SEPTEMBER 2019

ENSREG 1st TOPICAL PEER REVIEW
NATIONAL ACTION PLAN
ON AGEING MANAGEMENT

stuk
SÄTEILYTURVAKESKUS
STRÅLSÄKERHETSCENTRALEN
RADIATION AND NUCLEAR SAFETY AUTHORITY

Radiation and Nuclear Safety Authority

Nuclear Reactor Regulation

Contents

Abbreviations

AMP	Ageing management programme
BWR	Boiling Water Reactor
ELMA	Life cycle management program for in-containment electrical and automation equipment in OL1/OL2 NPP
ENSREG	European Nuclear Safety Regulators Group
EQ	Environmental Qualification
FLG	Fuel loading
IAEA	International Atomic Energy Agency
IGSCC	Intergranular Stress Corrosion Cracking
IRWST	In-containment Refuelling Water Storage Tank
KTO	Periodic inspection programme
LO1	NPP unit Loviisa 1
LO2	NPP unit Loviisa 2
LOCA	Loss of coolant accident
LTO	Long time operation
MCL	Main coolant line
NAR	National Assessment Report
NPP	Nuclear Power Plant
OL1	NPP unit Olkiluoto 1
OL2	NPP unit Olkiluoto 2
OL3	NPP unit Olkiluoto 3
PWR	Pressurized Water Reactor
PWSCC	Primary water stress corrosion cracking
R&D	Research and Development
RI-ISI	Risk informed in-service inspection
RPV	Reactor pressure vessel
SC	Safety class
SCC	Stress corrosion cracking
SS	Stainless steel
SSC	System, Structure or Component important to safety
SSE	Safe shut-down earthquake
STUK	Radiation and Nuclear Safety Authority
TPR	Topical Peer Review
UT	Ultrasonic testing
VVER	A type of PWR (Water Water Energetic Reactor)
VT	Visual testing
VTT	Technical Research Centre of Finland
WANO	World Association of Nuclear Operators
WENRA	Western European Nuclear Regulators Association

1 INTRODUCTION

Coordination of Topical Peer Review (TPR) process in Finland was done by the Radiation and Nuclear Safety Authority (STUK). For TPR preparation a cross-sectional working group was set up representing different disciplines, i.e., I&C, electrical, mechanical and civil engineering, and having knowledge and experience also in the area of aging management. This working group was responsible also for preparing the TPR and writing the National Action Plan (NAcP).

The licensees were invited to supply material first for the preparation of National Assessment Report (NAR) and later on for the TPR process and preparation of NAcP. The NAR and the TPR was prepared on the basis of this material and the contributions from the members of the working group. Most of the material was already earlier delivered to STUK but also some new material was delivered by the licensees during the TPR process.

The writing of NAcP was coordinated at STUK and the plan was prepared after the TPR process was finished. The NAcP was subjected to commenting procedure and comments were asked from the licensees and STUK's staff members.

The NAcP is to be delivered to the ENSREG and published at the ENSREG's website after its finalization. This document defines Finland's response in the TPR process, by way of a National Action Plan, which follows a standard format across all participating countries.

The NAcP is intended to enable progress to be monitored against the range of findings emerging from the TPR and it will also inform future TPR follow-up activities by ENSREG.

This NAcP has been written in accordance with the Council Conclusions of the 18 March 2019 and the ENSREG decision of the 25 March 2019, stating that countries who participated in the 1st TPR process should deliver their NAcPs for Nuclear Power Plants and Research Reactors by the end of September 2019.

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

IAEA has prepared specific safety guides for ageing management, most recent SSG-48 being published November 2018. The IAEA guidelines for NPP ageing management have been embedded in a national regulatory guide YVL A.8 "Ageing Management of a Nuclear Facility", which STUK has issued 2013 and updated 2019. Both the international and national guides point out the importance of a proactive and well-targeted ageing management in terms of preventive and predictive maintenance of SSCs. This focus in the overall ageing management programs has been found an area for improvement.

Therefore the ageing management of Finnish NPPs should be developed so that individual SSCs or SSC groups of NPP are itemized for ageing management purposes covering all safety classified SSCs, and that necessary actions to these individuals or groups are clearly specified, such as regular maintenance, condition monitoring, qualification, risk of obsolescence and spare part procurement.

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

The revised ageing management programs of both Finnish licensees are to be issued by the end of 2019. A comment arisen from the previous versions concerned just the scoping/grouping of SSCs and associated SSC data (design basis, ageing mechanisms, maintenance programs, condition monitoring, experimental qualification, time limited ageing analyses) to be specified to each SSC. The other noteworthy comment was about annual ageing reporting, which does not yet fulfil regulatory requirements for all parts.

Based on the previous mentioned scoping/grouping of SSCs, licensees should report on long-term trends in defects/failures, present operability, validity of qualifications etc.

The country action on the finding from the self-assessment is to review the updated ageing management programs of the licensees during the first third of 2020. If the finding will not be clarified from the coming updates, STUK will call for necessary corrective actions with a new deadline.

This finding will be followed by STUK, see the table of the planned actions at the end of this report.

2.2 Electrical cables

Ageing management of electrical cables of the Finnish NPPs has been adequate. Self-assessment during NAR process did not result any findings that would require special actions. However it was noted that AMP of electrical cables was still under preparation for the new OL3 NPP. Check finding n°1 below.

2.2.1 State finding n°1, Area for improvement, Unfinished AMP of electrical cables of OL3 NPP

Preparation of AMP of electrical cables of OL3 NPP was underway during NAR process.

2.2.2 Country position and action on finding n°1

TVO (licensee) has prepared an initial version of the AMP of electrical cables of OL3 NPP. TVO gathers experience of the AMP in practice and updates the AMP if seen necessary. STUK has reviewed the initial version unofficially.

