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Beta Radioactivity in Environmental Air and Precipitation at Los Alamos, New Mexico, for 1970

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BETA RADIOACTIVITY IN ENVIRONMENTAL AIR AND PRECIPITATION AT LOS ALAMOS, NEW MEXICO, FOR 1970

By

William R. Kennedy and Jack Aeby

ABSTRACT

Beta activity of particulate matter of both air and precipitation for 1970 are reported for Los Alamos, New Mexico. The lower monthly average levels found in precipitation collections and the slightly higher levels found in the air samples indicate that 1970 was a dryer year than 1969 with 14.93 and 25.67 in. of precipitation, respectively.

I. INTRODUCTION

Measurements of beta activity of particulate matter in both air and precipitation are part of the environmental monitoring program at Los Alamos. The sampling station is located at Technical Area-50 about 1-3/4 miles southeast of the Los Alamos Scientific Laboratory's administration building. The samplers are on the roof of the building and samples are collected each workday.

The results reported here continue the measurements reported in Radioactive Fallout Data, 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); LA-4133 (1968); and LA-4388 (1969)

II. 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 17.0 m^3/h. Air samples are 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 they are collected in a thin-window, gas (methane) flow proportional counter that gives a 50% overall efficiency for ^{90}Sr - ^{90}Y. A large chamber permits the air samples to be counted in the same geometry as the precipitation samples The efficiency for ^{90}Sr - ^{90}Y for the larger filter samples is also 50%.

III. 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.

A suitable sample is obtained, even during relatively dry periods, by washing the collector with 1 liter of distilled water. 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, by using 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.

IV. RESULTS

Precipitation for 1970 and the average for a 59 yr. period are shown in Fig. 1. The average daily activity for 1969 and 1970 is presented in Figs. 2 and 3, respectively. Average daily values for air collected are weighted for sample periods of more than 1 day. Average daily values for the precipitation collection are the total activity collected during the month divided by the number of days. Table I summarizes the data for 1970.

Beta activities, presented in the monthly tabulations, are not identified; however, the measurement methods were the same as used in previous years; therefore these results are comparable with those presented in earlier reports.

TABLE I

1970 SUMMARY

Precipitation		14.93 in.
Air Samples	$\bar{X}$/sample	0.17×10^{-12} μCi/ml
April 30 through May 1	Maximum	1.19×10^{-12} μCi/ml
Oct. 5 through Oct. 6	Minimum	0.01×10^{-12} μCi/ml
Precipitation Samples	Total	22,272 $\mu\mu Ci/m^2$
	$\bar{X}$/day	61 $\mu\mu Ci/m^2$
March 31 through April 1	Maximum	673 $\mu\mu Ci/m^2$
Jan. 9-12 through Jan. 16-19	Minimum	1 $\mu\mu Ci/m^2$

JANUARY 1970

Collection Date Start	Collection Date Stop	Beta Activity Counted 7 Days after Collection: Airborne ($\mu Ci/m^3$)	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(1969)	Jan. 2(1970)	0.08×10^{-12}	(Per day 72)143[a]	0.07	Jan. 2	1400	195.2
Jan. 2	Jan. 5	0.05×10^{-12}	(13)40	0	Jan. 5	1400	45.8
Jan. 5	Jan. 6	0.10×10^{-12}[a]	8	0	Jan. 6	1400	14.8
Jan. 6	Jan. 7	0.08×10^{-12}	14	0	Jan. 7	1400	23.9
Jan. 7	Jan. 8	0.05×10^{-12}	12	0	Jan. 8	1400	23.8
Jan. 8	Jan. 9	0.07×10^{-12}	4	0	Jan. 9	1400	18.1
Jan. 9	Jan. 12	0.06×10^{-12}	(1) 4[b]	Trace	Jan. 12	1400	11.8
Jan. 12	Jan. 13	0.07×10^{-12}	10	0	Jan. 13	1400	19.2
Jan. 13	Jan. 14	0.08×10^{-12}	10	0	Jan. 14	1400	17.3
Jan. 14	Jan. 15	0.09×10^{-12}	23	Trace	Jan. 15	1400	29.7
Jan. 15	Jan. 16	0.06×10^{-12}	14	0	Jan. 16	1400	16.3
Jan. 16	Jan. 19	0.03×10^{-12}	(1) 4	Trace	Jan. 19	1400	7.4
Jan. 19	Jan. 20	0.02×10^{-12}[b]	10	0	Jan. 20	1400	13.7
Jan. 20	Jan. 21	0.03×10^{-12}	5	0	Jan. 21	1400	14.3
Jan. 21	Jan. 22	0.06×10^{-12}	10	0	Jan. 22	1400	30.3
Jan. 22	Jan. 23	0.04×10^{-12}	8	0	Jan. 23	1400	15.4
Jan. 23	Jan. 26	0.08×10^{-12}	(3) 8	0	Jan. 26	1400	22.3
Jan. 26	Jan. 27	0.10×10^{-12}[a]	17	0	Jan. 27	1400	24.4
Jan. 27	Jan. 28	0.09×10^{-12}	7	Trace	Jan. 28	1400	27.9
Jan. 28	Jan. 29	0.09×10^{-12}	12	0	Jan. 29	1400	21.3
Jan. 29	Jan. 30	0.04×10^{-12}	6	0	Jan. 30	1400	18.2
$\bar{X}$ Daily		0.06×10^{-12}	12	0.004			
[a] Maximum		0.10×10^{-12}	72	0.07			
[b] Minimum		0.02×10^{-12}	1	0			
Total		1.37×10^{-12}	369	0.11			

