1st Topical Peer Review
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Brussels

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PM, Concrete Containment and PCPV structures
OUTLINE

- Scope of the Thematic Group
- Review Process
- Workshop outcomes
- Conclusions
1st Topical Peer Review: Scope

- Irreplaceable concrete structures
- The structure of the TS applies to both the concrete containment structures and the PCPVs
- Scope

Concrete structure itself
- Concrete structure that surrounds the preceding or a steel containment
1st Topical Peer Review: Review Process 1/2

- Thematic review group: Concrete Containment and PCPV
- 9 Experts + Rapporteur + Project Manager
- From 10 nationalities
- From different backgrounds
  - Regulator
  - TSO
  - Independent engineering consulting company
- Review of the National Assessment Reports and the adequacy against the WENRA TS.
- Each NAR reviewed by at least two experts (not from their own country)
1st Topical Peer Review: Review Process 2/2

Concrete Containment and PCPVs

155 Findings identified by experts

- Repetition
- Clarifications
- No Relevant

Finding contest
Experts

9 findings

- Experts Request
- Engineering
  Judgement
1st Topical Peer Review: Workshop Outcomes

- Comments and remarks that fed the TPR report. See conclusions.
- Some preliminary findings were screened out during the workshop. Not considered common issues.
- Finally 4 findings were identified:
  - Good Practice: Monitoring of concrete structures.
  - Good Practice: Assessment of inaccessible and/or limited access structures.
  - Expected level of performance: Monitoring of pre-stressing forces.
  - Challenge: Acceptance criteria for the degradation mechanism.
Monitoring of concrete structures

- Monitoring the concrete structures helps to better predict the mechanical behavior and also verify the analytical models developed.
- The installation of additional instrumentation may compensate for the loss of the sensors.
- The additional instrumentation may measure the same physical parameters as the embedded sensors.

**Good practice:** 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.
Assessment of inaccessible and/or limited access structures

- Ageing of inaccessible structures could potentially lead to severe latent degradation in concrete structures.
- Structural modifications during the life of an NPP may provide opportunities to access formerly inaccessible parts of the structure.
- Regulatory guides to address inspections and monitoring of inaccessible and limited access structures

**Good practice:** A proactive and comprehensive methodology is implemented to inspect, monitor and assess inaccessible structures or structures with limited access
Monitoring of pre-stressing forces

- The tendon tension has to be carefully monitored due to its significance for the containment function.
- Whatever the technology, pre-stressing forces should be monitored on a periodic basis to ensure the containment fulfils its safety function.

Expected level of performance: Pre-stressing forces are monitored on a periodic basis to ensure the containment fulfils its safety function.
Acceptance criteria for the degradation mechanism

- Both quantitative and qualitative criteria exist
- Some countries reported difficulties in defining objective and comprehensive acceptance criteria for ageing management of concrete structures

**Challenge:** It is difficult to define objective and comprehensive acceptance criteria for ageing management of concrete structures. The development of such criteria for a number of degradation mechanisms would improve the effectiveness of the AMPs
No major differences in the regulatory basis for safety assessment, and regulatory oversight of concrete containment structures.

The specific AMPs are generally well established, and result in implementation of periodic monitoring, inspections, testing, surveillance, preventive and corrective maintenance activities of concrete structures.

Ageing degradation mechanisms for concrete structures are well known and are covered by extensive comprehensive documents.

Concerning PCPVs, the TPR concluded that the findings mentioned above are also applicable to PCPVs and made no specific findings for PCPVs.

Concerning research reactors, the review of NARs has found that some AMPs need further development.
Thank you for attention
1st Topical Peer Review: List of acronyms

- AGR- Advanced Gas-cooled Reactor
- AMP- Aging Management Program
- BWR- Boiling Water Reactor
- CANDU- CANada Deuterium Uranium
- NAR- National Assessment Report
- NPP- Nuclear Power Plant
- PCPV- Prestressed Concrete Pressure Vessel
- PWR- Pressurized Water Reactor
- R&D- Research and Development
- SSC- Structures Systems and Components
- ToR- Terms of Reference
- TPR- Topical Peer Review
- TSO- Technical Safety Organization
- TS- Technical Specification
- VVER- Water-Water Energetic Reactor