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

November 10, 1992

MEMORANDUM FOR: Elinor G. Adensam, Director
Project Directorate II-1
Division of Reactor Projects

FROM: Scott F. Newberry, Chief
Instrumentation and Controls Branch
Division of Reactor Controls
and Human Factors

SUBJECT: REQUEST FOR ADDITIONAL INFORMATION STEAM LEAK DETECTION INSTRUMENTATION NUMAC UPGRADE - BRUNSWICK STEAM ELECTRIC PLANT, UNITS 1 AND 2

On September 14, 1992, the licensee submitted for NRC staff review a proposed revision to the Technical Specifications for the Brunswick Steam Electric Plant, Units 1 and 2. The staff determined that several topics addressing hardware and software implementation have not been addressed adequately in this submittal, and therefore it is requested that the licensee provide the additional information as listed in the enclosure in preparation for review of this Technical Specification amendment. Please provide a response and related documentation to these questions within 30 days.

Scott F. Newberry, Chief
Instrumentation and Controls Branch
Division of Reactor Controls
and Human Factors

Enclosure:
As stated

cc:
R. Lo

ENCLOSURE

General Background Information

1. Provide design information of the GE microprocessor based NUMAC system. Include the descriptions of the devices used in the microprocessor, the programming language, compiler, type of microprocessor, etc.

2. Provide drawings and descriptions of the physical location of the replacement system in the plant.

3. Discuss the temperature and humidity qualifications of the NUMAC system and how these qualifications meet normal plant and worst case accident conditions.

Software Verification and Validation

1. Provide references / guidelines used for the NUMAC system.

2. Discuss any differences with IEEE 7.4.3.2.

3. Describe the plans for performing the verification and validation (V&V) of the NUMAC system logic. If the V&V has been performed, provide the documentation of the V&V plan. If the V&V has not been performed, describe the process which CP&L will ensure the adequacy of the software used in the NUMAC system for 1E applications.

4. Provide the acceptance criteria for hardware and software, and also discuss traceability of products at different development stages to their specifications.

5. Provide the acceptance criteria and procedures for, and results of the hardware/software integration testing.

6. Provide the procedures and results for the startup testing.

7. Provide a listing of all software errors and their ensuring corrections.

Operations/Surveillances

1. Describe site acceptance / pre-operational testing; specifically address loss and restoration of power to the NUMAC system during standby and power operation. Also describe the memory-retention capability of the NUMAC system.

2. Discuss coordination of self check and continuous monitoring modes with normal NUMAC system operations.

3. Describe the steps required to recover the NUMAC system if a loss of system function is detected.

4. Describe all provisions for "back-up" provision to the NUMAC system.

5. Does the system provide alarms for the loss of the NUMAC system's self-diagnostic features?

6. Discuss the potential failures for which the NUMAC system is not capable of detecting during channel functional testing.

7. Discuss the NUMAC system stability.

EMI/RFI

1. Provide the NUMAC electromagnetic compatibility (EMC) specifications and justify the margin between the EMC specifications and expected electromagnetic interference.

2. Discuss the process by which CP&L will verify that the electromagnetic environment at the plant is enveloped by the NUMAC EMC test parameters:

   a. Provide a list of the test equipment used in the onsite EMI/RFI testing and their technical specifications.

   b. Provide the methodology and the results of the onsite electromagnetic interference survey.

   c. Provide the evaluations of the vendor's EMI/RFI testing methodology and the results of the factory testing for radiated and conducted susceptibility.

   d. Provide the results of the licensee's comparison between the onsite and factory EMI/RFI testing.

3. List the EMI/RFI testing frequencies and provide justifications for any frequencies not tested.

4. During the pre-operational test, are there any transient monitors installed? If any, what are the parameters being monitored?

5. Provide the surge transient susceptibility testing specifications for the NUMAC system and justify the margin between the specifications and expected surges.

Man Machine Interface

1. Discuss the interface that the man machine interface (MMI) has with the NUMAC system.

2. Discuss the process of altering setpoints through MMI or other means, i.e., password protection, administrative control, etc.

1E and Non-1E Isolation

1. Provide a detailed description of the devices used to accomplish electrical isolation between the 1E and non-1E systems and describe the specific testing performed to demonstrate that the devices are acceptable for this application.

2. Provide data to verify that the maximum credible faults applied during the tests discussed in the above question were the maximum voltage/current to which the device could be exposed, and explain how the maximum voltage/current was determined.

3. Verify that other faults were considered (i.e., open and short circuits)

4. Define the acceptance criteria for each type isolation device.

5. Provide the electrical wiring diagrams which show the non-1E connections to the NUMAC system.

Configuration Control

Describe the process for future modification to the software and hardware of the NUMAC system.

Commercial Grade Item Dedication

1. Provide the procurement documentation for the NUMAC system.

2. Provide the mean-time-to-failure (MTTF) and the mean-time-to-repair (MTTR) information for the NUMAC system.

3. Describe the audit and audit results of the vendor's QA program and procedures for commercial grade dedication of the NUMAC system.

4. What are the vendor's recommendation and bases for the shelf life of the NUMAC spare parts?

5. Provide the standards and procedures used to dedicate the GE commercial grade NUMAC system.

6. Describe the criteria governing the successful completion of the GE commercial grade NUMAC system.

7. Identify the methods and acceptance criteria for verifying the critical characteristics.

Design basis consideration

Provide the assessment and documentation on the development of the design modification with respect to the design basis.

Power Supply

1. Were the power supplies independently surge withstand tested?

2. Provide the power requirements for the NUMAC system.

3 Are switching power supplies used and what provisions are made to control harmonic distortions in the replacement system.

Failure Mode

Discuss the failure mode of a loss of detector signal.

Fail Safe

Describe operation and design of any other NUMAC component used to place the system in its fail safe condition.

Grounding

1. Are the analog and digital grounds isolated?

2. During RFI testing, was the signal on the ground line monitore Discuss the effects of the signal measured on the ground line in relation to RFI testing.

3. Discuss the effects of lightning strike on the ground line and provisions for system protection.

Setpoint Calculations

Discuss the methodology of calculating the analytical limit and allowable limit for the differential flow of the reactor water cleanup system isolation function.