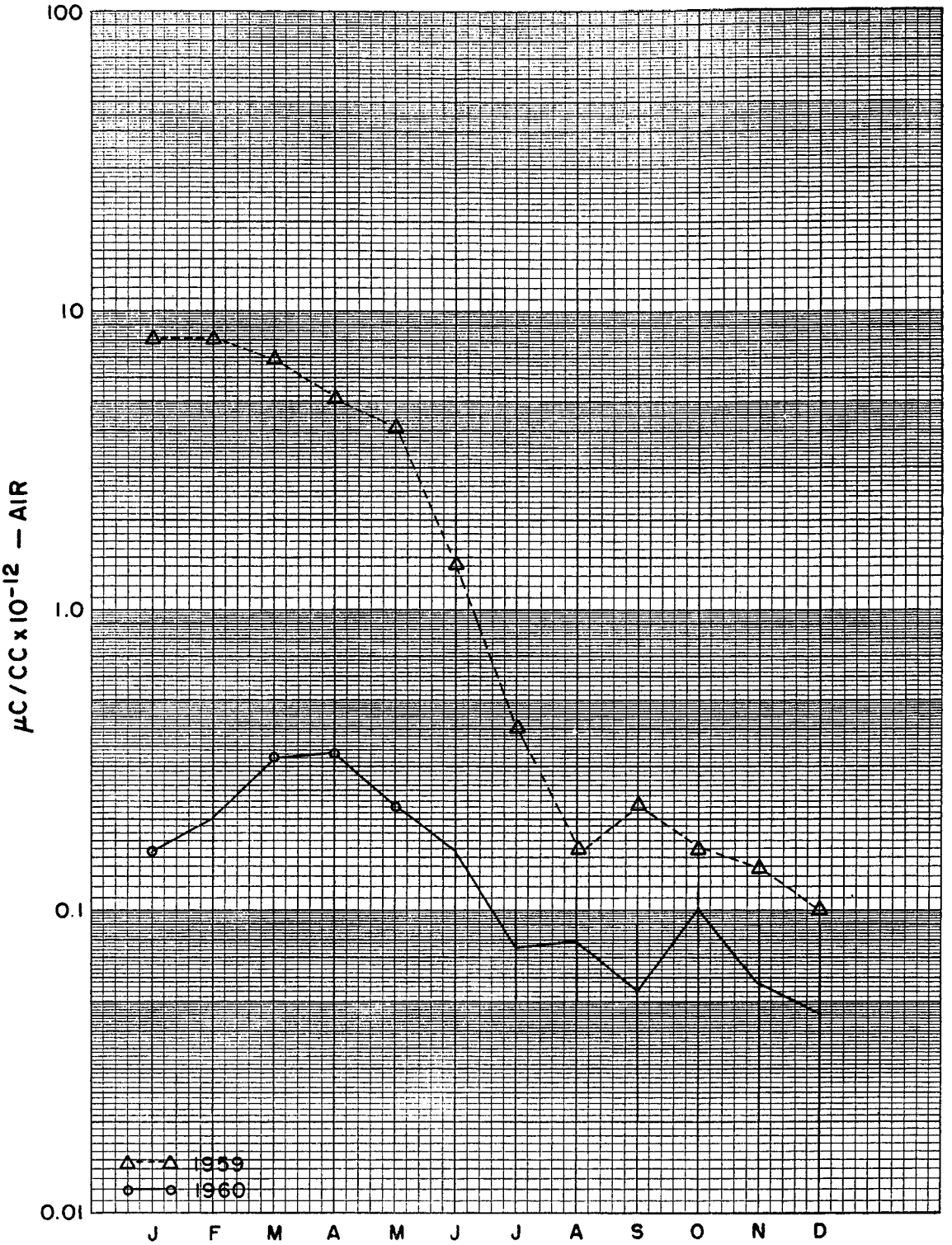

Fig. 2. Average "Per Day" Activity Found in Air Filter Samples

