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NYN-93052

April 7, 1993

United States Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Document Control Desk

Reference: Facility Operating License No. NPF-86, Docket No. 50-443

Subject: License Amendment Request 93-02: "Service Water System/Ultimate Heat Sink OPERABILITY Requirements" (TAC No. M85750)

Gentlemen:

North Atlantic Energy Service Corporation (North Atlantic) encloses herein License Amendment Request 93-02. This License Amendment Request is submitted pursuant to the requirements of 10CFR50.90 and 10CFR50.4.

The purpose of License Amendment Request 93-02 is to propose changes to the Seabrook Station Technical Specifications to redefine the requirements for an OPERABLE Service Water System and to consolidate the service water requirements with the requirements for the ultimate heat sink. The design of the Seabrook Station Service Water System employs two redundant loops. Each loop is equipped with two full capacity service water pumps, which use the Atlantic Ocean as the ultimate heat sink, and a cooling tower service water pump which uses the atmosphere as the ultimate heat sink. Operation of any one of the six pumps will satisfy the service water cooling requirements during the postulated design basis event. The requirements for service water cooling are presently contained in two separate Technical Specifications.

Seabrook Station Technical Specification 3/4.7.4 currently require two OPERABLE Service Water loops with each loop having three OPERABLE pumps (two service water pumps and one cooling tower service water pump) when in Modes 1, 2, 3, and 4. This requirement is unnecessarily restrictive since the second service water pump in each loop is not required for normal or design basis accident conditions and the associated cooling tower service water pump provides the required redundancy during the postulated design basis event. The proposed changes: (1) redefine an OPERABLE service water loop as having one OPERABLE service water pump and one OPERABLE cooling tower service water pump; (2) revise the allowed outage times for a service water loop cooling tower service water pump; (3) revise the surveillance requirements for service water pumps and; (4) adds two new action statements based on the proposed definition of service water system OPERABILITY. The proposed Technical Specification changes will remove the overly restrictive redundancy requirements and enhance plant reliability by allowing planned and corrective maintenance to be performed on line, thereby eliminating unnecessary mode changes. A Probabilistic Risk Assessment performed by North Atlantic supports the proposed definition of Service Water System OPERABILITY.

Seabrook Station Technical Specification 3/4.7.5 specifies the requirements for the ultimate heat sink. This specification has been consolidated into the proposed Technical Specification 3/4.7.5. This consolidation is proposed to reduce the potential for confusion between the Specifications and to control station operation in a manner consistent with the station design basis. The ultimate heat sink is the Atlantic Ocean when the service water pumps are utilized and the atmosphere when the cooling tower service water pumps are utilized.

The proposed changes to the Service Water System Technical Specification address issues identified in the NRC's Regulatory Review Task Force draft report related to requirements in Technical Specifications that go beyond regulatory requirements.

License Amendment Request 93-02 has been reviewed and approved by the North Atlantic Station Operation Review Committee and the Nuclear Safety Audit Review Committee.

As discussed in Section V of the License Amendment Request, the proposed changes have been determined not to involve a significant hazards consideration pursuant to 10CFR50.92. A copy of this letter and the enclosed License Amendment Request have been forwarded to the State of New Hampshire State Liaison Officer pursuant to 10CFR50.91(b). In addition, North Atlantic has determined that License Amendment Request 93-02 meets the criteria of 10CFR51.22(c)(9) for a categorical exclusion from the requirements for an Environmental Impact Statement (see Section VII, enclosed).

North Atlantic requests NRC review of License Amendment Request 93-02 and issuance of a license amendment by October 10, 1993 (see enclosed License Amendment Request 93-02, Section VI).

Should you have any questions regarding this letter, please contact Mr. Terry L. Harpster, Director of Licensing Services, at (603) 474-9521, extension 2765.

Very truly yours,

Ted C. Feigenbaum

Ted C. Feigenbaum

Enclosure

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North Atlantic
Energy Service Corporation

SEABROOK STATION UNIT 1

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

License Amendment Request No. 93-02
Service Water System/Ultimate Heat Sink
OPERABILITY Requirements

This License Amendment Request is submitted by North Atlantic Energy Service Corporation pursuant to 10CFR50.90. The following information is enclosed in support of this License Amendment Request:

- Section I - Introduction and Description of Proposed Changes
- Section II - Markup of Proposed Changes
- Section III - Retype of Proposed Changes
- Section IV - Safety Evaluation of Proposed Changes
- Section V - Determination of Significant Hazards for Proposed Changes
- Section VI - Proposed Schedule for License Amendment Issuance and Effectiveness
- Section VII - Environmental Impact Assessment
- Section VIII - Other Supporting Information

Sworn and Subscribed
to before me this
7th day of April, 1993

Tracy A. DeCredico
Notary Public

TRACY A. DeCREDICO, Notary Public
My Commission Expires October 3, 1995

Ted C. Feigenbaum
Ted C. Feigenbaum
Senior Vice President and Chief Nuclear Officer

I. Introduction and Description of Proposed Changes

A. Introduction

The purpose of the proposed Technical Specification change is to combine Technical Specification 3/4.7.5, Ultimate Heat Sink, with Technical Specification 3/4.7.4, Service Water System, and redefine the requirements for an OPERABLE Service Water System. The design of the Seabrook Station Service Water System employs two redundant loops. Each loop is equipped with two full capacity service water pumps, which use the Atlantic Ocean as the ultimate heat sink, and a cooling tower service water pump which uses the atmosphere as the ultimate heat sink. Seabrook Station's Technical Specifications currently require two OPERABLE Service Water loops with each loop having three OPERABLE pumps (two service water pumps and one cooling tower service water pump) when in Modes 1, 2, 3, and 4. This requirement unnecessarily exceeds single failure criteria since the second service water pump is not required for normal or design basis accident conditions and the associated cooling tower service water pump provides the required redundancy for the postulated design basis event. The proposed change redefines an OPERABLE service water loop as having one OPERABLE service water pump and one OPERABLE cooling tower service water pump. Additional changes are proposed to the duration that a cooling tower service water pump may be inoperable and to the surveillance requirements for service water pumps.

The requirements for transferring primary and secondary system heat loads are currently contained in two Technical Specifications. Technical Specification 3/4.7.4 specifies the requirements for the service water and cooling tower service water pumps and valves. Technical Specification 3/4.7.5 specifies the requirements for the service water pumphouse and the mechanical draft cooling tower. Both Technical Specifications must be met to have an operable system to transfer the required heat loads. This proposed change would consolidate these requirements into one Technical Specification.

The Service Water System is designed such that in the event of a Loss of Coolant Accident (LOCA) concurrent with a loss of offsite power, a single service water pump supplying a single flow train powered from its associated emergency diesel generator will provide sufficient capability to dissipate the heat loads. Service Water System cooling water for each loop is normally supplied by one of the two service water pumps which are located in the service water pumphouse. Cooling water is supplied to the service water pumphouse from the Atlantic Ocean via underground tunnels. In addition, to the service water pumphouse, a Seismic Category 1 mechanical draft cooling tower, with one cooling tower service water pump per loop, provides the required cooling water flow should the service water pumphouse fail to provide a sufficient supply of water due to seismic failure of the tunnels (see Figure 1).

A cooling tower actuation signal is generated if low service water pressure is sensed by two out of three loop pressure instruments and at least one service water pump breaker closed. These pressure instruments are safety related Class 1E devices. A tower actuation signal must be manually initiated if both service water pump breakers are open due to maintenance and/or electrical fault to transfer the cooling water supply from the service water pumphouse to the cooling tower.

Each service water pump is capable of supplying 100 percent of the flow required by a single loop to dissipate plant heat loads during normal full power operation and during postulated accident conditions. The cooling tower service water pump in each loop is also capable of providing 100 percent of the required cooling water flow in that loop to dissipate heat loads during the design basis event upon failure of the service water pumphouse tunnels. Thus, Technical Specifications currently require that the Service Water System have two OPERABLE loops with three OPERABLE pumps in each loop, each capable of dissipating post-LOCA heat loads.

