September 19, 1991

Docket No. 50-423

Distribution:

Docket File	CGrimes
NRC & Local PDRs	RGoel
PD I-4 Plant	ACRS (10)
SVarga	GPA/PA
JCalvo	OC/LFMB
SNorris	CWHehl
DJaffe	
DO'Neal	
OGC	
DHagan	
GHill (4)	
WJones	

Mr. Edward J. Mroczka
Senior Vice President
Nuclear Engineering and Operations
Connecticut Yankee Atomic Power Company
Northeast Nuclear Energy Company
Post Office Box 270
Hartford, Connecticut 06141-0270

Dear Mr. Mroczka:

SUBJECT: ISSUANCE OF AMENDMENT (TAC NO. 79628)

The Commission has issued the enclosed Amendment No. 63 to Facility Operating License No. NPF-49 for Millstone Nuclear Power Station, Unit No. 3, in response to your application dated June 6, 1991.

This amendment revises Technical Specification (TS) 3/4.6.4-2, "Electric Hydrogen Recombiners" by replacing TS Figure 3.6.2, "Hydrogen Recombiner Acceptance Criteria Flow vs. Containment Pressure" with a series of equations to be incorporated in plant procedures. In addition, the hydrogen recombiner temperature and flow requirements, currently addressed in TS 4.6.4.2.b.4 will be addressed in TS 4.6.4.2.b.4 and 4.6.4.2.b.5, respectively. These changes were a result of functional tests of hydrogen recombiners (A) and (B). Hydrogen recombiner (A) failed the test on March 26, 1991, and hydrogen recombiner (B) failed the test on April 2, 1991.

A copy of the related Safety Evaluation is also enclosed. The notice of issuance will be included in the Commission's biweekly Federal Register notice.

Sincerely,

/s/

David H. Jaffe, Senior Project Manager
Project Directorate I-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosures:
1. Amendment No. 63 to NPF-49
2. Safety Evaluation

cc w/enclosures:
See next page

OGC BMR 9/20/91

OFC	:PDI-4:LA	:PDI-4:PM	:PDI-4:PM	:SPLB	:PDI-4:D
NAME	:SNorris	:DO'Neal:cn	:DJaffe	:CMcCracken	:JStolz
DATE	9/13/91	9/4/91	9/4/91	9/ /91	9/4/91

Document Name: AMEND 79628

Mr. E. J. Mroczka
Northeast Nuclear Energy Company

Millstone Nuclear Power Station
Unit No. 3

cc:

Gerald Garfield, Esquire
Day, Berry and Howard
Counselors at Law
City Place
Hartford, Connecticut 06103-3499

W. D. Romberg, Vice President
Nuclear Operations
Northeast Utilities Service Company
Post Office Box 270
Hartford, Connecticut 06141-0270

Kevin McCarthy, Director
Radiation Control Unit
Department of Environmental Protection
State Office Building
Hartford, Connecticut 06106

Bradford S. Chase, Under Secretary
Energy Division
Office of Policy and Management
80 Washington Street
Hartford, Connecticut 06106

S. E. Scace, Nuclear Station Director
Millstone Nuclear Power Station
Northeast Nuclear Energy Company
Post Office Box 128
Waterford, Connecticut 06385

C. H. Clement, Nuclear Unit Director
Millstone Unit No. 3
Northeast Nuclear Energy Company
Post Office Box 128
Waterford, Connecticut 06385

Ms. Jane Spector
Federal Energy Regulatory Commission
825 N. Capitol Street, NE.
Room 8608C
Washington, DC 20426

Burlington Electric Department
c/o Robert E. Fletcher, Esq.
271 South Union Street
Burlington, Vermont 05402

R. M. Kacich, Manager
Nuclear Licensing
Northeast Utilities Service Company
Post Office Box 270
Hartford, Connecticut 06141-0270

D. O. Nordquist
Director of Quality Services
Northeast Utilities Service Company
Post Office Box 270
Hartford, Connecticut 06141-0270

Regional Administrator
Region I
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, Pennsylvania 19406

First Selectmen
Town of Waterford
Hall of Records
200 Boston Post Road
Waterford, Connecticut 06385

W. J. Raymond, Resident Inspector
Millstone Nuclear Power Station
c/o U.S. Nuclear Regulatory Commission
Post Office Box 376
Waterford, Connecticut 06385-0376

M. R. Scully, Executive Director
Connecticut Municipal Electric
Energy Cooperative
30 Stott Avenue
Norwich, Connecticut 06360

Mr. Alan Menard, Manager
Technical Services
Massachusetts Municipal Wholesale
Electric Company
Post Office Box 426
Ludlow, Massachusetts 01056

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

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.

