

August 14, 2003

MEMORANDUM TO: William D. Travers  
Executive Director for Operations

FROM: R. William Borchardt, Acting Director ( /RA by **RWBorchardt** )  
Office of Nuclear Reactor Regulation

SUBJECT: CLOSEOUT OF GENERIC SAFETY ISSUE (GSI) 168,  
"ENVIRONMENTAL QUALIFICATION OF LOW-VOLTAGE  
INSTRUMENTATION AND CONTROL CABLES"

This memorandum documents the resolution of Generic Safety Issue 168, "Environmental Qualification of Low-Voltage Instrumentation and Control (I&C) Cables." In support of the resolution of GSI-168, the Office of Nuclear Regulatory Research (RES) sponsored I&C cable test research at Wyle Laboratories and the Brookhaven National Laboratory. The resulting technical assessment was based on reviews and analyses of the research results of six loss-of-coolant accident (LOCA) cable tests, condition-monitoring tests on I&C cables, and information provided by the nuclear industry. The staff conducted numerous public meetings with a representative of the nuclear industry and the Institute of Electrical and Electronics Engineers during the technical assessment of this issue.

Following the completion of the research the Nuclear Regulatory Commission staff concluded that typical I&C cable qualification test programs include numerous conservative practices that collectively provide a high level of confidence that the installed I&C cables will perform their intended functions during and following design-basis events, as required by Title 10, Section 50.49, (10 CFR 50.49), of the Code of Federal Regulations "Environmental Qualification (EQ) of Electric Equipment Important to Safety for Nuclear Power Plants." These conservative practices continue to support the current use of a single prototype test specimen during qualification testing and, as such, a successful test provides a high level of confidence that these cables will be able to perform their safety functions during and following a design-basis event. However, I&C cable LOCA test failures during the NRC-sponsored research program indicate that the original margin and conservatism inherent in the qualification process have been reduced. Therefore, licensee awareness of the operating service environments (temperature, radiation, and moisture) is essential to ensure that operating conditions in nuclear power plants do not exceed the qualification parameters that were assumed during qualification testing. In this regard, walkdowns to look for any visible signs of anomalies attributable to aging with particular emphasis on the identification of localized adverse environments or "hot spots", coupled with the knowledge of the operating service environments, have proven to be effective and useful in ensuring that qualification is maintained.

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The Advisory Committee on Reactor Safeguards (ACRS) reviewed the technical assessment of GSI-168 during its meeting on June 6-8, 2002, and had the benefit of discussions with representatives of the RES and Office of Nuclear Reactor Regulation (NRR). The ACRS reported its findings in a letter dated June 17, 2002, in which the Committee agreed with the staff's conclusions stated in the technical assessment of GSI-168. The staff issued Regulatory Issue Summary 2003-09 on May 2, 2003, titled "Environmental Qualification of Low-Voltage Instrumentation and Control Cables," a generic communication to disseminate to the nuclear industry the test results and other pertinent information regarding the environmental qualification of I&C cables. The issue was resolved with no new requirements for licensees. ACRS agreed with the staff's action on the generic communication in an ACRS letter to the Executive Director for Operations dated April 15, 2003.

This memorandum documents that GSI-168 is closed.

## **REFERENCES**

1. Memorandum from M.E. Mayfield (RES) to J.T. Larkins (ACRS), May 6, 2002.
2. Memorandum from A.C. Thandani (RES) to S.J. Collins (NRR), June 28, 2002.
3. Letter from Marion (NEI) to M.E. Mayfield (RES), October 9, 2001.
4. Letter from G.E. Apostolakis (ACRS) to W.D. Travers (NRC), June 17, 2002.
5. Letter from Marion (NEI) to J.A. Calvo (NRR), August 22, 2002.

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