North Atlantic performed a Probabilistic Risk Assessment of the proposed change in service water system requirements to one operable pump, the revised AOTs for two service water pumps within the same loop, and the revised AOT for one cooling tower service water pump, to determine their impact on core damage frequency. This PRA evaluation modified the Service Water System fault tree model to reflect the longer allowed outage times (AOT's) for planned or corrective maintenance on the Service Water System during power operation. The results of the evaluation indicate the proposed changes will have a minor effect on system unavailability and a small impact (2.5E-6 per year) on the core damage frequency (CDF). This change in CDF is insignificant within the uncertainty bounds of the CDF distribution. The Service Water System Probabilistic Risk Assessment is enclosed herein in Section VIII.

B. Description of Proposed Changes

The current Technical Specification requirement to have three OPERABLE pumps per service water loop is overly restrictive. As stated in the UFSAR, the Service Water System is designed to dissipate the heat loads of the design basis event using one of the six pumps (two service water pumps and one cooling tower service water pump per loop). In addition, the proposed changes to Technical Specification 3/4.7.4 will enhance plant operation by providing greater flexibility in planning and performing maintenance on the Service Water System. Most maintenance on the pumps is currently performed during refueling outages due to the restrictive nature of the current Technical Specifications. Performing planned maintenance at times other than during outages would provide greater flexibility in outage planning and would likely improve plant and component reliability. The proposed changes will also permit the performance of unplanned maintenance during plant operation while minimizing plant heatup and cooldown cycles.

The proposed changes to Technical Specification 3/4.7.4 are described below:

1. The Limiting Condition for Operation will be changed as follows:

   a. Service Water System OPERABILITY will be defined in terms of service water loops and the service water pumphouse, cooling tower service water loops and the mechanical draft cooling tower, and the cooling tower makeup system,

   b. An OPERABLE service water loop will be defined as consisting of one OPERABLE service water pump and an OPERABLE cooling tower service water pump. The standby pump is removed from Technical Specifications still leaving redundant loops each with redundant pumps capable of providing adequate service water flow to dissipate heat loads during the design basis event. A Probabilistic Risk Assessment Evaluation performed by the North Atlantic Reliability and Safety Engineering Group demonstrates that the change in core damage frequency associated with this change is insignificant within the bounds of uncertainty.

2. Action Statement (a), which permits operation with one inoperable service water pump for seven days, will be deleted.

3. Action Statement (b), which permits operation with two service water pumps inoperable (one inoperable pump in each loop) for 72 hours, is deleted.

4. Action Statement (c), which permits operation with two service water pumps in one loop inoperable for 24 hours, is deleted.

5. Action Statement (d), which permits operation with a cooling tower service water pump inoperable for 72 hours, is deleted.

6. Proposed Action Statement (a) permits an inoperable service water loop for up to 72 hours. The 72 hour Allowed Outage Time (AOT) is consistent with the Standard Technical Specifications for Westinghouse Pressurized Water Reactors (NUREG-1431). This AOT will apply to the entire service water loop flowpath with the exception of the associated cooling tower service water pump, as discussed above.

7. Proposed Action Statement (b) increases the AOT for the cooling tower service water pumps from 72 hours to seven days. This change is based on the lower contribution to risk of the cooling tower service water pumps as compared to the normally operating service water pumps. The acceptability of this change is supported by the Service Water System Probabilistic Risk Assessment Evaluation (Section VIII).

8. Proposed Action Statement (c) specifies a 72 hour AOT for two cooling tower loops or the mechanical draft cooling tower. This is consistent with the existing AOT for the cooling tower in Technical Specification 3/4.7.5.

9. Proposed Action Statement (d) specifies a 24 hour AOT for two loops other than the two cooling tower loops and for the service water pumphouse.

10. Proposed Action Statement (e) specifies a 72 hour AOT for the portable tower makeup pump system. Currently, Technical Specification 3.7.5 ACTION d., does not specify an AOT for the portable tower makeup pump. If this pump is inoperable for reasons other than improper storage, a one hour report is required. This is consistent with the current requirement in Technical Specification 3/4.7.5.

11. Proposed Surveillance Requirement 4.7.4.1 incorporates existing Surveillance Requirements 4.7.4.a and 4.7.4.b.1 as they apply to the service water loops. The requirement specified in Surveillance Requirement 4.7.4.b.2 to verify that each of the four service water pumps starts automatically upon loss of or failure to start of the redundant pump within the loop is deleted. With the standby service water pump not required for loop OPERABILITY, the basis for testing the automatic start capability of these pumps as a Technical Specification Surveillance no longer exists. The deletion of this portion of Surveillance Requirement 4.7.4.b.2 does not affect the regular inservice testing which is performed on the service water pumps and cooling tower service water pumps as required by Technical Specification Surveillance Requirement 4.0.5. The OPERABILITY of the service water pumps and cooling tower service water pumps is demonstrated during quarterly inservice testing of these pumps as required by North Atlantic Procedure MA 6.4 "Inservice Testing of Pumps."

12. Proposed Surveillance Requirement 4.7.4.2 incorporates existing Surveillance Requirements 4.7.4.a and 4.7.4.b.1 as they apply to the cooling tower loops.

In addition, it incorporates existing Surveillance Requirement 4.7.5.d.1 and adds a Surveillance Requirement to verify that the service water cooling tower pumps start on a Tower Actuation signal.

13. Proposed Surveillance Requirement 4.7.4.3 incorporates existing Surveillance Requirement 4.7.5.a.1.

14. Proposed Surveillance Requirement 4.7.4.4 incorporates existing Surveillance Requirements 4.7.5.a.2, 4.7.5.b, 4.7.5.c, and 4.7.5.d.2.

15. Technical Specification 3/4.7.5 will be deleted.

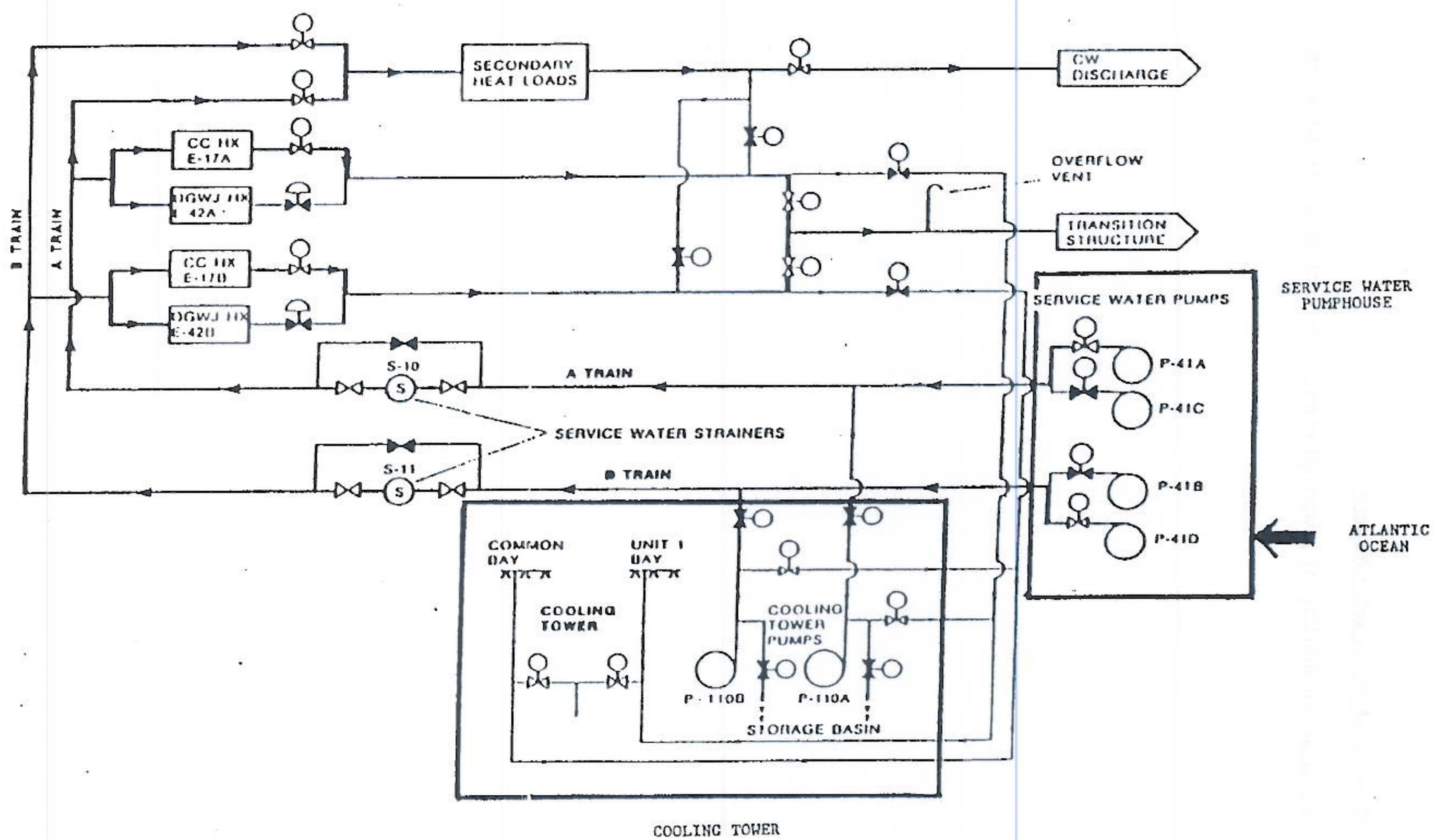
16. Bases 3/4.7.4, Service Water System, is revised to add additional details concerning Service Water System operation and to incorporate the bases for Technical Specification 3/4.7.5.