DOCKET NO. 50-423

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 3

AMENDMENT TO FACILITY OPERATING LICENSE

Amendment No. 63
License No. NPF-49

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment by Northeast Nuclear Energy Company, et al. (the licensee) dated June 6, 1991, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is amended by changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Facility Operating License No. NPF-49 is hereby amended to read as follows:

   (2) Technical Specifications

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 63 , and the Environmental Protection Plan contained in Appendix B, both of which are attached hereto are hereby incorporated in the license. The licensee shall operate the facility in accordance with the Technical Specifications and the Environmental Protection Plan.

3. This license amendment is effective as of the date of its issuance, to be implemented within 30 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

John F. Stolz, Director
Project Directorate I-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Attachment:
Changes to the Technical
Specifications

Date of Issuance: September 19, 1991

ATTACHMENT TO LICENSE AMENDMENT NO. 63

FACILITY OPERATING LICENSE NO. NPF-49

DOCKET NO. 50-423

Replace the following pages of the Appendix A Technical Specifications with the enclosed pages. The revised pages are identified by amendment number and contain vertical lines indicating the areas of change.

Remove	Insert
ix	ix
3/4 6-36	3/4 6-36
3/4 6-36a	3/4 6-36a
B 3/4 6-3	B 3/4 6-3
----	B 3/4 6-3a
----	B 3/4 6-3b

INDEX

LIMITING CONDITIONS FOR OPERATION AND SURVEILLANCE REQUIREMENTS

ELECTRIC HYDROGEN RECOMBINERS

LIMITING CONDITION FOR OPERATION

3.6.4.2 Two independent Hydrogen Recombiner Systems shall be OPERABLE.

APPLICABILITY: MODES 1 and 2.

ACTION:

With one Hydrogen Recombiner System inoperable, restore the inoperable system to OPERABLE status within 30 days or be in at least HOT STANDBY within the next 6 hours.

SURVEILLANCE REQUIREMENTS

4.6.4.2 Each Hydrogen Recombiner System shall be demonstrated OPERABLE:

a. At least once per 6 months by verifying during a Hydrogen Recombiner System functional test that the minimum reaction chamber gas temperature increases to greater than or equal to 700°F within 90 minutes and is maintained for at least 2 hours and that the purge blower operates for 15 minutes.

b. At least once per 18 months by:

1) Performing a CHANNEL CALIBRATION of all recombiner instrumentation and control circuits,

2) Verifying through a visual examination that there is no evidence of abnormal conditions within the recombiner enclosure (i.e., loose wiring or structural connections, deposits of foreign materials, etc.),

3) Verifying the integrity of all heater electrical circuits by performing a resistance to ground test following the above required functional test. The resistance to ground for any heater phase shall be greater than 10,000 ohms, and

4) Verifying during a recombiner system functional test using containment atmospheric air at an acceptable flow rate as determined in Section 4.6.4.2.b.5 that the gas temperature increases to greater than or equal to 1100°F within 5 hours and is maintained for at least 4 hours.

5) Verifying during a recombiner system functional test using containment atmospheric air that the blower would be capable of delivering at least 41.52 scfm at containment conditions of 12.47 psia and 130°F.

This page intentionally left blank

3/4.6.3 CONTAINMENT ISOLATION VALVES

The OPERABILITY of the containment isolation valves ensures that the containment atmosphere will be isolated from the outside environment in the event of a release of radioactive material to the containment atmosphere or pressurization of the containment and is consistent with the requirements of General Design Criteria 54 through 57 of Appendix A to 10 CFR Part 50. Containment isolation within the time limits specified for these isolation valves designed to close automatically ensures that the release of radioactive material to the environment will be consistent with the assumptions used in the analyses for a LOCA. FSAR Table 6.2-65 lists all containment isolation valves. The addition of deletion of any containment isolation valve shall be made in accordance with Section 50.59 of 10CFR50 and approved by the Plant Operation Review Committee.

3/4.6.4 COMBUSTIBLE GAS CONTROL

The OPERABILITY of the equipment and systems required for the detection and control of hydrogen gas ensures that this equipment will be available to maintain the hydrogen concentration within containment below its flammable limit during post-LOCA conditions. Either recombiner unit or the Mechanical Vacuum Pumps are capable of controlling the expected hydrogen generation associated with: (1) zirconium-water reactions, (2) radiolytic decomposition of water, and (3) corrosion of metals within containment. These Hydrogen Control Systems are consistent with the recommendations of Regulatory Guide 1.7, "Control of Combustible Gas Concentrations in Containment Following a LOCA," March 1971.

The Post-LOCA performance of the hydrogen recombiner blowers is based on a series of equations supplied by the blower manufactuer. These equations are also the basis of the acceptance criteria used in the surveillance procedure. The required performance was based on starting containment conditions before the LOCA of 10.59 psia (total pressure), 120°F and 100% relative humidiy.

