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LOS ALAMOS SCIENTIFIC LABORATORY
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Beta Radioactivity in Environmental Air and Precipitation at Los Alamos, New Mexico, for 1969

by

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BETA RADIOACTIVITY IN ENVIRONMENTAL AIR AND PRECIPITATION AT LOS ALAMOS, NEW MEXICO, FOR 1969

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W. R. Kennedy and Jack W. Aeby

ABSTRACT

Beta activity of particulate matter in both air and precipitation for 1969 are reported for Los Alamos, New Mexico. The gradually increasing levels in both air and water samples from January through July reflect a contribution from foreign fallout arriving at our station as well as greater than average rainfall. The slight upward trend in October is a normal seasonal upswing.

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 workday 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); LA-3887 (1967); and LA-4133 (1968).

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 workweek, 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 workdays. 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 1969.

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

1969 Summary

Precipitation		25.67 in.
Air Samples	$\bar{X}$/sample	0.13×10^{-12} μCi/cm^3
June 19-June 20	Maximum	0.49×10^{-12} μCi/cm^3
Jan. 20-Jan. 21 Oct. 22-Oct. 23 Dec. 3-De. 4	Minimum	$>0.01 \times 10^{-12}$ μCi/cm^3
Precipitation Samples	Total	59,911 μμCi/m^2
	$\bar{X}$/day	165 μμCi/m^2
May 26-May 27	Maximum	6,958 μμCi/m^2
Jan. 7-Jan. 8	Minimum	1 μμCi/m^2

JANUARY 1969

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 ($\mu\mu Ci/m^2$)
Dec. 31 (1968)	Jan. 2 (1969)	0.04×10^{-12}	5	0	Jan. 2	1400	25.0
Jan. 2	Jan. 3	0.04×10^{-12}	4	0	Jan. 3	1400	16.3
Jan. 3	Jan. 6	0.04×10^{-12}	(2)5	0	Jan. 6	1400	24.0
Jan. 6	Jan. 7	0.05×10^{-12}	2	0	Jan. 7	1400	28.1
Jan. 7	Jan. 8	0.04×10^{-12}	1**	0	Jan. 8	1400	17.8
Jan. 8	Jan. 9	0.07×10^{-12}	16	0	Jan. 9	1400	37.4
Jan. 9	Jan. 10	0.09×10^{-12}	86*	0.16	Jan. 10	1400	270.7
Jan. 10	Jan. 13	0.07×10^{-12}	(1)4	0	Jan. 13	1400	17.3
Jan. 13	Jan. 14	0.04×10^{-12}	5	trace	Jan. 14	1400	16.1
Jan. 14	Jan. 15	0.04×10^{-12}	5	trace	Jan. 15	1400	12.8
Jan. 15	Jan. 16	0.02×10^{-12}	16	0	Jan. 16	1400	14.4
Jan. 16	Jan. 17	0.03×10^{-12}	6	0	Jan. 17	1400	22.0
Jan. 17	Jan. 20	0.04×10^{-12}	(6)18	trace	Jan. 20	1400	46.5
Jan. 20	Jan. 21	$>0.01 \times 10^{-12}$**	11	0	Jan. 21	1400	30.9
Jan. 21	Jan. 22	0.03×10^{-12}	54	0.11	Jan. 22	1400	180.5
Jan. 22	Jan. 23	0.07×10^{-12}	85	0.21	Jan. 23	1400	288.1
Jan. 23	Jan. 24	0.09×10^{-12}	33	0.03	Jan. 24	1400	47.4
Jan. 24	Jan. 27	0.04×10^{-12}	(49)146	0.56	Jan. 27	1400	131.7
Jan. 27	Jan. 28	0.09×10^{-12}	61	trace	Jan. 28	1400	60.9
Jan. 28	Jan. 29	0.11×10^{-12}*	44	0	Jan. 29	1400	50.4
Jan. 29	Jan. 30	0.09×10^{-12}	16	0	Jan. 30	1400	65.6
Jan. 30	Jan. 31	0.08×10^{-12}	21	0	Jan. 31	1400	39.9
$\bar{X}$ "per day"		0.05×10^{-12}	20.8	0.037			
* Maximum		0.11×10^{-12}	86	0.56			
** Minimum		$>0.01 \times 10^{-12}$	1	0			
Total		1.22×10^{-12}	644	1.11			