17. Bases 3/4.7.5, Ultimate Heat Sink, will be deleted.

In summary, all of the requirements of Technical Specification 3/4.7.5 have been incorporated in the proposed Technical Specification 3/4.7.4.

Seabrook Station Technical Specification 3/4.7.5 specifies the requirements for the ultimate heat sink. This specification has been consolidated into the proposed Technical Specification 3/4.7.4. This consolidation is proposed to reduce the potential for confusion between the Specifications and to control station operation in a manner consistent with the station design basis. The ultimate heat sink is the Atlantic Ocean when the service water pumps are utilized and the atmosphere when the cooling tower service water pumps are utilized.

Figure 1
Service Water System



II. Markup of Proposed Changes

See attached markup of proposed changes to Technical Specifications.

3/4.7.4 SERVICE WATER SYSTEM/ULTIMATE HEAT SINK

LIMITING CONDITION FOR OPERATION

3.7.4 At least two independent service water loops shall be OPERABLE, including three OPERABLE pumps in each loop. INSERT A

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

INSERT B

a. With one service water pump inoperable, restore the required service water pumps to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With two service water pumps inoperable, restore at least one of the inoperable service water pumps to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With two service water pumps within one loop inoperable, restore at least one of the inoperable pumps to OPERABLE status within 24 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

d. With one cooling tower service water pump inoperable, restore the required cooling tower service water pump to OPERABLE status within 72 hours or be in HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.7.4 At least two Station Service Water loops shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power-operated, or automatic) servicing safety-related equipment that is not locked, sealed, or otherwise secured in position is in its correct position; and

b. At least once per 18 months during shutdown, by verifying that:

1) Each automatic valve servicing safety-related equipment actuates to its correct position on its associated Engineered Safety Feature actuation test signal, and

2) Each of the four Station pumps aligned to the ocean ultimate heat sink (UHS) starts automatically upon loss of or failure to start of the redundant pump within the loop and each of the two pumps aligned to the cooling tower UHS starts on a cooling tower actuation (TA) signal.

INSERT C

3/4.7.5 ~~ULTIMATE HEAT SINK~~ (THIS SPECIFICATION NUMBER IS NOT USED)

LIMITING CONDITION FOR OPERATION

3.7.5 The ultimate heat sink (UHS) shall be OPERABLE with:

a. A service water pumphouse water level at or above 5'-0", minus 36'-0" Mean Sea Level, USGS datum, and

b. A mechanical draft cooling tower comprised of one cooling tower cell with one OPERABLE** fan and a second cell with two OPERABLE** fans, and a contained basin water level of equal to or greater than 42.15* feet at a bulk average water temperature of less than or equal to 70°F, and

c. A portable tower makeup pump system stored to be OPERABLE for 30 days following a Safe Shutdown Earthquake.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

a. With the service water pumphouse inoperable, restore the service water pumphouse to OPERABLE status within 72 hours, or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With the mechanical draft cooling tower inoperable, restore the cooling tower to OPERABLE status within 72 hours, or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With the portable tower makeup pump system not stored to be OPERABLE, restore the portable tower makeup pump system to its required stored condition within 72 hours, or declare the portable tower makeup pump system inoperable.

d. With the portable tower makeup pump system inoperable, continue operation and notify the NRC within 1 hour in accordance with the procedure of 10 CFR 50.72 of actions or contingencies to ensure an adequate supply of makeup water to the mechanical draft cooling tower for a minimum of 30 days.

* With the cooling tower in operation with valves aligned for tunnel heat treatment, the tower basin level shall be maintained at greater than or equal to 40.55 feet.

**A fan may be considered OPERABLE if it is capable of being manually started from the main control board.

ULTIMATE HEAT SINK

SURVEILLANCE REQUIREMENTS

4.7.5 The ultimate heat sink shall be determined OPERABLE:

a. At least once per 24 hours by:

1) Verifying the water level in the service water pumphouse to be at or above 5'-0", minus 36'-0" Mean Sea Level, and

2) Verifying the water in the mechanical draft cooling tower basin to be greater than or equal to a level of 42.15 feet.

b. At least once per week by verifying that the water in the mechanical draft cooling tower basin to be at a bulk average temperature of less than or equal to 70°F.

c. At least once per 31 days by:

1) Starting from the control room each UHS cooling tower fan that is required to be OPERABLE and operating each of those fans for at least 15 minutes, and

2) Verifying that the portable tower makeup pump system is stored in its design operational readiness state.

d. At least once per 18 months by:

1) Verifying that each automatic valve in the flowpath actuates to its correct position on a Tower Actuation test signal, and

2) Verifying the portable tower makeup pump develops a flow greater than or equal to 200 gpm on recirculation test flow.

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3/4.7.2 STEAM GENERATOR PRESSURE/TEMPERATURE LIMITATION

The limitation on steam generator pressure and temperature ensures that the pressure-induced stresses in the steam generators do not exceed the maximum allowable fracture toughness stress limits. The limitations of 70°F and 200 psig are based on a steam generator RT_{NDT} of 60°F and are sufficient to prevent brittle fracture.

3/4.7.3 PRIMARY COMPONENT COOLING WATER SYSTEM

The OPERABILITY of the Primary Component Cooling Water System ensures that sufficient cooling capacity is available for continued operation of safety-related equipment during normal and accident conditions. The redundant cooling capacity of this system, assuming a single failure, is consistent with the assumptions used in the safety analyses.

3/4.7.4 SERVICE WATER SYSTEM

INSERT D

The Service Water System consists of two independent loops, each of which can operate with either a service water pump train or a cooling tower pump train. The OPERABILITY of the Service Water System ensures that sufficient cooling capacity is available for continued operation of safety-related equipment during normal and accident conditions. The redundant cooling capacity of this system, assuming a single failure, is consistent with the assumptions used in the safety analyses, which also assumes loss of either the cooling tower or ocean cooling.

3/4.7.5 ULTIMATE HEAT SINK

The limitations on service water pumphouse level, and the OPERABILITY requirements for the mechanical draft cooling tower and the portable tower makeup pump system, ensure that sufficient cooling capacity is available to either: (1) provide normal cooldown of the facility or (2) mitigate the effects of accident conditions within acceptable limits. This cooling capability is provided by the Atlantic Ocean except during loss of ocean tunnel water flow, when the cooling capability is provided by the mechanical draft cooling tower with tower makeup using portable pumps.

