James A. Fitzpatrick Nuclear Power Station License Renewal Safety Evaluation Report

Staff Presentation to the ACRS

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Introduction

- Overview
- Section 2: Scoping and Screening Review
- License Renewal Inspections
- Section 3: Aging Management Review Results
- Section 4: Time-Limited Aging Analyses (TLAAs)

Overview

- **LRA Submitted by Letter - July 31, 2006**
- **GE BWR - MARK 1 Containment**
- **2536 MWth, 881 MWe**
- **Op. License DPR-59, Expires October 17, 2014**
- **Located in Scriba, NY [on shore of Lake Ontario, 33 miles NW of Syracuse, NY]**

Overview

- Two (2) Open Items
- No Confirmatory Items
- Three (3) License Conditions
- 118 RAIs Issued, 346 Audit Questions
- ≈83% Consistent With GALL Report, Revision 1
- 25 Commitments
- Additional Components Brought Into Scope

Review Highlights

- **Scoping and Screening Methodology Audit**
  - September 25 - 29, 2006
- **AMP/AMR/TLAA Audit and Review**
  - November 13-17, 2006
  - December 11-15, 2006
  - January 8-9, 2007
- **Regional Inspections**
  - April 9-13, 2007
  - April 23-27, 2007

Section 2: Scoping and Screening Review

Section 2.1 - Scoping and Screening Methodology

- On-site Audit – September 25-29, 2006

  Staff Audit And Review Concluded That The Applicant's Methodology Satisfies The Rule (10 CFR 54.4(a) and 10 CFR 54.21)

Section 2.2 - Plant-Level Scoping

- No Omission Of Systems Or Structures Within The Scope Of License Renewal

Section 2: Scoping and Screening Review

Section 2.3 – Mechanical Systems

- 57 Mechanical Systems [26 BOP]
- 100% Reviewed
- BOP: Tier 1 Review: 10 Systems

  Tier 2 Review: 16 Systems
- 18 Miscellaneous Systems as 54.4.a(2)
- Additional Components Brought Into Scope

Section 2: Scoping and Screening Review, con't

Section 2.3 – Mechanical Systems

- **Examples of Components Brought Into Scope**
  - **Yard Fire Hydrants (Fire Protection)**
  - **Screenwell Bldg Fire Suppression system**
  - **Water Spray System over MG Set and EDG rooms**
  - **Floor and Roof Drainage System & Non-Safety related components (Inspection team)**
  - **Others: Sight glass for Security Generator, Tubing for Fuel Oil System, Tubing &valve body for Service, Instrument & Breathing Air System, etc…**

Section 2: Scoping and Screening Review

Section 2.4 – Containment, Structures, and Supports

- No Omission Of Structures Or Supports Within The Scope Of License Renewal

Section 2.5 – Electrical and Instrumentation & Control

- No Omission Of Electrical And Instrumentation & Control Systems Components Within The Scope Of License Renewal

Section 2: Scoping and Screening Summary

- The Applicant's Scoping Methodology Meets The Requirements Of The Rule (10 CFR Part 54)
- Scoping And Screening Results, As Amended, Included All SSCs Within The Scope Of License Renewal And Subject To AMR

License Renewal Inspections

Glenn Meyer

Richard Conte

Region I

Scoping and Screening

- 54.4(a)(2) - non-safety SSCs whose failure could impact safety SSCs
- Spatial and Structural Interactions
- LRA Drawings and procedures reviewed
- Plant walkdowns performed
- Some components or portions of systems needed to be added to scope

Scoping and Screening Conclusions

- **Spatial interaction - Acceptable**
- **Structural interaction - Acceptable**
- **Scoping and screening acceptable for license renewal**

Aging Management

- Reviewed 22 AMP programs
- Reviewed programs, evaluations, and records
  - Program procedures
  - Operational experience information
  - Corrective actions on prior plant issues
- Interviewed cognizant personnel
- Performed plant walk downs – only one issue noted

