ENSREG 1st TOPICAL PEER REVIEW

NATIONAL ACTION PLAN

ON AGEING MANAGEMENT

Hungarian Atomic Energy Authority

Budapest,September 2019.

Reviewed in 2021

	Name, Position	Signature	Date
Edited by:	**Ms. Eszter Retfalvi** National Coordinator, HAEA		
Approwed by:	**Mr. Szabolcs Hullán** Director-General, HAEA		

List of content

1. INRODUCTION

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 (TPR) commencing in 2017 and every six years thereafter. The purpose is to provide a mechanism for EU Member States to examine topics of strategic importance to nuclear safety, to exchange experience and to identify opportunities to strengthen nuclear safety. The process provides for participation, on a voluntary basis, of States neighbouring the EU with nuclear power programmes.

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. This selection was informed by a technical assessment performed by the Western European Nuclear Regulators Association (WENRA) in recognition of the age profile of the European nuclear reactor fleet and the safety significance of the topic. The Terms of Reference (ToR) and the Technical Specification (TS) of the first Topical Peer Review, as well as the Stakeholder Engagement Plan, were approved by ENSREG in January 2017 and published on the ENSREG Website in February 2017.

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 (NARs), 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. TPR idetified four challenges, which are common to many or all countries and are areas where action at a European level could help to increase available knowledge or drive consistency or produce beneficial new techniques or technology to assist in specific aspects of ageing management.

The goal of National Action Plan

The ENSREG provided guidance for the format and content of the NAcP (i.e., " ENSREG 1st Topical Peer review template for national Action Plan on Ageing Management). The current Hungarian NAcP has been prepared in accordance with these recommendations in the following structure and with the following content:

The introduction describes in general the preliminaries, the structure of the NAcP and review process. In Chapter 2, the ENSREG template recommend to describe the result of national self-assessments, In he case of Hungary the self-assessment based on the WENRA review specification did not identify areas for improvement, howewer in this section details provided the last reviews outside of the TPR process in the area of aging management. Chapter 3 contains the country-specific findings of the EU TPR Review Report for Hungary, a brief description of the situation in the area and a description of the measures taken. Chapter 4 introduces the domestic practice to meeting the required levels in the TPR

review process in the Electrical cables area and in areas where it is necessary to demonstrate the remedial action taken. Chapter 5 presents the domestic practice of other general findings highlighted in the TPR process. In Chapter 6, we outline the domestic aging management practices of facilities outside the defined scope of the TPR review process. Chapter 7 contains a summary table of the decided actions.

1.1. The review process

In Hungary it is the task of the Hungarian Atomic Energy Authority (HAEA) to coordinate the peer review process. As first step a related national self-assessment was prepared, its results are compiled in this National Assessment Report (NAR). The WENRA has prepared a specification [A0] for the review, in which it described the background and scope of the review in 2017 and specified the requirements on the content of the NARs Upon this the HAEA developed its specification on the national assessment [A1] in which it adapted the WENRA specification, i.e. it specified the facilities concerned and the chapters of the NAR to be developed, distributed the tasks among the concerned Licensees and the HAEA, determined the overall schedule of the review for both the Licensees and the HAEA.

In line with the HAEA specification, the Licensees performed the self-assessment independently of each other, the Paks NPP with the inclusion of TSOs, then they concluded their designated chapters for the NAR, which were sent to the HAEA for preliminary review and then in a finalized form already considered the HAEA comments. The NAR has been compiled by the HAEA from the chapters and information prepared by the Licensees and itself. The final version has gone through a security information check to avoid publication of sensitive information. Finally, the English translation was prepared. The HAEA published the NAR in both languages with a press release in its public website (www.haea.gov.hu) indicating that questions and comments would be welcome to the report.

In order to ensure transparency of the whole process and to involve the public, the ENSREG) held a public hearing on 3 May 2018 in Brussels. For this public hearing, the HAEA prepared its public summary in accordance with the practice of Hungarian public hearings, meeting the dual requirement of transparency and openness.

During the development of this National Action Plan (NAcP), the Nuclear Power Plant Licensee's proposal for an action plan for its own activities has been reviewed by the Authority and supplemented by activities to be performed by the Regulatory Body.

1.2. The 2021 review of the NAcP

According to the ENSREG TPR Action Plan the HAEA reviewed the Hungarian NAcP in 2021. The National Action Plan has been supplemented with the description of the activities after sending the report and the updated status of the actions with the desctribtion of progress in the related sections. The summary table in the Section 7 also updated.

1.2.1. Activities after September 2019

The HAEA sent the Hungarian NAcP to ENSREG in September 2019 and it was published on the ENSREG website in English. In order to fully implement the action plan, a regulatory taskplan has been prepared and approved. According to the regulatory taskplan HAEA issued a decision (PAE-HA7132) on the implementation of the detailed TPR action plan of the Paks NPP. The HAEA required the preparation of the TPR action plan, which includes the detailed description of each action, the schedules of their planned implementation, the final deadlines and reporting obligations. The HAEA must be informed about the status and progress of the corrective measures in the Ageing Management Report for 2020 and 2021. Based on the regulatory decision the HAEA built in the supervision activities concerning the

nuclear safety related actions into its annual oversight programme. In addition to the assessment of reports HAEA performed a special focused inspection on the progress of NAcP in Februar 2021. The result of these was the basis of the 2021 review of NAcP.

Beyond the Action of Licensee the National Action Plan also contains two additional actions to be completed by the HAEA itself. These activities were built in the legislative workplan and the guidance preparation plan of the HAEA.

As a summary, out of the 4 tasks 2 tasks have been implemented within deadline, and in the case of other 2 tasks the deadlines have not yet been expired.

2. FINDINGS RESULTING FROM THE SELF-ASSESSMENT

Regulation of ageing management in Hungary is organic part of the nuclear safety requirements from 2005. Accordingly, in the case of both concerned nuclear facility types there are detailed requirements on design and operation in the Nuclear Safety Code regarding this area. The requirements are further explained in the case of the NPP in the regulatory guidelines focusing on the design and operation issues of ageing management. Ageing management therefore is embedded in the regulatory oversight process as an individual technical area.

The permanent nuclear safety oversight implemented by the HAEA uses all the regulatory instruments determined by the Act on Atomic Energy. Content requirements for the specific license types determine the ageing management related expectations according to the given life cycle phase of the facility or to the given activity/modification. The HAEA reviews the compliance in the frame of the given licensing process. As a designated technical area for regulatory inspections, the ageing management is a grave aspect of the ten yearly due periodic safety reviews. In the regulatory assessment process, based on the regular reports, event investigations, licensing and inspection acts, the HAEA also scrutinizes the ageing management activity of the Licensees.

It is to be emphasized that both in the requirements and in the regulatory oversight process, the consideration of a graded approach is a very important aspect. Accordingly, as the various facilities as the safety classes within the various facilities are significant viewpoint in relation to differentiating the requirements and the applied depth and instruments of oversight.

Using the results of regulatory oversight and considering the conclusions of the Topical Peer Review it can be concluded that the ageing management of the Licensees satisfies the national regulations, and by this also the international requirements and recommendations. The ageing management of the Licensees is part of the activities aimed at maintaining the technical conditions of the systems, structures and components, in practice ageing management is the key of the coordinated implementation of the programmes. The quality assurance system of the Licensees provides that ageing management as a separate process is regularly reviewed, evaluated, the related experiences are collected and fed back.

