U.S.NRC
United States Nuclear Regulatory Commission
Protecting People and the Environment

Briefing on the Status of Subsequent License Renewal Preparations

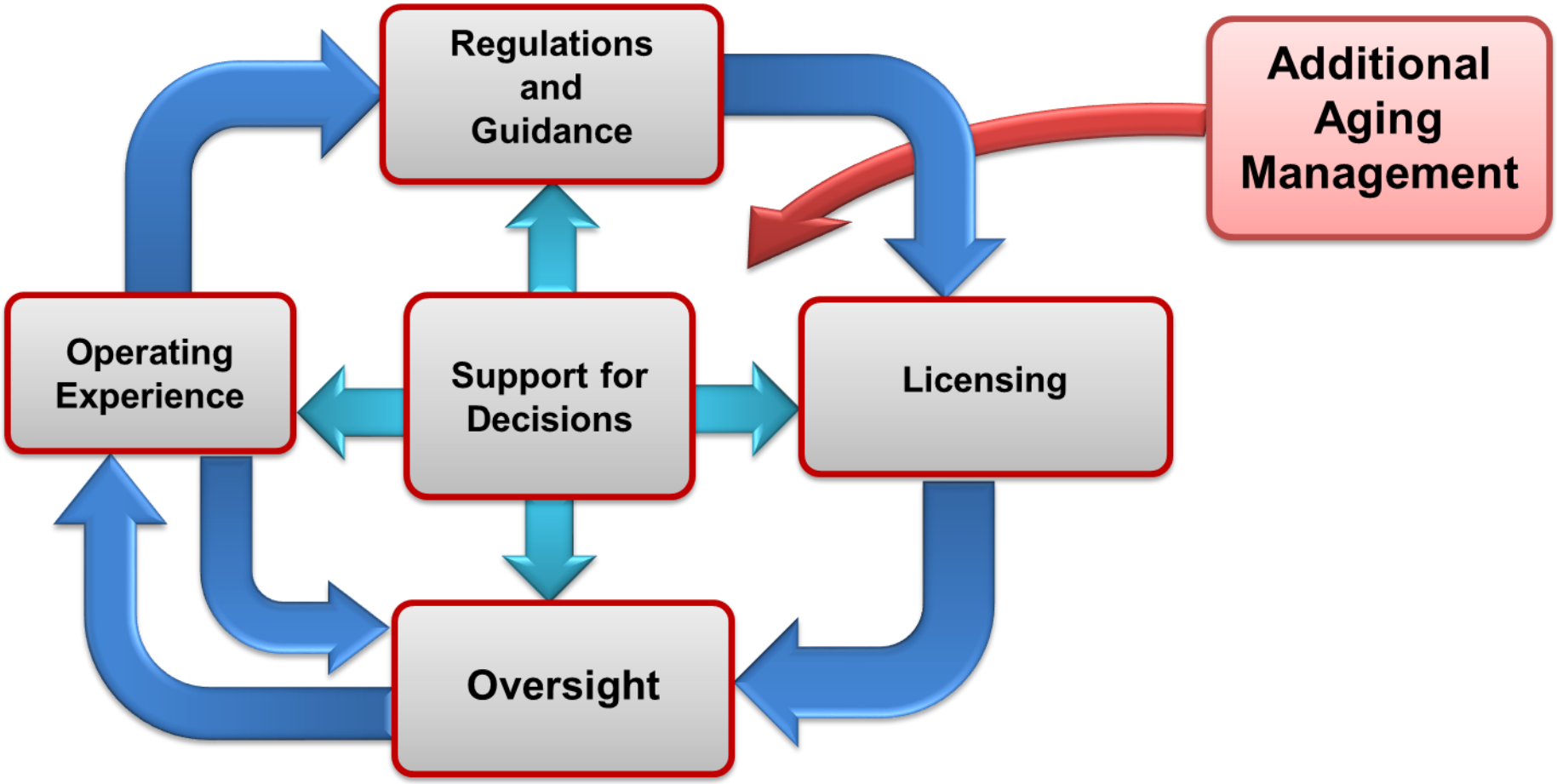
Commission Meeting with NRC and Industry

April 26, 2017

Agenda

- Introduction and Key Messages
- Understanding the Regulatory Framework for Subsequent License Renewal (SLR)
- Status of SLR Guidance Documents
- Overview of SLR Process Optimization
- Summary of Changes in SLR Guidance
- Status of Confirmatory Research Activities

Existing Regulatory Processes Are the Framework of License Renewal



Regulations and Processes Ensure Safe Operation

- License renewal regulations ensure passive, long-lived structures and components perform intended functions
- License renewal application review includes environmental and safety reviews, audits and inspections
- Continuous verification of safety through reviews and Reactor Oversight Process

