

UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555-0001

September 19, 1997

**NRC INFORMATION NOTICE 97-70: POTENTIAL PROBLEMS WITH FIRE BARRIER
PENETRATION SEALS**

Addressees

All holders of operating licenses for nuclear power reactors except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to alert addressees to problems in installed fire barrier penetration seals that have gone undetected as a result of inadequate surveillance inspection procedures and inadequate acceptance criteria. It is expected that recipients will review the information for applicability to their facilities and consider actions as appropriate, to avoid similar problems.

Description of Circumstances

The staff in NRC Region I inspected fire protection at Maine Yankee Atomic Power Plant (Maine Yankee) from June 26 through 30, 1995. No safety concerns or violations were identified at that time regarding the installed penetration seals. However, an unresolved item was opened regarding the acceptability of penetration seal qualification and testing, and qualifications of installers.

Subsequently, the licensee conducted a scoping study in preparation for a walkdown of fire barrier penetration seals. The licensee reported that some penetration seals in fire barrier walls had no damming material. On the basis of these findings, the licensee examined its criteria for penetration seals and conducted a technical review of its penetration seal design parameters. The licensee also found discrepancies between available test reports, procedural guidance, and the in-plant penetration seal configurations. In response to the discrepancies, the licensee established compensatory fire watches and developed a corrective action program. The planned corrective actions were (1) determining why the discrepancies had not been found during previous reviews, (2) evaluating the adequacy of procedures, test reports, acceptance criteria, and field inspections, (3) evaluating the adequacy of existing seal configurations, and (4) inspecting all fire barrier penetration seals. In Licensee Event Report (LER) 96-017-1, "Fire Barrier Penetration Seal Discrepancy," dated August 28, 1996 (Accession Number 9609030377), the licensee reported that it had found three additional types of deficiencies: (1) inadequate thickness of silicone foam, (2) temporary seals that were not upgraded to permanent seals for an indeterminate period, and (3) one seal in which the expected pipe movement exceeded the design rating of the seal.

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Updated on
9/17/97



ID# R-11C

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During the week of May 12, 1997, NRR staff reviewed and observed the problems found at Maine Yankee and the corrective actions taken by the licensee. During a telephone conference on May 14, 1997, Office of Nuclear Reactor Regulation (NRR) staff and Region I staff obtained detailed information from the licensee regarding the seal problems found and the corrective actions taken.

Discussion

The penetration seals at Maine Yankee were installed around 1978. Most of the original seals used silicone foam. Since the original installation, the licensee has inspected all the seals visually at each refueling outage. During the inspections and walkdowns that were documented in LER 96-017-01, the licensee found that more than a thousand seals required further evaluation, including destructive examination; about a thousand other seals had defects; and a small number of seals had no defects. The licensee found seals with inadequate thickness (the predominant problem), foreign materials in seals, no damming material, and the wrong seal material installed. Although the licensee's design criteria specified a minimum seal thickness of 7 inches, the average seal thickness was 5 to 6 inches, and some seals were only 2 to 3 inches thick. Although the licensee was once planning to repair and replace the seals with silicone foam and silicone elastomer, the licensee has since certified permanent cessation of power operation and is now proceeding to decommission the facility.

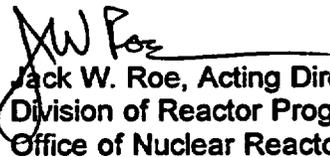
The licensee told the staff that the installations were deficient because the quality assurance and quality control procedures that were used by the installation vendor during original seal installation were inadequate. The licensee also told the staff that it believes that the deficiencies were not discovered for an extended period because its inspection and surveillance procedures did not cover all important penetration seal attributes (e.g., the presence of damming material was not a critical attribute) and because its inspectors had not been properly trained. The licensee has since completed a major effort, rewriting of its procedures.

NRC requirements and guidelines for fire barrier penetration seals are in various documents: 10 CFR Part 50, Appendix R, "Fire Protection Program for Nuclear Power Facilities Operation Prior to January 1, 1979;" Branch Technical Position APCSB 9.5-1, Appendix A, "Guidelines for Fire Protection for Nuclear Power Plants Docketed Prior to July 1, 1976;" and NUREG-0800, "Standard Review Plan." The extent to which these requirements or guidelines are applicable to a specific nuclear power plant depends on plant age, commitments established by the licensee in developing the fire protection plan, the staff safety evaluation reports and supplements, and the license conditions pertaining to fire protection. These requirements and guidelines ensure that fire barrier penetration seals will remain in place and retain their integrity when exposed to a fire. By so doing, there is reasonable assurance that the effects of a fire will be limited to discrete fire areas and that one division of systems related to safe shutdown will remain free of fire damage.