The surveillance procedure shall use the following methods to verify acceptable blower flow rate:

1. Definitions and constants

   CFM = cubic feet per minute

   RPM = revolutions per minute

   Blower RPM = 3550

   Blower ft^3/revolution = .028 ft^3

   Standard CFM = gas volume converted to conditions of 68°F and 14.7 psia.

2. Measure and record the following information:

   Pcontainment--Average of 3LMS*P934, 935, 936, and 937 (psia)

   Pout--From 3HCS-PI1A or B (psia)

   Tc--Containment temperature (°F)

   Pin--Measure with a new inlet gauge or calculate from Equation 3a below (psia)

   scfm measured--See Procedure/Form 3613A.3-1

   ΔP_f--From Table 2 (psi)

   A--As found Slip Constant

   Accuracy--Instrument accuracy range from Table 1.

3. Calculate as found slip constant (A)

   a. $Pin = Pcontainment - \Delta P_f$

   b.

$$A = \frac{3550 - \left(\left[\frac{scfm\ measured - Accuracy}{0.028 * 0.95}\right] * \left[\frac{14.7}{Pin} * \frac{Tc + 460}{528}\right]\right)}{\left(\left[\frac{Pout}{Pin} * 14.7\right] - 14.7\right)^{\frac{1}{2}} * \left(\frac{14.7}{Pin} * \frac{Tc + 460}{528}\right)^{\frac{1}{2}}}$$

4. Calculate expected postaccident flow rate using A calculated in Step 3.

   a. Slip RPM

      $= A * (4.937)^{\frac{1}{2}} * 1.218$

   b. Actual Inlet CFM

      ACFM = .028 (3550 - Slip RPM)

   c. Standard CFM

      scfm = ACFM 0.725

   d. Postaccident scfm Minimum = scfm * 0.95

   e. Acceptance Flow Rate

      Postaccident scfm minimum $\geq$ 41.52 scfm.

Table 1 Accuracy Range (Ref. 2)

scfm (measured)	Accuracy Range
40 to 50	5.8 scfm
50 to 80	4.7 scfm

Table 2 Inlet Piping Loss (Ref. 1)

scfm Measured (Unadjusted)	ΔP_f (psi)
30	.21
40	.31
50	.52
60	.73
70	.98
80	1.28

References:

1. Calculation 90-RPS-722GM, "Flow Acceptance Criteria for 3HCS*RBNR 1A/B Blowers 3HCS*C1A/B."

2. Calculation PA 90-LOE-0132GE, "Hydrogen Recombiner Flow Error Analysis."

The acceptance flow rate is the required flow rate at the worst case containment conditions 24 hours after the LOCA. The analysis assumes the recombiners are started no later than 24 hours after the accident. The 18-month surveillance shall verify the gas temperature and blower flow rate concurrently.

3/4.6.5 SUBATMOSPHERIC PRESSURE CONTROL SYSTEM

3/4.6.5.1 STEAM JET AIR EJECTOR

The closure of the isolation valves in the suction of the steam jet air ejector ensures that: (1) the containment internal pressure may be maintained within its operation limits by the mechanical vacuum pumps, and (2) the containment atmosphere is isolated from the outside environment in the event of a LOCA. These valves are required to be closed for containment isolation.

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO AMENDMENT NO. 63

TO FACILITY OPERATING LICENSE NO. NPF-49

NORTHEAST NUCLEAR ENERGY COMPANY, ET AL.

MILLSTONE NUCLEAR POWER STATION, UNIT NO. 3

DOCKET NO. 50-423

1.0 INTRODUCTION

By letter dated June 6, 1991, the Northeast Nuclear Energy Company, (the licensee) submitted a request for changes to the Millstone Nuclear Power Station, Unit No. 3 Technical Specifications (TS).

TS 3/4.6.4.2, "Electric Hydrogen Recombiners," would be changed by replacing TS Figure 3.6-2 "Hydrogen Recombiner Acceptance Criteria Flow vs. Containment Pressure" with a series of equations which were incorporated in plant procedures. In addition, the hydrogen recombiner temperature and flow requirements, which are addressed in TS 4.6.4.2.b.4, would be addressed in TS 4.6.4.2.b.4 and 4.6.4.2.b.5.

