

Technical Safety Reviews (TSR)

Nuclear Safety and Security Programme



Nuclear
Safety and
Security

Foreword



For over three decades, the IAEA has been providing review services in the areas of design safety and safety assessment to support Member States in the application of the Safety Standards. Throughout the years, the design safety and safety assessment review services have expanded and diversified. They now cover six technical subject areas: design safety, generic reactor safety, national safety requirements, probabilistic safety assessment, accident management and periodic safety review. The names of the services have also changed over the years, but their objectives have remained the same. The six services are now grouped under the Technical Safety Review (TSR) peer-review service.

The IAEA's TSR service was developed utilizing the experience and feedback from safety review services provided to Member States in the past with the aim of streamlining and harmonizing the review process. TSR supports the enhancement of nuclear safety for nuclear power plants and is based entirely on the IAEA Safety Standards. The service provides a flexible scope and is tailored to, and addresses, the needs of Member States at most stages of the development and implementation of a nuclear power programme, including the conceptual design, pre-licensing and licensing phases, nuclear power plant construction, operation and plant modifications, including periodic safety reviews and lifetime extension.

The TSR service provides assistance to regulatory bodies, plant operating organizations, plant vendors and technical support organizations, in their technical evaluations. It can play a key role in helping requesting parties to increase confidence in the safety of their designs or the adequacy of their safety assessments, as well as to identify practicable improvements to nuclear safety.

I encourage Member States to avail themselves of the benefits of the TSR service as an important element in strengthening global nuclear safety.

Lydie Evrard

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The Technical Safety Review (TSR) services address the needs of Member States at different stages of development and deployment of a Nuclear Power Programme. The review services are based on the IAEA safety standards, which provide a robust framework of fundamental principles, requirements, and guidance to ensure nuclear safety. They reflect an international consensus and serve as a global reference for protecting people and the environment from the harmful effects of ionizing radiation.

The TSR cover the following areas:

- Design Safety (DS);
- Generic Reactor Safety (GRS);
- Safety Requirements (SR);
- Probabilistic Safety Assessment (PSA);
- Accident Management (AM);
- Periodic Safety Review (PSR).

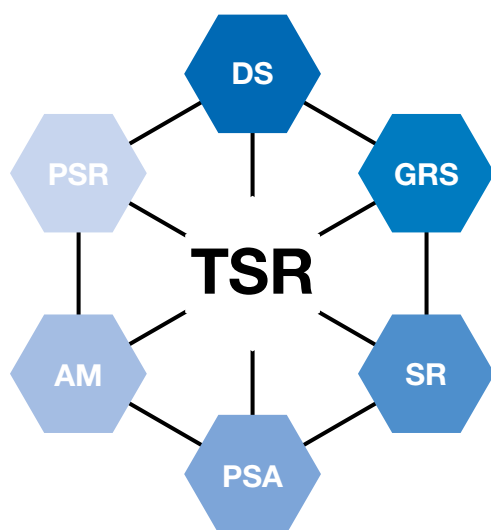
TSR services provide an independent evaluation of the plant design safety and safety assessment documentation or regulatory requirements against IAEA Safety Standards and are adapted to address the specific needs of a requesting Member State. TSR services encompass the spectrum of safety analyses performed in support of design, licensing and operation. The

The IAEA provides TSR services to address the needs of Member States at different stages of the development and deployment of nuclear power programmes.

reviews address deterministic and probabilistic methods as well as risk-informed decision making approaches and make recommendations for improvements to safety. TSR services are conducted in line with the TSR Service Guidelines (IAEA Services Series No. 41).

TSR services assist Member States in relation to the following topics:

- Safety of operating and new nuclear plant designs including innovative reactors and Small Modular Reactors;
- Specific chapters of the safety analysis report;
- Safety requirements developed by regulatory authorities;
- Safety assessment approaches and frameworks developed by regulatory authorities;
- Deterministic and probabilistic safety assessments;
- Probabilistic safety assessment applications and risk-informed decision-making;
- Safety assessments in support of plant modifications (Design Authority);
- Accident management programmes, accident analysis, procedures and guidelines;
- Actions taken to address emerging safety issues;
- Periodic Safety Reviews;
- Interfaces between safety, security and safeguards.



