ENSREG 1st TOPICAL PEER REVIEW

NATIONAL ACTION PLAN

ON AGEING MANAGEMENT

ITALY

2019

This National Report has been prepared by the Italian National Inspectorate for Nuclear Safety and Radiation Protection (ISIN), which carries out the functions of national competent regulatory Authority for nuclear safety and radiation protection.

List of content

1. INTRODUCTION

In 2014, the European Union (EU) Council adopted directive 2014/87/EURATOM amending the 2009 Nuclear Safety Directive to incorporate lessons learned following the accident at the Fukushima Daiichi nuclear power plant in 2011. The revised Nuclear Safety Directive introduced a European system of Topical Peer Review (TPR) commencing in 2017 and every six years thereafter.
The 30th Meeting of the European Nuclear Safety Regulators Group (ENSREG) in July 2015 identified ageing management of nuclear power plants as the topic for the first Topical Peer Review.

According to the Terms of Reference and Technical Specification, the Peer Review focused on the Ageing Management Programmes (AMPs) at Nuclear Power Plants (NPPs) and Research Reactors (RRs) above 1 MW_{th}.

The peer review process examined the application of the AMPs to the selected systems, structures and components (SSCs) in four thematic areas: electrical cables, concealed piping, reactor pressure vessels, or equivalent structures, and concrete containment structures.
The objective of the first Topical Peer Review was to examine how well Ageing Management Programmes in participating countries meet international requirements on ageing management (in particular WENRA Safety Reference Levels – (SRLs) and the IAEA Safety Standards).

In the first phase national self-assessments were conducted against the WENRA Technical Specification. Results of the self-assessments were documented in the **National Assessment Reports (NARs)**, published at the end of 2017.

As well known, in Italy all NPPs were definitively shutdown in the middle of 80's.

The Italian National Assessment Report (NAR) for the Topical Peer Review 2017 on Ageing Management, therefore, provided an overview on the national regulatory framework applicable only to research reactors and in particular described the ageing management approach for two reactors, the **TRIGA RC-1** reactor (1MW_{th}), operated by ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development), located in the Research Centre of Casaccia in Rome, and the **TRIGA MARK II** (0,250 MW_{th}), operated by the Applied Nuclear Energy Laboratory (LENA), University of Pavia.

The **TRIGA MARK II** reactor has been selected on voluntary basis, being its power below the reference level of 1 MW_{th} established in the Technical Specifications as the threshold power value for a research reactor to be included in the TPR.

As far as concern **TRIGA Mark II**, in the NAR it was recognized that in the recent times an Integrated Management System has been implemented in accordance with International Standard ISO 9001. On that basis an ageing management programme (AMP) was also in place. The outcome of the comparison of the IAEA guideline SSG-10 "Ageing Management for Research Reactors" with the IMS in place leaded to the drafting of a first a road map for all the activities not already included or providing adjustments to incorporate ageing in the main management system.

With regard to **TRIGA RC-1**, the competent regulatory Authority (ISIN) has taken note of the Licensee plan to implement starting from 2018 some extraordinary maintenance and upgrading modifications

on infrastructures of the reactor building, on the electrical power supply and on the instrumentation and control system. An Ageing Management Programme to be applied in the following years, after the completion of the above mentioned interventions, has been prepared.

The second phase of the TPR started in January 2018 when the National Assessment Reports were made available for questions and comments from stakeholders. In May 2018, ENSREG organized a 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.

A delegation from the National Centre for Nuclear Safety and Radiation Protection of ISPRA (that was the competent regulatory Authority in Italy in 2018), together with the licensees of the research reactors TRIGA RC- I (ENEA) and TRIGA MARK – II (University of Pavia), participated to the Conference, presenting and discussing the National Report and contributing to the Peer Review process.

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 work.

The present Report is intended to describe the response for italian Research Reactors to the outcomes of the TPR process, providing the Action Plan for the implementation of the related measures.

2. FINDINGS RESULTING FROM THE SELF-ASSESSMENT

2.1. Overall Ageing Management Programmes (OAMPs)

2.1.1 State finding n°1 (area for improvement or challenge) from the self-assessment

In the italian NAR, taking into account the age of the reactors, particular attention was devoted from the regulatory point of view to the proper management by the licensees of aging mechanism, either related to physical ageing, leading to the degradation of the physical characteristics of SSCs, or to non-physical ageing related to technological obsolescence.

