Federal Ministry
for the Environment, Nature Conservation,
Nuclear Safety and Consumer Protection

National Action Plan

Report by the Federal Ministry for the Environment,
Nature Conservation, Nuclear Safety and Consumer Protection on
Topical Peer Review
Ageing Management of Nuclear Power Plants
and Research Reactors

November 2023

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1. INTRODUCTION

Article 8e (2) of Council Directive 2014/87/Euratom amending Directive 2009/71/Euratom establishing a community framework for the nuclear safety of nuclear installations stipulates that all Member States of the European Union shall ensure that a national assessment is performed and that, according to Article 8e (3), arrangements are in place to allow for a so-called topical peer review to start in 2017, and for subsequent topical peer reviews to take place at least every six years thereafter.

Through the European Nuclear Safety Regulators Group (ENSREG), the Member States of the European Union have selected the topic of "ageing management" for the first peer review. This has been carried out for all nuclear power plants that were operating on 31 December 2017 as well as research reactors with a power equal to one MW_{th} or more.

ENSREG published the final report and country specific findings of the 1st topical peer review (TPR) on "Ageing Management" on October 29th, 2018. The TPR process provides for Member states to prepare a National Action Plan (NAcP) by September 2019, which addresses how to deal with the results of these reports.

The Federal Ministry for Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) and the competent nuclear licensing and supervisory regulating bodies of the *Länder* have drawn up and harmonized the National Action Plan for Germany. Federal and *Länder* authorities have consulted their respective experts within the process. Licensees operating Nuclear Power Plants and Research Reactors have been involved by the *Länder.*

The National Action Plan has been published on the Federal Ministry for Environment, Nature Conservation, Nuclear Safety and Consumer Protection (BMUV) website in September 2019 /BMU 19/ and is available under the following link https://www.bmuv.de/en/download/first-topical-peer-review-tpr.

Information on the progress on the planed actions as listed in the NAcP are given in chapter 2 of this final update of the NAcP. The status of the measures in 2023 are provided in the table in chapter 3. All actions are completed end of 2022.

2. UPDATE ON THE PLANED ACTIONS OF THE NACP

Four findings allocated to Germany were classified as area for improvement by the TPR Board.

- Methodology for scoping the SSCs subject to ageing management: The scope of the OAMP is reviewed and, if necessary, updated, in line with the new IAEA Safety Standard after its publication.
- Delayed NPP projects and extended shutdown: During long construction periods or extended shutdown of NPPs, relevant ageing mechanisms are identified and appropriate measures are implemented to control any incipient ageing or other effects.
- Overall Ageing Management Programmes of research reactors: A systematic and comprehensive OAMP is implemented for research reactors, in accordance with the graded approach to risk, the applicable national requirements, international safety standards and best practices.
- Non-destructive examination in the base material of beltline region: Comprehensive NDE is performed in the base material of the beltline region in order to detect defects.

The area for improvement „**Methodology for scoping the SSCs subject to ageing management: The scope of the OAMP is reviewed and, if necessary, updated, in line with the new IAEA Safety Standard after its publication.”** was considered in the NAcP /BMU 19/. As stated in section 3.1.2, according to German nuclear rules and regulations ageing management takes the checking the scope of SSCs to be considered into account and also consider further development of international rules and regulations. Therefore, no further measures has been derived.

The assessment of the area of improvement: "**Delayed NPP projects and extended shutdown: during long construction periods or extended shutdown of NPPs, relevant aging mechanisms are identified and appropriate measures are implemented to control incipient aging or other effects."** is detailed in section 3.1.4 in the NAcP /BMU19/. Based on the evaluation on the relevant requirements in the German rules and regulations regarding the consideration of changed operating conditions in the ageing management the nuclear licensing and supervisory authorities (federal and state) stated that the existing requirements are appropriate for taking ageing relevant effects into account, even during longer shutdown periods, and for taking corresponding measures.

