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Topical Peer Review

Overall ageing management programs - OAMP

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OUTLINE

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- Introduction
- Description of present situation of NPPs and RR across Europe
- Self - assessment of Ageing Management Programs in countries
- Findings
- Conclusions

Introduction

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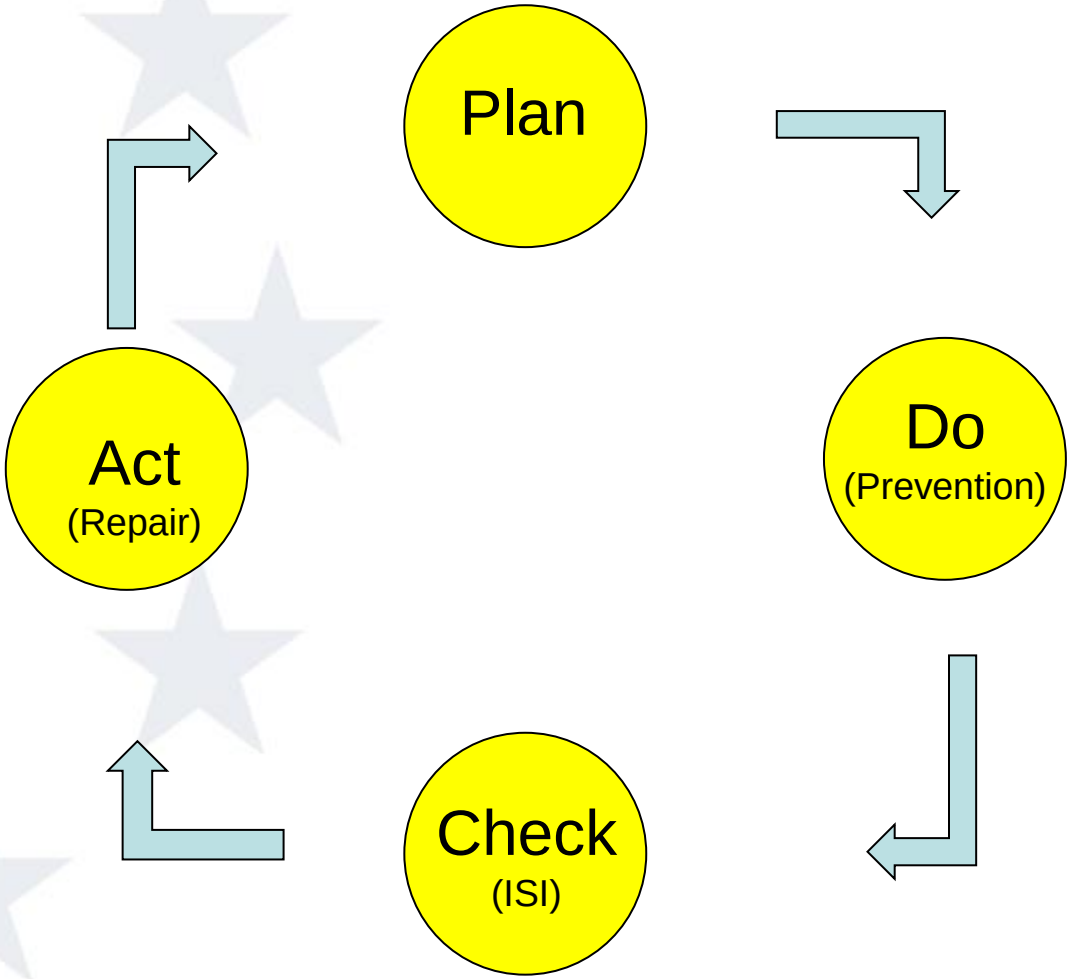
Features/ attributes of an effective AMP (IAEA) during lifecycle of a NPP

1. Scope of the ageing management program (SSC subject to)
2. Preventive actions to minimize and control ageing effects (pro active approach)
3. Detection of ageing effects (e.g. in service inspection (ISI), maintenance of SSC , monitoring etc.)
4. Monitoring and trending of ageing effects (e.g. comparison against acceptance criteria)
5. Mitigating ageing effects (e.g. environmental control, better materials, weldings)
6. Acceptance criteria (based on design basis with margins)
7. Corrective actions (e.g. repair or replacement)
8. Operating experience feedback and feedback of research and development results (e.g. within users groups)
9. Quality management (e.g. administrative control - documentation)

