

International Reference Centre for Environmental Radioactivity

by Dr. E. Shalmon (WHO)

A continuing rapid growth of the nuclear industry is anticipated in the near future. Estimates indicate that of the various peaceful applications of nuclear energy, power production systems including the fuel cycle have become the largest potential source of environmental radioactive contamination. Their rate of increase is expected to accelerate rapidly. Thus the 1971 value is expected almost to double during 1972-3¹ and to exceed the 1971 value a hundred fold by the year 2000². The environmental and public health impacts of the nuclear industry are expected to be felt particularly in developing countries, largely because they are almost non-existent there, while there are many economic and social incentives to promote such growth.

Long-term planning and implementation of appropriate public health measures become necessary in all countries, to ensure that development is accompanied by a comprehensive regime of environmental control. Its aims should include the minimizing to the lowest practicable limits of additions to environmental radioactivity; containing and isolating most radioactive wastes until their decay to innocuous levels; establishing a follow-up of environmental releases and concentration of radioactive pollutants; and the undertaking of proper actions to prevent and minimize the effects of possible accidents.

An international programme operating within appropriate national monitoring systems, aiming to ensure proper collection, measurement and analysis of data relating to the environmental effects of energy use and production, would be very useful. It should include studies to assess potential risks to human health and to set environmental criteria and standards relating to environmental pollutants. Support for such programmes of monitoring and collection of information has been included in several of the recommendations of the UN Conference on the Human Environment (i.e. recommendations 57, 73, 76 and 81). WHO, in close collaboration with IAEA in the area of radiation, has been actively engaged in this field. Its long-term environmental health programme is concentrated in the following main areas³:

- (1) Direct assistance to governments, including assistance in appraisal of needs, planning and management of programmes, training of professional and auxiliary staff and provision of services and financial aid to environmental health programmes.*
- (2) Development of health criteria and guidelines for environmental quality, preventive measures, environmental improvement and control.*
- (3) Collection and assessment of data on environmental conditions, aimed to aid Member States in evaluating and improving their programmes of prevention and control of environmental health hazards.*

¹ Based on data from IAEA's publication "Power and Research Reactors in Member States", 1972 Edition, Vienna, International Atomic Energy Agency.

² Based on data from Spinrad, B.I. (1971) "The role of nuclear power in meeting world energy needs", in "Environmental Aspects of Nuclear Power Stations", Vienna, International Atomic Energy Agency, pp 57-82.

³ World Health Organization (1971) Official records of the World Health Organization, No. 193, Annex 13, pp 91-122.

- (4) *Development of a code of environmental health to assist Member States in setting up their own national health programmes and services.*

Various aspects of this programme, and particularly the collection and assessment of data, are based on national reference centres, and WHO international and regional reference centres and collaborating laboratories. Priority is given to strengthen national institutions so that they can participate.