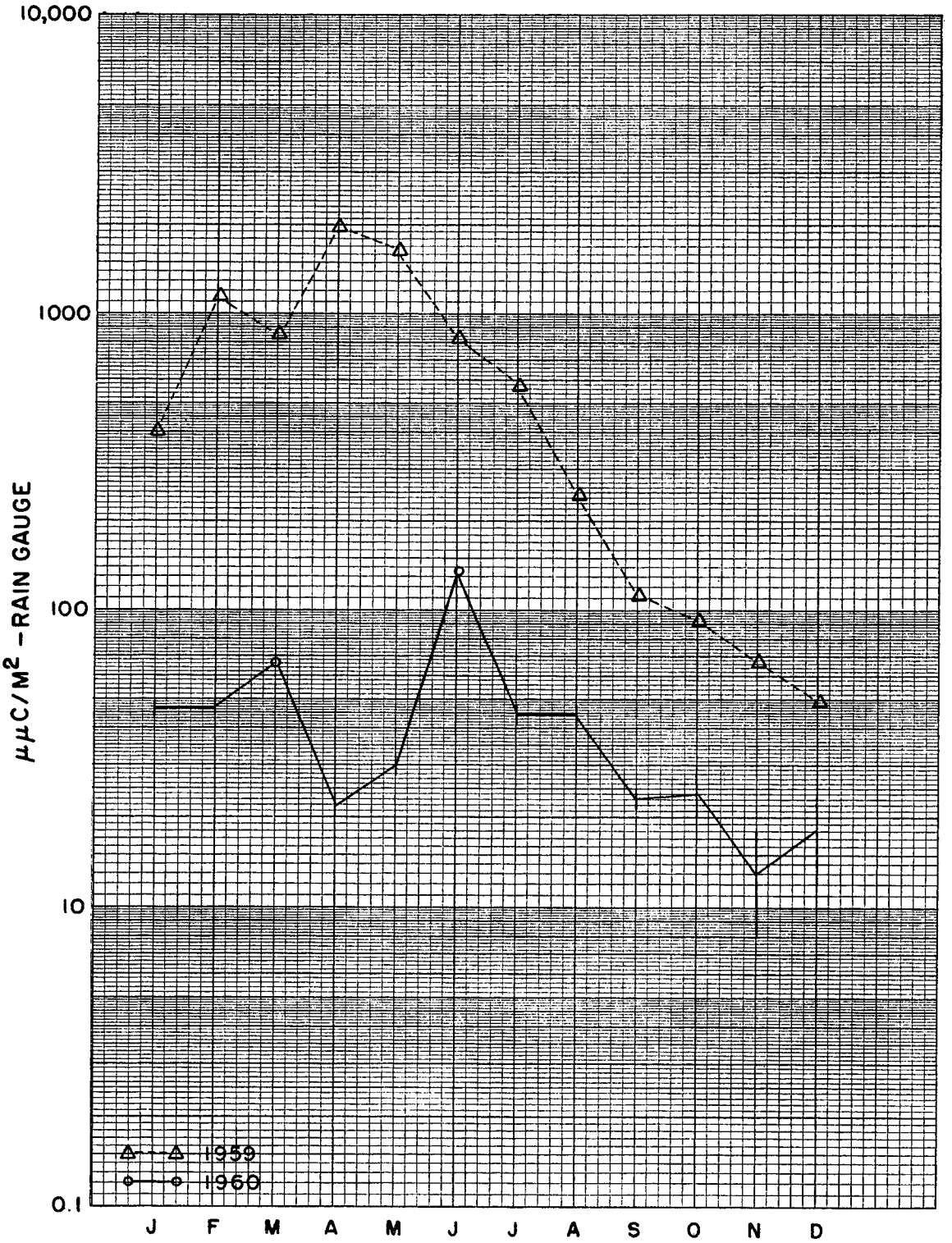

Fig. 3. Average "Per Day" Activities Found in Water Gauge Samples