Current review, thank to the systematic activity of the Licensees and the regulatory practice has not revealed any new, ageing management related deviation or place for improvement. The recognized ageing processes are managed by the Licensees and they are prepared to detect any unanticipated or new ageing mechanisms and to take into account the experiences of other facilities.

In the service life extension process of the Paks NPP units individual comprehensive ageing management reviews have taken place. In the licensing, the efficiency of the ageing management programme had to be described regarding the SSCs out of the scope of service life extension, while

within the scope (passive, long lived components) a comprehensive ageing review had to be performed by the Licensee. The ageing review aimed at demonstration of operability of the SSCs for the extended service life consisted of two parts: review of the ageing management programmes and validation of the time limited ageing analysis. As a result of the process, the activity was further improved on the basis of the deviations or places of improvements revealed partly by the Licensee itself partly by the HAEA. Based on the granted unit-level service life extension licences the compliance of the ageing management activity was accepted by the HAEA.

The above conclusions regarding the NPP are supported by the recently performed international reviews and comparisons. Namely the pre-SALTO and full scope SALTO missions implemented in Paks NPP (altogether 7 times between 2005 and 2011), the fulfilment of the recommendations and suggestions of which were confirmed by the follow-up missions. On the other hand in the IAEA IGALL programme Paks NPP is a very active member and so it can study and utilize the experiences of others from the first hand to improve its own programme.

Within ageing management a good example of using the external experience that is mentioned in Section 02.3.2 of the NR, but is out of the scope of this review, is the issue of modification of the MCPs in Paks NPP. Based on the Russian vendor recommendations, during the first period of the operation, the modification of the impeller/shaft took place according to the repair/replacement programme. The AMP, however, identified different damages, regarding which it turned out that operating experience and the damage process are related and that repair/replacement of the guide wheels and the compression heads became necessary.

Current review, thank to the systematic activity of the Licensees and the regulatory practice has not revealed any new, ageing management related deviation or place for improvement. The recognized ageing processes are managed by the Licensees and they are prepared to detect any unanticipated or new ageing mechanisms and to take into account the experiences of other facilities.

3. COUNTRY SPECIFIC FINDINGS RESULTING FROM THE TPR

3.1. Overall Ageing Management Programmes (OAMPs)

3.1.1. 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.

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

The finding is outside the original scope of the TPR review, approved byENSREG, and was therefore not addressed in the National Report. There is no national example from the past for long-term construction period or extended shutdown of a nuclear power plant in Hungary. Given the timeframe of such cases, provision should be made, in the light of the timeframe of such cases, for sufficient time to be able to take appropriate action during the periodic review of the existing AMP to identify possible new circumstances and other regular reviews under domestic law. In the case of delayed construction projects, Volume 9 of the NSC contains requirements for the conservation of the construction during the construction period. There are also requirements for commissioning, which must also be met for late nuclear power plant construction projects. In the special case of extended shutdown. the recommendations of the International Atomic Energy Agency only apply this definition to research reactors, and the WENRA RL does not currently include any recommendations. However, as the occurrence of similar situations cannot be ruled out with certainty and the current Hungarian

regulation lacks the concept, we have begun to review the NSC and in accordance with the competence of the HAEA, we initiated the amendment of the regulations.

The HAEA has proposed the addition of the following item in Annex 10 of the NSC. "Extended shutdown" A reactor with a permit to operate is temporarily shut down when the licensee has not decided whether to reactivate or to shut down the reactor. " The HAEA is wating for the publishing of new IAEA guidance for ageing management for extended shutdown and delayed constructions which is currently under development in IGAL project.

Following the introduction of the new concept, the HAEA will review its domestic nuclear safety regulations by 15 December 2021.

3.1.2.a. Status of action in 2021.

The Annex 10 of the NSC was completed with the definition of “extended shutdown and the Annex 5 5.3.6.2900. point has been supplemented with the relevant requirements for research reactor. This was introduced by the 198/2020 (V) Gov. Deg. Status: The action has been implemented.

3.2. Concealed pipework

3.2.1. 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.

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

After assessing the compliance with the expected level, the following corrective action was decided by the Paks NPP: Existing component specific AMPs for concealed pipework will be reviewed and the necessary AMPs upgrade will be conducted until 31 December 2022:

- Check if all concerned penetrations are covered in the scope of AMPs therefore the aging effects of penetrations are managed properly until 15 September 2020;
- In the case of identified gaps:
    a) development of methods for managing ageing of penetrations (including TLAA) according to the best international practice until 15 June 2021;
    b) modification of the concerned component specific AMPs, and/or introduction of other measures and/or TLAA calculations until 30 March 2022;

The HAEA evaluated the action plan submitted by the licensee. The action is adequate to take aging management of safety-related pipe penetrations through concrete structures to a level consistent with international practice. The deadlines set are sufficient to complete the task. The authority shall order the implementation of the remedial action by authority decision. The HAEA oversight the implementation of this decision as part of the normal regulatory oversight process. (See in 02.6 of the National Report.) The official supervision of aging management in Hungarian practice is fully embedded in the official oversight process. Based on these, the HAEA will oversee the implementation of this task in the context of the aging management monitoring procedures for the following activities:

The supervision over the execution of actions can be divided into two basic groups:

A.) The supervisory activities for (nuclear safety related) modifications requiring authority approval are to be performed in line with Govt. decree 118/2011. (VII.11) Korm.; i.e. licensing procedure, inspection and evaluation in connection with the given modification, and if appropriate, enforcement. The modifications not requiring authority approval are also inspected and evaluated by the authority

according to the rules of the above mentioned government decree. The oversight can be performed by a site inspection during the construction phase or via evaluation of the relevant documentation.

B.) Supervisory activities of actions not related to any modification (e.g. study, analysis, assessment, concept planning) are performed through evaluation of the individual documents in order to ensure that the necessary interventions will be accomplished in compliance with the nuclear safety requirements. If additional actions are to be established based on the regulatory evaluation (e.g. further modifications are needed), then the supervisory activities are realized as in Para A.

The progress of the implementation of the licensee's action plan is supervised by the authority in the frame of comprehensive and targeted inspections. These inspections are integrated to the yearly inspection plan of the authority.

In order to follow the implementation of the action plan, the authority shall require the licensee to report on the progress of the task in the annual aging management report, indicating any difficulties, decision points, changes in the planned timing and any developments that may affect performance.

3.2.2.a. Status of action in 2021.

The scope of specific AMPs for concealed pipework was reviewed, the relevant international experiences collected and the gap analysis already performed by the TSO of NPP. The upgrade of necessary AMPs are in progress on the basis of the analysis.

The deadline has not yet expired and can be met.

3.3. Reactor pressure vessel

3.3.1. 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

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

ISI of RPVs has been performed since the commissioning of the plant: standardized NDT methods (VT, UT, ET, PT and AET) have been applied and performed manually or by remotely controlled manipulator according to the accessibility and radiation conditions of the given location. UT is implemented from both ID and OD side. This is a Paks specific approach. It means that the indication detection and monitoring in the RPV base metal and welds, including the whole beltline region are solved and provided on the high technical level.