TSR	Technical Safety Review	PSA	Probabilistic Safety Assessment
DS	Design Safety	AM	Accident Management
GRS	Generic Reactor Safety	PSR	Periodic Safety Review
SR	Safety Requirements		

FIG. 1. Technical Safety Review services

Meeting specific needs

TSR services are conducted during the following life cycle stages:

- Conceptual to detailed design;
- Various pre-licensing as well as licensing phases;
- Nuclear power plant (NPP) construction; and
- NPP operation including periodic safety reviews and life time extension.

Additionally, the TSR can address specific technical or regulatory aspects, such as plans for plant modifications, updates of accident management programmes or consistency of safety regulation developed with IAEA design safety and safety assessment requirements. The different subject areas can be combined to address specific Member States' needs, including the wide ranging review of the safety case documentation.

How to request a TSR

Requesting parties can request a TSR service through their national official channels of their Permanent Missions. Terms of Reference can be discussed and agreed with IAEA senior safety officers prior to making an official request.

Who benefits?

The TSR services have been developed to assist plant operators and vendors, technical safety organizations and regulatory bodies in their technical evaluations as well as in the

development of requirements and in enhancing nuclear safety for specific facilities based on IAEA safety standards. The review of the preliminary and/or final safety analysis reports, accident management programmes or periodic safety reviews are of benefit to all stakeholders in new and existing nuclear power programmes.

Team composition

The review team is composed of senior international experts and led by IAEA staff. The review team's work is based on IAEA safety standards and supported by guidance documentation.

Duration and funding

From initiation to completion: three to nine months, depending on the Member State's needs and selected topics. The TSR services can include a mission to the Member State or be conducted in fully virtual mode. The TSR services are funded by the requesting party or through technical cooperation projects.

Reporting

The IAEA issues a final report to the requesting party that includes conclusions and recommendations.

Limitations

The TSR services do not constitute any kind of design certification, licensing or supervisory activity, as these are not among the functions of the IAEA.

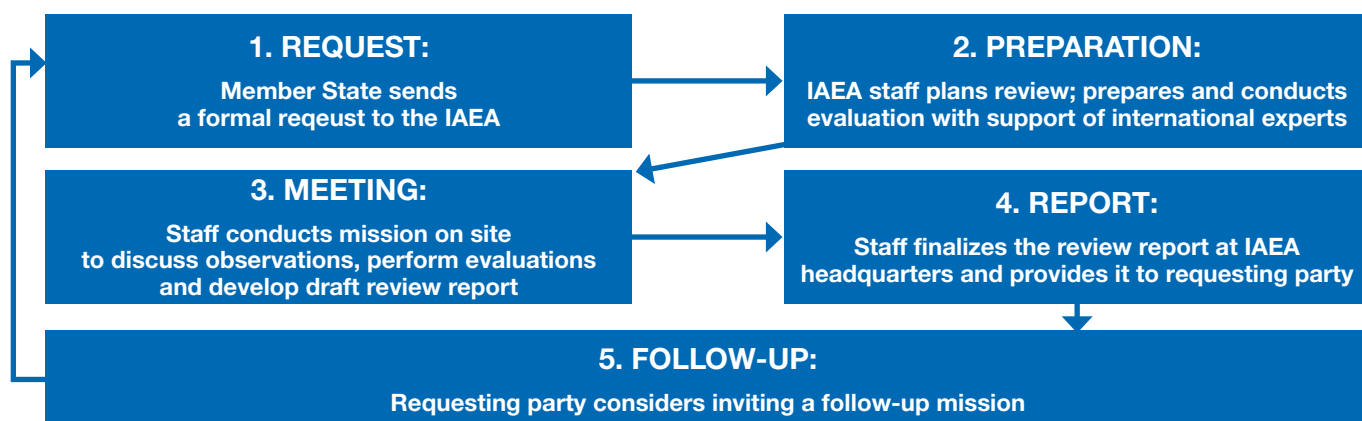


FIG. 2. Phases of the TSR services

Design Safety (DS) review

The DS review is conducted to review the safety of an NPP design at different reactor design stages, i.e., conceptual design, generic design and detailed design against the Safety Requirements on Safety of Nuclear Power Plants: Design (IAEA Safety Standards Series No. SSR-2/1 (Rev. 1)), supported by the Safety Guides for NPP design. This review can be limited to specific technical areas. Other IAEA Safety Standard documents can be used as a basis of the review depending on the needs of the requesting party and topical areas included within the scope of the review. The review of interfaces between safety, security and safeguards can be included within the objectives of the review, if so requested.

