

June 11, 1998

FOR: The Commissioners

FROM: L. Joseph Callan /s/  
Executive Director for Operations

SUBJECT: TRIAL USE OF APPLICATION-SPECIFIC REGULATORY GUIDE AND STANDARD REVIEW PLAN FOR RISK-INFORMED INSERVICE INSPECTION OF PIPING

## PURPOSE:

To provide for information final drafts for trial use of Regulatory Guide (RG)-1.178 (formerly Draft Guide (DG)-1063) and Standard Review Plan (SRP) Section 3.9.8. These documents address risk-informed inservice inspection (RI-ISI) programs for piping and provide guidance on an acceptable alternative to existing ISI programs by incorporating risk insights in accordance with 10 CFR 50.55a(a)(3)(I) requirements. The RG provides guidance to reactor licensees on acceptable approaches for developing and implementing a RI-ISI program of piping. The SRP provides guidance to the staff on the review of RI-ISI submittals.

## BACKGROUND:

The Commission's October 1, 1997, Staff Requirements Memorandum (SRM) on SECY-97-190 approved publication of the Federal Register Notice (FRN) and issuance of the draft regulatory guide and standard review plan for risk-informed ISI for a 90-day comment period. The SRM directed the staff to:

1. continue to evaluate the two methodologies submitted by NEI on RI-ISI programs and to work with the industry representatives on their respective pilot applications,
2. thoroughly discuss the issues addressed in the FRN and the details of the two methodologies during the public workshop, and
3. consider whether it is necessary and practical for licensees to perform risk assessment on all pipes in the plant for determining the scope of the risk-informed inservice inspection program.

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## DISCUSSION:

In response to the Commission's directives noted above and to public comments, the staff modified DG-1063 and its accompanying SRP and plans to issue final drafts of these documents for trial use (as RG-1.178 and SRP Section 3.9.8). Attachments to this paper contain the proposed *Federal Register* notice (Attachment 1) announcing the availability of the RG and SRP for trial use, the proposed RI-ISI RG and SRP (Attachments 2 and 3, respectively), and responses to the public comments (Attachment 4). Responses to the Commission's SRM and the changes made to these documents in response to public comments are addressed below.

The staff is issuing the documents for trial use for the following reasons:

- a. Development of the documents did not have the benefit of insights gained from pilot plant applications. Schedules for the receipt of licensee submittals have slipped such that these reviews are now expected to be completed by the end of December 1998.
- b. The industry submitted topical reports that apply two different methods for incorporating risk insights into their RI-ISI programs. The staff issued requests for additional information (RAIs) and is reviewing the reports in parallel with the pilot submittals. The staff's review of the pilot plant submittals and the topical reports are expected to be completed by the end of December 1998.
- c. The ASME passed three code cases (N-560, N-577, and N-578) that implement RI-ISI programs. The topical reports identified in (b.) above provide the technical details required to implement these code cases. The staff is reviewing these code cases in parallel with the pilot plant submittals.

To ensure consistency and completeness of the RG and SRP, the staff needs to incorporate insights gained from the pilot plants, the topical reports, and the three code cases prior to finalizing the RI-ISI RG and SRP. This sets the ISI RG and SRP apart from the other RI documents the Commission has received, since those documents had been developed with the benefit of pilot plant applications and thus were proposed for issuance as final documents. Following the review of the pilot plant submittals and their associated topical reports, the staff will then be able to finalize the RI-ISI RG and SRP by incorporating the decisions reached for the pilot plants. This regulatory guide does not establish any final staff positions, and may be changed prior to being adopted in final form. As such, this trial regulatory guide does not establish a staff position for purposes of the Backfit Rule, 10 CFR 50.109, and any changes to this regulatory guide prior to staff adoption in final form shall not be considered to be backfits as defined in 10 CFR 50.109(a)(1).

**Response to Commission directives in October 1, 1997, SRM:**

## **Continue to evaluate the two methodologies.**

The nuclear industry, through NEI, requested the staff to review and approve two topical reports that address methods for developing a RI-ISI program for piping. One topical report was developed by EPRI (EPRI TR-106706). The other topical report was developed by the Westinghouse Owners Group (WCAP-14572). Both methods support ongoing activities by the American Society of Mechanical Engineers to establish Section XI code cases for RI-ISI programs.

