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LOS ALAMOS SCIENTIFIC LABORATORY
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LOS ALAMOS • NEW MEXICO

Beta Radioactivity in Environmental Air and Precipitation at Los Alamos, New Mexico, for 1968

by

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BETA RADIOACTIVITY IN ENVIRONMENTAL AIR AND PRECIPITATION AT LOS ALAMOS, NEW MEXICO, FOR 1968

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ABSTRACT

Beta activity of particulate matter in both air and precipitation for 1968 at Los Alamos, New Mexico, is reported. The declining activities for January through April seem to be residual fallout from the 1966 foreign nuclear weapons tests, and the December high seems due to late 1967 tests. The May through September increases reflect the increasing rainfall of that period.

INTRODUCTION

Measurement of beta activity of particulate matter in both air and precipitation is part of the environmental monitoring program at Los Alamos. The sampling station is located at TA-50, about 1-3/4 miles southeast of the Administration Building of the Los Alamos Scientific Laboratory. The samplers are on the roof of the building. Samples are collected daily on a work day basis.

The results reported here continue the measurements reported in Radioactive Fallout Data, 1958, G. M. Dunning (Ed.), U. S. Atomic Energy Commission, U. S. Government Printing Office, Washington (March 1959); LAMS-2397 (November 1958 through December 1959); LAMS-2499 (1960); LAMS-2702 (1961); LAMS-2870 (1962); LAMS-3071 (1963); LA-3245-MS (1964); LA-3516-MS (1965); LA-3663 (1966); and LA-3887 (1967).

BETA ACTIVITY OF PARTICULATE MATTER IN AIR

Airborne radioactive particulate matter is collected on 4-in.-diam filters (MSA catalog number CR 17651). The air sampling rate is 25.5 m^3/h. Air samples are ordinarily collected for 24-h intervals during the work week, and weekend samples are collected for a 72-h 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 a 50% overall efficiency for ^{90}Sr - ^{90}Y. A large chamber permits the counting of these air samples in the same geometry as the precipitation samples. The efficiency for ^{90}Sr - ^{90}Y remains the same.

BETA ACTIVITY OF PARTICULATE MATTER IN PRECIPITATION

An oversized precipitation collector delivers 1 liter of water for each 0.1 in. of precipitation. The collector has a cross section of approximately 0.4 m^2.

Even during relatively dry periods this arrangement collects activity, and by

washing down the collector with about 1 liter of distilled water, a suitable sample is obtained. These wash samples as well as any precipitation samples are reduced in volume, dry-plated on 1-in.-diam stainless steel planchets, and counted in the Sharp Widebeta Counting System, employing a gas-flow, proportional, alpha and beta chamber. A cosmic ray umbrella with coincidence count cancel provides a low background for the system. The counting efficiency is determined by comparison with a Tracerlab standard of radiolead, which emits 1.17-MeV beta particles.

Samples are taken daily on work days. The precipitation collector is washed with 1 liter of water, usually between 0800 and 0900. When precipitation occurs, the wash is added to the collected precipitation.

RESULTS

Precipitation for 1967, 1968, and the average for a 31-year period is shown in Fig. 1. The average "per day" activity for 1967 and 1968 is presented in Figs. 2 and 3, respectively. Average per day values for air collected are weighted for sample periods of more than 1 day. Average per day values for the precipitation collection are the total activity collected during the month divided by the number of days. Table I summarizes the year's data for 1968.

Beta activities, presented in the monthly tabulations, are not identified; however, the measurements were made in the same manner as in previous years, making these results comparable to those presented in the earlier reports.

TABLE I

1968 Summary

Precipitation		19.55 in.
Air Samples	$\bar{X}$/sample	0.17×10^{-12} $\mu Ci/cm^3$
Mar. 21-Mar. 22	Maximum	1.45×10^{-12} "
Aug. 29-Aug. 30 Oct. 22-Oct. 23	Minimum	0.01×10^{-12} "
Precipitation Samples	Total	37,988 $\mu\mu Ci/m^2$
	X/day	3,166 "
Jan. 3-Jan. 4	Maximum	9,223 "
Nov. 21-Nov. 22	Minimum	1 "

The generally high levels in both air and precipitation samples in 1968 were due to foreign nuclear weapons tests in late 1967 and early 1968.

JANUARY 1968

Collection date Start	Collection date Stop	Beta activity counted 7 days after collection: Airborne ($\mu Ci/cm^3$)	Beta activity counted 7 days after collection: Precipitation collector ($\mu\mu Ci/m^2$)	Precipitation (in.)	Early count - Precipitation collector: Date of count	Early count - Precipitation collector: Time of count	Early count - Precipitation collector: Beta activity ($\mu\mu Ci/m^2$)
Jan. 2	Jan. 3	0.57×10^{-12}	8556	0	Jan. 3	1400	15590.0
Jan. 3	Jan. 4	0.41×10^{-12}	9223*	0	Jan. 4	1400	1263.8
Jan. 4	Jan. 5	0.23×10^{-12}	506	0	Jan. 5	1400	1457.4
Jan. 5	Jan. 8	0.12×10^{-12}	(47)139	0	Jan. 8	1400	170.6
Jan. 8	Jan. 9	0.19×10^{-12}	115	0	Jan. 9	1400	182.7
Jan. 9	Jan. 10	0.24×10^{-12}	110	0	Jan. 10	1400	135.5
Jan. 10	Jan. 11	0.33×10^{-12}	317	0.01	Jan. 11	1400	430.4
Jan. 11	Jan. 12	0.83×10^{-12}	149	0	Jan. 12	1400	206.6
Jan. 12	Jan. 15	1.31×10^{-12}*	(26)79	0	Jan. 15	1400	95.7
Jan. 15	Jan. 16	1.30×10^{-12}	45	0	Jan. 16	1400	49.9
Jan. 16	Jan. 17	1.02×10^{-12}	77	0	Jan. 17	1400	81.0
Jan. 17	Jan. 18	0.90×10^{-12}	715	0.03	Jan. 18	1400	819.3
Jan. 18	Jan. 19	0.38×10^{-12}	381	0	Jan. 19	1400	527.1
Jan. 19	Jan. 22	0.26×10^{-12}	(15)44	0	Jan. 22	1400	53.4
Jan. 22	Jan. 23	0.06×10^{-12}**	65	0	Jan. 23	1400	81.4
Jan. 23	Jan. 24	0.28×10^{-12}	53	0	Jan. 24	1400	52.0
Jan. 24	Jan. 25	0.33×10^{-12}	32	0	Jan. 25	1400	42.6
Jan. 25	Jan. 26	0.35×10^{-12}	20**	0	Jan. 26	1400	27.9
Jan. 26	Jan. 29	0.20×10^{-12}	(113)340	0.08	Jan. 29	1400	388.3
Jan. 29	Jan. 30	0.25×10^{-12}	141	0	Jan. 30	1400	158.5
Jan. 30	Jan. 31	0.20×10^{-12}	27	0.03	Jan. 31	1400	30.2
$\bar{X}$ "per day"		0.46×10^{-12}	682	0.005			
* Maximum		1.31×10^{-12}	9223	0.08			
** Minimum		0.06×10^{-12}	20	0			
Total		9.76×10^{-12}	21134	0.15			