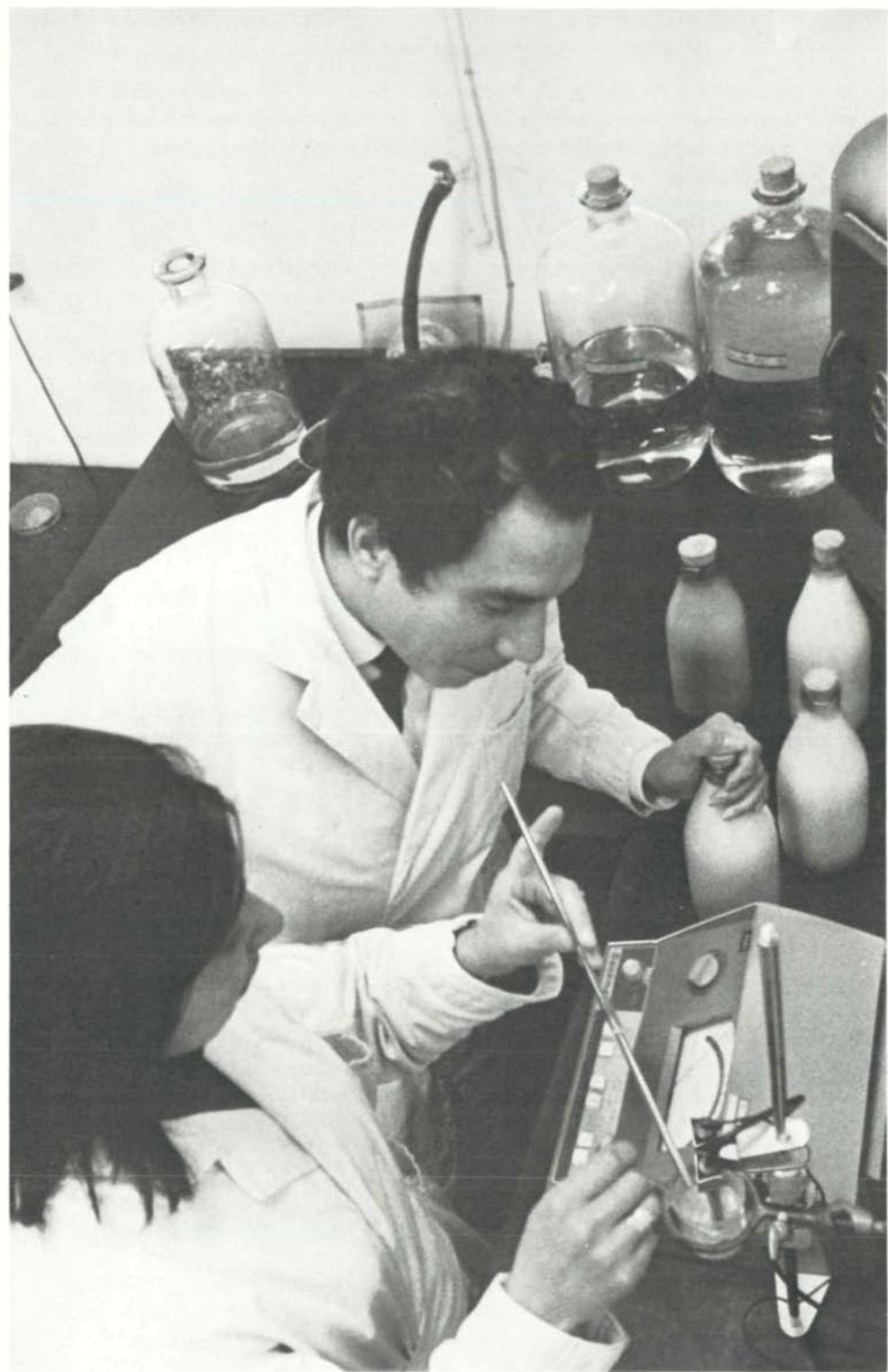
FUNCTIONS OF THE IRC

In October 1968 a WHO consultation meeting on environmental radiation considered plans and actions by public health authorities to safeguard and promote radiation protection of the public. It concluded that effective planning necessitates that the appropriate authorities should have available and make use of information on evaluation of radiation risks to health, and that "surveillance of radioactivity present or introduced into the environment contributes essential information for this purpose". The meeting recommended the establishment of a WHO IRC on environmental radioactivity, which will have the following primary objectives:

- a) Assessment by adequate preliminary monitoring of theoretical studies of expected levels of environmental contamination from a proposed installation and probable resulting exposure of the general population or 'critical' population group.*
- b) Supervision and monitoring of effluents from installations and works producing or using radioactive materials.*
- c) Routine surveillance and monitoring of significant materials in the environment arising from radioactive installations and works.*
- d) Research and investigations relating to the acceptable releases of radioactivity to the various types of environment and estimation of the dose to the whole population.*
- e) Collection and dissemination of environmental radiation data and information in the public interest.*

After extensive consultations with IAEA, the IRC was established in 1969 at the Central Service of Radiation Protection at Le Vésinet, France. This was followed by informal agreements with ten institutions throughout the world to act as collaborating laboratories. These were mainly selected on the basis of geographical distribution, so as to be nearly representative of the global distribution of environmental radioactive contamination, and also on the bases of capability and willingness to collaborate in the programme. In most cases, the selected national institutions are the same ones responsible for environmental monitoring of radioactivity in their respective countries. The aims and functions of the IRC were adopted from the recommendations of the 1968 Consultation Meeting. In operation of the IRC, assistance to WHO in the following areas received special emphasis:

- (i) An intercomparison programme to take account of population exposure to radiation, particularly from dietary sources.*
- (ii) Collection in some countries of information on levels of ^{89}Sr , ^{90}Sr , ^{137}Cs and some trace elements in milk.*
- (iii) Provision of facilities and training related to radiation protection.*
- (iv) Preparation of technical guidelines for the public health assessment of actual and potential radioactive releases into the environment, and for the evaluation of measures for controlling them.*



INTERCOMPARISON PROGRAMME

An important element of public health programmes which aim to protect the public from environmental radiation is the assessment of present and potential radiation exposure. It is essential that estimates of radiation doses be based on reliable data of intake levels of radionuclides and of body burdens, and that the reliability of results be clearly stated in order to avoid false conclusions. This is very seldom done in a satisfactory manner. Therefore, the first objective of the IRC was to carry out an intercomparison programme to establish the reliability of results among the participating laboratories.

Sources of error include extra-laboratory errors due to sampling, transportation, storage etc., and to intra-laboratory errors due to the processing and analysis of the samples and to the processing of the results. During 1970-72, the IRC carried out six intercomparison determinations aimed to assess intra-laboratory errors, and a seventh one is planned during the first part of 1973.

There were five collaborating laboratories which provided reliable results on radiochemical analysis of milk, and four on analysis of bones. Close contact was maintained with the laboratories, and information was collected on the methods of processing and analysis. It is planned to continue with intercomparison studies and with assistance to those laboratories which failed to provide reliable results.

