

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

License Amendment Request No. 93-04  
Engineered Safety Features Actuation System (ESFAS)  
Surveillance Intervals

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
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Sworn and Subscribed  
to before me this

23rd day of April, 1993

Tracy A. DeCredico  
Notary Public

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

## I. INTRODUCTION AND DESCRIPTION OF PROPOSED CHANGES

### A. Introduction

The Westinghouse Owners Group (WOG) initiated a program in response to growing concerns about the impact of current testing and maintenance requirements on plant operation, particularly as related to instrumentation systems, and to develop a justification to be used to revise generic and plant specific instrumentation Technical Specifications. Operating plants have experienced many inadvertent reactor trips and engineered safety system actuations during performance of instrumentation surveillances, causing unnecessary transients and challenges to safety systems. Significant time and effort on the part of a plants operating staff is devoted to performing, reviewing, documenting, and tracking the various surveillance activities which, in many instances, seemed unwarranted based on the high reliability of the equipment. Significant benefits for operating plants are achievable through the revision of instrumentation test and maintenance requirements.

In February 1983, the WOG submitted WCAP-10271, "Evaluation of Surveillance Frequencies and Out of Service Times for the Reactor Protection Instrumentation System," (Letter OG-86, dated February 3, 1983) as the first step in gaining approval of the instrumentation program. WCAP-10271 documents the justification for revisions to plant-specific Technical Specifications. The justification consists of the deterministic and numerical evaluation of the effects of particular Technical Specification changes with consideration given to safety, equipment requirements, human factors, and operational impact. The objective of the methodology is to reach a balance in which safety and operability are ensured. The Technical Specification revisions evaluated were increased allowed outage time for test and maintenance activities, less frequent surveillance testing, and testing of instrumentation in the bypass configuration.

In July 1983, the NRC requested additional information from the WOG (letter to J. J. Shepard from Cecil O. Thomas, dated July 28, 1983). The WOG responded in October 1983 (Letter OG-106, dated October 4, 1983) with responses to the NRC's concerns in Supplement 1 to WCAP-10271 which contains information in addition to that in WCAP-10271. Specifically, Supplement 1 demonstrates the applicability of WCAP-10271 to the Reactor Trip System (RTS) for four-loop plants with solid-state logic. Additionally, this supplement extends the evaluation to topics not addressed in the original WCAP, such as the interdependence of surveillance intervals and hardware failure rates.

In February 1985, the NRC issued the Safety Evaluation Report (SER) for WCAP-10271 and Supplement 1 (Letter to J. J. Shepard from C. O. Thomas, dated February 21, 1985). The SER approved quarterly testing on a staggered test basis, 6 hours to place a failed channel in a tripped mode, increased Allowed Outage Times (AOTs) for test and maintenance, and testing in bypass for analog channels of the RTS.

The changes to Technical Specification Tables 3.3-1 and 4.3-1 to increase the AOT for the RTS analog channels and to extend the STI for the analog channel operational tests were implemented in the Seabrook Station Technical Specifications issued with Facility Operating License NPF-86. These changes were in accordance with WCAP-10271 and Supplement 1.

The SER specifically required that, for analog channels shared by the RTS and ESFAS, the approved relaxations applied only to the RTS function. In July 1985, the NRC Staff provided comments on the draft "Guidelines for Preparing Submittals Requesting Revision of Reactor Protection System Technical Specification," (Letter to L. D. Butterfield from H. R. Denton,

dated July 24, 1985). In Enclosure 3 of the letter the NRC Staff provided a broader relaxation of the surveillance for shared components, subject to proper annotation of the surveillance requirements.

