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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 1963

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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 1963

by

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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", LAMS-2397 (Nov., Dec. of 1958 and all of 1959), LAMS-2499 (for 1960), LAMS-2702 (for 1961), and LAMS-2870 (for 1962). The beta activities 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" graphs show, in general, higher trends the first half of this year than last, with a tapering off toward the end of the year.

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 was relocated at TA-50 in March, due to the relocation of our Group at that site. The samplers are on the roof of the building, 31.5 feet above ground level. This location is about 1-3/4 miles S.E. of the Administration Building, the former location. Simultaneous sampling at both locations for 60 days indicated that no significant differences in samples were encountered due to the move.

Daily samples were collected throughout 1963. The first half of 1963 showed results consistently higher than the first half of 1962. The last half of 1963 showed a continuous decline in activities.

Gamma Background

Gamma background surveys were discontinued in March.

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 has been reduced from the previous 46 M^3/hr. to 25.5 M^3/hr. due to the addition of an activated charcoal filter behind the MSA filter. Air samples are ordinarily collected for 24 hour intervals during the work week and weekend 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 50 percent. Results are reported in terms of microcuries per cubic centimeter of air.

The filters are also counted 10 minutes, 5 hours, and 24 hours after removal, 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 1 liter of water for each 0.1 inch of precipitation. The collector has a cross section of approximately 0.4 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 time a sample is collected with about 1 liter of distilled water, and collecting the wash water, a suitable sample could be obtained. These "wash" samples as well as any precipitation samples are reduced in volume, dry-plated on 1-inch stainless planchets, and counted in a counter with an end window Geiger tube with a window thickness of 1.9 mg/cm^2. Late this year, we replaced this counter with a Sharp Widebeta/matic Counting System, employing a gas flow proportional counter, which increased our efficiencies and lowered our background. Our present results are comparable with past results in that the same standard is used for determining geometry and efficiency. The counting efficiency is 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, LAMS-2499, LAMS-2702, and LAMS-2870. These results are shown in Figs. 2 and 3, and precipitation for the year is shown in Fig. 1. Table I summarizes the year's data. Average "per day" values for air collection are weighted for sample periods of more than 1 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 1963

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/M³	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity µµc/M³
Dec. 31 (1962)	Jan. 2	0.05	15.41×10^{-12} *	288	0	Jan. 2	1400	356.2
Jan. 2	Jan. 3	0.05	9.96×10^{-12}	86**	0	Jan. 3	1204	112.3
Jan. 3	Jan. 4	0.05	4.76×10^{-12}	7851*	0.42	Jan. 4	1325	10233.4
Jan. 4	Jan. 7	0.05	4.33×10^{-12} **	1058	0	Jan. 7	1311	1459.1
Jan. 7	Jan. 8	0.05	8.41×10^{-12}	423	0	Jan. 8	1433	599.7
Jan. 8	Jan. 9	0.05	8.31×10^{-12}	276	0	Jan. 9	1333	373.5
Jan. 9	Jan. 10	0.04	10.48×10^{-12}	241	trace	Jan. 10	1310	351.9
Jan. 10	Jan. 11	0.04	5.48×10^{-12}	5906	0.32	Jan. 11	1501	7309.0
Jan. 11	Jan. 14	0.06	12.04×10^{-12}	---	0	NO SAMPLE		
Jan. 14	Jan. 15	0.05	6.43×10^{-12}	1453	0	Jan. 15	1220	1532.6
Jan. 15	Jan. 16	0.04	6.06×10^{-12}	316	0	Jan. 16	1242	415.5
Jan. 16	Jan. 17	0.05	5.77×10^{-12}	248	0	Jan. 17	1237	273.7
Jan. 17	Jan. 18	0.04	9.43×10^{-12}	448	0	Jan. 18	1350	481.0
Jan. 18	Jan. 21	0.04	8.16×10^{-12}	6621	0.30	Jan. 21	1357	7856.0
Jan. 21	Jan. 22	0.04	5.50×10^{-12}	628	0	Jan. 22	1237	646.8
Jan. 22	Jan. 23	0.04	7.14×10^{-12}	479	0	Jan. 23	1315	498.8
Jan. 23	Jan. 24	0.03	7.17×10^{-12}	1072	0	Jan. 24	1314	1903.2
Jan. 24	Jan. 25	0.03	7.72×10^{-12}	122	0	Jan. 25	1248	153.0
Jan. 25	Jan. 28	0.03	12.27×10^{-12}	346	0	Jan. 28	1310	385.5
Jan. 28	Jan. 29	0.0[illegible]	10.35×10^{-12}	166	0	Jan. 29	1420	45.1
Jan. 29	Jan. 30	0.04	10.97×10^{-12}	177	0	Jan. 30	1308	248.4
Jan. 30	Jan. 31	0.03	5.65×10^{-12}	556	trace	Jan. 31	1212	593.4
$\bar{X}$			5.86×10^{-12}	928	0.034			
* Maximum			15.41×10^{-12}	7851	0.42			
** Minimum			4.33×10^{-12}	86	0			
Total				28761	1.06			