INSERT E

The limitations on SERVICE WATER PUMPHOUSE minimum water level and the requirements for mechanical draft cooling tower OPERABILITY are based on providing a 30-day cooling water supply to safety-related equipment without exceeding its THE SAFETY RELATED EQUIPMENT design basis temperature and is consistent with the recommendations of Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Plants," March 1974.

The Cooling Tower is normally aligned to allow return flow to initally bypass the tower sprays and return to the basin. In addition, the control switches for the cooling tower fans are normally maintained in the "pull-to-lock" position. Upon receipt of a Tower Actuation Signal, the fans and sprays are manually operated as required. This manual operation, which is governed by procedures, ensures that ice does not buildup on the cooling tower tile fill and fans. Manual action is sufficient to maintain the cooling tower basin at a temperature which precludes equipment damage during the postulated design basis event.

INSERT F

3/4.7.5 (THIS SPECIFICATION NUMBER IS NOT USED)

INSERT A

The Service Water System shall be OPERABLE with:

a. An OPERABLE service water pumphouse and two service water loops with one OPERABLE service water pump in each loop,

b. An OPERABLE mechanical draft cooling tower and two cooling tower service water loops with one OPERABLE cooling tower service water pump in each loop, and

c. A portable cooling tower makeup system stored in its design operational readiness state.

INSERT B

a. With one service water loop inoperable, return the loop to OPERABLE status within 72 hours, or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With one cooling tower service water loop or one cooling tower cell inoperable, return the affected loop or cell to OPERABLE status within 7 days, or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With two cooling tower service water loops or the mechanical - draft cooling tower inoperable, return at least one loop and the mechanical draft cooling tower to OPERABLE status within 72 hours, or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

d. With two loops (except as described in c) or the service water pumphouse inoperable, return at least one of the affected loops and the service water pumphouse to OPERABLE status within 24 hours, or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

e. With the portable tower makeup pump system not stored in its design operational readiness state, restore the portable tower makeup pump system to its required condition within 72 hours, or continue operation and notify the NRC within the following 1 hour in accordance with the requirements of 10 CFR 50.72 *of* actions to ensure an adequate supply of makeup water for the service water cooling tower for a minimum of 30 days.

INSERT C

4.7.4.1 Each service water loop shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power-operated, or automatic) servicing safety related equipment that is not locked, sealed, or otherwise secured in position is in its correct position; and

b. At least once per 18 months during shutdown, by verifying that each automatic valve servicing safety-related equipment actuates to its correct position on its associated Engineered Safety Feature actuation test signal.

4.7.4.2 Each service water cooling tower loop shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power-operated, or automatic) servicing safety related equipment that is not locked, sealed, or otherwise secured in position is in its correct position; and

b. At least once per 18 months during shutdown, by verifying that:

1) Each automatic valve servicing safety-related equipment actuates to its correct position on its associated Engineered Safety Feature actuation test signal,

2) Each automatic valve in the flowpath actuates to its correct position on a Tower Actuation (TA) test signal, and

3) Each service water cooling tower pump starts automatically on a TA signal.

4.7.4.3 The service water pumphouse shall be demonstrated OPERABLE at least once per 24 hours by verifying the water level to be at or above 5'-0" (-36'-0" Mean Sea Level).

4.7.4.4 The mechanical draft cooling tower shall be demonstrated OPERABLE:

a. At least once per 24 hours by verifying the water in the mechanical draft cooling tower basin to be at a level of greater than or equal to 42.15' feet.

b. At least once per week by verifying that the water in the cooling tower basin to be at a bulk average temperature of less than or equal to 70°F.

INSERT C (continued)

c. At least once per 31 days by:

   1) Starting from the control room each cooling tower fan that is required to be OPERABLE and operating each of these fans for at least 15 minutes, and

   2) Verifying that the portable tower makeup pump system is stored in its design operational readiness state.

d. At least once per 18 months by verifying that the portable tower makeup pump develops a flow greater than or equal to 200 gpm.

With the cooling tower in operation with valves aligned for tunnel heat treatment, the tower basin level shall be maintained at greater than or equal to 40.55 feet.

INSERT D

Each service water loop consists of a service water pump and the piping, valves, and other components necessary to provide the flowpath required for heat removal. Each service water cooling tower loop consists of a service water cooling tower pump and the necessary piping, valves and other components required to provide its flowpath.

INSERT E

Cooling is normally provided by the Atlantic Ocean via the service water pumphouse. A seismically qualified mechanical draft cooling tower is provided as a backup to the ocean cooling water source because the supply from the circulating water tunnels is not seismically qualified. The mechanical draft cooling tower was designed to use three cells to support two units. Unit 1 utilizes two train-related cells; cell 1 serves Train A and has a single fan, the common cell serves Train B and has two fans. The cooling tower design basis is to provide the necessary ultimate heat sink in the event of a loss of ocean tunnel water flow; however, this source may be used during normal operations subject to the level and temperature limitations of this specification.

INSERT E (continued)

Switchover from the service water pumphouse to the mechanical draft cooling tower is accomplished either automatically (Tower Actuation (TA) signal) or manually. Manual action is required to realign the system from the cooling tower to the service water pumphouse. While a cooling tower pump is operating, interlocks prevent the train associated service water pumps from starting. To provide additional protection, during operation while aligned to the cooling tower, the service water pump control switches may be maintained in the pull-to-lock position to prevent inadvertent pump operation. As previously discussed, realignment to the service water pumphouse requires manual action; maintaining the control switches in the pull-to-lock position does not change this required action sequence. Pump operation is not affected by maintaining the control switches in the pull-to-lock position during this period; therefore, OPERABILITY of the service water pumps is not compromised.

INSERT F

The cooling tower basin temperature limit of 70°F provides sufficient time for manual initiation of the cooling tower sprays and fans following the design basis seismic event with a concurrent LOCA, during the design extreme ambient temperature conditions. Under this scenario,

III. Retype of Proposed Changes

See attached retype of proposed changes to Technical Specifications. The attached retype reflects the currently issued version of 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.

Revision bars are provided in the right hand margin to designate a change in the text.

3/4.7.4 SERVICE WATER SYSTEM/ULTIMATE HEAT SINK

LIMITING CONDITION FOR OPERATION

3.7.4 The Service Water System shall be OPERABLE with:

a. An OPERABLE service water pumphouse and two service water loops with one OPERABLE service water pump in each loop,

b. An OPERABLE mechanical draft cooling tower and two cooling tower service water loops with one OPERABLE cooling tower service water pump in each loop, and

c. A portable cooling tower makeup system stored in its design operational readiness state.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

a. With one service water loop inoperable, return the loop to OPERABLE status within 72 hours, or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With one cooling tower service water loop or one cooling tower cell inoperable, return the affected loop or cell to OPERABLE status within 7 days, or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

c. With two cooling tower service water loops or the mechanical draft cooling tower inoperable, return at least one loop and the mechanical draft cooling tower to OPERABLE status within 72 hours, or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

d. With two loops (except as described in c) or the service water pumphouse inoperable, return at least one of the affected loops and the service water pumphouse to OPERABLE status within 24 hours, or be in at least HOT STANDBY within 6 hours and in COLD SHUTDOWN within the following 30 hours.

e. With the portable tower makeup pump system not stored in its design operational readiness state, restore the portable tower makeup pump system to its required condition within 72 hours, or continue operation and notify the NRC within the following 1 hour in accordance with the requirements of 10 CFR 50.72 of actions to ensure an adequate supply of makeup water for the service water cooling tower for a minimum of 30 days.

3/4.7.4 SERVICE WATER SYSTEM/ULTIMATE HEAT SINK

SURVEILLANCE REQUIREMENTS

4.7.4.1 Each service water loop shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power-operated, or automatic) servicing safety related equipment that is not locked, sealed, or otherwise secured in position is in its correct position; and

b. At least once per 18 months during shutdown, by verifying that each automatic valve servicing safety-related equipment actuates to its correct position on its associated Engineered Safety Feature actuation test signal.

