NYO-4661

510355

UNCLASSIFIED

[redacted]

HEALTH AND SAFETY LABORATORY
Analytical Branch

SUNSHINE REPORT FOR JULY AND AUGUST

LEGAL NOTICE

This report was prepared as an account of Government sponsored work. Neither the United States, nor the Commission, nor any person acting on behalf of the Commission:

A. Makes any warranty or representation, expressed or implied, with respect to the accuracy, completeness, or usefulness of the information contained in this report, or that the use of any information, apparatus, method, or process disclosed in this report may not infringe privately owned rights; or

B. Assumes any liabilities with respect to the use of, or for damages resulting from the use of any information, apparatus, method, or process disclosed in this report.

As used in the above, "person acting on behalf of the Commission" includes any employee or contractor of the Commission, or employee of such contractor, to the extent that such employee or contractor of the Commission, or employee of such contractor prepares, disseminates, or provides access to, any information pursuant to his employment or contract with the Commission, or his employment with such contractor.

Compiled by:

James M. Fresco
Seymour Licht
George A. Welford

Photostat Price $ 9.30

Microfilm Price $ 3.60

Available from the
Office of Technical Services
Department of Commerce
Washington 25, D. C.

CLASSIFICATION CANCELLED
DATE
For The Atomic Energy Commission
Chief, Declassification Branch

September 16, 1955

UNCLASSIFIED

A0851

TABLE OF CONTENTS

		PAGE
	SUMMARY	
I.	FALLOUT OF Sr^{90} DURING SEPTEMBER, OCTOBER, NOVEMBER, AND DECEMBER	1, 2
	A. WORLD WIDE SEPTEMBER COMPOSITE FALLOUT	3
	Map - Sr^{90} d/m/ft^2/month for September 1954	4
	B. WORLD WIDE OCTOBER COMPOSITE FALLOUT	5, 6, 7
	Map - Sr^{90} d/m/ft^2/month for October 1954	8
	C. WORLD WIDE NOVEMBER COMPOSITE FALLOUT	9,10,11
	Map - Sr^{90} d/m/ft^2/month for November 1954	12
	D. WORLD WIDE DECEMBER COMPOSITE FALLOUT	13,14,15 16,17
	Map - Sr^{90} d/m/ft^2/month for December 1954	18
	E. UNITED STATES DECEMBER COMPOSITE FALLOUT	19,20,21
	Map - Sr^{90} d/m/ft^2/month for December 1954	22
II.	SUMMATION OF WORLD TOTAL FALLOUT ACTIVITY FOR SEPTEMBER THROUGH DECEMBER 1954	23,24
	A. TOTAL WORLD FALLOUT - SEPTEMBER 1954	25
	B. TOTAL WORLD FALLOUT - OCTOBER 1954	26
	C. TOTAL WORLD FALLOUT - NOVEMBER 1954	27
	D. TOTAL WORLD FALLOUT - DECEMBER 1954	28
	E. GRAPH OF TOTAL ACTIVITY FALLOUT FROM JUNE TO DECEMBER 1954	29
III.	SUMMATION OF WORLD WIDE Sr^{90} FALLOUT FROM SEPTEMBER TO DECEMBER 1954	30
	A. TOTAL WORLD Sr^{90} FALLOUT - SEPTEMBER 1954	31
	B. TOTAL WORLD Sr^{90} FALLOUT - OCTOBER 1954	32
	C. TOTAL WORLD Sr^{90} FALLOUT - DECEMBER 1954	33

PAGE

D. TOTAL WORLD Sr^{90} FALLOUT - DECEMBER 1954 34

E. GRAPH OF Sr^{90} FALLOUT FROM SEPTEMBER TO DECEMBER 1954 35

IV. COMPARISON OF Sr^{90} COLLECTION BY GUMMED PAPER AND POT ON THE ROOF OF HASL DURING MAY, JUNE, AND JULY 36

A. TABLE OF GUMMED PAPER AND POT COMPARISON DURING MAY, JUNE, AND JULY 37

V. Sr^{90} CONTAMINATION OF COW'S MILK IN LARGE MILK PRODUCING AREAS 38

A. COMPOSITE MILK SAMPLES IN METROPOLITAN NEW YORK FOR MAY, JUNE, AND JULY 39

TABLE A - COMPOSITE MILK SAMPLES IN METROPOLITAN NEW YORK FOR MAY, JUNE, AND JULY 40

B. JAPANESE MILK SAMPLES 41

TABLE B - JAPANESE MILK SAMPLES 42

C. CONTROL MILK FOR MAY AND JUNE 43

TABLE C - CONTROL MILK FOR MAY AND JUNE 44

D. COMPOSITE MILK SAMPLES FROM MADISON, WISCONSIN AND MANDAN, NORTH DAKOTA 45

TABLE D - COMPOSITE MILK SAMPLES FROM MADISON, WISCONSIN AND MANDAN, NORTH DAKOTA 46

VI. A. JAPANESE BONE SAMPLES 47

TABLE A - Sr^{90} CONTENT OF JAPANESE BONE SAMPLES 48

B. COOPERATIVE ANALYSIS 49

TABLE B - CALCIUM AND Sr^{90} CONTENT OF SAMPLES EXCHANGED WITH NUCLEAR SCIENCE AND ENGINEERING CORPORATION 50

VII. Sr^{90} CONTENT OF RAINWATER COLLECTED AT WATERTOWN, NEW YORK 51

A. TABLE OF TOTAL ACTIVITY AND Sr^{90} CONTENT OF RAINWATER AT WATERTOWN, NEW YORK 52,53

SUMMARY

I. The estimated average fallout of Sr^{90} at the 37 stations in the United States during December 1954 was 2.95 d/m/ft^2. The activity was measured approximately five months after collection.

II. Estimated world total fallout was at the following levels of β activities for September 1954 through December 1954. Activities are extrapolated to 1/1/56.

September	-	0.30 megacuries
October	-	0.22 megacuries
November	-	0.25 megacuries
December	-	0.32 megacuries

III. Estimated world total Sr^{90} fallout was at the following levels for September through December 1954.

September	-	0.020 megacuries
October	-	0.015 megacuries
November	-	0.017 megacuries
December	-	0.005 megacuries

IV. The comparison of gummed paper and a high-walled stainless steel pot showed extreme variation during May and June. The Sr^{90} collected on gummed paper appears to be a factor of 3 and 4 lower than the Sr^{90} collected in the steel pot for the months of May and June.

V. The Sr^{89} in milk for May and June was at a level of 100 d/m/qt. August milk supply reached 4.0 Sunshine Units in Metropolitan New York. Milk from Madison, Wisconsin and Mandan, North Dakota showed 1.0 Sunshine Unit for May.

VI. A. Analysis by Nuclear Science and Engineering Corporation for the Sr^{90} content of Japanese bone verifies the existence of Sr^{90} at all age levels in these samples.

B. The calcium analyses show possibly important differences in the cooperative samples.

Comparison of the two sets of Sr^{90} analyses gives further evidence that the counting error introduced by the higher background counters in use at HASL are masking the traces of activity present in certain biological specimens.

VII. Rain water collected at Watertown, New York contained measurable amounts of Sr^{90} for the period from 3/20/54 to 5/29/55.

I. FALLOUT OF Sr^{90} DURING SEPTEMBER, OCTOBER, NOVEMBER, AND DECEMBER

Daily gummed paper samples received from the world wide network are composited on a monthly basis for analysis of the total β activity and the Sr^{90} content. The results in this report complete the analysis of all samples for 1954.

Method for Total Activity Analysis

The samples received during a specific month from each station are ignited at 600°C, combined and mixed in a six ounce, wide mouth polyethylene bottle. A 0.5 gram fraction is weighed into a plastic planchet and β counted. 0.5 grams of K_2CO_3 is used for counter standardization. The β activity is then corrected for the total sample weight. This activity is then corrected for the total days in the respective month. If less than 10 samples are received from a station for the month, the result is not reported.

Method for Sr^{90} Analysis

The total ash, about one gram, is fused with Na_2CO_3 and the silica is removed by a perchloric acid dehydration.

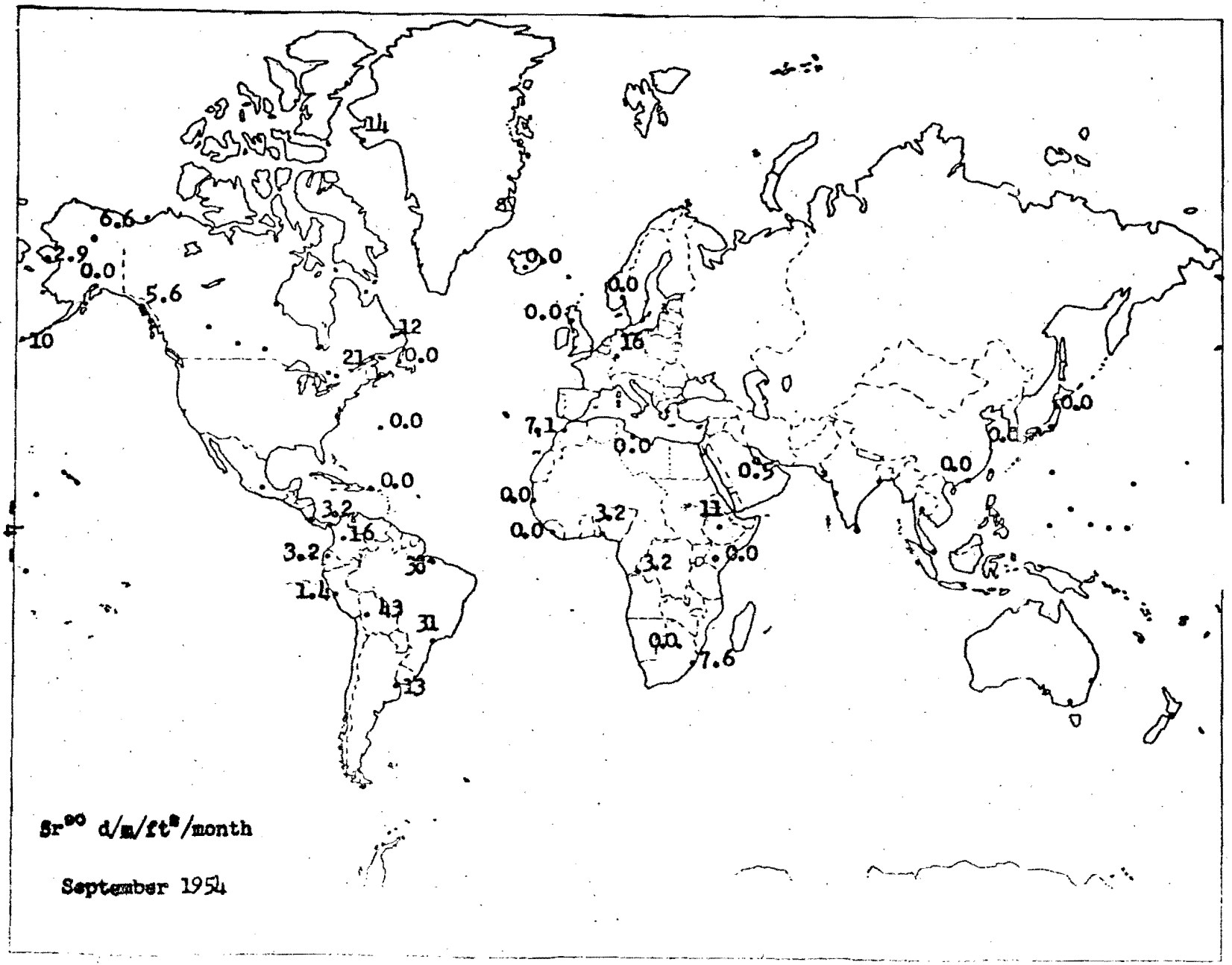
Calcium and strontium carrier are added. The solution is diluted and the calcium, strontium, and other elements precipitated with Na_2CO_3. The carbonate precipitate is