RPV base metal was three times inspected by UT during the manufacture phase and one time was inspected at the NPP on delivery stage. During the more than 30 years of operation the beltline region (base metal and weld) was inspected using remotely controlled manipulator UT ISI System in 8 times from inside, and 8 times from outside too (for 4 units it means more than 60 UT inspections of the beltline region).

ID inspection has always been done by vendor. The OD examination is performed by the plant staff. The UT inspections from both sides are qualified according to ENIQ methodology (based on the ASME BPVC III NB-2540 criteria). The Vendor and the staff must also be appropriately qualified. During the last 30 years the ID ISI was performed by SKODA, TECNATOM and SIEMENS. Actual Vendor of the ID ISI is INETEC. The UT system for the beltline region inspection is TOMOSCAN III with a special set of

conventional UT probes. The Procedure ISP-UT-38-E applied for the range of the RPV thickness of up to 220 mm including clad material thickness.

The OD UT inspection last 20 year is performed by SAPHI and SAPHIR Plus UT Systems (SIEMENS). For the beltline region the set of UT probes consist from Phased Array probes (16 elements probes), conventional 0° probe and probes for TOFD technic. The inspection covers the whole wall thickness of in the beltline region. In that case if the defect size has to be measured additionally the TOFD technique has to be used.

Acceptance criteria comply with ASME BPVC Section XI standards.

The most relevant indications are found from both sides (OD and ID). They are very well identified, their characteristics are known. During the ID UT inspection the Vendor has to perform a special scan, and based on the results has to review the database of these indications.

Paks Nuclear Power Plant operates component oriented Aging Management Programs (henceforward: SAMP). The SAMP defines the expected ageing mechanisms as well as the ISI applied for its detection (method, cycle, etc.). The RPV specific AMP is based on the similar GALL and IGALL programmes and regularly reviewed according to the best international practice. Annual Report on SAMP operational experience also ensures regular control of the RPV ISI results. In addition the Periodic Safety Review (PSR) has an important chapter with the detailed analyses of ISI performed for the RPV during the previous 10 years. This chapter of PSR demonstrates how the ISI corresponds to the best international practice and prove that the detected defects are controlled continuously.

Details of ISI for RPV are presented in subsection 05.1.3.1. of the NAR. In addition to the information in this section of NAR see the below inspection table (part of KA-01 ISI Framework program connected to the Beltline region).

A part of the KA-01 ISI Framework program Inspection Table

ID number (ASME ID)	**Identification of the main elements of the component**	**Method / technology**	**Inspection category according the ASME**	**Qualifi-cation**	**Inspection Scope**	**Inspection period**	**Notice**
1.	**Reactor Pressure Vessel cylindrical part from the outside surface**						
2 (B1.11)	Weld Nr. 5/6 (± 250 mm) (Picture KA-01-01, 12)	VT-VU-007	B-A		100 %	10 years	
		UT-VU-043	B-A	MHTE-VMT-014/2010			
1.5	Beltline region (Picture KA-01-01)	VT-VU-007	B-P		100%	10 years	
2.	**Reactor Pressure Vessel from the inside surface**						
2.1 (B13.10/60)	Reactor Pressure Vessel inside surface (KA-01 Picture Nr. 1)	VT-VU-007	B-N-1, B-N-2		100%	10 years	(1)

ID number (ASME ID)	**Identification of the main elements of the component**	**Method / technology**	**Inspection category according the ASME**	**Qualifi-cation**	**Inspection Scope**	**Inspection period**	**Notice**
2.3 (B1.11/40)	Weld Nr. 2/3; 3/5; 5/6; 6/8 (± 250 mm) Weld Nr. 8,9/10 (+250 -100mm) (Picture KA-01-01, 12)	ISP-UT-38-E	B-A	MHTE-VMT-18-K/2012	100%	10 years	(2)
2.4 (---)	Cladding inspection (Picture KA-01-01)	ISP-UT-38-E	-	MHTE-VMT-18-K/2012	min. 25%	10 years	
		ISP-ET-19-E		MHTE-VMT-18-K/2012			

(1) - The visual inspection of the deposited surfaces should be replaced by the eddy current test.

(2) - Postponement is allowed until the end of the inspection period.

