North Atlantic

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The Northeast Utilities System

October 11, 2002

Docket No. 50-443
NYN-02103

U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, D.C. 20555-0001

Seabrook Station
License Amendment Request 02-06
"Revision To Technical Specifications Associated With
Reduction of Decay Time for Core Offload"

North Atlantic Energy Service Corporation (North Atlantic) has enclosed herein License Amendment Request (LAR) 02-06. License Amendment Request 02-06 is submitted pursuant to the requirements of 10 CFR 50.90 and 10 CFR 50.4.

LAR 02-06 proposes a change to the Seabrook Station Technical Specifications 3/4.9.3 "Refueling Operations – Decay Time." Specifically, the proposed change will revise the decay time associated with the movement of irradiated fuel in the reactor vessel from 100 hours to 80 hours.

The proposed change is based on reanalysis of the radiological consequences of a limiting design basis Fuel Handling Accident using a 80 hour decay time. The change is also supported by a reanalysis of the spent fuel storage pool thermal hydraulic conditions with a higher average fuel assembly decay heat. Enclosure 1 contains a detailed description and basis for the change.

The Station Operation Review Committee and the Nuclear Safety Audit Review Committee have reviewed LAR 02-06.

As discussed in the enclosed LAR Section IV, the proposed change does not involve a significant hazard consideration pursuant to 10 CFR 50.92. A copy of this letter and the enclosed LAR has been forwarded to the New Hampshire State Liaison Officer pursuant to 10 CFR 50.91(b).

North Atlantic has determined that LAR 02-06 meets the criterion of 10 CFR 51.22(c)(9) for a categorical exclusion from the requirements for an Environmental Impact Statement.

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North Atlantic requests NRC Staff review of LAR 02-06, and issuance of a license amendment by September 30, 2003.

Should you have any questions regarding this letter, please contact Mr. James M. Peschel, Manager – Regulatory Programs, at (603) 773-7194.

Very truly yours,

NORTH ATLANTIC ENERGY SERVICE CORP.

Ted C. Feigenbaum
Executive Vice President
And Chief Nuclear Officer

cc: H. J. Miller, NRC Region I Administrator
R. D. Starkey, NRC Project Manager, Project Directorate I-2
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North Atlantic

SEABROOK STATION UNIT 1

Facility Operating License NPF-86
Docket No. 50-443

License Amendment Request 02-06,
"Revision To Technical Specifications Associated With Reduction of Decay Time for Core Offload"

North Atlantic Energy Service Corporation pursuant to 10CFR50.90 submits License Amendment Request 02-06. The following information is enclosed in support of this License Amendment Request:

- **Section I - Introduction and Safety Assessment for Proposed Changes**
- **Section II - Markup of Proposed Changes**
- **Section III - Retype of Proposed Changes**
- **Section IV - Determination of Significant Hazards for Proposed Changes**
- **Section V - Proposed Schedule for License Amendment Issuance And Effectiveness**
- **Section VI - Environmental Impact Assessment**

I, Ted C. Feigenbaum, Executive Vice President and Chief Nuclear Officer of North Atlantic Energy Service Corporation hereby affirm that the information and statements contained within this License Amendment Request are based on facts and circumstances which are true and accurate to the best of my knowledge and belief.

MY COMMISSION EXPIRES APR. 17, 2007 NOTARY PUBLIC NEW HAMPSHIRE

Sworn and Subscribed before me this 17th day of October, 2002

Marilyn R. Sullivan
Notary Public

Ted C. Feigenbaum
Executive Vice President
and Chief Nuclear Officer

SECTION I

INTRODUCTION AND SAFETY ASSESSMENT FOR PROPOSED CHANGES

I. INTRODUCTION AND SAFETY ASSESSMENT OF PROPOSED CHANGES

A. Introduction and Description of Change

License Amendment Request (LAR) 02-06 proposes a change to the Seabrook Station Technical Specifications 3.9.3, "Refueling Operations Decay Time – Limiting Condition for Operation" and 4.9.3, "Refueling Operations Decay Time – Surveillance requirements". Specifically, the proposed changes will revise the decay time for movement of irradiated fuel in the reactor vessel from 100 hours to 80 hours. A reduction in the minimum decay time requirement is desired to provide additional flexibility in outage planning. The proposed change will allow fuel to be moved from the reactor vessel to the spent fuel pool earlier in the outage.

