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BETA-GAMMA RADIOACTIVITY IN ENVIRONMENTAL AIR AT LOS ALAMOS, NEW MEXICO, FOR 1964

by

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7856

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), LAMS-2870 (for 1962), and LAMS-3071 (for 1963). 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, lower trends throughout this year than last.

Fallout from the Chinese detonation, arriving late in October sent the averages for that month slightly higher than would have normally been expected.

Introduction

As a part of the environmental monitoring program at Los Alamos, the measurements of air particulate radioactivity and activity in precipitation are made periodically. The sampling station was relocated at TA-50 in March 1963, 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 1964. The decline in activities that started in the last half of 1963 continued throughout 1964. However, the fallout from the Chinese nuclear detonation raised the October level slightly from what would have been expected from the trend of the preceding months.

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 Sharp Widebeta/matic Counting System, employing a gas flow proportional counter. 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 μμCi 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, LAMS-2870, and LAMS-3071. 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 1964

Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne $\mu Ci/cc$	Beta activity counted 7 days after collection: Rain gauge $\mu\mu Ci/M^2$	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity $\mu\mu Ci/M^2$
Dec. 31 (1963)	Jan. 2	--	0.73×10^{-12}	19**	0	Jan. 2	1400	43.2
Jan. 2	Jan. 3	--	0.56×10^{-12}	577*	0.03	Jan. 3	1400	686.4
Jan. 3	Jan. 6	--	0.59×10^{-12}	672	0.08	Jan. 6	1400	711.9
Jan. 6	Jan. 7	--	0.75×10^{-12}	45	0	Jan. 7	1400	56.5
Jan. 7	Jan. 8	--	0.61×10^{-12}	69	trace	Jan. 8	1400	43.8
Jan. 8	Jan. 9	--	0.35×10^{-12} **	127	0.05	Jan. 9	1400	331.5
Jan. 9	Jan. 10	--	0.44×10^{-12}	59	0	Jan. 10	1400	77.6
Jan. 10	Jan. 13	--	0.61×10^{-12}	78	0	Jan. 13	1400	104.1
Jan. 13	Jan. 14	--	0.89×10^{-12}	56	0	Jan. 14	1400	76.7
Jan. 14	Jan. 15	--	0.91×10^{-12}	56	0	Jan. 15	1400	70.2
Jan. 15	Jan. 16	--	1.16×10^{-12}	21	0	Jan. 16	1400	41.3
Jan. 16	Jan. 17	--	0.95×10^{-12}	28	0	Jan. 17	1400	39.5
Jan. 17	Jan. 20	--	0.67×10^{-12}	64	0.3	Jan. 20	1400	603.6
Jan. 20	Jan. 21	--	0.47×10^{-12}	56	0	Jan. 21	1400	65.5
Jan. 21	Jan. 22	--	0.52×10^{-12}	30	trace	Jan. 22	1400	42.6
Jan. 22	Jan. 23	--	0.53×10^{-12}	382	0.08	Jan. 23	1400	461.6
Jan. 23	Jan. 24	--	0.87×10^{-12}	113	0.04	Jan. 24	1400	144.4
Jan. 24	Jan. 27	--	0.52×10^{-12}	71	0	Jan. 27	1400	85.8
Jan. 27	Jan. 28	--	0.69×10^{-12}	56	0	Jan. 28	1400	43.5
Jan. 28	Jan. 29	--	1.27×10^{-12}	66	0	Jan. 29	1400	65.7
Jan. 29	Jan. 30	--	1.68×10^{-12} *	44	0	Jan. 30	1400	57.1
Jan. 30	Jan. 31	--	1.33×10^{-12}	36	0	Jan. 31	1400	42.8
$\bar{X}$ "per day"			0.78×10^{-12}	89	0.02			
* Maximum "per day"			1.68×10^{-12}	577	0.3			
** Minimum "per day"			0.35×10^{-12}	6	0			
Total				2745	0.60			

FEBRUARY 1964

Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μCi/cc	Beta activity counted 7 days after collection: Rain gauge μμCi/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity μμCi/M²
Jan. 31	Feb. 3	--	1.03×10^{-12}	573	0.60	Feb. 3	1400	631.4
Feb. 3	Feb. 4	--	0.48×10^{-12}	392	0.03	Feb. 4	1400	718.8
Feb. 4	Feb. 5	--	0.46×10^{-12}	99	0	Feb. 5	1400	103.0
Feb. 5	Feb. 6	--	0.83×10^{-12}	391	0.25	Feb. 6	1400	431.3
Feb. 6	Feb. 7	--	0.50×10^{-12}	73	0.43	Feb. 7	1400	76.9
Feb. 7	Feb. 10	--	1.03×10^{-12}	69**	0	Feb. 10	1400	77.9
Feb. 10	Feb. 11	--	0.81×10^{-12}	37	0	Feb. 11	1400	39.5
Feb. 11	Feb. 12	--	1.31×10^{-12}	1406*	0.30	Feb. 12	1400	1518.1
Feb. 12	Feb. 13	--	0.98×10^{-12}	818	0.17	Feb. 13	1400	840.7
Feb. 13	Feb. 14	--	1.13×10^{-12}	141	0	Feb. 14	1400	143.1
Feb. 14	Feb. 17	--	1.29×10^{-12}	88	trace	Feb. 17	1400	92.6
Feb. 17	Feb. 18	--	1.28×10^{-12}	75	0	Feb. 18	1400	80.5
Feb. 18	Feb. 19	--	1.24×10^{-12}	47	0	Feb. 19	1400	54.1
Feb. 19	Feb. 20	--	0.77×10^{-12}	71	trace	Feb. 20	1400	76.1
Feb. 20	Feb. 24	--	0.40×10^{-12} **	706	0.04	Feb. 24	1400	566.8
Feb. 24	Feb. 25	--	0.96×10^{-12}	70	0	Feb. 25	1400	77.6
Feb. 25	Feb. 26	--	1.15×10^{-12}	54	trace	Feb. 26	1400	67.8
Feb. 26	Feb. 27	--	1.49×10^{-12}	67	trace	Feb. 27	1400	62.8
Feb. 27	Feb. 28	--	2.10×10^{-12} *	56	0	Feb. 28	1400	62.8
$\bar{X}$ "per day"			1.01×10^{-12}	180	0.06			
* Maximum "per day"			2.10×10^{-12}	1406	0.60			
** Minimum "per day"			0.40×10^{-12}	23	0			
Total				5233	1.86			