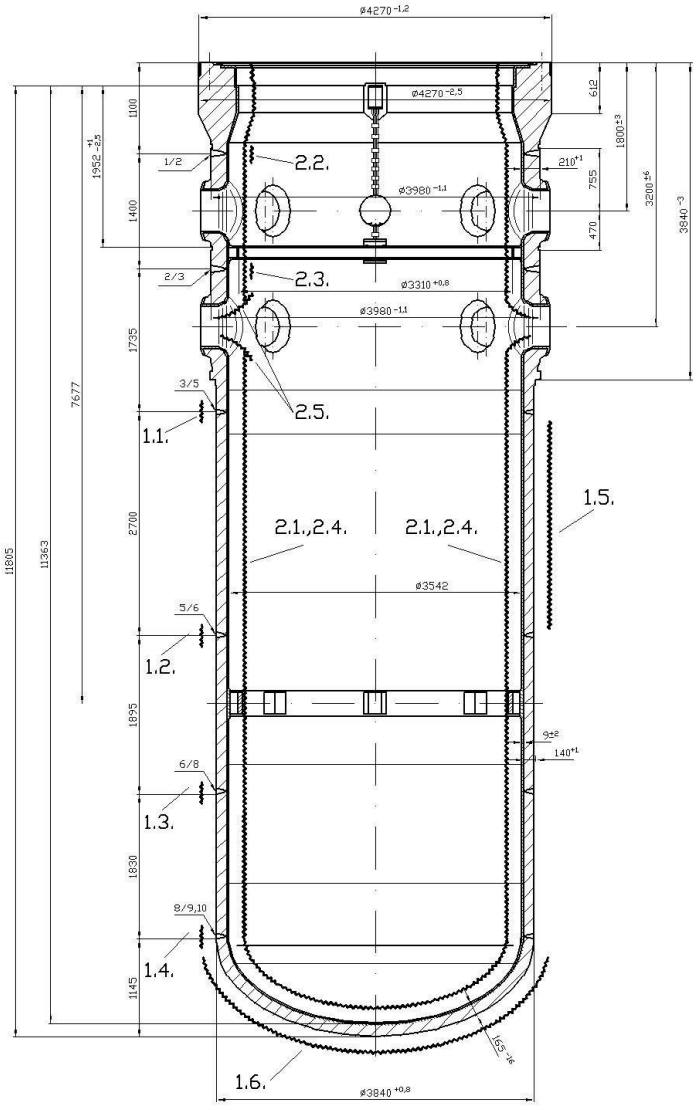


Figure KA-01-01

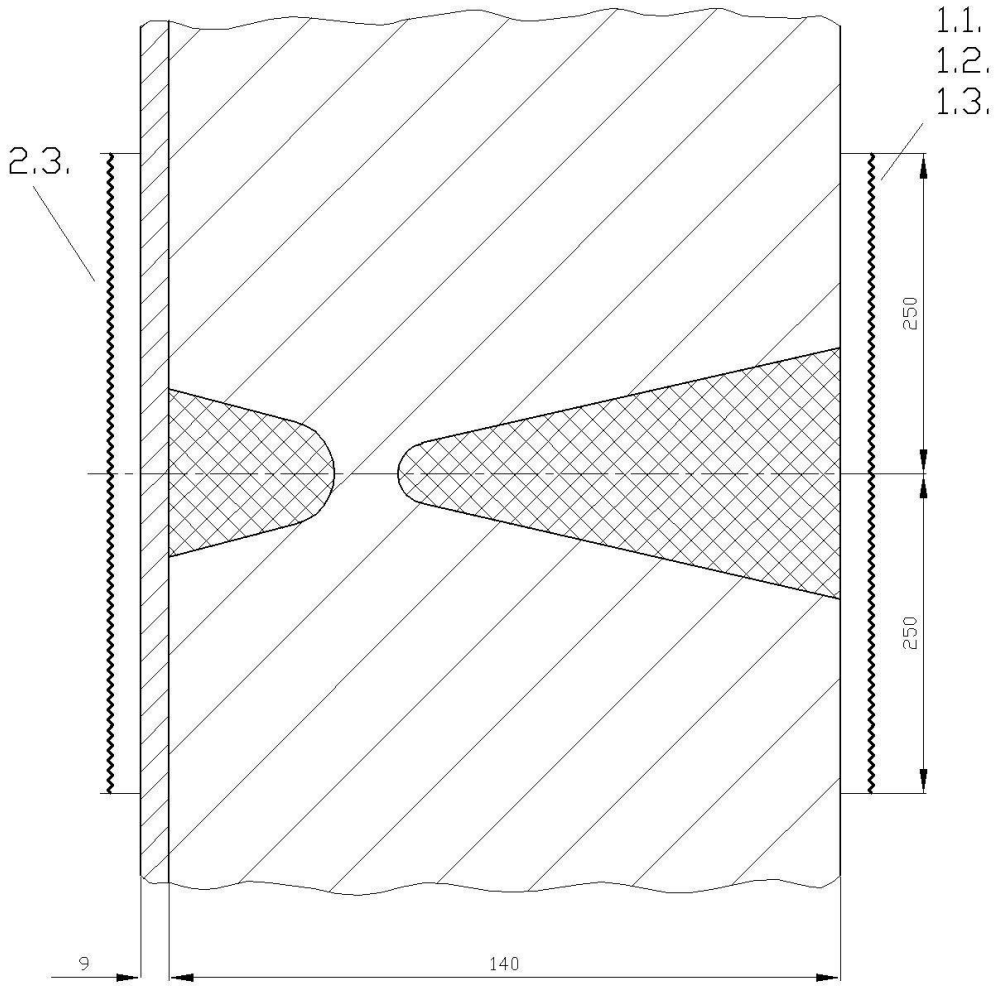


Figure KA-01-12

The above described ISI details show that the Paks NPP practice for the RPV inspection complies with the best international practice and it is concluded that no further action is needed.

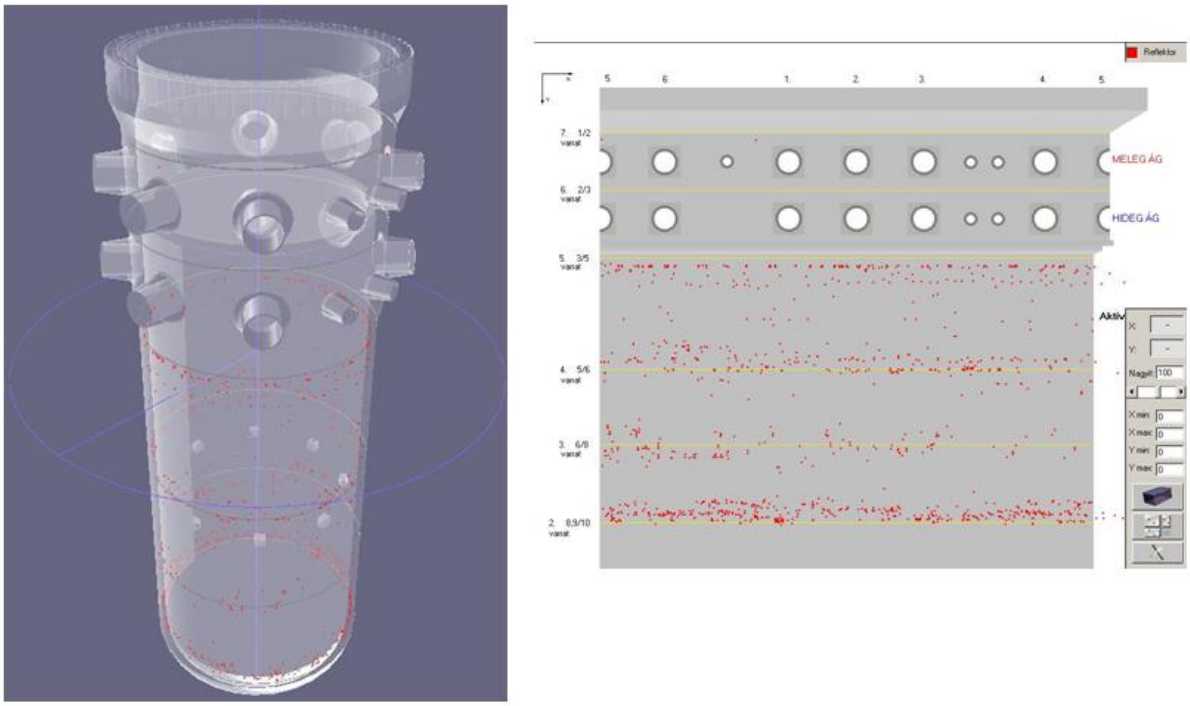
According to the Two Level Acceptance Criteria for UT inspection of this RPV area (approved by HAEA):
For the Outside zone (Welded joints and base metal excluding cladding interface (-30 mm)):

- Detection and registration level: noise level + 6 dB, at most D=1,5 mm FBH;
- Evaluation level (EL): equivalent level of the reflector is 24 mm^2 or more;
- Analyzing level: equivalent level of the reflector is EL + 12 dB, or more.

For the Inside zone (30 mm from the cladding interface):

- Detection and registration level: noise level + 6 dB, at most D=3 mm FBH;
- Evaluation level (EL): equivalent level of the reflector is up to 16 mm^2;
- Analyzing level: equivalent level of the reflector is EL + 12 dB, or more.

For indications higher than the Evaluation level or for new or increasing indications:
An appropriate sizing and defect type determination UT technic have to be used.
There are a large number of indications in the base material of beltline region of all four units, but there are well known, and are described. There is no new or increasing indication.



Detected and controlled indications – RPV Unit No1.

The above presented additional explanation implies that no remedial action is required; the practice is at the expected level.

HAEA reviewed the information, which was provided by Paks NPP and compared it with provided and received information in the course of it's regulatory oversight activities (licensing and inspections of the extension of the operating life). Based on the comparison, the obtained information is consistent with information of HAEA.

