

## SHORTER CONTRIBUTION

### The World-wide Strontium 90 Deposition during the Period from 1951 to the Fall of 1955

by

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The distribution map of the cumulative strontium 90 deposition on the whole earth during five years from the beginning of 1951 to the fall of 1955 was made based on the data of EISENBUD and HARLEY (1956) and those submitted by various countries to the Third Conference of the UN Scientific Committee on the Effect of Atomic Radiation which was held in March 1957 (Fig. 1). Regarding the

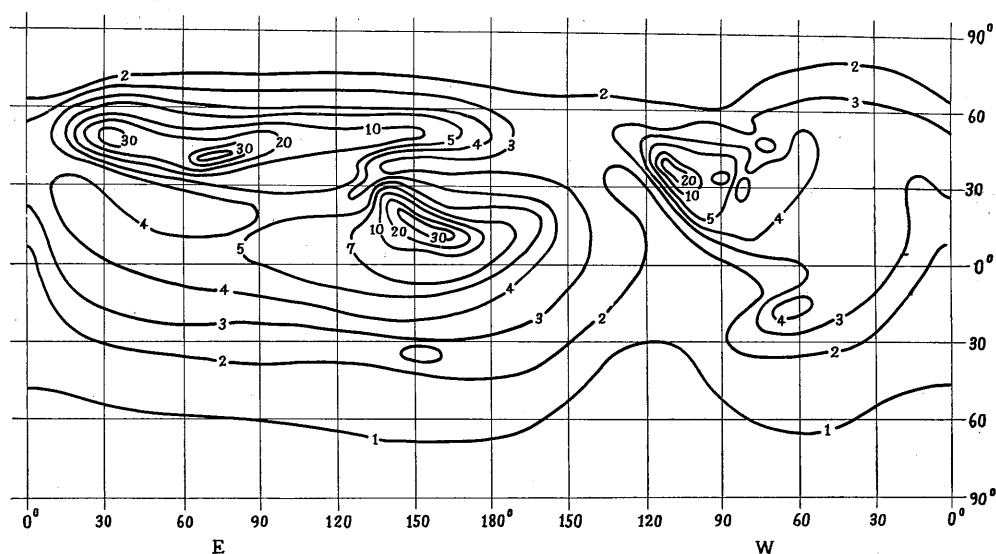


Fig. 1. Sr-90 deposits on the earth, 1951~1955 (mc of Sr-90/mi<sup>2</sup>).

distribution in the oceanic areas, the data obtained on islands were employed and the iso-Sr90 curves were drawn by interpolation, in which secondary changes due to the oceanic current were not taken into account. The map shows clearly that there are three big sources of contamination in the areas near Bikini Atoll in the Pacific, Kazakh district (between Black Sea and Lake Balkhash) in USSR and Nevada in USA. Among them the last is the smallest as origin of contamination, because it may be the proving ground of atomic bombs only, while in the former two areas hydrogen bomb tests are carried on, which might

produce much higher contamination than atomic bombs. It is interesting to see that most of the radioactive fallout derived from the Bikini area was transported west- and northwest-ward, which is mainly due to the trade wind and the clockwise flow of the air along the circumference of the North Pacific high.

On the other hand, the fallout originated from Central Asia and Nevada flowed eastward owing to the strong westerly in the temperate zone. As it is shown in the map the larger part of strontium 90 was deposited in the northern hemisphere, especially in its eastern half. Such a pattern of distribution may be attributed to the zonal structure of the world wind system and the location of the contamination sources. Table 1 shows the amount of radiostrontium in

Table 1. Cumulative Deposition of Strontium 90.  
(September, 1955)

Unit: megacurie			
N-Hemisphere		S-Hemisphere	
0.57 (81.4%)		0.13 (18.6%)	
East	West	East	West
0.40 (57.1%)	0.17 (24.3%)	0.07 (10.0%)	0.06 (8.6%)

megacurie accumulated on both hemispheres and their east and west parts. The total amount on the whole earth reached to 0.7 megacurie. It is to be noticed that about 81% and 57% of the total strontium are concentrated respectively on the northern hemisphere and its eastern half. Table 2 gives the mean values of

Table 2. Cumulative Deposition of Strontium 90.  
(September, 1955)

Unit: millicurie/mi <sup>2</sup>	
Whole Earth	3.5
N-Hemisphere	5.7
	East 8.0
	West 3.4
S-Hemisphere	1.3
	East 1.4
	West 1.2

Sr-90 concentration expressed in millicurie per square mile on different parts of the earth. The mean value of Sr-90 deposition was 3.5 mc/mi<sup>2</sup>\*. As is already given in Fig. 1, there is a remarkable meridional distribution of strontium 90 deposition on the northern hemisphere which is summarized in Figs. 2A and 2B. Fig. 2A shows that there are two maxima respectively between 10° and 20°N as well as between 40° and 50°N, while the maximum near 35°N on the dotted

\* It increased to about 20 mc/mi<sup>2</sup> on an average in the temperate zone of the northern hemisphere in the middle of 1957.

curves in Fig. 2B represents that due to the Nevada test that took place in the western hemisphere.

