

May 9, 2000

MEMORANDUM TO: Samuel J. Collins, Director
Office of Nuclear Reactor Regulation

FROM: Brian W. Sheron, Associate Director **/RA/**
for Project Licensing and Technical Analysis

SUBJECT: ACTION PLAN TO ADDRESS FAILURES OF BONDED-JACKET
OKONITE SINGLE-CONDUCTOR CABLES DURING
LOSS-OF-COOLANT-ACCIDENT TESTING BY THE
OFFICE OF NUCLEAR REGULATORY RESEARCH

The purpose of this memorandum is to inform you of the Action Plan to address the issues raised by the Office of Nuclear Regulatory Research (RES) in a memorandum dated May 2, 2000, concerning the results of Loss-Of-Coolant-Accident (LOCA) testing of bonded-jacket Okonite single-conductor instrumentation and control low-voltage cables conducted by Brookhaven National Laboratory (BNL) at Wyle Laboratories for RES. The specific test in question, LOCA Test #5, subjected cable samples to accelerated thermal and radiation aging, and then exposed them to LOCA qualification test conditions. The Okonite cable samples that were aged to an equivalent of 40 years in accordance with the vendor's qualification report failed to pass a submerged voltage withstand test after being exposed to the LOCA qualification test conditions.

NRC staff from RES and the Office of Nuclear Reactor Regulation (NRR) held a public meeting on February 8, 2000, to discuss the test results with representatives from Okonite. Okonite representatives stated that the testing performed by BNL was in accordance with the Okonite qualification report used to qualify the cable. The aging parameters that were used by Okonite were based on qualifying the cable for 40 years at a service temperature of 90 °C. Okonite now believes that the aging parameters were too severe for that cable. Also, the Okonite qualification test did not actually test a cable with the same configuration as the one that failed the BNL test. BNL tested a 600-Volt #12 American Wire Gage (AWG) single-conductor cable with ethylene propylene (EPR) insulation and a bonded chlorosulfonated polyethylene (CSPE) outer jacket. The original Okonite test used a 600-Volt #12 AWG cable with EPR insulation but no outer jacket, and a larger 2000-Volt #6 AWG cable with a bonded CSPE outer jacket, and they both passed the test. Okonite then qualified the 600-Volt #12 AWG cable with EPR insulation and a bonded CSPE outer jacket for 40 years based on similarity, without actually testing that configuration.

The staff held another public meeting on February 16, 2000, to discuss the LOCA Test #5 results with industry representatives. Representatives from the Nuclear Energy Institute (NEI), Electric Power Research Institute, Okonite, and several utilities attended. Industry

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representatives indicated that there may be Okonite cables in plant electric equipment that are important to safety in accordance with 10 CFR 50.49. However, they indicated that, because it is single-conductor cable, its application is expected to be limited. They also stated their belief that installed cables have not experienced sufficient thermal aging to render them susceptible to LOCA failures. The BNL LOCA Test #5 results have recently been issued and were made publicly available (Accession #ML003709449) on May 7, 2000. This report and the accompanying documentation supercedes previous public communications on this subject.

In accordance with our current Generic Communication Program documented in SECY-99-143, "Revisions to Generic Communication Program," the staff proposes the following actions:

- (1) Request Okonite, as a supplier of a basic component, to evaluate the BNL LOCA Test #5 report to determine if the failures represent a deviation or a failure to comply with 10 CFR 21. We will also request that Okonite inform NRR of its conclusions and intended actions within 30 days.
- (2) Request NEI to address, as an industry initiative, the issues resulting from the BNL LOCA Test #5 report. The licensees are in the best position to assess the situation, understand the potential risks, and determine what actions are needed to ensure continued compliance with 10 CFR 50.49. We will further request a public meeting with NEI to discuss the proposed industry approach and schedule for resolving this issue.

Once we get feedback from Okonite and the industry we will determine if any regulatory action is warranted. There are three potential courses of action we may pursue once we have responses from the vendor and the industry:

- (1) If only a small number of safety-related equipment items are affected, or only a small number of plants are affected, the staff may address these cases individually.
- (2) If the industry initiative sufficiently addresses the issue and several plants are affected, the staff will publish a Regulatory Issue Summary to document the resolution of the issue in accordance with SECY-99-143, "Revisions to Generic Communication Program."
- (3) If the industry initiative is inadequate, the staff may issue a generic letter to nuclear power plant licensees to obtain information on the affected safety-related equipment and plants.

BNL, under the direction of RES, is currently completing the final LOCA qualification test (#6) as part of GSI-168 "Environmental Qualification of Safety-Related Electric Equipment" and will be evaluating the results. In addition, if the agreed upon approach to resolving the issue includes the vendor and industry supplying the necessary information, we will work with RES to further assess the potential risk significance of failures to aid in the development of any necessary regulatory action.

We believe the foregoing approach to this issue is reasonable, based on information obtained at these public meetings. We further believe that continued operation of nuclear power plants is warranted while the staff, in conjunction with the industry, continues to evaluate the potential deficiency of these cables. This is based on industry statements related to the limited

application of single conductor EPR/Hypalon bonded-jacket cables in harsh environments and acknowledgment that most cables would not be in an operating environment as severe as the pre-test aging environment tried to simulate. In addition, the staff is not presently aware of any installed cables that have yet experienced the same thermal and radiation aging as that used for the simulated LOCA qualification test.

References:

1. ADAMS Accession #ML003697791

Memorandum, A. Thadani, RES, to S. Collins, NRR, "Recent Reported Failures of Low-Voltage I&C Cables with Bonded Jacket during Loss-of-Coolant-Accident (LOCA) Tests," dated May 2, 2000.

2. ADAMS Accession #ML003709449

Attachment 1 - Letter report from Robert Lofaro, BNL, to Satish Aggarwal, RES/NRC, "Results of Test 5 on Bonded Jacket Electric Cables," dated March 6, 2000.

Attachment 2 - Minutes of the NRC Meeting on February 8, 2000, with Okonite (letter from Robert Lofaro, BNL, to Satish Aggarwal, RES/NRC, dated March 8, 2000).

Attachment 3 - Minutes of the NRC Public Meeting on February 16, 2000, on the EQ Program (letter from Robert Lofaro, BNL, to Satish Aggarwal, RES/NRC, dated March 8, 2000).

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