



## Risk & Performance Initiatives

NRC / EPRI Meeting

November 25, 2002



### Agenda

- Discussion on Existing RI-ISI Applications (Status, Process, Feedback)
- Meeting Primary Focus:
  - Code Case N662
    - ASME Status
    - Background
    - Relief Request Format / Content
  - Partial Examination Coverage
    - Existing relief request process
    - Proposed alternative
- Other Initiatives:
  - Pressure testing
  - Snubbers
  - Online ISI
  - Period Percentage Requirements
  - Classification
- Action Items



## Existing Applications

- Status, Process, Feedback
  - RI-ISI Template Submittals
  - Additional Lessons Learned
  - Update to Incoming Submittals?

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## Code Case N662

- Alternative Surface Examination Requirements
- Approved By ASME Board of Nuclear Codes & Standards (9-17-02)
- Applicable to:
  - Class 1 piping:  $\geq 4$  inch NPS
  - Class 2 piping: all pipe sizes
- Relief to be requested via 10CFR50.55a(a)(3)(i)

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## Code Case N662

- Looking for Agreement on Format/Content
  - See handout
    - I. Code Requirement
    - II. Requested Authorization
    - III. Basis for the Proposed Alternative
    - IV. Conclusion

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## Code Case N662

- Looking for Agreement on Content
  - See handout
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# REQUEST FOR ALTERNATIVE 00X, Rev. 0

Component Numbers: Class 1 piping welds (NPS 4 and larger) and all Class 2 piping welds

Code Classes: 1 and 2

References: ASME Section XI, XXXX Edition, IWB-2500, IWC-2500  
ASME Section XI Task Group on ISI Optimization, Report No. 92-01-01, "Evaluation of Inservice Inspection Requirements for Class 1, Category B-J Pressure Retaining Welds in Piping," dated July 1995.  
EPRI TR-112657, Rev B-A "Revised Risk-Informed Inservice Inspection Evaluation Procedure," dated December 1999.  
ASME Code Case N-662

Examination Category: B-F, B-J, C-F-1 and C-F-2

Item Number: B5.10, B5.40, B5.70, and B5.100, B9.10 and B9.31, C5.10 through C5.42 and C5.50 through C5.82

Description: Alternative Requirements for Class 1 and 2 Surface Examinations

Unit/Inspection Interval Applicability: Unit 1 - third (3<sup>rd</sup>) 10-year interval

## I. Code Requirement(s)

IWB-2500 and IWC-2500 require components be examined and pressure tested as specified in Tables IWB-2500-1 and IWC-2500-1, respectively. These tables require a sampling of piping components (as well as other components) be subjected to various types of NDE (i.e., volumetric and/or surface examination) and pressure testing (i.e. visual, VT-2).

## II. Requested Authorization

Licensee proposes to use Code Case N-662 in its entirety as an alternative to the surface examination requirements of Table IWB-2500-1 for examination categories B-F (NPS 4 and larger) and B-J (NPS 4 and larger) and Table IWC-2500-1 for examination categories C-F-1 and C-F-2.

### III. Basis for the Proposed Alternative

The subject item numbers in ASME Section XI require a volumetric and/or surface exam on selected piping welds to ensure that generic degradation mechanisms are not active on either the inside diameter or the outside diameter (O.D.). However, these welds are selected using deterministic set of requirements that are un-informed as to any possible degradation mechanisms. ASME Code Case N-662 provides an alternative to the current ASME Section XI requirements for defining the number and location of surface examinations for piping components.

The ASME Section XI Task Group on ISI Optimization, Report No. 92-01-01, *Evaluation of Inservice Inspection Requirements for Class 1, Category B-J Pressure Retaining Welds in Piping*, dated July 1995 concluded with 50 units responding with a total of 9333 welds inspected, only 0.02% were found to have flaws detected by Section XI surface examinations. Only 2 were detected by ASME Section XI surface examination and these were fabrication induced.