FEBRUARY 1963

Collection Date		Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection		Precipitation (inches)	Early count - Rain gauge		
Start	Stop		Airborne $\mu c/cc$	Rain gauge $\mu\mu c/M^2$		Date of count	Time of count	Beta activity $\mu\mu c/M^2$
Jan. 31	Feb. 2	0.03	4.46×10^{-12}	252	trace	Feb. 1	1320	278.2
Feb. 1	Feb. 4	0.04	5.43×10^{-12}	1160	0.01	Feb. 4	1323	1356.5
Feb. 4	Feb. 5	0.04	6.34×10^{-12}	148	0	Feb. 5	1439	195.9
Feb. 5	Feb. 6	0.03	6.18×10^{-12}	163	0	Feb. 6	1511	178.1
Feb. 6	Feb. 7	0.04	7.27×10^{-12}	140	0	Feb. 7	1605	205.5
Feb. 7	Feb. 8	0.03	2.37×10^{-12} **	53**	0	Feb. 8	1425	82.6
Feb. 8	Feb. 11	0.04	12.52×10^{-12}	14395*	0.94	Feb. 11	1355	15677.0
Feb. 11	Feb. 12	0.04	8.18×10^{-12}	2425	0.10	Feb. 12	1333	2968.9
Feb. 12	Feb. 13	0.04	8.58×10^{-12}	660	0	Feb. 13	1340	807.9
Feb. 13	Feb. 14	0.04	10.49×10^{-12}	1360	0	Feb. 14	1123	1407.5
Feb. 14	Feb. 15	0.03	9.05×10^{-12}	257	0	Feb. 15	1558	273.2
Feb. 15	Feb. 18	--	10.49×10^{-12}	1557	0.01	Feb. 18	1536	1794.0
Feb. 18	Feb. 19	--	---	386	0	Feb. 19	1545	745.3
Feb. 19	Feb. 20	--	---	227	0	Feb. 20	1530	222.6
Feb. 20	Feb. 21	0.03	16.16×10^{-12}*	2289	trace	Feb. 21	1523	2999.7
Feb. 21	Feb. 25	0.04	10.98×10^{-12}	8401	0.67	Feb. 25	1313	10926.0
Feb. 25	Feb. 26	0.03	7.33×10^{-12}	1089	0	Feb. 26	1451	1200.2
Feb. 26	Feb. 27	0.03	7.42×10^{-12}	493	0	Feb. 27	1549	586.6
Feb. 27	Feb. 28	0.04	5.95×10^{-12}	550	0	Feb. 28	1611	582.4
$\bar{X}$			8.18×10^{-12}	1286	0.06			
* Maximum			16.16×10^{-12}	14395	0.94			
** Minimum			2.37×10^{-12}	53	0			
Total				36005	1.75			

MARCH 1963

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
Feb. 28	Mar. 1	0.04	2.72×10^{-12} **	350	0	Mar. 1	1539	818.4
Mar. 1	Mar. 4	0.03	7.92×10^{-12}	4513	trace	Mar. 4	1619	5294.8
Mar. 4	Mar. 5	0.04	5.78×10^{-12}	6969	0.34	Mar. 5	1411	9040.5
Mar. 5	Mar. 6	0.02	5.47×10^{-12}	1907	0	Mar. 6	1623	2339.1
Mar. 6	Mar. 7	0.03	9.58×10^{-12}	579	0	Mar. 7	1454	627.3
Mar. 7	Mar. 8	0.03	5.16×10^{-12}	70**	0	Mar. 8	1623	318.6
Mar. 8	Mar. 11	0.03	7.96×10^{-12}	1211	trace	Mar. 11	1548	1444.1
Mar. 11	Mar. 12	0.04	7.25×10^{-12}	9020	0.36	Mar. 12	1532	10490.8
Mar. 12	Mar. 13	0.04	11.00×10^{-12}	11950	trace	Mar. 13	1528	12315.6
Mar. 13	Mar. 14	--	9.89×10^{-12}	15660*	trace	Mar. 14	1405	1723.7
Mar. 14	Mar. 15	--	7.32×10^{-12}	537	0	Mar. 15	1552	557.8
Mar. 15	Mar. 18	--	14.44×10^{-12}	8870	0.05	Mar. 18	1610	12678.3
Mar. 18	Mar. 19	--	11.14×10^{-12}	2911	trace	Mar. 19	1633	3267.0
Mar. 19	Mar. 20	--	13.49×10^{-12}	5120	0	Mar. 20	0858	536.3
Mar. 20	Mar. 21	--	17.29×10^{-12}	237	0	Mar. 21	1416	322.8
Mar. 21	Mar. 22	--	11.35×10^{-12}	---	0	---	--	---
Mar. 22	Mar. 25	--	13.59×10^{-12}	---	0	Mar. 25	1622	448.8
Mar. 25	Mar. 26	--	15.70×10^{-12}	393	0	Mar. 26	1159	288.5
Mar. 26	Mar. 27	--	17.62×10^{-12}	236	0	Mar. 27	1625	550.4
Mar. 27	Mar. 28	--	13.27×10^{-12}	239	0	Mar. 28	1145	490.2
Mar. 28	Mar. 29	--	6.58×10^{-12}	1597	0.02	Mar. 29	1540	1290.9
Mar. 29	Apr. 1	--	17.86×10^{-12} *	12160	0.11	Apr. 1	1543	525.3
$\bar{X}$			7.50×10^{-12}	2727	0.03			
* Maximum			17.86×10^{-12}	15660	0.36			
** Minimum			2.72×10^{-12}	70	0			
Total				84529	0.93			