Aging Management Conclusions

Aging Management Programs support conclusion that aging effects will be managed

Overall Conclusions

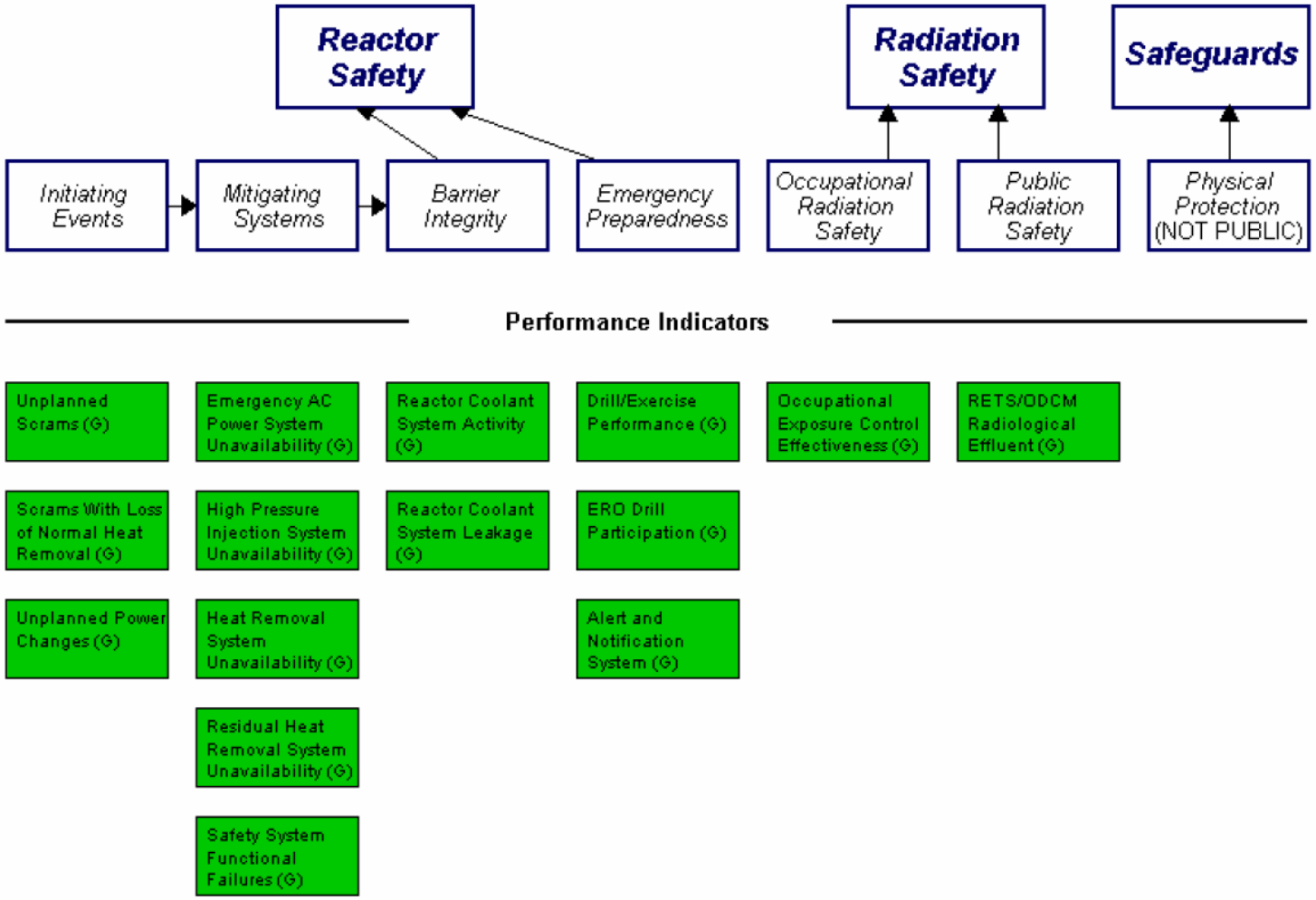
- **Scoping, screening and aging management programs are acceptable.**

- **Region I does not see any inspection impediments to renewing the operating license.**