FEBRUARY 1970

Collection Date Start	Collection Date Stop	Beta Activity Counted 7 Days after Collection: Airborne ($\mu Ci/m^3$)	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. 30	Feb. 2	0.09×10^{-12}	(Per day 25) 75	Trace	Feb. 2	1400	48.8
Feb. 2	Feb. 3	0.08×10^{-12}	14	0	Feb. 3	1400	34.4
Feb. 3	Feb. 4	0.06×10^{-12}	8	0	Feb. 4	1400	28.2
Feb. 4	Feb. 5	0.10×10^{-12}	10	0	Feb. 5	1400	63.1
Feb. 5	Feb. 6	0.09×10^{-12}	7	0	Feb. 6	1400	31.9
Feb. 6	Feb. 9	0.08×10^{-12}	(4) 11	0	Feb. [illegible]	1400	31.0
Feb. 9	Feb. 10	0.10×10^{-12}	9	0	Feb. 10	1400	1[illegible].8
Feb. 10	Feb. 11	0.12×10^{-12}	5	0	Feb. 11	1400	21.6
Feb. 11	Feb. 12	0.13×10^{-12}	10	0	Feb. 12	1400	73.4
Feb. 12	Feb. 13	0.16×10^{-12}	3[b]	0	Feb. 13	1400	31.1
Feb. 13	Feb. 16	0.11×10^{-12}	(26) 77	0.07	Feb. 16	1400	119.1
Feb. 16	Feb. 17	0.12×10^{-12}	14	0	Feb. 17	1400	43.0
Feb. 17	Feb. 18	0.21×10^{-12}	21	0	Feb. 18	1400	32.7
Feb. 18	Feb. 19	0.22×10^{-12}	94[a]	0.05	Feb. 19	1400	1022.9
Feb. 19	Feb. 20	0.06×10^{-12}[b]	30	0	Feb. 20	1400	55.7
Feb. 20	Feb. 24	0.13×10^{-12}	(29) 118	0.13	Feb. 24	1400	132.0
Feb. 24	Feb. 25	0.19×10^{-12}	28	0	Feb. 25	1400	40.4
Feb. 25	Feb. 26	0.31×10^{-12}	13	0	Feb. 26	1400	15.6
Feb. 26	Feb. 27	0.44×10^{-12}[a]	6	0	Feb. 27	1400	14.0
$\bar{X}$ Daily		0.14×10^{-12}	20	0.004			
[a] Maximum		0.44×10^{-12}	94	0.13			
[b] Minimum		0.06×10^{-12}	3	0			
Total		2.80×10^{-12}	553	0.25			

MARCH 1970

Collection Date Start	Collection Date Stop	Beta Activity Counted 7 Days after Collection: Airborne ($\mu Ci/m^3$)	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 ($\mu\mu Ci/m^2$)
Feb. 27	Mar. 2	0.23×10^{-12}	(Per day 7) 21	0.09	Mar. 2	1400	18.4
Mar. 2	Mar. 3	0.15×10^{-12}	3[b]	0	Mar. 3	1400	10.9
Mar. 3	Mar. 4	0.09×10^{-12}	6	0	Mar. 4	1400	15.4
Mar. 4	Mar. 5	0.13×10^{-12}	92	Trace	Mar. 5	1400	172.7
Mar. 5	Mar. 6	0.22×10^{-12}	5	Trace	Mar. 6	1400	12.8
Mar. 6	Mar. 9	0.14×10^{-12}	(3) 8	0	Mar. 9	1400	16.1
Mar. 9	Mar. 10	0.24×10^{-12}	90	0.24	Mar. 10	1400	526.0
Mar. 10	Mar. 11	0.07×10^{-12}[b]	207	0.37	Mar. 11	1400	430.0
Mar. 11	Mar. 12	0.07×10^{-12}[b]	28	0.14	Mar. 12	1400	70.8
Mar. 12	Mar. 13	0.17×10^{-12}	51	0	Mar. 13	1400	57.6
Mar. 13	Mar. 16	0.17×10^{-12}	10	Trace	Mar. 16	1400	17.0
Mar. 16	Mar. 17	0.16×10^{-12}	13	Trace	Mar. 17	1400	21.6
Mar. 17	Mar. 18	0.20×10^{-12}	10	Trace	Mar. 18	1400	15.4
Mar. 18	Mar. 19	0.22×10^{-12}	5	Trace	Mar. 19	1400	70.2
Mar. 19	Mar. 20	0.17×10^{-12}	68	0.05	Mar. 20	1400	124.1
Mar. 20	Mar. 23	0.19×10^{-12}	(11) 34	0	Mar. 23	1400	40.2
Mar. 23	Mar. 24	0.32×10^{-12}[a]	11	0	Mar. 24	1400	16.1
Mar. 24	Mar. 25	0.28×10^{-12}	4	0	Mar. 25	1400	6.9
Mar. 25	Mar. 26	0.26×10^{-12}	9	0	Mar. 26	1400	30.7
Mar. 26	Mar. 27	0.28×10^{-12}	432	0.68	Mar. 27	1400	705.8
Mar. 27	Mar. 30	0.14×10^{-12}	(531) 1592	0.21	Mar. 30	1400	1797.6
Mar. 30	Mar. 31	0.18×10^{-12}	559[a]	0.27	Mar. 31	1400	948.5
$\bar{X}$ Daily		0.18×10^{-12}	105	0.06			
[a] Maximum		0.32×10^{-12}	559	0.68			
[b] Minimum		0.07×10^{-12}	3	0			
Total		4.08×10^{-12}	3258	2.11			