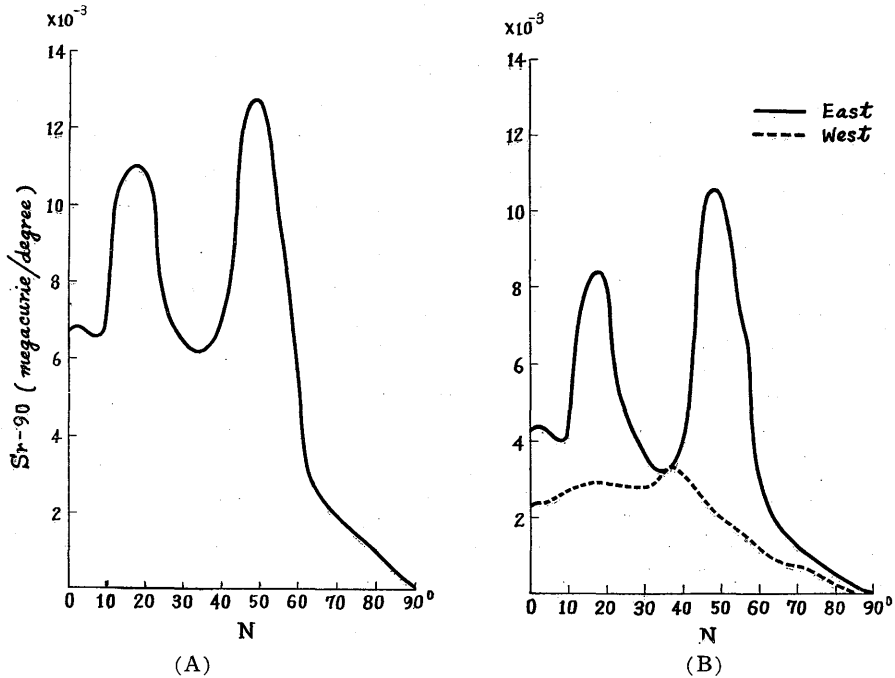


Fig. 2. Sr-90 deposition on the northern hemisphere.

### References

- H. EISENBUD and J.H. HARLEY, 1956: Radioactive fallout through September 1955, *Science* 124, 251.
- Data on deposition of Sr-90, submitted to UN Scientific Committee on the Effect of Atomic Radiation, 1957.

## 1951 年から 1955 年秋までに地表面に蓄積した Sr-90 の世界的分布

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1957年3月に開催された国連の第3回科学委員会に、各国から提出された Sr-90 の資料に基づいて、1951年のはじめから1955年の秋までの5年間に、地表面に蓄積した Sr-90 含量の世界的分布を求めた。主なる汚染源としては、第1図から明らかなように、太平洋のビキニ環礁、ソ連のカザツク地方（黒海とバルハン湖の間）およびアメリカ合衆国のネバダの三点がある。前二者では、水爆実験も行われているので、原爆実験のみを行つているネバダに比べれば、汚染度は高い。第1図によると、ソ連の実験とネバダの実験では、汚染地域は偏西風につて西から東へのび、ビキニでは逆に偏東風で西にひろがっている。これは地球上の風系と全く一致しているところである。

1955年秋までに地表面に蓄積した Sr-90 の総量は地球全体で0.7メガキエリーとなる。北半球には地球全体の80%、その中、東半には、地球全体の約57%が集まっている。緯度による分布をみると、第2図(A)に示すように、北緯20°と50°附近の2カ所にピークがみられる。前者はビキニ実験によるものであり、後者はソ連の実験によるものである。第2図(B)には北半球を東半、西半にわけての分布を示した。東半の分布は第2図(A)と同じような形であるが、西半は40°附近に一つのピークがみられる。これはネバダの実験によるものであり、前者に比べれば、その汚染度は低い。