NORTHEAST UTILITIES

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

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December 28, 1978

Docket No. 50-336

Director of Nuclear Reactor Regulation
Attn: Mr. R. Reid, Chief
Operating Reactors Branch #4
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

References: (1) W. G. Counsil letter to R. Reid, dated November 1, 1978.
(2) W. G. Counsil letter to R. Reid, dated December 15, 1978.

Gentlemen:

Millstone Nuclear Power Station, Unit No. 2
Proposed Revisions to Technical Specifications

In Reference (1), Northeast Nuclear Energy Company (NNECO) provided schedular details of licensing submittals required to support an increase in thermal power level to 2700 MWt for Cycle 3 operation. In discussing the submittal of the small break LOCA analysis, NNECO indicated its intent to take credit for operation of the charging pumps. The charging system has been completely reviewed as detailed below and determined to be fully qualified to allow credit for charging pump flow in ECCS calculations.

Pursuant to 10CFR50.90, NNECO hereby proposes to amend its operating license, DPR-65, by incorporating the following proposed revisions into the Millstone Unit No. 2 Technical Specifications:

> On Pages 3/4 5-3 and 3/4 5-6, add the requirement of an operable charging pump and operable flow path as an ECCS subsystem and reference appropriate surveillance requirements as shown in Attachment 1.

The charging system, although presently not credited in small break LOCA calculations, was originally designed, purchased, and installed as a QA and Seismic Category 1 System. As Architect-Engineer, Bechtel was instructed to engineer the charging system as part of the safety injection system. The QA and Seismic requirements imposed on the charging system components are identical to those imposed on the remainder of the Safety Injection System. The following is a description of the charging system, its components, their specifications and/or design criteria which is available to support an Appendix K calculation. It is emphasized that no plant modifications are necessary as a result of this effort. Charging pump flow is and was designed as a part of the Safety Injection System. The purpose of this submittal is to establish the acceptability of taking credit for this flow in ECCS Appendix K calculations.

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SYSTEM DESCRIPTION

The charging pumps are part of the chemical and volume control system (CVCS) which is described in the Final Safety Analysis Report (FSAR), Section 9.2. The emergency core cooling (ECC) function of this system is described in FSAR Sections 9.2.1.1.d and 9.2.3.4. In addition, the system has been reviewed by the NRC and an analysis is provided in the Millstone Unit No. 2 Safety Evaluation Report (SER) Section 9.4.3. The methods by which the charging and boric acid pumps operate subsequent to a SIAS are described in FSAR Section 9.2.4.1.

Attachment 2 lists all the pumps, valves, and piping associated with the charging flow path in the ECCS mode. These equipments are shown on FSAR Figure 9.2-2. They are legend identified by FSAR Figures 9.0-1, 9.0-2, and 9.0-3, which also establishes their code qualification.

Attachment 3 lists all electrical equipment associated with charging flow path in the ECC mode. These equipments are also shown on FSAR Figure 9 2-2 and identification of their qualifications are tabulated in Attachment 3.

ELECTRICAL SYSTEM DESCRIPTION

All of the electrical equipment used by the charging system during ECC conditions derive their power from the station emergency AC and DC power systems. These systems are described in FSAR Sections 8.3 and 8.5, respectively. Power Systems Facility Z1 and Facility Z2 are electrically and physically separate and redundant. These designations are also used to identify power sources in Attachment 3. The cable and raceway systems used in the charging system are described in FSAR Section 8.7.

The onsite emergency generators are described in FSAR Section 8.3. The worst case diesel generator loading as shown therein (Table 8.3-2) include all charging system loads. This maximum loading is 2247 Kw which is 81% of the diesel generator continuous rating (2750 Kw).

BORIC ACID TANK HEATERS AND PIPING HEAT TRACING

The Boric Acid Solution is stored and piped in heated and insulated tanks and lines as described in FSAR Section 9.2.4.1. Two independent and redundant heating systems are provided to preclude precipitation of Boric Acid. These systems are powered from MCC-22-1E (Facility Z1) and MCC-22-1F (Facility Z2) as shown on Attachment 3.

