Atomic Winds - Fall-out

"Fall-out", a word that has become as common as the wind to residents of southern Utah should be taken with more than just a grumble.

Fall-out, which would effect the residents of Cedar City and southern Utah, was probably taken just a little more seriously last week when the people of St. George, actually just a short distance as the wind blows, from Cedar City, were asked to stay in their home, and cars traveling from that vicinity were washed and tested for fall-out or more appropriately radio-activity. Fall-out not only occurred in St. George, but today it can still be detected in the air in Cedar City as proven by a home-made gieger counter brought at the attention of the Iron County Record by Theron Ashcroft of the Branch Agricultural college.

National wire services carried the story that people in southern Utah were asked to stay in their homes and stories were published all over the nation. What do you suppose will be the reaction of people who have planned to spend a few days in Cedar City during the tourist season? Do you think they may now give it a second thought? Or what is the effect of fall-out on us, the people of this area? Does this radiation come and go or does it accumulate within our bodies?

AEC public releases since the recent developments of Tuesday's detonation have stated "none of the fall-out levels reported, either on the highway or in St. George, are hazardous . . . . " However, at the same time, families were asked to stay indoors and motorists were given definite checks at Cedar City, St. George, Mesquite, Glendale and North Las Vegas.

A complete answer to this question of fall-out cannot be given at this time, but an understanding of what can and cannot be taken into the body is available. Dr. Gordon Dunning, representative of the AEC division of biology and medicine, with the testing organization, explained some of the problems, testing devices, and measurements theories to the press in the first of the present series of tests being conducted at Nevada, and at which a staff member of the Iron County Record was present. Here, in part, is the text of Dr. Dunning's discussion:

Following a nuclear detonation, radioactive materials are swept up high into the air and are carried by the winds over large areas of the world. Due to gravitational effect and the turbulent behavior of the atmosphere, radioactive particles are eventually deposited on the earth's surface. This phenomenon is called "fall-out".

To collect and evaluate the resultant fall-out from each detonation, the Atomic Energy Commission has organized extensive monitoring systems. One program, conducted through the test organization, monitors the area out to 200 miles from the Nevada Proving Grounds. Another program conducted by the Commission's New York Operations Office, monitors between 200 and 500 miles and also has a network of 120 stations spread across the country and operated through the cooperation of the U. S. Weather Bureau. As a result of these monitoring programs a close check is kept on both airbore and settled radioactivity.

In its continuing effort to keep the public appraised of the health aspects of fall-out, the AEC is cooperating with the Public Health officials by providing them with data and its evaluation, through nine Atomic Energy Commission installations located across the country.

In evaluating the radiation from fall-out, it must be realized that this is a problem of degree, not of kind. Rodiations are not foreign to our everyday life. Naturally occurring radioactive material in the soil and in the air, together with bombardment of cosmic rays, are with us continuously. At all times we are all being subjected to radiation from these causes — called background radiation. It is not that we have grown "immune" to these radiations but, rather, that man's remarkable recuperative powers usually repair damage to the extent that there is no detectable injury.

Just as a housewife uses a unit to measure out flour, the radiologist has units to express radiation. The one most commonly used is a roentgen; a milliroentgen is one-thousandth of a roentgen. To give some meaning to this unit, the following doses of radiation may be quoted:

Routine chest X-ray — 50 to 300 milliroentgens.

Routine gastro-intestinal examination — About 1000 milliroentgens.

Fluoroscopic examination — 20,000 to 30,000 milliroentgens.

In 1950, the International Commission on Radiological Protection recommended a maximum permissable whole-body exposure of penetrating radiation of 300 milliroentgens per week for an indefinite period. This is a conservative figure, especially when one realizes that about 25,000 milliroentgens must be received in a short time to detect any change in the blood picture and these changes are neither serious nor permanent.

In the light of the past data and experience, an Ad Hoc Committee of authorities in the field of medicine and roentgenology recommended that exposures resulting from radioactive fall-out should not exceed 3000 milliroentgens (3.0 roentgens) for a 10 week period. **This dose might be received in a single exposure or by an accumulation of smaller exposures.** In the case of airborne activity, the recommended maximum permissable concentration was one microcuric per cubic meter of air averaged over 24 hours (a microcuric is just another unit to express radioactivity). It should be emphasized that **any radiation measurements become meaningful in terms of health only when compared to such recommendations.**

This is important since there has been some misinterpretation in the past of radiation levels found after fall-out. For example, such typical survey instruments as a Geiger Counter may go completely off-scale when the radiation level is far below any value of concern to health. Probably a luminous dial watch will cause a Geiger Counter to go off-scale when the instrument is placed on its most sensitive range.

In determining the radiation dose one might receive from fall-out, a milliroentgent per hour reading is usually taken and then a calculation made of the total period of time. This will yield the most extreme estimate since this assumes that the person remains in that area continuously and that none of the activity is lost through weathering. (Actually, it has been found that weathering will usually reduce the amount of activity in a given locality very significantly). Based on these assumptions, the highest dose received in any town in the United States was about 500 milliroentgens for a lifetime dose. This is one-sixth the maximum permissable dose for a 10-week period. The highest dose at any place where personnel were present was at a mine near the Nevada Proving grounds. The calculated lifetime dose here was 2250 milliroentgens.

The highest concentration of airborne fall-out activity was about 0.2 microcuries per cubic meter averaged over 24 hours. This is one-fifth the maximum permissible concentration, and further, it was present in this average concentration for only a single 24-hour period. Incidentally, this concentration of activity would produce a radiation dose to the lungs about equivalent to that received in 20 days from breathing normal background activity in the air.

In addition to the above data, additional knowledge is being accumulated through an extensive and varied program of research sponsored by the Atomic Energy Commission, such as soil contamination, effects on plants, the genetic aspects of radiation, etc. As a result of all the hundreds of thousands of measurements taken by the monitoring programs and the data gleaned from the research studies, it has been shown that the levels of radiation produced outside the test control area were in no way harmful to humans, animals or crops.