

UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

June 13, 2001



CHIEF FINANCIAL  
OFFICER

Electric Power Research Institute  
Attn: Mr. Pat O'Regan  
EPRI Risk Informed Inspection Program Manager  
3412 Hillview Avenue  
P.O. Box 10412  
Palo Alto, CA 94303-0813

Dear Mr. O'Regan:

I am responding to your March 12, 2001, letter requesting a waiver of the 10 CFR 170 fees for the review of the extension of the Electric Power Research Institute (EPRI) Topical Report, TR-112657, Rev. B-A, "Revised Risk-Informed Inservice Inspection (RI-ISI) Evaluation Procedure." The extension report was submitted for approval with your February 28, 2001, letter. The EPRI Topical Report TR-112657 is the final version of the EPRI TR-106706, "Risk-Informed Inservice Inspection Evaluation Procedure," for which EPRI requested and ~~received a waiver of 10 CFR 170 fees in November 1996.~~ For reasons stated below, 10 CFR 170 fees are waived for the review of the extension of TR-112657, Rev. B-A.

In 1995, the Nuclear Regulatory Commission (NRC) published a policy statement (60FR42622) on the use of probabilistic risk assessment (PRA) methods in nuclear regulatory activities. The NRC staff was directed to prepare an action plan, together with a timetable for developing Regulatory Guides (RGs) and Standard Review Plans (SRPs) associated with the use of PRA in specific applications. A task group was established to delineate specific tasks in the RI-ISI area. The nuclear industry, under one umbrella of NEI, submitted two methodologies for the implementation of the RI-ISI. The NRC encouraged licensees to submit pilot plant applications for demonstrating risk-informed methodologies to be used for piping segment and piping structural element selection in systems scheduled for ISI. TR-106706 was the EPRI methodology used by Entergy Operations, Inc. for the Arkansas Nuclear One, Unit 2 pilot plant application. Using the results from the review of the pilot plant applications, the staff developed a RI-ISI application-specific RG and the corresponding SRP chapters and associated inspection procedure documents.

In your March 12, 2001, letter, you state that the extension of TR-112567, Rev. B-A documents an acceptable alternative to augmented inspection programs for break exclusion requirements (BER) typically identified via SRP sections 3.6.1 and 3.6.2. You requested the fee exemption based on 10 CFR 170.21(J), Footnote 4, Criterion 3, which provides that fees will not be assessed for requests/reports submitted to the NRC ... "[a]s a means of exchanging information between industry organizations and the NRC for the purpose of supporting generic regulatory improvements or efforts."

The NRC staff has confirmed that the review of the new information submitted with the February 28, 2001, letter will be used to support NRC's generic regulatory improvements, specifically regarding RI-ISI, and will assist in developing guidance for the industry on similar submittals.

Based on the foregoing, I have determined that the review of the extension of TR-112657, Rev. B-A meets the criteria for the fee waiver in 10 CFR 170.21(J), Footnote 4, criterion 3.

No invoices associated with the review of the extension of TR-112657, Rev. B-A have been issued.

If you have any questions, please contact Ellen Poteat of my staff at 301-415-6392.

Sincerely,

*Original signed by Jesse Funches*

Jesse L. Funches  
Chief Financial Officer

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P. O'Regan

-2-

The NRC staff has confirmed that the new information submitted with the February 28, 2001, letter will be used to support NRC's generic regulatory improvements, specifically regarding RI-ISI, and will assist in developing guidance for the industry on similar submittals.

Based on the foregoing, I have determined that the review of the extension of TR-112657, Rev. B-A meets the criteria for the fee waiver in 10 CFR 170.21(J), Footnote 4, criterion 3.

No invoices associated with the review of the extension of TR-112657, Rev. B-A have been issued.

If you have any questions, please contact Ellen Poteat of my staff at 301-415-6392.