As far as concern **TRIGA Mark II**, it was recognized that an Integrated Management System has been implemented in accordance with International Standard ISO 9001. On that basis an ageing management programme (AMP) is also in place. The outcome of the comparison of the IAEA guideline SSG-10 "Ageing Management for Research Reactors" with the IMS (Integrated Management System) in place leaded in 2017 to the drafting of a first a road map for all the activities not included or providing adjustments aiming to incorporate ageing in the main management system whose application is monitored by ISIN.

With regard to **TRIGA RC-1**, an Ageing Management Program of the reactor has been prepared by the licensee and it was expected to be implemented at the end of the program of interventions on infrastructures of the reactor building, on the electrical power supply and on the instrumental control.
ISIN has taken the decision to request the Licensee the conduct of the first inspection activities identified in the Ageing Management Programme for Electrical Cables, Hydraulic Circuit and Container in connection with the envisaged prolonged shutdown phase.

2.1.2. Country position and action on finding n°1 (licensee, regulator, justification)

As far as concern **TRIGA Mark II,** the licensee has performed all the activities, listed in the first road map in 2017, necessary to incorporate ageing in the integrated management system (IMS) that was in force.

With regard to **TRIGA RC – 1**, ISIN asked the licensee in June 2019 to update the information on the implementantion of the interventions to be carried out on infrastructures of the reactor building, on the electrical power supply and on the instrumental control, as described in the italian NAR.
For all these activities, the licensee is carrying out the project phase that is expected to be completed in 2020. In 2021 the licensee will carry out the administrative procedure for the realization of the interventions. The realization phase will start in 2021 and it will finish in 2022.

As described in the italian National Assessment Report (NAR), the Ageing Management Program of the reactor will be implemented at the end of the program of interventions, now scheduled for 2022.
The first inspection activities identified in the Ageing Management Programme for Electrical Cables, Hydraulic Circuit and Container will start in 2020 to be continued in connection with the envisaged prolonged shutdown phase (2021 – 2022).

ISIN has no observations on the licensee's actions and associated timescales; ISIN is now waiting for the submission of the licensing application for the interventions and will perform the institutional controls and monitoring during the realization phase.

2.2. Electrical cables

2.2.1. State finding n°1 (area for improvement or challenge) from the self-assessment

No findings for **TRIGA MARK II**: an ageing management program has been implemented based to the experience gained with the Integrated Management System and is considered adequate.

For **TRIGA RC-1** ageing problems have been addressed throughout the systematic implementation of the surveillance rules connected to the conditions and technical specifications attached to the licence of the reactor. As described in Parag. 2.1, an important extraordinary maintenance and upgrading interventions has been planned in 2021 – 2022.

2.2.2. Country position and action on finding n°1 (licensee, regulator, justification)

For **TRIGA RC – 1**, the licensee is carrying out the project phase that is expected to be completed in 2020. In 2021 the licensee will carry out the administrative procedure for the realization of the interventions. The realization phase will start in 2021 and it will finish in 2022.
ISIN has no observations on the licensee's actions and associated timescales; ISIN is now waiting for the submission of the licensing application for the interventions and will perform the institutional controls and monitoring during the realization phase.

2.3. Concealed pipework

2.3.1. State finding n°1 (area for improvement or challenge) from the self-assessment

It is considered that all the pipes of circuits relevant to safety are visible to inspection (not concealed pipework).

In addition, reactors operating conditions are characterized by low pressures, low temperatures, moderate flows which do not represent particularly challenging conditions for relevant piping. The preservation of good water quality conditions is also ensured.

Taking into account the consideration of Parag. 2.3.1, there are no findings for TRIGA MARK II and TRIGA RC – 1 about concealed pipework.

2.3.2. Country position and action on finding n°1 (licensee, regulator, justification)

Not applicable.

2.4. Reactor pressure vessel

2.4.1. State finding n°1 (area for improvement or challenge) from the self-assessment

As described in the Italian NAR, for **TRIGA MARK II** it was recognized that many activities were carried out in order to prevent, manage and mitigate ageing effects on reactor containment. To minimize corrosion the water quality is daily checked and the utilization of other materials except for aluminium is avoided. For these reasons, in 2010, after about 20 years of utilization, the filling-water demineralization system was completely replaced with a new mixed-bed, laboratory-grade demineraliser. The water produced is extremely pure. In 2014, a campaign of visual inspection was also conducted. The approach followed by the licensee is considered adequate.

There are no findings for TRIGA MARK II.

