Item B-9: Electrical Cable Penetrations of Containment

DESCRIPTION

Some prototype electrical penetration failures have occurred to date. In addition, failures of low voltage penetration modules have occurred at a licensed facility. It was originally postulated that failures of the low voltage penetration modules were due to electrical short-circuits caused by the collection of moisture in fissures (cracks) in the epoxy insulator/sealant. However, results of laboratory analysis indicated that failures were caused by heating of the conductors at the connection splices within the penetration module. The heating resulted from high contact resistance due to epoxy intrusion into an area of the conductor splice which was

not insulated during the manufacturing process. The accumulation of carbon deposits over a period of time, resulting from the heating process, created a conductive path (short-circuit) between adjacent conductors in the

penetration module. This item is documented in NUREG-0471.[1]

An evaluation of the standards and guides related to electrical penetrations was conducted by ORNL for the NRC. A draft report[2] was prepared by ORNL and transmitted to the NRC on December 13, 1978. This report

stated that existing requirements contained in IEEE 317-1976[3] and Regulatory Guide 1.63[4] provided adequate guidance for the design of containment electrical cable penetrations.

CONCLUSION

Based on the results of the ORNL report, DSI concluded that no further action on this issue was required.[5,6] Thus, this issue has been RESOLVED.

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[1] NUREG-0471, "Generic Task Problem Descriptions (Categories B, C, and D)," U.S. Nuclear Regulatory Commission, June 1978.
[2] Memorandum for A. Ungaro (U.S. Nuclear Regulatory Commission) from F. Clark (Oak Ridge National Laboratory), "Report on Standards and Requirements for Electrical Penetration Assemblies for Nuclear Reactor Containment Structures," December 13, 1978. [9507280225]
[3] IEEE Std 317, "Electrical Penetration Assemblies in Containment Structures for Nuclear Power Generating Stations," The Institute of Electrical and Electronics Engineers, Inc., 1976.
[4] Regulatory Guide 1.63, "Electrical Penetration Assemblies in Containment Structures for Light- Water-Cooled Nuclear Power Plants," U.S. Nuclear Regulatory Commission, October 1973, (Rev. 1) May 1977, (Rev. 2) July 1978 [7907100240], (Rev. 3) February 1987.
[5] Memorandum for S. Boyd from M. Srinivasan, "FY 1983–FY 1984 Office of Nuclear Reactor Regulation Operating Plan," November 17, 1982. [8301100332]
[6] Memorandum for W. Minners from R. Mattson, "Schedules for Resolving and Completing Generic Issues," January 21, 1983. [8301260532]