Northeast Nuclear Energy

Rope Ferry Rd. (Route 156), Waterford, CT 06385

Millstone Nuclear Power Station
Northeast Nuclear Energy Company
P.O. Box 128
Waterford, CT 06385-0128
(860) 447-1791
Fax (860) 444-4277

The Northeast Utilities System

DEC 21 1999

Docket No. 50-423
B17934

Re: 10 CFR 50.90
10 CFR 50.59

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

Millstone Nuclear Power Station, Unit No. 3
Request for Additional Information on Full Core Off-load
License Amendment (TAC No. MA4586)

The purpose of this letter is to provide additional information relating to a License Amendment Request for Full Core Off-load for Millstone Nuclear Power Station, Unit No. 3. In a letter dated January 18, 1999,[1] Northeast Nuclear Energy Company (NNECO) proposed to amend Operating License NPF-49 by revising Technical Specification Table 3.7-6, "Area Temperature Monitoring," and incorporating into the Millstone Unit No. 3 Final Safety Analysis Report a revision to describe the full core off-load condition as a normal evolution under the Millstone Unit No. 3 licensing basis. The initial submittal was supplemented by a letter dated April 5, 1999,[2] which forwarded a non-proprietary version of the Holtec International report used to support the amendment request. In a letter dated October 7, 1999,[3] the Staff requested additional

(1) M. L. Bowling letter to the U.S. Nuclear Regulatory Commission, "Millstone Nuclear Power Station, Unit No. 3 - License Amendment Request and Technical Specification Changes For Full Core Off-load (PTSCR 3-16-98)," dated January 18, 1999.

(2) R. P. Necci letter to the U.S. Nuclear Regulatory Commission, "Millstone Nuclear Power Station, Unit No. 3 - Supplemental Information: License Amendment Request and Technical Specification Changes For Full Core Off-load (PTSCR 3-16-98)," dated April 5, 1999.

(3) J. A. Nakoski (USNRC) letter to R. P. Necci, "Millstone Nuclear Power Station, Unit No. 3 - Request for Additional Information on Full Core Offload License Amendment Request (TAC No. MA4586)," dated October 7, 1999.

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information needed to complete its review. The 60-day response target in the request for additional information was extended per teleconferences with the NRC Project Manager on December 1, 1999, December 9, 1999, and December 20, 1999.

With support from Holtec International, NNECO has developed detailed responses to the questions posed by the Staff. This information is presented in question and answer format in Attachment 1.

Attachment 2 identifies those actions committed to by NNECO in this letter.

Should you have any questions on the information provided herein, please contact Mr. David W. Dodson at (860) 447-1791, extension 2346.

Very truly yours,

NORTHEAST NUCLEAR ENERGY COMPANY

RPNecci

Raymond P. Necci
Vice President - Nuclear Oversight
and Regulatory Affairs

Subscribed and sworn to before me

this 21 day of December, 1999

Donna Lynne Williams
Notary Public

Date Commission Expires: Nov 30, 2001

Attachments (2)

cc: H. J. Miller, Region I Administrator
J. A. Nakoski, NRC Senior Project Manager, Millstone Unit No. 3
A. C. Cerne, Senior Resident Inspector, Millstone Unit No. 3

Docket No. 50-423
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Attachment 1

Millstone Nuclear Power Station, Unit No. 3

Request for Additional Information on Full Core Off-load
License Amendment (TAC No. MA4586)

Questions and Responses

December 1999

**Millstone Nuclear Power Station, Unit No. 3
Request for Additional Information on Full Core Off-load
License Amendment (TAC No. MA4586)**

Questions and Responses

Q1. With regard to the thermal hydraulic analyses for the spent fuel pool (SFP), for the case with component cooling water (CCP) temperature of 95°F, provide the decay heat loads in the SFP. The information should clearly show the decay heat generated from each batch of the previously discharged spent fuel assemblies (SFAs) and from the freshly discharged full core in the SFP. This information is necessary to allow the NRC staff to determine whether the analyses is consistent with the guidance described in Standard Review Plan, Section 9.1.2 [sic], "Spent Fuel Pool Cooling and Cleanup System."

