Aging Management and License Renewal in the United States

Margaret Doane

Executive Director for Operations
U.S. Nuclear Regulatory Commission

June 2019
US Practices Compared to EU Topical Peer Review

• The USNRC assessment found that the US is generally well-aligned with the results of the TPR.

• US has a strong regulatory basis to continue with its practices and determined no change in regulatory practices are necessary.

• The USNRC found a gap or area not addressed by the TPR.
  – The TPR did not address time-limited aging analyses, which are considered of safety importance in the US.
What is Aging Management?

• Design, fabrication, construction, installation, testing and operation steps to:
  – Inhibit or preclude aging degradation (e.g., material selection and environmental control)
  – Identify degradation conditions in SSCs prior to a loss of intended function
  – Ensure effective corrective actions
License Renewal Status in USA

98 operating reactors
- 65 PWRs
- 33 BWRs

90 units with renewed licenses

49 units in the period of extended operation
License Renewal Rule 10 CFR Part 54

• Atomic Energy Act of 1954, as amended
  – Plants initially licensed to operate for 40 years
  – Allows for license renewal for up to 20 more years
  – A renewed license may be subsequently renewed (10 CFR 54.31(d)) with no restrictions on number of subsequent renewals

• A limited scope review focused on demonstrating adequate management of the effects of aging for long-lived, passive structures and components important to plant safety
License Renewal Guidance Documents

Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants

Final Report

Generic Aging Lessons Learned (GALL) Report

Final Report

Industry Guideline For Implementing The Requirements of 10 CFR Part 54 – The License Renewal Rule
NRC Safety Review

• Review adequacy of scoping and screening

• Assess adequacy of aging management review – have all relevant aging effects been identified and will they be effectively managed (using aging management programs)

• Adequacy of evaluation of time-limited aging analyses (TLAAs)

• Inspections on licensee implementation of the license renewal aging management programs
Inspections

• **IP 71002** – License Renewal Inspection
  – Implemented as a part of the review of the license renewal application

• **IP 71003** – Post-Approval Site Inspection
  – 4 phases implemented after license has been renewed

• Continue regular maintenance and other specialized activities (e.g., in-service inspection, fire protection)
Subsequent License Renewal (SLR)

- Operation from 60 to 80 years
- Regulatory framework and approval process is the same as license renewal
- Specific regulatory documents have been issued – GALL-SLR and SRP-SLR
- Optimization of the review process
  - 18 month review (reduced from 22 months)
  - Increased use of in-office audits and web portals
Technical Issues for SLR

• Reactor pressure vessel neutron embrittlement at high fluence

• Irradiation-assisted stress corrosion cracking (IASCC) of reactor internals

• Concrete and containment degradation

• Electrical cable qualification, condition monitoring and assessment
Status of SLR

• Three SLR applications submitted for review
  • Turkey Point, Units 3 and 4 (PWR): SER with Open Items issued May 2019
    • ACRS Subcommittee Meeting Scheduled June 2019
  • Peach Bottom, Units 2 and 3 (BWR): Safety and Environmental Reviews Ongoing
  • Surry, Units 1 and 2 (PWR): Safety and Environmental Reviews Ongoing

• North Anna, Units 1 and 2 (PWR) SLRA expected late calendar year 2020.
Summary

• Licensees are responsible for demonstrating that aging is adequately managed for licensed operating period

• NRC ensures that plants will be operated with reasonable assurance of adequate protection of the public health and safety

• Licenses have been renewed for ~90% of US plants and reviews of remaining plants are ongoing or planned

• NRC is currently reviewing applications for plant operation up to 80 years

• Certain technical issues require plant-specific resolution for subsequent license renewal

• For more information, license renewal website: https://www.nrc.gov/reactors/operating/licensing/renewal.html.