# Risk Informed ISI (RI ISI) Based on Code Case N-716

# RI ISI
# Background

- RBS Submittal dated June 16, 2009
- Requested approval date - December 2010
- RF-16 begins early 2011
- RI ISI Relief Requests based upon Code Case N-716 have a common template
- Submittal template based upon Grand Gulf pilot submittal dated September 22, 2006

# RI ISI Background

- Used prior submittals as guidance in development of RBS submittal
- Followed Regulatory Guide 1.200 Revision 1 guidance
  - GAPs identified
  - Applicable GAPs addressed

# RI ISI Background

- Submittal consists of the following sections
  - Risk Methodology based on Code Case N-716
  - Risk information included
  - PRA Model Capability addressed
- Performed Internal Flooding Analysis in support of submittal

# RI ISI Background

- Reviewed Risk Model for this use in accordance with current guidance
- Determined Risk Model acceptable for use in RI ISI Applications
- Assisted by industry-recognized subject matter experts
  - experience with many RI ISI submittals
- Implemented latest industry guidance
- Compared with other RI ISI submittals
- Incorporated lessons learned from RAIs

# River Bend Station PRA Background

- Developed in response to GL 88-20 (IPE)
- IPE approved via Oct. '97 NRC Staff Evaluation
- Used in support of various risk-informed License Amendment Requests

# River Bend Station PRA Background

- Last Full RBS PRA Revision: Revision 4 - Sept. 2005
- Revision 5 update: Scheduled completion - Dec. 2010

# PRA Self-Assessment Gap Analysis

- Performed Self-Assessment consistent with RG 1.200 R.1 Section 4.1 in late 2008
- Assessed against RG 1.200 Rev.1 and ASME PRA Standard

# PRA Self-Assessment Gap Analysis

- Used industry expertise in Gap analysis
- Entergy lead for Internal Flooding and Maintenance/Update elements
  - Internal Flooding PRA performed to meet ASME Cat. II

# PRA Self-Assessment
# Gap Analysis

- Gap: All items where any work required to meet RG 1.200 characterized as "gaps"
- Self-assessment grading consistent with RG 1.200 Section 2.1 expectations

# PRA Self-Assessment
# Gap Analysis

- Gaps to RG 1.200 identified in submittal
  - Consistent with RG 1.174
  - Consistent with Vogtle

# PRA Quality

Per RG 1.174 section 2.2.6:

"*There are, however, some applications that, because of the nature of the proposed change, have a limited impact on risk, and this is reflected in the impact on the elements of the risk model.*

*An example is risk-informed in-service inspection (RI-ISI). In this application, risk significance was used as one criterion for selecting pipe segments to be periodically examined for cracking. During the staff review it became clear that a high level of emphasis on PRA technical acceptability was not necessary. Therefore, the staff review of plant-specific RI-ISI typically will include only a limited scope review of PRA technical acceptability.*"

# PRA Quality

- N-716 RI ISI less reliant on PRA than other RI ISI approaches
  - Binning before selection
  - PRA one of 5 elements
  - Absolute risk ranking
- N-716 criteria
  - CDF of 1E-06, LERF of 1E-07
  - Degradation Mechanisms

# PRA
# Self-Assessment

- Self-Assessment performed to identify all work to meet RG 1.200, including Cat. II, for other future risk-informed applications
- For RBS RG 1.200 Gap Analysis:
  - Of the 72 Supporting Requirements (SR) with identified gaps, 7 SR's have different requirements for Cat. I vs. Cat. II.

# PRA
# Gap Analysis

- Breakdown of gaps:
  - 40 gaps: Documentation Issues
  - 13 gaps: Need not be met (per EPRI) mostly uncertainty issues, would not Impact RI ISI.
  - 10 gaps: Model refinements potentially needed but not significant for RI ISI
- 6 gaps (9 items): Model refinements or sensitivity studies. Addressed in Table 2 of submittal.

# PRA
# Inputs

- Internal Flooding PRA completed June 2009
  --meets Cat. II requirements
- Two cases quantified:
  · Base: EPRI pipe break frequencies
  · Sensitivity (Conservative, used for N-716 screening)

# PRA Inputs

- Used IFPRA to assess CDF (≤1E-06) and LERF (≤1E-07) for segments considered conservative due to assumptions & conservative simplifications due to scope
- Used PRA to confirm and provide upper limit CCDP/CLERP values in N-716 risk impact assessment
  - Compared risk impact results to guidance of RG 1.174

# PRA
# Inputs

- Addressed potentially applicable gaps in Table 2 of June 16 submittal
  --includes sensitivity studies
- Entered all gaps into Model Change Request (MCR) database to address in Revision 5 to RBS model
  - Controlled procedurally by common Entergy process

# PRA
# Conclusion

- Followed established process
- Determined RBS PRA providing acceptable support / sufficient rigor for N-716 RI ISI
  - Cat. II Internal Flooding PRA
  - Gaps to ASME Std. addressed, do not impact use for RI ISI

# Comparison to NRC Acceptance Criteria

## LIC-109 Rev.1, Appendix B

# Request for Alternative

## Extension of 2nd ISI Interval

# ISI Interval Extension Background

- Previously extended ISI Interval to RF-15 for examination of 123 welds.
- Projected exposure for these examinations - 17.83 Rem
- RBS proposed to perform 73 examinations by startup from RF-15
- Requested extension of ISI interval from RF-15 until RF-16 for remaining 50 examinations

# ISI Interval Extension Exposure Projections

- Include weld prep time, RP, scaffolding, insulation support and NDE
- Based upon current plant conditions, and crediting previous chemical cleaning, use of shielding and system flushing
- Validated during RWP challenge process for RF-15

# ISI Interval Extension Result of Approval

- Extension results in ~90% completion of subject Examination Categories for Second ISI Interval by end of RF-15
- NOTE: Subject examinations greatly reduced under RI ISI requirements
  - 123 examinations under conventional ISI program
  - 14 examinations under RI ISI program

# ISI Interval Extension Examinations

Result

- 43 examinations deferred to RF-16 pending RI ISI approval (not required under RI ISI)
- 80 examinations performed during RF-15
- No additional actions required when RI ISI submittal approved

# ISI Interval Extension Conclusions

- Low significance for extension based on:
  - acceptable previous examination history
  - industry experience for failure probabilities
  - proposed RI ISI program indicates 43 welds would not require future examination
- Excessive radiation exposure without a compensating increase in quality or safety

# Comparison to NRC Acceptance Criteria

## LIC-109 - Appendix B