Objective

The objective of the DS review service is to assist the requesting Member State to review the safety documentation for nuclear power plants and to make recommendations in order to enhance safety.

Process

The process includes preparatory work by the review team and review meetings that usually last two weeks. The whole process takes between 6–9 months to complete.

Output

The output is a report which summarizes the findings of the review and includes, if needed, a set of recommendations to improve the adherence to the IAEA safety standards.

Generic Reactor Safety (GRS) review

The GRS review service is performed on the safety documentation submitted to the IAEA. It provides an early evaluation of a vendor's new nuclear power plant design's safety documentation against the IAEA safety standards at the level of Fundamental Safety Principles (IAEA Safety Standards Series No. SF-1), and the Safety Requirements on Safety Assessment for Facilities and Activities (IAEA Safety Standards Series No. GSR Part 4 (Rev. 1)) and Safety of Nuclear Power Plants: Design (IAEA Safety Standards Series No. SSR-2/1 (Rev. 1)).

Objective

The objective of the GRS review service is to enable the requesting party to understand to which extent the safety case is complete and comprehensive in addressing the requirements of the safety standards.

Process

The process takes between 6–9 months to complete.

Output

The output is a report summarizing the extent to which the safety case addresses the requirements. It also includes, if needed, recommendations for improvement of completeness and comprehensiveness of the safety documentation based on the IAEA safety standards.

FACTS AND FIGURES 2020–2023

23 years

6 types of technical reviews

25 countries

79 services

The TSR Services support Member States with an independent evaluation of the safety assessment and design safety documentation and provide recommendations for enhancements to safety.

Safety Requirements (SR) review

The SR review service is conducted to review the national safety requirements for the design or safety assessment of NPPs against the IAEA safety standards. The review can be limited to specific requirements of interest.

Objective

The objective of the SR review service is to assist the requesting Member State in the process of issuing or revising national safety requirements for the design or safety assessment of NPPs to enhance safety.

Process

The process includes preparatory work by the review team and review meetings that usually last two weeks. The whole process takes between 3–9 months to complete.

Output

The output is a report which summarizes the findings of the review and includes, if needed, a set of recommendations or suggestions to improve the adherence to the IAEA Safety Standards.



Probabilistic Safety Assessment (PSA) review

The PSA review is based on the Safety Guides on Development and Application of Level 1 Probabilistic Safety Assessment for Nuclear Power Plants (IAEA Safety Standards Series No. SSG-3) and Development and Application of Level 2 Probabilistic Safety Assessment for Nuclear Power Plants (IAEA Safety Standards Series No. SSG-4).

Objective

The objective of the PSA review service is to assist in the assessment of the adequacy of the treatment of technological and methodological issues in the PSA.



Another objective is to assist in the assessment of whether the PSA applications and conclusions are adequately supported by the provided analysis.

Process

The process includes preparatory work by the review team and review meetings that usually last two weeks. The whole process takes between 6–9 months to complete.

Output

The output is a report which summarizes the findings of the review and includes, if needed, a set of recommendations to improve the PSA quality and applicability.

Accident Management (AM) review

The AM review service focusses on Member States' Accident Management Programmes (AMPs) and is conducted based on the IAEA safety standards on Safety Assessment for Facilities and Activities (IAEA Safety Standards Series No. GSR Part 4 (Rev. 1)); Safety of Nuclear Power Plants: Commissioning and Operation (IAEA Safety Standards Series No. SSR-2/2 (Rev. 1)) and Accident Management Programmes for Nuclear Power Plants (IAEA Safety Standards Series No. SSG-54).

Objective

The objective of the AM review service is to advise and assist the regulatory body, utility or technical support organization in the development and implementation of an accident management programme.

Process

The process includes preparatory work and the review of the AMP and associated documentation. The review meetings usually last two weeks. The whole process takes between 6–9 months to complete.

Output

The output is a report describing the review performed, the review findings and, if needed, recommendations in improving the plant specific AMP.

Evaluating the Periodic Safety Review (PSR)

This service provides an evaluation of the PSR programme based on the IAEA safety standards on Safety Assessment for Facilities and Activities (IAEA Safety Standards Series No. GSR Part 4); Safety of Nuclear Power Plants: Commissioning and Operation (IAEA Safety Standards Series No. SSR-2/2 (Rev. 1)) and Periodic Safety Review of Nuclear Power Plants (IAEA Safety Standards Series No. SSG-25).

