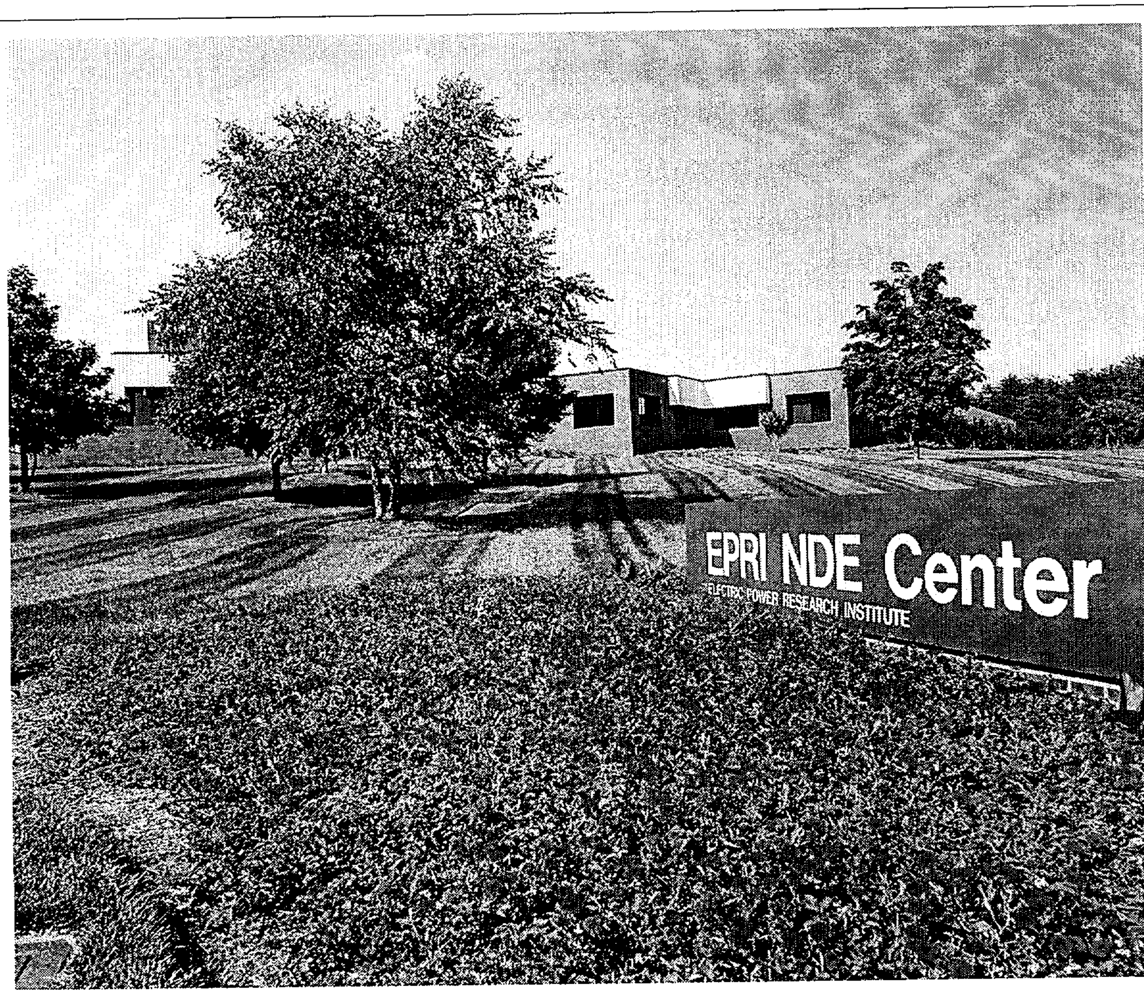
Extension of the EPRI Risk Informed ISI Methodology to Break Exclusion Region Programs

TR-1006937



Extension of the EPRI Risk Informed ISI Methodology (RI-ISI) to Break Exclusion Region (BER) Programs

TR-1006937

CONTENTS

1
INTRODUCTION AND PURPOSE

This report documents the conclusions, clarifications, enhancements and agreements reached with the USNRC for the extension of the EPRI Risk-Informed Inservice Inspection (RI-ISI) methodology (Reference 1) to Break Exclusion Region (BER) programs.

This report is the culmination of numerous interactions with NRC and industry staff, USNRC review and comments on the February, 2001 submittal (Reference 2), USNRC request for additional information (RAIs; Reference 3) and response to those RAIs (Reference 4).

The referenced February 2001 submittal was the end product of a comprehensive assessment of the base RI-ISI methodology for its applicability to BER programs, identification of required enhancements and clarifications to the base RI-ISI methodology and the complete application of the updated methodology to three units, covering both BWR and PWR designs, well as a third party review of the methodology extension and its application to the three plant applications.

The final version of the February, 2001 submittal, which has been revised to reflect the conclusions, clarifications and enhancements of this report, as well as their impact on the application to the three plants evaluated, are documented in TR-1006837, "Applications of Risk and Performance Technology, Volume 1: Application of the EPRI Risk-Informed Inservice Inspection (RI-ISI) Methodology to Break Exclusion Region (BER) Programs."

2 ADAPTATION OF THE RI-ISI EVALUATION PROCESS

2.1 Adaptation of the RI-ISI Process to BER Programs

This section identifies those portions of the base risk-informed inservice inspection (RI-ISI) process (Reference 1) that will require clarification and/or enhancement in order to support application to BER inspection programs. All other portions of the EPRI RI-ISI process remain unchanged and in effect. The EPRI RI-ISI method is defined in detail in Reference 1. The full EPRI RI-ISI methodology, together with the enhancements documented in this report, need to be met to fulfill its application to BER programs. In this section, each step in the RI-ISI process is presented and the required change (if required) is identified.

2.2 Definition of Program Scope

Application of RI-ISI to BER Programs requires an understanding of the traditional RI-ISI scope that is or has been previously applied. It also requires an understanding of the existing plant BER program including its scope and licensing basis. Application of this methodology requires that the entire scope of the BER program be included in the evaluation.

2.3 Consequence Evaluation

In contrast to traditional RI-ISI applications, which are intended to be best estimate evaluations, application to BER programs provides for bounding estimates and assumptions. This conservative application reduces the need to conduct resource intensive analyses, computations and their accompanying uncertainty.

By definition, BER piping is normally pressurized ("operating" configuration in Table 3-1 of Reference 1), therefore the "Initiating" and "Combination" impact groups in Table 3-1 should be evaluated.

