ENSREG
European Nuclear Safety Regulators Group

ENSREG 1st TOPICAL PEER REVIEW

NATIONAL ACTION PLAN

ON AGEING MANAGEMENT

IN POLAND

List of content

1. Introduction

In 2014, the European Union (EU) Council adopted directive 2014/87/EURATOM1 amending the 2009 Nuclear Safety Directive to incorporate lessons learned following the accident at the Fukushima Daiichi nuclear power plant in 2011. Recognizing the importance of peer review in delivering continuous improvement to nuclear safety, the revised Nuclear Safety Directive introduced a European system of Topical Peer Review commencing in 2017 and every six years thereafter.

In the first phase of the TPR national self-assessments were conducted against the WENRA TS. Results of the self-assessments were documented in the National Assessment Reports, published at the end of 2017. The national reports were peer reviewed through a process organised and overseen by ENSREG. The second phase started in January 2018 when the National Assessment Reports were made available for questions and comments from stakeholders. As an indication of the commitment to the Peer Review and the importance of the selected topic, this phase resulted in more than 2300 questions and comments. Subsequently, in May 2018, ENSREG organized a one-week workshop to discuss the results of the self-assessments, the questions and comments on the National Assessment Reports, as well as the replies to the questions, with a goal to identify and discuss both generic and country-specific findings on Ageing Management Programmes. In the third and final phase of the Topical Peer Review, a Topical Peer Review Report and country specific findings have been compiled to provide input for national action plans and ENSREG action plan.

As a scope of the TPR there were selected NPPs and RRs with power higher that 1 MW. In Poland there is existing in operation one research reactor – the MARIA reactor with thermal power 30 MW operated by the National Centre for Nuclear Research. Regarding to ageing management it was identified in 2015 during process of license renewal lack of existing Ageing Management Programme. It was expected that within two years it will be implemented full Ageing Management Programme but due to the difficulties this process lasted longer as it was expected and will be finished until end of 2019.

2. Findings resulting from the self-assessment

The self-assessment that was conducted by licensee during the first phase of the TPR confirmed that there is not existing Ageing Management Programme. Due to this fact it was conducted assessment of existing within licensee organization the Ageing Control Programme which is limited in scope comparing to AMP.

2.1. Overall Ageing Management Programmes

2.1.1. State finding n°1

Lacks in management system in the existing ACP include:

- Lack of the proper resource management;
- Lack of the proper quality assurance (framework of AMP's programmes):
    - Acceptance criteria;
    - Use of R&D programmes
    - Use of internal and external operating experience
    - Monitoring, testing, sampling and inspection activities
    - Preventive and remedial actions
- Lack of the review and update of the overall AMP
- Lack of the methodology for selection of SSCs within the scope of AMP

2.1.2. Country position and action on finding n°1

Licensee (planned action and comment):

In 2015, National Centre for Nuclear Research received conditioned licence for operation of the MARIA reactor for the next 10 years. Among others, the requirement on performing the analysis of SSCs, in particular SSCs susceptible to the long-term degradation processes occurring at the effect of operation and environmental conditions. The output of the analysis shall be the basis for the development of AMP.

In order to comply with licence, Atomic Law and international standards NCBJ focused on the development of the framework for the AMP and SSCs specific ageing programmes. The project is based on the activities already performed in the MARIA reactor and supplemented by the polish industry standards, research reactor safety standards and technical documents issued by IAEA. Additionally, safety standards for NPPs were used to support the development of the framework of the programme.

The development of AMP is based on the IAEA SSG-10 and NS-G-2.12 safety standards. The provision for including assignment of responsibilities as well as new methodology based on the PDCA (Plan-Do-Check-Act) is prepared. The PDCA approach in the MARIA reactor covers the review and update of the overall AMP and provides the methodology for selection of SSCs within the scope of AMP.

The new AMP for the MARIA research reactor was reviewed by President of PAA and NCBJ is obliged to introduce the applicable corrections within the programme in 2019.