FEBRUARY 1968

Collection date Start	Collection date Stop	Beta activity counted 7 days after collection: Airborne ($\mu Ci/cm^3$)	Beta activity counted 7 days after collection: Precipitation collector ($\mu\mu Ci/m^2$)	Precipitation (in.)	Early count - Precipitation collector: Date of count	Early count - Precipitation collector: Time of count	Early count - Precipitation collector: Beta activity ($\mu\mu Ci/m^2$)
Jan. 31	Feb. 1	0.33×10^{-12}*	269	0.05	Feb. 1	1400	292.6
Feb. 1	Feb. 2	0.29×10^{-12}	26	0	Feb. 2	1400	37.8
Feb. 2	Feb. 5	0.28×10^{-12}	(10)30	0	Feb. 5	1400	27.8
Feb. 5	Feb. 6	0.15×10^{-12}	13	0	Feb. 6	1400	26.5
Feb. 6	Feb. 7	0.12×10^{-12}	12	0	Feb. 7	1400	19.2
Feb. 7	Feb. 8	0.11×10^{-12}	19	0	Feb. 8	1400	18.6
Feb. 8	Feb. 9	0.14×10^{-12}	16	0	Feb. 9	1400	23.3
Feb. 9	Feb. 12	0.16×10^{-12}	(78)235	0.17	Feb. 12	1400	464.7
Feb. 12	Feb. 13	0.05×10^{-12}	455*	0.07	Feb. 13	1400	950.4
Feb. 13	Feb. 14	0.07×10^{-12}	397	0.25	Feb. 14	1400	489.2
Feb. 14	Feb. 15	0.13×10^{-12}	45	trace	Feb. 15	1400	47.4
Feb. 15	Feb. 16	0.07×10^{-12}	14	0	Feb. 16	1400	18.4
Feb. 16	Feb. 19	0.20×10^{-12}	(25)75	trace	Feb. 19	1400	86.1
Feb. 19	Feb. 20	0.12×10^{-12}	22	0	Feb. 20	1400	23.0
Feb. 20	Feb. 21	0.09×10^{-12}	14	0	Feb. 21	1400	28.2
Feb. 21	Feb. 23	0.19×10^{-12}	(25)51	0.02	Feb. 23	1400	58.6
Feb. 23	Feb. 26	0.08×10^{-12}	(17)11	0.02	Feb. 26	1400	25.3
Feb. 26	Feb. 27	0.12×10^{-12}	9**	trace	Feb. 27	1400	19.3
Feb. 27	Feb. 28	0.05×10^{-12}**	32	0	Feb. 28	1400	718.7
Feb. 28	Feb. 29	0.09×10^{-12}	32	0	Feb. 29	1400	38.6
$\bar{X}$ "per day"		0.14×10^{-12}	64	0.02			
* Maximum		0.33×10^{-12}	455	0.25			
** Minimum		0.05×10^{-12}	9	0			
Total		2.84×10^{-12}	1857	0.61			

MARCH 1968

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne ($\mu Ci/cm^3$)	Precipitation collector ($\mu\mu Ci/m^3$)	Precipitation (in.)	Early count - Precipitation collector: Date of count	Time of count	Beta activity ($\mu\mu Ci/m^3$)
Feb. 29	Mar. 1	0.14×10^{-12}	25	0	Mar. 1	1400	30.2
Mar. 1	Mar. 4	0.11×10^{-12}	(6)19	trace	Mar. 4	1400	30.0
Mar. 4	Mar. 5	0.17×10^{-12}	15	0	Mar. 5	1400	24.5
Mar. 5	Mar. 6	0.21×10^{-12}	5	0	Mar. 6	1400	16.6
Mar. 6	Mar. 7	0.30×10^{-12}	97	0.05	Mar. 7	1400	387.7
Mar. 7	Mar. 8	0.29×10^{-12}	18	trace	Mar. 8	1400	28.7
Mar. 8	Mar. 11	0.13×10^{-12}	(61)184	0.67	Mar. 11	1400	227.4
Mar. 11	Mar. 12	0.07×10^{-12}	145	trace	Mar. 12	1400	158.8
Mar. 12	Mar. 13	0.16×10^{-12}	10	0	Mar. 13	1400	20.3
Mar. 13	Mar. 14	NO SAMPLE	8	trace	Mar. 14	1400	16.2
Mar. 14	Mar. 15	0.27×10^{-12}	15	0	Mar. 15	1400	27.6
Mar. 15	Mar. 18	0.23×10^{-12}	(10)29	0	Mar. 18	1400	61.4
Mar. 18	Mar. 19	0.27×10^{-12}	7**	trace	Mar. 19	1400	35.1
Mar. 19	Mar. 20	0.19×10^{-12}	202*	0.02	Mar. 20	1400	299.7
Mar. 20	Mar. 21	0.06×10^{-12}**	109	trace	Mar. 21	1400	162.0
Mar. 21	Mar. 22	1.45×10^{-12}*	55	0.36	Mar. 22	1400	55.0
Mar. 22	Mar. 25	0.15×10^{-12}	(13)40	0	Mar. 25	1400	33.5
Mar. 25	Mar. 26	0.26×10^{-12}	11	0	Mar. 26	1400	30.5
Mar. 26	Mar. 27	0.26×10^{-12}	8	0	Mar. 27	1400	31.1
Mar. 27	Mar. 28	0.39×10^{-12}	12	0	Mar. 28	1400	31.4
Mar. 28	Mar. 29	0.48×10^{-12}	9	0	Mar. 29	1400	25.9
Mar. 29	Apr. 1	0.30×10^{-12}	(176)527	0.14	Apr. 1	1400	1654.6
$\bar{X}$ "per day"		0.28×10^{-12}	50	0.04			
* Maximum		1.45×10^{-12}	202	0.67			
** Minimum		0.06×10^{-12}	7	0			
Total		5.89×10^{-12}	1550	1.30			

