

IAEA Safety Standards for Research Reactors

March 2010

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IAEA

International Atomic Energy Agency

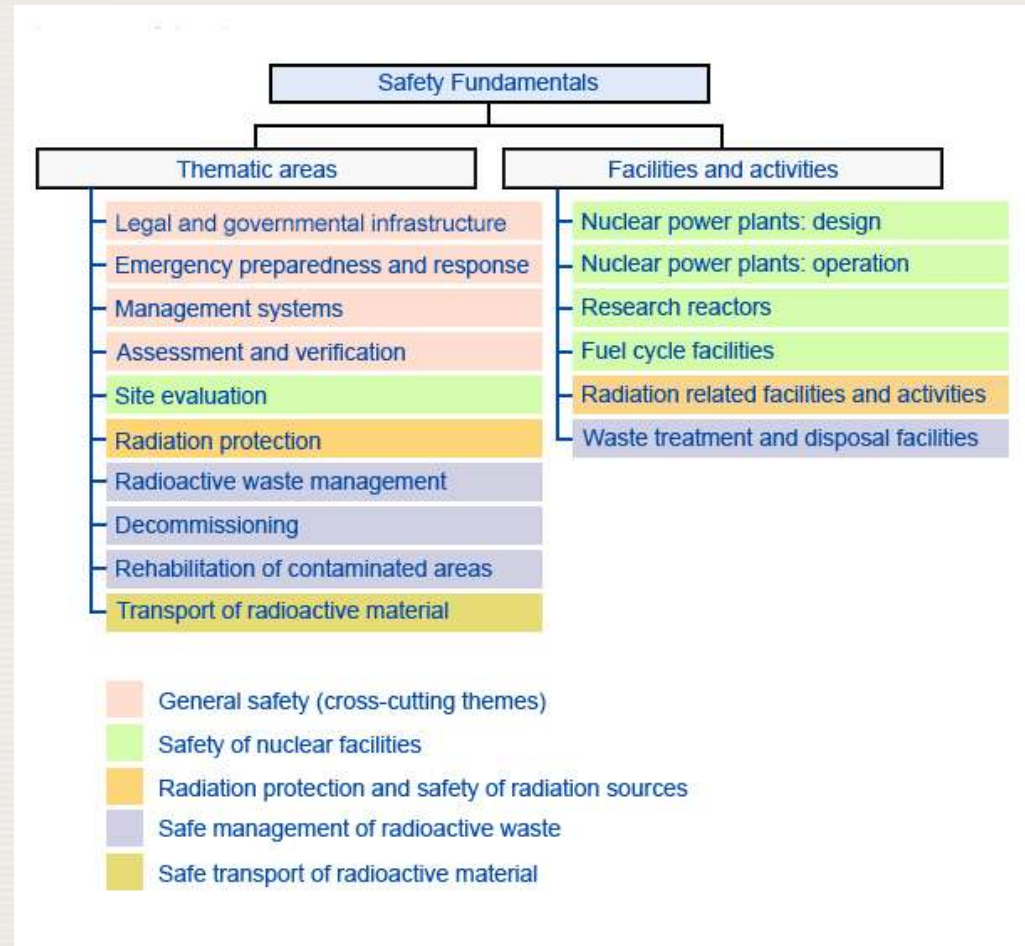
Content

- IAEA Safety Standards: Categories
- Existing and long-term structure of the IAEA Safety Standards
- IAEA Safety Standards for Research Reactors
- Supporting Documents
- Concluding remarks

