NORTHEAST UTILITIES

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

General Offices • Selden Street, Berlin, Connecticut

P.O. BOX 270
HARTFORD, CONNECTICUT 06141-0270
(203) 665-5000

October 29, 1985

Docket No. 50-~~213~~ 245
B11840

Director of Nuclear Reactor Regulation
Attn: Mr. John A. Zwolinski, Chief
Operating Reactors Branch #5
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Reference: (1) J. F. Opeka letter to the Honorable N. J. Palladino, dated September 30, 1985.

Gentlemen:

Millstone Nuclear Power Station, Unit No. 1
Environmental Qualification of Electrical Equipment
Justifications for Continued Operation

On October 22, 1985, Northeast Nuclear Energy Company (NNECO) was verbally requested by the NRC Staff to supplement our justifications for continued operation (JCOs) related to the eleven (11) valve motor operators which are not yet fully environmentally qualified. This request was necessitated by the NRC Staff's desire to have our JCOs more closely correspond to the NRC Staff's review criteria. The JCOs submitted in Reference (1) have been revised and are included in Attachment No. 1.

We trust that this submittal adequately responds to the NRC Staff's verbal request.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

J. F. Opeka

J. F. Opeka
Senior Vice President

E J Mroczka

By: E. J. Mroczka
Vice President

A048
1/1

Docket No. 50-245

Attachment No. 1

Millstone Nuclear Power Station, Unit No. 1

Supplemented Justifications for Continued Operation

October, 1985

SYSTEM: Low Pressure Coolant Injection (LPCI)

VALVES: LP-15A, 15B - Drywell Spray Valves (AC valves)
LP-16A, 16B - Drywell Spray Valves (DC valves)

SAFETY FUNCTION AND JUSTIFICATION
FOR CONTINUED OPERATION:

The low pressure coolant injection (LPCI) system functions to provide adequate cooling in the event of a large pressure boundary break. In conjunction with feedwater coolant injection (FWCI) and/or automatic pressure relief, the LPCI system also provides protection during small system breaks. As part of the emergency core cooling system (ECCS), the LPCI system has sufficient redundancy to ensure adequate operation in all conditions.

The purpose of the LPCI system is to provide sufficient coolant makeup to the vessel to prevent fuel clad melting as a result of a LOCA, which may range in break size from those which can be adequately handled by FWCI to the largest possible pipe break. The LPCI/containment cooling system also provides containment cooling when required by use of drywell spray and cooling of the recirculated flow via the emergency cooling water heat exchangers.

The LPCI system consists of two redundant trains, each containing two LPCI pumps and one LPCI heat exchanger. The LPCI pumps can take suction from either the ECCS suction header on the suppression pool (normal) or the condensate storage tank (alternate). After leaving the LPCI pumps, water is either directed through the LPCI heat exchanger or around it through a bypass valve, depending on the mode of system operation.

For containment (drywell) spray, water is directed through or around the LPCI heat exchanger, then through the drywell spray valves to one of two, eight-inch spray ring headers inside the drywell. Both spray ring headers can also be used simultaneously.

Functioning of the drywell spray has not been assumed in the calculations of post-accident containment conditions. These analyses demonstrate that even without any drywell spray cooling, the post-accident pressure and temperature values would not result in the loss of containment function. As such, these valves serve no essential safety function following a design basis accident. If no manual action is taken by the operator to open these valves, no other safety function would be degraded.

These four valves, which are all located outside containment, are not required to operate during a HELB outside containment. The Emergency Operating Procedures (EOPs) would only direct the operator to manually open these valves when drywell pressure is greater than 15 psig (i.e., break inside containment). For a LOCA, the only deficiencies in the qualification documentation concern radiation and aging considerations. The deleterious effects resulting from these parameters are time dependent phenomena which could not reasonably be expected to result in equipment failure in the short term. In addition, no fuel damage is expected if LPCI pumps are operating. Therefore, these valves would not be exposed to high radiation levels. If LPCI pumps are not operating, operation of these valves is irrelevant. As such, if these valves are opened by the operator, we fully expect the valves to close after completion of drywell

spray. Therefore, no other safety function would be degraded.