APRIL 1968

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne ($\mu Ci/cm^3$)	Precipitation collector ($\mu\mu Ci/m^3$)	Precipitation (in.)	Early count - Precipitation collector: Date of count	Time of count	Beta activity ($\mu\mu Ci/m^3$)
Apr. 1	Apr. 2	0.30×10^{-12}*	9	0.04	Apr. 2	1400	25.9
Apr. 2	Apr. 3	0.16×10^{-12}	174	0.01	Apr. 3	1400	268.8
Apr. 3	Apr. 4	0.16×10^{-12}	12	0	Apr. 4	1400	290.3
Apr. 4	Apr. 8	0.27×10^{-12}	(9)36	0.01	Apr. 8	1400	70.9
Apr. 8	Apr. 10	0.24×10^{-12}	(7)14	0	Apr. 10	1400	33.4
Apr. 10	Apr. 11	0.23×10^{-12}	17	0	Apr. 11	1400	33.9
Apr. 11	Apr. 12	0.19×10^{-12}	11	trace	Apr. 12	1400	26.0
Apr. 12	Apr. 15	0.22×10^{-12}	(10)30	0	Apr. 15	1400	72.0
Apr. 15	Apr. 16	0.22×10^{-12}	55	0.06	Apr. 16	1400	123.9
Apr. 16	Apr. 17	0.23×10^{-12}	102	0	Apr. 17	1400	239.7
Apr. 17	Apr. 18	0.24×10^{-12}	8**	0	Apr. 18	1400	162.4
Apr. 18	Apr. 19	0.28×10^{-12}	29	trace	Apr. 19	1400	47.4
Apr. 19	Apr. 22	0.26×10^{-12}	(31)94	0.01	Apr. 22	1400	136.0
Apr. 22	Apr. 23	0.11×10^{-12}	339*	0.11	Apr. 23	1400	589.1
Apr. 23	Apr. 24	0.08×10^{-12}**	24	0	Apr. 24	1400	39.3
Apr. 24	Apr. 25	0.25×10^{-12}	9	0	Apr. 25	1400	25.6
Apr. 25	Apr. 26	0.27×10^{-12}	13	0	Apr. 26	1400	35.3
Apr. 26	Apr. 29	0.24×10^{-12}	(4[illegible])136	trace	Apr. 29	1400	178.4
Apr. 29	Apr. 30	0.30×10^{-12}*	20	0	Apr. 30	1400	49.1
$\bar{X}$ "per day"		0.22×10^{-12}	38	0.008			
* Maximum		0.30×10^{-12}	339	0.11			
** Minimum		0.08×10^{-12}	8	0			
Total		4.25×10^{-12}	1132	0.24			

MAY 1968

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne ($\mu Ci/cm^3$)	Precipitation collector ($\mu\mu Ci/m^2$)	Precipitation (in.)	Early count - Precipitation collector: Date of count	Time of count	Beta activity ($\mu\mu Ci/m^2$)
Apr. 30	May 1	0.23×10^{-12}	25	trace	May 1	1400	49.2
May 1	May 2	0.24×10^{-12}	31	trace	May 2	1400	82.3
May 2	May 3	0.25×10^{-12}	40	0	May 3	1400	71.2
May 3	May 6	0.12×10^{-12}	(299)898	0.59	May 6	1400	1095.3
May 6	May 7	0.24×10^{-12}	24	0	May 7	1400	51.9
May 7	May 8	0.31×10^{-12}	17	0	May 8	1400	40.1
May 8	May 9	0.30×10^{-12}	23	0.17	May 9	1400	67.5
May 9	May 10	0.11×10^{-12}**	1049*	0.32	May 10	1400	4274.5
May 10	May 13	0.12×10^{-12}	(593)1779	0.66	May 13	1400	2029.2
May 13	May 15	0.22×10^{-12}	(9)17	0	May 15	1400	20.4
May 15	May 16	0.32×10^{-12}	18	0	May 16	1400	48.9
May 16	May 17	0.34×10^{-12}*	27	0	May 17	1400	61.0
May 17	May 20	0.24×10^{-12}	(7)21	0	May 20	1400	42.4
May 20	May 21	0.23×10^{-12}	22	0	May 21	1400	24.3
May 21	May 22	NO SAMPLE	18	0	May 22	1400	52.1
May 22	May 23	0.25×10^{-12}	16	0	May 23	1400	49.8
May 23	May 24	0.19×10^{-12}	19	0	May 24	1400	63.8
May 24	May 27	0.30×10^{-12}	(9)28	0	May 27	1400	62.8
May 27	May 28	0.19×10^{-12}	14	0	May 28	1400	28.8
May 28	May 29	0.12×10^{-12}	23	trace	May 29	1400	54.2
May 29	May 31	0.19×10^{-12}	(2)3**	trace	May 31	1400	72.5
$\bar{X}$ "per day"		0.23×10^{-12}	133	0.056			
* Maximum		0.34×10^{-12}	1049	0.66			
** Minimum		0.11×10^{-12}	3	0			
Total		4.50×10^{-12}	4112	1.74			