The decay time is assumed in a number of analyses supporting the fuel handling accident and the spent fuel pool thermal hydraulics. The affected analyses have been revised to reflect a decay time of 80 hours. The analyses affected are discussed below.

Fuel Handling Analyses

A fuel handling accident in the fuel building and in containment is analyzed to determine potential control room and offsite dose consequences. The hypothetical fuel handling accident involves the drop of a fuel assembly and the complete release of the radioactivity contained in the fuel rod to cladding gap for all fuel rods in the assembly. The analyses reflect the decay time specified in Technical Specification 3/4.9.3. The results of analyses performed with an 80-hour decay time are summarized in Section B below.

Spent Fuel Pool Cooling

The spent fuel pool thermal hydraulic performance is based on the decay heat generated in the spent fuel pool. The shorter decay time increases the decay heat generated. The ability of the cooling system to maintain spent fuel pool temperatures within design limits was analyzed with the decay time of 80 hours. The results of analyses performed with an 80-hour decay time are summarized in Section B below.

B. Evaluation of Proposed Changes

Fuel Handling Accident (FHA)

The following Design Basis Accidents, utilizing the Seabrook Station Technical Specification (3/4.9.3) requirement of a 100-hour decay time period prior to fuel movement, have been reviewed for appropriateness for reducing the decay time to 80 hours. The results of these analyses are summarized below.

- **Fuel Handling Accident as Occurring Within the Spent Fuel Pool**

  This analysis served as the design basis bounding FHA at the time of original licensing, based on a decay time of 100 hours as reported in Seabrook Station's Updated Final Safety Analysis Report (UFSAR). The results of the revised analysis show that the resulting offsite doses (based on a decay time period of 80 hours and using ICRP-30 Dose Conversion Factors (DCFs)) are comparable to the original doses (100-hour decay time period) and "well within" (<25 %) the limiting values of 10 CFR Part 100. In addition, control room doses (using the current control room modeling, including the effects of ICRP-30 DCFs) are also well within the limits of General Design Criteria 19 to 10 CFR Part 50, Appendix A. The calculated radiological consequences dose for this event is bounded by the FHA event inside an open containment building. Refer to Table 1, Summary of Results for a Fuel Handling Accident Inside the Fuel Storage Building.

- **Fuel Handling Accident as Occurring Within an Open Containment Building**

  At the time of licensing Seabrook Station, the FHA as occurring within the containment building was not a limiting event due to assumed containment integrity with no releases. Subsequent to the above reanalysis, a FHA as occurring within an "open" containment building (i.e., open personnel hatch) was performed, based on maximum dose rates both for 100 hours and 80 hours of fuel decay time. As a result of the reanalysis, the current bounding FHA event is that occurring inside an open containment building. The analysis results in both cases for offsite dose were acceptable and below the "well within" (< 25%) limiting values of 10 CFR Part 100. Refer to Table 2, Summary of Results for a Fuel Handling Accident Inside the Containment Building With an Instantaneous Release to the Atmosphere.

Spent Fuel Pool Cooling

The functions of the Spent Fuel Pool Cooling and Cleanup System are to:

a. Continuously remove decay heat generated by fuel elements stored in the pool,

b. Continuously maintain a minimum of 13 feet[1] of water over the spent fuel elements to shield personnel, and

c. Maintain the chemical parameters and optical clarity of the spent fuel pool water, and the water in the reactor cavity and refueling canal during refueling operations.

