News of Science

Radiation Hazards Pose Problem of How Government Can Best Be Organized to Protect the Public

During the past few weeks Congressmen, labor leaders, state officials, scientists, and citizens groups have voiced renewed concern about the dangers from weapon testing, the faster rate of fallout, the rising radioactivity in milk and other foods, and the growing problems of industrial radiation and atomic waste disposal. There has been particular concern as to how the Government can best be organized to monitor fallout and establish radiological health standards.

A movement is developing within the Administration and within the Congress to place primary responsibility for the nation's protection from radiation hazards in a single agency of the Federal Government. So far the Atomic Energy Commission has been chiefly responsible for work in this area. However, it is now being suggested in many quarters that the Public Health Service assume control, for there is a growing feeling that "it is unwise to continue the assignment of authority over the public health aspects of atomic energy to the same agency that has a prime interest in the promotional aspects in the field." This statement is from a recent report by the National Advisory Committee on Radiation Protection, a committee that was set up by the Public Health Service; however, none of the 12 committee members is from that agency, and only two are federal employees. The committee chairman is Russell H. Morgan, professor of radiology at Johns Hopkins Medical School.

The National Advisory Committee's report, which appeared in the 17 April issue of *Science*, was the culmination of a wave of criticism of the AEC's administration of the radiation control program. In response, commission chairman John A. McCone made the following statement to the Joint Committee on Atomic Energy at hearings on 29 March: "The importance of the fallout and sampling program is thoroughly recognized by the AEC and it is our intent to continue an active program. However, we have no desire to pre-empt this area of activity and if the Congress and the Executive Department wish to assign part of this activity to other Federal agencies we will cooperate with them to the fullest."

Atomic Energy Commission Program

In this fiscal year, the AEC will spend $19 million in research associated with radiation standards and protection. In addition, $2.6 million is being spent for sampling and analysis for national and world-wide fallout studies and $450,000, for fellowships for training in health physics, industrial hygiene, and so forth. It is expected that in 1960 the figures for radiation standards and protection will be increased to $20 million; these funds will be provided out of a $50-million operations budget for biomedical research. The AEC, since it was established in 1946, has used approximately $125 million for biomedical investigations on radiation.

Some 800 scientists are engaged in this work, backed by an equal number of laboratory technicians. Research is carried out at the Brookhaven, Argonne, and Oak Ridge laboratories, at the University of California's Lawrence and Los Alamos laboratories, and through contract with 204 universities and 19 corporations.

Arrangements for the exchange of information on sampling and of other fallout data exist between the AEC and a number of other federal offices, such as the Weather Bureau, the Department of Agriculture, the Public Health Service, and the Food and Drug Administration. Active sampling programs are being conducted in a number of countries with which the AEC exchanges information. These countries are widely dispersed over the world and include, for example, Japan, New Zealand, Norway, England, and Brazil. In addition to conducting a world-wide atmospheric sampling program, the commission has 64 soil-sampling stations in foreign countries and 17 in the United States.

Project Sunshine

No comprehensive up-to-date account of all the AEC's radiation control work is available, nor is it possible to obtain a clear-cut description of Project Sunshine, the commission's chief program dealing with the large-scale distribution of radioactivity. Sunshine was set up secretly in 1953, at the suggestion of AEC Commissioner Willard Libby, to study the fallout that could be expected in an atomic war. With the 1954 hydrogen bomb tests in the Pacific, the emphasis shifted to a study of the fallout from weapon tests, particularly of strontium-90.

The work is under the supervision of the Division of Biology and Medicine, which is headed by Charles A. Dunham. Forest Western is his assistant director for radiation protection. When asked recently to outline the scope of Project Sunshine, Western answered: "Unfortunately I can't answer, for the project has never been defined." He then went on to explain that when Sunshine was established, the division already had an extensive program of research on the biological aspects of radiation—some of it especially concerned with the hazard question, some not. This work continues today. Western pointed out that this separate research program has resulted in a complicated overlapping of activities that has sometimes led to confusion in connection with Sunshine.

Recently there has been criticism of the AEC because no one person is solely responsible for Project Sunshine. In answer to a question about this, Western said that the commission had been unable to recruit any of the men it had selected.