JUNE 1968

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne ($\mu Ci/cm^3$)	Precipitation collector ($\mu\mu Ci/m^2$)	Precipitation (in.)	Early count - Precipitation collector: Date of count	Time of count	Beta activity ($\mu\mu Ci/m^2$)
May 31	June 3	0.13×10^{-12}	(41)122	trace	June 3	1400	222.0
June 3	June 4	0.18×10^{-12}	67	0	June 4	1400	54.0
June 4	June 5	0.19×10^{-12}	24	0	June 5	1400	36.1
June 5	June 6	0.14×10^{-12}	15	0	June 6	1400	28.1
June 6	June 7	0.12×10^{-12}	35	trace	June 7	1400	65.4
June 7	June 10	0.20×10^{-12}	(28)84	0	June 10	1400	43.9
June 10	June 11	0.21×10^{-12}	17	0	June 11	1400	27.2
June 11	June 12	0.22×10^{-12}	31	0	June 12	1400	62.4
June 12	June 13	0.21×10^{-12}	16	0	June 13	1400	62.4
June 13	June 14	0.11×10^{-12}	5	0	June 14	1400	24.9
June 14	June 17	0.11×10^{-12}	(4)13**	trace	June 17	1400	43.9
June 17	June 18	0.17×10^{-12}	137	0	June 18	1400	178.8
June 18	June 19	0.16×10^{-12}	43	0.03	June 19	1400	90.9
June 19	June 20	0.14×10^{-12}	161*	trace	June 20	1400	237.4
June 20	June 21	0.10×10^{-12}	26	0	June 21	1400	58.1
June 21	June 24	0.08×10^{-12}**	(9)27	0	June 24	1400	20.0
June 24	June 25	0.23×10^{-12}	44	0	June 25	1400	31.0
June 25	June 26	0.30×10^{-12}*	33	0	June 26	1400	26.1
June 26	June 27	0.14×10^{-12}	25	0	June 27	1400	19.6
June 27	June 28	0.22×10^{-12}	12	0	June 28	1400	32.8
$\bar{X}$ "per day"		0.17×10^{-12}	31	0.001			
* Maximum		0.30×10^{-12}	161	0.03			
** Minimum		0.08×10^{-12}	4	0			
Total		3.36×10^{-12}	937	0.03			

JULY 1968

Collection date Start	Collection date Stop	Beta activity counted 7 days after collection: Airborne ($\mu Ci/cm^3$)	Beta activity counted 7 days after collection: Precipitation collector ($\mu\mu Ci/m^2$)	Precipitation (in.)	Early count - Precipitation collector: Date of count	Early count - Precipitation collector: Time of count	Early count - Precipitation collector: Beta activity ($\mu\mu Ci/m^2$)
June 28	July 1	0.19×10^{-12}	(11)34	0	July 1	1400	43.0
July 1	July 2	0.20×10^{-12}*	7	trace	July 2	1400	27.0
July 2	July 3	0.09×10^{-12}	66	trace	July 3	1400	101.1
July 3	July 5	0.15×10^{-12}	(14)28	0.16	July 5	1400	23.3
July 5	July 8	0.04×10^{-12}	(86)257	0.23	July 8	1400	680.7
July 8	July 9	0.12×10^{-12}	55	0.75	July 9	1400	56.7
July 9	July 10	0.06×10^{-12}	266	0.21	July 10	1400	477.9
July 10	July 11	0.07×10^{-12}	88	0.08	July 11	1400	166.5
July 11	July 12	0.08×10^{-12}	56	trace	July 12	1400	76.3
July 12	July 15	0.09×10^{-12}	(137)412	0.03	July 15	1400	230.2
July 15	July 16	0.06×10^{-12}	19	0	July 16	1400	26.0
July 16	July 17	0.06×10^{-12}	9	0	July 17	1400	23.2
July 17	July 18	0.07×10^{-12}	3**	trace	July 18	1400	22.9
July 18	July 19	0.05×10^{-12}	24	0	July 19	1400	13.4
July 19	July 22	0.04×10^{-12}	(71)212	0.15	July 22	1400	271.4
July 22	July 23	0.05×10^{-12}	452*	0.39	July 23	1400	2121.8
July 23	July 24	0.04×10^{-12}	67	0.12	July 24	1400	227.9
July 24	July 25	0.02×10^{-12}**	70	trace	July 25	1400	43.2
July 25	July 26	0.04×10^{-12}	42	0.59	July 26	1400	300.0
July 26	July 29	0.02×10^{-12}	(31)93	0.37	July 29	1400	394.0
July 29	July 30	0.02×10^{-12}	54	1.05	July 30	1400	46.1
July 30	July 31	0.09×10^{-12}	28	2.47	July 31	1400	497.2
$\bar{X}$ "per day"		0.08×10^{-12}	76	0.21			
* Maximum		0.19×10^{-12}	452	2.47			
** Minimum		0.02×10^{-12}	3	0			
Total		1.65×10^{-12}	2342	6.65			

AUGUST 1968

Collection date Start	Collection date Stop	Beta activity counted 7 days after collection: Airborne ($\mu Ci/cm^3$)	Beta activity counted 7 days after collection: Precipitation collector ($\mu\mu Ci/m^2$)	Precipitation (in.)	Early count - Precipitation collector: Date of count	Early count - Precipitation collector: Time of count	Early count - Precipitation collector: Beta activity ($\mu\mu Ci/m^2$)
July 31	Aug. 1	0.04×10^{-12}	292*	0.43	Aug. 1	1400	1783.7
Aug. 1	Aug. 2	0.05×10^{-12}	60	0.87	Aug. 2	1400	398.1
Aug. 2	Aug. 5	0.04×10^{-12}	(123)369	0.49	Aug. 5	1400	416.3
Aug. 5	Aug. 6	0.04×10^{-12}	22	0.40	Aug. 6	1400	24.3
Aug. 6	Aug. 7	0.03×10^{-12}	27	0.06	Aug. 7	1400	26.2
Aug. 7	Aug. 8	0.02×10^{-12}	26	0.01	Aug. 8	1400	33.0
Aug. 8	Aug. 9	0.03×10^{-12}	64	0.09	Aug. 9	1400	146.5
Aug. 9	Aug. 12	0.05×10^{-12}	(58)174	0.63	Aug. 12	1400	539.9
Aug. 12	Aug. 13	0.02×10^{-12}	229	0.43	Aug. 13	1400	610.8
Aug. 13	Aug. 14	0.04×10^{-12}	14*	0.32	Aug. 14	1400	600.2
Aug. 14	Aug. 15	0.07×10^{-1}	125	0.02	Aug. 15	1400	297.1
Aug. 15	Aug. 16	0.16×10^{-12}*	18	0	Aug. 16	1400	7.9
Aug. 16	Aug. 19	0.07×10^{-12}	(24)71	trace	Aug. 19	1400	92.4
Aug. 19	Aug. 20	0.07×10^{-12}	15	0	Aug. 20	1400	23.9
Aug. 20	Aug. 21	0.03×10^{-12}	266	0.72	Aug. 21	1400	1647.5
Aug. 21	Aug. 22	0.04×10^{-12}	7	0.02	Aug. 22	1400	18.6
Aug. 22	Aug. 23	0.05×10^{-12}	27	0	Aug. 23	1400	14.6
Aug. 23	Aug. 26	0.12×10^{-12}	(4)11	trace	Aug. 26	1400	51.2
Aug. 26	Aug. 27	0.05×10^{-12}	77	0.06	Aug. 27	1400	121.7
Aug. 27	Aug. 28	0.03×10^{-12}	74	0.06	Aug. 28	1400	269.6
Aug. 28	Aug. 29	0.06×10^{-12}	6**	0.65	Aug. 29	1400	18.8
Aug. 29	Aug. 30	0.01×10^{-12}**	130	trace	Aug. 30	1400	469.3
$\bar{X}$ "per day"		0.05×10^{-12}	72	0.17			
* Maximum		0.16×10^{-12}	292	0.87			
** Minimum		0.01×10^{-12}	6	0			
Total		1.12×10^{-12}	2235	5.29			