APRIL 1963

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
Apr. 1	Apr. 2	--	18.31×10^{-12}	1428	0	Apr. 2	1624	1687.7
Apr. 2	Apr. 3	--	21.59×10^{-12}	952	trace	Apr. 3	1630	1152.0
Apr. 3	Apr. 4	--	38.22×10^{-12} *	436	0	Apr. 4	1632	498.8
Apr. 4	Apr. 5	--	18.14×10^{-12}	6388	0.06	Apr. 5	1413	7135.0
Apr. 5	Apr. 8	--	10.43×10^{-12}	3798	0	Apr. 8	1558	3868.7
Apr. 8	Apr. 9	--	5.30×10^{-12}	934	0	Apr. 9	1545	952.7
Apr. 9	Apr. 10	--	9.60×10^{-12}	528	0	Apr. 10	1532	827.6
Apr. 10	Apr. 11	--	22.43×10^{-12}	495	0	Apr. 11	1556	489.0
Apr. 11	Apr. 12	--	30.32×10^{-12}	---	0	---	--	---
Apr. 12	Apr. 15	--	7.65×10^{-12}	4076	0.05	Apr. 15	1620	4733.5
Apr. 15	Apr. 16	--	6.78×10^{-12}	1308	0	Apr. 16	1440	1520.5
Apr. 16	Apr. 17	--	5.18×10^{-12}	434	0	Apr. 17	1610	516.5
Apr. 17	Apr. 18	--	10.38×10^{-12}	---	0	---	--	---
Apr. 18	Apr. 19	--	10.26×10^{-12}	1033	0	Apr. 19	1634	1183.0
Apr. 19	Apr. 22	--	8.54×10^{-12}	329	0	Apr. 22	1346	405.0
Apr. 22	Apr. 23	--	15.25×10^{-12}	1119	0	Apr. 23	1547	1156.0
Apr. 23	Apr. 24	--	15.79×10^{-12}	236**	0	Apr. 24	1532	299.0
Apr. 24	Apr. 25	--	9.67×10^{-12}	312	0	Apr. 25	1457	314.0
Apr. 25	Apr. 26	--	5.85×10^{-12}	2333	0.08	Apr. 26	1420	2357.0
Apr. 26	Apr. 29	--	4.69×10^{-12} **	8480*	0.07	Apr. 29	1503	9271.0
Apr. 29	Apr. 30	--	5.79×10^{-12}	407	0	Apr. 30	1329	488.0
$\bar{X}$			13.34×10^{-12}	1843	0.01			
* Maximum			38.22×10^{-12}	8480	0.08			
** Minimum			4.96×10^{-12}	236	0			
Total				35026	0.27			

MAY 1963

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
Apr. 30	May 1	--	4.82×10^{-12}	1144	0	May 1	1408	1451.0
May 1	May 2	--	7.28×10^{-12}	12553	0.03	May 2	1245	14856.0
May 2	May 3	--	5.13×10^{-12}	650	0	May 3	1537	952.0
May 3	May 6	--	5.78×10^{-12}	1429	0	May 6	1546	1878.0
May 6	May 7	--	6.59×10^{-12}	538	0	May 7	1202	774.0
May 7	May 8	--	4.12×10^{-12}	317	0	May 8	1553	638.0
May 8	May 9	--	5.34×10^{-12}	240	0	May 9	1434	457.0
May 9	May 10	--	3.51×10^{-12}	355	0	May 10	1548	496.0
May 10	May 13	--	4.56×10^{-12}	1096	trace	May 13	1542	1511.0
May 13	May 14	--	7.53×10^{-12}	342	0	May 14	1532	417.0
May 14	May 15	--	5.12×10^{-12}	153**	0	May 15	1651	293.5
May 15	May 16	--	6.33×10^{-12}	1107	0	May 16	1158	1334.2
May 16	May 17	--	8.51×10^{-12}	253	0	May 17	1626	403.2
May 17	May 20	--	4.96×10^{-12}	216	0	May 20	1628	823.1
May 20	May 21	--	2.98×10^{-12}	1301	0	May 21	1238	2106.3
May 21	May 22	--	2.56×10^{-12}	3210	0.03	May 22	1539	4003.0
May 22	May 23	--	2.01×10^{-12}	549	0	May 23	1248	806.4
May 23	May 24	--	1.90×10^{-12} **	1367	0	May 24	1620	1759.7
May 24	May 27	--	5.05×10^{-12}	892	0	May 27	1508	1131.3
May 27	May 28	--	7.57×10^{-12} *	15476*	0.06	May 28	1350	18097.7
May 28	May 29	--	5.33×10^{-12}	2203	0	May 29	1413	2402.5
May 29	May 31	--	5.12×10^{-12}	5510	0	May 30	1256	6308.3
$\bar{X}$			5.10×10^{-12}	1642	0.0042			
* Maximum			7.57×10^{-12}	15476	0.06			
** Minimum			1.90×10^{-12}	153	0			
Total				50901	0.13			

JUNE 1963

Collection Date		Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection		Precipitation (inches)	Early count - Rain gauge		
Start	Stop		Airborne μc/cc	Rain gauge μμc/M²		Date of count	Time of count	Beta activity μμc/M²
May 31	June 3	--	5.69×10^{-12}	105812*	0.95	June 3	1155	114897.5
June 3	June 4	--	5.14×10^{-12}	7056	trace	June 4	1235	7437.4
June 4	June 5	--	8.54×10^{-12} *	3363	0	June 5	1333	3578.5
June 5	June 6	--	7.05×10^{-12}	1820	0	June 6	1220	7365.0
June 6	June 7	--	2.45×10^{-12}	928	0	June 7	1418	1161.5
June 7	June 10	--	---	9098	0.03	June 10	1653	9230.0
June 10	June 11	--	5.44×10^{-12}	803	0	June 11	1400	1124.5
June 11	June 12	--	2.65×10^{-12}	909	0	June 12	1330	1132.4
June 12	June 13	--	2.63×10^{-12}	847	0	June 13	1407	1183.0
June 13	June 14	--	---	7483	0.04	June 14	1541	8583.1
June 14	June 17	--	---	53004	0.11	June 17	1634	57367.0
June 17	June 18	--	3.80×10^{-12}	11694	0.05	June 18	1342	12023.0
June 18	June 19	--	5.31×10^{-12}	13977	0.02	June 19	1530	16773.5
June 19	June 20	--	7.47×10^{-12}	5416	trace	June 20	1346	6029.6
June 20	June 21	--	6.91×10^{-12}	19096	0.05	June 21	1538	21108.3
June 21	June 24	--	3.96×10^{-12}	1810	0	June 24	1539	2274.1
June 24	June 25	--	2.97×10^{-12}	1315	0	June 25	1301	1570.2
June 25	June 26	--	2.62×10^{-12}	923	0	June 26	1338	1176.5
June 26	June 27	--	2.42×10^{-12}	590	0	June 27	1311	728.1
June 27	June 28	--	2.31×10^{-12}	887	0	June 28	1328	1070.7
June 28	July 1	--	2.24×10^{-12} **	549**	0	July 1	1404	828.8
$\bar{X}$			4.42×10^{-12}	8246	0.04			
* Maximum			8.54×10^{-12}	105812	0.95			
** Minimum			2.24×10^{-12}	549	0			
Total				247380	1.27			

