Strål säkerhets myndigheten
Swedish Radiation Safety Authority

Report

ENSREG 2nd Topical Peer Review

Fire Safety
Swedish National Action Plan

2026:11

Author: Per Hellström, Bengt Hedberg, Henrik Hellberg
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Executive Summary

EC Directive 2009/71/Euratom, as amended, (NSD) requires member states to undertake topical peer reviews (TPR) every 6 years, starting in 2017. The topic for the first TPR was ageing management.

The member states, acting through the European Nuclear Safety Regulators Group (ENSREG), have decided that the topic for the second topical peer review (TPR-II) is fire safety.

The Swedish nuclear facilities covered by TPR-II Swedish National Assessment Report (NAR) are Ringhals 3, Forsmark 2, Oskarshamn 3, the central interim storage for spent fuel (Clab) and the Westinghouse fuel fabrication facility, representing Nuclear Power Plants, dedicated spent fuel storage facilities and fuel cycle facilities. Sweden screened out non-reactor nuclear facilities (research reactors, nuclear power plants under decommissioning and radioactive waste facilities) from the Swedish NAR, primarily due to the expected much lower nuclear radiation risks from such facilities.

The TPR II Terms of Reference specifies that participating countries should develop a National Action Plan (NAcP) with planned follow-up actions with regards to the findings – if any – from the TPR II process. The NAcP template developed by the TPR Board is structured with three main chapters, i.e.; i) follow-up of findings from the peer review, ii) follow-up of other findings resulting from the self-assessment, and iii) optional consideration of other findings from the peer review.

This document corresponds to the National Action Plan (NAcP) that is expected to be developed by TPR II participating countries.

It should be noted, however, that the outcome from the TPR II process as documented in the TPR-II Summary report does not identify any specific national areas for improvement for Sweden.

It should also be noted that the TPR Team considered some weaknesses identified in the Swedish self-assessment to have been already satisfactorily addressed through improved design features or supplementary safety analyses.

SSM has decided to exclude follow-up actions concerning good practices and areas of good performance in this National Action Plan. Follow-up of Good practices and areas of good performances is considered an important element of already established experience feedback procedures.

There are no identified follow-up actions for Sweden. Thus, the conclusion from the Swedish NAR is still valid:

“The conclusion by SSM is that all facilities included in this national report have an adequate fire protection.”

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Abbreviations

AGP	Areas of Good Performance
CLAB	The central interim storage facility for spent nuclear fuel
CRR	Country Review Report
ENSREG	European Nuclear Safety Regulators Group
EU	European Union
Forsmark 2	Forsmark unit 2
IAEA	International Atomic Energy Agency
NAcP	National Action Plan
NAR	National Assessment Report
NSD	Nuclear Safety Directive
Oskarshamn 3	Oskarshamn unit 3
RHWG	Reactor Harmonisation Working Group (WENRA subgroup)
Ringhals 3	Ringhals unit 3
SRL	Safety Reference Level
SSM	Swedish Radiation Safety Authority
ToR	Terms of Reference
TPR	Topical Peer Review
WENRA	Western Europe Nuclear Regulators Associations
WG	Working Group

1 Introduction

EC Directive 2009/71/Euratom, as amended, (NSD) requires EU member states to undertake topical peer reviews (TPR) every 6 years with the first starting in 2017. The purpose of the topical peer review is to provide a mechanism for EU Member States to examine topics of importance to nuclear safety, to exchange experience and to identify opportunities to strengthen nuclear safety. The first TPR topic was ageing management.

The member states, acting through the European Nuclear Safety Regulators Group (ENSREG), decided in November 2020, at its 41st Plenary Meeting, that the topic for the second topical peer review should be fire protection [1].

The objective of the second Topical Peer Review is to examine how well Fire Safety Programmes in nuclear installations operating in participating countries meet international requirements on fire safety, in particular WENRA Safety Reference Levels – (SRLs) and the IAEA Safety Standards. Moreover, the objectives of the Topical Peer Review are to:

- Enable participating countries to review their provisions for fire safety, to identify good practices and to identify areas for improvement.
- Undertake a European peer review to share operating experience and identify findings: common issues or challenges at EU-level;
- Provide an open and transparent framework for participating countries to develop appropriate follow-up measures to address areas for improvement.

The scope of nuclear facilities to be studied in TPR-II were:

- Nuclear power plants
- Facilities under decommissioning
- Research Reactors
- Dedicated spent fuel storage facilities
- Fuel cycle facilities
- Waste storage facilities, that are at the same site and directly related to nuclear installations listed above

The Swedish national report screened out facilities under decommissioning as the radiological risks related to these facilities do not justify their inclusion. Also, there are no research reactors in Sweden. Thus, Swedish nuclear facilities covered by the Swedish national report [2] are:

- Nuclear power plants – represented by Ringhals 3, Oskarshamn 3 and Forsmark 2.
- Spent fuel facilities – represented by the central interim storage facility for spent nuclear fuel - CLAB
- Fuel fabrication facilities – represented by the Westinghouse fuel factory

SSM requested the licensees to report relevant information according to the technical specification [3] that was specifically developed for TPR II. The reports were structured in two main areas within which areas for improvement and good practices were identified for each facility, and with regulator assessment and conclusions:

- Fire safety analyses covering both deterministic and probabilistic fire safety analysis
- Fire protection covering both active and passive fire protection.