On March 20, 1986, the WOG submitted WCAP-10271, Supplement 2, "Evaluation of Surveillance Frequencies and Out of Service Times for the Engineered Safety Systems Actuation System." In May 1987, the WOG submitted WCAP-10271, Supplement 2, Revision 1 (Letter OG-87-15 to R. W. Starosticki from R. A. Newton, dated May 12, 1987). Supplement 2 and Supplement 2, Revision 1, specifically demonstrated the applicability of WCAP-10271 to the Engineered Safety Feature Actuation System (ESFAS) for four-loop plants with solid-state protection systems. Appendix D of WCAP-10271, Supplement 2, Revision 1, presented the results of the evaluation for extending the AOTs for the test and maintenance of the reactor trip breakers and the related logic cabinets.

In February 1989, the NRC issued the SER for WCAP-10271, Supplement 2 and Supplement 2, Revision 1 (Letter to R. A. Newton from C. E. Rossi, dated February 22, 1989). The SER approved quarterly testing, 6 hours to place a failed channel in a tripped mode, increased AOT for test and maintenance, and testing in bypass for analog channels of the ESFAS. The ESFAS functions approved in the SER were those presented in Appendix A1 of the reference WCAPS. These functions are all included in the Westinghouse Standard Technical Specifications (WSTS). Staggered testing was not required for ESFAS analog channels, and the requirement was removed from the RTS analog channels.

In April 1990, the NRC issued a Supplemental SER (SSER) for WCAP-10271, Supplement 2 and Supplement 2, Revision 1 (Letter to G. T. Goering from C. E. Rossi, dated April 30, 1990). The SSER approved STI and AOT extensions for the ESFAS functions that were included in Appendix A2 of WCAP-10271, Supplement 2, Revision 1. The functions approved are associated with the Safety Injection, Steam Line Isolation, Main Feedwater Isolation, and Auxiliary Feedwater Pump Start signals. The configurations contained in Appendix A2 are those that are not contained in the Westinghouse Standard Technical Specifications. The SSER also approved the extended AOTs for the RTS actuation logic that were requested in WCAP-10271, Supplement 2, Revision 1, Appendix D. No changes were approved for the test and maintenance AOTs for the reactor trip breakers.

With the issuance of the ESFAS SER and SSER, the relaxations for the analog channels of the RTS and ESFAS are now the same, and the special conditions applied to shared analog channels are no longer applicable. The AOTs for test and maintenance of RTS and ESFAS actuation logic are also now the same.

Increasing the STI for the RTS and ESFAS instrumentation results in less frequent surveillance testing and minimizes the potential number of inadvertent ESFAS actuations and reactor trips during surveillance testing. Less frequent surveillance testing has been estimated by the NRC Staff and the WOG to result in an average of 0.5 fewer inadvertent reactor trips, per unit, per year. Also, increasing the STI enhances the operational effectiveness of plant personnel. The amount of time plant personnel spend performing surveillance testing will be reduced. This allows manpower to be used for other tasks such as additional preventative maintenance. The increased AOT results in fewer human factor errors, since more time is allowed to perform an action.

WCAP-10271 results show that the reduction in testing and the increase in testing and maintenance AOTs do not adversely affect public health and safety. The results of the Seabrook Station specific evaluations for Functional Units 6.b, Feedwater Isolation on Low

RCS Tavg Coincident with a Reactor Trip, and 8.b., Automatic Opening of Containment Sump Suction isolation valves on RWST Level Low-Low also supports this conclusion. The proposed revision will reduce the number of ESFAS actuations and reactor trips and allow North Atlantic to better manage resources to maintain the plant.

No plant modifications are required to implement the items requested in this LAR. The increased AOT and testing in the bypass mode will be accomplished with the present plant configuration. At present, only the Containment Pressure Hi-3 analog instrumentation channels have bypass testing capability. All other analog instrumentation channel associated with the RTS or ESFAS are tested in the tripped condition.

ACTION statements for the RTS and ESFAS permit short term bypassing of an inoperable channel to test an operable channel. It will be necessary to use temporary modifications to allow the inoperable channel to be bypassed while testing an operable channel. The temporary modifications may include lifted leads or temporary jumpers that will be procedurally controlled. When the testing the operable channel is completed, the inoperable channel will be returned to the tripped condition.

