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To: STROUD, MICHAEL D
Subject: latest slides
Attachments: ACRS-Indian Point-Presentation 03-03-09.ppt

Here are the latest. I don't expect too many changes at this point.

Kim



**Advisory Committee on Reactor Safeguards
License Renewal Subcommittee
Indian Point Nuclear Generating Unit
Nos. 2 and 3
Safety Evaluation Report with Open Items**

March 4, 2009

Kimberly Green, Project Manager
Office of Nuclear Reactor Regulation



Introduction

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



Overview

- LRA Submitted by letter dated April 23, 2007
- Westinghouse 4-Loop
- 3216 MWth, 1080 MWe
- Operating license DPR-26 (IP2) expires September 28, 2013
- Operating license DPR-64 (IP3) expires December 12, 2015
- Located approximately 25 miles north of NYC limits



Overview

- Safety Evaluation Report with Open Items was issued January 15, 2009
- 20 Open items
- 121 RAI's Issued
- 272 Audit Questions
- 38 Commitments



Overview

- Scoping and Screening Methodology Audit
 - October 8, 2007 - October 12, 2007
- Aging Management Programs (AMP) Audit
 - August 27, 2007 – August 31, 2007
- Aging Management Review (AMR) & Time-Limited Aging Analysis (TLAA) Audit
 - October 22, 2007 – October 26, 2007
 - November 27, 2007 – November 29, 2007
 - February 19, 2008 – February 21, 2008
- Regional License Renewal Inspections
 - January 28, 2008 – February 1, 2008
 - February 11, 2008 – February 14, 2008
 - March 31, 2008 – April 2, 2008
 - June 2, 2008 – June 6, 2008, and June 18, 2008



Open Items

- SER issued with 20 open items
 - 14 with requests for additional information
 - 6 are still under review by staff
- Applicant submitted additional information dated January 27, 2009
- Staff can close out 13 Open Items



Section 2: Structures and Components Subject to Aging Management Review

Section 2.1 – Scoping and Screening Methodology

- Based on audit and review staff concluded that the applicant's methodology is consistent with the requirements of 10 CFR 54.4 and 54.21(a)(1)

Section 2.2 – Plant-Level Scoping Results

- IP2 chlorination and IP3 H₂ systems initially omitted from scope
- Staff concluded applicant identified mechanical systems and structures within the scope of license renewal per 10 CFR 54.4(a).



Section 2.3 – Scoping and Screening Results: Mechanical Systems

- **Mechanical Systems: 59 (IP2) and 87 (IP3)**
- **Two Tier Review of Balance of Plant systems:**
 - **Tier 1 Review: Review LRA and UFSAR**
 - **Tier 2 Review: Detailed review of LRA, UFSAR, and license renewal drawings**
- **100% of mechanical systems identified by applicant as within the scope of license renewal were reviewed**



Section 2.3 – Scoping and Screening Results: Mechanical Systems

- Staff identified omission of nonsafety-related components from scope for IP2 containment spray
- Applicant re-evaluated and identified 3 other systems (IP2 CCW, IP3 CCW, and IP3 BVS)
- Amended LRA and added components to scope



Section 2.3 – Scoping and Screening Results

Mechanical Systems

- Three Open Items
 - OI 2.3A.3.11-1 – yard hose houses and chamber housings
 - OI 2.3.4.2-1 – feedwater isolation valves
 - OI 2.3A.4.5-1 – auxiliary feedwater pump room fire event systems
- These OIs can be closed



Section 2.4 – Scoping and Screening Results:

Structures

- Staff concluded that there were no omissions of structures or structural components from scope of license renewal in accordance with 10 CFR 54.4(a), and no omissions from AMR in accordance with 10 CFR 54.21(a)(1).