MARCH 1964

Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne µCi/cc	Beta activity counted 7 days after collection: Rain gauge µµCi/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity µµCi/M²
Feb. 28	Mar. 2	--	1.61×10^{-12}*	45**	0	Mar. 2	1400	60.0
Mar. 2	Mar. 3	--	1.28×10^{-12}	885	0.15	Mar. 3	1400	897.8
Mar. 3	Mar. 4	--	0.60×10^{-12}**	620	0.15	Mar. 4	1400	668.7
Mar. 4	Mar. 5	--	0.67×10^{-12}	249	trace	Mar. 5	1400	257.5
Mar. 5	Mar. 6	--	0.75×10^{-12}	58	trace	Mar. 6	1400	62.7
Mar. 6	Mar. 9	--	0.96×10^{-12}	3567*	0.16	Mar. 9	1400	3766.4
Mar. 9	Mar. 10	--	0.91×10^{-12}	79	0	Mar. 10	1400	79.4
Mar. 10	Mar. 11	--	0.95×10^{-12}	51	0	Mar. 11	1400	62.8
Mar. 11	Mar. 12	--	0.66×10^{-12}	91	0	Mar. 12	1400	55.2
Mar. 12	Mar. 13	--	1.01×10^{-12}	85	trace	Mar. 13	1400	130.1
Mar. 13	Mar. 16	--	1.25×10^{-12}	263	0.03	Mar. 16	1400	251.6
Mar. 16	Mar. 17	--	0.71×10^{-12}	174	trace	Mar. 17	1400	168.4
Mar. 17	Mar. 18	--	1.14×10^{-12}	64	0	Mar. 18	1400	67.2
Mar. 18	Mar. 19	--	1.29×10^{-12}	68	0	Mar. 19	1400	90.6
Mar. 19	Mar. 20	--	1.34×10^{-12}	68	0	Mar. 20	1400	86.7
Mar. 20	Mar. 23	--	1.43×10^{-12}	73	trace	Mar. 23	1400	103.7
Mar. 23	Mar. 24	--	1.22×10^{-12}	142	trace	Mar. 24	1400	177.0
Mar. 24	Mar. 25	--	0.91×10^{-12}	242	0.02	Mar. 25	1400	252.5
Mar. 25	Mar. 26	--	0.80×10^{-12}	118	trace	Mar. 26	1400	144.0
Mar. 26	Mar. 27	--	1.14×10^{-12}	50	0	Mar. 27	1400	71.3
Mar. 27	Mar. 30	--	1.25×10^{-12}	59	0	Mar. 30	1400	93.9
Mar. 30	Mar. 31	--	1.21×10^{-12}	72	0	Mar. 31	1400	99.8
$\bar{X}$ "per day"			1.05×10^{-12}	230	0.019			
* Maximum "per day"			1.61×10^{-12}	1189	0.16			
** Minimum "per day"			0.60×10^{-12}	15	0			
Total				7123	0.58			

APRIL 1964

Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μCi/cc	Beta activity counted 7 days after collection: Rain gauge μμCi/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity μμCi/M²
Mar. 31	Apr. 1	--	0.97×10^{-12}	149	trace	Apr. 1	1400	159.6
Apr. 1	Apr. 2	--	1.17×10^{-12}	740	0.04	Apr. 2	1400	783.2
Apr. 2	Apr. 3	--	1.37×10^{-12}	1079	trace	Apr. 3	1400	1178.0
Apr. 3	Apr. 6	--	0.95×10^{-12}	1976	0.35	Apr. 6	1400	1951.2
Apr. 6	Apr. 7	--	1.89×10^{-12}	1960	0.18	Apr. 7	1400	2084.6
Apr. 7	Apr. 8	--	2.06×10^{-12}	957	0.19	Apr. 8	1400	1014.4
Apr. 8	Apr. 9	--	0.98×10^{-12}	142	0	Apr. 9	1400	146.3
Apr. 9	Apr. 10	--	1.37×10^{-12}	60	0	Apr. 10	1400	73.0
Apr. 10	Apr. 13	--	3.38×10^{-12} *	102**	0	Apr. 13	1400	110.5
Apr. 13	Apr. 14	--	0.78×10^{-12}	68	0	Apr. 14	1400	78.7
Apr. 14	Apr. 15	--	0.52×10^{-12} **	52	0	Apr. 15	1400	58.4
Apr. 15	Apr. 16	--	0.90×10^{-12}	85	0	Apr. 16	1400	119.9
Apr. 16	Apr. 17	--	1.08×10^{-12}	69	0	Apr. 17	1400	135.1
Apr. 17	Apr. 20	--	0.99×10^{-12}	409	0.05	Apr. 20	1400	413.6
Apr. 20	Apr. 21	--	1.38×10^{-12}	166	0	Apr. 21	1400	192.0
Apr. 21	Apr. 22	--	1.23×10^{-12}	86	0	Apr. 22	1400	93.5
Apr. 22	Apr. 23	--	1.60×10^{-12}	73	0	Apr. 23	1400	104.6
Apr. 23	Apr. 24	--	1.80×10^{-12}	38	0	Apr. 24	1400	65.3
Apr. 24	Apr. 27	--	2.03×10^{-12}	303	0	Apr. 27	1400	343.6
Apr. 27	Apr. 28	--	1.72×10^{-12}	108	0	Apr. 28	1400	124.6
Apr. 28	Apr. 29	--	1.56×10^{-12}	367	0	Apr. 29	1400	439.9
Apr. 29	Apr. 30	--	1.92×10^{-12}	10894*	0.25	Apr. 30	1400	10732.0
$\bar{X}$ "per day"			1.44×10^{-12}	663	0.04			
* Maximum "per day"			3.38×10^{-12}	10894	0.35			
** Minimum "per day"			0.52×10^{-12}	34	0			
Total				19883	1.08			

