NORTHEAST UTILITIES

THE CONNECTICUT LIGHT AND POWER COMPANY
WESTERN MASSACHUSETTS ELECTRIC COMPANY
HOLYOKE WATER POWER COMPANY
NORTHEAST UTILITIES SERVICE COMPANY
NORTHEAST NUCLEAR ENERGY COMPANY

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September 11, 1984

Docket No. 50-423
B11292

Director of Nuclear Reactor Regulation
Mr. B. J. Youngblood, Chief
Licensing Branch No. 1
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Reference: (1) B. J. Youngblood to W. G. Counsil, SER for Millstone Nuclear Power Station, Unit No. 3, dated August 2, 1984.

(2) W. G. Counsil to B. J. Youngblood, Transmittal of Amendment 9, dated July 24, 1984.

Dear Mr. Youngblood:

Millstone Nuclear Power Station, Unit No. 3
Transmittal of Responses to the SER Confirmatory Items

Enclosed are Northeast Nuclear Energy Company's responses to the SER Confirmatory Items 29, 32, 33, 35, and 38. FSAR pages addressed in the responses were provided in Amendment 9 to the FSAR (Reference 2). These responses should fully resolve the Staff's concern regarding the Confirmatory Items 29, 32, 33, 35, and 38.

If there are any questions, please contact our licensing representative directly.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY
et. al.

BY NORTHEAST NUCLEAR ENERGY COMPANY
Their Agent

W. G. Counsil

W. G. Counsil
Senior Vice President

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STATE OF CONNECTICUT)
) ss. Berlin
COUNTY OF HARTFORD)

Then personally appeared before me W. G. Counsil, who being duly sworn, did state that he is Senior Vice President of Northeast Nuclear Energy Company, a Applicant herein, that he is authorized to execute and file the foregoing information in the name and on behalf of the Applicants herein and that the statements contained in said information are true and correct to the best of his knowledge and belief.

Lorraine J. D'Amico
Notary Public

My Commission Expires March 31, 1988

Millstone Unit No. 3

Confirmatory Items

Instrumentation and Control Systems Branch

SER-C29 Cable Separation in NSSS Process Cabinets (SER 7.2.2.1)

The Staff requested that cable separation inside NSSS cabinets be addressed in the FSAR. The applicant indicated that the FSAR Section 7.2 will be revised to include a reference to WCAP-8892A and confirm that the balance of the plant control systems comply with the NSSS interface criteria. This is a confirmatory item.

Response (9/84)

Refer to the revised FSAR Section 7.1.2.2.1.

Status (9/84)

Closed.

TABLE 1.8N-1 (Cont)

R.G. No.	Title	Degree of Compliance	FSAR Section Reference	
		restrictive requirement for shop fabricaion, where the welders' physical position relative to the welds is controlled and does not present any significant problems. In addition, shop welds of limited accessibility are repetitive due to multiple production of similar components, and such welding closely supervised. For field application, the type of qualification should be considered on a case-by-case basis due to the great variety of circumstances encountered.		
1.73	Qualification Tests of Electric Valve Operators Installed inside the Conainment of Nuclear Power Plants (Rev. 0, January 1974)	The qualification programs for Westinghouse WRD supplied Class IE electric motor operators, solenoid valves, and limit switches described in WCAP-8587 and WCAP-9688 meet the requirements of Regulatory Guide 1.73.	3.11N 8.3.1	
1.74	Quality Assurance Terms and Definitions (Rev. 0, February 1974)	The Westinghose position for the WRD NSSS scope of supply on Regulatory Guide 1.74 is presented in WCAP-8370, "WRD Quality Assurance Plant." The Nuclear Fuel Division position on this Regulatory Guide is presented in WCAP-7800, "NFD Quality Assurance Program Plan."	17.1.2 17.2	
1.75	Physical Independence of Electric Systems (Rev. 2, September 1978)	Westinghouse takes exception to the Regulatory Guide 1.75 in several areas as discussed below. These issues have been presented to the Regulatory Staff and are not resolved at this time. 1. Isolation Devices (Paragraph 3.8) Regulatory Position: Interrupting devices actuated by fault current are not isolation devices. Westinghouse Position: Interrupting devices actuated by fault current are isolation devices when justified by test or analysis.	7.1 8.3.1.4	430.29
		2. Cable Spreading Area and Main Control Room (Paragraph 5.1.3) Regulatory Position: Places additional severe restrictions on equipment in area.		430.27
		Westinghose Position: The IEEE draft criteria are adequate.		430.27