License Renewal Framework Adequate for SLR

- The principles of license renewal continue to be effective for SLR
- Additional focus on the adequacy of aging management programs (AMPs) and activities for the subsequent period of extended operation

Staff is Finalizing Regulatory Guidance for SLR

- In December 2015, draft SLR guidance documents issued for public comment
- In 2016, staff held nine public meetings and addressed public comments
- In April 2017, Advisory Committee on Reactor Safeguards full committee meeting completed
- Final SLR guidance to be issued July 2017

SLR Applications Expected in the Near Future

- Peach Bottom Atomic Power Station
  - SLR application expected mid-2018
- Surry Power Station
  - SLR application expected early 2019
- Letters of intent useful in helping NRC prepare for anticipated submittals

Staff is Optimizing SLR Application Reviews

- Identified modifications to optimize review of SLR application. New approach includes:
  - Increasing the use of portals, telecommunications
  - Early development of safety evaluation report and environmental impact statement
  - Streamlining on-site audits
  - Eliminating redundant inspections
- Optimized review of high quality SLR application with no contentions could be completed in 18 months

Four Key Technical Issues for Operation Beyond 60 Years

- Reactor pressure vessel neutron embrittlement at high fluence
- Irradiation-assisted stress corrosion cracking (IASCC) of reactor internals and primary system components
- Concrete and containment degradation
- Electrical cable qualification and condition assessment

SLR Guidance Documents Enable Consistent Reviews of Applications

- Generic Aging Lessons Learned for SLR (GALL-SLR) Report (NUREG-2191)
  - Contains generic aging effects to be managed and appropriate AMPs
- Standard Review Plan for the Review of SLR Applications for Nuclear Power Plants (SRP-SLR) (NUREG-2192)
  - Contains guidance to NRC safety reviewers of the SLR application

Development of SLR Guidance Involved Rigorous Staff Review

- Technical sources used for SLR guidance
  - Expanded Materials Degradation Assessment
  - AMP effectiveness audits at plants in the period of extended operation
  - Relevant domestic and international operating experience
  - External stakeholder, staff comments

Refinements to Current Guidance to Support 80 Years of Operation

- New GALL-SLR Report AMPs
  - Fluence Monitoring
  - High Voltage Insulators
- Modified approach to aging management for reactor vessel internals
- Modifications to Reactor Vessel Material Surveillance AMP

Changes Include Revisions to Electrical and Structural AMPs

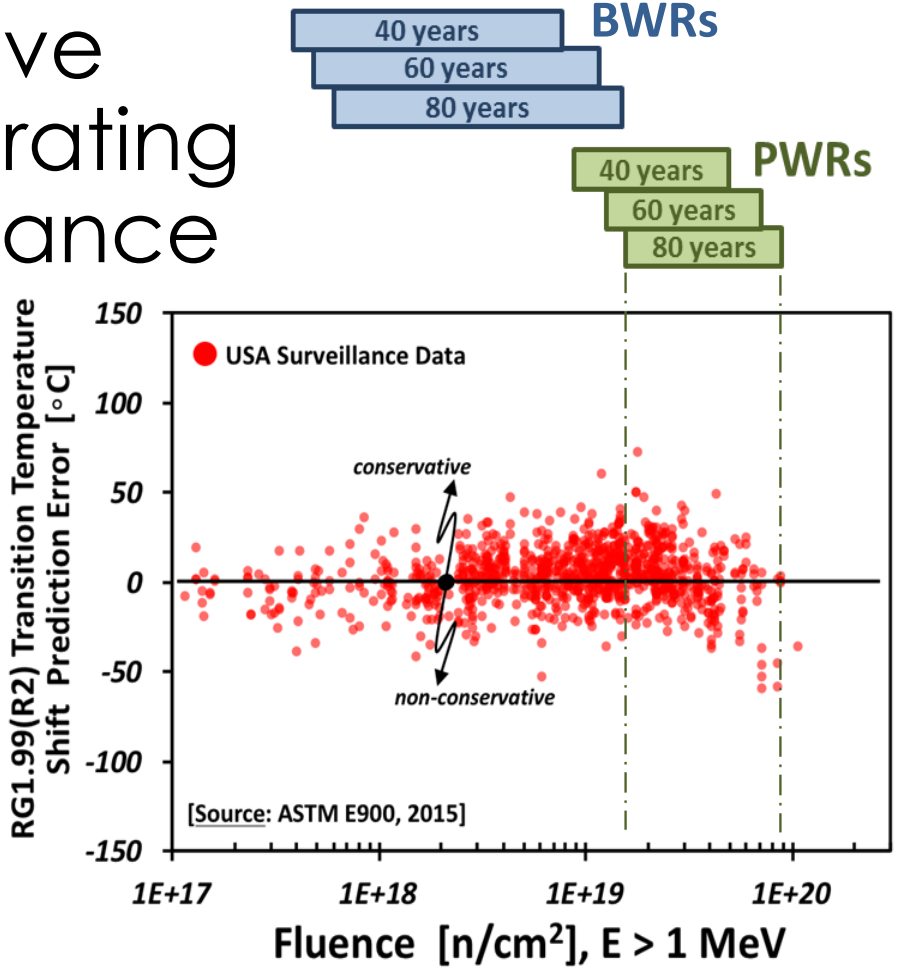
- Expanded Electrical Insulation of Cables AMP from one AMP to three AMPs to address aging of submerged cables at different voltages
- Aging management of concrete
  - Updated for alkali-silica reaction (ASR)
  - Added further evaluation for irradiation of concrete