CHARGING PUMPS ELECTRICAL CONTROL

Charging pumps MP18A and MP18C derive their power from emergency motor control centers (MCC) 22-1E (Facility Z1) and 22-1F (Facility Z2), respectively. These MCC's are part of the plant emergency power system and are electrically and physically separate and redundant.

Charging pump MP18B can be aligned with either a Z1 or Z2 power source, specifically MCC-22-1E or MCC-22-1F. Two power selector switches with electrical and Kirk key interlocks prevent tying these two MCC buses together. If one pump is out of service, the selector switches are positioned to feed the third pump from the power source used for the pump taken out of service. Thus, in

case of an incident, two charging pumps are available, each fed from a separate and redundant power source. This arrangement is exactly the same as that used for the third HPSI pump. However, all three charging pumps receive an automatic start signal from the engineered safety features actuation system. Therefore, if all pumps are operable and given a safety injection actuation signal (SIAS), three charging pumps will start automatically. Two pumps will be connected to the MCC of one facility and one will be connected to the redundant facility MCC. Even in the event that the third charging pump is inoperable and one diesel generator fails to start, one pump will be available for core cooling.

Physical separation of the charging pumps cable systems is maintained through use of the facility Z1 and Z2 raceway systems. Facility Z5 raceway is used for the common portions of the pump MP18B circuit. Facility Z5 is separate from both facilities Z1 and Z2.

CHARGING PUMPS SAFETY INJECTION OPERATION

Refer to FSAR Section 9.2.3.4, Figure 9.2-2, and Attachment 3.

Upon initiation of SIAS, the valves take their position as shown in FSAR Figure 9.2-2 and Attachment No. 3. Both the charging pumps (as previously described) and the boric acid pumps start on receipt of a SIAS.

Motor-operated valves (MOV) 2-CH-508 and 509 open to provide the gravity feed flowpath from the boric acid storage tanks to the charging pumps suction header. These valves obtain their power from MCC-22-1E (Facility Z1).

The boric acid pumps P19A and P19B start, MOV 2-CH-514 opens and solenoid operated valves (SOV's) 2-CH-510 and 2-CH-511 close, to provide a separate diverse flowpath from the boric acid storage tanks to the charging pumps suction header. The MOV and pumps obtain their power from MCC-22-1F (Facility Z2) and the SOV's from a 125V DC circuit (Facility Z2) at panel C02R.

MOV 2-CH-501 and SOV 2-CH-512 close on SIAS to remove charging suction from the volume control tank. Both of these valves are supplied power from a Facility Z1 power source. Volume control tank bypass SOV No. 2-CH-196 is also provided Z1 power but it is 125V DC from panel C02R.

Redundant charging line distribution SOV's 2-CH-518 and 2-CH-519 are supplied 125V DC from facility Z1 and Z2, respectively. These valves are maintained in a locked open position as detailed in Technical Specification 3.1.2.2.

Although SOV's 2-CH-210X and 2-CH-210Y and MOV 2-CH-504 are not required to be operational during an accident, their power supplies are "associated with" Facility Z1; i.e., their power derives from a safeguards bus but the cable and instrumentation is in a nonsafeguards raceway. The consequences of any or all of these valves taking an abnormal position does not, in any way affect the ability of the charging pumps to deliver their minimum flow into the reactor coolant system.

Given an SIAS and failure of either diesel generator (worst case single failure of the DBA), the minimum of 44 gpm of boric acid will be delivered from the boric acid storage tanks to the charging loops of the reactor coolant system.

Failure of the Z1 diesel will result in charging flow from the boric acid storage tank via the boric acid pumps, to the charging pumps suction header. The boric acid pumps provide sufficient NPSH for the charging pumps to preclude appreciable flow from the volume control tank due to MOV 501 "fail as is" position. Nuclear check valves are provided as shown in Attachment 2, to preclude reverse flow.

Failure of the Z2 diesel will result in charging flow through the gravity feed lines from the boric acid storage tanks. In this case, MOV 514 will remain closed and the boric acid pumps will not start.