The consequence of failure of each circumferential weld in the BER scope is evaluated (i.e. pipe whip, jet impingement and other impacts). Both circumferential and longitudinal breaks are postulated at each weld. This is more conservative than the SRP requirement, which requires that only terminal ends and some higher stressed locations be evaluated. In addition, as BER piping is almost exclusively low stress piping, only terminal end breaks will need to be postulated due to SRP requirements. The RI-ISI evaluation requires each BER weld to be assessed. In addition, a double-ended guillotine pipe break is conservatively assumed for each weld. The criteria for postulating and analyzing pipe whip and jet impingement impacts are to be consistent with existing plant high-energy pipe break analyses (e.g., SRP 3.6.2 if that is the plants basis for analyses). However, the consequences of pipe breaks are to be consistent with a risk-informed approach. For example, single failure criteria does not have to be considered explicitly and structures, systems, and components are allowed to fail. The importance of single failure criteria and the protection of equipment are encompassed in the risk-informed approach (e.g., estimates of CCDP and CLERP, and the delta risk assessment acceptance criteria ensure an adequate level of safety).

As has been noted, BER programs vary throughout the industry. The following guidelines related to the consequence evaluation process are defined and should be applied to each BER weld in order to assure consistent application.

1. Containment performance is an important aspect of having to utilize the BER assumption in design basis (e.g. single failure relative to containment isolation). Postulated breaks outside containment should not take credit for the outside containment isolation valve or other isolation valves in the vicinity unless there is plant design and/or analysis that supports equipment operability during the event. Likewise breaks inside containment should not credit equipment inside the containment unless plant design and/or analysis provide justification.

2. The containment penetration is assumed to fail (containment bypass) if the penetration is not designed and analyzed for a double-ended guillotine pipe break (DEGB). Note that design features may be utilized to preclude DEGB loads on the penetration (e.g. encapsulated pipe designed to preclude a DEGB load on a penetration). When failure of the penetration is assumed (e.g., no design or analysis information to demonstrate otherwise), the leakage around the penetration failure is assumed large enough to satisfy the "Large Release" portion of CLERP (conditional large early release probability) in the consequence evaluation unless analysis can justify smaller releases.

3. An unrestrained whipping pipe is not considered capable of causing a circumferential break in pipe of equal or larger nominal pipe size (SRP 3.6.2, Reference 5). The penetration of the equal or larger impacted pipe is also assumed not to fail. Through-wall cracks are postulated if the impacted pipe has thinner wall thickness except where analytical or experimental, or both, data for the expected range of impact energies demonstrate the capability to withstand the impact without rupture (e.g. SRP 3.6.2).

4. An unrestrained whipping pipe is assumed to fail a smaller line and its penetration unless demonstrated capable by design or analysis. Circumferential and longitudinal breaks are postulated for the smaller line except where analytical or experimental, or both, data for the expected range of impact energies demonstrate the capability to withstand the impact without rupture (e.g. SRP 3.6.2).

5. SRP 3.6.2 may be used to evaluate unrestrained whipping pipe and its potential physical impact on structures, systems and components. In lieu of SRP 3.6.2, plant specific criteria

and analyses may be used and conservative assumptions or engineering judgments derived from plant design and analyses may be used as follows:

a. Conservatively apply unrestrained piping length to identify potential targets.

b. If a structural target is designed similar to another structural target already analyzed for pipe whip impact with similar loads, this may be used as a reasonable basis. Otherwise, the structural target (e.g., common wall with adjacent area) is assumed to fail.

c. Equipment with active functions or electrical equipment such as a motor or air operated valve are assumed to fail (valve is assumed to fail in its normal position prior to the break). Check valves may be treated as piping as described above.

d. The determination of pipe whip potential (e.g., potential for developing a hinge) may be derived from plant analyses of similar configurations.

6. Jet Impingement – SRP 3.6.2 may be used to evaluate jet impingement targets and potential load impact on structures, systems and components. In lieu of SRP 3.6.2, plant specific criteria and analyses may be used, and conservative assumptions and engineering judgments derived from plant design and analysis may be used as follows:

   a. Electrical or active equipment within the zone of influence of the break is assumed to fail (e.g., active valve is assumed to fail in its normal position prior to break) unless otherwise qualified. The typical zone of influence is 10 to 20 pipe diameters (e.g. NUREG/CR-2913, Reference 6).

   b. If a structural or passive component type of target is designed similar to another similar target already analyzed for similar loads and found to be acceptable, this may be used as a reasonable basis. Otherwise, the target (e.g., common wall with adjacent area) is assumed to fail.

   c. Plant analyses of jet impingement may be used to derive insights into potential impacts. For example, jet impingement impact from another analyzed pipe having a similar zone of influence may be used.

7. Other Spatial Impacts (indirect effects) – Structures, systems and components in the area of the break are assumed to fail as a result of the break unless design basis/analysis or appropriate engineering judgment based on plant design and spatial evaluations justifies otherwise. The following provides additional guidance:

   a. Physical separation can be credited with regard to the containment structure and isolation. For example, equipment inside containment can be credited with isolating a break outside containment. For high-energy line breaks, only automatic isolation can be credited and it must be qualified per design basis.

   b. Equipment Qualification (EQ) – Equipment in affected areas may have been qualified as part of an EQ program. If this equipment is to be credited in the RI-ISI evaluation, the harsh environment identified as part of the EQ profile (temperature, pressure humidity, jet impingement and pipe whip) will need to envelope (or equal) the environment created by the assumed RI-ISI break. Caution should be applied, in that, the RI-ISI break will always assume that equipment available to isolate the break has an inherent unreliability. That is, the RI-ISI evaluation looks at both successful and unsuccessful isolation (and the resultant environments).

c. Temperature, pressure, water spray, flooding, and compartment pressure must be considered when evaluating impacts as described above. Electrical equipment in the break area is assumed to fail unless a technical basis and/or qualification are available. Engineering judgments based on plant design may be used to evaluate whether compartment pressure can cause catastrophic failure of the room. An isolated room should be assumed to fail unless analysis can demonstrate otherwise.