It is conceivable that valve position indication in the control room could be incorrect. However, operator actions are based on symptom-oriented Emergency Operating Procedures (EOPs) which focus operator attention on restoring and maintaining reactor water level and cooling the containment. Should a drywell spray valve be "closed" yet indicate "open" due to a harsh environment, there would not be any additional impact on vessel inventory or containment cooling status. Hence, no actions by the operator beyond those necessitated by the original event symptoms would be warranted. Should a drywell spray valve be "open" yet indicate "closed", a diversion of LPCI injection flow would exist. Again, the operator is not directed to identify and correct the diversion, but is merely directed to start additional pumps and provide enough makeup to restore and maintain vessel water level. Since the operator does not rely on these valve position indications, inaccurate valve position indications will not mislead the operator.

SYSTEM: Isolation Condenser

VALVES: IC-2 - Isolation Condenser Steam Inlet Isolation Valve
IC-4 - Isolation Condenser Condensate Return Valve

SAFETY FUNCTION AND JUSTIFICATION
FOR CONTINUED OPERATION:

The Isolation Condenser System is equipped with four motor-operated isolation valves. Valves IC-1 and IC-2 are located inside and outside of containment, respectively, on the steam line from the reactor vessel to the Isolation Condenser. Valves IC-3 and IC-4 are located outside and inside containment, respectively, on the condensate return line from the Isolation Condenser to the recirculation system. The function of all four of these valves is to provide primary containment isolation in the event of a break in the Isolation Condenser system (Group IV isolation). None of these valves automatically close during other LOCAs.

The Isolation Condenser is considered part of the emergency core cooling system (ECCS) at Millstone Unit No. 1. According to design basis analyses, functioning of the Isolation Condenser is required only for certain small-break LOCAs, for which the environmental conditions would be less severe. For all other LOCA scenarios, other ECCS subsystems are adequate to satisfy licensing criteria.

Valve IC-1 is presently fully environmentally qualified. The motor operator for valve IC-3 is planned to be replaced during the current refueling outage with a fully qualified operator. During normal operation, valves IC-1, IC-2, IC-4 are open and only IC-3 (normally closed) needs to open to initiate Isolation Condenser cooling when required. Therefore, the Isolation Condenser system can perform its intended safety function after a small-break LOCA with fully qualified equipment subsequent to the current refueling outage. IC-2 and IC-4 are normally open and stay open during a LOCA. Any electrical failure which could cause them to change their position is not credible.

In the event of an Isolation Condenser system pipe break outside of containment, valves IC-1 and IC-4 would isolate containment. Both of these valves are inside containment and would not be subjected to the harsh environment. In the event of a break inside containment, valves IC-2 and IC-3 would not be exposed to the harsh environment and would thus be capable of isolating containment. This notwithstanding, these valves will have completed their safety function within the first 30 seconds of an accident. Based on our engineering evaluation (considering the equipment operating time and expected effects associated with the qualification discrepancy), partial test data for similar valves, and information provided by the manufacturer, we have a high level of confidence that these valves would satisfactorily perform their design function.

The only credible failure mode for these valves once they have completed their safety function (i.e., the valves close) is one where the motor operator continues to operate against the seat of the valve until the operator stops due to motor failure or protective action. This type of failure would not preclude the fulfillment of the safety function of these valves or result in the degradation of any safety function. Even in the very unlikely case where either of these valves

fail to close due to a harsh environment, no safety function would be degraded since redundant containment isolation valves (which are either qualified or not located in the harsh environment) would perform the safety function.

It is conceivable that valve position indication in the control room could be incorrect. However, operator actions are based on symptom-oriented Emergency Operating Procedures (EOPs) which focus operator attention on restoring and maintaining reactor water level and cooling the containment. Should one of these valves be "closed" yet indicate "open" due to a harsh environment, there would not be any additional impact on vessel inventory or containment cooling status. Hence, no actions by the operator beyond those necessitated by the original event symptoms would be necessary to accomplish the intended safety function. Should one of these valves be "open" yet indicate "closed" due to the harsh environment, the safety function (i.e., isolation) would be accomplished by the redundant valve. The symptom-oriented EOPs would continue to focus operator attention on the critical functions of vessel inventory control and containment cooling. Since the operator does not rely on these valve position indications, inaccurate valve position indications will not mislead the operator.

