

# IAEA Safety Standards

for protecting people and the environment

## Conduct of Operations at Nuclear Power Plants

Specific Safety Guide

No. SSG-76



**IAEA**

International Atomic Energy Agency



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# IAEA SAFETY STANDARDS AND RELATED PUBLICATIONS

## IAEA SAFETY STANDARDS

Under the terms of Article III of its Statute, the IAEA is authorized to establish or adopt standards of safety for protection of health and minimization of danger to life and property, and to provide for the application of these standards.

The publications by means of which the IAEA establishes standards are issued in the **IAEA Safety Standards Series**. This series covers nuclear safety, radiation safety, transport safety and waste safety. The publication categories in the series are **Safety Fundamentals**, **Safety Requirements** and **Safety Guides**.

Information on the IAEA's safety standards programme is available on the IAEA Internet site

<https://www.iaea.org/resources/safety-standards>

The site provides the texts in English of published and draft safety standards. The texts of safety standards issued in Arabic, Chinese, French, Russian and Spanish, the IAEA Safety Glossary and a status report for safety standards under development are also available. For further information, please contact the IAEA at: Vienna International Centre, PO Box 100, 1400 Vienna, Austria.

All users of IAEA safety standards are invited to inform the IAEA of experience in their use (e.g. as a basis for national regulations, for safety reviews and for training courses) for the purpose of ensuring that they continue to meet users' needs. Information may be provided via the IAEA Internet site or by post, as above, or by email to [Official.Mail@iaea.org](mailto:Official.Mail@iaea.org).

## RELATED PUBLICATIONS

The IAEA provides for the application of the standards and, under the terms of Articles III and VIII.C of its Statute, makes available and fosters the exchange of information relating to peaceful nuclear activities and serves as an intermediary among its Member States for this purpose.

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# CONDUCT OF OPERATIONS AT NUCLEAR POWER PLANTS



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IAEA SAFETY STANDARDS SERIES No. SSG-76

# CONDUCT OF OPERATIONS AT NUCLEAR POWER PLANTS

SPECIFIC SAFETY GUIDE

INTERNATIONAL ATOMIC ENERGY AGENCY  
VIENNA, 2022

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# FOREWORD

**by Rafael Mariano Grossi**  
**Director General**

The IAEA's Statute authorizes it to "establish...standards of safety for protection of health and minimization of danger to life and property". These are standards that the IAEA must apply to its own operations, and that States can apply through their national regulations.

The IAEA started its safety standards programme in 1958 and there have been many developments since. As Director General, I am committed to ensuring that the IAEA maintains and improves upon this integrated, comprehensive and consistent set of up to date, user friendly and fit for purpose safety standards of high quality. Their proper application in the use of nuclear science and technology should offer a high level of protection for people and the environment across the world and provide the confidence necessary to allow for the ongoing use of nuclear technology for the benefit of all.

Safety is a national responsibility underpinned by a number of international conventions. The IAEA safety standards form a basis for these legal instruments and serve as a global reference to help parties meet their obligations. While safety standards are not legally binding on Member States, they are widely applied. They have become an indispensable reference point and a common denominator for the vast majority of Member States that have adopted these standards for use in national regulations to enhance safety in nuclear power generation, research reactors and fuel cycle facilities as well as in nuclear applications in medicine, industry, agriculture and research.

The IAEA safety standards are based on the practical experience of its Member States and produced through international consensus. The involvement of the members of the Safety Standards Committees, the Nuclear Security Guidance Committee and the Commission on Safety Standards is particularly important, and I am grateful to all those who contribute their knowledge and expertise to this endeavour.

The IAEA also uses these safety standards when it assists Member States through its review missions and advisory services. This helps Member States in the application of the standards and enables valuable experience and insight to be shared. Feedback from these missions and services, and lessons identified from events and experience in the use and application of the safety standards, are taken into account during their periodic revision.

I believe the IAEA safety standards and their application make an invaluable contribution to ensuring a high level of safety in the use of nuclear technology. I encourage all Member States to promote and apply these standards, and to work with the IAEA to uphold their quality now and in the future.