For **TRIGA RC-1** Reactor, in 2000 the status of reactor vessel has been tested to evaluate its integrity and to identify possible ageing phenomena. These surveys, carried out using ultrasonic techniques, have allowed to verify the status of components subject to particular ageing agents such as neutron and gamma irradiation as well as corrosion phenomena.

As said in Parag. 2.1, the Licensee has planned an extraordinary and maintenance upgrading programme. In view of the operation of the reactor after the implementation of this programme an AMP was prepared, including also aspects related to liner integrity.

2.4.2. Country position and action on finding n°1 (licensee, regulator, justification)

For **TRIGA RC – 1**, the licensee is carrying out the project phase that is expected to be completed in 2020. In 2021 the licensee will carry out the administrative procedure for the realization of the interventions. The realization phase will start in 2021 and it will finish in 2022.
ISIN has no observations on the licensee's actions and associated timescales; ISIN is now waiting for the submission of the licensing application for the interventions and will perform the institutional controls and monitoring during the realization phase.

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

2.5.1. State finding n°1 (area for improvement or challenge) from the self-assessment

There are no findings for **TRIGA MARK II.**

As described in the Italian NAR, with regard to **TRIGA-RC1** reactor, the Licensee has planned to reassess concrete structures seismic resistance. A specific regulatory oversight activity has been envisaged.

2.5.2. Country position and action on finding n°1 (licensee, regulator, justification)

As far as concern **TRIGA RC – 1**, the reassessment of the concrete structures seismic resistance has been completed in 2018. The results of these reassessment have demonstrated that some adjustments of the civil structures are necessary. These interventions have been included in the general program of interventions to be performed on infrastructures of the reactor building, on the electrical power supply and on the instrumental control.

The licensee is carrying out the project phase that is expected to be completed in 2020. In 2021 the licensee will carry out the administrative procedure for the realization of the interventions. The realization phase will start in 2021 and it will finish in 2022.
ISIN has no observations on the licensee's actions and associated timescales; ISIN is now waiting for the submission of the licensing application for the interventions and will perform the institutional controls and monitoring during the realization phase.

3. COUNTRY SPECIFIC FINDINGS RESULTING FROM THE TPR

3.1. Overall Ageing Management Programmes (OAMPs)

3.1.1. TPR expected level of performance: finding 1

For Italy the only finding was about the Overall Ageing Management Programmes.

As described in the ENSREG doc *"HLG_r(2018-37)_423 1st TPR country findings" – 24/09/2018*, the area of improvement for Italy was the following:

"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."

3.1.2. Country position and action (licensee, regulator, justification)

For **TRIGA Mark II** reactor**,** the licensee have performed all the activities necessary to incorporate ageing in the integrated management system (IMS) that was in force, as described in the italian NAR (2017).

The actions, listed in the first road map and implemented to integrate the IMS in accordance to the AMP, have been the following:

- analysis of the SSCs (systems, structures and components) in detail to identify the most relevant activity areas not included in the IMS in force;
- implementation in the IMS of new or revised procedures for ageing management of SSCs.

No further actions are necessary to improve the AMP actually in force for TRIGA MARK II research reactor.

With regard to **TRIGA RC – 1**, ISIN asked the licensee in June 2019 to update the information on the implementantion of the interventions to be carried out on infrastructures of the reactor building, on the electrical power supply and on the instrumental control, as described in the italian NAR.
For all these activities, the licensee is carrying out the project phase that is expected to be completed in 2020. In 2021 the licensee will carry out the administrative procedure for the realization of the interventions. The realization phase will start in 2021 and it will finish in 2022.

As described in the italian National Assessment Report (NAR), the Ageing Management Program of the reactor will be implemented at the end of the program of interventions, now scheduled for 2022. The first inspection activities identified in the Ageing Management Programme for Electrical Cables, Hydraulic Circuit and Container will start in 2020 to be continued in connection with the envisaged prolonged shutdown phase (2021 – 2022).

ISIN has no observations on the licensee's actions and associated timescales; ISIN is now waiting for the submission of the licensing application for the interventions and will perform the institutional controls and monitoring during the realization phase.