Existing Structure of the IAEA Safety Standards

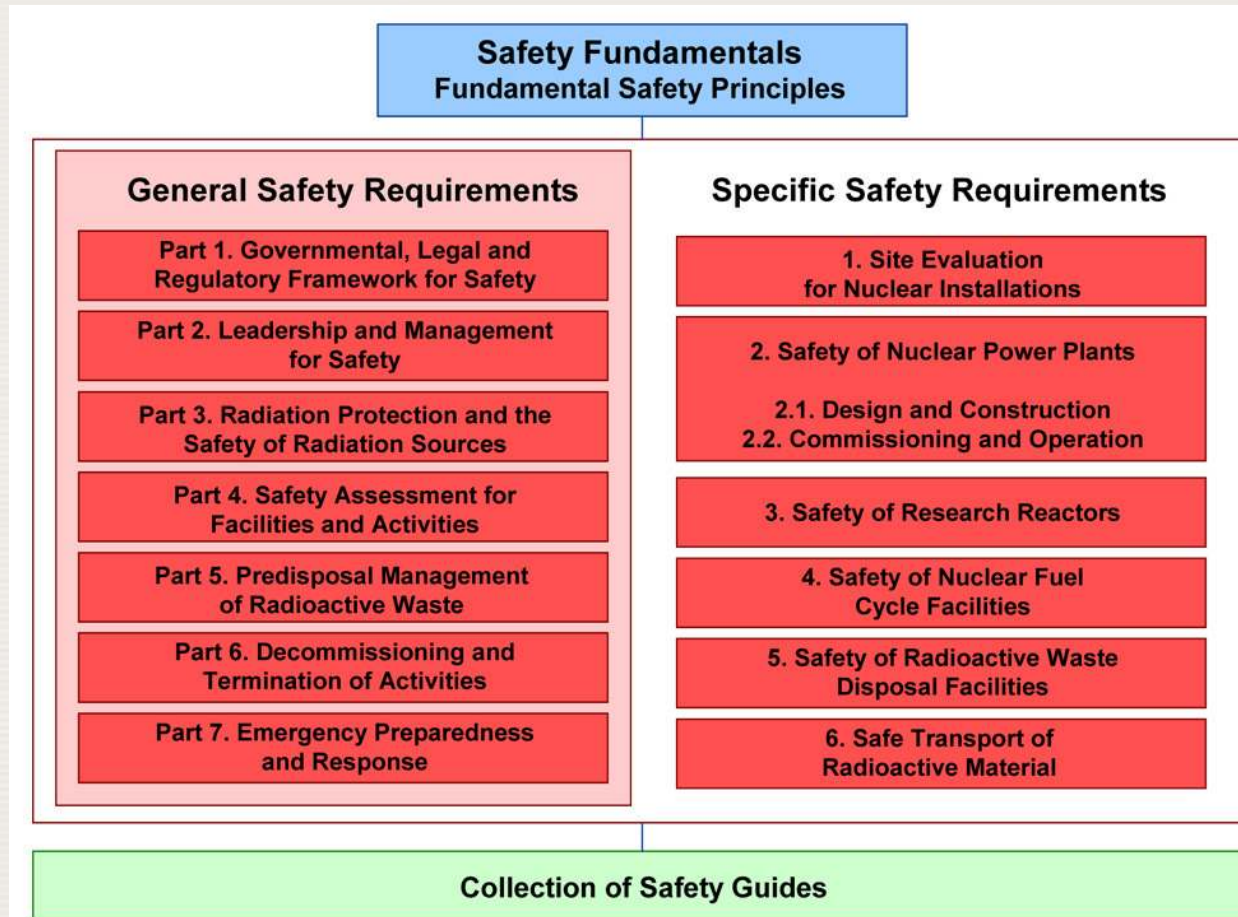
Two Categories:

1. **Thematic:** areas of cross cutting nature.
 2. **Facility Specific** (e.g. NPP, RRs, FCFs).
- The structure allows for small number of Safety Guides under thematic and large number under facility specific.



Long-term Structure of the IAEA Safety Standards

- Aims at ensuring logical relationship between the SF-1 and Safety Requirements, and between Safety Requirements and Safety Guides.



IAEA Safety Standards for Research Reactors: General

- The IAEA Safety Standards relevant to RRs reflect international consensus on what constitutes a high level of safety, and form the basis for the IAEA safety review services and assistance;
- They are covering all the areas important to the safety of research reactors and provide support to effective application of the IAEA Code of Conduct on the Safety of Research Reactors.
- They are intended for use by all organizations involved in research reactors, including operating organizations, regulatory bodies, users, designers, and suppliers.
- The Safety Standards use regulatory language to allow for their incorporation into national safety regulations, and in developing national regulatory guides.

IAEA Safety Standards for research reactors – March 2010

NS-R-4– Requirements on the “Safety of Research Reactors”

Safety Assessment
of RRs and
Preparation of the SAR
SS-35-G1

Utilization and
Modification of RRs
SS-35-G2

Maintenance Periodic
Testing and Inspections
of RRs
NS-G-4.2

Commissioning
of RRs
NS-G-4.1

The Operational Limits and
Conditions and Operating
Procedures for RRs
NS-G-4.4

The OO and Recruitment, Training
and Qualification of Personnel
for RRs
NS-G-4.5

Core Management and
Fuel Handling for RRs
NS-G-4.3

Radiation Protection and
Waste Management in
the Design and
Operation of RRs
NS-G-4.6