dissolved in nitric acid and evaporated to a small volume. Two hydroxide precipitations are run and the supernatants combined for Sr^{90} analysis. Yttrium carrier is added and a hydroxide precipitation is performed. The supernatant is stored for a two-week period for yttrium growth. A second yttrium precipitation is carried out after the storage period and yttrium oxalate is counted for the Sr^{90} content.

A. WORLD WIDE SEPTEMBER COMPOSITE FALLOUT

HASL No.	Station	Total Activity* d/m/ft²/month	Sr^{90} d/m/ft²/month	Sr^{90} / Total Activity
1462	Sidi Slimane, French Morocco	104 ± 26	7.1 ± 4.4	0.068
1467	Oslo, Norway	160 ± 13	0.0 ± 4.2	——
1470	Leopoldville, Belgian Congo	357 ± 43	3.2 ± 6.7	0.009
1472	Wheelus A.F.B., Tripoli	298 ± 90	0.0 ± 6.2	——
1475	Lagos, Nigeria	7.1 ± 30	3.2 ± 3.4	0.450
1478	Nairobi, Kenya, East Africa	127 ± 23	0.0 ± 4.4	——
1481	Durban, Natal U of South Africa	73 ± 6	7.6 ± 4.2	0.104
1484	Monrovia, Liberia	177 ± 9	0.0 ± 4.0	——
1489	Addis Ababa, Ethiopia	382 ± 17	11.0 ± 4.8	0.029
1492	Hiroshima, Japan	139 ± 9	0.0 ± 4.1	——
1495	Nagasaki, Japan	60 ± 7	0.0 ± 4.5	——
1498	Hong Kong	377 ± 55	0.0 ± 3.8	——

* 1462 - 1481 Activity as of counting date 5/24/55
1484 - 1498 Activity as of counting date 5/25/55


14
6.6
2.9
0.0
5.6
10
12
21
0.0
0.0
0.0
0.0
0.0
16
7.1
0.0
0.0
0.0
0.0
0.0
0.0
0.5
11
3.2
3.2
16
3.2
30
1.4
43
31
13
3.2
0.0
0.0
7.6
Sr90 d/m/ft2/month
September 1954

B. WORLD WIDE OCTOBER COMPOSITE FALLOUT

HASL No.	Station	Total Activity* d/m/ft²/month	Sr^{90} d/m/ft²/month	Sr^{90} / Total Activity
1460	Dhanhran, Saudi Arabia	37 ± 18	0.0 ± 4.1	——
1468	Oslo, Norway	96 ± 7	2.0 ± 3.2	0.021
1471	Leopoldville, Belgian Congo	554 ± 46	12.1 ± 6.1	0.022
1473	Wheelus A.F.B., Tripoli	511 ± 38	3.1 ± 4.9	0.006
✓ 1476	Lagos, Nigeria	0.0 ± 2	0.8 ± 3.8	——
1479	Nairobi, Kenya, East Africa	186 ± 35	0.0 ± 3.7	——
✓ 1482	Durban, Natal, U. of South Africa	121 ± 11	0.9 ± 3.5	0.007
1485	Monrovia, Liberia	165 ± 10	4.9 ± 3.0	0.030
1487	Milan, Italy	32 ± 35	0.0 ± 15.0	——
1490	Addis Ababa, Ethiopia	92 ± 7	0.0 ± 4.2	——
1493	Hiroshima, Japan	77 ± 7	1.3 ± 3.2	0.017
1496	Nagasaki, Japan	69 ± 7	1.2 ± 4.5	0.017
1499	Hong Kong	130 ± 12	1.2 ± 4.6	0.009

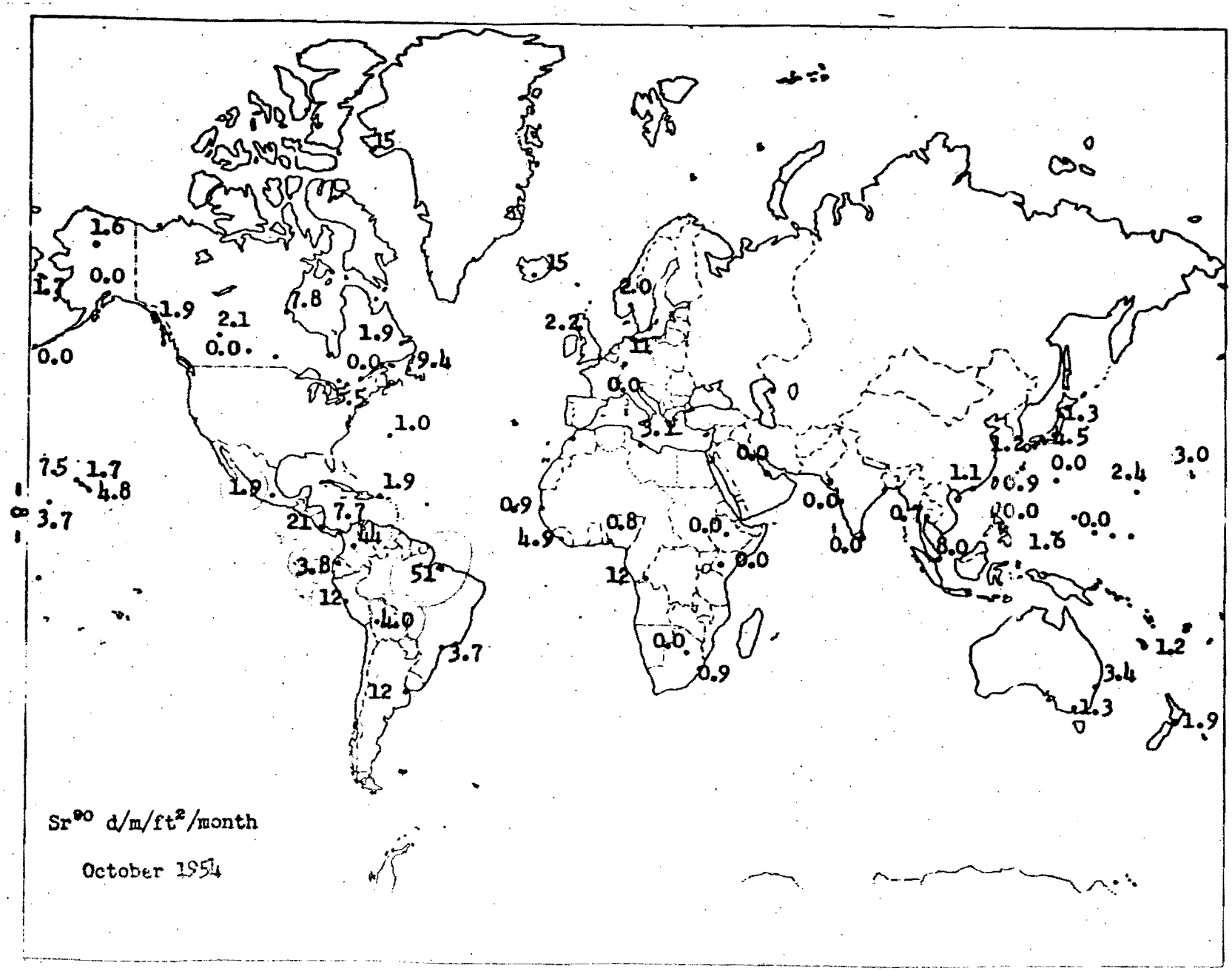
* 1460 - 1482 Activity as of counting date 5/24/55
1485 - 1499 Activity as of counting date 5/25/55

HASL No.	Station	Total Activity* d/m/ft²/month	Sr^{90} d/m/ft²/month	Sr^{90} / Total Activity
1536	Tai Pei, Formosa	385 ± 30	0.9 ± 2.2	0.002
1539	Tokyo, Japan	313 ± 15	4.5 ± 4.6	0.014
1545	Bangkok, Siam	83 ± 7	0.7 ± 3.4	0.008
1548	Bombay, India	74 ± 18	0.0 ± 4.1	——
1551	Melbourne, Australia	184 ± 9	1.3 ± 3.2	0.007
1554	Wellington, New Zealand	663 ± 15	1.9 ± 4.0	0.003
1557	Columbo, Ceylon	107 ± 15	0.0 ± 3.9	——
1560	Singapore	0.0 ± 37	8.0 ± 13.0	——
1562	Sydney, Australia	124 ± 17	3.4 ± 3.5	0.027
1567	Noumea, New Caledonia	127 ± 14	1.2 ± 7.2	0.00[illegible]
1570	Guam	263 ± 30	0.0 ± 5.9	——
1573	Iwo Jima	103 ± 14	0.0 ± 4.5	——
1576	Clarke A.F.B., Phil. Islands	106 ± 20	0.0 ± 3.1	——