MAY 1964

Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μCi/cc	Beta activity counted 7 days after collection: Rain gauge μμCi/M³	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity μμCi/M³
Apr. 30	May 1	--	1.52×10^{-12}	292	trace	May 1	1400	310.1
May 1	May 4	--	1.33×10^{-12}	149	0	May 4	1400	158.0
May 4	May 5	--	1.47×10^{-12}	96	0	May 5	1400	145.5
May 5	May 6	--	3.43×10^{-12} *	103	0	May 6	1400	127.5
May 6	May 7	--	1.46×10^{-12}	75	0	May 7	1400	79.0
May 7	May 8	--	2.01×10^{-12}	61	0	May 8	1400	72.1
May 8	May 11	--	1.87×10^{-12}	90**	0	May 11	1400	118.3
May 11	May 12	--	1.28×10^{-12}	99	0	May 12	1400	133.5
May 12	May 13	--	0.93×10^{-12}	116	0	May 13	1400	135.6
May 13	May 14	--	1.24×10^{-12}	92	0	May 14	1400	125.2
May 14	May 18	--	1.12×10^{-12}	4415	0.04	May 18	1400	4464.6
May 18	May 19	--	0.79×10^{-12}	474	trace	May 19	1400	540.6
May 19	May 20	--	0.70×10^{-12}	242	trace	May 20	1400	228.7
May 20	May 21	--	0.88×10^{-12}	255	0.02	May 21	1400	264.3
May 21	May 22	--	0.91×10^{-12}	465	trace	May 22	1400	471.6
May 22	May 25	--	0.81×10^{-12}	182	trace	May 25	1400	186.3
May 25	May 26	--	0.45×10^{-12}	3604*	0.41	May 26	1400	3831.7
May 26	May 27	--	0.31×10^{-12} **	172	trace	May 27	1400	200.6
May 27	May 28	--	0.67×10^{-12}	153	0	May 28	1400	177.9
May 28	June 1	--	0.80×10^{-12}	3992	0.20	June 1	1400	3835.1
$\bar{X}$ "per day"			1.20×10^{-12}	488	0.024			
* Maximum "per day"			3.43×10^{-12}	3604	0.41			
** Minimum "per day"			0.31×10^{-12}	30	0			
Total				15127	0.73			

JUNE 1964

Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μCi/cc	Beta activity counted 7 days after collection: Rain gauge μμCi/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity μμCi/M²
June 1	June 2	--	0.67×10^{-12}	209	0.11	June 2	1400	261.0
June 2	June 3	--	0.34×10^{-12}**	1834	trace	June 3	1400	2030.7
June 3	June 4	--	1.01×10^{-12}	276	0	June 4	1400	322.1
June 4	June 5	--	1.32×10^{-12}	158	0	June 5	1400	184.0
June 5	June 8	--	0.82×10^{-12}	197	0	June 8	1400	289.5
June 8	June 9	--	2.42×10^{-12}*	195	0	June 9	1400	232.9
June 9	June 10	--	1.26×10^{-12}	84	0	June 10	1400	85.2
June 10	June 11	--	---	82	0	June 11	1400	90.4
June 11	June 12	--	1.28×10^{-12}	3710*	0	June 12	1400	3941.3
June 12	June 15	--	1.07×10^{-12}	791	0	June 15	1400	976.2
June 15	June 16	--	1.29×10^{-12}	203	0	June 16	1400	280.0
June 16	June 17	--	0.84×10^{-12}	101	0	June 17	1400	181.0
June 17	June 18	--	1.01×10^{-12}	63	0	June 18	1400	106.7
June 18	June 19	--	1.29×10^{-12}	36	0	June 19	1400	72.0
June 19	June 22	--	0.96×10^{-12}	39**	0	June 22	1400	77.3
June 22	June 23	--	1.80×10^{-12}	48	0	June 23	1400	62.4
June 23	June 24	--	0.93×10^{-12}	68	0	June 24	1400	82.1
June 24	June 25	--	1.07×10^{-12}	68	0	June 25	1400	99.2
June 25	June 26	--	0.97×10^{-12}	525	trace	June 26	1400	672.1
June 26	June 29	--	0.83×10^{-12}	791	trace	June 29	1400	923.7
June 29	June 30	--	0.42×10^{-12}	748	0.15	June 30	1400	882.8
$\bar{X}$ "per day"			1.08×10^{-12}	340.9	0.01			
* Maximum "per day"			2.42×10^{-12}	3710	0.15			
** Minimum "per day"			0.34×10^{-12}	13	0			
Total				10226	0.30			

