



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, D. C. 20555

July 20, 1998

The Honorable Shirley Ann Jackson
Chairman
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Dear Chairman Jackson:

**SUBJECT: DRAFT SUPPLEMENT 1 TO NUREG 1552, "FIRE BARRIER
PENETRATION SEALS IN NUCLEAR POWER PLANTS"**

During the 454th meeting of the Advisory Committee on Reactor Safeguards, July 8-10, 1998, we met with representatives of the NRC staff, the Nuclear Energy Institute (NEI), and the Nuclear Information and Resource Service (NIRS) to discuss Supplement 1 to NUREG-1552. We also had the benefit of the documents referenced.

RECOMMENDATIONS

1. Supplement 1 to NUREG-1552 should be issued for public comment.
2. We agree with the Commission's direction in the June 30, 1998 Staff Requirements Memorandum that Section III. M of Appendix R to 10 CFR Part 50 should be amended to eliminate the requirement that penetration seal designs should utilize only noncombustible materials.
3. Steps should be taken to refine NRC inspections of fire barrier penetration seals and to allow licensees to focus their penetration seal programs based on risk.

DISCUSSION

Defense in depth against the effects of fire in nuclear power plants includes division of the plants into 'fire areas' separated by fire barriers. The fire barriers are intended to prevent the spread of fire from one area to adjacent areas. The fire barriers are, of course, penetrated by piping, cable trays, and the like. Spread of fire along these penetrations is prevented by fire barrier penetration seals. The average number of fire barrier penetration seals per nuclear plant unit is about 3000, and a single unit can have up to 10,000 seals.

Fire barrier penetration seals have been receiving much public attention in recent months. Indeed, many years ago, shortly after NRC upgraded its regulations and requirements for fire protection at nuclear power plants in response to the 1975 event at the Browns Ferry Nuclear

Power Plant, licensees were having substantial difficulties with the installation and maintenance of penetration seals. Over the last several years, the NRC staff has conducted three major reviews of installed penetration seals, as well as inspections of the qualification of penetration seals for service in nuclear power plants. These major, generic examinations were in addition to the ongoing monitoring of seals by the NRC inspectors at individual plants. At the same time, licensees have greatly upgraded their penetration seal programs to ensure that they comply with the regulatory requirements. Findings of the staff investigations and reviews are summarized in NUREG-1552.

More recently, the NRC staff has reviewed licensee event reports and inspection reports on deficiencies in fire barrier penetration seals. The staff has found that the frequency of problems with the seals are low and appear to be decreasing with time. These findings suggest that, on average, no more than one seal is deficient each year at a nuclear plant at present. It is unlikely that any justifiable, additional efforts by licensees or the NRC staff could improve the availability of the penetration seals. Results of this recent review are included in the Draft Supplement 1 to NUREG-1552.

Concerns have arisen because the material used commonly for fire barrier penetration seals in both nuclear and nonnuclear applications is "combustible" according to a particular test that has little to do with actual service applications of the seals. Typically, these seals are required to prevent the spread of fire for three hours. Realistic tests of both the material and the configuration of the seal in use demonstrate that fire barrier penetration seals at nuclear power plants are capable of fully meeting the service requirements for fire protection. Data from real fires at U. S. nuclear power plants do not suggest any additional concerns. Therefore, there is no need for the existing regulatory requirement for using only noncombustible materials for fire penetration seals. It is sufficient to require demonstration that the material in its particular configuration meets the functional requirements for fire protection.

It is clear that the NRC staff and the licensees, overall, have the issues of fire barrier penetration seals well in hand. Though specific events at specific plants still can be expected to occur, there are no widespread or potentially generic problems of safety significance associated with the seals or the seal materials now in use.

The efforts of the staff and the licensees on fire penetration seals have been successful in addressing problems of the past. At present, these efforts are out of proportion to the risk significance of fire barrier penetration seals. These efforts do amount to significant burdens on the licensees and significant drains on NRC resources. Fire risk assessment can be used as the basis for focusing these efforts on risk significant fire barrier penetration seals with no reduction in the protection of public health and safety. That is, inspections of the fire barrier penetration seals in a nuclear power plant could be based on risk in a manner similar to the risk-based inspection of piping systems.

To refine the programs now in place to deal with fire barrier penetration seals and other fire protection issues based on risk will require the availability of reliable fire risk assessment tools that treat the nuclear power plant in sufficient detail. Data on the reliability and performance of seals even when degraded will also be needed. This effort may well require that the NRC undertake research to further develop its analytical tools and databases.

Sincerely,



R. L. Seale
Chairman

References:

1. U. S. Nuclear Regulatory Commission, NUREG-1552, Supp. 1, "Fire Barrier Penetration Seals in Nuclear Power Plants," Draft Report for Comment, June 1998.
2. Memorandum dated June 30, 1998, from John C. Hoyle, Secretary of the Commission, to L. Joseph Callan, Executive Director for Operations, NRC, Subject: Staff Requirements: SECY 98-058 - Development of a Risk-Informed, Performance-Based Regulation for Fire Protection at Nuclear Power Plants.