Finding no.1 in Section 7.

Regulator (comment):

Most of listed lacks in the ACP causing that ageing management within the research reactor was not effective were identified earlier in 2015 during license renewal . Starting from this date licensee was preparing new document related to ageing management called the AMP. During second phase of the TPR it was ongoing process of assessment of this document by the PAA. In 2019 the AMP prepared by licensee was reviewed by the regulatory body. There are no specific and detailed requirements in national legal framework dedicated to content and methodology of preparation of ageing management documentations. Taking into account that fact licensee used correctly during

development of the AMP IAEA standards what was confirmed during regulatory assessment process. Currently after process of assessment the AMP for the MARIA reactor is under process of approval by the President of the PAA which is expected to be finished after resolving some issue by licensee till end of 2019. Parallel with review of the AMP there is from 2015 under preparation by licensee new Safety Classification of SSCs which can have after finalization impact on the AMP. Due to this fact it is expected that in near future licensee will reassess list of SSCs important for safety that should be covered by the AMP.

2.2. Electrical cables

2.2.1. State finding n°2

Lack of electrical cables in the ACP.

2.2.2. Country position and action on finding n°2

Licensee (planned action and comment):

The screening of electrical cables was included in preparation of the AMP for the MARIA reactor. The safety and safety-related cables were divided into 3 groups depending on the environmental conditions of theirs operation. The AMP for electrical cables shall be implemented in 2019.

Finding no.2 in Section 7.

Regulator (comment):

The AMP that is currently under process of approval by the President of the PAA covers safety related electrical cables listed in existing Safety Classification of the MARIA reactor.

2.3. Concealed pipework

There were not identified any finding related to concealed pipework during self-assessment.

Regulator (comment):

In near future it is expected that licensee will prepare updated version of Safety Classification and then he will assess list of SSCs that are covered by the APM including review if there are any new concealed pipework or inaccessible SSCs that were not covered by ageing management yet.

2.4. Reactor pressure vessel

This Section is not applicable due to design of the MARIA reactor.

2.5. Concrete containment structure and pre-stressed concrete pressure vessel

2.5.1. State finding n°3

Lack of concrete containment structures in the ACP.

2.5.2. Country position and action on finding n°3:

Licensee (position action and comment):

The containment structure and reactor biological shield are included in the scope of the AMP for the MARIA reactor. In collaboration with the Faculty of Civil Engineering of the Warsaw University of Technology the AMP for concrete structures was established. The programme is divided into two parts that are dealt separately: the concrete containment building and the concrete biological shield. Although the division, the common monitored parameters for both, containment and biological shield are: air temperature and humidity, surface and volumetric degradation, humidity of concrete. During one-time inspection, the mechanical properties of concrete are tested.

Finding no.3 in Section 7.

Regulator (comment):

The AMP that is currently under process of approval by the President of the PAA covers safety related concrete structures even if they are not listed in existing Safety Classification of the MARIA reactor.

3. Country specific findings resulting from the TPR

3.1. Overall Ageing Management Programmes

3.1.1. TPR expected level of performance

As area of improvement was identified:

"A systematic and comprehensive OAMP is implemented for research reactors, in accordance with the applicable national requirements, international safety standards and best practices."

3.1.2. Country position and action

Licensee (planned action and comment):

Section 2.1.1. includes the NCBJ positions and proposed actions to address the gap. The expected level of performance is expected to be achieved by the end of 2019.

Finding no.1 in Section 7.

Regulator (comment):

Section 2.1.1. includes the PAA position to licensee proposed actions.

3.2. Concealed pipework

3.2.1. TPR expected level of performance

As area of improvement was identified:

"Inspection of safety-related pipework penetrations through concrete structures are part of ageing management programmes, unless it can be demonstrated that there is no active degradation mechanism."

3.2.2. Country position and action

Licensee (planned action and comment):

NAR presented by Poland indicated only two concealed pipework in the area of the MARIA reactor. The sol systems, of which parts are concealed are secondary coolant circuit and impulse pipework. Both systems are necessary for normal operation of the MARIA reactor but are not required during accident conditions.

