



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SAFETY EVALUATION REPORT INPUT
PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3
SAFETY PARAMETER DISPLAY SYSTEM

1.0 INTRODUCTION

Each operating reactor shall install a Safety Parameter Display System (SPDS). Supplement 1 to NUREG-0737, "Requirements for Emergency Response Capability," as transmitted in NRC Generic Letter (GL) No. 82-33, outlines the NRC requirements for an SPDS. Regional workshops on GL 82-33 were held during March 1983. In these workshops, the NRC discussed the SPDS requirements and the staff reviews of the SPDS.

To satisfy the NRC requirements for an SPDS, Philadelphia Electric Company (PECO), the licensee for the Peach Bottom Atomic Power Station, Units 2 and 3, submitted a Safety Analysis Report (SAR) by letter dated September 29, 1983 (Ref. 1). The SAR provided a description of the SPDS at Peach Bottom. Subsequent to this submittal, the SPDS was revised, and the licensee submitted a new SAR by letter dated November 30, 1987 (Ref. 2), describing their redesigned SPDS.

This evaluation addresses the review of the licensee's submittal with respect to the isolation between the Class 1E instrumentation and the non-Class 1E SPDS at the Peach Bottom Station.

2.0 DISCUSSION AND EVALUATION

The SPDS at the Peach Bottom Station is integral to the Plant Monitoring System (PMS). The PMS consists of a data acquisition system (DAS) front-end, dual computers, and various peripherals. The interface between existing plant instrumentation systems and the PMS occurs at the DAS. This interface consists of inputs from Class 1E instrumentation and control systems and some inputs from non-Class 1E systems.

The Class 1E inputs are terminated at a Class 1E multiplexer, with the redundant field inputs terminated at a different multiplexer. The two Class 1E multiplexers of the PMS are powered from different Class 1E power sources, and the multiplexer cabinets are physically separate from each other and from the non-Class 1E equipment of the PMS.

The Class 1E multiplexers output data to the dual non-Class 1E computers of the PMS. This data link (Class 1E to non-Class 1E) consists of optical transmitter/receiver units and fiber-optic cables.

The fiber-optic cables are unique isolators in that they possess inherent characteristics that are not found in other types of electrical isolators normally used in nuclear power plants. The construction of the fiber optic cable is such that the cable contains no electrically conductive material. The fiber-optic cables have an isolation capability that is four to seven times greater than dry air. The voltage breakdown rating of a typical fiber-optic cable is on the order of 250 kV per meter.

Another desirable trait of the fiber-optic cable is that a fault at either end of data link might destroy the modem but will not propagate over the fiber-optic cable. For example, one of the tests that must be performed to qualify an isolator is the application of the maximum credible fault (voltage, current) to the output of the device to verify that the fault does not propagate or degrade the input (Class 1E) side. This postulated failure does not affect fiber-optic cable, as the electrical energy resulting from the fault will not propagate through the optical fiber. Another characteristic of the fiber-optic cable is its nonsusceptibility to the coupling of crosstalk and electromagnetic interference (EMI). Ground loop problems inherent with copper cables are also eliminated.

3.0 CONCLUSION

Based on the staff's review of the licensee's submittals with respect to the fiber-optic cables, it is concluded that these cables are acceptable and may be used for interfacing between the Class 1E instrumentation and the PMS/SPDS at the Peach Bottom Station. The staff also concludes that this equipment meets the Commission's requirements in NUREG-0737, Supplement No. 1.

4.0 REFERENCES

1. Letter, J. W. Gallagher (PECo) to D. G. Eisenhut (NRC), "Safety Parameter Display System," September 28, 1983.
2. Letter, J. W. Gallagher (PECo) to W. R. Butler (NRC), "Safety Parameter Display System," November 30, 1987.