The charging system has also been reviewed to ensure that the system meets the overall design requirements of General Design Criteria 1 through 5. This review has concluded that the entire charging system has been designed to high quality standards in accordance with recognized codes, protected against natural phenomena, including a seismic event (except for the boric acid storage tank heaters as described below), designed to minimize the effects of fires, explosions, etc., designed to withstand the most severe environmental conditions, and not shared with Millstone Unit No. 1.

Documentation for the seismic qualification of the boric acid storage tank heaters is not available at this time. Although it is uncertain whether these heaters can be shown to be seismically qualified, this qualification is superfluous because the small break LOCA analysis, when submitted, will demonstrate that the heaters are not required in the time required to mitigate the consequences of the worst case small break LOCA.

The Millstone Unit No. 2 Safety Evaluation Report further verifies the design adequacy and intent of the charging system. Section 9.4.3, Chemical and Volume Control System, states, in part, that:

> "The chemical and volume control system (CVCS) is designed to . . . 4) inject concentrated boric acid into the reactor coolant system during pressurizer low pressure, and/or a containment high-pressure signal. Accordingly, a portion of the CVCS will be used as part of the emergency core cooling system in the event of a LOCA and is designed to Seismic Category I requirements."

Also,

> "Three charging pumps have been provided in the CVCS. The charging pumps, during emergency operations, inject concentrated boric acid into the reactor coolant system. A pressurizer level control signal or a safety injection actuation signal (SIAS) will automatically start all three charging pumps (only one pump is normally running). The SIAS will also function to transfer the charging pump suction from the volume control tank to the discharge of the boric acid pumps. In the event that the boric acid pumps do not perform their intended function, an additional line has been provided to supply boric acid flow by gravity from the concentrated boric acid tanks to the charging pumps' suction header. Portions of the CVCS, the charging pumps, and associated valving and piping, have been designed to Seismic Category I requirements. Our independent analysis indicates that this portion of the system has sufficient component redundancy so that it is capable of withstanding the effects of a single active failure."

To summarize, (1) the charging system as described above was originally designed and installed for use as a part of the Millstone Unit No. 2 Safety Injection System, (2) its acceptability for this application has been re-evaluated and justified as described in this submittal, and (3) the original conclusions of the NRC as stated in the Millstone Unit No. 2 SER remain valid.

The above proposed changes to the Technical Specifications have been reviewed pursuant to 10CFR50.59 and have been determined to constitute an unreviewed safety question. The basis for this determination is that the failure of the charging system has the potential of creating an accident/malfunction of a type different than any evaluated previously in the FSAR. Although this change has been determined to constitute an unreviewed safety question, NNECO has concluded that the change is acceptable and is not a significant safety concern. The basis for this determination is that the charging system has been design to the same criteria as the other components and systems of the ECCS.

As discussed in Reference (1), preliminary calculations indicate that, for the worst case small break LOCA, a peak clad temperature (PCT) slightly below 2000°F will result if credit for operation of one charging pump is assumed. Formal documentation to this effect will be submitted as soon as possible. Nonetheless, it is the understanding of NNECO that this proposed change can be dispositioned independent of the review of the ECCS performance calculations. It is, therefore, proposed that the NRC Staff consider this request, i.e., qualification of the charging pump system, independent of the calculations in progress which take credit for its operation. NNECO and NUSCO remain available to discuss the attached information should any clarification be required.

The Millstone Unit No. 2 Nuclear Review Board has reviewed and approved the above proposed change, agreed that the change constitutes an unreviewed safety question, and has also concluded that the change is acceptable.

NNECO has reviewed this proposal pursuant to the requirements of 10CFR170 and determined that no fee is applicable in this instance. The basis for this determination is as described in Reference (2). The effort to qualify the charging pumps for credit in safety analysis is directly related to the power uprating.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

W. G. Counsil
Vice President

Attachment

STAT OF CONNECTICUT)
) ss. Berlin Dec. 28, 1978
COUNTY OF HARTFORD)