OL3 is still under commissioning and no fuel has been loaded yet. Before fuel loading STUK will verify that AMPs including the AMP for electrical cables are ready to be used in nuclear operation.

Development of the AMP and STUK's review procedures proceed according to plant's normal life cycle. Therefore this is not seen as an action to be registered in the table of summary of the planned actions (chapter 8).

2.3 Concealed pipework

As stated in the country report of Finland these type of structures are very rare and they have no safety significance. Therefore AMP of concealed pipework is defined within the corresponding system level AMP. This includes the maintenance plans and works of embedded pipework within internal visual inspections according to RI-ISI program for pipelines. One objective of NAR chapter 4 was to demonstrate the effectiveness of the above described approach using a specific case relating to a leak in turbine condensation water pipe. This example illustrated the ageing phenomena starting from design and observed during operation of the licensee in connection with the flooding risk. Corresponding corrective actions were designed and executed according to licensee's maintenance programme.

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

In Finnish NPPs, full-scope RI-ISI is applied, according to regulatory guide YVL E.5, appendix R of the ASME section XI and the framework document for RI-ISI from ENIQ.

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

These procedures have been found adequate in STUK's opinion.

2.4 Reactor pressure vessel

Self-assessment did not reveal any findings related to ageing management of reactor pressure vessels.

2.5 Concrete containment structure and pre-stressed concrete pressure vessel

STUK considers that the ageing management programmes concerning the concrete containments of Finnish NPP units are adequate and no significant degradation due to ageing has been reported.

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

OL3 plant supplier's (AREVA) in-service inspection plan for civil structures is described in NAR chapter 7.1.3. The AMP and maintenance guides of the licensee (TVO) for OL3 were in development during NAR process.

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

Licensee (TVO) has finished the update of inspection and maintenance guide for civil structures, which now covers also OL3 NPP. These AMP guides have been submitted to STUK and a decision will be finalized before fuel loading (FLG). STUK oversees the fulfillment of requirements through follow-up and periodic inspections (STUK's KTO-programme).

This finding will be followed by STUK, see the table of the planned actions at the end of this report.

3 COUNTRY SPECIFIC FINDINGS RESULTING FROM THE TPR

3.1 Overall Ageing Management Programmes (OAMPs)

3.1.1 Delayed NPP projects and extended shutdown

Expected level of performance: 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.

Country position and action, Fortum:

There are not any ongoing NPP projects in Fortum. For longer outages water chemistry procedures are in place to prevent incipient or premature ageing of main components.

Fortum has assessed the findings from TPR. Based on this assessment Fortum has not recognized any specific further actions.

Country position and action, TVO:

This does not concern OL1/OL2. However, TVO plans to prepare preservation concept for OL1/2 plants to mitigate the effects of extended shutdown periods.

The following concerns only OL3 under commissioning. The effects of long construction period is mitigated among others with the following actions:

1) Monitoring of components storing and packaging conditions prior installations

There are detailed criteria and controls defined per component type and storing location.

2) Component inspections and maintenance campaigns prior starting of commissioning

E.g. main rotating machines and valves dismantled, inspected and maintained prior starting of commissioning. Work is mainly performed by the original equipment manufacturer.

3) Preservation of systems before and after commissioning

There are three basic conditions for the systems:

- System is kept in operation

- System is in dry preservation

- System is in wet conditions (wet preservation)

Primary preservation condition is dry preservation when expected preservation period is long (over 14 days).

Technical criteria for preservation conditions and monitoring criteria are defined.

4) Compliance verification inspections over the project period taking into account aging:

- installation inspections, Erection Completion Certificate (ECC)

- commissioning inspections (the first phase prior starting commissioning and the second phase after commissioning completion)

- Take Over for Maintenance (TOM)

- Take Over to Temporary Operation (TOTO)

Preventive maintenance programs started for the components/systems permanently in operation from the ECC phase.

Comprehensive maintenance assessment for the systems prior TOTO phase including systematic aging assessment focusing on aging issues due to the long construction period. Preventive maintenance programs started overall from the TOTO phase.

5) Dedicated Aging Management Programmes (AMP) prepared during the project phase taking into account construction and commissioning phases experiences

6) Execution of the periodical testing programs prior fuel loading

TVO considers that there is expected level of performance like the one described in section 4.2.3 of TPR report [1].

Country position and action, regulator STUK:

Finland's allocation was "Area for Improvement" in Country specific findings report [2].

STUK considers that Fortum's measures are not adequate in case of extended periods a NPP is out of service. The licensee shall identify SSCs which are exposed to various degrading mechanisms, and specify actions to monitor, prevent or mitigate ageing in such SSCs.

STUK considers that TVO's measures for Olkiluoto 1 and 2 are not adequate in case of extended periods a NPP is out of service. TVO plans to prepare preservation concept for OL1/2 plants to mitigate the effects of extended shutdown periods.

These findings will be followed by STUK, see the table of the planned actions at the end of this report. Same action and timetable is set to both licensees.

STUK considers TVO's measures for Olkiluoto 3 are adequate. STUK is confirming implementation of these measures by resident inspectors who are always present at Olkiluoto site.

3.2 Concealed pipework

3.2.1 Inspection of safety-related pipework penetrations

Expected level of performance: 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.

Country position and action, Fortum:

Pipework penetrations have been evaluated in the scope of pipeline RI-ISI-program and pipeline condition monitoring program.

Fortum has assessed the findings from TPR. Based on this assessment Fortum has not recognized any specific further actions.

Country position and action, TVO:

Inspection of safety related pipework penetrations are analyzed using risk informed methods and included to inspection programs accordingly.

TVO considers that there is expected level of performance like the one described in section 6.2.3 of TPR report [1].

Country position and action, regulator STUK:

Finland's allocation was "Area for Improvement" in Country specific findings report [2].

RI-ISI program for pipelines including penetrations is under continuous improvement as stated by the licensees. A general description of RI-ISI methodology is given in chapter 5.2.3 of this document.