TABLE 1.8N-1 (Cont)

R.G. No.	Title	Degree of Compliance	FSAR Section Reference
		3. Instrument Cabinets (Paragraph 5.7) Regulatory Position: Separation requirements for instrument cabinets are the same as those for control boards. Westinghouse Position: Separation requirements should not be the same for instrumentation racks and control boards because functional requirements are different. The IEEE draft criteria are adequate. Refer to WCAP-8892-A and FSAR Section 7.1.2.2.1 for further information.	9
1.77	Assumptions Used for Evaluating a Control Rod Ejection Accident for Pressurized Water Reactors (Rev. 0, May 1974)	The result of the Westinghouse analysis shows compliance with the Regulatory Position given in Section C.1 of Regulatory Guide 1.77. In addition, Westinghouse complies with the intent of the assumptions given in Appendix A of the Regulatory Guide. However, Westinghouse takes exception to Position C.2, which implies that the Rod Ejection Accident should be considered as an emergency condition. Westinghouse considers this a faulted condition as stated in ANSI N18.2. Faulted condition stress limits will be applied for this accident.	15.4.2 15.4.7

process transmitters to operate within 5 percent of the high and low end of their calibrated span or range. Functional requirements established for every channel in the reactor protection and engineered safety features systems stipulate the maximum allowable errors on accuracy, linearity, and reproducibility. The protection channels have the capability for, and are tested to ascertain that the characteristics throughout the entire span in all aspects are acceptable and meet functional requirement specifications. As a result, no protection channel operates normally within 5 percent of the limits of its specified span.

In this regard, it should be noted that the specific functional requirements for response time, setpoint, and operating span will be finalized contingent on the results and evaluation of safety studies to be carried out using data pertinent to the plant. Emphasis is placed on establishing adequate performance requirements under both normal and faulted conditions. This will include consideration of process transmitters margins such that even under a highly improbable situation of full power operation at the limits of the operating map (as defined by the high and low pressure reactor trip, ΔT overpower and overtemperature trip lines (DNB protection) and the steam generator safety valve pressure setpoint) that adequate instrument response is available to ensure plant safety.

7.1.2.1.10 Engineered Safety Features Motor Specifications

Motors are discussed in Section 8.3.1.

7.1.2.2 Independence of Redundant Safety Related Systems

The safety related systems in Section 7.1.1.1 are designed to meet the independence and separation requirements of Criterion 22 of the 1971 General Design Criteria and Paragraph 4.6 of IEEE Standard 279-1971. The electrical power supplies, instrumentation, and control conductors for redundant circuits have physical separation to preserve the redundancy and to ensure that no single credible event will prevent operation of the associated function due to electrical conductor damage. Critical circuits and functions include power, control and analog instrumentation associated with the operation of the reactor trip system or engineered safety features actuation system. Credible events shall include, but not be limited to, the effects of short circuits, pipe rupture, missiles, fire, etc and are considered in the basic plant design. In the control board, separation of redundant circuits is maintained as described in Section 7.1.2.2.2.

7.1.2.2.1 General (Include Regulatory Guide 1.75 and IEEE Standard 384-1974)

Description of separation is provided in Section 8.3, and compliance with Regulatory Guide 1.75 is described in Section 1.8 for BOP Scope.

9

The physical separation criteria for redundant safety related system sensors, sensing lines, wireways, cables, and components on racks for the NSSS scope meet recommendations contained in Regulatory Guide 1.75 with the following comments.

1. The design of the protection system relies on the provisions of IEEE-384-74 relative to over-current devices to prevent malfunctions in one circuit from causing unacceptable influences on the functioning of the protection system. The protection system uses redundant instrumentation channels and actuation trains and incorporates physical and electrical separation to prevent faults in one channel from degrading any other protection channel.

2. Separation recommendations for redundant instrumentation racks are not the same as those given in Paragraph C16 of Regulatory Guide 1.75, Revision 1, for the control boards because of different functional requirements. Main control boards contain redundant circuits which are required to be physically separated from each other. However, since there are no redundant circuits which share a single compartment of an NSSS protection instrumentation rack, and since these redundant protection instrumentation racks are physically separated from each other, the physical separation requirements specified for the main control board do not apply.