4.7.4.2 Each service water cooling tower loop shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power-operated, or automatic) servicing safety related equipment that is not locked, sealed, or otherwise secured in position is in its correct position; and

b. At least once per 18 months during shutdown, by verifying that:

1) Each automatic valve servicing safety-related equipment actuates to its correct position on its associated Engineered Safety Feature actuation test signal,

2) Each automatic valve in the flowpath actuates to its correct position on a Tower Actuation (TA) test signal and

3) Each service water cooling tower pump starts automatically on a TA signal.

4.7.4.3 The service water pumphouse shall be demonstrated OPERABLE at least once per 24 hours by verifying the water level to be at or above 5'-0" (-36'-0" Mean Sea Level).

4.7.4.4 The mechanical draft cooling tower shall be demonstrated OPERABLE:

a. At least once per 24 hours by verifying the water in the mechanical draft cooling tower basin to be at a level of greater than or equal to 42.15* feet.

b. At least once per week by verifying that the water in the cooling tower basin to be at a bulk average temperature of less than or equal to 70°F.

*With the cooling tower in operation with valves aligned for tunnel heat treatment, the tower basin level shall be maintained at greater than or equal to 40.55 feet.

3/4.7.4 SERVICE WATER SYSTEM/UTIMATE HEAT SINK

SURVEILLANCE REQUIREMENTS

c. At least once per 31 days by:

1) Starting from the control room each cooling tower fan that is required to be OPERABLE and operating each of these fans for at least 15 minutes, and

2) Verifying that the portable tower makeup pump system is stored in its design operational readiness state.

d. At least once per 18 months by verifying that the portable tower makeup pump develops a flow greater than or equal to 200 gpm.

3/4.7.5 (THIS SPECIFICATION NUMBER IS NOT USED)

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3/4.7.2 STEAM GENERATOR PRESSURE/TEMPERATURE LIMITATION

The limitation on steam generator pressure and temperature ensures that the pressure-induced stresses in the steam generators do not exceed the maximum allowable fracture toughness stress limits. The limitations of 70°F and 200 psig are based on a steam generator RT_{NDT} of 60°F and are sufficient to prevent brittle fracture.

3/4.7.3 PRIMARY COMPONENT COOLING WATER SYSTEM

The OPERABILITY of the Primary Component Cooling Water System ensures that sufficient cooling capacity is available for continued operation of safety-related equipment during normal and accident conditions. The redundant cooling capacity of this system, assuming a single failure, is consistent with the assumptions used in the safety analyses.

3/4.7.4 SERVICE WATER SYSTEM/ULTIMATE HEAT SINK

The Service Water System consists of two independent loops, each of which can operate with either a service water pump train or a cooling tower pump train. Each service water loop consists of a service water pump and the piping, valves, and other components necessary to provide the flowpath required for heat removal. Each service water cooling tower loop consists of a service water cooling tower pump and the necessary piping, valves and other components required to provide its flowpath. The OPERABILITY of the Service Water System ensures that sufficient cooling capacity is available for continued operation of safety-related equipment during normal and accident conditions. The redundant cooling capacity of this system, assuming a single failure, is consistent with the assumptions used in the safety analyses, which also assumes loss of either the cooling tower or ocean cooling.

Cooling is normally provided by the Atlantic Ocean via the service water pumphouse. A seismically qualified mechanical draft cooling tower is provided as a backup to the ocean cooling water source because the supply from the circulating water tunnels is not seismically qualified. The mechanical draft cooling tower was designed to use three cells to support two units. Unit 1 utilizes two train-related cells; cell 1 serves Train A and has a single fan, the common cell serves Train B and has two fans. The cooling tower design basis is to provide the necessary ultimate heat sink in the event of a loss of ocean tunnel water flow; however, this source may be used during normal operations subject to the level and temperature limitations of this specification.

Switchover from the service water pumphouse to the mechanical draft cooling tower is accomplished either automatically (Tower Actuation (TA) signal) or manually. Manual action is required to realign the system from the cooling tower to the service water pumphouse. While a cooling tower pump is operating, interlocks prevent the train associated service water pumps from starting. To provide additional protection, during operation while aligned to the cooling tower, the service water pump control switches may be maintained in the pull-to-lock position to prevent inadvertent pump operation. As previously

3/4.7.4 SERVICE WATER SYSTEM/ULTIMATE HEAT SINK (Continued)

discussed, realignment to the service water pumphouse requires manual action; maintaining the control switches in the pull-to-lock position does not change this required action sequence. Pump operation is not affected by maintaining the control switches in the pull-to-lock position during this period; therefore, OPERABILITY of the service water pumps is not compromised.

The limitations on service water pumphouse minimum water level and the requirements for cooling tower OPERABILITY are based on providing a 30-day cooling water supply to safety-related equipment without exceeding the safety related equipment design basis temperature and is consistent with the recommendations of Regulatory Guide 1.27, "Ultimate Heat Sink for Nuclear Plants," March 1974.

The Cooling Tower is normally aligned to allow return flow to bypass the tower sprays and return to the basin. In addition, the control switches for the cooling tower fans are normally maintained in the "pull-to-lock" position. Upon receipt of a Tower Actuation Signal, the fans and sprays are manually operated as required. This manual operation, which is governed by procedures, ensures that ice does not buildup on the cooling tower tile fill and fans. The cooling tower basin temperature limit of 70°F provides sufficient time for manual initiation of the cooling tower sprays and fans following the design basis seismic event with a concurrent LOCA, during the design extreme ambient temperature conditions. Under this scenario, manual action is sufficient to maintain the cooling tower basin at a temperature which precludes equipment damage during the postulated design basis event.

3/4.7.5 (THIS SPECIFICATION NUMBER IS NOT USED)

IV. Safety Evaluation of License Amendment Request 93-02 Proposed Changes

Seabrook Station currently has two Technical Specifications that pertain to the transfer of primary and secondary component heat load. Technical Specification 3/4.7.4 specifies requirements for the Service Water System. Technical Specification 3/4.7.5 specifies requirements for the Ultimate Heat Sink.

Combining Technical Specifications 3/4.7.4 and 3/4.7.5 consolidates the requirements for the transfer of heat loads from plant components. The current requirements of Technical Specification 3/4.7.5 are incorporated in the proposed Technical Specification 3/4.7.4. The Allowed Outage Time (AOT) for an INOPERABLE portable tower makeup pump system has been made consistent with the AOT for an improperly stored pump (72 hours).

Technical Specification 3/4.7.4 currently requires two OPERABLE Service Water loops with each loop having three OPERABLE pumps (two service water pumps and one cooling tower service water pump) when in Modes 1, 2, 3, and 4. This requirement unnecessarily exceeds single failure criteria since the second service water pump is not required for plant safety. The proposed changes redefine an OPERABLE service water loop as having one OPERABLE service water pump and one OPERABLE cooling tower service water pump. Additional changes are proposed to the duration that cooling tower service water loops and service water loops may be inoperable, and to the surveillance requirements for service water pumps.

North Atlantic performed a Probabilistic Risk Assessment (PRA) Evaluation which assumed that the standby service water pumps were unavailable for an extended period of time while at power. The purpose of this evaluation was to account for planned and unplanned maintenance, consistent with the assumptions for other equipment that does not have a Limiting Condition of Operation. The new service water model developed in this evaluation was used to evaluate the unavailability of both service water pumps in a loop consistent with the proposed Action Statement requirement of 72 hours, and cooling tower service water pump unavailability with the proposed Action Statement requirement of seven days. This evaluation demonstrates that the impact on the core damage frequency associated with the proposed changes to Technical Specification 3/4.7.4 is insignificant within the bounds of the core damage frequency uncertainty. The evaluation did not include the positive contributions due to increased flexibility in performing pump maintenance without changing operating mode or the fact that in actuality, service water pump maintenance would receive high priority to restore its availability. The Service Water Probabilistic Risk Assessment is enclosed herein in Section VIII.

Each service water pump is capable of supplying 100 percent of the flow required by a single loop to dissipate plant heat loads during normal full power operation and during postulated accident conditions. The cooling tower service water pump in each loop is also capable of providing 100 percent of the required cooling flow in that loop to dissipate heat loads of the design basis event upon failure of the service water pumphouse tunnels. Thus, with three OPERABLE pumps in each loop, the Service Water System currently has two redundant loops with each loop having three pumps capable of dissipating the design basis event heat loads.