8. Spatial Propagation - when postulating propagation to adjacent areas (e.g., adjacent wall failure due to pipe whip), both the isolation success and failure case must be considered where applicable. For the failure to isolate case, the consequences are likely to be unanalyzed (beyond design basis), thus spatial propagation impacts must be analyzed or core damage assumed (CCDP = probability of isolation failure). For the isolation success case, the environmental impacts may be similar to analyzed cases; engineering judgment may be utilized based on plant design and analysis consistent with PRA/IPEEE studies:

   a. Equipment in the vicinity of the propagation path (on other side of a door or wall failure) is assumed to fail unless qualified or protected from the break (similar to design basis or SRP 3.6.2).

   b. For the isolation failure case, spatial propagation must be evaluated relative to impacts and equipment is assumed to fail unless qualified or protected (similar to design basis or SRP 3.6.2). Secondary propagation paths have to be considered as propagation continues to other areas.

   c. For the successful isolation case, impacts beyond the immediate vicinity of the propagation path depend on distance, size of the adjacent room or area, and vent path (e.g., openings to adjacent room or upper elevations).

2.4 Degradation Mechanism Evaluation

Reference 1 identifies those degradation mechanisms that need to be evaluated in support of a RI-ISI application including a review of plant specific service history. These mechanisms and criteria for assessing susceptibility to the mechanisms are unchanged by this application.

2.5 Risk Characterization

Although no change to the risk ranking process is required, the results of the application to BER programs may be different with respect to traditional RI-ISI results. Thus, a plant, which applies the RI-ISI process to BER programs after completion of a traditional RI-ISI application, shall revisit the risk ranking of all welds in the RI-ISI application (e.g. Section XI scope plus BER scope). As a final step, the risk ranking shall also be summarized for the "BER Only" scope to support element selection as described in the next section.

2.6 Inspection Element Selection

While no changes to the element selection process are required, explicit consideration shall be given to the size of the final inspection population. If a plant is applying RI-ISI to BER programs after completion of the traditional RI-ISI, the risk category population sizes may change for BER systems since some welds may move to higher risk categories (e.g. risk category 6 to 4). In addition, the element selection process must consider the BER scope independently from the traditional RI-ISI scope, to ensure that the BER scope is appropriately covered during the element selection process.

Similar to traditional RI-ISI applications to Class 1 piping (Section 3.6.4.2 of Reference 1), it is expected that BER piping will tend to be grouped into three subsets. The first is brought about by the exceptional performance history of BER piping coupled with its typical high consequence of failure which results in the large number of elements being assigned to risk category 4 (10 percent inspection size). There is a second subset were a 25 percent sample is chosen due to a number of elements identified as potentially susceptible to some degradation mechanism (e.g. risk category 2, due to thermal fatigue). The third subset consists of those elements assigned to risk categories 6 or 7, which do not require volumetric NDE. As such, it is anticipated that unless plant specific design features control, inspection populations for BER programs to be approximately 10 percent of the current population.

If a situation occurs where a very large number of elements are assigned to low risk categories (i.e. Risk Categories 6 or 7) to the point that BER inspections falls below 10 percent of the BER piping population, the basis for the low risk ranking shall be investigated. Although BER piping is typically highly reliable (i.e. low failure potential), inspection percentages significantly below 10% should not be expected unless plant design features have been incorporated to specifically address assumed breaks in the BER region.

This ten percent trigger value is consistent with previous RI-ISI applications for important piping (EPRI TR-112657; Reference 1), ASME Code Case N560 (Reference 7), and the performance based criteria for BWR stainless steel piping in BWR reactor coolant systems (Reference 8), which have been previously approved by the USNRC.

Figure 1 provides a flowchart of the process required to be followed to assure that the final BER inspection population is consistent with the intent of this methodology. This required process is described as follows:

Item 1 Are there a number of welds included in the BER program scope that are physically located outside the BER boundaries as defined in SRP 3.6.2 (e.g. beyond the containment isolation valve (and boundary restraint)? A number of cases have been identified where plants conservatively extended the BER boundary beyond that required by SRP requirements. Therefore, many of these "non-BER" welds, located beyond the isolation valve (and boundary restraint) will not result in BER type consequences and therefore, provided there are no other plant unique issues, these welds would be expected to be of lower importance from a consequence perspective.

Item 2 For some plants, the piping within the BER program was also provided with break limiting devices/analyses. In the cases where pipe whip restraints, jet shields, vent opening and/or analyses are available, the consequence of postulated failure should be reduced. It is important to note that these analyses and plant hardware need to be designed to respond to the BER break of interest (e.g. high energy line breaks versus seismic design requirements).

Summary 1 and 2 If plant specific physical characteristics do not support a smaller sample size then further evaluation is necessary to understand the basis for the limited sample size. Items 3, and 4 provide examples of this type of evaluation.

Item 3 The EPRI RI-ISI methodology analyzes failure potential and consequence of failure independently. As such, the final results (i.e. risk significance) are not adversely impacted by conservatisms in either of the supporting analyses. However, as with the consequence analysis discussed in items 1 and 2, if inspection populations fall below 10 percent then the failure potential evaluation should be re-assessed. This evaluation should assure that plant specific and industry operating experience with this type of piping has been appropriately factored into the analysis (e.g. comparison to similar plant designs) and that no degradation mechanisms have been inadvertently screened in or out.

Item 4 A key insight from probabilistic risk assessments pertains to the concept of common mode (common cause) failure. BER piping provides a classic example of the potential for one postulated failure to impact more than one key safety function (i.e. cascading effect). As such, from a consequence perspective, larger bore BER piping is expected to result in a high consequence of failure. If the evaluation identifies any of the large bore piping as medium to low consequence, a distinct evaluation shall be conducted to assure robustness in the consequence assignment. This evaluation shall include one or more of the following:

1) identification of the plant specific hardware (whip restraints, jet shields, penetration designs, separation) supporting the lower consequence assignment,