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

Sheila M. Oates
Notary Public

My Commission Expires March 31, 1981

DOCKET NO. 50-336

ATTACHMENT 1

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2

PROPOSED REVISIONS TO TECHNICAL SPECIFICATIONS

DECEMBER, 1978

EMERGENCY CORE COOLING SYSTEMS

ECCS SUBSYSTEMS - $T_{avg} \geq 300°F$

LIMITING CONDITION FOR OPERATION

3.5.2 Two separate and independent ECCS subsystems shall be OPERABLE with each subsystem comprised of:

a. One OPERABLE high-pressure safety injection pump,

b. One OPERABLE low-pressure safety injection pump, and

c. A separate and independent OPERABLE flow path capable of taking suction from the refueling water storage tank on a safety injection actuation signal and automatically transferring suction to the containment sump on a sump recirculation actuation signal.

d. One OPERABLE charging pump, a separate and independent OPERABLE flow path from the Boric Acid Storage Tank, one OPERABLE Boric Acid Pump, and one OPERABLE Boric Acid Storage Tank pursuant to Specifications 3.1.2.4, 3.1.2.2.a, 3.1.2.6, and 3.1.2.8.a, respectively.

APPLICABILITY: MODES 1, 2, and 3*.

ACTION:

a. With one ECCS subsystem inoperable, restore the inoperable subsystem to OPERABLE status within 48 hours or be in HOT SHUTDOWN within the next 12 hours.

b. In the event the ECCS is actuated and injects water into the Reactor Coolant Sy[illegible], a Special Report shall be prepared and submitted to the Commission pursuant to Specification 6.9.2 within 90 days describing the circumstances of the actuation and the total accumulated actuation cycles to date.

* With pressurizer pressure $\geq$ 1750 psia.

EMERGENCY CORE COOLING SYSTEMS

SURVEILLANCE REQUIREMENTS (Continued)

d. At least once per 18 months, during shutdown, by cycling each power operated valve in the subsystem flow path not testable during plant operation through one complete cycle of full travel.

e. Pursuant to Surveillance Requirements 4.1.2.4, 4.1.2.2, 4.1.2.6, and 4.1.2.8.a.

DOCKET NO. 50-336

ATTACHMENT 2

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2

CHARGING SYSTEM COMPONENTS

DECEMBER, 1978

ATTACHMENT 2

CHARGING SYSTEM COMPONENTS

Equipment		Qualifications
Boric acid tanks	T8A, T8B	FSAR Table 9.2-10
Boric acid pumps	P19A, P19B	FSAR Table 9.2-11
Charging pumps	MP18A, MP18B, MP18C	FSAR Table 9.2-9
Regenerative heat exchanger	X-21	FSAR Table 9.2-3

Piping (For qualification see FSAR Fig. 9.0-3)

HCB-12	CCB-6
HCB-13	CCB-4
HCB-14	
HCB-15	CCA-13
HCB-16	
HCB-17	
HCB-18	
HCB-19	
HCB-20	
HCB-21	
HCB-22	
HCB-25	

Valves (For qualification see FSAR Figures 9.0-3 & 9.2-2)

2-RC-71	2-CH-141	2-CH-171
2-CH-003	2-CH-142	2-CH-172
2-CH-004	2-CH-143	2-CH-173
2-CH-025	2-CH-144	2-CH-174
2-CH-026	2-CH-145	2-CH-175
2-CH-027	2-CH-146	2-CH-176
2-CH-036	2-CH-147	2-CH-177
2-CH-037	2-CH-148	2-CH-179
2-CH-038	2-CH-149	2-CH-180
2-CH-088	2-CH-150	2-CH-184
2-CH-091	2-CH-151	2-CH-185
2-CH-118	2-CH-152	2-CH-186
2-CH-125	2-CH-153	2-CH-189
2-CH-127	2-CH-154	2-CH-190
2-CH-128	2-CH-155	2-CH-191
2-CH-129	2-CH-156	2-CH-196
2-CH-130	2-CH-157	2-CH-210X
2-CH-131	2-CH-158	2-CH-210Y
2-CH-132	2-CH-159	2-CH-311
2-CH-133	2-CH-160	2-CH-314
2-CH-134	2-CH-161	2-CH-315
		2-CH-192

2-CH-137
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2-CH-709
2-CH-710
2-CH-714
2-CH-727
2-CH-730
2-CH-748
2-CH-749