All portions of the spent fuel pool cooling loop are designated Safety Class 3, and are designed and constructed to meet seismic Category I requirements. Those portions of the cleanup system not designed to these requirements are normally isolated from the cooling loop. A leak detection system is provided.

All safety-related portions of the Spent Fuel Pool Cooling System are housed in structures capable of withstanding seismic and flood conditions, as well as tornado-generated missiles.

A seismic Category I normal makeup and a backup supply capable of being connected to an alternate seismic Category I source are provided.

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[1] A minimum of 10 feet of water above the highest fuel element position permits fuel handling without exceeding a radiation dose of 2.5 mr/hr at the surface of the pool.

The Spent Fuel Pool Cooling System is designed to assure adequate cooling to stored fuel, assuming a single failure of an active component coincident with a loss of offsite power. The spent fuel pool cooling and cleanup system design temperature is 200°F, with a design pressure of 150 psig.

A third SFP cooling pump, 1-SF-P10C, has been added to the original design to provide additional cooling capability for the heat load associated with a full core offload during refuelings. The third pump can be powered from either the A or B emergency buses. Electrical power is manually connected to 1-SF-P10C. Manual electrical connection assures adequate electrical separation of the emergency electrical buses.

Normal Operation for spent fuel pool cooling is defined as operation with two spent fuel pool cooling trains operable (two pumps and two heat exchangers), one primary component cooling water loop supplying both heat exchangers, and the Atlantic Ocean as the ultimate heat sink. There is a third spent fuel pool cooling pump that can be cross-tied to either train. The acceptance criteria is to maintain spent fuel pool (SFP) temperature <140°F.

A normal refueling at Seabrook Station consists of a full core discharge to the spent fuel pool. Therefore, the normal case defined in the UFSAR and required by SRP 9.1.3 includes a single active failure. The single active failure is either one PCCW pump or one spent fuel pool cooling pump.

The total decay heat load in the spent fuel pool is calculated assuming the spent fuel pool (SFP) is filled to a capacity of 1232[2] assemblies upon the final full core discharge beginning at 80 hours after shutdown and unloading the core at the maximum rate of approximately 6 assemblies per hour. At this rate the full core would be off-loaded in approximately 112 hours after shutdown. The Branch Technical Position ASB 9-2 decay heat calculation method including uncertainty was used to calculate the total decay heat load in the SFP assuming a full core discharge to the SFP initiated at 80 hours after shutdown. The decay heat loads are used in the evaluation of the SFP heat exchanger performance. In the evaluation of heat exchanger performance the design conditions (including fouling) are used for the spent fuel pool, primary component cooling water, and service water heat exchangers.

A steady-state calculation of the heat exchanger performance was used to determine the maximum spent fuel pool temperature for several normal and abnormal refueling conditions. The calculation of the normal cooling capability of the SFP Cooling System assumes the following:

1. Two SFP cooling heat exchangers in service. PCCW flow is 3000 gpm to each heat exchanger.

2. Two of the three SFP cooling pumps are in service. SFP cooling flow is 1100 gpm for each pump.

3. The Atlantic Ocean is in service or is capable of being placed in service to function as the ultimate heat sink.

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[2] The licensed capacity is 1236 assemblies (TS 5.6.3). However the physical arrangement of the spent fuel pool precludes the use of the nine (9) rack locations, i.e., only 1227 rack locations are accessible for fuel storage. For conservatism, the analysis was performed for 1232 assemblies.

