



Risk & Performance- Inspired (RPI) Applications

**August 29, 2000
Two White Flint**

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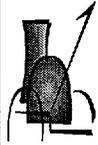
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Agenda

- **Purpose of Meeting**
- **RI-ISI Submittals**
- **BER**
- **Items for Clarification**
- **Additional RPi Activities**
- **Action Items**
- **Concluding Remarks**

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Purpose of Meeting

- **Follow-up to Dec, 1999 meeting**
- **Continue NRC/Industry dialogue for Ongoing Risk and Performance Inspired Applications**
- **Provide to NRC, Status on Applications/Submittals**
- **Discuss Schedule**

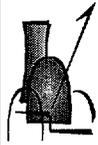
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RI-ISI Submittals

- **Follow-on Plants (1999)**
 - **Fitzpatrick (October, 1999)**
 - **South Texas, Units 1 & 2 (December, 1999)**

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RI-ISI Submittals

- **Follow-on Plants (2000)**

- **W - PWRs**

- Braidwood, U1 & U2 [3Q]
- Byron, U1 & U2 [3Q]
- Callaway [4Q]
- Comanche Peak, U1 & U2 [4Q]
- Diablo Canyon, U1 & U2 [4Q]
- South Texas Project, U1 & U2 [4Q]
- Wolf Creek [4Q]

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RI-ISI Submittals

- **Follow-on Plants (2000 cont.)**

- **BWRs**

- Perry [3Q]
- WNP2 [4Q]
- Pilgrim [4Q]
- Dresden, U1 & U2 [3Q]
- LaSalle, U1 & U2 [3Q]
- Quad Cities, U1 & U2 [3Q]
- Nine Mile Point, U2 [4Q]*

- **CE - PWRs**

- Calvert Cliffs, U1 & U2 [4Q]*

* BER pilot plants

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RI-ISI Submittals

- **Follow-on Plants (2001)**

- **BWRs**

- Brunswick, U1 & U2 [1Q]
- Fermi [2Q]
- Clinton [3Q]
- Limerick, U1 & U2 [3Q]
- Peach Bottom, U1 & U2 [3Q]
- Monticello [4Q]
- Nine Mile Point, U1 [4Q]

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RI-ISI Submittals

- **Follow-on Plants (2001)**

- **W - PWRs**

- Indian Point, U2 [1Q]
- Indian Point, U3 [1Q]
- Seabrook [1Q]
- Point Beach, U1 & U2 [4Q]

- **B&W - PWRs**

- Crystal River [2Q]
- TMI [3Q]

- **CE - PWRs**

- Waterford [4Q]

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RI-ISI Submittals

- **Follow-on Plants (2002)**

- **BWRs**

- Duane Arnold [4Q]

- **W - PWRs**

- Kewaunee [4Q]
- Prairie Island, U1 & U2 [4Q]
- VC Summer [1Q]
- HB Robinson [4Q]



Break Exclusion Requirements

- Historical Perspective
- Goals
- Impact on Existing Design Bases
- Adaptation of RI-ISI
- Schedule

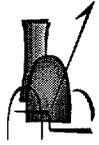
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Break Exclusion Requirements

- Historical Perspective
 - Giambusso Letter, December 1972
 - O'Leary Letter, 1973
 - Regulatory Guide 1.46 "Protection Against Pipe Whip Inside Containment," May 1973
 - Standard Review Plan 3.6.1, "Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment," July 1981
 - Standard Review Plan 3.6.2, "Determination of Rupture Locations and Dynamic Effects Associated with the Postulated Rupture of Piping," July 1981
 - Many Specific Licensee/USNRC Agreements
 - ASME Boiler and Pressure Vessel Code, Section XI
 - USNRC Generic Letter 89-08 (FAC)

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Break Exclusion Requirements

- **Historical Perspective (cont.)**

- Individual Plant Requirements vary greatly:
 - Group A plants have no requirements for augmented examinations
 - Group B plants have a small number of augmented examinations
 - Group C plants meet SRP requirements,
 - Group D plants exceed SRP requirements
- Terminology includes BER, NBZ, HELB, AE...
- Requirements predate augmented inspection programs for FAC and Thermal Fatigue

- **Goals**

- A logical, consistent, stable and predictable process,
- Cost-effective implementation (RI-ISI process)

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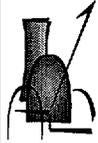


Break Exclusion Requirements

- **Impact on Existing Design Bases**

- Current Process
 - Very plant specific
 - Special rules for "BER piping"
- Proposal
 - Change is to inspection size, only

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Break Exclusion Requirements

- **Adaptation of RI-ISI (SCOPE)**
 - **BWRs:**
 - can be Class 1, 2, 3, NNS piping,
 - MS, FW, RWCU, HPCI
 - **PWRs:**
 - can be Class 2, 3 and NNS piping,
 - MS, FW, AFW, SGBD, CVCS, AS

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Break Exclusion Requirements

- **Adaptation of RI-ISI (FAILURE POTENTIAL)**
 - **Operating Experience for applicable systems**
 - the only significant failures are due to FAC and high temperature creep and creep/fatigue,
 - others failures or anomalies due to thermal fatigue and cavitation
 - **Impact of Inspections**
 - Creep and creep/fatigue n/a for NPPs
 - FAC programs are in place,
 - RI-ISI assesses susceptibility to thermal fatigue and cavitation

