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MEASURES TO STRENGTHEN INTERNATIONAL CO-OPERATION IN MATTERS RELATING TO NUCLEAR SAFETY AND RADIOLOGICAL PROTECTION

(b) EDUCATION AND TRAINING IN RADIATION PROTECTION AND NUCLEAR SAFETY

INTRODUCTION

1. Last year, in resolution GC(XXXV)/RES/552, the General Conference, taking into account "the need for achieving a common level of understanding in matters relating to radiation protection and nuclear safety", requested the Director General "to prepare a comprehensive proposal for education and training in both radiation protection and nuclear safety" for consideration at the Conference's 1992 regular session.
2. The expression "common level of understanding" is taken by the Secretariat to mean an acceptable level of understanding which provides the essential basis for organizations and individuals to be able to benefit from each other's experience. With increasing emphasis on international co-operation in radiation protection and nuclear safety, the need for a common level of understanding is now greater than ever. Moreover, the growing international interaction in these areas makes it desirable for experts to have a recognized forum to facilitate achieving a common level of understanding, and the Agency - given its statutory obligations - can play a unique role in this respect.
3. In the following comprehensive proposal for *education* and *training*¹ in radiation protection and nuclear safety, resources required for implementing the proposal are not identified; however, resources additional to those currently provided for radiation protection and nuclear safety through the Regular Budget and the Technical Assistance and Co-operation Fund would be needed.

¹ In this paper, *education* denotes the means of systematically conveying background knowledge and instruction in the many disciplines associated with radiation protection and nuclear safety; *training* denotes activities designed to teach the skills required in specific areas of radiation protection and nuclear safety.

4. It is considered that implementation of the proposal would enhance the effectiveness and efficiency of the Secretariat's efforts to contribute to manpower development in radiation protection and nuclear safety and would allow optimum use to be made of resources allocated through the Regular Budget and within the framework of the Technical Co-operation Programme.

5. The principal aim of the proposal is to strengthen the relevant parts of Member States' national infrastructures so that, in the long term, the education and training of nationals in radiation protection and nuclear safety become self-supporting.

STRENGTHENING NATIONAL INFRASTRUCTURES

6. Considerable national and international guidance on radiation protection and nuclear safety is available; the Agency alone, pursuant to its Statute, has established a comprehensive set of standards and guides. However, while the existence and use of this material are a necessary condition for good radiation protection and nuclear safety practices, they are not a sufficient condition.

7. In addition, within the Agency framework over a hundred national and four regional Technical Co-operation projects concerned with radiation protection and nuclear safety topics are currently under way. In spite of the Agency's current and past efforts, however, there are still Member States without infrastructures adequate for their needs - and in the absence of an adequate infrastructure, with well qualified teachers, the implementation of appropriate education and training programmes cannot be expected.

8. Radiation protection infrastructures are assessed through - inter alia - RAPAT missions. Nuclear safety infrastructures are assessed through - inter alia - the various services rendered by the Agency in this area, notably OSART missions (see Annex 1 to document GC(XXXVI)/INF/309), ASSET missions (see Annex 2 to the same document) and - more recently - the peer discussions among regulators promoted by the Agency.

9. RAPATs have found that, while some developing Member States have a fairly sophisticated radiation protection infrastructure, others lack both the basic elements of such an infrastructure and a programme and strategy for creating one; in a number of countries, the basic elements exist, but little else. A shortage of trained manpower is an acute problem in most of the countries which have been visited by RAPATs.

THE AGENCY'S ROLE

10. Pursuant to its Statute, the Agency has been assisting Member States in their manpower development programmes for over 30 years, inter alia through the provision of education and training opportunities for various groups of

professionals in radiation protection and nuclear safety. The fellowships and training courses provided by the Agency in these fields are recognized as being of high technical quality. Between 1981 and 1990, more than 4000 individuals from developing Member States benefited from various forms of Agency-supported education and training in radiation protection and nuclear safety.

11. However, education and training in radiation protection and nuclear safety are primarily a national responsibility, and virtually all countries using ionizing radiation on an appreciable scale or committed to nuclear power programmes do provide some such training and education - albeit of greatly varying scope and quality.

12. As they have encountered the difficulties of setting up and implementing education and training programmes, Member States have become increasingly aware of the benefits that can be derived in this connection from international co-operation and harmonization. Taking into account RAPAT and other advisory mission findings, the Agency could develop for such countries integrated education and manpower training packages which might be made available through - inter alia - the Agency's Technical Co-operation Programme.