JULY 1963

Collection Date		Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection		Precipitation (inches)	Early count - Rain gauge		
Start	Stop		Airborne $\mu c/cc$	Rain gauge $\mu\mu c/M^2$		Date of count	Time of count	Beta activity $\mu\mu c/M^2$
July 1	July 2	--	2.07×10^{-12} *	2331	trace	July 2	1329	2764.0
July 2	July 3	--	2.04×10^{-12}	851	trace	July 3	1526	1770.2
July 3	July 5	--	1.43×10^{-12}	1042	0	July 5	1229	1384.1
July 5	July 8	--	1.62×10^{-12}	3616	trace	July 8	1353	3939.7
July 8	July 9	--	0.51×10^{-12} **	10367	1.76	July 9	1538	14037.4
July 9	July 10	--	0.69×10^{-12}	7822	0.21	July 10	1246	9422.8
July 10	July 11	--	1.14×10^{-12}	2717	trace	July 11	1419	3206.8
July 11	July 12	--	1.07×10^{-12}	2420	0.06	July 12	1325	2970.6
July 12	July 15	--	1.96×10^{-12}	1018	trace	July 15	1400	1303.3
July 15	July 16	--	1.19×10^{-12}	472**	0	July 16	1309	636.5
July 16	July 17	--	0.81×10^{-12}	1145	0	July 17	1341	1336.7
July 17	July 18	--	1.03×10^{-12}	1121	0	July 18	1204	1443.0
July 18	July 19	--	0.99×10^{-12}	12453*	0.41	July 19	1521	14439.0
July 19	July 22	--	1.06×10^{-12}	2470	trace	July 22	1400	3052.8
July 22	July 23	--	1.69×10^{-12}	1174	trace	July 23	1228	1524.6
July 23	July 24	--	1.23×10^{-12}	1130	trace	July 24	1431	1377.2
July 24	July 25	--	1.21×10^{-12}	2638	0.04	July 25	1216	3595.4
July 25	July 26	--	1.08×10^{-12}	7462	0.26	July 26	1527	8473.8
July 26	July 29	--	1.21×10^{-12}	5783	trace	July 29	1440	6814.6
July 29	July 30	--	1.31×10^{-12}	877	trace	July 30	1313	1175.7
July 30	July 31	--	1.45×10^{-12}	796	0	July 31	1354	1042.6
$\bar{X}$			1.28×10^{-12}	2281	0.092			
* Maximum			2.07×10^{-12}	12453	1.76			
** Minimum			0.51×10^{-12}	472	0			
Total				70705	2.84			

AUGUST 1963

Collection Date		Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection		Precipitation (inches)	Early count - Rain gauge		
Start	Stop		Airborne $\mu c/cc$	Rain gauge $\mu\mu c/M^2$		Date of count	Time of count	Beta activity $\mu\mu c/M^2$
July 31	Aug. 1	--	1.68×10^{-12}	1128	0	Aug. 1	1314	1562.3
Aug. 1	Aug. 2	--	0.98×10^{-12}	236**	0	Aug. 2	1346	361.1
Aug. 2	Aug. 5	--	0.81×10^{-12}	8735	0.35	Aug. 5	1540	9638.9
Aug. 5	Aug. 6	--	1.71×10^{-12}*	1577	trace	Aug. 6	1354	1849.5
Aug. 6	Aug. 7	--	1.25×10^{-12}	463	0	Aug. 7	1430	728.6
Aug. 7	Aug. 8	--	1.18×10^{-12}	956	0	Aug. 8	1539	1437.5
Aug. 8	Aug. 9	--	1.00×10^{-12}	1706	trace	Aug. 9	1322	2416.6
Aug. 9	Aug. 12	--	0.44×10^{-12}	9186*	1.25	Aug. 12	1203	10126.4
Aug. 12	Aug. 13	--	0.36×10^{-12}	5837	0.83	Aug. 13	1602	8853.2
Aug. 13	Aug. 14	--	0.53×10^{-12}	2826	0.06	Aug. 14	1456	3656.8
Aug. 14	Aug. 15	--	1.50×10^{-12}	728	0	Aug. 15	1343	1026.4
Aug. 15	Aug. 16	--	1.65×10^{-12}	1724	0	Aug. 16	1410	2192.2
Aug. 16	Aug. 19	--	0.79×10^{-12}	906	0.03	Aug. 19	1544	2279.0
Aug. 19	Aug. 20	--	0.97×10^{-12}	2768	0.30	Aug. 20	1354	5319.1
Aug. 20	Aug. 21	--	0.92×10^{-12}	1696	trace	Aug. 21	1407	1402.3
Aug. 21	Aug. 22	--	0.60×10^{-12}	244	trace	Aug. 22	1400	367.9
Aug. 22	Aug. 23	--	0.40×10^{-12}	392	trace	Aug. 23	1400	462.0
Aug. 23	Aug. 26	--	0.26×10^{-12}	2816	0.92	Aug. 26	1400	3394.2
Aug. 26	Aug. 27	--	0.25×10^{-12}	1045	0.10	Aug. 27	1400	1290.2
Aug. 27	Aug. 28	--	0.22×10^{-12}**	849	0.03	Aug. 28	1400	1009.9
Aug. 28	Aug. 29	--	0.55×10^{-12}	274	trace	Aug. 29	1400	413.0
Aug. 29	Aug. 30	--	0.58×10^{-12}	576	0.14	Aug. 30	1400	616.5
$\bar{X}$			0.85×10^{-12}	1505	0.13			
* Maximum			1.71×10^{-12}	9186	1.25			
** Minimum			0.22×10^{-12}	236	0			
Total				46668	4.07			