RESPONSE

Tables 3.1 and 3.2 of the Holtec Licensing Report list the previously discharged batches of fuel to the Spent Fuel Pool (SFP) up to April 1995 and the projected discharges up to the last projected discharge in February 2026. In addition to these discharges, the NNECO revised analysis includes the heat load associated with an additional 1088 fuel assemblies. It should be noted that NNECO is not seeking to license this storage capacity at this time. The additional heat load was included in the analysis to support future contingencies related to spent fuel management strategies.

Batch specific decay heat loads on the date of last discharge (conservatively postulated to occur one year earlier than projected, i.e. March 1, 2025) are tabulated for old discharges in Tables 1-A and 1-B below. For the last freshly discharged full core of fuel, time dependent decay heat is tabulated in Table 1-C. The decay heat loads are computed using the ORNL/RSIC ORIGEN2 computer code implemented on Holtec's QA validated DECOR code. The DECOR program is an input/output interface to the ORIGEN2 executable code from ORNL used in its original form in accordance with the code developer's instructions.

TABLE 1-A: BATCH SPECIFIC DECAY HEAT LOAD SUMMARY
(PREVIOUSLY DISCHARGED FUEL)

Item No.	Shutdown Date	Enrichment (wt. %)	Burnup (MWD/MTU)	Uranium Weight (MTU)	Number of Assemblies	Decay Heat (BTU/hr)
1	10/31/87	2.42	20570	0.4614	65	41547.6
2	10/31/87	2.90	21585	0.4613	10	6494.4
3	5/11/89	2.90	32186	0.4613	45	45924.1
4	5/11/89	3.40	32576	0.4613	40	40273.5
5	2/2/91	2.90	38739	0.4613	9	11718.3
6	2/2/91	3.40	41566	0.4613	24	33036.3

Item No.	Shutdown Date	Enrichment (wt. %)	Burnup (MWD/MTU)	Uranium Weight (MTU)	Number of Assemblies	Decay Heat (BTU/hr)
7	2/2/91	3.50	35994	0.4621	46	53287.0
8	7/31/93	3.50	47885	0.4621	9	15372.4
9	7/31/93	3.80	50174	0.4623	4	7138.1
10	7/31/93	4.10	43915	0.4627	32	47643.6
11	7/31/93	4.50	41683	0.4616	23	31528.1
12	4/14/95	4.50	44142	0.4616	21	31784.0
13	4/14/95	4.20	44722	0.4639	32	50107.9
14	4/14/95	4.50	42111	0.4630	56	80342.1
					TOTAL	496197.2

TABLE 1-B: BATCH SPECIFIC DECAY HEAT LOAD SUMMARY
(PROJECTED FUEL DISCHARGES)

Item No.	Shutdown Date	Enrichment (wt. %)	Burnup (MWD/MTU)	Uranium Weight (MTU)	Number of Assemblies*	Decay Heat (BTU/hr)
1	10/1/98	5.0	60000	0.455	97	225949.1
2	10/1/00	5.0	60000	0.455	96	232415.4
3	9/1/02	5.0	60000	0.455	97	243874.4
4	9/1/04	5.0	60000	0.455	96	251497.6
5	8/1/06	5.0	60000	0.455	97	264661.7
6	7/1/08	5.0	60000	0.455	96	273561.5
7	7/1/10	5.0	60000	0.455	97	290269.3
8	7/1/12	5.0	60000	0.455	96	303228.4
9	6/1/14	5.0	60000	0.455	97	328379.4
10	3/1/15**	5.0	60000	0.455	1088**	3799846.4
11	5/1/16	5.0	60000	0.455	96	355406.3
12	5/1/18	5.0	60000	0.455	97	415143.8
13	4/1/20	5.0	60000	0.455	96	526400.9
14	3/1/22	5.0	60000	0.455	97	861318.1
15	3/1/24	5.0	60000	0.455	96	2276449.2
					TOTAL	10648401.5

* Estimates based on current fuel and expected core designs

** Contingency planning value to accommodate future spent fuel management strategies

TABLE 1-C: TIME DEPENDENT FRESHLY DISCHARGED FULL CORE**
DECAY HEAT LOAD

Time After Reactor Shutdown (hours)	Decay Heat Load (million BTU/hr)
164.6	34.29
171.3	33.69
190.1	32.25
207.2	31.08
221.5	30.21
245.6	28.90
287.5	27.04
318.4	25.91
363.9	24.51
395.7	23.68
451.2	22.43
510.1	21.31
552.5	20.60
600	19.89