JULY 1964

Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μCi/cc	Beta activity counted 7 days after collection: Rain gauge μμCi/M³	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity μμCi/M³
June 30	July 1	--	0.14×10^{-12}	2168*	trace	July 1	1400	2544.3
July 1	July 2	--	0.31×10^{-12}	149	trace	July 2	1400	177.0
July 2	July 6	--	0.25×10^{-12}	1533	0.04	July 6	1400	1580.5
July 6	July 7	--	0.24×10^{-12}	1118	trace	July 7	1400	1417.5
July 7	July 8	--	0.28×10^{-12}	508	0.01	July 8	1400	620.0
July 8	July 9	--	0.20×10^{-12}	252	0.09	July 9	1400	309.3
July 9	July 10	--	0.33×10^{-12}	120	0.43	July 10	1400	141.7
July 10	July 13	--	0.27×10^{-12}	704	0.31	July 13	1400	747.5
July 13	July 14	--	0.69×10^{-12} *	58**	0.01	July 14	1400	88.0
July 14	July 15	--	0.31×10^{-12}	96	trace	July 15	1400	114.5
July 15	July 16	--	0.22×10^{-12}	280	0.22	July 16	1400	290.2
July 16	July 17	--	0.10×10^{-12} **	1061	0.43	July 17	1400	1125.3
July 17	July 20	--	0.16×10^{-12}	451	0.12	July 20	1400	467.1
July 20	July 21	--	0.15×10^{-12}	508	0.03	July 21	1400	583.3
July 21	July 22	--	0.16×10^{-12}	155	0.01	July 22	1400	243.8
July 22	July 23	--	0.23×10^{-12}	352	trace	July 23	1400	388.6
July 23	July 24	--	0.25×10^{-12}	77	trace	July 24	1400	89.7
July 24	July 27	--	0.29×10^{-12}	496	0.05	July 27	1400	587.9
July 27	July 28	--	0.19×10^{-12}	109	0.01	July 28	1400	121.5
July 28	July 29	--	0.20×10^{-12}	99	0.01	July 29	1400	112.3
July 29	July 30	--	0.17×10^{-12}	691	0.04	July 30	1400	531.2
July 30	July 31	--	0.12×10^{-12}	358	0.04	July 31	1400	438.9
$\bar{X}$ "per day"			0.24×10^{-12}	366	0.08			
* Maximum "per day"			0.69×10^{-12}	2168	0.43			
** Minimum "per day"			0.10×10^{-12}	58	trace			
Total				11343	1.91			

AUGUST 1964

Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μCi/cc	Beta activity counted 7 days after collection: Rain gauge μμCi/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity μμCi/M²
July 31	Aug. 3	--	0.13×10^{-12}	533	0.25	Aug. 3	1400	587.1
Aug. 3	Aug. 4	--	0.13×10^{-12}	30	0	Aug. 4	1400	52.4
Aug. 4	Aug. 5	--	0.16×10^{-12}	214	0	Aug. 5	1400	226.2
Aug. 5	Aug. 6	--	0.14×10^{-12}	53	trace	Aug. 6	1400	75.9
Aug. 6	Aug. 7	--	0.15×10^{-12}	55	trace	Aug. 7	1400	79.7
Aug. 7	Aug. 10	--	0.07×10^{-12} **	371	0.23	Aug. 10	1400	372.0
Aug. 10	Aug. 11	--	0.13×10^{-12}	50	trace	Aug. 11	1400	84.6
Aug. 11	Aug. 12	--	0.19×10^{-12}	649*	0.36	Aug. 12	1400	1178.7
Aug. 12	Aug. 13	--	0.18×10^{-12}	413	0.16	Aug. 13	1400	536.6
Aug. 13	Aug. 14	--	0.08×10^{-12}	108	0.03	Aug. 14	1400	127.5
Aug. 14	Aug. 17	--	0.21×10^{-12}	183	0.03	Aug. 17	1400	199.1
Aug. 17	Aug. 18	--	0.20×10^{-12}	275	0.02	Aug. 18	1400	189.6
Aug. 18	Aug. 19	--	0.16×10^{-12}	162	0.08	Aug. 19	1400	194.8
Aug. 19	Aug. 20	--	0.93×10^{-12} *	54	trace	Aug. 20	1400	88.8
Aug. 20	Aug. 21	--	0.54×10^{-12}	34	0	Aug. 21	1400	58.6
Aug. 21	Aug. 24	--	0.73×10^{-12}	34**	0	Aug. 24	1400	62.1
Aug. 24	Aug. 25	--	0.44×10^{-12}	52	0	Aug. 25	1400	90.2
Aug. 25	Aug. 26	--	0.31×10^{-12}	52	trace	Aug. 26	1400	96.1
Aug. 26	Aug. 27	--	0.22×10^{-12}	140	trace	Aug. 27	1400	192.6
Aug. 27	Aug. 28	--	0.40×10^{-12}	51	0	Aug. 28	1400	76.1
Aug. 28	Aug. 31	--	0.10×10^{-12}	136	trace	Aug. 31	1400	152.3
$\bar{X}$ "per day"			0.27×10^{-12}	118	0.04			
* Maximum "per day"			0.93×10^{-12}	649	0.36			
** Minimum "per day"			0.07×10^{-12}	11	0			
Total				3649	1.23			