* 1536 – 1551 Activity as of counting date 5/28/55
1554 – 1576 Activity as of counting date 6/4/55

HASL No.	Station	Total Activity* d/m/ft²/month	Sr^{90} d/m/ft²/month	Sr^{90} / Total Activity
1579	Johnston Island	173 ± 42	3.7 ± 4.7	0.02
1582	French Frigate Shoals	69 ± 11	7.5 ± 5.4	0.11
1585	Midway	47 ± 12	3.0 ± 4.2	0.06
1588	Wake	82 ± 23	2.4 ± 4.1	0.03
1591	Canton Island	87 ± 15	lost	——
1595	Yap	102 ± 44	1.6 ± 3.7	0.02
1598	Koror	64 ± 12	1.5 ± 3.5	0.02
1601	Lihue	107 ± 12	2.9 ± 4.3	0.03
1604	Honolulu, Hawaii	54 ± 10	1.7 ± 4.0	0.03
1607	Hilo, Hawaii	125 ± 18	4.8 ± 4.1	0.04

* 1579 - 1588 Activity as of counting date 6/23/55
1591 - 1601 Activity as of counting date 6/24/55
1604 - 1607 Activity as of counting date 6/25/55


Sr^{90} d/m/ft^2/month
October 1954

C. WORLD WIDE NOVEMBER COMPOSITE FALLOUT

HASL No.	Station	Total Activity* d/m/ft²/month	Sr^{90} d/m/ft²/month	Sr^{90} / Total Activity
1469	Oslo, Norway	70 ± 6.9	9.1 ± 4.5	0.13
1474	Wheelus A.F.B., Tripoli	551 ± 31	1.2 ± 4.5	0.002
1477	Lagos, Nigeria	29 ± 8	5.4 ± 3.7	0.19
1480	Nairobi, Kenya, East Africa	277 ± 30	6.2 ± 3.3	0.19
1483	Durban, Natal U of South Africa	74 ± 8	0.0 ± 5.2	——
1486	Monrovia, Liberia	186 ± 10	0.0 ± 4.5	——
1488	Milan, Italy	75 ± 8	1.4 ± 3.6	0.02
1491	Addis Ababa, Ethiopia	31 ± 6	1.2 ± 4.6	0.04
1494	Hiroshima, Japan	203 ± 12	0.0 ± 5.2	——
1497	Nagasaki, Japan	97 ± 9	2.2 ± 3.7	0.02
1500	Hong Kong	321 ± 16	8.3 ± 5.1	0.03
1537	Tai Pei, Formosa	645 ± 41	3.2 ± 6.3	0.005
1540	Tokyo, Japan	305 ± 15	0.0 ± 3.6	——

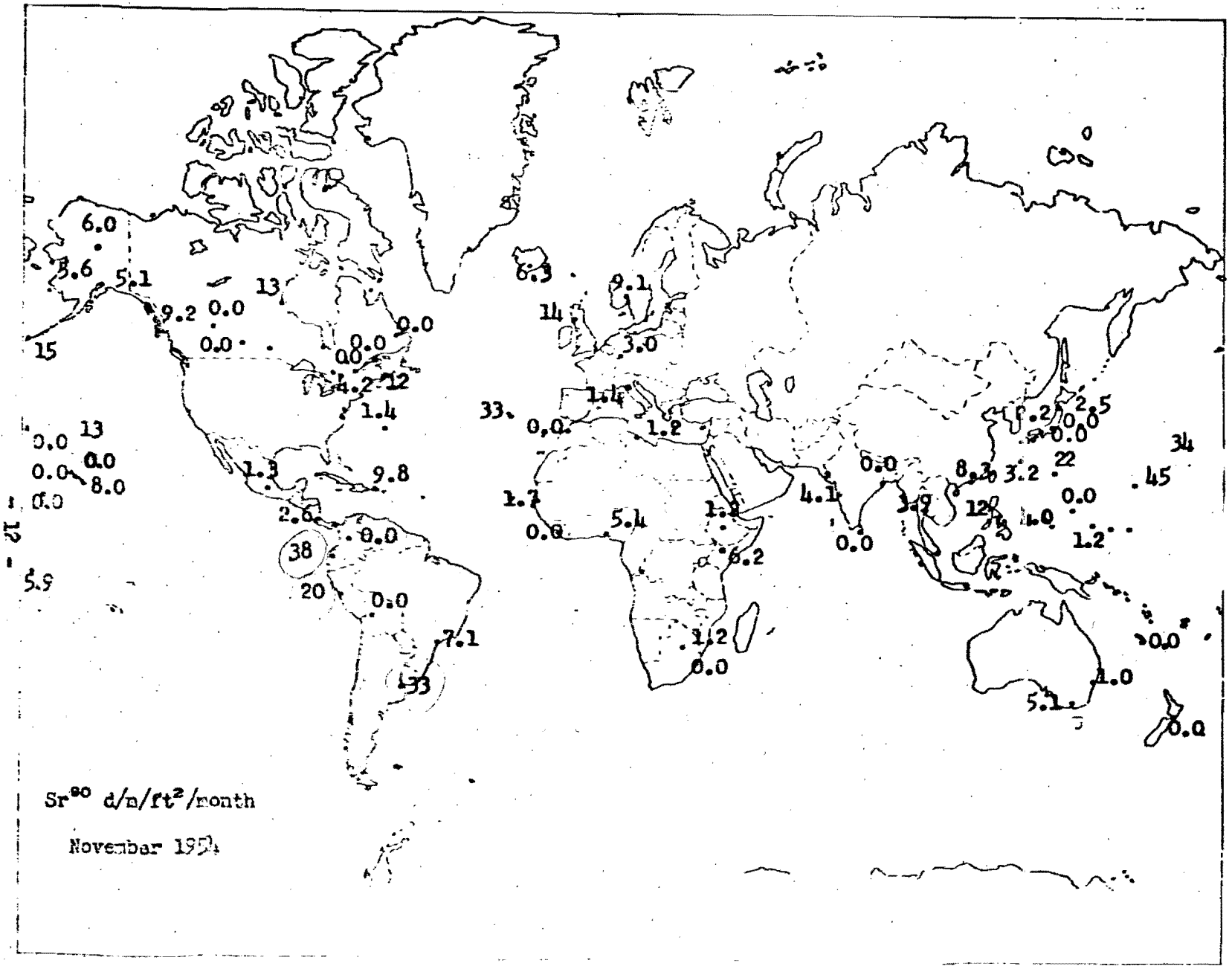
* 1469 - 1480 Activity as of counting date 5/24/55
1483 - 1500 Activity as of counting date 5/25/55
1537 - 1540 Activity as of counting date 5/28/55

HASL No.	Station	Total Activity* d/m/ft²/month	Sr^{90} d/m/ft²/month	Sr^{90} / Total Activity
1543	Misawa A.F.B., Japan	28 ± 25	2.5 ± 16.4	0.09
1546	Bangkok, Siam	36 ± 11	3.9 ± 6.4	0.11
1549	Bombay, India	45 ± 9	4.1 ± 4.3	0.09
1552	Melbourne, Australia	205 ± 17	5.1 ± 4.1	0.02
1555	Wellington, New Zealand	82 ± 13	0.0 ± 3.9	——
1558	Columbo, Ceylon	84 ± 16	0.0 ± 5.8	——
1563	Sydney, Australia	85 ± 12	1.0 ± 4.0	0.01
1566	Calcutta, India	30 ± 27	0.0 ± 3.6	——
1568	Noumea, New Caledonia	58 ± 8	0.0 ± 8.5	——
1571	Guam	90 ± 15	0.0 ± 14.6	——
1574	Iwo Jima	90 ± 9	21.7 ± 9.2	0.24
1577	Clarke A.F.B., Phil. Islands	81 ± 19	12.5 ± 7.2	0.15
1580	Johnston Island	130 ± 24	0.0 ± 4.4	——
1583	French Frigate, Shoals	132 ± 18	0.0 ± 4.6	——

* 1543 - 1552 Activity as of counting date 5/28/55
1555 - 1577 Activity as of counting date 6/4/55
1580 - 1583 Activity as of counting date 6/23/55

HASL No.	Station	Total Activity* d/m/ft^2/month	Sr^{90} d/m/ft^2/month	Sr^{90} / Total Activity
1586	Midway	80 ± 24	34 ± 17.5	0.43
1589	Wake	70 ± 15	45.1 ± 71.4	0.64
1592	Canton Island	73 ± 10	5.9 ± 4.4	0.08
1593	Truk	170 ± 10	1.2 ± 3.7	0.007
1596	Yap	152 ± 68	4.0 ± 3.9	0.003
1599	Koror	88 ± 14	0.0 ± 3.8	———
1602	Lihue	54 ± 7	12.8 ± 5.8	0.24
1605	Honolulu, Hawaii	39 ± 8	0.0 ± 6.9	———
1608	Hilo, Hawaii	65 ± 14	8.0 ± 7.0	0.12

* 1586 - 1602 Activity as of counting date 6/24/55
1605 - 1608 Activity as of counting date 6/25/55


6.0
5.6
5.1
9.2
0.0
0.0
13
15
0.0
0.0
0.0
4.2
12
1.4
0.0
13
0.0
0.0
8.0
0.0
1.3
9.8
2.6
0.0
38
20
0.0
5.9
7.1
33
6.3
9.1
14
3.0
1.4
33
0.0
1.2
1.7
0.0
5.4
1.2
6.2
1.2
0.0
4.1
0.0
0.0
3.9
8.3
3.2
22
12
4.0
0.0
1.2
2.5
0.0
0.0
34
45
0.0
1.0
5.1
0.0
Sr90 d/m/ft2/month
November 1954