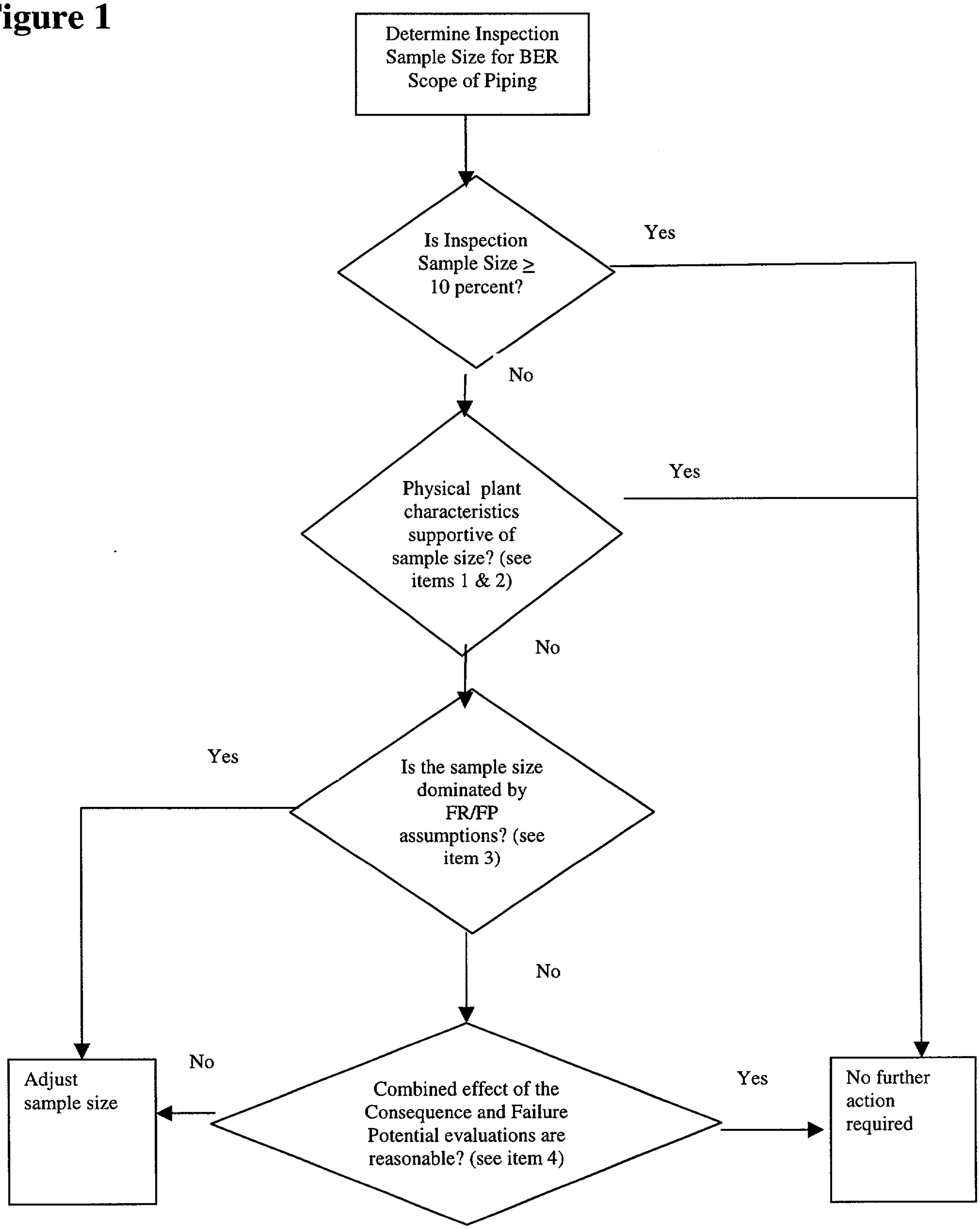
2) identification of additional, unaffected equipment that will reliably perform the same safety function (e.g. RCS inventory control, injection, heat removal, containment isolation and heat removal and fission product scrubbing), and

3) comparison to other similar units based upon conditional consequence (as opposed to CDF/LERF) that shows the analysis is realistic/conservative.

In summary, the element selection process should satisfy the following criteria:

- The percentage requirements for high risk (25%) and medium risk (10%) must be satisfied for the complete RI-ISI Program scope population including BER.
- The percentage requirements for high risk (25%) and medium risk (10%) must be satisfied for the "BER Only" scope population.
- The number of BER inspections should not be significantly less than 10% of the BER scope unless plant design features justify otherwise.

Figure 1



Determine Inspection Sample Size for BER Scope of Piping
Is Inspection Sample Size ≥ 10 percent?
Yes
No
Physical plant characteristics supportive of sample size? (see items 1 & 2)
Yes
No
Is the sample size dominated by FR/FP assumptions? (see item 3)
Yes
No
Combined effect of the Consequence and Failure Potential evaluations are reasonable? (see item 4)
No
Yes
Adjust sample size
No further action required

2.7 Risk Impact Assessment

The risk impact assessment that shall be conducted will be a function of the scope of application.

If a licensee implements a BER only application, then the risk impact assessment shall be conducted on a system by system basis with each system in the BER program, meeting system level criteria of 1E-07 for CDF and 1E-08 for LERF and a cumulative total impact of less than 1E-06 for CDF and 1E-07 for LERF.

If a licensee implements a traditional RI-ISI together with a BER application, then the risk impact assessment shall be conducted in a two step fashion. The first step shall be to include the BER scope of piping with the traditional RI-ISI application (e.g. Class 1 and 2 piping) and conducting the risk impact evaluation in accordance with Reference 1. The second step shall be conducted for the BER only scope, on a system by system basis, with each system in the BER program, meeting system level criteria of 1E-07 for CDF and 1E-08 for LERF and a cumulative total impact of less than 1E-06 for CDF and 1E-07 for LERF.

2.8 Plant Specific Submittals

BER programs are typically defined in the Updated Final Safety Analysis Report (UFSAR). As such, changes to the UFSAR need to be conducted consistent with individual licensee's UFSAR change control process. Typically, this will include a 50.59 evaluation (References 9 and 10).

It is envisioned that upon USNRC generic approval of this report, licensees will conduct evaluations consistent with this document and use that evaluation (together with this report) as the technical basis for supporting a 50.59 evaluation.

As the plant-specific probabilistic risk assessment (PRA) will be an important input into this analysis, the quality of the PRA should be assessed. If there is a previously approved RI-ISI program, then the PRA quality basis for that application should be reviewed to confirm it is applicable to the risk-informed BER (RI-BER) program. If there is not an approved RI-ISI program at the plant, where NRC has already accepted the use of the PRA in its RI-ISI application, the licensee should review the results of previous independent reviews of the PRA (including the staff review of the IPE) and ensure that any comments that could influence the results of the RI-BER program are incorporated or otherwise dispositioned.

Given the 50.59 process, no formal submittal of the risk-informed BER evaluations or a template to the USNRC is expected. However, the USNRC would be notified of the adoption of a RI-BER program through the licensees' periodic 50.59 summary report. Appendix A provides an example 50.59 process for RI-BER applications contained in licensees' UFSAR.

Changes to other licensing basis documents or commitment (e.g., Technical Specifications), may require USNRC review and approval. Therefore, licensees need to review all relevant documentation and notify the USNRC, as appropriate.

3 SUMMARY AND CONCLUSIONS

This report documents the conclusions, clarifications, enhancements and agreements reached with the USNRC for the extension of the EPRI Risk-Informed Inservice Inspection (RI-ISI) methodology (Reference 1) to Break Exclusion Region (BER) programs.