# THE IAEA SAFETY STANDARDS

## BACKGROUND

Radioactivity is a natural phenomenon and natural sources of radiation are features of the environment. Radiation and radioactive substances have many beneficial applications, ranging from power generation to uses in medicine, industry and agriculture. The radiation risks to workers and the public and to the environment that may arise from these applications have to be assessed and, if necessary, controlled.

Activities such as the medical uses of radiation, the operation of nuclear installations, the production, transport and use of radioactive material, and the management of radioactive waste must therefore be subject to standards of safety.

Regulating safety is a national responsibility. However, radiation risks may transcend national borders, and international cooperation serves to promote and enhance safety globally by exchanging experience and by improving capabilities to control hazards, to prevent accidents, to respond to emergencies and to mitigate any harmful consequences.

States have an obligation of diligence and duty of care, and are expected to fulfil their national and international undertakings and obligations.

International safety standards provide support for States in meeting their obligations under general principles of international law, such as those relating to environmental protection. International safety standards also promote and assure confidence in safety and facilitate international commerce and trade.

A global nuclear safety regime is in place and is being continuously improved. IAEA safety standards, which support the implementation of binding international instruments and national safety infrastructures, are a cornerstone of this global regime. The IAEA safety standards constitute a useful tool for contracting parties to assess their performance under these international conventions.

## THE IAEA SAFETY STANDARDS

The status of the IAEA safety standards derives from the IAEA's Statute, which authorizes the IAEA to establish or adopt, in consultation and, where appropriate, in collaboration with the competent organs of the United Nations and with the specialized agencies concerned, standards of safety for protection of health and minimization of danger to life and property, and to provide for their application.

With a view to ensuring the protection of people and the environment from harmful effects of ionizing radiation, the IAEA safety standards establish fundamental safety principles, requirements and measures to control the radiation exposure of people and the release of radioactive material to the environment, to restrict the likelihood of events that might lead to a loss of control over a nuclear reactor core, nuclear chain reaction, radioactive source or any other source of radiation, and to mitigate the consequences of such events if they were to occur. The standards apply to facilities and activities that give rise to radiation risks, including nuclear installations, the use of radiation and radioactive sources, the transport of radioactive material and the management of radioactive waste.

Safety measures and security measures<sup>1</sup> have in common the aim of protecting human life and health and the environment. Safety measures and security measures must be designed and implemented in an integrated manner so that security measures do not compromise safety and safety measures do not compromise security.

The IAEA safety standards reflect an international consensus on what constitutes a high level of safety for protecting people and the environment from harmful effects of ionizing radiation. They are issued in the IAEA Safety Standards Series, which has three categories (see Fig. 1).

### **Safety Fundamentals**

Safety Fundamentals present the fundamental safety objective and principles of protection and safety, and provide the basis for the safety requirements.

### **Safety Requirements**

An integrated and consistent set of Safety Requirements establishes the requirements that must be met to ensure the protection of people and the environment, both now and in the future. The requirements are governed by the objective and principles of the Safety Fundamentals. If the requirements are not met, measures must be taken to reach or restore the required level of safety. The format and style of the requirements facilitate their use for the establishment, in a harmonized manner, of a national regulatory framework. Requirements, including numbered ‘overarching’ requirements, are expressed as ‘shall’ statements. Many requirements are not addressed to a specific party, the implication being that the appropriate parties are responsible for fulfilling them.

### **Safety Guides**

Safety Guides provide recommendations and guidance on how to comply with the safety requirements, indicating an international consensus that it

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<sup>1</sup> See also publications issued in the IAEA Nuclear Security Series.