The secondary coolant circuit is buried in soil and therefore it is not related to the expected level of performance. However due to the economic reasons, NCBJ is planning to assess the lifetime of the pipework.

The impulse pipework (pipes' diameter of 16 mm with 20 mm lattice spacing) is partially encased in the biological shield of the MARIA reactor (2,5 meter thickness). The pipework material is a corrosion resistant austenitic steel (1H18N9T, 1.4541). The results of the tube rupture analysis indicates high safety margin in putting the reactor in safe shutdown.

Additionally, the operating experiences include the tube puncturing in 2015. The tube leakage occurred in reactor pool with 200 l/h (4,8 m^3/h) flow rate and decreased drastically as soon as the residual heat removal mode was applied.

Concluding, the impulse pipework is necessary for normal operation of reactor and its rupture does not account as a high risk circumstance. No action on ageing management of these pipelines is planned by NCBJ.

Finding no.4 in Section 7.

Regulator (comment):

The leakage analyses presented in the SAR of the MARIA reactor indicates that tube rupture pose no risk to the fundamental safety functions. Therefore, these partly concealed pipework were not included within the scope of the AMP. However, the more comprehensive analysis of safety functions is expected in updated version of Safety Classification. In updated Safety Classification that is under development it will be analysed with new methodology if there are required more actions dedicated to the impulse pipework. In case of classification of that SSC as important to safety it will be expected from licensee to include this SSC into the AMP where licensee have opportunity to demonstrate that there is no active degradation mechanism or failure of this SSC will not limit safety function realised by this SSC and there is no need to include this to the AMP.

3.3. Reactor pressure vessel

This Section is not applicable due to design of the MARIA reactor.

3.4. Concrete containment structure and pre-stressed concrete pressure vessels

No country specific findings were identified during second phase of the TPR.

4. Generic findings related to Electrical cables

4.1. Characterization the state of the degradation of cables aged at the plant

Cables are aged within the actual power plant environment and tested to assess cable condition and determine residual lifetime.

4.1.1. Country implementation

The AMP for electrical cables covers the several activities to assess the cable condition. The main activities include insulation resistance measurements, continuity tests, impedance of the short-circuit measurements. The operating experience have not indicated major problems through the reactor lifetime (45 years).

4.1.2. Country planned action if relevant

Licensee (comment):

The actions mentioned in Section 4.1.1. together with the foreseen modification of the switchgear stations (the modification includes replacement of power supply cables) will fully cover the characterization of the state of the degradation of cables in MARIA reactor. No other methods are expected to be implemented.

Regulator (comment):

Independent from planned modification that covers replacement of electrical cables the new AMP will cover existing cables (tests and assessment of cable condition) and during replacement of electrical cables it will be required from licensee to update the AMP. In case if any old electrical cable covered by the AMP will not be replaced during the modification, licensee will be asked to assess this cable condition using replaced cables from similar work and environmental conditions.

4.2. Documentation of the cable ageing management program

The AMP is sufficiently well-documented to support any internal or external reviews in a fully traceable manner.

4.2.1. Country implementation

Not applicable to research reactors (Section 5.2.3 of Topical Peer Review Report)

4.3. Methods for monitoring and directing all AMP-activities

Methods to collect NPP cable ageing and performance data are established and used effectively to support the AMP for cables.

4.3.1. Country implementation

Due to the large number of cables in NPPs, the TPR expected level of performance includes the methods for monitoring and directing all AMP-activities. With the limited number of cables in the MARIA reactor, NCBJ does not predict purchase of any very sophisticated databases.

4.3.2. Country planned action if relevant

Licensee (comment):

No planned action is proposed.

Regulator (comment):

Actually there is no existing specific requirements dedicated for electrical cables. Electrical cables are covered by the AMP and they are treated at the same level as other SSCs important for safety.