This report is the culmination of numerous interactions with NRC and industry staff, USNRC review and comments on the February, 2001 submittal (Reference 2), USNRC request for additional information (RAIs; Reference 3) and response to those RAIs (Reference 4).

The referenced February 2001 submittal was the endproduct of a comprehensive assessment of the base RI-ISI methodology for its applicability to BER programs, identification of required enhancements and clarifications to the base RI-ISI methodology and the complete application of the updated methodology to three units, covering both BWR and PWR designs, well as a third party review of the methodology extension and its application to the three plant applications.

Appendix A provides an example 50.59 process for RI-BER applications contained in licensees' UFASR. Changes to other licensing basis documents or commitments (e.g., Technical Specifications), may require USNRC review and approval. Therefore, licensees need to review all relevant documentation and notify the USNRC, as appropriate.

The final version of the February, 2001 submittal, which has been revised to reflect the conclusions, clarifications and enhancements cited in this report, as well as their impact on the application to the three plants evaluated, are documented in TR-1006837, "Applications of Risk and Performance Technology, Volume 1: Application of the EPRI Risk-Informed Inservice Inspection (RI-ISI) Methodology to Break Exclusion Region (BER) Programs."

4 REFERENCES

1. EPRI TR-112657, Rev B-A, "Revised Risk-Informed Inservice Inspection Evaluation Procedure, "Final Report, December, 1999.
2. Letter from Patrick O'Regan (EPRI) to Dr Brian Sheron, Associate Director for Project Licensing and Technical Analysis, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, entitled "Extension of Risk-Informed Inservice Inspection (RI-ISI) Methodology," dated February 28, 2001.
3. Memorandum from Terence Chan and Mark P. Rubin to Herbert N. Berkow, "Comments and Request for Additional Information Related to Electric Power Research Institute Extension of Risk-Informed Inservice Inspection Methodology," November, 2001.
4. Response to USNRC Request for Additional Information, December, 2001.
5. Standard Review Plan 3.6.2, "Determination of Rupture Locations and Dynamic Effects Associated With the Postulated Rupture of Piping", USNRC, Rev. 1, July 1981.
6. NUREG/CR-2913, "Two-Phase Jet Loads," January, 1983.
7. ASME Code Case N-560, Alternative Examination Requirements for Class 1 Piping Welds, Section XI, Division 1.
8. USNRC Safety Evaluation of the BWRVIP Vessel and Internals Project, BWR Vessel and Internals Project, Technical Basis for Revisions to Generic Letter 88-01 Inspection Schedules (BWRVIP-75)," EPRI Report, September 15, 200.
9. NEI 99-04, Guidelines for Managing NRC Commitment Changes, July 1999.
10. NRC Regulatory Issue Summary 2000-17, Managing Regulatory Commitments Made By Power Reactor Licensees To The NRC Staff, September 21, 2000.
11. General Design Criterion 4 of 10 CFR, Appendix A, "Environmental and Dynamic Effects Design Bases.
12. Letter from A. Giambusso, "General Information Required for Consideration of the Effects of a Piping System Break Outside Containment", Atomic Energy Commission, December 1972.
13. Regulatory Guide 1.46, "Protection Against Pipe Whip Inside Containment", Atomic Energy Commission, May 1973.
14. ASME Boiler and Pressure Vessel Code, Section III, Subsection NB and NC, various editions.

15. Standard Review Plan 3.6.1, "Plant Design for Protection Against Postulated Piping Failures in Fluid Systems Outside Containment", Nuclear Regulatory Commission, Rev. 1, July 1981.

16. Standard Review Plan 6.6, "Inservice Inspection of Class 2 and 3 Components", USNRC, Rev.1, July 1981.

17. Generic Letter 87-11, "Relaxation in Arbitrary Intermediate Pipe Rupture Requirements", USNRC, June 1987.

18. Condition Assessment Guidelines for Fossil Fuel Power Plant Components, Electric Power Research Institute, Palo Alto, CA: March, 1990. GS-6724.

19. State-of-the-Art Weld Repair Technology for High Temperature and Pressure Parts, Electric Power Research Institute, Palo Alto, CA: November, 1996. TR-103592-V1.

20. JPN-99-034, James A. Fitzpatrick Nuclear Power Plant, Docket 50-333, Risk-Informed Inservice Inspection (RI-ISI) Program, October 13, 1999.

21. NOC-AE-000689, South Texas Project, Units 1 and 2, Dockets Docket Nos. STN 50-498, STN 50-499, Relief Request for Application of an Alternative to the ASME Boiler and Pressure Vessel Code Section XI Examination Requirements for Class 1 Piping Welds, December 30, 1999.

22. NUREG-11061, "Report of the U.S. Nuclear Regulatory Commission Piping Review Committee, Volumes 1 through 5" U.S. Nuclear Regulatory Commission, various dates.

23. Letter from J. F. O'Leary, Director of Licensing, USNRC dated July 12, 1972.

24. ASME Code Case N578, Risk-Informed Requirements for Class 1, 2, or 3 Piping, Method B Section XI, Division 1, September 1997.

25. NUREG/CR-5750, "Rates of Initiating Events at U.S. Nuclear Power Plants: 1987 – 1995", February 1999.

26. NUREG-1412, "Foundation for the Adequacy of the Licensing Bases," U.S. Nuclear Regulatory Commission, December, 1991.

27. NUREG/CR-6490, "Nuclear Power Plant Generic Aging Lessons Learned (GALL), Volumes 1 and 2" U.S. Nuclear Regulatory Commission, December, 1996.

28. Generic Letter 89-08, "Erosion/Corrosion-Induced Pipe Wall Thinning," dated May 2, 1989.

29. Generic Letter 88-01, "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping," dated January 25, 1988.

APPENDIX A

Example 10CFR50.59 Process

10 CFR 50.59 APPLICABILITY DETERMINATION

Part 1 – Initiation

Implementing Document No.	Revision	Title
USAR 3.6A.2.1.5 AND 6.6.8	**13**	**Update to UFSAR sections 3.6 and 6.6 to allow the use of risk-informed technology in determining the number of augmented piping inspections in the break exclusion region (BER).**

(Check one proposed activity type only): ☐ *Unit 1* ☒ *Unit 2* ☐ *Common*

(Check one proposed activity type only): ☒ *Permanent* ☐ *Temporary*

Part 2 – Applicable Regulations/Criteria

Address the questions below for all aspects of the Proposed Activity. See NAI-DSE-01, Section 4.2 for a discussion of regulatory requirements and controls. If the answer is "YES" for any portion of the activity, apply the identified regulation/process(es) to that portion of the activity. (Note: It is common to have more than one regulation/process apply to a proposed activity.)