Based on the above, STUK has not recognized any further actions.

3.2.2 Opportunistic inspections

Expected level of performance: Opportunistic inspection of concealed pipework is undertaken whenever the pipework becomes accessible for other purposes.

Country position and action, Fortum:

Need of opportunistic inspection will be evaluated case by case whenever segments of concealed pipework becomes accessible.

Fortum has assessed the findings from TPR. Based on this assessment Fortum has not recognized any specific further actions.

Country position and action, TVO:

Inspection programmes of piping are done using risk informed methods that covers all safety classes (1,2,3 and non nuclear). Concealed pipework has not been identified as significant regarding risk. However sections of concealed EDG pipelines have been inspected using guided wave technique that doesn't require direct access to the pipe. During maintenance activities of concealed piping, inspection points are added in a way that general degradation can be detected.

TVO considers that there is expected level of performance like the one described in section 6.2.3 of TPR report [1].

Country position and action, regulator STUK:

Finland's allocation was "Area for Improvement" in Country specific findings report [2].

Majority of nuclear safety related pipework in Finnish NPPs are approachable and visible for inspections, e.g. pipework related to cooling water ways and fire water are located in rock tunnels or concrete channels. Only few instances of concealed pipework exist, which can not be accessed and correspond to WENRA TPR technical specification.

During 2019 STUK has verified within the periodic inspection programme (KTO) that licensees' actions relating to opportunistic inspections of concealed pipework are adequate.

Based on the above, STUK has not recognized any further actions.

3.3 Reactor pressure vessel

3.3.1 Non-destructive examination in the base material of beltline region

Expected level of performance: Comprehensive NDE is performed in the base material of the beltline region in order to detect defects.

Country position and action, Fortum:

NDE inspections in the base material of beltline region are included in the RPV ISI-program. Inspections are performed by UT/ET method. Inspection procedures have been qualified according to ENIQ-methodology. NDE has been performed also for the base material to detect possible hydrogen flakes.

Fortum has assessed the findings from TPR. Based on this assessment Fortum has not recognized any specific further actions.

Country position and action, TVO:

The belt-line region welds of OL1/OL2 RPVs are periodically inspected and inspection programmes have been analyzed to be sufficient for such reactor types. OL3 inspection programmes have been done according ASME Section XI and during manufacturing also UCC (under cladding crack) inspections have been done to area of interest.

TVO considers that there is expected level of performance like described in section 7.2.2 of TPR report [1].

Country position and action, regulator STUK:

Finland’s allocation was “Area for Improvement” in Country specific findings report [2].

RPV vessel and head welds are periodically inspected according to ASME BPVC XI rules. RPV interior is inspected in all commercial nuclear sites in every 8 years and the beltline cladding is a part of the RPV inspection. The manufacturing methods of the RPVs in Finnish plants differ from Doel 3 and Tihange 2 cases. E.g. in Olkiluoto1 and 2 the degree of deformation is higher than in Doel 3 RPV.

RPV inner part inspection with corebelt base material inspections was performed for Olkiluoto 1 in 2014, Olkiluoto 2 in 2015 , Loviisa 1 in 2016 and Loviisa 2 in 2014. The RPV welds and the cladding of core beltline area in Loviisa 2 was inspected in 2018 and for Loviisa 1 it will be inspected in the year 2020 revision. The RPV in Olkiluoto 3 plant was inspected thoroughly during the manufacturing. Used inspection techniques were ultrasound with normal and angle probe, magnetic particle and liquid penetrant testing. The inspections included the beltline region.

The inspections have been performed with qualified methods according the STUK guide YVL E.5. This guide follows closely the principles of ENIQ recommended practices 1-11 and gives strict requirements to the whole inspection system, i.e. the qualification of the equipment, software, inspection procedures and personnel. STUK also requires the inspection companies to be accredited by accreditation body and approved by STUK before the inspections.

No indications have been found in the previous RPV beltline inspections.

Based on the above, STUK has not recognized any further actions.

4 GENERIC FINDINGS RELATED TO ELECTRICAL CABLES

TPR findings related to electrical cables are represented in the next paragraphs with country position for Finland. Country implementation is explained separately for both of the licensees Fortum and TVO because each of them have their own practices. Further on TVO's practices may differ between the older OL1/OL2 NPP and the new OL3 NPP.

Generally the Finnish licensees' performance meet the good practice or TPR expected level of performance. There were one TPR finding that was seen to require some further monitoring although the TPR expected level of performance is already met. Check chapter 4.2.2 and the relevant part of the table in chapter 8.

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

Fortum:

Cable samples have been installed in deposits in the most harsh environment. Samples are tested periodically.

TVO:

Cable deposits for periodical electrical/mechanical testing have been in use since the start-ups of OL1/OL2 and same kind of deposits are being installed in OL3. Test results are used to monitor cable ageing.

4.1.2 Country planned action if relevant

Licensees performance correspond the good practice. No further actions are needed to address the finding.

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

Fortum:

Relating to older documents (before 2000's) the traceability may not be that good, but newer documents are traceable and well-documented.

TVO:

AMP for cables is in use for OL3 and being prepared for OL1/OL2 (aim to be complete during 2019.

4.2.2 Country planned action if relevant

Licensees performance correspond the TPR expected level of performance. No further actions are needed to address the finding.

In addition to continuous surveillance, results of the AMPs are reviewed in STUK every year. YVL-guide A.8 requires that licensees provide an ageing management follow-up report to STUK on a yearly basis. This report consists of all plant equipment including electrical cables. In addition YVL-guide E.7 requires licensees to report from ageing management of safety classified cables inside containment every five years.

As mentioned above TVO is preparing separate AMP document for cables. Up to this date ageing management of electrical cables of OL1/OL2 NPP has been defined in the general AMP for all SSCs. Separate AMP document for cables will further on clarify and develop traceability and reviewability of the ageing management of electrical cables of OL1/OL2 NPP.