The staff reviewed and issued requests for additional information (RAI) for each topical report. To date, the Westinghouse Owners Group responded to the RAIs and updated their topical report to incorporate the lessons learned from the pilot plants and issues raised by the staff during the past two years (WCAP-14572, Revision 1). Public meetings were held to discuss the various elements in the program, to discuss their technical merit, and to observe the implementation of the process to the Surry pilot plant. In parallel, the staff performed independent audits of the methodology.

The staff also reviewed the topical report submitted by EPRI (EPRI TR-106706) and issued RAIs on that report. To date, the staff has received neither responses to the RAIs nor an update to the topical report. The method has been evolving and has been applied to two pilot plants - Vermont Yankee and ANO-2. A public meeting with EPRI to discuss the technical details was held in November 1997. The staff will continue to meet with the industry to discuss developments in the EPRI methodology.

## **Public workshop**

On November 20-21, 1997, the staff held a public workshop on the draft regulatory guide and standard review plan. The workshop was well attended by industry and international representatives. The discussions were very lively and direct. Supporters of the two methodologies were very strong proponents of their respective programs. The comments received on the body of the RG and SRP were positive. Both the EPRI methodology supporters and the WOG methodology supporters agreed that the body of the RG adequately addressed their methods. However, the supporters of the EPRI methodology expressed strong disappointment that elements of their methodology were not highlighted in the appendices. That message was also strongly expressed in their written comments.

In response to the comments, the staff stated that it was unable to make an informed decision on the basic elements of the EPRI methodology until the staff received responses to RAIs and an update to the EPRI topical report, and had an opportunity to review and evaluate the report and the activities of the pilot plants. In addition, while existing documentation of the EPRI methodology appears to conform to the body of the RG, the staff identified inconsistencies between the two code cases (N-560 and N-578) that apply the same methodology. Consequently, the appendices did not address the elements of the EPRI method.

In developing the final draft of RG 1.178, the staff has concluded that in the interest of providing balance with respect to the quantitative and qualitative methods and to allow for additional review of technical concerns, the appendices should be removed from the RG. This will allow the staff to focus limited resources in the near term to the review and approval of the pilot plant applications and the topical reports submitted in support of the pilot plant analyses. Regulatory guidance will be provided to the industry through the staff's safety evaluations of the topical reports and pilot plant submittals. Upon completion of the topical report and pilot reviews, a decision will be made on the need for and content of any appendices for the final RG. In the interim, the staff will document the technical content of the appendices, including elements of a qualitative approach, in a draft NUREG report(s) and make it available for information. The final NUREG will be published following the review and approval of the pilot plants and topical reports (calendar year 1999).

Discussions at the workshop also focused on the issue of scope. The draft RG required a full scope evaluation of a plant's piping. The staff's evaluation on scope is provided below in response to the Commission's SRM question on this subject.

## **Practicality of full scope RI-ISI programs**

In the October 1, 1997 SRM, the Commission requested the staff to consider whether it is necessary and practical for licensees to perform risk assessments on all pipes in the plant when implementing a risk-informed inservice inspection program. On this matter, there has been significant discussion by the industry regarding the economic viability of full versus partial scope (as well as quantitative versus qualitative approaches) and indicating that the pilot studies will assist the industry in assessing the economic viability of the approaches. Therefore, the staff has concluded that it should not judge the scope issue a priori, but rather to assess the proposed approaches on their own merit. As such, the RG indicates that both partial and full scope applications of RI-ISI are acceptable.

## **Public comment**

The 90-day public comment period ended on January 13, 1998. Disposition of comments is addressed in Attachment 4. The comments can be divided into three categories: editorial, content, and technical. The editorial comments were incorporated, as appropriate. The public comments supported the content in the body of the RG as appropriately addressing both qualitative and quantitative RI-ISI programs. However, several comments recommended that the appendices be removed, as the content in the appendices was too detailed for a RG. The technical comments that relate to the appendices will be addressed in a NUREG, as discussed above.

As stated, all organizations that provided comments appeared to be reasonably satisfied with the body of the RG, other than the level of detail required in a submittal (Chapter 6). The staff updated Chapter 6 to streamline the information to that will be required to review an application. Experience to be gained from reviewing the pilot plants may refine that section in the RG.

