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April 30, 1993

Docket No. 50-213 B14451

U.S. Nuclear Regulatory Commission Attention: Document Control Desk Washington, DC 20555

Gentlemen:

Haddam Neck Plant Feedwater Control System Upgrade Request for Additional Information (TAC No. M85741)

By letter dated January 29, 1993,⁽¹⁾ Connecticut Yankee Atomic Power Company submitted a proposed license amendment to reflect modifications to upgrade the feedwater control system at the Haddam Neck Plant. By letter dated April 7, 1993,⁽²⁾ the Staff requested additional information to complete their review of the proposed license amendment.

The response to the requested information is provided in the accompanying attachment.

We trust you will find this information satisfactory, and we remain available to answer any questions you may have.

Very truly yours,

CONNECTICUT YANKEE ATOMIC POWER COMPANY

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FOR: J. F. Opeka Executive Vice President

BY:

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E. A. DeBarba Vice President

cc: See Page 2

- (1) J. F. Opeka letter to U.S. Nuclear Regulatory Commission, "Haddam Neck Plant, Proposed Revision to Technical Specifications," dated January 29, 1993.
- (2) A. B. Wang letter to J. F. Opeka, "Haddam Neck Plant-Feedwater Control System Upgrade, Request for Additional Information (TAC No. M85741)," dated April 7, 1993.

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cc: T. T. Martin, Region I Administrator A. B. Wang, NRC Project Manager, Haddam Neck Plant W. J. Raymond, Senior Resident Inspector, Haddam Neck Plant U.S. Nuclear Regulatory Commission B14451/Page 2 April 30, 1993

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Attachment 1

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Haddam Neck Plant

Feedwater Control System Upgrade Response to Request for Additional Information

April 1993

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Request No. 1:

Are the digital modules used for this modification similar to the one used for the reactor protection system (RPS) upgrade?

Response No. 1:

Yes. There are no new configurations utilized during Phase III of the RPS upgrade. The Foxboro SPEC 200 MICRO control card is a rack-mounted microprocessor based unit which can be configured with up to six blocks from a menu of twenty-one different functions. Phase III utilizes only CALC, ALRM, and GATE blocks in a safety-related function. These blocks were also utilized in Phase I and Phase II of the RPS upgrade.

Request No. 2:

Is the Validation and Verification (V&V) program the same for this modification as was done for the RPS digital upgrade?

Response No. 2

Yes. The acceptability of Foxboro SPEC 200 MICRO equipment for use in safety systems of nuclear power plants, including software validation and verification, is documented in Foxboro Test Reports QOAAE01, QOAAE02, QOAAE03, QOAAE04, and QOAAE05. Specifically, QOAAE02, "Conformance of SPEC 200 MICRO to Application Criteria for Programmable Digital Controllers in Nuclear Power Generating Stations," QOAAE03, "SPEC 200 MICRO Software Validation and Verification," and QOAAEO4, "Methodology Used to Demonstrate Compliance of the SPEC 200 MICRO Applicable Configuration," provide the basis for the V&V program utilized by Foxboro for all phases of the RPS upgrade. Test Report QOAAE02 utilizes the guidelines of ANSI/IEEE-ANS-7-4.3.2, "Application Criteria for Programmable Digital Systems in Safety Systems of Nuclear Power Generating Stations," as a basis for describing the Foxboro program. Test Report QOAAE03 will document the procedures used by the SPEC 200 MICRO development team and serves as the Foxboro Company Software Verification and Validation Report. This report describes the organized methodology used to create and validate the quality of the hardware and software developed for the SPEC 200 MICRO systems. Finally, Test Report QOAAE04 will document the testing methodology applied to specific applications (configurations) of the SPEC 200 MICRO equipment.

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Request No. 3:

Is the configuration management the same as was for the RPS upgrade?

Response No. 3:

Yes. The configuration of the SPEC 200 MICRO is controlled by an Instrumentation and Controls Department Instruction, ICDI-29, "SPEC 200 MICRO Configuration Change Control," and two station Corrective Maintenance Procedures, CMP 8.2-76.1, "Downloading of SPEC 200 MICRO Configurator," and CMP 8.2-76.2, "Uploading of SPEC 200 MICRO Configurator." These procedures apply to all configuration changes made to SPEC 200 MICRO equipment installed in plant systems at the Haddam Neck Plant.

Request No. 4:

How are software changes controlled after the V&V of the installed software is performed?