SEPTEMBER 1963

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
Aug. 30	Sept. 3	--	0.83×10^{-12}	1903	0.30	Sept. 3	1400	2051.3
Sept. 3	Sept. 4	--	1.13×10^{-12}	285	0	Sept. 4	1400	465.1
Sept. 4	Sept. 5	--	0.22×10^{-12} **	1799	0.50	Sept. 5	1400	2366.5
Sept. 5	Sept. 6	--	0.33×10^{-12}	108	trace	Sept. 6	1400	157.7
Sept. 6	Sept. 9	--	0.43×10^{-12}	950	0.08	Sept. 9	1400	1144.6
Sept. 9	Sept. 10	--	0.49×10^{-12}	1929	0.15	Sept. 10	1400	3435.1
Sept. 10	Sept. 11	--	0.32×10^{-12}	730	0.14	Sept. 11	1400	1198.4
Sept. 11	Sept. 12	--	0.58×10^{-12}	108**	trace	Sept. 12	1400	136.0
Sept. 12	Sept. 13	--	0.62×10^{-12}	117	trace	Sept. 13	1400	151.8
Sept. 13	Sept. 16	--	0.89×10^{-12}	3043*	0.33	Sept. 16	1400	3080.0
Sept. 16	Sept. 17	--	2.21×10^{-12} *	NO SAMPLE	0	Included 9/18		NO SAMPLE
Sept. 17	Sept. 18	--	NO SAMPLE (Included 9/19)	330	0.17	Sept. 18	1400	354.2
Sept. 18	Sept. 19	--	0.56×10^{-12}	151	0	Sept. 19	1400	174.6
Sept. 19	Sept. 20	--	0.38×10^{-12}	910	0.05	Sept. 20	1400	1141.4
Sept. 20	Sept. 23	--	0.22×10^{-12} **	2459	0.53	Sept. 23	1400	2482.4
Sept. 23	Sept. 24	--	0.56×10^{-12}	224	trace	Sept. 24	1400	746.9
Sept. 24	Sept. 25	--	1.29×10^{-12}	758	0.02	Sept. 25	1400	775.5
Sept. 25	Sept. 26	--	1.80×10^{-12}	242	0	Sept. 26	1400	253.7
Sept. 26	Sept. 27	--	1.59×10^{-12}	126	0	Sept. 27	1400	139.7
Sept. 27	Sept. 30	--	1.37×10^{-12}	125	0	Sept. 30	1400	168.2
$\bar{X}$ 1 day			0.79×10^{-12}	543	0.08			
* Maximum			2.21×10^{-12}	3043	0.50			
** Minimum			0.22×10^{-12}	108	0			
Total				16297	2.31			

OCTOBER 1963

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
Sept. 30	Oct. 1	--	0.97×10^{-12}	71	0	Oct. 1	1400	90.2
Oct. 1	Oct. 2	--	0.96×10^{-12}	118	trace	Oct. 2	1400	217.9
Oct. 2	Oct. 3	--	4.93×10^{-12} *	6032	0.19	Oct. 3	1400	6987.5
Oct. 3	Oct. 4	--	NO SAMPLE	320	0	Oct. 4	1400	396.7
Oct. 4	Oct. 7	--	NO SAMPLE	139	0	Oct. 7	1400	178.7
Oct. 7	Oct. 8	--	NO SAMPLE	81	0	Oct. 8	1400	111.5
Oct. 8	Oct. 9	--	1.09×10^{-12}	39	0	Oct. 9	1400	48.0
Oct. 9	Oct. 10	--	1.03×10^{-12}	81	0	Oct. 10	1400	93.4
Oct. 10	Oct. 11	--	NO SAMPLE	341	0	Oct. 11	1400	341.1
Oct. 11	Oct. 14	--	NO SAMPLE	1487	0	Oct. 14	1400	1608.6
Oct. 14	Oct. 15	--	2.43×10^{-12}	264	0	Oct. 15	1400	382.8
Oct. 15	Oct. 16	--	1.50×10^{-12}	119	0	Oct. 16	1400	202.6
Oct. 16	Oct. 17	--	0.92×10^{-12}	61	0	Oct. 17	1400	104.6
Oct. 17	Oct. 18	--	0.61×10^{-12}	65	0	Oct. 18	1400	125.7
Oct. 18	Oct. 21	--	0.68×10^{-12}	2011	1.15	Oct. 21	1400	2030.6
Oct. 21	Oct. 22	--	0.39×10^{-12}	47	0	Oct. 22	1400	56.6
Oct. 22	Oct. 23	--	0.65×10^{-12}	32**	0	Oct. 23	1400	33.7
Oct. 23	Oct. 24	--	1.07×10^{-12}	50	0	Oct. 24	1400	71.5
Oct. 24	Oct. 28	--	0.95×10^{-12}	150	0	Oct. 28	1400	172.3
Oct. 28	Oct. 29	--	0.59×10^{-12}	78	0	Oct. 29	1400	89.6
Oct. 29	Oct. 30	--	0.76×10^{-12}	250	trace	Oct. 30	1400	302.5
Oct. 30	Oct. 31	--	0.81×10^{-12}	126	trace	Oct. 31	1400	149.8
$\bar{X}$			1.20×10^{-12}	386	0.044			
* Maximum			4.93×10^{-12}	6032	1.15			
** Minimum			0.39×10^{-12}	32	0			
Total				11962	1.37			

