



## **Nuclear Long-Term Operations & Aging Management Conference**

# **NRC's Perspectives**

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# Agenda

- Status of License Renewals
- Generic Aging Lessons Learned (GALL)  
Report for Planning Long-Term Operation
- Need for Aging Facilities to Address Operating Experience
- NRC's Perspective on Subsequent Renewals



# Status of License Renewals

- Renewed licenses: 71 units (41 sites)
- Applications in review: 15 units (11 sites)
- Last application expected: Early 2017
- In period of extended operation (PEO): 9 units (8 sites)
- Entry into the PEO in 2012: 6 units (5 sites)
- Entry into the PEO in 2013: 11 units (10 sites)
- Entry into the PEO in 2014: 13 units (13 sites)



## Generic Aging Lessons Learned (GALL) Report

- Standard Review Plan – License Renewal (NUREG-1800)
- GALL Report (NUREG-1801)
  - Technical basis for Standard Review Plan
  - Lists generic reviews of systems, structures, and components (SSCs) in scope for license renewal
  - Identifies aging management programs (AMPs) acceptable for managing aging effects of SSCs in license renewal (LR)
  - Treated as approved Topical Report and provides one acceptable approach for aging management



# Generic Aging Lessons Learned (GALL) Report

- Updates to GALL Report (NUREG-1801)
  - Published in 2001
  - Revised in 2005 and 2010
  - Interim Staff Guidance (ISG) used to supplement in between updates
- Revisions capture NRC's lessons learned from past reviews and operating experience
- Revision 2 specifically focused on evaluating operating experience (domestic & international)



# Operating Experience

- Operating Experience (OE) is one of ten essential Aging Management Program (AMP) elements reviewed during license renewal (LR)
- AMPs should continue to be informed and enhanced based on ongoing review of plant-specific and industry OE
- Why Emphasis on OE?
  - Recent “Hot Topics” & Developing Issues
  - Better documentation needed in applications
  - Limited experience with AMP Implementation
  - Implications for subsequent renewals



# Recent “Hot Topics”

## Buried and Underground Piping and Tanks

- Issued new AMP XI.M41 in GALL Report Rev 2, focused on:
  - Preventive Actions: cathodic protection, coatings, backfill quality
  - Augmented inspection quantities based on meeting or not meeting preventive measures
  - Included inspections of underground piping and tanks
- Interim Staff Guidance (ISG) being developed to address plants without cathodic protection



# Recent “Hot Topics”

## Inaccessible non-EQ Cables

- Updated XI.E3 in GALL Report Rev 2, “Inaccessible Power Cables Not Subject to 10 CFR 50.49 Environmental Qualification Requirements”
  - Expanded scope to include cables  $\geq 400$  volts and non-energized cables
  - Changed inspection and testing frequencies
    - 1-yr frequency for inspections
    - 6-yr frequency for testing
    - Added event-driven inspections
    - Heavy rain
    - Flooding





## **Developing Issues – Selective Leaching**

- Aluminum bronze selective leaching occurring in components at South Texas Project
- Large amount of susceptible piping
- Long-term degradation has occurred in different configurations
- Current licensing basis approach
  - Pre-engineered analysis that meets Generic Letter 90-05 and ASME Code
  - Allows operation to the next outage

## **Developing Issues – Concrete alkali silica reaction (ASR)**





## Other Developing Issues

- ISG in development for wall thinning mechanisms via cavitation
- Unique challenge with Crystal River containment damage and repair



## Better Documentation Needed in Applications

- Applicants need to improve identification of OE in AMP descriptions
  - New programs typically only contain general description of OE without specifics
  - OE description should include discussions of Condition Reports, responses to generic communications, industry OE gained from other licensee implementation, etc.
- Basis documentation needs to include thorough consideration of various sources of OE and/or changes to existing procedures
- Applications should clearly state how applicants intend to consider OE to manage AMPs on ongoing basis



## Limited experience with AMP Implementation

- Only 9 of 71 units have entered the PEO
  - Anticipate more lessons learned as numbers in PEO ramp up
  - Need effort and evidence from industry of AMP effectiveness in implementation (e.g., Implementation Working Groups, INPO initiatives?)
- Maintenance of AMP through OE is essential if subsequent renewal to be considered viable option



## **Limited experience with AMP Implementation – *AMP Effectiveness Audits***

### **Purpose**

- Gain additional understanding of how AMPs have been implemented in PEO
- Review AMP's findings in PEO to determine effectiveness in identifying aging
- Look at changes and evolution of AMPs in response to inspection findings and plant-specific and industry operating experience
- Results of assessment will inform considerations for second license renewals



## **Limited experience with AMP Implementation – *AMP Effectiveness Audits***

**Sites: Ginna & Nine Mile Point Unit 1  
(PEOs in 2009)**

- NRC staff attended audit at sites for 3 days
- Reviewed AMPs, original basis documents, implementing procedures, condition reports and follow-on reports
- Interviewed plant staff and AMP owners



## **Limited experience with AMP Implementation – *AMP Effectiveness Audits***

Audits provided a better understanding of how AMPs are implemented:

- Assignment of AMP owners
- Implementing plant procedures
- Use of Condition Reports

Implementation practices varied between Ginna & Nine Mile Point

- Self-assessments of AMP effectiveness
- Assignment & training of employees





## **Limited experience with AMP Implementation – *AMP Effectiveness Audits***

- Items for consideration
  - Turnovers and maintaining knowledge of AMPs will present challenges
  - Difficult to identify changes to AMPs resulting from operating experience related to aging issues
- Uncertainties to be addressed by industry for subsequent renewal
  - Continuity of knowledge for effective implementation of AMPs
  - Evidence of AMPs evolving and responding to operating experience rather than remaining static



## **Limited experience with AMP Implementation – *AMP Effectiveness Audits***

- NRC staff will review data collected from audits to evaluate effectiveness of AMP implementations
- Findings will be considered along with other factors for subsequent renewal
- NRC staff will evaluate and provide industry with needs for additional audits



## **NRC's Perspective on Subsequent Renewals**

NRC's ongoing efforts to address technical issues related to second 20-year license renewal (NRC activities)

- Evaluate the effectiveness of GALL Aging Management Programs (AMPs) – AMP Effectiveness Audits
- Expanded materials degradation assessment (EMDA)
- Workshops with industry and international colleagues
- Relevant domestic and international operating experience



## **NRC's Perspective on Subsequent Renewals**

Industry must do its part . . .

- Provide evidence that AMPs are implemented and maintained effectively
- Resolve known technical challenges
  - Reactor pressure vessel
  - Concrete structures
  - Cables



## **NRC's Perspective on Subsequent Renewals**

- Older plants will reach end of first license extension period as early as 2029 (e.g., Ginna and Nine Mile Point)
- Requirements, guidance, and process will need to be in place by first application
- NRC's resource loading for effort will depend on certainty of first application for subsequent renewal