

IAEA SAFETY STANDARDS SERIES

Building Competence in Radiation Protection and the Safe Use of Radiation Sources

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SAFETY GUIDE

No. RS-G-1.4



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JOINTLY SPONSORED BY
THE INTERNATIONAL ATOMIC ENERGY AGENCY,
THE INTERNATIONAL LABOUR OFFICE,
THE PAN AMERICAN HEALTH ORGANIZATION
AND THE WORLD HEALTH ORGANIZATION

INTERNATIONAL ATOMIC ENERGY AGENCY
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FOREWORD

by Mohamed ElBaradei
Director General

One of the statutory functions of the IAEA is to establish or adopt standards of safety for the protection of health, life and property in the development and application of nuclear energy for peaceful purposes, and to provide for the application of these standards to its own operations as well as to assisted operations and, at the request of the parties, to operations under any bilateral or multilateral arrangement, or, at the request of a State, to any of that State's activities in the field of nuclear energy.

The following advisory bodies oversee the development of safety standards: the Commission for Safety Standards (CSS); the Nuclear Safety Standards Committee (NUSSC); the Radiation Safety Standards Committee (RASSC); the Transport Safety Standards Committee (TRANSSC); and the Waste Safety Standards Committee (WASSC). Member States are widely represented on these committees.

In order to ensure the broadest international consensus, safety standards are also submitted to all Member States for comment before approval by the IAEA Board of Governors (for Safety Fundamentals and Safety Requirements) or, on behalf of the Director General, by the Publications Committee (for Safety Guides).

The IAEA's safety standards are not legally binding on Member States but may be adopted by them, at their own discretion, for use in national regulations in respect of their own activities. The standards are binding on the IAEA in relation to its own operations and on States in relation to operations assisted by the IAEA. Any State wishing to enter into an agreement with the IAEA for its assistance in connection with the siting, design, construction, commissioning, operation or decommissioning of a nuclear facility or any other activities will be required to follow those parts of the safety standards that pertain to the activities to be covered by the agreement. However, it should be recalled that the final decisions and legal responsibilities in any licensing procedures rest with the States.

Although the safety standards establish an essential basis for safety, the incorporation of more detailed requirements, in accordance with national practice, may also be necessary. Moreover, there will generally be special aspects that need to be assessed on a case by case basis.

The physical protection of fissile and radioactive materials and of nuclear power plants as a whole is mentioned where appropriate but is not treated in detail; obligations of States in this respect should be addressed on the basis of the relevant instruments and publications developed under the auspices of the IAEA. Non-radiological aspects of industrial safety and environmental protection are also

The requirements and recommendations set forth in the IAEA safety standards might not be fully satisfied by some facilities built to earlier standards. Decisions on the way in which the safety standards are applied to such facilities will be taken by individual States.

Civil nuclear activities conducted within the jurisdiction of States are, as any other activities, subject to obligations to which States may subscribe under international conventions, in addition to generally accepted principles of international law. States are expected to adopt within their national legal systems such legislation (including regulations) and other standards and measures as may be necessary to fulfil all of their international obligations effectively.

PREFACE

An essential element of a national infrastructure for radiation protection and safety is the maintenance of an adequate number of competent personnel. This is emphasized in the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources and in the IAEA publication on Legal and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety.

The IAEA has assigned high priority to its programme for education and training in radiation safety over many years and has issued a number of technical publications to support training in protection and safety. The Safety Report on Training in Radiation Protection and the Safe Use of Radiation Sources addresses the development and provision of classroom based training, distance learning and on the job training in protection and safety. Standard syllabuses, training course manuals and visual aid materials are available and kept up to date to assist in the establishment of national training programmes. Every year the IAEA organizes training courses in different languages for both basic professional training and on specialized topics in protection and safety, and facilitates fellowships and scientific visits to well regarded institutions for on the job training.

This Safety Guide makes recommendations concerning the building of competence in protection and safety, which relate to the training and assessment of qualification of new personnel and retraining of existing personnel in order to develop and maintain appropriate levels of competence. The qualification required for each category of job is determined on the basis of minimum educational levels, training and work experience. Participation in refresher training is necessary in order to maintain competence, to refresh acquired knowledge and to complement it with new developments in the field. This Safety Guide also suggests a structure for a national strategy for building competence.

This Safety Guide is jointly sponsored by the IAEA, the International Labour Office (ILO), the Pan American Health Organization (PAHO) and the World Health Organization (WHO). The IAEA gratefully acknowledges the contribution of experts from several countries and from the ILO, PAHO and WHO to the drafting and review of the text.