Sincerely,

Jesse L. Funches  
Chief Financial Officer

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Date Rec'd: 04/05/2001

DAF Action: DAF-1-069

OC Action: 2001-116

DAF Due Date: 05/02/2001

5/18

Branch: LFARB

Action Item: Request for Fee Billing Waiver for Review of EPRI's extension of Risk-Informed In-Service Inspection Methodology

Description:

[Redacted]

Date to DIR:

[Redacted]

Ext. Date:

[Redacted]

Date Closed:

[Redacted]

Subject File:

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OCFO TICKET

04-Apr-01

Assigned: DAF

Item No: 2001-116

Priority: 1

From: Collins

Office: NRR

To: Funches

Date: 04/02/2001

Due Date: 05/02/2001

Ticket No:

Subject: Request for Fee Billing Waiver for Review of EPRI's Extension of Risk-informed In-Service Inspection Methodology

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NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001  
April 2, 2001

017 F3 2001-116  
J Funches

MEMORANDUM TO: Jesse Funches, Chief Financial Officer

FROM: *Samuel J. Collins*  
Samuel J. Collins, Director  
Office of Nuclear Reactor Regulation

SUBJECT: REQUEST FOR FEE BILLING WAIVER FOR REVIEW OF ELECTRIC  
POWER RESEARCH INSTITUTE'S EXTENSION OF RISK-INFORMED  
IN-SERVICE INSPECTION (RI-ISI) METHODOLOGY

By letter dated March 12, 2001 (attachment), the Electric Power Research Institute (EPRI) requested a waiver of fees for the review of the extensions of the RI-ISI methodology. EPRI submitted the extensions of its RI-ISI methodology by letter dated February 28, 2001.

EPRI cited criteria 3 of footnote 4 of 10 CFR 170.21 as the rationale for requesting the fee waiver. Criteria 3 of footnote 4 states that fees will not be assessed for reports submitted to the NRC: "As a means of exchanging information between industry organizations and the NRC for the purposes of supporting generic regulatory improvements or efforts."

NRR staff have confirmed that the new information submitted with the February 28, 2001, letter will be used to support generic regulatory improvements, specifically regarding RI-ISI, and assist EPRI in developing guidance for the industry on similar submittals. Therefore, NRR supports EPRI's request for a fee billing waiver.

NRR requests that the final decision on this matter be transmitted to EPRI.

Project No. 669

Attachment: Letter from EPRI dated March 12, 2001

*Sj*



March 12, 2001

Dr. Brian W. Sheron  
Associate Director for Project Licensing and Technical Analysis  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, DC 20555-0001

Subject: Extension of Risk-Informed Inservice Inspection (RI-ISI) Methodology

Dear Dr. Sheron:

Per Reference 1, EPRI submitted a draft report documenting the extension of the EPRI RI-ISI process (Reference 2) as an acceptable alternative to augmented inspection programs for break exclusion requirements (BER) typically identified via Standard Review Plan sections 3.6.1 and 3.6.2.

A waiver of review fees is requested based on the exemption listed in footnote 4 to the Special Projects fee category in the table presented in 10CFR50.170.21, which says: [footnote] "4. Fees will not be assessed for requests/reports submitted to the NRC: ...

3. As a means of exchanging information between industry organizations and the NRC for the purpose of supporting generic regulatory improvements or efforts."

We look forward to your review of the Reference 1 material and welcome a meeting in the near future to discuss any comments you or your staff may have.