Introduction

Systematic approach to managing the effects of ageing



Introduction

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Country review group focusing on OAMPs

- 8 Experts + 4 Rapporteurs + Project Manager
- From 12 nationalities

- Review of the National Assessment Reports and the adequacy against the WENRA TS.
- Each NAR reviewed by two experts and rapporteur (not from their own country)
- Number of questions on OAMPs : 628
- Number of areas (findings) to be reviewed during the May workshop : 14

Description of present situation of NPPs across Europe

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1. Legal basis and regulatory oversight

- Regulatory framework is based on:
  - main legislative/formally binding documents (laws, regulations)
  - specific regulatory decisions, authorizations etc.
  - subsequent implementing documents (e.g. guides, etc.)
- These documents are based on internationally accepted safety standards e.g.: IAEA, ISO , ASME, CSA, ASTM, ANSI, IEEE. IEC, WENRA RL etc. :
  - IAEA Safety Guide NS-G-2.12 “Ageing management”
  - SRS No. 57 “Safe Long Term Operation of Nuclear Power Plants”
  - USNRC NUREG series etc.

Description of present situation of NPPs across Europe

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2. Overall approach to ageing management

- All countries implement a proactive AMP at NPPs;
- AMPs are being implemented for a specific type of NPP or even for a specific unit;
- Regulator´s require to implement an effective and systematic AMPs in which coordination, traceability and experience feedback are important elements;
- The regulator requires that the licensee(s) updates the AMP during PSR or whenever deemed necessary e.g. LTO;
- The ageing management of research reactors is in majority of cases not formalised and is not as comprehensive as for NPPs

Description of present situation of NPPs across Europe

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3. Licensees' AMP experience and application practice

- The licensees AMPs of the NPPs were originally based on vendor´s and manufacturers documentation/recommendations;
- Integrate separate maintenance, surveillance and inspection programs into an integrated ageing management process for SSC of the plant ;
- In several countries licensees are obliged to notify the regulator on modifications to an existing AMP which derive from e.g. operating experience, state-of-the-art science and technology etc;
- All NARs state that the overall AMPs for NPPs meet national requirements and international safety standards and is considered sufficiently comprehensive and adequate.

Self - assessment of Ageing Management Programs in Countries

4. Self Assessments resulted in the country specific findings

In the NARs, almost all countries reported findings (good practices, challenges and areas for improvement) on OAMPs, which were presented during the workshop. These findings included:

- Improvement of existing performance indicators in support of an effective OAMP,
- Harmonization of AMPs between licensees (where more than one licensee exists),
- Regular update and where necessary expansion of the scope of the licensee´s information systems/databases for AM,
- Implementation of an AMP at NPPs under construction,
- Initiatives to develop a more comprehensive AMP for research reactors in accordance with international safety standards e.g. IAEA Safety Standards.

These findings have been identified by the licensees or regulators during the preparation of their NARs. Some countries already reported on the progress achieved in the implementation of some of these findings.

Peer Review findings on AMPs - overall

Based on the discussions during the workshop the following overall findings were identified

1. Organization of internal oversight of the licensee
2. Data collection and record keeping, operation of databases to support AM processes
3. Methodology for scope setting of SSC subject to AM
4. Effectiveness of the AMP and the use of performance indicators (e.g. programmatic performance indicators, numerical – parametric – indicators)
5. AMPs of delayed NPP projects
6. AMP for research reactors -graded approach.

Findings on OAMPs

1.Organization and oversight of AM at NPPs

- Several countries are arranging peer reviews of the licensee´s AMPs by external entities to obtain an independent assessment of whether the OAMPs are consistent with IAEA Safety Standards and generally accepted practices to identify areas for improvement.

Good practice: External peer review services (e.g. SALTO, OSART-LTO, INSARR-Ageing) are used to provide independent advice and assessment of licensees' ageing management programmes. Good practice: the use of external peer review services to review licensee´s ageing management e.g. SALTO, OSART-LTO

Findings on OAMPs

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2. Data collection and record keeping, operation of databases to support AM processes at NPPs

- The NPPs licensee´s AMPs are usually based on the vendor documentation. A continuous update of the documentation is identified as important;
- For this purpose, countries use internal and external operating experience databases e.g. reports from WANO, IAEA - IRS system, etc and participate in relevant networks, users groups and projects (i.e. FRAMATOME Regulators association, VVER Regulator´s Forum or IAEA IGALL etc.);
- Countries were encouraged to share results of their R&D and to use existing R&D instruments available within the Euratom research program;

Expected level of performance: 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.