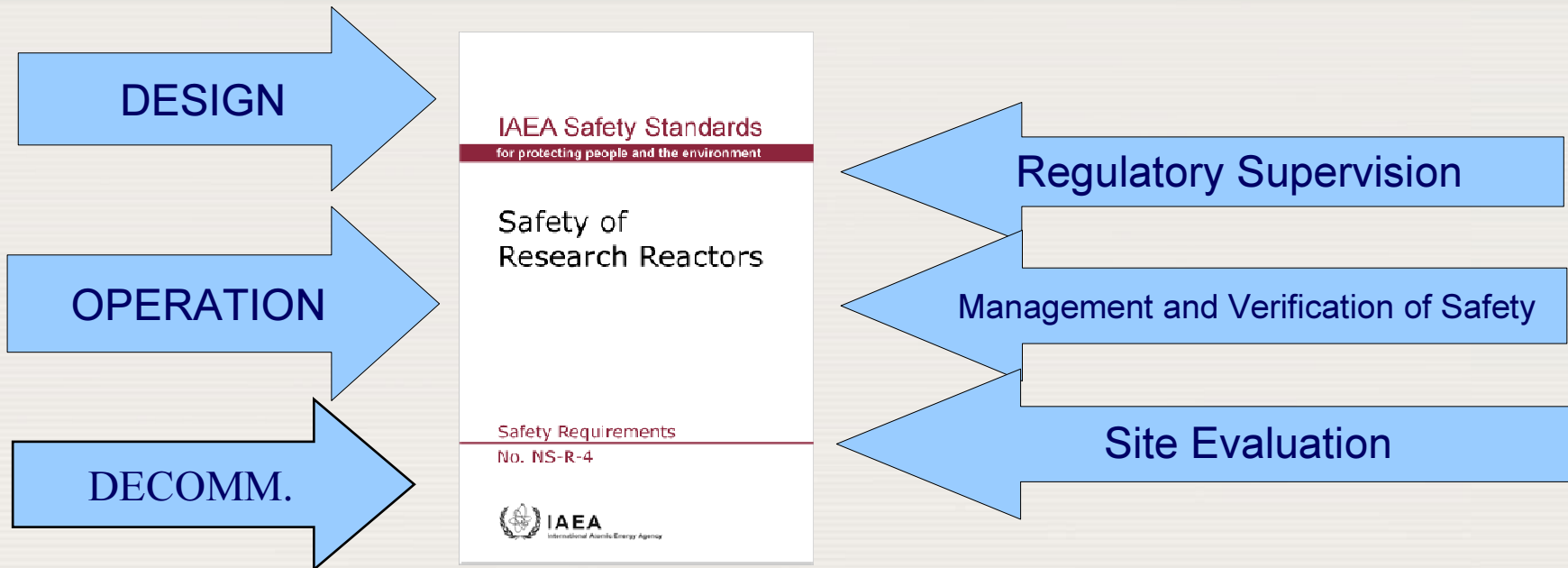
Decommissioning
of NPPs and
RRs(1999)
WS-G-2.1

Ageing Management for
Research Reactors
NS-G-4.7

The Use of A
Graded Approach in the
Application of the Safety
Requirements for RRs
DS 351

Safety of I&C and
Software
Important to Safety
(in the drafting stage)

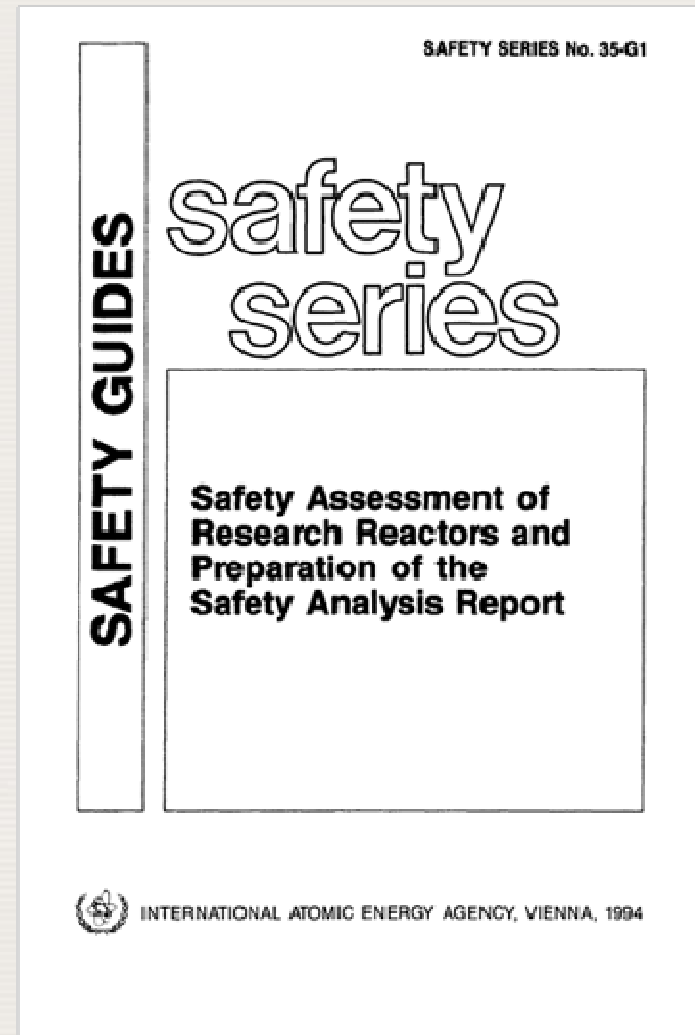
NS-R-4: Safety of Research Reactors



RRs with power levels in excess of several tens of MW, fast reactors, and RRs using experimental devices such as high pressure and temperature loops, or cold neutron sources may require application of standards of NPP or additional safety measures.

