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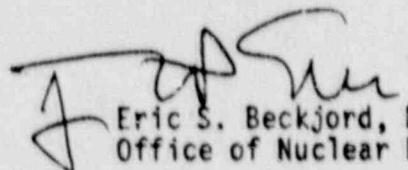
MEMORANDUM FOR: Brian Sheron, Director, Division of Systems Research, Office  
of Nuclear Regulatory Research

FROM: Eric S. Beckjord, Director, Office of Nuclear Regulatory  
Research

SUBJECT: GENERIC ISSUE A-19, "DIGITAL COMPUTER PROTECTION SYSTEM"

The prioritization of Generic Issue A-19, "Digital Computer Protection System," has resulted in its classification as a Licensing Issue. Staff efforts currently underway in pursuit of this issue will address licensing needs in the area of microcomputer and Artificial Intelligence Systems.

The enclosed prioritization evaluation will be incorporated into NUREG-0933, "A Prioritization of Generic Safety Issues," and is being sent to the regions, other offices, the ACRS, and the PDR, by copy of this memorandum, to allow others the opportunity to comment on the evaluation. All comments should be sent to the Advanced Reactors and Generic Issues Branch, DRA, RES (Mail Stop NL/S-169). Should you have any questions pertaining to the contents of this memorandum, please contact Ronald C. Emrit (492-3731).

  
Eric S. Beckjord, Director  
Office of Nuclear Regulatory Research

Enclosure:  
Prioritization Evaluation

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ENCLOSURE

PRIORITIZATION EVALUATION

Issue A-19: Digital Computer Protection System

## ITEM A-19: DIGITAL COMPUTER PROTECTION SYSTEM

### DESCRIPTION

Current trends in the design of nuclear power plants show an increase in the use of digital computer technology in safety-related instrumentation and control systems. The first application of this technology was Arkansas Nuclear One, Unit 2 (ANO-2) where digital computers were used in the initiating logic for two reactor trip parameters. After the ANO-2 application, other digital computers, such as core protection calculators, have been installed by licensees to provide reactor trip signals.

Since digital technology is considerably different from analog technology, the staff's review procedures and acceptance criteria appropriate for the safety review of digital computer-based systems are different from those used for analog-based systems. Thus, in this NUREG-0371<sup>2</sup> issue, the staff identified the need to standardize the safety review of reactor protection systems that incorporated digital computers. It was believed that the results of such standardization would be: (1) the development of staff requirements for the design, development, and qualification of digital computers for use by applicants; and (2) a Standard Review Plan that would define uniform and consistent guidelines for the conduct of the staff's safety review.

### CONCLUSION

In 1982, the American Nuclear Society (ANS) and the IEEE jointly approved the standard ANSI/IEEE-ANS 7-4.3.2-1982, "Application Criteria for Programmable Digital Computer Systems in Safety Systems of Nuclear Power Generating Stations." This standard established a method for designing, verifying, and implementing software and validating computer systems used in safety-related systems of nuclear power plants.<sup>1237</sup> In 1985, the NRC issued Regulatory Guide 1.152, "Criteria for Programmable Digital Computer System Software in Safety-Related Systems of Nuclear Power Plants," which endorsed the method in ANSI/IEEE-ANS 7-4.3.2-1982. RES is currently conducting a research program to investigate the use of digital computer safety systems at nuclear power plants. Contractor effort has been initiated at Oak Ridge National Laboratory to support a User's Need Request currently being finalized in NRR.<sup>1286</sup> In particular, specific licensing needs in the area of microcomputer and Artificial Intelligence Systems have been identified by NRR and these needs, as well as others, will be addressed in the NRR User's Request. The desired end product of the research effort is a Regulatory Guide for the design, development, acceptance testing, and periodic functional verification of Class IE computer safety systems, and a Standard Review Plan addendum providing review guidance for digital computer systems in nuclear power plant safety systems (by referencing R.G. 1.152 and the new regulatory guide). Since this issue deals with the use of alternative (i.e., digital instead of analog) technology for nuclear power plant safety systems, it is not intended that the use of digital technology will result in a change in the safety of current nuclear power plants. We, therefore, conclude that this is a Licensing Issue currently being pursued by the staff.

REFERENCES

2. NUREG-0371, "Task Action Plans for Generic Activities (Category A)," U.S. Nuclear Regulatory Commission, November 1978.
1237. NUREG/CR-5420, "Multiple System Responses Program - Identification of Concerns Related to a Number of Specific Regulatory Issues," U.S. Nuclear Regulatory Commission, October 1989.
1296. Memorandum for M. Virgilio from S. Newberry, "Proposed Research Programs to Support SICB Regulation Needs," April 26, 1990.