PUBLIC HEALTH

Lasting Fallout Danger

A person who leaves his shelter the second day after an H-bomb explosion could be exposed to lethal doses of radiation the first month. Shelter period should be weeks not days.

➤ THE DANGER from radioactive fallout from an H-bomb would persist for weeks or months, Dr. Ralph E. Lapp, Washington physicist, has warned. Civil defense evacuation should be planned for a longer period than now recommended.

A man leaving his shelter the second day after the explosion of a Bikini-type bomb would be exposed "to a maximum of almost three lethal doses of radiation in the first month," Dr. Lapp said in the *Bulletin of the Atomic Scientists* (June).

Civil defense officials should be preparing for a "shelter phase" of a considerable number of weeks, not of a few days, he urged, particularly since fallout from the March 1, 1954, burst, although large, will not be the "largest or the worst" expected from bombs of the future.

If an emergency standard of one r (roentgen) a day is set as the safety level, 20 times the Atomic Energy Commission's present limits, Dr. Lapp suggested it will be from six to nine months before an area would be safe.

"The persistence of fallout for weeks and months is as radical a departure in weapon effects as is the vast area of fallout itself," Dr. Lapp said.

To learn how to deal with this new problem, the Government should conduct tests in which fission products are distributed over various kinds of terrain, then measure radiation intensities for at least a year.

Decontaminating thousands of square miles is a problem "so far beyond any AEC experience" that Dr. Lapp viewed the possibility with "considerable skepticism."

Data Not Classified

A physicist formerly with the Manhattan project, Dr. Lapp is now a writer and commentator on atomic energy living in Washington. He emphasized that all material used in his calculations comes from published sources and that he "has never had any access to classified thermonuclear weapons data."

The "real index" of lethal radioactivity from A- or H-bombs is the total roentgen square miles, he said.

The Atomic Energy Commission recently revealed that the radioactivity dose 110 miles downwind from Bikini was 2,000 r. That report, Dr. Lapp pointed out, covered only the first 36 hours "following" fallout.

Totaling the information for all fallout patterns outlined by the AEC, Dr. Lapp deduced a "real index" of 30,000,000 roentgen square miles. This figure agrees closely with an estimate Dr. Lapp made before the AEC issued its public statement on fallout from the March 1, 1954, test explosion at Bikini.

Taking the example of fallout at 110 miles downwind as 2,000 r, he calculated the "eternity dose" as approximately 8,000 r. The eternity dose is the radiation a person standing in the open would receive if exposed to radioactivity from one hour after the burst to infinity.

If it takes five hours for fallout to become effective 110 miles away, then the following time schedule would hold: five to 12 hours, 1,000 r; 12 to 24 hours, 625 r; 24 to 48 hours, 545 r; two days to one week, 815 r; one week to one month, 720 r, and one month to one year, 840 r.

"Most significant is the fact that while 2,000 r are delivered in the first 36-hour period, an additional 2,500 r follows in the first year.

"This fact is obviously of the greatest significance to civil defense, yet no mention of this residual radioactivity was made by the AEC in its Feb. 15 release," Dr. Lapp wrote.

Value of Shelter

A person well sheltered during the first two days under the above table of fallout rate would have escaped 2,170 r. At 48 hours, the dose rate outside his shelter would be 15 roentgens per hour.

He could travel to a "cool" area several hours away without serious overexposure, Dr. Lapp said, "provided, of course, that transportation were available." However, if he stayed and were in the open for the next five days, he would face an additional 815 r, and another 720 r in the following three weeks.

"Thus, if he emerged from his shelter at the end of the second day (which would seem justifiable on the basis of the 'official' facts about fallout) he would be exposed to a maximum of almost three lethal doses of radiation in the first month," Dr. Lapp wrote.

Evaluating the possibility of evacuation after fallout to a "cool" area, Dr. Lapp pointed out that this will depend upon the "power and number of the enemy bombs, their nature and conditions of detonation, the local meteorology, and the proximity of the target to other targets."

If bombs were dropped only for the blast-heat punch, then some "cool" areas might exist, although in the northeastern United States particularly, many cities might be bottled up by fallout from nearby explosions. Dr. Lapp noted that Rochester and Syracuse, N. Y., might suffer such a fate if Buffalo were blasted.

WESTERN PEPPER—Black pepper, previously grown only in the Orient, is now being successfully cultivated in Puerto Rico. Since pepper plants take three years to reach harvest stage, it will be 1958 before this five-acre tract produces a crop. Dr. Catesby T. Jones is shown examining a pepper plant.

An enemy trying to maximize fallout, however, might resort to pattern bombing, pinning down and immobilizing several cities with one burst. Moreover, Dr. Lapp says, "an enemy might in this way select an aiming point unprotected by point defense of the Nike type."

Rather than detonating bombs from a high tower in ideal weather conditions, they can be set off at the surface when weather conditions, such as a front, might conceal the attack. Fallout would then "not be neatly predictable," and might greatly exceed a 2,000 r dose in the first 36 hours 110 miles downwind.

"Rain-out" might take place instead of fallout, Dr. Lapp suggested, thus producing localized areas of contamination "hotter" than the surrounding region by a factor of ten or more.

Internal hazards cannot be ignored, Dr. Lapp said. Radiostrontium appears "by far the greatest biological hazard," because it has a long life, a high fission yield, can be coated on debris, and resembles calcium in its reactions. Thus it can be taken up by animals and men, where it lodges in bones.

Concerning global contamination, Dr. Lapp calculated that 1,500 superbombs, each with explosive power of 20 million tons of TNT, could produce "global contamination to the extent that at the end of one year, the dose rate would just equal that stipulated for workers in our atomic laboratories."

He concluded that the problem of global contamination would seem to be of minor importance compared with lethal radioactive fallout in localized areas.

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