SEPTEMBER 1964

Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μCi/cc	Beta activity counted 7 days after collection: Rain gauge μμCi/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity μμCi/M²
Aug. 31	Sept. 1	--	0.46×10^{-12}	208	trace	Sept. 1	1400	269.3
Sept. 1	Sept. 2	--	0.11×10^{-12}	53	0.01	Sept. 2	1400	94.8
Sept. 2	Sept. 3	--	0.12×10^{-12}	30	0	Sept. 3	1400	57.2
Sept. 3	Sept. 4	--	0.11×10^{-12}	34	0	Sept. 4	1400	53.8
Sept. 4	Sept. 8	--	0.04×10^{-12} **	531	0.30	Sept. 8	1400	563.0
Sept. 8	Sept. 9	--	0.47×10^{-12}	143	0.01	Sept. 9	1400	163.6
Sept. 9	Sept. 10	--	0.45×10^{-12}	69	0.18	Sept. 10	1400	93.9
Sept. 10	Sept. 11	--	0.18×10^{-12}	40	0.01	Sept. 11	1400	59.6
Sept. 11	Sept. 14	--	0.06×10^{-12}	420	0.04	Sept. 14	1400	811.1
Sept. 14	Sept. 15	--	0.16×10^{-12}	160	trace	Sept. 15	1400	191.5
Sept. 15	Sept. 16	--	0.26×10^{-12}	329	0.07	Sept. 16	1400	422.4
Sept. 16	Sept. 17	--	0.86×10^{-12} *	74	0.01	Sept. 17	1400	86.3
Sept. 17	Sept. 18	--	0.24×10^{-12}	26**	0	Sept. 18	1400	37.0
Sept. 18	Sept. 21	--	0.21×10^{-12}	658	0.27	Sept. 21	1400	759.2
Sept. 21	Sept. 22	--	0.16×10^{-12}	1798*	0.03	Sept. 22	1400	3525.2
Sept. 22	Sept. 23	--	0.24×10^{-12}	251	0.52	Sept. 23	1400	308.8
Sept. 23	Sept. 24	--	0.16×10^{-12}	50	0.03	Sept. 24	1400	58.4
Sept. 24	Sept. 25	--	0.13×10^{-12}	71	0	Sept. 25	1400	90.6
Sept. 25	Sept. 28	--	0.12×10^{-12}	166	0.01	Sept. 28	1400	195.7
Sept. 28	Sept. 29	--	0.30×10^{-12}	166	0	Sept. 29	1400	212.6
Sept. 29	Sept. 30	--	0.33×10^{-12}	110	0	Sept. 30	1400	156.1
$\bar{X}$ "per day"			0.25×10^{-12}	180	0.05			
* Maximum "per day"			0.86×10^{-12}	1798	0.52			
** Minimum "per day"			0.04×10^{-12}	26	0			
Total				5387	1.51			

OCTOBER 1964

Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μCi/cc	Beta activity counted 7 days after collection: Rain gauge μμCi/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity μμCi/M²
Sept. 30	Oct. 1	--	0.25×10^{-12}	62	0	Oct. 1	1400	106.4
Oct. 1	Oct. 2	--	0.25×10^{-12}	34	0	Oct. 2	1400	57.8
Oct. 2	Oct. 5	--	0.28×10^{-12}	60	0	Oct. 5	1400	85.7
Oct. 5	Oct. 6	--	0.20×10^{-12}	46	0	Oct. 6	1400	65.4
Oct. 6	Oct. 7	--	0.22×10^{-12}	41	0	Oct. 7	1400	58.1
Oct. 7	Oct. 8	--	0.19×10^{-12}	35	0	Oct. 8	1400	50.9
Oct. 8	Oct. 9	--	0.14×10^{-12}	33	trace	Oct. 9	1400	65.8
Oct. 9	Oct. 12	--	0.15×10^{-12}	57	0.03	Oct. 12	1400	180.6
Oct. 12	Oct. 13	--	0.26×10^{-12}	37	0	Oct. 13	1400	83.3
Oct. 13	Oct. 14	--	0.30×10^{-12}	23	0	Oct. 14	1400	45.4
Oct. 14	Oct. 15	--	0.25×10^{-12}	28	0	Oct. 15	1400	44.4
Oct. 15	Oct. 16	--	0.17×10^{-12}	22	0	Oct. 16	1400	40.0
Oct. 16	Oct. 19	--	0.11×10^{-12}**	261*	0.02	Oct. 19	1400	279.7
Oct. 19	Oct. 20	--	0.15×10^{-12}	30	0	Oct. 20	1400	41.0
Oct. 20	Oct. 21	--	0.12×10^{-12}	19	0	Oct. 21	1400	35.2
Oct. 21	Oct. 22	--	0.13×10^{-12}	19	0	Oct. 22	1400	29.2
Oct. 22	Oct. 23	--	0.29×10^{-12}	47	0	Oct. 23	1400	117.3
Oct. 23	Oct. 26	--	3.74×10^{-12}	60	0	Oct. 26	1400	147.0
Oct. 26	Oct. 27	--	3.75×10^{-12}*	29	0	Oct. 27	1400	54.4
Oct. 27	Oct. 28	--	0.93×10^{-12}	25	0	Oct. 28	1400	42.9
Oct. 28	Oct. 29	--	0.17×10^{-12}	13**	0	Oct. 29	1400	31.3
Oct. 29	Oct. 30	--	0.54×10^{-12}	17	0	Oct. 30	1400	25.4
$\bar{X}$ "per day"			0.57×10^{-12}	32.2	0.002			
* Maximum "per day"			3.75×10^{-12}	87	0.03			
** Minimum "per day"			0.11×10^{-12}	13	0			
Total				998	0.06			