FEBRUARY 1969

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. 3	0.05×10^{-12}	(2)7	0	Feb. 3	1400	32.1
Feb. 3	Feb. 4	0.03×10^{-12}	10	0	Feb. 4	1400	25.6
Feb. 4	Feb. 5	0.03×10^{-12}	9	trace	Feb. 5	1400	35.2
Feb. 5	Feb. 6	0.08×10^{-12}	17	0	Feb. 6	1400	34.5
Feb. 6	Feb. 7	0.10×10^{-12}	60	0.02	Feb. 7	1400	130.5
Feb. 7	Feb. 10	0.11×10^{-12}	(4)13	0	Feb. 10	1400	31.9
Feb. 10	Feb. 11	0.09×10^{-12}	7	0	Feb. 11	1400	19.1
Feb. 11	Feb. 12	0.08×10^{-12}	3**	0	Feb. 12	1400	21.1
Feb. 12	Feb. 13	0.08×10^{-12}	151	0.12	Feb. 13	1400	765.7
Feb. 13	Feb. 14	0.05×10^{-12}	49	trace	Feb. 14	1400	122.0
Feb. 14	Feb. 17	0.09×10^{-12}	(16)48	0.06	Feb. 17	1400	78.4
Feb. 17	Feb. 18	0.03×10^{-12}**	3**	0.04	Feb. 18	1400	17.7
Feb. 18	Feb. 19	0.03×10^{-12}**	247	0.55	Feb. 19	1400	1921.9
Feb. 19	Feb. 20	0.07×10^{-12}	349*	trace	Feb. 20	1400	1320.3
Feb. 20	Feb. 24	0.05×10^{-12}	(14)55	0.11	Feb. 21	1400	63.0
Feb. 24	Feb. 25	0.08×10^{-12}	9	0	Feb. 25	1400	18.5
Feb. 25	Feb. 26	0.07×10^{-12}	6	0	Feb. 26	1400	11.7
Feb. 26	Feb. 27	0.08×10^{-12}	13	0.01	Feb. 27	1400	113.5
Feb. 27	Feb. 28	0.17×10^{-12}*	9	0	Feb. 28	1400	16.4
$\bar{X}$ "per day"		0.08×10^{-12}	38	0.034			
* Maximum		0.17×10^{-12}	349	0.55			
** Minimum		0.03×10^{-12}	3	0			
Total		1.47×10^{-12}	1065	0.94			

MARCH 1969

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 ($\mu\mu Ci/m^2$)
Feb. 28	Mar. 3	0.08×10^{-12}	(13)40	trace	Mar. 3	1400	51.8
Mar. 3	Mar. 4	0.04×10^{-12}	110	0.14	Mar. 4	1400	802.5
Mar. 4	Mar. 5	0.03×10^{-12}**	144	trace	Mar. 5	1400	211.1
Mar. 5	Mar. 6	0.08×10^{-12}	74	trace	Mar. 6	1400	101.5
Mar. 6	Mar. 7	0.12×10^{-12}	69	0.08	Mar. 7	1400	98.2
Mar. 7	Mar. 10	0.04×10^{-12}	(46)139	0.35	Mar. 10	1400	198.6
Mar. 10	Mar. 11	0.05×10^{-12}	72	0.15	Mar. 11	1400	143.1
Mar. 11	Mar. 12	0.05×10^{-12}	7	trace	Mar. 12	1400	25.2
Mar. 12	Mar. 13	0.07×10^{-12}	17	0	Mar. 13	1400	23.2
Mar. 13	Mar. 14	0.09×10^{-12}	166*	0.23	Mar. 14	1400	348.0
Mar. 14	Mar. 17	0.04×10^{-12}	(18)55	0.01	Mar. 17	1400	51.1
Mar. 17	Mar. 18	0.08×10^{-12}	4	0	Mar. 18	1400	17.6
Mar. 18	Mar. 19	0.09×10^{-12}	3	0	Mar. 19	1400	5.9
Mar. 19	Mar. 20	0.27×10^{-12}*	7	0	Mar. 20	1400	24.0
Mar. 20	Mar. 21	0.09×10^{-12}	8	0	Mar. 21	1400	24.5
Mar. 21	Mar. 24	0.10×10^{-12}	82	0.02	Mar. 24	1400	94.1
Mar. 24	Mar. 25	0.04×10^{-12}	95	0.06	Mar. 25	1400	157.0
Mar. 25	Mar. 26	0.08×10^{-12}	12	0	Mar. 26	1400	21.1
Mar. 26	Mar. 27	0.09×10^{-12}	11	0	Mar. 27	1400	23.3
Mar. 27	Mar. 28	0.10×10^{-12}	3**	0	Mar. 28	1400	15.6
$\bar{X}$ "per day"		0.08×10^{-12}	36.1	0.035			
* Maximum		0.27×10^{-12}	166	0.35			
** Minimum		0.03×10^{-12}	3	0			
Total		1.63×10^{-12}	1118	1.08			