Plant modifications will be required in the future if North Atlantic does elect to test additional analog instrumentation channels in the bypassed condition. Any future bypass testing on the channels addressed by this revision would be accomplished without reliance upon lifted leads or temporary jumpers and will provide bypass status indications to the plant operators in the control room.

#### B. Seabrook Station Specific Evaluation

A Functional Unit that is not included in the WCAP-10271 program but is implemented in the ESFAS at Seabrook Station is Functional Unit 6.b, Feedwater Isolation on Low RCS Tavg Coincident with Reactor Trip. North Atlantic has performed a qualitative Seabrook Station specific evaluation of this Functional Unit that demonstrates that the unavailability and risks associated with increased AOT and STIs for this Functional Unit are equivalent to, or less than those of other Functional Units included in WCAP-10271. The documents which form the basis for the Seabrook Station specific evaluation are listed in Section VIII and are available for NRC review at Seabrook Station.

Feedwater isolation occurs when the two-out-of-four RCS Tavg Low signal is received coincident with a Reactor Trip (P-4) signal. By comparison of circuit design, it can be determined that the unavailability of the two-out-of-four logic circuit for the Tavg Low signal at Seabrook Station is similar to the two-out-of-four Tavg Low-Low signal coincident with one-out-of-two steam flow high evaluated for the SI signal in WCAP-10271. The Tavg Low and Tavg Low-Low signals are developed from the same temperature loops and use two-out-of-four logic in the Solid State Protection System (SSPS). The feedwater isolation on low RCS Tavg coincident with reactor trip function uses 1 master relay and 3 slave output relays. The safety injection function uses 2 master relays and 6 slave relays. Since the dominant contribution to the unavailability of the ESFAS signals is common cause failure of the master and slave relays and since unavailability is a function of the number of master and slave relays, the unavailability of the RCS low Tavg circuitry is bounded by the SI signal unavailability.

WCAP-10271 demonstrates that use of the proposed optimized ESFAS Technical Specifications does not result in any significant increase in SI signal unavailability or cause significant increase in risk to the public. Therefore, any increase in unavailability of

feedwater isolation on low RCS Tavg coincident with reactor trip resulting from implementation of the proposed Technical Specification changes is acceptable since it is dominated by the previously reviewed and approved SI signal unavailability.

In addition, Westinghouse has determined that the feedwater isolation on low RCS Tavg coincident with reactor trip function is not credited in any safety analysis (WCAP-13181, "RTD Bypass Elimination Licensing Report", forwarded by Letter NYN-92035, dated March 20, 1992 as part of the RTD Bypass Elimination License Amendment Request). Since it is not credited in any safety analysis it would not be credited in the risk analysis, therefore, change in unavailability does not have to be considered and the function could be deleted from the Technical Specifications. North Atlantic will pursue removal of the feedwater isolation on low RCS Tavg coincident with reactor trip function from the Technical Specifications in a future LAR as it is not addressed by WCAP-10271.

The Millstone 3 Nuclear Power Plant has a feedwater isolation on low Tavg coincident with a reactor trip which is similar to the design at Seabrook Station. Changes similar to those proposed by this License Amendment Request were approved by the NRC for Millstone Unit 3 in Amendment 70 to Facility Operating License NPF-49, which was issued on November 23, 1992.

Another Functional Unit that is not included in the WCAP-10271 program but is implemented in the ESFAS at Seabrook Station is Functional Unit 8.b, Automatic Switchover to Containment Sump on Refueling Water Storage Tank (RWST) Level Low-Low coincident with Safety Injection. North Atlantic has performed a qualitative Seabrook Station specific evaluation of this Functional Unit that demonstrates that the unavailability and risks associated with increased AOT and STIs for this Functional Unit are equivalent to, or less than, those of other Functional Units evaluated in WCAP-10271. The documents which form the basis for this Seabrook Station specific evaluation are listed in Section VIII and are available for NRC review at Seabrook Station.