NOVEMBER 1964

Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne μCi/cc	Beta activity counted 7 days after collection: Rain gauge μμCi/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity μμCi/M²
Oct. 30	Nov. 2	--	0.33×10^{-12}	16**	trace	Nov. 2	1400	34.1
Nov. 2	Nov. 3	--	0.51×10^{-12} *	31	0	Nov. 3	1400	50.6
Nov. 3	Nov. 4	--	0.25×10^{-12}	20	0	Nov. 4	1400	23.7
Nov. 4	Nov. 5	--	0.51×10^{-12} *	24	0	Nov. 5	1400	38.1
Nov. 5	Nov. 6	--	0.50×10^{-12}	29	0	Nov. 6	1400	35.4
Nov. 6	Nov. 9	--	0.29×10^{-12}	58	0	Nov. 9	1400	71.5
Nov. 9	Nov. 10	--	0.17×10^{-12}	94	0	Nov. 10	1400	97.8
Nov. 10	Nov. 11	--	0.28×10^{-12}	47	trace	Nov. 11	1400	71.1
Nov. 11	Nov. 12	--	0.33×10^{-12}	71	0	Nov. 12	1400	107.7
Nov. 12	Nov. 13	--	0.16×10^{-12}	93	0	Nov. 13	1400	106.3
Nov. 13	Nov. 16	--	0.13×10^{-12}	677	0.17	Nov. 16	1400	1336.5
Nov. 16	Nov. 17	--	0.02×10^{-12} **	121	0.02	Nov. 17	1400	218.5
Nov. 17	Nov. 18	--	0.03×10^{-12}	371*	0.87	Nov. 18	1400	1349.9
Nov. 18	Nov. 19	--	0.25×10^{-12}	207	trace	Nov. 19	1400	479.0
Nov. 19	Nov. 20	--	0.22×10^{-12}	49	0	Nov. 20	1400	60.8
Nov. 20	Nov. 23	--	0.14×10^{-12}	57	0	Nov. 23	1400	57.9
Nov. 23	Nov. 24	--	0.18×10^{-12}	48	0	Nov. 24	1400	52.3
Nov. 24	Nov. 25	--	0.19×10^{-12}	45	0	Nov. 25	1400	48.5
Nov. 25	Nov. 30	--	0.13×10^{-12}	37	trace	Nov. 30	1400	64.1
$\bar{X}$ "per day"			0.24×10^{-12}	70	0.037			
* Maximum "per day"			0.51×10^{-12}	371	0.87			
** Minimum "per day"			0.02×10^{-12}	5	0			
Total				2095	1.10			

DECEMBER 1964

Collection Date Start	Collection Date Stop	Gamma mr/hr 3 ft above roof	Beta activity counted 7 days after collection: Airborne µCi/cc	Beta activity counted 7 days after collection: Rain gauge µµCi/M²	Precipitation (inches)	Early count - Rain gauge: Date of count	Early count - Rain gauge: Time of count	Early count - Rain gauge: Beta activity µµCi/M²
Nov. 30	Dec. 1	--	0.13×10^{-12}	21	0	Dec. 1	1400	28.6
Dec. 1	Dec. 2	--	0.13×10^{-12}	11	0	Dec. 2	1400	35.0
Dec. 2	Dec. 3	--	0.07×10^{-12} **	169	0.12	Dec. 3	1400	237.4
Dec. 3	Dec. 4	--	0.12×10^{-12}	350	trace	Dec. 4	1400	403.2
Dec. 4	Dec. 7	--	0.11×10^{-12}	285	0.06	Dec. 7	1400	319.8
Dec. 7	Dec. 8	--	0.13×10^{-12}	35	0	Dec. 8	1400	24.0
Dec. 8	Dec. 9	--	0.11×10^{-12}	45	0	Dec. 9	1400	54.9
Dec. 9	Dec. 10	--	0.12×10^{-12}	45	0	Dec. 10	1400	49.5
Dec. 10	Dec. 11	--	0.14×10^{-12}	28	0	Dec. 11	1400	42.9
Dec. 11	Dec. 14	--	0.12×10^{-12}	43	trace	Dec. 14	1400	52.0
Dec. 14	Dec. 15	--	0.18×10^{-12}	23	0	Dec. 15	1400	169.9
Dec. 15	Dec. 16	--	0.18×10^{-12}	15	0	Dec. 16	1400	37.2
Dec. 16	Dec. 17	--	0.30×10^{-12} *	13	0	Dec. 17	1400	39.3
Dec. 17	Dec. 18	--	0.16×10^{-12}	12	0	Dec. 18	1400	27.9
Dec. 18	Dec. 21	--	0.10×10^{-12}	79	0.13	Dec. 21	1400	81.2
Dec. 21	Dec. 22	--	0.12×10^{-12}	10	0	Dec. 22	1400	18.2
Dec. 22	Dec. 23	--	0.16×10^{-12}	8**	0	Dec. 23	1400	14.2
Dec. 23	Dec. 24	--	0.12×10^{-12}	15	0	Dec. 24	1400	23.9
Dec. 24	Dec. 28	--	0.08×10^{-12}	511	0.16	Dec. 28	1400	641.7
Dec. 28	Dec. 29	--	0.13×10^{-12}	133	0.08	Dec. 29	1400	641.7
Dec. 29	Dec. 30	--	0.19×10^{-12}	193	0.03	Dec. 30	1400	215.7
Dec. 30	Dec. 31	--	0.19×10^{-12}	279*	0.11	Dec. 31	1400	320.7
$\bar{X}$ "per day"			0.14×10^{-12}	75	0.02			
* Maximum "per day"			0.30×10^{-12}	279	0.16			
** Minimum "per day"			0.07×10^{-12}	8	0			
Total				2323	0.71			

TABLE I

SUMMARY 1964

Precipitation		11.26 in.
Air Samples	$\overline{X}$/sample	0.69×10^{-12} μCi/cc
10/26-10/27	Maximum	3.75×10^{-12} "
11/16-11/17	Minimum	0.02×10^{-12} "
Water Samples	Total	86,132 μμCi/M^2
	$\overline{X}$/day	236 "
4/29-4/30	Maximum	10,894 "
12/22-12/23	Minimum	8 "