D. WORLD WIDE DECEMBER COMPOSITE FALLOUT

HASL No.	Station	Total Activity* d/m/ft²/month	Sr^{90} d/m/ft²/month	Sr^{90} / Total Activity
1656	North Bay, Ontario	142 ± 20	2.3 ± 3.5	0.016
1657	Moosoonee, Ontario	38 ± 7	0.0 ± 3.5	——
1658	Moncton, New Brunswick	133 ± 14	0.0 ± 3.6	——
1659	Montreal, Quebec	135 ± 10	4.2 ± 4.0	0.031
1660	Seven Islands, Quebec	10 ± 12	0.7 ± 4.1	0.070
1661	Winnipeg, Manitoba	96 ± 22	0.0 ± 3.4	——
1662	Churchill, Manitoba	24 ± 5	6.4 ± 3.4	0.270
1663	Regina, Saskatchewan	28 ± 16	4.3 ± 3.7	0.150
1664	Edmonton, Alberta	115 ± 45	0.0 ± 3.5	——
1665	Goose Bay, Labrador	72 ± 16	1.0 ± 3.3	0.014
1666	Stephenville, Newfoundland	263 ± 47	4.8 ± 3.5	0.018
1671	Juneau, Alaska	163 ± 9	2.6 ± 5.3	0.016
1674	Bermuda	270 ± 44	2.2 ± 3.2	0.008

* 1656 - 1674 Activity as of counting date 6/27/55

HASL No.	Station	Total Activity* d/m/ft^2/month	Sr^{90} d/m/ft^2/month	$\frac{Sr^{90}}{\text{Total Activity}}$
1675	Lima, Peru	235 ± 82		——
1679	Sao Paulo, Brazil	145 ± 23	0.0 ± 9.3	——
1680	Belem, Brazil	270 ± 26	9.8 ± 6.0	0.036
1681	La Paz, Bolivia	769 ± 55	4.8 ± 5.1	0.006
1682	Quito, Ecuador	112 ± 20	0.0 ± 3.6	——
1687	Pretoria, South Africa	366 ± 24	1.2 ± 3.2	0.003
1694	Nairobi, Kenya, East Africa	149 ± 82	0.0 ± 5.1	——
1695	Durban, Natal U of South Africa	118 ± 35	0.0 ± 3.5	——
1655	Anchorage, Alaska	132 ± 32	0.0 ± 4.4	——
1667	Thule, Greenland	75 ± 13	0.0 ± 7.8	——
1668	Keflavik, Iceland	23 ± 20	14.0 ± 7.0	0.061
1669	Nome, Alaska	21 ± 13	3.6 ± 7.7	0.171
1670	Fairbanks, Alaska	113 ± 24	0.0 ± 8.8	——

* 1675, 1655 - 1670 Activity as of counting date 6/27/55
1679 - 1687 Activity as of counting date 6/29/55
1694 - 1695 Activity as of counting date 6/30/55

HASL No.	Station	Total Activity* d/m/ft²/month	Sr^{90} d/m/ft²/month	Sr^{90} / Total Activity
1672	San Juan, Puerto Rico	46 ± 30	5.3 ± 2.9	0.115
1676	San Jose, Costa Rica	25 ± 40	0.0 ± 3.6	——
1677	Lagens A.F.B., Azores	220 ± 21	0.0 ± 7.7	——
1685	Prestwick, Scotland	442 ± 23	2.1 ± 4.8	0.005
1686	Rhein Main, Germany	726 ± 97	13.0 ± 9.9	0.018
1690	Sidi Slimane, French Morocco	193 ± 27	2.2 ± 4.1	0.011
1691	Oslo, Norway	135 ± 16	0.5 ± 3.6	0.004
1678	Buenos Aires, Argentina	506 ± 42	0.0 ± 3.7	——
1692	Wheelus A.F.B., Tripoli	791 ± 82	6.7 ± 3.5	0.008
1697	Milan, Italy	128 ± 52	1.5 ± 3.1	0.012
1698	Addis Ababa, Ethiopia	30 ± 23	0.0 ± 3.7	——
1706	Melbourne, Australia	236 ± 47	2.2 ± 3.3	0.009
1707	Wellington, New Zealand	98 ± 103	——	——
1710	Sydney, Australia	79 ± 82	2.6 ± 3.3	0.033

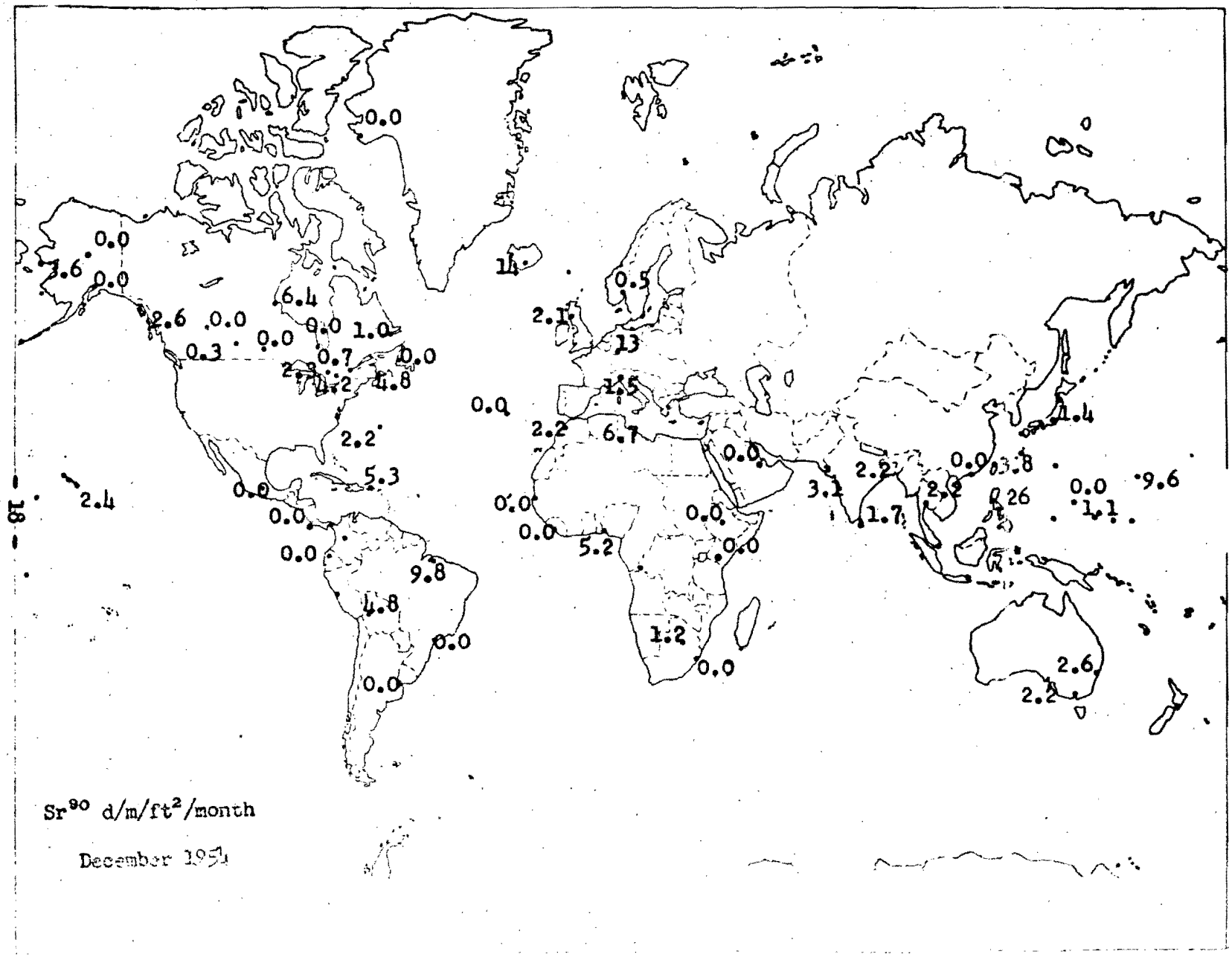
* 1672 - 1676 Activity as of counting date 6/27/55
1677 - 1678 Activity as of counting date 6/29/55
1692 - 1710 Activity as of counting date 6/30/55

HASL No.	Station	Total Activity* d/m/ft²/month	Sr^{90} d/m/ft²/month	Sr^{90} / Total Activity
1673	Canal Zone	143 ± 32	——	——
1683	Mexico City	132 ± 43	0.0 ± 3.5	——
1688	Dakar, French West Africa	185 ± 66	0.0 ± 3.9	——
1689	Dhanhran, Saudi Arabia	246 ± 38	0.0 ± 5.7	——
1693	Lagos, Nigeria	7.4 ± 58	5.2 ± 3.6	0.070
1696	Monrovia, Liberia	142 ± 20	0.0 ± 3.7	——
1700	Hong Kong	113 ± 63	0.0 ± 3.3	——
1701	Tai Pei, Formosa	350 ± 30	3.8 ± 3.7	0.011
1704	Bangkok, Siam	716 ± 56	2.2 ± 2.9	0.003
1705	Bombay, India	77 ± 99	3.1 ± 3.2	0.040
1708	Columbo, Ceylon	129 ± 16	1.7 ± 3.3	0.013
1711	Calcutta, India	75 ± 19	2.2 ± 3.5	0.029

* 1673 Activity as of counting date 7/30/55
1683 - 1689 Activity as of counting date 6/29/55
1693 - 1711 Activity as of counting date 6/30/55

HASL No.	Station	Total Activity* d/m/ft^2/month	Sr^{90} d/m/ft^2/month	Sr^{90} / Total Activity
1702	Tokyo, Japan (Haneda)	250 ± 28	1.4 ± 3.5	0.006
1714	Guam	154 ± 34	0.0 ± 3.6	——
1716	Clarke A.F.B., Phil. Islands	33 ± 18	26.0 ± 12.0	0.790
1717	Johnston Island	213 ± 24	0.0 ± 3.9	——
1720	Wake	111 ± 43	9.6 ± 8.8	0.086
1722	Ponape	199 ± 78	0.8 ± 3.3	0.004
1723	Truk	168 ± 82	1.1 ± 3.6	0.006
1725	Koror	93 ± 56	0.0 ± 6.7	——
1727	Honolulu, Hawaii	30 ± 56	2.4 ± 7.7	0.080

