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No. 59/21 CANADA'S PROGRAMME FOR RADIATION PROTECTION

An address by Mr. J. Waldo Monteith, Minister of National Health and Welfare, at the Jubilee Meeting of the Canadian Public Health Association, Montreal, Quebec, on June 1, 1959.

At the outset, I want to thank you for inviting me here today. This is my first opportunity of meeting the Canadian Public Health Association as a body, and I am delighted that it has coincided with one of the important milestones in your history.

Permettez-moi aussi d'adresser quelques mots d'appréciation à la Société d'hygiène et de médecine préventive de la province de Québec qui s'est chargée de l'organisation et du programme.

The lifetime of the Canadian Public Health Association has spanned an impressive era in the nation's health progress. From the advent of pasteurization to the impact of the Salk vaccine it has witnessed developments which have brought Canadians to the threshold of a new age of freedom from sickness and disease. Indeed, never before in human experience has so much headway been made in so brief a period.

The Association, itself, has played a leading role in this great forward movement. Through such educational media as its distinguished Journal, it has channeled information to public health workers across the country in a continuing effort to keep them abreast of advances in public health and preventive medicine. As the senior professional agency in the field, it has also constituted the "right hand" of governments in supporting various public health measures. In these and other ways, the Association has achieved an enviable record of service to the people of Canada -- a record which can stand as a worthy inspiration for the second half-century on which it is now about to enter.

My topic today is "Canada's Programme of Radiation Protection". I chose this topic for two reasons. In the first place, I am aware that considerable publicity has been given to such matters as radioactive fallout from nuclear tests and the medical use of X-rays. I am aware, moreover, that this publicity has created confusion and anxiety in the minds of many Canadians. As Minister of National Health and Welfare, I naturally feel a responsibility to do what I can to clarify the situation.

Secondly, I have chosen this topic because of the nature of this audience. You are the nation's leaders in public health, and radiation protection is -- in the view of the Dominion Government -- largely a public health matter. Indeed, I understand that Canada was one of the first countries to so regard it. It was in 1949 that my Department was assigned responsibility for advising the Atomic Energy Control Board on the health aspects of the use of atomic energy and its by-products.

In discussing this topic, I am also anxious to obtain your co-operation in disseminating the facts, in proper perspective, to all Canadians. To my mind, it is of vital importance that our people have a sound and realistic understanding of the problems involved.

Radiation Protection Division

Because this is a complex matter, requiring highly trained staff and special equipment, my Department has established a separate unit within our Health Branch to deal with it. Called the Radiation Protection Division, this unit has three closely related functions -- administration, physical measurements and clinical studies.

From our point of view, the central question is, of course: "What is likely to be the effect on health of exposure to radiation?" This means that in the final analysis our chief interest must be with clinical studies. The other two parts of our programme -- administration and physical measurements -- are, however, essential adjuncts, and their development must necessarily precede that of clinical studies.

Before going into the details of the programme, I might indicate briefly how it has come into being. I have already mentioned the Department's entry in the field in 1949. It was at that time also that plans were made for developing a method of measuring occupational radiation exposures on a country-wide basis. Later we assumed responsibility for the medical use of radioisotopes. In this regard, we have been assisted by an advisory committee composed of leading physicians and physicists.

With the increased size and frequency of nuclear weapons testing in 1954, it became apparent that radioactive fallout would constitute a new source of radiation exposure, and one, moreover, that would affect the whole population rather than only a part, as in the case of radioisotopes. This realization led to a study not only of fallout but also of other sources of radiation exposure affecting the whole population such as the medical use of X-rays and radiation from natural sources. More recently, our activities have been extended to meet problems associated with the building of nuclear reactors for power production.

Underlying these various developments, of course, has been our concern for the possible effects of radiation exposure on both exposed individuals and on future generations. Study programmes in these areas are under way or planned.

So much for the historical background. Let me turn now to a closer examination of the programme itself.