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Break Exclusion Requirements

- **Adaptation of RI-ISI (FAILURE POTENTIAL)**
 - Plant Specific Service History
 - ≥ 10 years of BER inspection history
 - susceptibility to waterhammer
 - other augmented inspections (e.g. FAC)
 - leak detection capability

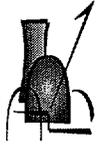
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Break Exclusion Requirements

- **Adaptation of RI-ISI (CONSEQUENCE of FAILURE)**
 - Consequence of Failure (General)
 - no credit for equipment in the vicinity (e.g. inside containment vs outside containment),
 - if credited: successful and unsuccessful operation assessed,
 - some plants designed for breaks even in the "no break zone"

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Break Exclusion Requirements

- **Adaptation of RI-ISI**
 - **RISK SIGNIFICANCE** - no change
 - **INSPECTION SIZE** - no change
 - **Change in Risk**
 - meet R.G. 1.174 req'ts
 - provide for defense in depth

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Break Exclusion Requirements

- **Adaptation of RI-ISI**
 - **Licensee Submittals**
 - CCNP and NMP-2
 - Follow-on process
 - Other licensee commitments
 - Existing lack of consistency among the fleet

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Break Exclusion Requirements

- **Adaptation of RI-ISI**
 - **Schedule**
 - **Draft Revision to RI-ISI TR [Sept, 2000]**
 - **CCNP, U1 & U2 [Oct, 2000]**
 - **NMP-2 [Oct, 2000]**

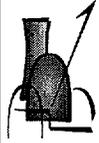
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Items for Clarification

- **Class 1 applications**
- **Socket Welded Connections**
- **Credit for Augmented Examinations**
- **Delta Risk**
- **Program Implementation**

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Items for Clarification - cont.

- **Class 1 applications**
- **N560**
 - Applies to examination category B-J piping welds
 - Inspection size equals 10% of total population
- **N578**
 - TR-112657, section 3.6.4.2
 - Class 1 inspection populations substantially below 10% should be reviewed

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Items for Clarification - cont.

- **Socket Welded Connections**
 - TR does not provide inspection volumes for socket welded connections,
 - ANO-2 application to CAT4 locations (RT),
 - ASME Code Cases N577/578 call for VT-2 exams,
 - EPRI-MRP thermal fatigue task group,
 - EPRI NDE Center research,
 - ASME TG ISI Optimization - code action to eliminate surface exam

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Items for Clarification - cont.

- **Credit for Augmented Examinations**
 - **TR-112657, section 3.6.4.2**
 - risk ranking includes all potential degradation mechanisms
 - FAC & IGSCC inspections per augmented program,
 - RI-ISI exams for other mechanisms and CAT4 locations only
 - **Fitzpatrick application**
 - risk ranking with and without (FAC, IGSCC & MIC)
 - augmented exams fully credited towards RI-ISI population

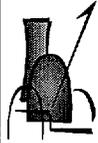
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Items for Clarification - cont.

- **Delta Risk is met if:**
 - **System level criteria is met for each individual system, or**
 - **Cumulative impact for all systems meets the plant level criteria**

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Items for Clarification - cont.

- **Program Implementation**
 - Implemented at the beginning of a ten year interval
 - Implemented within an interval provided IWA-2000 is met
 - Relief request

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Individual Licensee Issues

- **Per the SER, each applicant must address:**
 - inclusion of B-F welds
 - quality, scope and level of detail of PRA used,
 - walkdown procedure (direct and indirect effects of breaks)
 - criteria, information and operating experience for application to thermal fatigue & local corrosion
 - Use of Markov model, transition rates and data

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Additional RPi Activities

- **Living RI-ISI Program Requirements**
- **Inspection Volumes**
- **Relief Requests**
- **Alternative surface exam req'ts**
- **LCM/LR**
- **Integration Tasks**
- **Containment**

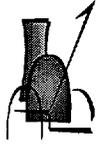
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Additional RPi Activities - cont.

- **Living RI-ISI Program Requirements**
 - 30 RI-ISI applications completed or underway
 - developing site specific and generic living program criteria
- **Inspection Volumes**
- **Relief Requests**

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Additional RPi Activities - cont.

- **Alternative surface exam req'ts**
 - Code case being letter balloted at WGIRBE
 - Subgroup Water Cooled System - Dec, 2000
 - Further supported by Task Group ISI Optimization Socket Welded Connection Whitepaper

- **LCM/LR**
 - open communication with EPRI/industry groups

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Additional RPi Activities - cont.

- **Integration Tasks**
 - BWRVIP-075
 - IGSCC in BWRs
 - SER (9/00) ?

 - EPRI-MRP thermal fatigue ITG
 - interim guidance
 - evaluation tools consistent with EPRI RI-ISI methodology
 - examination volumes

 - PDI

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Additional RPi Activities - cont.

- **Containment**
 - Project delayed due to other priorities (e.g. RI-ISI piping applications)
 - Revised schedule:
 - start late 2000
 - NRC participation on plant inspections

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Action Items (12/99)

- **Industry/NEI/NRC Senior Level Mgt**
 - RI-ISI submittals
 - Integration/Coordination
- **Containment Inspections (NRC participation)**
- **LR - coordination with 3 year plan**
- **BER/HELB White Paper**
- **Living Program Criteria**
- **Use C&S whenever appropriate**

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Concluding Remarks

- Industry
- NRC

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