* 1702 - 1727 Activity as of counting date 6/30/55


0.0
0.0
3.6
0.0
6.4
2.6
0.0
0.0
0.0
1.0
0.3
0.7
0.0
2.3
4.2
4.8
14
0.5
2.1
13
1.5
0.0
2.2
6.7
2.2
5.3
0.0
2.4
0.0
0.0
0.0
0.0
5.2
0.0
0.0
0.0
9.8
4.8
0.0
0.0
1.2
0.0
3.1
2.2
1.7
0.0
2.2
0.0
3.8
26
1.4
0.0
1.1
9.6
2.6
2.2
Sr90 d/m/ft2/month
December 1954

E. UNITED STATES DECEMBER COMPOSITE FALLOUT

HASL No.	Station	Total Activity* d/m/ft²/month	Sr^{90} d/m/ft²/month	Sr^{90} / Total Activity
1017	Detroit, Michigan	—	4.0 ± 3.3	—
1018	Louisville, Kentucky	442 ± 18	2.2 ± 2.2	0.005
1019	Knoxville, Tennessee	352 ± 18	14.4 ± 4.9	0.041
1020	Memphis, Tennessee	304 ± 18	5.1 ± 3.0	0.017
1021	Atlanta, Georgia	—	2.5 ± 2.3	—
1022	Philadelphia, Pennsylvania	312 ± 33	7.8 ± 2.6	0.025
1023	Pittsburgh, Pennsylvania	386 ± 2	10.7 ± 3.6	0.028
1024	New York, New York	256 ± 20	7.4 ± 3.4	0.029
1025	Binghamton, New York	55 ± 9	0.0 ± 2.2	—
1026	Rochester, New York	151 ± 12	6.3 ± 2.5	0.042
1627	Jacksonville, Florida	86 ± 18	0.0 ± 3.9	—
1628	Miami, Florida	51 ± 13	2.1 ± 3.4	0.041
1632	Boston, Massachusetts	162 ± 33	2.3 ± 3.7	0.014

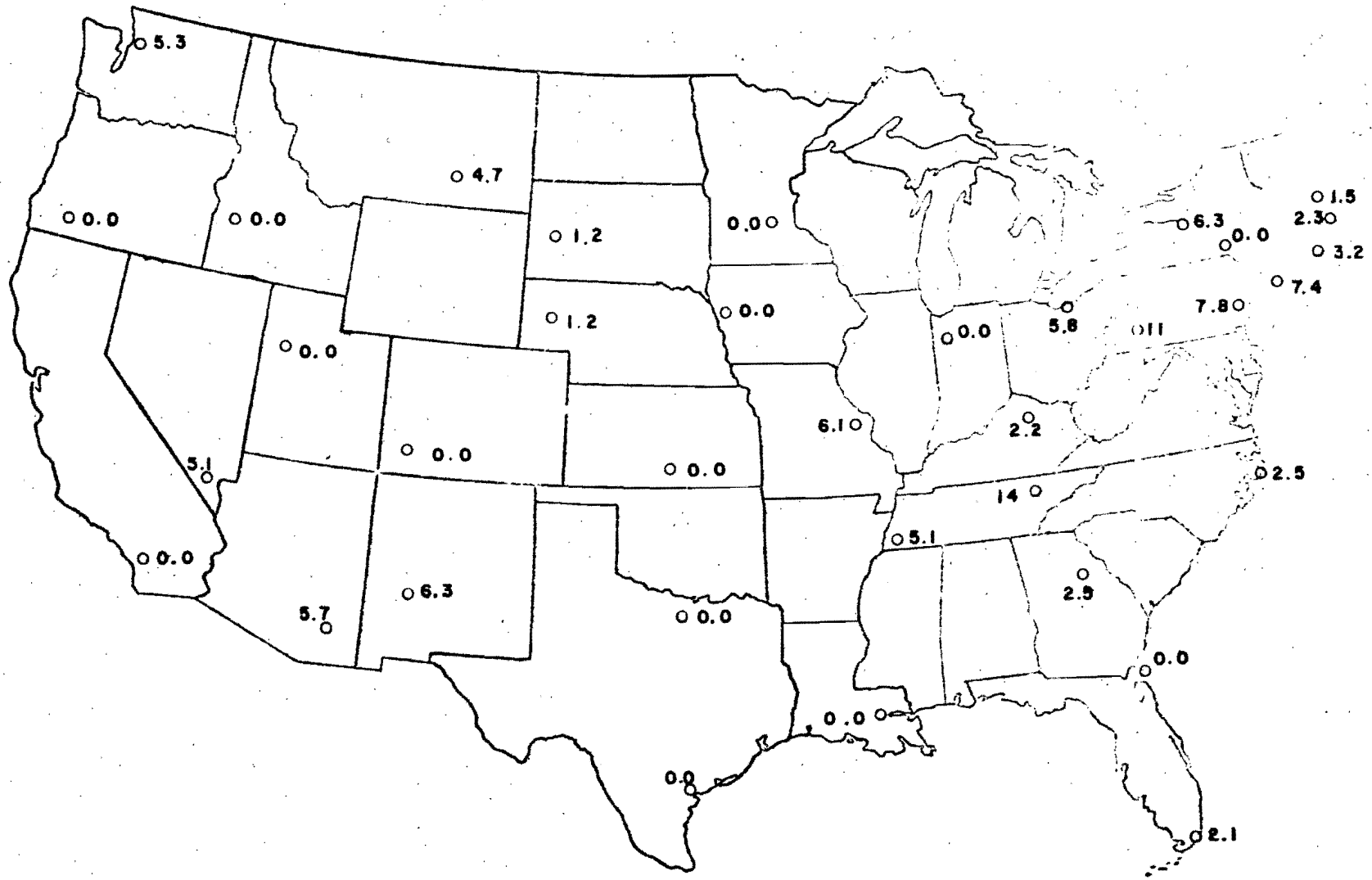
* 1017 - 1026 Activity as of counting date 4/19/55
1627 - 1632 Activity as of counting date 6/25/55

HASL No.	Station	Total Activity* d/m/ft²/month	Sr^{90} d/m/ft²/month	Sr^{90} / Total Activity
1633	Corpus Christi, Texas	21 ± 7	0.0 ± 4.0	——
1634	Dallas, Texas	109 ± 28	0.5 ± 3.1	0.004
1630	Cape Hattaras, North Carolina	235 ± 39	2.5 ± 2.7	0.011
1635	Wichita, Kansas	30 ± 18	2.1 ± 3.7	0.070
1636	Scottsbluff, Nebraska	65 ± 23	9.2 ± 3.0	0.142
1637	Rapid City, South Dakota	22 ± 18	0.0 ± 3.1	——
1639	Des Moines, Iowa	192 ± 28	4.7 ± 3.8	0.024
1641	St. Louis, Missouri	230 ± 34	2.4 ± 3.2	0.010
1642	Chicago, Illinois	162 ± 23	3.0 ± 3.4	0.018
1644	Boise, Idaho	100 ± 16	3.5 ± 3.0	0.035
1647	Tucson, Arizona	96 ± 29	5.7 ± 3.7	0.060
1648	Grand Junction, Colorado	118 ± 19	0.0 ± 3.4	——
1649	Albuquerque, New Mexico	104 ± 59	6.3 ± 3.1	0.061

* 1633 - 1649 Activity as of counting date 6/25/55

HASL No.	Station	Total Activity* d/m/ft²/month	Sr^{90} d/m/ft²/month	Sr^{90} / Total Activity
1650	Las Vegas, Nevada	48 ± 70	5.1 ± 3.4	0.110
1651	Seattle, Washington	243 ± 21	5.3 ± 3.5	0.022
1652	Medford, Oregon	108 ± 19	0.0 ± 3.4	—
1654	Los Angeles, California	125 ± 29	0.0 ± 3.4	—
1631	Concord, New Hampshire	72 ± 15	0.0 ± 3.2	—
1643	New Orleans, Louisiana	268 ± 64	6.6 ± 3.8	0.025
1645	Billings, Montana	57 ± 25	1.6 ± 3.1	0.028
1646	Salt Lake City, Utah	199 ± 21	0.6 ± 3.6	0.003
1626	New Haven, Connecticut	178 ± 16	3.2 ± 3.6	0.018
1629	Cleveland, Ohio	194 ± 28	5.8 ± 3.5	0.030
1638	Minneapolis, Minnesota	158 ± 23	0.0 ± 3.5	—

* 1650 - 1654 Activity as of counting date 6/27/55
1631 - 1638 Activity as of counting date 6/25/55



SR^{90} D/M/FT^2 FOR DECEMBER 1954

II. SUMMATION OF WORLD TOTAL FALLOUT ACTIVITY FOR SEPTEMBER THROUGH DECEMBER 1954

In order to estimate total world fallout from the relatively small number of sampling stations available, the surface was divided in the following manner:

Zone	Area
North Temperate	21,884,154 square miles
South Temperate	35,021,941 square miles
North Tropic	37,054,470 square miles
Arctic	12,929,328 square miles
South Tropic	50,931,103 square miles
Pacific	15,981,048 square miles
United States	3,022,387 square miles

Sampling stations were assigned to a zone according to its geopraphical location. The number of stations sending in at least 10 daily samples are listed for each month in Tables A, B, C, and D.

The estimated mean total fallout for each zone is the product of the average total activity per square foot and the zonal area. In the zones where the station density

is low, the sampling area may represent as low as 10^{-13} per cent of the total area. Since a rigorous statistical analysis of the data would be difficult at the present time, minimum and maximum values for within zone measurements have been recorded in the tables.

Total world fallout of β activity extrapolated to 1/1/56 for September is estimated at 0.3 megacuries. During October, the estimated fallout activity is 0.2 megacuries; 0.25 megacuries for November; and 0.32 megacuries in December. Activity values for November and December were extrapolated to 1/1/56 using 10/15/54 as a mid-point in the Russian series, and 4/11/54 as a mid-point in the Castle series.

Tabulated below is a comparison of these data:

Month	Estimated Activity Blast date - 4/11/54	Estimated Activity Blast date - 10/15/54
November	0.25	0.17
December	0.32	0.24

The fraction of Russian fissions in the debris collected during this period is unknown. Therefore, the estimated values tabulated above represent a minimum and maximum value for the activity at 1/1/56.