** 193 assemblies, 0.455 MTU Uranium weight, 60000 MWD/MTU burnup, 5 wt% enrichment

Q2. With regard to the decay heat calculation, on Page 8 of the Holtec report, Holtec stated that fuel burnup for freshly discharged SFAs is assumed to be consistent with a 24-month operating cycle. On Page 13, Holtec stated that 1 year operation at full power is assumed before a scheduled full-core discharge. Please provide clarification of this apparent discrepancy.

RESPONSE

This apparent discrepancy is the result of applying two different conservative factors to the end of licensed life decay heat calculation. The projected fuel discharges for decay heat load evaluation are based on conservatively bounding burnup by maximizing core irradiation time (24 month cycle) at full reactor power. With pool fuel inventory (i.e., number of SFAs) from previous discharges maximized, the last fresh discharge is also projected to occur after 2 years of reactor operation. All SFAs are conservatively assumed to have a bounding burnup of 60,000 Mwd/MtU. This assumption results in a maximum decay heat load for each of the discharged SFAs.

In the interest of conservatism, with burnup consistent with 24 month full power operation, the last fresh discharge is postulated to occur 1 year after a previous discharge. In this manner, decay heat contribution from old discharges is conservatively evaluated in the analysis. The assumption of one year of operation at full power between refuelings is consistent with the guidelines of Standard Review Plan (SRP) 9.1.3 Section III.1.h.ii. In this manner, decay heat contribution from old discharges is conservatively evaluated in the analysis.

Q3. Please provide information for each CCP temperature, preferably in a revision to Table 5.4 of the Holtec report, on the calculated peak temperature and its associated coincident time after the reactor shutdown. This information is necessary to allow the NRC staff to determine whether the results are consistent with the guidance described in Standard Review Plan, Section 9.1.2 [sic], "Spent Fuel Pool Cooling and Cleanup System."

RESPONSE

The coincident time at the instant of peak bulk pool temperature is the sum of three time constants, namely core hold time (τ_h), core transfer time (τ_t) and dynamic time lag (τ_d). The dynamic time lag represents a finite response time for the pool to adjust its temperature field after cessation of fuel transfer. In other words, thermal inertia absorbs the impact of discrete events (fuel discharges) resulting in smooth transition in pool temperature. The monotonic reduction in decay heat load in this post fuel transfer time lowers the peak temperature response and the coincident peak heat load to the Reactor Plant Component Cooling Water (CCP) system. In the interest of conservatism, Table 5.4 of the License Amendment Report was developed with complete neglect of pool thermal inertia (i.e. $\tau_d = 0$). This conservatism is rigorously demonstrated by undertaking a numerical solution of the underlying transient phenomena with pool thermal inertia included in the analysis. The requested results are summarized in Table 3-A as a function of CCP temperatures.

TABLE 3-A: RESULTS OF MILLSTONE UNIT 3 DYNAMIC RESPONSE ANALYSIS

CCP Temperature (°F)	Coincident Time to Peak Response After Reactor Shutdown (hours)	Peak Bulk Pool Temperature (°F)	Coincident Pool Decay Heat Load (million BTU/hr)
95	364	149.00	35.56
90	277	148.77	38.53
85	218	148.56	41.47
80	176	148.31	44.38

Q4. In the thermal hydraulic analyses for the SFP, Holtec took into account that the heat removal capability of the SFP cooling system heat exchanger is a function of the CCP temperature. In order to maintain the SFP water below the SFP temperature limit of 150°F, the SFAs "in-reactor" decay time (hold time) required prior to discharge of any SFAs to the SFP varies as the CCP temperature varies. Holtec calculated the following SFA "in-reactor" hold times required prior to a planned full-core offload operation at four CCP temperatures (80°F, 85°F, 90°F and 95°F):

CCP Temperature, °F	SFAs In-Reactor Hold Time Required, Hrs.
80	101
85	142
90	200
95	285

Also, Northeast Nuclear Energy Company (NNECO) proposed to add a new figure (Figure 9.1-20, "Fuel Assembly Transfer Limit Verses [sic] CCP Temperature") to the Final Safety Analysis Report (FSAR). This new figure shows SFA discharge limits[1] verses [sic] SFA "in-reactor" hold times and CCP temperatures.