On this basis, the non-destructive testing of reactor pressure vessel at the facility meets the relevant international requirements. The Paks Nuclear Power Plant is ready for identifying and evaluate of potential degradations.

In the light of international experiences, it should be noted that visual, ultrasonic and internal eddy-current testing of reactor tanks at the Paks Nuclear Power Plants are a part of the periodic inspection program. A feature of these tests is that their scope extends to welded joints and their surroundings, and to the cylindrical part of the material opposite the reactor core.Non-destructive tests are qualified tests performed in accordance with the ENIQ methodology.

The HAEA agrees with the licensee's conclusion and does not consider the further measures necessary for correcting the situation in this area.

3.3.3. TPR expected level of performance:

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

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

The finding is outside the scope of the TPR review, approved by ENSREG, and was therefore not addressed in the National Report. At present, in Hungary, the requirements contained in Volume 3a of the NSC ensure that the statement is generally fulfilled.

„3a.3.2.4700. The ageing processes and characteristics shall be identified in the case of all safety class system components, and data and methods required for developing an ageing management programme and system to be carried out during operation shall be provided. The ageing management system specified by the design shall conform to the maintenance programmes, the rating of tests and the environmental qualification of system components, as well as the programmes for maintaining the qualified state.

3a.3.2.5200. A monitoring programme shall be devised and implemented for parts of the pressure retaining equipment and pipelines of the primary circuit that are exposed to high neutron radiation or other ageing processes in order to monitor the ageing processes in the materials used.

3a.3.3.1700. The data used in strength analyses shall come from a conservative approach, and they shall be collected in accordance with the selected standard. Effects leading to the degradation of structural materials shall be taken into account.

3a.3.3.1800. Protection against brittle fracture shall be examined in the case of system components where this is necessary."

In addition to legislative requirements the HAEA published the Guideline № N1.7. "Authorization documentation for the production and procurement of elements for the nuclear power plant systems" and Guideline № N3a.13. "Management planning for aging and lifetime of new neclear power plant". As part of our current revision of Guideline No. N1.7, we issued the wording of the recommendations as an aspect for the statement, as well as this point of view is reflected in the being prepared, new Guidline for the future block: "Safety assessment of reactor's pressure vessels from the point of view of brittle fracture under the normal operation, under a pressure test for strength, under the pressure thermal shock(PTS) and under unexpected operational events. ".
HAEA verifies the fulfillment of design requirements in several licensing procedures in accordance with the legislative requirements of Hungarian law. It is necessary to take into account the above recommendation as a criterion of assessment for construction licences and for the production license of the pressure vessels. The Guidelines are sufficient for this fulfillment because they are also the basis for official assessment. That is why HAEA decided to give more recommendation and explanation to an appropriate and sufficient number of samples in the Guidelines for the new build NPP. Deadline is December 15th, 2020

3.3.4.a. Status of action in 2021.

The new guidline N3a. 50 "Surveillance program of reactor vessel of new NPP" is under publication.

The action has been implemented.

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

3.4.1. No findings for Hungary.

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

The scope of AM for cables is described in TPR national report of Hungary in chapter 03.1.1. with reference to cable database (ADRIA). Additional interpretation of cable AM is provided below.

In 1990s two depots were established, where we put the cable samples taken from the units.

There were a lot of problems with the depots, e.g.:

- little space available on the cold pipe --> few and short cable samples that were unsuitable for subsequent certification tests;
- the depot had to be dismantled and removed from its place at each major overhaul;
- the metal elements of the cables were activated delivery for examination was unable;
- the results of the performed tests, primarily the change in the elongation at break, did not correlate with international experience;
- **tests performed did not show a tendency towards operating time/loads**

It was decided to stop depositing and undergo laboratory ageing (heat and, if necessary, radiation) + cable qualification (mild and harsh environments, too). **Deposition could only save laboratory ageing,** but cable qualification with harsh condition would have been necessary for upset & emergency conditions.

The IAEA full-scope SALTO mission performed in May 2011 evaluated the “Cable database and an easy access to important parameters for cable status assessment” as a good practice.

The SALTO review report (IAEA-TC-HUN 4017) states: “*Paks NPP has a systematic approach in storing and aggregating data and information, using a database, forming an important base for the aging management and environmental qualification of cables. This database contains not only basic data of cabling (including types, routes, etc.) but also the assumed normal ambient parameters and those resulting from the postulated initiating events (such as pipe breaks). For each cable an envelope of the environmental stressors is generated and stored, based on environmental data from all rooms through which the cable passes. From the database a number of displays can be generated, e.g. showing for each cable the time curve of the environmental stressors of postulated events and cable route. The database is a good instrument which supports the determination of the circumstances for environment qualification tests of cables thereby forming a good base for long term operation and assessment of cable status.*”

4.1.2. Country planned action if relevant

No remedial action is required; the practice is at the expected level.

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

The documentation of AMP for cables is described in TPR national report of Hungary in chapter 03.1.2., 03.1.3. and 03.1.4. Additional interpretation of cable AM is provided below.

Almost all of the cables types which perform safety functions, or which installed more than 5000m extend are qualified

Cable type groups and cables Commodity Groups are formed. A selected cable taken from all CG was subjected to a cable qualification test for 36 CG:

- artificial ageing to the end life of NPP and functional test by simulating the operating conditions, or upset & emergency conditions (for safety related cables).

Some cables could not be covered by the cable qualification. These cables, if they had an upset function, were replaced by qualified ones, and if they did not have an upset & emergency function, AMPs were developed to continuously monitor the aging process of the cables.

The original built-in safety related PVC insulated MV cables have been replaced with advanced XLPE insulated, qualified cables. For MV cables, OWTS examination is performed (for the zero condition and repetition periodically).

Installation of new cables (new technology system or replacement of old cable) is only permitted if it is designed in the "ADRIA" cable database management software. The software verifies - based on the results of previous qualification tests - whether a particular type of cable can be considered as properly qualified at the place of installation and only permits the installation of the cable if it is satisfied.

If a new type of cable is to be installed, it is a requirement to have qualification until the end of the plant life.

4.2.2. Country planned action if relevant

No remedial action is required; the practice is at the expected level.

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

The methods of AM data collection for cables is described in TPR national report of Hungary in chapter 03.1.3. Additional interpretation of cable AM is provided below.

The aging status of non-qualified cables is monitored by AMPs , which are based on 3 Maintenance Instructions that regulate the testing of cables:

- V-SÖKP-07 & TVV205 - Low Voltage PVC Insulated Cables
- V-SÖKP-12 & TVV206 - Non-environmentally qualified cables
- V-SÖKP-13 & TVV207 – I&C cables without having EQ

Periodic measurements are carried out by the electrical maintenance organization on the order of the electrical technical organization.

For power and I&C cables with PVC wires and jackets, the Shore D hardness and the slope of the return voltage to the cable are measured.

Other ageing concerned cables are inspected by visual inspection, photographic recording, and, if applicable, Shore-D hardness measurement of the jacket. The ambient temperature is also recorded.

The measurement results are documented and evaluated by the electrical technical organization.

4.3.2. Country planned action if relevant

No remedial action is required; the practice is at the expected level.

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

The degradation mechanisms and stressors for cables is described in TPR national report of Hungary in chapter 03.1.1.1. Additional interpretation of cable AM is provided below.