A significant number of comments were received that addressed concerns over the lack of discussions of the major elements in the EPRI methodology

(code cases N-560 and N-578).

With respect to the EPRI methodology, the staff did not have adequate information to address the technical issues in code cases N-560 and N-578. The information provided by NEI through topical report EPRI-TR-106076 was not sufficient to render a technical decision of acceptability. The staff issued a RAI to NEI on that topical report and, to date, has not received a response.

The second most critical concern raised by comments focuses on incorporating flexibility to permit partial scope RI-ISI programs. As noted above, RG 1.178 indicates that partial scope submittals are acceptable.

#### **Significant changes made to the RG and SRP:**

In response to public comments and discussions with ACRS, the following changes to the RI-ISI guide and SRP have been made.

- Guidance regarding the scope, level of detail, and quality of the PRA needed for RI-ISI programs was modified to provide more flexibility.
- Guidance regarding the performance monitoring program for high safety significant piping (HSS) and low safety significant piping (LSS) remained unchanged, except for the second barrier to fission product release (e.g., primary system piping). The RG was modified to state that if the categorization of the primary system (Class-1 piping) identified the reactor coolant system or a subset, such as the cold and hot leg piping, to be LSS, then some level of inspection will continue to be required. The basis for this guidance is that for defense-in-depth considerations (i.e., the RCS is the second barrier to fission product release) some level of inspection should be maintained.
- Documentation requested for an ISI program submittal was reduced.
- The appendices to the RG were removed, as previously discussed.

#### **COORDINATION:**

RG 1.178 and SRP Section 3.9.8 were reviewed by the ACRS on April 3 and May 1, 1998. The staff has scheduled a final meeting with the ACRS for June 4, 1997. The staff will consider the ACRS comments prior to implementing the draft RG and SRP for trial use on the pilot plants and will develop a draft NUREG report(s) that incorporates the attachments in DG-1063 and addresses the elements of a qualitative approach. The staff met with the CRGR on May 21, 1998. The CRGR endorsed issuing the RG and SRP for trial use subject to incorporation of their comments in this paper, the RG and the SRP. This paper and the attachments incorporate CRGR comments. The Office of the General Counsel has reviewed the documents and has no legal objection to their being issued for trial use.

#### **CONCLUSION:**

The staff intends to issue RG 1.178 and SRP Section 3.9.8 for trial use and develop a draft NUREG(s) that incorporates the technical details addressed in the attachments to DG-1063, including qualitative methods. Upon completion of the WOG and EPRI topical report reviews and the three pilot plant reviews, the staff will incorporate lessons learned from those reviews into the RG and SRP and issue them as final documents. It is expected that this will take approximately 12-18 months from the date of this paper, including time for ACRS and CRGR reviews. If during that time period other plants propose to use this RG, a determination will be made at that time whether or not to treat those plants as pilots and incorporate the results of the reviews in the final RG and SRP.

L. Joseph Callan  
Executive Director for Operations

#### **Attachments:**

1. [Federal Register notice announcing publication of RGs 1.178 and SRP Section 3.9.8 for trial use](#)
2. [Regulatory Guide 1.178 \(draft for trial use\)](#)
3. [Standard Review Plan Section 3.9.8 \(draft for trial use\)](#)
4. [Details Regarding Disposition of Public Comments](#)
5. [SRM dated October 1, 1997](#)

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**ATTACHMENT 1**

***Federal Register Notice Announcing Publication of  
RG 1.178 and SRP Section 3.9.8***

**For Trial Use**

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[7590-01-P]

Application-Specific Regulatory Guide 1.178  
and Standard Review Plan Section 3.9.8  
for Inservice Inspection of Piping

**AGENCY:** Nuclear Regulatory Commission.  
**ACTION:** Issuance of documents for trial use.

**SUMMARY:** On October 15, 1997, the Nuclear Regulatory Commission published in the Federal Register (62 FR 53663) the availability of draft regulatory guide (DG-1063) and draft Standard Review Plan Section 3.9.8 on the use of probabilistic risk assessment (PRA) in support of risk-informed inservice inspection (RI-ISI) programs of piping. The Federal Register Notice requested public comment on the draft documents. The preparation of these documents followed from the Commission's August 16, 1995, "Policy Statement on the Use of PRA Methods in Nuclear Regulatory Activities" (60 FR 42622). The draft guidance documents provided examples of acceptable approaches for using PRA information in support of plant-specific changes to plant licensing basis of piping inspections. The use by power reactor licensees of such PRA information and guidance is voluntary, and alternative approaches may be proposed.

