# IAEA's Education and Training Programme to Strengthen Radiation Protection in Member States

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## Abstract

IAEA's education & training programme to strengthen radiation protection in Member States is guided by the resolutions of its General Conference. The IAEA 'Strategic Approach to Education and Training in Radiation, Transport and Waste Safety', as endorsed by the General Conference, provides the overarching framework. The paper describes the aims and objectives of the strategy along with the supporting activities such as the Post Graduate Educational Course on Radiation Protection, training Radiation Protection Officers, Train-the-Trainers workshops, practice-specific and topical specific training courses. The paper also describe the key elements to guide Members States in developing a national strategy to ensure education and training needs in radiation protection are appropriately identified and optimally met by utilizing national, regional and international resources. The role of the IAEA Steering Committee on Education and Training is described, and importance of collaborating with regional training centres and other organizations is emphasized.

Key words: IAEA, Education, Training, Radiation Protection

## 1. Introduction

The statute of the International Atomic Energy Agency includes the establishment of, and provision for, the application of safety standards for the protection of health, life and property. Education and training play a key role in facilitating the application of Safety Standards in IAEA Member States and for globally strengthening radiation protection. The education and training activities of IAEA follow the resolutions of its General Conference and reflect IAEA Safety Standards and guidance [1, 2, 3]. The basis and the various mechanisms by which the IAEA Secretariat helps to strengthen radiation protection in Member States are described below.

## 2. IAEA strategic approach to strengthen radiation protection in Member States

An IAEA 'Strategic Approach to Education and Training in Radiation and Waste Safety, 2001 – 2010' was endorsed by the IAEA General Conference in 2001[1]. A steering committee, comprised of experts from IAEA regional and collaborating centers in Member States, International Organizations and the IAEA Secretariat, was established to advise the Agency on the implementation of the strategy and to make recommendations as appropriate.

Subsequent General Conference Resolutions[2] have underlined or emphasized the importance of sustainable programmes for education and training in nuclear, radiation, transport and waste safety, and also welcomed the ongoing commitment of the Secretariat and Member States to the implementation of the strategy for education and training in radiation and waste safety.

Towards the end of 2009, the steering committee made an analysis of the overall achievements based on the effectiveness of the various components of the 2001–2010 strategy. The steering committee,

[1] IAEA General Conference Resolution GC(45)/RES/10C
[2] IAEA General Conference Resolutions GC(46)/RES/9, GC(47)/RES/7, GC(48)/RES/10, GC(49)/RES/9, GC(50)/RES/10, GC(51)/RES/11, GC(52)/RES/9 and GC(53)/RES/10

noting the achievements of the 2001–2010 strategy, revised and updated it and recommended that it be continued for the period 2011–2020. The revised and updated 'Strategic Approach to Education and Training in Radiation, Transport and Waste Safety, 2011-2020', including a summary of the key achievements made under the 2001–2010 strategy, was submitted to the IAEA Policy Making Organs in 2010, where it was endorsed by the General Conference[3].

## 3. Establishment of a national strategy for building competence

One of the main elements of the IAEA strategic approach[3] is to encourage and support the development and implementation of States' own national strategy for building competence, as discussed below.

IAEA Safety Requirements on 'Governmental, Legal and Regulatory Framework for Safety' [4] recommend that Governments establish a generic national policy and strategy for safety, and that this should include, inter alia, the need and provision for human resources. More specifically, IAEA's strategy for education and training[3] recommends that Member States specifically develop a national strategy for education and training for radiation, transport and waste safety. Such a strategy can be considered to consist of four interlinked phases, where the outcome of one phase is the starting point for the next phase, with the loop being closed by evaluation and feedback, as shown in figure 1.


Figure 1. Phases to establish and maintain a national strategy for education and training in radiation protection.

The first phase in the process is the assessment of who needs education and training in radiation protection in the country. This assessment will entail:

- Collection of information about the current and reasonably foreseeable facilities[4] and activities[5] within the country;

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[3] IAEA General Conference Resolution GC(54)/RES/7

[4] The term 'facilities' includes: nuclear facilities; irradiation installations; some mining and raw material processing facilities, such as uranium mines; radioactive waste management facilities; and any other places where radioactive materials are

- Analysis of existing national education and training requirements, such as those required by regulations or as part of professional qualifications;
- Evaluation of the number of people within the identified facilities and activities that need to be trained and educated in radiation protection.