SEPTEMBER 1968

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne ($\mu Ci/cm^3$)	Precipitation collector ($\mu\mu Ci/m^2$)	Precipitation (in.)	Early count - Precipitation collector: Date of count	Time of count	Beta activity ($\mu\mu Ci/m^2$)
Aug. 30	Sept. 3	0.07×10^{-12}	(12)48	trace	Sept. 3	1400	65.2
Sept. 3	Sept. 4	0.10×10^{-12}	38	trace	Sept. 4	1400	83.1
Sept. 4	Sept. 5	0.12×10^{-12}*	12	0	Sept. 5	1400	36.2
Sept. 5	Sept. 6	0.09×10^{-12}	26	0.06	Sept. 6	1400	37.2
Sept. 6	Sept. 9	0.07×10^{-12}	(14)41	trace	Sept. 9	1400	67.8
Sept. 9	Sept. 10	0.09×10^{-12}	47	0.01	Sept. 10	1400	82.5
Sept. 10	Sept. 11	0.06×10^{-12}	44	0	Sept. 11	1400	90.1
Sept. 11	Sept. 12	0.12×10^{-12}*	16	trace	Sept. 12	1400	41.0
Sept. 12	Sept. 13	0.08×10^{-12}	9	0	Sept. 13	1400	28.9
Sept. 13	Sept. 16	0.08×10^{-12}	(6)18	0	Sept. 16	1400	47.1
Sept. 16	Sept. 17	0.11×10^{-12}	21	0	Sept. 17	1400	60.8
Sept. 17	Sept. 18	0.09×10^{-12}	5**	0	Sept. 18	1400	20.2
Sept. 18	Sept. 19	0.05×10^{-12}	8	0	Sept. 19	1400	27.4
Sept. 19	Sept. 20	0.07×10^{-12}	5**	0	Sept. 20	1400	20.2
Sept. 20	Sept. 23	0.10×10^{-12}	(37)102	0.04	Sept. 23	1400	166.4
Sept. 23	Sept. 24	0.11×10^{-12}	13	0	Sept. 24	1400	44.3
Sept. 24	Sept. 25	0.10×10^{-12}	8	trace	Sept. 25	1400	26.3
Sept. 25	Sept. 26	0.09×10^{-12}	12	0	Sept. 26	1400	35.4
Sept. 26	Sept. 27	0.09×10^{-12}	14	0.02	Sept. 27	1400	50.8
Sept. 27	Sept. 30	0.03×10^{-12}**	(165)495*	0.25	Sept. 30	1400	1721.5
$\bar{X}$ "per day"		0.09×10^{-12}	33	0.014			
* Maximum		0.12×10^{-12}	165	0.25			
** Minimum		0.03×10^{-12}	5	0			
Total		1.72×10^{-12}	982	0.43			

OCTOBER 1968

Collection date Start	Stop	Beta activity counted 7 days after collection: Airborne ($\mu Ci/cm^3$)	Precipitation collector ($\mu\mu Ci/m^2$)	Precipitation (in.)	Early count - Precipitation collector: Date of count	Time of count	Beta activity ($\mu\mu Ci/m^2$)
Sept. 30	Oct. 1	0.06×10^{-12}	15	0	Oct. 1	1400	26.4
Oct. 1	Oct. 2	0.07×10^{-12}	5	0	Oct. 2	1400	19.5
Oct. 2	Oct. 3	0.12×10^{-12}	10	0.06	Oct. 3	1400	33.2
Oct. 3	Oct. 4	0.09×10^{-12}	160*	0.21	Oct. 4	1400	313.8
Oct. 4	Oct. 7	0.06×10^{-12}	(27)82	0.07	Oct. 7	1400	81.4
Oct. 7	Oct. 8	0.10×10^{-12}	8	0	Oct. 8	1400	17.5
Oct. 8	Oct. 9	0.10×10^{-12}	10	0	Oct. 9	1400	33.5
Oct. 9	Oct. 10	0.07×10^{-12}	8	0	Oct. 10	1400	20.6
Oct. 10	Oct. 11	0.07×10^{-12}	8	0	Oct. 11	1400	30.9
Oct. 11	Oct. 14	0.05×10^{-12}	(2)7	0	Oct. 14	1400	30.1
Oct. 14	Oct. 15	$0.0[illegible] \times 10^{-12}$	130	0.11	[illegible]. 15	140	449.8
Oct. 15	Oct. 16	0.05×10^{-12}	20	trace	Oct. 16	1400	24.2
Oct. 16	Oct. 17	0.06×10^{-12}	15	0	Oct. 17	1400	34.1
Oct. 17	Oct. 18	0.15×10^{-12}*	8	0	Oct. 18	1400	11.5
Oct. 18	Oct. 21	0.09×10^{-12}	(3)10	0	Oct. 21	1400	28.8
Oct. 21	Oct. 22	0.06×10^{-12}	4	0	Oct. 22	1400	24.1
Oct. 22	Oct. 23	0.01×10^{-12}**	7	0	Oct. 23	1400	26.5
Oct. 23	Oct. 24	0.07×10^{-12}	31	0	Oct. 24	1400	27.1
Oct. 24	Oct. 25	0.04×10^{-12}	9	0	Oct. 25	1400	34.9
Oct. 25	Oct. 28	0.05×10^{-12}	(1)3**	0	Oct. 28	1400	29.0
Oct. 28	Oct. 29	0.05×10^{-12}	7	0	Oct. 29	1400	28.1
Oct. 29	Oct. 30	0.05×10^{-12}	4	0	Oct. 30	1400	25.3
Oct. 30	Oct. 31	0.06×10^{-12}	6	0	Oct. 31	1400	37.8
$\bar{X}$ "per day"		0.07×10^{-12}	18.3	0.015			
* Maximum		0.15×10^{-12}	160	0.21			
** Minimum		0.01×10^{-12}	1	0			
Total		1.60×10^{-12}	567	0.46			