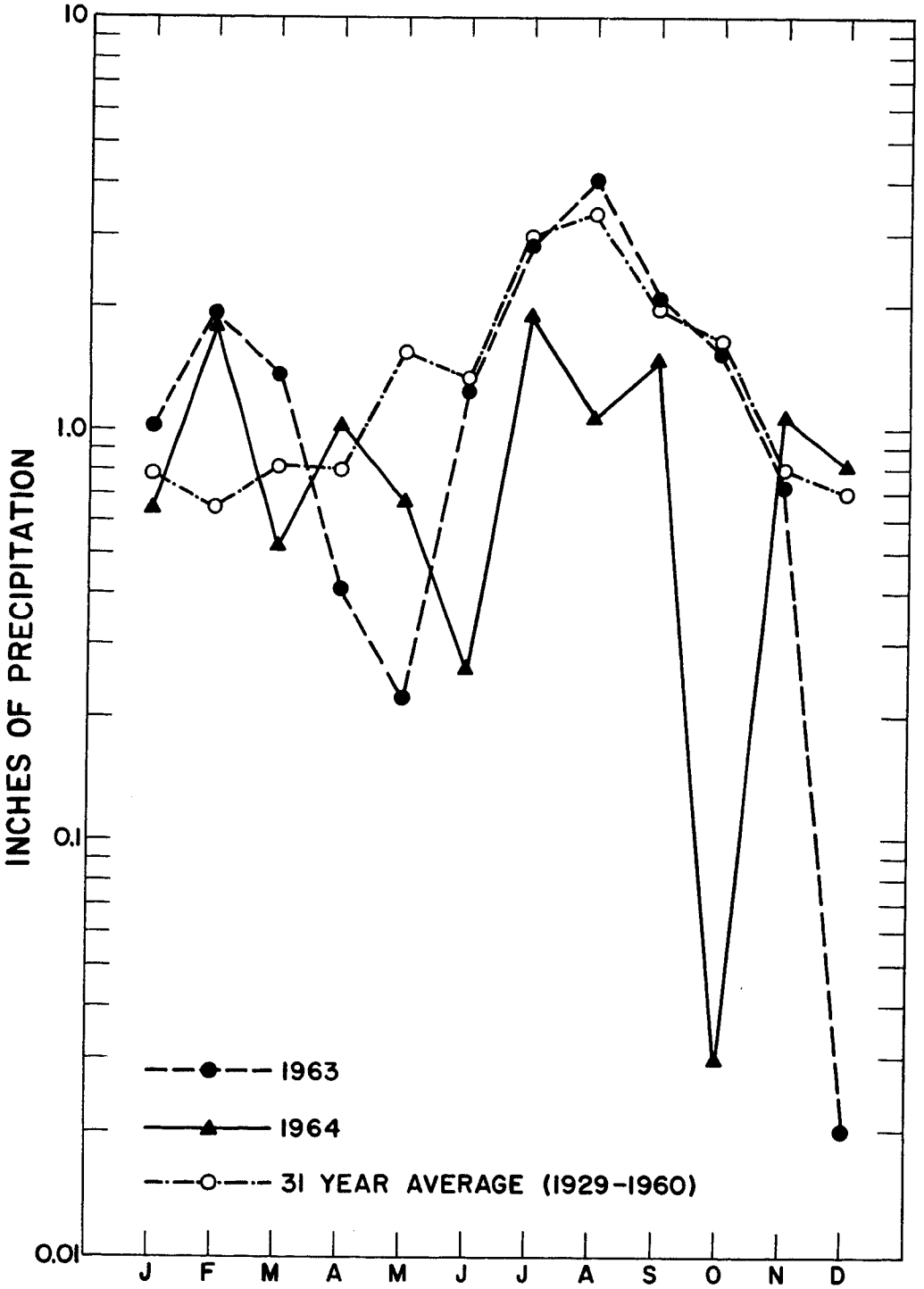

Figure 1

Total Monthly Precipitation

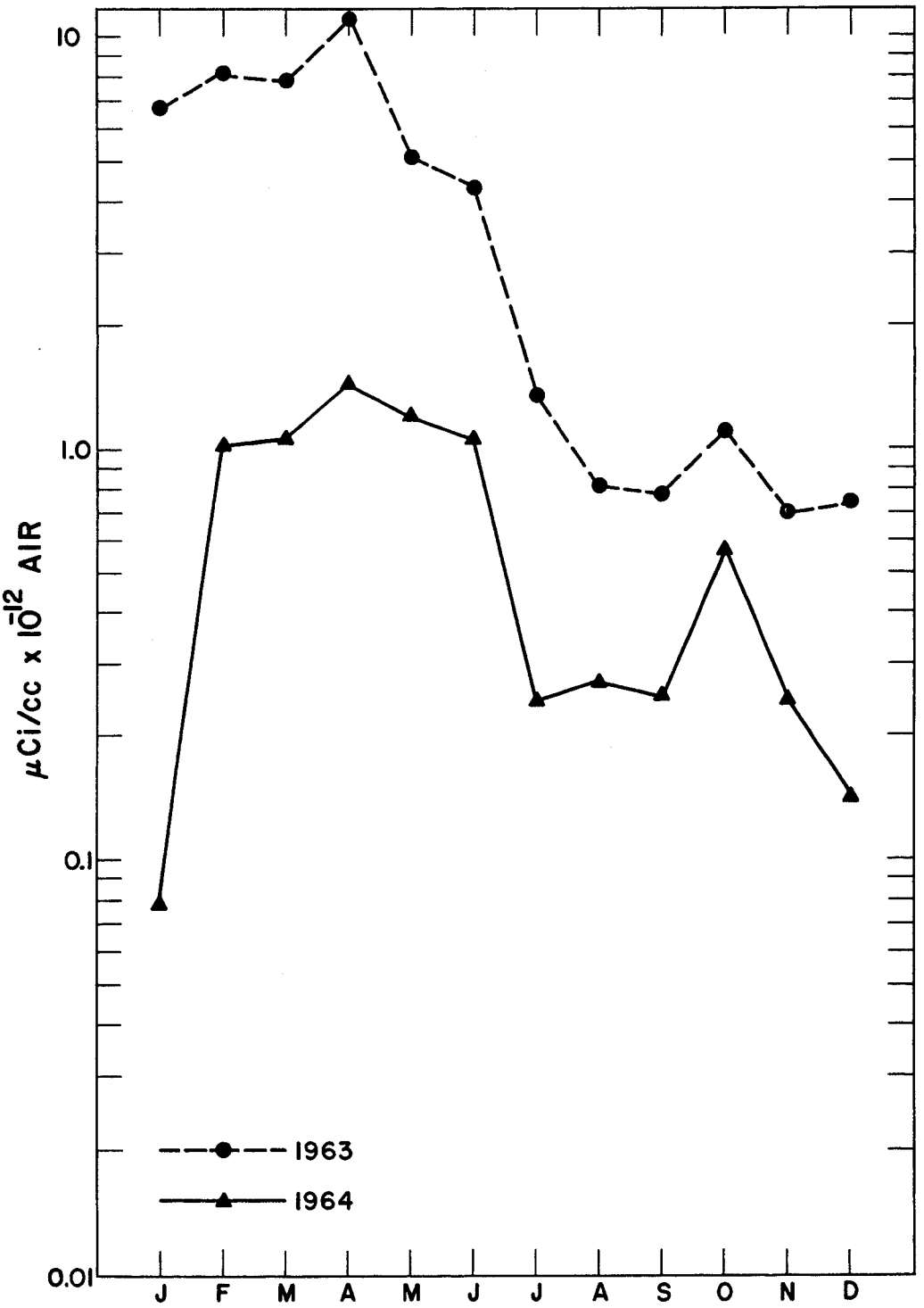

Figure 2