APRIL 1969

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 ($\mu\mu Ci/m^2$)
Mar. 28	Apr. 1	0.16×10^{-12}	(7)29**	0	Apr. 1	1400	15.6
Apr. 1	Apr. 2	0.16×10^{-12}	60	0	Apr. 2	1400	101.1
Apr. 2	Apr. 3	0.16×10^{-12}	330	0.05	Apr. 3	1400	247.0
Apr. 3	Apr. 4	0.18×10^{-12}	60	0	Apr. 4	1400	34.5
Apr. 4	Apr. 7	0.18×10^{-12}	(18)55	0	Apr. 7	1400	30.9
Apr. 7	Apr. 8	0.19×10^{-12}	58	0	Apr. 8	1400	32.9
Apr. 8	Apr. 9	0.27×10^{-12}	51	0	Apr. 9	1400	29.4
Apr. 9	Apr. 10	0.23×10^{-12}	36	trace	Apr. 10	1400	55.0
Apr. 10	Apr. 11	0.14×10^{-12}	140	0	Apr. 11	1400	35.9
Apr. 11	Apr. 14	0.17×10^{-12}	(193)579	1.45	Apr. 14	1400	1030.1
Apr. 14	Apr. 15	0.18×10^{-12}	2237*	0	Apr. 15	1400	231.5
Apr. 15	Apr. 16	0.23×10^{-12}	572	0	Apr. 16	1400	894.8
Apr. 16	Apr. 17	0.15×10^{-12}	572	0.14	Apr. 17	1400	228.8
Apr. 17	Apr. 18	0.20×10^{-12}	940	0.33	Apr. 18	1400	375.9
Apr. 18	Apr. 21	0.23×10^{-12}	(209)626	0.02	Apr. 21	1400	250.4
Apr. 21	Apr. 22	0.15×10^{-12}	164	0	Apr. 22	1400	65.4
Apr. 22	Apr. 23	0.33×10^{-12}	225	0	Apr. 23	1400	90.4
Apr. 23	Apr. 24	---	173	0	Apr. 24	1400	69.3
Apr. 24	Apr. 25	---	144	0	Apr. 25	1400	57.7
Apr. 25	Apr. 28	0.09×10^{-12}**	(22)67	0	Apr. 28	1400	68.8
Apr. 28	Apr. 29	0.38×10^{-12}*	67	0	Apr. 29	1400	61.0
Apr. 29	Apr. 30	0.36×10^{-12}	48	0	Apr. 30	1400	63.9
Apr. 30	May 1	---	51	0	May 1	1400	82.0
$\bar{X}$ "per day"		0.20×10^{-12}	243	0.06			
* Maximum		0.38×10^{-12}	2237	1.45			
** Minimum		0.09×10^{-12}	7	0			
Total		4.14×10^{-12}	7304	2.00			

MAY 1969

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 1	May 2	0.26×10^{-12}	6	0	May 2	1400	53.6
May 2	May 5	0.27×10^{-12}	(48)145	0.27	May 5	1400	325.0
May 5	May 6	0.14×10^{-12}	1089	0.79	May 6	1400	2171.0
May 6	May 7	0.18×10^{-12}	1334	0.41	May 7	1400	1886.1
May 7	May 8	0.36×10^{-12}	900	0	May 8	1400	616.9
May 8	May 9	0.30×10^{-12}	40	0	May 9	1400	44.4
May 9	May 12	0.23×10^{-12}	(188)565	0.11	May 12	1400	668.3
May 12	May 13	0.24×10^{-12}	99	0	May 13	1400	179.3
May 13	May 14	0.26×10^{-12}	64	0.06	May 14	1400	83.9
May 14	May 15	0.29×10^{-12}	151	trace	May 15	1400	186.4
May 15	May 16	0.44×10^{-12}	82	0	May 16	1400	115.9
May 16	May 19	0.33×10^{-12}	(19)56	0	May 19	1400	88.1
May 19	May 20	0.29×10^{-12}	35	0	May 20	1400	74.6
May 20	May 21	0.32×10^{-12}	40	0	May 21	1400	84.5
May 21	May 22	0.26×10^{-12}	30**	0	May 22	1400	58.3
May 22	May 23	0.06×10^{-12}**	210	0.03	May 23	1400	290.4
May 23	May 26	0.32×10^{-12}	(367)1100	0.05	May 26	1400	1233.2
May 26	May 27	0.47×10^{-12}*	6958*	0	May 27	1400	118.4
May 27	May 28	0.45×10^{-12}	95	0	May 28	1400	167.6
May 28	May 29	0.37×10^{-12}	49	0.12	May 29	1400	89.9
$\bar{X}$ "per day"		0.29×10^{-12}	434	0.06			
* Maximum		0.47×10^{-12}	6958	0.79			
** Minimum		0.06×10^{-12}	30	0			
Total		5.84×10^{-12}	13048	1.85			