Actuation of the automatic switchover from the RWST to containment sump occurs when the two-out-of-four RWST level Low-Low signal is received coincident with a Safety Injection (SI) signal. By comparison of circuit design, it can be determined that the unavailability of the two-out-of-four logic circuit for the RWST Level Low-Low signal is similar to that of the Auxiliary Feedwater (AFW) pump start signal developed by two-out-of-four Steam Generator (S/G) Water Level Low-Low in one generator. The RWST and S/G level signals are developed from differential pressure type level transmitters, use two-out-of-four logic in the Solid State Protection System (SSPS), and have a similar number of master and slave output relays.

As demonstrated in WCAP-10271, Supplement 2, Revision 1, the unavailability of the AFW pump start signal is approximately a factor of 2 less than the unavailability calculated for the SI signal. Thus, the increase in STI and AOT for the RWST level signal coincident with SI would have a small impact on ESFAS unavailability.

In addition, the risk results in WCAP-10271, Supplement 2, Revision 1, are based on manual sump switchover. The automatic switchover at Seabrook Station is an enhancement to the operator action (i.e., the emergency procedures specify operator action as a backup to the automatic signal). The overall impact of the automatic switchover on risk is to decrease the core damage frequency as compared to the generic analysis.

WCAP-10271 demonstrates that use of the proposed optimized ESFAS Technical Specifications does not result in any significant increase in SI signal unavailability or cause significant increase in risk to the public. Therefore, any increase in unavailability of the automatic switchover from the RWST to containment sump resulting from implementation of the proposed Technical Specification changes is acceptable since it is dominated by the previously reviewed and approved SI signal unavailability.

The Wolf Creek Generating Station has an automatic switchover from the RWST to the containment sump which is similar to the design at Seabrook Station. Changes similar to those proposed by this License Amendment Request were approved by the NRC for Wolf Creek in Amendment 43 to Facility Operating License NPF-42, which was issued on March 29, 1991.

### C. Conclusion

In WCAP-10271 and its supplements, the WOG evaluated the impact of the proposed STI and AOT changes on core damage frequency and public risk. The NRC Staff concluded in its evaluation of the WOG evaluation that an overall upper bound increase of the core damage frequency due to the proposed STI and AOT changes is less than 6 percent for Westinghouse Pressurized Water Reactor (PWR) plants. The NRC Staff also concluded that actual core damage frequency for individual plants is expected to increase by substantially less than 6 percent. The NRC Staff considered this core damage frequency increase to be small compared to the range of uncertainty in the core damage frequency analyses and, therefore, acceptable.

The NRC Staff concluded, in addition, that a staggered test strategy need not be implemented for ESFAS analog channel testing and is no longer required for RTS analog channel testing. This conclusion was based on the small relative contribution of the analog channels to RTS and ESFAS unavailability, process parameter signal diversity and normal operational testing sequencing.

The changes proposed by LAR 93-04 are consistent with the NRC Staff's Safety Evaluation Reports dated February 21, 1985, February 22, 1989, and April 30, 1990, to the WOG regarding evaluation of WCAP-10271, WCAP-10271 Supplement 1, WCAP-10271 Supplement 2 and WCAP-10271 Supplement 2, Revision 1. The Staff has stated that approval of these changes is contingent upon confirmation that certain conditions are met. Although WCAP-10271 Supplement 2 and WCAP-10271 Supplement 2, Revision 1, apply to the ESFAS instrumentation, it is North Atlantic's interpretation that conditions imposed in the SER for WCAP-10271 and WCAP-10271 Supplement 1 for the RTS instrumentation shall also be applied to the ESFAS where appropriate. North Atlantic's responses to these conditions is provided below.

#### 1. ESFAS SER and SSER Conditions (February 22, 1989, and April 30, 1990):

- a. SER Condition: Confirm the applicability of the generic analysis to the plant.