NOVEMBER 1968

Collection date Start	Collection date Stop	Beta activity counted 7 days after collection: Airborne ($\mu Ci/cm^3$)	Beta activity counted 7 days after collection: Precipitation collector ($\mu\mu Ci/m^2$)	Precipitation (in.)	Early count - Precipitation collector: Date of count	Early count - Precipitation collector: Time of count	Early count - Precipitation collector: Beta activity ($\mu\mu Ci/m^2$)
Nov. 1	Nov. 4	0.03×10^{-12}	(54)161	0.21	Nov. 4	1400	199.1
Nov. 4	Nov. 5	0.07×10^{-12}	13	trace	Nov. 5	1400	40.6
Nov. 5	Nov. 6	0.05×10^{-12}	2	trace	Nov. 6	1400	19.6
Nov. 6	Nov. 7	0.05×10^{-12}	13	0	Nov. 7	1400	31.6
Nov. 7	Nov. 8	0.05×10^{-12}	14	trace	Nov. 8	1400	127.1
Nov. 8	Nov. 11	0.07×10^{-12}*	(2)6	0	Nov. 11	1400	26.3
Nov. 11	Nov. 12	0.06×10^{-12}	6	0	Nov. 12	1400	24.8
Nov. 12	Nov. 13	0.05×10^{-12}	2	trace	Nov. 13	1400	16.8
Nov. 13	Nov. 14	0.03×10^{-12}	65*	0.21	Nov. 14	1400	442.9
Nov. 14	Nov. 15	0.03×10^{-12}	61	0.01	Nov. 15	1400	60.4
Nov. 15	Nov. 18	0.02×10^{-12}**	(23)69	0.05	Nov. 18	1400	86.4
Nov. 18	Nov. 19	0.03×10^{-12}	4	0	Nov. 19	1400	19.4
Nov. 19	Nov. 20	0.04×10^{-12}	4	0	Nov. 20	1400	20.7
Nov. 20	Nov. 21	0.04×10^{-12}	7	0	Nov. 21	1400	21.7
Nov. 21	Nov. 22	0.04×10^{-12}	1**	0	Nov. 22	1400	13.3
Nov. 22	Nov. 25	0.04×10^{-12}	(1)4	0	Nov. 25	1400	23.2
Nov. 25	Nov. 26	0.06×10^{-12}	5	0	Nov. 26	1400	20.4
Nov. 26	Nov. 27	0.07×10^{-12}	10	0	Nov. 27	1400	32.1
$\bar{X}$ "per day"		0.046×10^{-12}	16.5	0.02			
* Maximum		0.07×10^{-12}	65	0.21			
** Minimum		0.02×10^{-12}	1	0			
Total		0.83×10^{-12}	447	0.52			

DECEMBER 1968

Collection date Start	Collection date Stop	Beta activity counted 7 days after collection: Airborne ($\mu Ci/cm^3$)	Beta activity counted 7 days after collection: Precipitation collector ($\mu\mu Ci/m^2$)	Precipitation (in.)	Early count - Precipitation collector: Date of count	Early count - Precipitation collector: Time of count	Early count - Precipitation collector: Beta activity ($\mu\mu Ci/m^2$)
Nov. 27	Dec. 2	0.05×10^{-12}	(15)73	0.09	Dec. 2	1400	114.3
Dec. 2	Dec. 3	0.04×10^{-12}	12	0	Dec. 3	1400	22.2
Dec. 3	Dec. 4	0.06×10^{-12}	6**	0	Dec. 4	1400	19.6
Dec. 4	Dec. 5	0.05×10^{-12}	22	0	Dec. 5	1400	52.4
Dec. 5	Dec. 6	1.20×10^{-12}*	9	0	Dec. 6	1400	54.4
Dec. 6	Dec. 9	0.83×10^{-12}	(5)16	0	Dec. 9	1400	44.0
Dec. 9	Dec. 10	0.11×10^{-12}	8	0	Dec. 10	1400	43.1
Dec. 10	Dec. 11	0.67×10^{-12}	6**	0	Dec. 11	1400	39.3
Dec. 11	Dec. 12	0.24×10^{-12}	80*	trace	Dec. 12	1400	223.6
Dec. 12	Dec. 13	0.09×10^{-12}	36	0	Dec. 13	1400	103.7
Dec. 13	Dec. 16	0.09×10^{-12}	(6)19	0	Dec. 16	1400	17.0
Dec. 16	Dec. 17	0.11×10^{-12}	25	0	Dec. 17	1400	48.1
Dec. 17	Dec. 18	0.07×10^{-12}	70	0.07	Dec. 18	1400	149.5
Dec. 18	Dec. 19	0.07×10^{-12}	14	0	Dec. 19	1400	30.7
Dec. 19	Dec. 20	0.08×10^{-12}	33	trace	Dec. 20	1400	41.6
Dec. 20	Dec. 23	0.06×10^{-12}	(43)129	0.16	Dec. 23	1400	148.2
Dec. 23	Dec. 24	0.05×10^{-12}	7	0	Dec. 24	1400	19.6
Dec. 24	Dec. 26	0.06×10^{-12}	(37)74	0.18	Dec. 26	1400	324.5
Dec. 26	Dec. 27	0.03×10^{-12}**	30	trace	Dec. 27	1400	56.5
Dec. 27	Dec. 30	0.04×10^{-12}	(5)9	trace	Dec. 30	1400	24.1
Dec. 30	Dec. 31	0.05×10^{-12}	15	0	Dec. 31	1400	28.7
$\bar{X}$ "per day"		0.19×10^{-12}	22.4	0.017			
* Maximum		1.20×10^{-12}	80	0.18			
** Minimum		0.03×10^{-12}	6	0			
Total		4.05×10^{-12}	693	0.54			