4.4. Systematic identification of ageing degradation mechanisms considering cable characteristics and stressors

Degradation mechanisms and stressors are systematically identified and reviewed to ensure that any missed or newly occurring stressors are revealed before challenging the operability of cables.

4.4.1. Country implementation

The lack of high and medium voltage cables results in the lower number of degradation mechanisms. Additionally, the analysis of the environmental conditions resulted in the identification of few degradation stressors, which are controlled by chosen methods described in Section 4.1.1. Should the trend analysis indicate a pattern, an additional detection degradation method is applied. The time-domain reflectometry is a new tool in the MARIA reactor to cover unexpected ageing deterioration.

4.4.2. Country planned action if relevant

Licensee (comment):

The currently used methods and planned activities seem to cover all degradation mechanisms. Therefore using the graded approach, no planned action is proposed.

Regulator (comment):

During preparation of the AMP licensee performed review of stressors and actually any corrective actions are not necessary. Ageing management is one of the elements of PSR and during next PSR depending of the changes in the MARIA reactor it will be analysed if this type of review is necessary.

4.5. Prevention and detection of water treeing

Approaches are used to ensure that water treeing in cables with polymeric insulation is minimised, either by removing stressors contributing to its growth or by detecting degradation by applying appropriate methods and related criteria.

4.5.1. Country implementation

No high voltage power supply cables are used in the MARIA reactor, therefore no water treeing is expected.

4.5.2. Country planned action if relevant

Licensee (comment):

No planned action is proposed.

Regulator (comment):

Water treeing wasn't identified in the AMP as an existing degradation mechanism of electric cables.

4.6. Consideration of uncertainties in the initial EQ

The accuracy of the representation of the stressors used in the initial Environmental Qualification is assessed with regard to the expected stressors during normal operation and Design Basis Accidents.

4.6.1. Country implementation

No equipment qualification was applied to the existing cables.

4.6.2. Country planned action if relevant

Licensee (planned action and comment):

The replacement of the cables is planned and the EQ will be applied. The planned modification is described in Section 4.1.2.

Finding no.5 in Section 7.

Regulator (comment):

Independent from replacement of electrical cables during the first PSR that was conducted in 2018-2019 it was identified an issue that needs corrective actions that cover analysis of qualification items important for safety (including cables).

4.7. Determining cables' performance under highest stressors

Cables necessary for accident mitigation are tested to determine their capabilities to fulfil their functions under Design Extension Conditions and throughout their expected lifetime.

4.7.1. Country implementation

The power supply cables necessary for fulfilling main safety functions are planned to be qualified accordingly to expected environmental conditions (as it is mentioned in Section 4.6.1)

4.7.2. Country planned action if relevant

Licensee (planned action):

The analysis of the environmental conditions that could reasonably be anticipated is performed and the results will indicate the cable needed properties.

Regulator (comment):

It is expected from licensee that qualification that will be conducted (Section 4.6.2.) of items important for safety will include design basis accidents as well as beyond design conditions.

4.8. Techniques to detect the degradation of inaccessible cables

Based on international experience, appropriate techniques are used to detect degradation of inaccessible cables.

4.8.1. Country implementation

The following techniques are used in the MARIA reactor:

- Insulation resistance measurement
- Impedance measurement
- Time domain reflectometry
- Visual inspection

4.8.2. Country planned action if relevant

Licensee (comment):

Since the techniques applied in the MARIA reactor are used worldwide, no further action is planned.

Regulator (comment):

At the moment in time there is not required from licensee to extend existing techniques used to detect degradation of inaccessible cables. When the updated Safety Classification will be finalized it will be expected from licensee to review and assess list of electric cables that are important for safety taking into account their possible inaccessibility and techniques used to detect degradation.

5. All other Generic Findings

5.1. Overall Ageing Management Programmes

5.1.1. External peer review services

External peer review services (e.g. SALTO, OSART-LTO, INSARR-Ageing) are used to provide independent advice and assessment of licensees' ageing management programmes.