NOVEMBER 1963

Collection Date Start	Collection Date Stop	Gamma mr/hr 3 f 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
Oct. 31	Nov. 1	--	0.72×10^{-12}	389	0.18	Nov. 1	1400	414.9
Nov. 1	Nov. 4	--	0.67×10^{-12}	184	0.10	Nov. 4	1400	188.7
Nov. 4	Nov. 5	--	1.21×10^{-12}	68	0	Nov. 5	1400	73.0
Nov. 5	Nov. 6	--	NO SAMPLE	37	0	Nov. 6	1400	42.9
Nov. 6	Nov. 7	--	0.57×10^{-12}	44	0	Nov. 7	1400	69.5
Nov. 7	Nov. 8	--	0.83×10^{-12}	140	trace	Nov. 8	1400	167.0
Nov. 8	Nov. 11	--	0.46×10^{-12}	53	0	Nov. 11	1400	78.5
Nov. 11	Nov. 12	--	0.24×10^{-12} **	63	0	Nov. 12	1400	76.5
Nov. 12	Nov. 13	--	0.29×10^{-12}	28**	0	Nov. 13	1400	36.2
Nov. 13	Nov. 14	--	0.30×10^{-12}	28**	0	Nov. 14	1400	55.5
Nov. 14	Nov. 15	--	0.53×10^{-12}	41	0	Nov. 15	1400	64.2
Nov. 15	Nov. 18	--	1.13×10^{-12}	693	0	Nov. 18	1400	720.7
Nov. 18	Nov. 19	--	1.67×10^{-12} *	191	0.08	Nov. 19	1400	196.7
Nov. 19	Nov. 20	--	1.16×10^{-12}	65	0	Nov. 20	1400	92.6
Nov. 20	Nov. 21	--	0.73×10^{-12}	60	0	Nov. 21	1400	68.0
Nov. 21	Nov. 22	--	0.37×10^{-12}	788	0.28	Nov. 22	1400	875.0
Nov. 22	Nov. 26	--	0.58×10^{-12}	2010*	0.22	Nov. 26	1400	2068.0
Nov. 26	Nov. 27	--	0.49×10^{-12}	140	0	Nov. 27	1400	160.3
Nov. 27	Nov. 28	--	0.51×10^{-12}	81	0	Nov. 28	1400	95.2
$\bar{X}$			0.69×10^{-12}	170	0.029			
* Maximum			1.67×10^{-12}	2010	0.28			
** Minimum			0.24×10^{-12}	28	0			
Total				5103	0.87			

DECEMBER 1963

Collection Date		Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection		Precipitation (inches)	Early count - Rain gauge		
Start	Stop		Airborne μc/cc	Rain gauge μμc/M²		Date of count	Time of count	Beta activity μμc/M²
Dec. 2	Dec. 3	--	0.72×10^{-12}	71	0	Dec. 3	1400	83.8
Dec. 3	Dec. 4	--	0.53×10^{-12}	42	0	Dec. 4	1400	40.9
Dec. 4	Dec. 5	--	0.46×10^{-12} **	53	0	Dec. 5	1400	62.2
Dec. 5	Dec. 6	--	0.49×10^{-12}	39	0	Dec. 6	1400	47.6
Dec. 6	Dec. 9	--	1.11×10^{-12} *	58	0	Dec. 9	1400	84.4
Dec. 9	Dec. 10	--	0.98×10^{-12}	59	0	Dec. 10	1400	80.6
Dec. 10	Dec. 11	--	0.88×10^{-12}	75	trace	Dec. 11	1400	90.2
Dec. 11	Dec. 12	--	0.54×10^{-12}	43	0	Dec. 12	1400	57.5
Dec. 12	Dec. 13	--	0.54×10^{-12}	40	0	Dec. 13	1400	59.7
Dec. 13	Dec. 16	--	0.71×10^{-12}	86	0	Dec. 16	1400	71.2
Dec. 16	Dec. 17	--	0.52×10^{-12}	44	0	Dec. 17	1400	61.2
Dec. 17	Dec. 18	--	0.67×10^{-12}	30	0	Dec. 18	1400	40.8
Dec. 18	Dec. 19	--	0.64×10^{-12}	41	0	Dec. 19	1400	56.8
Dec. 19	Dec. 20	--	0.65×10^{-12}	30	0	Dec. 20	1400	39.4
Dec. 20	Dec. 23	--	0.69×10^{-12}	367*	0	Dec. 23	1400	397.7
Dec. 23	Dec. 24	--	0.55×10^{-12}	65	0.02	Dec. 24	1400	71.8
Dec. 24	Dec. 26	--	0.75×10^{-12}	44	0	Dec. 26	1400	62.9
Dec. 26	Dec. 27	--	0.91×10^{-12}	28**	0	Dec. 27	1400	31.9
Dec. 27	Dec. 30	--	0.63×10^{-12}	36	0	Dec. 30	1400	51.6
Dec. 30	Dec. 31	--	0.50×10^{-12}	51	0	Dec. 31	1400	61.7
$\bar{X}$			0.72×10^{-12}	42				
* Maximum			1.11×10^{-12}	367				
** Minimum			0.46×10^{-12}	28				
Total				1302	0.03			

TABLE I

SUMMARY 1963

Precipitation		17.83 in.
Air Samples	$\bar{X}$/sample	4.16×10^{-12} μc/cc
4/3-4/4	Maximum	38.22×10^{-12} "
8/27-8/28 9/20-9/23	Minimum	0.22×10^{-12} "
Water Samples	Total	634,639 $\mu\mu c/M^2$
	$\bar{X}$/day	1,739 "
5/31-6/3	Maximum	35,271 "
11/12-11/14 12/26-12/27	Minimum	28 "