Administrative Activities

On the administration side, we have the task of acting as health advisers to the Atomic Energy Control Board. This includes providing advice not only on the use of radioisotopes but also with respect to nuclear reactors. A representative of the Department serves on the Board's Reactor Safety Advisory Committee which studies proposals for the construction and operation of these facilities.

In addition, we work in a more familiar area. Over the years, radiologists and other X-ray workers across the country have consulted with us in the matter of protective measures. This has been purely voluntary on their part and has led us to develop quite an extensive programme concerned with X-rays.

In carrying out these administrative activities, we have established close working relationships with many outside groups. These include other federal agencies, various professional associations, universities, and provincial as well as local Departments of Health. On the world scene, our officials serve on such bodies as the United Nations Scientific Committee on the Effects of Atomic Radiation and the International Commission on Radiological Protection.

The latter, I might add, is an independent professional organization set up in 1928 to deal with the health hazards of X-rays. It later enlarged its scope to include radioisotopes. It consists of world experts elected on the basis of recognized ability. The recommendations of the Commission are used by the Department in its radiation protection activities.

Physical Measurements

The second part of our programme has to do with "physical measurements". Here, we are concerned with three functions:

-- assessment of radiation exposure of occupational groups;

-- assessment of radiation exposure of the whole population;

-- certain special projects.

The assessment of radiation exposure of occupational groups is carried out by several methods. For example, the Department conducts a central film monitoring service for isotope and X-ray workers. Dental-sized films are issued every two weeks and returned to us for processing and interpretation. Any over-exposure is immediately reported to the laboratory involved. This service is now offered to some 8,500 Canadians for whom individual punch-card exposure records are maintained.

As a follow-up, an extensive field inspection and survey programme provides information on the "housekeeping habits" of isotope workers. These surveys, in conjunction with the monitoring film records, will serve as the basis for further examination of particular individuals. To this end, we are actively planning the construction of a facility for measuring the amount of radiation in the human body.

To be known as a total body monitor, this facility will fit into our programme in this way: suppose a field survey indicates that a laboratory is badly contaminated and that there is a strong likelihood workers have ingested radioactivity. In that event, these workers can be brought to the monitoring unit and measurements made to determine whether or not the amount of radioactivity in their bodies is in excess of the permissible level recommended by the International Commission on Radiological Protection.

A variety of methods are also employed in assessing the radiation exposure of the whole population. For one thing, a study is being made of the radiation exposure to reproductive tissues arising from the medical use of X-rays. This is a joint undertaking between the Department and the National Research Council. Another project concerns the measurement of radioactive fallout. This, as I have said, dates back to 1954.

At that time, our appraisal of the situation led us to the conclusion that strontium-90 was one of the components of fallout most likely to be of concern from the health viewpoint.

Accordingly, our efforts were directed to the measurement of this radioactive element. Because strontium-90 is chemically similar to calcium, it was expected that it would enter the body in much the same way as calcium. Nutritional figures show that the main source of calcium in the average Canadian diet is dairy products. For this reason, and because of its ready availability, milk was chosen as the initial medium for measurement.

As you may know, cesium-137 -- another component of fallout -- is also of concern from the health viewpoint. Whereas strontium-90 is related to possible effects on exposed persons, cesium-137 is related to possible effects on future generations. While our programme to date has concentrated on the measurement of strontium-90, we are actively planning the development of suitable methods for adding cesium-137 determinations to our current studies.

In addition, we are engaged in setting up a nation-wide network for sampling air, rainfall and soil. The air sampling programme, which will be carried out on a daily twenty-four hour basis, will give us a measurement of the fallout concentration in air at ground level. Monthly rainfall samples will be analyzed for strontium-90 and cesium-137. This will provide information about the rate of fallout and will enable us to estimate the reproductive tissue dose from fallout for the whole population. Annual soil samples will be analyzed for strontium-90 and cesium-137, and these results will be used as a cross-check on the rainfall data as well as to further our understanding of the up-take of fallout by various plants.

