

PUBLIC HEALTH

Fallout: Man-Made Threat

Every rainstorm brings radiation fallout from the skies. Scientists and the AEC still disagree on a permissible level of radiation to which humans can be exposed without damage.

By HELEN BUECHL

EVERY TIME it rains, it rains fallout from nuclear blasts. The amount of fallout that comes down with each rainstorm varies, but the fact remains that radioactive particles accompany each shower.

The fallout consists of such radioactive particles as iodine-131, cesium-137 and strontium-90. Fallout is classified either as "local" or widely distributed.

The larger particles produced by the nuclear explosion give the local fallout. This radioactive debris falls to earth within a radius of a few hundred miles of the blast.

Widely distributed fallout consists of smaller particles thrown very high into the atmosphere by the explosion. This debris tends to remain in the stratosphere for a few years, losing some of its radioactivity during this period.

Man receives radiation from the radioactive particles that drift down from these bomb blasts. He acquires this radioactivity through the food he eats and drinks. The particles settle on vegetables and grains that man eats, and on the grains and feed that animals eat. When animal products are eaten by man, some of the animal's radioactivity is added to the human diet. Such is the case with milk.

Fallout and Sickness

Local fallout tends to produce radiation sickness, skin burns and death. These acute effects depend mainly upon the dose of radiation. Chronic effects such as cancer, lowered resistance to stresses, premature aging and premature death also depend upon the size of the radiation dose from local fallout.

Scientists are still wrestling with the concept of threshold. That is, can man receive a certain dose of radiation without harm, and if there is such a "safe" amount, what is it? Another unknown is the rate at which fallout is settling on the earth.

In an attempt to answer these questions, scientists have been studying the strontium-90 level in milk. This is a relatively revealing index of the amount of fallout reaching the United States daily. It is measured in strontium units.

Strontium-90 levels in milk across the country reflect the increased amount of fallout that has cluttered the atmosphere since 1954. For instance, Atomic Energy Commission reports show that at that time the strontium-90 level in milk in New York City was 2.5 units or micromicrocuries of strontium-90 per gram of calcium. (A micromicrocurie is equal to one million-millionth of one curie; the curie is an

amount of radiation equal to that produced by one gram of radium.)

Before January, 1959, the figures reveal, the level had risen to more than 11 micromicrocuries of strontium-90 per gram of calcium.

The National Committee on Radiological Protection has established a maximum permissible level of 100 strontium units for the general population. Meanwhile, the International Committee on Radiological Protection (ICRP) has tentatively lowered the level to 67. This includes the entire radioactive count of strontium-90 in man's complete diet, not just milk. The permissible level does not mean any radiation level over the limit will automatically cause death or injury, nor, on the other hand, does it imply that any dose below the level will automatically be safe. It is simply a recommended ceiling in the lifetime strontium concentration in the bones.

One Anacostia, D. C., high school junior, Robert Schooley, 17, has built a device that measures the total amount of radiation in milk. The apparatus costs slightly more than \$28. Bob measured the radioactivity of milk from May, 1958, through January, 1959, in the Washington, D. C., area. More complicated methods are required to measure the strontium-90 level, however. The Public Health Service has invited this junior

scientist to tour the Cincinnati, Ohio, laboratory where PHS technicians measure strontium-90 levels of milk.

Other data show bread picked at random off the shelf of a supermarket in New York City in February, 1959, was four times as "hot" as the ICRP maximum permissible level. The clover grown on a Raleigh, N. C., farm in July of 1957 registered strontium-90 content of more than twice the 100 units allowed.

Alarming Predictions

Further alarming news was revealed in a summary report by scientists on the 1959 Fallout Prediction Panel to the Congressional Joint Subcommittee on Atomic Energy. The report contained predictions the dose of radiation to the reproductive organs of Americans would double within the next few years. This increase will occur when cesium-137, now stored in the stratosphere, begins to descend.

This prediction applies to all persons living in the north temperate zone, including Europeans and Russians as well as Americans. Currently, the dose of radiation to the reproductive organs of persons in this zone is already two and one half times the world average. This figure, however, is within the maximum permissible level, scientists reassure.

Despite this evidence, the General Advisory Committee to the Atomic Energy Commission recently stated that total external radiation from fallout to date, to



DO-IT-YOURSELF RADIATION DETECTOR—Robert Schooley, 17-year-old high school junior, pours milk into a device he built and used to measure the total radioactivity of milk in the Washington, D. C., area. He found that the radioactive content of milk fluctuates.

gether with any estimated fallout from future weapons tests, is less than five percent as much as the average exposure to cosmic rays and other natural background radiation. The amount is also less than five percent of the estimated average radiation dose Americans receive from X-rays for medical purposes, the committee added.

This, however, is only an average. The percentages fluctuate from 15% to 30%, depending upon the section of the U. S. that is sampled.

The Committee also reported that human beings have lived for many generations in parts of the world having five or more times the background radiation normally found in this country, or more than 100 times the average amount of radiation from fallout in the U. S.

No one has yet proved these levels are safe, however. No studies have been made to determine the biological effects of these higher levels.

But it is now beyond question that humans exposed to fairly large doses of radiation have an increased chance of developing leukemia, Dr. Austin M. Brues, director of biological and medical research, Argonne National Laboratory, Lemont, Ill., stated before a Congressional Subcommittee on Atomic Energy. Similar evidence makes it clear that radium in the human skeleton has been responsible for cancer of the bone in humans, he said.

There is still no direct evidence that small doses of radiation, such as those from natural background and fallout, will definitely produce a proportionally low number of leukemias and cancers, nor that a low dose will necessarily shorten the average life span, the scientist testified.

On the other side of the coin, Dr. W. L. Russell of the Oak Ridge National Laboratory, Oak Ridge, Tenn., presented revealing evidence concerning the effects of radiation on pregnant mice.

Genetic Damage Found

He showed that genetic damages, i.e., sterility, can occur in unborn female mice, depending upon the length of time a dose of radiation is directed on a target. He suggested there may be a similar reaction to radiation in pregnant humans that could result in sterile baby girls. But this does not necessarily lead to the conclusion that there is a threshold dose of radiation above which genetic damage will occur, he emphasized.

Scientists appear to agree that the most likely victim of radiation exposure will be the unborn child and the infant. This is due to radioactive iodine attracted to the thyroid gland, which, in the infant, receives some 15 to 20 times the dose received by adults.

In addition, bone growth is most rapid during this stage of human development. Since strontium-90 is attracted to bone, and since both radioactive iodine and strontium are present in milk, an important component of the child's diet, it seems logical that the youngsters will be the more likely candidates for thyroid and bone cancers.

Meanwhile, Atomic Energy Commission scientists are busy considering methods for testing weapons that will avoid creating fallout in the first place.

Science News Letter, June 13, 1959

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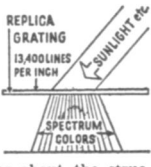
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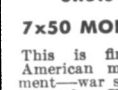
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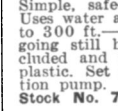
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