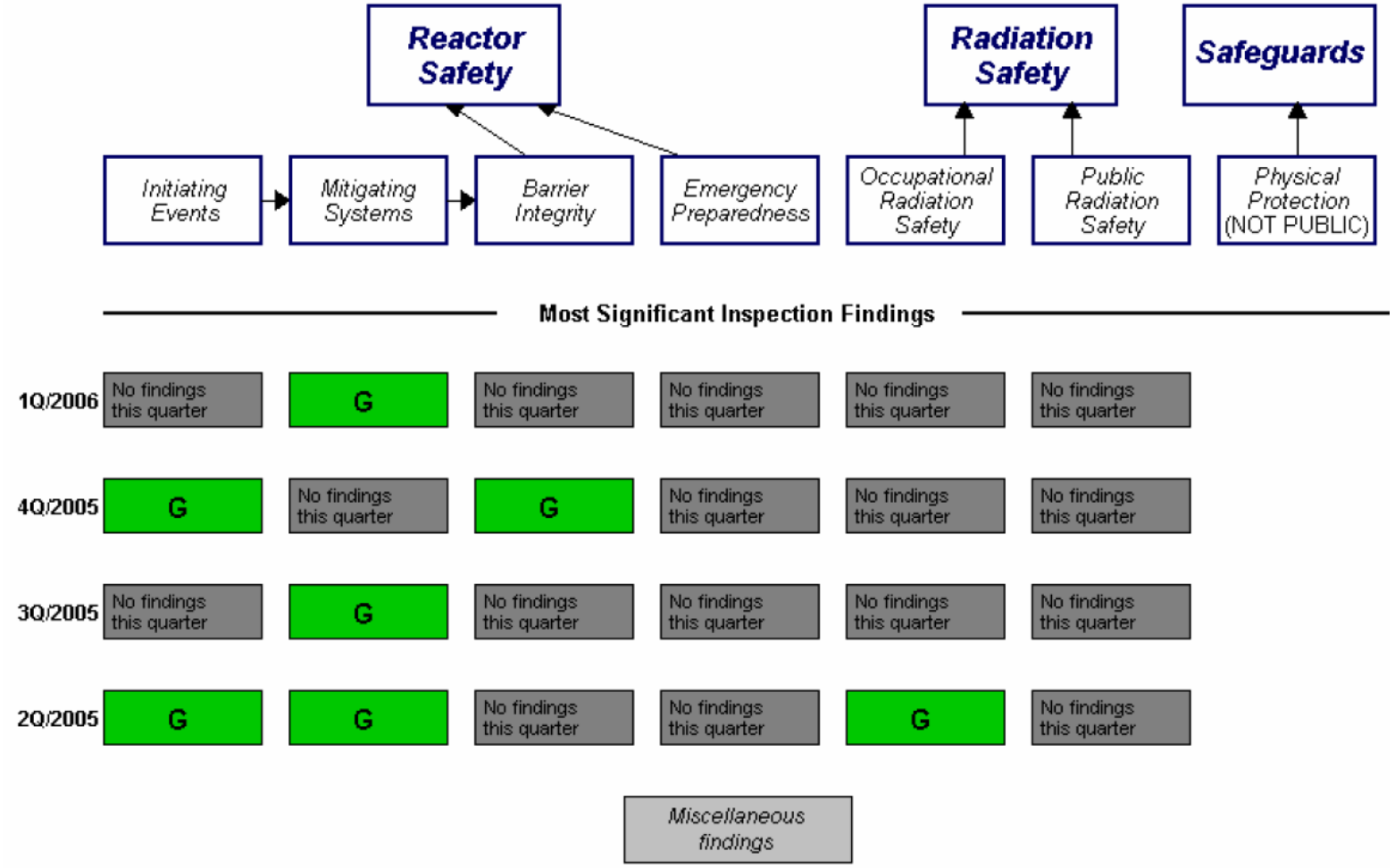
Current Performance

- **Licensee Response Column (Column I) of the NRC's Action Matrix – Green PIs and Findings**
- **No cross-cutting issues**
- **Reactor Oversight Process baseline inspections**