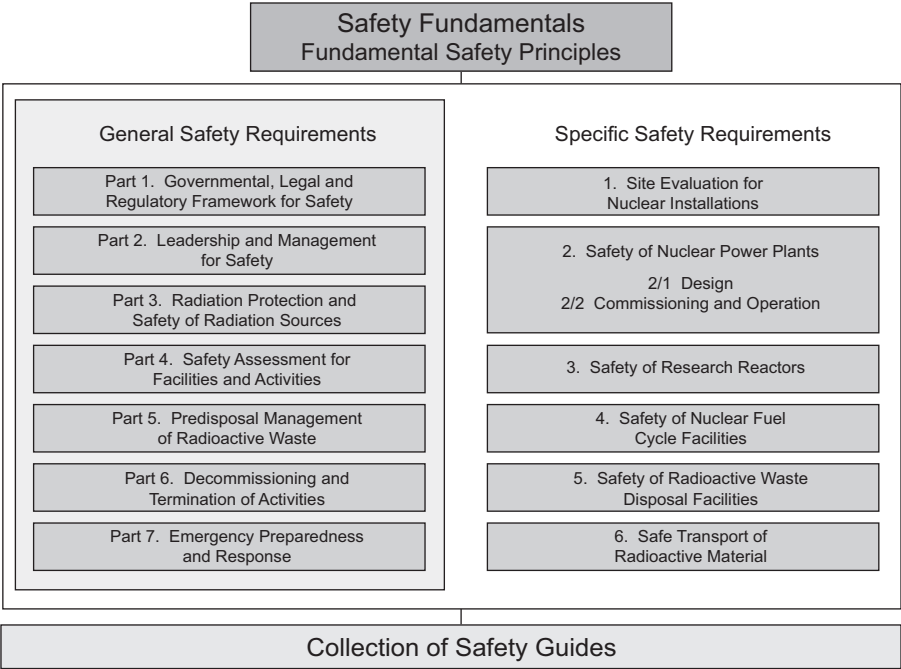


FIG. 1. The long term structure of the IAEA Safety Standards Series.

is necessary to take the measures recommended (or equivalent alternative measures). The Safety Guides present international good practices, and increasingly they reflect best practices, to help users striving to achieve high levels of safety. The recommendations provided in Safety Guides are expressed as ‘should’ statements.

APPLICATION OF THE IAEA SAFETY STANDARDS

The principal users of safety standards in IAEA Member States are regulatory bodies and other relevant national authorities. The IAEA safety standards are also used by co-sponsoring organizations and by many organizations that design, construct and operate nuclear facilities, as well as organizations involved in the use of radiation and radioactive sources.

The IAEA safety standards are applicable, as relevant, throughout the entire lifetime of all facilities and activities — existing and new — utilized for peaceful purposes and to protective actions to reduce existing radiation risks. They can be

used by States as a reference for their national regulations in respect of facilities and activities.

The IAEA's Statute makes the safety standards binding on the IAEA in relation to its own operations and also on States in relation to IAEA assisted operations.

The IAEA safety standards also form the basis for the IAEA's safety review services, and they are used by the IAEA in support of competence building, including the development of educational curricula and training courses.

International conventions contain requirements similar to those in the IAEA safety standards and make them binding on contracting parties. The IAEA safety standards, supplemented by international conventions, industry standards and detailed national requirements, establish a consistent basis for protecting people and the environment. There will also be some special aspects of safety that need to be assessed at the national level. For example, many of the IAEA safety standards, in particular those addressing aspects of safety in planning or design, are intended to apply primarily to new facilities and activities. The requirements established in the IAEA safety standards might not be fully met at some existing facilities that were built to earlier standards. The way in which IAEA safety standards are to be applied to such facilities is a decision for individual States.

The scientific considerations underlying the IAEA safety standards provide an objective basis for decisions concerning safety; however, decision makers must also make informed judgements and must determine how best to balance the benefits of an action or an activity against the associated radiation risks and any other detrimental impacts to which it gives rise.

## DEVELOPMENT PROCESS FOR THE IAEA SAFETY STANDARDS

The preparation and review of the safety standards involves the IAEA Secretariat and five Safety Standards Committees, for emergency preparedness and response (EPReSC) (as of 2016), nuclear safety (NUSSC), radiation safety (RASSC), the safety of radioactive waste (WASSC) and the safe transport of radioactive material (TRANSSC), and a Commission on Safety Standards (CSS) which oversees the IAEA safety standards programme (see Fig. 2).