Sincerely,

Pat O'Regan  
EPRI Risk Informed Inspection Program Manager

Dr. Brian W. Sheron  
March 12, 2001  
Page 2

cc: L. Ohlshan (USNRC)  
R. Bradley (NEI)

References:

1. NEI letter from Patrick O'Regan to Dr. Brian Sheron (USNRC), dated February 28, 2001.
2. *Revised Risk-Informed Inservice Inspection Evaluation Procedure*, EPRI, Palo Alto, CA: 1999. EPRI TR-112657, Rev. B-A



MB1344

POWERING PROGRESS THROUGH  
SCIENCE AND TECHNOLOGY

February 28, 2001 r=

Dr. Brian W. Sheron Associate Director for Project Licensing and Technical Analysis Office of Nuclear Reactor Regulation U.S. Nuclear Regulatory Commission Washington, DC 20555-0001

Subject: Extension of Risk-Informed Inservice Inspection (RI-ISI) Methodology

Dear Dr. Sheron:

The USNRC approved the EPRI Risk-Informed Inservice Inspection (RI-ISI) methodology for generic application in 1999 (Reference 1). Since that time, its application has received widespread acceptance in the industry as a means to focus resources on risk significant components and eliminate unnecessary occupational exposures (Reference 2).

In parallel with these applications, EPRI has continued research and development efforts to further the effectiveness of risk and performance based technologies and hence risk-informed regulation. To support communication and technical discussion on these efforts, EPRI staff, member utilities and NEI staff have met periodically with USNRC staff.

The purpose of this letter is to forward the attached information to support our mutual objective of efficient and effective review of these extensions of the EPRI RI-ISI methodology. The first attachment contains a draft report documenting the extension of the EPRI RI-ISI process (Reference 3). This report provides the basis and process for extending the RI-ISI methodology as an acceptable alternative to augmented inspection programs for break exclusion requirements (BER) typically identified via Standard Review Plan sections 3.6.1 and 3.6.2. Per previous discussions with USNRC staff, this process has been applied at two sites (one BWR and one PWR).

Attachments 2 and 3 present additional insights gained from more recent applications of the EPRI RI-ISI methodology. The second attachment provides additional criteria for assessing the susceptibility of piping to thermal fatigue. The criteria is being applied by some licensees that have RI-ISI submittals underway and is provided herein for generic approval thereby avoiding the need for future plant specific approvals.

The third attachment discusses the impact of RI-ISI programs relative to the implementation of repair and replacement activities. This topic is also being discussed at ASME Section XI.

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Dr. Brian W. Sheron  
February 28, 2001  
Page 1

Finally, as you aware, the Material Reliability Project is developing plans for addressing the generic implications of the VC Summer event. Included in these plans is an assessment of the potential impact of the VC Summer event on current and future RI-ISI applications. The existing RI-ISI process includes a living program component. As such, it is our intent to incorporate any lessons learned from this event into the RI-ISI process as applicable.

We look forward to your review of the attached and welcome a meeting in the near future to discuss any comments you or your staff may have.

Sincerely,

RA.4L.r.t

Fat O'Regan  
EPRI Risk Informed Inspection Program Manager

cc: S. Ali (USNRC)  
F. Annarato (EPRI)  
R. Bradley (NEI)  
G. Holahan (USNRC)  
L. O'Leary (USNRC)

References:

1. SAFETY EVALUATION REPORT related to "Revised Risk-Informed Inservice Inspection Procedure" (EPRI TR-I 12657, Rev. B July 1999), dated October 28, 1999.
2. NEI letter from Anthony Pietrangeli to Dr. Brian Sheron (USNRC), dated October 20, 2000.
3. Revised Risk-Informed Inservice Inspection Evaluation Procedure, EPRI, Palo Alto, CA: 1999. EPRI TR-I 12657, Rev. B-A

Attachments:

1. Applications of Risk and Performance Technology, Volume 1
  2. TASCs Severity Assessment
  3. Preservice Inspection Elements
- Applications of Risk and Performance Technology  
Volume 1 - Break Exclusion Requirements  
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INTRODUCTION AND PURPOSE

General Design Criteria 4 (Reference 1) requires that structures, systems, and components important to safety be designed to accommodate the effects of postulated accidents, including appropriate protection against the dynamic and environmental effects of postulated pipe ruptures

Paraphrasing from NUREG-1061 (Reference 14), "design basis accident", or maximum hypothetical accident" have been terms used to describe what was generally known as the double-ended guillotine break (DEGB). The concept was originated by the US Atomic Energy Commission for the multiple purpose of sizing containments and establishing "accident" doses and later for sizing emergency core cooling systems. The original concept was quite straightforward: namely an instantaneous DEGB of a major pipe in the primary system of a lightwater reactor would maximize the fluid release and establish an upper bound for the design pressure established for a containment.