The staff is revising Inspection Procedure 64704, "Fire Protection Program," March 18, 1994, contained in the NRC Inspection Manual, to include specific guidance for inspecting fire barrier penetration seals. It should be noted that nonconforming conditions may go undetected if the surface of the seal is covered by thermal insulation or damming material. In addition, the staff has included guidance for inspecting fire barrier penetration seal programs in its procedures for the new fire protection functional inspection program.

In July 1996, the NRC published NUREG-1552, "Fire Barrier Penetration Seals in Nuclear Power Plants," to document the findings of a comprehensive technical assessment of fire barrier penetration seals. The assessment addressed reports of potential problems, and determined the adequacy of NRC requirements, review guidance and inspection procedures. The staff concluded that the general condition of penetration seal programs in the industry is satisfactory and that there were no problems of safety significance. Previous actions, along with continued upkeep of existing penetration seal programs and continued inspections, are adequate to maintain public health and safety. However, the staff is continuing to study this issue to determine if further regulatory action is required. The staff also recommended revisions to the NRC fire protection regulation and review guidance. The content of this report was discussed with the NRC Commission before it was issued.

This information notice establishes no new NRC requirements; therefore, no specific action or written response is required by this notice. However, recipients are reminded that they are required by 10 CFR 50.65 to take industry-wide operating experience (including information presented in NRC information notices) into consideration, where practical, when setting goals and performing periodic evaluations. If you have any questions about the information in this notice, please contact the technical contact listed below or the appropriate NRR project manager.


Jack W. Roe, Acting Director
Division of Reactor Program Management
Office of Nuclear Reactor Regulation

Technical contact: Christopher Bajwa, NRR
301-415-1237
E-mail: csb1@nrc.gov

Attachment: List of Recently Issued NRR Information Notices

Attachment filed in Jacket

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
97-69	Reactor Trip Breakers and Surveillance Testing of Auxiliary Contacts	09/19/97	All holders of OLs for pressurized water reactors except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel
97-68	Loss of Control of Diver in a Spent Fuel Storage Pool	09/03/97	Holders of a facility or construction permit issued for a power reactor pursuant to 10 CFR Part 50
97-67	Failure to Satisfy Requirements for Significant Manipulations of the Controls for Power Reactor Operator Licensing	08/21/97	All holders of OLs for nuclear power reactors except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor vessel
97-66	Failure to Provide Special Lenses for Operators Using Respirator or Self-Contained Breathing Apparatus During Emergency Operations	08/20/97	All holders of operating licenses or construction permits for nuclear power and non-power reactors and all licensed reactor operators and senior operators

OL = Operating License
CP = Construction Permit

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original signed by

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Attachment: List of Recently Issued NRR Information Notices
Tech Editor has reviewed and concurred on 08/22/97
*SEE PREVIOUS CONCURRENCES
DOCUMENT NAME: 97-70.IN

Office	Tech Contacts	C:SPLB	(A)C:PECB	(A)D:DRPM
Name	JCarter/CBajwa*	LMarsh*	RDennig*	JRoe <i>JRoe</i>
Date	08/26/97	08/26/97	09/02/97	09/16/97

DM 9/15/97

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*SEE PREVIOUS CONCURRENCES
DOCUMENT NAME: G:\TJCPEN_SEAL.IN3

Office	Tech Contacts	C:SPLB	(A)C:PECB	(A)D:DRPM
Name	JCarter/CBajwa*	LMarsh*	RDennig*	JRoe
Date	08/26/97	08/26/97	09/02/97	09/ /97

mkw 9/2/97

*EM
7/12/97*

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*See previous concurrence
DOCUMENT NAME: G:\TJCPEN_SEAL.IN4

Office	Tech Contacts	C:SPLB	(A)C:PECB	(A)D:DRPM
Name	JCarter/CBajwa	LMarsh*	RDennig <i>[Signature]</i>	JRoe
Date	08/26/97	08/26/97	08/21/97 9	08/ 197

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DOCUMENT NAME: G:\TJC\PEN_SEAL.IN3

Office	Tech Contacts	C:SPLB ¹⁴⁴	(A)C:PECB	(A)D:DRPM
	<i>dfoster/CBajwa</i> <i>CB</i>	LMarsh <i>mm</i>	RDennig	JRoe
Date	08/24/97	08/24/97	08/ /97	08/ /97