In parallel with the above, several risk-informed code cases have been developed for use on piping welds (ASME Code Cases N-560, N-577 and N-578). One of the methods for risk-informing piping examinations is via use of EPRI TR-112657, Rev. B-A, *Revised Risk-Informed Inservice Inspection Evaluation Procedure (NRC SER dated 10/28/99)*. Table 4-1, *Summary of Degradation-Specific Inspection Requirements and Examination Methods*, of the EPRI TR lists the required degradation mechanisms to be evaluated in Class 1, 2, and 3 piping. It also contains the risk-informed examination method required for each of these degradation mechanisms. The only degradation mechanism that requires a surface examination is O.D. chloride cracking. These two initiatives led the Code to investigate the value of surface examinations.

As such, Code Case N-662 incorporates lessons learned from the risk-informed initiatives and industry examination experience into Section XI by requiring that an evaluation be conducted to identify locations, if any, where a surface examination would be of benefit from a generic piping degradation perspective. This evaluation includes identifying where O.D. degradation is most likely to occur and includes reviewing plant specific programs, practices and operating experience. If the potential for degradation is identified, Code Case N-662 defines examination techniques, volumes and frequencies. As such, implementation of N-662 will identify more appropriate locations for surface examination, if any, and eliminate unnecessary examinations.

Other examination requirements for piping components, including volumetric and pressure testing will continue to be performed. Examination requirements for other components including small bore Class 1 piping are not subject to this relief request.

Code Case N-662 was approved by the ASME Boiler and Pressure Vessel Code Committee on September, 17, 2002, but is not yet included in the most recent listing of NRC approved code cases provided in Revision 12 of Regulatory Guide 1.147, "Inservice Inspection Code Case Acceptability – ASME Section XI Division 1."

Licensee considers the alternative provided by Code Case N-662 provides an acceptable level of quality and safety. The additional requirement of Code Case N-662

to evaluate susceptibility to O. D. degradation is an improvement to existing "random" examination requirements.

IV. Conclusion

10CFR50.55a(a)(3) states:

"Proposed alternatives to the requirements of (c), (d), (e), (f), (g), and (h) of this section or portions thereof may be used when authorized by the Director of the Office of Nuclear Reactor Regulation. The applicant shall demonstrate that:

- (i) The proposed alternatives would provide an acceptable level of quality and safety, or
- (ii) Compliance with the specified requirements of this section would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety."

Licensee believes this alternative provides a level of safety and quality consistent with the Code requirements. Therefore, Licensee requests the NRC authorize the proposed alternative in accordance with 10CFR50.55a(a)(3)(i).

## Partial Examination Coverage

- RI and traditional Section XI examinations obtaining <90% coverage require a relief request
- Alternative process to be proposed:
  - Select other locations (i.e. > 90%) where allowed, physically possible and desirable,
  - Review basis for inspection location selection (e.g. type of degradation, severity of degradation),
  - Can be used both pre- and post- inspection,
  - Expect to eliminate many low value-added relief requests
  - Some locations may still require relief request