All IAEA Member States may nominate experts for the Safety Standards Committees and may provide comments on draft standards. The membership of the Commission on Safety Standards is appointed by the Director General and includes senior governmental officials having responsibility for establishing national standards.

A management system has been established for the processes of planning, developing, reviewing, revising and establishing the IAEA safety standards.

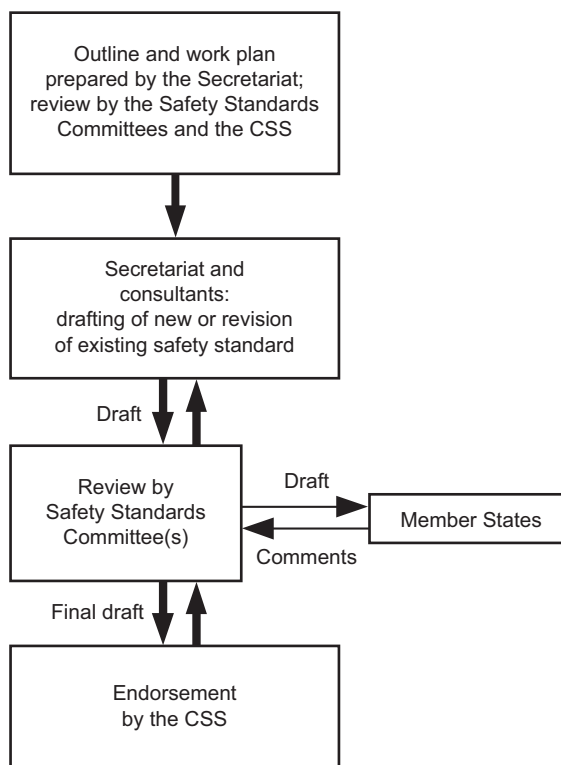


FIG. 2. The process for developing a new safety standard or revising an existing standard.

It articulates the mandate of the IAEA, the vision for the future application of the safety standards, policies and strategies, and corresponding functions and responsibilities.

## INTERACTION WITH OTHER INTERNATIONAL ORGANIZATIONS

The findings of the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) and the recommendations of international expert bodies, notably the International Commission on Radiological Protection (ICRP), are taken into account in developing the IAEA safety standards. Some safety standards are developed in cooperation with other bodies in the United Nations system or other specialized agencies, including the Food and Agriculture Organization of the United Nations, the United Nations Environment Programme, the International Labour Organization, the OECD Nuclear Energy Agency, the Pan American Health Organization and the World Health Organization.

## INTERPRETATION OF THE TEXT

Safety related terms are to be understood as defined in the IAEA Safety Glossary (see <https://www.iaea.org/resources/safety-standards/safety-glossary>). Otherwise, words are used with the spellings and meanings assigned to them in the latest edition of The Concise Oxford Dictionary. For Safety Guides, the English version of the text is the authoritative version.

The background and context of each standard in the IAEA Safety Standards Series and its objective, scope and structure are explained in Section 1, Introduction, of each publication.

Material for which there is no appropriate place in the body text (e.g. material that is subsidiary to or separate from the body text, is included in support of statements in the body text, or describes methods of calculation, procedures or limits and conditions) may be presented in appendices or annexes.

An appendix, if included, is considered to form an integral part of the safety standard. Material in an appendix has the same status as the body text, and the IAEA assumes authorship of it. Annexes and footnotes to the main text, if included, are used to provide practical examples or additional information or explanation. Annexes and footnotes are not integral parts of the main text. Annex material published by the IAEA is not necessarily issued under its authorship; material under other authorship may be presented in annexes to the safety standards. Extraneous material presented in annexes is excerpted and adapted as necessary to be generally useful.

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# 1. INTRODUCTION

## BACKGROUND

1.1. Requirements for the operation of nuclear power plants are established in IAEA Safety Standards Series No. SSR-2/2 (Rev. 1), Safety of Nuclear Power Plants: Commissioning and Operation [1], while requirements for the design of nuclear power plants are established in IAEA Safety Standards Series No. SSR-2/1 (Rev. 1), Safety of Nuclear Power Plants: Design [2].