   However, redundant, isolated control signal cables leaving the protection racks are brought into close proximity elsewhere in the plant, such as the control board. It could be postulated that electrical faults, or interference, at these locations might be propagated into all redundant racks and degrade protection circuits because of the close proximity of protection and control wiring within each rack. Regulatory Guide 1.75, Paragraph C-4 and IEEE-384-1974, Paragraph 4.5(3), provide the option to demonstrate by tests that the absence of physical separation could not significantly reduce the availability of Class 1E circuits. 9

   Westinghouse test programs have demonstrated that Class 1E protection systems, Nuclear Instrumentation System (NIS); Solid State Protection System (SSPS); and 7300 Process Control System (7300 PCS), are not degraded by non-Class 1E circuits sharing the same enclosure. Conformance to the requirements of IEEE-279 and Regulatory Guide 1.75 has been established and accepted by the NRC based on the following which is applicable to these systems at Millstone.

   Tests conducted on the as-built designs of the NIS and SSPS were reported and accepted by the NRC in support of the Diablo Canyon application (Docket Numbers 50-275 and 50-323). Westinghouse considers these programs as applicable to all plants, including Millstone. Westinghouse tests on the 7300 PCS were covered in a report entitled, 7300 Series Process Control System Noise Tests, subsequently reissued as WCAP-8892-A. In a letter dated April 20, 1977,

R. Tedesco to C. Eicheldinger, the NRC accepted the report in which the applicability of the Millstone plant is established. 9

3. The physical separation criteria for instrument cabinets within the NSSS scope meet the recommendations contained in Paragraph 5.7 of IEEE-384-1974.

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Confirmatory Items

Instrumentation and Control Systems Branch

SER-C32 Conformance with Branch Technical Position ICSB-26 (SER 7.2.2.7)

The applicant committed to revise FSAR Section 7.2 to indicate the conformance with the BTP ICSB-26.

Response (9/84)

Refer to the revised FSAR Section 7.2.1.1.2.

Status (9/84)

Closed.

5. Steam Generator Low-Low Level Trip

This trip protects the reactor from loss of heat sink. This trip is actuated on two out of four low-low water level signals occurring in any steam generator.

The logic is shown on Figure 7.2-1, Sheet 7.

6. Reactor Trip on a Turbine Trip (anticipatory)

The reactor trip on a turbine trip is actuated by two out of three logic from emergency trip fluid pressure signals or by all closed signals from the turbine steam stop valves. A turbine trip causes a direct reactor trip above P-9. Below P-9 the turbine is bypassed on turbine trip, the turbine bypass system is discussed in Section 10.4.4. The reactor trip on turbine trip provides additional protection and conservatism beyond that required for the health and safety of the public. This trip is included as part of good engineering practice and prudent design. No credit is taken in any of the safety analysis (Chapter 15) for this trip.

The turbine provides anticipatory trips to the reactor protection system from contacts which change position when the turbine stop valves close or when the turbine emergency trip fluid pressure goes below its setpoint. Digital isolators (Section 7.2.1.1.8) have been used to isolate these contacts from the reactor protection system cabinets which receive the inputs from these contacts.

One of the design bases considered in the protection system is the possibility of an earthquake. With respect to these contacts, their functioning is unrelated to a seismic event in that they are anticipatory to other diverse parameters which cause reactor trip. The contacts are shut during plant operation and open to cause reactor trip when the turbine is tripped. No power is provided to the protections system from the contacts; they merely serve to interrupt power to cause reactor trip. This design functions in a de-energize-to-trip fashion to cause a plant trip if power is interrupted in the trip circuitry. This ensures that the protection system will in no way be degraded by this anticipatory trip because seismic design considerations do not form part of the design bases for anticipatory trip sensors. (The reactor protection system cabinets which receive the inputs from the anticipatory trip sensors are, of course, seismically qualified as discussed in Section 3.10.) The anticipatory trips thus meet IEEE-279-1971 and BTP ICSB-26, including redundancy, 9
separation, single failure, etc. Seismic qualification of the contacts sensors is not required.

The logic for this trip is shown on Figure 7.2-1, Sheet 16.

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Confirmatory Items

Instrumentation and Control Systems Branch

SER-C-33 Test of Engineered Safeguard P-4 Interlock (SER 7.3.3.2)

The staff raised a concern on the possibility of accidental shorting or grounding of safety system circuits during testing of the P-4 interlocks. The applicant has committed to incorporate built-in test features to facilitate testing of the P-4 interlock. This is a confirmatory item subject to documentation of this change.

Response (9/84)

A discussion of the engineered safety feature P-4 interlock testing was presented during the December 1, 1983 ICSB meeting.

The discussion included implementing the Westinghouse recommendation into the test procedure by testing at the switchgear or implementing NNECO's test procedure by installing a permanently installed voltmeter in the control room and hardwiring it into the system.