A.	Is the regulatory authority, controlling the proposed activity, any of the following?		
	1. 10CFR50.90 (Operating License, Technical Specifications or Environmental Protection Plan)	☐ YES ☒ NO	If "Yes," process change per NIP-LPP-01
	2. 10CFR50.54(a) (QA Program Description)	☐ YES ☒ NO	If "Yes," process change per NIP-LPP-01.
	3. 10CFR50.54(p) (Security Plans)	☐ YES ☒ NO	If "Yes," process change per NIP-LPP-01.
	4. 10CFR50.54(q) (Emergency Plan)	☐ YES ☒ NO	If "Yes," process change per NIP-LPP-01.
	5. 10CFR50.55a(f) and (g) (IST/ISI Requirements)	☐ YES ☒ NO	If "Yes," process change per NIP-LPP-01.
	6. 10CFR Part 20 (Standards for Radiation Protection)	☐ YES ☒ NO	If "Yes," process change per NIP-PRO-02 or NIP-PRO-03.
	7. 10CFR50.65(a)(4) (Maintenance Rule) • Maintenance activities and associated procedures. • Temporary Alteration (facility or procedure) supporting maintenance that will be installed not longer than 90 days at power.	☐ YES ☒ NO	If "Yes," maintenance activity is assessed under NIP-OUT-01 or GAP-PSH-03, and procedure change(s) process per NIP-PRO-03 and NIP-PRO-04.
	8. 10 CFR 50.46 ECCS Model (changes and errors)	☐ YES ☒ NO	If "Yes," process per NIP-IRG-01
B.	Does the proposed activity change plant-specific programs (ODCM or COLR,) which are controlled by the Technical Specifications?	☐ YES ☒ NO	If "Yes," process change per NIP-LPP-01.
C.	Does the proposed activity involve an editorial or administrative change to the UFSAR update as described in Section 4.2.3 of NAI-DSE-01?	☐ YES ☒ NO	If "Yes," process change per NIP-LPP-01.
D.	Does the proposal have an effect on the environment (e.g., changes to nonradiological gaseous or liquid effluents, power level, or thermal effluents), **OR** involve construction activities that introduce measurable nonradiological environmental effects to onsite areas that were NOT previously disturbed during site preparation and construction?	☐ YES ☒ NO	If "Yes," an Environmental Evaluation may be required. Contact Supervisor Environmental Protection.
E.	Does the proposed activity involve a Fire Protection Program change?	☐ YES ☒ NO	If "Yes," process change per NIP-LPP-01 and the applicable Unit License Condition.
F.	Does the proposed change or activity change or negate an existing NRC commitment?	☐ YES ☒ NO	If "Yes," process per NIP-IRG-01.

Part 3 – Conclusions (Check Conclusion A or B):

A.	☐	All aspects of the proposed activity are controlled by one or more of the processes above; therefore, **10 CFR 50.59 is not applicable** and a 10 CFR 50.59 Screening is **not** required. Proceed with change per applicable procedures/processes.
B.	☒	Activity only partially covered by other regulations. Proceed with covered change(s) per applicable procedure/process. Initiate 10CFR 50.59 Screening for aspects not covered.

Part 4 – Preparer (Include Completed Applicability Determination with Implementing Document or Activity Package)

Preparer - (Print/Initial)	Date Prepared

Part 1 - Initiation [Upon Completion of Screen – Attach to Implementing Document/Package]

Implementing Document No.	Revision	Title
UFSAR 3.6A.2.1.5 and 6.6.8	**13**	**Updated Safety Analysis Report**

(Check one proposed activity type only):

☐ *Unit 1* ☒ *Unit 2* ☐ *Common*

(Check one proposed activity type only):

☒ *Permanent* ☐ *Temporary*

(Check one proposed activity type only):

☐ *Procedure Activity* ☐ *Design Activity* ☐ *Test or Experiment* ☐ *Temporary Alteration* ☒ *Other*

Part 2 - Brief description of the proposed activity*: Check one:*

A) ☐ Immediate Change to a Technical Procedure (Type 1 PCE) controlled by NIP-PRO-04. If checked, go to Part 10. (N/A Part 3, 4, 5, 6, 7, 8, and 9)

B) ☒ Other, provide written description of activity: **UFSAR change to include the Risk-Informed Inservice Inspection process for the Break Exclusion Region piping welds.**

Part 3 - Technical Specifications/License Conditions *N/A* ☐

1. ☐ YES ☒ NO Does the *proposed activity* require/involve a change to the Technical Specifications/License Conditions?

If "**NO**," continue with the screening. If "**YES**," a license amendment is required. Exit Screen and prepare a License Document Change Request (LDCR) per NIP-LPP-01.

Part 4 - General *N/A* ☐

1. Is the *proposed activity* an Interim Compensatory Action to address a non-conforming/degraded condition?

☐ YES If "**YES**," (reference ESA # if applicable ______) go to Part 6 (skip Part 5).

☒ NO If "**NO**," go to Part 5 (skip Part 6).

Part 5 - Changes to Facility/Procedures *N/A* ☐

1. ☐ YES ☒ NO Does the *proposed activity* involve a modification, addition to, or removal from, the facility that adversely affects <u>any</u> UFSAR described design function?
2. ☐ YES ☒ NO Does the *proposed activity* involve a modification, addition to, or removal from, a procedure that adversely affects how <u>any</u> UFSAR described design functions are performed or controlled?

Justify "**NO**" answers below: **No physical change to any design function. No change to procedures that affect how design functions are performed or controlled.**

Why are UFSAR described design functions <u>not</u> adversely affected? **The only change is to the methodology used to define the number of augmented piping inspections required to be conducted in the break exclusion region.**

Part 6 - Changes to Facility/Procedure (Interim Compensatory Actions) *N/A* ☒

1. ☐ YES ☐ NO Does the *proposed activity* involve a modification, addition to, or removal from, the facility that adversely affects UFSAR

described design functions <u>other than</u> those design functions that are degraded/nonconforming?

2. ☐ YES ☐ NO Does the *proposed activity* involve a modification, addition to, or removal from, a procedure that adversely affects how UFSAR described functions are performed or controlled <u>other than</u> those design functions that are degraded/nonconforming?

Justify "**NO**" answers below:

Why are <u>other</u> UFSAR described design functions <u>not</u> adversely affected?