In figure II E, the monthly total world fallout for the period from June to December 1954 is plotted. The results for June, July, and August were taken from NYOO-4621, "Radioactive Debris from Operation Castle Fallout", and extrapolated to 1/1/56.

A. TOTAL WORLD FALLOUT - SEPTEMBER 1954

Burst Date - 4/11/54
Extrapolated Date - 1/1/56
Decay Slope - -1.2
Counting Period - 4/55 to 6/55

Zone	Number of Stations	Minimum mc/mi^2	Mean mc/mi^2	Maximum mc/mi^2	Estimated Mean Curies
North Temperate	14	0.72	1.99	3.79	43,711
South Temperate	1	—	0.98	—	34,311
North Tropic	8	0.02	1.22	3.03	46,418
Arctic	5	0.77	1.54	3.69	19,963
South Tropic	9	0.59	2.82	10.94	143,626
Pacific	2	0.48	0.80	1.12	12,785
United States	37	0.11	1.49	5.16	4,512
TOTAL					305,328

B. TOTAL WORLD FALLOUT - OCTOBER 1954

Burst Date - 4/11/54
Extrapolated Date - 1/1/56
Decay Slope - -1.2
Counting Period - 4/55 to 6/55

Zone	Number of Stations	Minimum mc/mi^2	Mean mc/mi^2	Maximum mc/mi^2	Estimated Mean Curies
North Temperate	17	0.56	1.67	4.60	36,481
South Temperate	4	0.55	1.10	1.70	38,619
North Tropic	15	0.0	0.86	3.09	32,527
Arctic	5	0.37	1.03	1.58	13,343
South Tropic	9	0.68	1.56	4.51	79,503
Pacific	17	0.41	0.97	2.51	15,437
United States	37	0.17	1.35	3.23	4,074
TOTAL					219,984

C. TOTAL WORLD FALLOUT - NOVEMBER 1954

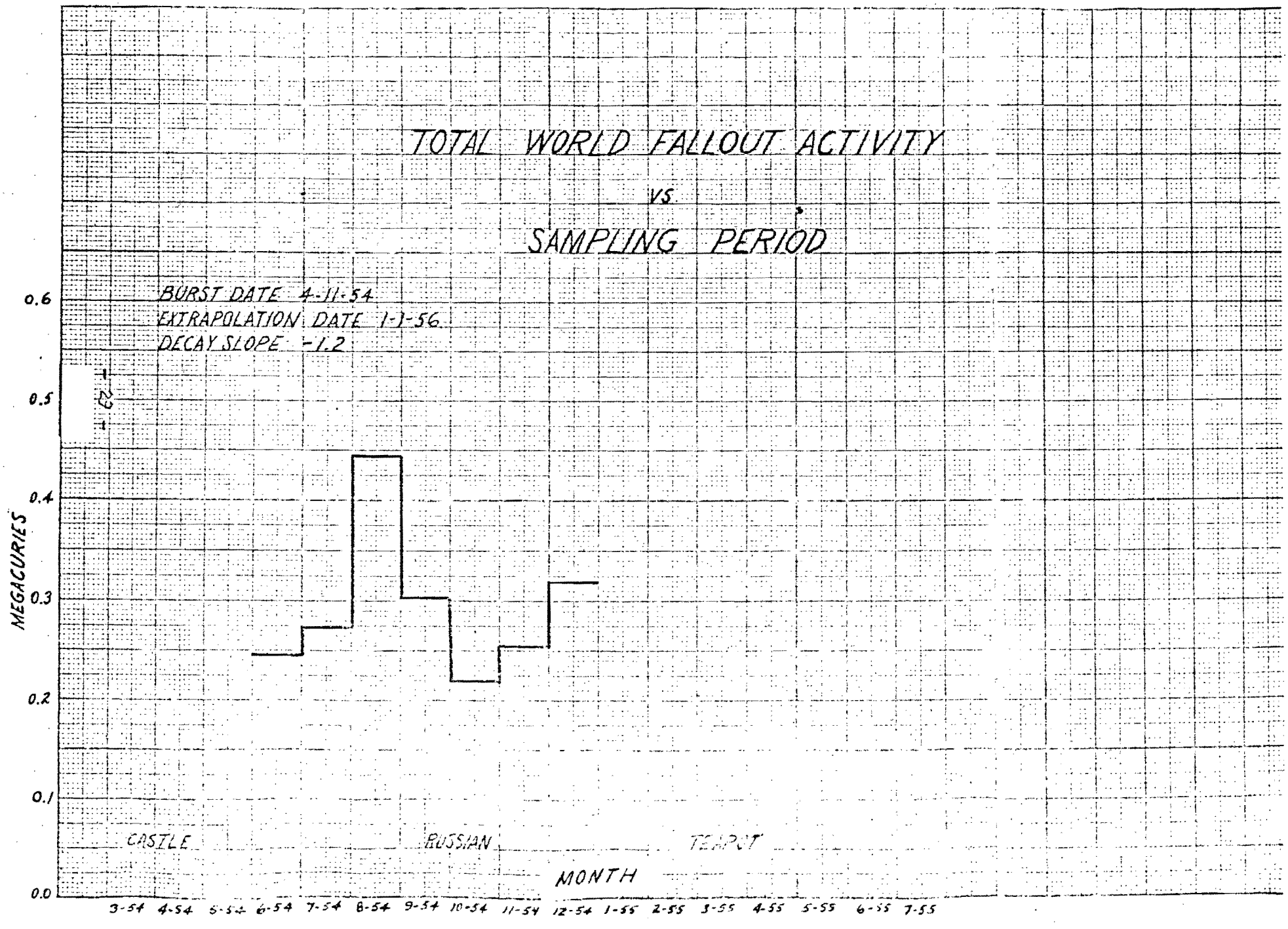
Burst Date - 4/11/55
Extrapolated Date - 1/1/56
Decay Slope - -1.2
Counting Period - 4/55 to 6/55

Zone	Number of Stations	Minimum mc/mi^2	Mean mc/mi^2	Maximum mc/mi^2	Estimated Mean Curies
North Temperate	19	0.25	1.50	4.48	32,892
South Temperate	4	0.68	1.01	1.64	35,433
North Tropic	14	0.25	1.11	5.18	41,978
Arctic	4	0.02	0.67	1.16	8,637
South Tropic	8	0.61	2.29	9.35	116,581
Pacific	19	0.06	0.86	2.45	13,664
United States	36	0.36	1.59	4.80	4,803
TOTAL					253,988

D. TOTAL WORLD FALLOUT - DECEMBER 1954

Burst Date - 4/11/54
Extrapolated Date - 1/1/56
Decay Slope - -1.2
Counting Period - 4/55 to 6/55

Zone	Number of Stations	Minimum mc/mi^2	Mean mc/mi^2	Maximum mc/mi^2	Estimated Mean Curies
North Temperate	21	0.09	1.73	6.92	37,881
South Temperate	4	0.69	2.01	4.43	70,376
North Tropic	14	0.06	1.50	6.27	56,932
Arctic	5	0.19	0.64	1.16	8,275
South Tropic	6	0.98	2.37	6.73	120,706
Pacific	9	0.26	1.21	2.18	19,337
United States	35	0.18	1.31	3.19	3,970
TOTAL					317,477


TOTAL WORLD FALLOUT ACTIVITY
VS.
SAMPLING PERIOD
BURST DATE 4-11-54
EXTRAPOLATION DATE 1-1-56
DECAY SLOPE -1.2
MEGACURIES
0.0
0.1
0.2
0.3
0.4
0.5
0.6
CASTLE
RUSSIAN
TEAPOT
MONTH
3-54 4-54 5-54 6-54 7-54 8-54 9-54 10-54 11-54 12-54 1-55 2-55 3-55 4-55 5-55 6-55 7-55

III. SUMMATION OF WORLD WIDE Sr^{90} FALLOUT FROM SEPTEMBER TO DECEMBER 1954

The same procedure for calculation of estimated total world wide β activity is used for estimation of Sr^{90} fallout. This is described in Section II.

The estimated Sr^{90} content of fallout material for September through December is as follows:

Month	Curies Total Activity*	Curies Sr^{90}	Sr^{90} / Total Activity
September	305,328	20,149	.066
October	219,984	14,784	.067
November	253,988	16,606	.065
December	317,477	5,480	.017

* Extrapolated to 1/1/56

The data indicate that improvement in the estimate of total world fallout will result from the following:

1. Increase the number of collecting stations outside the United States, or redistribute the existing network more homogeneously throughout the world.

2. Since the predictable error of the Sr^{90} analysis is large, and in many cases greater than the disintegration rate of the sample, a more precise measurement would result from the utilization of instrumentation with lower background counting rates.