#### North Atlantic's Response:

The generic analyses used in WCAP-10271 and the Supplements are applicable to Seabrook Station. Seabrook Station uses the Westinghouse Process Control System and the Westinghouse Solid State Protection System for both the ESFAS and RTS. Both of these systems were specifically modelled in the generic analyses. With the exception of Functional

Unit 6.b, Feedwater Isolation on Low RCS Tavg Coincident with Reactor Trip and Functional Unit 8.b, Automatic Switchover to the Containment Sump, the ESFAS functional units implemented at Seabrook Station are addressed by the generic analyses and the example changes to the Technical Specifications. Seabrook Station specific qualitative evaluations of Functional Unit 6.b and Functional Unit 8.b were performed to justify the changes associated with the feedwater isolation and automatic switchover to the containment sump. It has been determined that any increase in the unavailability of these Functional Units due to the change in STI and AOT for the RCS Tavg Low and RWST Level Low-Low signal is acceptable since the unavailability of these functions is dominated by the previously reviewed and approved Safety Injection signal unavailability. The documents which form the basis for the Seabrook Station specific analysis are listed in Section VIII and are available for NRC review at Seabrook Station.

b. SER Condition:

Confirm that any increase in instrument drift due to the extended STIs is properly accounted for in the setpoint calculation methodology.

North Atlantic Response:

Instrumentation calibration and operational surveillance records for 1991 and 1992 for ESFAS and RTS instrumentation have been reviewed. This review included 15 RTS instrument loops that have ACOTs with quarterly STIs.

This review followed the guidelines provided in the letter from C.E. Rossi (NRC) to R.F. Janecek (BWR Owners Group), dated April 27, 1988, "Staff Guidance for License Determination that the Drift Characteristics for Instrumentation used in RPS Channels are Bounded by NEDC-30851P Assumptions when the Functional Test Interval is Extended from Monthly to Quarterly".

This review confirmed that the ESFAS instrument drift assumptions in the Seabrook Station setpoint calculations remain valid when the ESFAS ACOT STI is changed from monthly to quarterly. The documents which form the basis for the Seabrook Station specific analysis are listed in Section VIII and are available for NRC review at Seabrook Station.

Future calibrations will be reviewed for excessive drift as part of the failure evaluations discussed in Item 2.b below.

2. RTS SER Conditions (February 21, 1985):

a. SEP condition:

Approval of an increase in STI for the analog channel operational tests from once per month to once per quarter is contingent on performance of the testing on a staggered test basis.

North Atlantic Response:

In the ESFAS SER dated February 22, 1989, this provision was not required for ESFAS channels and the requirement was removed from the RTS channels. The proposed changes remove the staggered testing requirement from the RTS analog channel operational tests.

b. SER Condition:

Approval of items related to extending STIs is contingent upon procedures being in place to require evaluation of RTS channel failures for common cause and to require additional testing if necessary.

North Atlantic Response:

North Atlantic has procedures and procedural steps to evaluate failures for common cause and require additional testing as necessary. These procedures are being enhanced to incorporate the recommendations provided in "Westinghouse Owners Group Guidelines for Preparing Submittals Requesting Revision of Reactor Protection System Technical Specification Based on Generic Approval of WCAP-10271 and Supplements". The enhanced procedures will be in-place prior to implementation of this License Amendment Request.

c. SER Condition:

Approval of channel testing in a bypassed condition is contingent on the capability of the RTS design to allow such testing without lifting leads or installing temporary jumpers.

North Atlantic Response:

Seabrook Station presently does not have bypass testing capability for any of the analog instrumentation associated with the RTS or ESFAS with the exception of the Containment Pressure High-3 channels. Plant modifications will be required in the future if North Atlantic does elect to test other channels in bypass. Any future bypass testing will be accomplished without reliance upon lifted leads or temporary jumpers and will provide bypass status indications to the plant operators in the control room.

However, the Technical Specification ACTION statements for the RTS and ESFAS permit short term bypassing of an inoperable channel to test an operable channel. It will be necessary to use temporary modifications to allow the inoperable channel to be bypassed while testing an operable channel. The temporary modifications may include lifted leads or temporary jumpers that will be procedurally controlled. When the testing is completed, the inoperable channel will be returned to the tripped condition.