Response to No. 4:

The software that has undergone Foxboro's V&V, described in Response 2 above, is that which makes up the twenty-one functions (blocks) which are contained in the programmable read only memory (PROM) and cannot be changed. Up to six of these blocks can be configured at the site on any one control card to perform the required functions. As stated in Response 1 above, Phase III utilizes only three of the possible functions. Once configured, this configuration is controlled by the procedures described in Response 3 above. If the need to modify any algorithms which make up the twenty-one functions is ever identified, Foxboro would be responsible to contact the Haddam Neck Plant per the requirements of 10CFR21. After release of the system to operations, any configuration changes will be controlled administratively by the design change process.

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Request No. 5:

Do environmental qualification parameters of the equipment meet or exceed the EMI, RFI and ambient temperature parameters specific to the location of installation? How is this verified?

Response No. 5:

The equipment, which was purchased QA Category 1, Class 1E, will be located in the Control Room which is considered a mild environment. This is the same location as the equipment utilized for RPS Phase I and II. Electromagnetic Interference testing was performed by the CYAPCO Instrument and Controls Department (I&C) subsequent to the installation of RPS Phase I and II to demonstrate that the environment of the installed equipment was enveloped by Foxboro's qualification testing. The results of the testing confirmed that the electrical environment of the RPS equipment is well below levels which could adversely effect component operation. This, coupled with the successful operation of the installed equipment for over three years, provides a high degree of confidence in the electromagnetic compatibility of the equipment. An independent consultant has also been hired and is in the process of evaluating the previous test results along with Foxboro's qualification test results. Prior to the upcoming refueling outage (RF017), this consultant will be visiting the site to evaluate the control room environment and recommend what, if any, additional testing should be done to ensure compatibility.

Request No. 6:

What happens if a common mode failure occurs in the software?

- a. How operations identifies and rectifies?
- b. Are there any back-up systems available?

Response No. 6:

CYAPCO does not consider a common mode failure of this application at the Haddam Neck Plant to be credible. The Foxboro SPEC 200 MICRO control card is a stand-alone unit which performs the same functions as the equipment it replaces. The software that makes up the functions is contained in programmable read only memory (PROM) in the rack mounted card which cannot be changed by CYAPCO.

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The SPEC 200 MICRO control cards are designed to fail safe. All analog outputs fail to zero and all logic outputs fail to the "trip" condition. A failure in a reactor trip card would be processed as a reactor trip on one channel. The operators would receive an alarm and would evaluate the plant status accordingly. Similarly, a failure in the steam generator overfill protection function would be processed and annunciated as one channel of feedwater isolation.

Each SPEC 200 MICRO control card includes an LED indicator of card failure. Additionally, monthly surveillance testing will be performed in accordance with plant technical specifications.

No back-up systems are required as this would be a single failure of one function. As each function has redundancy, the system remains operable.

Request No. 7:

Reference: Proposed revision to ACTION 6 of Technical Specification (TS) Table 3.3-1.

The present ACTION statement allows 1 hour to place an inoperable channel in tripped condition. The proposed revision changes this time to 6 hours. This extension from 1 hour to 6 hours was proposed by Westinghouse in their WCAP-10271 and was approved by NRC in RTS SER dated February 21, 1985. However, the NRC stipulated certain conditions that licensees must meet to include this pre-approved change to their plant-specific TS. The submittal did not indicate if these conditions were met.

Response to No. 7:

The concerns raised by the Staff are not applicable for the steam generator water level low coincident with steam/feedwater flow mismatch trip for the following reasons. The question relates to the allowed time to place an inoperable channel in the tripped condition. Although WCAP-10271 includes guidance for certain plants to extend the allowed time from 1 to 6 hours for reactor trip system functions, this guidance is not required for this proposed change as the existing technical specifications at the Haddam Neck Plant already invoke the 6-hour provision for multiple-channel functions; that is a function which has redundant channels. There is one function in Table 3.3-1 which has only one channel. That is Table 3.3-1 Functional Unit 9, Steam Generator water level low coincident with steam/feedwater flow mismatch. Table 3.3-1, ACTION 5 requires that the affected portion of the [one] inoperable channel be placed in the tripped condition within 1 hour. U.S. Nuclear Regulatory Commission B14451/Attachment 1/Page 5 April 30, 1993

2.4 2.

The proposed change to the Technical Specification for Functional Unit 9 is based on a plant modification which is adding redundancy to what had been a single-channel function, making it a multiple-channel function. ACTION 6 (with the 6-hour provision) is the applicable action statement for a multiplechannel function. Therefore, this change invokes a previously approved requirement for reactor trip system multiple-channel functions as the result of a plant modification which added (multiple-channel) redundancy to what had been a single-channel function. CYAPCO has reviewed WCAP-10271 and the NRC's SER to ensure the proposed change is consistent with the guidance contained in those documents.