The second phase is the design of a national education and training programme that is based on the assessment carried out in the first phase. The programme should define the educational and training events that need to take place to ensure that all people identified in the first phase have the required level of education and training to enable them to perform their work in a safe manner that is in-line with (inter)national requirements, such as the International Basic Safety Standards [1].

The third phase is the implementation of the aforementioned national education and training programme; noting that this might necessitate the development of new, or expansion of, existing educational/training mechanisms and infrastructure. An analysis of the current national status and capacity for delivering education and training events in radiation protection will first need to be undertaken to identify the gaps between what is available and what is needed. The analysis will need to take into consideration, inter alia: the current availability of training providers, trainers and lecturers with the appropriate experience, training facilities and financial resources; the types of education and training events that are required such as basic or specialized, scientific or technical, theoretical or practical, initial or refresher, short duration or long duration, academic or vocational; the need for new regulatory requirements; and the development of new syllabi. Given the key role played by qualified experts and radiation protection officers, particular attention should be given to ensuring that their educational and training needs are provided for, as well as ensuring that mechanisms are in place for their formal recognition/appointment as appropriate. To facilitate sustainability, consideration should be given to establishing a 'train-the-trainers' programme.

Where gaps are identified between what is currently available and what is needed, decisions will need to be taken whether to develop the expertise/infrastructure nationally or to send people to other countries for their education/training. Factors to consider in making such decisions will include the current and future demands for education and training, financial resources and possible support from international organizations or through bi/multi-lateral agreements

In some situations, not all the infrastructure and not all the mechanisms might be in place to implement all necessary activities from the start, but this should not delay the implementation of those educational and training events that are already in place or those that need only minor improvements.

In terms of continual improvement, it is important to ensure that the effectiveness of the national education and training programme be evaluated and monitored on a periodic basis (this is the 'fourth phase' shown figure 1). This will help to ensure that the State's education and training programme continues to meet the national needs, recognizing that some initially identified needs may decrease over time while the need for refresher training will increase. The introduction of new technologies or changes to regulations may also introduce new educational and training needs. Clearly the development and sustainable implementation of the national education and training programme will require a strong commitment from the government, including an appropriate budget and resources. A detailed methodology to assist States to develop such a national strategy is being developed by IAEA and will be published later this year.

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produced, processed, used, handled, stored or disposed of — or where radiation generators are installed — on such a scale that consideration of protection and safety is required [4].

[5] The term 'activities' includes the production, use, import and export of radiation sources for industrial, research and medical purposes; the transport of radioactive material; the decommissioning of facilities; radioactive waste management activities such as the discharge of effluents; and some aspects of the remediation of sites affected by residues from past activities [4].

## 4. Mechanisms to assist Member States strengthen education and training

IAEA provide direct assistance to Member States via a range of mechanisms, such as by offering appraisal missions, running educational and training events and developing standardized syllabi. These and other mechanisms are described below.

### 4.1. Education and training appraisal service

IAEA offer an Education and Training Appraisal (EduTA) service to its Member States, with the objective of reviewing the national status of provisions for education and training in radiation protection. The host country is required to carry out a prior self-assessment based on IAEA Safety Standards and Guidance [1, 2, 3], which is then reviewed and validated by a team of international experts. An end-of-mission report describes the current national situation and identifies opportunities for improvement. To date, EduTA missions have be carried out in Algeria, Argentina, Brazil, Belarus, Egypt, Ghana, Greece, Korea, Malaysia, Morocco, Singapore, and South Africa.