Atmospheric Radioactivity Studies

Joshua Z. Holland, meteorologist and a biology division member who devotes all his time to fallout problems, recently described one major aspect of the AEC's fallout work with commendable simplicity and conciseness. He delivered a paper before the American Meteorological Society that is a synthesis of the commission's biologically motivated studies of atmospheric radioactivity. This paper is now being prepared for release as a regular AEC information report. It will be accompanied by a number of helpful charts and tables, including Table 1, shown here, which outlines the fallout sampling networks that provide the bulk of the AEC-sponsored measurements of radioactivity in the atmosphere and in precipitation.

Sampling Methods

In Table 1, where the AEC is listed alone, this indicates that the entire project—both the collection and the analysis of samples—is under the supervision of the Health and Safety Laboratory (New York Operations Office); where the AEC is listed jointly with another agency, that agency is responsible for the collection and the Health and Safety Laboratory is responsible for the analysis. All of the data from the various programs

Table 1. Data from Atomic Energy Commission fallout monitoring networks.

Type of sample	Operating agency	Number of stations	Frequency of sampling	Geographical extent	Analysis
Gummed film	AEC	197	Daily	Worldwide	Total beta radiation
Precipitation in pots and funnels	AEC	57	Monthly	Worldwide	Sr^{90}, Sr^{89}, W^{185}, total beta radiation
Precipitation in washtubs	AEC	4	With each rain	U.S. and New Zealand	Sr^{90}, Sr^{89}, (U.S.), Cs^{137} (N.Z.), Ba^{140}, W^{185}, total beta radiation
Other	AFCRC*	6	Biweekly	76°N to 41°S	Sr^{90}, Ba^{140}, W^{185}, Pb^{210}, H^3
Other	PHS†	44	Daily	U.S.	Total beta radiation
Other	USGS‡	3	Biweekly	N. America	H^3
Soil	USDA§-AEC	87	Every 2 years	Worldwide	Sr^{90}
Soil	AEC	17	Every year	U.S.	Sr^{90}
Surface air	NRL‖	28	Daily	Worldwide	Daily: total beta radiation; monthly: Sr^{90}, Sr^{89}, Y^{91}, Cs^{137}, Ce^{141}, Ce^{144}, Pb^{210}, W^{185}
Surface air	PHS†	44	Daily	U.S.	Total beta radiation
Upper air	USAF¶-AEC	4	Monthly	45°N to 23°S	Sr^{90}, Sr^{89}, Zr^{95}, Cs^{137}, Ba^{140}, Ce^{144}, W^{185}, Rh^{102}, total beta radiation

* Air Force Cambridge Research Center (with partial AEC support); † U.S. Public Health Service; ‡ U.S. Geological Survey (with partial AEC support); § U.S. Department of Agriculture; ‖ Naval Research Laboratory (with partial AEC support); ¶ U.S. Air Force.

noted in the table are eventually sent to the Weather Bureau, which conducts comprehensive studies and makes worldwide graphs and so forth. Lester Machta heads this work.

The table indicates several sampling methods. The gummed film collector mentioned consists of a square foot of cellulose acetate film coated with rubber-base cement. Two of these are exposed at each station per day. At the end of the collection period, the films are folded and mailed in a preaddressed envelope to the Health and Safety Laboratory. The people who do this collecting are volunteers; the AEC does not have teams in the field for this work.

It has been found that fallout collectors that retain precipitation, while not providing such convenient samples for counting, collect more radioactivity per unit area than does the gummed film. In fact, it appears that most of the strontium-90 fallout is brought down by rain and is not retained by gummed film. Therefore, 1-foot stainless steel pots have been used as collectors. Samples are transferred to polyethylene bottles and mailed in. The pots are now being replaced by a new collector consisting of a funnel and simple ion-exchange column that will facilitate and standardize the sample-handling procedure.

Air filter samplers are also widely used to collect airborne dust. These are an essential part of local industrial radiation protection programs.