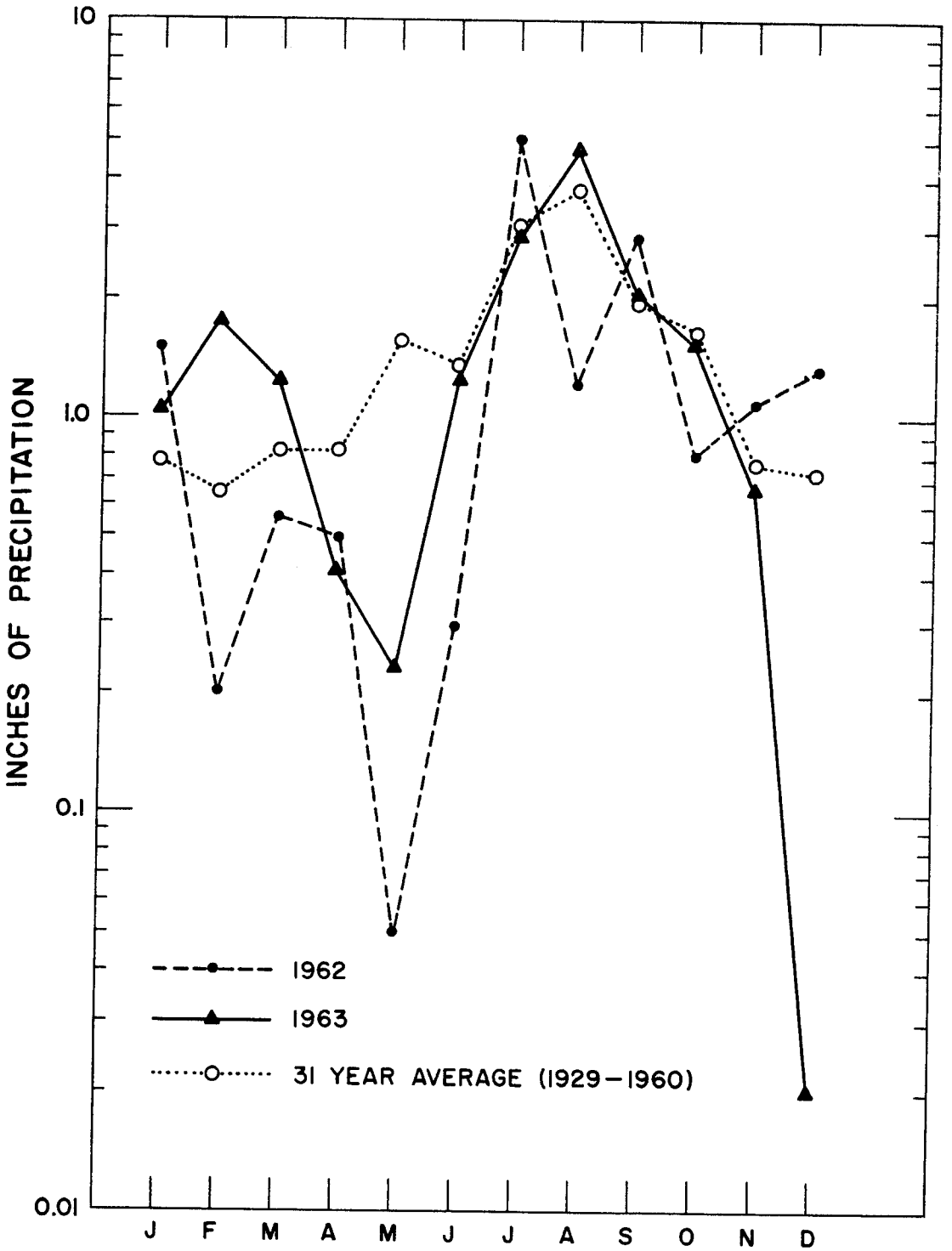

Figure 1

Total Monthly Precipitation

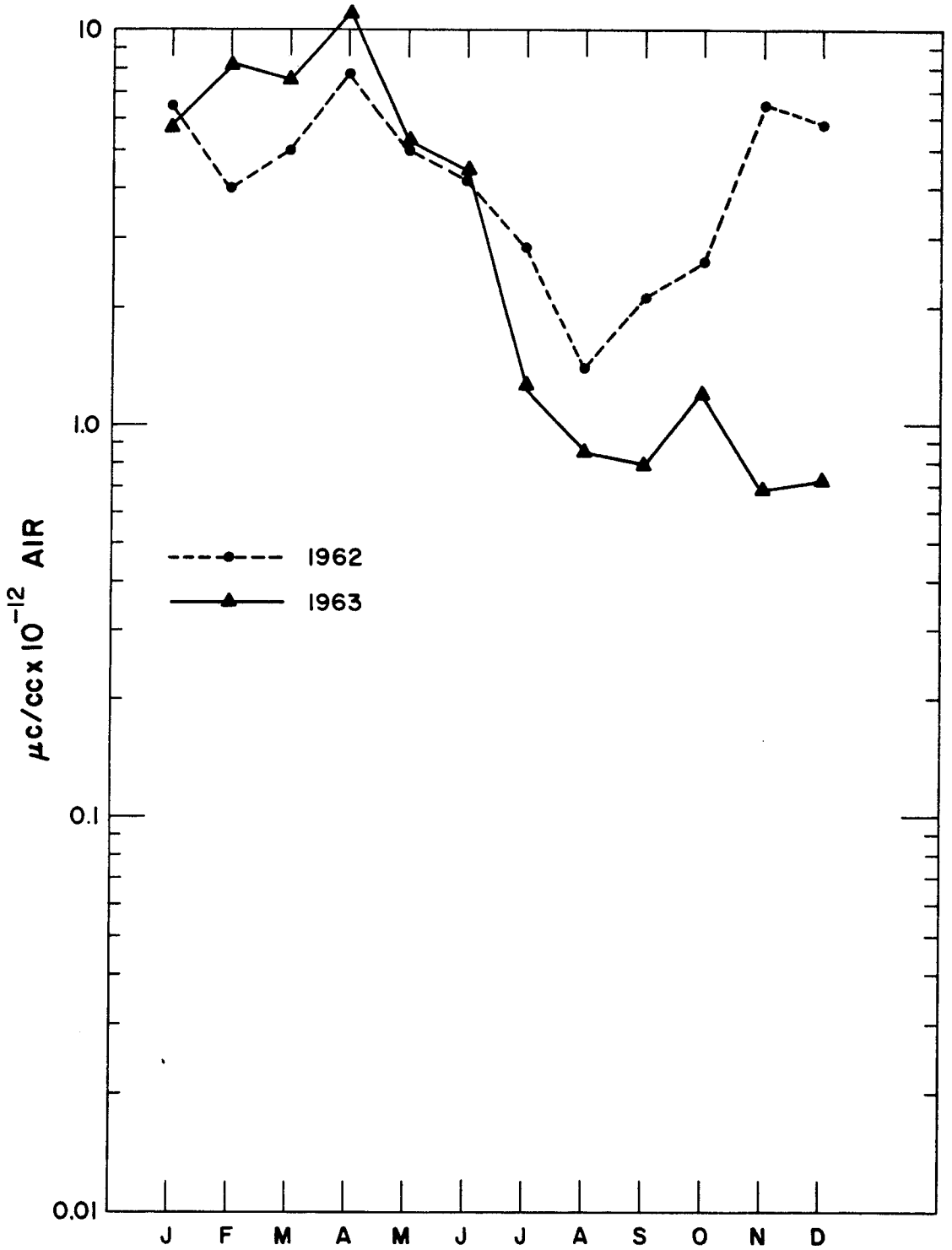

Figure 2