Any future design to permit bypass testing will be reviewed in accordance with 10CFR50.59.

d. SER Condition:

For channels which provide dual inputs to other safety-related systems, such as ESFAS, the approval of items that extend STIs and AOTs applies only to the RTS function.

North Atlantic Response:

The ESFAS SER dated February 22, 1989, approves STI and AOT extensions for the ESFAS analog channels that are the same as the RTS channels. The notes added at the time the RTS relaxations were implemented at Seabrook Station addressing the above condition are being removed as part of this License Amendment Request.

e. SER Condition:

Same as ESFAS SER Condition 1.b above.

North Atlantic Response:

The response is as provided for ESFAS SER Condition 1.b.

In conclusion, based on the NRC evaluations of WCAP-10271 and its supplements and the discussion of the various SER conditions above, there is reasonable assurance that the proposed changes will not adversely affect or endanger the health and safety of the general public.

D. Description of Proposed Changes

The following changes are proposed to the Technical Specifications and their Bases:

1. Table 3.3-1, Functional Units 9, 10, and 13, and Page 3/4 3-5. Note (1), currently refers to ESFAS ACTION statements for channels that provide input to both the RTS and ESFAS, is deleted. The note was required because the ESFAS Allowed Outage Times (AOT) were more restrictive. This note is no longer required as the AOT for the RTS and ESFAS functions are proposed to be the same.
2. Table 3.3-1, Functional Units 11, 12.a, 12.b, and 16.a. These functional units are changed from ACTION 7 to ACTION 6 to reflect full implementation of WCAP-10271.
3. Page 3/4 3-6, ACTION 7. The existing wording is deleted because this ACTION statement is no longer required. New wording provides the revised ACTION statement for Functional Units 17 and 20 because ACTION 9 is still required for Functional Unit 19.
4. Table 3.3-1, Functional Units 17 and 20. These functional units are changed from ACTION 9 to new ACTION 7 to reflect full implementation of WCAP-10271.
5. Table 4.3-1, Functional Units 2.a, 3, 4, and 6 through 15, and Page 3/4 3-13. Notes (16) and (17) are deleted because full implementation of WCAP-10271 deletes the requirement for staggered testing and provides the same requirements for RTS and ESFAS functional units that are provided with input from the same instrument channel.
6. Table 3.3-3, Functional Units 1.c, 1.e, 4.c, 4.d, and 4.e. These functional units are changed from ACTION 14 to ACTION 18 to reflect full implementation of WCAP-10271.
7. Page 3/4 3-22, ACTION 14. The existing wording is deleted because this ACTION statement is no longer required. A new ACTION 14 is provided with wording based on the existing ACTION 18. The AOT to place the undervoltage relay in trip has been changed from one to six hours as provided in WCAP-10271.
8. Table 3.3-3, Functional Units 9.a and 9.b. ACTION 18 is changed to the new ACTION 14.

9. Page 3/4 3-22 and 3/4 3-23, ACTIONS 13, 15, 18, 20, and 22. These ACTIONS are revised to reflect the additional time permissible to bypass, trip, and restore a channel as justified by WCAP-10271. Wording changes are made to conform with the wording in WCAP-10271.
10. Table 4.3-2, Functional Units I.c, I.d, I.e, 2.c, 3.b.3, 4.c, 4.d, 4.e, 5.b, 6.a, 6.b, 7.c, 8.b, 10.a, and 10.c. The Analog Channel Operational Test (ACOT) interval is changed from Monthly (M) to Quarterly (Q) per WCAP-10271.
11. Page B 3/4 3-1. The note regarding postponement of quarterly RTS testing is deleted because it is no longer required. The listing of the NRC SERs is updated.

II. Markup of Proposed Changes

See attached markup of proposed changes to Technical Specifications.