In order to determine whether adequate controls exist to ensure the guidance of Standard Review Plan, Section 9.1.2 [sic], "Spent Fuel Pool Cooling and Cleanup System," are met, the NRC staff needs to understand the provisions established or to be established in the plant operating procedure to ensure that these SFA discharge limits will not be exceeded.

RESPONSE

When this License Amendment Request is approved, the proposed FSAR Figure 9.1-20, with corrected title "Fuel Assembly Transfer Limit Versus CCP Temperature," will become part of the Millstone Unit No. 3 License and Design Bases. Millstone Station Procedure RAC 02, "Technical Specification Change Requests and Implementation of License Amendments," provides instructions for the implementation of license amendments including the completion of associated procedure modifications. Procedures have been reviewed and impacted procedures have been identified. Procedure changes have been prepared for implementation following issuance of the license amendment. Procedure RE 31007, "Refueling Operations," specifically addresses the control of SFA discharge limits. The revision to this procedure will direct the refueling operator to conduct the off-load within the limits of an attachment to the procedure which is a reproduction of proposed FSAR Figure 9.1-20.

Q5. On Page 6 of Attachment 2 to the January 18, 1999, submittal, NNECO stated that two additional criteria control the minimum SFA "in-reactor" hold time. One is the Millstone Unit No. 3 Technical Specifications (TS) which require a minimum SFA "in-reactor" hold time of 100 hours. The other is the thermal and stress analysis of the existing Westinghouse storage racks which require a minimum SFA in reactor hold time of 132[2] hours. NNECO further stated that the minimum SFAs "in-reactor" hold

(1) The number of SFAs allowed to be discharged to the SFP at CCP temperatures of 80°F, 85°F, 90°F and 95°F.

(2) The proposed FSAR Figure 9.1-20 also shows that with CCP temperature at 80°F, the minimum SFA in reactor hold time is 132 hours.

time for CCP temperatures in the range of 80°F to 95°F are from 132 to 285 hours respectively. The results of the Holtec analysis (as indicated in the above Q-4) show that the corresponding minimum SFA "in-reactor" hold time for CCP temperature at 80°F is 101 hours. Please clarify which of the these three "minimum" SFA "in-reactor" hold times will be incorporated in the TS or operating procedures as a SFA discharge constraint. Also, clarify how the minimum SFA "in-reactor" hold time of 132 hours was derived.

RESPONSE

The analysis for this License Amendment Request evaluated three separate "in-reactor" hold time requirements. The shortest "in reactor" hold time was the Millstone Unit No. 3 Technical Specification limit of 100 hours. This time is the minimum hold time assumed in the analysis of a fuel handling accident in the spent fuel pool.

The Holtec thermal hydraulic analysis for CCP at a temperature of 80°F results in a minimum hold time of 101 hours for a full core to be off-loaded to the SFP at an average rate of three assemblies per hour. This evolution generates the bounding decay heat load in the SFP. The SFP has been analyzed to be maintained at less than 150°F with a single train of SFP cooling.

The final "in-reactor" hold time evaluated (132 hours) was the hold time assumed in the original licensing basis.[3] This hold time is the earliest time that irradiated fuel would be put into the storage racks as assumed in the analysis of the original Westinghouse storage racks.

The License Amendment Request uses all three "in-reactor" hold time requirements to develop the bounding hold time curve shown as proposed FSAR Figure 9.1-20. This figure is used in the implementing procedure that administratively controls the discharge of SFA until a minimum of 132 hours of "in-reactor" hold time has elapsed. This hold time fully bounds the Technical Specification minimum hold time of 100 hours. While the Holtec analysis shows that for an 80°F CCP temperature fuel movement could start as soon as 101 hours, the limitation shown on FSAR Figure 9.1-20 does not permit movement until 132 hours.