The proposed change is consistent with maintaining redundant service water loops each of which is capable of supplying 100 percent of the cooling water flow required during a LOCA with a concurrent loss of offsite power. An OPERABLE service water loop will be defined as having two OPERABLE pumps, a service water pump and a cooling tower service water pump. The standby service water pump will be considered an installed spare to provide operational flexibility, increased system availability, and the capability for on-line pump maintenance. The increase in the Allowed Outage Time (AOT) for the cooling tower service water pump reflects its lower risk relationship as compared to the operating service water pump. The 72 hour AOT for a service water loop is consistent with the Standard Technical Specifications for Westinghouse Pressurized Water Reactors and is supported by the new Probabilistic Risk Assessment for the Service Water System.

The proposed change remains consistent with the Bases for Technical Specification 3/4.7.4. Each of the two independent loops will operate with either a service water pump or a cooling tower service water pump and will provide sufficient cooling capacity for continued operation of safety-related equipment during accident conditions. Since each loop will have a redundant pump, the system, assuming a single failure, remains consistent with the assumptions specified in the UFSAR, Section 9.2.

This proposed amendment does not change the cooling tower actuation logic. Automatic tower actuation will still occur upon loss of service water pressure with at least one service water pump breaker closed, as would be experienced on loss of the service water pumphouse due to seismic failure of the tunnels. The tower actuation signal is automatically generated if low service water pressure is sensed by two out of three loop pressure instruments. These pressure instruments are Class 1E Seismic Category I and indicate service water pump discharge header pressure. If the operating service water pump's breaker opens due to electrical failure of the pump motor, and the standby pump fails to start or is unavailable due to maintenance, a tower actuation will be manually generated from the Main Control Board. For conservatism, the probabilistic risk assessment for this proposed change assumed a manual tower actuation was required upon loss of the operating service water pump. Manual transfer of service water heat loads to the cooling tower is consistent with Section 9.2 of the UFSAR and is addressed in the appropriate system operating, abnormal, and emergency procedures.

Since each set of service water pumps and the associated cooling tower service water pumps are powered from the emergency buses, a loss of power to one bus will still leave the other service water loop unaffected with at least one OPERABLE service water pump.

While a literal interpretation of the proposed change could result in having a service water pump inoperable for an extended period of time, North Atlantic has committed to a safe, conservative operating philosophy. This policy would preclude operation of the Service Water System in a degraded condition due to pump inoperability for an extended period of time. The Seabrook Station Maintenance Manual identifies a priority system for the repair of system components. In the case of the Service Water System, a Service Water pump repair would receive a high priority and would thereby be expeditiously repaired.

The requirement specified in Surveillance Requirement 4.7.4.b.2 to verify that each of the four service water pumps starts automatically upon loss, or failure to start, of the redundant pump within the loop is deleted. With the standby service water pump not required for loop OPERABILITY, the basis for testing the automatic start capability of these pumps as a Technical Specification Surveillance no longer exists. The deletion of this portion of Surveillance Requirement 4.7.4.b.2 does not affect the regular inservice testing which is performed on the service water pumps and cooling tower service water pumps as required by Technical Specification Surveillance Requirement 4.0.5. The OPERABILITY of the service water pumps and cooling tower service water pumps is demonstrated during quarterly inservice testing of these pumps as required by North Atlantic Procedure MA 6.4 "Inservice Testing of Pumps."

The proposed Technical Specification changes are consistent with the Updated Final Safety Analysis Report (UFSAR) Section 9.2, the conclusions of the current Service Water System model in the Seabrook Probabilistic Safety Assessment (IPE Report), and the Bases for Technical Specification 3/4.7.4.

In addition, the proposed changes to Technical Specification 3/4.7.4 will enhance plant operation by providing greater flexibility in planning and performing maintenance on the Service Water System. Most maintenance on the pumps is currently performed during refueling outages due to the restrictive nature of the current Technical Specifications. Performing planned maintenance at times other than during outages would provide greater flexibility in outage planning and would likely improve plant and component reliability. The proposed changes will also permit the performance of unplanned maintenance during plant operation while minimizing plant heatup and cooldown cycles.

Seabrook Station Technical Specification 3/4.7.5 specifies the requirements for the ultimate heat sink. This specification has been consolidated into the proposed Technical Specification 3/4.7.5. This consolidation is proposed to reduce the potential for confusion between the Specifications and to control station operation in a manner consistent with the station design basis. The ultimate heat sink is the Atlantic Ocean when the service water pumps are utilized and the atmosphere when the cooling tower service water pumps are utilized.

V. Determination of Significant Hazards for License Amendment Request 93-02 Proposed Changes

(1) The proposed changes do not involve a significant increase in the probability or consequences of an accident previously evaluated.

The proposed changes do not increase the consequences of any accident previously evaluated in the UFSAR. The only design basis accident of concern is a Loss of Coolant Accident (LOCA) concurrent with a loss of offsite power. The systems relied upon to mitigate this accident are the Emergency Core Cooling System (ECCS), the Containment Building Spray System (CBS) and the emergency AC power system emergency diesel generators (EDG's). The Service Water System has a potential effect on the ECCS and CBS systems since it provides the cooling water flow for the Primary Component Cooling Water System, which in turn provides the cooling water flow for the ECCS and CBS systems and it provides cooling water for the EDG's.

The Service Water System is designed to provide the required cooling water flow to safety related systems necessary for the safe shutdown of the plant following a LOCA with a loss of off-site power. The system was designed with two independent loops, with each loop having two possible heat sinks. The normal heat sink is the Atlantic Ocean, with cooling water flow provided by one of two service water pumps. The alternate heat sink is the atmosphere utilizing a Seismic Category 1, mechanical draft cooling tower. In the unlikely event that insufficient ocean water flow is available at the service water pumphouse, a tower actuation signal would be generated to automatically align the system to the cooling tower, with full flow provided by the associated cooling tower service water pump. If both service water pump breakers are open due to maintenance and/or electrical fault, manual initiation of the tower actuation signal will continue to be performed in accordance with existing procedures.

The required post-LOCA cooling flow can be provided by one pump in one service water loop. The proposed Technical Specification changes will still require the capability to meet the single failure criteria. Technical Specifications will continue to require two independent service water loops with each loop provided with two redundant pumps (e.g. one service water pump and one cooling tower service water pump). The increased Allowed Outage Time (AOT) for an inoperable service water loop is consistent with the Standard Technical Specifications for Westinghouse Pressurized Water Reactors (NUREG-1431). The increased AOT for the cooling tower service water pumps reflects their lower risk relationship as compared to the service water pumps.

The Service Water System Probabilistic Risk Assessment (PRA) model was revised to include; (1) the affects of removing the standby service water pump from the definition of loop OPERABILITY, (2) increasing to seven days the AOT for the cooling tower service water pumps and (3) the 72 hour AOT for an inoperable service water loop. This PRA evaluation demonstrates that the proposed Technical Specification changes have an insignificant effect on the core damage frequency. Redundancy of the Service Water System is maintained, with two redundant loops provided with redundant pumps, each of which is capable of supplying 100 percent of the required flow to dissipate the heat of the design basis event.

(2) The proposed changes do not create the possibility of a new or different kind of accident from any accident previously evaluated.

The proposed Technical Specification changes do not change the design or function of any plant structure, system or component, nor do they introduce any new failure modes. The Service Water System will continue to meet single failure criteria for the design basis accident by requiring two redundant service water loops, with each loop containing fully redundant pumps capable of removing post-LOCA heat loads from the design basis accident. There are no modifications to plant structures, systems and components associated with these proposed changes, and the operation of plant equipment and systems remains unchanged. Since the changes proposed in this License Amendment Request do not revise existing plant structures, systems and components nor does it change the manner in which the plant is operated and in which it will respond to the design basis accident the proposed changes do not create the possibility of a new or different kind of accident from any previously analyzed.

(3) The proposed changes do not result in a significant reduction in the margin of safety.