Later changes in regulatory philosophy tended to shift the DEGB from a hypothetical accident to one with increasing credibility. It was a relatively short step from the hypothetical to a belief in randomly occurring major pipe breaks.

The Nuclear Regulatory Commission has issued a number of documents that provide criteria for implementing the above requirement, including the scope of applicable systems, locations to postulate breaks, methods for analyzing pipe whip forces and displacements, design of rupture restraints, and methods for evaluating the integrity of components subjected to the pipe rupture loads.

In determining the locations at which breaks are to be postulated in high energy piping, the regulatory guidance provides special rules for break exclusion regions (a.k.a. "no break zone"), including containment penetration areas. There are a variety of terms that have been developed to identify these special rules including break exclusion requirements (BER), no break zones (NBZ), high energy break exclusion region (HEBER), high stress welds, augmented inspections, etc. These rules provide licensees the option of not specifying breaks in these regions provided additional requirements are met. The requirements for not specifying breaks in these areas consist of:

- maintaining design stresses low (i.e. below BER acceptance criteria),
- minimizing welded attachments,
- minimizing the number of branch connections,
- postulation of pipe breaks upstream and downstream of the "no break zone",
- increased number of inspections in the "no break zone" region.

It should be noted that at the time of the Giambusso letter (Reference 2) and the issuance of the applicable Standard Review Plan sections, inservice inspection requirements of ASME Section XI were in their formative stages of development and application. In addition, augmented inspection programs that factored in actual operating experience, for example Generic Letter 8908 for flow assisted corrosion (FAQ and TR-10) 581 for thermal stratification, cycling and striping (TASCS), had not been foreseen.

The purpose of this report is to revisit the inspection sample size of the BER augmented inspection programs. In doing so, this report has reviewed plant operating experience since the early seventies, developed an understanding of the performance history of this program as well as its application across the industry.

The goal of this report is to, as warranted, recommend a reasonable inspection sample size taking into account the safety benefit associated with BER inspection programs and plant specific design features while maintaining an adequate level of defense-in-depth. Although existing evidence and analyses have identified the potential for catastrophic pipe breaks (i.e. double ended guillotine breaks) as vanishingly low for this scope of piping, prudence dictates that a reasonable inspection sample size, and a process for determining that sample size, be developed. In support of this goal, two example plant applications (see Appendix A and B) were conducted to assure that the defined process is robust and can be consistently applied to both BWR and PWR plants.

1-2

HISTORICAL PERSPECTIVE

2.1 Purpose/Introduction

The purpose of this section is to provide a historical perspective on the break exclusion requirements (BER) as applied to high-energy piping, including containment penetration areas. Most of the formative regulatory guidance specific to BER programs comes from the early days of Nuclear Power, generally in the 1972 to 1975 time frame, prior to any significant history of nuclear plant operations. Knowledge of the frequency of occurrence and speed of progression of various degradation mechanisms in plant operating environments and the adequacy of various sampling plans could not have been incorporated into the regulatory guidance. Neither could specific consequence insights from later risk assessments (e.g. PRA). Inspection criteria were conservatively set beyond the requirements of ASME XI to provide a perceived reduction in the probability of breaks in the exclusion zone. For some plants, the development of regulations and guidance in this area has resulted in an inspection burden that exceeds that required by ASME Section XI. Augmented inspection requirements can be as high as 100% of welds every ten years versus the ASME XI requirements of 7.5% (Class 2) and 25% (Class 1) every ten years. Not all plants have been as severely impacted as other plants since plant specific requirement