FENOC Beaver Valley 2-NRC-WOG

Meeting On Risk-informed In-service Inspection (ISI)

Augmented High Energy Line Break (HELB)

September 25, 2002

Agenda

FENOC/WOG/BNFL Westinghouse

- Introduction and Opening Remarks
- Risk Informed ISI Methods Applied to High Energy Line Break Augmented Inspections - WCAP-14572 Revision 1-NP-A Addendum 1 - Markup
  - History
  - Lead Plant, Scope, and Approach
  - Results
  - NRC Review
- Related WOG Risk-Informed Initiatives
- Summary

Introduction

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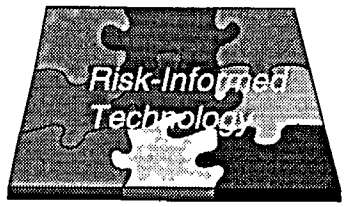
Introduction and Opening Remarks

To discuss and to obtain NRC feedback and direction on program results on the extension of the risk-informed ISI application to High Energy (HE) piping in the Break Exclusion Zone (BEZ) at FirstEnergy Nuclear Operating Company Beaver Valley Unit 2 - the lead plant for the WOG Topical Report Addendum



Risk Informed Methods Applied
to
High Energy Line Break Augmented Inspections
WCAP-14572 Revision 1-NP-A
Addendum 1 - Markup

History

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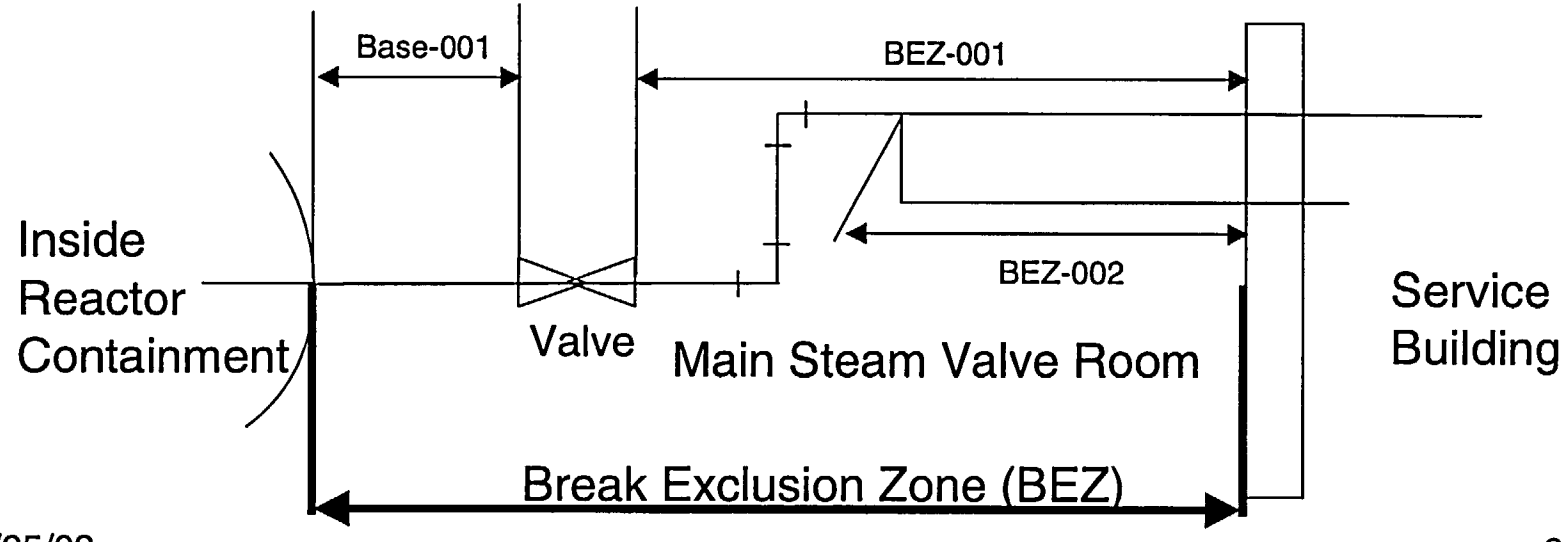
- WCAP 14572 Rev 1-NP-A Addendum 1 submitted 12/99 for augmented exams and HELB specifically
- March 8, 2000 WOG/NRC met to address and discuss NRC questions (ADAMS ML0036900235) on the Addendum to WCAP-14572, Revision 1-NP-A for augmented exams and HELB specifically
- Markup to Addendum 1 of WCAP-14572, Rev 1-NP-A issued to NRC 6/2000
- Beaver Valley-2 identified to NRC to test methodology for HELB exams
- Meeting held between NRC/NEI/WOG/EPRI in May 2001;
  - NRC expressed concern about consequence analysis that would be used to address HELB exams for break exclusion regions, particularly where 100% selection per SRP or NUREG-0800 is required to meet GDC-4 intent
  - NRC concerned about portions of high energy piping currently covered by augmented ISI where a break would violate single failure criteria, e.g., there is no way to isolate the failure of some main steam piping outside containment
  - Treatment of dynamic effects from pipe failure must be consistent with NRC Standard Review Plan Chapter 3.6.2
  - Notification proposed to be done via periodic §50.59 summary report and SAR update per §50.71(e)
- Meeting held September 2001 between NRC/FENOC/WOG presenting results of application of WCAP 14572 Methodology for Lead Plant Scope, Segment Definition, Direct Consequence Assessment, and Indirect Effects Assessment tasks.
- Meeting held between NRC/NEI/WOG/EPRI in October 2001; technical issues and regulatory approach discussed.
  - Confirmed process for notification via §50.59 summary report and SAR update per §50.71(e)