5.1.1.1. Allocation by the TPR

No good practice was allocated.

5.1.1.2. Country position

Licensee (planned action and comment):

In the end of 2017 NCBJ hosted the follow-up IAEA INSARR mission. The scopes of the follow-up and the main mission (in 2014) included the review of the ageing management programmes in the MARIA reactor. In accordance with follow-up evaluation, the recommendation regarding a systematic ageing management programme following the IAEA safety standards SSG-10 remains partially implemented and it remains open.

NCBJ is applying to the IAEA for a TC project to strengthen the competence for long-term safe operation of MARIA Research Reactor. The TC project design includes hosting the IAEA OMARR mission in 2021. According to IAEA, the mission provides recommendations and suggestions inter alia in the area of ageing management.

Finding no.6 in Section 7.

Regulator (opinion):

In 2017 when INSARR was hosted the NCBJ had the ACP with limited scope. Due to this fact it will be recommended and desired to host another mission (INSARR or OMARR) when the AMP will be fully implemented. Results of external peer review services are subject of PSR.

5.1.2. Data collection, record keeping and international cooperation

Participation in international R&D projects, experience exchange within groups of common reactor design and the use of existing international databases are used to improve the effectiveness of the NPPs OAMP.

5.1.2.1. Allocation by the TPR

Generic finding not relevant to research reactors (marked as not concerned).

5.1.3. Methodology for scoping the SSCs subject to ageing management

The scope of the OAMP for NPPs/RRs is reviewed and, if necessary, updated, in line with the new IAEA Safety Standard after its publication.

5.1.3.1. Allocation by the TPR

Generic finding not relevant to research reactors (marked as not concerned).

5.1.4. TPR expected level of performance: 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.

5.1.4.1. Allocation by the TPR

Generic finding not relevant to research reactors (marked as not concerned).

5.1.5. 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.

5.1.5.1. Allocation by the TPR

Existence of the OAMP in the MARIA reactor is pointed as area of improvements. The TPR expected level of performance in the area of Overall Ageing Management Programmes of research reactors is referred in Section 2.1.1. of the National Action Plan.

5.1.5.2. Country position and action

Licensee (planned action and comment):

The TPR expected level of performance in the area of Overall Ageing Management Programmes of research reactors is referred in Section 2.1.2. of the National Action Plan.

Finding no.1 in Section 7.

Regulator (comment):

The TPR expected level of performance in the area of Overall Ageing Management Programmes of research reactors is referred in Section 2.1.2. of the National Action Plan.

5.2. Concealed pipework

5.2.1. Use of results from regular monitoring of the condition of civil structures

In addition to providing information on soil and building settlement, the results from regular monitoring of the condition of civil structures are used as input to the ageing management programme for concealed pipework.

5.2.1.1. Allocation by the TPR

No good practice was allocated.

5.2.1.2. Country position

Licensee (planned action and comment):

The Section 2.5.2 of the National Action Plan provides a detailed information on the new scope of AMP for concrete structures. In 2019, the first inspections and tests of these are performed and although no updates are expected, the results may provide a new information on ageing mechanisms in encased pipelines.

Finding no.7 in Section 7.

Regulator (comment):

Ageing Management Programme dedicated to concrete structure is included in the AMP. When the updated classification will be finalized it will be expected from licensee to review and assess list of concrete structures that are important for safety taking into account their possible inaccessibility and techniques used to detect degradation.

5.2.2. Good practice: performance checks for new or novel materials

In order to establish the integrity of new or novel materials, sections of pipework are removed after a period of operation and inspected to confirm the properties are as expected.

5.2.2.1. Allocation by the TPR

No good practice was allocated.

5.2.2.2. Country position

Licensee (planned action and comment):

In general, modifications and design changes of SSCs in the MARIA reactor are preceded by comprehensive analyses. In order to comply with good practices based on TPR reports NCBJ will include additional measures to assess the performance checks for new or novel materials.