At the design heat load of 46.44E6 Btu/hr under normal operation the spent fuel pool cooling system (with a single active failure) is capable of maintaining the spent fuel pool at 140°F. This heat load corresponds to the full core offload plus residual heat from all previously discharged assemblies at 118.5 hours after shutdown. Based on a core offload beginning at 80 hours after shutdown and a core offload rate at the maximum rate (6 assemblies per hour), the full core offload would be complete at approximately 112 hours after shutdown. With a maximum service water temperature of 65°F, two SFP cooling trains and one PCCW train operable, the maximum SFP water temperature at 110 hours after shutdown is calculated to be 142°F, slightly greater than the acceptance criteria. By reducing the assumed service water temperature to 63°F a full core offload beginning at 80 hours after shutdown, proceeding at a rate of 6 assemblies per hour can be completed at 110 hours after shutdown without exceeding the 140°F acceptance limit on SFP water temperature. Therefore, for offload rates that result in the full core being off-loaded in less than 118.5 hours requires that credit be taken for service water temperatures less than the 65°F design limit. Administrative controls will be established to provide guidance for offload completion in less than 118.5 hours to maintain 140°F.

As discussed above the design basis condition assumes the Atlantic Ocean as the ultimate heat sink. Administrative controls will be established to include guidance on the acceptable conditions for maintaining 140°F spent fuel pool temperatures when the cooling tower is used as the ultimate heat sink.

Loss of Spent Fuel Pool Cooling

In the unlikely event of a total loss of spent fuel pool cooling sufficient time is available for operators to take action before the pool reaches bulk boiling to provide makeup and maintain water level. The time for the spent fuel pool to heat up from 140°F to 212°F has been calculated assuming an adiabatic heatup.

Assuming the core offload begins at 80 hours after shutdown and proceeds at a rate of 6 assemblies per hour, with the full core offload achieved at 110 hours after shutdown, the total decay heat load in the SFP including uncertainty is calculated to be 47.791E6 Btu/hr. With a minimum SFP water level at an elevation of 23'6", the time to heat up the SFP water from 140°F to 212°F is calculated as 3.28 hours. At this heat load a boil-off rate of approximately 100 gpm would exist which is within the make-up capacity to the pool. Normally, more than 25 feet of water is maintained over the spent fuel.

SFP Concrete Wall Temperature

Assuming core offload to the SFP begins at 80 hours after shutdown concrete wall temperature profiles were calculated. The calculations were performed using gamma heat deposition in the stainless steel liner and concrete wall based on an 80-hour decay. The wall temperature profile was developed using the HEATING7 general-purpose conduction code. The acceptance criterion is to maintain the maximum long-term temperature in the concrete wall at or below 200°F.

For a core offload beginning at 80 hours after shutdown, any freshly discharged fuel assembly can be offloaded to any location that is one cell removed from the SFP wall. Administrative procedures currently recommend restricting the placement of freshly discharged fuel assemblies adjacent to the spent fuel pool wall. This restriction will become a formal requirement. The maximum calculated wall temperature for this case is 143°F.

C. Safety Assessment Conclusion of the Proposed Change

North Atlantic concludes that based upon the aforementioned discussion the proposed change does not adversely affect or endanger the health or safety of the general public or involve a significant safety hazard.

TABLE 1

Summary of Results for a Fuel Handling Accident Inside the Fuel Storage Building Based on a 2-hour Release

Dose Receptor	**Thyroid**	**Whole Body**	**Skin**	**Acceptance Criteria (SRP-0800) Thyroid (Rem)**	**Acceptance Criteria (SRP-0800) Whole Body (Rem)**	**Acceptance Criteria (SRP-0800) Skin (Rem)**
EAB 100 hours decay time	5.5	0.35	0.9	75	6.25	N/A
EAB 80 hours decay time	4.4	0.17	0.54	75	6.25	N/A
Control Room 100 hours Decay time	Note 1	Note 1	Note 1	30.0	5.0	30.0
Control Room 80 hours decay time	0.55	0.11	1.5	30.0	5.0	30.0
LPZ 100 hours decay time	2.3	0.14	0.37	75	6.25	N/A
LPZ 80 hours decay time	2.1	0.08	0.26	75	6.25	N/A

1 Not evaluated for the original licensing basis.

TABLE 2

Summary of Results for a Fuel Handling Accident Inside the Containment Building With an Instantaneous Release to the Atmosphere