STUK will follow the development of the OL1/OL2 AMP document for cables. STUK will review development progress or finished document at the latest by the end of 2019.

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

Fortum:

AMP for cables introduces the methods for data collecting. The collected and document data is used for reporting.

TVO:

More detailed instructions for condition/ageing monitoring of cables, including the methods for collecting and documenting the data, are in use in OL1/OL2/OL3, and referred to in the AMP for cables. The results of the ageing monitoring of the cables are reported to STUK every five years together with the ageing follow-up report required by Guide YVL A.8. Possible needs for further condition monitoring actions are evaluated as part of these reports.

4.3.2 Country planned action if relevant

Licensees performance correspond the TPR expected level of performance. No further actions are needed to address the finding.

STUK reviews ageing monitoring data provided in follow-up reports on a yearly basis. Check chapter 4.2.2.

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

Fortum:

Degradation mechanisms and stressors for cables have been identified in the AMP and are reviewed to ensure their correctness.

TVO:

Possible new/unexpected ageing mechanisms/stressors, including handling of operating experience (both internal and external), belong to the scope of the annual System Health Analysis reporting.

4.4.2 Country planned action if relevant

Licensees performance correspond the TPR expected level of performance. No further actions are needed to address the finding.

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

Fortum:

Loviisa AMP for cables does not cover water treeing in particular. However water treeing is recognized to be a potential problem and changes have been made to minimize stressors of cables. For example at the end of 1990s it was detected that cables in steam generator space were in hotter temperatures than designed. Thermal insulation and ventilation were improved and cable routes changed in the steam generator space to prevent degradation caused by heat that could accelerate water treeing

TVO:

In OL1/OL2/OL3 medium voltage (6,6 kV or 10 kV) cables are installed primarily inside the NPPs and cable tunnels, in dry locations and mild environment. In case of a need to install a medium/high voltage cable directly in ground or in a trench where exposure to moisture cannot be excluded, special cable types designed for direct burial / submergence and equipped with water-impermeable barriers (radially and longitudinally watertight cables) are used. Partial discharge and/or tan δ measurements are used for determining the condition of medium voltage cables.

4.5.2 Country planned action if relevant

Licensees performance correspond the TPR expected level of performance. No further actions are needed to address the finding.

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

Fortum:

Trends are collected and changes are assessed for the stressors. Accident related cables have been assessed for DBA.

As mentioned in chapter 4.5.1 at the end of 1990s it was found that condition of some cables in steam generator space was bad. Inspections revealed that there were hot spots nearby cable routes where radiation and temperature were higher than expected. The initial environmental qualification did not cover these conditions which led to degradation of the cables nearby these hot spots.

These findings led to cabling changes in the steam generator space. Degraded cables were replaced and cable routes were changed. Thermal insulation and ventilation in the steam generator space were also improved. Since then thermal imaging have been used to monitor temperature and to check if some other hot spots occur.

TVO:

As for OL1/OL2, the EQ statuses of all in-containment electrical and I&C components, including cables, have been evaluated as part of ELMA-project (life cycle management program for in-containment electrical and automation equipment) and the operating license renewal (2016-2017). Among other things, due to the limitations of qualification of the original LOCA cables, all original cables with long-term functional requirement in

LOCA conditions are being replaced. Restrictions for artificial ageing (e.g. dose-rate effects and acceleration factors) have been taken into consideration when updating the EQ instructions applicable for OL1/OL2 and the latest review for the OL1/OL2 DBA requirements was performed before starting the ELMA project EQ campaigns in 2010-2011.

As for OL3, e.g. dose rate effects and thermal ageing acceleration factors have been included already in the original environmental qualifications for the cables.

The Cable/EQ AMPs include the tasks for evaluating the possible needs for improving the EQ process based on e.g. the actual degradation.

4.6.2 Country planned action if relevant

Licensees performance correspond the TPR expected level of performance. No further actions are needed to address the finding.

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

Fortum:

The cables of LO1/LO2 are qualified by type testing for the environment in which they operate and for the most demanding accident conditions including severe accidents with a test sequence including ageing stressor. If lifetime extension is topical cables will be tested again to match the targeted qualified lifetime.

TVO:

The cables of OL1/OL2/OL3 are qualified by type testing for the environment in which they operate and for the most demanding accident conditions with a test sequence including ageing stressors. During the installed life the actual condition of the cables is monitored by periodical tests and inspections. In OL1/OL2 there are no severe accident environmental requirements for cables (i.e. the severe accident mitigation systems do not require functionality of cables that are exposed to the accident conditions). In OL3, the cables required to function in severe accident environmental conditions are qualified by type testing also for these conditions.

4.7.2 Country planned action if relevant

Licensees performance correspond the TPR expected level of performance. No further actions are needed to address the finding.

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

Fortum:

IAEA recommendations from IAEA-TECDOC-1188 chapter 6 are in use at Loviisa NPP for inaccessible cables. For example visual inspections and sample cable testing are in use from techniques represented. Further techniques may be used if shown relevant.

TVO:

As for OL1/OL2, insulation resistance and conductor resistance measurements are used for low voltage and signal cables. In addition, time domain reflectometry has been used for certain signal cables. In addition, partial discharge and tan δ measurements are used for determining the condition of medium voltage cables.

As for OL3, the following condition monitoring techniques are planned: insulation resistance measurements for power cables, impedance measurements for control and instrumentation cables, time domain reflectometry for certain special cables and partial discharge measurements for medium voltage cables.

4.8.2 Country planned action if relevant

Licensees performance correspond the TPR expected level of performance. No further actions are needed to address the finding.

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.

1. Allocation by the TPR

Finland was allocated "Good practice" in Country specific findings report [2].

2. Country position

Country position and action, Fortum:

OSART -LTO module has been conducted in 2018 as a part of OSART review.