2.0 DISCUSSION

On March 26, 1991, as a part of the 18-month surveillance test, a functional test of the Millstone Unit No. 3 hydrogen recombiner (A) was performed using the acceptance criterion included in TS 4.6.4.2.b.4. The test results indicated that the hydrogen recombiner was capable of delivering a flow rate of approximately 74.5 scfm at a containment pressure of 14.77 psia. This represents a failure to meet the acceptance criterion of TS Figure 3.6-2, which is a pressure dependent flow curve, by approximately 2 scfm. On April 2, 1991, NNECO performed the same test on hydrogen recombiner (B). The test results indicated that the hydrogen recombiner (B) was capable of delivering a flow rate of approximately 72.8 scfm at 14.725 psia, whereas the required flow rate at that pressure is 75 scfm. Millstone Unit 3 is provided with two 100 percent capacity electric hydrogen recombiners which are designed to process the post-LOCA containment atmosphere to maintain the hydrogen concentration at a safe level (below 4 percent). Based on these test results, the licensee could not verify the operability of both the hydrogen recombiners using the acceptance criterion included in Figure 3.6-2. Therefore, on April 2, 1991, the licensee informed the staff of the current situation and on the licensee's plan to request that the NRC staff process a license amendment on an emergency basis.

Since the issuance of TS Figure 3.6-2 on March 2, 1990 (License Amendment 47), new technical information was received, by the licensee, from the hydrogen

recombiner blower manufacturer, M-D Pneumatics, which indicated that the information used to generate Figure 3.6-2 was not appropriate and was overly conservative. This has resulted in the test failures. Figure 3.6-2 was developed using generic information for this type of blower.

On April 22, 1991, the NRC issued an emergency amendment to TS Figure 3.6-2 (License Amendment No. 61). The amendment added the following footnote to TS Figure 3.6-2.

> Until September 30, 1991, a flow rate of 72.4 scfm or greater at a pressure of 14.5 to 14.8 psia is acceptable in lieu of the values indicated by Figure 3.6-2.

The licensee's letter of June 6, 1991, proposed that Millstone Unit 3 TS 3/4.6.4.2 "Electric Hydrogen Recombiners" replace TS Figure 3.6-2 "Hydrogen Recombiner Acceptance Criteria Flow vs. Containment Pressure" with a series of equations to be incorporated in plant procedures. Also, the hydrogen recombiner temperature and flow requirements, currently addressed in TS 4.6.4.2.b.4, would be addressed in TS 4.6.4.2.b.4 and 4.6.4.2.b.5, respectively. In addition, the series of equations would be incorporated into the TS Bases.

2.0 EVALUATION

The licensee proposed to modify the surveillance requirement 4.6.4.2.b.4 for the hydrogen recombiner by separating the flow rate acceptance criteria from the gas temperature acceptance criteria. A new TS 4.6.4.2.b.5 for the flow rate verification has been proposed. The existing surveillance requirement requires testing with a flow rate above the limit specified in TS Figure 3.6-2. The licensee indicated that the curve in Figure 3.6-2 was developed using generic information and is more conservative than required and difficult to meet. The licensee proposed to replace the flow versus containment pressure curve by a series of equations provided by the blower manufacturer for increased accuracy. These equations use actual pressure and temperature to predict the recombiner flow. The licensee proposed to include these equations into the revised surveillance procedure but not in the TS due to the complexity of the equations.

The proposed new TS 4.6.4.2.b.5 would require that the 18-month functional test for the hydrogen recombiners be performed using containment air which will verify that a flow rate of at least 41.52 scfm at a containment pressure of 12.47 psia and 130°F could be obtained. This flow rate is the required design flow rate 24 hours after a loss of coolant accident (LOCA) which will maintain the hydrogen concentration inside containment at a safe level of below 4 percent as indicated in FSAR Section 6.2.

The staff has reviewed the licensee's submittal as discussed above. The licensee proposal to separate the flow rate acceptance criteria from the gas temperature acceptance criteria and listing under a new TS Section 4.6.4.2.b.5 is administrative in nature and therefore acceptable. The staff also concurs

that the surveillance test which ensures that the hydrogen recombiner can deliver at least 41.52 scfm at a containment pressure of 12.47 psia and 130°F meet the system performance requirement as determined by the design basis analysis in FSAR Section 6.2 and is therefore acceptable. The staff considers that the blower equations which use the actual pressure and temperature to determine the blower flow rate should be included in the Bases Section of the TS. In a conference call on August 13, 1991, the licensee committed to include the blower equations in the Bases section of the TS. The staff finds this acceptable.

3.0 STATE CONSULTATION

In accordance with the Commission's regulations, the Connecticut State official was notified of the proposed issuance of the amendment. The State official had no comments.

4.0 ENVIRONMENTAL CONSIDERATION

The amendment changes a requirement with respect to installation or use of a facility component located within the restricted area as defined in 10 CFR Part 20, and changes the surveillance requirements. The NRC staff has determined that the amendment involves no significant increase in the amounts, and no significant change in the types, of any effluents that may be released offsite, and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendment involves no significant hazards consideration, and there has been no public comment on such finding (56 FR 29278). Accordingly, the amendment meets the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b) no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendment.

5.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributor: Daniel O'Neal/Raj Goel

Date: September 19, 1991