The bases for Technical Specification 3/4.7.4 state the following:

> "The Service Water System consists of two independent loops, each of which can operate with either a service water pump train or a cooling tower pump train. The OPERABILITY of the Service Water System ensures that sufficient cooling capacity is available for continued operation of safety-related equipment during normal and accident conditions. The redundant cooling capacity of this system, assuming a single failure, is consistent with the assumptions used in the safety analyses, which also assumes loss of either the cooling tower or ocean cooling."

The changes proposed in this License Amendment Request do not alter the Service Water System's ability to perform its safety related function as defined above. As discussed for criterion (1) and (2) above, OPERABILITY of the standby service water pump is not necessary to ensure at least one loop with at least one pump supplying 100 percent of the required flow is available during the design basis accident. Thus, there is no significant reduction in the margin of safety. Since none of the assumptions in the Technical Specification Bases are affected by this proposed change the margin of safety which exists in the Service Water System is not reduced.

VI. Proposed Schedule for License Amendment Issuance and Effectiveness

North Atlantic requests NRC review of License Amendment Request 93-02 and issuance of a license amendment having immediate effectiveness by October 10, 1993.

The proposed changes to Technical Specification 3/4.7.4 will enhance plant operation by providing greater flexibility in planning and performing maintenance on the Service Water System and will consolidate the requirements for the Service Water System, which includes the service water pumphouse and mechanical draft cooling tower, in one Technical Specification. Most maintenance on the pumps is currently performed during refueling outages due to the restrictive nature of the current Technical Specifications. Performing planned maintenance at times other than during outages would provide greater flexibility in outage planning. The proposed changes will also permit the performance of unplanned maintenance during plant operation while minimizing plant heatup and cooldown cycles.

VII. Environmental Impact Assessment

North Atlantic has reviewed the proposed license amendment against the criteria of 10CFR51.22 for environmental considerations. The proposed changes do not involve a significant hazards consideration, nor increase the types and amounts of effluents that may be released offsite, 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.

VIII. Other Supporting Information

PRA Evaluation:	Change in Service Water Tech Spec 3.7.4 Engineering Evaluation 92-09, Revision 2 December 1992

Enclosed herein.

PRA EVALUATION:

CHANGE IN SERVICE WATER TECH SPEC 3.7.4

Engineering Evaluation 92-09 Rev. 2

December 1992

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PRA EVALUATION: CHANGE IN SERVICE WATER TECH SPEC 3.7.4

1.0 Introduction

This evaluation documents the change in operational risk, at the system level (system availability) and at the plant level (core damage frequency), for a proposed change in the Allowed Outage Times (AOTs) for the Service Water (SW) System.

2.0 Background

The current Service Water Tech Spec (TS 3.7.4) applies AOTs to all six SW pumps - four ocean water pumps and two cooling tower pumps. These pumps are each 100% capacity and provide triple redundancy per train. In the licensing design basis, the cooling tower is the seismically qualified ultimate heat sink. Thus, to define operability, one train of SW must contain one SW pump, one CT pump, and the associated flow paths to the PCC and DG heat exchangers. On that basis, a new TS has been proposed, summarized in the table below:

	Allowed Outage Time	
Components Inoperable	Current TS 3.7.4	Proposed TS 3.7.4
1 SW pump	7 d	N/A
2 SW pumps, opposite loop	72 hr	N/A
2 SW pumps, same loop	24 hr	72 hr
1 CT pump	72 hr	7 d
One loop (except for CT pump)	not explicit	72 hr

(See proposed Tech Spec 3.7.4, Attachment 1). The change for SW pumps brings this Tech Spec in line with the Standard Tech Specs, which have a 72-hour AOT for single SW train unavailability. The increase in the CT pump AOT is based on the lower risk importance of the standby CT subsystem compared to the normally operating ocean SW subsystem. Thus, a longer AOT for 1 CT pump (7 days Vs 72 hours for one SW loop) has been proposed.

3.0 Discussion

This Tech Spec change impacts risk by increasing the likelihood that a SW pump would be unavailable due to planned or unplanned maintenance. This change is evaluated by considering the impact on system unavailability (Section 3.1) and on the frequency of shutdown due to loss of one train of SW (Section 3.2). These impacts are combined in the plant model to produce a delta core damage frequency (Section 3.3).

3.1 SW System Model

The SW system is included in the current Seabrook PRA - SSPSS-1990. This model includes the ocean SW pumps, the Cooling Tower and pumps (manual actuation only), the flow path through the PCC and DG heat exchangers, and the associated area ventilation. The maintenance contribution to the SW system model is described below (the "current" model); then the model with the change in Tech Spec is presented (the "new" model).

(1) Current Maintenance Model

This model includes contributions from *unplanned maintenance*, based on the number of pumps, the maintenance frequency, and the maintenance duration, as follows:

- ocean SW pump, for each loop (7-day LCO)

  = MNT1 = MNT2

  = 2 x ZMPSWF x ZMPLSD = 0.0123

- cooling tower pump (72-hr LCO)

  = MNT3

  = 2 x ZMPMSF x ZMPMSD = 0.00260

- cooling tower fans (based on TS 3.7.5, 72-hr LCO)

  = MNT4

  = 3 x ZMPMSF x ZMPMSD = 0.00526

where the frequency and duration variables are based on generic data from PLG-0500, as follows:

ZMPSWF = 3.35E-4 (mean)	- Maint. Freq. - operating SW pumps
ZMPMSF = 1.17E-4 (mean)	- Maint. Freq. - standby pumps (CT pump/fan)
ZMPLSD = 28.7 hr (mean)	- Maint. Duration - pumps, 7-day LCO
ZMPMSD = 11.1 hr (mean)	- Maint Duration - pump/fan, 72-hr LCO

Assumptions in the current model:

- Maintenance frequencies and durations are based on generic industry data and not on Seabrook specific data due to the limited operational data. This data was collected by PLG from a number of nuclear plants for similar equipment and is judged to be reasonably representative of expected Seabrook experience. (Note that the mean maintenance duration is considerably less than the LCO based on actual experience, but increases with longer LCO.)

- No planned maintenance is done on the SW system during power operation that makes a pump inoperable.
- No contribution is given to 2 SW pumps in unplanned maintenance at the same time because of the low likelihood of dual pump failure or failure of the second pump while the first was being repaired.
- The maintenance contribution from pumps (and CT fans) covers unplanned maintenance from other components. Thus, no explicit maintenance contribution is modeled for valves, instrumentation, etc., that would make a loop inoperable. The pump contribution is assumed to dominate maintenance unavailability.
- Maintenance contribution from failures of SW or CT ventilation is not included because it is assumed that remedial action would be taken to keep the SW system operational.
- Maintenance is unrecoverable. This assumption may be very conservative for some maintenance activities where the system can be made operable quickly.

(2) New Maintenance Model

A "new" SW model was developed to account for the proposed changes in Tech Specs. These changes impact the modeling of unplanned maintenance and planned maintenance, as follows:

Unplanned Maintenance:

- standby SW pump in each train (no LCO)

  = MNT1' = MNT2'

  = 2 x ZMPSWF x ZMPSWD = 0.0653

- cooling tower pump (7-day LCO)

  = MNT3'

  = 2 x ZMPMSF x ZMPLSD = 0.00672

- cooling tower fans (based on TS 3.7.5, unchanged)

  = MNT4 (same as current model)

where the variables are based on generic data from PLG-0500, as follows:

ZMPSWD = 97.4 hr (mean) - Maint. Duration - SW pumps, no LCO

Other variables - see current model

Assumptions:

- The standby SW pump is repaired in unplanned maintenance with no special priority - consistent with other pumps with no LCO. This is believed to be conservative; a SW pump failure would still receive high priority. The variable ZMPSWD was developed from the data variable ZMPNSD in PLG-0500, using generic data for SW and CC pumps, judged to be more representative of the SW and CC pumps at Seabrook.

Planned Maintenance for the standby SW pump in each train:

= MNT1(PLANNED) = MNT2(PLANNED)

= 2 x (1/4 yr) x (1 yr/ 8760 hr) x (336 hr) = 0.0192

Assumptions:

- Each SW pump is unavailable due to planned maintenance once every four years for 14 days.
- Planned maintenance is done on one pump at a time - no MNT1(PLANNED) X MNT2(PLANNED) terms.