APRIL 1970

Collection Date Start	Collection Date Stop	Beta Activity Counted 7 Days after Collection: Airborne ($\mu Ci/m^3$)	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 ($\mu\mu Ci/m^2$)
Mar. 31	Apr. 1	0.15×10^{-12}	673[a]	0.13	Apr. 1	1400	1260.2
Apr. 1	Apr. 2	0.14×10^{-12}[b]	80	0.06	Apr. 2	1400	84.8
Apr. 2	Apr. 3	0.23×10^{-12}	37	0	Apr. 3	1400	41.8
Apr. 3	Apr. 6	0.19×10^{-12}	(Per day 52)155	0	Apr. 6	1400	174.3
Apr. 6	Apr. 7	0.31×10^{-12}	31	0	Apr. 7	1400	55.2
Apr. 7	Apr. 8	0.49×10^{-12}	48	0	Apr. 8	1400	71.3
Apr. 8	Apr. 9	0.42×10^{-12}	28	Trace	Apr. 9	1400	20.9
Apr. 9	Apr. 10	0.40×10^{-12}	283	0	Apr. 10	1400	451.1
Apr. 10	Apr. 13	0.29×10^{-12}	(22) 66	0	Apr. 13	1400	48.2
Apr. 13	Apr. 14	0.25×10^{-12}	42	0	Apr. 14	1400	89.6
Apr. 14	Apr. 15	0.54×10^{-12}	29	0	Apr. 15	1400	44.7
Apr. 15	Apr. 16	1.01×10^{-12}[a]	36	0	Apr. 16	1400	59.1
Apr. 16	Apr. 17	0.43×10^{-12}	23	0	Apr. 17	1400	45.6
Apr. 17	Apr. 20	0.21×10^{-12}	(97) 291	0	Apr. 20	1400	195.4
Apr. 20	Apr. 21	0.42×10^{-12}	88	Trace	Apr. 21	1400	64.3
Apr. 21	Apr. 22	0.41×10^{-12}	26	Trace	Apr. 22	1400	43.2
Apr. 22	Apr. 23	0.73×10^{-12}	9	0	Apr. 23	1400	36.6
Apr. 23	Apr. 24	0.60×10^{-12}	2[b]	0	Apr. 24	1400	28.4
Apr. 24	Apr. 27	0.49×10^{-12}	(2) 6	0	Apr. 27	1400	30.1
Apr. 27	Apr. 28	0.43×10^{-12}	11	0.02	Apr. 28	1400	23.9
Apr. 28	Apr. 29	0.55×10^{-12}	17	0	Apr. 29	1400	25.7
Apr. 29	Apr. 30	0.72×10^{-12}	12	0	Apr. 30	1400	25.5
$\bar{X}$ Daily		0.42×10^{-12}	64	0.007			
[a] Maximum		1.01×10^{-12}	673	0.13			
[b] Minimum		0.14×10^{-12}	2	0			
Total		9.14×10^{-12}	1993	0.20			

