



Strål  
säkerhets  
myndigheten

Swedish Radiation Safety Authority

# Winter 2020 International Workshop on

## Age-Related Degradation of Cables

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### Thematic presentation of Electrical cables in Sweden

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# Electrical Cables Presentation Outline

1. Historical overview for EU-TPR
2. Electrical cables AMP's implementation on NPP reactors
3. Electrical cables questions raised from the Topical Peer Review Process
4. Conclusions : findings, good practices, challenges, and areas of improvement



# Historical overview for TPR

- 2014/87 / EURATOM
- ENSREG
  - European Nuclear Safety Regulators Group
- WENRA
  - Western European Regulators Association
- TPR comprises three phases
  - National assessment
  - Peer Review
  - Follow-up



## **Licensees' implementation of the Electrical cables AMP on NPPs and SSM's assessment (1/3)**

- The scope of the AMP of electrical cables used by the Swedish licensees cover electrical cables included in SSCs important to nuclear safety, which includes:
  - SSCs important to safety that are necessary to fulfil the fundamental safety functions
  - Other SSCs whose failure may prevent SSCs important to safety from fulfilling their intended functions.
  
- Identification of ageing mechanisms
  - FORS-AMPs common gross list (Good practice)
  
- Ageing assessment
  - Qualified lifetime
  - Ageing effects and stressors



## **Licensees' implementation of the Electrical cables AMP on NPPs and SSM's assessment (2/3)**

- The licensee apply various methods for monitoring, testing, sampling and inspection activities for electrical cables. Some cables are continuously monitored.
  
- Preventive and remedial actions
  - Measurement of insulation resistance
  - Continuous monitoring (cables routed in closed trays, embedded)
  
- The AMPs does not always deal with ageing issues, instead the licensee waits until the cables are degraded and must be replaced through remedial actions



## **Licensees' implementation of the Electrical cables AMP on NPPs and SSM's assessment (3/3)**

- SSM concludes that the
  - use of qualified lifetime as a basis of maintenance might be an applicable method but the utilities have to consider if there are any hot spots.
  - cooperation between utilities is very important to understand and learn more about degradations mechanisms.
  - aim of the AMP is to deal with ageing's issues, which means to be proactive and not waiting until the cables are degraded and must be replaced through remedial actions.
  - experience of the application of AMPs for electrical cables is very important to modify the maintenance programme if needed, but also to perform constantly improvement regarding scope, methodology and frequency of existing AMP to ensure fulfilment of the objectives related to AMP.



## 4. Questions raised by the Topical Peer Review Process

- ➔ SSM received 20 questions on the national report regarding in general:
  - Requirements
  - Guidelines
  - cooperation between sites
  - evaluation methods
  - inspection and testing intervals.



## 5. Overall assessment and general conclusions

- SSM concludes that the Swedish licensees each have compiled an AMP that encompasses Electrical cables.
  
- Good practice
  - FORS-AMPs grosslist
  
- General areas for improvements in the Electrical cables AMP are about
  - acceptance criteria
  - identified ageing mechanisms
  - environment conditions and hotspots
  - Cooperation between sites





**Thank you for your attention**