The electrical technical organization prepares annual summaries of the ageing management activities performed under the AMPs. It summarizes the examinations carried out and assesses the condition of the cables involved in ageing management, examining whether there was any deterioration or a trend. It also examines whether there is a need to change the scope, whether any scheduled examinations were physically feasible, whether a new mitigation method was available, whether it was necessary to involve an expert, or whether it was necessary to modify the AMPs.

Every ten years a PSR is conducted (latest: in 2017) focusing even for the assessment of environmental conditions, too.

4.4.2. Country planned action if relevant

No remedial action is required; the practice is at the expected level.

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

The degradation mechanisms and stressors for cables is described in TPR national report of Hungary in chapter 03.1.1.1. Additional interpretation of cable AM is provided below.

The original PVC insulated MV cables were replaced with modern XLPE insulated and sheathed cables designed for laying in wet conditions, longitudinally and transversely waterproof ("FL" index).

In rainy weather, the cables can be affected by dripping water and water vapour in concrete cable trenches and tunnels in the courtyard. In these cable spaces, we have improved drainage of stagnant water and additionally provided natural and artificial ventilation to reduce humidity.

When laying each MV cable, we measure the zero condition of the cable by OWTS measurement and monitor it continuously with periodically. This measurement method is suitable for identifying water treeing-type aging.

4.5.2. Country planned action if relevant

No remedial action is required; the practice is at the expected level.

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

The requirements for the stressors used in the Environmental Qualification for cables are described in TPR national report of Hungary in chapter 03.1.2.2. Additional interpretation of cable EQ is provided below:

During the ten-year PSR, changes in environmental conditions are assessed separately (last PSR was in 2017). It was found that although the annual and summer average temperatures are noticeably higher by + 1-2 °C during the lifetime of the power plant, this does not significantly increase the average temperature of the rooms without having air-conditioning. The temperature in the air-conditioned rooms can be kept at the set value.

Normal operating environment parameters have been assessed on units that have been operating for 20 years. The result of this can be assumed to be constant for the remaining operating time of the units, and would need to be revised only if external or internal conditions change.

The average temperature of the rooms is based on the summer peak, which points to safety.

In addition, during regular plant walk downs, operations personnel will report to the maintenance organization when they experience abnormal environmental conditions.

4.6.2. Country planned action if relevant

No remedial action is required; the practice is at the expected level.

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

The scope of cables necessary for accident mitigation is described in TPR national report of Hungary in chapter 03.1.1. with reference to cable database (ADRIA). Additional interpretation is provided below:

Cables that have function during DBA have been identified and their environmental impacts on DBE have been identified. The cable types concerned were (also) qualified for this environmental condition.

4.7.2. Country planned action if relevant

No remedial action is required; the practice is at the expected level.

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

No current implementation.

4.8.2. Country planned action if relevant

There are no inaccessible safety related cables at Paks NPP according to the design documents. Despite of this fact, Paks NPP personnel will review the potential existence of such cables again.

Deadline: 15.12.2021.

If any safety related cables are identified as inaccessible, the necessary measures will be developed for the effective AM of those cables.

Deadline: 15.12.2022.

The HAEA evaluated the action plan submitted by the licensee. The action is adequate to take aging management of inaccessible safety related cables to a level consistent with international practice. The deadlines set are sufficient to complete the task. The authority shall order the implementation of the remedial action by authority decision. The HAEA oversight the implementation of this decision as part of the normal regulatory oversight process. (See in 02.6 of the National Report.)

4.8.2.a. Status of action in 2021.

The detailed task plan is under development for reviewing the completeness of the database and for collecting international experiences.

The deadline has not yet expired and can be met.

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: Good practice
5.1.1.2. Country position and action (licensee, regulator, justification)

The review and update of OAMP is described in TPR national report of Hungary in chapter 02.4.

In addition IAEA SALTO missions were organized for support of Licence Renewal Project tasks, including development of AMPs between 2005-2013 (7 SALTO missions: 5 limited scope; 1 full-scope and 1 follow-up).

Component oriented AMPs for mechanical components were reviewed and approved by IAEA expert team in 2018-2019.

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: jó megfelelés
5.1.2.2. Country position and action (licensee, regulator, justification)

Data collection and record keeping is described in TPR national report of Hungary in chapter 02.3.3.

AM and LTO experience exchange meeting is yearly organized for Czech, Slovak and Hungarian operators and TSOs. Paks NPP contributes in IAEA IGALL project since 2009. Paks NPP is a member of EPRI since 2016 and use the EPRI AM and LTO related documents and info for updating the SAMPs . PAKS NPP participates in the annual SG database meeting and FAC meetings (Chech, Slovak, Finnish, Hungarian common committees).

Other examples of R&D activities are placed in NAR 02.3.2.5.

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: Jó megfelelés

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

Scope of OAMP is described in TPR national report of Hungary in chapter 02.3.1.

5.1.4. TPR expected level of performance: Atomerőművek elhúzódó építési projektei, illetve hosszan tartó leállított állapothosszan tartó leállított állapota

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: Javítandó terület

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

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: Good performance

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

At the time of launching of the BRR Ageing Management Programme in 2005, the IAEA-TECDOC-792 Management of Research Reactor Ageing publication was taken as a basis. During the subsequent review of the programme the IAEA SSG-10 Ageing Management for Research Reactor [A16] recommendations were used.

The physical and non-physical ageing effects and the steps of the ageing management process to be taken into account in the BRR were determined based on these reference documents.

The ageing management programme of the BRR was launched in 2005 after the completion of the first Periodic Safety Review. The objective of the programme is to identify and to monitor all degradation mechanisms and altogether to safely operate the reactor until the end of its design lifetime. The activity consists of the following, well-separable processes:

- Data collection, monitoring, surveillance of building conditions;
- Evaluation. Monitoring of exceedance of limit values, preparation of wear and usage trends;
- Intervention. Preparation and execution of repair and replacement schedules;
- Documentation according to the quality assurance practice of the BRR;
- Reporting on the activity of the given year;
- Adapting R&D experience, revision of the programme.

For more detail see the Chapter 0.2.3.1 of NAR.

The AMP is evaluated on an annual basis and every 10 years during the Periodic Safety Review. The availability and failure rates are also evaluation parameters. These numbers have not increased significantly in the last 12 years from the introduction of the AMP, except for the two exceptions.

Review of the programme takes place every 5 years or if such an event occurs that can be attributed to the ageing processes of similar reactors. Review can be initiated by the change of the regulatory environment, regulatory inspection and the regulatory resolution completing the 10-yearly conducted PSR.