MAY 1970

Collection Date Start	Collection Date Stop	Beta Activity Counted 7 Days after Collection: Airborne ($\mu Ci/m^3$)	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 ($\mu\mu Ci/m^2$)
Apr. 30	May 1	1.19×10^{-12}	11[b]	0.13	May 1	1400	24.5
May 1	May 4	0.24×10^{-12}	(Per day 36)108	Trace	May 4	1400	112.2
May 4	May 5	0.34×10^{-12}	16	0	May 5	1400	19.3
May 5	May 6	0.50×10^{-12}	11[b]	0	May 6	1400	32.7
May 6	May 7	0.41×10^{-12}	10	0	May 7	1400	32.4
May 7	May 8	0.65×10^{-12}	15	0	May 8	1400	46.8
May 8	May 11	0.41×10^{-12}	(7) 21	0.13	May 11	1400	37.5
May 11	May 12	0.36×10^{-12}	339	0	May 12	1400	437.5
May 12	May 13	0.39×10^{-12}	58	0	May 13	1400	81.3
May 13	May 14	0.40×10^{-12}	30	0	May 14	1400	46.7
May 14	May 15	0.32×10^{-12}	22	0	May 15	1400	39.1
May 15	May 18	0.28×10^{-12}	(15) 44	0.01	May 18	1400	88.0
May 18	May 19	0.32×10^{-12}	45	Trace	May 19	1400	87.6
May 19	May 20	0.31×10^{-12}	29	0	May 20	1400	62.2
May 20	May 21	0.30×10^{-12}	92	0	May 21	1400	187.3
May 21	May 22	0.10×10^{-12}[b]	35	0	May 22	1400	54.3
May 22	May 25	0.40×10^{-12}	(30) 90	0	May 25	1400	80.5
May 25	May 26	0.24×10^{-12}	81	0	May 26	1400	115.5
May 26	May 27	0.27×10^{-12}	452[a]	0	May 27	1400	604.8
May 27	May 28	0.18×10^{-12}	380	Trace	May 28	1400	508.1
May 28	June 1	0.44×10^{-12}	(21) 83	Trace	June 1	1400	96.8
$\bar{X}$ Daily		0.38×10^{-12}	63	0.01			
a Maximum		1.19×10^{-12}	452	0.20			
b Minimum		0.10×10^{-12}	11	0			
Total		8.05×10^{-12}	1972	0.31			

JUNE 1970

Collection Date Start	Collection Date Stop	Beta Activity Counted 7 Days after Collection: Airborne ($\mu Ci/m^3$)	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 1	June 2	0.22×10^{-12}	36	0	June 2	1400	47.2
June 2	June 3	0.30×10^{-12}	85	0	June 3	1400	98.0
June 3	June 4	0.16×10^{-12}[b]	71	Trace	June 4	1400	121.0
June 4	June 5	0.25×10^{-12}	342	Trace	June 5	1400	939.5
June 5	June 8	0.19×10^{-12}	(Per Day 379)1137	1.26	June 8	1400	1341.3
June 8	June 9	0.30×10^{-12}	66	Trace	June 9	1400	87.8
June 9	June 10	0.39×10^{-12}	42	Trace	June 10	1400	70.8
June 10	June 11	0.55×10^{-12}	484[a]	0	June 11	1400	579.1
June 11	June 12	0.40×10^{-12}	35	0.07	June 12	1400	56.1
June 12	June 15	0.40×10^{-12}	(61) 182	0.12	June 15	1400	198.6
June 15	June 16	0.59×10^{-12}	18	0	June 16	1400	25.4
June 16	June 17	0.61×10^{-12}	18	0	June 17	1400	45.8
June 17	June 18	0.53×10^{-12}[a]	16[b]	0	June 18	1400	52.4
June 18	June 19	0.28×10^{-12}	16[b]	0	June 19	1400	38.7
June 19	June 22	0.26×10^{-12}	(132)396	0.11	June 22	1400	477.1
June 22	June 23	0.29×10^{-12}	21	Trace	June 23	1400	39.0
June 23	June 24	0.30×10^{-12}	116	Trace	June 24	1400	139.7
June 24	June 25	$0.[illegible]7 \times 10^{-12}$	48	Trace	June 25	1400	55.1
June 25	June 26	$0.[illegible]9 \times 10^{-12}$	104	Trace	June 26	1400	159.1
June 26	June 29	0.23×10^{-12}	(28) 83	Trace	June 29	1400	132.4
June 29	June 30	0.29×10^{-12}	35	Trace	June 30	1400	410.3
$\bar{X}$ Daily		0.34×10^{-12}	111	0.05			
a Maximum		0.61×10^{-12}	484	0.65			
b Minimum		0.16×10^{-12}	16	0			
Total		7.24×10^{-12}	3351	1.56			

JULY 1970

Collection Date Start	Collection Date Stop	Beta Activity Counted 7 Days after Collection: Airborne ($\mu Ci/m^3$)	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 30	July 1	0.21×10^{-12}	5[b]	Trace	July 1	1400	38.6
July 1	July 2	0.30×10^{-12}[a]	29	0	July 2	1400	42.4
July 2	July 6	0.27×10^{-12}	(Per day 90) 359	0.33	July 6	1400	393.5
July 6	July 7	0.12×10^{-12}	555[a]	0.05	July 7	1400	903.0
July 7	July 8	0.11×10^{-12}	105	0.04	July 8	1400	158.2
July 8	July 9	0.12×10^{-12}	76	0.01	July 9	1400	129.0
July 9	July 10	0.12×10^{-12}	27	Trace	July 10	1400	49.0
July 10	July 13	0.12×10^{-12}	(29) 87	0	July 13	1400	110.0
July 13	July 14	0.17×10^{-12}	39	Trace	July 14	1400	48.9
July 14	July 15	0.17×10^{-12}	70	Trace	July 15	1400	96.6
July 15	July 16	0.18×10^{-12}	467	0.24	July 16	1400	816.4
July 16	July 17	0.11×10^{-12}	46	0.29	July 17	1400	29.4
July 17	July 20	0.09×10^{-12}	(86) 257	0.16	July 20	1400	425.9
July 20	July 21	0.05×10^{-12}[b]	202	0.25	July 21	1400	624.3
July 21	July 22	0.09×10^{-12}	153	0.17	July 22	1400	410.0
July 22	July 23	0.10×10^{-12}	141	0.34	July 23	1400	271.1
July 23	July 24	0.06×10^{-12}	61	0.09	July 24	1400	616.3
July 24	July 27	0.05×10^{-12}[b]	(247) 742	0.45	July 27	1400	741.7
July 27	July 28	0.07×10^{-12}	174	0.05	July 28	1400	775.8
July 28	July 29	0.05×10^{-12}[b]	48	0.01	July 29	1400	59.3
July 29	July 30	0.09×10^{-12}	174	0	July 30	1400	26.7
July 30	July 31	0.13×10^{-12}	48	0	July 31	1400	23.2
$\bar{X}$ Daily		0.12×10^{-12}	124.7	0.08			
a Maximum		0.30×10^{-12}	555	0.35			
b Minimum		0.05×10^{-12}	5	0			
Total		2.78×10^{-12}	3865	2.52			