EDITORIAL NOTE

An appendix, when included, is considered to form an integral part of the standard and to have the same status as the main text. Annexes, footnotes and bibliographies, if included, are used to provide additional information or practical examples that might be helpful to the user.

The safety standards use the form 'shall' in making statements about requirements, responsibilities and obligations. Use of the form 'should' denotes recommendations of a desired option.

The English version of the text is the authoritative version.

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1. INTRODUCTION

BACKGROUND

1.1. The three IAEA Safety Fundamentals publications [1–3] all call for the availability of adequately trained staff. The International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources (BSS) [4] require as one of the main points of safety culture that “the responsibilities of each individual, including those at senior management levels, for protection and safety be clearly identified and each individual be suitably trained and qualified” (Ref. [4], para. 2.28(c)). The Safety Requirements publication on Legal and Governmental Infrastructure for Nuclear, Radiation, Radioactive Waste and Transport Safety (Ref. [5], para. 6.17) also emphasizes that “Achievement of a high level of safety will be greatly facilitated by an adequate supporting infrastructure for nuclear, radiation, radioactive waste and transport related activities. Government and, as appropriate, concerned organizations shall therefore pay attention to and provide for, among other things, the following: (1) training and education...”.

1.2. Education, training and experience are of primary importance for achieving competence in any area of work. Persons who are to be responsible for nuclear, radiation, transport or radioactive waste safety should have an adequate level of understanding of concepts relating to radiation protection and should also be acquainted with the safe and secure use of radiation sources. Generally, training has as a prerequisite a specified educational level. In addition, persons may need an appropriate level of work experience to fulfil particular responsibilities. Qualification of these persons necessitates recognition of the adequacy of the combination of their educational level, training and work experience. This may include consideration of the equivalence of certain elements of this combination. In some circumstances, such qualified persons may have to be authorized by a regulatory body to carry out certain functions or to assume certain responsibilities.

1.3. Any person who is occupationally exposed to ionizing radiation, or who may be exposed in the course of work, should receive adequate training in radiation protection and in the safe use of radiation sources. In addition, there are people who, while not exposed to ionizing radiation, need to be trained in protection and safety in order to perform their duties competently. Employers, registrants and licensees have responsibilities in relation to protection and safety and should be informed or should undergo suitable training. Staff of regulatory bodies who have specific responsibilities in relation to the safety of radiation sources or who would be involved

in intervention in the event of accidents, such as emergency response personnel, also need to acquire and maintain competence.

OBJECTIVE

1.4. This Safety Guide presents recommendations on how to meet the requirements concerning training in radiation safety and in radiation protection aspects of nuclear, transport and radioactive waste safety contained in the BSS [4] and Refs [5, 6]. This Safety Guide provides guidance to national regulatory authorities on the establishment of minimum qualification requirements in the area of protection and safety for nuclear and radiation related technologies. It also provides guidance on a national strategy for building competence in this area.

SCOPE

1.5. This Safety Guide addresses training in protection and safety aspects in relation to all practices and intervention situations in nuclear and radiation related technologies, but not training in the use of the technology itself. In this regard, the interface between technological design and radiation safety should be carefully structured into training programmes. This Safety Guide addresses:

- The categories of persons to be trained;
- The requirements for education, training and experience for each category;
- The processes of qualification and authorization of persons;
- A national strategy for building competence.

1.6. The specific technical aspects of nuclear installations,¹ such as siting, design, construction, operation and maintenance, are not considered here. Detailed guidance on training in these aspects is given in Ref. [7] and will be given in future Safety Guides.

¹ A nuclear installation is a nuclear fuel fabrication plant, a nuclear reactor (including subcritical and critical assemblies), a research reactor, a nuclear power plant, a spent fuel storage facility, an enrichment plant or a reprocessing facility.

STRUCTURE

1.7. The text is organized as follows. Section 2 outlines the responsibilities for training at different levels. Section 3 describes categories of persons to be trained and recommends the minimum requirements for educational level, training and work experience. Section 3 also deals with the assessment of qualification and the process of authorization that is needed to carry out work in specific areas. The different ways of demonstrating competence are also discussed and the need for refresher training and continuous professional development is emphasized. Accreditation of specific courses or training centres to ensure the quality of training is discussed. Section 4 suggests a systematic structured strategy for building competence to address the State's needs.