1.2. This Safety Guide provides specific recommendations to ensure that operations in nuclear power plants are conducted in a safe, effective, thorough and professional manner.

1.3. This Safety Guide was developed in parallel with six other Safety Guides on the operation of nuclear power plants, as follows:

- IAEA Safety Standards Series No. SSG-70, Operational Limits and Conditions and Operating Procedures for Nuclear Power Plants [3];
- IAEA Safety Standards Series No. SSG-71, Modifications to Nuclear Power Plants [4];
- IAEA Safety Standards Series No. SSG-72, The Operating Organization for Nuclear Power Plants [5];
- IAEA Safety Standards Series No. SSG-73, Core Management and Fuel Handling for Nuclear Power Plants [6];
- IAEA Safety Standards Series No. SSG-74, Maintenance, Testing, Surveillance and Inspection in Nuclear Power Plants [7];
- IAEA Safety Standards Series No. SSG-75, Recruitment, Qualification and Training of Personnel for Nuclear Power Plants [8].

A collective aim of this set of Safety Guides is to support the fostering of a strong safety culture in nuclear power plants.

1.4. The terms used in this Safety Guide are to be understood as defined in the IAEA Safety Glossary [9].

1.5. This Safety Guide supersedes IAEA Safety Standards Series No. NS-G-2.14, Conduct of Operations at Nuclear Power Plants<sup>1</sup>.

## OBJECTIVE

1.6. The purpose of this Safety Guide is to provide recommendations to ensure that operations in nuclear power plants are conducted in accordance with the requirements established in SSR-2/2 (Rev. 1) [1].

1.7. The recommendations provided in this Safety Guide are aimed primarily at operating organizations of nuclear power plants and regulatory bodies.

## SCOPE

1.8. It is expected that this Safety Guide will be used primarily for land based stationary nuclear power plants with water cooled reactors designed for electricity generation or for other production applications (such as district heating or desalination).

1.9. This Safety Guide identifies the main responsibilities and operating practices in relation to the safe operation of a nuclear power plant, and addresses the following:

- (a) The structure of the operations department<sup>2</sup> of a nuclear power plant;
- (b) Setting high standards of performance and making safety related decisions in an effective manner;
- (c) Conducting control room activities in a thorough and professional manner;
- (d) Maintaining a nuclear power plant within the established operational limits and conditions (OLCs).

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<sup>1</sup> INTERNATIONAL ATOMIC ENERGY AGENCY, Conduct of Operations at Nuclear Power Plants, IAEA Safety Standards Series No. NS-G-2.14, IAEA, Vienna (2008).

<sup>2</sup> The operations department is the part of the operating organization responsible for the conduct of operations.

## STRUCTURE

1.10. Section 2 provides recommendations on the organizational and administrative aspects of the operations department. Section 3 provides recommendations relating to the shift complement of operators and their duties. Section 4 provides recommendations on shift routines and on good operating practices. Section 5 provides recommendations on the control of plant equipment and of the plant status. Section 6 provides recommendations on the use and maintenance of operations equipment and operator aids, and Section 7 provides recommendations on work control and authorization.

## 2. MANAGEMENT AND ORGANIZATION OF PLANT OPERATIONS

### FUNCTIONS AND ORGANIZATION OF PLANT OPERATIONS

2.1. Requirements for the management of facilities and activities, including nuclear power plants, are established in IAEA Safety Standards Series No. GSR Part 2, Leadership and Management for Safety [10]. Further recommendations for nuclear power plants are provided in IAEA Safety Standards Series No. GS-G-3.5, The Management System for Nuclear Installations [11].

2.2. The management and organization of a nuclear power plant should ensure a high level of safety performance in the conduct of operations within the plant. This should be achieved through the effective implementation and control of operations activities.

2.3. A clear understanding by operating personnel<sup>3</sup> of their authorities, responsibilities and accountabilities, and the associated interfaces, is essential for the proper and safe functioning of a nuclear power plant. To achieve this, the organizational structure in relation to plant operations should be clearly

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<sup>3</sup> ‘Operating personnel’ are the individual workers engaged in the operation of an authorized facility or the conduct of an authorized activity [9]. Within the context of this Safety Guide, operating personnel are those workers involved in the day to day operation of the reactor and who are part of the operations department at the nuclear power plant.

defined, and the administrative controls for implementing the structure should be formally documented.