3.2. Concealed pipework

3.2.1. TPR expected level of performance: finding 1

No findings (see ENSREG doc "HLG_r(2018-37)_423 1st TPR country findings" – 24/09/2018)

3.2.2. Country position and action (licensee, regulator, justification)

No findings (see ENSREG doc "HLG_r(2018-37)_423 1st TPR country findings" – 24/09/2018)

3.3. Reactor pressure vessel

3.3.1. TPR expected level of performance: finding 1

No findings (see ENSREG doc "HLG_r(2018-37)_423 1st TPR country findings" – 24/09/2018)

3.3.2. Country position and action (licensee, regulator, justification)

No findings (see ENSREG doc "HLG_r(2018-37)_423 1st TPR country findings" – 24/09/2018)

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

3.4.1. TPR expected level of performance: finding 1

No findings (see ENSREG doc "HLG_r(2018-37)_423 1st TPR country findings" – 24/09/2018)

3.4.2. Country position and action (licensee, regulator, justification)

No findings (see ENSREG doc "HLG_r(2018-37)_423 1st TPR country findings" – 24/09/2018)

4. GENERIC FINDINGS RELATED TO ELECTRICAL CABLES

4.1. Good practice: characterize 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

Not applicable for TRIGA MARK – II and TRIGA RC – 1 research reactors.

4.1.2. Country planned action if relevant

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4.2. TPR expected level of performance: 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

It is already applied in TRIGA MARK II and TRIGA RC – 1.

4.2.2. Country planned action if relevant

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4.3. TPR expected level of performance: 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

Monitoring is conducted in the implementation of the AMP.

4.3.2. Country planned action if relevant

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4.4. TPR expected level of performance: 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

Not applicable for the TRIGA MARK – II and TRIGA RC – 1 research reactors' cables characteristics.

4.4.2. Country planned action if relevant

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4.5. TPR expected level of performance: 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

Not applicable for TRIGA MARK – II and TRIGA RC – 1 research reactors.

4.5.2. Country planned action if relevant

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4.6. TPR expected level of performance: 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

Not applicable for TRIGA MARK – II and TRIGA RC – 1 research reactors.

4.6.2. Country planned action if relevant

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4.7. TPR expected level of performance: 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

Not expected harsh environment on TRIGA RC – 1 and TRIGA MARK – II research reactors.

4.7.2. Country planned action if relevant

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4.8. TPR expected level of performance: 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

Not applicable for TRIGA MARK – II and TRIGA RC – 1 research reactors because cables are accessible.

4.8.2. Country planned action if relevant

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5. ALL OTHER GENERIC FINDINGS

5.1. Overall Ageing Management Programmes (OAMPs)

5.1.1. Good practice: 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 allocation for Italy by the TPR

5.1.1.2. Country position

As described in the Italian NAR, the competent Regulatory Authority has requested licensees to submit an updated evaluation of safety which takes into account the recommendations of the "Code of Conduct on the Safety of Research Reactors".

In this regard, the implementation of a periodic safety review, including ageing verification aspects, has been requested to be provided in the context of the five years report on status of conservation, whose preparation is made mandatory by the licence.

For the periodic safety review reference is made to the IAEA "Periodic Safety Review for NPPs" Specific Safety Guide No. SSG-25. This guide is applied according to a graded approach taking into account the IAEA "Use of a graded approach in the application of the safety requirements for research Reactors" Specific Safety Guide No. SSG-22.

In relation to ageing, reference is made to the IAEA "Ageing Management for Research Reactors" Specific Safety Guide No. SSG-10.

Moreover, in 2019 the reactor **TRIGA MARK II** requested the IAEA to carry out a pilot Integrated Research Reactor Utilization Review (**IRRUR**) Mission. The IAEA responded positively to the request and the mission was held in the period 1 – 5 April 2019.

The main conclusion of the mission are the following: "*the IAEA team was very impressed with the staff and management of the reactor and believed that there are many opportunities for growth for this reactor and has made suggestions and recommendations to enable that growth*."

Finally, this reactor regularly carries out the Peer Review according to ISO 9001: 2015, by a third certifying body.

5.1.2. TPR expected level of performance: 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

No allocation for Italy by the TPR

5.1.2.2. Country position and action

TRIGA RC -1 and TRIGA MARK II participate to international R &D projects as described in Parag. 2.1 and in the Italian NAR.

5.1.3. TPR expected level of performance: Methodology for scoping the SSCs subject to ageing management

The scope of the OAMP for NPPs 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

No allocation for Italy by the TPR

5.1.3.2. Country position and action

No NPPs are operating in Italy.

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

No allocation for Italy by the TPR

5.1.4.2. Country position and action

No NPPs are operating in Italy.