A complete picture of environmental radiation exposure requires that we also make measurements of the radiation levels from natural sources. By natural sources is meant cosmic rays, radioactivity in the soil and building materials, and radioactivity normally present in the body. Taken together, these natural sources form a background or baseline of radiation to which mankind has always been exposed. To obtain a proper perspective, exposures from other sources must be compared with this baseline.

Such comparisons have been made. For example, the recent Report of the United Nations Scientific Committee on the Effects of Atomic Radiation contains the following estimated "genetically significant" doses computed from world-wide averages on the basis of a thirty-year period:

- from natural sources: a projected dose of 3 rem;
- from man-made sources other than fallout: a projected dose of between .5 and 5 rem;
- from radioactive fallout: a projected dose of .01 rem.

The Report also contains similar values with regard to "somatic" or body dose -- in terms of what is called "estimated mean marrow dose". From these, it is evident that the dose contributions from the various sources are in roughly the same proportion whether one considers the "genetic" dose or the "somatic" dose. Data of this kind support the view I expressed recently in Parliament to the effect that radioactive fallout contributes only a small part of the total radiation exposure at the present time.

I again make this statement so as to place radioactive exposure caused by fallout in its proper perspective. We are not trying to ignore or minimize the situation -- as some might appear to believe. The emphasis that is placed on fallout studies in the Department's programme is ample proof that we are not ignoring it. Furthermore, our interpretation of the facts is based on the best scientific advice that we can obtain, and I might say that we are able to obtain the views of the best scientists in Canada and in other countries.

The final section of our measurements programme is "special projects". These will include facilities for coping with accidents which might involve high radiation exposures or widespread dispersion of radioactivity. The same facilities will also be available for testing industrial and commercial radiation sources to ensure that they meet acceptable safety standards.

Clinical Studies

You will recall that at the outset I indicated three broad divisions in our radiation protection programme -- administration, physical measurements and clinical studies. I have dealt with the first and second of these and would now like to say something about the third -- clinical studies.

As I mentioned, this is of chief interest to us since it involves the effects of radiation on humans. I would add that it is also the area containing the most uncertainties as we lack adequate knowledge about the fundamental biological effects of the irradiation of man. This is particularly so in the case of chronic, low-level radiation exposure.

It is because of these uncertainties that the matter of maximum permissible exposure to radiation has been approached with great caution. Here, I think it should be noted that those who are concerned with developing guidelines in this area are highly experienced persons who are actively engaged in radiation protection work. They have access to the most up-to-date, fundamental biological knowledge of the effects of irradiation on man. They are fully aware of the uncertainties and have allowed for them in their recommendations. That is

why we believe it is meaningful to use these recommendations as the basis for assessing the significance of levels of radiation exposure. That is why we believe that Canadians should be reassured by the fact that our findings indicate that strontium-90 levels are well below what these recommendations suggest as permissible for the whole population.

This in no way removes the necessity for continuing scientific research into the possible effects of chronic, low-level radiation exposure. In the words of the Report of the United Nations Scientific Committee on the Effects of Atomic Radiation:

> "Present knowledge concerning long-term effects and their correlation with the amounts of radiation received does not permit us to evaluate with any precision the possible consequence to man of exposure to low radiation levels.... Such a situation requires that mankind proceed with great caution in view of a possible underestimation. At the same time, the possibility cannot be excluded that our present estimates exaggerate the hazards of chronic exposure to low levels of radiation. Only further intensive research can establish the true position."

Research, then, is the only path to certainty in this as in other health fields. And research will take time.

Meanwhile, we must continue and expand our present programmes. Above all, we must keep a sense of perspective on this matter. The facts do not warrant either panic or complacency. As far as the Department is concerned, we intend to keep firmly abreast of all new developments and to work closely with others, to the end that everything possible will be done to ensure the health of Canadians. Such an undertaking, I would suggest, deserves the strong support of this Association and all its members.

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