NRC is Prepared to Review SLR Applications

- GALL-SLR Report AMPs address technical issues
- Plant-specific approaches for a few technical issues
- Applicant's responsibility to evaluate technical issues, develop acceptable aging management methods

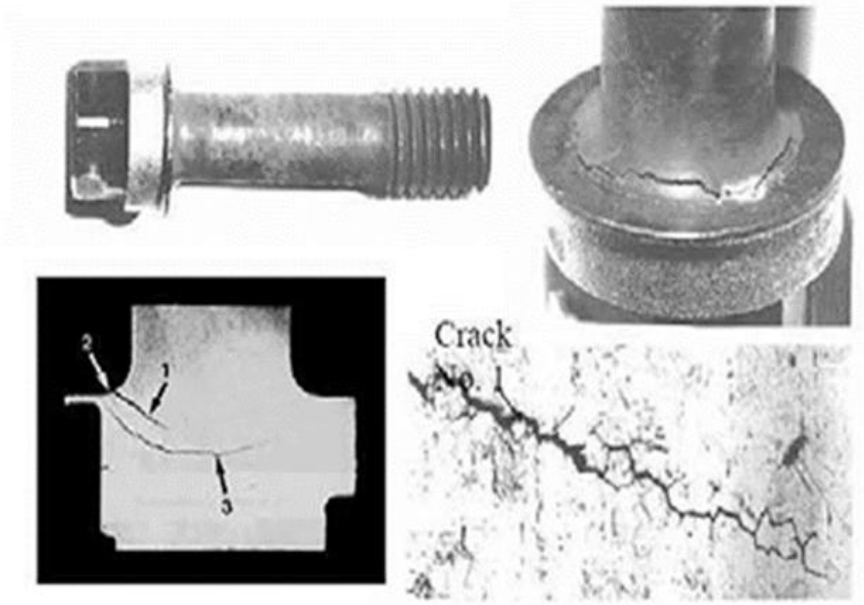
Staff is Ensuring Reactor Pressure Vessel Integrity

- Confirming predictive methods using operating experience (surveillance data)
- Assessing embrittlement at higher fluence levels