It should be noted that NNECO is planning, via a separate License Amendment Request, to license additional storage racks for the Millstone Unit No. 3 SFP. Proposed FSAR Figure 9.1-20 was developed using the "in-reactor" hold time for the existing Westinghouse storage racks. The additional storage racks do not use an "in-reactor" hold time for the qualification of the racks. A revision to FSAR Figure 9.1-20 may be made to provide separate administrative controls for SFA discharges to the existing Westinghouse storage racks and for SFA discharges to the additional storage racks to be installed.

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[3] W. G. Counsil letter to B. J. Youngblood (USNRC), "Millstone Nuclear Power Station, Unit No. 3 - Response to Select Requests for Additional Information," dated July 22, 1983.

Q6. In Page 8 of Attachment 2 to the January 18, 1999 submittal, NNECO stated that during shutdown (i.e. Modes 5, 6, and with the reactor defueled) SFP cooling system availability may be limited to a single train. Under these circumstances, NNECO relied on the large passive water volume contained in the SFP to protect against single failures. NNECO's rationale is that Holtec's thermal hydraulic analysis for this design change was performed with the assumption that only a single SFP cooling train was operating and that a single SFP cooling train has sufficient heat removal capacity to maintain the SFP during normal operation at or below 150°F. This is not consistent with the guidance in Standard Review Plan, Section 9.1.3, "Spent Fuel Pool Cooling And Cleanup System," and does not satisfy the requirement described in General Design Criterion 44, "Cooling Water." In order to determine whether adequate controls exist to ensure the guidance of Standard Review Plan, Section 9.1.3 is met, the NRC staff needs to understand the provisions established or to be established in plant operating procedures to ensure that prior to a planned offload (partial or full-core) event, both trains of the SFP cooling system are operable and available for SFP cooling.

RESPONSE

The requirements of General Design Criterion 44 and the guidance of Standard Review Plan, Section 9.1.3 have been met as described in the submittal and as previously approved by the NRC Staff in the original plant Safety Evaluation Report. The design of the Millstone Unit No. 3 Spent Fuel Pool cooling system includes two 100% capacity trains which remove decay heat from the spent fuel pool. The system is designed to function during normal and accident conditions, performing its intended function assuming a single active failure. General Design Criterion 44 and the guidance of Standard Review Plan, Section 9.1.3 do not address the need for, or the performance of, maintenance activities necessary to maintain systems.

The new thermal/hydraulic analysis shows that with the maximum projected SFP decay heat load, a single train of spent fuel pool cooling is capable of maintaining the bulk pool temperature at less than 150°F. To evaluate bounding failure consequences, an active failure of this single train is assumed to occur at 150°F at the maximum decay heat load. To provide margin and to establish an upper temperature limit for equipment operability evaluations, a design assumption was made that this total loss of cooling exists for 30 minutes. This results in a calculated heat-up of the SFP to a limiting temperature of 155.7°F.

The SFP systems, structures and components were evaluated for the limiting temperature. NNECO has verified that they are all designed for normal operation at the environmental and service conditions that would result from a steady state pool temperature of 155.7°F.

The statement on Page 8 of Attachment 2 of the submittal was made to acknowledge that planned refueling outage maintenance activities take place during Modes 5 and 6, and with the reactor defueled. Such maintenance activities could include tasks that would impact the availability of portions of systems that support the SFP cooling system. Refueling outage maintenance activities are reviewed in accordance with existing plant procedures to assess their impact on the ability to maintain required safety functions during shutdown conditions. Where an unacceptable level of risk is created by a planned maintenance activity, the activity is either rescheduled or appropriate contingency plans are established to limit that risk.

Support systems for the SFP cooling system may require maintenance during the refueling outage because they also support safety significant systems that cannot be secured while the plant is operating. Examples of such systems include the Service Water system, the CCP system, and the AC Electrical Power Source which powers the SFP cooling pumps. Should maintenance require removal of any of these systems from service during the refueling outage, the plant specific shutdown risk procedure for decay heat removal (applicable during Modes 5 and 6, and with the reactor defueled) will be utilized to determine appropriate controls and compensatory measures.

