

IMPLEMENTATION OF THE INTERNATIONAL BASIC SAFETY STANDARDS IN IAEA MEMBER STATES: A UNIQUE EXPERIENCE

Monica Gustafsson⁽¹⁾ and Khammar Mrabit⁽²⁾

International Atomic Energy Agency, Wagramerstrasse 5, A-1400 Vienna, Austria

⁽¹⁾ Phone: +43-1-2600-22725, Fax: +43-1-26007, E-mail: M. Gustafsson@iaea.org

⁽²⁾ Phone: +43-1-2600-22722, Fax: +43-1-26007, E-mail: K. Mrabit@iaea.org

1. ABSTRACT

During the last seven years, an unprecedented proactive international co-operative effort has been implemented in 52 Member States of the International Atomic Energy Agency (IAEA) within the framework of its Technical Co-operation (TC) Model Project on Upgrading Radiation Protection Infrastructure. The objectives of this Model Project are to assist those Member States which have an inadequate radiation and waste safety infrastructure and are already receiving IAEA assistance, in complying with the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources. These objectives are in line with the statutory mandate of the IAEA, which stipulates that safety standards are to be applied to its own operations, including all TC activities.

Five project milestones were defined in order to facilitate the setting of priorities, the timing and monitoring of progress, the optimization of resources, and to achieve compliance with the BSS. These milestones comprise the establishment of (1) a regulatory framework; (2) occupational exposure control; (3) medical exposure control; (4) public exposure control; and (5) emergency preparedness and response.

By the end of September 2001, more than 75% of participating Member States had promulgated radiation protection laws and established regulatory authorities, and over 60% had put in place individual and workplace monitoring control. During the last seven years of implementation, more than 900 fellows and scientific visitors received individually tailored training; 3000 persons attended educational and specialized courses; 1150 expert and monitoring missions were undertaken; and equipment worth US\$7 millions was provided.

The purpose of this paper is to present the approach used and the current status of this Model Project.

2. BACKGROUND

By its Statute, the IAEA is authorized to establish or adopt safety standards for protection of health and minimization of danger to life and property, and to provide for the application of these standards to its own operations as well as to operations making use of materials, services, equipment, facilities, and information made available by the IAEA.

The safety standards of reference are the *International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources* (BSS), the latest revision of which was published in 1996 [1]. The application of the standards is done through, inter alia, provision of technical assistance within the framework of the IAEA (Agency) Technical Co-operation (TC) programme. The IAEA's Statute further requires that its Board of Governors consider the "adequacy of proposed health and safety standards for handling and storing materials and for operating facilities" before giving approval to TC projects.

For more than a decade, from 1984 to 1995, information specifically relevant to radiation safety was obtained through more than 60 expert team missions undertaken by the Agency's Radiation Protection Advisory Teams (RAPATs) and follow-up technical visits and individual expert missions. The RAPAT programme documented major weaknesses and the reports provided useful background for the preparation of national requests for IAEA technical assistance.

Building on this experience and subsequent policy reviews, the IAEA took steps to evaluate more systematically the needs for technical assistance in areas of radiation and waste safety. The outcome was the development of an integrated system designed to more closely assess national priorities and needs for upgrading radiation and waste safety infrastructures.

This paper reviews the IAEA's integrated approach used and the status of the *Model Project on upgrading radiation protection infrastructures* (hereafter called the Model Project) in its Member States. The project is being implemented under the TC programme and involved 52 countries in its first phase.

3. THE MODEL PROJECT

3.1. Project Objectives

The objectives of the Model Project are to assist those IAEA Member States, which have an inadequate radiation and waste safety infrastructure and are already receiving IAEA assistance, so that they can comply with the BSS.

The project was first approved in 1994 as an interregional project with the involvement of five Member States. It was enlarged in 1995 to include 52 Member States that were grouped into five regional projects and managed by four Regional Project Managers (17 in Africa; 11 in Europe; 10 in Latin America; 14 in Asia [5 in East Asia and 9 in West Asia]). One of the first actions in implementing the project was to define more clearly what constituted an adequate radiation and waste safety infrastructure. This had to be done for different types of radiation applications ranging from common industrial and medical uses and practices found in every country to the full nuclear fuel cycle which exists in relatively few developing countries. Decisions were taken about what was needed to bring each country up to an adequate level, about how to implement the provision of technical assistance and how to verify results.