Staff is Assessing Effects of Irradiation-Assisted Degradation of Internals

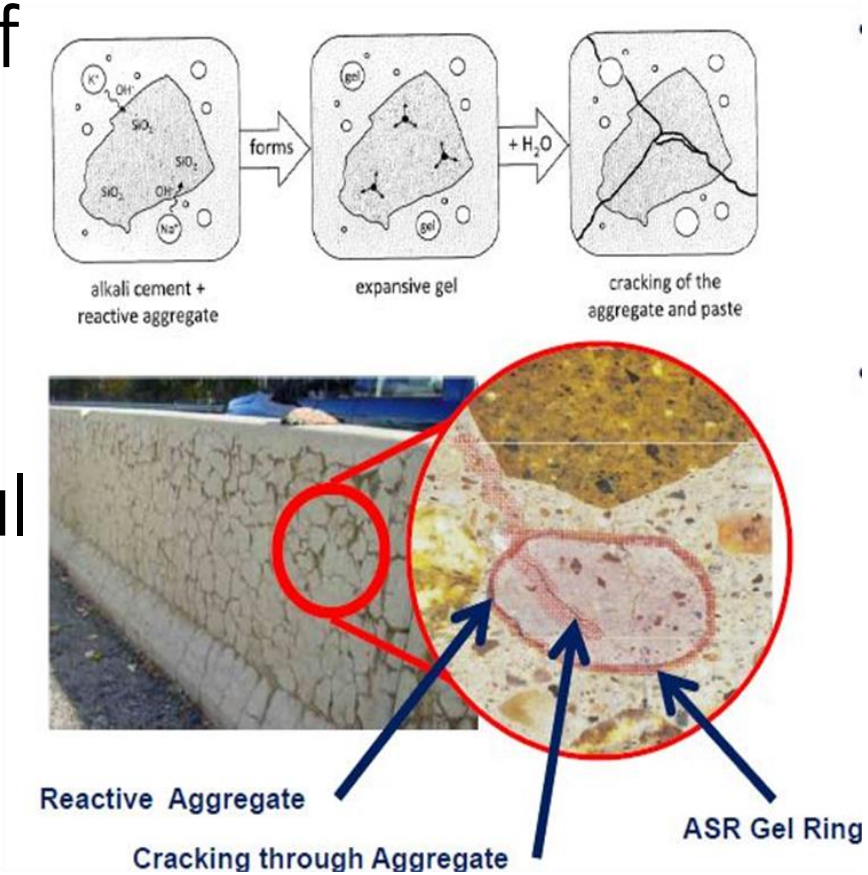
- Evaluating impacts of IASCC, loss of fracture toughness, and void swelling
- Testing materials at higher irradiation levels



Cracking in a PWR baffle bolt

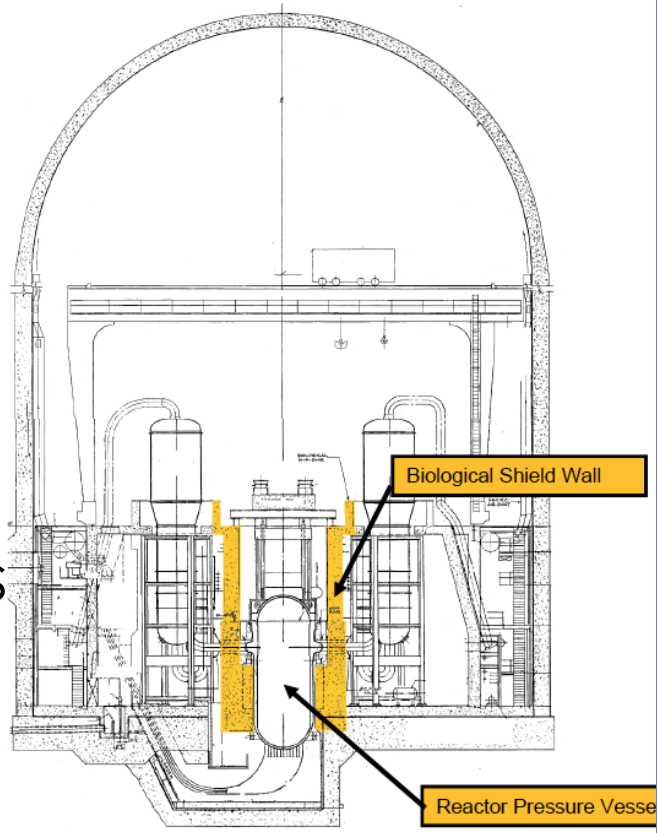
Staff is Assessing Concrete Degradation

- Evaluating effects of ASR on structural performance of concrete
- Confirming structural integrity



Staff is Confirming Structural Concrete Integrity

- Evaluating effects of irradiation on concrete structures
  - Confirming DOE concrete irradiation damage and EPRI concrete structural performance results
  - Assessing EPRI's evaluation of susceptible plant configurations
  - Assessing neutron fluence and gamma dose on structural bio-shield concrete



Staff is Confirming Adequacy of Cable Condition Assessment Techniques

- Evaluating synergistic effects of gamma radiation and thermal exposure in low voltage cables

Thermal aging of jacketed cables

- Confirming assessment of medium voltage cable submergence qualification

NRC Demonstrating Readiness to Accept and Review SLR Applications

- License renewal framework is basis for SLR
- Extensive stakeholder engagement continues
- Confirmatory research ongoing for technical issues
- NRC ready to accept and review SLR applications

Acronyms

- AMP: Aging Management Program
- ASR: Alkali-Silica Reaction
- DOE: Department of Energy
- EPRI: Electric Power Research Institute
- GALL-SLR: Generic Aging Lessons Learned for Subsequent License Renewal
- IASCC: Irradiation-Assisted Stress Corrosion Cracking
- SLR: Subsequent License Renewal
- SRP-SLR: Standard Review Plan for the Review of Subsequent License Renewal Applications for Nuclear Power Plants