2.4. The structure of the operations department will differ depending on the specific plant; however, this structure is normally composed of personnel who perform shift work and additional personnel who are present during normal working hours. The following tasks, functions and responsibilities should be taken into account in determining the structure for the operations department:

- (a) Planning of the overall activities and work of the operations department in cooperation with other departments at the plant, to develop an integrated programme for plant operations;
- (b) Human resources planning and staff development;
- (c) Direct operation of the plant by monitoring and controlling plant systems in accordance with operating procedures, OLCs and administrative procedures;
- (d) Supervision of shift operations by the shift supervisor, and periodic evaluation of shift operations by the management of the operations department;
- (e) Organization and supervision of refuelling and shutdown activities;
- (f) Development of operating procedures, and coordination of their preparation to ensure the safe and reliable operation of the plant;
- (g) Coordination of the development and implementation of programmes and policies to ensure that plant operations are performed in a safe and reliable manner;
- (h) Involvement in the development of surveillance programmes for structures, systems and components important to safety, and coordination of the implementation of such programmes;
- (i) Development and implementation of work management processes to ensure that shift personnel are aware of the work undertaken in the plant and maintain the correct plant configuration;
- (j) Maintenance of proper plant configuration by the correct handling of changes in the plant status caused by maintenance, modifications and testing activities;
- (k) Identification of deficiencies in equipment and in the plant to ensure that maintenance activities can be structured effectively;
- (l) Support of outage activities through the involvement of knowledgeable plant operating personnel in schedule development, testing, special projects,

alignment of systems<sup>4</sup>, tracking of system operability and the return to service of systems;

- (m) Establishment and implementation of a system to prevent unauthorized access to, or interference with, items important to safety;
- (n) Identification of training needs, involvement in the development of training programmes and in the monitoring of training sessions, and evaluation of training programmes;
- (o) Verification of good housekeeping and material conditions in the areas of the plant for which the operations department is responsible;
- (p) Establishment of operating goals and objectives in accordance with the overall goals and objectives for the plant;
- (q) Reporting on abnormal events, including near misses and low level events, participating in the investigation of such events and deciding on measures to be taken to reduce the probability of a similar situation reoccurring;
- (r) Dissemination of operating experience to operating personnel to learn from events at the nuclear power plant and at other nuclear installations;
- (s) Production of reports on the conduct of operations for management and other groups and authorities as necessary;
- (t) Arrangements and responsibilities for accident management;
- (u) Arrangements and responsibilities for emergency preparedness and response.

2.5. For the safe operation of the plant, administrative controls should be established that include OLCs and operating instructions and procedures. These controls constitute the operations programme and should be established before the commencement of operation. The overall responsibility for establishing and implementing the operations programme and for managing the operations department should normally rest with the operations manager. The operations manager has responsibility for the day to day running of the operations department.

2.6. The operations department should be involved in prioritizing all work that might affect the safe operation of the plant and should be assigned the responsibility for overseeing the planning and scheduling of such work.

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<sup>4</sup> The alignment of a system or equipment is the configuration of the system or equipment that is created by operating switches, valves or breakers to ensure the appropriate functioning of the system or equipment for a given purpose.

## OPERATING POLICY

2.7. An operating policy is required to be established in which safety has an overriding priority in all aspects of plant operations, including challenges resulting from production demands and project schedules (see para. 4.1 of SSR-2/2 (Rev. 1) [1]). The policy is also required to promote a strong safety culture, including a questioning attitude, and should encourage a ‘no blame’ culture and a rigorous and prudent approach to all safety related activities.

2.8. The operating policy should be based on maintaining the independence of each level of defence in depth and an adequate reliability of each level, as part of the conduct of operations. The influence of human and organizational factors on one or more levels of defence in depth should be taken into account in all operational activities.

2.9. A defence in depth approach should be generally applied to safety related activities in plant operations. These activities should be carefully planned, appropriately authorized by the operations department and performed by competent operating personnel in accordance with approved procedures.