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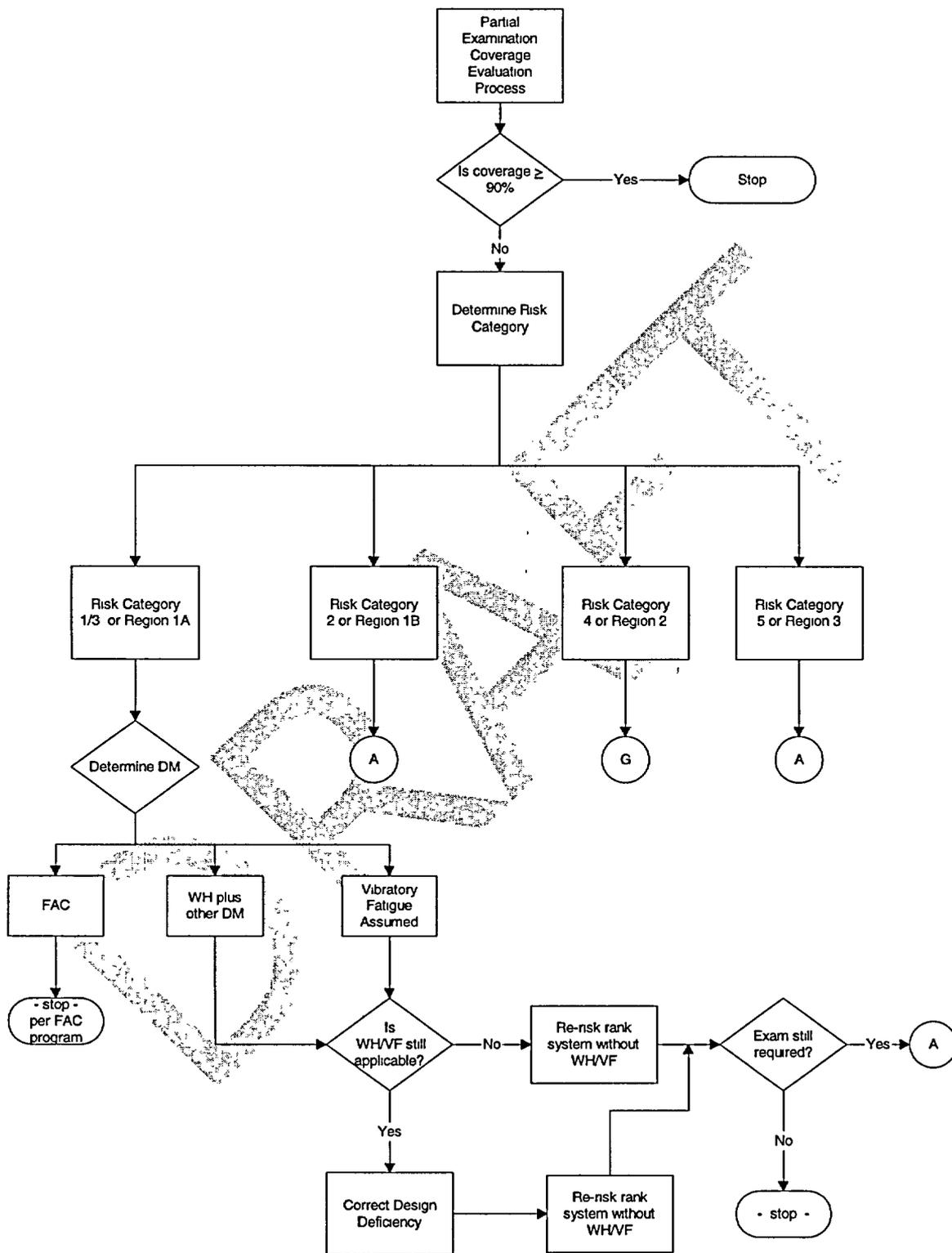