5.1.5. TPR expected level of performance: 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

Area for Improvement for Italy according to the TPR

5.1.5.2. Country position and action

As far as concern **TRIGA Mark II,** the licensee have performed all the activities, listed in the first road map in 2017, necessary to incorporate ageing in the integrated management system (IMS) that was in force.

With regard to **TRIGA RC – 1**, ISIN asked the licensee in June 2019 to update the information on the implementation of the interventions to be carried out on infrastructures of the reactor building, on the electrical power supply and on the instrumental control, as described in the italian NAR.

For all these activities, the licensee is carrying out the project phase that is expected to be completed in 2020. In 2021 the licensee will carry out the administrative procedure for the realization of the interventions. The realization phase will start in 2021 and it will finish in 2022.

As described in the italian National Assessment Report (NAR), the Ageing Management Program of the reactor will be implemented at the end of the program of interventions, now scheduled for 2022.

The first inspection activities identified in the Ageing Management Programme for Electrical Cables, Hydraulic Circuit and Container will start in 2020 to be continued in connection with the envisaged prolonged shutdown phase (2021 – 2022).

ISIN has no observations on the licensee's actions and associated timescales; ISIN is now waiting for the submission of the licensing application for the interventions and will perform the institutional controls and monitoring during the realization phase.

5.2. Concealed pipework

5.2.1. Good practice: 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 allocation for Italy by the TPR

5.2.1.2. Country position

No concealed pipework are present in Italian RRs.

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 allocation for Italy by the TPR

5.2.2.2. Country position

No concealed pipework are present in Italian RRs.

The TRIGA MARK II has no pipes or channels related to the cooling system that cannot be inspected. The only embedded pipes are the horizontal irradiation channels located inside the biological screen and not reachable from the outside. For these pipes the research reactor management has decided to carry out, when possible, video inspections.

5.2.3. TPR expected level of performance: 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

No allocation for Italy by the TPR

5.2.3.2. Country position and action

No concealed pipework are present in Italian RRs.

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

No allocation for Italy by the TPR

5.2.4.2. Country position and action

No concealed pipework are present in Italian RRs.

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

No allocation for Italy by the TPR

5.2.5.2. Country position and action

No concealed pipework are present in Italian RRs.

5.3. Reactor pressure vessel

5.3.1. Good practice: 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

No allocation for Italy by the TPR

5.3.1.2. Country position

No NPPs are operating in Italy.

5.3.2. Good practice: 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

No allocation for Italy by the TPR

5.3.2.2. Country position

No NPPs are operating in Italy.

5.3.3. TPR expected level of performance: 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

No allocation for Italy by the TPR.

5.3.3.2. Country position and action

No NPPs are operating in Italy.

5.3.4. TPR expected level of performance: 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

No allocation for Italy by the TPR

5.3.4.2. Country position and action

No NPPs are operating in Italy.

5.3.5. TPR expected level of performance: 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

No allocation for Italy by the TPR

5.3.5.2. Country position and action

No NPPs are operating in Italy.

5.3.6. TPR expected level of performance: 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

No allocation for Italy by the TPR

5.3.6.2. Country position and action

No NPPs are operating in Italy.

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

5.4.1. Good practice: 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

No allocation for Italy by the TPR

5.4.1.2. Country position

No complementary instrumentation is used for this scope.

In the MARK – II reactor, as a best practice, and in order to monitor the status of the biological shield of the reactor, during operation are performed dose measurements at predetermined points of its biological shield. Values are compared to historical data and any anomalies are reported to the management.

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

No allocation for Italy by the TPR

5.4.2.2. Country position

There are no inaccessible and/or limited access structures in the TRIGA MARK II and TRIGA RC – 1 .

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

No allocation for Italy by the TPR

5.4.3.2. Country position and action

For the TRIGA MARK – II reactor, the licensee is considering to verify the conditions of the concrete that constitutes the biological screen of the reactor and supports the Reactor Tank.

It is not considered applicable to TRIGA RC – 1 because there are no structures that need this type of monitoring.

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 (fuel cycle facilities, installations under decommissioning, waste facilities, etc.)

In Italy, as well known, there are no other operating nuclear facilities in addition to the four Research Reactors, two of which (TRIGA RC – 1 and TRIGA MARK – II) have been submitted to the Topical Peer Review on Ageing Management.

All other nuclear installations are shutdown since many years and under decommissioning with different stages of implementation.