2. RESPONSIBILITIES FOR BUILDING COMPETENCE IN PROTECTION AND SAFETY

GOVERNMENTAL RESPONSIBILITIES

2.1. The BSS require that employers, registrants or licensees have the primary responsibility for the provision of training to workers (Ref. [4], para. I.4 (h)). Moreover, the training criteria for medical and paramedical personnel should be specified or subject to approval, as appropriate, by the regulatory body in consultation with relevant professional bodies (Ref. [4], para. II.1 (f)). The government should ensure that an adequate legislative framework is established which requires appropriate training of all personnel engaged in activities relating to nuclear, radiation, radioactive waste and transport safety. The legislation should assign responsibilities for the provision of training. The government should, where appropriate, specify which persons should have particular qualifications and the process to be employed for the recognition of such qualifications.

2.2. Where more than one authority has responsibility for protection and safety, for example if medical applications are regulated by the health ministry and industrial applications by another ministry or by the regulatory body, there may be differences in requirements for qualification of workers in these two areas. National minimum requirements for qualification acceptable to all parties involved in licensing for these types of applications should be established.

2.3. In assigning responsibilities for emergency planning and preparedness at the national level, governments should clearly assign responsibility for training the

particular groups that may be involved. These groups will include medical doctors, paramedical and fire brigade personnel, police officers, military and civil protection personnel, emergency workers and their representatives, radiation protection, monitoring and rescue staff, and other decision makers and advisers. Members of the public living near nuclear installations should be suitably informed about the protection and safety aspects of the nuclear installation and the emergency plan [8].

2.4. The government should, in addition, ensure that a system is in place to provide suitable instruction or information, as appropriate, on protection and safety to other parties such as:

- Teaching staff in research and educational establishments [9];
- Students, since educational material on protection and safety could beneficially be included in school curricula, particularly for students of medicine, dentistry or physics, for example, who might later work with radiation sources or radiation generators;
- Others who may have responsibilities in incidents involving radioactive materials, such as industrial safety officers in recycling facilities and customs staff and border police at national borders.

2.5. Whenever appropriate, a strategy for building competence in protection and safety should be established at the national level (see Section 4).² Input should be obtained from all relevant parties, which may include the regulatory body, other governmental organizations, licensees or registrants, and training centres.

RESPONSIBILITIES OF THE REGULATORY BODY

2.6. The regulatory body should provide guidance on qualification requirements for each category of job found in particular practices or intervention situations. This guidance should address the minimum educational level, minimum training and retraining requirements and minimum experience for each job category. In addition, the regulatory body should enforce regulations concerning the recognition of qualifications or authorization processes relating to certain duties and/or responsibilities, such as those of radiation protection officers. Alternatively, the

² 'Building competence' comprises training and assessing the qualification of new personnel and retraining existing personnel in order to develop and maintain appropriate levels of competence. Competence means the ability to apply knowledge, skills and attitudes so as to perform a job in an effective and efficient manner and to an established standard.

regulatory body should review and approve, if appropriate, proposals regarding training requirements made by employers, registrants and licensees.

2.7. Training requirements in the protection and safety of radiation sources should be established for the following areas:

- The production and use of radiation sources (including maintenance and calibration) for medical, industrial, veterinary or agricultural purposes, or for education, training or research;
- Regulatory activities (e.g. inspection, safety assessment, legal and other regulatory issues);
- Activities involving nuclear fuel;³
- Decommissioning and radioactive waste management;
- Transport of radioactive material;
- Emergency planning and preparedness;
- Exposure to enhanced levels of natural radiation in workplaces, such as in the mining and processing of raw materials or in the oil and gas industries.

2.8. The regulatory body should not be responsible for providing training, except for training of its own staff. However, whenever appropriate, the regulatory body should provide guidance in respect of the types of training required, the course content, the duration and level of training, and the assessment of trainees. Training centres and courses dealing with safety and with protection related aspects of nuclear, transport and waste safety may be accredited by the regulatory body or by other professional bodies recognized by the regulatory body [10].

2.9. The regulatory body should ensure that up to date records are maintained which include:

- Information on accredited training centres and training courses;
- National and international agreements relating to training and educational aspects;
- The records of personal authorizations issued.

³ ‘Activities involving nuclear fuel’ means all operations associated with the production of nuclear energy, including mining, milling, processing and enrichment of uranium or thorium, manufacture of nuclear fuel, operation of nuclear reactors, reprocessing of nuclear fuel, decommissioning and any activity for the management of radioactive waste, and any research or development activity relating to any of the foregoing.