2.10. Adequate independent safety assessments and verifications should be performed for different operational activities to ensure that such activities can be completed without affecting the safety of the plant.

2.11. Plant operations important to safety are required to be undertaken by suitably qualified and competent operating personnel, which may require the formal authorization of personnel (see para. 4.16 of SSR-2/2 (Rev. 1) [1]). Further recommendations on the recruitment, qualification and training of personnel for nuclear power plants are provided in SSG-75 [8].

2.12. The assignment of plant personnel to operate control room keys or other safety related equipment should be specified in administrative procedures. Only personnel who are physically and mentally fit for operational duties should be allowed to perform activities in relation to plant operation in the main control room or safety related activities elsewhere in the plant.

2.13. Operating personnel should maintain the reactor and its supporting systems within the bounds of approved equipment alignments. As stated in para. 4.26 of SSR-2/2 (Rev. 1) [1], “All activities important to safety shall be carried out in accordance with written procedures to ensure that the plant is operated within the established operational limits and conditions.”

2.14. The nuclear power plant should be maintained in a safe condition by deliberate monitoring and control to ensure that fundamental safety functions (e.g. control of reactivity, removal of heat from the reactor and from the fuel store, confinement of radioactive material) are fulfilled at all stages of the lifetime of the nuclear power plant, including decommissioning. Requirements on decommissioning are established in IAEA Safety Standards Series No. GSR Part 6, Decommissioning of Facilities [12]. Further recommendations are provided in IAEA Safety Standards Series No. SSG-47, Decommissioning of Nuclear Power Plants, Research Reactors and Other Nuclear Fuel Cycle Facilities [13].

2.15. The operating organization should ensure the safe operation at all units at a multiple unit site, taking in consideration the evolution of work at one or more of the units. This should be achieved by appropriate procedures, work planning, training and the allocation of appropriate resources.

2.16. Paragraph 5.11 of SSR-2/2 (Rev. 1) [1] states:

“The radiation protection programme shall ensure that for all operational states, doses due to exposure to ionizing radiation at the plant or doses due to any planned radioactive releases (discharges) from the plant are kept below authorized limits and are as low as reasonably achievable.”

Requirements for protection against exposure to ionizing radiation are established in IAEA Safety Standards Series No. GSR Part 3, Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards [14].

## HUMAN RESOURCES AND QUALIFICATION OF PERSONNEL

2.17. Paragraph 3.11 of SSR-2/2 (Rev. 1) [1] states:

“The organization, qualifications and number of operating personnel shall be adequate for the safe and reliable operation of the plant in all operational states and in accident conditions. Succession planning shall be an established practice for the operating personnel. The recruitment and selection policy of the operating organization shall be directed at retaining competent personnel to cover all aspects of safe operation. A long term staffing plan aligned to the long term objectives of the operating organization shall be developed in anticipation of the future needs of the operating organization for personnel and skills.”

2.18. The operations manager should ensure that an adequate number of competent and qualified operating personnel are available at all times to operate the plant safely. There should be sufficient numbers of operating personnel to allow individuals to be periodically released for training and development. The long term staffing plan for operating personnel should be supported by reviews of career development, associated action plans and recruitment plans. These reviews should aim to foster continuous improvement and learning.

2.19. The long term staffing plan should consider potential changes in technical capabilities throughout the lifetime of the plant. Further recommendations are provided in IAEA Safety Standards Series No. SSG-48, Ageing Management and Development of a Programme for Long Term Operation of Nuclear Power Plants [15].

2.20. The shift teams should be staffed in such a way that a sufficient number of authorized operators<sup>5</sup> and other personnel are available for the reliable accomplishment of assigned tasks in all operational states and accident conditions, as well as for the purposes of fire protection. Special attention should be paid to ensuring that staffing levels provide adequate redundancy and diversity in terms of the competences needed for all operational states and accident conditions.