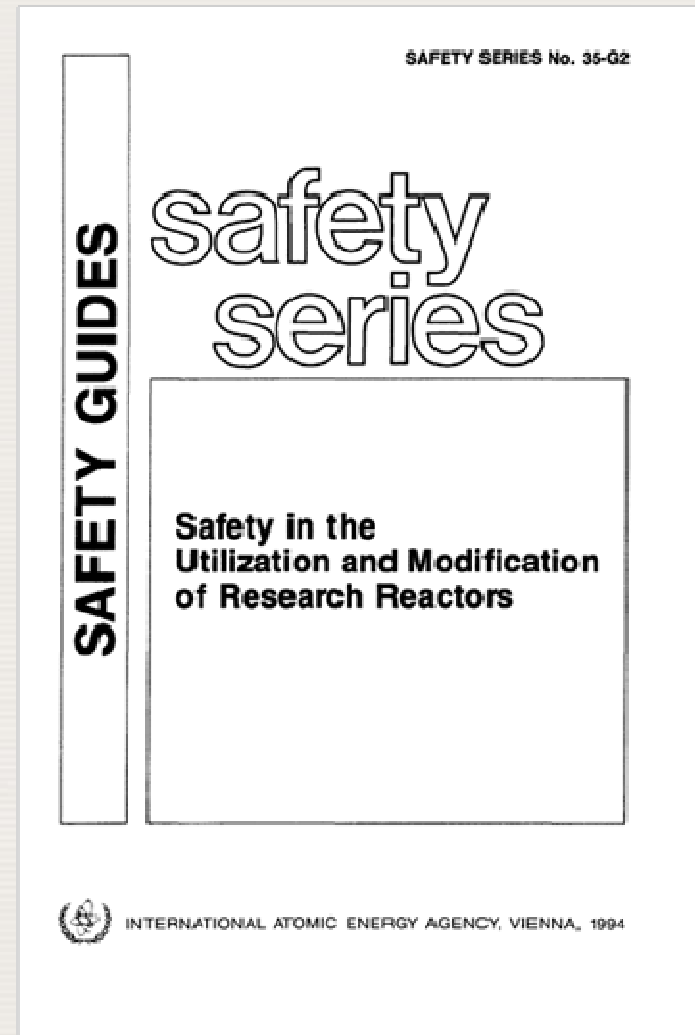
Safety Guide- SS 35-G1 (1994)

- Provides guidance on the preparation, review, and assessment of the SAR.
- It is useful for the licensing process of research reactors, and also for re-licensing and re-assessment of existing research reactors.
- Currently under revision to include guidance on management system and to take into account the feedback from its application.



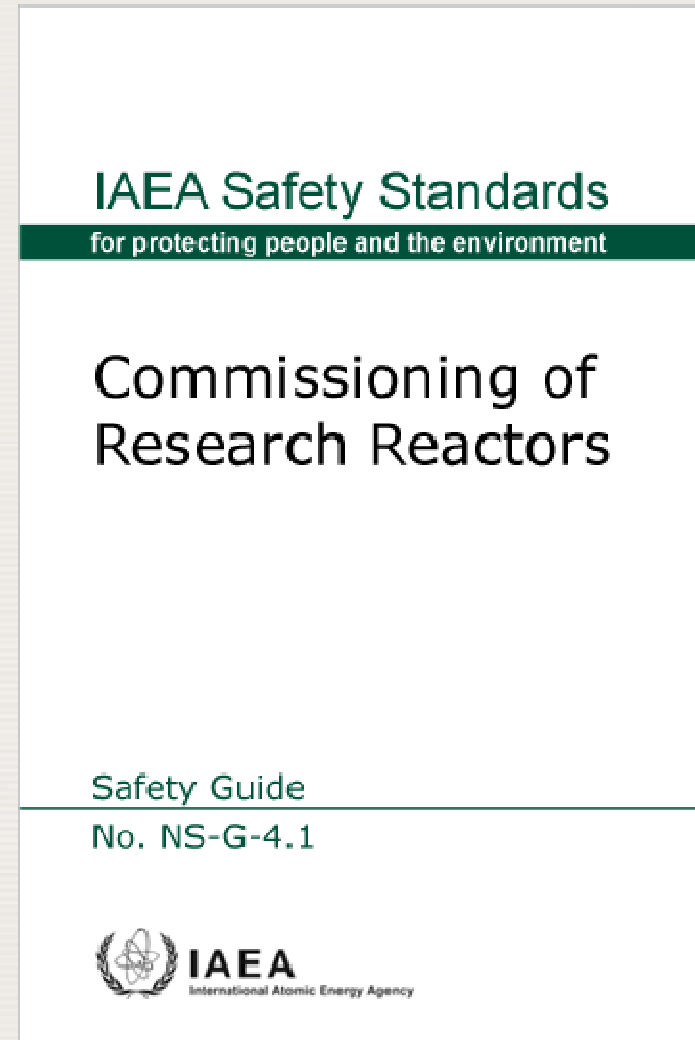
Safety Guides- SS 35-G2 (1994)