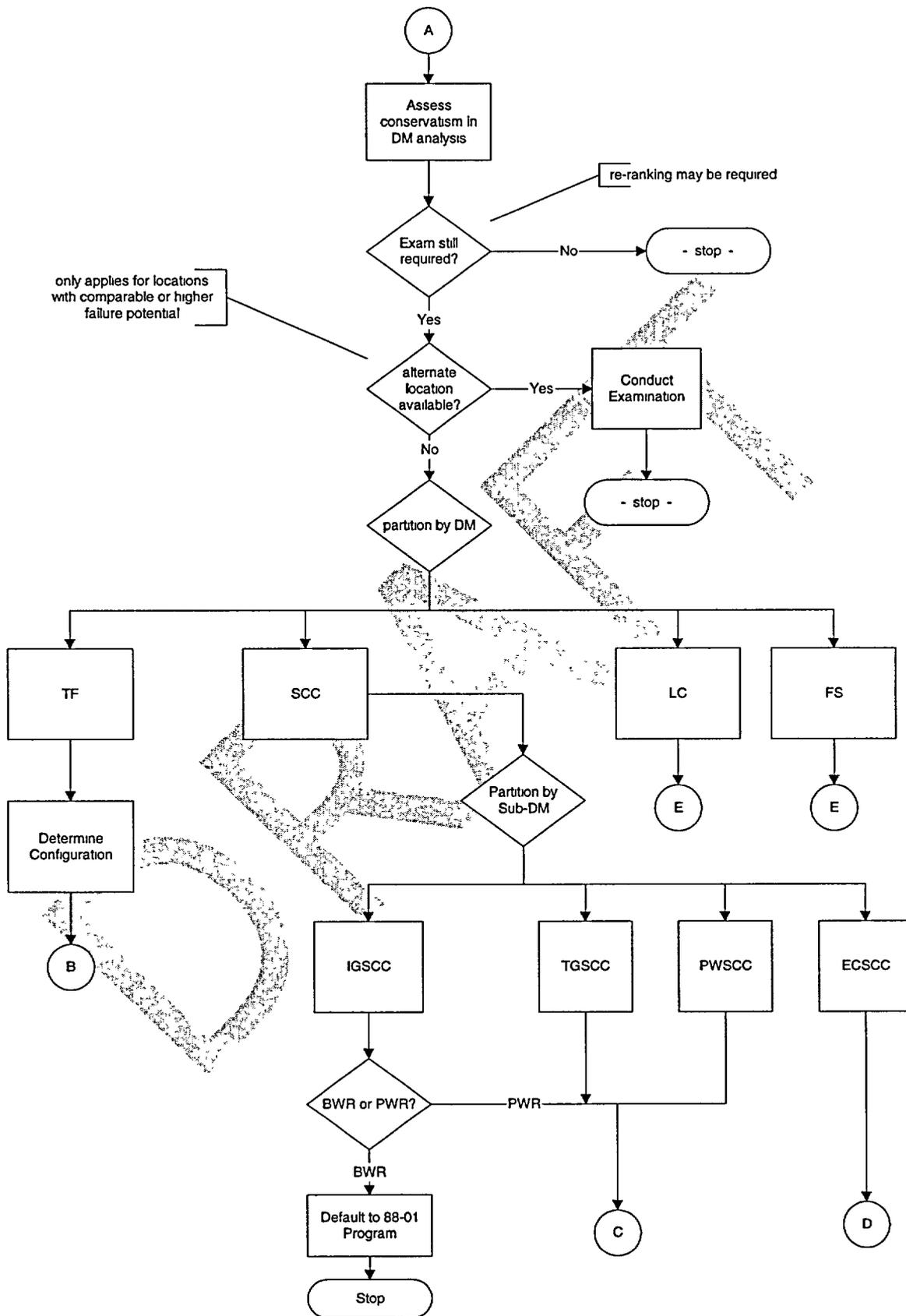
## Partial Examination Coverage (cont.)

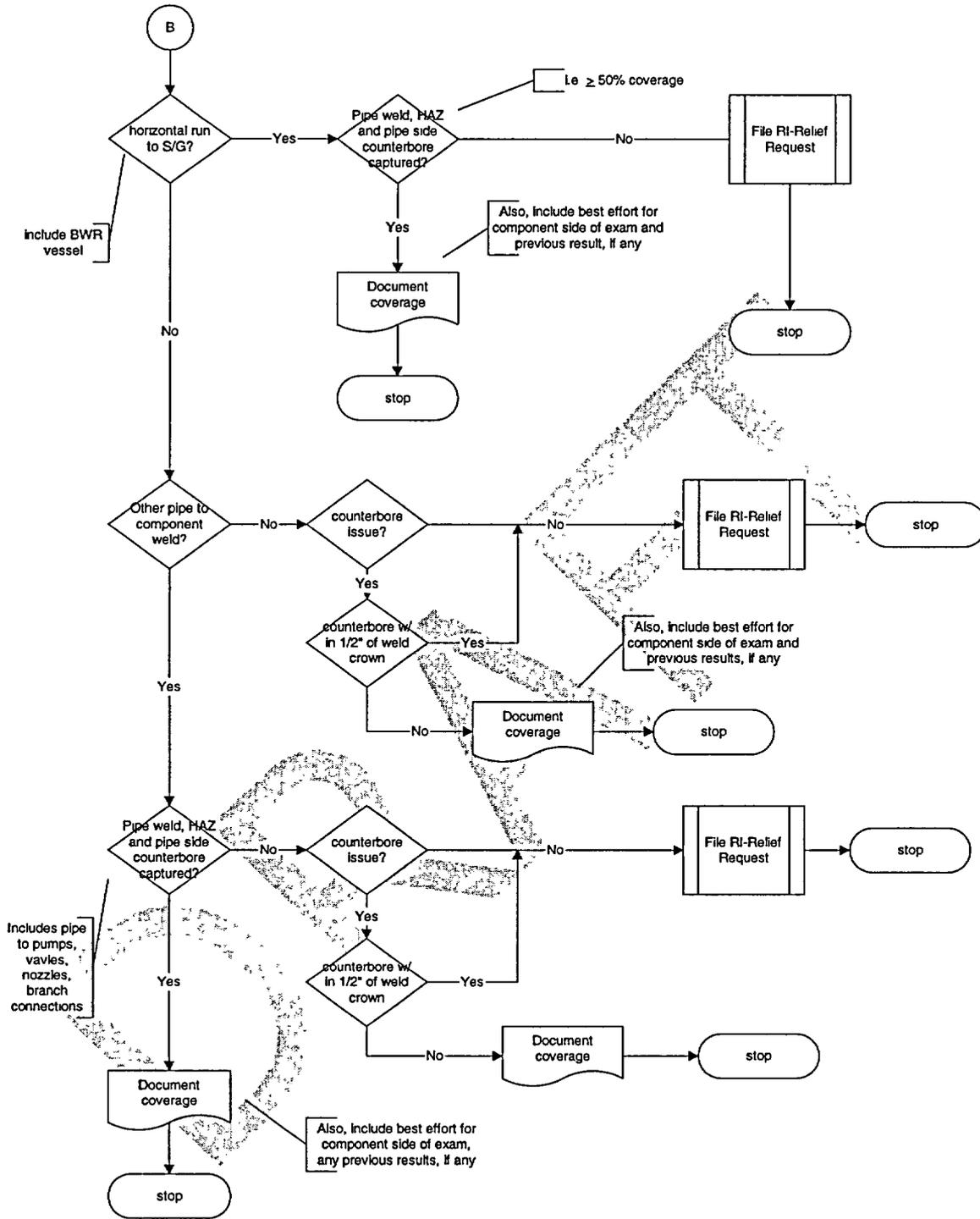
- Partial Exam Whitepaper
  - Provides a process flowchart (see following draft slides),
  - Provides guidance for use of the process flowchart
  - Provides basis for when partial coverage is acceptable (i.e. no relief request required),
  - Identifies situations that still require a relief request,
  - Provides guidance in developing risk-informed basis for required relief requests