JUNE 1969

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 29	June 2	0.37×10^{-12}	(138)554	trace	June 2	1400	592.4
June 2	June 3	0.32×10^{-12}	250	0.02	June 3	1400	640.9
June 3	June 4	0.48×10^{-12}	326	0	June 4	1400	136.0
June 4	June 5	0.43×10^{-12}	27	0	June 5	1400	124.4
June 5	June 6	0.37×10^{-12}	131	0.09	June 6	1400	190.1
June 6	June 9	$0.3[illegible] \times 10^{-12}$	(773)2319	0	June 9	1400	2486.6
June 9	June 10	$0.28 [illegible] 10^{-12}$	3610	0.59	June 10	1400	5662.4
June 10	June 11	$0.3[illegible] \times 10^{-12}$	105	0	June 11	1400	132.5
June 11	June 12	0.37×10^{-12}	98	0	June 12	1400	123.6
June 12	June 13	0.36×10^{-12}	1797	0.49	June 13	1400	3367.5
June 13	June 16	0.33×10^{-12}	(728)2188	0.84	June 16	1400	2781.9
June 16	June 17	0.34×10^{-12}	3723*	1.17	June 17	1400	9166.8
June 17	June 18	0.45×10^{-12}	542	0.02	June 18	1400	2466.8
June 18	June 19	0.42×10^{-12}	357	0	June 19	1400	335.9
June 19	June 20	0.49×10^{-12}*	2046	0	June 20	1400	113.8
June 20	June 23	0.43×10^{-12}	(390)1171	0	June 23	1400	123.6
June 23	June 24	0.41×10^{-12}	121	0	June 24	1400	434.0
June 24	June 25	0.28×10^{-12}	468	0.07	June 25	1400	512.6
June 25	June 26	0.40×10^{-12}	70	0	June 26	1400	57.3
June 26	June [illegible]7	0.21×10^{-12}**	31**	0	June 27	1400	48.4
June 27	June 30	0.32×10^{-12}	(15)46	0	June 30	1400	800.1
$\bar{X}$ "per day"		0.37×10^{-12}	666	0.11			
* Maximum		0.49×10^{-12}	3723	1.17			
** Minimum		0.21×10^{-12}	31	0			
Total		7.80×10^{-12}	19980	3.30			

JULY 1969

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 ($\mu\mu Ci/m^2$)
June 30	July 1	0.20×10^{-12}	44	0	July 1	1400	66.8
July 1	July 2	0.19×10^{-12}	132	trace	July 2	1400	254.5
July 2	July 3	0.27×10^{-12}*	37	0	July 3	1400	132.4
July 3	July 7	0.21×10^{-12}	(337)1342	0.17	July 7	1400	2083.2
July 7	July 8	0.16×10^{-12}	60	0	July 8	1400	81.9
July 8	July 9	0.15×10^{-12}	87	trace	July 9	1400	102.3
July 9	July 10	0.16×10^{-12}	78	trace	July 10	1400	90.8
July 10	July 11	0.09×10^{-12}	75	0	July 11	1400	61.8
July 11	July 14	0.08×10^{-12}	(68)203	0.06	July 14	1400	243.7
July 14	July 15	0.10×10^{-12}	4**	trace	July 15	1400	83.8
July 15	July 16	0.06×10^{-12}**	48	trace	July 16	1400	48.4
July 16	July 17	0.06×10^{-12}**	215	1.46	July 17	1400	402.1
July 17	July 18	0.06×10^{-12}**	180	0.13	July 18	1400	511.6
July 18	July 22	0.18×10^{-12}	(110)330	0.08	July 22	1400	393.0
July 22	July 23	0.22×10^{-12}	42	0	July 23	1400	94.0
July 23	July 24	0.10×10^{-12}	969*	0.31	July 24	1400	979.1
July 24	July 25	0.11×10^{-12}	929	1.57	July 25	1400	1002.5
July 25	July 26	0.06×10^{-12}**	94	0.37	July 26	1400	444.4
July 26	July 28	0.06×10^{-12}**	370	0.24	July 28	1400	444.4
July 28	July 29	0.19×10^{-12}	6	0.06	July 29	1400	40.4
July 29	July 30	0.15×10^{-12}	79	trace	July 30	1400	78.6
July 30	July 31	0.11×10^{-12}	87	0	July 31	1400	124.4
$\bar{X}$ "per day"		0.13×10^{-12}	173	0.14			
* Maximum		0.27×10^{-12}	969	1.57			
** Minimum		0.06×10^{-12}	4	0			
Total		2.97×10^{-12}	5391	4.44			

AUGUST 1969

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 ($\mu\mu Ci/m^2$)
July 21	Aug. 1	0.07×10^{-12}	518*	0.29	Aug. 1	1400	603.0
Aug. 1	Aug. 4	0.18×10^{-12}*	(251)754	0.54	Aug. 4	1400	493.3
Aug. 4	Aug. 5	0.06×10^{-12}	237	0.12	Aug. 5	1400	683.3
Aug. 5	Aug. 6	0.06×10^{-12}	82	0.11	Aug. 6	1400	102.4
Aug. 6	Aug. 7	0.06×10^{-12}	105	0.08	Aug. 7	1400	179.2
Aug. 7	Aug. 8	0.04×10^{-12}**	123	0	Aug. 8	1400	177.4
Aug. 8	Aug. 11	0.21×10^{-12}	(14)41	0	Aug. 11	1400	129.2
Aug. 11	Aug. 12	0.09×10^{-12}	54	0	Aug. 12	1400	54.0
Aug. 12	Aug. 13	0.10×10^{-12}	34	0.01	Aug. 13	1400	56.9
Aug. 13	Aug. 14	0.08×10^{-12}	303	0.08	Aug. 14	1400	240.4
Aug. 14	Aug. 15	0.13×10^{-12}	54	0.10	Aug. 15	1400	561.9
Aug. 15	Aug. 18	0.13×10^{-12}	(128)383	0.27	Aug. 18	1400	486.9
Aug. 18	Aug. 19	0.05×10^{-12}	87	trace	Aug. 19	1400	177.5
Aug. 19	Aug. 20	0.05×10^{-12}	52	0	Aug. 20	1400	62.9
Aug. 20	Aug. 21	0.07×10^{-12}	25**	trace	Aug. 21	1400	57.8
Aug. 21	Aug. 22	0.07×10^{-12}	142	trace	Aug. 22	1400	259.6
Aug. 22	Aug. 25	0.09×10^{-12}	(71)214	0.47	Aug. 25	1400	261.5
Aug. 25	Aug. 26	0.09×10^{-12}	112	0.04	Aug. 26	1400	151.7
Aug. 26	Aug. 27	0.10×10^{-12}	67	trace	Aug. 27	1400	67.9
Aug. 27	Aug. 28	0.07×10^{-12}	96	0.02	Aug. 28	1400	127.4
Aug. 28	Aug. 29	0.04×10^{-12}**	216	0.44	Aug. 29	1400	980.1
$\bar{X}$ "per day"		0.08×10^{-12}	119	0.12			
* Maximum		0.18×10^{-12}	518	0.79			
** Minimum		0.04×10^{-12}	25	0			
Total		1.84×10^{-12}	3699	3.77			