Section 2.5 – Scoping and Screening Results: Electrical and Instrumentation and Control Systems

- OI 2.5-1 – Station blackout scoping
- Issue is under staff evaluation
- With exception of SBO OI scoping, staff concluded no omissions of electrical and instrumentation and control system components from the scope of license renewal in accordance with 10 CFR 54.4(a), and no omissions from AMR in accordance with 10 CFR 54.21(a)(1)



Section 2.6 – Conclusion for Scoping and Screening

- The applicant’s scoping and screening methodology is consistent with the requirements of 10 CFR 54.4 and 10 CFR 54.21(a)(1)
- With exception of open items, the applicant adequately identified those SSCs within the scope of license renewal in accordance with 10 CFR 54.4(a), and those SCs subject to an AMR in accordance with 10 CFR 54.21(a)(1).



U.S. NRC

UNITED STATES NUCLEAR REGULATORY COMMISSION

Protecting People and the Environment

License Renewal Inspections

Glenn Meyer

Region I Inspection Team Leader



Inspection Objectives

- Scoping of Non-safety SSCs
- 28 Aging Management Programs (AMPs)
- 2 Systems: Auxiliary Feedwater; IP2 SBO diesel generator (DG)
- Followup: IP2 SBO DG, electrical cable vault, and containment liner



Scoping

- Scoping of non-safety SSCs – generally accurate and acceptable
- Structural and spatial interactions reviewed
- AMP reviews found 2 component scoping errors



Aging Management Program Review

Resolved by LRA Amendment 3:

- **Structural Monitoring**
- **Oil Analysis**
- **Diesel Fuel Monitoring**
- **Water Chemistry**
- **Metal-Enclosed Bus Inspection**



Aging Management Program Review

Resolved by LRA Amendment 3:

- Selective Leaching
- Non-EQ Bolted Cable Connections

Resolved by LRA Commitment 37:

- Exposed rebar on containment exterior



Aging Management Program Review

Resolved Onsite:

- Metal-Enclosed Bus Operating Experience
- Instrument air heat exchangers
- AMR for transit material
- Condition Reports on isolated degradation



Follow Up Inspections

- IP2 SBO diesel – scoping and system review when operational
- Electrical cable vault – when accessible
- Unit 2 containment liner – when accessible



Inspection Conclusions

- **Non-safety SSC scoping and aging management programs are acceptable.**
- **Inspection results support a conclusion of reasonable assurance that aging effects will be managed and intended functions will be maintained**



Current Performance

- Both units – Licensee Response Column
- All Findings - Green
- All Performance Indicators (PIs) – Green



Section 3: Aging Management Review Results

- Section 3.0 – Aging Management Programs
- Section 3.1 – Reactor Vessel & Internals
- Section 3.2 – Engineered Safety Features
- Section 3.3 – Auxiliary Systems
- Section 3.4 – Steam and Power Conversion System
- Section 3.5 – Containments, Structures and Component Supports
- Section 3.6 – Electrical and Instrumentation and Controls System



Section 3.0.3 – Aging Management Programs (AMPs)

- 41 AMPs
 - 10 New Programs
 - 31 Existing Programs
- 15 consistent with GALL Report
- 10 consistent with GALL Report with enhancements
- 8 had exceptions
- 8 plant-specific



Section 3.0.3 – AMPs

- 8 Open Items
- The following 5 OIs can be closed
 - OI 3.0.3.2.7-1 – fire penetration seals
 - OI 3.0.3.3.3-1 – acceptance criteria for visual examinations
 - OI 3.0.3.3.4-1 – inspection methods, etc. for lubrite sliding supports
 - OI 3.0.3.3.4-2 – corrective actions for ISI
 - OI 3.0.3.3.7-1 – Periodic Surveillance and Preventive Maintenance Program



Section 3.0.3 – AMPs

- The following 3 OIs are still under review
 - OI 3.0.3.2.15-1 – IP2 reactor refueling cavity leakage
 - OI 3.0.3.2.15-2 – IP2 spent fuel pool leak
 - OI 3.0.3.3.2-1 – Exterior containment concrete degradation



Section 3.1 – Aging Management of Reactor Vessel, Internals, and RCS

- 2 Open Items
 - OI 3.1.2-1 – Nickel alloy components
 - OI 3.1.2.2.7-1 – Inspection of CASS

These 2 OIs can be closed



Section 3.3 – Aging Management of Auxiliary Systems

- OI 3.3-1 – Clarification of material/environment/aging effect for titanium components