Soil sampling is the best measure of the total strontium-90 which has fallen per unit area of earth's surface. However, analysis of bulky samples is far more difficult than analysis of the more concentrated types of samples. Lyle Alexander of the Department of Agriculture's Bureau of Plant Industry is in charge of the chief soil survey, which is international in scope.

Environmental Radioactivity Studies

Hal L. Hollister, a physicist, is the other person in the Division of Biology and Medicine who works full time on fallout; his province is environmental contamination. The commission has many projects in this area. For example, a pasture survey for the analysis of plants, soil, whole animals, bone, and milk is being conducted by the Health and Safety Laboratory in cooperation with the Department of Agriculture. Ocean sampling programs are being carried out at Stanford University, the University of Washington, the Woods Hole Oceanographic Institution, the University of Miami, the University of California's Scripps Institution for Oceanography, and the Lamont Geological Laboratory of Columbia University. The last also has a program to study strontium-90 in human bone. The bones of cadavers are contributed by cooperating groups all over the world.

At the Los Alamos Scientific Laboratory there is a program to determine whole-body concentrations of cesium-137; everyone who visits the laboratory is checked. In addition, the laboratory conducts a milk survey under which powdered milk is collected at many points in the United States and Canada. And finally, there are various food analysis projects, although an AEC spokesman commented that these are "not very systematic."

Public Health Service

Since the discovery of the x-ray 50 years ago, the Public Health Service, as the principal federal health agency, has been concerned with radiation hazards and has engaged in the compilation and distribution of data on radiation and the investigation of accidents and other activities. In the 1930's, for example, the PHS participated in the investigation of radium poisoning in workers who painted dials in watch factories. During World War II, staff members worked with personnel at the Manhattan District in establishing standards for radiation tolerance.

In 1945, the Division of Tuberculosis set up and published radiation standards for photofluorographic technicians. Both the National Institutes of Health and the Bureau of State Services initiated training programs in 1948 to increase the technical competence of PHS personnel, and in the same year a Radiological Health Branch was set up with a budget of $17,638.

By 1955, the program had expanded to include 39 positions and a budget of $260,000. During the previous 7 years, the Service had undertaken studies of stream characteristics of the Columbia River Basin near the Hanford atomic energy works and a study of hazards to uranium miners on the Colorado plateau; it had also started radiological training activities at the Robert A. Taft Sanitary Engineering Center in Cincinnati. In 1953, the Service began collaborating with the AEC in the off-site monitoring of weapon tests.

In 1956, the Surgeon General established a series of staff studies to determine more precisely the nature of the radiological public-health problem and the role of the PHS. The fundamental problems, it was agreed, were those of determining more precisely the tolerance levels of radiation exposure, developing means of protecting human beings from unnecessary exposure, and disseminating information to members of the public health profession and the public.

On 5 February 1958 Arthur S. Flemming, Secretary of Health, Education, and Welfare, approved the establishment of a Division of Radiological Health in

the Bureau of State Services. In February of this year, the Surgeon General also established the National Advisory Committee on Radiation, mentioned earlier, to advise him and the newly established division.

Radiological Health Budget

The Division of Radiological Health, with Francis J. Weber as chief, began operating last July. For fiscal 1958, the budget was $390,000; for 1959, it is $608,000. The staff has been expanded to 76 persons.

A principal activity of the division is the training of personnel in the technical aspects of radiation in relation to health. In 1958 the Service offered short topical courses to 351 personnel from states and communities. Nine of these courses are being conducted this year.

To date, 43 stations have been set up for the measurement of radioactivity in the air, 45 stations for testing water, and 10 for sampling milk. Samples are analyzed once a month, and the methods used have been sent to state health departments.

On 16 March Flemming held a news conference to discuss radiation problems. As background for the Public Health Service's present interest in the field, he reminded his audience that it was the PHS that several years ago advocated the abolition of x-ray machines for fitting shoes and that last year proposed the substitution of skin tests for mass x-ray surveys as the first step in detecting tuberculosis.