SEPTEMBER 1969

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 ($\mu\mu Ci/m^3$)
Aug. 29	Sept. 2	0.12×10^{-12}	(110)439	1.19	Sept. 2	1400	636.6
Sept. 2	Sept. 3	0.10×10^{-12}	14	0.06	Sept. 3	1400	20.0
Sept. 3	Sept. 4	0.16×10^{-12}	49	trace	Sept. 4	1400	63.0
Sept. 4	Sept. 5	0.05×10^{-12}	17	0.08	Sept. 5	1400	25.8
Sept. 5	Sept. 8	0.03×10^{-12}**	(43)128	0.06	Sept. 8	1400	146.3
Sept. 8	Sept. 9	0.04×10^{-12}	53	0.29	Sept. 9	1400	47.3
Sept. 9	Sept. 10	0.04×10^{-12}	91	0.42	Sept. 10	1400	180.1
Sept. 10	Sept. 11	0.03×10^{-12}**	125	trace	Sept. 11	1400	451.9
Sept. 11	Sept. 12	0.03×10^{-12}**	236	0.58	Sept. 12	1400	697.8
Sept. 12	Sept. 15	0.04×10^{-12}	(44)131	0.42	Sept. 15	1400	289.8
Sept. 15	Sept. 16	0.05×10^{-12}	274*	trace	Sept. 16	1400	712.3
Sept. 16	Sept. 17	0.06×10^{-12}	35	trace	Sept. 17	1400	26.7
Sept. 17	Sept. 18	0.06×10^{-12}	61	0	Sept. 18	1400	16.9
Sept. 18	Sept. 19	0.04×10^{-12}	17	0	Sept. 19	1400	20.3
Sept. 19	Sept. 22	0.05×10^{-12}	(185)556	1.08	Sept. 22	1400	1198.0
Sept. 22	Sept. 23	0.08×10^{-12}	54	0	Sept. 23	1400	62.9
Sept. 23	Sept. 24	0.13×10^{-12}	27	0	Sept. 24	1400	29.9
Sept. 24	Sept. 25	0.16×10^{-12}	52	0	Sept. 25	1400	27.9
Sept. 25	Sept. 26	0.16×10^{-12}	4**	trace	Sept. 26	1400	7.2
Sept. 26	Sept. 29	0.06×10^{-12}	44	0	Sept. 29	1400	69.5
Sept. 29	Sept. 30	0.17×10^{-12}*	20	trace	Sept. 30	1400	38.1
$\bar{X}$ "per day"		0.07×10^{-12}	80	0.12			
* Maximum		0.17×10^{-12}	274	0.79			
** Minimum		0.03×10^{-12}	4	0			
Total		1.65×10^{-12}	2407	3.77			