AUGUST 1970

Collection Date Start	Collection Date Stop	Beta Activity Counted 7 Days after Collection: Airborne ($\mu Ci/m^3$)	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. 3	0.08×10^{-12}	(Per day 76)228	0.25	Aug. 3	1400	297.6
Aug. 3	Aug. 4	0.08×10^{-12}	42	0	Aug. 4	1400	47.1
Aug. 4	Aug. 5	0.06×10^{-12}	29	0	Aug. 5	1400	38.0
Aug. 5	Aug. 6	0.06×10^{-12}	76	0.37	Aug. 6	1400	281.3
Aug. 6	Aug. 7	0.03×10^{-12}[b]	55	0.01	Aug. 7	1400	87.7
Aug. 7	Aug. 10	0.05×10^{-12}	(63) 207	0.59	Aug. 10	1400	342.3
Aug. 10	Aug. 11	0.13×10^{-12}	10	0.06	Aug. 11	1400	20.4
Aug. 11	Aug. 12	0.16×10^{-12}	88	0.04	Aug. 12	1400	98.6
Aug. 12	Aug. 13	0.18×10^{-13}	34	0	Aug. 13	1400	77.1
Aug. 13	Aug. 14	0.13×10^{-12}	34	0.01	Aug. 14	1400	49.0
Aug. 14	Aug. 17	0.09×10^{-10}	(351) 1052[a]	2.11	Aug. 17	1400	1655.8
Aug. 17	Aug. 18	0.09×10^{-12}	70	1.02	Aug. 18	1400	103.1
Aug. 18	Aug. 19	0.07×10^{-12}	218	0.50	Aug. 19	1400	447.7
Aug. 19	Aug. 20	0.06×10^{-12}	119	0.14	Aug. 20	1400	139.2
Aug. 20	Aug. 21	0.05×10^{-12}	88	0	Aug. 21	1400	114.5
Aug. 21	Aug. 24	0.08×10^{-12}	(32) 107	0.40	Aug. 24	1400	137.6
Aug. 24	Aug. 25	0.16×10^{-12}	17	0	Aug. 25	1400	21.3
Aug. 25	Aug. 26	0.16×10^{-12}	10	0	Aug. 26	1400	17.0
Aug. 26	Aug. 27	0.20×10^{-12}	10	0	Aug. 27	1400	20.8
Aug. 27	Aug. 28	0.21×10^{-12}[a]	8[b]	0	Aug. 28	1400	18.5
Aug. 28	Aug. 31	0.14×10^{-12}	(48) 144	0.06	Aug. 31	1400	157.5
$\bar{X}$ Daily		0.10×10^{-12}	85.4	0.18			
a Maximum		0.21×10^{-12}	351	2.11			
b Minimum		0.03×10^{-12}	8	0			
Total		2.27×10^{-12}	2646	5.60			