He then went on to describe Department of Health, Education, and Welfare plans for 1960 for the Public Health Service. The department's budget for 1960 calls for slightly more than a doubling of the capabilities of the PHS in the field of radiation. The request is for an appropriation of $1,439,100, an increase of $805,000 and the largest single increase within the Service. This is in addition to the some $2 million being devoted to the study of radiation by the National Institutes of Health through grants-in-aid and in its own laboratories. The expanded PHS effort would be made in three categories—research, technical assistance to states and communities, and training of personnel. The research proposed would include studies of two types of population groups—individuals exposed to radiation in industry and individuals exposed in the course of medical diagnosis and therapy. In addition, the research would seek to simplify and standardize tests used to measure radiation levels.

On 3 April, just a few days after the release of the report of the National Advisory Committee on Radiation, the White House announced that the President had asked that a special study of the administration of the radiation control program be conducted by the Bureau of the Budget. Among the problems the study will consider is whether the principal responsibility for protecting the public against the effects of radiation should remain with the Atomic Energy Commission or be transferred to the Public Health Service. Participants in the survey include the leading officials of the two agencies chiefly concerned—John A. McCone of AEC and Arthur S. Flemming of HEW. A report of the Budget Bureau's investigation is expected soon, for on 5 May the Congress' Joint Committee on Atomic Energy will open hearings on the issue.

Soviet Pay Scale Revision

Scientists in the U.S.S.R. were told recently that the mere possession of a doctor's degree was no longer a guarantee of a lifetime of luxury in the nation's top salary brackets. Drastic changes in the system of wages and payments to scientists, providing for payment based on quality of work rather than on academic degrees, are being drafted.

The measure promises to close the large gap between the salaries of academicians and others who teach and do research, on the one hand, and scientists and engineers who are directly connected with production on the other. A secondary result, it is hoped, will be elimination of the log jam of applications for advanced degrees that has kept scores of scientists bogged down in the process of training candidates for degrees. The proposed wage changes were announced briefly in *Literaturnava Gazeta* by the deputy chairman of the State Committee on Labor and Wages.

Academic Freedom Committee Attacks Defense Education Act

The Academic Freedom Committee of the American Civil Liberties Union last month criticized the 1958 National Defense Education Act as threatening the traditional freedom of colleges and universities with control by the Federal Government. The committee's statement was signed by its chairman, Louis M. Hacker, professor of economics at Columbia University and former dean of its School of General Studies, and by ACLU executive director Patrick Murphy Malin. The statement pointed out that "Civil liberties are chiefly endangered by the law, not in its most-publicized loyalty-oath provisions (to which we are opposed, as we always have been to such provisions), but in the broad wording of provisions which confer power on the Commissioner."

As examples of undue power accorded to the commissioner, the statement cited sections of the act authorizing him to: (i) determine which accrediting agencies or associations are reliable authority as to the quality of training offered at the various institutions of higher education; (ii) award fellowships only upon his finding that the program will substantially increase facilities for training teachers; and (iii) determine whether or not each fellow is "maintaining satisfactory proficiency."

The Hacker-Malin statement described the widely criticized loyalty oath required by the act as "one of those superficially attractive catch-all attempts, popular early in this decade but now increasingly outlawed or discarded," which actually "have a most harmful effect, especially in education, where freedom of thought and association should be most protected and encouraged."

Listing of Psychologists

In the forthcoming (tenth) edition of *American Men of Science* there will be four volumes covering individuals of note in the biological and physical sciences and a fifth covering those in the social and behavioral sciences; hence, the problem has arisen as to where psychologists should properly be listed. For example, the biography of a psychologist working in the field of biology might appropriately be included in the volumes on the biological sciences even though the subject of the biography is a social or educational psychologist. In such a case, a brief cross reference to the biography in question would be included in the volume on the social and behavioral sciences.

It has been suggested by the American Psychological Association that psychologists who have a preference should advise the editor as to the category—biological and physical sciences or social and behavioral sciences—in which they wish their full biographical listing to appear. Letters on this subject should be sent immediately to *American Men of Science,* Arizona State University, 820 College Avenue, Tempe, Arizona. All information for the A-E volume for the biological and physical sciences should be in the hands of the editor before 1 June.

Coal-Tar Color Ban

The Food and Drug Administration announced recently that it was preparing to order the removal from the market of 17 coal-tar colors, which are used principally in lipstick. It will issue an order to this effect when the legal re-