

Elements of an Aging Management Program

**Division of Spent Fuel Storage and Transportation
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission**

**Meeting to Discuss the Request for Additional Information
Responses Regarding the Calvert Cliffs Independent Spent
Fuel Storage Facility License Renewal
July 17, 2014**

Regulatory Basis

- **10 CFR 72.42(a), 72.240(c):**
 1. TLAAAs that demonstrate that ITS SSCs will continue to perform their intended function for the period of extended operation.
 2. 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
- **For in-scope SSCs, detailed AMPs addressing the 10 elements lead to efficient staff reviews and effective management of aging effects**

AMP Element 1: Scope of the Program



NUREG-1927: The scope of the program should include the specific structures and components subject to an AMR

- **Identifies:**
 - In-scope components and subcomponents
 - Materials of construction
 - Service environment
 - Aging mechanisms for material/environment combination
 - Aging effects associated with each aging mechanism

AMP Element 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. NRC-endorsed criteria (peak cladding temperatures below ISG-11, rev. 3 limit during drying), consensus codes and standards, etc.**

AMP Element 3: Parameters Monitored/ 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

- **Identifies:**
 - Parameters (e.g. cracking size monitoring, rate of material loss, temperature, neutron fluence, etc.)
 - Location(s) to be monitored or inspected (e.g. at highest heat location, neutron fluence at 1 m from cask)
- **Learning/Proactive/Responsive AMP:**
 - Operational experience and other quality data (tollgates)
 - Informs parameters monitored/inspected (tiered approach)

AMP Element 4: Detection of Aging Effects



NUREG-1927: Define method or technique, frequency, sample size, data collection, and timing to ensure timely detection of aging effects

- **Identifies:**
 - Method/technique (e.g. visual, volumetric, and/or surface inspections or surveys)
 - Frequency of inspection (e.g. inspection intervals)
 - Sample size (dependent on operational experience trending)
 - Calibration of equipment
 - Data collection (clearinghouse for operational experience)
 - Timing (new or one-time inspections, time of year)
- **Learning/Proactive/Responsive AMP:**
 - Operational experience and other quality data (tollgates)
 - Consensus codes and standards
 - Informs methods/techniques for detecting aging effects/mechanisms (tiered approach)

AMP Element 5: Monitoring & Trending



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

- **Trending of aging effects (e.g. corrosion rate, crack growth rate, etc.)**
- **Assess effects per prior inspections and industry-wide operational experience**
- **Learning/Proactive/Responsive AMP:**
 - Operational experience and other quality data (tollgates)
 - Informs monitoring and trending

AMP Element 6:

Acceptance Criteria



NUREG-1927: Acceptance criteria, against which the need for corrective action will be evaluated; should ensure that SSC functions are maintained

- **Criteria for inspections, assessing aging effects, and decision-making**
- **Establish technical basis for specific acceptance criteria**
- **Domestic and international consensus codes and standards whenever practicable, or previously justified and established criteria**
- **Separate criteria should be provided for each aging effect**
- **Alternative criteria may be used if justified:**
 - Supporting technical basis (OpE and/or engineering analysis/standards)
 - Avoid non-quantifiable phrases (e.g. significant, moderate, minor, little, etc.)
- **Learning/Proactive/Responsive AMP:**
 - Operational experience and other quality data (tollgates)
 - Informs acceptance criteria

AMP Element 7: Corrective Actions



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

- **CAP commensurate with 10CFR72 Subpart G, or 10CFR50 Appendix B**
- **Maintenance plans and/or corrective actions for specific degradation effects (e.g. repair, replacement, mitigation activities, & extent of condition)**
 - Actions to prevent reoccurrence
 - Justification for actions such as repair, replace, and/or mitigate
 - Analysis of how action may affect other subcomponents
- **Consideration of corrective actions on other components**
- **Plans for OpE incorporation into the remediation plan**
- **Learning/Proactive/Responsive AMP:**
 - Operational experience and other quality data (tollgates)
 - Informs corrective actions

AMP Element 8: Confirmation Process



NUREG-1927: The confirmation process should ensure that preventive actions are adequate and appropriate corrective actions have been completed and are effective

Element should reference:

- Quality Assurance Program consistent with 10CFR72 Subpart G, or 10CFR50 Appendix B.
- Methods to confirm adequate actions are taken, and are verified as effective

AMP Element 9: Administrative Controls



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

Elements should reference:

- Quality Assurance Program consistent with 10CFR72 Subpart G, or 10CFR50 Appendix B.
- Inspector requirements
- Record retention requirements
- Review process of inspection results
- Frequency/methods for:
 - reporting inspection results to NRC
 - evaluating suitability of AMP based on industry-wide OpE (tollgates)

AMP Element 10: Operating Experience



NUREG-1927: Include past corrective actions; provide objective evidence to support a determination that the effects of aging will be adequately managed so that the SSC intended functions will be maintained during the period of extended operation

- **Critical element to Learning/Proactive/Responsive AMP**
- **Reference and evaluate applicable Operational Experience:**
 - Industry-wide Condition Reports, Corrective Action Reports, NRC Information Notices, Applicable industry initiatives (e.g. DOE cask demo, EPRI-sponsored inspections)