This OI can be closed



Section 3.4 – Aging Management of Steam and Power Conversion Systems

- One Open Item
 - OI 3.4-1 – AMR results for a fire in IP2 auxiliary feedwater pump room

This OI is still under staff review



Section 3.5 – Aging Management of Containment, Structures and Component Supports

- 3 Open Items
- These 2 OIs are still under staff review
 - OI 3.5-1 – Water-cement ratio for IP concrete
 - OI 3.5-2 – Reduction of strength and modulus of concrete due to elevated temperatures



Section 3.5 – Aging Management of Containment, Structures and Component Supports

- This OI can be closed
 - OI 3.5-3 – Aging management of concrete surrounding B1 supports



- ## Section 3.6 – Aging Management of Electrical and I&C Systems
- LRA identified no aging effects for IP2 138-kV high-voltage cable
 - Staff issued RAI
 - Applicant amended LRA to add cable to Periodic Surveillance and Preventive Maintenance Program



Section 3.7 Conclusion

With the exception of the Open Items, the applicant has demonstrated that aging effects will be adequately managed during the period of extended operation in accordance with 10 CFR 54.21(a)(3)



Section 4: Time-Limited Aging Analyses

- 4.1 Identification of Time Limited Aging Analyses (TLAAs)
- 4.2 Reactor Vessel Neutron Embrittlement
- 4.3 Metal Fatigue
- 4.4 Environmental Qualification of Electrical Equipment
- 4.5 Concrete Containment Tendon Prestress
- 4.6 Containment Liner Plate and Penetration Fatigue
- 4.7 Other Plant-Specific TLAAs



Section 4.2: Reactor Vessel Neutron Embrittlement – Upper Shelf Energy

Limiting Beltline Material—Lower Shell Plate (B2002-3)

Unit 2

% CU	48 EFPY Fluence (E>1 MeV) at 1/4T 10 ¹⁹ (n/cm ²)	Initial Charpy V notch USE Value (ft-lb)	Irradiated Charpy V notch USE Value at 48 EFPY (ft-lb)	Acceptance Criterion per 10 CFR 50, App. G (ft-lb)
0.25	1.136	74	48.3	≥50

- Equivalent margins analysis submitted which meets Appendix G of ASME Section XI and 10 CFR Part 50, Appendix G



Section 4.2: Reactor Vessel Neutron Embrittlement – Upper Shelf Energy

Limiting Beltline Material—Lower Shell Plate (B2803-3)

Unit 3

% CU	48 EFPY Fluence (E>1 MeV) at 1/4T 10 ¹⁹ (n/cm ²)	Initial Charpy V notch USE Value (ft-lb)	Irradiated Charpy V notch USE Value at 48 EFPY (ft-lb)	Acceptance Criterion per 10 CFR 50, App. G (ft-lb)
0.24	0.9298	68	49.8	≥50

- Equivalent margins analysis submitted which meets Appendix G of ASME Section XI and 10 CFR Part 50, Appendix G



Section 4.2: Reference Temperature for Pressurized Thermal Shock (PTS) Values

Limiting Beltline Material—Lower Shell Plate (B2803-3) Unit 3

%CU %Ni	48 EFPY Fluence (E>1 MeV) (@clad/steel interface) 10 ¹⁹ (n/cm ²)	Initial Charpy RT _{NDT} °F	RT _{PTS} °F	Acceptance Criterion per 10 CFR 50.61 °F
0.24	1.56	74	279.5	≤270°F
0.52				

Commitment 32: As required by 10 CFR 50.61(b)(4), IP3 will submit a plant-specific safety analysis for plate B2803-3 to the NRC three years prior to reaching the RT_{PTS} screening criterion. Alternatively, the site may choose to implement the revised PTS rule when approved.