Part 7 - Changes to Evaluation Methodologies N/A ☐

1. ☒ YES ☐ NO Does the *proposed activity* involve revising or replacing an UFSAR described Method of Evaluation, used in establishing the Design Bases or in the Safety Analyses?

Justify "**NO**" answer below:

Justification: **The proposed activity provides an alternative to the current UFSAR section 3.6 methodology for determining the number of augmented inspections required in the break exclusion region.**

Part 8 - Tests and Experiments N/A ☐

1. ☐ YES ☒ NO Does the *proposed activity* involve conducting a test or experiment, not described in the UFSAR, where an SSC is utilized or controlled in a manner that is outside the reference bounds of the design bases as described in the UFSAR, or is inconsistent with the analyses or descriptions in the UFSAR?

Justify "**NO**" answer below: **These examinations are described in the UFSAR, and therefore are not new.**

Justification: **Only the number of inspections, which are based upon EPRI TR-1006937 Rev. 0-A and Nuclear Engineering Report NER-2A-025, are changing.**

If ANY Part 5, 6, 7 or 8 answers are "**YES,**" a 10 CFR 50.59 Evaluation **is** required. Discontinue Screen, prepare Evaluation

If ALL Part 5, 6, 7 or 8 answers are "**NO,**" a 10 CFR 50.59 Evaluation is **not** required. Proceed to Part 9.

Part 9 - Relevant UFSAR/Tech Spec Sections N/A ☐

UFSAR Sections reviewed where relevant information was found:	Tech Spec Sections reviewed where relevant information was found:
3.6A.2.1.5 **6.6.8**	**N/A**

Part 10 - Conclusion and Signoff [Upon completion of Screen - Attach to Implementing Document /Package]

Based upon all Part 5, 6, 7, and 8 answers being "NO," a 10CFR50.59 Evaluation is NOT required.

Preparer: ______________________ Date ____________ [Requal Date:____________]
Print Name and Sign

Reviewer: ______________________ Date ____________ [Requal Date:____________]
Print Name and Sign

10 CFR 50.59 EVALUATION FORM

50.59 Evaluation No: Draft: Revision:

Plant: (Unit 1, Unit 2, or Common) **Unit 2**

Affected Systems: **Multiple**

Title: **Update to UFSAR sections 3.6 and 6.6 to allow the use of risk-informed technology in determining the number of augmented piping inspection in the break exclusion region (BER).**

Mod/Temp Mod/SDC/Procedure No:

Duration: ☒ Permanent or ☐ Temporary

Based on the attached discussion, does the *Proposed Activity*:

☐ YES ☒ NO Require a License Amendment for a change to the Technical Specifications/License Conditions.
☐ YES ☒ NO Require a License Amendment because it meets one (or more) of the eight (8) criteria of 10CFR50.59(c)(2).

*************************** REVIEW, APPROVAL AND CONCURRENCE**************************

1. PREPARED BY: ______________________/____________ ____________
Qualified Evaluator Signature Requal Date Date

2. REVIEWED BY: ______________________/____________ ____________
Qualified Reviewer Signature Requal Date Date

3. REVIEWED BY: ______________________ ____________
Branch Manager Date

4. SORC APPROVAL RECOMMENDATION:

SORC: ☐ As Submitted ☐ As Revised ____________ ____________
SORC Meeting No. Date

5. APPROVAL: ______________________ ____________
Plant Manger or Designee (both Plant Mangers if common) Date

______________________ ____________
Plant Manger or Designee (both Plant Mangers if common) Date

6. SRAB: Meeting Number: ____________ ☐ Concurs ☐ Does Not Concur

10 CFR 50.59 EVALUATION FORM (Cont)

50.59 Evaluation No.: _____	**Page 2 of**
Part A - Description:	
1. Reason for Activity:	Provide an alternative methodology for determining the number of augmented inspections for the break exclusion region (BER).
2. Function(s) of affected SSC:	Pressure boundary integrity
Part B - Analysis	
1. Applicable Criteria:	UFSAR section 3.6 provides criteria for postulated piping breaks. In particular, section 3.6 also defines the requirements that need to be met in order to not postulate piping breaks. One of the criterion involves defining the number of augmented piping inspections that need to be performed on the BER piping. These UFSAR criteria are consistent with Standard Review Plan (section 3.6) criteria.
2. Conformance:	The proposed activity implements an NRC approved alternative methodology for defining the number of augmented piping inspections to be performed on the BER piping.

UFSAR Sections reviewed where relevant information was found:	Tech Spec Sections reviewed where relevant information was found:
UFSAR section 3.6A.2.1.5 defines the methodology for postulating piping breaks. UFSAR section 6.6.8 defines the piping inspection program including augmented piping inspections.	N/A

PART C – Evaluation (NOTE: If the proposed activity only affects a "method of evaluation," only evaluation question 8 need be evaluated. If the proposed activity does not affect a "method of evaluation'" only questions 1 through 7 need be evaluated.

Does the proposed activity:

1. ☐ YES ☐ NO — Result in more than a minimal increase in frequency of occurrence of an accident previously evaluated in the UFSAR?

   Justification:

2. ☐ YES ☐ NO — Result in more than a minimal increase in the likelihood of occurrence of a malfunction of a structure, system or component (SSC) important to safety previously evaluated in the UFSAR?

   Justification:

3. ☐ YES ☐ NO — Result in more than a minimal increase in the consequences of an accident previously evaluated in the UFSAR?

   Justification:

4. ☐ YES ☐ NO — Result in more than a minimal increase in the consequences of a malfunction of an SSC important to safety previously evaluated in the UFSAR?

   Justification:

5. ☐ YES ☐ NO — Create a possibility for an accident of a different type than any previously evaluated in the UFSAR?

   Justification:.

50.59 Evaluation No.: _____	**Page 3 of**

6. ☐ YES ☐ NO — Create a possibility for a malfunction of an SSC important to safety with a different result than any previously evaluated in the UFSAR?

Justification:

7. ☐ YES ☐ NO — Result in a design basis limit for a fission product barrier as described in the UFSAR being exceeded or altered?

Justification:

8. ☐ YES ☒ NO — Result in a departure from a method of evaluation described in the UFSAR used in establishing the design bases or in the safety analyses?

