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MEMORANDUM FOR: W. Regan, Acting Branch Chief, Human Factors Engineering Branch
Division of Human Factors Safety

FROM: Faust Rosa, Chief, Instrumentation & Control Systems Branch
Division of Systems Integration

SUBJECT: MCGUIRE 1&2 - REVIEW OF ISOLATION DEVICES THAT INTERFACE WITH
THE SPDS

By letter dated March 29, 1984, Duke Power Company, the licensee for the McGuire 1&2 Nuclear Station, provided a response to Generic Letter 82-33. In this response they provided a Safety Analysis Report (SAR) on their Safety Parameter Display System (SPDS). ICSB reviewed the SAR and concluded it was incomplete and requested specific information on isolation devices. On October 29, 1984 further clarification was provided.

Enclosed is our Safety Evaluation Report (SER) which addresses the acceptability of the isolators. Based on our review of the information provided, we conclude that with some exception the isolators are qualified isolation devices and are acceptable for interfacing the SPDS with safety systems. The exception is discussed in the attached SER which also includes a request for additional information. We conclude that implementation of the SPDS may continue pending review of this information.

FAUST ROSA
Faust Rosa, Chief
Instrumentation & Control Systems Branch
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Enclosure:
As stated

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SAFETY EVALUATION - MCGUIRE NUCLEAR STATION
SAFETY PARAMETER DISPLAY SYSTEM (SPDS)

I. BACKGROUND

In order to satisfy the NRC requirements concerning the SPDS, Duke Power Company, the licensee for the McGuire 1 & 2 Nuclear Station, submitted a Safety Analysis Report (SAR) on March 29, 1984. This report provided a description of the SPDS that is being implemented as part of the Operator Aid Computer System. The SAR did not address the requirements that the SPDS must be suitably isolated from safety systems to prevent the propagation of electrical and electronic interference. On September 14, 1984, a request for additional information was sent to the licensee. Additional information on the isolators was submitted on October 29, 1984. Our evaluation addresses the qualification and documentation of the isolators as acceptable interface devices between the Class 1E safety-related system and the SPDS.

II. DISCUSSION AND EVALUATION

The Operator Aid Computer System provides a centralized computer based data and display system to assist control room personnel in evaluating the safety status of the plant. The top level graphical display contains a minimum set of plant parameters representative of the plant safety status and these constitute the SPDS. There are six Critical Safety Function displays that are displayed continuously on 3 separate displays on the main control board for each unit. Each display has an associated decision tree on which the operator can call up specific trend information. Another display is available in the technical support center.

The SPDS at McGuire is software implemented on the operator aid computer (OAC) system. This system consists of a Honeywell model 4400 computer with bulk core memory. The system displays are driven by an Aydin 5205-C color graphic video display generator. Alarm typers, printers and floppy disk drives are also utilized. The OAC has both Class 1E and non-Class 1E sensor inputs. The Class 1E inputs are isolated from the OAC by qualified isolation amplifiers, Westinghouse series 7300, that were reviewed and accepted by the staff in the following documents: (1) WCAP-8892-A "Westinghouse 7300 Series Process Control System Noise Tests," June 1977, (2) NRC letter, R. Tedesco to C. Eicheldinger, Westinghouse Electric Company, April 20, 1977.

The information supplied in Duke Power Company letter dated October 29, 1984 did not address the E-MAX isolators used on the radiation monitoring inputs to the SPDS. The licensee shall provide the following information to the NRC for confirmatory review of these devices.

Isolation Devices

- a. For the E-MAX device used to accomplish electrical isolation, describe the specific testing performed to demonstrate that the device is acceptable for this application. This description should include elementary diagrams when necessary to indicate the test configuration and how the maximum credible faults were applied to the device.

- b. Data to verify that the maximum credible faults applied during the test were the maximum voltage/current to which the device could be exposed, and define how the maximum voltage/current was determined.
- c. Data to verify that the maximum credible fault was applied to the output of the device in the transverse mode (between signal and return) and other faults were considered (i.e., open and short circuits).
- d. Define the pass/fail acceptance criteria for this device.
- e. Provide a commitment that the isolation device comply with the environmental qualifications (10CFR 50.49) and with the seismic qualifications which were the basis for plant licensing.
- f. Provide a description of the measures taken to protect the safety systems from electrical interference (i.e., Electrostatic Coupling, EMI, Common Mode and Crosstalk) that may be generated by the SPDS.)

III. CONCLUSION

Based on our audit of the above documentation on Westinghouse series 7300 isolation amplifiers, the topical report, and the previous approval of this report, we conclude that the Westinghouse 7300 isolation amplifiers are acceptable for interfacing the OAC/SPDS with safety-related systems. We also conclude that this equipment meets the Commission's requirements as stated in NUREG-0737, Supplement No. 1.

Adequate information was not provided by the licensee for the staff to confirm acceptability of the E-MAX isolation devices that are used between the radiation monitors and the SPDS. The staff however concludes that it is acceptable for the licensee to continue implementing the SPDS program, but must provide adequate analysis and documentation on the E-MAX isolators for confirmatory review prior to SPDS operation.