The evaluation of both procedures has been completed. The applicant has determined to incorporate the test feature, by providing a permanently installed voltmeter in the control room and hardwiring it into the system, to facilitate testing of the P-4 interlock.

Status (9/84)

Closed.

Millstone Unit No. 3

Confirmatory Items

Instrumentation and Control Systems Branch

SER-C35 IE Bulletin 80-06 Concern (SER 7.3.3.5)

As was done for operating reactors through IE Bulletin 80-06, the staff requested that the applicant review all safety systems to determine if any safety equipment would change state after reset. In FSAR Amendment No. 5, the applicant stated that the requested reviews have been performed and that safety-related equipment will remain in its associated emergency mode following reset. The conclusions of the applicant review are as follows:

1. All equipment receiving an ESF actuation signal directly and not via the emergency diesel sequencer will remain in the emergency mode. After the equipment receives an ESF signal, it is driven to its emergency position. The ESF signal can be reset, and the equipment will remain in the emergency mode.

2. To change the equipment from its emergency position, the ESF signal must be reset and the equipment control switch must be operated.

3. All equipment receiving a loss of offsite power (LOP) actuation signal via the sequencer will go to its emergency position and remain there as in 1, and 2, above, except the quench spray and recirculation spray pump motors. The reason for this is that the SIS signal cannot be reset until after a time delay which ensures that load sequenced by a SIS signal will have started; however the CDA signal can be reset at any time. If the CDA signal is reset before the quench spray and recirculation spray pumps are actuated by the sequencer after a LOP, then the quench spray and recirculation spray pumps will not start. Resetting the CDA signal will not stop the motors after a CDA signal is received and the quench spray or recirculation spray pump motors start. The pumps motors can be stopped with their control switch if the CDA signal is not present. If the CDA output signal is reset and blocked before the pump motors are actuated, then this is treated as a bypassed or inoperable status and annunciated as part of the Regulatory Guide 1.47 alarms.

The Staff finds that the design is consistent with the intent of the bulletin. The bulletin requires a confirmatory test to verify the conclusions of this review. This is a confirmatory item subject to the applicant's commitment to perform a confirmatory test.

Response (9/84)

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Confirmatory Items

Instrumentation and Control Systems Branch

A confirmatory test to verify the above conclusions will be performed as a part of the engineered safety features integrated test with and without loss of normal power.

Status (9/84)

Closed.

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Confirmatory Items

Instrumentation and Control Systems Branch

SER-C38 Failure Mode and Effects Analyses of ESFAs (SER 7.3.3.10)

Because the FMEA for the NSSS was performed using assumptions on the BOP design, the staff requested the applicant to review that the interface requirements of Appendix B and C of WCAP-8584 are met. The applicant confirmed that the BOP design complies with the interface requirements of Appendix B and C of WCAP-8584. This is a confirmatory item subject to documentation in the FSAR.

Response (9/84)

Refer to the revised FSAR Section 7.3.2.

Status (9/84)

Closed.

b.	Radiation	±10 percent at center scale
c.	Containment pressure	±1.8 percent of full scale

3. Ranges of sensed variables to be accommodated until conclusion of protective action is assured.

   Ranges required in generating the required actuation signals for loss-of-coolant protection are given:

a.	Pressurizer pressure	1,700 to 2,500 psig
b.	Containment pressure	0 to 60 psig

   Ranges required in generating the required actuation signals for steam line break protection are given:

a.	T_{avg}	530 to 630°F
b.	Steam line pressure (from which steam line pressure rate is derived)	0 to 1,200 psig
c.	Containment pressure	0 to 60 psia

   Ranges required in generating the required signals for CBI:

a.	Chlorine	0-10 ppm
b.	Radiation	10^{-6} µci/cc- 10^{-1} µci/cc
c.	Containment pressure	0-60 psia

7.3.1.3 Final System Drawings

The schematic diagrams for the systems discussed in this section are listed in Section 1.7 and are submitted in support of this application.

7.3.2 Analysis

Failure mode and effects analyses have been performed on ESF systems equipment within the Westinghouse scope of supply (WCAP-8584). The Millstone ESF systems, although not identical, have been designed to equivalent safety design criteria. The system designs within the BOP scope meet the interface criteria in Appendixes B and C of WCAP-8584. 9

Analyses of the instrumentation and control systems used to initiate the operation of the ESF systems and their essential auxiliary supporting systems have been made. For balance-of-plant safety systems, the assurance that safety-related instrumentation and