The measures will be applied whenever little relevant previous internal or external experience of a particular material used in replacement or design changes is acquired.

Finding no.8 in Section 7.

Regulator (comment):

Actually it is not required from licensee to inspect removed sections of pipework after period of operation. It was not included in the AMP nevertheless it will be considered during next PSR.

5.2.3. Inspection of safety-related pipework penetrations

Inspection of safety-related pipework penetrations through concrete structures are part of ageing management programmes, unless it can be demonstrated that there is no active degradation mechanism.

5.2.3.1. Allocation by the TPR

Inspection of the safety-related pipework in the MARIA reactor is considered as area of improvements. The TPR expected level of performance in the area of Overall Ageing Management Programmes of research reactors is referred in Section 3.2.2 of the National Action Plan.

5.2.3.2. Country position and action

Licensee (comment):

The TPR expected level of performance in the area of Overall Ageing Management Programmes of research reactors is referred in Section 3.2.2 of the National Action Plan.

Regulator (comment):

Regulator's comment is included in Section 3.2.2. of the National Action Plan.

5.2.4. TPR expected level of performance: scope of concealed pipework included in AMPs

The scope of concealed pipework included in ageing management includes those performing safety functions, and also non-safety-related pipework whose failure may impact SSCs performing safety functions

5.2.4.1. Allocation by the TPR

Generic finding not relevant to research reactors (marked as not concerned).

5.2.5. TPR expected level of performance: opportunistic inspections

Opportunistic inspection of concealed pipework is undertaken whenever the pipework becomes accessible for other purposes.

5.2.5.1. Allocation by the TPR

Generic finding not relevant to research reactors (marked as not concerned).

5.3. Reactor pressure vessel

5.3.1. Hydrogen water chemistry

Hydrogen Water Chemistry (HWC) is used in BWRs which may be sensitive to Intergranular Stress Corrosion Cracking.

5.3.1.1. Allocation by the TPR

Generic finding not relevant to research reactors (marked as not concerned).

5.3.2. Implementation of a shield

Shielding in the core of PWRs with relatively high fluence is implemented to preventively reduce neutron flux on the RPV wall.

5.3.2.1. Allocation by the TPR

Generic finding not relevant to research reactors (marked as not concerned).

5.3.3. Volumetric inspection for nickel base alloy penetration

Periodic volumetric inspection is performed for nickel base alloy penetrations which are susceptible to Primary Water Stress Corrosion Cracking for PWRs to detect cracking at as early a stage as possible.

5.3.3.1. Allocation by the TPR

Not applicable for RR (marked as not concerned).

5.3.4. 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.

5.3.4.1. Allocation by the TPR

Generic finding not relevant to research reactors (marked as not concerned).

5.3.5. Environmental effect of the coolant

Fatigue analyses have to take into account the environmental effect of the coolant.

5.3.5.1. Allocation by the TPR

Generic finding not relevant to research reactors (marked as not concerned).

5.3.6. Suitable and sufficient irradiation specimens

For new reactors, suitable and sufficient irradiation specimens and archive materials are provided to support the reactor through its full operational life.

5.3.6.1. Allocation by the TPR

Generic finding not relevant to research reactors (marked as not concerned).

5.4. Concrete containment structure and pre-stressed concrete pressure vessel

5.4.1. Monitoring of concrete structures

Complementary instrumentation is used to better predict the mechanical behaviour of the containment and to compensate for loss of sensors throughout the life of the plant.

5.4.1.1. Allocation by the TPR

Generic finding not relevant to research reactors (marked as not concerned).

5.4.2. Good practice: assessment of inaccessible and/or limited access structures

A proactive and comprehensive methodology is implemented to inspect, monitor and assess inaccessible structures or structures with limited access.

5.4.2.1. Allocation by the TPR

Generic finding not relevant to research reactors (marked as not concerned).

5.4.3. TPR expected level of performance: monitoring of pre-stressing forces

Pre-stressing forces are monitored on a periodic basis to ensure the containment fulfils its safety function.