2.21. During particularly busy periods — for example, during reactor outages — line managers should ensure that sufficient operating personnel are provided to enable rest periods (see also para. 3.13 of SSR-2/2 (Rev. 1) [1] in relation to the staff health policy). Line managers should be particularly vigilant in order to identify any signs of fatigue or reduction in fitness for duty in operating personnel (see also para. 4.29 of SSR-2/2 (Rev. 1) [1]).

2.22. Paragraph 4.19 of SSR-2/2 (Rev. 1) [1] states:

“A suitable training programme shall be established and maintained for the training of personnel before their assignment to safety related duties. The training programme shall include provision for periodic confirmation of the competence of personnel and for refresher training on a regular basis. The refresher training shall also include retraining provision for personnel who have had extended absences from their authorized duties. The training shall emphasize the importance of safety in all aspects of plant operation and shall promote safety culture.”

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<sup>5</sup> In some States, certain operating positions in the shift teams are subject to a licensing process.

Additional training or briefings should be provided for operations important to safety or for infrequent operations (including operations that are performed less frequently because of improved operational performance, such as startup of the plant). Changes to regulations and procedures, modifications to plant equipment and changes to the organizational structure should be addressed in continuing training. Special training should be provided on internal events and external events relevant to the safety of the plant.

2.23. All operating personnel and technical support personnel associated with the shift teams should be trained in the safety analysis aspects of activities that they are responsible for.

2.24. Support for the training department should be provided through the involvement of members of the operations department in the analysis of training needs and the development of training materials and training tools. Operating personnel should also be involved as training instructors for subjects on which they have expertise.

2.25. More detailed recommendations on the training and qualification of operating personnel for nuclear power plants, including a systematic approach to training, are provided in SSG-75 [8].

## PERFORMANCE STANDARDS AND OBJECTIVES

2.26. Paragraph 4.2 of SSR-2/2 (Rev. 1) [1] states that “Safety performance standards shall be developed for all operational activities and shall be applied by all site personnel.”

2.27. Realistic, measurable and challenging goals and objectives for the operation of the nuclear power plant should be established by the operations department to support the goals and objectives of the operating organization. These goals and objectives should address areas where high standards of performance are expected. High standards of performance and the expectations of management should be reflected in the operating policy and operating procedures.

2.28. Requirement 9 of SSR-2/2 (Rev. 1) [1] states that “**The operating organization shall establish a system for continuous monitoring and periodic review of the safety of the plant and of the performance of the operating organization.**” Performance objectives and associated criteria should be

established and used to routinely monitor the performance of the plant and of operating personnel.

2.29. Paragraph 4.35 of SSR-2/2 (Rev. 1) [1] states:

“Monitoring of safety performance shall include the monitoring of: personnel performance; attitudes to safety; response to infringements of safety; and violations of operational limits and conditions, operating procedures, regulations and licence conditions.”

Recommendations on OLCs and operating procedures are provided in SSG-70 [3]. The performance of operating personnel should be appraised regularly, and the results should be used for enhancing individual performance and preventing complacency, and for the systematic collection of data for the training of operating personnel.

2.30. The managers of the operations department are required to demonstrate their commitment to safety (see Requirement 2 of GSR Part 2 [10]). This commitment should be clearly communicated to operating personnel and should be supported by the frequent presence of managers in the workplaces of such personnel. Managers are also required to demonstrate leadership for safety (see Requirement 2 of GSR Part 2 [10]). Safety performance should also be improved through coaching programmes.

2.31. The managers and supervisors of the operations department should, through consistent words and actions, develop a working environment that fosters adherence to the operating policy and reflects high standards of performance. In addition, para. 4.30 of SSR-2/2 (Rev. 1) states that “The operating organization shall encourage plant personnel to have a questioning attitude and to make appropriate and conservative decisions<sup>[6]</sup>, so as to minimize risk and to maintain the plant in a safe condition.”

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<sup>6</sup> Conservative decision making in operational safety management means making decisions that maintain all levels of defence in depth at all times. In practice, a conservative approach means that decisions that take equipment out of service, alter plant line-ups, reschedule equipment testing or extend the out of service time of equipment are evaluated for their effects on safety, and that the final configuration meets the provisions of the safety analysis report and remains within established OLCs.