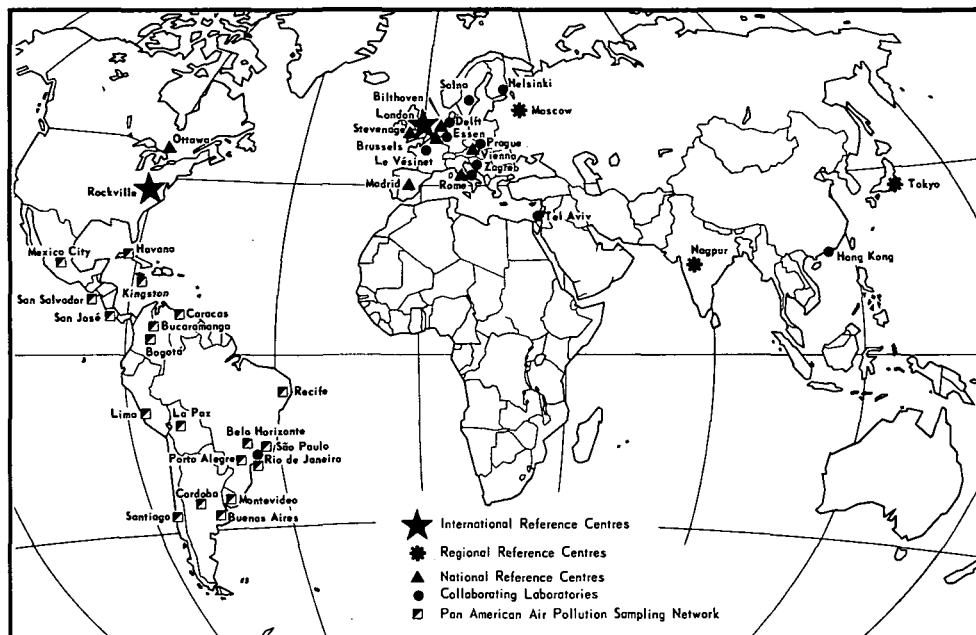
PUBLICATION OF INFORMATION

The IRC has published comparable results of ^{89}Sr , ^{90}Sr and ^{137}Cs activities in milk in various countries. The data are derived from the monitoring networks of some of the participating laboratories which achieved reliable results and are willing to make the information available without delays. The information is aimed to assist Member Governments, interested public health groups, international and regional organizations, and the scientific community. Results are validated and reported in a uniform way, namely in picocuries per litre (pCi/l) and in picocuries per gramme calcium (pCi/g Ca) for ^{90}Sr , and in picocuries per litre (pCi/l) and in picocuries per gramme potassium (pCi/g K) for ^{137}Cs . They are generally averaged on monthly and quarterly bases, and in one case, also corrected for different consumption levels of milk in the various regions of that country to assist the estimation of uptake values of the reported radionuclides. Five reports have so far been published, covering the period of January 1970 till March 1972. They include information from 11 countries representing about 12% of the world's population and diverse geographical, climatic, social, economic and legislative conditions. It is planned soon to publish annually the results of ^{90}Sr levels in human bones in some countries.

OTHER ACTIVITIES

Properly-trained technical staff is an essential component of any public health programme which includes environmental monitoring, or more broadly, radiation protection. Yet many countries lack such staff, or even sufficient facilities and services for their training. The IRC assisted WHO during 1970-72 by providing or collaborating in several training courses and meetings.

WHO NETWORK OF AIR POLLUTION REFERENCE CENTRES AND LABORATORIES



The IRC has assisted WHO in providing a personal dosimetry service to some of the Mediterranean and African countries. It has provided on a regular basis more than 800 dosimeters per month during 1972, largely for measuring personal exposure to radiation. Some dosimeters, however, were intended to measure dose equivalents from rapid neutrons. The IRC also participated during 1972 in the WHO/IAEA programme of dosimetric intercomparison in high energy radiotherapy. Lithium fluoride dosimeters were standardized and their readings compared to those furnished by WHO/IAEA.

CONCLUSIONS

The WHO IRC on environmental radioactivity, in collaboration with various institutions throughout the world, has assisted WHO to aid Member States in the following areas:

- Intercomparison programmes to take account of population exposure to radiation.*
- Collection of information on levels of ^{89}Sr , ^{90}Sr and ^{137}Cs in milk.*
- Provision of facilities and training related to environmental monitoring and radiation protection.*

The IRC plans to contribute in the following areas to the collaborative programme of WHO and IAEA on environmental radiation:

- Studies on the environmental behaviour of radionuclides released by the nuclear industry.*
- Development of a manual on monitoring environmental radioactivity which will provide guidelines to national health authorities in establishing surveillance services.*
- Development of technical guidelines for the control of environmental radioactivity to assist national health authorities to deal with public health problems arising from the expansion of the nuclear industry.*