

European Nuclear Safety Regulators Group ENSREG

2nd Topical Peer Review – 'Fire Protection'

Country Review Report

Poland

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1. Brief overview of the candidate installations

Installation category	Number of installations	Name of candidate installations
Nuclear power plant		-
Research reactor	1	Maria, Świerk
Fuel reprocessing facility		-
Fuel fabrication facility		-
Fuel enrichment facility		-
Dedicated spent fuel storage		-
Installations under decommissioning		-
On-site radioactive waste storage		-
Total	1	

The following installation was finally selected and included in the national assessment report (NAR).

2. Regulatory framework

The NAR mentions that "the fire safety system of the MARIA reactor is primarily based on national requirements, regulations, and guidelines, which include:" in particular. two essential regulations:

- Regulation of the Minister of Infrastructure of April 12, 2002, on technical conditions to be met by buildings and their location (Journal of Laws, 2019, item 1065, as amended);
- Regulation of the Minister of Internal Affairs and Administration of June 7, 2010, on fire protection of buildings, other construction facilities, and areas (Journal of Laws, No. 109, item 719, as amended).

These two regulations are principal for protection of buildings against fire in Poland, however they were issued after the design of the research reactor and are not specific to nuclear installations.

The NAR does not mention if the WENRA SRLs are transposed in the regulatory framework. In response to the question of the TPR Team¹, Poland's answer was "As regarding of the WENRA Issue S reference levels (SRLs) for research reactors related to topic: "Protection against Internal Fires" - the analysis showed compliance of 10 (out of a total of 19) of the SRLs with national regulations. Another 4 SRLs were not reflected in Polish law (Category C: SRLs considered as not be implemented), while the rest 5 SLRs were considered as partially met (Category B)."

The NAR does not allow to identify key regulatory requirements related to nuclear safety.

¹ 'The NAR in §1.2 presents the regulatory framework. If not yet clearly mentioned in the NAR, could you indicate whether the WENRA SRLs for NPPs, and RRs (if relevant for your country), which are used as reference for this topical peer review on 'fire protection' (as per the Technical specification) are binding or not in your country? If they are not binding, what is the status of the SRLs (non-binding, guidance, advisory..)?'

The NAR does not mention "which and how international safety standards are used in developing the overall fire safety programme".

3. Findings and significant improvements of approaches on the installations from the national self-assessment

Research reactors

Maria research reactor

The following **strengths** related to fire protection were reported in the NAR for **Maria** research reactor:

- Above-standard equipping of the MARIA reactor facility with modern fire protection devices, including a comprehensive fire alarm system, a sound broadcasting system that meets the standards of an audible warning system, and a larger number of portable fire extinguishing equipment units than required.
- Adaptation of the building from the 1970s to current fire protection regulations based on the guidelines of the Fire Protection State Expertise.
- Constant presence in a 24/7 shift system of internal services capable of taking emergency actions (OGA group) and promptly dispatching external services.
- Cooperation with the nearest units of the Fire Service (time of arrival up to 10 minutes from the call) in the field of training and joint exercises.

The following **weaknesses** related to fire protection were reported in the NAR for **Maria** research reactor:

- The construction building and reactor installations were designed using old standards and technical solutions, preventing its full adaptation to the requirements of current regulations;
- The lack of automatic extinguishing systems wherever there is a risk of fire that could threaten critical infrastructure for nuclear safety and radiological protection.
- The scope of the fire safety analyses performed does not cover scenarios involving combinations of various events. Uncertainties are not taken into account in the fire safety analyses. Neither direct nor indirect consequences for nuclear safety and radiological protection have been evaluated in analysis of impact of a fire (apart from the initiating events themselves).
- No on-site internal Plant Fire Brigade unit.

The following **lessons learned** related to fire protection were reported in the NAR for **Maria research reactor**:

- As a result of analysing the safety status in terms of fire protection, a decision was made to carry out a Fire Protection State Expertise for the MARIA reactor facility by fire protection and construction security experts with the aim of adapting the facility (buildings from the 1970s) to the applicable regulations. The suggestions and recommendations given in this Expertise are consequently being implemented.
- The most common detected deficiencies during inspections concern housekeeping, i.e. mess and disorder resulting from leaving residues from some work, including flammable materials, in inappropriate places (fire escapes, rooms subject to fire load restrictions). Most often, unnecessary items and remnants of post-modernisation and renovation works are removed during the inspection itself. Year by year, there are fewer and fewer such cases and a clear improvement in attitudes towards compliance with fire prevention rules is visible. PAA observes the safety culture is even improving in RR MARIA as its staff becomes more and more aware of fire safety rules and still better applies them in practice.

- Emergency exercises have highlighted the need to equip the OGA team with necessary personal protective equipment (such as boots, helmets, and firefighting suits) to effectively extinguish fires in the initial phase, minimizing the risk to the personnel performing the operations. Part of the required equipment for the OGA group has recently been purchased.
- Since the establishment of the National Centre for Nuclear Research (NCBJ) in 2011, there
 have been no significant internal fire-related incidents in the MARIA reactor facility. Only a
 few incidents occurred due to the activation of the fire alarm system during construction and
 installation work involving tools and materials that caused smoke. The system was triggered
 due to the lack of smoke detector protection. Regular training and exercises are conducted to
 enhance the skills of the emergency response personnel.