However, in order to take into account the findings from the TPR and the further development of international rules and regulations (cf. review of WENRA RL ISSUE I), the nuclear licensing and supervisory regulatory bodies (federal and state) assess the need of concretizing German nuclear rules and regulations in this respect. The regulatory bodies regularly assess and review the nuclear regulations like KTA safety standards to ensure they are up to date and revised if necessary. The KTA Safety Standard 1403 "Ageing Management" was revised in 2022. The basic principle of KTA Safety Standard 1403 stipulates in the revised version that ageing management also includes all aspects of ageing due to changes in operating conditions during long shutdowns. This means that planned action for these area of improvement is completed by the end of 2022.

As stated in section 3.1.5 about the area of improvement **„ A systematic and comprehensive OAMP is implemented for research reactors, in accordance with the graded approach to risk, the applicable national requirements, international safety standards and best practices.”** the systematic application of ageing management needs to be improved in accordance with the graded approach.

The ageing management in research reactors is not applied on the same systematic level, as for NPPs. The research reactor operators are requested to apply ageing management standard KTA 1403 to research reactors in accordance with the graded approach. The research reactor operators have assessed their OAMP. As a result, the operators have either developed new processes for ageing management or have further developed existing processes in accordance with the requirements of KTA Safety Standard 1403 and have been included in the operational manuals. The implementation of these processes are monitored by the nuclear licensing and supervisory

regulatory bodies. The ageing management program of the research reactor are still a topic of the supervision by the competent authorities. This means that the planned action for these area of improvement is completed by the end of 2022.

For the area for improvement: "**Non-destructive examination in the base material of beltline region: Comprehensive NDE is performed in the base material of the beltline region in order to detect defects."** the BMU requested the Reactor Safety Commission (RSK) to discuss the results of the TPR. It has been discussed whether, according to state of the art in science and technology, additional measures for the testing of the base metal of the RPV are required in German nuclear power plants.

In October 2019 the RSK concludes that the deviations in the cylindrical rings of the RPVs of the Doel-3, Tihange-2 and Beznau-1 plants due to the manufacturing process deduced no need for a comprehensive inspection of the basic material of the RPVs of the German nuclear power plants /RSK 19/. According to the state of the art in science and technology, the RSK does not consider it necessary to carry out further measures in the German nuclear power plants. On this basis no further measures are derived by BMUV and the Länder authorities.

In summary all planned actions in the action plan have been completed.

3. TABLE: SUMMARY OF THE PLANNED ACTIONS

Installation	Thematics	Finding	Planned action	Deadline	Update 2023	Regulator's Approach to Monitoring
NPP (all)	OAMP	During long construction periods or extended shutdown of NPPs, relevant ageing mechanisms are identified and appropriate measures are implemented to control any incipient ageing or other effects.	The nuclear licensing and supervisory regulatory bodies (federal and state) will assess the need of concretizing German nuclear rules and regulations in respect of extended shutdowns.	2022	The assessment of the need to concretize the German nuclear rules and regulations in respect of extended shutdowns has been completed in 2021. As a result, KTA safety standard 1403 was extended with regard to extended shutdowns in 2022. **Action completed**.	
RR (all)	OAMP	A systematic and comprehensive OAMP is implemented for research reactors, in accordance with the graded approach to risk, the applicable national requirements, international safety standards and best practices"	The systematic application of ageing management needs to be improved in accordance with the graded approach.	2022	The RRs have assessed their OAMPs. The operators have either developed new processes for ageing management or have further developed existing processes in accordance with the requirements of KTA Standard 1403. The nuclear licensing and supervisory regulatory bodies are monitoring the process to improve the systematic application of the ageing management **Action completed**	During supervisory process

4. References

/BMU 19/ National Action Plan, Report by the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU) on Topical Peer Review Ageing Management of Nuclear Power Plants and Research Reactors, September 2019

/RSK 19/ Recommendation of the Reactor Safety Commission: “Results of the ENSREG Topical Peer Review on ageing management Requirement of examining the RPV base”, 22./23.October 2019