The main components of this process consist of collecting and evaluating information on the existing safety infrastructure, establishing and maintaining Country Radiation and Waste Safety Profiles and formulating and implementing Country Safety Action Plans. For all participating countries, assessments were made to identify their infrastructure weaknesses. These included establishment of (1) a regulatory framework; (2) occupational exposure control; (3) medical exposure control; (4) public exposure control; and (5) emergency preparedness and response, and are later referred to as the five project milestones. The Regional Project Managers discussed shortcomings with national authorities as part of the steps to prepare and finalize detailed Country Safety Action Plans (needed to rectify weak or non-existent infrastructure elements, to monitor the development of improvements in safety infrastructure, to sustain an effective infrastructure and develop it for additional uses of radiation). In each Action Plan, the obligations both of the participating country and of the Agency were specified for the effective implementation of the projects with the planned time frame.

Countries participating in the Model Projects to Upgrade Radiation & Waste Safety Infrastructure

Africa	East Asia & the Pacific	West Asia	Europe	Latin America
Cameroon	Bangladesh	Kazakhstan	Albania	Bolivia
Cote d'Ivoire	Mongolia	Jordan	Armenia	Costa Rica
Ethiopia	Myanmar	Lebanon	Belarus	Dominican Republic
Gabon	Sri Lanka	Qatar	Bosnia & Herzegovina	El Salvador
Ghana	Viet Nam	Syrian Arab Republic	Cyprus	Guatemala
Madagascar		Union Arab Emirates	Estonia	Haiti
Mali		Uzbekistan	Georgia	Jamaica
Mauritius		Yemen	Latvia	Nicaragua
Namibia		Kyrgyzstan	Lithuania	Panama
Niger			Moldova	Paraguay
Nigeria			Former Republic of Macedonia	
Senegal				
Sierra Leone				
Sudan				
Uganda				
Dem. Rep. of Congo				
Zimbabwe				

3.2. Country Radiation and Waste Safety Profiles

The intention behind the establishment of a Country Radiation and Waste Safety Profile information system is to maintain and keep updated all the data and information known to the Agency on the radiation and waste safety infrastructure of a given Member State receiving its assistance. The essential structure of the system relies on a questionnaire, the answers to which are the basic inputs for the computerized database.

The questionnaire and derived database cover the following main sections:

- Organizational infrastructure;
- Legal and regulatory status;
- Extent of practices involving ionizing radiation;
- Provisions for individual dosimetry;
- Public exposure control;
- Radiation protection and safety of patients in medical diagnosis and therapy;
- Transport of radioactive material;
- Planning and preparedness for radiation emergencies;
- Quality assurance; and
- Education and training.

However, the system is not limited to the database, but also includes a narrative of the status of radiation and waste safety infrastructure, the assembly of hard copies of information including laws and regulations, mission reports, and other material, as well as relevant Country Safety Action Plans.

4. METHODOLOGY OF IMPLEMENTATION

4.1. *Commitment by the Governments*

It should be noted that the Model Project presumes that governments and national authorities are prepared to comply with their obligations as described in the Preamble of the BSS. For this reason, Country Safety Action Plans were approved by relevant counterparts and authorities in each participating Member State, and the implementation of the Country Safety Action Plans did not start before official approval from the Member State concerned was obtained. As a result of this approach, Member States firmly committed themselves to establishing a national infrastructure, which includes *inter alia*:

- Appropriate national legislation and/or regulations (the type of regulatory system will depend on the size, complexity and safety implications of the regulated practices and sources as well as on the regulatory traditions in the country);
- A regulatory body empowered and authorized to inspect radiation users and to enforce the legislation and/or regulations;
- Sufficient resources,
- Adequate numbers of trained persons; and
- An adequate occupational radiation protection programme.

4.2. *Country Safety Action Plans*

The Country Safety Action Plans were thus developed from an analysis of the Country Radiation and Waste Safety Profiles against the requirements for an adequate safety infrastructure. Missing or deficient items were determined and documented for the preparation of a Safety Action Plan specific to each country, and including actions that are needed for the country to achieve a full and adequate infrastructure commensurate with its existing and planned applications of ionizing radiation.

The Action Plans include both generic and specific activities. Generic activities apply to all countries and as a first priority cover notification, authorization, and control of all radiation sources — whatever their use — within the country. Later steps cover protection of workers, patients receiving medical treatment and the public from environmental releases; emergency plans; transport arrangements; and other areas. Specific activities are tailored to each country's particular needs, such as personnel training or the provision of necessary equipment.

The development of human resources through training is an important component of the Model Project. It involves not only educational courses but covers also specialized training for, *inter alia*, regulators, radiation protection specialists, and medical personnel. The establishment and sustainability of a sound infrastructure for assuring radiation and waste safety depends heavily upon national capabilities in education and training in these areas.

4.3. *Generalizing the System*

The first milestone to be achieved under the Model Project is the establishment of a system of notification and authorization as required by the BSS, followed by milestone 2 on occupational exposure control. The Regional Project Managers are expected to monitor and report on each country's compliance with the respective milestones, and the Agency reports regularly to its Board of Governors on the progress achieved; the latest report was submitted in November 2001.