The subject of this notice is the issuance of the regulatory guide and Standard Review Plan for trial use. Due to the fact that it has taken the industry longer to develop their analytic methods for integrating risk insights into their ISI programs (two year delay in transmitting pilot plant submittals to the NRC), the staff has not had an opportunity to incorporate into the RG and SRP issues that surface during detailed technical reviews. The staff, therefore, is issuing the documents for trial use. This regulatory guide does not establish any final staff positions, and may be changed prior to being adopted in final form. As such, this trial regulatory guide does not establish a staff position for purposes of the Backfit Rule, 10 CFR 50.109, and any changes to this regulatory guide prior to staff adoption in final form shall not be considered to be backfits as defined in 10 CFR 50.109(a)(1).

In parallel with the public comment process, the staff completed activities explicitly related to the application-specific documents which have also helped to shape their final form. These activities included:

- A public workshop conducted by the staff on November 20-21, 1997, was held to provide an overview of the draft documents, to answer questions regarding their intended application, and to solicit comments and suggestions;
- Discussions with the Advisory Committee on Reactor Safeguards (ACRS) and its Subcommittee on Probabilistic Risk Assessment (PRA), the Committee to Review Generic Requirements (CRGR), and the staff of the Office of General Counsel;
- Development of SEC-97-287 describing the key policy issues associated with the final version of RG 1.174 and SRP Section 19 and associated staff recommendations; and
- Development of SECY-98-015 describing public comments on the general guidance documents and changes made to those documents.

In response to public comments and the activities noted above, the staff developed for trial use RG-1.178 and SRP Section 3.9.8 for RI-ISI programs of piping. The significant changes the staff made to DG-1063 and the draft SRP Section 3.9.8 documents are discussed in Section II of this Federal Register Notice.

**EFFECTIVE DATE:** Effective immediately.

Comments and suggestions in connection with items for inclusion in guides currently being developed or improvements in all published guides are encouraged at any time. Written comments may be submitted to the Rules and Directives Branch, Division of Administrative Services, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555.

Copies of the regulatory guide 1.178 and Standard Review Plan Section 3.9.8 are available for inspection and copying for a fee at the NRC Public Document Room, 2120 L Street N.W. (Lower Level), Washington, D.C. 20555-0001. A free single copy of these documents may be requested by writing to the Office of Administration, Attention: Printing, Graphics and Distribution Branch, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001, or by Fax to (301) 415-5272. Final regulatory guides may also be purchased from the National Technical Information Service on a standing order basis. Details on this service may be obtained by writing NTIS, 5285 Port Royal Road, Springfield, VA 22161. Regulatory guides are not copyrighted, and Commission approval is not required to reproduce them.

## I. Background

On August 16, 1995, the Commission published in the Federal Register a final policy statement on the "Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities" (60 FR 42622). The policy statement included the following policy regarding expanded NRC use of PRA:

1. The use of PRA technology should be increased in all regulatory matters to the extent supported by the state-of-the-art in PRA methods and data and in a manner that complements the NRC's deterministic approach and supports the NRC's traditional defense-in-depth philosophy.
2. PRA and associated analyses (e.g., sensitivity studies, uncertainty analyses, and importance measures) should be used in regulatory matters, where practical within the bounds of the state-of-the-art, to reduce unnecessary conservatism associated with current regulatory requirements, regulatory guides, license commitments, and staff practices. Where appropriate, PRA should be used to support proposals for additional regulatory requirements in accordance with 10 CFR 50.109 (Backfit Rule). Appropriate procedures for including PRA in the process for changing regulatory

requirements should be developed and followed. It is, of course, understood that the intent of this policy is that existing rules and regulations shall be complied with unless these rules and regulations are revised.

