

June 17, 2002

Dr. William D. Travers  
Executive Director for Operations  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555-0001

Dear Dr. Travers:

**SUBJECT: PROPOSED TECHNICAL ASSESSMENT OF GENERIC SAFETY  
ISSUE-168, "ENVIRONMENTAL QUALIFICATION OF LOW-VOLTAGE  
INSTRUMENTATION AND CONTROL CABLES"**

During the 493<sup>rd</sup> meeting of the Advisory Committee on Reactor Safeguards, June 6-8, 2002, we reviewed the technical assessment of Generic Safety Issue (GSI)-168, "Environmental Qualification of Low-Voltage Instrumentation and Control Cables," proposed by the Office of Nuclear Regulatory Research (RES). During this review, we had the benefit of discussions with representatives of the RES staff. We also had the benefit of the documents referenced.

## **RECOMMENDATIONS AND CONCLUSIONS**

We recommend that:

- A discussion of the treatment of the instrumentation and control (I&C) cables during the license renewal term be included in the generic communication recommended by RES.
- The staff encourage the industry to perform further developmental work on techniques for monitoring I&C cable condition.

We agree with the staff's conclusions that:

- The current equipment qualification (EQ) process for low-voltage I&C cables is adequate for the duration of the current license term of 40 years.
- Knowledge of the conservatism in the operating environment, as compared to the qualification environment, coupled with observation of the condition of the cables can be used to extend the qualified life of the cables.
- A combination of condition monitoring techniques is needed since no single technique is effective to detect degradation of I&C cables.

- Test results and other pertinent information should be disseminated to the nuclear industry through a generic communication.

## DISCUSSION

GSI-168 considers the EQ of low-voltage I&C cables. These cables are particularly important, since their failure could result in misleading information being presented to operators.

Originally, 43 sub-issues were identified concerning the operability of I&C cables during a loss-of-coolant accident. All but six were resolved by researching previous literature on the subject. The RES technical assessment evaluates the results of research and testing performed to resolve the six remaining issues. We agree with RES that, although some I&C cables failed during testing, the current EQ process is adequate for the current license term of 40 years. This conclusion is based on the implementation of licensee programs to demonstrate that there is sufficient margin in environmental conditions in which the I&C cables operate and on implementation of a monitoring program for these cables.

Walkdowns to look for visible signs of anomalies attributable to cable aging coupled with monitoring of operating environment have proven to be useful. The staff should encourage the industry to perform additional developmental work on techniques for monitoring I&C cable condition.

The RES assessment suggests that industry implementation of a monitoring program will result in a small reduction in core damage frequency. We support the RES recommendation that a generic communication be issued to the industry to notify them of these results. The generic communication should include a discussion of the treatment of the I&C cables during the license renewal term.

We would like to review the proposed resolution of GSI-168.

Additional comments by ACRS Members Dana A. Powers, F. Peter Ford, Victor H. Ransom, Stephen L. Rosen, and John D. Sieber are provided below.

Sincerely,

**/RA/**

George E. Apostolakis  
Chairman

Additional Comments by ACRS Members Dana A. Powers, F. Peter Ford, Victor H. Ransom, Stephen L. Rosen, and John D. Sieber

The staff has recommended a resolution of cable integrity issues for one class of design-basis accidents, loss-of-coolant accidents. For these accidents, temperature and radiation loads are of dominant concern. Other design-basis accidents, such as main steamline breaks, can impose other loads on cables such as large amplitude vibrations and bending. The staff has

not investigated the effects of these other loads on the integrity of aged cables adequately. What the staff has done is adequate to resolve the six, open, sub-issues of GSI-168. The staff should consider additional examinations of cable integrity as part of its ongoing work on mechanical loads and vibrations associated with main steamline breaks and other design-basis accidents.

References:

1. Memorandum dated May 6, 2002, from Michael E. Mayfield, Division of Engineering Technology, Office of Nuclear Regulatory Research, to John T. Larkins, ACRS, Subject: Proposed Technical Assessment of Generic Safety Issue (GSI) 168, "Environmental Qualification of Low-Voltage Instrumentation and Control (I&C) Cables."
2. U. S. Nuclear Regulatory Commission, NUREG-6704, "Assessment of Environmental Qualification Practices and Condition Monitoring Techniques for Low-Voltage Electrical Cables," February 2001.