Regulatory Approach for License Renewal for Commercial Nuclear Power Reactors in the USA

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Overview

• Safety during the first 40 years of operation

• First License Renewal
  – 40-60 years of operations

• Subsequent License Renewal
  – 60-80 years of operations
Safety During the First 40 Years

• Relies on the current regulatory process:
  – Continuous oversight through inspections
  – Daily assessment of events
  – Performance assessments of inspection findings

• Generic safety issues identification and resolution

Regulations and Guidance
  • Rulemaking
  • Guidance Development
  • Generic Communications
  • Standards Development

Operation Experience
  • Events Assessment
  • Generic Issues

Support for Decisions
  • Research Activities
  • Risk Assessment
  • Performance Assessment
  • Advisory Activities
  • Adjudication

Licensing, Decommissioning, and Certification
  • Licensing
  • Decommissioning
  • Certification

Oversight
  • Inspection
  • Assessment/Performance
  • Enforcement
  • Allegations
  • Investigations
Safety During the First 40 Years
Aging Management

Existing Regulatory Process

Maintenance Rule
(10 CFR 50.65)

Quality Assurance Program
(Appendix B to 10 CFR Part 50)

10 CFR 50.55a
Requirements

Active Components

Passive Components
Safety License Renewal

**Existing Regulatory Process**

- **Maintenance Rule** (10 CFR 50.65)
- **Quality Assurance Program** (Appendix B to 10 CFR Part 50)
  - 10 CFR 50.55a Requirements
  - **Active Components**
  - **Passive Components**

**License Renewal**

- **Aging Management** (10 CFR Part 54)
  - Ensures that the effects of aging will be effectively managed throughout the period of extended operation
License Renewal: 40-60 Years

License Renewal Principles:

- Regulatory process ensures that an acceptable level of safety is maintained during the period of extended operation.
- Each plant’s current licensing basis must be maintained during the renewal term in the same manner, and to the same extent, as during the original licensing term.
Aging Management

• **Aging Management:**
  – Ensures the availability of required safety functions throughout the plant’s life

• **Aging Management Programs (AMPs):**
  – Identifies the monitoring, inspection, and/or mitigation programs found acceptable for adequately managing the effects of aging

• **Time-Limited Aging Analyses (TLAAs):**
  – Calculations or analyses that consider the effects of aging and must show that the aging effects encompassed by the TLAAs will be managed
License Renewal Guidance

• GALL Report Revision 2 (NUREG-1801)
  – Provides assessments for aging management review, including identification of materials, environments and aging affects that require management
  – Identifies acceptable AMPs
  – One acceptable method to manage aging effects, plant-specific alternatives may be proposed

• Standard Review Plan for Review of License Renewal Applications for Nuclear Power Plants Revision 2 (NUREG-1800)
  – Provides guidance to NRC staff reviewers to perform safety reviews of license renewal applications
License Renewal Status

- **Status of license renewal activities:**
  - 83 units have renewed licenses
  - 12 units currently under review
  - 5 upcoming units between 2017 and 2022

- **Age of current plants:**
  - By the end of 2016, 45 units will have more than 40 years of operation
  - Older plants will reach the end of 60 years in 2029

- **Subsequent license renewal permitted**
  - Letter of intent received
Subsequent License Renewal

• The principles of license renewal would continue to be effective to ensure safety for operations beyond 60 years

• Optimization of application review process

• Identification of aging management needs for subsequent license renewal period

• Technical reviews ensure effective aging management
Subsequent License Renewal
Technical Sources

• Expanded materials degradation assessment

• AMPs effectiveness audits at plants in the period of extended operation

• Relevant domestic and international operating experience

• Industry, public, and staff comments
Technical Issues for Operation Beyond 60 years

- Reactor pressure vessel neutron embrittlement at high fluence
- Irradiation-assisted stress corrosion cracking of reactor internals and primary system components
- Concrete and containment degradation
- Electrical cable qualification, condition monitoring and assessment
Subsequent License Renewal Guidance

• **Generic Aging Lessons Learned for Subsequent License Renewal (GALL-SLR) Report (NUREG-2191)**
  - Acceptable method to manage aging effects and plant-specific alternatives may be proposed

• **Standard Review Plan for Review of Subsequent License Renewal Applications for Nuclear Power Plants (SRP-SLR) (NUREG-2192)**
  - Provides guidance to NRC staff reviewers to perform safety reviews of SLR applications
Basis for Subsequent License Renewal Guidance Changes

• Expected aging differences for operations beyond 60 years

• New domestic and foreign operating experience

• Aging management program audits and inspections occurring during the license renewal application review process and the period of extended operation

• Implementation of GALL Report and SRP, Rev. 2

• Issuance of interim staff guidance
Subsequent License Renewal Timeline

- 2014: Draft GALL & SRP
- 2015: First Application Submitted
- 2016: First Application Review?
- 2017: First Application
- 2018: First SLR
- 2019: License Issued?
- 2020: Development & SRP
- 2021: Public Meeting & Comments Disposition
- 2022: Final GALL & SRP

Draft GALL & SRP for comments

First Application

Final GALL & SRP
Summary

• Plants are required to meet their licensing basis during initial licensing, during first license renewal, and during subsequent license renewal.

• Regulatory processes are effective for ensuring licensing basis is met and for identifying and resolving any new safety issues throughout plant operations.

• Aging management is implemented by plants during initial operation, expanded during first license renewal, and further expanded during subsequent license renewal.

• Certain technical issues require resolution for subsequent license renewal.
Open Literature Reference List

• License Renewal Documentation
  http://www.nrc.gov/reactors/operating/licensing/renewal.html

• Subsequent License Renewal Documentation