### 4.2. Post Graduate Educational Course in Radiation Protection and the Safety of Radiation Sources

IAEA's post-graduate educational course in radiation protection and safety of radiation sources (PGEC) is a comprehensive and multidisciplinary programme that includes both theoretical and practical modules that cover: Review of fundamentals; Quantities and measurements; Biological effects of ionizing radiation; The international system of radiation protection; General requirements for protection and safety; Assessment of doses due external and internal exposures; Planned exposure situations (Generic, Occupational and Public, Medical and Emergency); and Existing exposure situations. The PGEC also includes a module on 'Training the Trainers' as well as project work in which students are encouraged to do research or practical work that will be of direct benefit in their home country.

The PGEC is aimed at young professionals who may in later years become senior managers/decision makers with responsibilities related to radiation protection. Typically, around 80 to 100 participants per year benefit from this 6-month course that is hosted by regional training centers in Africa (English and French), Europe (English and Russian), Latin America (Spanish), and Asia (Arabic and English). Participation in the course is supported by IAEA and it is run in line with a standard syllabus [5] which has recently been updated to take account of new IAEA Safety Standards such as the revised International Basic Safety Standards [1] and to ensure it is consistent with ICRP's latest terminology. The revised syllabus will be published in 2012.

Presenter's material in the form of PowerPoint slides and lecture notes have been made available to the training centers to ensure that the information provided to the students is consistent across all regions and that it is based on IAEA Safety Standards. Data from the training centers shows an increasing trend in the use of national lecturers and less reliance on lecturers provided by IAEA. This is taken to be a good indicator that the competence and self-sustainability of these centers are improving, while noting that the use of external international experts is still valuable.

### 4.3. Specialized Training Courses & Workshops

IAEA organizes short duration (between 3 days to 6 weeks) specialized training courses and workshops on a range of subjects. Topics covered include, for example: regulatory framework; occupational protection; patient protection; radioactive waste management; transport of radioactive materials; and safety of radioactive sources. The courses are organized at both the

national and regional level for various target audiences, such as: regulators; workers in industry, medicine and research; and medical staff,

Each year around 25 such training events are organized in various IAEA Member States around the world in Arabic, English, French and Russian, Spanish.

### 4.4. Training for Radiation Protection Officers

The Radiation Protection Officer, according to the International Basic Safety Standards [1], is a person technically competent in radiation protection matters relevant for a given type of practice who is designated by the registrant, licensee or employer to oversee the application of relevant requirements. Noting the key role played by the RPO, IAEA has developed a syllabus for training RPOs. Foundation training is aimed at providing potential RPOs with a basic understanding of: radiation protection principles and source safety; the general requirements of the BSS [1]; and the duties of the radiation protection officer. The syllabus includes suggestions for practical sessions, demonstrations, laboratory exercises, case studies, and technical visits to re-enforce the theory. Practice-specific modules describe the additional topics to be covered by RPOs at a range of medical and industrial facilities. Suggestions are also made for topics that could be covered during 'on-the-job' training. The RPO syllabus will be published in 2012.

### 4.5. Other Training Mechanisms

***Fellowships***

On-the-job training is provided to individuals by means of IAEA fellowships that are typically 1 to 3 months in duration. Such fellowships enable individuals to work alongside experienced professionals in well-established organizations. The attendance at the IAEA PGEC followed by one or more fellowships provides a solid basis for radiation protection professionals.

***Training the Trainers***

This train-the-trainers (TTT) modality is aimed at developing communication skills as well as familiarizing participants with IAEA training material with a view to building a core of national trainers in radiation protection. The course syllabus includes presentational and communication skills, organization of training events and includes practical exercises. The TTT training course is designed to be interactive with an emphasis on presentations being by the participants. Train-the-trainers workshops for radiation protection in medical and industrial applications have been run at around the world at both national and regional levels.

## 5. The Future

Considerable work has been undertaken in pursuance of the strategic aims for strengthening education and training in radiation protection, and considerable progress has been made, especially at the regional level. Future work will focus on strengthening education and training at the national level, with IAEA regional training centres playing a key role. The ultimate effectiveness will depend upon the commitment of Member States to develop their own national strategy and to establish sustainable training programmes in radiation protection. By working together good progress can be made towards the realization of a comprehensive and harmonized approach to education and training. These steps are essential ingredients for maintaining high standards of radiation protection worldwide.

## References

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