Fortum has assessed the findings from TPR. Based on this assessment Fortum has not recognized any specific further actions.

Country position and action, TVO:

WANO Peer review was held in 2016. WANO TSM "System Health as Part of Life Cycle Management Process" was held in 2016. OSART-LTO review by IAEA was held in Olkiluoto at March 2017. SALTO review is at planning stage.

Country position and action, regulator STUK:

Both licensees are also members of WANO (World Association of Nuclear Operators). Finland's allocation was "Good practice" in Country specific findings report [2].

Based on the above, STUK considers that no further actions are required.

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.

1. Allocation by the TPR

Finland was allocated "Good performance" in Country specific findings report [2].

2. Country position and action

Country position and action, Fortum:

Loviisa NPP actively participates international experience exchange projects and forums, such as WWER water chemistry forum, Nordic Countries Ageing management forum, I-ERWG working group.

Fortum has assessed the findings from TPR. Based on this assessment Fortum has not recognized any specific further actions.

Country position and action, TVO:

Participation in activities of European BWR Club and Nordic Beräkningsgrupp (BG). Participation in international conferences concerning NPP structural integrity issues. International NPP component degradation database CODAP used in R&D projects.

TVO considers that there is expected level of performance like the one described in section 4.2.3 of TPR report [1].

Country position and action, regulator STUK:

Finland's allocation was "Good performance" in Country specific findings report [2].

Based on the above, STUK considers that no further actions are required.

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.

1. Allocation by the TPR

Finland was allocated "Good performance" in report Country specific findings [2].

2. Country position and action

Country position and action, Fortum:

The scope of the OAMP is in line with the national and IAEA requirements, it has been reviewed and assessed regularly and updated just recently. Development and continuous improvement in this area is going on.

Fortum has assessed the findings from TPR. Based on this assessment Fortum has not recognized any specific further actions.

Country position and action, TVO:

Basically all safety classified systems are in the scope. At present screening is on its way.

TVO considers that there is expected level of performance like the one described in section 4.2.3 of TPR report [1].

Country position and action, regulator STUK:

All safety classified and consequentially safety relevant SSCs are within ageing management, in other words, their operability is maintained and/or monitored on a regular basis (corrective maintenance strategy is not applied). This approach is understood to comply with the IAEA's "scope setting" or even more since also SSCs subject to periodic refurbishment or replacements are incorporated into the ageing management scope. In this respect, STUK's position is to classify the AMP scope as a good performance.

Finland's allocation was “Good performance” in Country specific findings report [2].

Based on the above, STUK considers that no further actions are required.

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.

1. Allocation by the TPR

This good practice was not allocated for Finland in Country specific findings report [2].

2. Country position

Country position and action, Fortum:

There are no concealed pipelines buried in the ground/soil in Loviisa NPP.

Fortum has assessed the findings from TPR. Based on this assessment Fortum has not recognized any specific further actions.

Country position and action, TVO:

The results from regular monitoring of the condition of civil structures are in practice utilized in OL1/OL2 and OL3: The root cause and consequences will be clarified when damages in civil structures are observed. It would be evaluated whether the damage might have impact on adjacent structures, e.g. concealed piping. Or whether the reason of damage could be the defect in adjacent structure, e.g. leakage of piping.

TVO considers that there are good practices as described in section 6.2.2 of TPR report [1].

Country position and action, regulator STUK:

Finland was not given “Good practice” in Country specific findings report [2].

However, STUK considers that no further actions are required because only few instances of concealed pipework exists in Finnish NPPs and RI-ISI process has been found adequate.

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.

1. Allocation by the TPR

This good practice was not allocated for Finland in Country specific findings report [2].

2. Country position

Country position and action, Fortum:

The need of performance checks for new or novel materials will be evaluated case by case and they will be included in the relevant maintenance, monitoring or inspection program.

Fortum has assessed the findings from TPR. Based on this assessment Fortum has not recognized any specific further actions.

Country position and action, TVO:

TVO does not use new pipeline materials. Materials used in TVO NPPs are traditional standard materials.

There are recognized needs for additional inspections for environmental reasons at NPP units OL1/OL2/OL3 plants’ pipelines. For example erosion inspections are done by UT and sea water system problems are inspected by opening components.

In pipeline systems hard surface welding can be mentioned as an example of new material compared to standard valve solutions. In this area TVO has recognized some findings and some repairs are ongoing at OL3. In case of scaling pumps and valves much bigger than normal, also a well known manufacturing process can be a part of the reason for findings. For example OL1/2 sea water pumps’ impellers’ sigma phase problem and OL3 large valves’ sealing surface cracks.

There is expected level of performance at TVO’s plants.

Country position and action, regulator STUK:

Finland was not given “Good practice” in Country specific findings report [2].

Only few instances of concealed pipework exists in Finnish NPPs. In case of any material changes to pipework in general, the suitability and performance verification is included as part of basic structural design practices. Therefore, STUK considers that no further actions are required.

5.2.3 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.

1. Allocation by the TPR

Finland was allocated "Good performance" in Country specific findings report [2].

2. Country position and action

Country position and action, Fortum:

There are only short segments of pipework concealed in the concrete. Such concealed pipework segments are in the scope of RI-ISI-program and pipeline condition monitoring program.

Fortum has assessed the findings from TPR. Based on this assessment Fortum has not recognized any specific further actions.

Country position and action, TVO:

Inspection programmes of piping are done using risk informed methods that covers all safety classes (1,2,3 and non nuclear). Concealed pipework has not been identified as significant regarding risk. However sections of concealed EDG pipelines has been inspected using guided wave technique that doesn't require direct access to the pipe. During maintenance activities of concealed piping, inspection points are added in a way that general degradation can be detected.

TVO considers that there is expected level of performance like the one described in section 6.2.3 of TPR report [1].