Objective

The objective of the PSR service is to assist the requesting Member State in establishing and implementing PSR programmes according to the IAEA safety standards and to assure a high level of safety throughout the operating lifetime of the NPP.

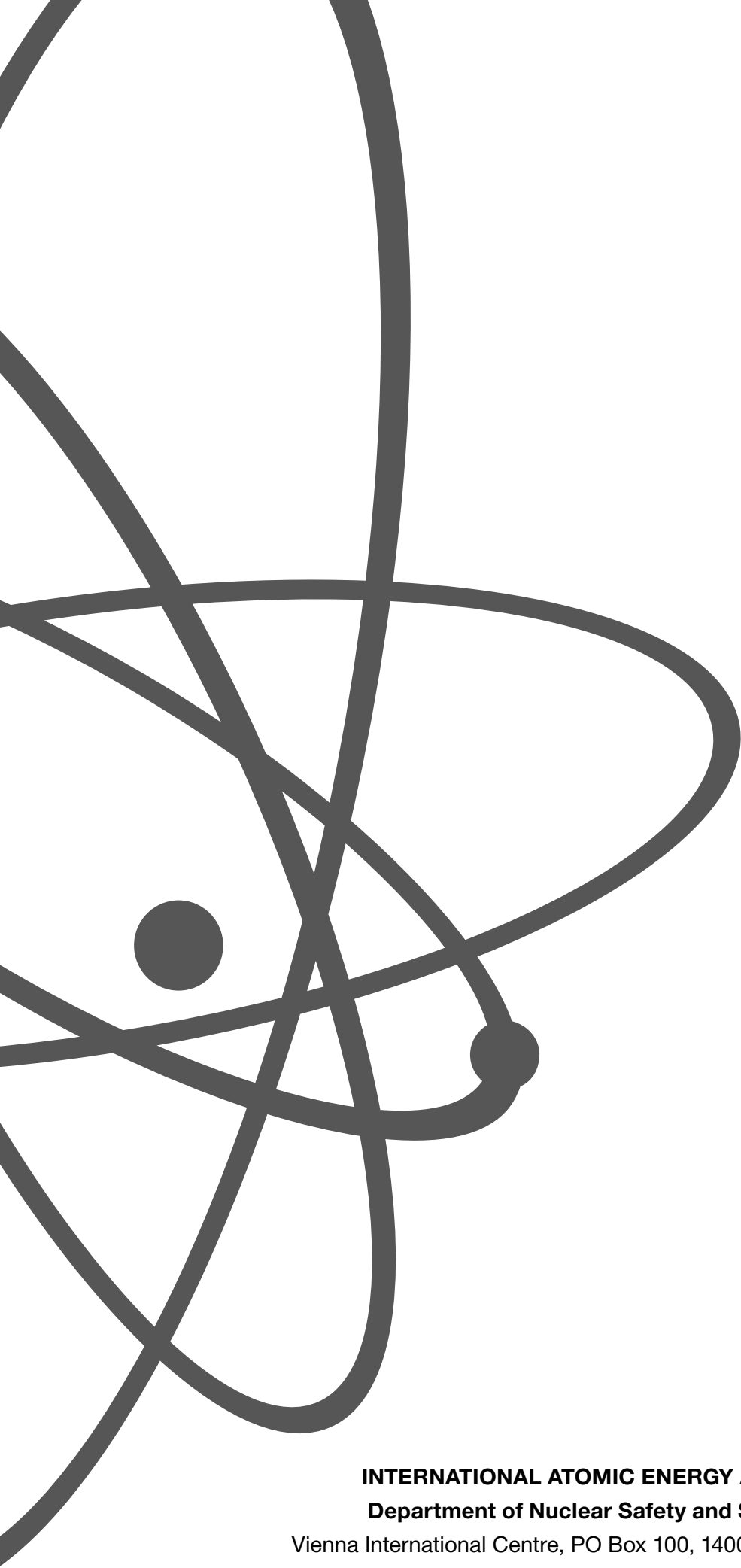
Process

The process includes preparatory work by the review team and review meetings that usually last two weeks. The whole process takes between 6–9 months to complete.

Output

The output is a report which summarizes the findings of the review and includes, if needed, a set of recommendations to improve the adherence to the IAEA Safety Standards.





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