THE PROPOSAL

Objectives

13. The encouragement of education and training in radiation protection and nuclear safety would have the following objectives:

- The achievement of national self-sufficiency in carrying out education and training programmes.
- The strengthening of national radiation protection and nuclear safety infrastructures.
- The meeting of immediate national needs in States requesting assistance.

Frame of Technical Reference

14. The provision of education and training in radiation protection and nuclear safety by the Agency would be based on the new international Basic Safety Standards expected to be issued jointly by FAO, ILO, NEA/OECD, the Pan American Health Organization (PAHO), WHO and the Agency (see document GC(XXXVI)/1008) and on the Agency's existing safety standards and guides, including the Regulations for the Safe Transport of Radioactive Materials; for nuclear safety the technical frame of reference would consist in particular of the standards developed through the NUSS programme and of the Agency's codes for research reactor safety (see documents GOV/2601 and 2602).

Target Groups of Countries

15. The provision of education and training in radiation protection and nuclear safety in different countries would be adjusted to the different degrees of utilization of radiation and nuclear technologies - to whether the Member State requesting assistance was:

- applying all nuclear technologies and operating nuclear power plants;
- applying nuclear technologies in certain fields and operating research reactors;
- making wide use of ionizing radiation in medicine, industry, agriculture and research;
- making use of ionizing radiation for medical purposes (essentially X-ray equipment in diagnostic radiology).

Means

16. The Agency's activities directed towards the achievement of a common level of understanding in matters relating to radiation protection and nuclear safety would continue to be based on existing modalities:

- Education
 - Educational courses
- Training
 - Training courses
 - Workshops
- Education and training
 - Fellowships
 - Scientific visits
 - Seminars
 - Educational and training material.

Education

Target Audience

17. The target audience would vary from country to country (or from one group of countries to another), but would generally include:

- young professionals needing to acquire (through post-graduate courses) a sound basis in radiation protection and nuclear safety in order to become trainers in their home countries;
- high-level managers and decision-makers, in order that they can recognize the need to strengthen radiation protection and nuclear safety infrastructures and arrange for education and training in this connection.

Educational Courses

18. Over the past ten years, the Agency has been sponsoring an educational course entitled "Interregional Post-Graduate Course on Radiation Protection and Nuclear Safety". Some 150 young professionals have taken this course, which is based on the relevant Agency standards and guides. Many course participants have subsequently become trainers in their own countries.

19. It is proposed that the course programme be converted into self-contained modules corresponding to different degrees of utilization of radiation and nuclear technologies (see paragraph 15 above) and that the course, which has so far been held almost exclusively in Spanish, be offered in other Agency working languages as well. The course graduates would be expected to provide education and training in their home countries (the "train the trainers" approach).

20. Moreover, the inclusion of radiation protection and nuclear safety courses in the curricula of leading educational centres and institutes, particularly in developing Member States, would be encouraged and the Secretariat would assist Member States in establishing, reviewing and upgrading educational courses suited to their needs. The advantages of this approach would be the availability of the necessary basic educational facilities, a certain continuity and stability, avoidance of duplication and the possibility of reaching a wider audience.

Training

Target Audience

21. The target audience would vary from country to country (or from one group of countries to another), but would generally include:

- people with broad expertise in radiation protection and nuclear safety who require specialized training in particular areas;
- professionals and technicians who need to master specific techniques or to upgrade specific skills;

Training Courses

22. The training courses² would continue to be short, intensive and highly specialized, and the more frequently held ones would continue to be standardized. As at present, the courses would be organized on an interregional, a regional or a national basis. The number of courses would have to be increased.

23. The subjects to be covered by *interregional* courses would include: legislation and regulatory aspects; emergency planning and preparedness; interventions and protective actions following accidents; probabilistic safety assessment and its applications; safety systems (defence-in-depth procedures); operational safety; safety aspects of maintenance; quality assurance; accident management; ageing of safety components and systems; verification of design and construction; validation of operating and functional test procedures; and safety of research reactors.

24. The subjects to be covered by *regional* courses would include: operational safety of WWER-type plants; reliability-based maintenance; seismic safety; the limiting of radioactive releases with regional transboundary significance; safe transport of radioactive material; occupational radiation protection; radiation protection in medical practice; protection of the public, including the limiting of normal releases of radioactive material into the environment. They would be organized - inter alia - within the framework of RCA, ARCAL and AFRA.

25. The Secretariat would continue to assist in planning *national* courses, taking into account the findings of RAPAT, OSART and ASSET missions.

