



# CC N711 - Alternative Examination Coverage Requirements

**Patrick O'Regan**  
poregan@epri.com

**Rockville, MD**  
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# Overview

- RI-ISI Background
- N711 Process
- Summary
- Q&A

# RI-ISI Timeline

## 1996-1997

ASME CC N560 –  
Class-1 BJ Welds Only

ASME CC N577 –  
RI-ISI Method A

ASME CC N-578 –  
RI-ISI Method B



## 1998-1999

NRC Approves  
Industry Reports –

WOG Topical  
Report 14572

EPRI Topical  
Report 112657



## 1999-Present

U.S. & Worldwide Industry  
Implement –

~ 20 U.S. Reactors +  
Several Countries

>70 U.S. Reactors +  
Several countries

# RI-ISI

- ASME Section XI Inservice Inspection Programs as mandated by 10CFR50.55
  - Class 1, 2 & 3 components
  - Rules may be used on non-Code components
  
- Augmented Programs
  - IGSCC (BWRs) - USNRC Generic Letter 88-01, Category A \*
  - Thermal Fatigue - USNRC IEBs 88-08, 88-11 & IN 93-20
  - IGSCC (PWRs) - USNRC IEB 79-17
  - SWS - USNRC Generic Letter 89-13
  - FAC - USNRC Generic Letter 89-08

\* Non Category A inspections may be credited towards the RI-ISI population

# Recent Initiatives

- RI-Repair/Replacement
- Streamlined RI-ISI

# Risk-Informed Repair / Replacement

- Process uses the “consequence portion” of EPRI RI-ISI methodology supplemented with “additional considerations” to define final high and low safety significance
- High Safety Significant (HSS) components continue to meet ASME Section XI requirements
- Low Safety Significant (LSS) components no longer need to meet ASME Section XI requirements (similar to 10CFR50.69)
- ANO, Unit 2 Pilot Plant Application
  - NRC approved Classification and Treatment processes
- EPRI Report 1022945
- Methodology being used by 10CFR50.69 pilot plant (Vogtle U1 & U2)
- Coordinating with New Build activities

# Recent Initiatives - Streamlined RI-ISI

- GOAL: Develop a consistent, generic and streamlined process for implementing and maintaining a RI-ISI program
  - ASME Whitepaper 2002-02-01
    - Reviewed over fifty plant-specific RI-ISI applications,
    - Thirty, of which, were Class 1 & 2 or fullscope applications
    - Reviewed a number of industry and USNRC risk assessments
  - Delta risk assessment conducted for eight plants
    - N716 (RIS\_B) provides a risk reduction or at worst, risk neutrality
    - Looked at BWRs and PWRs,
    - Looked at plants that used the EPRI and West RI-ISI methods

# Recent Initiatives - Streamlined RI-ISI

## ASME CC N716

- ~40 plant applications
- Reflects RG1.200 and EPRI Report 1021467 (PRA Technical Adequacy)
- Included in USNRC Regulatory Guide 1.147 to be issued September, 2014
- Pilot Study underway for New Build fleet (Summer 2 & 3, AP1000)



# Voluntary Safety Benefit of RI-ISI - a snapshot

Number of Units	Safety Improvement
4	Additional analyses to more accurately define plant risk
3	Hardware modifications (e.g. rerouting of piping, flow restricting orifices)
4	New or revised operating procedures
8	New NDE on non inspected and / non safety-related piping

# RI-ISI Methodology - Incomplete Items

- Break Exclusion Region / High Energy Line Break
- Examination Volumes

# RI-ISI Methodology - Incomplete Items

- Break Exclusion Region / High Energy Line Break
  - USNRC SRP Sections 3.6.1 and 3.6.2, or licensee specific commitments
  - Initial methodology and pilot plants did not address
  - RI-ISI Extension approved for use on BER programs and documented in EPRI TR1006937-A

# RI-ISI Methodology - Incomplete Items

- Examination Volumes
  - WCAP-14572 and EPRI TR112657 used wording along the lines of “sufficient to capture the mechanism of interest”
  - In response to NRC input revised to “essentially 100%”
  - Subsequently ASME CC N711 was developed and approved by ASME

## Alternative Examination Coverage Requirements

- Traditional SXI process requires > 90 percent exam coverage
- Existing RI-ISI methodologies require > 90 percent exam coverage
- Intent of RI-ISI was to conduct an “inspection for cause” approach that would reliably detect the mechanism of interest, irrespective of exam coverage

## Alternative Examination Coverage Requirements

- Structured process developed to determine the exam volume of primary interest
  - Geometric configuration
  - Degradation mechanism(s) potentially operative
- Volume of primary interest: volume of highest susceptibility to postulated degradation
- Can be used by RI-ISI as well as traditional SXI programs