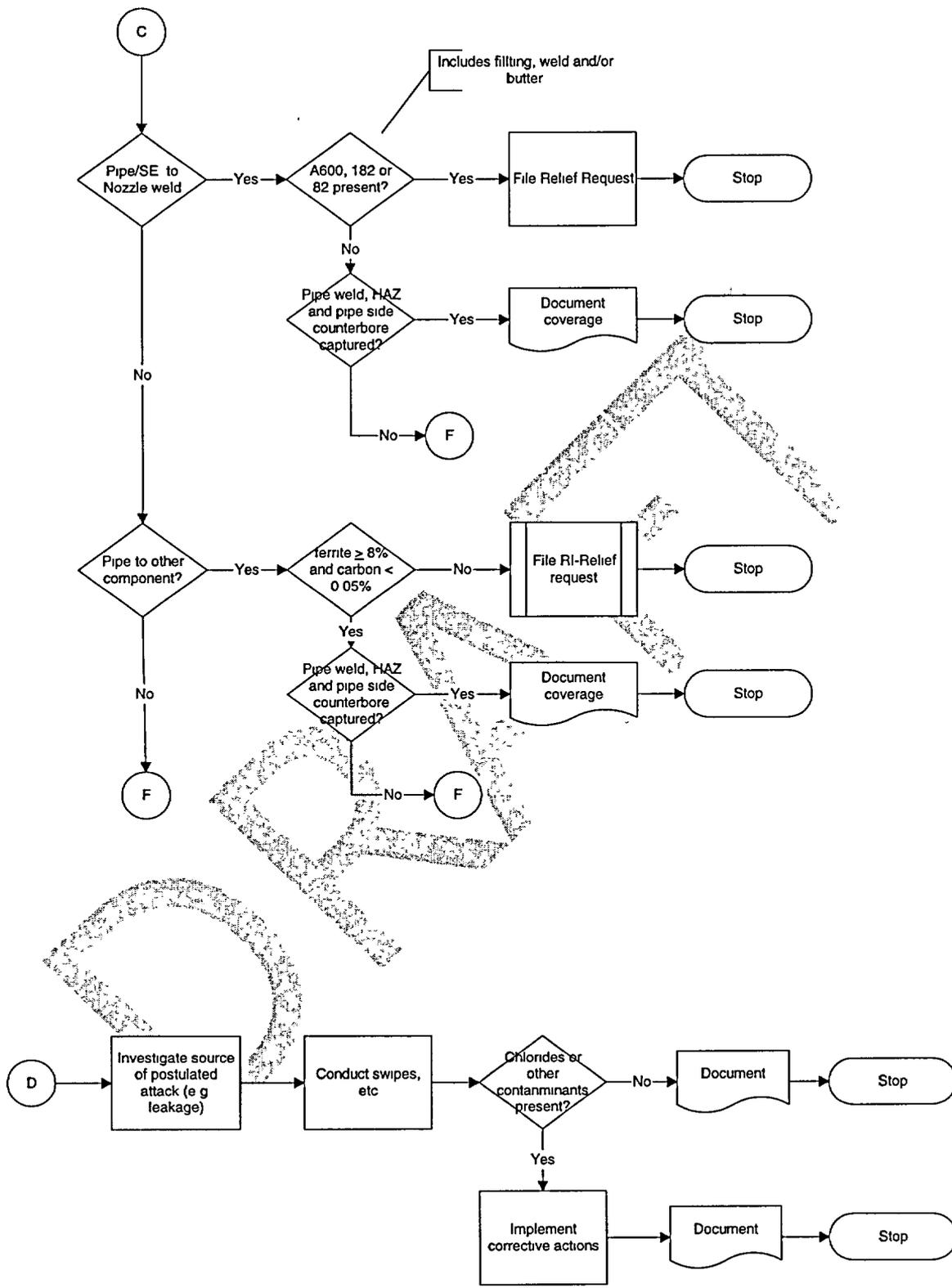
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