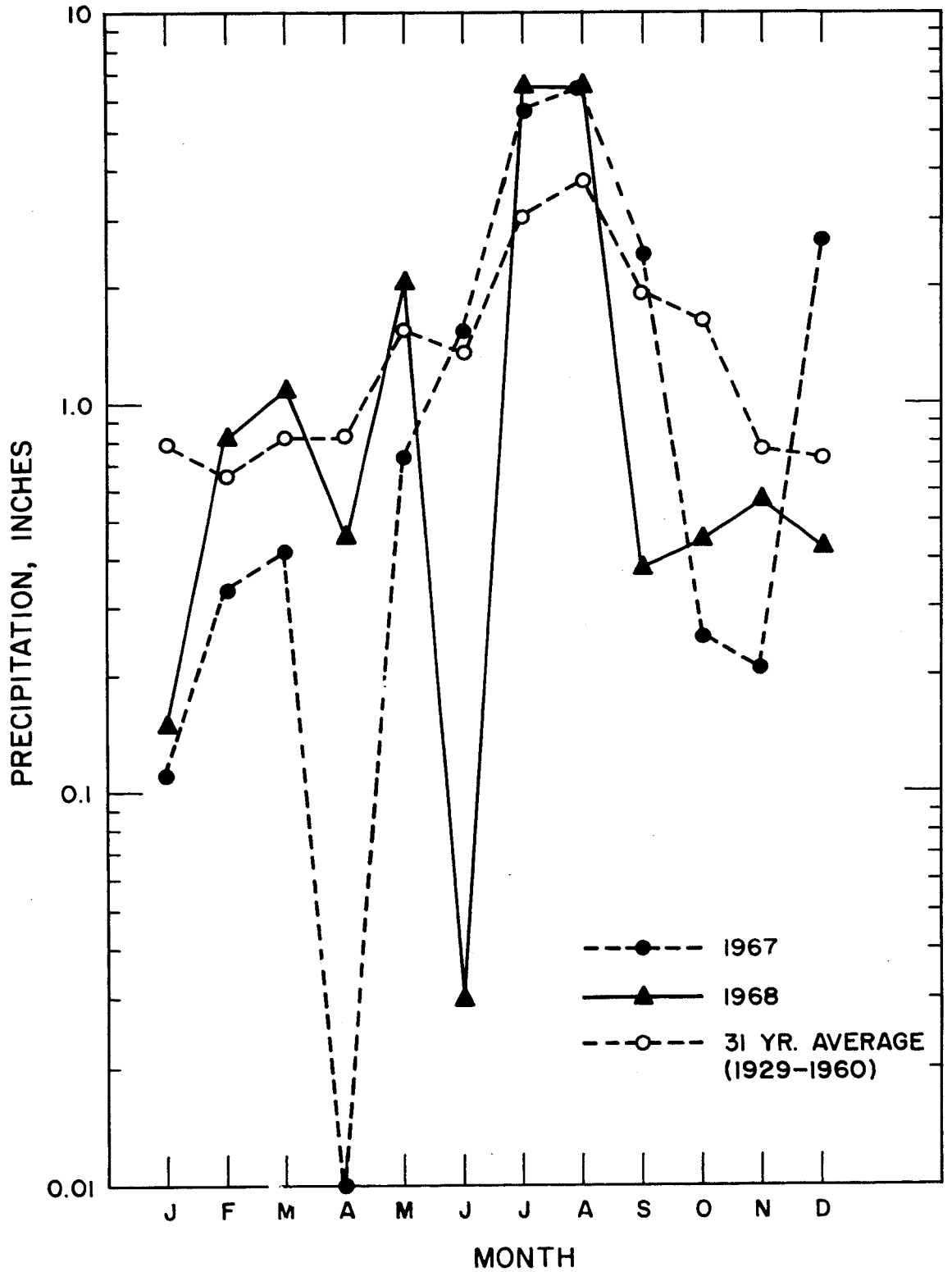

Fig. 1. Total monthly precipitation.