5.2. Concealed pipework

5.2.1. Good practice: use of results from regular monitoring of the condition of civil structures

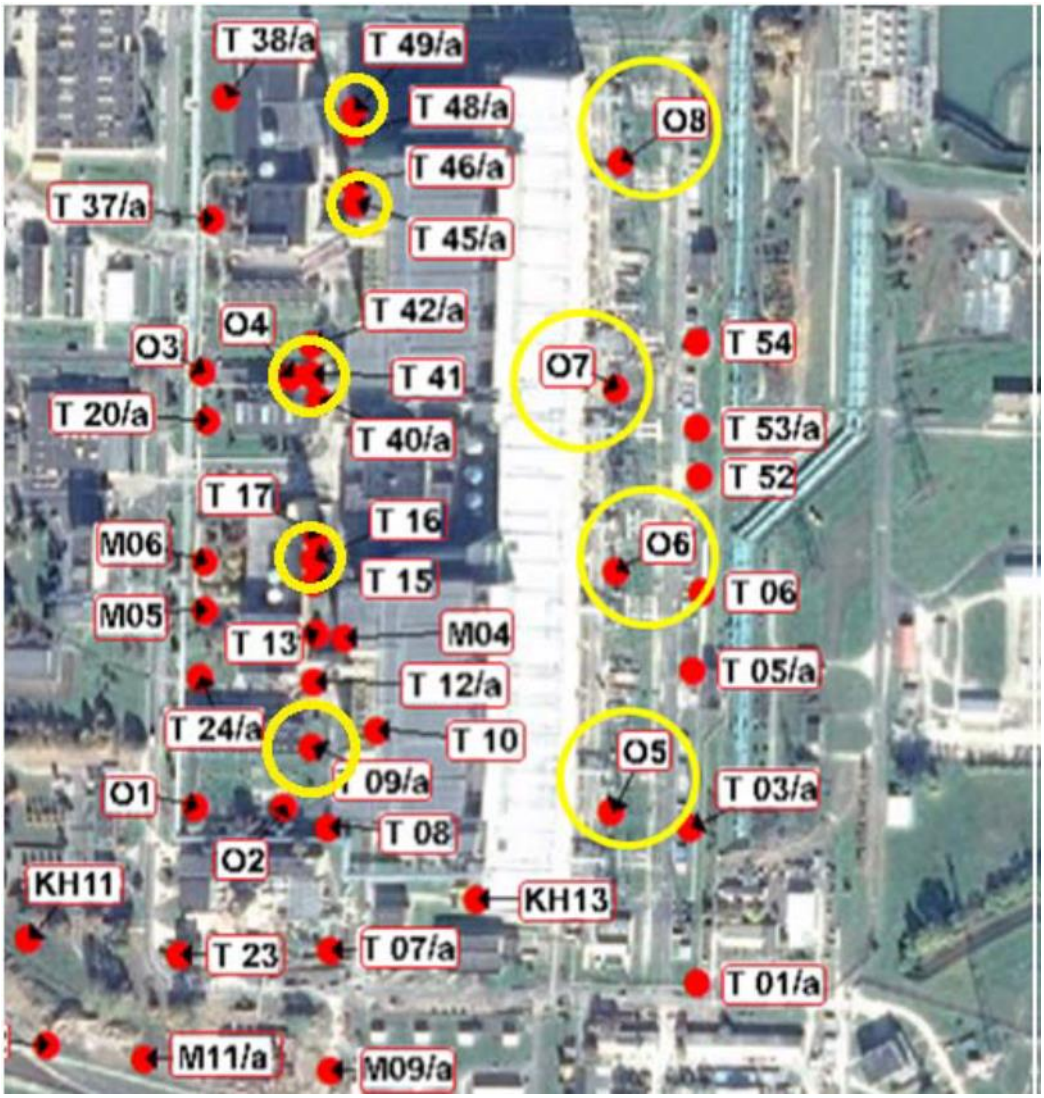
In addition to providing information on soil and building settlement, the results from regular monitoring of the condition of civil structures are used as input to the ageing management programme for Concealed pipework.

5.2.1.1. Allocation by the TPR: no allocation
5.2.1.2. Country position and action (licensee, regulator, justification)

Detection of signs of possible leakage (spillage, wet soil, level decrease etc.) due to through wall defects are described in TPR national report of Hungary in chapter 04.1.3.1. Monitoring of the condition of civil structures is described in 07.1.3.1

Additional information:

Paks NPP has been worked out a systematic monitoring system for detecting the unacceptable building settlement due to the change of the soil water level conditions. This monitoring system consists of a set of observation wells as it is shown in below Figure:



The detected water level are compared regularly to the acceptable level determined by TLAA calculation for the extended 50 years operation life.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. 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

5.2.2.2. Country position and action (licensee, regulator, justification):

Determination of degradation mechanisms for pipework is described in TPR national report of Hungary in chapter 04.1.1.2.

Additional information:

Component specific AMPs for pipelines consider the type of piping material. Any changes of pipelines section parameters (including material changes) are considered, and result in review and necessary

modification of SAMP. According to the recent practice, there is no intention for replacing any pipeline sections with new or novel materials, except known material types.

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: area for improuvment
5.2.3.2. Country position and action (licensee, regulator, justification): see in Section 3.2.2.

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: jgood practice
5.2.4.2. Country position and action (licensee, regulator, justification)

The scope of concealed pipework AMPs are described in TPR national report of Hungary in chapter 04.1.

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: jó megfelelés
5.2.5.2. Country position and action (licensee, regulator, justification):

Inspections of concealed pipework are described in TPR national report of Hungary in chapter 04.3.1.

5.3. Reactor pressure vessel

5.3.1. Good practice: Hydrogen water chemistry

5.3.1.1. Application of Hydrogen Water Chemistry (HWC) in Boiling Water Reactors (BWR) to reduce intergranular stress corrosion effects.
5.3.1.2. Allocation by the TPR: no allocation
Country position and action (licensee, regulator, justification):
There is no BWR type NPP in Hungary

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

The reduction of embrittlement of the components of the vessel wall opposite to the core was realised in the first few years of operation, when the applied core configuration reduced the fast neutron load to the vessel wall. see NAR 5.2.2

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: not affected

5.3.3.2. Country position and action (licensee, regulator, justificationThe Hungarian NPP not operated with nickel base alloy.

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: area for improvment

5.3.4.2. Country position and action (licensee, regulator, justification): Ls. 3.3.2. fejezet

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: good performance

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

Environmental effect of the coolant in fatigue analyses was considered in TLAAs described in TPR national report of Hungary in chapter 02.4.4.6.

Additional information:

PAKS NPP has performed a full scope of construction review for all SC 1-3 SCs including the piping elements before the plant entered the extended operation period. This review work was based on the Hungarian Safety Guide 3.25 which incorporates the ASME BPVC III requirements and also requires to consider the environmental effects of the coolant for the fatigue calculations according to NUREG/CR/6909, „Effect of LWR Coolant Environment on Fatigue Life of Reactor Materials" (Final Report), ANL-06/08, U.S. Nuclear Regulatory Commission, Washington, DC, February 2007..

The whole set of construction review documents were reviewed by independent US experts (e.g. Registered Professional Engineers) and were approved by the HAEA.

Approach to environmentally assisted fatigue issue will be discussed in WWER AM group going to be launched in January 2020 under IAEA.

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: area for improvment

5.3.6.2. Country position and action (licensee, regulator, justification): See.3.4.4

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: not affected

5.4.1.2. Country position and action (licensee, regulator, justification)*:*

The Paks NPP and the BRR do not have such system components, so this finding cannot be interpreted at hungarian facilities.

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: Good practice

*Country position and action (licensee, regulator, justification)*Assessment of inaccessible and/or limited access structures are described in TPR national report of Hungary in chapter 07.1.2.3. and 07.1.3.