Country position and action, Regulator STUK:

In Finnish NPPs, full-scope RI-ISI is applied, according to regulatory guide YVL E.5, appendix R of the ASME section XI and the framework document for RI-ISI from ENIQ. This applies to all piping, including plastic, fiberglass, epoxy and rubber coated piping and flexible hoses and bellows as well. RI-ISI is applied to piping of all safety classes, including not safety classified piping. Thus, RI-ISI includes, for example, primary piping, secondary piping, CWCS piping, seawater piping, firewater piping, diesel oil piping, containment spray piping, etc.

The RI-ISI process has the following main steps:

1. Identification and screening of systems presenting risk in case of pipe failure (e.g. worst-case conditional core damage probability > 1E-6)

2. Identification of degradation mechanisms and segmentation of systems

3. Identification of pipe segments presenting risk

4. Selection of piping and welds for inspection.

5. Drawing up of inspection plan and methodology.

Typically in Finnish NPPs, approximately 100 systems have been analyzed in step 1, and 50 systems have been segmented for further detailed analysis. If it is found that pipe failure in a system has no safety significance, the system may be excluded from the scope of further analysis or RI-ISI inspections. Because concealed piping is rare and present only in not safety significant segments, therefore the systems and pipe segments which have been included in detailed analysis do not include concealed pipework.

For example, in Loviisa RI-ISI (2008, update 2018), all systems and media were included:

– Safety systems (emergency cooling-, heat removal-, fire protection systems etc.)

– Primary and secondary systems (primary piping, main steam lines, seawater cooling systems, etc.)

– Auxiliary systems (auxiliary water, waste water, pressurised air systems etc.)

– these systems contain water, steam, nitrogen, hydrogen, air, oil, chemicals and also empty systems are included

– more than 100 systems were screened and around 50 systems were selected to be included in failure categorization

Procedure description (methodology) for Loviisa 1 and 2 piping RI-ISI programme is described in licensee document LO1-K854-961-76, for OL1 and OL2 in licensee document 11740 and for OL3 in document NFPSS DC 1051, which has been accepted by STUK.

Finland’s allocation was “Good performance” in Country specific findings report [2].

STUK considers that there is no need for further actions.

5.3 Reactor pressure vessel

5.3.1 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.

1. Allocation by the TPR

This good practice was not allocated for Finland in Country specific findings report [2].

2. Country position

Country position and action, Fortum:

Shielding has been implemented with dummy/shieding fuel elements around the core at Loviisa NPP.

Fortum has assessed the findings from TPR. Based on this assessment Fortum has not recognized any specific further actions.

Country position and action, TVO:

Shield is not needed for BWRs like OL1/OL2. Shield is typically needed for PWRs like OL3. In OL3 a so-called "heavy reflector" is applied. This is an effective massive shield.

TVO considers that there is a good practice like the one described in section 7.2.2 of TPR report [1].

Country position and action, regulator STUK:

This good practice was not allocated for Finland in Country specific findings report [2].

Based on the above, STUK considers that there is no need for further actions.

5.3.2 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.

1. Allocation by the TPR

Finland was allocated "Good performance" in Country specific findings report [2].

2. Country position and action

Country position and action, Fortum:

There are no nickel base alloy penetrations in Loviisa NPP components.

This is not applicable for Fortum.

Country position and action, TVO:

Regarding PWSCC there are no inspection targets identified for BWRs (OL1/OL2). Nickel based alloy sensitivity at BWR for IGSCC defines inspection targets for OL1 and OL2. These inspections are done using state of the art phased array ultrasonic technique and eddy current technique when required. At the time of writing these comments the start of operation of OL3 has not yet been done. All penetrations are added to ISI programme according ASME Section XI including closure head J-groove welds. Also degradation potential is analyzed and inspection methods developed accordingly.

TVO considers that there is expected level of performance like described in section 7.2.3 of TPR report [1].

Country position and action, regulator STUK:

Finland was allocated "Good performance" in Country specific findings report [2].

Based on the above, STUK considers that there is no need for further actions.

5.3.3 TPR expected level of performance: Environmental effect of the coolant

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

1. Allocation by the TPR

Finland was allocated "Good performance" in Country specific findings report [2].

2. Country position and action

Country position and action, Fortum:

Environmental effects of the coolant have been taken into account in the fatigue analyses.

Fortum has assessed the findings from TPR. Based on this assessment Fortum has not recognized any specific further actions.

Country position and action, TVO:

This has already been done for OL1/OL2/OL3 piping systems.

Fatigue analyses of piping systems of OL1/OL2 have been updated to address also environmental effects of the coolant. For OL3 environmental effects have been considered already from the beginning of the project.

TVO considers that there is expected level of performance like described in section 7.2.2 of TPR report [1].

Country position and action, Regulator STUK:

Finland was allocated "Good performance" in Country specific findings report [2].

Based on the above, STUK considers that there is no need for further actions.

5.3.4 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.

1. Allocation by the TPR

Finland was allocated "Good performance" in Country specific findings report [2].

2. Country position and action

Country position and action, Fortum:

There are suitable and sufficient amount of irradiation specimens available.

Fortum has assessed the findings from TPR. Based on this assessment Fortum has not recognized any specific further actions.

Country position and action, TVO:

The OL1/OL2 irradiation surveillance program is approved by the Regulator STUK. The program concerns several capsules of surveillance specimens located inside the RPV. Periodically capsules are retrieved and the specimens tested to measure the effect of irradiation on material properties.

For OL3 the amount of capsules is chosen so that there are enough capsules for surveillance specimens for 60 years. Program "Reactor pressure vessel irradiation surveillance program FFP NFPMR DC 1042 rev. C" has been accepted by STUK. In summary, totally 330 specimens (264 Charpy V-notch + 30 tension + 36 CTJ) destined for initial tests are supplied to the Utility before plant start-up. Totally 720 specimens (432 Charpy V-notch + 108 tension + 180 CTJ) destined for the post irradiation tests are placed in 6 irradiation capsules. In addition, another set of 86 specimens is necessary to determine initial RTNDT (54 Charpy V + 32 Pellini)."