Average "Per Day" Activity Found in Air Filter Samples

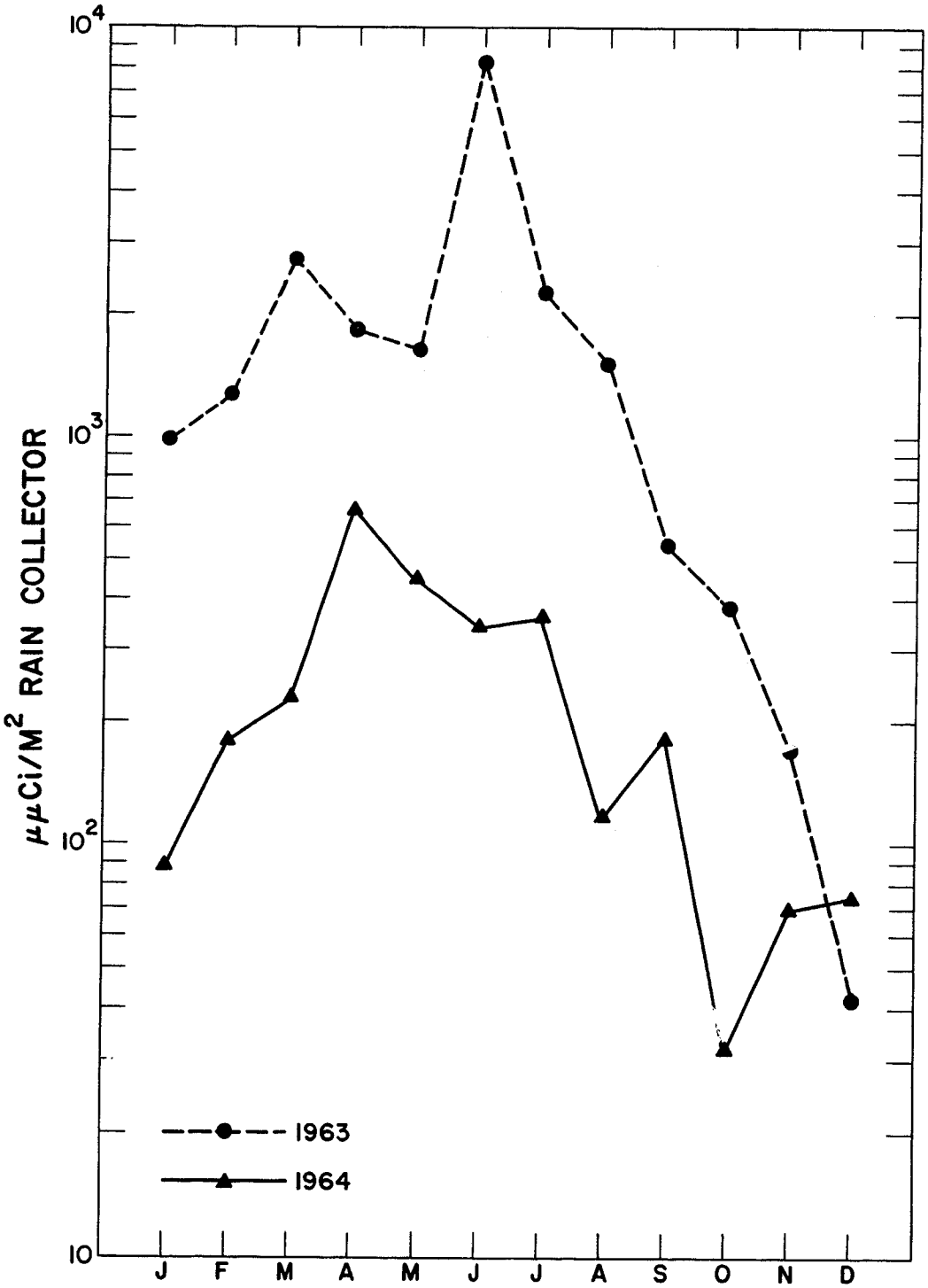

Figure 3

Average "Per Day" Activities Found in Rain Collector Samples