Workshops

26. Workshops would cover - inter alia - personnel dosimetry techniques; area monitoring techniques; measurement of radioactivity; radiochemistry techniques; practical use of safety assessment techniques; assessment of fire hazards; and root cause analysis of incidents at nuclear installations.

27. In organizing workshops, the Secretariat would continue to rely as far as possible on the technological infrastructure and equipment at the Agency's laboratories. Emphasis would continue to be placed on upgrading the "hands-on" experience of participants, usually through extensive computer-aided laboratory and field work. For Agency-supported workshops held in Member States, expert services, training material and demonstration kits - and some laboratory equipment to enhance the training capabilities of host institutions - would continue to be provided.

² A forecast of interregional and regional courses to be given during the period 1992-96 was presented in GOV/INF/629 in October 1991.

Education and Training

Fellowships

28. Participation in educational courses (including courses held at leading educational centres and institutes in developing Member States) would continue to be provided through the Agency's fellowship programme³. The Secretariat would continue to encourage Member States to nominate candidates who, after such courses, can themselves contribute to manpower development programmes.

Scientific Visits

29. The Agency's programme of scientific visits would be strengthened, greater emphasis being placed on decision-makers and managers who may influence radiation protection and nuclear safety infrastructures.

Seminars

30. Radiation protection and nuclear safety seminars would be organized for each region, with the objective of familiarizing decision-makers and managers in Member States with the means available for enhancing the infrastructures under their supervision - including the education and training opportunities available within the region. The seminars would also serve to upgrade educational and training capabilities and to encourage co-operation among the educational and training centres in the region.

Educational and training material

31. The Secretariat would strengthen its co-operation with other international organizations through the Interagency Committee on Radiation Safety (see paragraph 6 of document GC(XXXVI)/1008).

32. A series of training publications has been established and a first training manual - on the Safe Transport of Radioactive Material - has been published. Emphasis would be placed on the preparation of training manuals to cover the most immediate needs of Member States, it being hoped that such training manuals would eventually be used by Member States in training their personnel with little or no help from the Agency.

33. The systematic production of viewgraphs, slides and films would be established in co-operation with relevant institutions in Member States. In

³ The Agency's fellowship programme provides on-the-job training in radiation protection and nuclear safety for over 300 individuals each year.

addition, the Agency's safety-related publications (standards and guides, etc.) would be used extensively as reference material for group training.

Proposed Priorities for Implementation

34. Recognizing that the available resources might well be less than desired, the Secretariat would give high priority to:

- the organization of regional seminars on education and training, the main objective being to familiarize participants with the opportunities existing within the region and the mechanisms by means of which people in the region can benefit from them;
- the preparation of manpower development packages geared to the different degrees of utilization of radiation and nuclear technologies as indicated in paragraph 15 above and covering all relevant means of manpower development (educational and training courses, workshops, fellowships, scientific visits, seminars and educational and training material);
- the education of young professionals through educational courses, with a view to preparing them to be trainers in their home countries;
- scientific exchange activities for senior managers and decision-makers from countries with weak radiation protection and nuclear safety infrastructures;
- support for educational courses and fellowships for candidates from countries where Agency missions reveal - for example - major weaknesses in radiation protection and nuclear safety infrastructures, a lack of control of radiation sources, or safety concerns regarding nuclear installations built to early standards;
- interregional training courses and workshops on subjects considered to be of immediate interest; and
- the development of appropriate mechanisms for periodic reviews of how this proposal is being implemented.

CONCLUDING REMARKS

35. The Secretariat would continue to meet the immediate needs of Member States for education and training in radiation protection and nuclear safety through the means that the Agency has traditionally used, taking into account the results of assistance provided in the past and the information obtained through Agency advisory missions. There would, however, be additional

emphasis on encouraging countries to request manpower development packages in the light of priorities recommended by Agency missions and the outcome of seminars.

36. In developing the Agency's training programme, the Secretariat would continue to take into account both the identified needs and priorities of Member States regarding radiation protection and nuclear safety and the activities of national and other international agencies. It would co-operate with national authorities in formulating manpower development programmes necessary for establishing adequate nuclear safety and radiation protection infrastructures, under the supervision of the competent national authority, which - as indicated in paragraph 11 above - should have the primary responsibility for education and training. A clear commitment (with allocation of the necessary resources) by national authorities would be essential if the Agency's assistance is to achieve its stated objectives.

37. The General Conference is invited to consider the proposal for education and training in radiation protection and nuclear safety outlined in this paper.