TVO considers that there is expected level of performance like described in section 7.2.2 of TPR report [1].

Country position and action, regulator STUK:

Finland was allocated "Good performance" in Country specific findings report [2].

Based on the above, STUK considers that there is no need for further actions.

5.4 Concrete containment structure and pre-stressed concrete pressure vessel

5.4.1 Good practice: monitoring of concrete structures

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

1. Allocation by the TPR

This good practice was not allocated for Finland in Country specific findings report [2].

2. Country position

Country position and action, Fortum:

Monitoring of concretes are conducted by visual and NDE inspections. There is no need for complementary instrumentation because the containment is made of the steel.

Country position and action, TVO:

Monitoring system of OL3 includes several alternative measurements (big number of embedded strain gauges, pendulums, load cells, optical strain gauges).

TVO considers that there is a good practice like the one described in section 8.2.2 of TPR report [1].

Country position and action, Regulator STUK:

This good practice was not allocated for Finland in Country specific findings report [2].

This finding is not applicable for licensee Fortum, because the containment material is steel.

Based on licensee's (TVO) answer, STUK considers that the good practice as stated in this chapter is fulfilled.

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

1. Allocation by the TPR

This good practice was not allocated for Finland in Country specific findings report [2].

2. Country position

Country position and action, Fortum:

Assessment of the supporting structures of RPV has been done by testing the representative material samples taken from the same structure but from accessible locations.

Fortum has assessed the findings from TPR. Based on this assessment Fortum has not recognized any specific further actions.

Country position and action, TVO:

The subject has been considered in the design and construction phase as far as possible. The possible inspection/assessing methods could be further evaluated in AMPs for concrete structures.

TVO considers that there is a good practice like the one described in section 8.2.2 of TPR report [1].

Country position and action, Regulator STUK:

Inaccessible and/or limited access structures are identified in the relevant AMPs. According to guide Y-05-00005 (referred in NAR p. 77) for Loviisa 1 and 2, guides AMP107835 and AMP103459 (ref. in NAR p. 80, 82) for Olkiluoto 1 and 2, the inspection scope includes all containment rooms and frequency is based on safety significance. Licensee guides for OL3 will be unified with the guides for OL1 and OL2 (ref. in NAR p. 84). Inspections of rooms containing high radiation conditions are performed in co-operation with radiation protection personnel. Additionally, e.g. OL3 inner containment concrete surface is inaccessible for inspections/monitoring because of the leak-tight steel liner, which has been considered already in design phase and effects of ageing were evaluated. All pool structures (with steel liner) in Finnish NPPs contain leak-detection systems.

This good practice was not allocated for Finland in Country specific findings report [2].

However, STUK considers that other methods presented in this chapter and NAR of Finland are adequate and there is no need for further actions.

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.

1. Allocation by the TPR

Finland was allocated "Good performance" in Country specific findings report [2].

2. Country position and action

Country position and action, Fortum:

There are no pre-stressed concrete structures in Loviisa NPP. Not applicable for Fortum.

Country position and action, TVO:

The tendons are grouted in OL1/OL2 and OL3 with exception of four tendons in OL3, directly monitored by load cells. The level of pre-stressing is assessed by means of different measurements (embedded strain gauges, pendulums and in OL3 also load cells). Especially monitoring of containment behavior during periodical ISI tests (tightness test under LOCA pressure) gives relevant information from the level of pre-stressing.

TVO considers that there is expected level of performance like the one described in section 8.2.3 of TPR report [1].

Country position and action, regulator STUK:

Finland was allocated "Good performance" in Country specific findings report [2].

STUK considers that there is no need for further actions.

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 Finland, there is one TRIGA Mark II research reactor (250 kW), FiR 1, situated in Otaniemi Campus area, Espoo. The research reactor was taken into operation in 1962, and it is operated by VTT Technical Research Centre of Finland Ltd (VTT). In 2012, VTT decided to commence the activities related to the planning of the decommissioning of the research reactor due to economical reasons. The reactor was permanently shut down in the end of June 2015. VTT applied operating license for the decommissioning phase in June 2017. STUK gave its statement about VTT's application to the Ministry of Economic Affairs and Employment in April 2019. After this the first license application for decommissioning phase in Finland will proceed to the Government for the decision making process. This will be the first decommissioned nuclear facility in Finland. This reactor is not in the scope of this TPR process due to its low thermal power.

The AMP of FiR 1 research reactor determines ageing management practices of its systems structures and components. STUK has approved the program by the decision 1/F42213/2013, 10.6.2013. The AMP has been followed while the research reactor has been in permanent shut down phase and its condition will be monitored according to approved program until decommissioning phase. After that the present program will not be followed any longer. In its decision STUK has required VTT to deliver a description on the condition of ageing management before starting of dismantling. The systems structures and components needed during dismantling have to be shown to STUK and also procedures assuring their serviceability like preliminary inspections.

Ageing management of a nuclear power plant is regulated in section 5 of regulation STUK Y/1/2018 as follows:

1. The design, construction, operation, condition monitoring and maintenance of a nuclear facility shall provide for the ageing of systems, structures and components important to safety in order to ensure that they meet the design-basis requirements with necessary safety margins throughout the service life and decommissioning of the facility.

2. Systematic procedures shall be in place for preventing such ageing of systems, structures and components which may deteriorate their availability, and for the early detection of the need for their repair, modification and replacement. Safety requirements and applicability of new technology shall be periodically assessed in order to ensure that the technology applied is up to date, and the availability of the spare parts and the system support shall be monitored.

As a conclusion it can be stated that ageing management of FiR 1 research reactor is implemented according to STUK Y/1/2018 section 5.