The quantification for the "new" SW model is in general as follows

SW Unavail. = SWpumps(hardware failure + *unplanned maint.* + *planned maint.*) * CTpumps (hardware failure + *unplanned maint*) + common components failure

where the terms in italic are the ones affected by the proposed TS change.

(3) Quantitative Results - Systems Analysis

The SW system configuration is quantified for a number of different boundary conditions. Boundary conditions are the signals and support systems, external to the SW system, that impact the system configuration. For example, with loss of offsite power (LOSP), the SW pumps must restart, presenting a different failure mode - pump fails to start - that is not present when offsite power is available. The important boundary conditions for the SW system are the number of support systems (e.g. AC power) available, LOSP, SI signal, and whether the Cooling Tower is included. The combination of boundary conditions that are quantified is given below:

System Configuration	Number of Trains	LOSP Initiator	SI Signal Present	CT Included *
SW1	2		x	x
SW2	2			x
SW3	2	x		
SW4	1		x	x
SW5	1			x
SW6	1	x		
SW7	2		x	
SW8	2			
SW9	1		x	
SWA	1			

* Cooling Tower is included in the SW system assuming manual actuation. This action is credited for all initiators except loss of offsite power (LOSP), due to the short time available to restore DG cooling, and other severe hazards (e.g., seismic events) due to the confusion that might result in the control room.

With the maintenance contribution changes above, the SW system unavailability changes as follows:

System Unavailability (Current/New TS)			Maintenance Contribution (Percent of TOTAL)	
System Configuration	TOTAL	(Percent Change)	Unplanned Maint.	Planned Maint.
SW1	3.32E-4		<0.1 %	-
	3.32E-4	(<0.1 %)	<0.1 %	<0.1 %
SW2	3.95E-7		9.1 %	-
	4.67E-7	(18.1 %)	19.3 %	3.8 %
SW3	7.90E-4		2.2 %	-
	8.50E-4	(7.6 %)	7.1 %	2.1 %
SW4	4.34E-3		0.2 %	-
	4.35E-3	(0.2 %)	0.4 %	<0.1 %
SW5	6.01E-5		15.7 %	-
	7.02E-5	(16.8 %)	25.7 %	2.1 %
SW6	1.34E-2		1.3 %	-
	1.40E-2	(4.4 %)	4.2 %	1.2%
SW7	3.70E-4		0.5 %	-
	3.76E-4	(1.6 %)	1.6 %	0.5 %
SW8	4.09E-5		4.3 %	-
	4.69E-5	(14.6 %)	12.7 %	<0.1 %
SW9	5.57E-3		0.7 %	-
	5.70E-3	(2.3 %)	2.3 %	0.7 %
SWA	1.29E-3		3.0 %	-
	1.42E-3	(10.3%)	9.3 %	2.7 %

The results at the system level indicate that, for about half the cases, the change in Tech Specs generally has a insignificant impact on system unavailability. Of the others, the most significant changes are for SW2, SW5, SW8, and SWA which are all normal configuration cases, i.e. offsite power available and no SI signal present. For these cases, the pump failure terms are important and, consequently, increasing pump maintenance unavailability affects the total. For the other system configurations, the system unavailability is dominated by failure of valves to close to isolate the non-safety loads given a LOSP or SI signal. For these cases, pump maintenance is a relatively small contribution to total system unavailability. Increasing this small contribution results in small changes in system unavailability.

Thus, the impact of the Tech Spec change on SW system unavailability is dependent on the boundary conditions. To evaluate how important the various boundary conditions are to risk, these results are integrated into the plant model below.

3.2 Initiating Event Frequency

Loss of either train of SW would affect the plant power generation through PCC cooling to the RCP motors. The frequency of loss of one SW train is given by the frequency of loss of one ocean SW pump over one year of operation and failure of the other pump while the first is being repaired. This also includes failure of the operating pump while the standby pump is out for maintenance - either planned or unplanned. (There are also other combinations of valves, heat exchangers, etc. that could fail and contribute to loss of the train; however, they are not affected by this TS change. In addition, no credit is given for operator action to start the Cooling Tower in time to prevent the shutdown.)

The equation for loss of one SW train can be written, in general, as follows:

$$L1SW = F(PA)*T(yr) * F(PC)*T(repair) + F(PA)*T(yr) * M(PC)$$

where:

F(PA) = failure rate for operating SW pump (A) to continue to run,

F(PC) = failure rate for standby SW pump (C) to start and run while pump A is being repaired,

T(yr) = duration the operating SW pump must run = 8760 hr per yr * 0.70 , plant availability factor,

T(repair) = duration of unplanned maintenance on failed pump A,

M(PC) = pump C unavailability due to planned and unplanned maintenance.

The last two term are the ones that change due to the new TS AOT, as follows:

	Current TS Model	New TS Model
T(repair)	ZMPLSD	ZMPSWD
M(PC)		
Planned Maint.	none	2*(1/4)*(1/8760)*336
Unplanned Maint.	ZMPSWF*ZMPLSD	ZMPSWF*ZMPSWD

where the variables are defined earlier.

The results are given below:

L1SW	Initiator Frequency	Maintenance Contribution (Percent of TOTAL)	
	TOTAL	Unplanned Maint.	Planned Maint.
Current TS Model	5.47E-3 per yr	44.2 %	-
New TS Model	1.83E-2 per yr	67.8 %	20.9 %

Thus, the initiator frequency increases by about a factor of 3. This large increase is due to the significance of maintenance in the current model.

3.3 Quantitative Results - Core Damage Frequency

As a result of the change in TS, the CDF (mean) changes by about 2.5E-6 per year, or 2.3 % increase in the total (1.12E-4/yr). This change is due about equally to the following impacts:

- System unavailability (1.0 %)
- Initiating event frequency (1.3 %)

This is a change in the mean value from 1.12E-4 to 1.14E-4, compared to the range of the CDF distribution which is approximately one order of magnitude (from 5th to 95th percentile). Thus, this is an insignificant change within the uncertainty bounds on the CDF distribution.

4.0 Conclusion

As a result of the quantitative evaluation above, the effect of the changes proposed for TS 3.7.4 is generally small for the SW system unavailability and is significant for the SW initiating event frequency. However, with these changes in the plant model, the overall result is insignificant to the core damage frequency. This evaluation is based on a best estimate of planned and unplanned SW pump maintenance.

The evaluation does not include the positive contributions due to removing the major SW pump maintenance activities from outages. These contributions include reducing the unavailability of SW pumps during outages and permitting more flexibility in outage planning. The outage effects are very sensitive to the configuration of the primary system, time after shutdown, other systems unavailable, etc. and thus are difficult to estimate. As a result, the proposed Tech Spec change does not increase the core damage risk within the bounds of the uncertainty.

3/4.7.4 SERVICE WATER SYSTEM

LIMITING CONDITION FOR OPERATION

3.7.4 At least two independent service water loops shall be OPERABLE, with one service water pump and one cooling tower service water pump in each loop.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTION:

a. With one service water loop inoperable due to an inoperable cooling tower service water pump, restore the required cooling tower service water pump to OPERABLE status within 7 days or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

b. With one service water loop inoperable except as specified in ACTION a., restore the required service water loop to OPERABLE status within 72 hours or be in at least HOT STANDBY within the next 6 hours and in COLD SHUTDOWN within the following 30 hours.

SURVEILLANCE REQUIREMENTS

4.7.4 At least two Station Service Water loops shall be demonstrated OPERABLE:

a. At least once per 31 days by verifying that each valve (manual, power-operated, or automatic) servicing safety-related equipment that is not locked, sealed, or otherwise secured in position is in its correct position; and

b. At least once per 18 months during shutdown, by verifying that:

1) Each automatic valve servicing safety-related equipment actuates to its correct position on its associated Engineered Safety Feature actuation test signal, and

2) Each of the two station pumps aligned to the cooling tower ultimate heat sink (UHS) starts automatically on a cooling tower actuation (TA) signal.