- Provide guidance on the safety categorization of modifications and utilization and the associated approval channels.
- While it is applicable for existing research reactors, it is also recommended for use by organizations planning a new experiment, or plan to put a new research reactor into operation.
- Currently, it is under revision to take into account the feedback from its application.



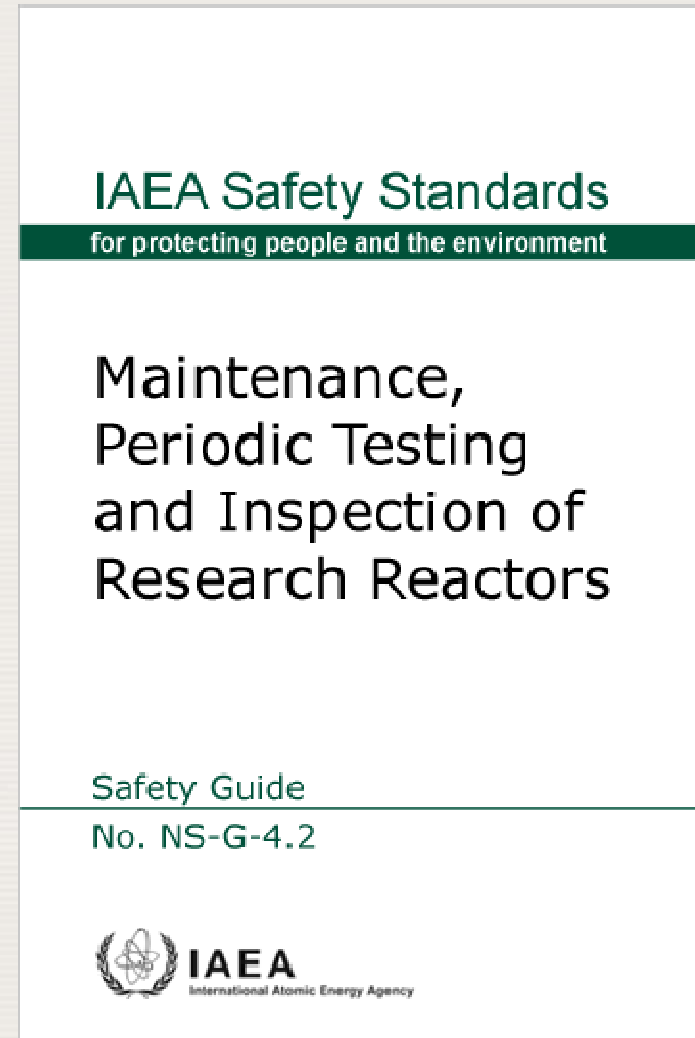
NS-G-4.1: Commissioning of RRs (2006)

- Provide guidance on preparation and implementation of commissioning programme.
- It is also suitable for:
 - *Re-commissioning of a RR after a period of extended shutdown*
 - *Commissioning of new experimental device*
 - *Commissioning of modification with major safety significance*



NS-G-4.2: Maintenance, Periodic Testing , and Inspection for RRs (2006)

- Provides guidance on preparation and implementation of maintenance, periodic testing and inspection programmes. The topics covered include activities related to:
 - Preventive and corrective maintenance of Safety Systems and Components (SSCs);
 - Testing intended to ensure that operations remain within the established Operational Limits and Conditions (OLCs);
 - Inspections initiated by operating organizations on SSCs to determine whether they are acceptable for continued safe operation.



NS-G-4.3: Core Management and Fuel Handling for RRs (2008)

- Addresses activities of core management and fuel handling that should be performed to allow optimum reactor core operation and reactor utilization without compromising the safety of the fuel and the reactor.
- Covers core design and operation, monitoring of core's safety parameters, refueling process, and receiving, storage, handling, and transport of fresh and spent fuel.