The following **improvements** related to fire protection were reported in the NAR for **Maria** research reactor:

- Recent PSR action plan, based on IAEA safety standard for NPPs (SSG-25) with application of graded approach, includes several corrective actions related to fire safety analyses and organizational aspects of fire protection:
 - Modernisation of the main switchboard for the MARIA reactor;
 - Modernisation of the fire alarm system located in the battery room in order to adapt it to the requirements of the explosion hazard assessment;
 - Replacement of the internal ø52 hydrants with modern ø25 hydrants with a semi-rigid hose covering the entire area of the ZLIII fire zone;
 - Replacement of cables supplying circuits guaranteed for correct operation, shutdown and cooling of the reactor with PH90/E90 cables.
- Discontinued fixed carbon dioxide (CO2) fire extinguishing system was replaced by a modern and highly efficient fire detection and alarm system, enabling immediate actions by the Facility Emergency Groups (OGA) before the arrival of the Fire Brigade.

4. Peer-review conclusions

4.1 Attributes of the NAR and the information provided

The candidate installation is the one which was the subject of the Board's review prior to the national self-assessment. The recommendation of the Board (consideration of on-site waste storage) was addressed in the NAR.

In general, the information provided in the NAR was sufficient for the peer review.

There are no comments on the structure of the NAR.

In general, the outcomes of the self-assessment were clearly mentioned.

In general, replies to the written questions allowed to clarify the identified issues.

Additional information and updates provided in reply to written questions, the site visit, and in the national presentation in the country review workshop were taken into account in the definition of the findings below in section 4.3.

4.2 Conclusions from the site visit

The site visit to the Maria Research Reactor was conducted by TPR II team on 21 May 2024.

During the site visit a number of topics, based on questions shared in advance with the counterparts, were discussed e.g. management of ignition sources and fire loads, modernisation of fire protection means, configuration and operational aspects of ventilation system (no dampers in the reactor hall),

firefighting strategy, arrangements specific to experiments, use and developments of PSA, fire protection in diesel generator room, etc.

A number of areas of the installation were visited, such the Main Control Room (MCR), with explanation of all large panels (recently modernised); the reactor hall, rooms with 2 diesel generators, with ventilation pumps, carbon and heap filters, switchgear room, etc.

TPR II team noted:

- An already implemented and still ongoing improvements programme in place (dampers installations, new fire zone and doors, new extinguishing systems, separation/change of cables, new additional filters etc);
- A process for updating of procedures and efforts to strengthen safety culture, so as to minimise the presence of fire loads;
- The possibility to improve separation in the diesel generator room to prevent potential fires to spread;
- Results from 2024 PSR expected soon and has potentially identified further improvements to be evaluated.

The TPR II team appreciated the willingness and cooperation of Poland to host the site visit to MARIA Research Reactor.

4.3 Peer review findings

The self-assessment revealed some weaknesses in the fire protection of the nuclear installation. The finding in the table below was acknowledged as an area of improvement by the TPR Team:

Areas For Improvement mentioned in the NAR as weaknesses and acknowledged as such by the TPR Team

Nuclear installation: Maria Research Reactor						
AFI (1)	Lack of automatic extinguishing systems					

The TPR team recommends that Poland addresses this area for improvement in the National Action plan.

During the country review workshop, the findings identified during the peer review phase have been discussed. Based on these discussions, the TPR team concluded on the following findings:

Areas For Improvement					
Nuclear installation: Maria Research Reactor					
	Finding	Lack of compartmentation or compensatory measures between redundant SSCs (UPS, diesel generators)			
AFI (2)	Justification	The insufficient compartmentation between redundant safety- related components creates a risk of common cause failure due to potential propagation of a fire.			

The TPR Board recommends that Poland addresses this area for improvement in the TPR national action plan.

Areas of Good performance							
Nuclear installation: Maria Research Reactor							
	Finding	Implementation of new and modern provisions, in particular to meet the current fire protection regulations.					
AGP (1)	Justification	 An important modernisation programme is on-going. It covers: implementation of new equipment e.g. replacement of main switchboard, a new alarm system in battery room together with explosion prevention, a replacement of cables for operation, shutdown or cooling such as of internal hydrants, etc. evolution of procedures and safety culture, e.g. the use of portable extinguishing systems, daily housekeeping and the management of the facility. 					

Definition of the types of findings

According to the TPR II Terms of Reference, the country group workshop discussions should lead to conclude on the findings categorised as an 'area of good performance' or 'area for improvement'. These are defined therein as follows:

A National area of good performance which should be understood as an arrangement, practice, policy or programme related to fire protection that is recognized by the TPR Review Team as a significant accomplishment for the country and has been undertaken and implemented effectively in the country and is worthwhile to commend.

A National area for improvement which should be understood as an aspect of fire protection identified by the TPR Peer Review Team where improvement is expected, considering the arrangement, practice, policy or programme generally observed in other participating countries. It may also be self-identified by the country itself (i.e. self-assessment) where improvement is appropriate.