Performance Indicators



Inspection Findings



Aging Management Program (AMP) Audit and Review

- Total 36 AMPs
  - 26 existing AMPs
  - 10 new AMPs

- GALL Report Consistency
  - 10 Consistent
  - 20 Consistent with exceptions/enhancements
  - 6 Plant Specific

AMP/AMR/TLAA AUDIT AND REVIEW

- 346 Audit Questions
- All Questions Except Two were Resolved
  - 2 Questions Converted to RAIs
  - Fifty-five of the Questions Resulted in Revisions to the LRA
- 25 Commitments at the End of the Audit

AUDIT AND REVIEW

- **Audit Summary (ADAMS Accession No. ML071580047)**
  - **A pilot of new way to document audit information**
  - **Publicly Available, Issued on June 19, 2007**
  - **Audit Summary Includes :**
    - **Audit and Review Results**
    - **Audit and Review Q&A Database**
    - **Reviewers' Evaluations/Comments**
    - **List of Documents Reviewed by the Audit and Review Team**

Aging Management Review

- **100% Review**
  - **21 plant systems and 44 Auxiliary & Miscellaneous systems in scope for 10 CFR 54.4 (a)(2)**
  - **4 structural components & commodity groups**
  - **6 electrical commodity groups**

Section 3: Aging Management Review - Overview

- 3.1 Reactor Vessel, Internals and Reactor Coolant System
- 3.2 Engineered Safety Features Systems
- 3.3 Auxiliary Systems
- 3.4 Steam and Power Conversion Systems
- 3.5 Structures and Component Supports
- 3.6 Electrical and I&C Components

Aging Management Review– Drywell Shell

- **Two Aging Management Programs**
  - **Containment Inservice Inspection Program**
  - **Containment Leak Rate Program**
- **Consistent with the Staff Interim Guidance LR-ISG-2006-01**
- **No leakage identified in the vicinity of the sand cushion drain line**
- **Water leakage monitoring (each refueling)**
  - **refueling seal bellows**
  - **drywell air gap drains**
  - **sand pocket drains**
  - **functional checks on the alarm system**

Aging Management Review of Electrical and I&C Components

- **Six Commodity Groups Reviewed**
- **Commitment 24 - Implement the Bolted Connections Program consistent with the proposed revision to GALL XI.E6, "Electrical Cable Connections Not Subject to 10 CFR 50.49 EQ Requirements."**
- **Commitment 25 - Implement aging management for the 115 kV Oil-Filled Cable System that will be controlled by the following AMPs (In response to RAI 3.6.2-1)**
  - **External Surfaces Monitoring Program**
  - **Oil Analysis Program**
  - **Periodic Surveillance and Preventive Maintenance Program**

Section 4: Time-Limited Aging Analyses (TLAA) - Overview

- 4.1 Identification of TLAA
- 4.2 Reactor Vessel Neutron Embrittlement
  - Open Item 4.2.1-1
- 4.3 Metal Fatigue
  - Open Item 4.3.3-1
- 4.4 Environmental Qualification Analyses of Electrical Equipment
- 4.5 Concrete Containment Tendon Prestress [N/A]
- 4.6 Containment Liner Plate, Metal Containment, and Penetrations Fatigue Analysis

Section 4: Time-Limited Aging Analyses (TLAA), Cont.

- **4.7 Other Plant Specific TLAAs**
  - **4.7.1 Recirculation valves**
  - **4.7.2 Fatigue Crack growth Analysis [UFSAR 16.3.2.2]**
  - **4.7.3 TLAA in BWRVIP Documents**
  - **4.7.4 Assessment of Plant-specific Fatigue Flaw Growth and Fracture Mechanics Evaluations**

Neutron Fluence

- **Open Item 4.2.1-1**
  - **Calculation of Neutron Fluence not in accordance with Reg. Guide 1.190**
    - Fluence values were based on dosimeter measurements
    - Flux uncertainties reported in the 25 to 30 percent which are outside of recommended range
    - Result: Above Lead to Open Item 4.2.1-1