The approach used for the implementation of the Model Project represents a system that is being generalized to all Member States receiving IAEA assistance. It will provide the Agency with a fully documented system for assessing the current status of any country with respect to its radiation and waste safety infrastructure and a prioritized and agreed set of needs that should form the basis of future technical assistance activities. There will also be enough data to assess the capacity of the country to assure the safety of other developments of technology or requested items of equipment that could pose radiation hazards.

Over time, the system should provide a firmer basis for the Agency's co-operative work with its Member States and the provision of technical assistance in areas of radiation and waste safety. Efforts can be better directed towards achieving a situation in which no Member State which actively co-operates with the IAEA can have an inadequate radiation and waste safety infrastructure. Under an agreed action plan, this work will encompass measures for improving the identification of needs and requirements and enhancing the use of resources to further strengthen national capabilities for ensuring safety in the peaceful applications of nuclear and radiation technologies.

4.4. *Standardization of Activities*

In order to manage this big undertaking, the Agency must make efficient use of resources, which implies a balance between standardized measures and respect for the peculiarities of each Member State. As described herein, a number of activities have been standardized. This includes, inter alia:

1. The Country Safety Action Plans contain the same elements for all Member States although individual actions may differ depending on the country profiles used for tailoring the action plans.
2. Model legislation and model regulations ensure a consistent and coherent international approach, and yet national legal traditions are respected by allowing for local adaptation.
3. Checklists for the safety review of the main practices using radiation have been provided simultaneously to more than 50 Member States.
4. Training of manpower for the users and regulators is being done in a synchronized and standardized manner, through regional educational and specialized training events, and information exchange is being fostered through regional workshops and seminars.
5. The setting of milestones facilitates a common methodology and timing to monitor progress, as described below.
6. An information system for regulatory authorities is being implemented simultaneously in more than 50 Member States. This system is called Regulatory Authority Information System (RAIS).

5. MONITORING PROGRESS

5.1. *Peer Reviews and Appraisal Services*

As the implementation of the Country Safety Action Plans progresses, both Member States and the IAEA need to appraise in a systematic and harmonized way the effectiveness of the measures taken in order to correct weaknesses and optimize resources. For this purpose, and in addition to the regular monitoring made by the Regional Project Managers, the Agency established:

- an IAEA-TECDOC-1217, *Assessment by Peer Review of the Effectiveness of Regulatory Programme for Radiation Safety* [2], which provides advice on the conduct of peer reviews using a methodology to obtain qualitative and quantitative information and on its analysis against performance criteria and indicators; and
- an Occupational Radiation Protection Appraisal Service (ORPAS) that aims at assessing the regulatory and practical implementation of occupational radiation protection arrangements, and also at identifying specific strengths and best practices that can be shared with other Member States. It also provides a basis for determining where improvements may be required and for recommending actions to make such improvements.

6. RESULTS ACHIEVED UP TO SEPTEMBER 2001

From 1999 until September 2001, 32 Peer Review missions were undertaken that provided an independent assessment of the project achievements. The review teams' most relevant findings were in line with the assessment done through the continuous project monitoring made by the Agency.

It could thus be concluded that substantial progress has been made in upgrading radiation protection infrastructure, especially in the regulatory framework and occupational exposure control. By the end of September 2001, more than 75% of participating Member States had promulgated radiation protection laws

and established regulatory authorities, and over 60% had put in place individual and workplace monitoring control.

With respect to the results achieved, the participating countries may be divided into three categories:

- Countries advanced in project implementation, which have attained milestones 1 and 2 and have succeeded in implementing several activities related to the other milestones.
- Countries where there have been some implementation delay; these countries need to revise existing legislation and restructure existing radiation protection systems including occupational radiation protection. There are indications that the national authorities concerned have become more committed, and that steps have been taken to speed up implementation. It is expected that, if this trend continues and there is no serious delay, these countries should be able to report substantial progress in meeting the principal requirements of the BSS in the foreseeable future.
- Countries where there have been major implementation delays as a result of institutional instability, severe general infrastructural weaknesses, inadequate support at the decision-making level, changes in national programme priorities, etc. These countries had not established a national legislative and regulatory infrastructure to be able to regulate practices and enforce national legislation and regulation that govern, among other things, occupational radiation protection activities.

It is worth mentioning that by the end of September 2001, the Agency has received requests from 29 Member States (additional to the 52 Member States which participated in the first phase of the Model Project), thus the total number of Member States participating in the Model Project now exceeds 80. The Agency, as requested by its Board of Governors, will integrate any new Member State, upon request, into relevant regional Model Projects on upgrading radiation protection infrastructure.

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