SYSTEM: Reactor Water Cleanup (RWCU) System

VALVES: CU-2 - Reactor Outlet Cleanup System Inboard Isolation Valve
CU-3 - Reactor Outlet Cleanup System Outboard Isolation Valve.

SAFETY FUNCTION AND JUSTIFICATION FOR CONTINUED OPERATION:

Lines that penetrate the reactor vessel and primary containment and then interface with auxiliary systems that are not required during isolation conditions and located outside of the primary containment are isolated on a Group III signal. The RWCU system is one system affected by this isolation. The Group III isolation senses reactor low water level and initiates an isolation to limit the loss of coolant inventory in the event the leak is from a Group III system.

Valves CU-2 and CU-3 are redundant (i.e., in series) to each other. For a break inside the drywell, closing CU-2 or CU-3 will have no impact on break isolation, and CU-3 (which would not be exposed to the harsh environment since it is located outside the drywell) would provide the containment isolation function. If the break occurs outside the drywell, valve CU-2 (which would not be exposed to the harsh environment since it is located inside the drywell) would close and isolate the break.

The only deficiency in the qualification documentation concerns radiation and aging considerations. The deleterious effects resulting from these parameters are time-dependent phenomena which could not reasonably be expected to result in equipment failure in the short term. This equipment will have completed its safety function within the first 30 seconds of an incident. Based upon our engineering evaluation (considering the equipment operating time and expected effects associated with the qualification discrepancy), partial test data for similar valves, and information provided by the manufacturer, we have a high level of confidence that these valves would satisfactorily perform their design function.

The only credible failure mode for these valves once they have completed their safety function (i.e., the valves close) is one where the motor operator continues to operate against the seat of the valve until the operator stops due to motor failure or protective action. This type of failure would not preclude the fulfillment of the safety function of these valves or result in the degradation of any safety function. Even in the very unlikely case where CU-2 (or CU-3) fails to close due to a harsh environment, no safety function would be degraded since CU-3 (or CU-2), which would not be located in the harsh environment, would perform the safety function.

It is conceivable that valve position indication in the control room could be incorrect. However, operator actions are based on symptom-oriented Emergency Operating Procedures (EOPs) which focus operator attention on restoring and maintaining reactor water level and cooling the containment. Should one of these valves be "closed" yet indicate "open" due to a harsh environment, there would not be any additional impact on vessel inventory or containment cooling status. Hence, no actions by the operator beyond those necessitated by the original event symptoms would be necessary to accomplish the intended safety

function. Should one of these valves be "open" yet indicate "closed" due to the harsh environment, the safety function (i.e., isolation) would be accomplished by the redundant valve. The symptom-oriented EOPs would continue to focus operator attention on the critical functions of vessel inventory control and containment cooling. Since the operator does not rely on these valve position indications, inaccurate valve position indications will not mislead the operator.

SYSTEM: Reactor Recirculation

VALVES:
RR-2A - Recirculation Pump Discharge Isolation Valve - "A" Loop
RR-2B - Recirculation Pump Discharge Isolation Valve - "B" Loop

SAFETY FUNCTION AND JUSTIFICATION FOR CONTINUED OPERATION:

In the event of a LOCA, the low pressure coolant injection (LPCI) loop select logic will determine the broken loop and send a "close" signal to the recirculation pump discharge valve in the intact loop (valve RR-2A if the break is in loop "B" or valve RR-2B if the break is in loop "A"). The valve in the broken loop remains open. Similarly, the LPCI injection valves (normally closed) in the broken loop receive a "close" signal for ten minutes and the injection valves in the intact loop receive an "open" signal for five minutes after the the reactor vessel pressure drops to 350 psig. This logic ensures that all LPCI flow will be directed into the reactor vessel via the normal recirculation flow path.