A. TOTAL WORLD Sr^{90} FALLOUT - SEPTEMBER 1954

Zone	Number of Stations	Minimum mc/mi^2	Mean mc/mi^2	Maximum mc/mi^2	Estimated Mean Curies
North Temperate	14	0.0	0.093	0.3	2,035
South Temperate	1	—	0.2	—	7,003
North Tropic	8	0.0	0.036	0.2	1,366
Arctic	5	0.0	0.064	0.2	828
South Tropic	9	0.0	0.171	0.5	8,709
Pacific	2	0.0	0.0	0.0	0.0
United States	39	0.0	0.069	0.9	208
TOTAL					20,149

B. TOTAL WORLD Sr^{90} FALLOUT - OCTOBER 1954

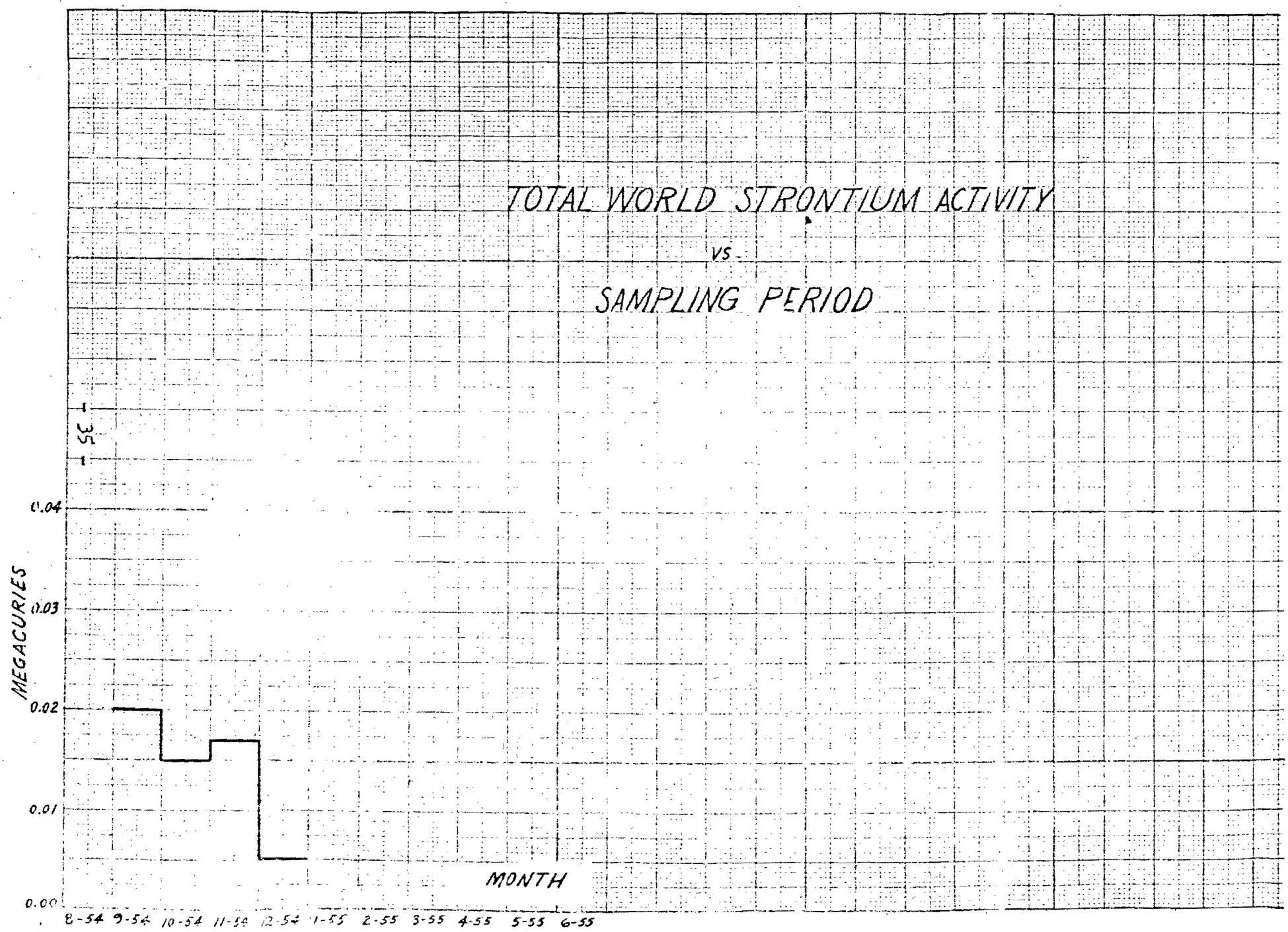
Zone	Number of Stations	Minimum mc/mi^2	Mean mc/mi^2	Maximum mc/mi^2	Estimated Mean Curies
North Temperate	17	0.0	0.036	0.14	788
South Temperate	4	0.02	0.060	0.16	2,101
North Tropic	15	0.0	0.077	0.55	2,922
Arctic	5	0.0	0.158	0.21	2,043
South Tropic	9	0.0	0.124	0.65	6,315
Pacific	16	0.0	0.030	0.09	479
United States	39	0.0	0.045	0.6	136
TOTAL					14,784

C. TOTAL WORLD Sr^{90} FALLOUT - NOVEMBER 1954

Zone	Number of Stations	Minimum mc/mi^2	Mean mc/mi^2	Maximum mc/mi^2	Estimated Mean Curies
North Temperate	19	0.0	0.078	0.41	1,707
South Temperate	4	0.0	0.12	0.41	4,202
North Tropic	14	0.0	0.035	0.12	1,328
Arctic	4	0.06	0.072	0.08	931
South Tropic	8	0.0	0.13	0.48	6,621
Pacific	19	0.0	0.10	0.57	1,598
United States	38	0.0	0.0724	0.40	219
TOTAL					16,606

D. TOTAL WORLD Sr^{90} FALLOUT - DECEMBER 1954

Zone	Number of Stations	Minimum mc/mi²	Mean mc/mi²	Maximum mc/mi²	Estimated Mean Curies
North Temperate	21	0.0	0.032	0.16	700
South Temperate	3	0.0	0.02	0.03	700
North Tropic	14	0.0	0.0192	0.07	729
Arctic	5	0.0	0.046	0.18	595
South Tropic	7	0.0	0.0286	0.12	1,530
Pacific	8	0.0	0.0638	0.33	1,087
United States	36	0.0	0.046	0.18	139
TOTAL					5,480


TOTAL WORLD STRONTIUM ACTIVITY
VS.
SAMPLING PERIOD
MEGACURIES
0.04
0.03
0.02
0.01
0.00
MONTH
8-54
9-54
10-54
11-54
12-54
1-55
2-55
3-55
4-55
5-55
6-55

IV. COMPARISON OF Sr^{90} COLLECTION BY GUMMED PAPER AND POT ON THE ROOF OF HASL DURING MAY, JUNE, AND JULY

A sheet of gummed paper, of the type used for fallout analysis, and a 12-gallon stainless steel pot are exposed, side by side, for weekly intervals on the roof of HASL. The weekly analyses for total activity and Sr^{90} content are grouped into monthly composites for comparison of collection efficiency.

The Sr^{90} to total activity ratio for the pot in both months were higher than the gummed paper. The Sr^{90} collection in the roof pot is a factor of 3.0 or 4.0 above that for one gummed paper. During May and June, an inferior batch of gummed paper was used at HASL. This paper lost its adhesive qualities after a few hours of exposure. This is the reason for the exceptionally low total activity and Sr^{90} results for this period.

A. TABLE OF GUMMED PAPER AND POT COMPARISON DURING MAY, JUNE, AND JULY

Week of	Total Activity d/m/ft² HASL No.	G.P.	HASL No.	R.P.	Sr^{90} d/m/ft² G.P.	R.P.	Sr^{90} / Total Activity G.P.	R.P.
MAY								
5/2/55	1501	2200	1502	1200	8.2	12	.004	.010
5/9/55	1520	590	1521	310	1.8	1.3	.003	.004
5/16/55	1532	2300	1533	34	1.7	4.1	.001	0.12
5/23/55	1610	4200	1611	14500	6.9	39	.002	.003
TOTALS		9,290		16,044	18.6	56.4	.002	.004
JUNE								
5/30/55	1620	150	1621	360	5.0	1.9	.033	.005
6/6/55	1622	620	1623	1100	2.6	14	.004	.001
6/13/55	1624	220	1625	210	0.0	5.8	—	.028
6/20/55	1734	440	1735	1150	4.0	30	.009	.026
6/27/55	1845	130	1846	58	0.8	0.0	.006	—
TOTALS		1,560		2,878	12.4	51.7	.008	.018
JULY								
7/4/55	1847	110	1848	120	1.6	1.0	—	—
7/11/55	1853	—	1854	210	—	11	—	—
7/18/55	1858	58	—	—	2.3	—	—	—

V. Sr^{90} CONTAMINATION OF COW'S MILK IN LARGE MILK PRODUCING AREAS

Since milk is a major source of body calcium in the United States, HASL has monitored the milk supply of Metropolitan New York for Sr^{90} content during the past eighteen months. Previous to April 1955, five pound samples of powdered milk and eight quart weekly samples of wet milk were analyzed on a weekly basis. The results of this weekly survey are reported in NYO-4653. Beginning with the April 1955 milk supply, weekly samples are composited, analyzed, and reported monthly. This program has been broadened to include monthly samples from other large milk producing areas throughout the United States, and a sample from England and Japan.

A. COMPOSITE MILK SAMPLES IN METROPOLITAN NEW YORK FOR MAY, JUNE, AND JULY

Two types of milk, representing the major milk suppliers in this area are analyzed for the Sr^{90} content. Five-pound lots of dry whole milk are obtained on a weekly basis. The samples are conbined, ashed, and divided into two equal parts; and analyzed monthly for Sr^{90} content. A large quantity of Sr^{89} appears in the May and June milk supply, which would indicate exposure of livestock to fresh fallout debris. A steady increase of the Sr^{90} content is evident in the June and July milk supply. The value for July has reached 4.1 Sunshine Units.

TABLE A

COMPOSITE MILK SAMPLES IN METROPOLITAN NEW YORK FOR MAY, JUNE, AND JULY

MAY

Type	HASL No.	Sr^{90} d/m/qt	Sr^{89}* d/m/qt	Sunshine Units
Wet	1614 A	5.9 ± 0.2	100 ± 8.8	2.1 ± 0.1
	B	4.7 ± 0.2	93 ± 8.7	1.7 ± 0.1
Dry	1615 A	———	———	———
	B	5.0 ± 0.1	55 ± 0.5	1.5 ± .03

JUNE

Wet	1851 A	7.6 ± 0.2	108 ± 2.4	2.8 ± .08
	B	8.7 ± 0.2	126 ± 2.4	3.2 ± .08

JULY

Wet	1900 A	11.5 ± 0.3	79 ± 1.0	4.2 ± .08
	B	11.0 ± 0.4	37 ± 1.1	4.0 - 0.2

* Extrapolated to first day of sampling month

B. JAPANESE MILK SAMPLES

Two pounds of dry whole milk are received monthly from a large milk distributor in Japan. The milk is ashed and analyzed in duplicate for Sr^{89} and Sr^{90} content. Analyses since January 1955 indicate that the Sr^{90} content is of the same order of magnitude as the milk supply in metropolitan New York. No steady rise of radiostrontium is evident in the Japanese milk supply during the early summer months.