Dose Receptor	**Thyroid**	**Whole Body**	**Skin**	**Acceptance Criteria (SRP-0800) Thyroid (Rem)**	**Acceptance Criteria (SRP-0800) Whole Body (Rem)**	**Acceptance Criteria (SRP-0800) Skin (Rem)**
EAB 100 hours decay time	63.9[1]	1.98[1]	0.47	75	6.25	N/A
EAB 80 hours decay time	69.6	2.2	0.55	75	6.25	N/A
Control Room 100 hours Decay time	6.78[1]	0.29[1]	1.31	30.0	5.0	30.0
Control Room 80 hours Decay time	7.38	0.31	1.5	30.0	5.0	30.0

1 The 100-hour decay time results presented are based on an instantaneous puff release. Previously, the 100-hour decay time values provided by North Atlantic, as stated in the SER associated with License Amendment 40, were based on a calculated dose for the 0-2 hour period. The License Amendment 40 values for the exclusion area boundary were 62.7 rem to the thyroid and 2.0 rem to the whole body. For control room habitability, the results for the 30-day control room doses were 6.7 rem to the thyroid and 0.29 rem to the whole body.

SECTION II

MARKUP OF PROPOSED CHANGES

Refer to the attached markup of the proposed changes to the Technical Specifications. The attached markup reflects the currently issued revision of the Technical Specifications listed below. Pending Technical Specifications or Technical Specification changes issued subsequent to this submittal are not reflected in the enclosed markup.

The following Technical Specification changes are included in the attached markup:

Technical Specification	Title	Page
3.4.9.3	Refueling Operations – Decay Time	3/4 9-3

3/4.9.3 DECAY TIME

LIMITING CONDITION FOR OPERATION

3.9.3 The reactor shall be subcritical for at least ~~100~~ 80 hours.

APPLICABILITY: During movement of irradiated fuel in the reactor vessel.

ACTION:

With the reactor subcritical for less than ~~100~~ 80 hours, suspend all operations involving movement of irradiated fuel in the reactor vessel.

SURVEILLANCE REQUIREMENTS

4.9.3 The reactor shall be determined to have been subcritical for at least ~~100~~ 80 hours by verification of the date and time of subcriticality prior to movement of irradiated fuel in the reactor vessel.

SECTION III

RETYPE OF PROPOSED CHANGES

Refer to the attached retype of the proposed changes to the Technical Specifications. The attached retype reflects the currently issued version of the Technical Specifications. Pending Technical Specification changes or Technical Specification changes issued subsequent to this submittal are not reflected in the enclosed retype. The enclosed retype should be checked for continuity with Technical Specifications prior to issuance.

3/4.9.3 DECAY TIME

LIMITING CONDITION FOR OPERATION

3.9.3 The reactor shall be subcritical for at least 80 hours.

APPLICABILITY: During movement of irradiated fuel in the reactor vessel.

ACTION:

With the reactor subcritical for less than 80 hours, suspend all operations involving movement of irradiated fuel in the reactor vessel.

SURVEILLANCE REQUIREMENTS

4.9.3 The reactor shall be determined to have been subcritical for at least 80 hours by verification of the date and time of subcriticality prior to movement of irradiated fuel in the reactor vessel.

SECTION IV

DETERMINATION OF SIGNIFICANT HAZARDS FOR PROPOSED CHANGES

IV. DETERMINATION OF SIGNIFICANT HAZARDS FOR PROPOSED CHANGES

License Amendment Request (LAR) 02-06 proposes a change to the Seabrook Station Technical Specifications 3/4.9.3, "Refueling Operations – Decay Time. Specifically, the proposed changes will revise the decay time for movement of irradiated fuel in the reactor vessel from 100 hours to 80 hours.