5.4.3.1. Allocation by the TPR

Generic finding not relevant to research reactors (marked as not concerned).

6. Status of the regulation and implementation of AMP to other risk significant nuclear installations

6.1. Board recommendation

The Board recommends that countries explore the regulation and implementation of Ageing Management Programmes of other risk significant nuclear installations while developing and implementing National Action Plans to ensure they exist and are effective.

6.2. Country position and action

In Poland there are existing four nuclear facilitates. One of them is the MARIA reactor that was covered by the TPR. There are also: the EWA reactor under decommissioning and two wet spent fuel pools.

The EWA reactor is in the last phase of decommissioning with only existing limited number of concrete structures. Due to limited impact for radiological safety there is not required by regulator any AMP.

Spent fuel pools are operated under unlimited in time licence. At that time there weren't any requirements for ageing management and therefore there are not existing such document. However till 2025 licensee shall complete periodic safety review where one topic to analyse is ageing management. It is expected that licensee shall analyse necessity of existence of ageing management program for spent fuel pools. It also worth to mention that actually there are no spent fuel in both of this spent fuel pools.

7. Table: Summary of the planned actions

No.	Installation	Thematics	Finding	Planned action	Deadline	Regulator's Approach to Monitoring
1	MARIA Reactor	Overall Ageing Management	Lacks in management system in current ageing management procedure (ACP)	Review and revision of the procedure	2019	All planned actions for 2019 are implemented in the new AMP for the MARIA reactor. That document after assessment process is in the final phase of process of the approval by President of PAA which is expected to be finished till end of 2019.
2	MARIA Reactor	Electrical cables	Lack of electrical cables in current ageing management procedure (ACP)	The screening of electrical cables and implementation of 3 groups of cables within the scope of AMP	2019	
3	MARIA Reactor	Concrete containment structures	Lack of concrete containment structures in current ageing management procedure (ACP)	The preparation of new AMP for concrete structures; first inspections and tests	2019	
4	MARIA Reactor	Concealed pipework	Use of results from regular monitoring of the conditions of civil structures	Possible updates using results from civil structures	N/A*	Implementation of planned action depends of update of Safety Classification. Nevertheless planned action will be analysed during next PSR (till 2023).
5	MARIA Reactor	Electrical cables	Consideration of uncertainties in the initial EQ	Qualification of replaced electrical cables	N/A**	Need of qualification of SSCs important for safety was identified as a corrective action resulting from PSR and it will be monitored by PAA similar to other correction actions resulting from PSR.

6	MARIA Reactor	Overall Ageing Management	Use of external peer review services dedicated to ageing management or with elements of review dedicated to ageing management	TC project design approved including IAEA OMARR application finalization	2019	Implementation of recommendations of external peer review services will be analysed during next PSR (till 2023).
7	MARIA Reactor	Concealed pipework	Performance checks for new or novel materials	Additional measures to assess the performance checks for new or novel materials	N/A*	Planned actions have no deadline because they rely of the results of AMP activities Nevertheless ageing management is part of PSR that will be performed in the MARIA reactor (till 2023) and then it will be possibility to assess/monitor implemented action connected with these findings.
8	MARIA Reactor	Concealed pipework	Inspection of safety-related pipework penetrations	No planned action	N/A*	

* - deadline not applicable as the implementation is in continuous manner or the implementation will depend on the result of AMP activities

8. Acronyms

Abbreviation	Meaning
ACP	Ageing Control Programme
AMP	Ageing Management Programme
EQ	Environmental Qualification
NAR	National Assessment Report
NCBJ	National Centre for Nuclear Research
NPP	Nuclear Power Plant
OAMP	Overall Ageing Management Programme
PAA	National Atomic Energy Agency
PSR	Periodic Safety Review
RR	Research Reactor
SAR	Safety Analysis Report
SSC	Systems, Structures and Components
TPR	Topical Peer Review