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ATTACHMENT 3

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 2

CHARGING SYSTEM ELECTRICAL EQUIPMENT

DECEMBER, 1978

ATTACHMENT 3

CHARGING SYSTEM ELECTRICAL EQUIPMENT

Item	Spec	Elem[1]	Power Supply	Fac	Position Norm	Position SIAS	Position Fail
Boric Acid Tank Heaters							
P141	A	Sh. 15	MCC-22-1E	Z1			
P142	A	Sh. 16	MCC-22-1F	Z2			
P143	A	Sh. 17	MCC-22-1E	Z1			
P144	A	Sh. 18	MCC-22-1F	Z2			
Boric Acid Pump							
P19A	B	Sh. 4	MCC-22-1F	Z2			
P19B	B	Sh. 5	MCC-22-1F	Z2			
Charging Pump							
MP18A	C	Sh. 40	MCC-22-1E	Z1			
MP18B	C	Sh. 41, 42	MCC-28-1E,1F	Z5			
MP18C	C	Sh. 43	MCC-22-1F	Z2			
Boric Acid Piping Heat Tracing	D	25203-37005	MCC-22-1E MCC-22-1F	Z1 Z2			
Motor Operated Valves							
2-CH-429	E	Sh. 38	MCC-22-1F	Z2	LO	LO*	
2-CH-501	F	Sh. 6	MCC-22-1E	Z1	O	C	
2-CH-504	F	Sh. 7	MCC-22-1E	1	C	C*	
2-CH-508	F	Sh. 8	MCC-22-1E	Z1	C	O	
2-CH-509	F	Sh. 9	MCC-22-1E		C	O	
2-CH-514	F	Sh. 10	MCC-22-1F	Z2	C	O	
Solenoid Operated Valves							
2-CH-196	G	Sh. 54	CO2R	Z1	C	C*	FC
2-CH-210X	H	Sh. 22	CO4	1	C	C*	FC
2-CH-210Y	H	Sh. 23	CO4R	1	C	C*	FC
2-CH-510	J	Sh. 24	CO2R	Z2	C	C	FC
2-CH-511	J	Sh. 25	CO2R	Z2	C	C	FC
2-CH-512	K	Sh. 21	CO4	Z1	C	C	FC
2-CH-517	J	Sh. 35	CO2R	Z2	LC	LC*	FC
2-CH-218	K	Sh. 36	CO2R	Z1	O	O*	FO
2-CH-519	K	Sh. 37	CO2R	Z2	O	O*	FO
2-CH-192	E	Sh. 53	CO2R	Z1	C	C*	FC

LEGEND

	Specification	Title
A	7604-M-753	Miscellaneous code and non-code tanks. (QA and seismic+ requirement contained in Combustion Spec 18767-PE-603.)
B	7604-M-754	Boric acid pumps and drivers. (QA and seismic requirement contained in Combustion Spec 18767-PE-404.)
C	7604-M-757	Charging pumps and drivers (QA and seismic requirement contained in Combustion Spec 18767-PE-403.)
D	7604-E-41	Electrical heat tracing equipment. (QA and seismic requirement contained within this Bechtel specification.)
E	7604-M-233A	Nuclear valves (gate, globe, and check). (QA and seismic requirement contained within this Bechtel specification).
F	7604-M-780	Motor operated valves. (QA and seismic requirement contained within Combustion Specs 18767-PE-705 and C0000-PE-707.)
G	P/O 509872	Purchase order for QA valve operator. (NOTE: Seismic test successfully completed using Action procedure No. 13958.)
H	7604-M-409B	Control valves, miscellaneous nuclear. (QA and seismic requirement contained within this Bechtel specification.)
J	7604-M-781	Pneumatic operated valves. (QA and seismic requirement contained within Combustion specification 18767-PE-707.)
K	7604-M-409A	Control valves, miscellaneous nuclear. (QA and seismic requirement contained within this Bechtel specification).

1 Elementary drawing number prefaced by 25203-32009, unless noted otherwise.

LO Locked open

LC Locked closed

O Open

C Close

* Does not receive SIAS signal

FO Fail open

FC Fail close

\+ Documentation for the Seismic Qualification of the boric acid storage tank heaters pending. Technical specification 3.1.2.2. Hi-Lo temperature alarms and redundancy assures proper operation of the system.