Lead Plant, Scope, and Approach

- Lead Plant
  - FirstEnergy Corporation Beaver Valley Unit 2 (FENOC BV2)
- Scope
  - RI-ISI Base Program ASME Class 1/Class 2 RI-ISI Piping
  - BV2 High Energy (HE) Piping in the Break Exclusion Zone (BEZ) as defined in the UFSAR



Lead Plant, Scope, and Approach

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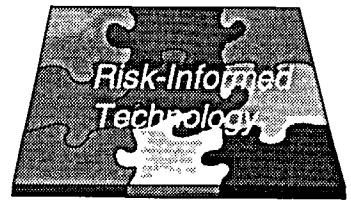
- Approach
  - WOG RI-ISI Methodology defined in Addendum to WCAP-14572, Revision 1-NP-A dated May 2000
  - Identical to WOG Risk-Informed In-Service Inspection Methodology defined in WCAP-14572 Revision 1-NP-A
  - Documentation process and requirements identical to base scope
  - Safety concerns and regulatory oversight addressed via well-defined assessment process (10CFR50.59)

Results



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- Scope and Segment Definition
  - HE piping identified using UFSAR system list and plant piping line list
  - 16 segments added to base scope segments
  - 917 Base Scope Class 1 and 2 piping segments
  - 933 Total segments considered in evaluation
  - No additional segments defined as a result of indirect consequences

Results

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- Consequence Evaluation
  - Direct
  - Indirect
    - A walkthrough per WOG RI-ISI Methodology defined in addendum to WCAP-14572 Revision 1-NP-A (May 2000) was completed for all BEZ piping inside and outside of containment
    - Walkthroughs confirmed existing Design Basis documentation
    - Design Basis Break Locations exist at penetrations inside containment.
    - Penetration Design consistent inside and outside containment.
    - Potential new pipe breaks in the BEZ have designs in place to mitigate consequences in adjacent areas
    - Existing plant design reflects train separation
    - Systems required to perform safety related functions concurrently or consecutively were physically isolated
    - Current inspection locations have isolated or redundant impacts on safety in the event of a piping failure
    - To date no flaw indications found within BEZ scope segments
  - Evaluated through plant PRA

Results

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- Failure Probability Assessment - WinSRRA used to assess piping failure probability
- Risk Evaluation
  - Segment combinations considered
    - 917 Base scope (Class 1 and 2 piping)
    - 933 segments in combined scope (Class 1, Class 2, and BEZ)
    - 72 BEZ segments (56 Base Scope/BEZ and 16 BEZ only)
    - Evaluated with no credit for non-BEZ augmented inspection program
      - 933 segments in combined scope (Class 1, Class 2, and BEZ)
      - 72 BEZ segments
  - Relative ranking of segments did not vary as a result of combination considered
  - Importance of segments did not vary as a result of combination considered

Results

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Risk Results Summary				
Segment Combination	CDF		LERF	
	With Op. Action	Without Op. Action	With Op. Action	Without Op. Action
Base Scope (917 Segments)	1.36E-06	1.90E-06	2.15E-08	2.33E-08
Base + BEZ (933 Segments)	1.36E-06	1.90E-06	2.15E-08	2.33E-08
BEZ (72 Segments)	1.07E-10	9.93E-11	2.62E-12	1.46E-12

Results

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- Expert Panel Categorization
  - Panel Members consistent with Base Scope Review
  - Significant discussion on potential indirect effects due to flooding, etc. confirmed indirect effects assessment completed as part of standard methodology application.
  - No change to base scope HSS/LSS rankings

