



*Rochester Committee
for Scientific Information
Rochester, NY*

*RCSI Bulletin 92
Radiation Primer - Part II: Government and Fallout*

*By: George G. Berg
May 11, 1964*

The Rochester
Committee For Radiation Information

P. O. BOX 5236, RIVER CAMPUS STATION
ROCHESTER 20, NEW YORK

May 11, 1964

RADIATION PRIMER

PART II

GOVERNMENT AND FALLOUT

1. Where does radioactive contamination come from?

- (a) from combat with atomic weapons.
- (b) from peacetime atomic explosions, that is weapons tests and "plowshare" earth-moving operations.
- (c) from industrial wastes of atomic age industries (atomic fuel making plants, atomic fuel processing plants, atomic weapons plants, atomic powered industries).
- (d) from normal wastes of industries, laboratories and hospitals that use radioactive elements.
- (e) from accidents wherever radioactive elements are used from (a) to (d).

2. Who is in charge of checking for fallout?

The Surgeon General of the United States, acting as the head of the U. S. Public Health Service (U. S. P. H. S.). The Service has a division concerned solely with Radiological Health. The Surgeon General is advised in this work by a committee of scientists, the National Advisory Committee on Radiation (N. A. C. O. R.). This is a Government committee, but the members are part-time consultants, not Government employees: they are scientists working in universities and industry (one member is from the University of Rochester, another one from Cornell).

3. How do we check for fallout?

There is a nation-wide network of 73 sampling stations, with at least one station in each state. This is the Radiation Surveillance Network, managed by the Division of Radiological Health of the U. S. P. H. S. The Network publishes weekly reports for official use only. The stations of the Network are paid for and operated by many different agencies. Most of them are State operated, some are set up by the Atomic Energy Commission (A. E. C.), and some by the U. S. P. H. S. itself.

In New York State, most of the sampling of air, water and milk is done by radiation surveillance stations of the New York State Department of Health (organized as a State Network), although some samples are taken by U.S. operated stations, such as the important A. E. C. Health and Safety Laboratory in New York City. Milk is sampled at some dozen New York State cities and towns, and air and water at about a dozen locations across the state. At some places the sampling is done daily, at others weekly or monthly (Rochester, New York, is not one of the communities where samples are taken). The results are published as Radioactivity Bulletins of the State of New York Department of Health, for official users.

There is no comparable setup for checking other kinds of food for fallout, or for checking people to see whether they picked up radioactive contamination. There are, however, special projects that test one thing or another.

At present, for instance, the U.S. Department of Agriculture (U. S. D. A.) and the New York City laboratory of the A. E. C. are checking some soil samples; a scientific laboratory in St. Louis has a Government grant to check radioactive contamination in milk teeth (this project was started by C. N. I. - the St. Louis Committee on Nuclear Information), and Consumers Union laboratories are checking for fallout in typical teen-age diets (with partial support from a Government grant: see Consumer Reports, September '63).

There is also local sampling by institutions that do it as part of their intramural safety programs. In Rochester, for instance, both Eastman Kodak and the U. of R. Atomic Energy Project sample the air in their plants all the time.

World-wide monitoring of fallout is accomplished by the United Nations Scientific Committee on Effects of Atomic Radiation. The S. C. E. A. R. collects, interprets and publishes information from member nations.

4. What is the hazard of fallout?

Radioactive fallout contaminates people and their environment with radioactive elements. Radioactivity brings with it damage and the risk of more damage (just as a highway going past your house brings with it discomfort in the form of noise and smell, and the risk of more discomfort if you are hit by a car). The damages are varied (injury to dividing cells, aging of body, genetic deterioration of population) and so are the added risks (various cancers, crippling of children in the womb, hereditary abnormalities of offspring). The hazard of fallout is the chance that you and your community will be hurt in one of these ways.

There is nothing in the resulting damage to distinguish fallout hazard from many other hazards of living. The same damages may be caused by chemical pollutants, by viruses, by radioactive substances normally found in nature, and by the workings of human heredity. Fallout adds to the amount of hazard without changing the kind.

5. How is hazard measured?

The more radioactivity brought in by fallout, the greater the hazard. Radioactive substances found in fallout do not all carry the same kinds of radioactivity (see Radiation Primer, Part I), and they may concentrate in different parts of the body for a different length of time. The measurement of radiation is consequently just the first step in the measurement of hazard. There is an entire science, Health Physics, concerned with measuring radiation hazards. Hazard is easiest to measure where it is greatest and damage can be seen often, and becomes impossible to measure accurately when conditions come close to safety and damages get hard to spot. Scientists get most of their hard facts from exposing animals to very hazardous or damaging radiation (or from studying accidents to people). As they work down to normal conditions, they have to do more and more guessing and leave a wider margin for error. (This is not unlike estimating the hazard at a school crossing: we guess it is hazardous and put a traffic policeman there without waiting to count the number of children killed.)