IAEA Safety Standards

for protecting people and the environment

Core Management
and Fuel Handling
for Research
Reactors

Safety Guide

No. NS-G-4.3



NS-G-4.4: Operational Limits and Conditions and Operating Procedures for RRs (2008)

- Provides guidance on formulating and presenting the OLCs and Operating Procedures for RRs.
- It covers the development, content, and implementation of the OLCs and Operating Procedures for the operation of RRs and associated experiments.

IAEA Safety Standards

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Operational Limits
and Conditions and
Operating
Procedures for
Research Reactors

Safety Guide

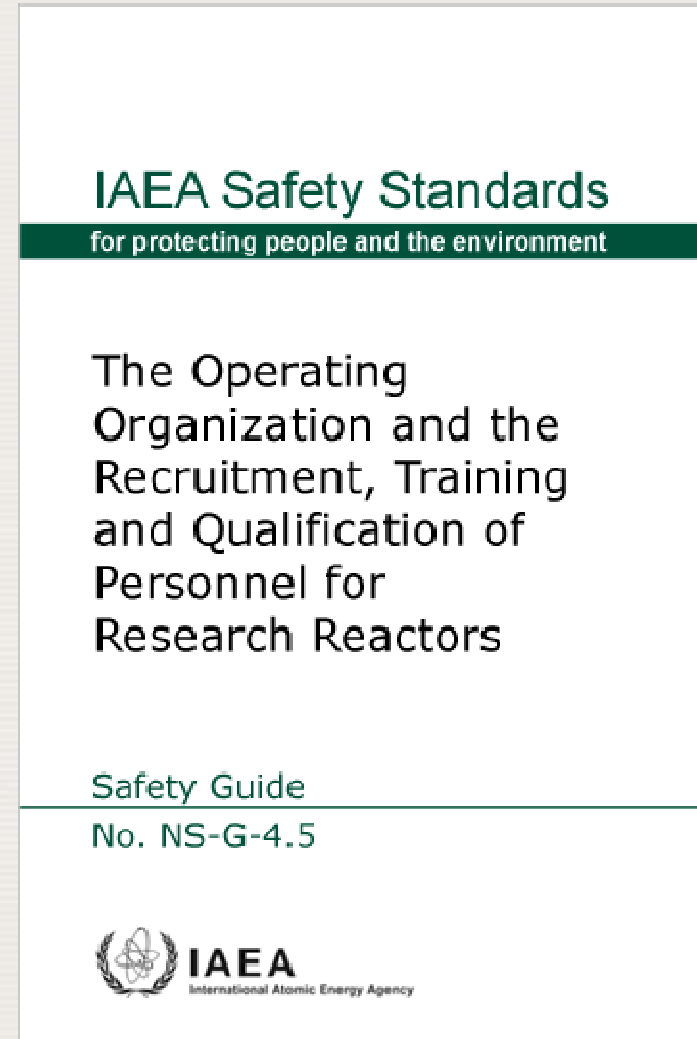
No. NS-G-4.4



NS-G-4.5: The Operating Organization and the Recruitment, Training and Qualification of Personnel for RRs (2008)

The Safety Guide covers:

- **The nature of the operating organization, and guidance on its establishment**
- **The recruitment process for reactor personnel, including the required qualifications**
- **The initial training and re-training programmes of reactor personnel**
- **The authorization process for individuals whose duties have an immediate relation with safety**



NS-G-4.6: Radiation Protection and Radioactive Waste Management in the Design and Operation of RRs (2009)

- Identifies important components that should be considered in the design stage to facilitate radiation protection and waste management.
- Provides good practices to be followed in operational radiation protection and radioactive waste management programmes and their optimization.

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Radiation Protection and Radioactive Waste Management in the Design and Operation of Research Reactors