TABLE B

JAPANESE MILK SAMPLES

Sampling Month	Sr^{89}* d/m/qt	Sr^{90} d/m/qt
February 1955	0.0 ± 3.5	2.9 ± 0.8
	0.0 ± 3.5	4.4 ± 0.8
March 1955	0.0 ± 2.3	2.9 ± 0.8
	0.7 ± 2.3	3.5 ± 0.8
April 1955	0.0 ± 2.4	2.7 ± 0.7
	0.2 ± 2.4	4.2 ± 0.7
May 1955	8.6 ± 1.9	1.2 ± 0.8
	4.0 ± 1.8	1.9 ± 0.8

* Extrapolated to first day of sampling month

C. CONTROL MILK FOR MAY AND JUNE

To check possible laboratory contamination or gradual procedural changes, 150 pounds of dried milk from a single batch was purchased. Duplicate samples have been analyzed monthly since July 1954. The mean, based on eighteen analyses, is 2.3 d/m/qt. The results for May and June 1955 are in Table C, and are lower than found in previous analyses. Recovery experiments are in process to determine whether this resulted from a change in the procedure.

TABLE C

CONTROL MILK

Date Analyzed	Sr^{90} d/m/qt	Sunshine Units
5/1/55	1.4 ± 0.2	0.4 ± 0.1
	1.2 ± 0.2	0.4 ± 0.1
6/1/55	1.2 ± 0.1	0.4 ± 0.1
	1.6 ± 0.2	0.4 ± 0.1

Sr^{90} d/m/qt 7/1/54 - 4/1/55

Minimum	Mean	Maximum
1.3	2.3	3.3

D. COMPOSITE MILK SAMPLES FROM MADISON, WISCONSIN AND MANDAN, NORTH DAKOTA

As a part of HASL's increasing milk monitoring system, monthly samples are received from Madison, Wisconsin and Mandan, North Dakota. The analytical data for the first monthly composites are reported in Table D. The Sr^{90} content is of the same order of magnitude as that for the Metropolitan New York area for the month of May.

TABLE D

COMPOSITE MILK SAMPLES FROM MADISON, WISCONSIN AND MANDAN, NORTH DAKOTA

MAY (Madison, Wisconsin)

HASL #	Sr^{90} d/m/qt	Sr^{89}* d/m/qt	Sunshine Units
1531 A	3.2 ± .07	35 ± 0.6	1.0 ± .02
B	1.5 ± .08	14 ± 0.5	0.5 ± .02

MAY (Mandan, North Dakota)

1840 A	2.6 ± .09	29 ± 0.6	0.8 ± .03
B	1.7 ± .06	12 ± 0.4	0.5 ± .02

* Extrapolated to first day of sampling month

VI. A. JAPANESE BONE SAMPLES

Table A gives the Sr^{90} content of adult bones received from Japan. These samples were analyzed at Nuclear Science and Engineering Corporation at Pittsburgh, Pennsylvania. The significant finding here is that small but measureable quantities of Sr^{90} are found in all age levels among the Japanese population.

Additional information concerning the bone samples has been requested from the ABCC in Japan.

TABLE A

Sr^{90} CONTENT OF JAPANESE BONE SAMPLES

HASL No.	Autopsy Number	Age	Specimen	Sr^{90} d/m/g ash	Sunshine Units
418	53-AH-251	68	Entire left femur Segments of 2 ribs Segment of crest of ilium Segments of 3 ribs	0.02 ± 0.003	0.03 ± 0.005
420	53-AH-260	55	Entire left femur Segments of 5 vertebrae Segment of 1 rib Part of crest of ilium	0.042 ± 0.004	0.055 ± 0.005
424	53-AH-289	49	Entire left femur Segments of 2 ribs Segments of 2 vertebrae Segment of crest of ilium	0.009 ± 0.002	0.01 ± 0.003
426	53-AH-305	76	Entire left femur Segments of 2 ribs Segment of crest of ilium Segments of 3 vertebrae 2 segments of sternum	0.040 ± 0.005	0.044 ± 0.006
429	53-AH-319	60	Entire femur Segments of 3 vertebrae (1 slab) Segments of 2 ribs Segment of crest of ilium Segment of sternum	0.0085 ± 0.0006	0.0097 ± 0.0009
432	53-AH-328	47	Entire femur Segments of 2 ribs Segments of 2 vertebrae (1 slab) Another segment of vertebra	0.023 ± 0.003	0.043 ± 0.007
444	54-AH-16	64	Entire left femur Segment of 1 rib Segment of sternum Segments of 2 vertebrae	0.045 ± 0.006	0.054 ± 0.007

VI. B. COOPERATIVE ANALYSIS

The seven Japanese bone samples mentioned in VI A, which were run at HASL, were sent to Nuclear Science and Engineering Corporation for Sr^{90} analysis. Because of their low activity, the standard deviations, due to the counting error at HASL, was in most cases higher than the Sr^{90} content. Since NSEC used a lower background β counter, their results would be more reliable for this low level activity. In all cases in Table VI A, measureable amounts of Sr^{90} were obtained. In addition, two vegetation and one calf bone sample were sent to NSEC for analysis - Table B gives the HASL and NSEC results.

The calcium results show possibly important differences.

TABLE B

CALCIUM AND Sr^{90} CONTENT OF COOPERATIVE SAMPLES

HASL No.	Type	% Ca HASL	% Ca NSEC	Sr^{90} d/m/g ash HASL	Sr^{90} d/m/g ash NSEC	Sunshine Units HASL	Sunshine Units NSEC
682	calf bone	36.1	34.8	2.14±0.13	0.74 ±0.07	2.7 ±0.2	0.96 ±0.09
732	vegetation	8.4	11.8	4.84±0.90	5.22 ±0.25	26.2 ±0.5	20.0 ±1.4
733	vegetation	6.0	8.6	1.21±0.06	2.18 ±0.08	9.14±0.4	11.5 ±0.6
418	human bone	36.0	28.5	0.13±0.09	0.02 ±0.003	0.16±0.11	0.03 ±0.005
420	human bone	36.0	35.0	0.0 ±0.1	0.042 ±0.004	0.0 ±0.11	0.055 ±0.005
424	human bone	36.0	39.0	0.9 ±0.1	0.009 ±0.002	1.0 ±0.11	0.01 ±0.003
426	human bone	36.0	40.8	0.08±0.09	0.040 ±0.005	0.10±0.11	0.044 ±0.006
429	human bone	36.0	39.8	0.01±0.09	0.0085±0.0006	0.12±0.11	0.0097±0.0009
432	human bone	36.0	21.5	0.1 ±0.09	0.023 ±0.003	0.13±0.11	0.043 ±0.007
444	human bone	36.0	38.8	0.18±0.09	0.045 ±0.006	0.22±0.11	0.054 ±0.007

VII. Sr^{90} CONTENT OF RAINWATER COLLECTED AT WATERTOWN, NEW YORK

Knowlton Brothers, a photographic paper manufacturer, collects a sample from all rainwater in Watertown. This sample is surveyed, and if the activity level is measureable, the sample is sent to HASL for further analysis. Total β activity was determined at HASL on a small aliquot, and the remainder was sent to NSEC for Sr^{90} analysis. Table VII A gives the collection date, β activity, and Sr^{90} activity for these samples.

TABLE A

TOTAL ACTIVITY AND Sr^{90} CONTENT OF RAINWATER COLLECTED AT WATERTOWN, NEW YORK

HASL No.	Sampling Date	Volume ml	Sr^{90} d/m/l	Total Activity C-date	Total Activity d/m/l
233*	3/20/54	3940	3.2 ± 0.2	5/1/54	660.5
234*	4/9/54	3080	2.0 ± 0.2	5/1/54	317.0
235*	4/20/54	3150	5.2 ± 0.4	5/1/54	924.7
236*	4/23/54	3040	4.3 ± 0.3	5/1/54	502.0
333	6/22/54	3060	4.2 ± 0.4	6/30/54	544.3
374*	9/21/54	3900	1.4 ± 0.1	10/4/54	5548.2
375*	9/27/54	1400	3.5 ± 0.3	10/4/54	1664.5
386*	9/30/54	3670	6.0 ± 0.4	10/12/54	660.5
389*	10/2/54	3900	3.1 ± 0.2	10/12/54	1347.4
1011**	2/23/55	3920	3.5 ± 0.2	3/14/55	210 ± 3.5
1012	2/28/55	3720	4.6 ± 0.3	3/14/55	287 ± 4.2
1027**	3/7/55	3920	5.9 ± 0.5	3/14/55	714 ± 5.6
1036**	3/10/55	3860	12.0 ± 0.7	4/5/55	642 ± 5.4
1044	3/11/55	3840	9.2 ± 0.6	4/5/55	360 ± 5.6

* insoluble

** melted snow sample

HASL No.	Sampling Date	Volume ml	Sr^{90} d/m/l	Total Activity C-date	Total Activity d/m/l
1045	3/12/55	3900	5.1 ± 0.4	4/5/55	600 ± 5.4
1046	3/14/55	3360	11.4 ± 0.6	4/6/55	147 ± 4.5
1047	3/16/55	3970	7.7 ± 0.4	4/6/55	1480 ± 3.8
1075	3/17/55	3890	13.5 ± 0.8	4/5/55	936 ± 6.6
1133**	3/24/55	4080	11.4 ± 0.6	4/5/55	366 ± 5.4
1134	3/22/55	3880	8.3 ± 0.4	4/5/55	354 ± 4.8
1135	3/23/55	3980	7.8 ± 0.4	4/5/55	1010 ± 6.0
1139	3/26/55	3890	2.7 ± 0.2	4/5/55	222 ± 4.8
1336	4/14/55	3620	9.2 ± 0.4	5/3/55	510 ± 55
1337	4/19/55	3960	19.6 ± 1.1	5/3/55	4770 ±120
1349	4/21/55	3800	26.6 ± 1.3	5/3/55	600 ± 91
1353	4/25/55	3780	9.0 ± 0.5	5/3/55	700 ± 62
1504	5/9/55	3870	15.6 ± 0.9	5/25/55	2490 ±110
1612	5/26/55	4000	9.4 ± 0.4	—	—
1613	5/29/55	3990	7.2 ± 0.4	—	—

** melted snow sample