6. Who measures the hazards?

Working estimates of radiation hazard come to us from two scientific bodies: the I. C. R. P. (International Commission on Radiological Protection) and the N. C. R. P. (National Commission on Radiation Protection and Measurement). The N. C. R. P. is a professional organization of American scientists, and not a government body: its members are representatives of scientific societies. The N. C. R. P. sends representatives in turn to its international parent body, the I. C. R. P. and so do similar groups from other countries.

These bodies appoint committees of experts to establish the hazard of specific kinds of radiation or fallout. N. C. R. P. findings are published as U.S. Bureau of Standards pamphlets, while those of the I. C. R. P. appear through the World Health Organization (W. H. O.) of the United Nations.

What is in these reports? Two things : information and advice.

Information: how much hazard is there in any one kind of exposure to radiation?

Advice: where is a reasonable dividing line between a tolerable hazard and an excessive hazard.

The working committees generally find it reasonable to tolerate as much additional hazard from fallout, as was there in the first place from naturally occurring radioactivity. This is called the "doubling dose" philosophy.

What are the reports used for? They are the source of all the official safety rules for industry and for the public, but the rules are made by Government agencies.

7. How much hazard is too much?

Many Government bodies, including legislatures, can have a say on how much hazard is too much. The most important one to the U.S. public is the Federal Radiation Council (F.R.C.), a body of political executives appointed by the President. The Council draws on information from N.C.R.P. and I.C.R.P., the services of Government scientists and engineers, and the advice of scientific committees (usually from the National Academy of Sciences-National Research Council), and makes decisions which balance hazard against utility.

Thus it assigns Radiation Protection Guide Numbers to each kind of fallout. Guides in Range I are acceptable hazards. Range II is still acceptable, but has to be watched. Range III is over the line, and people should not be normally exposed to the hazard of absorbing radiation at that level.

The line drawn by the F.R.C. between acceptable and undesirable hazards is binding on all agencies of the U.S. Government.

The Guides (R.P.G. Numbers) are subject to change. The line between Range II (acceptable) and Range III (not acceptable) is well below the level of hazard at which damage to people can actually be measured (as explained in Par. 5, above). The F.R.C. is free to change the numbers as it gets new scientific information or as it reaches new estimates of public benefit in relation to radiation hazard.

The Guides are meant for the protection of the general public. People working with radioactivity fall under the occupational rules of the F.R.C. which allow more hazard (usually ten times more).

Do the Guide Numbers tell you officially how much fallout is too much? They do not. Guide Numbers are meant to regulate "normal, peacetime nuclear operations" within the realm of U.S. authority, and nothing else. In its statement of September 10, 1962, the F.R.C. made it clear that this does not include Soviet weapons tests, so that the Guides do not apply to just any fallout on U.S. territory. Nor do they apply to major accidents or to acts of war. As each emergency arises, the F.R.C. says that it will provide special guides for it.

How much radioactivity is too much in your quart of milk? When in doubt, call the Division of Radiological Health of the U. S. Public Health Service. The Division may ask the F. R. C. whether it wishes to claim Federal jurisdiction and name a number. Meanwhile, the R. P. G. gives no authority whatever to the official, who would like to take the Range III contaminated food off the market (as in Par. 10, below; see also the press releases of the Division of Radiological Health for its official "Background for Milk Radioactivity Reports").

8. Who sets limits for occupational hazards?

The Atomic Energy Commission (A. E. C.) sets the limits for occupational hazards from radioactive materials. The A. E. C. follows the general standards laid down by the F. R. C. (Par. 7, above), and is advised by a Government scientific committee, the Advisory Committee for Biology and Medicine of the A. E. C. (A. C. B. M.). The A. C. B. M. is a group of consulting scientists from universities and industry. (One member is from Eastman Kodak Co.).

A. E. C. rules on maximum permissible doses of radiation (MPD-s), maximum permissible concentrations of radioactive materials (MPC-s), and related safety standards are published in the Federal Register under Title 10 of the Code of Federal Regulations. They have the force of Federal law.

States must comply with A. E. C. limits on hazard, but may make additional or more stringent safety rules. Cities may establish further rules within State law. In New York State, such rules are the State Industrial Code Rule 38 and State Sanitary Code Chapter XVI; in New York City, Article 175 of City Health Code.

9. Who controls the source of fallout?

(a) No one can control the fallout that is already in the air from weapons tests, nor is there any agreement at this time to control future testing by France and China.

A treaty between some fifty nations including the U. S., the U. S. S. R. and the United Kingdom (the Test Ban Treaty) controls fallout from weapons tests by subscribing nations. Signers are pledged not to let loose any fallout outside of their own borders. The U. S. Arms Control and Disarmament Agency has the task of extending and strengthening such treaties. The A. E. C., which operates the Nevada proving grounds, has the responsibility of controlling fallout from underground tests there.