3. PRA evaluations in support of regulatory decisions should be as realistic as practicable and appropriate supporting data should be publicly available for review.
4. The Commission's safety goals for nuclear power plants and subsidiary numerical objectives are to be used with appropriate consideration of uncertainties in making regulatory judgments on the need for proposing and backfitting new generic requirements on nuclear power plant licensees.

It was the Commission's intent that implementation of this policy statement would improve the regulatory process in three areas:

1. Enhancement of safety decision making by the use of PRA insights,
2. More efficient use of agency resources, and
3. Reduction in unnecessary burdens on licensees.

In parallel with the development of Commission policy on uses of risk assessment methods, the NRC developed an agency-wide implementation plan for application of probabilistic risk assessment insights within the regulatory process (SECY-95-079). This implementation plan included tasks to develop a series of Regulatory Guides (RGs) and Standard Review Plans (SRPs). Final issuance of the RI-ISI RG and SRP is the subject of this Federal Register Notice.

## II. Changes Made to the Application-Specific Guidance Documents.

- A significant change to the documents is that they now permit partial scope RI-ISI programs. The staff's position is that applications for partial scope will be dealt with on the merits of the submittals and conformance with the requirements of 10 CFR 50.55a(a)(3)(I) and the guidelines in RG 1.174, which include defense in depth and margin considerations.
- The second change to the RG and SRP is the requirement for some non-destructive examination (NDE) of the primary coolant piping, even if the piping is categorized as low-safety-significant and low-failure-potential. The staff believes that it is appropriate to continue to require some level of monitoring to provide verification of assumptions in the RI-ISI program regarding potential modes of degradation as plants age. The basis for this decision is RG 1.174 Principle Number 2, "The proposed change is consistent with the defense-in-depth philosophy." The basis for Class-1 inspections is defense-in-depth validation that the second barrier to fission product release remains intact. When drafting the ASME Section XI Code, the industry believed that the integrity of the primary system piping would remain through the duration of the licensed period and when it was drafted, industry believed that the inspection program was implemented for defense-in-depth purposes.
- The third change is the deletion of the Appendices in DG-1063. The reason for deleting the appendices is to focus staff's limited resources on the review and approval of the pilot plant applications and the topical reports submitted in support of the pilot plant analyses. Staff positions on the methodologies will be provided in the staff's safety evaluation on industry's topical reports and pilot plant submittals. This process would minimize resources needed to update the RG and SRP. The staff will incorporate the attachments in a NUREG report, to be issued following the staff's review of the pilot plants. The NUREG will also address the technical issues raised in the public comments on quantification of risk from piping.
- Documentation requested for ISI program submittal was significantly reduced and clarified.

Dated at Rockville, Maryland, this \_\_\_\_ day of \_\_\_\_\_ 1998.

For the Nuclear Regulatory Commission.  
Malcolm R. Knapp, Acting Director  
Office of Nuclear Regulatory Research

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**ATTACHMENT 5**

**SRM DATED OCTOBER 1, 1997**

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October 1, 1997

MEMORANDUM L. Joseph Callan  
TO: Executive Director for Operations  
FROM: John C. Hoyle, Secretary /s/  
SUBJECT: STAFF REQUIREMENTS - SECY-97-190 - DRAFT REGULATORY GUIDE AND STANDARD REVIEW PLAN ON RISK-INFORMED INSERVICE INSPECTION OF PIPING

The Commission has approved publication of the Federal Register notice (FRN) and issuance of the draft regulatory guide and standard review plan for a 90-day public comment period.

(EDO)

(SECY Suspense: 10/31/97)

The staff should continue to evaluate the two methodologies in parallel and work with industry representatives on their respective pilot applications. The issues raised in the FRN and the details of the two methodologies should be thoroughly discussed during the public workshop. The staff should also consider whether it is necessary and practical for licensees to perform risk assessment on all pipes in the plant for determining the scope of the risk-informed inservice inspection program.

The Commission intends to revisit the policy issues inherent in the draft documents in light of the expected substantial public comments.

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**SECY NOTE:** THIS SRM, SECY-97-190, AND THE COMMISSION VOTING RECORD CONTAINING THE VOTE SHEETS OF ALL COMMISSIONERS WILL BE MADE PUBLICLY AVAILABLE 5 WORKING DAYS FROM THE DATE OF THIS SRM.