

# Elements of an Aging Management Program (AMP)

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# Regulatory Basis



- **10 CFR 72.42(a), 72.240(c):**
  - TLAAs that demonstrate that ITS SSCs will continue to perform their intended function for the period of extended operation.
  - A description of the AMP for management of issues associated with aging that could adversely affect ITS SSCs.
- **Guidance: NUREG-1927 AMP Elements:**

1. Scope of the Program	6. Acceptance Criteria
2. Preventive Actions	7. Corrective Actions
3. Parameters Monitored/Inspected	8. Confirmation Process
4. Detection of Aging Effects	9. Administrative Controls
5. Monitoring and Trending	10. Operating Experience
- **Increased efficiency and reduced number/rounds of Requests for Additional Information with complete AMPs**

# AMP Elements

## 1. Scope of the Program

*NUREG-1927: The scope should include the specific SSCs subject to an AMR*

- Component and subcomponent
- Material of construction
- Environment
- Aging mechanisms for material/environment combination
- Aging effects corresponding to the aging mechanism

## 2. Preventive Actions

*NUREG-1927: Preventive actions should mitigate or prevent the applicable aging effects*

- Actions to minimize, control, or prevent the degradation mechanism  
(e.g. peak cladding temperatures below ISG-11, rev. 3 limit during drying)

# AMP Elements

## 3. Parameters Monitored or Inspected

*NUREG-1927: Parameters monitored or inspected should be linked to the effects of aging on the intended functions of the particular structure and component*

- Parameters (e.g. cracking, loss of material, temperature, fluence, etc.)
- Location (e.g. at highest heat location, at 1 m from cask)

## 4. Detection of aging effects

*NUREG-1927: Detection of aging effects should occur before there is a loss of any structure and component intended function*

- Method/technique (e.g. visual, volumetric, and/or surface inspections or surveys)
  - Justification & qualification that technique can achieve proposed acceptance criteria for detecting potential aging effects to be monitored or inspected
- Frequency of inspection (e.g. inspection intervals)
- Sample size (dependent on operational experience trending)
- Data collection (clearinghouse for operational experience)
- Timing (new or one-time inspections)

# AMP Elements

## 5. Monitoring & Trending

***NUREG-1927:** Should provide for prediction of the extent of the effects of aging and timely corrective or mitigative actions*

- Assess effects per prior inspections and industry-wide operational experience
- Track trending of aging effects (e.g. corrosion rate, crack growth rate, etc.)

## 6. Acceptance Criteria

***NUREG-1927:** Acceptance criteria, against which the need for corrective action will be evaluated, should ensure SSC intended function is maintained under the existing licensing-basis design conditions during the renewal period*

- Criteria for evaluating inspection results for operable aging effects
- Domestic and International consensus codes and standards, or previously used criteria if relevancy is justified and established
- Technical basis for these criteria should be provided
- Separate criteria should be provided for each aging effect

# AMP Elements

## 7. Corrective Actions

*NUREG-1927: Corrective actions, including root cause determination and prevention of recurrence, should be timely*

- **CAP commensurate with 10 CFR 71 Subpart G, or 10 CFR 50 Appendix B**
- Maintenance plans, corrective actions for the specific degradation effects (e.g. repair, replacement, mitigation activities, and extent of condition)
  - Actions to prevent reoccurrence
  - Justification for repair, replace, and/or mitigate deferral
  - Analysis of how action may affect other subcomponents
- Consideration of corrective actions on other components
- Plans for OE incorporation into the remediation plan

## 8. Confirmation Process

*NUREG-1927: Confirmation process should ensure that preventive actions are adequate & appropriate corrective actions have been completed & are effective*

- **QA Program consistent with 10 CFR 72 Subpart G, or 10 CFR 50 Appendix B**
- Method to confirm actions required are taken
- Follow up action to determine success (e.g. effectiveness of repair)

# AMP Elements

## 9. Administrative Controls

*NUREG-1927: Administrative controls should provide a formal review and approval process*

- CAP commensurate with 10 CFR 71 Subpart G, or 10 CFR 50 Appendix B
- Inspector requirements
- Record retention requirements
- Review process of examination results
- Frequency/methods for reporting inspection results to NRC
- Frequency for updating AMP based on industry-wide operational experience

## 10. Operating Experience

*NUREG-1927: Include past corrective actions resulting in program enhancements; objective evidence to support a determination that the effects of aging will be adequately managed so that the structure and component integrity functions will be maintained during the period of extended operation*

- Provide specific industry-wide operational experience that supports the use of an examination method, inspection frequency, and/or inspection criteria

# Path Forward

- Staff developed generic AMP guidance for specific near-term aging effects:
  - Fuel performance
  - Concrete
  - Polymer-based neutron shielding