(b) The Defense Atomic Security Agency (D. A. S. A.) of the Department of Defense (D. O. D.) controls all radioactive substances in use by the military and is responsible for regulating contamination.

(c) The Interstate Commerce Commission (I. C. C.) is responsible for preventing radioactive contamination from interstate shipments (civilian) and the Post Office Department is separately responsible for shipments by mail.

(d) The Director of Regulation of the A. E. C. controls the radioactive contamination from peaceful uses of atomic energy in the U. S. He is a civil servant with powers of licensing and inspection and some powers of enforcement, which he exercises through three Divisions of the A. E. C. (Protection standards, Licensing, Compliance).

(e) State Governments and a few City Governments set up their own agencies for regulating radioactive pollution at the source. New York State has an agreement with the A. E. C. to take over locally most of the regulatory responsibilities of the A. E. C. Our Governor appoints a Director of the State Atomic Energy Commission who coordinates the agencies that do the field work of radiation control (his own office, N. Y. State Dept. of Labor, N. Y. State Dept. of Health, N. Y. City Dept. of Health, New York State Atomic Research and Development Authority).

(f) Finally, the user of radioactive materials must show competence and accept responsibility for control of these materials to get his license.

10. Who protects you from fallout?

(a) If radioactivity is an occupational hazard where you work, then the use of radioactive materials is probably under a license and you are the responsibility of the Director of Regulation of the A. E. C. and his Division of Compliance (Par. 9(d), above), except where he delegated that responsibility to officials of your State (Par. 9(e), above).

(b) As members of the public, you and your family are the responsibility of the Director of the Department of Health of your State. He is a State executive officer, and can be given orders only by the Governor. He is advised in this work by the Division of Radiological Health of the U. S. P. H. S. (Par. 2, above). He runs laboratories that check for various kinds of pollution: in New York State this includes the State Radiation Surveillance Network (Par. 3, above).

In Home Rule cities such as New York, most of these responsibilities are taken over by the Director of the City Health Department.

Once fallout is detected, the Health Officers have only limited powers for protecting the public, but they may recommend action to the Governor.

(c) The Governor can search existing State laws for authority to ban polluted food and water, or can proclaim an emergency and assume the powers of seizure and evacuation. He may call for emergency Federal help.

The A. E. C. is in charge of getting such assistance to him from all Federal agencies (including the Armed Forces) under the authority of an "Interagency Radiological Assistance Plan". On the other hand, he is free to decide that the hazard is at a tolerable level in view of emergency conditions, take no action, and release no information on the fallout.

11. How does the system perform?

The Joint Congressional Committee on Atomic Energy examines all aspects of fallout hazard in its periodic hearings. These are published (U.S. Government Printing Office), and are a prime source of expert testimony both for and against our system of radiation protection and control.

The system had its major trials in Nevada, where the A. E. C. operates an atomic explosion test site, and in the neighboring State of Utah, which shared in the fallout. The performance of the system has been analyzed recently by L. Mattison and R. Daly ("Nevada Fallout: Past and Present", Bulletin of the Atomic Scientists, April, 1964).

12. Index of names.

Each name is followed by the number of the paragraph in the Primer in which it is used. This index will help you identify the function of many agencies in the control of fallout.

Armed Forces (10)
Arms Control and Disarmament Agency (9)
A. C. B. M. (8)
A. E. C. (3, 8, 9, 10)
Atomic Power Authority, N. Y. (9)
Bureau of Standards (6)
Code of Federal Regulations, Title 10 (8)
D. A. S. A. (9)
Department of Defense (9)
Departments of Health of States (3, 9, 10) and City (9, 10)
Director of Regulation, A. E. C. (9, 10)
Division of Radiological Health (3, 7, 10)
Division of Compliance, A. E. C. (10)
F. R. C. (7, 9)
Government Printing Office (11)
Governors (10)
Health and Safety Lab, A. E. C. (3)
Interagency Radiological Assistance Plan (10)
I. C. R. P. (6, 7)
I. C. C. (9)
Joint Congressional Committee on Atomic Energy (11)
M. P. C. and M. P. D. (8)
N. A. C. O. R. (2)

N. A. S. - N. R. C. (7)
N. C. R. P. (6, 7)
New York State and New York City Codes (8)
New York State Atomic Energy Commission (9)
Post Office Department (9)
Radiation Protection Guides (7)
Radiation Surveillance Network (3)
Radioactivity Bulletins (3, 10)
S. C. E. A. R. (3)
Surgeon General (2)
Test ban (9)
U. N. (3, 6)
U. S. D. A. (3)
U. S. P. H. S. (2, 3)
W. H. O. (6)

George G. Berg, Ph.D.