Section 4.3: Metal Fatigue Analyses

- 60-year fatigue analyses were performed for all NUREG/CR-6260 locations, except 2 locations (IP2) and 3 locations (IP3)
- Entergy will manage aging for NUREG/CR-6260 locations in accordance with 10 CFR 54.21(c)(1)(iii) (Commitment 33)



Section 4.3: Metal Fatigue Analyses

Section 4.3 – Class 1 Fatigue

- One Open Item
 - OI 4.3-1 – Number of IP3 plant heatups and cooldowns

This OI can be closed



Open Items Still Under Staff Review

- OI 2.5-1 – SBO scoping
- OI 3.0.3.2.15-1 – IP2 reactor refueling cavity leakage
- OI 3.0.3.2.15-2 – IP2 spent fuel pool leak
- OI 3.0.3.3.2-1 – Exterior containment concrete degradation
- OI 3.4-1 – AMR results for the auxiliary feedwater pump room event
- OI 3.5-1 – Water-cement ratio for IP concrete
- OI 3.5-2 – Reduction of strength and modulus of concrete due to elevated temperatures



- OI 2.5-1 – SBO scoping
 - Applicant revised LRA Figures 2.5-2 and 2.5-3, the “Offsite Power Scoping Diagram(s)” for IP2 and IP3 for primary and secondary offsite power paths
 - By letters dated March 24, 2008 and August 14, 2008, the applicant revised and clarified its response
 - The staff is completing its review of the applicant’s information on the SBO scoping boundary and will document its conclusion in the final SER



- OI 3.0.3.2.15-1 – IP2 reactor refueling cavity leakage
 - IP2 refueling cavity leaks at the upper elevations of the stainless steel cavity liner when flooded during refueling outages
 - Attempts have been made to mitigate this condition
 - An action plan is being developed for permanent fix
 - Applicant has committed to perform one-time inspection prior to entering period of extended operation to confirm absence of degradation (Commitment 36)
 - Applicant has not identified augmented inspections for period of extended operation
 - Staff sent draft RAI to request how the AMP will monitor condition during period of extended operation



- OI 3.0.3.2.15-2 – IP2 spent fuel pool leak
 - IP2 spent fuel pool (SFP) has experienced leakage
 - IP2 SFP does not have leak chase channels
 - Applicant committed to test the groundwater outside IP2 SFP every 3 months (Commitment 25)
 - Applicant does not plan to perform augmented inspections of SFP during the period of extended operation.
 - Staff sent draft RAI to request how the AMP will monitor this condition during period of extended operation



- OI 3.0.3.3.2-1 – Exterior containment concrete degradation
 - External surfaces of IP2 and IP3 containments have locations of concrete spalling
 - Applicant explained that areas of spalling occur at cadweld sleeves and scaffolding anchor locations
 - Applicant concluded there is sufficient design margin for exposed rebar
 - Applicant committed to perform enhanced inspections of containment (Commitment 37)
 - Staff sent draft RAI requesting information on how the applicant will use the above within its Containment Inservice Inspection Program



- OI 3.4-1 – AMR results for the IP2 auxiliary feedwater pump room fire event
 - Applicant stated that systems are continuously in operation and monitored
 - Applicant stated aging related degradation that occurs during 1 hour is negligible
 - Applicant concluded that there are no aging effects; therefore no AMPs are necessary
 - Applicant provided additional information on January 27, 2009
 - Staff is still evaluating applicant’s response



- OI 3.5-1 – Water-cement ratio for IP concrete
 - LRA identified the water-cement ratios for IP concrete
 - Staff identified a discrepancy and asked for clarification
 - Applicant stated it used Method 2 in ACI 318-63 standard to determine concrete strength
 - Staff sent draft RAI to define water-cement ratios and provide results of original concrete strength tests. Alternatively, the applicant may identify applicable aging effects and how they will be managed



- OI 3.5-2 – Reduction of strength and modulus of concrete due to elevated temperatures
 - LRA stated concrete surrounding IP2 penetrations can reach 250 °F
 - GALL Report recommends further evaluation to manage reduction of strength and modulus of concrete structures due to elevated temperature (>200 °F)
 - Applicant concluded that reduction of strength and modulus is not an aging effect requiring management
 - Applicant determined a reduction in strength of 15% from elevated temperatures which is acceptable
 - Staff sent draft RAI about how strength margin was determined and if reduction in modulus of elasticity was considered. Alternatively, the applicant may explain how the aging effect will be managed



Questions?