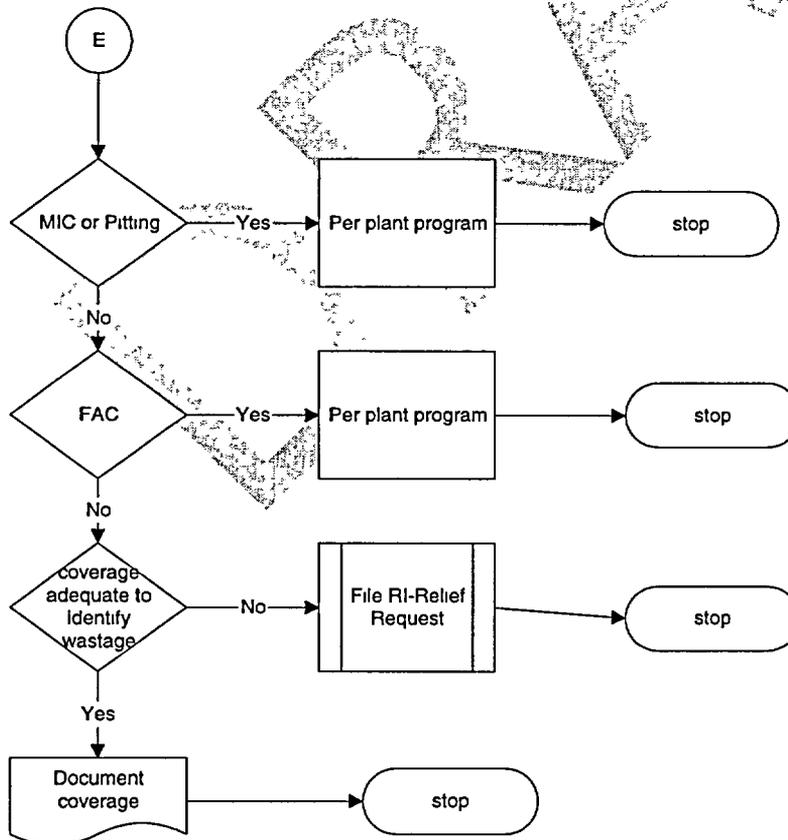
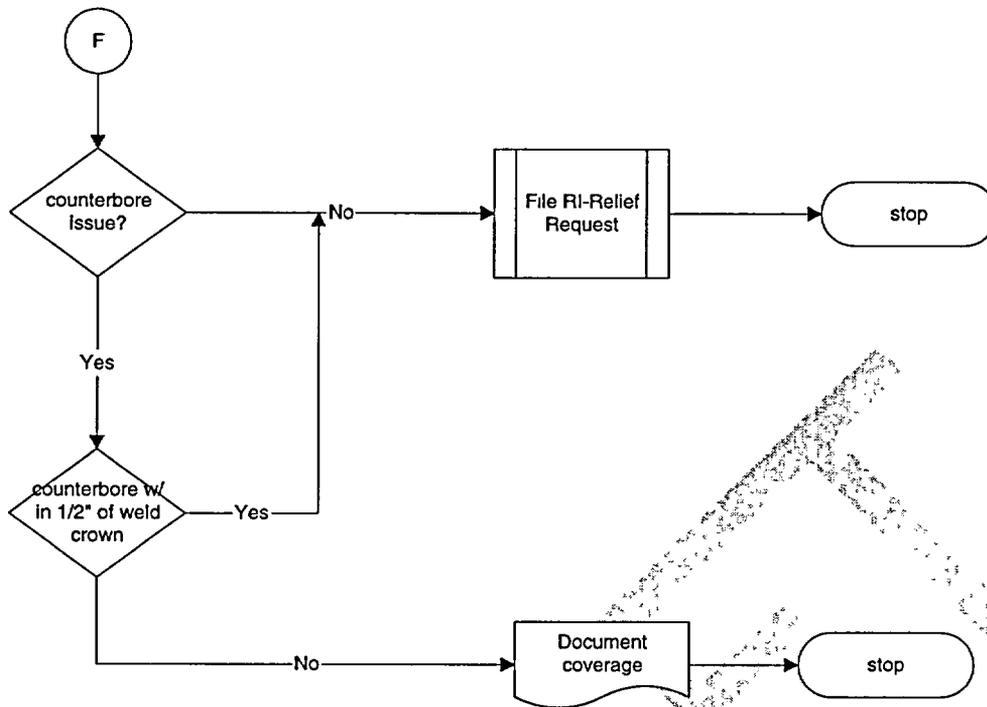