Average "Per Day" Activity Found in Air Filter Samples

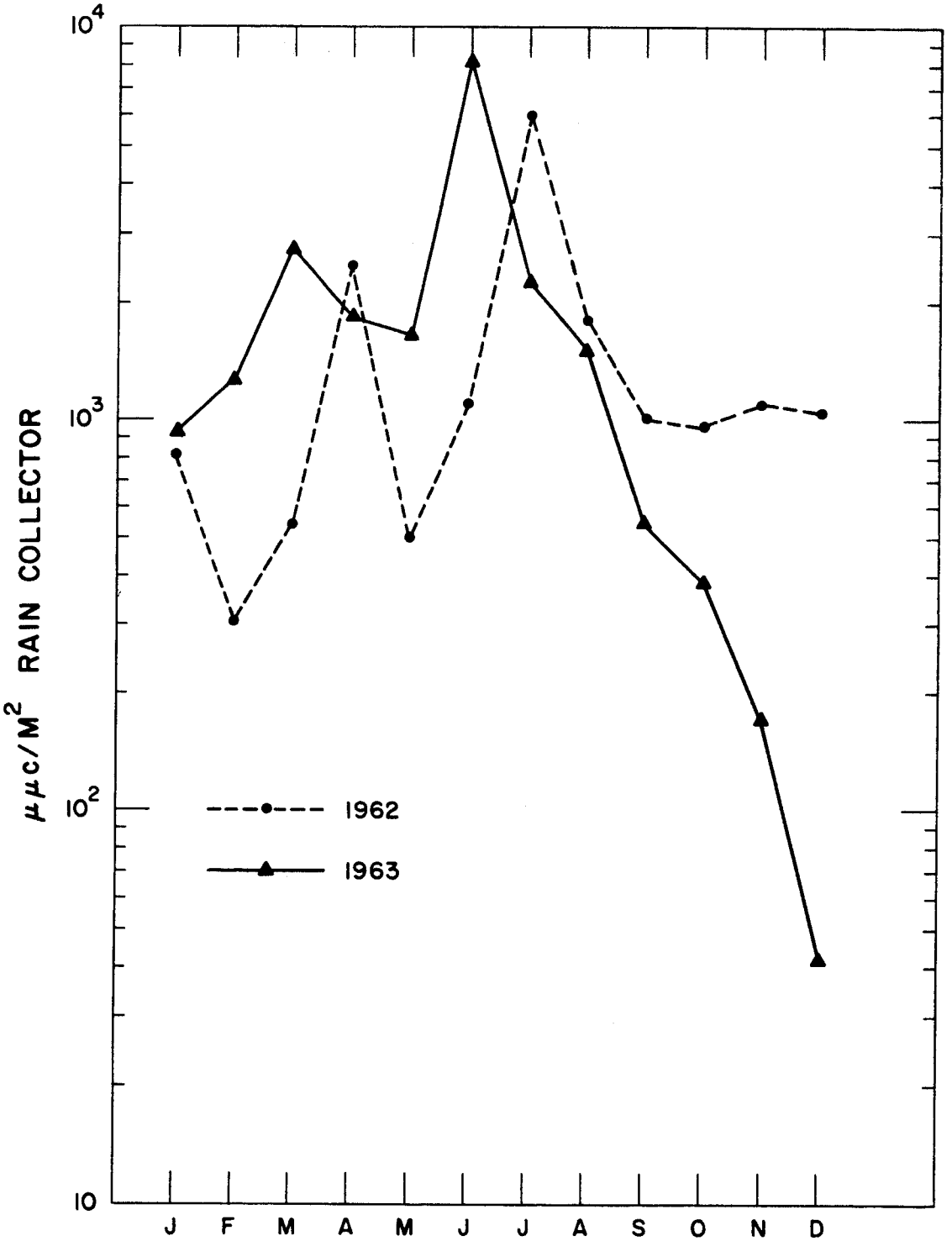

Figure 3

Average "Per Day" Activities Found in Rain Collector Samples