Reports from all licensees were provided to SSM in January and February 2023. SSM checked the licensee reports for possible inconsistencies and asked for clarifications where needed. The final licensee reports were provided to SSM in August and September 2023. All the information received was processed and compiled by SSM during March to October 2023. The Swedish national report [2] was completed and distributed to ENSREG in the end of October 2023.

The second phase started in November 2023 when the National Assessment Reports were made available for questions and comments from stakeholders, in addition to questions from the TPR review team members. As an indication of the interest and commitment to the TPR II and the importance of the selected topic, this phase resulted in more than 2600 questions and comments combined from the nominated peer review experts, participating Member States and all stakeholders

The review was structured in three main areas; fire safety analyses, passive fire protection and active fire protection (according to the NAR structure). For each area, several specific thematic areas were identified and also a few cross-cutting areas. The work progressed with review work and a number of digital meetings and a draft summary report and draft country review reports were developed to be available for upcoming workshops. Subsequently, in August-September 2024 ENSREG organized two one-week workshops:

- Workshop 1 to discuss thematic findings
- Workshop 2 to discuss country specific findings

Both workshops were based on draft reports of the summary report (thematic) and country review reports (country specific findings). Both the summary report and the CRR were the results of the self-assessments, the questions and comments on the National Assessment Reports, as well as the replies to the questions. The workshop goal was to identify and discuss both generic and country-specific findings related to fire protection.

In the third and final phase of the Topical Peer Review, a final summary Topical Peer Review Report [4] and final Country Review Reports [5] with country specific findings have been compiled to provide input for national action plans and ENSREG work.

The main conclusion of the peer review in the Summary Report is that the NARs provide informative insights into national practices and regulatory approaches. Comprehensive fire protection strategies - encompassing prevention, as well as active and passive measures - are widely implemented. Fire safety analyses and regular inspections play a key role in identifying and addressing potential gaps. The exchange of operational feedback and best practices further strengthens fire risk management.

The TPR review has highlighted a diverse range of approaches and solutions adopted across participating countries. While variations exist in fire protection implementation, no critical deficiencies were identified in the fire protection strategies of the installations within the TPR scope. The TPR review has noted the importance of applying all levels of defence-in-depth to ensure robust fire protection, supported by thorough fire safety analyses. Effective fire load management remains a priority, with leadership, accountability, and a strong safety culture playing a crucial role in minimizing fire risks.

The peer review conclusion [5] on the Swedish NAR stated:

- The information provided in the NAR allowed a meaningful peer review in particular, for the identification of peer review findings.

- The document was reader-friendly and facilitated the finding of relevant information.
- The outcomes of the self-assessment appropriately mentioned the findings, which were well-illustrated and clearly described.

The TPR II Terms of Reference specifies that participating countries should develop a National Action Plan (NAcP) with planned follow-up actions with regards to the findings – if any – from the TPR II process. The NAcP template developed by the TPR Board is structured with three main chapters, i.e.; i) follow-up of findings from the peer review, ii) follow-up of other findings resulting from the self-assessment, and iii) optional consideration of other findings from the peer review.

This document corresponds to the National Action Plan (NAcP) that is expected to be developed by TPR II participating countries.

Furthermore, the Swedish licensees have been informed about all findings from the peer review (improvement areas, good practices and areas of good performance) as an input to the respective organisations work on continuous improvements in fire safety.

2 Follow-up of findings from the peer review – national areas for improvement

A total of 46 areas for improvements were identified for the various nuclear facilities (see Summary report [4]). It should be noted, however, that the outcome from the TPR II process as documented in the TPR-II Summary report does not identify any national areas for improvement for Sweden.

3 Follow-up of other findings resulting from the self-assessment

The Swedish self-assessment [2] revealed some weaknesses in the fire protection of the nuclear installations that were considered by the TPR team to have been already satisfactorily addressed through improved design features or supplementary safety analyses.

4 Consideration of the other findings from the peer review to enhance fire protection

In total the review identified four good practice and 39 areas of good performance (see Summary report [4]).

It is noted that the review for Sweden identified two areas of good performance (AGP):

SE-AGP-1	The design approach of the fire detection and alarm system is robust regarding the separation of redundant trains.	NPPs (SE)
SE-AGP-2	Measures to be taken by the operators in the control room are pre-defined in written instructions for every single fire compartment depending on the area affected. For complex spaces, intervention layouts (rooms, detectors and so on) and fire compartment layouts are complemented with specially developed intervention plans.	Ringhals 3 NPP (SE)

Consideration of Good practices and areas of good performances are considered nationally as part of normal experience feedback procedures.

5 Overall conclusions

There are no identified follow-up actions for Sweden. The conclusion from the Swedish NAR is still valid:

> "*The conclusion by SSM is that all facilities included in this national report have an adequate fire protection.*"

6 References

[1]. TPR ToR HLG-r(2022-49)_646 ToR TPR Review Process on Fire Protection, June 2022.

[2]. Topical Peer Review 2023, Fire Protection, Swedish National Assessment Report, SSM Report 2023:13.

[3]. Report Topical Peer Review 2023 Fire Protection Technical Specification for the National Assessment Reports - Ad-hoc TPR II WG report to WENRA 21 June 2022.

[4]. 2nd Topical Peer Review Summary Report, ENSREG, May 2025.

[5]. 2nd Topical Peer Review – 'Fire Protection', Country Review Report Sweden, ENSREG, January 2025.

The Swedish Radiation Safety Authority (SSM) works proactively and preventively with nuclear safety, radiation protection, nuclear security, and nuclear non-proliferation to protect people and the environment from the harmful effects of radiation, now and in the future.

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