7 REFERENCES

[1] European Nuclear Safety Regulator's Group - ENSREG - 1st Topical Peer Review Report - "Ageing Management" October 2018

[2] European Nuclear Safety Regulator's Group - ENSREG - 1st Topical Peer Review - "Ageing Management" – Country specific findings October 2018

GUIDES AND STANDARDS RELATING TO AGEING MANAGEMENT

ASME Boiler & Pressure Vessel Code, Section III: Rules for Construction of Nuclear Facility Components-Division 2-Code for Concrete Containments

ASME Boiler & Pressure Vessel Code, Section XI: Rules for In-service Inspection of Nuclear Power Plant Components

IAEA Safety Reports Series No. 82, Ageing Management for Nuclear Power Plants: International Generic Ageing Lessons Learned (IGALL)

IAEA Safety Reports Series No.57, Safe Long Term Operation of Nuclear Power Plants, 2008

IAEA Safety Standards Series No. NS-G-2.6, Safety Guide, Maintenance, Surveillance and In-Service Inspection in Nuclear Power Plants, Vienna, 2002

IAEA Safety Standards Series No. NS-G-2.12 Ageing Management for Nuclear Power Plants

IAEA Safety Standards, Specific Safety Guide No. SSG-13, Chemistry Programme for Water Cooled Nuclear Power Plants

IAEA Nuclear Energy Series No. NP-T-3.13, Stress Corrosion Cracking in Light Water Reactors: Good Practices and Lessons Learned

NUREG-1801, Rev. 2, Generic Aging Lessons Learned (GALL) Report (Volumes 1 and 2), U.S. Nuclear Regulatory Commission, 2010

STUK Regulation on the Safety of a Nuclear Power Plant (STUK Y/1/2018)

STUK – Guide YVL 3.8: Nuclear Power Plant Pressure Vessel In-service Inspection with Non-Destructive Testing Methods, 22.09.2003

STUK – Guide YVL A.8: Ageing management of a nuclear facility, 20 May 2014

STUK – Guide YVL E.4: Strength analysis of nuclear power plant pressure equipment, 15 November 2013

STUK – Guide YVL E.5: In-service inspection of nuclear facility pressure equipment with non-destructive testing methods, 20 May 2014

STUK – Guide YVL E.6: Buildings and structures of a nuclear facility, 15 November 2013

STUK – Guide YVL E.7: Electrical and I&C equipment of a nuclear facility, 15 November 2013

US NRC Regulatory Guide 1.207, Guidelines for Evaluating Fatigue Analyses Incorporating the Life Reduction of Metal Components due to the Effects of the Light-Water Reactor Environment for New Reactors, U.S. Nuclear Regulatory Commission, 2007

8 TABLE: SUMMARY OF THE PLANNED ACTIONS

This table contains the planned actions for each reactor in Finland, the associated deadlines and the monitoring process by the national regulator, STUK. The table should contain sufficient details to facilitate the follow-up process.

Installation	Thematics	Finding	Planned action	Deadline	Regulator's Approach to Monitoring
Loviisa 1, Loviisa 2, Olkiluoto 1, Olkiluoto 2	Chapter 2.1 Self assessment, Overall Ageing Management Programmes (OAMPs)	Ageing management of Finnish NPPs should be developed so that individual SSCs or SSC groups of NPP are itemized for ageing management purposes covering all safety classified SSCs, and that necessary actions to these individuals or groups are clearly specified, such as regular maintenance, condition monitoring, qualification, risk of obsolescence and spare part procurement.	Based on the previous mentioned scoping/grouping of SSCs, licensees should report on long-term trends in defects/failures, present operability, validity of qualifications etc. The revised ageing management programs of both Finnish licensees are to be issued by the end of 2019.	30.4.2020	The country action on the finding from the self-assessment is to review the updated ageing management programs of the licensees during the first third of 2020.

Olkiluoto 3	Chapter 2.5 Self-assessment, Concrete containment structure and pre-stressed concrete pressure vessels	OL3 plant supplier's (AREVA) in-service inspection plan for civil structures is described in NAR chapter 7.1.3. The AMP and maintenance guides of the licensee (TVO) for OL3 were in development during NAR process.	Licensee (TVO) has finished the update of inspection and maintenance guide for civil structures, which now covers also OL3 NPP. These AMP guides have been submitted to STUK and a decision will be finalized before fuel loading.	Before fuel loading	STUK oversees the fulfillment of requirements through follow-up and periodic inspections.
Loviisa 1, Loviisa 2	Chapter 3.1 Overall Ageing Management Programmes (OAMPs), Delayed NPP projects and extended shutdown	In terms of ageing management Fortum has not provided for extended periods when his NPP unit is out of service.	Fortum shall identify SSCs which are exposed to various degrading mechanisms during long plant outages, and specify actions to monitor, prevent or mitigate ageing in such SSCs.	31.12.2021	Fortum to prepare for STUK's review an AMP dedicated to extended periods when his NPP unit is out of service.
Olkiluoto 1, Olkiluoto 2	Chapter 3.1 Overall Ageing Management Programmes (OAMPs), Delayed NPP projects and extended shutdown	In terms of ageing management TVO has not provided for extended periods when his NPP unit is out of service.	TVO shall identify SSCs which are exposed to various degrading mechanisms during long plant outages, and specify actions to monitor, prevent or mitigate ageing in such SSCs.	31.12.2021	TVO to prepare for STUK's review an AMP dedicated to extended periods when his NPP unit is out of service.

Olkiluoto 1, Olkiluoto 2	Chapter 4.2 TPR expected level of performance: documentation of the cable ageing management program	Up to this date ageing management of electrical cables of OL1/OL2 NPP has been defined in the general AMP for all SSCs. TVO is preparing separate AMP document for cables.	TVO prepares separate AMP document for cables.	31.12.2019	STUK will review development progress or finished document at the latest by the end of 2019.