Section 4.2: Reactor Vessel Neutron Embrittlement

- **Six TLAAs Affected by Neutron Fluence Cal**
  - Reactor Vessel Fluence – OI 4.2.1-1
  - Pressure-Temperature Limits – sOI 4.2.2-1
  - Charpy Upper Shelf Energy – sOI 4.2.3-1
  - Adjusted Reference Temperature – sOI 4.2.4-1
  - Reactor Vessel Circumference Weld Inspection Relief – sOI 4.2.5-1
  - Reactor Vessel Axial Weld Failure Probability – sOI 4.2.6-1
- **One AMP Affected by Neutron Fluence**

  Reactor Vessel Surveillance Program – sOI B1.24-3

Section 4.3: Metal Fatigue

- **Environmentally-adjusted CUF values for the following projected to be above 1.0 for the PEO**
  - **RPV shell**
  - **RPV FW nozzle safe end**
  - **RPV recirculation inlet nozzle thermal sleeve**
  - **RPV recirculation outlet nozzle**
- **The applicant amended the LRA to include Commitment No. 20**

  Commitment # 20 Will Ensure That Either
  - **Projected 60 yrs Cycles Enveloped by Design Cycles**
  - **Refined CUF ≤ 1 for PEO**
  - **Aging Effects Will be Managed for the Components**
  - **Repair Or Replace the Affected RPV Locations**

Section 4.3: Metal Fatigue Con't

- **Open Item 4.3.3-1**
  - **RAI 4.3.3-1 - Applicant to identify which option or options under LRA Commitment No. 20 would be used to satisfy the commitment when implemented and, for each option selected to meet the commitment, to provide a sufficient detailed description of the methodology that would be used to satisfy the option.**
  - **The staff's determination on the acceptability of the TLAA on environmentally-assisted fatigue is pending submittal of the applicant's response to RAI 4.3.3-1 and the staff's review of the response to this RAI.**

Section 4.4: Environmental Qualification (EQ) of Electrical Equipment

- Applicant's EQ Program consistent with GALL AMP X.E1, "Environmental Qualification of Electrical Equipment"
- Staff Concluded The EQ Program Is Adequate To Manage The Effects Of Aging On The Intended Function Of Electrical Components
- The Staff Accepted the Evaluation in Accordance with 10 CFR 54.21(c)(1)(iii)

Conclusions

- **On the basis of its review of the James A. FitzPatrick LRA, with the exception of Open Item (OI) 4.2.1-1, and OI 4.3.3-1, the staff determines that the requirements of 10 CFR 54.29(a) have been met.**

Questions

Section 3 – Aging Management Program Example

- **Bolting Integrity Program**
  - **Consistent with GALL AMP XI.M18, "Bolting Integrity," with an enhancement**
  - **Commitment No. 19 – Enhance the Program to be consistent with GALLAMP**
    - **To include guidance from EPRI NP-5769 and EPRI TR-104213**
    - **To clarify that actual yield strength is used in selecting materials for low susceptibility to SCCs and to clarify the prohibition on use of lubricants containing MoS2 for bolting.**

Section 3 – Aging Management Program Example

- **BWR Vessel Internals Program**
  - **Consistent with GALL AMP XI.M9, "BWR Vessel Internals," with exceptions**
  - **Three Commitments**
    - **Enhance the BWR Vessel Internals Program to inspect fifteen (15) percent of the top guide locations using enhanced visual inspection techniques. EVT-1, within the first 18 years of the period of extended operation, with at least one-third of the inspections to be completed within the first six (6) years and at least two-thirds within the first 12 years of the period of extended operations. Locations selected for examination will be areas that have exceeded the neutron fluence threshold.**
    - **Install core plate wedges prior to the PEO or perform plant-specific analysis to determine acceptance criteria for continued inspection of core plate rim hold down bolting in accordance with BWRVIP-25 and submit the inspection plan to the NRC two years prior to the PEO**
    - **Inspect Steam Dryer Per BWRVIP-139, as Approved by NRC Staff**