If the discharge isolation valve in the intact loop fails to close, the LPCI flow injection into that loop could flow back through the recirculation pump and into the vessel. This flow could then pass through the lower plenum of the reactor vessel, bypassing the core, and out through the break in the other recirculation loop. This would negate the effectiveness of the LPCI system.

It is estimated that flow bypass of the core is a concern only for breaks greater than 0.01 ft^2. For smaller breaks, vessel water level can be recovered even if spillage of LPCI flow through the break occurs. Thus, proper closure of the recirculation pump discharge valve is required for LPCI system success for only larger break sizes.

The large-break LOCA analysis for Millstone Unit No. 1 does not take any credit for the functioning of the LPCI system. As such, if RR-2A and RR-2B were to fail to operate properly, the qualified core spray system would be utilized as evaluated in large-break LOCA analysis.

The failure of these valves to function properly will not degrade other safety functions. It is conceivable that valve position indication in the control room could be incorrect. However, operator actions are based on symptom-oriented Emergency Operating Procedures (EOPs) which focus operator attention on restoring and maintaining reactor water level. Should a recirculation pump discharge isolation valve be "closed" yet indicate "open" due to a harsh environment, there would not be any additional impact on vessel inventory. Hence, no actions by the operator beyond those necessitated by the original event symptoms would be warranted. Should a recirculation pump discharge isolation valve be "open" yet indicate "closed", a diversion of LPCI injection flow would exist. Again, the operator is not directed to identify and correct the diversion, but is merely directed to start additional pumps and provide enough makeup to restore and maintain vessel water level. Since the operator does not rely on these valve position indications, inaccurate valve position indications will not mislead the operator.

SYSTEM: Feedwater Coolant Injection (FWCI) System

VALVE: MW-96A - FWCI System Emergency Condensate Transfer Pump Discharge Stop Valve.

SAFETY FUNCTION AND JUSTIFICATION FOR CONTINUED OPERATION:

The feedwater coolant injection (FWCI) system is a subsystem of the emergency core cooling system. The FWCI system provides adequate high pressure coolant to the core to prevent clad melting for all pressure boundary break sizes below those for which the low pressure coolant injection (LPCI) or core spray systems can cool the core without assistance from other safeguard systems. The FWCI system is designed to meet these design basis requirements without reliance on an off-site external power source.

The FWCI system uses normal feedwater/condensate system components. Water is taken from the main condenser hotwell by a condensate pump which supplies water to the suction of the condensate booster pumps. The condensate booster pump supplies the net positive suction head to the reactor feed pump which supplies water to the vessel via the feed regulating valves and the feedwater spargers. A selector switch determines whether the "A" or the "B" string of pumps will start on automatic FWCI initiation signals. The emergency condensate transfer pump will automatically start and supply water from the condensate storage tank to the condenser hotwell to ensure adequate makeup water.

For a LOCA, the only deficiency in the qualification documentation concerns radiation and aging considerations. The deleterious effects resulting from these parameters are time-dependent phenomena which could not reasonably be expected to result in equipment failure in the short term. In addition, for any LOCA for which FWCI is required, no fuel damage is expected if FWCI or feedwater operates successfully. If fuel damage were to occur due to some failure in FWCI/feedwater, then guaranteeing the operability of MW-96A is irrelevent.

Based upon the above information, as well as partial test data for similar valves and information provided by the manufacturer, we have a high level of confidence that this valve will function properly. The only credible failure mode for this valve once it has completed its safety function (i.e., the valve opens) is one where the motor operator continues to operate against the backseat until the operator stops due to motor failure or protective action. This type of failure would not preclude the fulfillment of the safety function of this valve or result in the degradation of any safety function. With this valve in the open position, the valve position indication in the control room could conceivably indicate that the valve is closed or not fully opened. However, operator actions are based on symptom-oriented Emergency Operating Procedures (EOPs) which focus operator attention on restoring and maintaining reactor water level. Should the valve be "open" yet indicate "closed" due to a harsh environment, there would be no adverse impact on condenser hotwell and the FWCI pumps can be operated as long as deemed necessary by the operators. Since the operator does not rely on these valve position indications, inaccurate valve position indications will not mislead the operator.