May 17, 2000

Mr. Arthur Pack, Jr.
Vice President of Engineering
The Okonite Company
Post Office Box 340
Ramsey, NJ 07446

SUBJECT: Okonite Bonded Jacket Cable Loss-Of-Coolant-Accident Test Failures
(NRC Vendor Docket Number, 99900231)

Dear Mr. Pack:

Brookhaven National Laboratories (BNL), under contract to the NRC, has been conducting research on low-voltage instrumentation and control cables (I&C) to support the resolution of Generic Safety Issue 168, "Environment Qualification of Electric Equipment." As part of this research, in late 1999, a loss-of-coolant accident (LOCA) test was conducted on I&C cables with ethylene propylene rubber (EPR) insulation and bonded chlorosulfonated polyethylene (CSPE) outer jackets (Test #5). The purpose of the test was to determine if cables with bonded jackets have a unique failure mechanism that is not present in unbonded jacketed cables under postulated LOCA conditions. The testing was performed at Wyle Laboratories in Huntsville, Alabama, on cable samples from several manufacturers including Okonite.

The test subjected the following Okonite cable to accelerated thermal and radiation aging and then exposed the cable samples to LOCA conditions:

- EPR insulation with bonded CSPE jacket; single-conductor; #12 American wire gage (AWG)

The following accelerated aging parameters were selected on the basis of Okonite's original test report for 40-year qualification:

- 504 hrs. @ 302 ^{o}F followed by 50 Mrads @ 0.65 Mrad/hr.

The LOCA test consisted of exposure to 150 Mrads of gamma radiation at a dose rate of 0.75Mrad/hr. followed by exposure to a double-peak steam profile, as described in IEEE Std. 323-1974. The peak conditions of the steam profile were 346 ^{o}F and 113 psig. A boric acid-based chemical spray was initiated when the test chamber pressure had reached 32 psig and was continued for 24 hours. The duration of the steam exposure was 10 days. Following the LOCA exposure, submerged voltage withstand tests were performed on the specimens at a test voltage of 2400 volts ac (equivalent to 80v/mil ac) as described in IEEE Std. 383-1974. All three of the Okonite specimens aged to an equivalent of 40 years, and one of the two Okonite specimens, aged to an equivalent of 20 years, failed instantaneously. The artificial aging apparently contributed to the failure mechanism since circumferential cracks were observed following preaging. Longitudinal splits were observed on the cable jacket following LOCA exposure. The enclosed BNL Report contains a summary of the results of LOCA Test #5.

Discussions and meetings with representatives from Okonite and industry on February 8, and 16, 2000, respectively, determined that the composite EPR with CSPE jacket in Okonite test report NQRN-1A is a bonded jacket system, similar to the BNL specimens. It is NRC's understanding that Okonite EPR insulation with bonded CSPE jacket, single-conductor, #12 AWG cables can be used in electric equipment important to safety located in harsh environment areas of nuclear power plants. Okonite test report NQRN-1 is the basis for environmental qualification of this cable under 10 CFR 50.49 "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants."

We request that you evaluate the results in the enclosed BNL report to determine if the failures described therein represent "deviations" or "failures to comply" (as defined in 10 CFR Part 21) in any products supplied by you as "basic components" (also as defined in 10 CFR Part 21) to any NRC-licensed facilities. Not being a nuclear plant designer or licensee, under 10 CFR Part 21, you would not necessarily be expected to consider yourselves capable of performing the evaluation prescribed in 10 CFR 21.21(a)(1). Rather, you would be expected to inform affected licensees or purchasers of any deviations or failures to comply you identify in accordance with 10 CFR 21.21(b). We also request that you inform this office of your intended actions within 30 days of this letter.

If you have any questions concerning this issue, please contact Paul C. Shemanski of my staff at (301) 415-1377. We appreciate your cooperation in this matter.

Sincerely,

Samuel J. Collins, Director **/RA by B. Sheron for/**
Office of Nuclear Reactor Regulation

Attachment: Results of Test #5 on Bonded Jacket Electric Cables, dated March 6, 2000

cc: Mr. R. Beedle, NEI

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