OCTOBER 1969

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 ($\mu\mu Ci/m^3$)
Sept. 30	Oct. 1	0.09×10^{-12}	35	0	Oct. 1	1400	82.5
Oct. 1	Oct. 2	0.10×10^{-12}	15	0	Oct. 2	1400	64.0
Oct. 2	Oct. 3	0.09×10^{-12}	9	0	Oct. 3	1400	22.3
Oct. 3	Oct. 6	0.16×10^{-12}	(22)65	trace	Oct. 6	1400	83.6
Oct. 6	Oct. 7	0.25×10^{-12}	17	0	Oct. 7	1400	31.4
Oct. 7	Oct. 8	0.26×10^{-12}*	29	0	Oct. 8	1400	48.0
Oct. 8	Oct. 9	0.15×10^{-12}	9	0	Oct. 9	1400	24.4
Oct. 9	Oct. 10	0.13×10^{-12}	10	0	Oct. 10	1400	20.0
Oct. 10	Oct. 13	0.03×10^{-12}	(678)2035*	1.53	Oct. 13	1400	3788.6
Oct. 13	Oct. 14	0.16×10^{-12}	13	0	Oct. 14	1400	22.1
Oct. 14	Oct. 15	0.24×10^{-12}	23	trace	Oct. 15	1400	39.6
Oct. 15	Oct. 16	0.09×10^{-12}	20	0	Oct. 16	1400	35.5
Oct. 16	Oct. 17	---	NO SAMPLE	-	---	--	---
Oct. 17	Oct. 20	0.05×10^{-12}	(258)775	0	Oct. 20	1400	775.4
Oct. 20	Oct. 21	0.06×10^{-12}	261	0.58	Oct. 21	1400	633.7
Oct. 21	Oct. 22	0.03×10^{-12}	137	0.51	Oct. 22	1400	541.2
Oct. 22	Oct. 23	$<0.01 \times 10^{-12}$**	135	0.41	Oct. 23	1400	188.4
Oct. 23	Oct. 24	0.05×10^{-12}	35	0	Oct. 24	1400	34.7
Oct. 24	Oct. 27	0.09×10^{-12}	(9)26	0	Oct. 27	1400	21.8
Oct. 27	Oct. 28	0.02×10^{-12}	12	0	Oct. 28	1400	19.3
Oct. 28	Oct. 29	0.07×10^{-12}	284	0.32	Oct. 29	1400	1529.1
Oct. 29	Oct. 30	0.09×10^{-12}	38	trace	Oct. 30	1400	37.8
Oct. 30	Oct. 31	0.04×10^{-12}	8**	0	Oct. 31	1400	14.6
$\bar{X}$ "per day"		0.10×10^{-12}	129	0.10			
* Maximum		0.26×10^{-12}	678	1.53			
** Minimum		$<0.01 \times 10^{-12}$	8	0			
Total		2.27×10^{-12}	3991	3.38			

NOVEMBER 1969

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 ($\mu\mu Ci/m^2$)
Oct. 31	Nov. 3	0.05×10^{-12}	(48)143	0.13	Nov. 3	1400	187.5
Nov. 3	Nov. 4	0.10×10^{-12}	9	0.08	Nov. 4	1400	20.1
Nov. 4	Nov. 5	0.07×10^{-12}	11	0	Nov. 5	1400	16.0
Nov. 5	Nov. 6	0.06×10^{-12}	11	0	Nov. 6	1400	19.5
Nov. 6	Nov. 7	0.07×10^{-12}	9	0	Nov. 7	1400	28.6
Nov. 7	Nov. 10	0.05×10^{-12}	(3)8	0	Nov. 10	1400	16.9
Nov. 10	Nov. 11	0.05×10^{-12}	8	trace	Nov. 11	1400	13.5
Nov. 11	Nov. 12	0.05×10^{-12}	5	0	Nov. 12	1400	19.8
Nov. 12	Nov. 13	0.06×10^{-12}	7	0	Nov. 13	1400	15.1
Nov. 13	Nov. 14	0.06×10^{-12}	4**	0	Nov. 14	1400	21.0
Nov. 14	Nov. 17	0.05×10^{-12}	(47)141	0.12	Nov. 17	1400	287.9
Nov. 17	Nov. 18	0.05×10^{-12}	70*	0	Nov. 18	1400	85.4
Nov. 18	Nov. 19	0.07×10^{-12}	65	0	Nov. 19	1400	79.3
Nov. 19	Nov. 20	0.05×10^{-12}	22	0	Nov. 20	1400	97.8
Nov. 20	Nov. 21	0.04×10^{-12}**	16	0	Nov. 21	1400	33.3
Nov. 21	Nov. 24	0.17×10^{-12}*	(16)49	0	Nov. 26	1400	51.1
Nov. 24	Nov. 25	0.10×10^{-12}	4	0	Nov. 27	1400	13.1
Nov. 25	Nov. 26	0.07×10^{-12}	32	0	Nov. 28	1400	14.8
Nov. 26	Dec. 1	0.09×10^{-12}	10	0	Nov. 29	1400	23.5
$\bar{X}$ "per day"		0.06×10^{-12}	21	0.01			
* Maximum		0.17×10^{-12}	70	0.13			
** Minimum		0.04×10^{-12}	4	0			
Total		1.31×10^{-12}	624	0.34			