With regard to the SFP cooling function, all planned SFP cooling system maintenance activities are performed prior to a refueling outage, and at a time when decay heat loads are significantly reduced. Following commencement of core off-load activities, should it be necessary to remove a train of SFP cooling from service due to planned maintenance on its associated support system train, appropriate contingency actions will be established to address restoration of the cooling function should a single active failure occur on the remaining available SFP train.

The maintenance activity that has the greatest impact on the availability of SFP cooling trains is the maintenance outage of an electrical bus. This outage will result in the loss of electrical power to one of the two SFP cooling pumps. The electrical bus that remains in service is protected by ensuring that three sources of power (at least one off-site and at least one on-site) are available for the bus. Furthermore, activities that could impact the availability of the protected bus are carefully controlled to limit the risk of loss of the bus. Review of outage activities shows that the loss of the operating SFP pump is the only active failure that does not have a backup during maintenance on an electrical bus. The compensatory measures listed below provide backup for the operating SFP pump.

1. A pre-fabricated temporary cable will be used to restore power to the standby SFP cooling pump upon an active failure of the protected pump during the outage with any of the core loaded into the spent fuel pool (worse case is during a train outage).
2. Operating procedures will require that the necessary equipment is available to respond to evaluated SFP cooling single failures (Service Water system pump, CCP system pump, and SFP cooling pump) prior to the SFP temperature exceeding 155.7°F.
3. Operating procedures are being revised to explicitly deal with loss of SFP cooling and restoration of cooling function prior to exceeding the limiting evaluated temperature of 155.7°F.
4. The setpoint and the alarm response procedure for high SFP temperature is being revised. The current setpoint of 135°F is being lowered to 125°F to match the entry condition of the emergency operating procedure (EOP) for Loss of

Spent Fuel Pool Cooling. This allows greater than two hours at the bounding decay heat load for operator investigation and temporary cable installation prior to exceeding the limiting evaluated temperature of 155.7°F after an active failure. The actual amount of time available to effect SFP cooling recovery is variable and dependent upon the actual decay heat load in the SFP. It should be noted that under design basis heat loads, the spent fuel pool may exceed the alarm setpoint temperature during normal operation. However, plant experience has been that actual SFP operating temperatures are significantly lower than predicted. For example, all six full core off-loads performed to date have resulted in SFP operating temperatures below 115°F.

Q7. In the unlikely event that there is a complete loss of cooling following an unplanned full-core offload event, the SFP water temperature will begin to rise and eventually will reach the boiling temperature. In order for the staff to determine whether the guidance in Standard Review Plan Section, 9.1.2 [sic], "Spent Fuel Pool Cooling and Cleanup System," is met the staff needs information on the calculated minimum time-to-boil (hours) and its corresponding boil-off rate (gpm) for the case with maximum decay heat input as presented in Holtec report Table 5.4, "Minimum Hold Time Results", and the available make-up rate.

RESPONSE

In the unlikely event of a complete loss of active cooling of the SFP following a full core off-load event, the pool temperature will begin to rise and eventually reach boiling temperature. The pool inventory loss from evaporation and eventual boiling is replenished by two redundant, oversized, makeup pumps (225 gpm each). The minimum time to boil under this loss of cooling scenario is evaluated by Holtec's TBOIL computer code. The event is assumed coincident with the instant when the last fuel assembly is transferred to the pool and the pool is postulated to be at its limiting 150°F initial temperature. The highest decay heat load case (corresponding to the 80°F CCP temperature) is selected for a conservatively bounding analysis. In the interest of conservatism, credit for pool makeup is completely neglected. The minimum time to boil, under this array of conservative assumptions is computed to be in excess of five hours.

The time for temperature increase from 150°F to 200°F was calculated and is shown in Table 5.5 of the Holtec report. Similarly, a conservative time to boil has been calculated for each of the CCP temperatures. This yields the following:

CCP Temperature (°F)	Time to Boil (hours)
80	5.47
85	5.89
90	6.39
95	6.97

Note that the shortest time to boil corresponds to the lowest CCP temperature case. This is because more fuel assemblies may be transferred to the SFP earlier in the off-load at lower CCP temperatures, thus creating higher decay heat loads in the pool.