Base Scope	Base/BEZ Scope
107 HSS Segments	107 HSS Segments
807 LSS Segments	823 LSS Segments
3 Not Used Segments	3 Not Used Segments

  - 16 BEZ, which are non-Class 1/2 segments, all ranked LSS
  - 8 segments ranked HSS during Base Scope Class 1/2 effort are part of BEZ pipe scope

Results

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- Structural Element/Non-Destructive Examination (NDE) Selection

Program	Exams	Reduction
Current Section XI	586	NA
Base Scope	88	85%
Base Scope and Augmented BEZ	320	NA
Base Scope and RI-ISI BEZ	88	72%

Program	Exams	
Current BEZ	240	NA
RI-ISI BEZ	8	96%

Results

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- Change in Risk - Base Scope program conclusions remain applicable
  - 4 Piping Class 2 Segments added for inspection (2 RCS and 2 SIS)
  - Reduction in overall plant risk

Change In Risk Results Summary				
Segment Combination	CDF		LERF	
	With Op. Action	Without Op. Action	With Op. Action	Without Op. Action
Section XI	2.81E-07	8.24E-07	4.52E-09	6.41E-09
Base Scope (917 Segments)	2.73E-07	8.02E-07	4.36E-09	6.32E-09
Base + BEZ (933 Segments)	2.73E-07	8.02E-07	4.36E-09	6.32E-09
Section XI BEZ Segments	1.17E-10	1.11E-10	2.85E-12	2.00E-12
RI-ISI BEZ Segments	1.17E-10	1.11E-10	2.85E-12	2.00E-12

- 10CFR50.59 - Example provided

NRC Review Schedule

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- Beaver Valley
  - Base Scope Submittal
    - Provided to NRC in July 2002
    - Approval Requested for February 2003 to support Spring 2003 Outage
  - 10CFR50.59
    - Completion needed by February 2003 to support Spring 2003 Outage
- WOG WCAP SER
  - Need by December 2002

Related WOG Risk-Informed Initiatives

WOG Risk-Informed ISI Subgroup

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- Two day training session held on the WOG RI-ISI Process on June 19 & 20, 2002
- Working with EPRI and NEI on developing a "White Paper" on the Living Program for RI-ISI
- To ensure consistent application of the WOG RI-ISI methodology, the Subgroup expects to start peer evaluations of RI-ISI programs in 2003
- Investigating application of risk-informed methods to leakage and analytical evaluation
- Developed a process for conducting inquiries for interpretation of WCAP-14572

Risk-Informed Repair & Replacement

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- Provided support to the development and approval of ASME Code Cases N-658 and N-660
  - Tested Code Case N-658 as part of Option 2 pilot program at Surry Unit 1 and Wolf Creek
  - Incorporated both RI-ISI methodologies into the ASME repair/replacement application
  - Code Cases approved by ASME in July/August 2002
- Demonstration showed that many Class 2 and 3 pressure retaining items may be categorized as low safety significant; some non-Code Class items may be high safety significant
- Working with WOG on developing first applications

Risk-Informing 10CFR50 Special Treatment Requirements - Option 2

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- Performed WOG Option 2 Pilot Program
  - Applied to 2 systems at 2 plants (Wolf Creek/Surry)
  - Tested NEI Guidance (NEI-00-04) and ASME Code Case N-658
  - Developed cost/benefit evaluation (submitted to NEI and NRC)
- Provided feedback to NEI on industry guidance and to ASME on Code Case
- Provided feedback through NEI and ASME to NRC on proposed 50.69 rule
- Continuing to follow progress of industry guidance and NRC rulemaking

Option 3 - LBLOCA

- Initiating Frequencies
- Petition for Rulemaking Submitted

Reactor Vessel In-Service Inspection Interval Extension

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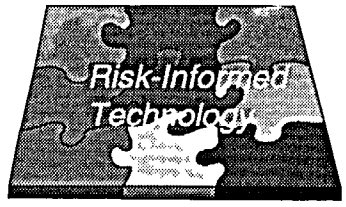
- Joint CEOG-WOG Program
  - Initial feasibility evaluations completed
  - Program aligned with PTS efforts
  - Pilot plants identified

- ASME
  - Draft Code Case and White Paper presented at Sept 2002 ASME Section XI meetings
  - ASME Review comments requested by October 11, 2002
  - Revised Code Case/White Paper presentation planned for December 2002

Summary



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- Beaver Valley Unit 2 BEZ application completed
- WOG requests SER to be provided on outstanding WCAP Addendum Report
- WOG continuing to support several beneficial risk-informed initiatives with industry, NRC and ASME