

January 28, 2002

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Mr. David Lochbaum
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SUBJECT: PROPOSED STAFF GUIDANCE ON AGING MANAGEMENT OF FIRE
PROTECTION SYSTEMS FOR LICENSE RENEWAL

Dear Messrs. Nelson and Lochbaum:

The purpose of this letter is to provide you with the opportunity to comment on the staff proposed guidance for aging management of fire protection systems as stated in NUREG-1801, "Generic Aging Lessons Learned Report," dated July 2001. The staff proposes to revise the inspection criteria for two items: 1) wall thinning of piping due to corrosion and 2) valve line-up inspections for halon/carbon dioxide fire suppression systems. The staff plans to incorporate these changes into the improved renewal guidance documents in a future update. Enclosure 1 contains the staff basis to support these changes. Enclosure 2 is a markup of the proposed changes for these aging management programs in NUREG-1801, Chapter XI.M26, "Fire Protection" and Chapter XI.M27, "Fire Water Systems." Enclosure 3 is a markup of how the proposed change would be incorporated into the standard review plan for license renewal, NUREG-1800, Table 3.3-2. This approach, for revising the guidance documents, is consistent with our goal to more efficiently resolve license renewal issues identified by the staff or the industry as outlined in NRR Office Letter No. 805, "License Renewal Application Review Process." The staff will consider your response to this letter in deciding how to finalize and implement this guidance.

The staff developed this guidance for the fire protection aging management programs on the basis of lessons learned from applications reviewed after issuance of NUREG-1801. The staff is requesting NEI to provide a schedule for comments on the proposed guidance. Should you have any questions or comment, please contact Jim Strnisha of my staff at 301-415-1092.

Sincerely,

/RA/

Christopher I. Grimes, Program Director
License Renewal & Environmental Impacts
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Project 690
Enclosures: As stated
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Project No. 690

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NRC Staff Position on Aging Management of Fire Protection Systems

Introduction

The staff proposes to revise the Fire Protection system aging management program inspection criteria in NUREG-1801 for two items: 1) wall thinning of piping due to corrosion and 2) valve line-up inspections for halon/carbon dioxide fire suppression systems. The staff discussion and position for each issue is as follows:

1. Staff Position for Wall Thinning of Fire Protection Piping Due to Internal Corrosion

Fire Protection (FP) piping is typically designed for a 50-year life in industrial applications. The limiting aging effect is general corrosion. Because the general corrosion of FP piping is typically very uniform, loss of intended function as a result of catastrophic failure caused by wall thinning throughout the system is possible and needs to be managed. However, internal inspections (performed during each refueling cycle by disassembling portions of the FP piping), as stated in NUREG-1801, Chapter XI.M27, "Fire Water Systems," are not the best means to detect this aging effect. Each time the system is opened, oxygen is introduced into the system and this accelerates the potential for general corrosion. Therefore, the staff recommends that a non-intrusive means of measuring wall thickness, such as ultrasonic inspection, be used to detect this aging effect.

The staff initially considered that a one-time ultrasonic inspection performed near the end of the operating term would be sufficient to detect wall thinning. However, further evaluation determined that it may be difficult to justify a one-time ultrasonic inspection in light of the possibility of changes in operating conditions that may require the applicant to open the FP systems more frequently (e.g., for the 50-year service life sprinkler head testing) and allow oxygen in. National Fire Protection Association (NFPA) 25, 1999 Edition, Section 2.3.3.1, "Sprinklers," states that "where sprinklers have been in place for 50 years, they shall be replaced or representative samples from one or more sample areas shall be submitted to a recognized testing laboratory for field service testing." NFPA 25 also contains guidance to perform this sampling every 10 years after the initial field service testing. Therefore, the staff is recommending that in addition to an ultrasonic inspection of the fire protection piping before exceeding the current license term, the applicant shall perform ultrasonic inspections immediately after the 50-year service life sprinkler head testing and at 10-year intervals thereafter.

The 50-year service life of sprinkler heads does not necessarily equal the 50th year of operation in terms of licensing. The service life is defined from the time the sprinkler system is installed and functional. In most cases, sprinkler systems are in place several years before the operating license is issued. The staff interpretation, in accordance with NFPA 25, is that testing should be performed at year 50 (or sooner) of sprinkler system service life, not at year 50 of plant operation. The staff position for this approach will typically result in an applicant performing three such inspections over a 60-year period; the first before the end of the current operating term, the second after the 50-year sprinkler head testing, and the third after the first 10-year follow-up sprinkler head testing.

As an alternative to non-intrusive testing, an applicant may use its work control process to include a visual inspection of the internal surface of the FP piping upon each entry to the system for routine or corrective maintenance, as long as the applicant can demonstrate that it will perform inspections (based on past maintenance history) on a representative number of locations on a reasonable periodic basis. As part of these inspections, applicants need to be sensitive to wall thickness to ensure against catastrophic failure, and the inner diameter of the piping as it applies to the flow requirements of the FP system.

As part of the review of this issue and the above stated approach, a concern was raised as to the inspection specifications of the internal surface of below grade FP piping. The staff acknowledges that some applicants may be able to demonstrate that the environmental and material conditions that exist on the interior surface of below grade FP piping are similar to the conditions that exist within the interior surface of the above grade FP piping. If an applicant makes such a demonstration, the staff agrees that the results of the interior inspections of the above grade FP piping can be extrapolated to evaluate the interior condition of the below grade FP piping. If not, additional inspection activities are needed to provide the reasonable assurance that the intended function of below grade FP piping will be maintained consistent with an applicant's current licensing basis for the period of extended operation.

2. Staff Position for Valve Line-up Inspections of Halon/Carbon Dioxide Fire Suppression Systems

NUREG-1801, Chapter XI.M26, "Fire Protection," currently identifies the need to perform a functional test of the halon/carbon dioxide fire suppression systems to determine the suppression agent charge pressure and verify that the extinguishing agent supply valves are open and the system is in automatic mode. 10 CFR 54.21 specifies that an aging management review is to be performed for those structures and components that perform an intended function without moving parts or without a change in configuration or properties and that are not subject to replacement based on a qualified life or specified time period. The staff reviewed these items and determined that a valve lineup inspection, charging pressure inspection, and automatic mode of operation verification are operational activities pertaining to system or component configurations or properties that may change, and are not aging management related. Therefore, the staff position is to revise NUREG-1801 to eliminate the halon/carbon dioxide system inspections for charging pressure, valve lineups, and automatic mode of operation.