SEPTEMBER 1970

Collection Date Start	Collection Date Stop	Beta Activity Counted 7 Days after Collection: Airborne ($\mu Ci/m^3$)	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 ($\mu\mu Ci/m^2$)
Aug. 31	Sept. 1	0.05×10^{-12}	606	0.34	Sept. 1	1400	1180.9
Sept. 1	Sept. 2	0.06×10^{-12}	643[a]	0.25	Sept. 2	1400	1567.4
Sept. 2	Sept. 3	0.09×10^{-12}	17	0	Sept. 3	1400	23.2
Sept. 3	Sept. 4	0.07×10^{-12}	14	0.01	Sept. 4	1400	20.6
Sept. 4	Sept. 5	0.14×10^{-12}[a]	(Per day 38)153	0	Sept. 8	1400	178.6
Sept. 8	Sept. 9	0.08×10^{-12}	5[b]	0	Sept. 9	1400	12.3
Sept. 9	Sept. 10	0.13×10^{-12}	11	0	Sept. 10	1400	44.3
Sept. 10	Sept. 11	0.10×10^{-12}	19	0	Sept. 11	1400	43.0
Sept. 11	Sept. 14	0.09×10^{-12}	(146) 437	0.76	Sept. 14	1400	685.7
Sept. 14	Sept. 15	0.06×10^{-12}	7	0	Sept. 15	1400	12.8
Sept. 15	Sept. 16	0.05×10^{-12}	18	0	Sept. 16	1400	27.2
Sept. 16	Sept. 17	0.09×10^{-12}	11	0	Sept. 17	1400	19.0
Sept. 17	Sept. 18	0.09×10^{-12}	6	0	Sept. 18	1400	14.0
Sept. 18	Sept. 21	0.03×10^{-12}[b]	(31) 92	0.06	Sept. 21	1400	105.9
Sept. 21	Sept. 22	0.07×10^{-12}	21	0.21	Sept. 22	1400	20.7
Sept. 22	Sept. 23	0.09×10^{-12}	412	0	Sept. 23	1400	732.9
Sept. 23	Sept. 24	0.10×10^{-12}	9	0	Sept. 24	1400	50.0
Sept. 24	Sept. 25	0.10×10^{-12}	23	0	Sept. 25	1400	40.9
Sept. 25	Sept. 28	0.13×10^{-12}	(4) 11	0	Sept. 28	1400	76.7
Sept. 28	Sept. 29	0.07×10^{-12}	7	0	Sept. 29	1400	17.3
Sept. 29	Sept. 30	0.10×10^{-12}	9	0	Sept. 30	1400	14.8
$\bar{X}$ Daily		0.08×10^{-12}	83	0.05			
a Maximum		0.14×10^{-12}	643	0.76			
b Minimum		0.03×10^{-12}	5	0			
Total		1.79×10^{-12}	2491	1.63			

OCTOBER 1970

Collection Date Start	Collection Date Stop	Beta Activity Counted 7 Days after Collection: Airborne ($\mu Ci/m^3$)	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 ($\mu\mu Ci/m^2$)
Sept. 30	Oct. 1	0.04×10^{-10}	11	Trace	Oct. 1	1400	17.1
Oct. 1	Oct. 2	0.07×10^{-12}	41	0	Oct. 2	1400	58.5
Oct. 2	Oct. 5	0.05×10^{-12}	(Per day 49) 146	0.08	Oct. 5	1400	85.1
Oct. 5	Oct. 6	0.01×10^{-12}[b]	26	Trace	Oct. 6	1400	31.8
Oct. 6	Oct. 7	0.04×10^{-12}	7	Trace	Oct. 7	1400	12.8
Oct. 7	Oct. 8	0.10×10^{-12}	29	0.07	Oct. 8	1400	192.6
Oct. 8	Oct. 9	0.11×10^{-12}[a]	39	0	Oct. 9	1400	55.9
Oct. 9	Oct. 12	0.06×10^{-12}	(23) 70	0.02	Oct. 12	1400	75.4
Oct. 12	Oct. [illegible]	0.07 [illegible]$^{-12}$	8	0	Oct. 13	1400	16.6
Oct. 13	Oct. 14	0.06×10^{-12}	11	0	Oct. 14	1400	22.8
Oct. 14	Oct. 15	0.05×10^{-12}	10	0.08	Oct. 15	1400	11.7
Oct. 15	Oct. 16	0.02×10^{-12}[a]	84	0.01	Oct. 16	1400	122.5
Oct. 16	Oct. 19	0.04×10^{-12}	(10) 30	Trace	Oct. 19	1400	38.0
Oct. 19	Oct. 20	0.10×10^{-12}	17	0	Oct. 20	1400	15.6
Oct. 20	Oct. 21	0.10×10^{-12}	86[a]	Trace	Oct. 21	1400	164.3
Oct. 21	Oct. 22	0.06×10^{-12}	17	0.02	Oct. 22	1400	46.3
Oct. 22	Oct. 23	0.06×10^{-12}	80	0.13	Oct. 23	1400	153.5
Oct. 23	Oct. 26	0.09×10^{-12}	(18) 55	Trace	Oct. 2[illegible]	1400	93.8
Oct. 26	Oct. 27	0.09×10^{-12}	55	Trace	Oct. 27	1400	84.2
Oct. 27	Oct. 28	0.08×10^{-12}	18	0	Oct. 2[illegible]	1400	24.1
Oct. 28	Oct. 29	0.06×10^{-12}	5[b]	0	Oct 29	1400	22.8
Oct. 29	Oct. 30	0.06×10^{-12}	5[b]	0	Oct. 30	1400	16.7
$\bar{X}$ Daily		0.06×10^{-12}	27	0.01			
a Maximum		0.11×10^{-12}	86	0.13			
b Minimum		0.01×10^{-12}	5	0			
Total		1.42×10^{-12}	850	0.40			