In accordance with 10 CFR 50.92, North Atlantic has concluded that the proposed change does not involve a significant hazards consideration (SHC). The basis for the conclusion that the proposed change does not involve a SHC is as follows:

1. **The proposed change does not involve a significant increase in the probability or consequences of an accident previously evaluated.**

   The proposed change to TS 3/4.9.3 does not result in a condition where the design, material, and construction standards that were applicable prior to the proposed change are altered. The probability of occurrence of an accident previously evaluated for Seabrook Station is not altered by the proposed amendment to the technical specifications (TSs). The accidents remain the same as currently analyzed in the Updated Final Safety Analysis Report (UFSAR) as a result of the proposed change to the decay time. The accidents impacted by the new decay time have been reanalyzed and the applicable design limits have not been exceeded. The control room and offsite dose consequences for fuel handling accidents have been reevaluated and continue to meet acceptance limits.

   Therefore based on the above discussion, it is concluded that the proposed revision to TS 3/4.9.3 does not involve a significant increase in the probability or consequences of any accident previously evaluated.

2. **The proposed change does not create the possibility of a new or different kind of accident from any previously evaluated.**

   The proposed change to the decay time will not create a new accident scenario. The analyses impacted by the revised decay time have been evaluated. The new analysis of the fuel handling accident and spent fuel pool cooling system performance demonstrates that the applicable acceptance criteria continues to be met. The proposed change will not alter the way any structure, system or component functions, and will not significantly alter the manner in which the plant is operated. There will be no significant adverse effect on plant operation or accident mitigation equipment.

   Since no new failure modes are created by the proposed revision to TS 3/4.9.3 the proposed change does not create the possibility of a new or different kind of accident from any that was previously evaluated.

3. **The proposed change does not involve a significant reduction in a margin of safety.**

The fuel handling accident in the fuel building and containment has been reanalyzed for a decay time of 80 hours. The spent fuel pool cooling performance has also been evaluated for the revised decay time. These analyses demonstrate that acceptance criteria are still met for the revised decay time as described herein. The results of the revised analysis show that the resulting offsite doses (based on a decay time period of 80 hours are comparable to the original doses (100-hour decay time period) and well within (< 25 %) the limiting values of 10 CFR Part 100. Control room doses are also well within the limit of General Design Criteria 19 to 10 CFR Part 50, Appendix A. Therefore it is concluded that the proposed decay time still provides sufficient margin to dose consequences from fuel handling and to spent fuel pool temperature limits.

Thus, it is concluded that the proposed revision to TS 3/4.9.3 does not involve a significant reduction in a margin of safety.

Therefore, based upon the evaluation presented above and the previous discussion of the amendment request, North Atlantic concludes that the proposed revision to TS 3/4.9.3, does not constitute a significant hazard as defined by the criteria in 10CFR50.92(c).

SECTIONS V AND VI

PROPOSED SCHEDULE FOR LICENSE AMENDMENT ISSUANCE AND EFFECTIVENESS

AND

ENVIRONMENTAL IMPACT ASSESSMENT

V. PROPOSED SCHEDULE FOR LICENSE AMENDMENT ISSUANCE AND EFFECTIVENESS

North Atlantic requests NRC review of License Amendment Request 02-06, and issuance of a license amendment by September 30, 2003, having immediate effectiveness and implementation within 90 days. Issuance of a license amendment by the requested date would afford North Atlantic the flexibility for planning of technical resources in support of Seabrook Station's 9th refueling outage scheduled to commence in October of 2003.

VI. ENVIRONMENTAL IMPACT ASSESSMENT

North Atlantic has reviewed the proposed license amendment against the criteria of 10CFR51.22 for environmental considerations. The proposed change does not involve a significant hazards consideration, nor increase the types and amounts of effluent that may be released off-site, nor significantly increase individual or cumulative occupational radiation exposures. Based on the foregoing, North Atlantic concludes that the proposed change meets the criteria delineated in 10CFR51.22(c)(9) for a categorical exclusion from the requirements for an Environmental Impact Statement.