## Alternative Examination Coverage Requirements

- Step 1 - Determine degradation mechanism of interest
  - Uses process contained in EPRI TR-112657 B-A
  - Additional effort required by deterministic ISI programs
- Step 2 - Determine configuration (e.g. pipe to pipe, pipe to valve)
- Step 3 - based on 1 and 2, enter Table 2 of the CC
- Step 4 - based on Table 2, identify if volume of primary interest was captured
- Step 5 - document use of CC on Form N-711-A and include with Form NIS-1 or Form OAR-1

Damage Mechanism	Process Decision Point	If Decision Point is “Yes”	If Decision Point is “No”	Risk Characterization <sup>(2)(4)</sup>	
				Method A	Method B
FAC	Requirements governed by plant FAC program. No further action required.			Region 1A Region 1B Region 2	Category 1 Category 3 Category 5
WH + other DM VF (assumed)	(a) Is water hammer and/or vibratory fatigue still applicable?	<ul style="list-style-type: none"> <li>correct design deficiency</li> <li>re-risk rank system without water hammer and/or vibratory fatigue</li> </ul>	<ul style="list-style-type: none"> <li>re-risk rank system without water hammer and/or vibratory fatigue</li> </ul>	Non RI-ISI Exam	Non RI-ISI Exam
	(b) Is the examination still required?	<ul style="list-style-type: none"> <li>partition by applicable damage mechanism as shown below</li> </ul>	<ul style="list-style-type: none"> <li>no further action required</li> </ul>		
TASCS TT	(c) Is the inspection location on a horizontal run to a steam generator or BWR vessel, including feedwater nozzle?	<ul style="list-style-type: none"> <li>see decision point (d)</li> </ul>	<ul style="list-style-type: none"> <li>see decision point (e)</li> </ul>	Region 1A Region 1B Region 2 Non RI-ISI Exam	Category 2 Category 5 Non RI-ISI Exam
	(d) Was the weld, pipe side heat affected zone and pipe side counterbore transition captured?	<ul style="list-style-type: none"> <li>document exam limitation and coverage achieved and verify examination performed to the extent practical, including best effort for component side</li> <li>no further action required</li> </ul>	<ul style="list-style-type: none"> <li>volume of primary interest not sufficiently examined</li> <li>coverage requirement not met</li> </ul>		
	(e) Is the inspection location a pipe to component weld? Includes pipe to pumps, valves, nozzles and branch connections.	<ul style="list-style-type: none"> <li>see decision point (f)</li> </ul>	<ul style="list-style-type: none"> <li>see decision point (g) if the exam limitation is a counterbore issue</li> <li>if the exam limitation is a weld or heat affected zone issue , then the required volume was not sufficiently examined and the coverage requirement was not met</li> </ul>		
	(f) Was the weld, pipe side heat affected zone and pipe side counterbore transition captured?	<ul style="list-style-type: none"> <li>document exam limitation and coverage achieved and verify examination performed to the extent practical, including best effort for component side</li> <li>no further action required</li> </ul>	<ul style="list-style-type: none"> <li>see decision point (h) if the exam limitation is a counterbore issue</li> <li>if the exam limitation is a weld or heat affected zone issue , then the volume of primary interest was not sufficiently examined and the coverage requirement was not met</li> </ul>		