NOVEMBER 1970

Collection Date Start	Collection Date Stop	Beta Activity Counted 7 Days after Collection: Airborne ($\mu Ci/m^3$)	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 ($\mu\mu Ci/m^2$)
Oct. 30	Nov. 2	0.25×10^{-12}	(Per day 5) 14	Trace	Nov. 2	1400	20.6
Nov. 2	Nov. 3	0.11×10^{-12}	31	Trace	Nov. 3	1400	80.9
Nov. 3	Nov. 4	0.09×10^{-12}	6	0	Nov. 4	1400	24.6
Nov. 4	Nov. 5	0.11×10^{-12}	8	0	Nov. 5	1400	26.4
Nov. 5	Nov. 6	0.12×10^{-12}	8	0	Nov. 6	1400	17.2
Nov. 6	Nov. 9	0.05 c 10^{-12}	(72) 215[a]	0.20	Nov. 9	1400	233.2
Nov. 9	Nov. 10	0.05×10^{-12}	6	0	Nov. 10	1400	32.2
Nov. 10	Nov. 11	0.11×10^{-12}	2[b]	0	Nov. 11	1400	11.9
Nov. 11	Nov. 12	0.10×10^{-12}	11	Trace	Nov. 12	1400	35.3
Nov. 12	Nov. 13	0.08×10^{-12}	59	Trace	Nov. 13	1400	85.0
Nov. 13	Nov. 16	0.03×10^{-12}	(8) 25	0	Nov. 16	1400	32.2
Nov. 16	Nov. 17	0.08×10^{-12}	14	0	Nov. 17	1400	40.0
Nov. 17	Nov. 18	0.11×10^{-12}	13	0	Nov. 18	1400	12.5
Nov. 18	Nov. 19	0.11×10^{-12}	9	0	Nov. 19	1400	20.2
Nov. 19	Nov. 20	0.15×10^{-12}	6	0	Nov. 20	1400	12.1
Nov. 20	Nov. 23	0.28×10^{-12}[a]	(2) 7	0	Nov. 23	1400	23.3
Nov. 23	Nov. 24	0.04×10^{-12}	11	0	Nov. 24	1400	24.5
Nov. 24	Nov. 25	0.05×10^{-12}	9	0	Nov. 25	1400	31.1
Nov. 25	Nov. 30	0.06×10^{-12}	(8) 42	0.03	Nov. 30	1400	58.1
$\bar{X}$ Daily		0.10×10^{-12}	16	>0.01			
a Maximum		0.28×10^{-12}	72	0.20			
b Minimum		0.03×10^{-12}	2	0			
Total		1.98×10^{-12}	496	0.27			

DECEMBER 1970

Collection Date Start	Collection Date Stop	Beta Activity Counted 7 Days after Collection: Airborne ($\mu Ci/m^3$)	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: Date of Count	Early Count: Precipitation Collector: Beta Activity ($\mu\mu Ci/m^2$)
Nov. 30	Dec. 1	0.13×10^{-12}	40[a]	Trace	Dec. 1	1400	67.2
Dec. 1	Dec. 2	0.05×10^{-12}[b]	7	0	Dec. 2	1400	27.3
Dec. 2	Dec. 3	0.15×10^{-12}	13	0	dec. 3	1400	33.0
Dec. 3	Dec. 4	0.12×10^{-12}	8	0	Dec. 4	1400	30.0
Dec. 4	Dec. 7	0.06×10^{-12}	(Per day 2) 7	0	Dec. 7	1400	21.0
Dec. 7	Dec. 8	0.08×10^{-12}	8	0	Dec. 8	1400	21.9
Dec. 8	Dec. 9	0.05×10^{-12}[b]	4	0	Dec. 9	1400	[illegible]
Dec. 9	Dec. 10	0.06×10^{-12}	12	Trace	Dec. 10	1400	[illegible]
Dec. 10	Dec. 11	$0.07 \times$ [illegible]	7	Trace	Dec. 11	1400	22.9
Dec. 11	Dec. 14	0.05×10^{-12}[a]	(2) 5[b]	0.02	Dec. 14	1400	23.5
Dec. 14	Dec. 15	0.06×10^{-12}	40[a]	0	Dec. 15	1400	59.9
Dec. 15	Dec. 16	0.08×10^{-12}	26	0	Dec. 16	1400	43.3
Dec. 16	Dec. 17	0.10×10^{-12}	12	0	Dec. 17	1400	20.4
Dec. 17	Dec. 18	0.05×10^{-12}[b]	3	Trace	Dec. 18	1400	22.6
Dec. 18	Dec. 21	0.18×10^{-12}[a]	(19) 57	0.02	Dec. 21	1400	71.4
Dec. 21	Dec. 22	0.11×10^{-12}	19	Trace	Dec. 22	1400	57.4
Dec. 22	Dec. 23	0.05×10^{-12}[b]			Dec. 23	1400	31.8
Dec. 23	Dec. 28	0.06×10^{-12}	(16) 79	0.02	Dec. 28	1400	96.6
Dec. 28	Dec. 29	0.06×10^{-12}	27	0	Dec. 29	1400	47.4
Dec. 29	Dec. 30	0.07×10^{-12}	16	0	Dec. 30	1400	71.8
Dec. 30	Dec. 31	0.05×10^{-12}[b]	38	0	Dec. 31	1400	74.0
$\bar{X}$ Daily		0.08×10^{-12}	13	>0.01			
a Maximum		0.18×10^{-12}	40	0.02			
b Minimum		0.05×10^{-12}	2	0			
Total		1.69×10^{-12}	428	0.11			

