

July 18, 2002

Dr. George E. Apostolakis, Chairman
Advisory Committee on Reactor Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555

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

Dear Dr. Apostolakis:

In your letter dated June 17, 2002, on the above-mentioned subject, you provided your recommendations and endorsement of the staff's conclusions concerning the technical assessment of GSI-168. The Office of Nuclear Reactor Regulation (NRR) will now proceed with the resolution of GSI-168 to implement Stage 4, "Regulation and Guidance Development," according to Management Directive 6.4, "Generic Issues Program." This process will address the recommendations made in your letter of June 17, 2002, and by the Office of Nuclear Regulatory Research (RES). Upon completion of this process, the NRR staff will be available to discuss with ACRS the implementation of these recommendations.

Although not included in the scope of GSI-168, some members of the ACRS provided additional comments concerning the effects of loads, such as large amplitude vibration and bending resulting from postulated main steam line breaks (MSLBs), on the integrity of aged cables. In this respect, the following information is provided:

1. The cables are qualified in accordance with IEEE Std. 323-1974, "Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations," and IEEE Std. 383-1974, "Standard for Qualifying Class 1E Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations." IEEE Std. 383-1974 specifies a Post-LOCA Simulation Test which includes a mandrel bend test. In this test, upon completion of LOCA simulation, the cable specimens are straightened and recoiled around a metal mandrel with a diameter of approximately 40 times the overall cable diameter. This mandrel bend test is intended to demonstrate that test specimens have some residual flexibility after the preaging and accident exposures. The staff believes that since these cables can withstand this severe mechanical deformation, they could also withstand vibrations from dynamic loads. Also, during the qualification tests the cables were subjected to large amounts of radiation which are principally due to assumed LOCA releases and the cables retained flexibility at the conclusion of the qualification tests. Large releases are not assumed for MSLB events. Thus, the plant cables will be considerably more flexible than cable test specimens.
2. MSLB and other pipe break events can produce jet impingement, pipe whip and related localized loads (Ref. Standard Review Plan 3.6.1 and 3.6.2). Direct

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exposure to steam impingement from the MSLB and pipe whip are assumed to damage the cables and cause failures. The safety-related cables are not qualified for these conditions. Redundancy and diversity are considered in plant design and equipment layout and the qualified cables that are not subjected to the direct impingement or pipe whip will perform the appropriate safety function(s). Thus, the coping equipment and cables that are credited for coping with the event are not subjected to the same steam environment that results from the postulated main steam line break event.

3. The staff believes that the most significant cable vibration comes from seismic events, BWR hydrodynamic loads, and possibly from end devices which can vibrate during normal plant operation. These cables are typically installed in seismically qualified raceway systems (conduit, cable tray, duct banks) that significantly limit the amount of bending that a cable can experience. The only place where appreciable relative motion (i.e., bending) might occur is at locations where cable transition between raceways types (for example, from tray to a conduit). Even at these locations there is a little relative displacement since the two raceways are typically anchored to the same structure. Therefore, it is logical to conclude that there should not be large relative displacement or bending of cables during MSLB events.

We will appreciate your review of the abovementioned information and if you still conclude that additional investigation is warranted, the staff would initiate appropriate action.

Sincerely,

/RA by William F. Kane Acting For/

William D. Travers
Executive Director for Operations

cc:
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