No spent fuel is anymore in the installation, with the exemption of the spent fuel present in AVOGADRO storage facility (13 tons) and in ITREC facility (2 tons). The spent fuel of AVOGADRO facility will be transferred in France for reprocessing, according to the in place agreement, while for the spent fuel of ITREC installation a dry storage facility is planned and the licensing process of the related project is ongoing.

It has to be emphasized that, in order to perform dismantling activities connected to the decommissioning phase, the necessary plant systems, whose function is required for these operations, are submitted to refurbishment or to replacement whose licensing process is performed by ISIN.

The operation of these plant systems is necessary only for the short period needed to finish the decommissioning phase.

For these reasons, in Italy there aren't significant nuclear installations for which it could be useful and interesting to perform an AMP in 2020.

7. TABLE: SUMMARY OF THE PLANNED ACTIONS

Installation	Thematics	Finding	Planned action	Deadline	Regulator's Approach to Monitoring
TRIGA MARK II	**OAMP**	**Area of improvement from the TPR:** 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	No planned action. The licensee have performed all the activities, listed in the first road map in 2017, necessary to incorporate ageing in the integrated management system (IMS) that was in force. An ageing management program has been implemented based to the experience gained with the Integrated Management System and is considered adequate.	-	ISIN will perform periodic controls about the integrated management system (IMS) in force.
TRIGA RC - 1	**OAMP**	**Area of improvement from the TPR**: 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	ISIN asked the licensee in June 2019 to update the information on the implementation of the interventions to be carried out on infrastructures of the reactor building, on the electrical power supply and on the instrumental control, as described in the italian NAR. For all these activities, the licensee is carrying out the project phase that is expected to be completed in 2020. In 2021 the licensee will carry out the administrative procedure for the realization of the interventions. The realization phase will start in 2021 and it will finish in 2022. As described in the italian National Assessment Report (NAR), the Ageing Management Program of the reactor will be implemented at the end of the program of interventions, now scheduled for 2022. The first inspection activities identified in the Ageing Management Programme for Electrical Cables, Hydraulic Circuit and Container will start in 2020 to be continued in connection with the envisaged prolonged shutdown phase (2021 – 2022).	2022	ISIN has no observations on the licensee's actions and associated timescales; ISIN is now waiting for the submission of the licensing application for the interventions and will perform the institutional controls and monitoring during the realization phase.

TRIGA RC - 1	**Electrical Cables**	**Area of improvement derived from the self- assessment:** the interventions on electrical cables have been included in the general program of interventions to be performed on infrastructures of the reactor building, on the electrical power supply and on the instrumental control.	The licensee is carrying out the project phase that is expected to be completed in 2020. In 2021 the licensee will carry out the administrative procedure for the realization of the interventions. The realization phase will start in 2021 and it will finish in 2022.	2022	ISIN has no observations on the licensee's actions and associated timescales; ISIN is now waiting for the submission of the licensing application for the interventions and will perform the institutional controls and monitoring during the realization phase.
TRIGA RC - 1	**Reactor Pressure Vessel: for us Reactor Containment**	**Area of improvement derived from the self- assessment:** the Licensee has been planned an extraordinary and maintenance upgrading programme. In view of the operation of the reactor after the implementation of this programme an AMP was prepared, including also aspects related to liner integrity.	The licensee is carrying out the project phase that is expected to be completed in 2020. In 2021 the licensee will carry out the administrative procedure for the realization of the interventions. The realization phase will start in 2021 and it will finish in 2022.	2022	ISIN has no observations on the licensee's actions and associated timescales; ISIN is now waiting for the submission of the licensing application for the interventions and will perform the institutional controls and monitoring during the realization phase.
TRIGA RC -1	**Concrete containment structure and pre-stressed concrete pressure vessel**	**Area of improvement derived from the self- assessment:** The reassessment of the concrete structures seismic resistance has been completed in 2018. The results of these reassessment have demonstrated that some adjustments of the civil structures are necessary. These interventions have been included in the general program of interventions to be performed on infrastructures of the reactor building, on the electrical power supply and on the instrumental control.	The licensee is carrying out the project phase that is expected to be completed in 2020. In 2021 the licensee will carry out the administrative procedure for the realization of the interventions. The realization phase will start in 2021 and it will finish in 2022.	2022	ISIN has no observations on the licensee's actions and associated timescales; ISIN is now waiting for the submission of the licensing application for the interventions and will perform the institutional controls and monitoring during the realization phase.