Justification: The proposed activity allows the use of an alternate method for determining the number of augmented piping inspections required to meet the criteria of UFSAR 3.6. UFSAR 3.6 is based upon the criteria contained in section 3.6.2 of the Standard Review Plan (Determination of Rupture Locations and Dynamic Effects Associated With the Postulated Rupture of Piping) and specifically Branch Technical Position MEB 3-1 (Postulated Rupture Locations In Fluid System Piping Inside And Outside Containment). The proposed activity implements a methodology approved by the NRC for this intended application and as such, per NAI-DSE-01 (section 6.2.8), is not a departure from a method of evaluation described in the UFSAR used in establishing the design bases or in the safety analyses.

The NRC approved this alternate method in "Safety Evaluation Report Related to "Extension of the EPRI Risk-Informed Inservice Inspection Methodology to Break Exclusion Region Programs" (EPRI TR-1006937, Rev. 0-A,). The NRC SER concluded that the methodology was applicable to all NSSS designs and all terms and conditions as stipulated in the SER are met by this proposed activity.

Part D – Conclusions *The proposed activity implements an NRC approved methodology as an alternative to existing UFSAR requirements. All terms and conditions as stipulated in the SER are met by this proposed activity.*

Part E – References ***(1) EPRI TR-112657 Rev. B-A, Risk-Informed Inservice Inspection Evaluation Procedure,***

(2) EPRI TR-1006937, Rev. 0-A, Extension of the EPRI Risk-Informed Inservice Inspection Methodology to Break Exclusion Region Programs

(3) Nuclear Engineering Report NER-2A-025

Part F – Attachments

LICENSING DOCUMENT CHANGE REQUEST

LDCR Number	Rev.
2 – 0 1 – U F S – X X X	0 0

PART 1 – INITIATION (*ORIGINATOR*)

Page 10 of __

A. Affected Doc	OPL	UFS	Plans &	Programs
☐ Unit 1 X Unit 2 ☐ Site	☐ Facility Operating License ☐ Technical Specifications ☐ Technical Specification Bases ☐ Environmental Prot. Plan	X UFSAR	☐ Site Emergency Plan (SEP) ☐ Security Plans (SPS) ☐ Process Control Program (PCP) ☐ Offsite Dose Calc. Manual (ODM)	☐ ISI Program Plan (ISI) ☐ IST Program Plan (IST) ☐ Core Operating Limits Report (COL) ☐ QA Topical Report (QAT)

B. Description X **Permanent** ☐ **Temporary; Expected Duration:** _

Change to the wording in Sections 3.6A.2.1.5 and 6.6.8 to read as attached.

C. Page	Section, Figure, Table	Page	Section, Figure, Table
3.6A-14 6.6-3	3.6A.2.1.5 6.6.8		

D. Source of Change; References

EPRI Topical Report 1006937 Rev. 0-A "Extension of Risk-Informed Inservice Inspection to Break Exclusion Programs " and Nuclear Engineering Report NER-2A-025.

E. NIP–SEV–01 Review	☐ Applicability Review No.: ☐ Safety Evaluation No.:	F. Originator (*Print*)	Date 12/11/01

● **FORWARD TO LICENSE DOCUMENT OWNER FOR FURTHER PROCESSING** ●

A. Independent Review (*Print / Initial / Date*) ☐ Obtained per NIP–IRG–01	B. Effectiveness Review ☐ N/R ☐ Attached	C. SORC ☐ N/R Mtg. No.: Mtg. Date:
D. SRAB ☐ N/R Mtg. No.: Mtg. Date:	E. Plant Mgr. ☐ N/R (*UFSAR Only*) ☐ Obtained per Doc Coversheet	☐ Obtained per NIP–IRG–01 ☐ Obtained per NIP–SEV–01
F. NRC (*NIP–IRG–01 Submittal Required*) ☐ N/R ☐ Letter No. / Date: ☐ NRC Appl. Date:	G. LDO Branch Manager / Designee (*Print / Initial*)	Date

PART 2 – REVIEW AND APPROVAL (*LDO*)

PART 3 – IMPLEMENTATION (*LDO*)

PART 4 – CLOSURE (*LDO*)

PART 3	PART 4		
A. OPL Only: Affected Documents Updated ☐	A. ☐ Incorporated into License Document, Revision / Amendment: ____	OR	B. ☐ Not Incorporated into License Document
B. UFS Only: Need "As–Built" or Affected Document ☐	C. Closed by (*Print / Initial*)		Date
C. Other: ____________ ☐			

3.6A.2.1.5 Postulated Pipe Break Locations

h. For these portions of high-energy fluid system piping, preservice and subsequent inservice examinations are performed in accordance with the requirements specified in ASME Section XI. During each inspection interval, as defined in IWA-2400, an ISI is performed on all nonexempt ASME Code Section XI circumferential and longitudinal welds within the break exclusion region for high-energy fluid system piping. These inspections consist of augmented volumetric examinations (nominal pipe size greater than or equal to 4 in) and augmented surface examinations (nominal pipe size less than 4 in) such that 100 percent of the previously defined welds are inspected at each interval **or as required per the Risk-Informed process for piping outlined in EPRI Topical Report TR-1006937.** The break exclusion zone consists of those portions of high-energy fluid system piping between the moment limiting restraint(s) outside the outboard containment isolation valve and the moment limiting restraint(s) beyond the inboard containment isolation valve. The choice of the restraint(s) that define the limits of the break exclusion zone is based upon those restraint(s) which are necessary to ensure the operability of the primary containment isolation valves.

6.6.8 Augmented Inservice Inspection to Protect Against Postulated Piping Failures

No augmented ISI will be required for ASME Class 2 and 3 systems and components since there is no ASME Class 2 or 3 high-energy piping between containment isolation valves. As indicated in Table 1.9-1, Note 12, Difference 3, B31.1 Class 2 and Class 3 piping exists between the containment isolation valve and the associated first restraint. During each inspection interval, as defined in IWA-2400, an ISI is performed on all nonexempt ASME Code, Section XI circumferential and longitudinal welds within the break exclusion region for B31.1 Class 2 and 3 high-energy fluid system piping. These inspections consist of augmented volumetric examinations (nominal pipe size greater than or equal to 4 in) and augmented surface examinations (nominal pipe size less than 4 in) such that 100 percent of the previously defined welds are inspected at each interval **or as required per the Risk-Informed process for piping outlined in EPRI Topical Report TR-1006937.** The break exclusion zone consists of those portions of high-energy fluid system piping between the moment limiting restraint(s) outboard of the outside primary containment isolation valve and the moment limiting restraint(s) beyond the inside primary containment isolation valve. The criteria that determine which restraint(s) are chosen to determine the limits of the break exclusion zone are based upon those restraints which are necessary to ensure the operability of the primary containment isolation valves.