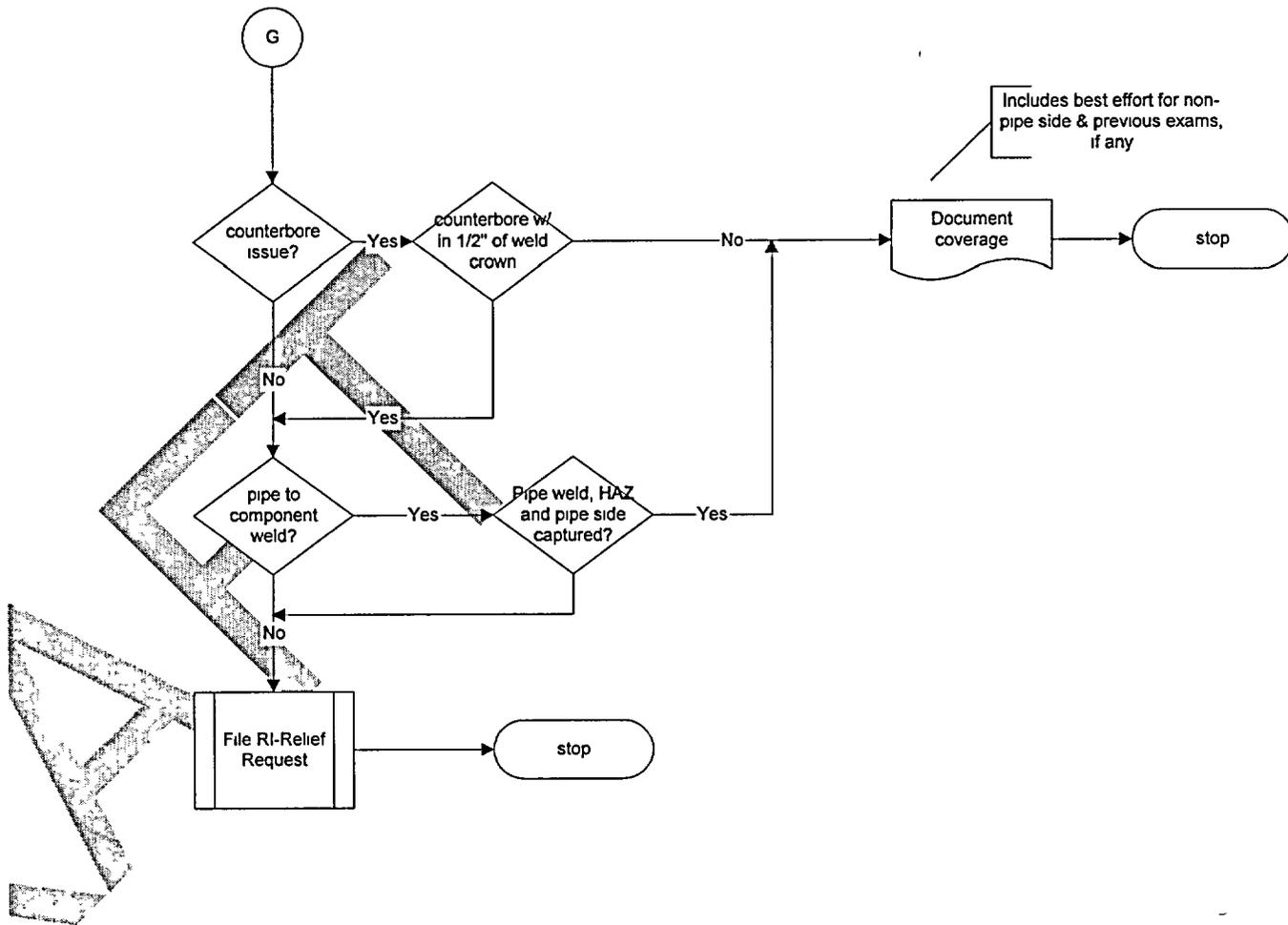












## Other Initiatives

- Pressure Testing
  - Code action, with RI insights, to define boundaries, frequencies and corrective actions,
  - Working Group Pressure Testing,
    - Letter balloted for comment October, 2002
  - Working Group on the Implementation of Risk-Based Examinations
    - E-mail distribution for information October, 2002

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## Other Initiatives

- Snubber Testing
  - EPRI TR-110381 and O&M10 provided initial look at RI-Snubber testing
  - Key risk ranking assumption tied significance to pump/valve versus piping
  - Intend to revise O&M 10 (RI-Snubber Testing) based on more recent work
    - Revised risk ranking approach,
    - Trial application to several plants,
    - Consideration of service life monitoring approach

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## Other Initiatives

- Online ISI
  - Provide guidance for conducting on-line inspections (components & supports),
  - Alternative sample expansion criteria
  - Corrective actions

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## Other Initiatives

- Period Percentage Requirements
  - Existing Requirements
    - IWB/IWC-2410 require inspection locations to be allocated over three inspection periods
    - Essentially 1/3 of population per inspection period
  - Existing Situation
    - Small (per outage) inspection location populations still require mobilization costs
    - Graying of the NDE workforce

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## Other Initiatives

- Period Percentage Requirements (cont.)
  - Proposed Alternative:
    - RI-ISI identifies inspections locations and postulated degradation mechanism(s), if any
    - Remove IWB/IWC-2410 requirement for inspection locations with no postulated mechanisms (e.g. Cat4, Region 1B/2)
    - Inspection locations with postulated degradation mechanisms would still need to meet IWB/IWC-2410 scheduler requirements??

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## Other Initiatives

- Classification
  - Develop streamlined, coherent and generic classification criteria
  - Generic nature will reduce licensee/NRC resource burden
  - Generic nature will increase consistency of application
  - Example, HSS would be:
    - Reactor coolant pressure boundary,
    - Decay heat removal pressure boundary function,
    - High energy piping penetrating containment

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## Other Initiatives

- Classification (cont.)
  - Lessons learned from RI-ISI studies with regards to component reliability (non proposed HSS)
    - Passive components typically highly reliable
    - Reliability typically controlled by susceptibility to various forms of degradation (e.g. TF, IGSCC, MIC, FAC)
  - Requirement to confirm RRM activity does not increase susceptibility to postulated degradation mechanisms (RI-ISI table plus waterhammer and vibratory fatigue)
    - Hardware (e.g. material, routing)
    - Analysis,
    - New or existing monitoring,
    - Combination

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## Agenda

- Action Items

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