DECEMBER 1969

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 ($\mu\mu Ci/m^2$)
Dec. 1	Dec. 2	0.04×10^{-12}	7	0	Dec. 2	1400	28.8
Dec. 2	Dec. 3	0.04×10^{-12}	6	0	Dec. 3	1400	13.6
Dec. 3	Dec. 4	$>0.01 \times 10^{-12}$**	58	0.26	Dec. 4	1400	693.3
Dec. 4	Dec. 5	0.03×10^{-12}	93	0.05	Dec. 5	1400	728.8
Dec. 5	Dec. 8	0.06×10^{-12}	(27)80	trace	Dec. 8	1400	83.8
Dec. 8	Dec. 9	0.08×10^{-12}*	2**	0.01	Dec. 9	1400	18.4
Dec. 9	Dec. 10	0.07×10^{-12}	44	0	Dec. 10	1400	53.4
Dec. 10	Dec. 11	0.05×10^{-12}	11	trace	Dec. 11	1400	23.1
Dec. 11	Dec. 12	0.06×10^{-12}	10	trace	Dec. 12	1400	20.6
Dec. 12	Dec. 15	0.05×10^{-12}	(2)7	0	Dec. 15	1400	18.0
Dec. 15	Dec. 16	0.06×10^{-12}	3	0	Dec. 16	1400	16.8
Dec. 16	Dec. 17	0.08×10^{-12}	3	0	Dec. 17	1400	20.0
Dec. 17	Dec. 18	0.05×10^{-12}	9	0	Dec. 18	1400	35.2
Dec. 18	Dec. 19	0.04×10^{-12}	5	0	Dec. 19	1400	12.1
Dec. 19	Dec. 22	0.03×10^{-12}	(1)4	0	Dec. 22	1400	21.3
Dec. 22	Dec. 23	0.08×10^{-12}	4	trace	Dec. 23	1400	25.3
Dec. 23	Dec. 24	0.04×10^{-12}	4	0	Dec. 24	1400	[illegible]
Dec. 24	Dec. 26	0.03×10^{-12}	(2)5	0	Dec. 26	1400	30.1
Dec. 26	Dec. 29	0.06×10^{-12}	(50)150	0.39	Dec. 29	1400	264.1
Dec. 29	Dec. 30	0.04×10^{-12}	36	trace	Dec. 30	1400	48.8
Dec. 30	Dec. 31	0.05×10^{-12}	99*	0.05	Dec. 31	1400	116.3
$\bar{X}$ "per day"		0.05×10^{-12}	21	0.02			
* Maximum		0.08×10^{-12}	99	0.39			
** Minimum		$>0.01 \times 10^{-12}$	2	0			
Total		1.05×10^{-12}	640	0.81			

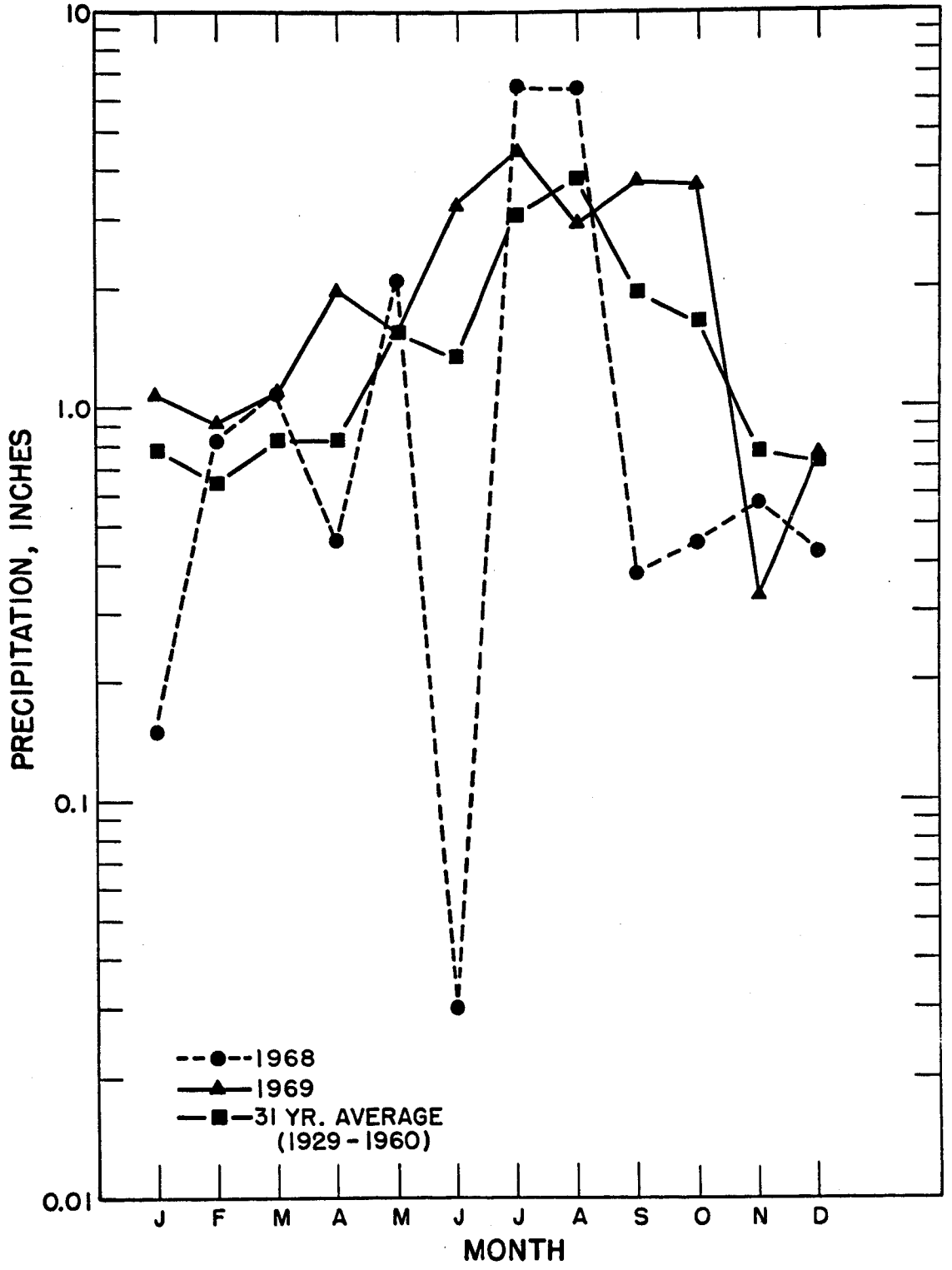

Fig. 1. Total monthly precipitation.