A conservative calculation of the water loss for the highest decay heat load yields a maximum loss of approximately 95 gpm. The primary grade makeup system is the preferred makeup source for the spent fuel pool. Each of the two pumps in the primary makeup system have a capacity of 225 gpm at 141 psig. These pump capacities are well within the makeup requirements for loss of water volume due to pool boiling.

Q8. In order to determine whether adequate controls exist to ensure the guidance of Standard Review Plan, Section, 9.1.2 [sic], "Spent Fuel Pool Cooling and Cleanup System," is met, the NRC staff needs to understand the provisions established or to be established in plant operating procedures to monitor and control the SFP water temperature during full-core offload events. Information should include:

(A) How often the local temperature indicators for SFP water temperature will be monitored.

(B) The set-point of the high water temperature alarm for the SFP.

(C) Information supporting a determination that there is sufficient time for operators to intervene in order to ensure that the temperature limit of 150°F will not be exceeded.

(D) The mitigative actions (i.e. prohibit fuel handing, aligning other systems to provide SFP cooling, etc.) to be taken in the event of a high SFP water temperature alarm.

RESPONSE

During normal SFP operation, two redundant trains of SFP cooling are available. One train operates to provide decay heat removal and the second train is maintained in standby. The compensatory measures developed for the proposed full core off-load license amendment are required to supplement the existing SFP design under those conditions in which only one train of SFP cooling is available and the SFP cooling function would be vulnerable to an active single failure. Whenever two trains of SFP cooling are available, the compensatory measures identified herein are not applicable.

(A) The SFP temperature is recorded once per shift during Modes 5 and 6, and when the reactor is defueled. This SFP monitoring provides information to make the operators aware of pool temperatures trending upward prior to reaching the high temperature alarm setpoint.

(B) The existing setpoint of the Spent Fuel Pool high temperature alarm is 135°F. This setpoint is being revised to 125°F as a compensatory measure to accommodate SFP operation with a single train of SFP cooling available. See response to Question 6.

(C) The Holtec analysis concluded that at the maximum SFP decay heat load, the SFP would have a heat-up rate of 11.3°F/hr if all forced cooling is lost. The alarm setpoint of 125°F ensures that at least two hours are available to respond to a loss of SFP cooling event. The actual amount of time available to effect SFP cooling recovery is variable and dependent upon the actual decay heat load in the SFP. As stated in the response to Q6, a temporary power cable is being fabricated to provide power to an SFP cooling pump located on an electrical bus that is out of service for outage maintenance activities. Instructions and procedures are being prepared to energize the temporary power to the SFP cooling pump prior to the SFP temperature exceeding 155.7°F.

(D) Upon receipt of any high SFP temperature alarm during full core off-load, the refueling activity will be stopped and the cause of the alarm investigated. The actions to be performed would depend upon the condition found. If the alarm is received during operations with only one train of SFP cooling available, the procedural actions to be performed will depend upon the failure identified. These can include, but are not limited to, temporary powering of an SFP cooling pump, cross-connecting heat exchangers, or redirecting cooling water flow as warranted. If the alarm is received during operations with both trains of SFP cooling available, the actions would be as normally required by the Loss of SFP Cooling EOP.

Docket No. 50-423
B17934

Attachment 2

Millstone Nuclear Power Station, Unit No. 3

Request for Additional Information on Full Core Off-load License Amendment (TAC No. MA4586)

List of Regulatory Commitments

December 1999

List of Regulatory Commitments

The following table identifies those actions committed to by NNECO in this document.

REGULATORY COMMITMENT	COMMITTED DATE OR OUTAGE
B17934.01: Refueling procedures will require that one train of SFP cooling with sufficient backups be available at the commencement of a full core off-load.	Prior to implementation of the license amendment.
B17934.02: Compensatory measures for restoring SFP cooling will be described in an operating procedure and will include use of a dedicated temporary power cable for the SFP cooling pumps.	Prior to implementation of the license amendment.
B17934.03: The ability of the operator to perform the restoration of SFP cooling in the required time per the operating procedure will be validated.	Prior to implementation of the license amendment.
B17934.04: The SFP temperature monitoring alarm setpoint will be changed to match the Loss of SFP Cooling EOP entry condition.	Prior to implementation of the license amendment.