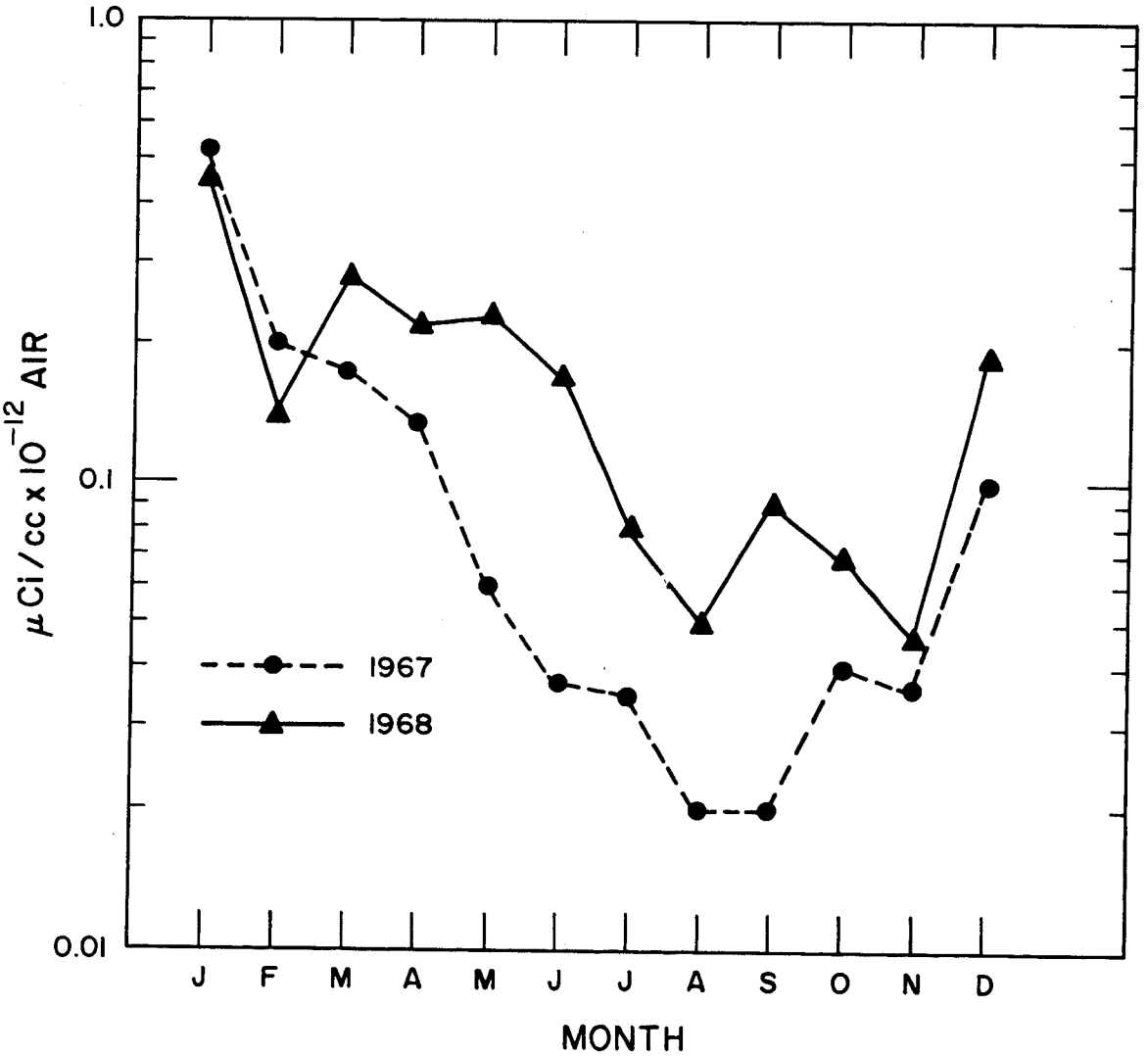

Fig. 2. Average "per day" activity found in air filter samples.

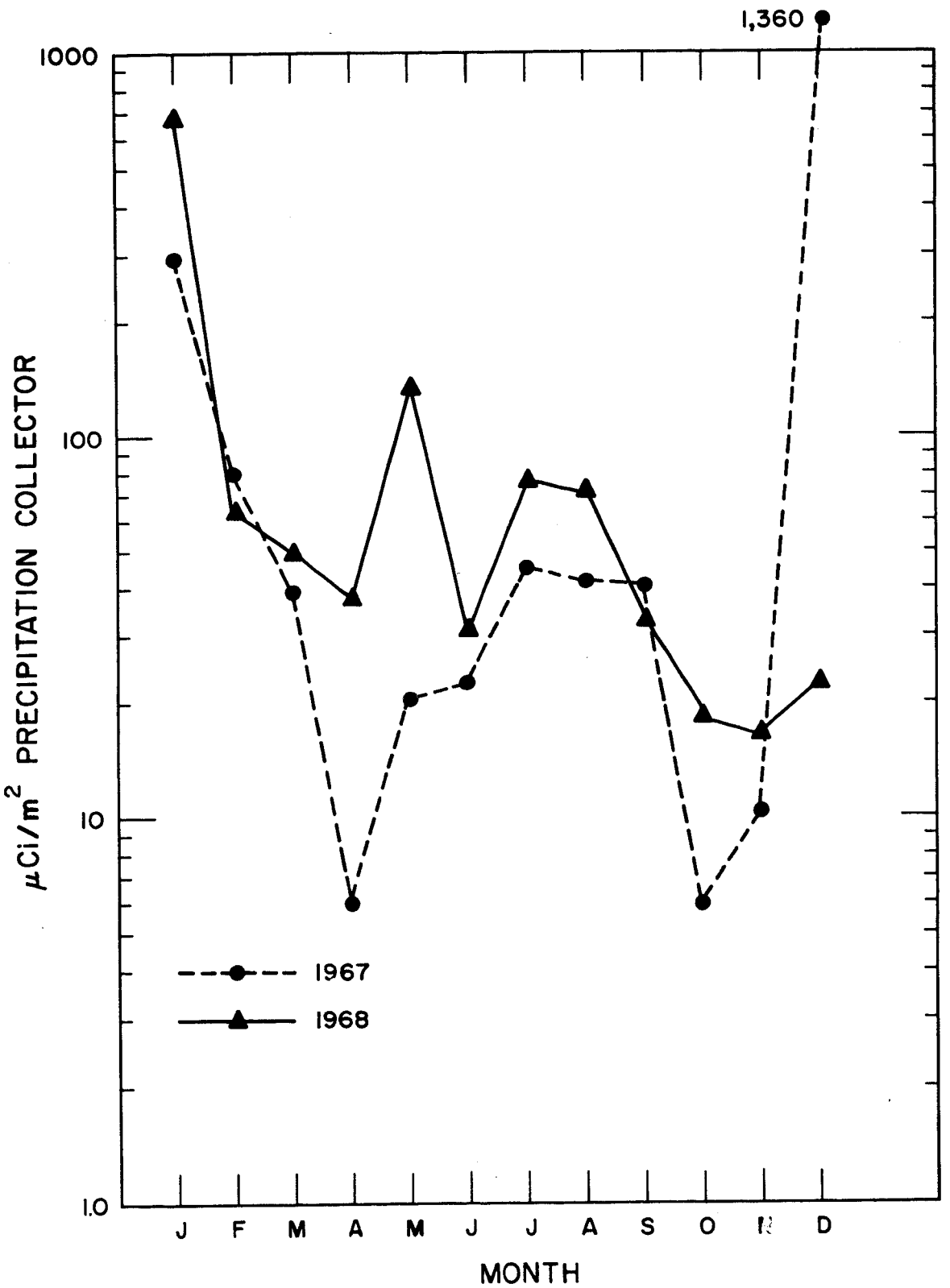

Fig. 3. Average "per day" activity found in precipitation collector samples.