Safety Guide

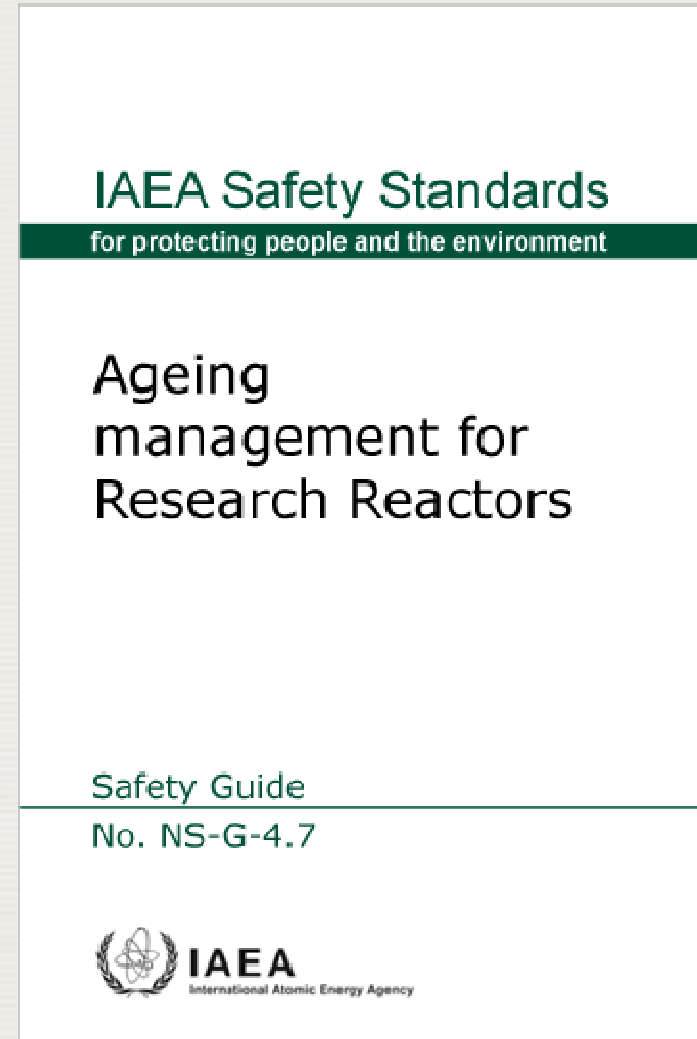
No. NS-G-4.6



NS-G-4.7 (ex-DS412): Ageing Management for Research Reactors (in print)

Provides guidance on:

- **Ageing management in different stages of the RR lifetime;**
- **Elements for a systematic programme on ageing management for the systems and components important to safety.**
- **Managing the obsolescence.**
- **Interfaces of ageing management with other technical areas including maintenance, periodic safety reviews for decision on the continuation of the facility operation.**



DS351: Use of a Graded Approach in Application of the Safety Requirements for RRs (under development)

- **While all safety requirements and recommendations established in the NS-R-4 should be considered, some may not be applicable to low risk RRs.**
- **These requirements and recommendations should be graded for their applicability to a particular RR.**
- **DS351 provides a practical guidance for grading the application of the safety requirements through the various stages of the RR lifetime without compromising safety.**
- **The document is expected to be published in the first half of 2011.**

Safety Guide on the Safety of I&C and Software important to Safety of RRs (under development)

- The document is intended to provide guidance on the safety during the design, operation and maintenance of the I&C and software important to safety.
- It also covers safety aspects to be considered in different stages of projects for replacement/modernization of I&C systems of RRs.