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: not affected

5.4.3.2. Country position and action (licensee, regulator, justification):
The Paks NPP and the BRR do not have such system components, so this finding cannot be interpreted at hungarian facilities.

6. STATUS OF THE REGULATION AND IMPLEMENTATION OF AMP TO OTHER RISK SIGNIFICANT NUCLEAR INSTALLATIONS

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.

6.1. Country position and action (licensee, regulator, justification)(fuel cycle facilities, installations under decommissioning, waste facilities, etc.)

- Name: Interim Spent Fuel Storage Facility
- Licensee: Centre for Energy Research of the Hungarian Academy of Sciences
- Type: modular, dry
- Start-up date: 1998
- Planned shutdown date: 50 years.

- Name: Training Reactor
- Licensee: Budapest University of Technology and Economics
- Type: light-water cooled and moderated, tank-type reactor, with graphite reflector and with EK-10 fuel
- Power: 100 kWth
- Start-up date: 1971
- Planned shutdown date: not determined, current operation license is valid until 2027

At the time of construction and commissioning of the concerned nuclear facilities basically there were no requirements in the national legislation on the comprehensive, systematic ageing management. At the time of commissioning of the NPP, there existed mandatory requirements on the design and operation of certain plant programmes (maintenance, in-service inspections, surveillance activities) which can be nowadays regarded as parts of an effective ageing management programme.

Ageing management as a concept appeared in the national regulatory system in 1995, when a guideline attached to a resolution of the HAEA was published on the method of implementation of the first Periodic Safety Review of Units 1 and 2 of Paks NPP. It contained detailed description how the systematic activity aimed at managing the ageing of the systems, structures and components (SSCs)

should be evaluated and reviewed. The guideline was based on the international recommendations and national considerations, experience of that time. Its scope covered all safety related SSCs. The demand for implementation of an optimal and coordinated programme and most of the attributes of the currently regarded effective ageing management appeared in it.

The requirements reached the level of legislation in 1997, when by the government decree on nuclear safety requirements evaluation of ageing and ageing management activities became mandatory elements of the periodic safety review of all nuclear facilities [included the two nuclear facilities concerned] as well as it specified aspects how to do that. The need for investigation of ageing issues also appeared regarding nuclear safety related events and the design and operation aspects of ageing management were also included in the decree, though not on a systematic basis as it is expected today.

At the time of the preparation of the NAR, the nuclear safety requirements in force are included in the Govt. Decree 118/2011 Korm. [A8] and in its annex, in the Nuclear Safety Code (NSC). The NSC of 10 Volumes and the related guidelines on the implementation contain the detailed requirements on the design of ageing management and the operation of a comprehensive ageing management programme as described below (for Research Reactors it specified in Volume 5, and for Spent fuel storage facility it is specified in Volume 6):

1. Definition of ageing, ageing processes, ageing management and ageing management programme is in line with the interpretation of the WENRA TPR specification [A0] (Definitions 130-133 of NSC Volume 10).
2. Ageing processes to be expected throughout the lifetime shall be taken into account during the design (for ISFSF: NSC 6.2.2.0200, for BRR: NSC 5.2.2.4200.).
3. Ageing processes shall be identified in the design, the data for ageing management programme shall be ensured, harmony with the maintenance and other plant programmes shall be provided, fulfilment of safety functions shall be demonstrated taking into account uncertainties and the lifetime of the SSCs shall be determined together with the indicators and criteria related to the ageing mechanisms. Design requirements on ageing management shall also be determined (NSC 6.3.2.3900-4400, NSC 5.2.5.0100-0200., 5.2.7.0200-0300, 5.2.10.0100.).
4. A comprehensive ageing management programme shall be operated coordinated with the other facility programmes (maintenance, surveillance, qualification) including the establishment and maintenance of an ageing management database. The programme shall be reviewed and updated on a regular basis. (NSC 6.6.2.0100-0700, NSC 5.3.9.0100-0600). In the case of the nuclear power plant further stipulations are applied to the plant programmes: maintenance effectiveness monitoring shall be applied for active components, environmental qualification shall be applied for electric and I&C components in harsh environment, individual ageing management programmes shall be developed for main circulation loop and spent fuel pool components. (NSC 4.6.0.0100-0200.)
5. Evaluation of ageing processes and effectiveness of ageing management is part of the ten-yearly due Periodic Safety Review (NSC 1.7.3.0500., NSC 6.6.2.0700., NSC 5.3.9.0600.).
6. Regarding the ISFSF, the HAEA published detailed guidelines for the Licensee on considering the ageing during design and implementation of ageing management in operation.
7. Obligations on regular reports by the nuclear facilities contain that the experience related to the operation of ageing management programme should be described in the annual report according to the specified aspects.

In Hungary the Act on Atomic Energy stipulates that a graded approach shall prevail in the application and oversight of atomic energy. Accordingly the nuclear safety requirements are more stringent, more detailed for the nuclear facilities representing a higher risk level, while the regulatory procedures are

differentiated according to nuclear safety significance as required by the decree on the Nuclear Safety Requirements [A8]. The ageing management requirements described above follow, and the regulatory procedures applied to oversee this area consider this basic concept.

The aging management program for spent fuel storage facilities and building structures shall be developed by the organization responsible for operation in accordance with the operational, maintenance, condition monitoring and control practices of the facility. The list of equipment and building structures included in the aging management program is approved by the facility management. The list shall be updated periodically and as necessary. In order to determine the scope of the aging management program, it is recommended to group equipment and structures according to their active and passive functions, examples of which are Appendices 1 and 2 to this guide. The system components should be further subdivided into their material (stainless or carbon steel), their media (water, steam, gas, air, oil, radioactive media, etc.) and their environment (IPC, underground, concreted, yard, etc.) Based on. When defining the scope of an aging management program, in addition to the classification in the previous paragraph, the classification of the equipment into a security class (BIOS), as well as in Section 6.1.26. s. It is recommended to refer to the list of constituents in Annex M1 to this Guide.

7. SUMMARY OF THE PLANNED ACTIONS

Installation	Area	Finding	Planned action	Deadline	Regulator's Approach to Monitoring	Status in 2021
HAEA	OAMP	extended shutdown	Review of national law	15 December 2021.	regulatory taskplan	The action has been implemented
HAEA	RPV	adequate number of surveillance samples	Guideline review	15 December 2020	regulatory taskplan	The action has been implemented
PAKS NPP	ECS	Inspection of safety-related pipework penetrations through concrete structures are part of ageing management programmes	Existing component specific AMPs for concealed pipework will be reviewed and the necessary AMPs upgrade will be conducted	31 December 2022	1. Oversight of the performance: a) assessment of annual report b) planed inspection 2. Issuing a regulatory desision	In progress The deadline has not yet expired and can be met.
PAKS NPP	CP	appropriate techniques are used to detect degradation of inaccessible cables.	The completeness of the database will be reviewed and, in the event of identified shortages, we will develop the relevant specific AMPs.	2022 December	1. Oversight of the performance: a) assessment of annual report b) planed inspection 2. Issuing a regulatory desision	In progress The deadline has not yet expired and can be met.