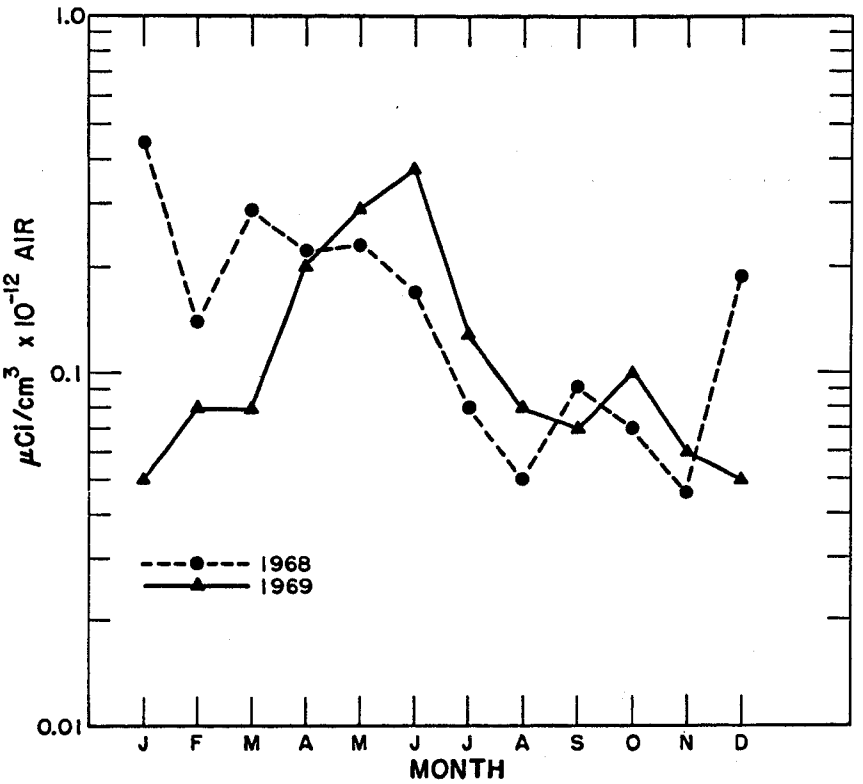

Fig. 2. Average "per day" activity found in air filter samples.

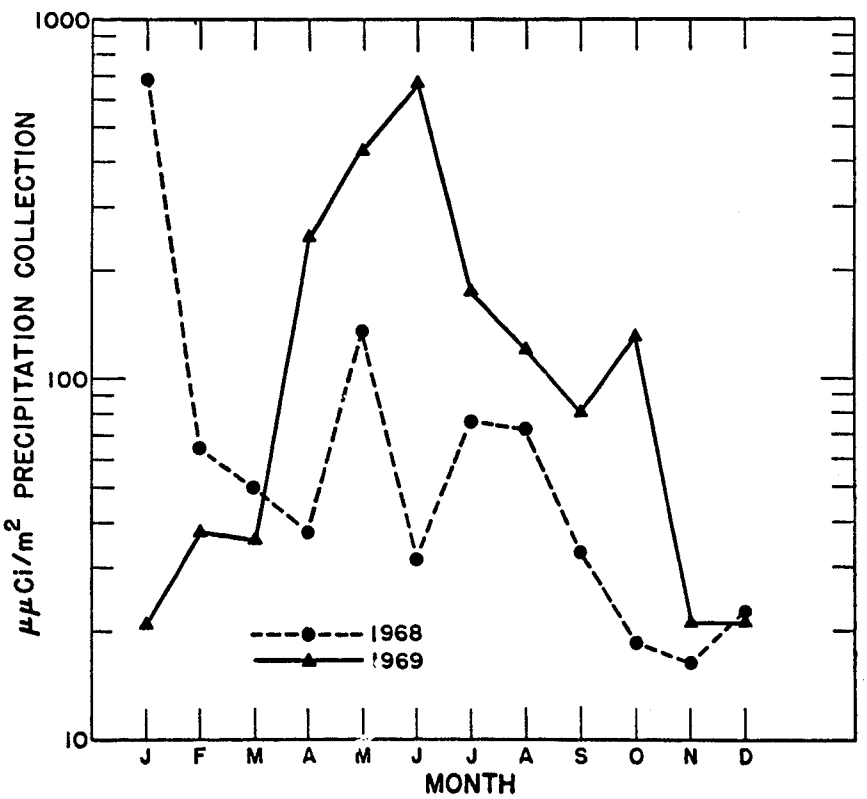

Fig. 3. Average "per day" activity found in precipitation collector samples.