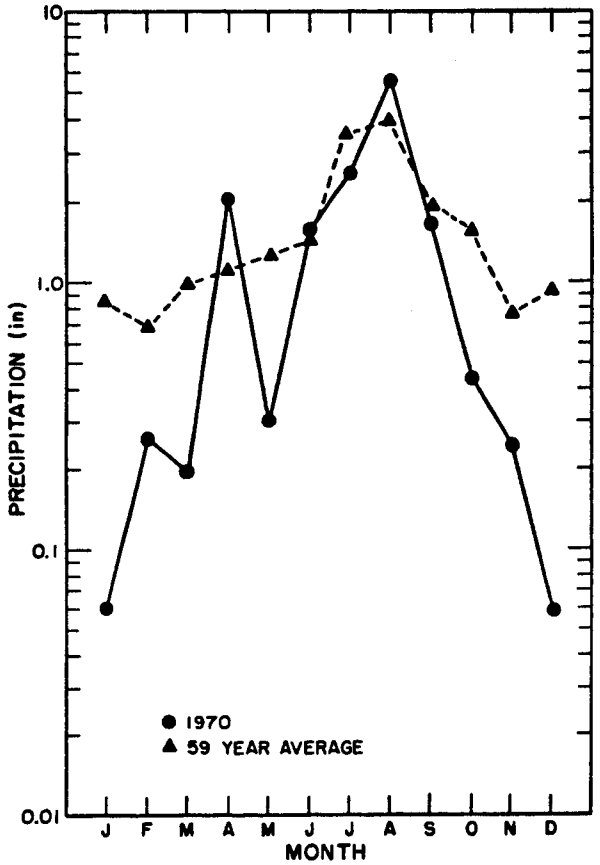

Fig. 1. Precipitation.

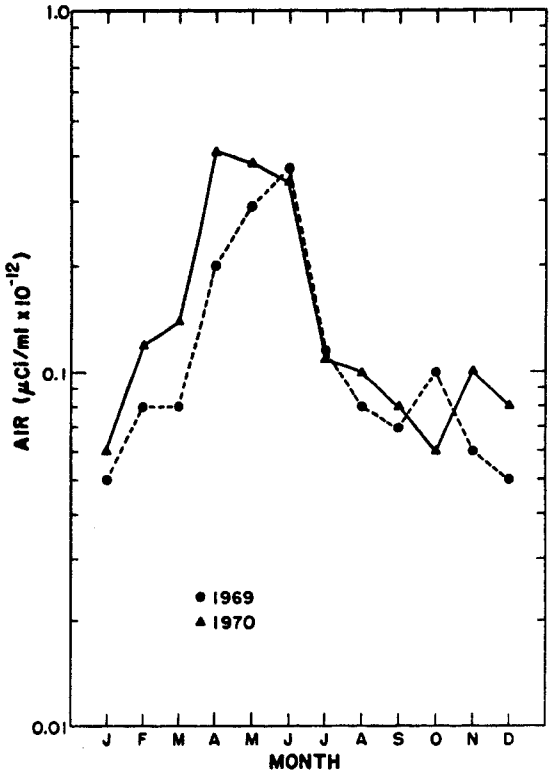

Fig. 2. Average daily activity found in air filter samples.

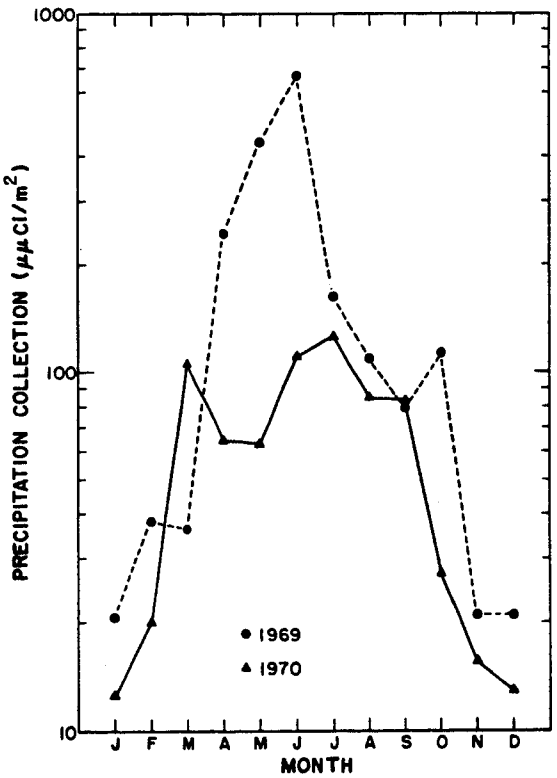

Fig. 3. Average daily activity found in precipitation collector samples.

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