Some other Safety Guides that can be used for RRs

Design of Spent
Fuel Storage Facilities
SS116

Operation of Spent Fuel
Storage Facilities
SS117

Application of Management
System for Facilities and
Activities **GS-G-3.1**

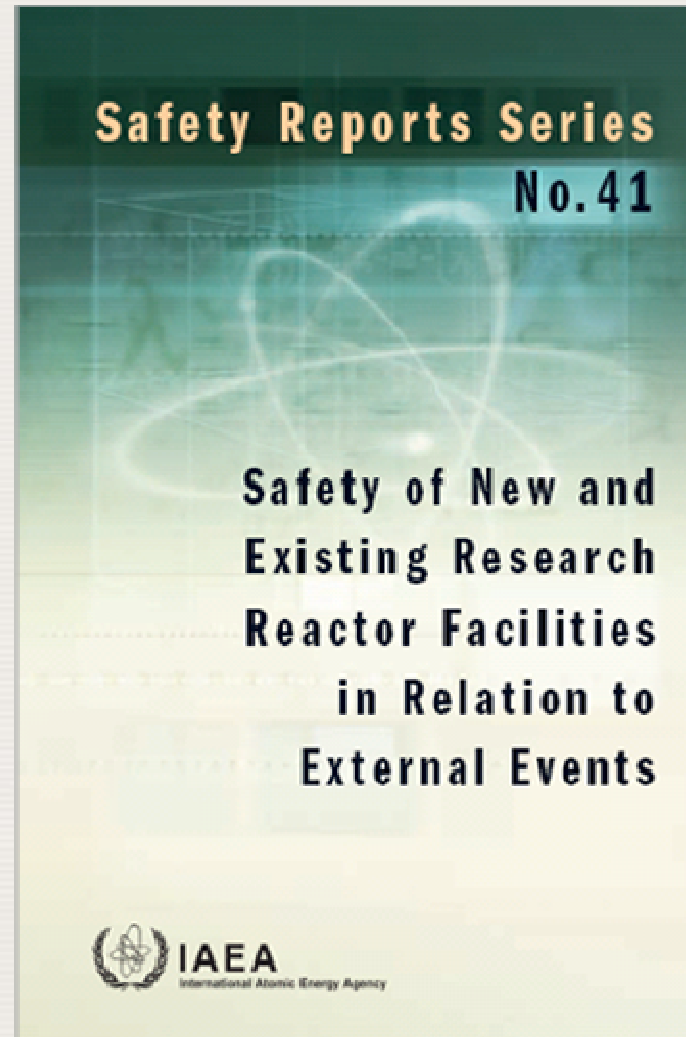
Criticality Safety
DS 407

Fire Protection in NPPs
SS 50-SG-D2

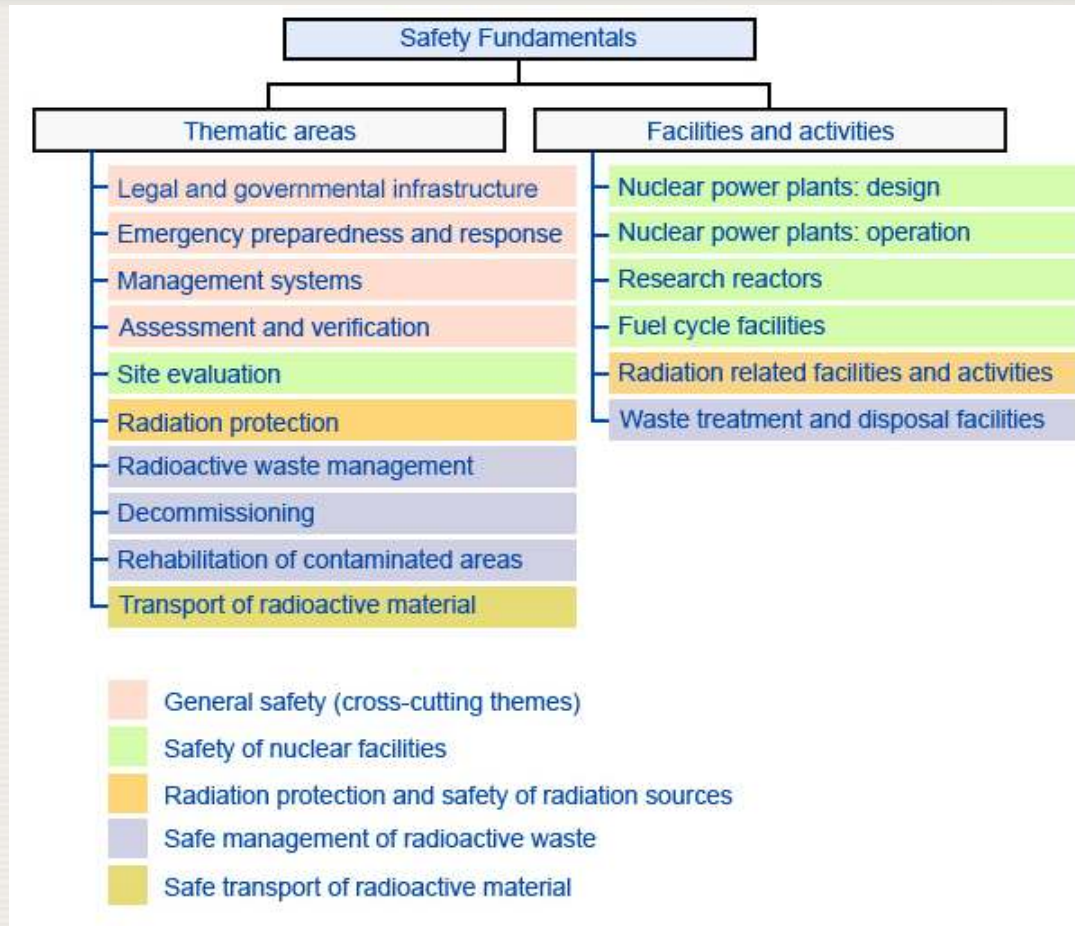
Fire Safety in the operation
of NPPs
NS-G-2.1

Supporting Documents

- **Complement the Safety Guides and includes Safety Reports, and TECDOCs.**
- **Provide technical information, practical examples and detailed methods that can be used to implement recommendations.**
- **Do not establish requirements or recommendations.**



Existing structure of the IAEA Safety Standards



<http://www-ns.iaea.org/standards/default.htm>

Concluding remarks

- Application of the IAEA Safety Standards will help Member States to achieve the highest level of Safety for their Research Reactors.
- The IAEA programme on RRs safety gives priority to the development and promotion of proper use of the IAEA Safety Standards, through:
 - **Assistance to Member States in application of the Safety Standards**
 - **Conduct of safety review missions and training activities based on the Safety Standards.**

Thank You