Findings on OAMPs

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3. Scope of SSCs subject to AM of NPPs

- The peer review noted that countries have different approaches to determine which SSCs are subject to ageing management
- The peer review concluded that OAMP should apply to all safety significant SSCs including:
  - SSCs necessary to fulfil the fundamental safety functions
  - Other SSCs whose failure may prevent previous SSCs from fulfilling their intended safety functions.
- After the new IAEA Safety Standard (Specific Safety Guide on Ageing and Development of a Program for Long term Operation of Nuclear Power Plants) is published, countries should analyse whether their approach to scoping of SSCs complies with the new IAEA Safety Standard.

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

Findings on OAMPs

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4. Long outages and delayed NPP projects

- The time period from start of construction to operation may be relatively long, in particular if unexpected delays occur in the project. A few countries emphasized the importance of raising awareness of this possibility and implementing an effective OAMP during construction for ensuring the original capabilities of safety significant SSCs are preserved for future operation.
- This is also valid in the case of extended shutdown at operating NPPs. An extended outage can be unplanned, but also planned outages may be significantly extended beyond their intended duration. Both circumstances can lead to the need to manage ageing including new or different ageing mechanisms or effects.
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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.

Findings on OAMPs

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5. AMP for research reactors.

- Each research reactor covered by the NARs is specific and unique by the design, age, purpose etc.
- In several cases the NARs stated that the OAMP is not systematically implemented by the research reactor licensees, nor sufficiently formalised.
- When such a programme exists, the requirements have been developed for example on the basis of the IAEA Specific Safety Guide No. SSG-10: Ageing Management for Research Reactors and IAEA-TECDOC-792: Management of research reactor ageing.
- WENRA has already initiated activities to establish SRLs for research reactors, including their ageing management.

Expected level of performance: **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.**

Findings on OAMPs

6. *Effectiveness of the OAMP and the use of p*erformance indicators .

- There are a variety of approaches in countries to evaluate the effectiveness of the OAMPs including the use of indicators and other tools such as internal audits.
- Performance indicators might be established at component level, system level and plant level. (e.g. programmatic performance indicators, numerical – parametric – indicators)
- Some countries reported on development and the use of performance indicators such as:
  - preventive and corrective maintenance efforts (e.g. in terms of person-years or cost)
  - number of recurrent failures and occurrences of degradation, etc.

Challenge: Indicators are considered important for the evaluation of the effectiveness of the OAMPs but no unified approach is available. Further development of improved performance indicators or other appropriate tools would enable consistent evaluation of the effectiveness of the OAMPs among NPPs.

Conclusions

- NARs outlined the essential technical, procedural and organizational provisions for ageing management
- The AMPs in their forms, content and implementation are varying across Europe mostly due to NPPs different design features, their age, and regulatory framework ,
- Despite the differences identified the AMPs are considered by the national regulators as adequate and in compliance with national requirements and international safety standards and practices
- The need for a comprehensive AMP has been recognized by both the regulators and the licensees , licensees should review their AMP in view of the anticipated LTO,
- The ageing management of research reactors generally not as formalized as for NPPs

Conclusions

- All countries recognize the benefit of participating in international cooperation and experience sharing networks through e.g. expert missions or IGALL activities
- The comparison of different approaches and experiences in the implementation of AMPs across Europe contribute to a high level of nuclear safety .

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Thank you for your attention

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Abbreviations

ASME - American Society of Mechanical Engineers
ASTM - American Society for Testing and Materials
ANSI - American National Standards Institute
CSA - Canadian Standards Association
IEC - International Electrotechnical Commission
IGALL - International Generic Ageing Lessons Learned
IAEA - International Atomic Energy Agency
LTO - Long term operation
NAR - National assessment report
NPP(s)- Nuclear power plant(s)
SSC - Systems structures and components
OAMP - Overall ageing management program(s)
WANO – World Association of Nuclear Operators
WENRA- Western European Nuclear Regulators Association