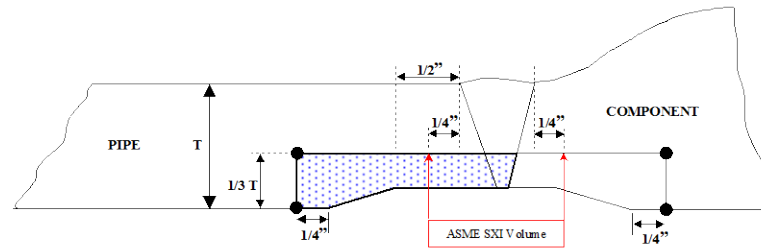


TASCS TT (Cont'd)	(a) Is the counterbore transition located within ½” (13mm) of the weld fusion line?	<ul style="list-style-type: none"> <li>required volume not sufficiently examined</li> <li>coverage requirement not met</li> </ul>	<ul style="list-style-type: none"> <li>document exam limitation and coverage achieved and verify examination performed to the extent practical</li> <li>no further action required</li> </ul>	Region 1A Region 1B Region 2 Non RI-ISI Exam (Cont'd)	Category 2 Category 5 Non RI-ISI Exam (Cont'd)		
	(b) Is the counterbore transition located within ½” (13mm) of the weld fusion line?	<ul style="list-style-type: none"> <li>volume of primary interest not sufficiently examined</li> <li>coverage requirement not met</li> </ul>	<ul style="list-style-type: none"> <li>document exam limitation and coverage achieved and verify examination performed to the extent practical, including best effort for component side</li> <li>no further action required</li> </ul>				
IGSCC (BWR)	Requirements governed by owner controlled program. No further action required.						
IGSCC (PWR) PWSCC	(c) Is the inspection location a pipe or safe end to nozzle weld?	<ul style="list-style-type: none"> <li>see decision point (j)</li> </ul>	<ul style="list-style-type: none"> <li>see decision point (m)</li> </ul>				
	(d) Is Alloy 600, 182 or 82 present? Includes fitting, weld and/or buttering.	<ul style="list-style-type: none"> <li>partial coverage (i.e., ≤ 90%) is not acceptable</li> <li>coverage requirement not met</li> </ul>	<ul style="list-style-type: none"> <li>see decision point (k)</li> </ul>				
	(e) Was the weld, pipe side heat affected zone and pipe side counterbore transition captured? If corrosion resistant cladding exists on the inner surface, the weld is not a concern.	<ul style="list-style-type: none"> <li>document exam limitation and coverage achieved and verify examination performed to the extent practical, including best effort for component side</li> <li>no further action required</li> </ul>	<ul style="list-style-type: none"> <li>see decision point (l) if the exam limitation is a counterbore issue</li> <li>if the exam limitation is a weld or heat affected zone issue, then the volume of primary interest was not sufficiently examined and the coverage requirement was not met</li> </ul>				
	(f) Is the counterbore located within ½” (13mm) of the weld fusion line?	<ul style="list-style-type: none"> <li>volume of primary interest not sufficiently examined</li> <li>coverage requirement not met</li> </ul>	<ul style="list-style-type: none"> <li>document exam limitation and coverage achieved and verify examination performed to the extent practical, including best effort for nozzle side</li> <li>no further action required</li> </ul>				

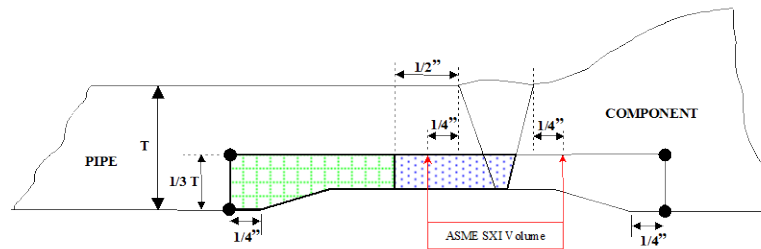
# N711 Examples

Damage Mechanisms: TASCs, TT

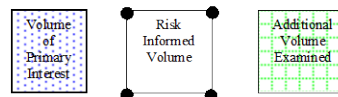
Component Configuration:  
Pipe to Component



Example 1



Example 2

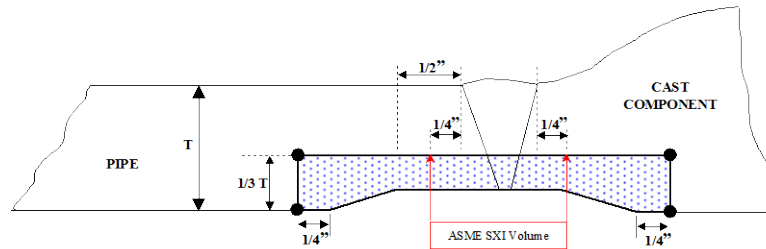


# N711 Examples

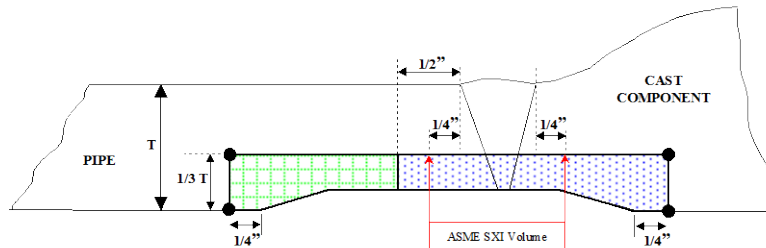
Damage Mechanisms: IGSCC

Component Configuration:  
Pipe to Cast Component

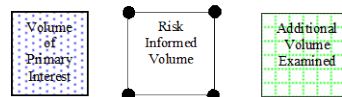
Ferrite/Carbon Content  
NOT within Resistant Region of Figure 1



Example 5



Example 6



# Summary

- RI-ISI has been very successful in reducing worker exposure, rad waste, low value added exams and improving plant safety
- N711 provides a structured process for determining the examination “volume of primary interest”
- “Volume of primary interest” represents the higher susceptibility to the degradation of interest
- N711 provides an informed process for when a relief request should be required
- Use of N711 is documented in Form N-711-A and to be included with Form NIS-1 or Form OAR-1

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